1047 Richmond Road

TIA Report

July 2023

1047 Richmond Road

TIA Report

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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 Ottawa this 30 day of June 2023.
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Signature of Individual certifier that s/he meets the above four criteria

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TIA REPORT

Parsons has been retained by Fengate Capital Management Ltd. to prepare a TIA in support of a Zoning By-Law Amendment (ZBLA) and Official Plan Amendment (OPA) Application for a proposed residential development at 1047 Richmond Rd. This document follows the TIA process as outlined in the City of Ottawa's Transportation Impact Assessment (TIA) Guidelines (2017). The following report represents Step 5 – TIA Report.

1.0 SCREENING FORM

The Screening Form confirmed the need for a TIA Report based on the Trip Generation, Location and Safety triggers. The Trip Generation trigger was met as the development is anticipated to generate more than 60 person trips during peak hours. The Location trigger was met due to the location of the proposed development site in both a Transit-Oriented Development (TOD) zone and a Design Priority Area (DPA) and the designation of Richmond Rd as a Spine Route. The Safety trigger is met due to the proximity of the proposed access within 150m of the signalized Richmond/New Orchard intersection. The Screening Form has been provided in **Appendix A** along with responses to the latest City comments.

2.0 SCOPING REPORT

2.1. Existing and Planned Conditions

2.1.1. Proposed Development

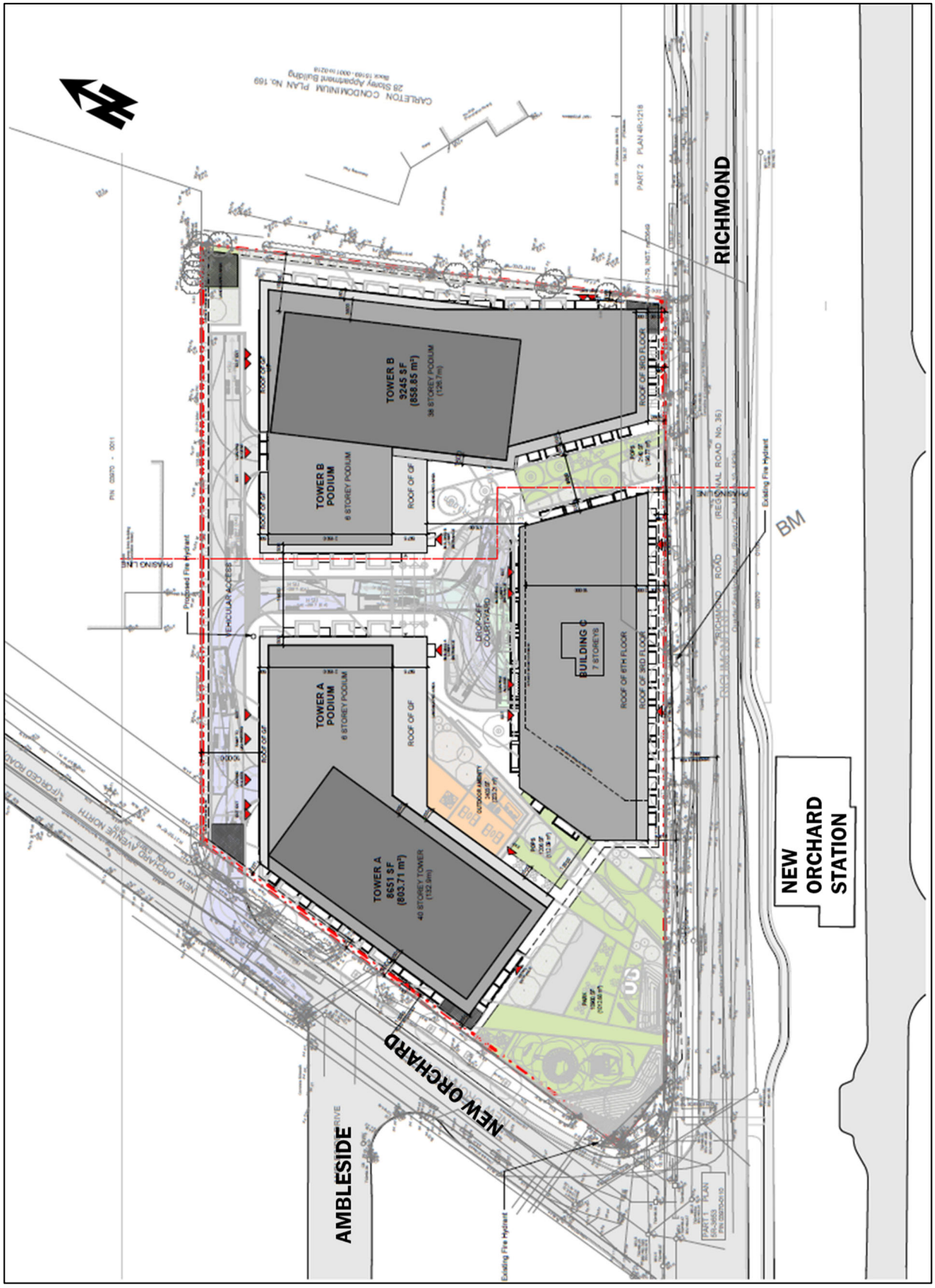
The proposed development is located at the municipal address of 1047 Richmond Rd. The site is currently occupied by a car dealership, which will be replaced by three proposed residential towers that are 6 to 40-storeys high. The buildings will consist of approximately 1,152 apartment units, along with approximately 859 m^2 (9,247 ft^2) of first floor retail. Additionally, the development is proposed to provide three truck loading areas, an underground parking garage and a park approximately 1,013 m^2 (10,900 ft^2).

A single access to New Orchard Ave N is provided at the north end of the site. Internally, the driveway provides access to the underground parking garage, three truck loading areas and a drop-off courtyard.

The full buildout of the development is estimated to be 2026. The site is currently zoned as Traditional Mainstreet TM[2494] H(25). The local context of the site is illustrated in **Figure 1**, while the concept plan for the proposed development is provided in **Figure 2** (high quality plan provided in **Appendix A**).

Figure 1: Local Context

Figure 2: Proposed Concept Plan



2.1.2. Existing Conditions

Area Road Network

Description of roads included within the study area has been provided below.

Richmond Rd is an east-west municipal arterial road that extends from Baseline Rd in the west (where it continues west as Robertson Rd) to Island Park Dr in the east (where it continues east as Wellington St W). Within the study area, the roadway consists of a two-lane cross-section, with sidewalks on both sides of the road. Bike lanes are provided west of New Orchard Ave N. The posted speed limit is 50 km/h.

Ambleside Dr is a short east-west municipal local road providing access to residential buildings, extending from New Orchard Ave N to McEwen Ave. The roadway consists of a two-lane cross-section, with on-street parking on the south side and a sidewalk on the north side. The speed limit is assumed to be 50 km/h.

New Orchard Ave N is a short (dead-end) north-south municipal local road providing access to the car dealership, a nursing home and low to high-rise residential units. The road extends from Richmond Rd to a cul-de-sac 200m north. The roadway consists of a two-lane cross-section and a sidewalk on the west side, with on-street parking permitted on both sides north of Ambleside Dr. The cul-de-sac at the north end provides access to a series of pathways along Sir John A. Macdonald Pkwy. The speed limit is assumed to be 50 km/h.

McEwen Ave is a short (dead-end) north-south municipal local road providing access to residential buildings. The road extends from Richmond Rd to Ambleside Dr, where it turns left and ends at a cul-de-sac. The road consists of a two-lane cross-section, with sidewalks provided on both sides along most sections and on-street parking permitted on the west side near the north end. Similar to New Orchard Ave N, the cul-de-sac at the north end provides access to a series of pathways along Sir John A. Macdonald Pkwy. The speed limit is assumed to be 50 km/h.

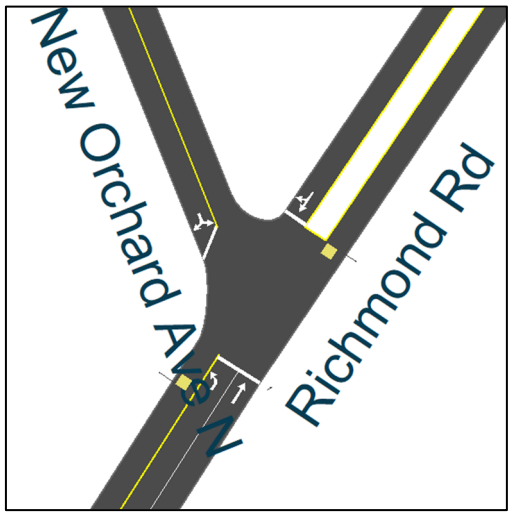
Woodroffe Ave is a north-south municipal arterial roadway that extends from Sir John A. Macdonald Pkwy in the north to south of Cortleigh Dr and Castlestone Way in the south. Within the study area, the roadway consists of a two-lane cross-section, with sidewalks on both sides of the road. The posted speed limit along Woodroffe Ave is 50 km/h.

Existing Study Area Intersections

Richmond/New Orchard

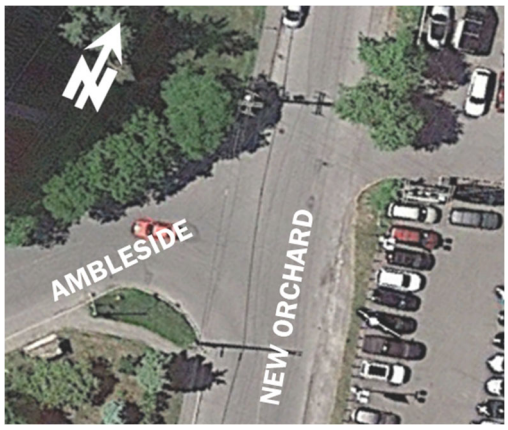
The Richmond/New Orchard intersection is a signalized three-legged “T” intersection. Prior to the ongoing closure of the west leg due to construction, the intersection consisted of the configuration shown.

The eastbound approach consists of a through lane and an auxiliary left-turn lane. The westbound and southbound approaches consist of an all-movement lane. Painted zebra crosswalks are provided on all legs of the intersection. Existing bike lanes have been removed recently to provide space for LRT construction. There are no prohibited movements at the intersection.



Ambleside/New Orchard

The Ambleside/New Orchard intersection is an unsignalized three-legged intersection, with stop control on the eastbound approach only. All approaches of the intersection consist of a single all-movement lane. On the east side, there is a driveway access to the car dealership. No dedicated pedestrian crossings are provided at the intersection.



Richmond/McEwen/Edgeworth

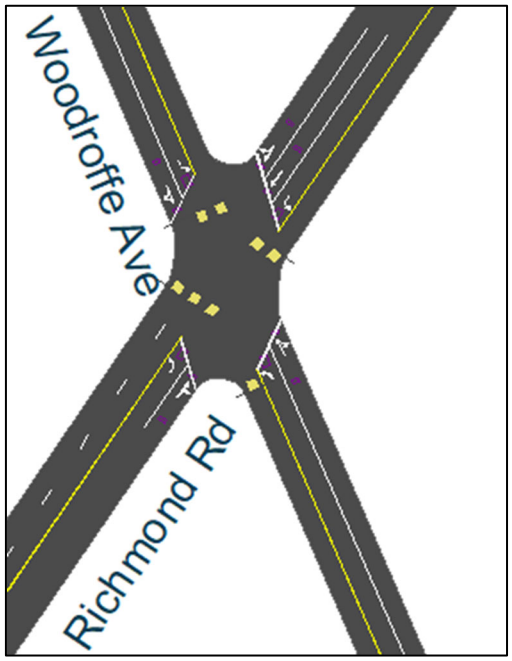
The Richmond/McEwen/Edgeworth intersection is a signalized three-legged "T" intersection. Prior to the ongoing closure of the east leg due to construction, the intersection consisted of the configuration shown.

The eastbound and westbound approaches consist of an all-movement lane. The southbound approach consists of a right-turn lane and an auxiliary left-turn lane. At the northbound approach, Edgeworth Ave is designed as a right-turn only onto Richmond Rd. However, this movement has long been blocked off to traffic. All movements to/from Edgeworth Ave are prohibited. Bike lanes and provided on both sides of Richmond Rd and sidewalks are provided on all sides of the intersection. Painted crosswalks are provided on the north, west and south legs.

Richmond/Woodroffe

The Richmond/Woodroffe intersection is a signalized four-legged intersection. Prior to the ongoing closure of the south leg due to construction, the intersection consisted of the configuration shown.

The northbound, southbound and eastbound approaches consist of a shared through/right-turn lane and an auxiliary left-turn lane. The westbound approach consists of a through lane, an auxiliary right-turn lane and an auxiliary left-turn lane. Painted zebra crosswalks are provided on all legs of the intersection. There are no restricted movements at this intersection.



Existing Driveways to Adjacent Developments

A single site access is proposed off New Orchard Ave N at the north end of the site. Adjacent development accesses located within 200m of the proposed access are described below.

New Orchard Ave N Access

- On the west side of New Orchard Ave N, there is a total of 5 adjacent driveways. North of Ambleside Dr, there is an access to a high-rise residential apartment building, an access to a single residential unit and two accesses to low and mid-rise residential buildings. South of Ambleside Dr, there is an outbound driveway to a social services organization.
- On the east side of New Orchard Ave N, there are 2 adjacent driveways, which are all located north of Ambleside Dr. The two accesses are for a nursing home.

Existing Area Traffic Management Measures

Existing area traffic management measures within the study area include pedestrian advance walk phases at the Richmond/New Orchard intersection, along with zebra crosswalks at signalized intersections.

Pedestrian/Cycling Network

The active transportation network facilities for pedestrians and cyclists are illustrated in **Figure 3**. As shown, sidewalk facilities are provided on the north side of Ambleside Dr, the west side of New Orchard Ave N, and the north side and some sections on the south side of Richmond Rd. Sidewalks are also provided on both sides of McEwen Ave and Woodroffe Ave.

A Pedestrian Crossover was recently constructed on Richmond Rd, approximately 200m west of New Orchard Ave N.

For both pedestrian and cyclist usage, major Multi-Use Pathways (MUP) are provided north of the site and run along both sides of Sir John A. Macdonald Pkwy. The MUP is designated as a major pathway in the City of Ottawa Official Plan (OP). An underpass is available through the New Orchard Ave N cul-de-sac to access the MUP on the north side of Sir John A. Macdonald Pkwy. A MUP is also available on the south side of Richmond Rd, east of New Orchard Ave N.

Based on the City of Ottawa TMP, Richmond Rd is classified as a Crosstown Bikeway in the city's urban cycling network. Bike lanes are currently provided along both sides of Richmond Rd from New Orchard Ave N to Carling Ave.

Transit Network

The following description of OC Transpo routes within the study area reflect the current bus operations:

- **Route #11 (Parliament <-> Bayshore):** identified by OC Transpo as a "Frequent Route", this route operates all day, 7 days a week and at an average rate of every 15 minutes during weekday peak hours. The nearest bus stop to the site is at the intersection of Richmond/New Orchard.
- **Route #87 (Tunney's Pasture <-> Baseline):** identified by OC Transpo as a "Frequent Route", this route operates all day, 7 days a week and at an average rate of every 15-to-30 minutes during weekday peak hours. The nearest bus stop to the site is within 600m at the intersection of Woodroffe/Richmond.
- **Route #153 (Tunney's Pasture <-> Lincoln Fields)**: identified by OC Transpo as a "Local Route", this route operates with a custom routing to local destinations. The nearest bus stops to the site are at the intersections of Ambleside/New Orchard and Richmond/New Orchard.

The transit network for the study area is illustrated in **Figure 4** and the transit route maps are provided in **Appendix B**. **Figure 5** illustrates the bus stop locations.

Figure 3: Study Area Active Transportation Facilities

Figure 4: Area Transit Network

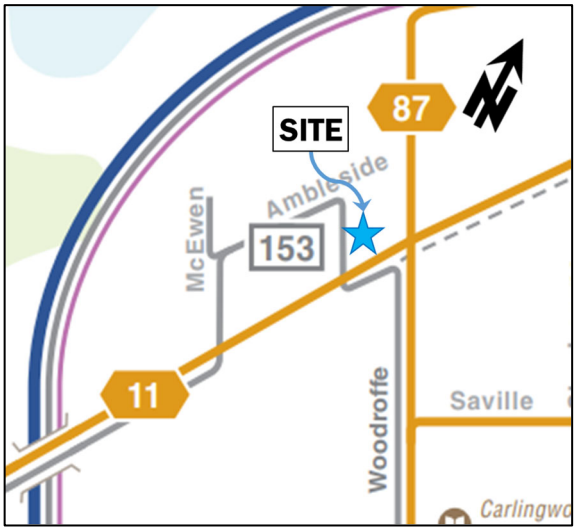
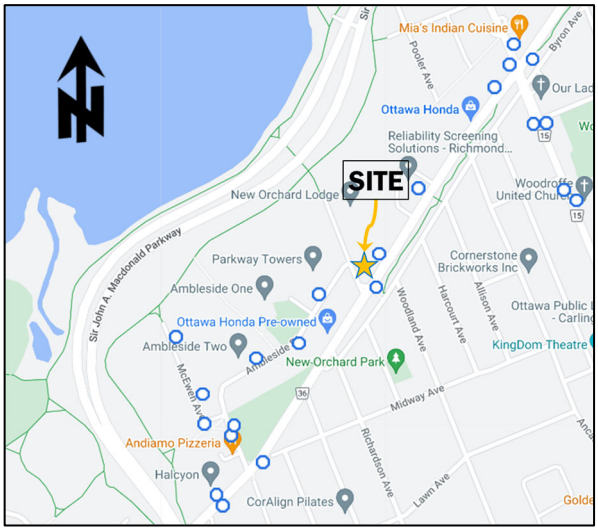


Figure 5: Bus Stop Locations



Peak Hour Travel Demands

The existing peak hour traffic volumes at the signalized intersections within the study area were obtained from the City of Ottawa for the following intersections:

- Richmond/McEwen – Conducted Thursday, August 25, 2016
- Richmond/New Orchard – Conducted Thursday, August 25, 2016
- Richmond/Woodroffe – Conducted Thursday, December 01, 2016

Counts were conducted separately at the intersection of Ambleside/New Orchard on Wednesday, August 11, 2021.

The vehicle volumes at study area intersections are shown in **Figure 6**, with raw traffic count data provided in **Appendix C**. Pedestrian and cyclist volumes at the intersection of Richmond/New Orchard are shown in **Figure 7**.

Figure 6: Existing Peak Hour Traffic Volumes

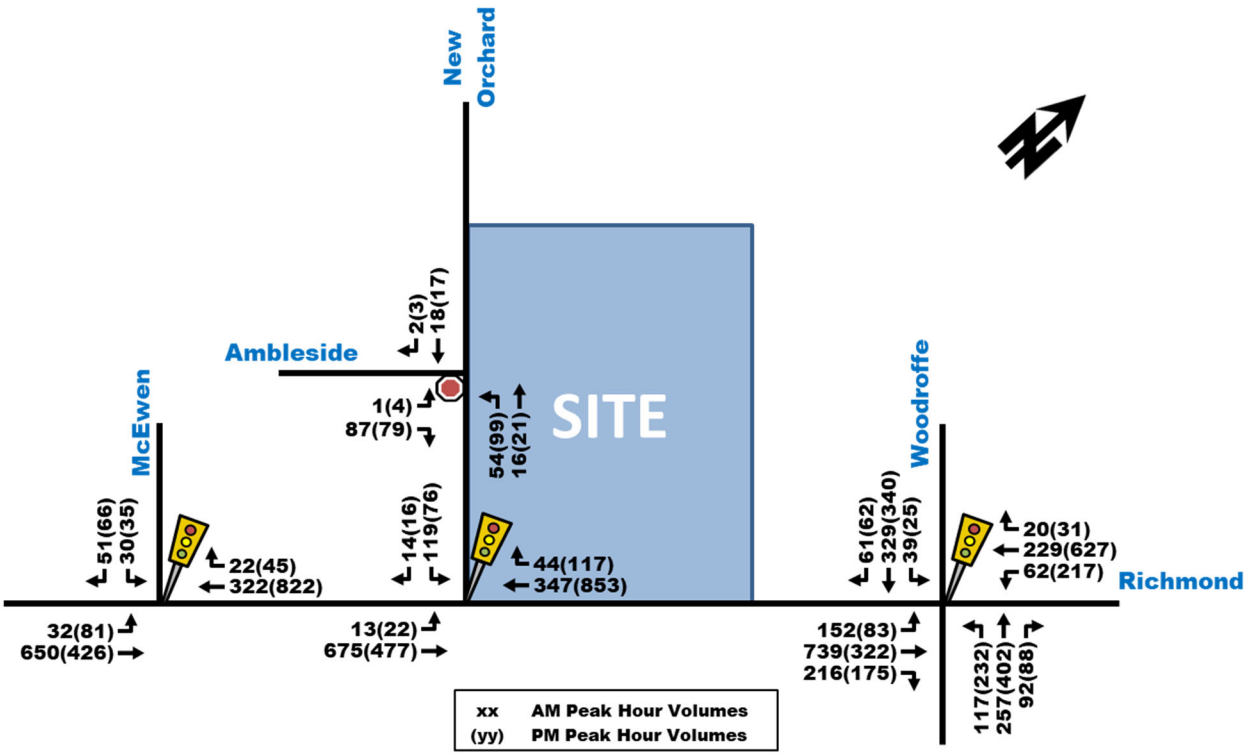
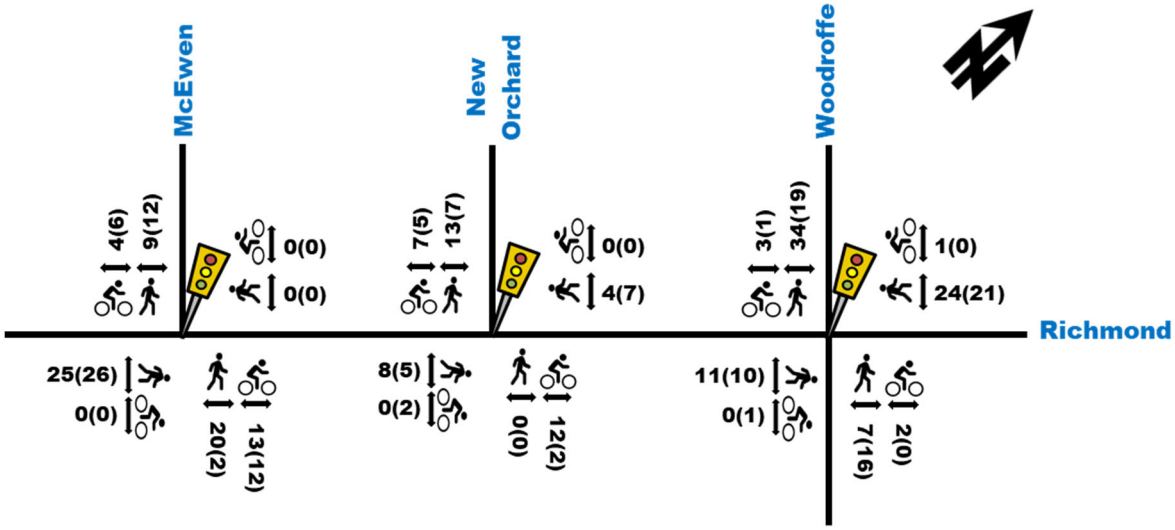


Figure 7: Existing Peak Hour AT Volumes at Richmond/New Orchard



Existing Road Safety Conditions

A five-year collision history data (2015-2019, inclusive) was reviewed using the Open Ottawa webpage from the City of Ottawa. Data for all intersections and road segments within the study area was obtained. It was determined that a total of 73 collisions have occurred at intersections and road segments within the study area. Of the 73 collisions, 26 resulted from rear ends, 17 from turning movements, 13 from angled collisions, 7 from single vehicle (unattended), 3 from single vehicle (other), 3 from sideswipes, 1 from approaching and 2 from "other". Furthermore, 57 (78%) collisions representing the majority of collisions, resulted in property damage only, while 16 (22%) resulted in non-fatal injuries.

A standard unit of measure for assessing collisions at an intersection is based on the number of collisions per million entering vehicles (MEV). Intersections with a ratio of 1.0 Collisions/MEV or greater are considered to be at a higher risk for collisions. Based on the City of Ottawa TIA Guidelines (2017), a collision pattern is characterized as a sequence of more than six collisions of the same impact type occurring for a specific movement within a five-year period.

At intersections within the study area, reported collisions have historically taken place as follows:

- 0.27 Collisions/MEV at the intersection of Richmond/New Orchard. A total of 8 collisions occurred at this intersection with no particular collision pattern observed.
- 0.25 Collisions/MEV at the intersection of Richmond/McEwen. A total of 7 collisions occurred at this intersection in the five-year period, with no particular collision patterns observed.
- 0.68 Collisions/MEV at the intersection of Richmond/Woodroffe. A total of 39 collisions occurred at this intersection in the five-year period. The only potential collision pattern at this intersection occurred in the northbound approach, where 7 rear end collisions occurred within the five-year period.
- Only 1 collision occurred at the intersection of Ambleside/New Orchard.

With regards to road segments on the development site's boundary streets, the number of collisions that have occurred in the five-year period are as follows:

- 1 collision occurred along New Orchard Ave N, between Richmond Rd and the north end.
- 13 collision occurred along Richmond Rd, between New Orchard Ave N and Woodroffe Ave.
- 4 collision occurred along Richmond Rd, between McEwen Ave and New Orchard Ave N.

With regards to active transportation (i.e. walking and biking) related collisions, the following collisions are documented out of the total 73 collisions in the study area:

- 1 bicycle collision at the intersection of Richmond/New Orchard and 1 at the intersection of Richmond/Woodroffe, both of which resulted in a non-fatal injury.
- 1 pedestrian collision at the intersection of Richmond/McEwen and 2 at the intersection of Richmond/Woodroffe, all of which resulted in a non-fatal injury. Also, 3 pedestrian collisions occurred along Richmond Rd, between New Orchard Ave N and Woodroffe Ave, which resulted in a non-fatal injury.

Since the preparation of this section, 2020 data has also become available on the Open Ottawa webpage, which included 4 additional collisions in the study area consisting of the following:

- 1 vehicle collision at the intersection of Richmond/McEwen resulting in non-fatal injury,
- 1 vehicle collision at the intersection of Richmond/Woodroffe resulting in property damage only,
- 1 vehicle collision at the intersection of Ambleside/New Orchard resulting in property damage only, and
- 1 vehicle collision along Richmond Rd, between New Orchard Ave N and Woodroffe Ave, resulting in property damage only.

Based on the data presented, there are no significant safety concerns within the study area. Note that the Protected Intersection Design Guidelines (PIDG) will be incorporated into future analysis at study area intersections (advanced pedestrian intervals, no right-turn-on-red, etc.), which will result in improvements of safety and comfort for pedestrians and cyclists and reduce potential collisions.

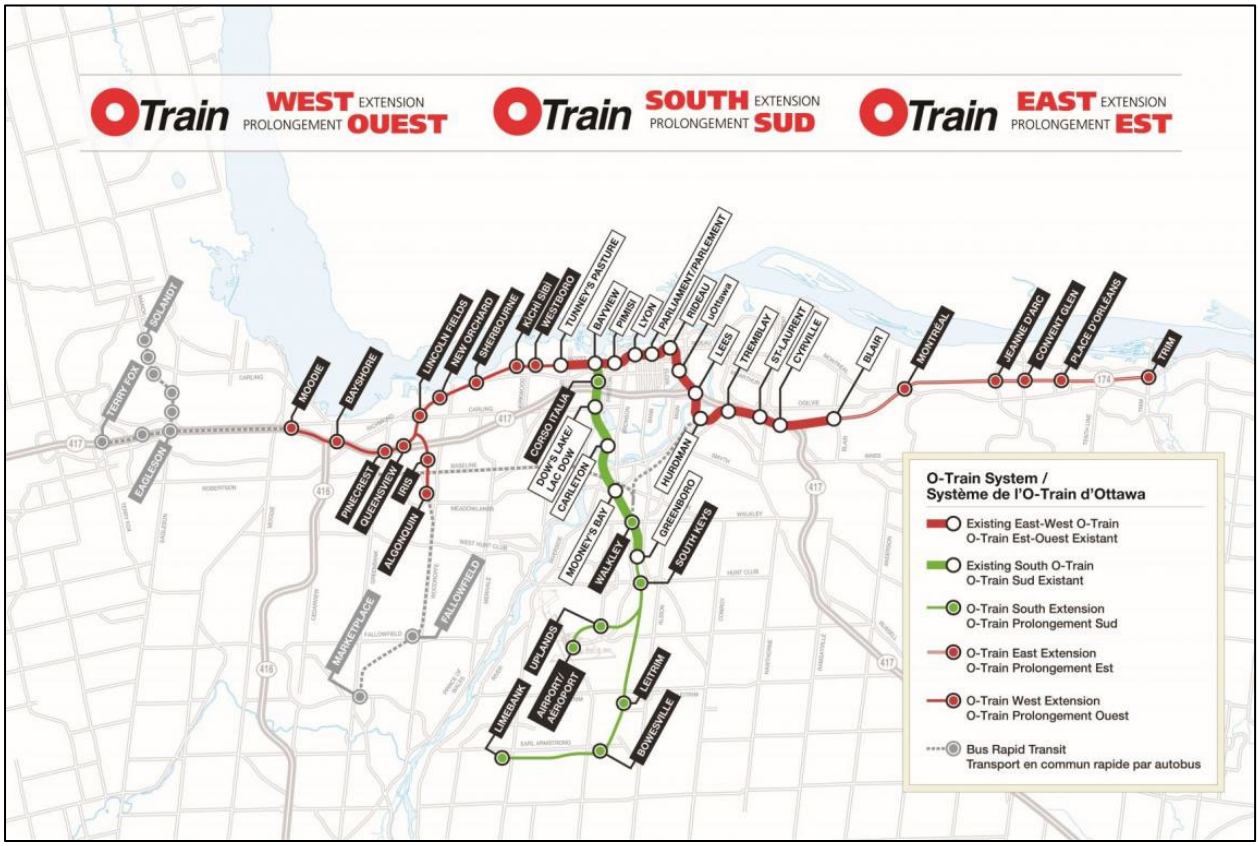
2.1.3. Planned Conditions

2.1.3.1. Future Transportation Network Changes

LRT Stage 2

The Light Rail Transit (LRT) in the City of Ottawa has entered Stage 2 of its development, which will include the extending of the LRT corridor in the west, east and south directions. The west extension will include a new station called "New Orchard" within the Byron Linear Park, which will be located within 150m walking distance of the new proposed residential building development. The west extension is expected to be completed by 2026. **Figure 8** illustrates the full expansion of the LRT Stage 2 system.

Figure 8: LRT Stage 2 Expansions Map



Future Study Area Modifications

Some modifications will be implemented to the study area as part of the LRT Stage 2 project. The designs have not been finalized and may still undergo design changes in the future. These modifications include the following:

- Along Richmond Rd, cycle tracks are anticipated to be provided on both sides of the road.
- A new concrete sidewalk will be constructed on the north side of Ambleside Dr and west side of McEwen Ave.
- The intersection of Richmond/New Orchard is expected to operate with a single all-movement lane on all approaches.
- The intersection of Richmond/Woodroffe is expected to operate with an auxiliary left-turn lane and a shared through/right-turn lane on all approaches. A channelized right-turn will be provided on the eastbound approach.
- The intersection of Richmond/McEwen will provide a single all-movement lane on the southbound and westbound approaches and a through lane with auxiliary left-turn lane on the eastbound approach.

- Bike crossings will also be provided on all approaches of the three Richmond Rd intersections at McEwen Ave, New Orchard Ave N and Woodroffe Ave. All bike crossings are expected to be unidirectional, with a bidirectional crossing at the south leg of the Woodroffe Ave intersection.

2.1.3.2. Other Area Developments

The following section outlines proposed future adjacent developments within the study area. Based on the City of Ottawa's Development Applications search tool, there are three development applications initiated near the development site.

100 New Orchard Ave N

A Zoning By-Law Amendment (ZBLA) application has been submitted for a 14-storey high-rise residential building located at 100 New Orchard Ave N. The development will consist of 84 residential units, which did not trigger the need for a TIA report. As such, the development is anticipated to generate a low traffic volume.

1071 Ambleside Dr

A Zoning By-Law Amendment (ZBLA) and Official Plan Amendment (OPA) application has been submitted for a 30-storey residential building with 293 apartment units that will be replacing a surface parking lot at 1071 Ambleside Dr. The development is anticipated to generate approximately 47 vehicle trips during peak hours by 2023 (full buildout) and 18 vehicle trips during peak hours by 2028 (i.e. post LRT west extension).

1299 Richmond Rd

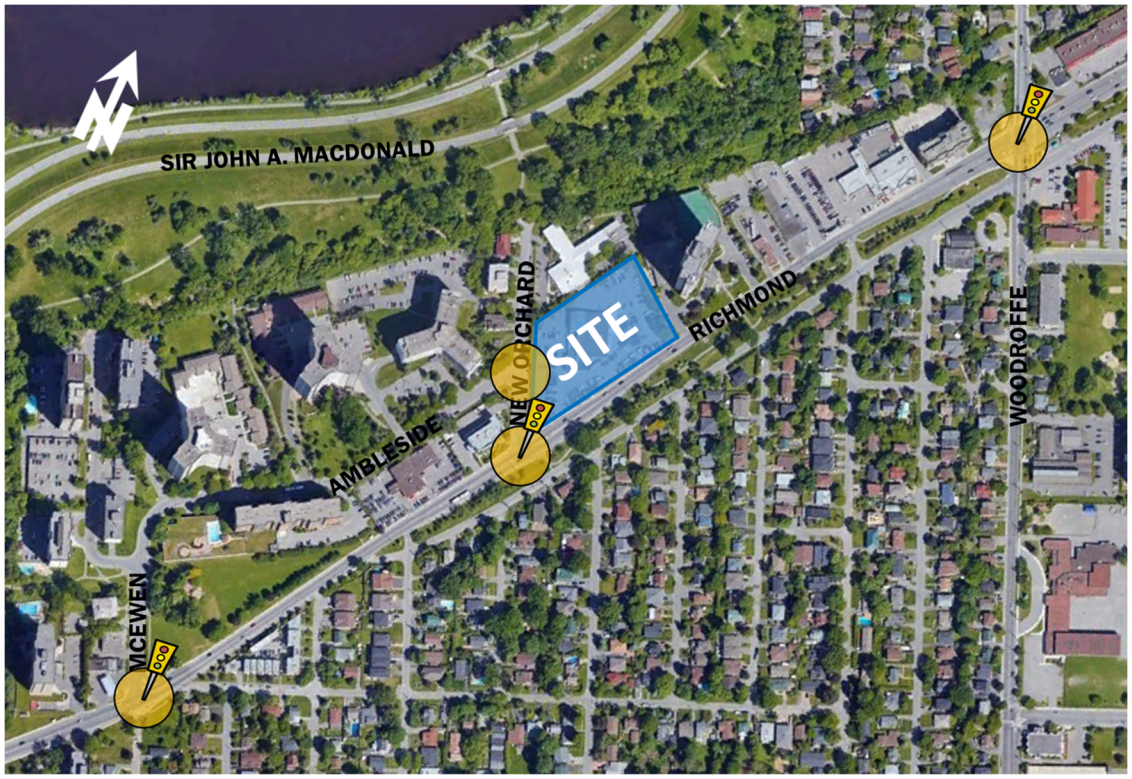
A Zoning By-Law Amendment (ZBLA) and Site Plan Control (SPC) application has been submitted for a residential tower development with a 28 and 32-storey towers. The towers will consist of 590 apartment units and 8,046 ft^2 ground floor retail space, replacing the existing commercial building. Full buildout is expected by year 2025, where the development is expected to generate up to 61 veh/h during peak hours. As this development is located outside the study limits at approximately 900m west of the proposed development, volumes generated will be considered as part of the background growth rate.

2.2. Study Area and Time Periods

The proposed development is assumed to be fully constructed by 2026. The development may be constructed in multiple phases, which will be reviewed in more detail at Site Plan Application (SPA). For the purpose of this report, horizon years 2026 and 2031 (i.e. five-years after development buildout) will be analyzed using the weekday morning and afternoon peak hour time period traffic volumes. Proposed study area intersections are outlined below and highlighted in **Figure 9**.

- Richmond/New Orchard
- Ambleside/New Orchard
- Richmond/McEwen
- Richmond/Woodroffe

Figure 9: Study Area



2.3. Exemption Review

The following modules/elements of the TIA process provided in **Table 1** are recommended to be exempt in the subsequent steps of the TIA process, based on the City's TIA guidelines and the subject site:

Table 1: Exemptions Review Summary

Module	Element	Exemption Consideration
4.1 – 4.4 Design Review Component	All	Not required for applications involving ZBLA. However, a brief description may be provided.

3.0 FORECASTING REPORT

3.1. Development Generated Travel Demand

3.1.1. Trip Generation and mode shares

As mentioned previously, the site currently consists of a car dealership and a surface parking lot. Conservatively, the dealership is assumed to generate a negligible number of trips during peak hours. The proposed development will replace the dealership with three high-rise residential buildings containing 1,152 apartment units and 9,247 ft^2 of first floor commercial space. The commercial space will likely provide ancillary use for the high-density residential units and is expected to be intended for local residents, community and potentially some pass-by traffic. As such, it is not expected to be a regional attraction and is not anticipated to generate new trips.

The appropriate trip generation rates for high-rise apartment land uses were obtained from the 2020 TRANS Trip Generation Manual. The Manual provides person-trip rates during the peak AM and PM periods (7am-9:30am and 3:30PM-6PM). The trip rates are summarized in **Table 2** below.

Table 2: Residential Trip Generation Trip Rates

Land Use	Data Source	Trip Rates	
		AM Peak Period (7-9:30am)	PM Peak Period (3:30-6pm)
High-Rise Apartments	TRANS 2020	T = 0.8(du);	T = 0.9(du);
Notes: *T = Average Vehicle Trip Ends* *du = Dwelling unit*			

Using the trip rates provided in **Table 2**, the total number of person trips expected to be generated during the morning and afternoon peak periods can be found in **Table 3**.

Table 3: Apartment Units Peak Period Person Trip Generation

Land Use	Dwelling Units	AM Peak Period Person Trips	PM Peak Period Person Trips
High-Rise Apartments	1,152	921	1,036

The proposed development is anticipated to generate 921 and 1,036 person trips during the morning and afternoon peak periods, respectively. The total peak period person trips in **Table 3** are then divided into different travel modes using mode share percentages obtained from the 2020 TRANS Manual for the "Ottawa West" district. **Table 4** provides the travel mode breakdown for the proposed building.

Table 4: Residential Peak Period Trips Mode Shares Breakdown

Travel Mode	Mode Share	AM Peak Period Person Trip	Mode Share	PM Peak Period Person Trips
Auto Driver	28%	262	33%	341
Auto Passenger	11%	105	11%	119
Transit	41%	379	26%	265
Cycling	3%	30	7%	71
Walking	16%	144	23%	241
Total Person Trips	**100%**	**921**	**100%**	**1,036**

Standard traffic analysis is usually conducted using the morning and afternoon peak hour trips as they represent a worst-case scenario. In the 2020 TRANS Manual, Table 4 provides conversions rates from peak period to peak hours for different mode shares. The conversion rates are provided in **Table 5** below.

Table 5: Peak Period to Peak Hour Conversion Factors (2020 TRANS Manual)

Travel Mode	Peak Period to Peak Hour Conversion Factors	
	AM	PM
Auto Driver and Passenger	0.48	0.44
Transit	0.55	0.47
Bike	0.58	0.48
Walk	0.58	0.52

Using the conversion rates in **Table 5** and the peak period person trips for different travel modes in **Table 4**, the peak hour trips for different travel modes can be calculated as shown in **Table 6**.

Table 6: Residential Peak Hour Trips Mode Share Breakdown

Travel Mode	AM Peak Hour Trips	PM Peak Hour Trips
Auto Driver	126	150
Auto Passenger	51	52
Transit	208	125
Cycling	17	34
Walking	84	125
Total Person Trips	**486**	**486**

As shown **Table 6**, the proposed development is anticipated to generate a total of 486 person trips during the morning and afternoon peak hours. Inbound and outbound percentages were obtained from the 2020 TRANS Manual and applied to each travel mode as shown in **Table 7**.

Table 7: Residential Land Use Trip Generation

Travel Mode	AM Peak (Person Trips/h)			PM Peak (Person Trips/h)		
	In (31%)	Out (69%)	Total	In (58%)	Out (42%)	Total
Auto Driver	39	87	126	87	63	150
Passenger	16	35	51	30	22	52
Transit	65	144	208	72	52	125
Cycling	5	12	17	20	14	34
Walk	26	58	84	73	53	125
Total Person Trips	**151**	**335**	**486**	**282**	**204**	**486**

As shown **Table 7**, the proposed development is anticipated to generate up to 150 vehicle trips, 208 transit trips and 159 Active Transport (walking and cycling) trips, during the morning and afternoon peak hours.

However, the New Orchard LRT Station is expected to be fully constructed by full buildout of the proposed development (2026). As such, the transit mode share should be adjusted to reflect the higher number of transit trips. The percentages provided in **Table 8**, are reflective of the City's Transit-Oriented Development (TOD) projections. A higher cycling percentage was assumed given the proximity to the major pathways along Sir John A. Macdonald Pkwy and the future cycle tracks along Richmond Rd. Walking percentages have been reduced considering the general distance of the site from major employment centres.

Table 8: Residential Peak Hour Trips TOD Mode Share Breakdown

Travel Mode	Mode Share	AM Peak Hour Trips	PM Peak Hour Trips
Auto Driver	15%	73	73
Auto Passenger	5%	24	24
Transit	65%	316	316
Cycling	10%	49	49
Walking	5%	24	24
Total Person Trips	**100%**	**486**	**486**

Using the TOD mode shares in **Table 8**, the breakdown of inbound and outbound trips for the residential land use are provided in **Table 9**.

Table 9: Residential Land Use Trip Generation (TOD Mode Shares)

Travel Mode	AM Peak (Person Trips/h)			PM Peak (Person Trips/h)		
	In (31%)	Out (69%)	Total	In (58%)	Out (42%)	Total
Auto Driver	23	50	73	42	31	73
Passenger	7	17	24	14	10	24
Transit	98	218	316	183	133	316
Cycling	15	34	49	28	21	49
Walk	7	17	24	14	10	24
Total Person Trips	**151**	**335**	**486**	**282**	**204**	**486**

As shown in **Table 9**, the proposed development is anticipated to generate 73 vehicle trips, 316 transit trips and 73 active transport trips during peak hours.

3.1.2. Trip Distribution and Assignment

Based on the 2011 OD Survey (Ottawa West district) and the distribution of background traffic volumes on Richmond Rd, the site-generated commuter traffic (i.e. vehicles travelling to work in the AM peak hour and back from work in the PM peak hour) was estimated as follows:

- 10% to/from the north;
- 25% to/from the south;

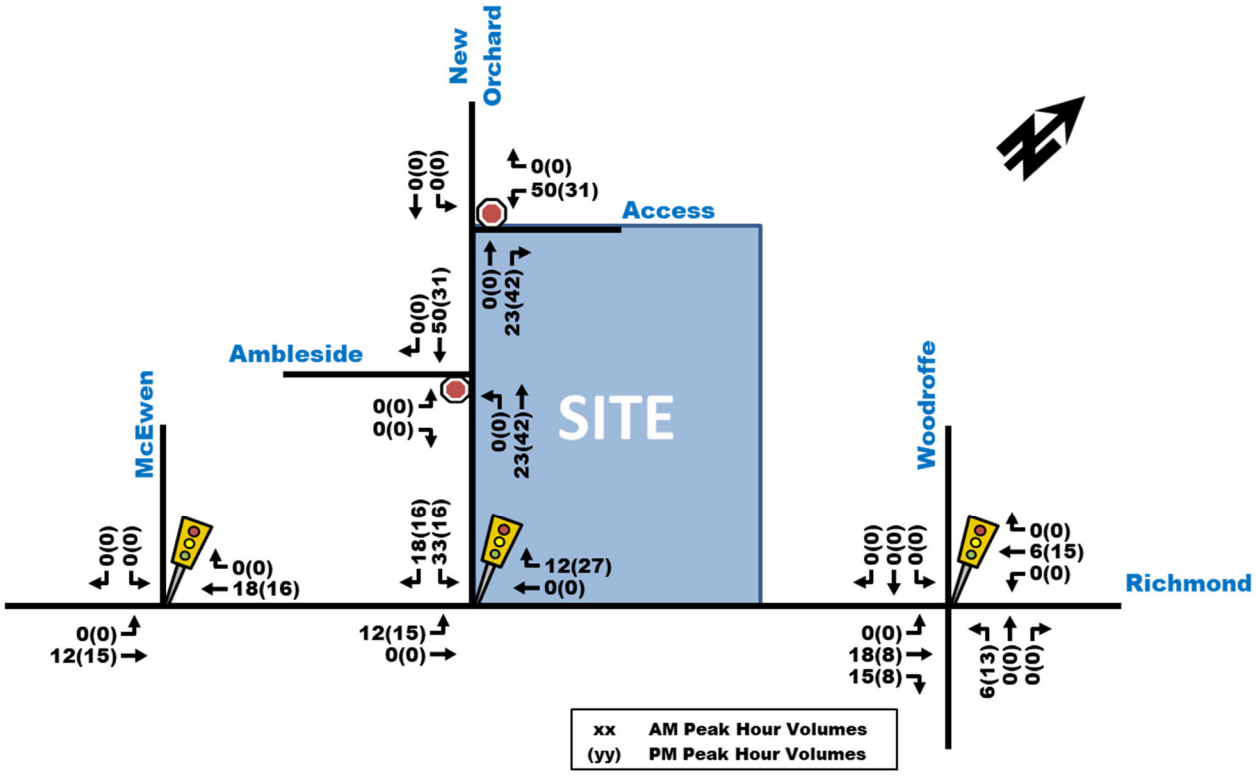
- 30% to/from the east; and,
- 35% to/from the west.

For non-commuter site-generated traffic (i.e. inbound traffic during the AM peak hour and outbound traffic during the PM peak hour), it was assumed that traffic would be divided evenly with regards to their travel directions for the primary purpose of reaching major commercial destinations, such as Ikea, Bayshore Mall and Lincoln Fields Mall to the west and the downtown and Hwy 417 to the east and south. The distribution of site-generated traffic volumes was estimated as follows:

- 50% to/from the west on Richmond Rd;
- 25% to/from the east on Richmond Rd; and,
- 25% to/from Hwy 417 via Woodroffe Ave.

Trips travelling to/from the north, south and east will travel east on Richmond Rd, while trips travelling west will travel west on Richmond Rd. The anticipated site-generated auto trips for the proposed building were then assigned to the road networks as shown in **Figure 10**. As mentioned previously, the new proposed building will be accessed via a new access along New Orchard Ave N.

Figure 10: Proposed Development Site-Generated Traffic



3.2. Background Network Traffic

3.2.1. Transportation network plans

Refer to **Section 2.1.3: Planned Conditions** for a summary of all future modifications anticipated within the study area and at the Richmond Rd intersections with McEwen Ave, New Orchard Ave N and Woodroffe Ave as a result of constructing the New Orchard LRT Station.

3.2.2. Background Growth

A regression analysis was conducted using historic (2009, 2011, 2016) traffic volumes at the intersection of Richmond/New Orchard. A summary of the analysis results is provided in **Table 10** below, with the detailed analysis sheet provided in **Appendix D**.

Table 10: Percent Annual Change at Richmond/New Orchard

Time Period	Percent Annual Change			
	North Leg	East Leg	West Leg	Overall
8 hrs	1.28%	1.86%	1.38%	**1.60%**
AM Peak	0.64%	0.07%	0.15%	**0.15%**
PM Peak	2.75%	2.53%	2.06%	**2.34%**

Based on the results provided in **Table 10**, a background growth rate of 2% was applied to the through movements on Richmond Rd. This growth rate is considered conservative as the AM peak indicates no growth and the 8 hrs period indicates a growth of less than 2%. Although the north leg of the intersection also indicates some growth, there is no background growth rate applied to New Orchard Ave N as it is a short local street with a dead-end, which provides very limited capacity for traffic growth.

A conservative 2% background traffic growth rate was applied only to the through movements of Richmond Rd to account for potential future developments in the area. **Figure 11** provides the future background traffic at horizon year 2026 and **Figure 12** provides the future background traffic at horizon year 2031.

Figure 11: Future Background 2026 Traffic Volumes

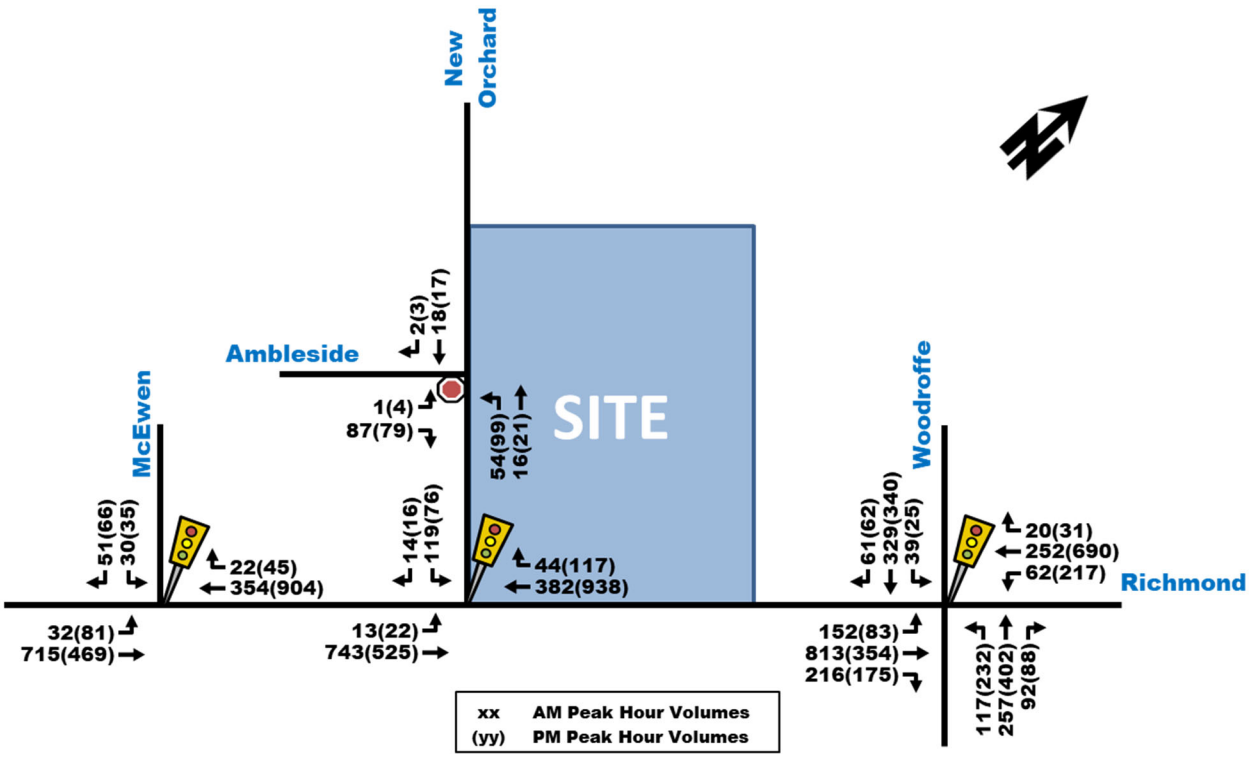
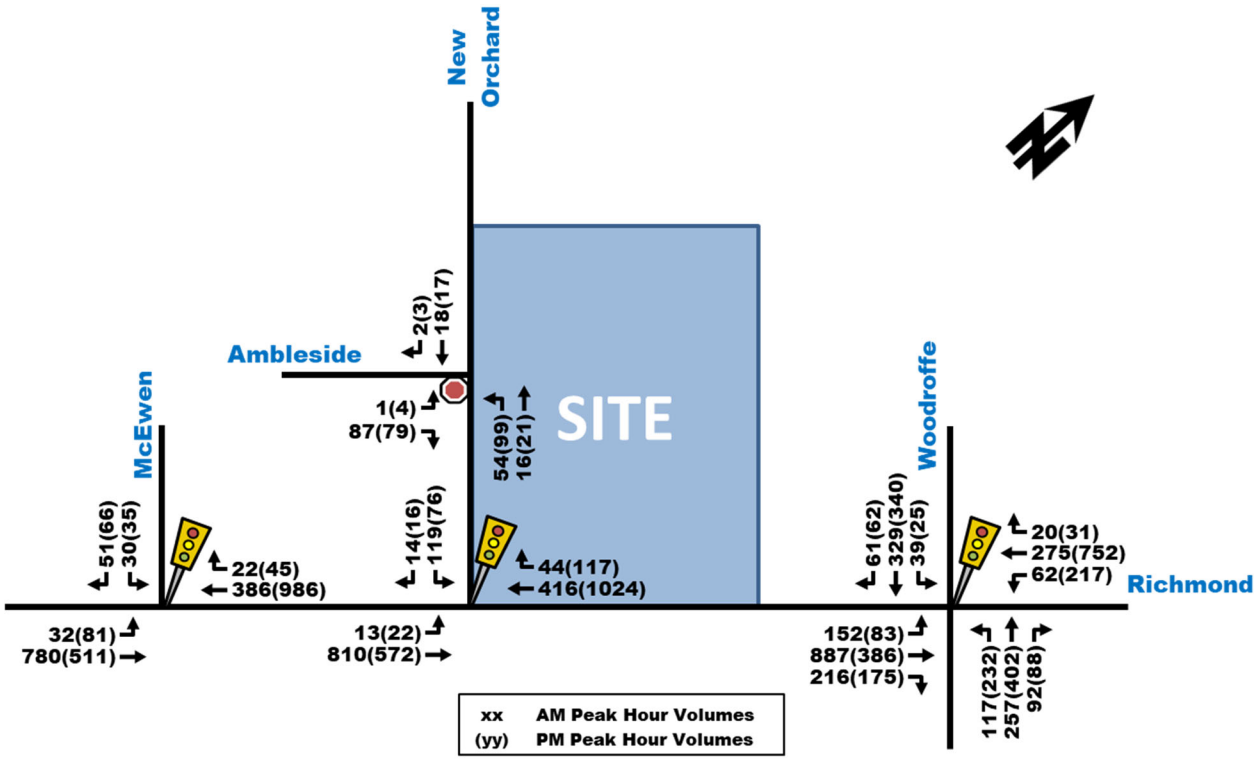


Figure 12: Future Background 2031 Traffic Volumes



3.2.3. Other Developments

Description of other area developments taking place within the study area was provided in **Section 2.1.3.2: Other Area Developments**. Only one future adjacent development, located at 1071 Ambleside Dr, was anticipated to generate traffic in the study area. Traffic volumes anticipated to be generated by the 1071 Ambleside Dr development are illustrated in **Figure 13**. Total future background 2026 and 2031 volumes are illustrated in **Figure 14** and **Figure 15**, where the adjacent development volumes in **Figure 13** were added to the future background volumes in **Figure 11** and **Figure 12**.

Figure 13: 1071 Ambleside Dr Proposed Future Development

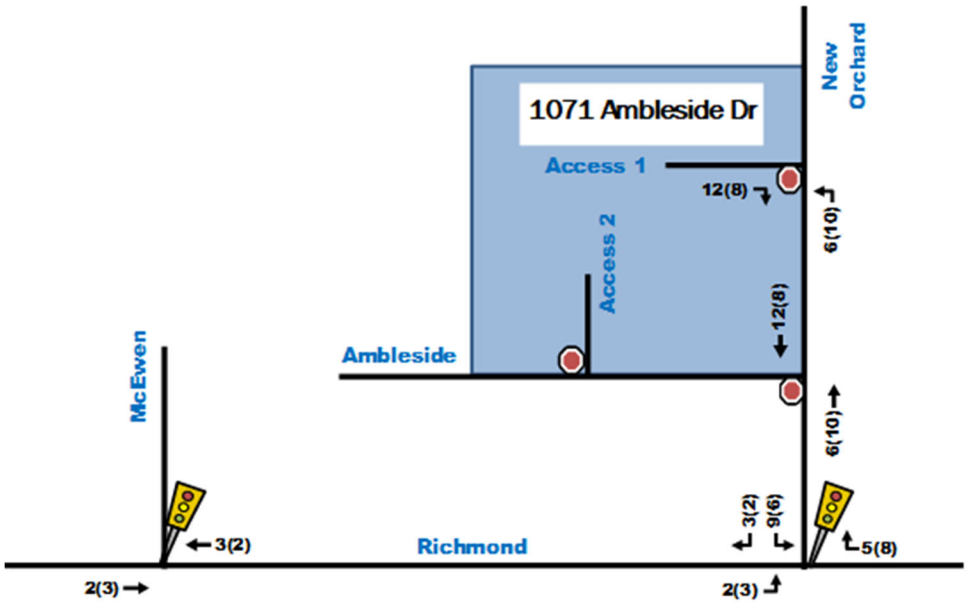


Figure 14: Total Future Background 2026 Traffic Volumes

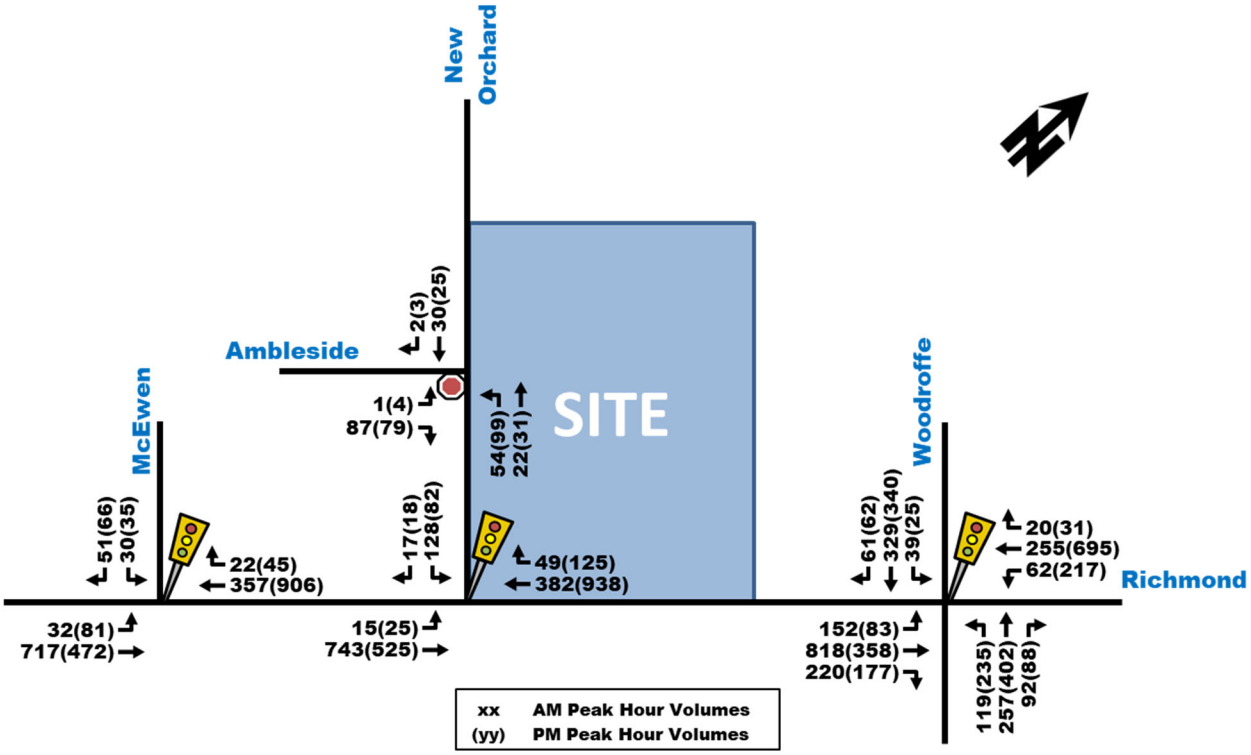
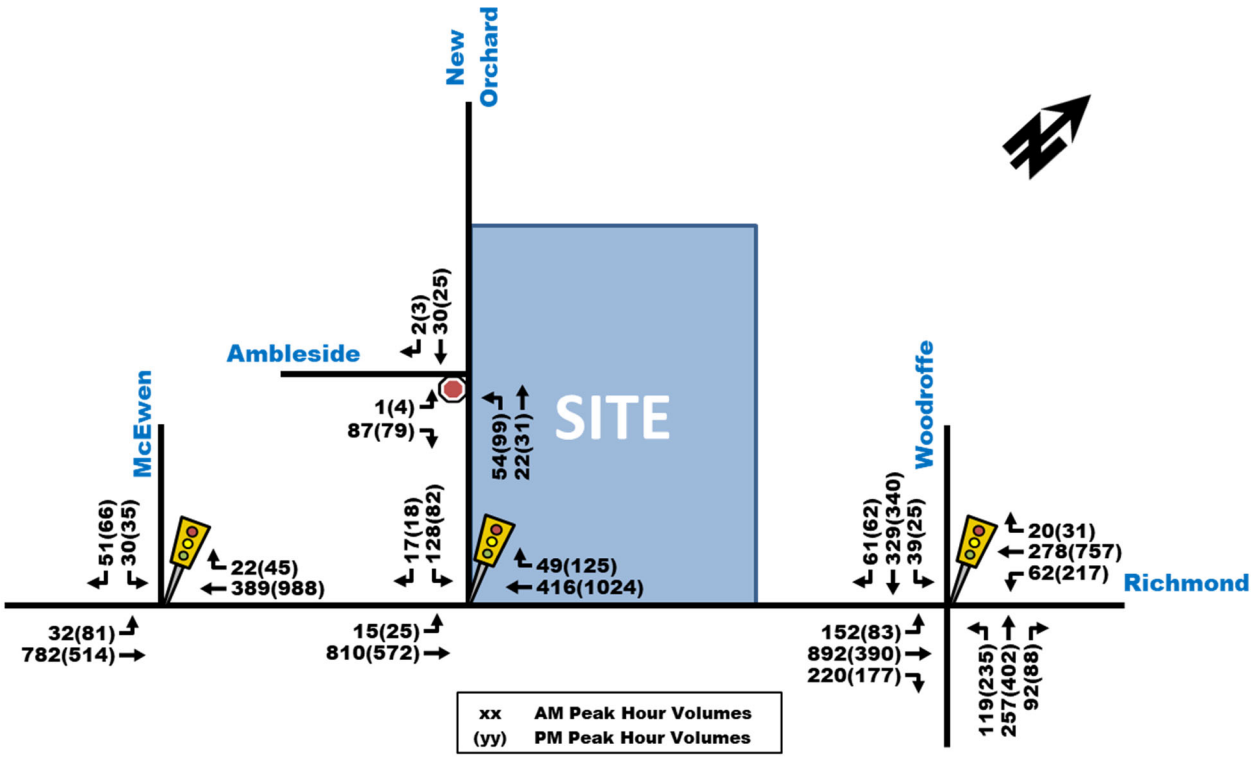


Figure 15: Total Future Background 2031 Traffic Volumes



3.3. Demand Rationalization

The total projected future traffic volumes can be determined by superimposing the site-generated traffic volumes in **Figure 10**, onto the total future background traffic volumes in **Figure 14** and **Figure 15**. The resulting total projected traffic volumes 2026 and 2031 illustrated in **Figure 16** and **Figure 17**. Analysis of study area intersections is provided in **Section 4.9**.

While the proposed development is anticipated to generate a total of 73 vehicles during both peak hours, the traffic will split between east and west travel directions on Richmond Rd, resulting in mostly negligible impacts to existing traffic operations within the study area.

Potential Future Capacity Issues

The ongoing construction of LRT along Richmond Rd will result in lost operational capacity at study area intersections as existing auxiliary turn lanes are removed to enhance pedestrian and cycling infrastructure along the corridor.

The Richmond/New Orchard intersection will be losing the auxiliary EBL turn lane, which will potentially result in extended traffic queues forming as left-turning vehicles may block through traffic. However, side street volumes are relatively low, and may be resolved via demand rationalizations over time.

The intersection of Woodroffe/Richmond will lose the auxiliary EBR lane and the second EBT and WBT lanes. The current intersection operation is poor and the long-term outlook of this intersection will remain poor since both roadways are major arterial connections, carrying heavy traffic.

Additionally, intersection timings at all three intersections will be adjusted to accommodate new protected intersection designs that provide more time for pedestrians and cyclists, reducing the overall time available for

vehicles. The intersection timings in the forthcoming analysis will be adjusted based on the City of Ottawa's Protected intersection Design Guide (September 2021). Pedestrian and cyclist volumes will also increase significantly, especially at the Richmond/New Orchard intersection as a result of the new facilities and pedestrian trips to/from the future New Orchard LRT Station. The following section will address adjustments to future traffic.

Figure 16: Total Projected 2026 Traffic Volumes

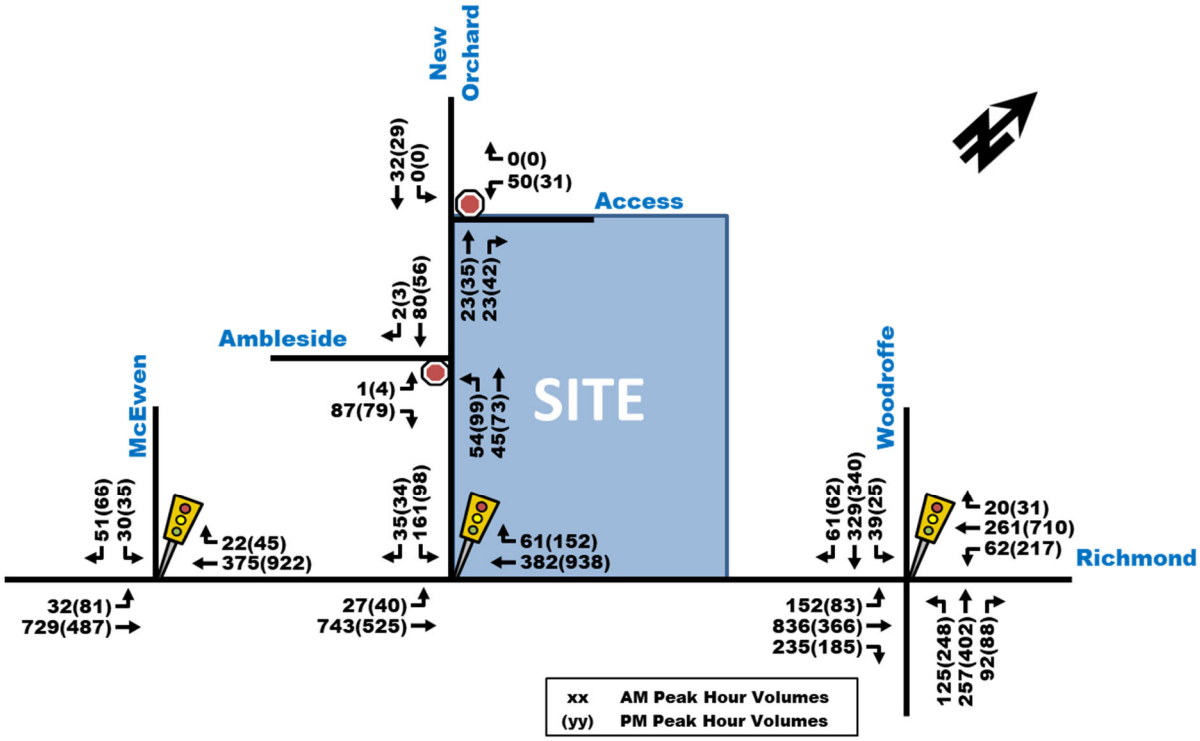
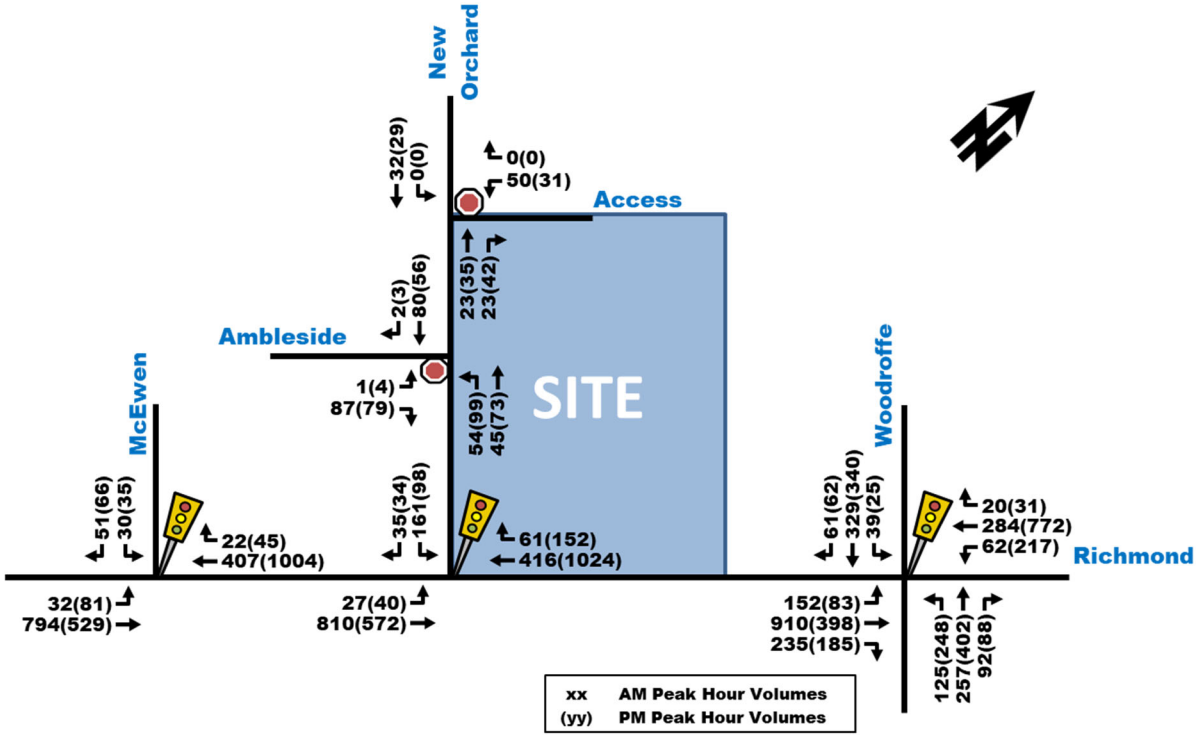


Figure 17: Total Projected 2031 Traffic Volumes



Future Background Traffic Adjustments

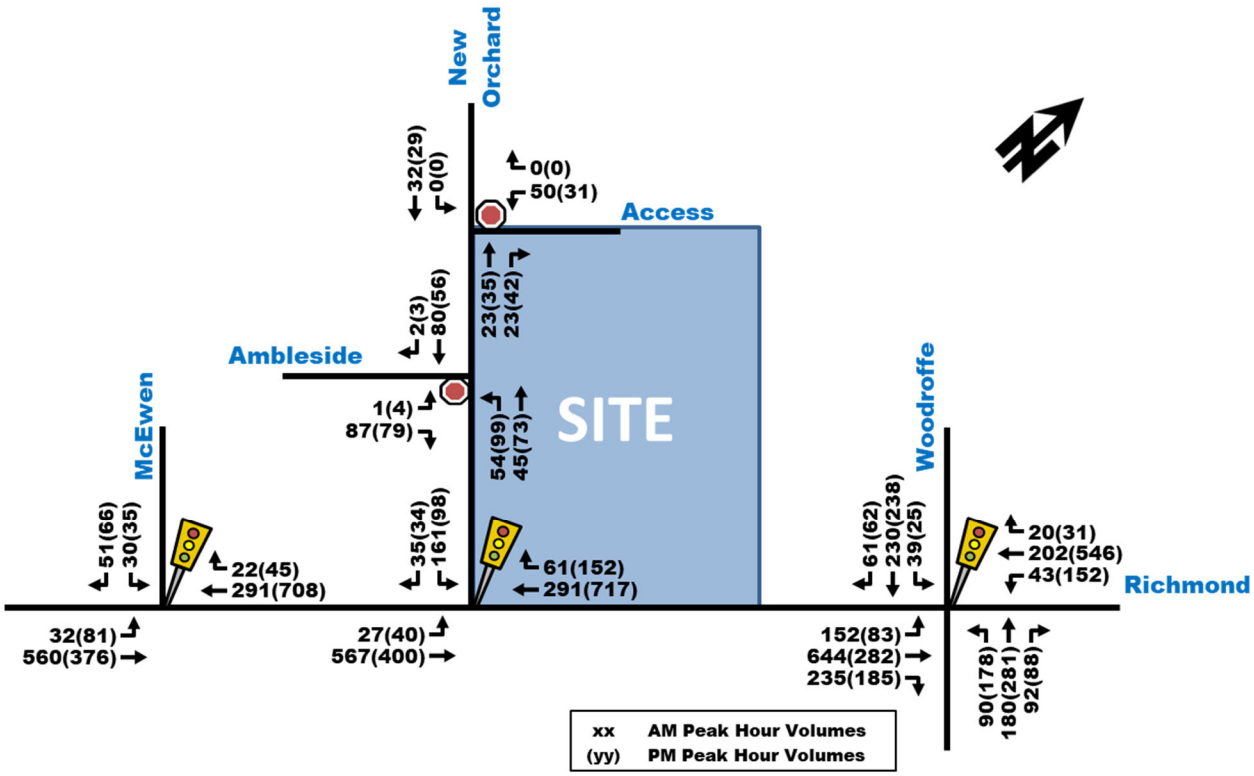
In **Section 3.2.2** of this TIA, background traffic along Richmond Rd was conservatively expected to continue increasing by 2% per year which aligns with historical growth. However, the implementation of LRT along the corridor and other sustainable initiatives throughout the City are expected to encourage existing drivers to take transit or active travel, and reduce background traffic in the fullness of time. It is also worth noting that the COVID-19 pandemic already resulted in notable changes to travel behaviors, where post-pandemic traffic volumes are notably reduced during peak hours due to increased work-from-home rates. These changes in travel behaviors are not reflected in this report, given that the traffic counts are dated pre-pandemic.

The assumption that traffic volumes would be reduced is also supported by the City's Regional Transportation Model (RTM), which forecasts travel patterns of traffic up to the 2031 horizon year during the AM peak hour. The model suggests Richmond Rd traffic could stagnate or reduce by up to 10% from existing levels. The City's model outputs have been provided in **Appendix E**.

A sensitivity analysis was conducted using total projected 2031 traffic volumes in **Figure 17**, where future traffic volumes (without demand rationalizations) have been reduced in increments of 10% to a maximum of 30% for the through movements on Richmond Rd and Woodroffe Ave, which is the estimated limit based on the City's RTM. Note that the NBL and WBL at Richmond/Woodroffe intersection were also reduced based on preliminary analysis review of future operations.

Figure 18 illustrates total projected 2031 traffic volumes with a 30% reduction. The implications of this reduction on the adjacent road network will be discussed in **Section 4.9**.

Figure 18: Total Projected 2031 Traffic Volumes, with 30% Reduction



4.0 ANALYSIS

4.1. Development Design

As this is a ZBLA, design related elements will be provided in more detail in the future Site Plan Application (SPA) submission of the proposed development.

4.1.1. Design for Sustainable Modes

The City of Ottawa's TDM-supportive Development Design and Infrastructure checklist has been provided in **Appendix F** and discussed in more detail in **Section 4.5**.

Auto and Bicycle Parking

Vehicle and bicycle parking are proposed to be provided in a three-level underground parking garage. The parking garage ramp, three truck loading entrances and a drop-off courtyard are all located along the site's proposed internal driveways.

Pedestrian and Cyclist Facilities

Pedestrian sidewalks will be provided at the frontages of the proposed development, along Richmond Rd and New Orchard Ave N. As mentioned previously, bike lanes will be provided along Richmond Rd and New Orchard Ave N (up to Ambleside Dr) as part of the construction work for the west expansion of the LRT. Additionally, bike crossings will be provided on all approaches at the three Richmond Rd intersections with Woodroffe Ave, New Orchard Ave N and McEwen Ave.

Transit Amenities

The New Orchard LRT Station will be located within a 150m walking distance of the proposed development site. The station can be accessed via sidewalk facilities and the crossings at the intersection of Richmond/New Orchard. The existing bus routes may also continue to operate in the future as indicated in **Section 2.1.2: Transit Network**. The existing bus stop along the site frontage on Richmond Rd is expected to be unaffected in the future.

4.1.2. Circulation and Access

Municipal service, emergency and moving vehicles will access the site via New Orchard Ave N. Three loading bays are proposed onsite, one assigned to each building. The fire route includes the internal site courtyard where fire trucks may access Building C. A preliminary truck turning review was completed to support the current site plan concept. However, the site plan is expected to undergo further refinements over the course of approvals and leading into the future Site Plan Application; the truck turning review will be revisited at that stage to ensure there are no conflicts. Preliminary truck turn templates have been provided in **Appendix G**.

4.2. Parking

The development is proposing to provide a total of 1,152 dwelling units and approximately 1,013 m^2 (10,900 ft^2) retail space, within three residential buildings. Based on the City of Ottawa Parking Provisions, the proposed development is located in "Area Z", which consists of the following parking requirements:

- No off-street motor vehicle parking required for the proposed residential and commercial land uses.
- Visitor parking is required at a rate of 0.1 per dwelling unit, up to a maximum of 30 spaces per building and excluding the first twelve units. Based on the number of units in each building, this equates to a total of approximately 68 required spaces for the three proposed buildings.
- Bicycle parking is required at a rate of 0.50 per dwelling unit and 1 per 250 m^2 of retail space, for a total of approximately 580 required spaces.

The development is proposing to provide a total of 689 vehicle parking spaces within three levels of an underground parking garage. Additionally, the total number of bicycle parking spaces proposed is 726 spaces, well above the required by-law amount.

4.3. Boundary Street Design

The detailed Multi-Modal Level of Service (MMLOS) analysis for boundary streets and signalized intersections will be provided in the future Site Plan Application.

4.4. Access Intersection Design

Access to the proposed development will be provided via an internal driveway that connects to New Orchard Ave N. The New Orchard Ave N access will be located at the north end of the site, approximately 90m north of the Richmond/New Orchard intersection. Note that both accesses will allow all movements in/out of the site. Along the internal driveway, access will be provided to three truck loading areas, a drop-off courtyard, and a three-level underground parking garage.

The Private Approach By-Law notes the following requirements under Section 25 that are relevant to the subject development:

- The maximum width for a two-way access is 9m.
- The minimum distance between the property access and the adjacent property line must be at least 3m. However, it is noted in Section 25, paragraph 1.P, that a distance of 0.3m may be acceptable to City staff if the access is found to be a safe distance from the adjacent property, has adequate sight lines and does not create a traffic hazard.

Compliance of the access with the requirements of the Private Approach By-Law will be ensured as part of the future Site Plan Application (SPA) for this development.

4.5. Transportation Demand Management

4.5.1. Context for TDM

The proposed development is located in both a Design Priority Area (DPA), known as Richmond Traditional Mainstreet, and a Transit-Oriented Development (DPA) zone, where the future New Orchard LRT Station will be located within 150m walking distance. The property is owned and will be managed by the Fengate Capital Management.

Given the proposed land-use of the development as a residential building, it is assumed that most trips generated will be from residents leaving the site in the AM peak to go to work and returning to the site in the PM peak. Sections 3.1.1 and 3.1.2 describe how many trips are anticipated per travel mode and anticipates the likely locations that they will travel to and from based on the OD-Survey 2011 for Ottawa.

The development is proposing to provide 1,152 apartment units in three residential buildings. A breakdown of the unit types indicates that the units provided will consist of 89 studio units, 526 one-bedroom units, 519 two-bedroom units and 18 three-bedroom units.

4.5.2. Need and Opportunity

Transit usage is anticipated to increase greatly in the area as a result of the future New Orchard LRT Station. In addition to the LRT expansions, the active transportation facilities (sidewalks and bike lanes) are anticipated to be improved in the area. Therefore, transit and active transport travel modes are expected to generate the highest number of trips.

The proposed development is expected to utilize Transportation Demand Management (TDM) measures to maintain sustainable transit and active mode shares, as described in more detail in Section 4.5.3 below.

4.5.3. TDM Program

The TDM Infrastructure and TDM Measures Checklists have been provided in **Appendix F**. The proposed measures in each respective checklists are identified below. It should be noted that some measures are being considered but will be confirmed during the Site Plan Application (SPA).

Proposed measures identified in the TDM-supportive Development Design and Infrastructure Checklist are:

- All ten (10) Required measures related to Walking and Cycling (facilities and bicycle parking) and Vehicle Parking have been satisfied
- Ten (10) out of fourteen (14) basic measures related to Walking and Cycling, Parking and Ridesharing have been satisfied, namely:
    - Locating building close to the street.
    - Locating building entrances to minimize walk distance to sidewalks and transit.
    - Locating building doors and windows to ensure visibility of pedestrians.
    - Providing safe, direct and attractive walking routes to transit.
    - Ensuring walking routes are secure, visible, and lighted.
    - Designing roads for cyclist circulation.
    - Providing lighting, landscaping and benches along walking and cycling routes.
    - Providing wayfinding signage for site access.
    - Provide a designated area for carpool drivers to drop-off or pick-up passengers.
    - Providing parking for long-term and short-term users.
- One (1) out of seven (7) better measures related to Parking have been satisfied, while one Carsharing measure will be considered during Site Plan Application, namely:
    - Provide separate areas for short-term and long-term parking.
    - Providing carshare parking spaces for tenants and the benefit of the surrounding community. (To be confirmed during SPA)

Proposed measures identified in the TDM Measures Checklist are:

- Designate an internal or external coordinator. (To be confirmed during SPA)
- Conduct periodic surveys to identify travel-related behaviors. (To be confirmed during SPA)
- Display walking and cycling information at major entrances.
- Display transit information at major entrances.
- Offer PRESTO cards for one month. (One year measure to be considered during SPA)
- Provide on-site carshare vehicles for residents and carshare memberships. (To be confirmed during SPA)
- Unbundle parking costs from monthly rent.
- Provide multi-modal travel information package to new residents.

4.6. Neighbourhood Traffic Management

This module compares the maximum two-way traffic of a local or collector road during morning and afternoon peak hours, to the respective thresholds suggested by the City of Ottawa TIA Guidelines.

Site-generated traffic of the proposed development are expected to use local road New Orchard Ave N as part of their access route to/from the proposed development. The thresholds suggested in the TIA Guidelines indicate an ideal two-way traffic volume limit of 120 veh/h for local roads during peak hours. Using the total projected 2031 traffic volumes in **Figure 17**, future traffic volumes along New Orchard Ave N were projected to be as follows:

- Existing two-way traffic volumes on New Orchard Ave N is nearly double the optimal limit, with 231 veh/h during the afternoon peak hour.

- With the proposed development, traffic volumes are expected to increase on to approximately 324 veh/h during the afternoon peak hour, between Ambleside Dr and Richmond Rd. These volumes are more aligned with the collector road threshold of 300 veh/h.

It should be noted that these volumes are exceeding the specified threshold on New Orchard Ave N over a short distance of approximately 60m, as the majority of traffic diverts to/from Ambleside Dr. Additionally, the 60m section of New Orchard Ave N is designed with wider lanes and limited access to developments, which are typical characteristics of a collector road.

The thresholds provided in the TIA Guidelines are ideal suggestions and not firm requirements for traffic volumes. The City may choose to reclassify this section of New Orchard Ave N as a collector road. However, it is not considered critical at this time. With the future LRT extensions completed, its possible that volumes here may decrease over time to align more closely with the ideal limit of a local road.

4.7. Transit

As shown in **Table 9**, the proposed development is anticipated to generate a total of 316 transit trips during both the morning and afternoon peak hours. These trips are expected to utilize both the LRT at the future New Orchard Station along with any bus routes that will be operating in the area. The LRT was created with the purpose of accommodating a substantial number of riders in the future. As such, the future transit network is expected to have sufficient capacity that can easily accommodate the projected number of site-generated transit trips.

Existing conditions (pre-COVID) transit ridership data was obtained from OC Transpo for six bus stops near the proposed development site, as shown in **Figure 19**. The data, provided in **Table 11**, is a summary of average bus boarding, alighting and occupancy information for bus routes at each of the respective stop numbers, during morning and afternoon peak hours.

Figure 19: Transit Ridership Data Bus Stop Locations

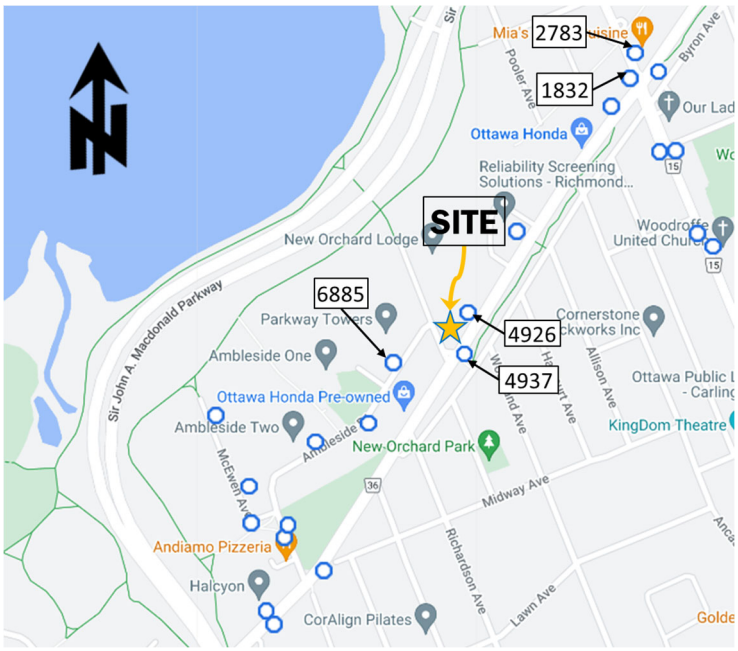


Table 11: Transit Ridership Data (5 Jan 2020 - 16 Mar 2020)

Stop No.	Location	Route	Direction	AM			PM		
				Boarding	Alighting	Avg. Load at Depart.	Boarding	Alighting	Avg. Load at Depart.
1832	Woodroffe / Richmond	87	SB	0	0	4	0	3	17
2783	Woodroffe / Richmond	87	NB	25	0	17	11	14	9
4926	Richmond / New Orchard	11	WB	8	3	6	4	23	11
		153	WB	0	0	1	0	0	7
4937	Richmond / New Orchard	11	EB	30	5	12	12	5	7
		153	EB	0	0	4	0	0	4
6885	Ambleside / New Orchard	153	WB	0	0	1	2	1	7

As shown in **Table 11**, the average load of each bus route at its respective bus stop ranges from about 1 to 17 persons during the peak hours. It should be noted that these bus routes serve their respective stops several times during peak hours. Bus route #11 and #87 in particular are "frequent routes" that arrive every 15 minutes or less during peak hours. In the future, the LRT will also be providing service in the area, at the New Orchard Station. It is expected that the LRT will arrive approximately every 3-5 minutes less during peak hours. At this time, it is not known if the bus route will continue to operate with the exact same routes and rates as today, but the LRT is expected to mor than enough capacity to accommodate all future transit volumes.

Based on information obtained from the OC Transpo website, the person capacity of OC Transpo vehicles, which includes the number of seats on the bus plus the standing capacity, ranges from approximately 57 occupants in its smallest vehicles to approximately 110 occupants in its largest vehicles. The LRT's capacity is approximately 336 occupants.

Therefore, based on the current average bus loads, the available capacity and frequency of the existing bus routes, and the future anticipated capacity and frequency of the LRT, the proposed development generating approximately 316 transit trips during peak hours is anticipated to be accommodated by the available and future transit services.

4.8. Review of Network Concept

The purpose of this module is to determine if the proposed development zoning is expected to generate more than 200 peak hour person trips compared to the existing zoning of the site. As indicated in **Section 3.1.1**, the proposed development is expected to generate approximately 486 total person trips during peak hours. Based on project statistics, the total GFA of the proposed development is approximately 730,000 ft^2.

Under existing zoning, the total GFA of the development was estimated to be approximately 550,000 ft^2, as identified in a Density Study completed for this development. Therefore, existing zoning permits up to approximately 75% of the size of the proposed development, or 870 total residential units.

Using the trip generation rates and calculations in **Section 3.1.1**, it is estimated that the proposed development would generate 366 total person trips during peak hours, under existing zoning. Therefore, this results in a difference of 120 total person trips between existing zoning and proposed development zoning, which does not trigger any changes to the TMP concepts for auto or transit vehicle networks as identified in the TIA Guidelines.

4.9. Intersection Design

4.9.1. Intersection Control

Stop control will be provided for vehicles exiting the site at the New Orchard Ave N access, which will allow all movements in/out of the site. All other off-site intersection controls in the study area will continue to operate similar to existing conditions.

4.9.2. Intersection Design

Synchro 11 Trafficware was used to analyze intersection performance of intersections within the study area. Critical movements at each of the intersections were assessed based on either the movement with the highest volume-to-capacity ratio (for signalized intersections), or the movement experiencing the highest average delay (for unsignalized intersections). It should be noted that, as per the TIA Guidelines, the Peak Hour Factor (PHF) used for analysis was 0.90 in existing conditions and 1.0 in all future scenario conditions.

As mentioned previously, the intersection designs for each of the Richmond Rd intersections at McEwen Ave, New Orchard Ave N and Woodroffe Ave will be modified in the future as part of the LRT construction in the area (see **Section 2.1.3.1**). This will result in modifications in the signal timing plans at each of the signalized intersections. As such, the timing plans have been modified at signalized intersections for both horizon years 2026 and 2031 in accordance with the guidelines of the City of Ottawa's Protected Intersection Design Guide (September 2021). Additionally, all phase timings in Synchro were optimized, while cycle lengths were unchanged from existing. Future pedestrian and cyclist volumes are expected to increase significantly in the study area due to improved facilities and pedestrians accessing LRT station. These volumes will be accounted for in the total projected Synchro models.

All detailed Synchro analysis reports for existing and future conditions have been provided in **Appendix H**.

Existing Conditions

Table 12 below summarizes the intersection performance of study area intersections, based on existing conditions traffic volumes illustrated in **Figure 6**.

Table 12: Existing Conditions Intersection Performance

Intersection	Weekday AM Peak (PM Peak)					
	Critical Movement			Intersection 'As a Whole'		
	LOS	max. v/c or avg. delay (s)	Movement	Delay (s)	LOS	v/c
Richmond Rd/McEwen Ave (S)	A(B)	0.55(0.70)	EBT(WBT)	7.3(6.9)	A(B)	0.53(0.65)
Richmond Rd/New Orchard Ave N (S)	A(C)	0.59(0.80)	EBT(WBT)	8.7(14.2)	A(C)	0.58(0.76)
Woodroffe Ave/Richmond Rd (S)	F(F)	1.72(1.11)	EBT(NBL)	167.2(59.6)	F(F)	1.37(1.01)
Ambleside/New Orchard Ave N (U)	A(A)	8.8(8.8)	EB(EB)	6.6(6.6)	A(A)	-
Note: Analysis of signalized intersections assumes a PHF of 0.9 and a saturation flow rate of 1800 veh/h/lane. (S) – Signalized intersection, movement with highest v/c ratio identified as critical movement. (U) – Unsignalized intersection, movement with highest average delay identified as critical movement.						

As shown in **Table 12**, both the critical movement and the intersection 'as a whole' at the signalized Richmond/Woodroffe intersection operate at capacity with a LOS 'F' during both peak hours, while the other two signalized intersections operate at a LOS 'C' or better.

The unsignalized intersection of Ambleside/New Orchard operates at a LOS 'A' during both peak hours.

Total Future Background 2026

Table 13 below summarizes the Synchro traffic operations at study area intersections, based on total future background 2026 traffic volumes illustrated in **Figure 14**.

Table 13: Total Future Background 2026 Conditions Intersection Performance

Intersection	Weekday AM Peak (PM Peak)					
	Critical Movement			Intersection 'As a Whole'		
	LOS	max. v/c or avg. delay (s)	Movement	Delay (s)	LOS	v/c
Richmond Rd/McEwen Ave (S)	A(B)	0.55(0.69)	EBT(WBT)	8.1(6.4)	A(B)	0.53(0.63)
Richmond Rd/New Orchard Ave N (S)	A(C)	0.60(0.79)	EBT(WBT)	8.2(13.1)	A(B)	0.58(0.65)
Woodroffe Ave/Richmond Rd (S)	F(F)	1.13(1.21)	EBT(NBL)	62.7(75.7)	F(F)	1.01(1.07)
Ambleside/New Orchard Ave N (U)	A(A)	8.8(8.8)	EB(EB)	6.0(6.2)	A(A)	-
Note: Analysis of signalized intersections assumes a PHF of 1.0 and a saturation flow rate of 1800 veh/h/lane. (S) – Signalized intersection, movement with highest v/c ratio identified as critical movement. (U) – Unsignalized intersection, movement with highest average delay identified as critical movement.						

As shown in **Table 13**, operations are similar to or slightly better than existing conditions due to increasing the PHF to 1.0. The intersection of Woodroffe/Richmond continues to experience congestion, although the morning peak hour experiences better performance compared to existing conditions.

Total Future Background 2031

Table 14 below summarizes the Synchro traffic operations at study area intersections, based on total future background 2031 traffic volumes illustrated in **Figure 15**.

Table 14: Total Future Background 2031 Conditions Traffic Volumes

Intersection	Weekday AM Peak (PM Peak)					
	Critical Movement			Intersection 'As a Whole'		
	LOS	max. v/c or avg. delay (s)	Movement	Delay (s)	LOS	v/c
Richmond Rd/McEwen Ave (S)	A(C)	0.60(0.75)	EBT(WBT)	8.6(6.2)	A(B)	0.57(0.69)
Richmond Rd/New Orchard Ave N (S)	B(D)	0.66(0.85)	EBT(WBT)	8.6(16.4)	B(C)	0.64(0.71)
Woodroffe Ave/Richmond Rd (S)	F(F)	1.23(1.42)	EBT(NBL)	79.0(86.8)	F(F)	1.07(1.13)
Ambleside/New Orchard Ave N (U)	A(A)	8.8(8.8)	EB(EB)	6.0(6.2)	A(A)	-
Note: Analysis of signalized intersections assumes a PHF of 1.0 and a saturation flow rate of 1800 veh/h/lane. (S) – Signalized intersection, movement with highest v/c ratio identified as critical movement. (U) – Unsignalized intersection, movement with highest average delay identified as critical movement.						

As shown in **Table 14**, operations at the signalized intersections are anticipated to deteriorate slightly compared to total future background 2026 due to higher congestions and delays.

Total Projected 2026

Table 15 below summarizes the Synchro traffic operations at study area intersections, based on total projected 2026 traffic volumes illustrated in **Figure 16**.

Table 15: Total Projected 2026 Conditions Traffic Volumes

Intersection	Weekday AM Peak (PM Peak)					
	Critical Movement			Intersection 'As a Whole'		
	LOS	max. v/c or avg. delay (s)	Movement	Delay (s)	LOS	v/c
Richmond Rd/McEwen Ave (S)	B(D)	0.69(0.83)	EBT(WBT)	17.1(14.7)	B(C)	0.65(0.77)
Richmond Rd/New Orchard Ave N (S)	E(F)	0.95(1.86)	EBT(EBT)	31.9(201.3)	E(F)	0.91(1.63)
Woodroffe Ave/Richmond Rd (S)	F(F)	1.15(1.27)	EBT(NBL)	67.4(83.2)	F(F)	1.03(1.11)
Ambleside/New Orchard Ave N (U)	A(A)	9.1(9.0)	EB(EB)	4.5(4.9)	A(A)	-
New Orchard Ave N/Site Access (U)	A(A)	9.1(8.7)	WB(WB)	3.5(2.0)	A(A)	-
Note: Analysis of signalized intersections assumes a PHF of 1.0 and a saturation flow rate of 1800 veh/h/lane. (S) – Signalized intersection, movement with highest v/c ratio identified as critical movement. (U) – Unsignalized intersection, movement with highest average delay identified as critical movement.						

As shown in **Table 15**, operations at the signalized intersections are expected to deteriorate significantly in comparison to the future background 2026 volumes, particularly at the intersections of Richmond/New Orchard and Richmond/Woodroffe. The Richmond/New Orchard intersection 'as a whole' is expected to operate at capacity during the afternoon peak hour and near capacity during the morning peak hour, with critical movements operating similarly. The Richmond/Woodroffe intersection continues to operate at capacity during peak hours and with regards to its critical movements.

The poor operations are caused by a combination of factors, which includes:

- The loss of lane capacity at the intersections due to the future LRT corridor.
- The application of the Protected Intersection Design Guidelines (PIDG) to the intersection timing plans which allocates protected phasing times for pedestrians and cyclists and reduces green time for vehicles, which is in full alignment with the vision outlined in the TMP and New Official Plan to support more sustainable modes of travel.
- The addition of significant number of pedestrians and cyclist at the intersections, especially Richmond/New Orchard, where many pedestrian trips are the result of travel to/from the future New Orchard LRT Station.

With regards to unsignalized intersections, the WB movement at the proposed development access along New Orchard Ave N is anticipated to operate at a LOS 'A' during both peak hours. The Ambleside/New Orchard intersection will continue to operate at LOS 'A' during peak hours.

Total Projected 2031 (without Demand Rationalizations)

Table 16 below summarizes the Synchro traffic operations at study area intersections, based on total projected 2031 traffic volumes illustrated in **Figure 17**.

Table 16: Total Projected 2031 Conditions Traffic Volumes

Intersection	Weekday AM Peak (PM Peak)					
	Critical Movement			Intersection 'As a Whole'		
	LOS	max. v/c or avg. delay (s)	Movement	Delay (s)	LOS	v/c
Richmond Rd/McEwen Ave (S)	C(D)	0.75(0.90)	EBT(EBL)	18.9(19.2)	B(D)	0.70(0.86)
Richmond Rd/New Orchard Ave N (S)	F(F)	1.04(2.01)	EBT(EBT)	42.8(245.0)	E(F)	0.99(1.77)
Woodroffe Ave/Richmond Rd (S)	F(F)	1.25(1.50)	EBT(NBL)	84.0(95.5)	F(F)	1.10(1.17)
Ambleside/New Orchard Ave N (U)	A(A)	9.1(9.0)	EB(EB)	4.5(4.9)	A(A)	-
New Orchard Ave N/Site Access (U)	A(A)	9.1(8.7)	WB(WB)	3.5(2.0)	A(A)	-
Note: Analysis of signalized intersections assumes a PHF of 1.0 and a saturation flow rate of 1800 veh/h/lane. (S) – Signalized intersection, movement with highest v/c ratio identified as critical movement. (U) – Unsignalized intersection, movement with highest average delay identified as critical movement.						

As shown in **Table 16**, operations are similar to total projected 2026 operations, with higher delays and v/c ratios. Intersection performance indicates very high congestion rates due to previously mentioned factors resulting in significant reduction of vehicular capacity, particularly the implementation of PIDG requirements to prioritize active transportation users along the corridor. Significant traffic queues are also expected as a result of the congestion. Demand rationalization analysis is provided in the next section to address the high traffic concerns.

Total Projected 2031 (with Demand Rationalizations)

Table 17 below summarizes the Synchro traffic operations at study area intersections, based on total projected 2031 traffic volumes with the demand rationalization outlined in **Section 3.3.**, i.e. a 30% reduction in background traffic volumes, as illustrated in **Figure 18**.

Table 17: Total Projected 2031 Conditions Traffic Volumes, with 30% Reduction and Mitigation Measures

Intersection	Weekday AM Peak (PM Peak)					
	Critical Movement			Intersection 'As a Whole'		
	LOS	max. v/c or avg. delay (s)	Movement	Delay (s)	LOS	v/c
Richmond Rd/McEwen Ave (S)	A(B)	0.53(0.65)	EBT(WBT)	13.7(10.3)	A(A)	0.50(0.59)
Richmond Rd/New Orchard Ave N (S)	C(E)	0.77(0.94)	SBL(WBT)	21.3(40.4)	C(D)	0.75(0.85)
Woodroffe Ave/Richmond Rd (S)	D(D)	0.84(0.88)	EBT(WBT)	35.2(45.4)	C(D)	0.74(0.84)
Ambleside/New Orchard Ave N (U)	A(A)	9.1(9.0)	EB(EB)	4.5(4.9)	A(A)	-
New Orchard Ave N/Site Access (U)	A(A)	9.1(8.7)	WB(WB)	3.5(2.0)	A(A)	-
Note: Analysis of signalized intersections assumes a PHF of 1.0 and a saturation flow rate of 1800 veh/h/lane. (S) – Signalized intersection, movement with highest v/c ratio identified as critical movement. (U) – Unsignalized intersection, movement with highest average delay identified as critical movement.						

As shown in **Table 17**, operations of intersections 'as a whole' have improved as a result of the 30% reduction in traffic and adjustment of timings. All signalized intersections now operate at a LOS 'D' or better during peak hours, with respective critical movements operating at a LOS 'E' or better. Unsignalized intersections of Ambleside/New Orchard and the New Orchard Ave N site access continue to operate at LOS 'A' during peak hours. Based on a review of traffic queue lengths (both 95th percentile and average) in Synchro reports, it is expected that traffic queues would not be excessive at the study area intersections.

As mentioned in **Section 3.3**, a reduction of 30% is not considered unreasonable given that future study area modifications will result in significant reduction of vehicle capacity on Richmond Rd and background traffic volumes are expected to be offset by a significant increase in transit capacity due to the LRT. This is combined with the post-pandemic change in travel behavior during peak hours as a result of shift to work-from-home will also play a role in reducing future background volumes.

As previously noted, the increase in vehicle congestion in the study area is a direct result of the city's vision of the increase in active transportation and transit users and the requirements of the PIDG to prioritize them along transit priority corridors, such as Richmond Rd. The tradeoff is reduced operating capacity for vehicles. The 30% reduction represents an optimal reduction factor that results in very good traffic operations and minimal queues along the corridor. But even with a lower reduction factor for background traffic, such as 20% (which is equivalent to a 0% background traffic growth rate), would only result in isolated segments of congestion along Richmond Rd (particularly in the segment between New Orchard Ave N and Woodroffe Ave), only during the peak hour periods. This would be considered acceptable in light of the notable enhancements to transit opportunities and active transportation safety.

5.0 FINDINGS, CONCLUSIONS AND RECOMMENDATIONS

Based on the results summarized herein, the following transportation related conclusions are offered:

Proposed Development

- Fengate Capital Management is proposing a residential development to replace the existing car dealership at the northeast corner of the Richmond/New Orchard signalized intersection. The municipal address of the development is 1047 Richmond Rd.
- The proposed development is assumed to be fully constructed by 2026. The development may be constructed in multiple phases, which will be reviewed in more detail at Site Plan Application (SPA).
- The development will consist of three residential buildings that are 6 to 40-storeys high. The buildings are proposed to consist of 1,152 apartment units, along with approximately 859 m^2 (9,247 ft^2) of first floor retail. A park approximately 1,013 m^2 (10,900 ft^2) in size is also proposed.

- Approximately 689 vehicle parking spaces and 726 bicycle parking spaces are proposed to be provided in the underground parking garage, which adheres to the requirements of the City of Ottawa's Parking Provisions.
- The New Orchard Ave N access will be located at the north end of the site, approximately 90m north of the Richmond/New Orchard intersection. The underground parking garage ramp, a drop-off courtyard and three loading zones will be located along the internal site driveway. The site access will provide stop control for vehicles exiting the site.
- Municipal service and loading vehicle circulation pathing were assessed and can generally be accommodated within the internal road network and each loading bay. Fire trucks will be permitted onsite to access Building C, the courtyard has been designed to accommodate the turnaround. However, further refinements to the site plan are expected and the truck turning assessment will be revisited during the Site Plan Control application.
- The development is anticipated to generate approximately 486 person trips during peak hours, which includes 73 vehicle trips, 24 passenger trips, 316 transit trips and 73 active transport (walking and cycling) trips.
- The development will be located across from the future New Orchard LRT Station (anticipated to be constructed by 2026), within a 150m walking distance. As a result, transit usage was expected to be very high, with 316 trips anticipated to be generated by the proposed development. A review of the existing and future transit network in the area indicated that these volumes can be accommodated in the future.
- Based on a review of a Density Study completed for this development, it was estimated that approximately 870 total residential units can be constructed under existing zoning. The difference in total person trips between the proposed development's zoning and the existing zoning is approximately 120 person trips, which does not trigger any changes to the TMP concepts for auto or transit vehicle networks as identified in the TIA Guidelines.
- A suite of TDM measures is anticipated to be adopted by the development for the purpose of ensuring sustainable transit and active mode travel patterns are maintained. Additional measures may be considered during SPA. At this time, measures include displaying multi-modal travel information for walking, cycling and transit, and unbundling parking costs from monthly rent. Proposed number of bicycle parking spaces is approximately 25% more than minimum By-Law requirements. Other proposed key measures include:
    - Providing safe, direct, and attractive walking routes to transit.
    - Offering residents PRESTO cards for one month.
    - Locating buildings close to street.
    - Designing roads to accommodate cyclist circulation.
    - Providing lighting, landscaping and benches along walking and cycling routes.

Future Study Area Modifications

- As part of LRT west extension, which will be complete by 2026, the following modifications are expected:
    - A new station will be constructed within the Byron Linear Park called New Orchard Station (directly across from development site).
    - Cycle tracks are anticipated to be provided on both sides of Richmond Rd.
    - The intersection of Richmond/New Orchard will provide a single all-movement lane on all approaches.

  - The intersection of Richmond/Woodroffe is expected to operate with an auxiliary left-turn lane and a shared through/right-turn lane on all approaches. A channelized right-turn will be provided on the eastbound approach.
  - The intersection of Richmond/McEwen will provide a single all-movement lane on the southbound and westbound approaches and a through lane with auxiliary left-turn lane on the eastbound approach.
  - Unidirectional bike crossings will be provided on all approaches of the three Richmond Rd intersections with McEwen Ave, New Orchard Ave N and Woodroffe Ave, with a bidirectional crossing on the south leg of the Woodroffe Ave intersection.
  - A new concrete sidewalk will be constructed on the north side of Ambleside Dr and west side of McEwen Ave.
- Three adjacent developments are anticipated to be constructed at 100 New Orchard Ave N, 1071 Ambleside Dr and 1299 Richmond Rd. The 100 New Orchard Ave N development is anticipated to generate minimal traffic, while the 1071 Ambleside Dr development is anticipated to generate 47 vehicle trips by 2023 and 18 vehicle trips by 2028, which has been included in the future background traffic volumes. The 1299 Richmond Rd development is outside the study limits and was accounted for in the future background growth rate.

Existing and Future Background Conditions

- In existing conditions, the intersection of Woodroffe/Richmond 'as a whole' operates at capacity with a LOS 'F' during both peak hours. All other intersections provide acceptable traffic operations.
- A review of historical traffic volumes indicated a growth trend at the Richmond/New Orchard intersection of approximately 2% during the afternoon peak hour. Therefore, a 2% background growth rate was conservatively applied to both the morning and afternoon peak hours, to account for any unforeseen future developments that may generate traffic in the study area. The growth rate was only applied only to the through movements of Richmond Rd.
- Given the future modifications of the signalized study area intersections as protected intersections, the signal timing plans were modified in accordance with the City of Ottawa's Protected Intersection Design Guide (September 2021). While this affords greater prioritization and safety for pedestrians and cyclists along the corridor, it comes at the cost of vehicle capacity. Furthermore, with the construction of the New Orchard LRT Station, its expected there will be a significant number of new transit riders crossing Richmond Road. Therefore, the 2% background growth rate applied was considered overly conservative and traffic volume reduction scenarios were developed to account for the significant enhancements to transit and active transportation opportunities within the study area.
- Both the total future background 2026 and 2031 conditions are expected to operate similar to existing conditions, with some differences in delays and v/c ratios. Some improvements in operations can be attributed to the increase of the Peak Hour Factor (PHF) to 1.0 for all future scenarios in Synchro, as per the requirements of the TIA Guidelines.
- MMLOS analysis of boundary streets and signalized intersections for existing and future conditions will be provided during SPA.

Projected Conditions

- With regards to neighbourhood traffic management, the two-way traffic volumes along New Orchard Ave N exceeds the 120 veh/h ideal threshold of a local road in existing conditions, between Richmond Rd and Ambleside Dr, and slightly exceed the 300 veh/h threshold of a collector road in future conditions, with up to 324 veh/h during the afternoon peak hour of total projected 2031 conditions. A

reclassification is not considered necessary as the threshold is exceeded over a short distance of 60m and volumes may decrease over time due to effects of the LRT.

- In total projected 2026 and 2031 conditions, traffic operations are anticipated to deteriorate significantly compared to the respective total future background conditions, especially at the intersection of Richmond/New Orchard. The intersections of Richmond/New Orchard and Richmond/Woodroffe are both expected to operate at capacity, with their critical movements also operating at capacity during peak hours. Excessive traffic queuing is also expected at study area intersections. The poor traffic operations can be attributed to the following combination of factors:
    - Loss of lane capacity, especially auxiliary turn lanes at study area intersections due to LRT.
    - Applying measures from the Protected Intersection Design Guidelines (PIDG) to the intersection timing plans, which includes measures to enhance priority and safety of pedestrians and cyclists and reduce vehicle priority. These measures align with the vision of the City of Ottawa new TMP and OP to support sustainable travel modes.
    - Adding a significant number of pedestrians and cyclists at the intersections to account for both site-generated trips and pedestrian travel to/from the future LRT New Orchard station.

Demand Rationalizations

- Since a conservative background growth rate of 2% was applied to through volumes on Richmond Rd to account for potential future development traffic, operations are expected to be fairly congested at study area intersections. This congestion is a tradeoff of the City's vision to improve bike, walk and transit facilities and incorporate PIDG. It is reasonable to assume that future background traffic would naturally decrease as a result of these initiatives. The reduction is further supported by the change in travel behavior post-pandemic, where traffic decreased as a result of increase in work-from-home.

  A reduction up to 30% was supported by the City's Regional Transportation Model forecasts on both Richmond Rd and Woodroffe Ave. Therefore, reductions were applied as follows:
    - 30% reduction of background traffic volumes for the through volumes on Richmond Rd and Woodroffe Ave; and
    - The northbound and westbound left-turns at the intersection of Woodroffe/Richmond.

  The reductions resulted in improvements, where all signalized intersections now operate at a LOS 'D' or better during peak hours, with respective critical movements operating at a LOS 'E' or better. Additionally, traffic queues were reduced to reasonable levels.

Overall, based on the preceding report, the proposed development can be supported by the transportation network at the 2026 and 2031 horizon years. The development plan leverages its location in close proximity to the future New Orchard LRT Station with enhanced active transportation facilities and will consider various TDM initiatives to promote sustainable travel choices for its residents and reduce the vehicular impacts on the adjacent network. As a result, the analysis confirmed that no off-site roadway modifications were needed to support the development based on information available at the time of this study. The proposed development is recommended to proceed from a transportation perspective.

Prepared By:

Basel Ansari, P.Eng.
Transportation Engineer

Reviewed By:

Austin Shih, M.A.Sc., P.Eng.
Senior Transportation Engineer

Appendix A:

Screening Form and City Comments

Office: +1 613.738.4160
1223 Michael Street, Suite 100|Ottawa, ON K1J 7T2

City of Ottawa 2017 TIA Guidelines

TIA Screening Form

Date	16-Nov-21
Project	1047 Richmond Rd
Project Number	477943-01000

Results of Screening	Yes/No
Development Satisfies the Trip Generation Trigger	Yes
Development Satisfies the Location Trigger	Yes
Development Satisfies the Safety Trigger	Yes

Module 1.1 - Description of Proposed Development	
Municipal Address	1047 Richmond Rd, Ottawa, ON
Description of location	Northeast corner of the intersection of Richmond/New Orchard
Land Use	Apartment units, with first floor retail
Development Size	Three buildings 6-40 storeys, 1,151 units
Number of Accesses and Locations	One on New Orchard Ave
Development Phasing	1 Phase
Buildout Year	Assumed 2026
Sketch Plan / Site Plan	See attached

Module 1.2 - Trip Generation Trigger		
Land Use Type	Townhomes or Apartments	
Development Size	1151	Units
Trip Generation Trigger Met?	Yes	

Module 1.3 - Location Triggers	
Development Proposes a new driveway to a boundary street that is designated as part of the City's Transit Priority, Rapid Transit, or Spine Bicycle Networks (See Sheet 3)	No
Development is in a Design Priority Area (DPA) or Transit-oriented Development (TOD) zone. (See Sheet 3)	Yes
Location Trigger Met?	Yes

Module 1.4 - Safety Triggers		
Posted Speed Limit on any boundary road	<80	km/h
Horizontal / Vertical Curvature on a boundary street limits sight lines at a proposed driveway	No	
A proposed driveway is 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) or within auxiliary lanes of an intersection;	Yes	
A proposed driveway makes use of an existing median break that serves an existing site	No	
There is a documented history of traffic operations or safety concerns on the boundary streets within 500 m of the development	No	
The development includes a drive-thru facility	No	
Safety Trigger Met?	Yes	

CLIENT

Client Name

ISSUES

NO	ISSUANCE	STATUS	DATE

SEAL

SUB CONSULTANT

PRIME CONSULTANT

IBI
ibigroup.com

PROJECT

1047 RICHMOND ROAD
Project Address

PROJECT NO:	Project Number
DRAWN BY:	Author
CHKD' BY:	Checker
SCALE:	1 : 300
DATE:	12/09/20

SHEET TITLE

SITE PLAN

SHEET NUMBER

A102

ISSUE

1223 Michael Street North, Suite 100 | Ottawa, ON K1J 7T2
P: +1 613.738.4160 | F: +1 613.739.7105 | www.parsons.com

5 July 2023

City of Ottawa
Development Review Services
110 Laurier Avenue West
Ottawa, ON K1P 1J1

Attention: Josiane Gervais

Dear Josiane:

Re: 1047 Richmond Rd TIA

Step 5 – Response to City Comments

The following response has been prepared in response to City of Ottawa TIA Forecasting Report comments received on April 18, 2022. City comments are presented in black with the corresponding responses from Parsons in Green.

Transportation Engineering Services

1. Section 4.8 must ensure that the network capacity (auto trips and transit trips) can accommodate the proposed increase in trips due to rezoning of the site. A comparison between the largest trip generation for the current zoning and the proposed rezoning is required to assess if any changes are required in the network that are not reflected in the current TMP. Provide a response to this specific issue if the difference in zoning results in the potential for 200 more peak hour person trips.

   Section 4.8 was updated to provide an estimate of the difference in total person trips between existing zoning and proposed development zoning. It was determined that the difference would not exceed 200 person trips.

2. Transit trips start as pedestrian trips. Ensure adequate facilities and space for the 500 plus trips during peak periods.

   Noted.

3. To support the projected mode shares (which are already heavily supported by the Stage 2 LRT development) ensure that the building integrates well with the transit system as well as the active modes. Provide enhanced measures for cycling, including secure and comfortably designed bicycle parking for each tenant, bicycle repair stations, bicycle wash stations and easy access to bike parking. Conditions defined during zoning could support future site plan submissions.

   Proposed TDM Measures are identified in Section 4.5 of the TIA Report. Further measures may be explored at SPC.

Consideration for future Site Plan Submission

4. Display the protected ROW on both New Orchard and Richmond on the site plan.

   Proponent notified. To be included at SPC.

5. Provide site access grades and ensure compliance with Section 25.1.u of the PABL. Regarding the underground parking ramp grade of 15% shown in Sheet A201 of the Site Plan provided in devApps, please note that such a slope can be difficult for cyclists to clear and can be a psychological barrier to some drivers. When the underground parking ramp's slope exceeds 8%, a vertical-curve transition or a transition slope of half the ramp should be implemented. In addition, when the slope is exceeding 6%, a subsurface melting device should be used.

Ramp and access grades to be confirmed at SPC.

6. Please note that the 3 metre distance requirement mentioned in Section 25.1.p of the PABL applies at both the street line and curb line / roadway edge. As such, both accesses do not seem to meet this clause of the PABL. Attempt to meet the bylaw or an exemption will be required.

   To be reviewed at SPC.

7. In existing conditions, New Orchard Ave N has somewhat of a rural cross-section (especially north of Ambleside Dr where only a substandard asphalt sidewalk is provided on the west side). This development is expected to continue upgrading the remainder of its frontages where the project leaves off (with continuity of the pedestrian and cycling facilities that will be provided as part of the LRT project).

   Frontage on New Orchard Ave is expected to be upgraded as part of development. To be confirmed at SPC.

8. Ensure no issues will arise from the loading zone and underground parking ramp being directly adjacent to each other as shown in Sheet A201 of the Site Plan.

   To be reviewed at SPC.

9. Any drop off locations should be provided on private property and allow for vehicles to return to Richmond Road without making on street u-turns.

   Richmond Rd access has been removed from the latest site plan; therefore, U-turns will not be possible. Access is now only proposed along New Orchard Ave N.

10. Ensure paving materials used on City right of way are durable and appropriate to the harsh urban and climatic conditions of Ottawa. Use materials that can be sourced when needed to be replaced. Contact David Atkinson for additional information on paver selection. A maintenance and liability agreement may be required for these pavers placed in City ROW.

    Proponent notified.

Traffic Signal Operations

11. Synchro model for the 2031 with mitigation shows that the cycle length along the corridor increased to 130s at Richmond/Woodroffe and 120s at the other intersections, in addition to a 30% reduction in volumes. These are very big cycle lengths for relatively small intersections. The side street delays for pedestrians and cyclists will be significant under these circumstances and will not be considered user-friendly. The high non-auto modal shares benchmarks need to be met in order for Richmond Road to function effectively.

    Synchro analysis has been updated. Cycle lengths were reverted to existing conditions cycle lengths at the 2031 demand rationalization scenario.

Traffic Signal Design

12. Please note there is ongoing construction part of stage 2 LRT Confederation line along the Richmond Rd corridor, the intersections have not been finalized. The intersection of Richmond & New Orchard is to be rebuilt in accordance with the Protected Intersection Guidelines and AODA references part of the complete streets rehabilitation project in 2026, this will include all new traffic signal plant.

    Noted. The Protected Intersection Guidelines have been considered as part of the intersection capacity analysis conducted in Synchro.

13. If/when the proposed modifications at 1047 Richmond Road are approved for installation and RMA approved, please forward the approved geometry detail design drawings (dwg digital format, NAD83 coordinates) including base mapping, existing/proposed utilities, approved pavement marking drawing, autoturn templates (in separate digital files) for detail traffic plant design layout. Please send all digital (CAD) design files to Jon.Pach@ottawa.ca.

Note that RMA not needed at this time.

Street Lighting

14. No comments with initial development review. Street Lighting reserves the right to make future comments based on subsequent submissions.

    Noted.

15. Future considerations are as follows:
    a. If there are any proposed changes to the existing city roadway geometry, the City of Ottawa Street Light Asset Management Group is required to provide a full street light design. Street Lighting contact is Barrie Forrester (City of Ottawa) at 613-580-2424 ext. 23332, Barrie.Forrester@ottawa.ca
    b. Be advised that the applicant will be 100% responsible for all costs associated with any relocations/modifications to the existing street light plant.

    Noted.

Appendix B:

Transit Route Maps

11

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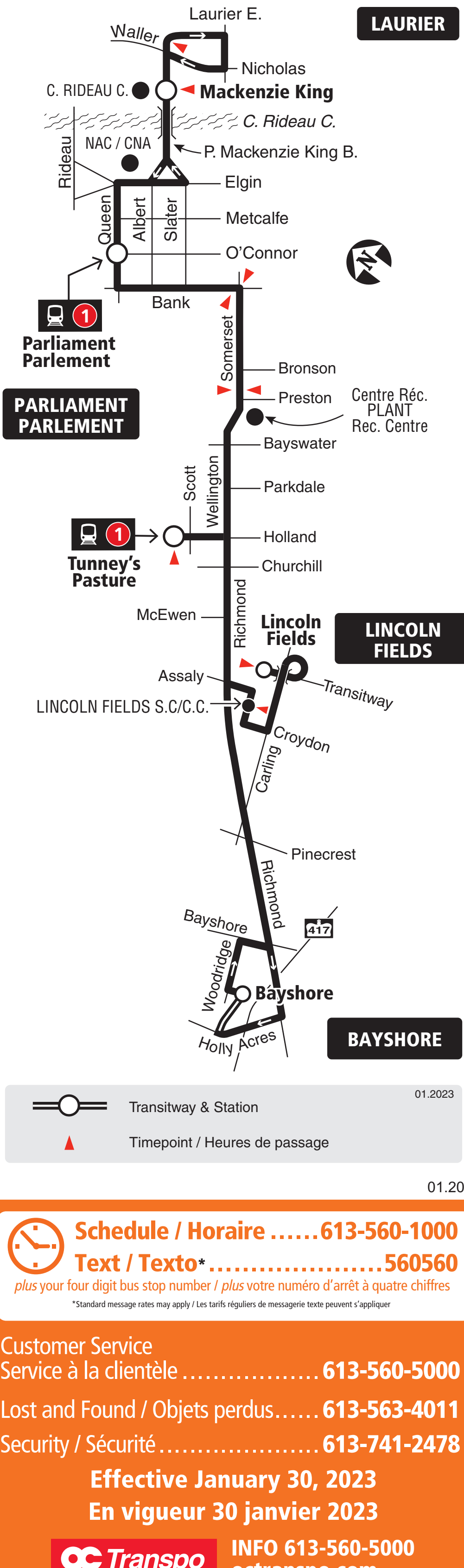

01.2023

Transitway & Station

Timepoint / Heures de passage

01.2023

Schedule / Horaire 613-560-1000

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*Standard message rates may apply / Les tarifs réguliers de messagerie texte peuvent s'appliquer

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Service à la clientèle **613-560-5000**

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

Security / Sécurité **613-741-2478**

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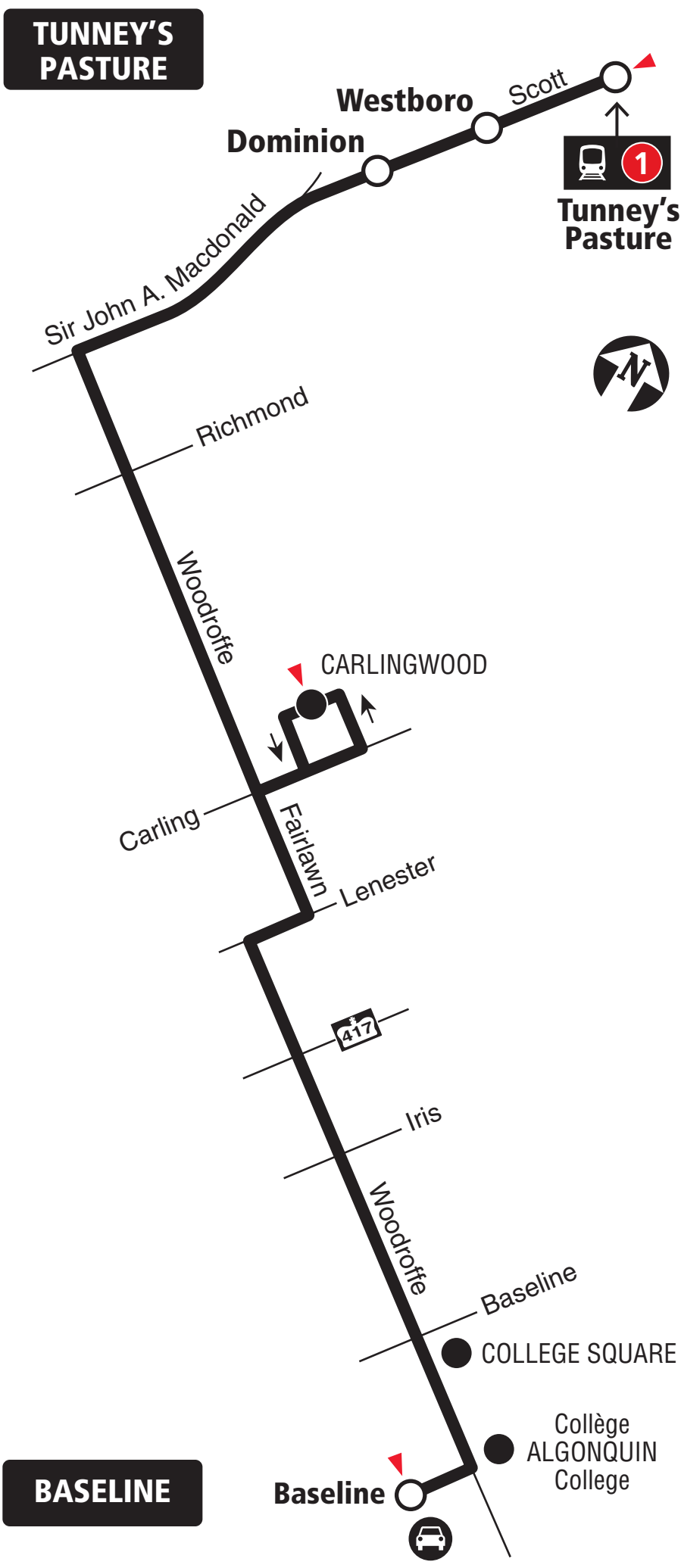


2022.06

Transitway & Station

Park & Ride / Parc-o-bus

Timepoint / Heures de passage

2022.06

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 **613-560-5000**

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

Security / Sécurité **613-741-2478**

Effective June 26, 2022

En vigueur 26 juin 2022

OC Transpo

INFO 613-560-5000
octranspo.com

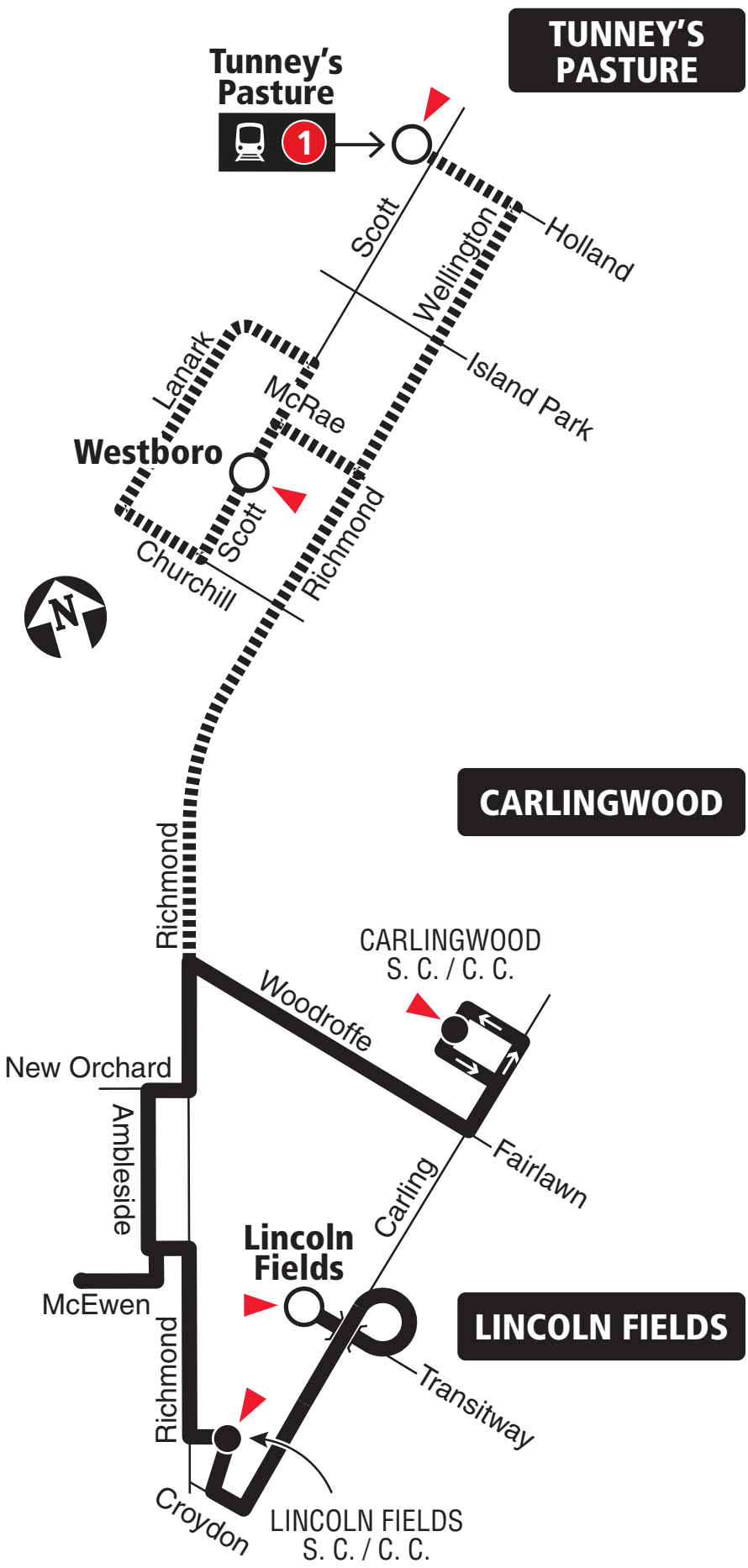
153

LINCOLN FIELDS
TUNNEY'S PASTURE
CARLINGWOOD

Local

7 days a week / 7 jours par semaine

Selected time periods only
Périodes sélectionnées seulement



12.2022

○	Station
▮▮▮▮▮▮▮▮▮▮	Some trips / Quelques trajets
▲	Timepoint / Heures de passage

12.2022

Schedule / Horaire 613-560-1000
Text / Texto* 560560
plus your four digit bus stop number / *plus* votre numéro d'arrêt à quatre chiffres
*Standard message rates may apply / Les tarifs réguliers de messagerie texte peuvent s'appliquer

Customer Service
Service à la clientèle **613-560-5000**

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

Security / Sécurité **613-741-2478**

Effective December 18, 2022
En vigueur 18 décembre 2022

OC Transpo

INFO 613-560-5000
octranspo.com

Appendix C:

Traffic Data

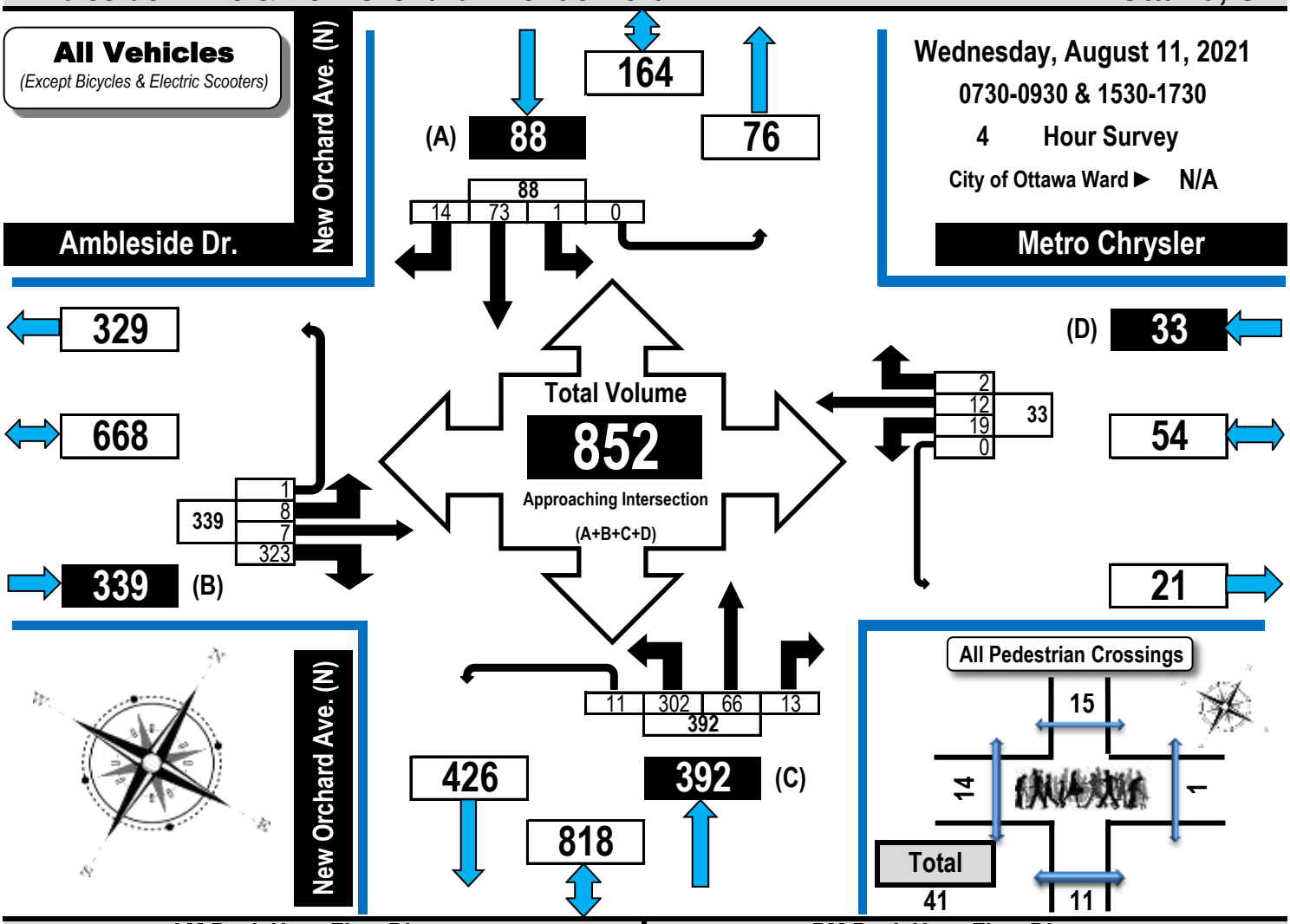
Turning Movement Count
Summary, AM and PM Peak Hour Flow Diagrams
All Vehicles Except Bicycles

Ambleside Drive & New Orchard Avenue North — Ottawa, ON

All Vehicles
(Except Bicycles & Electric Scooters)

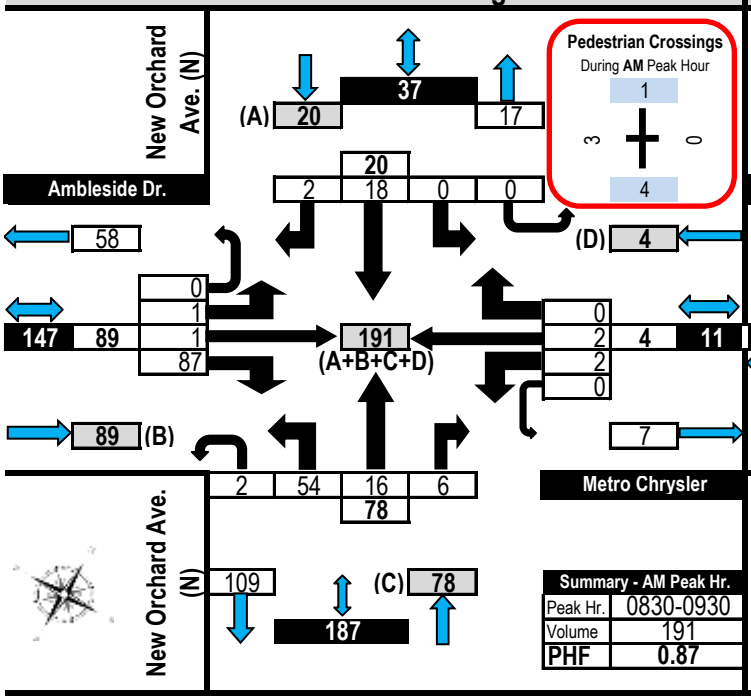
Wednesday, August 11, 2021
0730-0930 & 1530-1730
4 Hour Survey
City of Ottawa Ward ► N/A

Ambleside Dr. | New Orchard Ave. (N) | Metro Chrysler



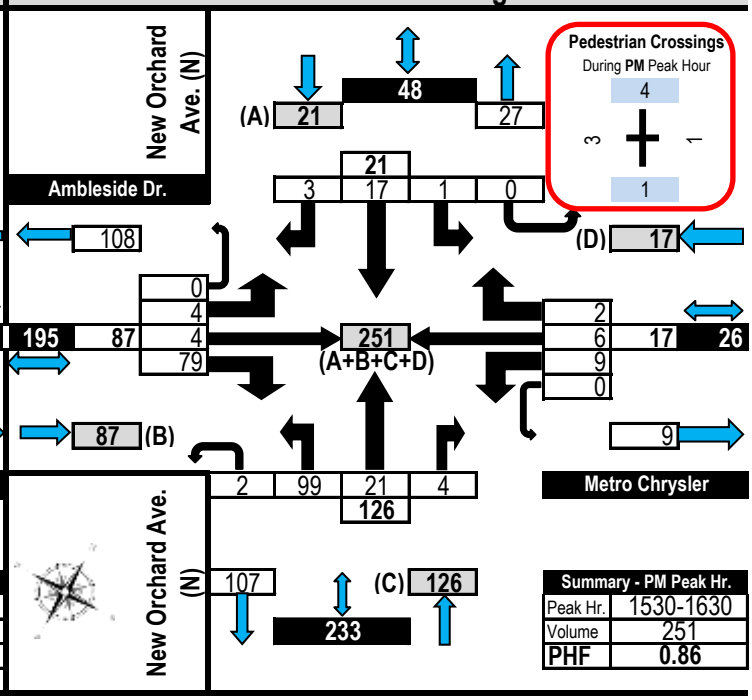
New Orchard Ave. (N)

AM Peak Hour Flow Diagram



Summary - AM Peak Hr.	
Peak Hr.	0830-0930
Volume	191
PHF	0.87

PM Peak Hour Flow Diagram



Summary - PM Peak Hr.	
Peak Hr.	1530-1630
Volume	251
PHF	0.86

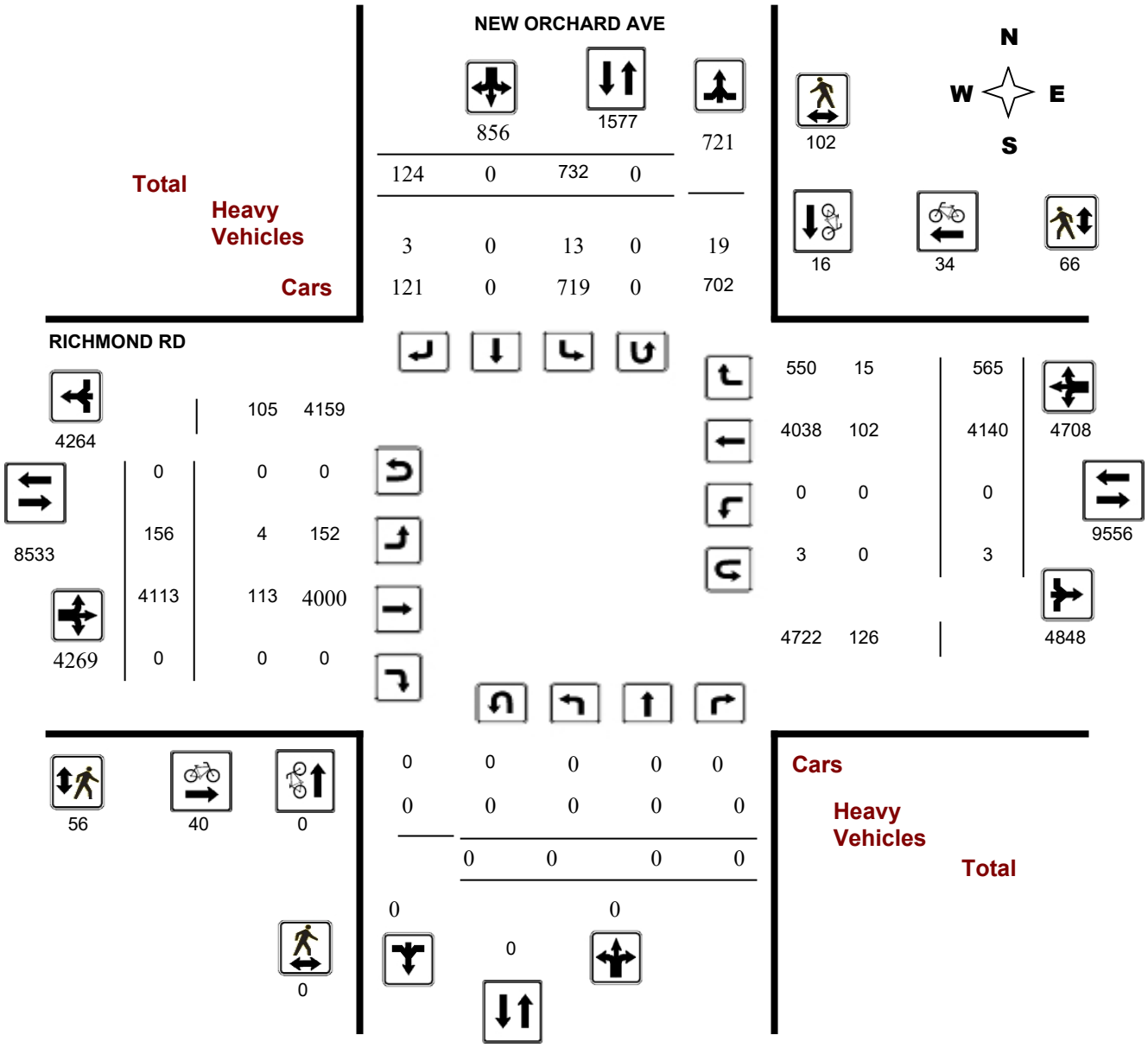
Transportation Services - Traffic Services

Turning Movement Count - Study Results

NEW ORCHARD AVE @ RICHMOND RD

Survey Date: Thursday, August 25, 2016
Start Time: 07:00
WO No: 36256
Device: Miovision

Full Study Diagram



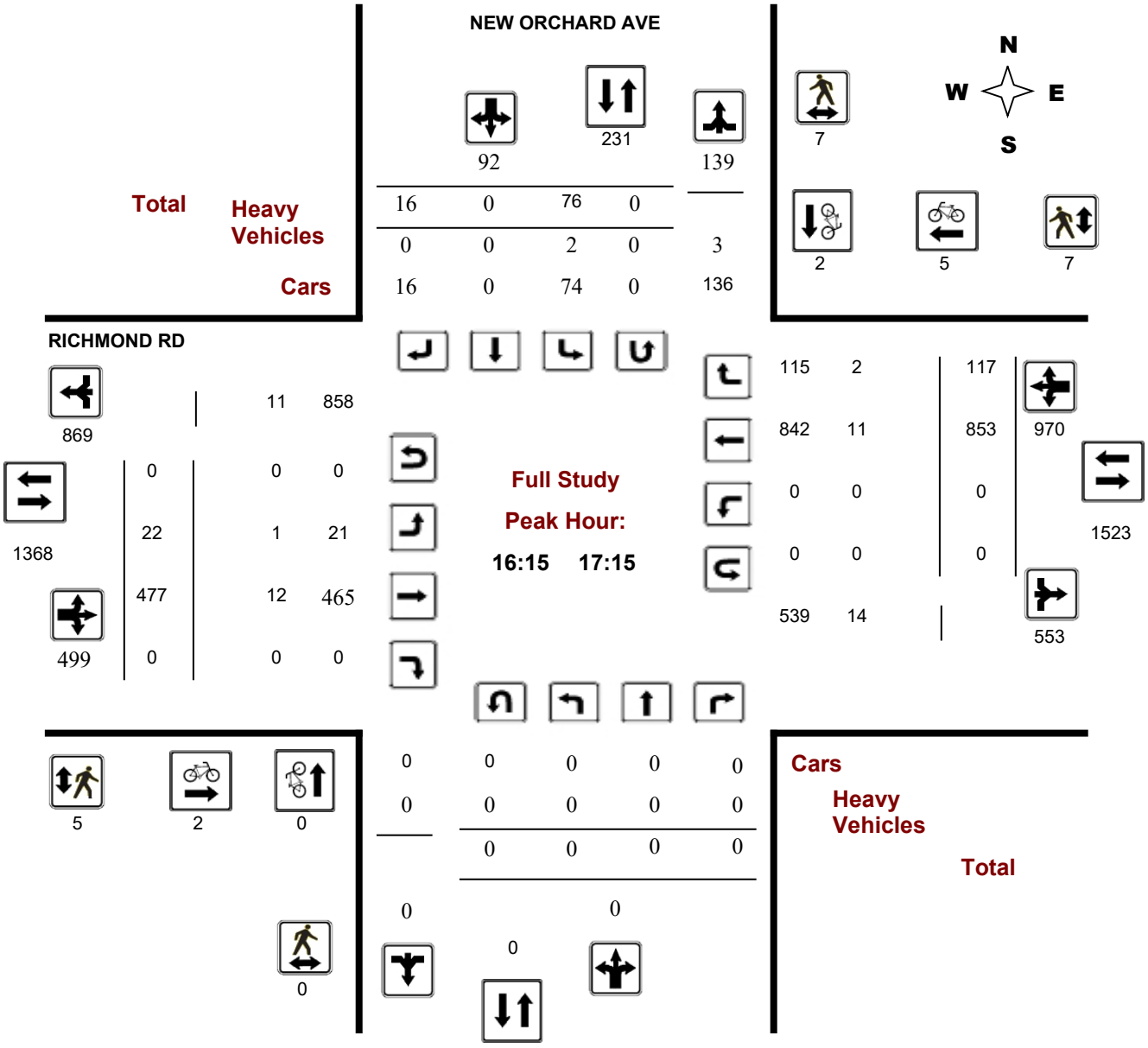
Transportation Services - Traffic Services

Turning Movement Count - Study Results

NEW ORCHARD AVE @ RICHMOND RD

Survey Date: Thursday, August 25, 2016
Start Time: 07:00
WO No: 36256
Device: Miovision

Full Study Peak Hour Diagram



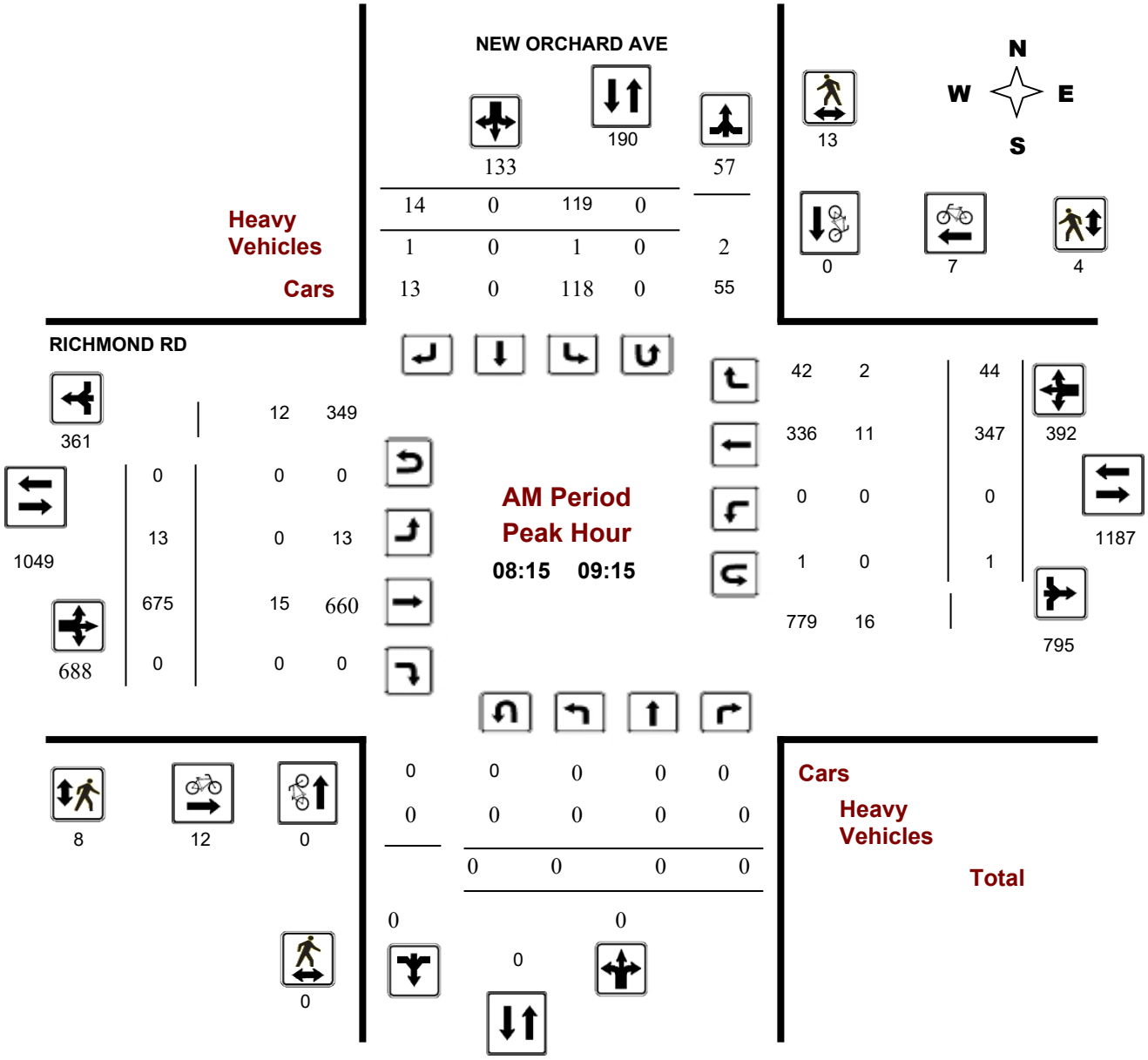
Transportation Services - Traffic Services

Turning Movement Count - Peak Hour Diagram

NEW ORCHARD AVE @ RICHMOND RD

Survey Date: Thursday, August 25, 2016 **WO No:** 36256

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



Comments

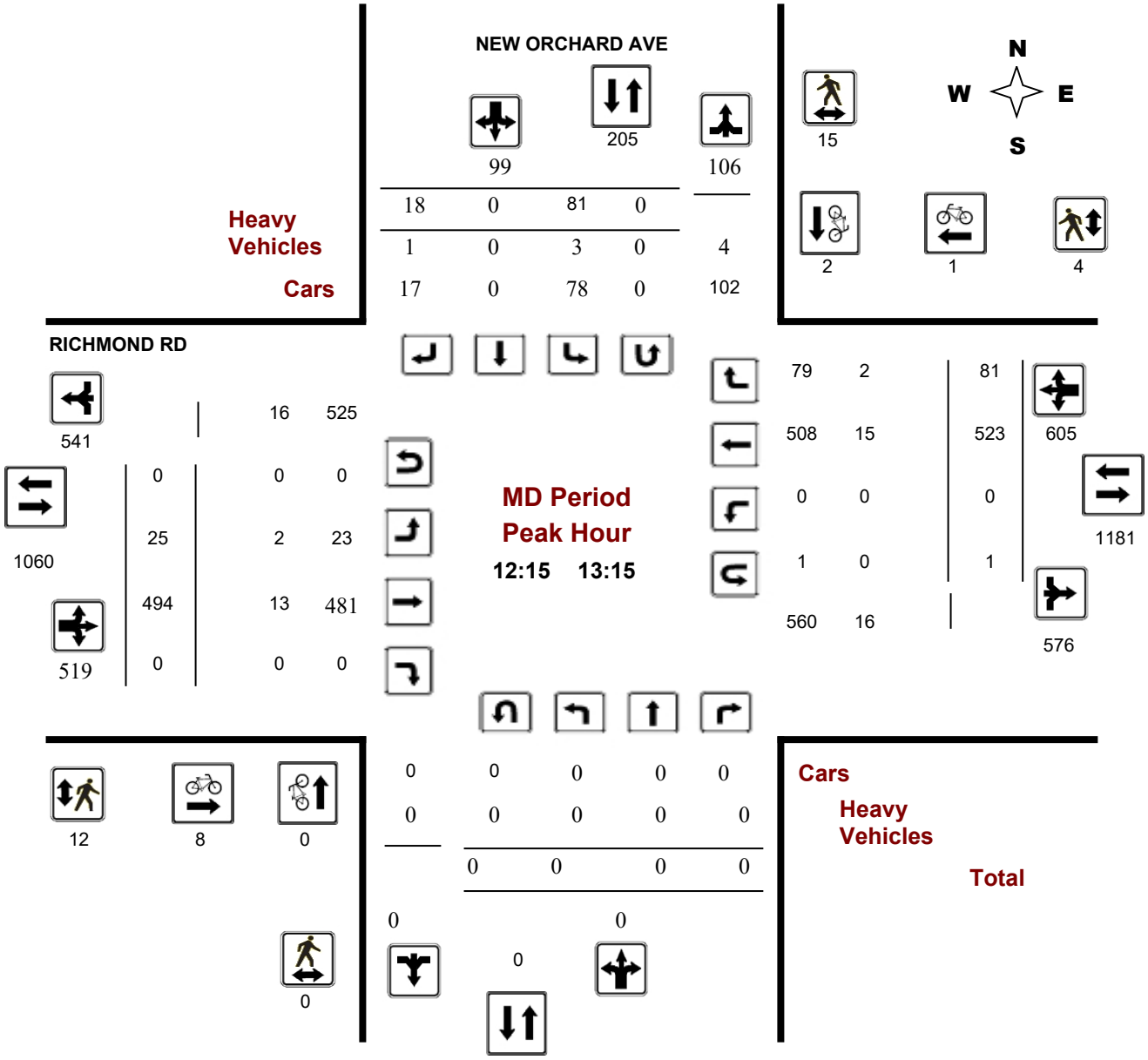
Transportation Services - Traffic Services

Turning Movement Count - Peak Hour Diagram

NEW ORCHARD AVE @ RICHMOND RD

Survey Date: Thursday, August 25, 2016 **WO No:** 36256

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



Comments

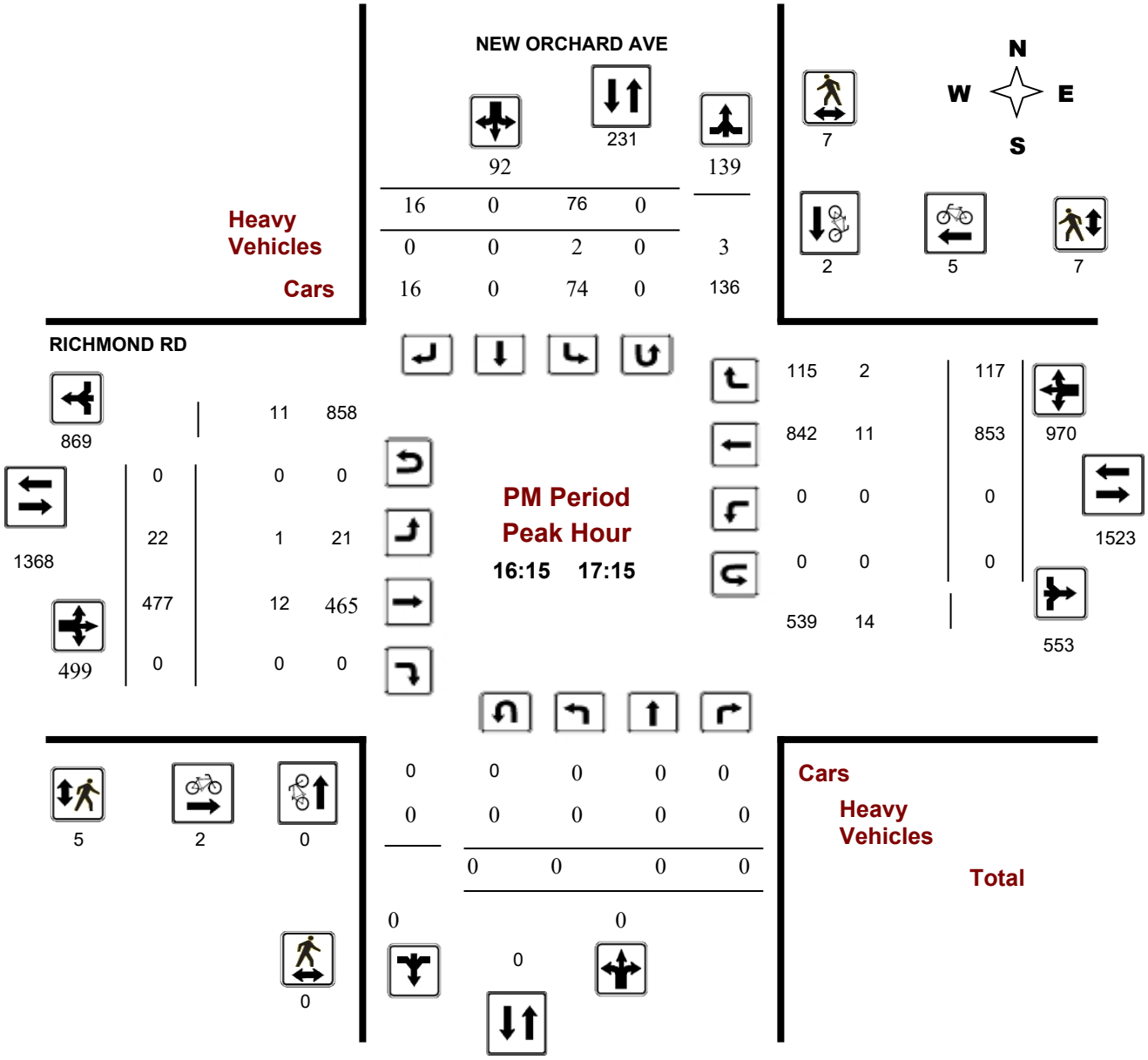
Transportation Services - Traffic Services

Turning Movement Count - Peak Hour Diagram

NEW ORCHARD AVE @ RICHMOND RD

Survey Date: Thursday, August 25, 2016 **WO No:** 36256

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



Comments

Transportation Services - Traffic Services

Turning Movement Count - Study Results

NEW ORCHARD AVE @ RICHMOND RD

Survey Date: Thursday, August 25, 2016 **WO No:** 36256

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

Full Study Summary (8 HR Standard)

Survey Date: Thursday, August 25, 2016

Total Observed U-Turns

Northbound: 0 Southbound: 0

Eastbound: 0 Westbound: 3

AADT Factor

.90

	NEW ORCHARD 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**	93	0	5	**98**	**98**	18	559	0	**577**	0	191	30	**221**	**798**	**896**
08:00 09:00	0	0	0	**0**	104	0	15	**119**	**119**	13	706	0	**719**	0	327	43	**370**	**1089**	**1208**
09:00 10:00	0	0	0	**0**	110	0	11	**121**	**121**	19	493	0	**512**	0	350	49	**399**	**911**	**1032**
11:30 12:30	0	0	0	**0**	94	0	22	**116**	**116**	23	498	0	**521**	0	475	79	**554**	**1075**	**1191**
12:30 13:30	0	0	0	**0**	82	0	14	**96**	**96**	23	488	0	**511**	0	489	76	**565**	**1076**	**1172**
15:00 16:00	0	0	0	**0**	95	0	18	**113**	**113**	20	431	0	**451**	0	696	95	**791**	**1242**	**1355**
16:00 17:00	0	0	0	**0**	73	0	20	**93**	**93**	17	459	0	**476**	0	819	103	**922**	**1398**	**1491**
17:00 18:00	0	0	0	**0**	81	0	19	**100**	**100**	23	479	0	**502**	0	793	90	**883**	**1385**	**1485**
Sub Total	0	0	0	**0**	732	0	124	**856**	**856**	156	4113	0	**4269**	0	4140	565	**4705**	**8974**	**9830**
U Turns	0			**0**	0			**0**	**0**	**0**			**0**	3			**3**	**3**	**3**
Total	0	0	0	**0**	732	0	124	**856**	**856**	156	4113	0	**4269**	3	4140	565	**4708**	**8977**	**9833**
EQ 12Hr	0	0	0	**0**	1017	0	172	**1189**	**1189**	217	5717	0	**5934**	4	5755	785	**6544**	**12478**	**13667**
Note: These values are calculated by multiplying the totals by the appropriate expansion factor.														**1.39**					
AVG 12Hr	0	0	0	**0**	915	0	155	**1070**	**1070**	195	5145	0	**5340**	4	5180	706	**5890**	**11230**	**12300**
Note: These volumes are calculated by multiplying the Equivalent 12 hr. totals by the AADT factor.														**.90**					
AVG 24Hr	0	0	0	**0**	1199	0	203	**1402**	**1402**	255	6740	0	**6995**	5	6786	925	**7716**	**14711**	**16113**
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

NEW ORCHARD AVE @ RICHMOND RD

Survey Date: Thursday, August 25, 2016 **WO No:** 36256

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

Full Study 15 Minute Increments

		NEW ORCHARD 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	17	0	0	17	**17**	4	103	0	107	0	32	4	36	**143**	**160**
07:15	07:30	0	0	0	0	18	0	1	19	**19**	4	128	0	132	0	59	7	66	**198**	**217**
07:30	07:45	0	0	0	0	26	0	1	27	**27**	7	157	0	164	0	42	8	50	**214**	**241**
07:45	08:00	0	0	0	0	32	0	3	35	**35**	3	171	0	174	0	58	11	69	**243**	**278**
08:00	08:15	0	0	0	0	21	0	4	25	**25**	5	177	0	182	0	68	9	77	**259**	**284**
08:15	08:30	0	0	0	0	22	0	6	28	**28**	1	161	0	162	0	82	8	90	**252**	**280**
08:30	08:45	0	0	0	0	25	0	4	29	**29**	2	177	0	179	1	90	12	103	**282**	**311**
08:45	09:00	0	0	0	0	36	0	1	37	**37**	5	191	0	196	0	87	14	101	**297**	**334**
09:00	09:15	0	0	0	0	36	0	3	39	**39**	5	146	0	151	0	88	10	98	**249**	**288**
09:15	09:30	0	0	0	0	26	0	1	27	**27**	5	110	0	115	0	87	11	98	**213**	**240**
09:30	09:45	0	0	0	0	21	0	5	26	**26**	4	113	0	117	0	89	15	104	**221**	**247**
09:45	10:00	0	0	0	0	27	0	2	29	**29**	5	124	0	129	0	86	13	99	**228**	**257**
11:30	11:45	0	0	0	0	22	0	4	26	**26**	7	132	0	139	1	116	14	131	**270**	**296**
11:45	12:00	0	0	0	0	19	0	5	24	**24**	5	135	0	140	0	109	24	133	**273**	**297**
12:00	12:15	0	0	0	0	32	0	5	37	**37**	7	115	0	122	0	112	20	132	**254**	**291**
12:15	12:30	0	0	0	0	21	0	8	29	**29**	4	116	0	120	0	138	21	159	**279**	**308**
12:30	12:45	0	0	0	0	21	0	4	25	**25**	13	123	0	136	0	130	29	159	**295**	**320**
12:45	13:00	0	0	0	0	19	0	4	23	**23**	3	124	0	127	0	126	13	139	**266**	**289**
13:00	13:15	0	0	0	0	20	0	2	22	**22**	5	131	0	136	1	129	18	148	**284**	**306**
13:15	13:30	0	0	0	0	22	0	4	26	**26**	2	110	0	112	0	104	16	120	**232**	**258**
15:00	15:15	0	0	0	0	26	0	8	34	**34**	3	95	0	98	0	125	27	152	**250**	**284**
15:15	15:30	0	0	0	0	27	0	3	30	**30**	7	114	0	121	0	155	21	176	**297**	**327**
15:30	15:45	0	0	0	0	17	0	5	22	**22**	6	109	0	115	0	191	26	217	**332**	**354**
15:45	16:00	0	0	0	0	25	0	2	27	**27**	4	113	0	117	0	225	21	246	**363**	**390**
16:00	16:15	0	0	0	0	19	0	10	29	**29**	4	109	0	113	0	188	23	211	**324**	**353**
16:15	16:30	0	0	0	0	19	0	5	24	**24**	3	118	0	121	0	213	26	239	**360**	**384**
16:30	16:45	0	0	0	0	22	0	2	24	**24**	5	120	0	125	0	200	27	227	**352**	**376**
16:45	17:00	0	0	0	0	13	0	3	16	**16**	5	112	0	117	0	218	27	245	**362**	**378**
17:00	17:15	0	0	0	0	22	0	6	28	**28**	9	127	0	136	0	222	37	259	**395**	**423**
17:15	17:30	0	0	0	0	22	0	4	26	**26**	4	121	0	125	0	197	20	217	**342**	**368**
17:30	17:45	0	0	0	0	18	0	4	22	**22**	4	108	0	112	0	207	21	228	**340**	**362**
17:45	18:00	0	0	0	0	19	0	5	24	**24**	6	123	0	129	0	167	12	179	**308**	**332**
Total:		0	0	0	0	732	0	124	856	**856**	156	4113	0	4269	3	4140	565	4708	**856**	**9,833**

Note: U-Turns are included in Totals.

Transportation Services - Traffic Services

Turning Movement Count - Study Results

NEW ORCHARD AVE @ RICHMOND RD

Survey Date: Thursday, August 25, 2016 **WO No:** 36256

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

Full Study Cyclist Volume

Time Period		NEW ORCHARD AVE			RICHMOND RD			
		Northbound	Southbound	Street Total	Eastbound	Westbound	Street Total	Grand Total
07:00	07:15	0	0	**0**	1	1	**2**	**2**
07:15	07:30	0	0	**0**	2	3	**5**	**5**
07:30	07:45	0	0	**0**	2	2	**4**	**4**
07:45	08:00	0	0	**0**	2	3	**5**	**5**
08:00	08:15	0	2	**2**	3	2	**5**	**7**
08:15	08:30	0	0	**0**	3	4	**7**	**7**
08:30	08:45	0	0	**0**	3	1	**4**	**4**
08:45	09:00	0	0	**0**	4	1	**5**	**5**
09:00	09:15	0	0	**0**	2	1	**3**	**3**
09:15	09:30	0	0	**0**	0	0	**0**	**0**
09:30	09:45	0	1	**1**	1	0	**1**	**2**
09:45	10:00	0	0	**0**	2	0	**2**	**2**
11:30	11:45	0	0	**0**	0	1	**1**	**1**
11:45	12:00	0	0	**0**	2	0	**2**	**2**
12:00	12:15	0	0	**0**	0	0	**0**	**0**
12:15	12:30	0	1	**1**	0	1	**1**	**2**
12:30	12:45	0	0	**0**	2	0	**2**	**2**
12:45	13:00	0	1	**1**	5	0	**5**	**6**
13:00	13:15	0	0	**0**	1	0	**1**	**1**
13:15	13:30	0	1	**1**	0	0	**0**	**1**
15:00	15:15	0	0	**0**	0	0	**0**	**0**
15:15	15:30	0	1	**1**	0	0	**0**	**1**
15:30	15:45	0	1	**1**	0	0	**0**	**1**
15:45	16:00	0	0	**0**	0	0	**0**	**0**
16:00	16:15	0	0	**0**	0	2	**2**	**2**
16:15	16:30	0	0	**0**	0	1	**1**	**1**
16:30	16:45	0	0	**0**	0	1	**1**	**1**
16:45	17:00	0	1	**1**	0	1	**1**	**2**
17:00	17:15	0	1	**1**	2	2	**4**	**5**
17:15	17:30	0	3	**3**	2	2	**4**	**7**
17:30	17:45	0	0	**0**	0	3	**3**	**3**
17:45	18:00	0	3	**3**	1	2	**3**	**6**
Total		0	16	**16**	40	34	**74**	**90**

Transportation Services - Traffic Services

Turning Movement Count - Study Results

NEW ORCHARD AVE @ RICHMOND RD

Survey Date: Thursday, August 25, 2016 **WO No:** 36256

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

Full Study Pedestrian Volume

	NEW ORCHARD 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	2	**2**	2	0	**2**	**4**
07:15 07:30	0	1	**1**	0	0	**0**	**1**
07:30 07:45	0	0	**0**	0	1	**1**	**1**
07:45 08:00	0	1	**1**	0	2	**2**	**3**
08:00 08:15	0	3	**3**	2	1	**3**	**6**
08:15 08:30	0	3	**3**	2	2	**4**	**7**
08:30 08:45	0	4	**4**	1	0	**1**	**5**
08:45 09:00	0	3	**3**	3	2	**5**	**8**
09:00 09:15	0	3	**3**	2	0	**2**	**5**
09:15 09:30	0	6	**6**	4	4	**8**	**14**
09:30 09:45	0	4	**4**	1	2	**3**	**7**
09:45 10:00	0	1	**1**	3	2	**5**	**6**
11:30 11:45	0	1	**1**	0	3	**3**	**4**
11:45 12:00	0	5	**5**	1	4	**5**	**10**
12:00 12:15	0	7	**7**	0	2	**2**	**9**
12:15 12:30	0	4	**4**	2	1	**3**	**7**
12:30 12:45	0	3	**3**	4	1	**5**	**8**
12:45 13:00	0	3	**3**	2	0	**2**	**5**
13:00 13:15	0	5	**5**	4	2	**6**	**11**
13:15 13:30	0	4	**4**	3	5	**8**	**12**
15:00 15:15	0	5	**5**	1	1	**2**	**7**
15:15 15:30	0	11	**11**	8	7	**15**	**26**
15:30 15:45	0	7	**7**	1	3	**4**	**11**
15:45 16:00	0	0	**0**	2	3	**5**	**5**
16:00 16:15	0	2	**2**	0	5	**5**	**7**
16:15 16:30	0	2	**2**	1	3	**4**	**6**
16:30 16:45	0	1	**1**	2	1	**3**	**4**
16:45 17:00	0	3	**3**	0	2	**2**	**5**
17:00 17:15	0	1	**1**	2	1	**3**	**4**
17:15 17:30	0	4	**4**	1	5	**6**	**10**
17:30 17:45	0	1	**1**	1	0	**1**	**2**
17:45 18:00	0	2	**2**	1	1	**2**	**4**
Total	0	102	**102**	56	66	**122**	**224**

Transportation Services - Traffic Services

Turning Movement Count - Study Results

NEW ORCHARD AVE @ RICHMOND RD

Survey Date: Thursday, August 25, 2016 **WO No:** 36256

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

Full Study Heavy Vehicles

		NEW ORCHARD 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	5	0	**5**	0	0	0	**0**	**5**	**5**
07:15	07:30	0	0	0	**0**	0	0	0	**0**	**0**	0	3	0	**3**	0	2	0	**2**	**5**	**5**
07:30	07:45	0	0	0	**0**	0	0	0	**0**	**0**	0	3	0	**3**	0	2	0	**2**	**5**	**5**
07:45	08:00	0	0	0	**0**	0	0	0	**0**	**0**	0	5	0	**5**	0	4	0	**4**	**9**	**9**
08:00	08:15	0	0	0	**0**	1	0	0	**1**	**1**	1	3	0	**4**	0	5	0	**5**	**9**	**10**
08:15	08:30	0	0	0	**0**	0	0	1	**1**	**1**	0	3	0	**3**	0	3	0	**3**	**6**	**7**
08:30	08:45	0	0	0	**0**	0	0	0	**0**	**0**	0	4	0	**4**	0	2	0	**2**	**6**	**6**
08:45	09:00	0	0	0	**0**	1	0	0	**1**	**1**	0	4	0	**4**	0	4	2	**6**	**10**	**11**
09:00	09:15	0	0	0	**0**	0	0	0	**0**	**0**	0	4	0	**4**	0	2	0	**2**	**6**	**6**
09:15	09:30	0	0	0	**0**	0	0	0	**0**	**0**	0	3	0	**3**	0	3	1	**4**	**7**	**7**
09:30	09:45	0	0	0	**0**	1	0	0	**1**	**1**	0	4	0	**4**	0	3	1	**4**	**8**	**9**
09:45	10:00	0	0	0	**0**	2	0	0	**2**	**2**	0	3	0	**3**	0	3	2	**5**	**8**	**10**
11:30	11:45	0	0	0	**0**	0	0	0	**0**	**0**	0	7	0	**7**	0	9	0	**9**	**16**	**16**
11:45	12:00	0	0	0	**0**	0	0	1	**1**	**1**	0	6	0	**6**	0	3	3	**6**	**12**	**13**
12:00	12:15	0	0	0	**0**	0	0	0	**0**	**0**	0	6	0	**6**	0	6	0	**6**	**12**	**12**
12:15	12:30	0	0	0	**0**	2	0	1	**3**	**3**	1	1	0	**2**	0	4	0	**4**	**6**	**9**
12:30	12:45	0	0	0	**0**	0	0	0	**0**	**0**	1	2	0	**3**	0	2	1	**3**	**6**	**6**
12:45	13:00	0	0	0	**0**	1	0	0	**1**	**1**	0	4	0	**4**	0	6	1	**7**	**11**	**12**
13:00	13:15	0	0	0	**0**	0	0	0	**0**	**0**	0	6	0	**6**	0	3	0	**3**	**9**	**9**
13:15	13:30	0	0	0	**0**	1	0	0	**1**	**1**	0	3	0	**3**	0	3	0	**3**	**6**	**7**
15:00	15:15	0	0	0	**0**	1	0	0	**1**	**1**	0	5	0	**5**	0	4	0	**4**	**9**	**10**
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	4	0	**4**	**7**	**7**
15:45	16:00	0	0	0	**0**	0	0	0	**0**	**0**	0	3	0	**3**	0	2	0	**2**	**5**	**5**
16:00	16:15	0	0	0	**0**	0	0	0	**0**	**0**	0	1	0	**1**	0	2	0	**2**	**3**	**3**
16:15	16:30	0	0	0	**0**	2	0	0	**2**	**2**	0	5	0	**5**	0	1	0	**1**	**6**	**8**
16:30	16:45	0	0	0	**0**	0	0	0	**0**	**0**	0	2	0	**2**	0	4	2	**6**	**8**	**8**
16:45	17:00	0	0	0	**0**	0	0	0	**0**	**0**	0	1	0	**1**	0	2	0	**2**	**3**	**3**
17:00	17:15	0	0	0	**0**	0	0	0	**0**	**0**	1	4	0	**5**	0	4	0	**4**	**9**	**9**
17:15	17:30	0	0	0	**0**	1	0	0	**1**	**1**	0	2	0	**2**	0	2	1	**3**	**5**	**6**
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	2	0	**2**	0	1	1	**2**	**4**	**4**
Total:	None	0	0	0	**0**	13	0	3	**16**	**16**	4	113	0	**117**	0	102	15	**117**	**234**	**250**

Transportation Services - Traffic Services

Turning Movement Count - Study Results

NEW ORCHARD AVE @ RICHMOND RD

Survey Date: Thursday, August 25, 2016 **WO No:** 36256

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

Full Study 15 Minute U-Turn Total

Time Period		NEW ORCHARD AVE Northbound U-Turn Total	NEW ORCHARD 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	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	1	**1**
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	1	**1**
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	1	**1**
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	3	**3**

Transportation Services - Traffic Services

W.O. 36566

Turning Movement Count - 15 Minute Summary Report

RICHMOND RD @ WOODROFFE AVE

Survey Date: Thursday, December 01, 2016

Total Observed U-Turns

Northbound: 0 Southbound: 0

Eastbound: 0 Westbound: 1

		WOODROFFE 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	16	44	18	**78**	5	81	10	**96**	**174**	24	106	36	**166**	11	32	4	**47**	**213**	**387**
07:15	07:30	18	48	15	**81**	7	86	18	**111**	**192**	29	132	35	**196**	11	33	3	**47**	**243**	**435**
07:30	07:45	25	65	22	**112**	11	92	12	**115**	**227**	36	154	54	**244**	11	22	2	**35**	**279**	**506**
07:45	08:00	33	75	20	**128**	5	90	17	**112**	**240**	37	175	50	**262**	17	42	5	**64**	**326**	**566**
08:00	08:15	26	67	20	**113**	11	69	14	**94**	**207**	39	188	56	**283**	17	56	4	**77**	**360**	**567**
08:15	08:30	32	49	28	**109**	15	83	8	**106**	**215**	37	189	55	**281**	10	73	7	**90**	**371**	**586**
08:30	08:45	26	66	24	**116**	8	87	22	**117**	**233**	39	187	55	**281**	18	58	4	**80**	**361**	**594**
08:45	09:00	25	67	24	**116**	7	66	19	**92**	**208**	30	189	43	**262**	18	54	5	**77**	**339**	**547**
09:00	09:15	33	57	26	**116**	5	67	11	**83**	**199**	29	132	49	**210**	22	70	7	**99**	**309**	**508**
09:15	09:30	27	42	12	**81**	4	48	9	**61**	**142**	19	99	46	**164**	21	49	2	**72**	**236**	**378**
09:30	09:45	45	54	22	**121**	2	56	12	**70**	**191**	18	88	63	**169**	22	59	2	**83**	**252**	**443**
09:45	10:00	46	44	21	**111**	2	47	9	**58**	**169**	22	81	73	**176**	26	66	2	**94**	**270**	**439**
11:30	11:45	35	43	34	**112**	4	42	11	**57**	**169**	17	72	49	**138**	25	69	6	**100**	**238**	**407**
11:45	12:00	45	65	26	**136**	4	60	12	**76**	**212**	24	82	60	**166**	36	48	4	**88**	**254**	**466**
12:00	12:15	62	46	25	**133**	7	54	11	**72**	**205**	16	78	61	**155**	27	87	6	**120**	**275**	**480**
12:15	12:30	48	58	24	**130**	4	51	6	**61**	**191**	19	77	75	**171**	26	89	9	**124**	**295**	**486**
12:30	12:45	53	58	29	**140**	5	59	16	**80**	**220**	22	69	57	**148**	29	80	2	**111**	**259**	**479**
12:45	13:00	50	63	27	**140**	4	46	9	**59**	**199**	16	71	61	**148**	32	77	9	**118**	**266**	**465**
13:00	13:15	53	57	20	**130**	3	49	9	**61**	**191**	22	73	60	**155**	38	81	7	**126**	**281**	**472**
13:15	13:30	45	64	25	**134**	6	49	10	**65**	**199**	20	68	62	**150**	29	80	6	**115**	**265**	**464**
15:00	15:15	59	92	17	**168**	8	77	11	**96**	**264**	31	88	47	**166**	34	90	7	**131**	**297**	**561**
15:15	15:30	53	91	15	**159**	10	93	20	**123**	**282**	22	65	36	**123**	40	117	3	**160**	**283**	**565**
15:30	15:45	59	115	34	**208**	9	88	21	**118**	**326**	16	67	53	**136**	36	150	16	**202**	**338**	**664**
15:45	16:00	59	81	24	**164**	7	88	18	**113**	**277**	13	74	42	**129**	43	176	11	**230**	**359**	**636**
16:00	16:15	57	95	24	**176**	5	102	13	**120**	**296**	19	71	43	**133**	52	163	14	**229**	**362**	**658**
16:15	16:30	46	100	15	**161**	8	90	17	**115**	**276**	14	84	44	**142**	53	156	10	**219**	**361**	**637**
16:30	16:45	70	96	22	**188**	3	73	17	**93**	**281**	29	86	46	**161**	64	161	4	**230**	**391**	**672**
16:45	17:00	59	111	27	**197**	9	75	15	**99**	**296**	21	81	42	**144**	48	147	3	**198**	**342**	**638**
17:00	17:15	49	80	24	**153**	5	81	15	**101**	**254**	18	90	49	**157**	49	160	5	**214**	**371**	**625**
17:15	17:30	57	100	28	**185**	11	94	22	**127**	**312**	9	93	38	**140**	51	147	9	**207**	**347**	**659**
17:30	17:45	62	68	18	**148**	9	86	17	**112**	**260**	21	73	41	**135**	47	158	2	**207**	**342**	**602**
17:45	18:00	71	76	27	**174**	7	95	22	**124**	**298**	30	88	35	**153**	34	139	6	**179**	**332**	**630**
TOTAL:		1444	2237	737	**4418**	210	2324	453	**2987**	**7405**	758	3270	1616	**5644**	997	2989	186	**4173**	**9817**	**17222**

Note: U-Turns are included in Totals.

Comment:

Transportation Services - Traffic Services

Turning Movement Count - Cyclist Volume Report

Work Order
36566

RICHMOND RD @ WOODROFFE AVE

Count Date: Thursday, December 01, 2016 **Start Time:** 07:00

	WOODROFFE AVE			RICHMOND RD			
Time Period	Northbound	Southbound	**Street Total**	Eastbound	Westbound	**Street Total**	**Grand Total**
07:00 08:00	0	1	**1**	1	2	**3**	**4**
08:00 09:00	2	1	**3**	1	1	**2**	**5**
09:00 10:00	0	0	**0**	3	0	**3**	**3**
11:30 12:30	0	0	**0**	0	0	**0**	**0**
12:30 13:30	1	0	**1**	1	0	**1**	**2**
15:00 16:00	0	0	**0**	0	0	**0**	**0**
16:00 17:00	0	1	**1**	0	1	**1**	**2**
17:00 18:00	0	2	**2**	0	2	**2**	**4**
Total	3	5	**8**	6	6	**12**	**20**

Comment:

Note: These volumes consists of bicycles only (no mopeds or motorcycles) and ARE NOT included in the Turning Movement Count Summary.

Transportation Services - Traffic Services

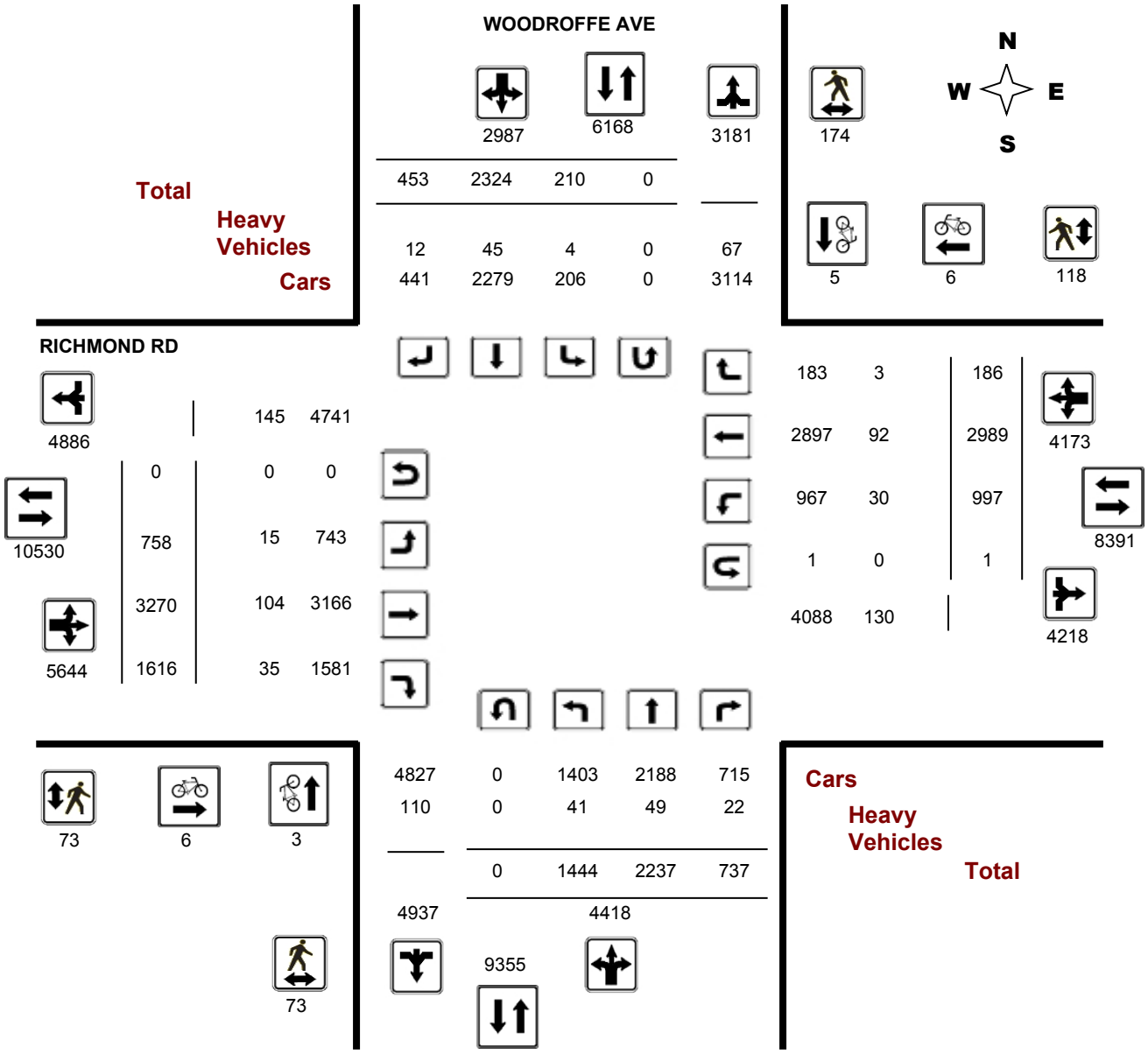
Turning Movement Count - Full Study Diagram

RICHMOND RD @ WOODROFFE AVE

Survey Date: Thursday, December 01, 2016

WO#: 36566

Device: Miovision



Comments

Transportation Services - Traffic Services

W.O. 36566

Turning Movement Count - Heavy Vehicle Report

RICHMOND RD @ WOODROFFE AVE

Survey Date: Thursday, December 01, 2016

		WOODROFFE 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	08:00	7	6	4	**17**	2	6	0	**8**	**25**	3	25	1	**29**	0	7	0	**7**	**36**	**61**
08:00	09:00	5	5	4	**14**	0	6	1	**7**	**21**	4	28	9	**41**	6	17	1	**24**	**65**	**86**
09:00	10:00	7	8	7	**22**	1	3	2	**6**	**28**	1	14	3	**18**	8	11	1	**20**	**38**	**66**
11:30	12:30	2	8	4	**14**	0	3	2	**5**	**19**	3	6	2	**11**	3	7	1	**11**	**22**	**41**
12:30	13:30	7	6	1	**14**	0	7	3	**10**	**24**	1	8	6	**15**	9	16	0	**25**	**40**	**64**
15:00	16:00	3	7	1	**11**	0	6	4	**10**	**21**	0	9	7	**16**	0	9	0	**9**	**25**	**46**
16:00	17:00	7	6	1	**14**	1	7	0	**8**	**22**	2	8	4	**14**	1	16	0	**17**	**31**	**53**
17:00	18:00	3	3	0	**6**	0	7	0	**7**	**13**	1	6	3	**10**	3	9	0	**12**	**22**	**35**
Sub Total		41	49	22	**112**	4	45	12	**61**	**173**	15	104	35	**154**	30	92	3	**125**	**279**	**452**
U-Turns (Heavy Vehicles)					**0**				**0**	**0**				**0**				**0**	**0**	**0**
Total		41	49	22	**0**	4	45	12	**61**	**173**	15	104	35	**154**	30	92	3	**125**	**279**	**452**

Heavy Vehicles include Buses, Single-Unit Trucks and Articulated Trucks. Further, they ARE included in the Turning Movement Count Summary.

Transportation Services - Traffic Services

Work Order
36566

Turning Movement Count - Pedestrian Volume Report

RICHMOND RD @ WOODROFFE AVE

Count Date: Thursday, December 01, 2016 **Start Time:** 07:00

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	1	2	**3**	1	1	**2**	**5**
07:15 07:30	0	5	**5**	0	4	**4**	**9**
07:30 07:45	2	8	**10**	1	12	**13**	**23**
07:45 08:00	3	10	**13**	1	11	**12**	**25**
07:00 08:00	6	25	**31**	3	28	**31**	**62**
08:00 08:15	3	4	**7**	3	5	**8**	**15**
08:15 08:30	0	12	**12**	3	2	**5**	**17**
08:30 08:45	1	8	**9**	4	6	**10**	**19**
08:45 09:00	6	6	**12**	4	3	**7**	**19**
08:00 09:00	10	30	**40**	14	16	**30**	**70**
09:00 09:15	0	8	**8**	1	2	**3**	**11**
09:15 09:30	5	1	**6**	2	2	**4**	**10**
09:30 09:45	2	4	**6**	1	2	**3**	**9**
09:45 10:00	1	4	**5**	4	8	**12**	**17**
09:00 10:00	8	17	**25**	8	14	**22**	**47**
11:30 11:45	2	2	**4**	2	2	**4**	**8**
11:45 12:00	2	4	**6**	3	6	**9**	**15**
12:00 12:15	1	10	**11**	1	3	**4**	**15**
12:15 12:30	1	6	**7**	1	3	**4**	**11**
11:30 12:30	6	22	**28**	7	14	**21**	**49**
12:30 12:45	2	7	**9**	6	1	**7**	**16**
12:45 13:00	2	1	**3**	2	1	**3**	**6**
13:00 13:15	3	3	**6**	0	1	**1**	**7**
13:15 13:30	1	5	**6**	2	2	**4**	**10**
12:30 13:30	8	16	**24**	10	5	**15**	**39**
15:00 15:15	0	5	**5**	3	0	**3**	**8**
15:15 15:30	1	2	**3**	2	1	**3**	**6**
15:30 15:45	1	4	**5**	5	2	**7**	**12**
15:45 16:00	1	3	**4**	1	3	**4**	**8**
15:00 16:00	3	14	**17**	11	6	**17**	**34**
16:00 16:15	2	11	**13**	2	7	**9**	**22**
16:15 16:30	4	1	**5**	2	2	**4**	**9**
16:30 16:45	6	4	**10**	4	6	**10**	**20**
16:45 17:00	4	3	**7**	2	6	**8**	**15**
16:00 17:00	16	19	**35**	10	21	**31**	**66**
17:00 17:15	3	9	**12**	3	3	**6**	**18**
17:15 17:30	2	1	**3**	0	1	**1**	**4**
17:30 17:45	5	14	**19**	3	5	**8**	**27**
17:45 18:00	6	7	**13**	4	5	**9**	**22**
17:00 18:00	16	31	**47**	10	14	**24**	**71**
Total	73	174	**247**	73	118	**191**	**438**

Comment:

Transportation Services - Traffic Services

Work Order 36566

Turning Movement Count - Full Study Summary Report

RICHMOND RD @ WOODROFFE AVE

Survey Date: Thursday, December 01, 2016

Total Observed U-Turns

Northbound: 0 Southbound: 0

Eastbound: 0 Westbound: 1

AADT Factor 1.00

Full Study

	WOODROFFE 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	92	232	75	**399**	28	349	57	**434**	**833**	126	567	175	**868**	50	129	14	**193**	**1061**	**1894**
08:00 09:00	109	249	96	**454**	41	305	63	**409**	**863**	145	753	209	**1107**	63	241	20	**324**	**1431**	**2294**
09:00 10:00	151	197	81	**429**	13	218	41	**272**	**701**	88	400	231	**719**	91	244	13	**348**	**1067**	**1768**
11:30 12:30	190	212	109	**511**	19	207	40	**266**	**777**	76	309	245	**630**	114	293	25	**432**	**1062**	**1839**
12:30 13:30	201	242	101	**544**	18	203	44	**265**	**809**	80	281	240	**601**	128	318	24	**470**	**1071**	**1880**
15:00 16:00	230	379	90	**699**	34	346	70	**450**	**1149**	82	294	178	**554**	153	533	37	**723**	**1277**	**2426**
16:00 17:00	232	402	88	**722**	25	340	62	**427**	**1149**	83	322	175	**580**	217	627	31	**875**	**1455**	**2604**
17:00 18:00	239	324	97	**660**	32	356	76	**464**	**1124**	78	344	163	**585**	181	604	22	**807**	**1392**	**2516**
Sub Total	1444	2237	737	**4418**	210	2324	453	**2987**	**7405**	758	3270	1616	**5644**	997	2989	186	**4172**	**9816**	**17221**
U Turns				**0**				**0**	**0**				**0**				**1**	**1**	**1**
Total	1444	2237	737	**4418**	210	2324	453	**2987**	**7405**	758	3270	1616	**5644**	997	2989	186	**4173**	**9817**	**17222**
EQ 12Hr	2007	3109	1024	**6141**	292	3230	630	**4152**	**10293**	1054	4545	2246	**7845**	1386	4155	259	**5800**	**13645**	**23938**
Note: These values are calculated by multiplying the totals by the appropriate expansion factor.													**1.39**						
AVG 12Hr	2007	3109	1024	**6141**	292	3230	630	**4152**	**10293**	1054	4545	2246	**7845**	1386	4155	259	**5800**	**13645**	**23938**
Note: These volumes are calculated by multiplying the Equivalent 12 hr. totals by the AADT factor.													**1.00**						
AVG 24Hr	2629	4073	1342	**8045**	382	4232	825	**5439**	**13484**	1380	5954	2943	**10277**	1815	5443	339	**7599**	**17876**	**31360**
Note: These volumes are calculated by multiplying the Average Daily 12 hr. totals by 12 to 24 expansion factor.													**1.31**						

Comments:

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

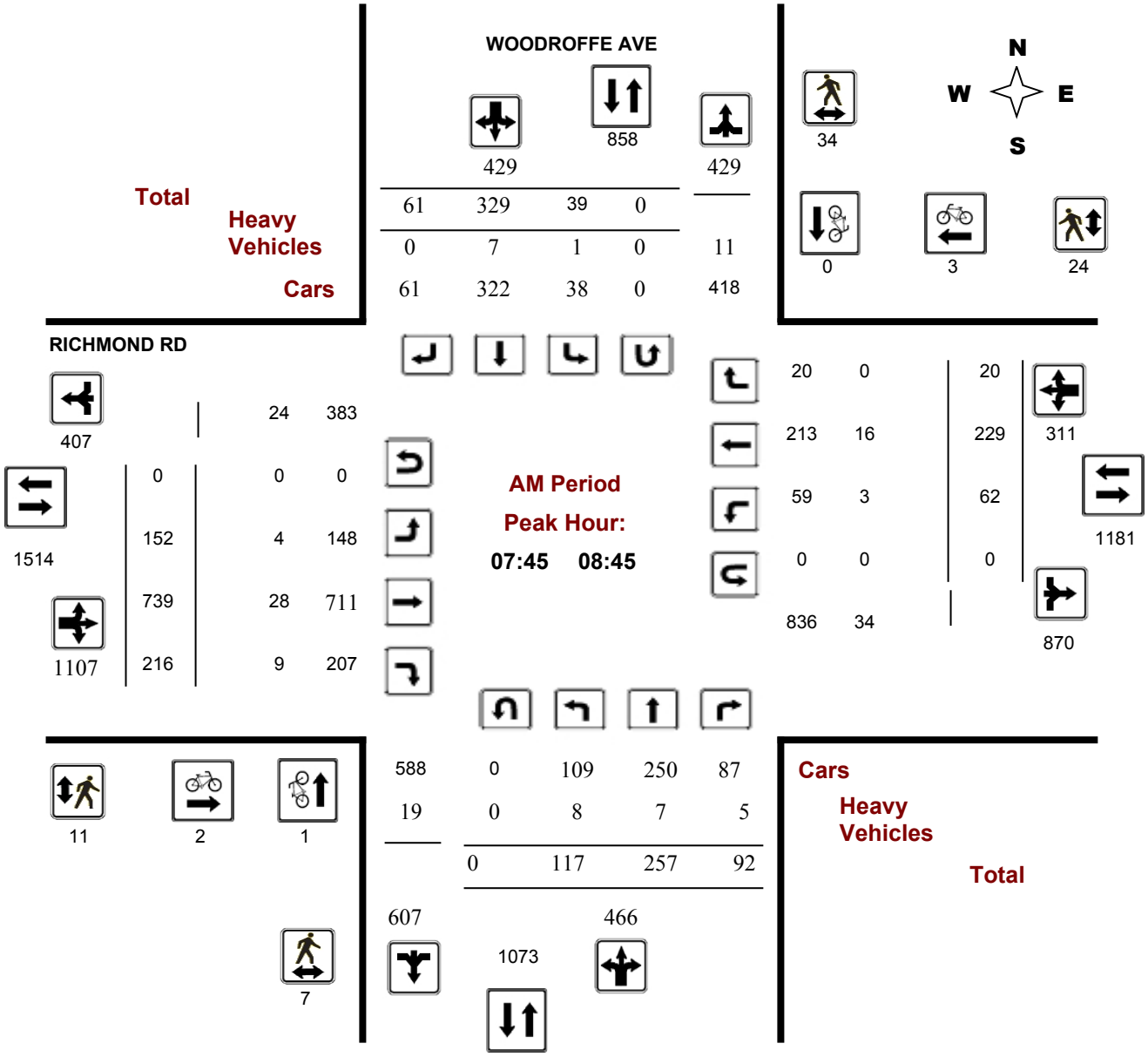
Transportation Services - Traffic Services

Turning Movement Count - Full Study Peak Hour Diagram

RICHMOND RD @ WOODROFFE AVE

Survey Date: Thursday, December 01, 2016 **WO No:** 36566

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



Comments

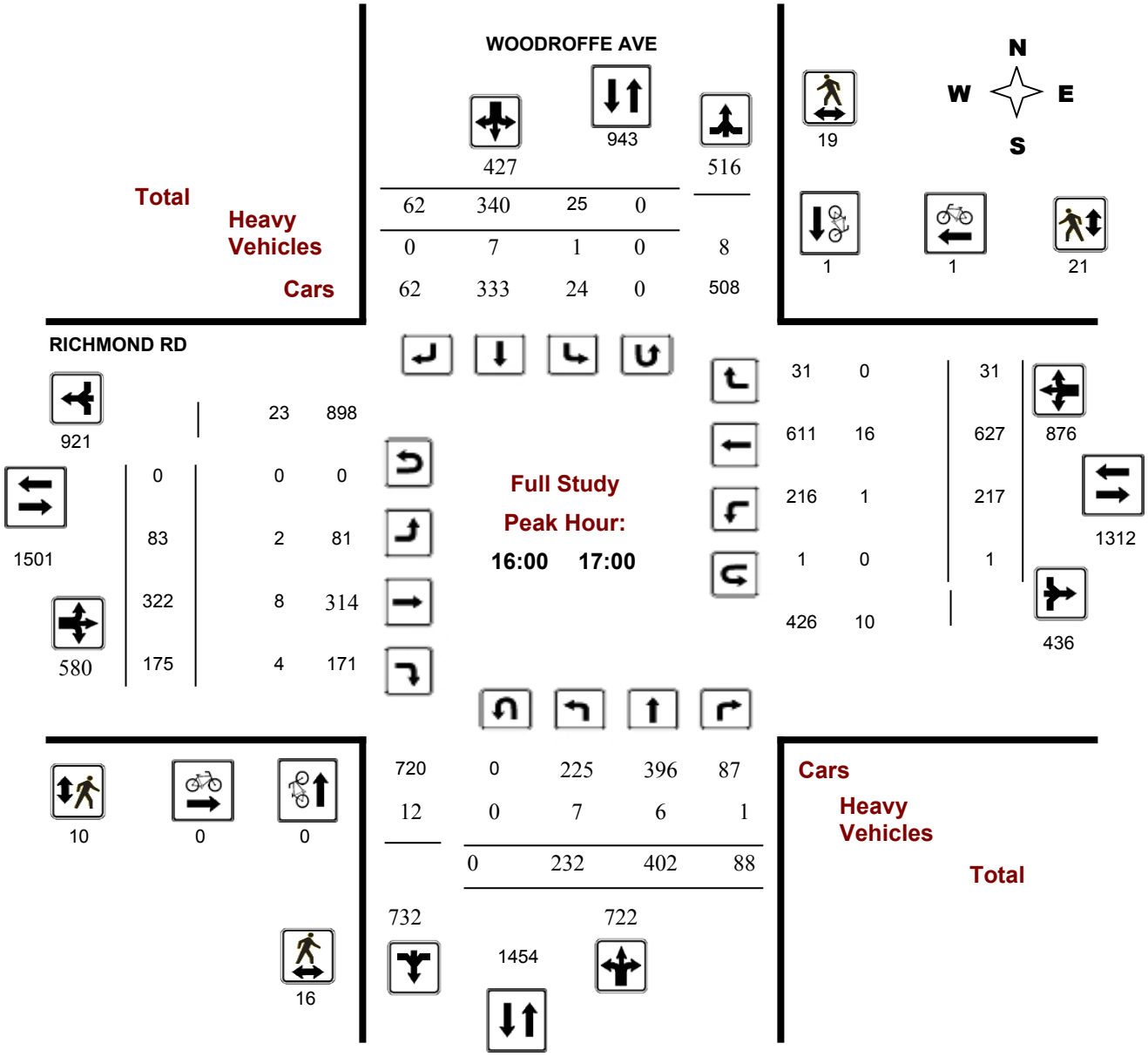
Transportation Services - Traffic Services

Turning Movement Count - Full Study Peak Hour Diagram

RICHMOND RD @ WOODROFFE AVE

Survey Date: Thursday, December 01, 2016 **WO No:** 36566

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



Comments

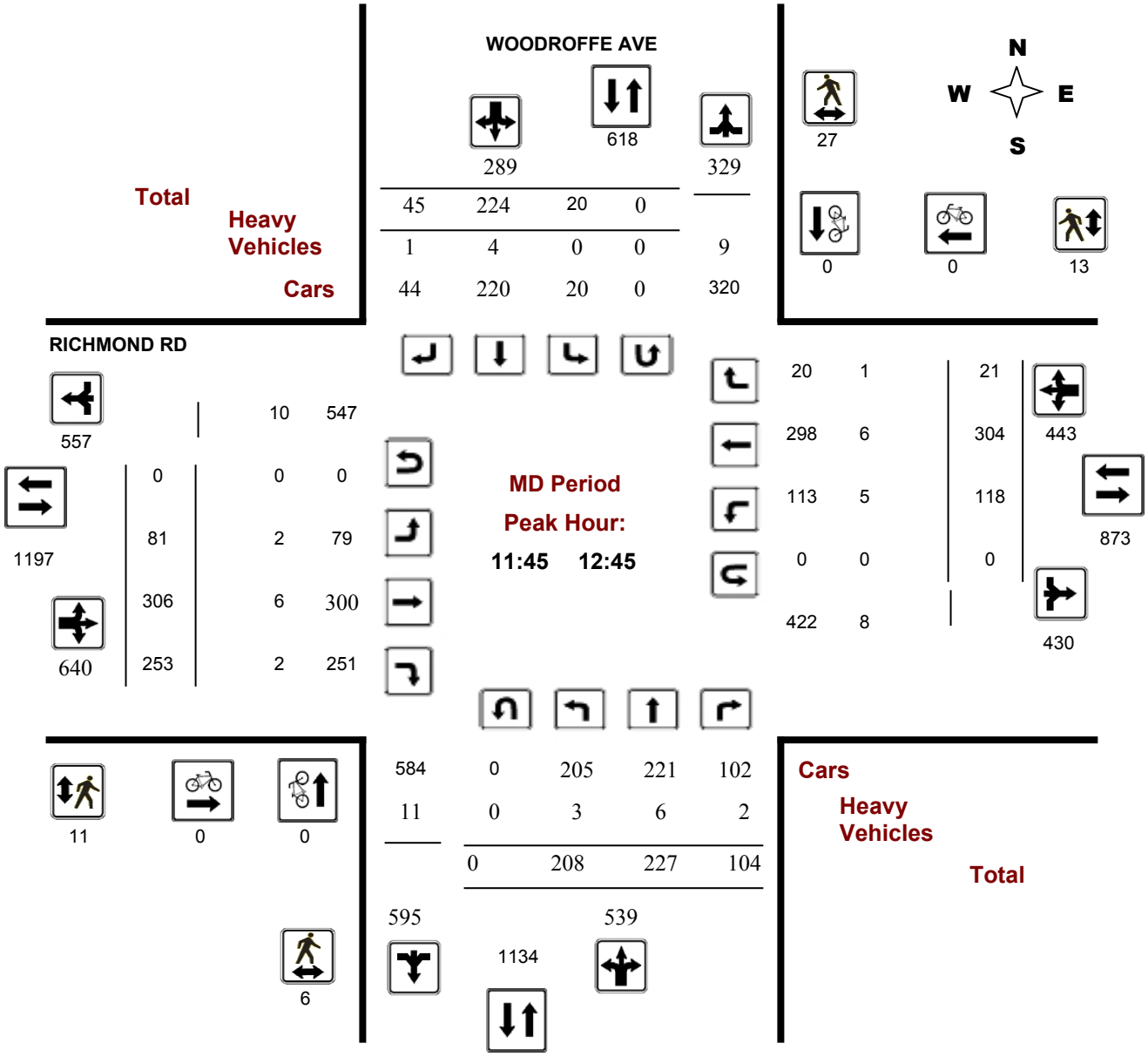
Transportation Services - Traffic Services

Turning Movement Count - Full Study Peak Hour Diagram

RICHMOND RD @ WOODROFFE AVE

Survey Date: Thursday, December 01, 2016 **WO No:** 36566

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



Comments

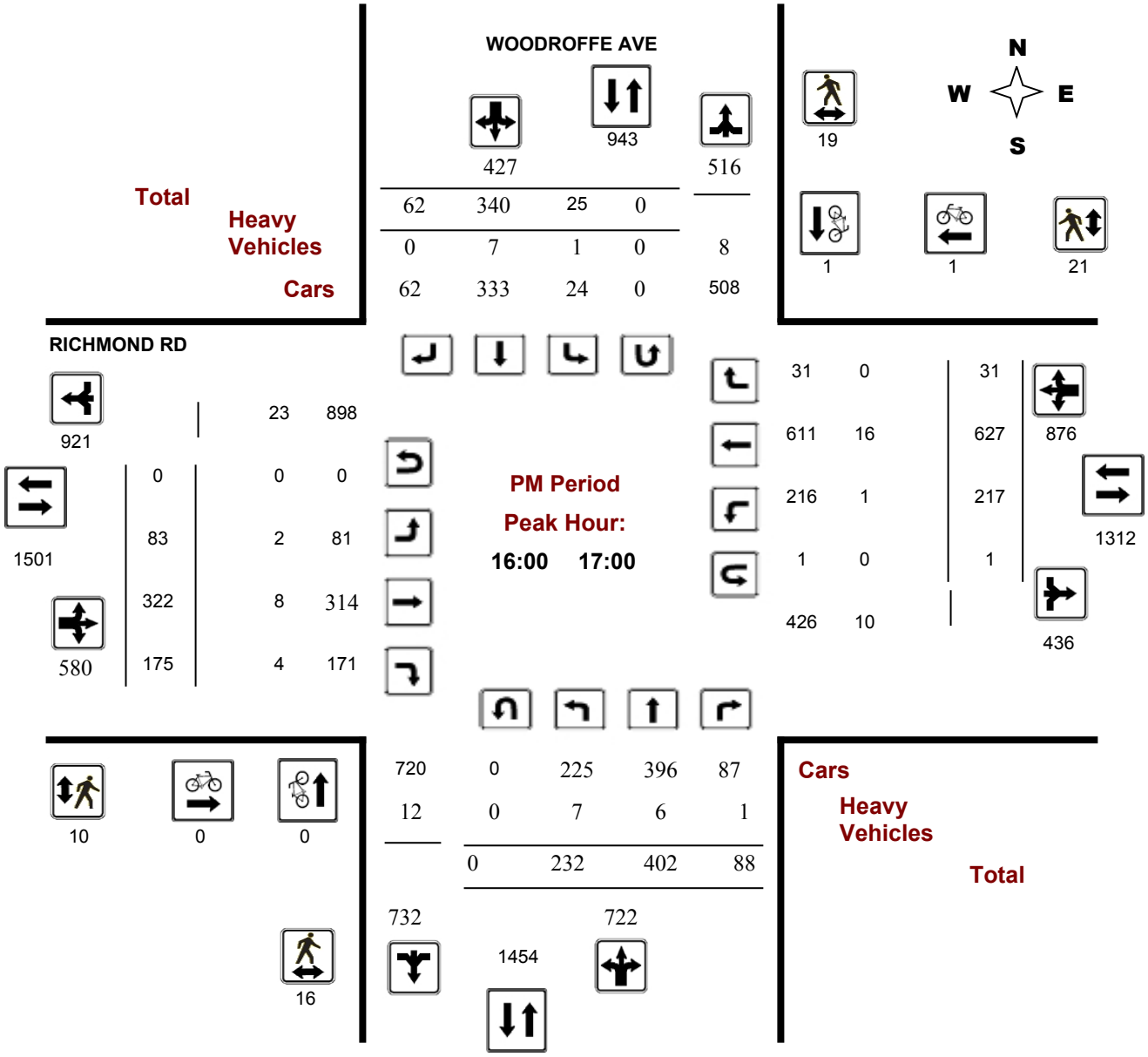
Transportation Services - Traffic Services

Turning Movement Count - Full Study Peak Hour Diagram

RICHMOND RD @ WOODROFFE AVE

Survey Date: Thursday, December 01, 2016 **WO No:** 36566

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



Comments

Transportation Services - Traffic Services

Work Order
36566

Turning Movement Count - 15 Min U-Turn Total Report

RICHMOND RD @ WOODROFFE AVE

Survey Date: Thursday, December 01, 2016

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	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	1	1
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	1	1

Transportation Services - Traffic Services

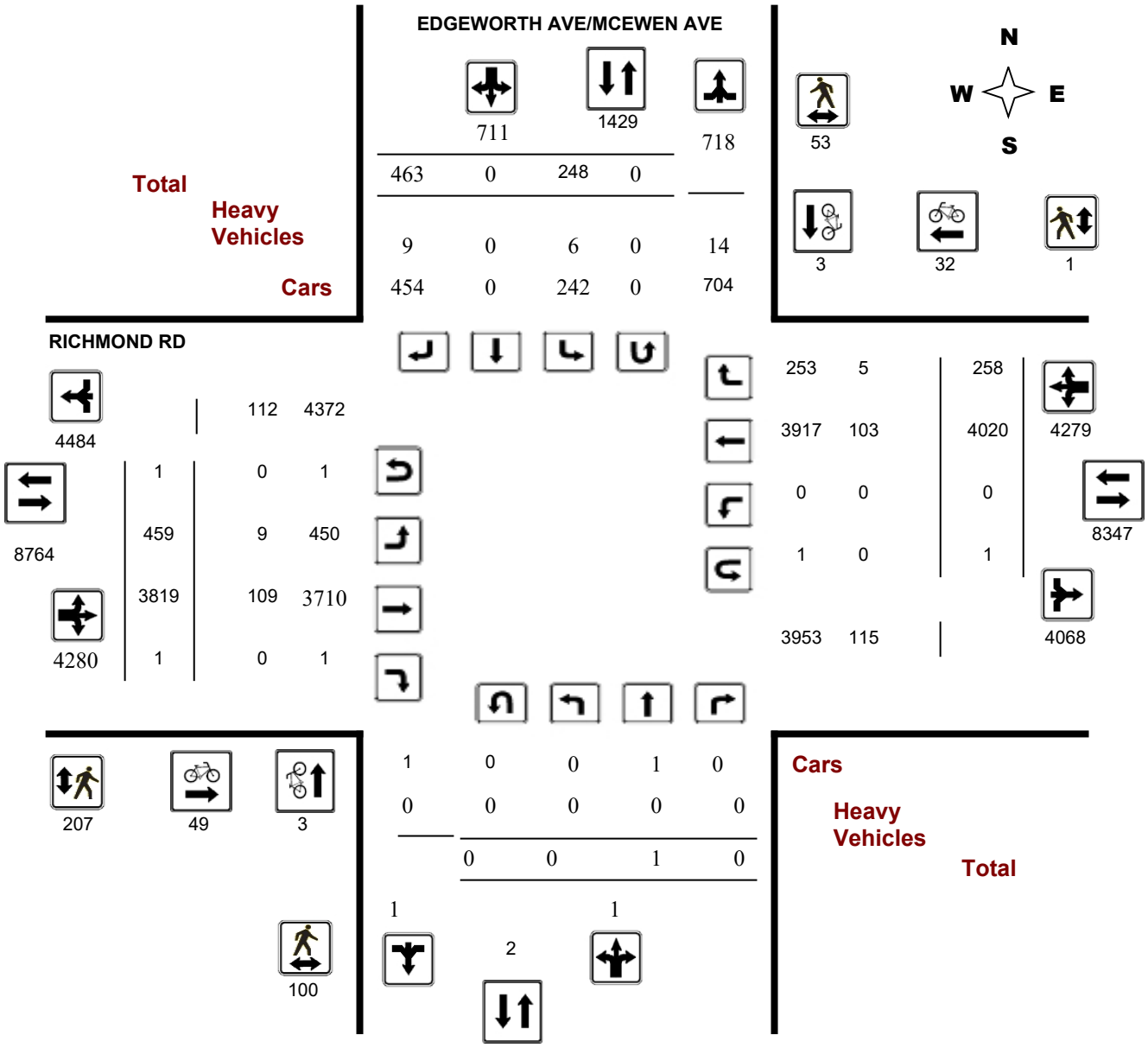
Turning Movement Count - Study Results

RICHMOND RD @ EDGEWORTH AVE/MCEWEN AVE

Survey Date: Thursday, August 25, 2016
Start Time: 07:00

WO No: 36242
Device: Miovision

Full Study Diagram



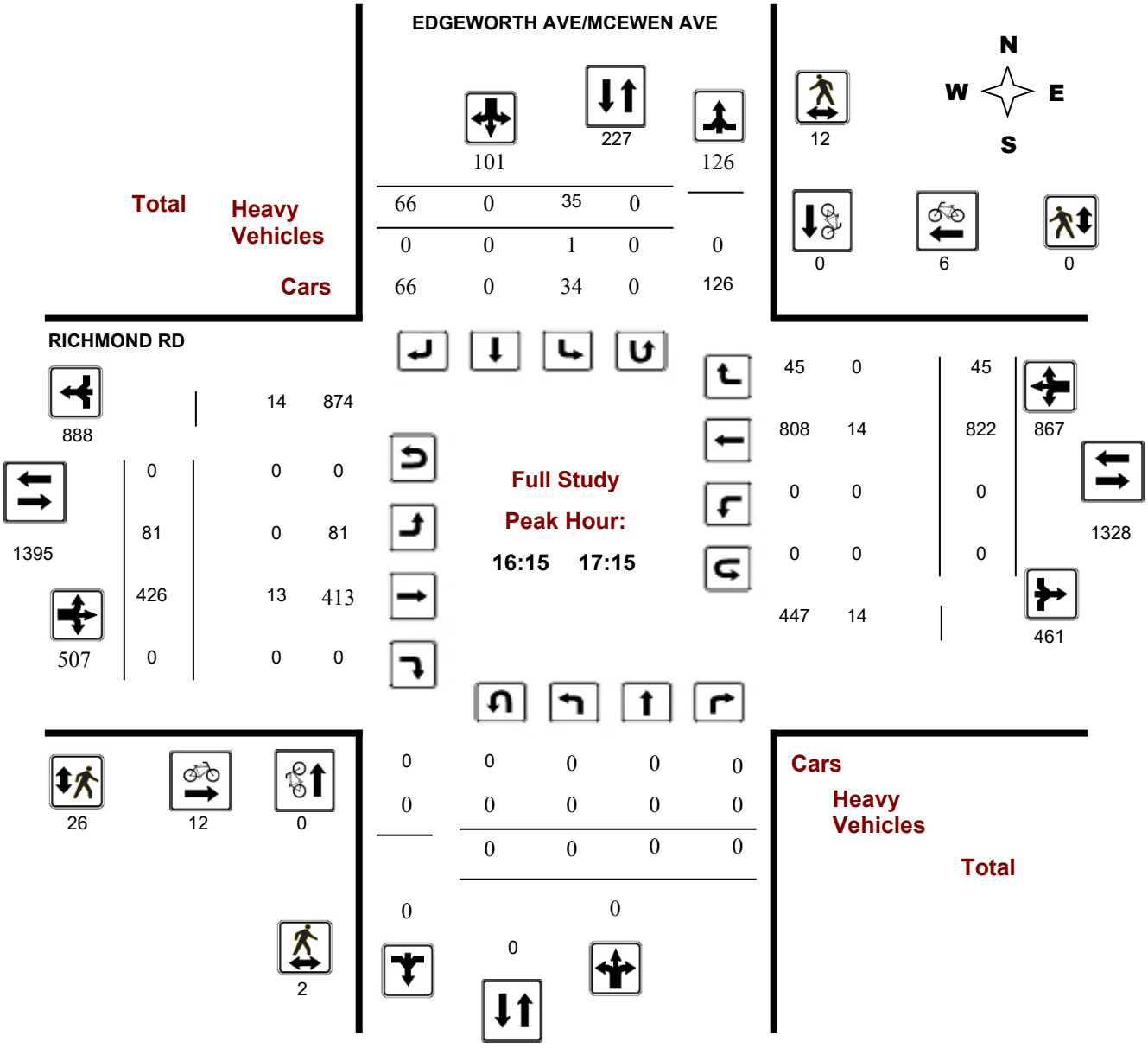
Transportation Services - Traffic Services

Turning Movement Count - Study Results

RICHMOND RD @ EDGEWORTH AVE/MCEWEN AVE

Survey Date: Thursday, August 25, 2016
Start Time: 07:00
WO No: 36242
Device: Miovision

Full Study Peak Hour Diagram



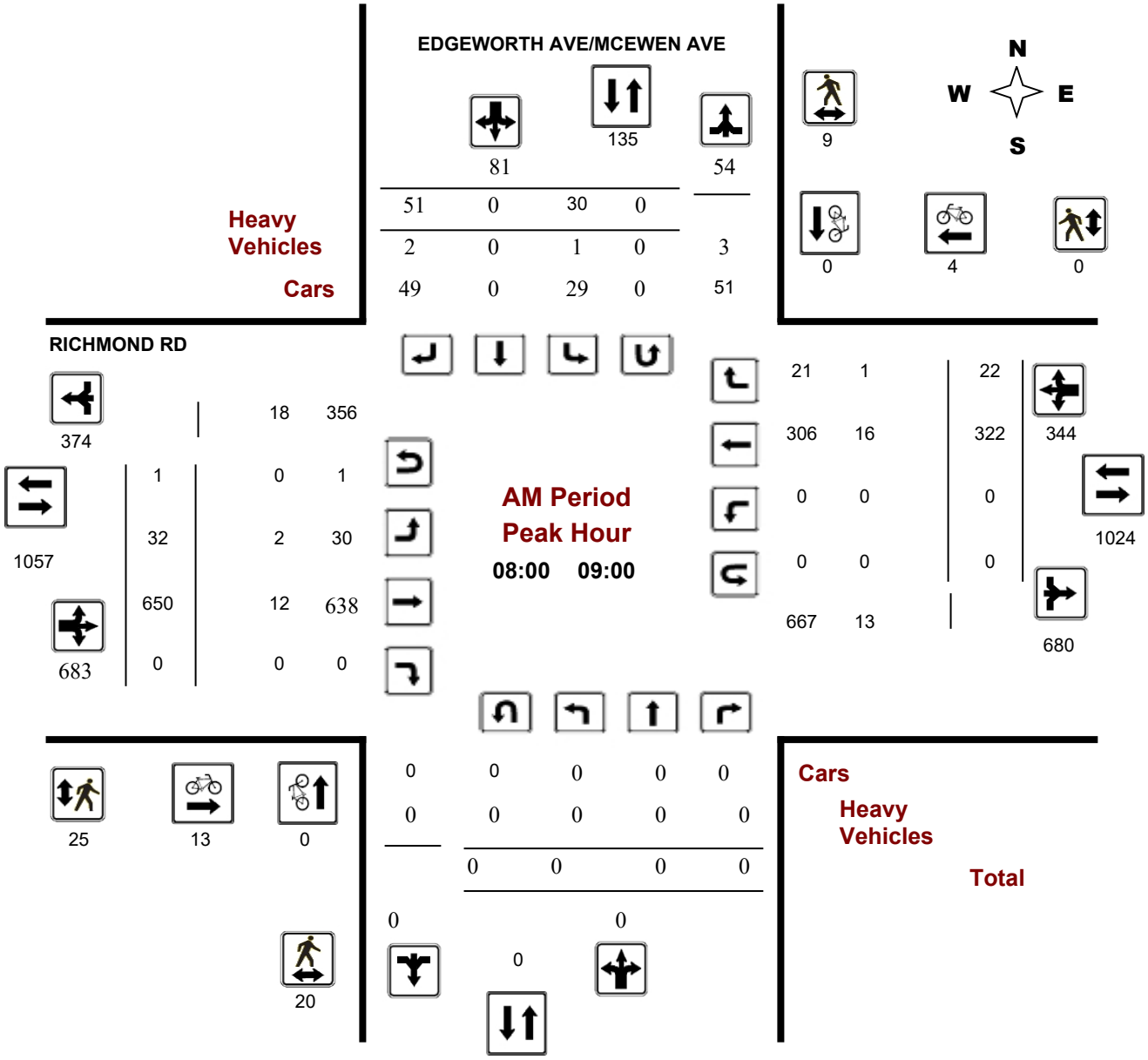
Transportation Services - Traffic Services

Turning Movement Count - Peak Hour Diagram

RICHMOND RD @ EDGEWORTH AVE/MCEWEN AVE

Survey Date: Thursday, August 25, 2016 **WO No:** 36242

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



Comments

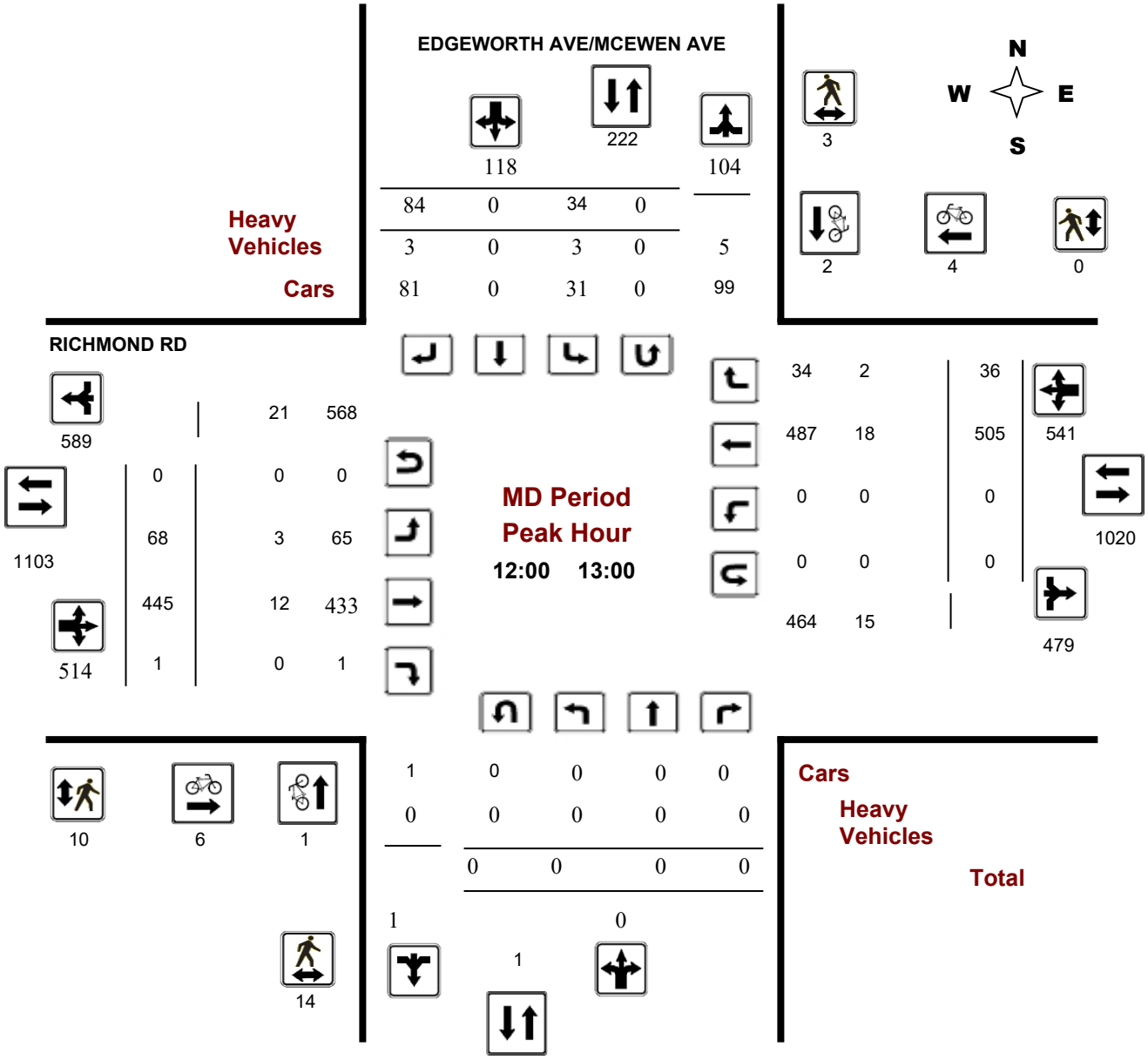
Transportation Services - Traffic Services

Turning Movement Count - Peak Hour Diagram

RICHMOND RD @ EDGEWORTH AVE/MCEWEN AVE

Survey Date: Thursday, August 25, 2016 **WO No:** 36242

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



Comments

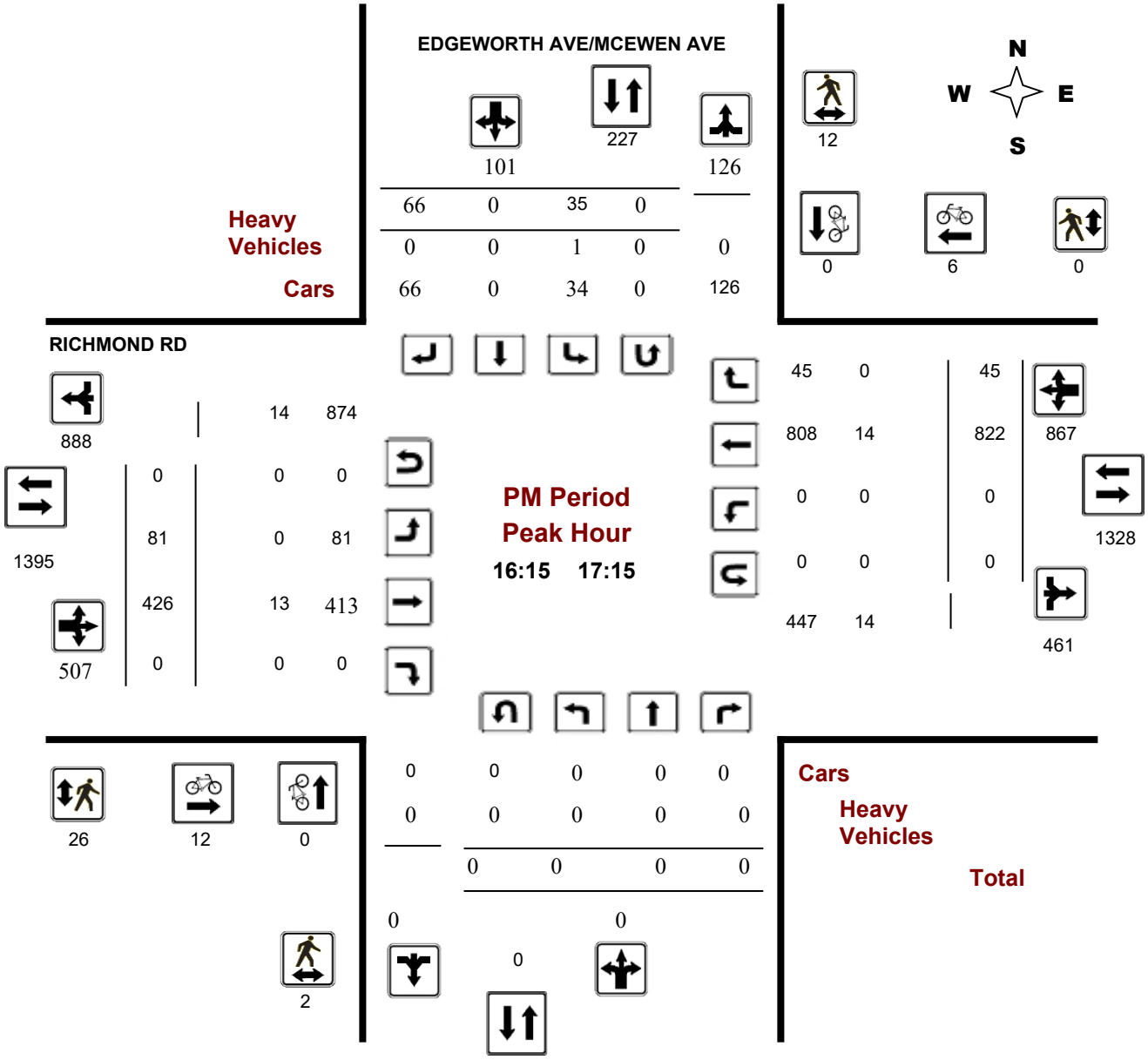
Transportation Services - Traffic Services

Turning Movement Count - Peak Hour Diagram

RICHMOND RD @ EDGEWORTH AVE/MCEWEN AVE

Survey Date: Thursday, August 25, 2016 **WO No:** 36242

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



Comments

Transportation Services - Traffic Services

Turning Movement Count - Study Results

RICHMOND RD @ EDGEWORTH AVE/MCEWEN AVE

Survey Date: Thursday, August 25, 2016 **WO No:** 36242

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

Full Study Summary (8 HR Standard)

Survey Date: Thursday, August 25, 2016

Total Observed U-Turns

Northbound: 0 Southbound: 0

Eastbound: 1 Westbound: 1

AADT Factor

.90

	EDGEWORTH AVE/MCEWEN 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**	24	0	40	**64**	**64**	26	572	0	**598**	0	187	21	**208**	**806**	**870**
08:00 09:00	0	0	0	**0**	30	0	51	**81**	**81**	32	650	0	**682**	0	322	22	**344**	**1026**	**1107**
09:00 10:00	0	0	0	**0**	30	0	59	**89**	**89**	39	428	0	**467**	0	318	28	**346**	**813**	**902**
11:30 12:30	0	0	0	**0**	28	0	71	**99**	**99**	70	460	1	**531**	0	463	36	**499**	**1030**	**1129**
12:30 13:30	0	0	0	**0**	39	0	71	**110**	**110**	70	456	0	**526**	0	461	33	**494**	**1020**	**1130**
15:00 16:00	0	0	0	**0**	31	0	54	**85**	**85**	57	395	0	**452**	0	706	36	**742**	**1194**	**1279**
16:00 17:00	0	0	0	**0**	35	0	60	**95**	**95**	75	404	0	**479**	0	797	39	**836**	**1315**	**1410**
17:00 18:00	0	1	0	**1**	31	0	57	**88**	**89**	90	454	0	**544**	0	766	43	**809**	**1353**	**1442**
Sub Total	0	1	0	**1**	248	0	463	**711**	**712**	459	3819	1	**4279**	0	4020	258	**4278**	**8557**	**9269**
U Turns	0			**0**	0			**0**	**0**	**1**			**1**	1			**1**	**2**	**2**
Total	0	1	0	**1**	248	0	463	**711**	**712**	460	3819	1	**4280**	1	4020	258	**4279**	**8559**	**9271**
EQ 12Hr	0	1	0	**1**	345	0	644	**989**	**990**	639	5308	1	**5948**	1	5588	359	**5948**	**11896**	**12886**
Note: These values are calculated by multiplying the totals by the appropriate expansion factor.														**1.39**					
AVG 12Hr	0	1	0	**1**	310	0	580	**890**	**891**	575	4777	1	**5353**	1	5029	323	**5353**	**10706**	**11597**
Note: These volumes are calculated by multiplying the Equivalent 12 hr. totals by the AADT factor.														**.90**					
AVG 24Hr	0	1	0	**1**	406	0	760	**1166**	**1167**	753	6258	1	**7012**	1	6588	423	**7012**	**14024**	**15191**
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

RICHMOND RD @ EDGEWORTH AVE/MCEWEN AVE

Survey Date: Thursday, August 25, 2016 **WO No:** 36242

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

Full Study 15 Minute Increments

		EDGEWORTH AVE/MCEWEN 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	4	0	7	11	**11**	3	105	0	108	0	34	4	38	**146**	**157**
07:15	07:30	0	0	0	0	3	0	11	14	**14**	4	149	0	153	0	39	10	49	**202**	**216**
07:30	07:45	0	0	0	0	9	0	11	20	**20**	12	165	0	177	0	53	5	58	**235**	**255**
07:45	08:00	0	0	0	0	8	0	11	19	**19**	7	153	0	160	0	61	2	63	**223**	**242**
08:00	08:15	0	0	0	0	5	0	16	21	**21**	11	142	0	153	0	61	9	70	**223**	**244**
08:15	08:30	0	0	0	0	6	0	12	18	**18**	10	163	0	173	0	80	6	86	**259**	**277**
08:30	08:45	0	0	0	0	11	0	9	20	**20**	4	189	0	193	0	84	3	87	**280**	**300**
08:45	09:00	0	0	0	0	8	0	14	22	**22**	8	156	0	164	0	97	4	101	**265**	**287**
09:00	09:15	0	0	0	0	7	0	16	23	**23**	7	121	0	128	0	74	9	83	**211**	**234**
09:15	09:30	0	0	0	0	5	0	14	19	**19**	16	115	0	131	0	82	9	91	**222**	**241**
09:30	09:45	0	0	0	0	12	0	13	25	**25**	8	95	0	103	0	89	5	94	**197**	**222**
09:45	10:00	0	0	0	0	6	0	16	22	**22**	8	97	0	105	0	73	5	78	**183**	**205**
11:30	11:45	0	0	0	0	8	0	16	24	**24**	13	116	0	129	0	106	9	115	**244**	**268**
11:45	12:00	0	0	0	0	5	0	16	21	**21**	21	139	0	160	0	100	8	108	**268**	**289**
12:00	12:15	0	0	0	0	7	0	19	26	**26**	18	96	1	115	0	129	8	137	**252**	**278**
12:15	12:30	0	0	0	0	8	0	20	28	**28**	18	109	0	127	0	128	11	139	**266**	**294**
12:30	12:45	0	0	0	0	8	0	23	31	**31**	16	116	0	132	0	112	7	119	**251**	**282**
12:45	13:00	0	0	0	0	11	0	22	33	**33**	16	124	0	140	0	136	10	146	**286**	**319**
13:00	13:15	0	0	0	0	8	0	11	19	**19**	14	98	0	112	1	105	9	115	**227**	**246**
13:15	13:30	0	0	0	0	12	0	15	27	**27**	24	118	0	142	0	108	7	115	**257**	**284**
15:00	15:15	0	0	0	0	11	0	16	27	**27**	13	83	0	96	0	130	8	138	**234**	**261**
15:15	15:30	0	0	0	0	6	0	16	22	**22**	17	100	0	117	0	168	8	176	**293**	**315**
15:30	15:45	0	0	0	0	6	0	12	18	**18**	10	112	0	122	0	198	5	203	**325**	**343**
15:45	16:00	0	0	0	0	8	0	10	18	**18**	17	100	0	117	0	210	15	225	**342**	**360**
16:00	16:15	0	0	0	0	8	0	9	17	**17**	14	109	0	123	0	186	7	193	**316**	**333**
16:15	16:30	0	0	0	0	8	0	20	28	**28**	23	93	0	116	0	210	16	226	**342**	**370**
16:30	16:45	0	0	0	0	11	0	16	27	**27**	17	101	0	118	0	180	11	191	**309**	**336**
16:45	17:00	0	0	0	0	8	0	15	23	**23**	21	101	0	122	0	221	5	226	**348**	**371**
17:00	17:15	0	0	0	0	8	0	15	23	**23**	20	131	0	151	0	211	13	224	**375**	**398**
17:15	17:30	0	1	0	1	8	0	19	27	**28**	22	104	0	126	0	182	14	196	**322**	**350**
17:30	17:45	0	0	0	0	7	0	10	17	**17**	24	99	0	123	0	202	11	213	**336**	**353**
17:45	18:00	0	0	0	0	8	0	13	21	**21**	24	120	0	144	0	171	5	176	**320**	**341**
Total:		0	1	0	1	248	0	463	711	**712**	460	3819	1	4280	1	4020	258	4279	**712**	**9,271**

Note: U-Turns are included in Totals.

Transportation Services - Traffic Services

Turning Movement Count - Study Results

RICHMOND RD @ EDGEWORTH AVE/MCEWEN AVE

Survey Date: Thursday, August 25, 2016 **WO No:** 36242

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

Full Study Cyclist Volume

Time Period		EDGEWORTH AVE/MCEWEN AVE			RICHMOND RD			
		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	0	0	**0**	2	1	**3**	**3**
07:30	07:45	0	0	**0**	0	0	**0**	**0**
07:45	08:00	0	0	**0**	1	1	**2**	**2**
08:00	08:15	0	0	**0**	5	1	**6**	**6**
08:15	08:30	0	0	**0**	2	2	**4**	**4**
08:30	08:45	0	0	**0**	4	1	**5**	**5**
08:45	09:00	0	0	**0**	2	0	**2**	**2**
09:00	09:15	0	0	**0**	1	1	**2**	**2**
09:15	09:30	0	0	**0**	0	0	**0**	**0**
09:30	09:45	0	0	**0**	3	0	**3**	**3**
09:45	10:00	0	0	**0**	0	0	**0**	**0**
11:30	11:45	0	0	**0**	1	1	**2**	**2**
11:45	12:00	0	0	**0**	1	2	**3**	**3**
12:00	12:15	0	1	**1**	1	2	**3**	**4**
12:15	12:30	0	0	**0**	1	0	**1**	**1**
12:30	12:45	0	0	**0**	1	0	**1**	**1**
12:45	13:00	1	1	**2**	3	2	**5**	**7**
13:00	13:15	0	0	**0**	4	0	**4**	**4**
13:15	13:30	0	0	**0**	0	2	**2**	**2**
15:00	15:15	1	1	**2**	2	0	**2**	**4**
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	0	**0**	**0**
16:00	16:15	0	0	**0**	0	3	**3**	**3**
16:15	16:30	0	0	**0**	2	1	**3**	**3**
16:30	16:45	0	0	**0**	3	2	**5**	**5**
16:45	17:00	0	0	**0**	3	1	**4**	**4**
17:00	17:15	0	0	**0**	4	2	**6**	**6**
17:15	17:30	0	0	**0**	0	1	**1**	**1**
17:30	17:45	1	0	**1**	0	2	**2**	**3**
17:45	18:00	0	0	**0**	3	3	**6**	**6**
Total		3	3	**6**	49	32	**81**	**87**

Transportation Services - Traffic Services

Turning Movement Count - Study Results

RICHMOND RD @ EDGEWORTH AVE/MCEWEN AVE

Survey Date: Thursday, August 25, 2016 **WO No:** 36242

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

Full Study Pedestrian Volume

	EDGEWORTH AVE/MCEWEN 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**	6	0	**6**	**6**
07:15 07:30	0	0	**0**	8	0	**8**	**8**
07:30 07:45	0	0	**0**	7	0	**7**	**7**
07:45 08:00	0	1	**1**	8	0	**8**	**9**
08:00 08:15	6	3	**9**	7	0	**7**	**16**
08:15 08:30	2	1	**3**	2	0	**2**	**5**
08:30 08:45	5	2	**7**	9	0	**9**	**16**
08:45 09:00	7	3	**10**	7	0	**7**	**17**
09:00 09:15	1	2	**3**	6	0	**6**	**9**
09:15 09:30	7	1	**8**	10	0	**10**	**18**
09:30 09:45	5	2	**7**	6	0	**6**	**13**
09:45 10:00	3	0	**3**	5	0	**5**	**8**
11:30 11:45	2	3	**5**	6	0	**6**	**11**
11:45 12:00	5	0	**5**	8	0	**8**	**13**
12:00 12:15	2	0	**2**	1	0	**1**	**3**
12:15 12:30	5	2	**7**	5	0	**5**	**12**
12:30 12:45	3	1	**4**	3	0	**3**	**7**
12:45 13:00	4	0	**4**	1	0	**1**	**5**
13:00 13:15	4	1	**5**	8	0	**8**	**13**
13:15 13:30	3	6	**9**	4	1	**5**	**14**
15:00 15:15	1	0	**1**	3	0	**3**	**4**
15:15 15:30	7	3	**10**	8	0	**8**	**18**
15:30 15:45	2	5	**7**	10	0	**10**	**17**
15:45 16:00	5	1	**6**	6	0	**6**	**12**
16:00 16:15	3	0	**3**	6	0	**6**	**9**
16:15 16:30	1	4	**5**	2	0	**2**	**7**
16:30 16:45	0	2	**2**	3	0	**3**	**5**
16:45 17:00	0	2	**2**	10	0	**10**	**12**
17:00 17:15	1	4	**5**	11	0	**11**	**16**
17:15 17:30	4	1	**5**	10	0	**10**	**15**
17:30 17:45	5	2	**7**	12	0	**12**	**19**
17:45 18:00	7	1	**8**	9	0	**9**	**17**
Total	100	53	**153**	207	1	**208**	**361**

Transportation Services - Traffic Services

Turning Movement Count - Study Results

RICHMOND RD @ EDGEWORTH AVE/MCEWEN AVE

Survey Date: Thursday, August 25, 2016 **WO No:** 36242

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

Full Study Heavy Vehicles

		EDGEWORTH AVE/MCEWEN 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	6	0	**6**	0	1	0	**1**	**7**	**7**
07:15	07:30	0	0	0	**0**	0	0	0	**0**	**0**	0	2	0	**2**	0	1	0	**1**	**3**	**3**
07:30	07:45	0	0	0	**0**	0	0	0	**0**	**0**	0	5	0	**5**	0	5	0	**5**	**10**	**10**
07:45	08:00	0	0	0	**0**	0	0	0	**0**	**0**	0	4	0	**4**	0	2	0	**2**	**6**	**6**
08:00	08:15	0	0	0	**0**	0	0	0	**0**	**0**	1	2	0	**3**	0	5	0	**5**	**8**	**8**
08:15	08:30	0	0	0	**0**	1	0	1	**2**	**2**	0	2	0	**2**	0	4	1	**5**	**7**	**9**
08:30	08:45	0	0	0	**0**	0	0	0	**0**	**0**	1	2	0	**3**	0	2	0	**2**	**5**	**5**
08:45	09:00	0	0	0	**0**	0	0	1	**1**	**1**	0	6	0	**6**	0	5	0	**5**	**11**	**12**
09:00	09:15	0	0	0	**0**	0	0	1	**1**	**1**	0	5	0	**5**	0	2	1	**3**	**8**	**9**
09:15	09:30	0	0	0	**0**	0	0	1	**1**	**1**	0	3	0	**3**	0	4	0	**4**	**7**	**8**
09:30	09:45	0	0	0	**0**	0	0	0	**0**	**0**	0	4	0	**4**	0	4	0	**4**	**8**	**8**
09:45	10:00	0	0	0	**0**	0	0	0	**0**	**0**	0	2	0	**2**	0	1	1	**2**	**4**	**4**
11:30	11:45	0	0	0	**0**	0	0	0	**0**	**0**	0	7	0	**7**	0	7	0	**7**	**14**	**14**
11:45	12:00	0	0	0	**0**	0	0	1	**1**	**1**	0	8	0	**8**	0	5	0	**5**	**13**	**14**
12:00	12:15	0	0	0	**0**	0	0	0	**0**	**0**	2	2	0	**4**	0	8	0	**8**	**12**	**12**
12:15	12:30	0	0	0	**0**	0	0	1	**1**	**1**	0	3	0	**3**	0	3	0	**3**	**6**	**7**
12:30	12:45	0	0	0	**0**	0	0	1	**1**	**1**	1	5	0	**6**	0	2	1	**3**	**9**	**10**
12:45	13:00	0	0	0	**0**	3	0	1	**4**	**4**	0	2	0	**2**	0	5	1	**6**	**8**	**12**
13:00	13:15	0	0	0	**0**	0	0	0	**0**	**0**	1	7	0	**8**	0	2	0	**2**	**10**	**10**
13:15	13:30	0	0	0	**0**	0	0	0	**0**	**0**	0	3	0	**3**	0	2	0	**2**	**5**	**5**
15:00	15:15	0	0	0	**0**	0	0	0	**0**	**0**	0	2	0	**2**	0	3	0	**3**	**5**	**5**
15:15	15:30	0	0	0	**0**	0	0	0	**0**	**0**	1	6	0	**7**	0	8	0	**8**	**15**	**15**
15:30	15:45	0	0	0	**0**	1	0	0	**1**	**1**	0	3	0	**3**	0	2	0	**2**	**5**	**6**
15:45	16:00	0	0	0	**0**	0	0	0	**0**	**0**	0	1	0	**1**	0	1	0	**1**	**2**	**2**
16:00	16:15	0	0	0	**0**	0	0	0	**0**	**0**	1	1	0	**2**	0	1	0	**1**	**3**	**3**
16:15	16:30	0	0	0	**0**	0	0	0	**0**	**0**	0	3	0	**3**	0	3	0	**3**	**6**	**6**
16:30	16:45	0	0	0	**0**	0	0	0	**0**	**0**	0	3	0	**3**	0	4	0	**4**	**7**	**7**
16:45	17:00	0	0	0	**0**	0	0	0	**0**	**0**	0	2	0	**2**	0	2	0	**2**	**4**	**4**
17:00	17:15	0	0	0	**0**	1	0	0	**1**	**1**	0	5	0	**5**	0	5	0	**5**	**10**	**11**
17:15	17:30	0	0	0	**0**	0	0	1	**1**	**1**	0	0	0	**0**	0	1	0	**1**	**1**	**2**
17:30	17:45	0	0	0	**0**	0	0	0	**0**	**0**	0	2	0	**2**	0	2	0	**2**	**4**	**4**
17:45	18:00	0	0	0	**0**	0	0	0	**0**	**0**	1	1	0	**2**	0	1	0	**1**	**3**	**3**
Total:	None	0	0	0	**0**	6	0	9	**15**	**15**	9	109	0	**118**	0	103	5	**108**	**226**	**241**

Transportation Services - Traffic Services

Turning Movement Count - Study Results

RICHMOND RD @ EDGEWORTH AVE/MCEWEN AVE

Survey Date: Thursday, August 25, 2016 **WO No:** 36242

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

Full Study 15 Minute U-Turn Total

EDGEWORTH AVE/MCEWEN 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	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	1	**1**
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	1	1	**2**

Appendix D:

Background Growth Analysis

Richmond/New Orchard
8 hrs

Year	Date	North Leg		South Leg		East Leg		West Leg		Total
		SB	NB	NB	SB	WB	EB	EB	WB	
2009	Wednesday, August 19	823	594	1	1	3639	4238	3783	3413	16492
2011	Thursday, July 14	807	746	1	1	4467	5691	5347	4184	21244
2016	Thursday, August 25	856	721	1	1	4708	4848	4269	4264	19668

North Leg

Year	Counts				% Change			
	NB	*SB*	*NB+SB*	*INT*	*NB*	*SB*	*NB+SB*	*INT*
2009	594	823	1417	16492				
2011	746	807	1553	21244	25.6%	-1.9%	9.6%	28.8%
2016	721	856	1577	19668	-3.4%	6.1%	1.5%	-7.4%

Regression Estimate	2009	646	812	1458
Regression Estimate	2016	742	851	1593
Average Annual Change		**2.00%**	**0.69%**	**1.28%**

West Leg

Year	Counts				% Change			
	EB	*WB*	*EB+WB*	*INT*	*EB*	*WB*	*EB+WB*	*INT*
2009	3783	3413	7196	16492				
2011	5347	4184	9531	21244	41.3%	22.6%	32.4%	28.8%
2016	4269	4264	8533	19668	-20.2%	1.9%	-10.5%	-7.4%

Regression Estimate	2009	4422	3650	8072
Regression Estimate	2016	4525	4359	8884
Average Annual Change		**0.33%**	**2.57%**	**1.38%**

East Leg

Year	Counts				% Change			
	EB	*WB*	*EB+WB*	*INT*	*EB*	*WB*	*EB+WB*	*INT*
2009	4238	3639	7877	16492				
2011	5691	4467	10158	21244	34.3%	22.8%	29.0%	28.8%
2016	4848	4708	9556	19668	-14.8%	5.4%	-5.9%	-7.4%

Regression Estimate	2009	4812	3873	8685
Regression Estimate	2016	5078	4802	9879
Average Annual Change		**0.77%**	**3.12%**	**1.86%**

South Leg

Year	Counts				% Change			
	NB	*SB*	*NB+SB*	*INT*	*NB*	*SB*	*NB+SB*	*INT*
2009	1	1	2	16492				
2011	1	1	2	21244	0.0%	0.0%	0.0%	28.8%
2016	1	1	2	19668	0.0%	0.0%	0.0%	-7.4%

Regression Estimate	2009	1	1	2
Regression Estimate	2016	1	1	2
Average Annual Change		**0.00%**	**0.00%**	**0.00%**

Richmond/New Orchard
AM Peak

Year	Date	North Leg		South Leg		East Leg		West Leg		Total
		SB	NB	NB	SB	WB	EB	EB	WB	
2009	Wednesday, August 19	142	37	1	1	373	788	662	352	2356
2011	Thursday, July 14	137	55	1	1	388	854	748	364	2548
2016	Thursday, August 25	133	57	1	1	392	795	688	361	2428

North Leg

Year	Counts				% Change			
	NB	*SB*	*NB+SB*	*INT*	*NB*	*SB*	*NB+SB*	*INT*
2009	37	142	179	2356				
2011	55	137	192	2548	48.6%	-3.5%	7.3%	8.1%
2016	57	133	190	2428	3.6%	-2.9%	-1.0%	-4.7%

Regression Estimate	2009	43	141	183
Regression Estimate	2016	59	133	192
Average Annual Change		**4.85%**	**-0.87%**	**0.64%**

West Leg

Year	Counts				% Change			
	EB	*WB*	*EB+WB*	*INT*	*EB*	*WB*	*EB+WB*	*INT*
2009	662	352	1014	2356				
2011	748	364	1112	2548	13.0%	3.4%	9.7%	8.1%
2016	688	361	1049	2428	-8.0%	-0.8%	-5.7%	-4.7%

Regression Estimate	2009	697	356	1053
Regression Estimate	2016	702	363	1065
Average Annual Change		**0.10%**	**0.26%**	**0.15%**

East Leg

Year	Counts				% Change			
	EB	*WB*	*EB+WB*	*INT*	*EB*	*WB*	*EB+WB*	*INT*
2009	788	373	1161	2356				
2011	854	388	1242	2548	8.4%	4.0%	7.0%	8.1%
2016	795	392	1187	2428	-6.9%	1.0%	-4.4%	-4.7%

Regression Estimate	2009	817	377	1194
Regression Estimate	2016	806	394	1200
Average Annual Change		**-0.18%**	**0.61%**	**0.07%**

South Leg

Year	Counts				% Change			
	NB	*SB*	*NB+SB*	*INT*	*NB*	*SB*	*NB+SB*	*INT*
2009	1	1	2	2356				
2011	1	1	2	2548	0.0%	0.0%	0.0%	8.1%
2016	1	1	2	2428	0.0%	0.0%	0.0%	-4.7%

Regression Estimate	2009	1	1	2
Regression Estimate	2016	1	1	2
Average Annual Change		**0.00%**	**0.00%**	**0.00%**

Richmond/New Orchard
PM Peak

Year	Date	North Leg		South Leg		East Leg		West Leg		Total
		SB	NB	NB	SB	WB	EB	EB	WB	
2009	Wednesday, August 19	104	86	1	1	710	502	441	667	2512
2011	Thursday, July 14	97	108	1	1	895	630	597	851	3180
2016	Thursday, August 25	92	139	1	1	970	553	499	869	3124

North Leg

Year	Counts				% Change			
	NB	*SB*	*NB+SB*	*INT*	*NB*	*SB*	*NB+SB*	*INT*
2009	86	104	190	2512				
2011	108	97	205	3180	25.6%	-6.7%	7.9%	26.6%
2016	139	92	231	3124	28.7%	-5.2%	12.7%	-1.8%

Regression Estimate	2009	89	102	191
Regression Estimate	2016	140	91	232
Average Annual Change		**6.70%**	**-1.62%**	**2.75%**

West Leg

Year	Counts				% Change			
	EB	*WB*	*EB+WB*	*INT*	*EB*	*WB*	*EB+WB*	*INT*
2009	441	667	1108	2512				
2011	597	851	1448	3180	35.4%	27.6%	30.7%	26.6%
2016	499	869	1368	3124	-16.4%	2.1%	-5.5%	-1.8%

Regression Estimate	2009	504	724	1227
Regression Estimate	2016	524	892	1416
Average Annual Change		**0.57%**	**3.03%**	**2.06%**

East Leg

Year	Counts				% Change			
	EB	*WB*	*EB+WB*	*INT*	*EB*	*WB*	*EB+WB*	*INT*
2009	502	710	1212	2512				
2011	630	895	1525	3180	25.5%	26.1%	25.8%	26.6%
2016	553	970	1523	3124	-12.2%	8.4%	-0.1%	-1.8%

Regression Estimate	2009	553	760	1313
Regression Estimate	2016	573	990	1563
Average Annual Change		**0.52%**	**3.85%**	**2.53%**

South Leg

Year	Counts				% Change			
	NB	*SB*	*NB+SB*	*INT*	*NB*	*SB*	*NB+SB*	*INT*
2009	1	1	2	2512				
2011	1	1	2	3180	0.0%	0.0%	0.0%	26.6%
2016	1	1	2	3124	0.0%	0.0%	0.0%	-1.8%

Regression Estimate	2009	1	1	2
Regression Estimate	2016	1	1	2
Average Annual Change		**0.00%**	**0.00%**	**0.00%**

Appendix E:

2031 City Transportation Model

TRANS Regional Model

Version 2.15 - Assigned Oct, 2021

AM Peak Hour Total Traffic Volume

Richmond Rd. (Cleary to Carling)

2011 Model - Basecase

N/A

User Initials: TIMW
Plot Prepared: Jan, 2022
EMME Scenario: 23713

TRANS

Legend

AM Peak Hour Total Traffic Volume

1000 2000 3000 4000 5000

N

Distance (m)

100 200 300 400 500

TRANS Regional Model

Version 2.15 - Assigned June 16, 2020

AM Peak Hour Total Traffic Volume

Richmond Rd. (Cleary to Carling)

2031 Model - Basecase

N/A

User Initials: TIMW
Plot Prepared: January, 2022
EMME Scenario: 21711

Legend

AM Peak Hour Total Traffic Volume

1000 2000 3000 4000 5000

Distance (m)

100 200 300 400 500

N

Appendix F:

TDM Checklists

Page Setup: ----

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Last Saved: Friday, June 30, 2023 11:41:09 AM

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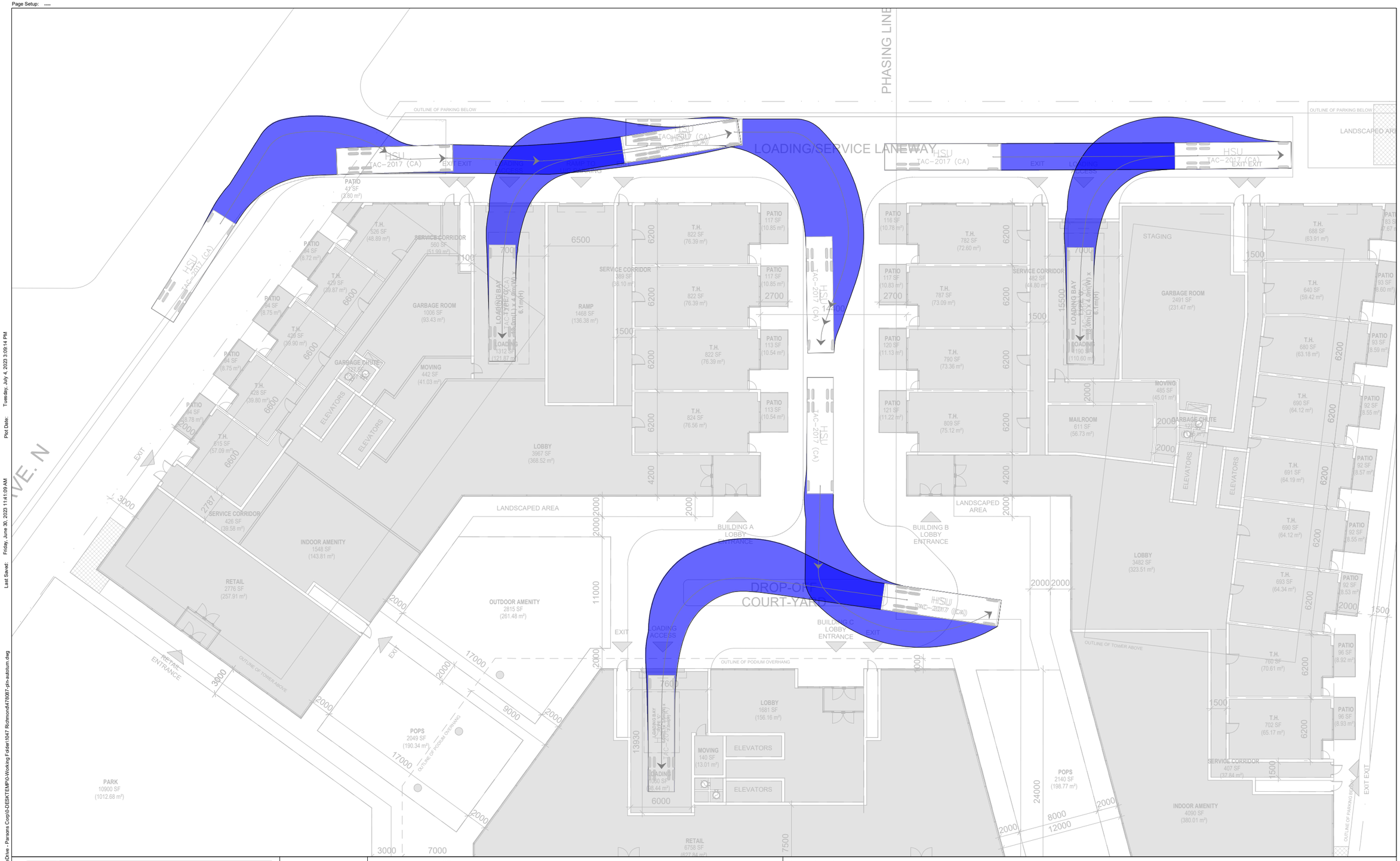
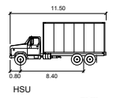


PARSONS®

NOTE: The location of utilities is approximate only, the exact location should be determined by consulting the municipal authorities and utility companies concerned. The contractor shall prove the location of utilities and shall be responsible for adequate protection from damage.

Legend



Not to Scale

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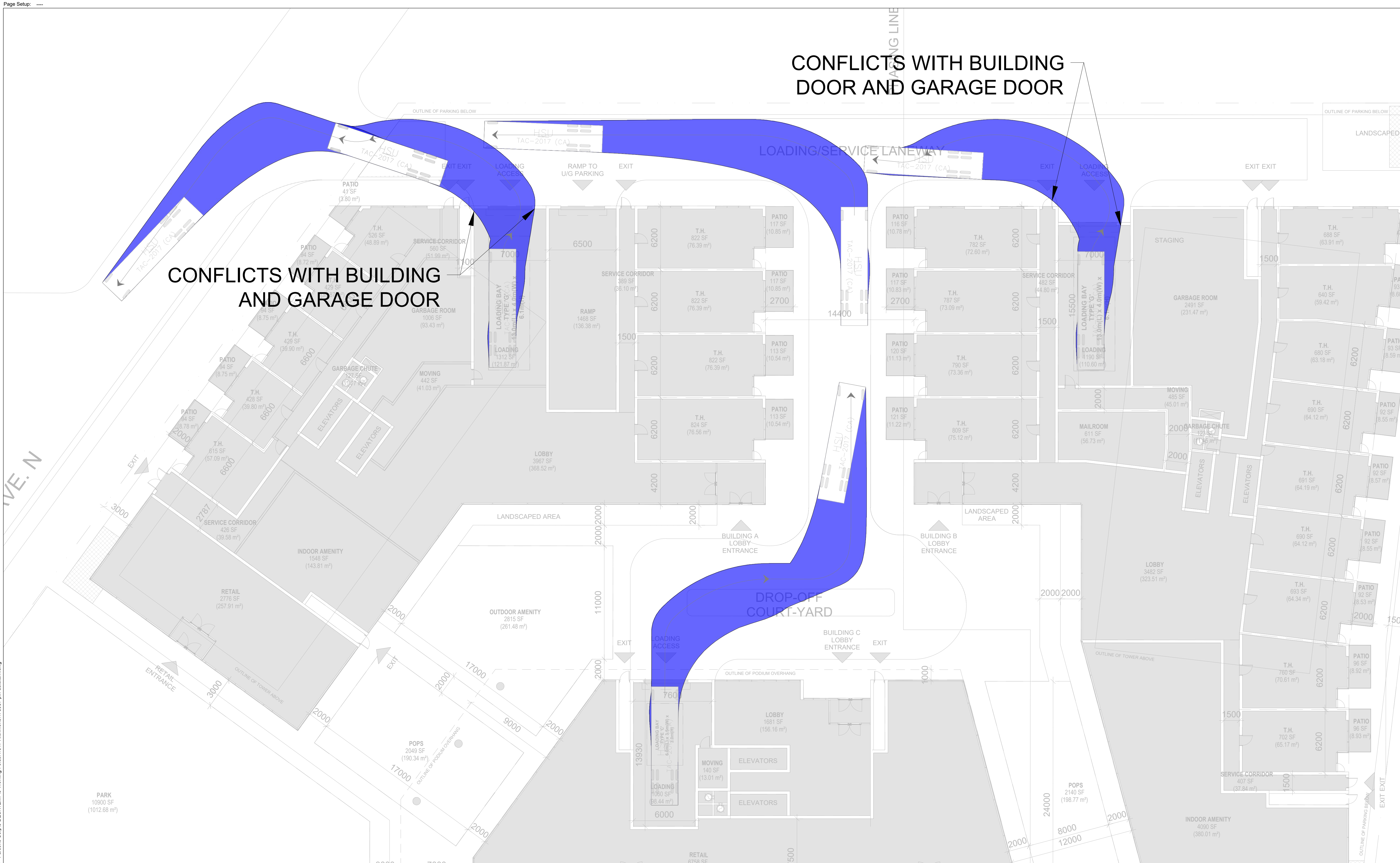
Client	
Date	Jul 04, 2023
Figure Number	001
Project Number	478087
Project Description	1047 Richmond Rd

Page Setup:



Last Saved: Friday, June 30, 2023 11:41:09 AM
Plot Date: Tuesday, July 4, 2023 3:09:23 PM

Consultant's Information:

PARSONS

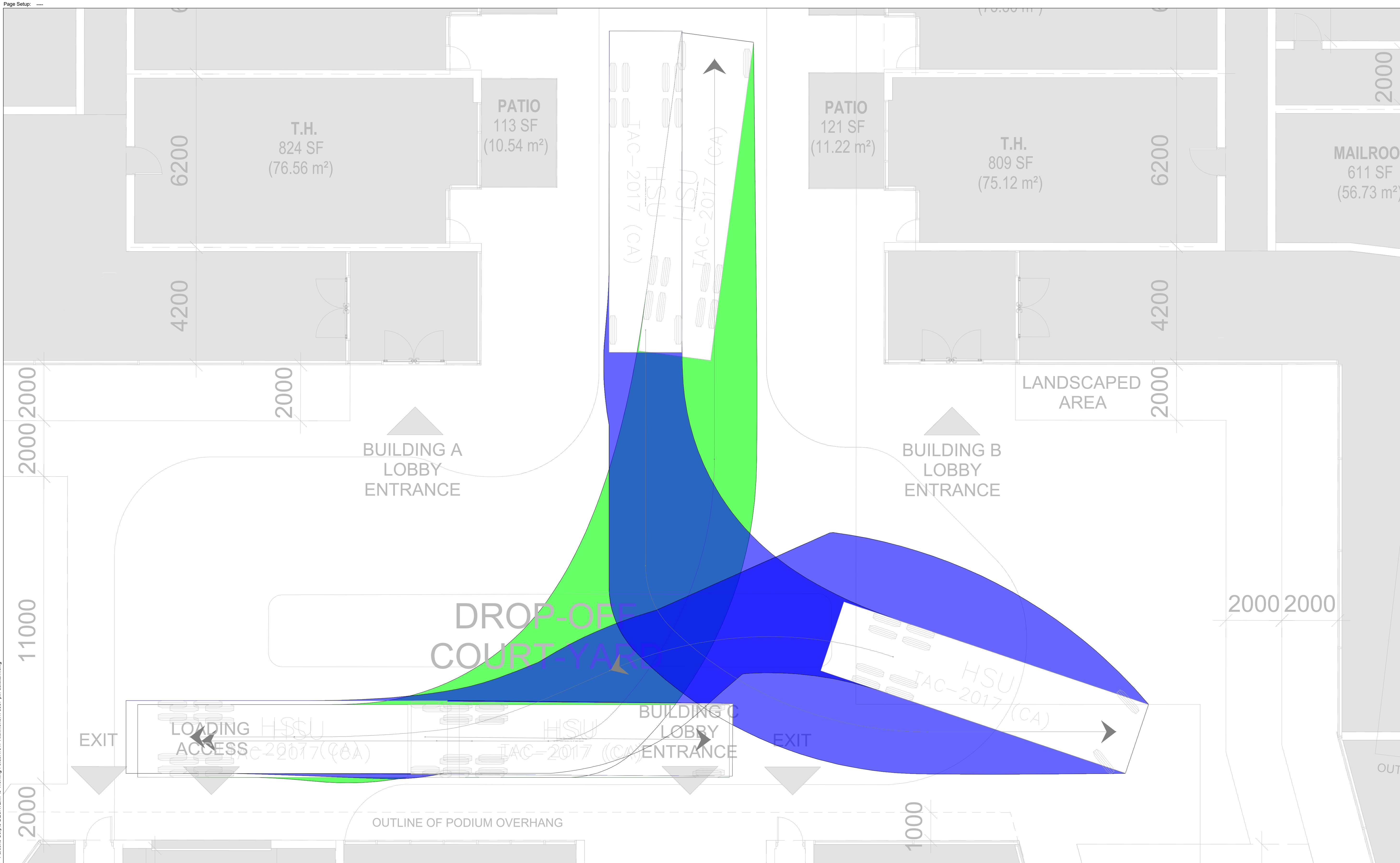
NOTE: The location of utilities is approximate only, the exact location should be determined by consulting the municipal authorities and utility companies concerned. The contractor shall prove the location of utilities and shall be responsible for adequate protection from damage.

Legend

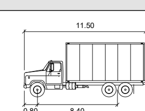
HSU

Not to Scale

Drawing Description	HSU OUT
Client	
Date	Jul 04, 2023
Figure Number	002
Project Number	478087
Project Description	1047 Richmond Rd



Legend



HSU

	meters
Width	: 2.60
Track	: 2.60
Lock to Lock Time	: 6.0
Steering Angle	: 40.0

Not to Scale

NOTE: The location of utilities is approximate only, the exact location should be determined by consulting the municipal authorities and utility companies concerned. The contractor shall prove the location of utilities and shall be responsible for adequate protection from damage.

Drawing Description: FIRE TRUCK

Client:

Date: Jul 04, 2023

Figure Number: 003

Project Number: 478087

Project Description: 1047 Richmond Rd

Consultant's Information: C:\Users\p004979B\OneDrive - Parsons Corp\0-DESKTEMP\0-Working Folder\1047 Richmond\478087-plh-autoturn.dwg

Last Saved: Friday, June 30, 2023 11:41:09 AM Plot Date: Tuesday, July 4, 2023 3:09:33 PM

Page Setup: ----

Appendix G:

Truck Turning Templates

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)*	☐ May be considered. To be confirmed during Site Plan Control process.
	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)	☑

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	☐ May be considered. To be confirmed during Site Plan Control process.
	1.2	**Travel surveys**	
BETTER	1.2.1	Conduct periodic surveys to identify travel-related behaviours, attitudes, challenges and solutions, and to track progress	☐ May be considered. To be confirmed during Site Plan Control process.
	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	☐ May be considered. To be confirmed during Site Plan Control process.
		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	☐ May be considered. To be confirmed during Site Plan Control process.
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	☐

Appendix H:

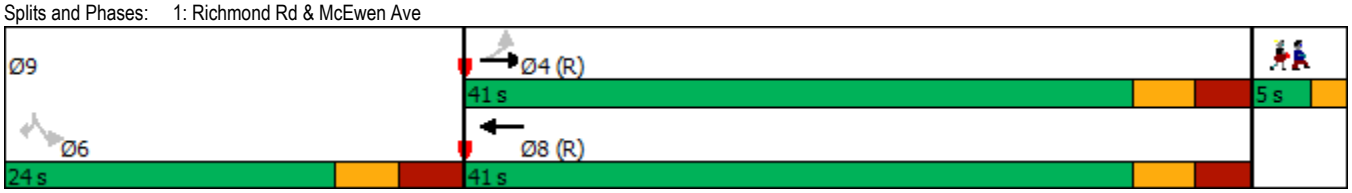
Synchro Analysis Reports

Existing Conditions

Lane Group	EBL	EBT	WBT	SBL	SBR	Ø9
Lane Configurations						
Traffic Volume (vph)	32	650	322	30	51	
Future Volume (vph)	32	650	322	30	51	
Lane Group Flow (vph)	0	758	382	33	57	
Turn Type	Perm	NA	NA	Perm	Perm	
Protected Phases		4	8			9
Permitted Phases	4			6	6	
Detector Phase	4	4	8	6	6	
Switch Phase						
Minimum Initial (s)	10.0	10.0	10.0	10.0	10.0	3.0
Minimum Split (s)	24.3	24.3	36.3	23.8	23.8	5.0
Total Split (s)	41.0	41.0	41.0	24.0	24.0	5.0
Total Split (%)	58.6%	58.6%	58.6%	34.3%	34.3%	7%
Yellow Time (s)	3.3	3.3	3.3	3.3	3.3	2.0
All-Red Time (s)	3.0	3.0	3.0	3.5	3.5	0.0
Lost Time Adjust (s)		0.0	0.0	0.0	0.0	
Total Lost Time (s)		6.3	6.3	6.8	6.8	
Lead/Lag						
Lead-Lag Optimize?						
Recall Mode	C-Max	C-Max	C-Max	None	None	None
Act Effct Green (s)		56.1	56.1	10.0	10.0	
Actuated g/C Ratio		0.80	0.80	0.14	0.14	
v/c Ratio		0.55	0.27	0.14	0.23	
Control Delay		7.1	5.5	27.9	10.9	
Queue Delay		0.0	0.0	0.0	0.0	
Total Delay		7.1	5.5	27.9	10.9	
LOS		A	A	C	B	
Approach Delay		7.1	5.5	17.1		
Approach LOS		A	A	B		
Queue Length 50th (m)		48.7	31.7	3.9	0.0	
Queue Length 95th (m)		80.8	52.5	11.0	8.9	
Internal Link Dist (m)		726.4	379.9	123.9		
Turn Bay Length (m)				20.0		
Base Capacity (vph)		1389	1417	416	389	
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		0.55	0.27	0.08	0.15	

Intersection Summary	
Cycle Length: 70	
Actuated Cycle Length: 70	
Offset: 38 (54%), Referenced to phase 4:EBTL and 8:WBT, Start of Green	
Natural Cycle: 70	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.55	
Intersection Signal Delay: 7.3	Intersection LOS: A
Intersection Capacity Utilization 86.2%	ICU Level of Service E
Analysis Period (min) 15	

Splits and Phases: 1: Richmond Rd & McEwen Ave

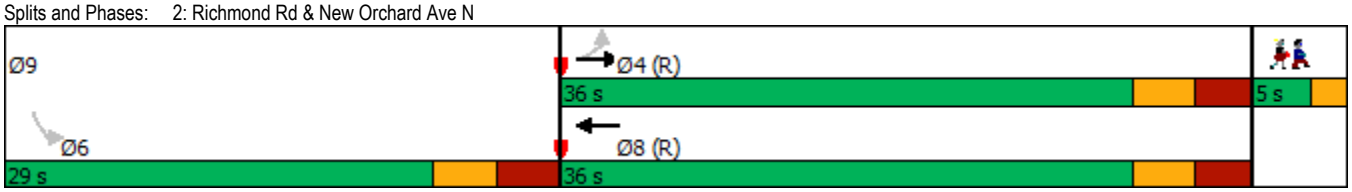


Lane Group	EBL	EBT	WBT	SBL	Ø9
Lane Configurations					
Traffic Volume (vph)	13	675	347	119	
Future Volume (vph)	13	675	347	119	
Lane Group Flow (vph)	14	750	435	148	
Turn Type	Perm	NA	NA	Perm	
Protected Phases		4	8		9
Permitted Phases	4			6	
Detector Phase	4	4	8	6	
Switch Phase					
Minimum Initial (s)	10.0	10.0	10.0	10.0	3.0
Minimum Split (s)	24.3	24.3	32.3	28.7	5.0
Total Split (s)	36.0	36.0	36.0	29.0	5.0
Total Split (%)	51.4%	51.4%	51.4%	41.4%	7%
Yellow Time (s)	3.3	3.3	3.3	3.3	2.0
All-Red Time (s)	3.0	3.0	3.0	3.4	0.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	
Total Lost Time (s)	6.3	6.3	6.3	6.7	
Lead/Lag					
Lead-Lag Optimize?					
Recall Mode	C-Max	C-Max	C-Max	None	None
Act Effct Green (s)	49.6	49.6	49.6	12.0	
Actuated g/C Ratio	0.71	0.71	0.71	0.17	
v/c Ratio	0.02	0.59	0.35	0.51	
Control Delay	2.2	5.6	6.8	30.4	
Queue Delay	0.0	0.0	0.0	0.0	
Total Delay	2.2	5.6	6.8	30.4	
LOS	A	A	A	C	
Approach Delay		5.5	6.8	30.4	
Approach LOS		A	A	C	
Queue Length 50th (m)	0.2	11.5	21.5	16.9	
Queue Length 95th (m)	m0.4	14.8	44.4	30.6	
Internal Link Dist (m)		379.9	396.9	54.3	
Turn Bay Length (m)	70.0				
Base Capacity (vph)	625	1263	1241	537	
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	0.02	0.59	0.35	0.28	

Intersection Summary	
Cycle Length: 70	
Actuated Cycle Length: 70	
Offset: 68 (97%), Referenced to phase 4:EBTL and 8:WBT, Start of Green	
Natural Cycle: 75	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.59	
Intersection Signal Delay: 8.7	Intersection LOS: A
Intersection Capacity Utilization 59.0%	ICU Level of Service B
Analysis Period (min) 15	

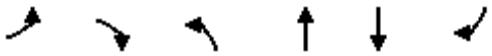
m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 2: Richmond Rd & New Orchard Ave N



Lane Group	EBL	NBT	SBT
Lane Configurations			
Traffic Volume (vph)	1	16	18
Future Volume (vph)	1	16	18
Lane Group Flow (vph)	98	78	22
Sign Control	Stop	Free	Free

Intersection Summary		
Control Type: Unsignalized		
Intersection Capacity Utilization 23.1%		ICU Level of Service A
Analysis Period (min) 15		



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	1	87	54	16	18	2
Future Volume (Veh/h)	1	87	54	16	18	2
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	1	97	60	18	20	2
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (m)				78		
pX, platoon unblocked						
vC, conflicting volume	159	21	22			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	159	21	22			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	100	91	96			
cM capacity (veh/h)	801	1056	1593			

Direction, Lane #	EB 1	NB 1	SB 1
Volume Total	98	78	22
Volume Left	1	60	0
Volume Right	97	0	2
cSH	1053	1593	1700
Volume to Capacity	0.09	0.04	0.01
Queue Length 95th (m)	2.3	0.9	0.0
Control Delay (s)	8.8	5.7	0.0
Lane LOS	A	A	
Approach Delay (s)	8.8	5.7	0.0
Approach LOS	A		

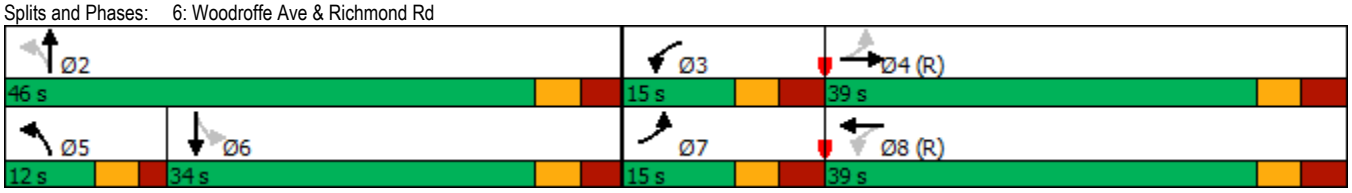
Intersection Summary			
Average Delay	6.6		
Intersection Capacity Utilization	23.1%	ICU Level of Service	A
Analysis Period (min)	15		

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations								
Traffic Volume (vph)	152	739	62	229	117	257	39	329
Future Volume (vph)	152	739	62	229	117	257	39	329
Lane Group Flow (vph)	169	1061	69	276	130	388	43	434
Turn Type	pm+pt	NA	pm+pt	NA	pm+pt	NA	Perm	NA
Protected Phases	7	4	3	8	5	2		6
Permitted Phases	4		8		2		6	
Detector Phase	7	4	3	8	5	2	6	6
Switch Phase								
Minimum Initial (s)	5.0	10.0	5.0	10.0	5.0	10.0	10.0	10.0
Minimum Split (s)	11.7	33.9	11.7	33.9	10.3	31.5	31.5	31.5
Total Split (s)	15.0	39.0	15.0	39.0	12.0	46.0	34.0	34.0
Total Split (%)	15.0%	39.0%	15.0%	39.0%	12.0%	46.0%	34.0%	34.0%
Yellow Time (s)	3.3	3.3	3.3	3.3	3.3	3.3	3.3	3.3
All-Red Time (s)	3.4	3.6	3.4	3.6	2.0	3.2	3.2	3.2
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	6.7	6.9	6.7	6.9	5.3	6.5	6.5	6.5
Lead/Lag	Lead	Lag	Lead	Lag	Lead		Lag	Lag
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes		Yes	Yes
Recall Mode	None	C-Max	None	C-Max	None	Max	Max	Max
Act Effct Green (s)	42.4	35.5	39.8	32.2	40.7	39.5	27.5	27.5
Actuated g/C Ratio	0.42	0.36	0.40	0.32	0.41	0.40	0.28	0.28
v/c Ratio	0.37	1.72	0.35	0.26	0.60	0.57	0.17	0.90
Control Delay	18.5	356.0	20.1	25.0	32.0	26.4	29.8	57.7
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	18.5	356.0	20.1	25.0	32.0	26.4	29.8	57.7
LOS	B	F	C	C	C	C	C	E
Approach Delay		309.6		24.0		27.8		55.2
Approach LOS		F		C		C		E
Queue Length 50th (m)	18.5	~316.8	7.1	20.0	15.9	54.5	6.3	79.4
Queue Length 95th (m)	31.3	#394.7	14.6	30.1	#28.8	83.7	15.2	#134.9
Internal Link Dist (m)		69.5		81.7		838.1		358.2
Turn Bay Length (m)	95.0		75.0		55.0		50.0	
Base Capacity (vph)	459	617	212	1078	216	677	253	483
Starvation Cap Reductn	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.37	1.72	0.33	0.26	0.60	0.57	0.17	0.90

Intersection Summary	
Cycle Length: 100	
Actuated Cycle Length: 100	
Offset: 35 (35%), Referenced to phase 4:EBTL and 8:WBTL, Start of Green	
Natural Cycle: 150	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 1.72	
Intersection Signal Delay: 167.2	Intersection LOS: F
Intersection Capacity Utilization 110.6%	ICU Level of Service H
Analysis Period (min) 15	

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

Splits and Phases: 6: Woodroffe Ave & Richmond Rd



Lane Group	EBL	EBT	WBT	SBL	SBR	Ø9
Lane Configurations						
Traffic Volume (vph)	81	426	822	35	66	
Future Volume (vph)	81	426	822	35	66	
Lane Group Flow (vph)	0	563	963	39	73	
Turn Type	Perm	NA	NA	Perm	Perm	
Protected Phases		4	8			9
Permitted Phases	4			6	6	
Detector Phase	4	4	8	6	6	
Switch Phase						
Minimum Initial (s)	10.0	10.0	10.0	10.0	10.0	3.0
Minimum Split (s)	24.3	24.3	36.3	23.8	23.8	5.0
Total Split (s)	56.0	56.0	56.0	24.0	24.0	5.0
Total Split (%)	65.9%	65.9%	65.9%	28.2%	28.2%	6%
Yellow Time (s)	3.3	3.3	3.3	3.3	3.3	2.0
All-Red Time (s)	3.0	3.0	3.0	3.5	3.5	0.0
Lost Time Adjust (s)		0.0	0.0	0.0	0.0	
Total Lost Time (s)		6.3	6.3	6.8	6.8	
Lead/Lag						
Lead-Lag Optimize?						
Recall Mode	C-Max	C-Max	C-Max	None	None	None
Act Effct Green (s)		66.5	66.5	10.0	10.0	
Actuated g/C Ratio		0.78	0.78	0.12	0.12	
v/c Ratio		0.61	0.70	0.20	0.32	
Control Delay		9.1	3.9	36.6	13.2	
Queue Delay		0.0	0.0	0.0	0.0	
Total Delay		9.1	3.9	36.6	13.2	
LOS		A	A	D	B	
Approach Delay		9.1	3.9	21.3		
Approach LOS		A	A	C		
Queue Length 50th (m)		39.1	19.1	5.8	0.0	
Queue Length 95th (m)		70.8	32.4	14.7	11.6	
Internal Link Dist (m)		760.7	379.9	123.9		
Turn Bay Length (m)				20.0		
Base Capacity (vph)		921	1385	342	339	
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		0.61	0.70	0.11	0.22	

Intersection Summary	
Cycle Length: 85	
Actuated Cycle Length: 85	
Offset: 17 (20%), Referenced to phase 4:EBTL and 8:WBT, Start of Green	
Natural Cycle: 100	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.70	
Intersection Signal Delay: 6.9	Intersection LOS: A
Intersection Capacity Utilization 104.9%	ICU Level of Service G
Analysis Period (min) 15	

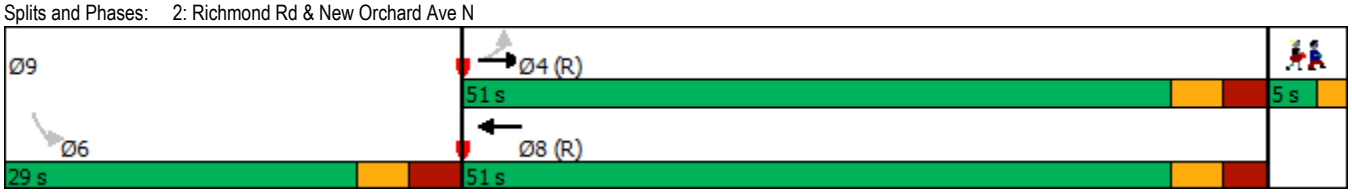
Splits and Phases: 1: Richmond Rd & McEwen Ave

Lane Group	EBL	EBT	WBT	SBL	Ø9
Lane Configurations					
Traffic Volume (vph)	22	477	853	76	
Future Volume (vph)	22	477	853	76	
Lane Group Flow (vph)	24	530	1078	102	
Turn Type	Perm	NA	NA	Perm	
Protected Phases		4	8		9
Permitted Phases	4			6	
Detector Phase	4	4	8	6	
Switch Phase					
Minimum Initial (s)	10.0	10.0	10.0	10.0	3.0
Minimum Split (s)	24.3	24.3	32.3	28.7	5.0
Total Split (s)	51.0	51.0	51.0	29.0	5.0
Total Split (%)	60.0%	60.0%	60.0%	34.1%	6%
Yellow Time (s)	3.3	3.3	3.3	3.3	2.0
All-Red Time (s)	3.0	3.0	3.0	3.4	0.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	
Total Lost Time (s)	6.3	6.3	6.3	6.7	
Lead/Lag					
Lead-Lag Optimize?					
Recall Mode	C-Max	C-Max	C-Max	None	None
Act Effct Green (s)	65.4	65.4	65.4	11.2	
Actuated g/C Ratio	0.77	0.77	0.77	0.13	
v/c Ratio	0.11	0.39	0.80	0.45	
Control Delay	8.3	8.4	15.1	36.1	
Queue Delay	0.0	0.0	0.0	0.0	
Total Delay	8.3	8.4	15.1	36.1	
LOS	A	A	B	D	
Approach Delay		8.4	15.1	36.1	
Approach LOS		A	B	D	
Queue Length 50th (m)	1.4	37.9	99.7	13.9	
Queue Length 95th (m)	m3.5	78.9	#236.5	27.2	
Internal Link Dist (m)		379.9	402.2	54.3	
Turn Bay Length (m)	70.0				
Base Capacity (vph)	219	1372	1347	440	
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	0.11	0.39	0.80	0.23	

Intersection Summary	
Cycle Length: 85	
Actuated Cycle Length: 85	
Offset: 1 (1%), Referenced to phase 4:EBTL and 8:WBT, Start of Green	
Natural Cycle: 100	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.80	
Intersection Signal Delay: 14.2	Intersection LOS: B
Intersection Capacity Utilization 75.7%	ICU Level of Service D
Analysis Period (min) 15	

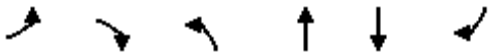
\# 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.
m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 2: Richmond Rd & New Orchard Ave N



Lane Group	EBL	NBT	SBT
Lane Configurations			
Traffic Volume (vph)	4	21	17
Future Volume (vph)	4	21	17
Lane Group Flow (vph)	92	133	22
Sign Control	Stop	Free	Free

Intersection Summary		
Control Type: Unsignalized		
Intersection Capacity Utilization 25.7%		ICU Level of Service A
Analysis Period (min) 15		



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	4	79	99	21	17	3
Future Volume (Veh/h)	4	79	99	21	17	3
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	4	88	110	23	19	3
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (m)				78		
pX, platoon unblocked						
vC, conflicting volume	264	20	22			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	264	20	22			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	99	92	93			
cM capacity (veh/h)	675	1057	1593			

Direction, Lane #	EB 1	NB 1	SB 1
Volume Total	92	133	22
Volume Left	4	110	0
Volume Right	88	0	3
cSH	1032	1593	1700
Volume to Capacity	0.09	0.07	0.01
Queue Length 95th (m)	2.2	1.7	0.0
Control Delay (s)	8.8	6.2	0.0
Lane LOS	A	A	
Approach Delay (s)	8.8	6.2	0.0
Approach LOS	A		

Intersection Summary			
Average Delay	6.6		
Intersection Capacity Utilization	25.7%	ICU Level of Service	A
Analysis Period (min)	15		

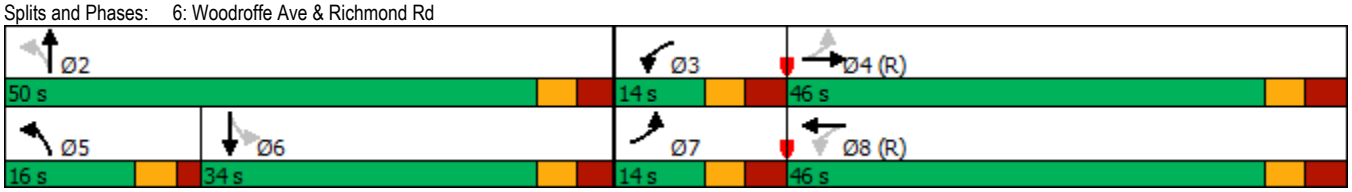
Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations								
Traffic Volume (vph)	83	322	217	627	232	402	25	340
Future Volume (vph)	83	322	217	627	232	402	25	340
Lane Group Flow (vph)	92	552	241	731	258	545	28	447
Turn Type	pm+pt	NA	pm+pt	NA	pm+pt	NA	Perm	NA
Protected Phases	7	4	3	8	5	2		6
Permitted Phases	4		8		2		6	
Detector Phase	7	4	3	8	5	2	6	6
Switch Phase								
Minimum Initial (s)	5.0	10.0	5.0	10.0	5.0	10.0	10.0	10.0
Minimum Split (s)	11.7	33.9	11.7	33.9	10.3	31.5	31.5	31.5
Total Split (s)	14.0	46.0	14.0	46.0	16.0	50.0	34.0	34.0
Total Split (%)	12.7%	41.8%	12.7%	41.8%	14.5%	45.5%	30.9%	30.9%
Yellow Time (s)	3.3	3.3	3.3	3.3	3.3	3.3	3.3	3.3
All-Red Time (s)	3.4	3.6	3.4	3.6	2.0	3.2	3.2	3.2
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	6.7	6.9	6.7	6.9	5.3	6.5	6.5	6.5
Lead/Lag	Lead	Lag	Lead	Lag	Lead		Lag	Lag
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes		Yes	Yes
Recall Mode	None	C-Max	None	C-Max	None	Max	Max	Max
Act Effct Green (s)	46.4	39.1	47.9	41.9	44.7	43.5	27.5	27.5
Actuated g/C Ratio	0.42	0.36	0.44	0.38	0.41	0.40	0.25	0.25
v/c Ratio	0.33	0.91	1.10	0.57	1.11	0.80	0.18	1.02
Control Delay	19.0	53.0	113.6	29.8	119.7	38.9	36.1	88.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	19.0	53.0	113.6	29.8	119.7	38.9	36.1	88.0
LOS	B	D	F	C	F	D	D	F
Approach Delay		48.2		50.5		64.8		84.9
Approach LOS		D		D		E		F
Queue Length 50th (m)	10.4	107.0	~35.1	66.8	~48.1	99.5	4.7	~97.6
Queue Length 95th (m)	19.4	#172.1	#84.2	86.4	#98.3	#145.6	12.8	#161.4
Internal Link Dist (m)		69.3		80.5		859.2		386.2
Turn Bay Length (m)	95.0		75.0		55.0		50.0	
Base Capacity (vph)	285	607	220	1281	232	685	155	440
Starvation Cap Reductn	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.32	0.91	1.10	0.57	1.11	0.80	0.18	1.02

Intersection Summary

Cycle Length: 110
Actuated Cycle Length: 110
Offset: 0 (0%), Referenced to phase 4:EBTL and 8:WBTL, Start of Green
Natural Cycle: 120
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 1.11
Intersection Signal Delay: 59.6 — Intersection LOS: E
Intersection Capacity Utilization 101.2% — ICU Level of Service G
Analysis Period (min) 15

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

Splits and Phases: 6: Woodroffe Ave & Richmond Rd

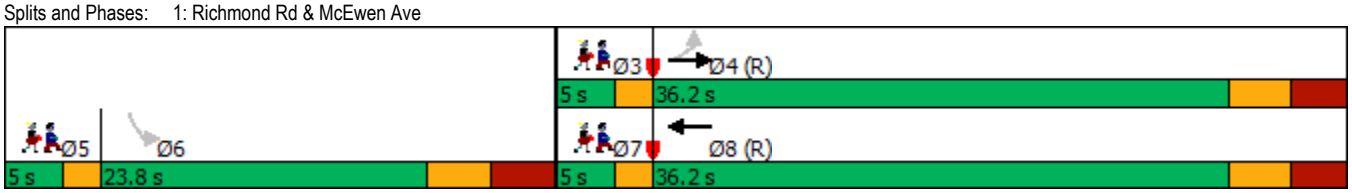


Total Future Background 2026

Lane Group	EBL	EBT	WBT	SBL	Ø3	Ø5	Ø7
Lane Configurations							
Traffic Volume (vph)	32	717	357	30			
Future Volume (vph)	32	717	357	30			
Lane Group Flow (vph)	32	717	379	81			
Turn Type	Perm	NA	NA	Perm			
Protected Phases		4	8		3	5	7
Permitted Phases	4			6			
Detector Phase	4	4	8	6			
Switch Phase							
Minimum Initial (s)	10.0	10.0	10.0	10.0	1.0	1.0	1.0
Minimum Split (s)	24.3	24.3	31.3	23.8	5.0	5.0	5.0
Total Split (s)	36.2	36.2	36.2	23.8	5.0	5.0	5.0
Total Split (%)	51.7%	51.7%	51.7%	34.0%	7%	7%	7%
Yellow Time (s)	3.3	3.3	3.3	3.3	2.0	2.0	2.0
All-Red Time (s)	3.0	3.0	3.0	3.5	0.0	0.0	0.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0			
Total Lost Time (s)	6.3	6.3	6.3	6.8			
Lead/Lag	Lag	Lag	Lag	Lag	Lead	Lead	Lead
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Recall Mode	C-Max	C-Max	C-Max	None	None	None	None
Act Effct Green (s)	51.4	51.4	51.4	10.1			
Actuated g/C Ratio	0.73	0.73	0.73	0.14			
v/c Ratio	0.05	0.55	0.29	0.31			
Control Delay	4.3	7.9	7.0	16.7			
Queue Delay	0.0	0.0	0.0	0.0			
Total Delay	4.3	7.9	7.0	16.7			
LOS	A	A	A	B			
Approach Delay		7.7	7.0	16.7			
Approach LOS		A	A	B			
Queue Length 50th (m)	1.2	43.4	31.1	3.5			
Queue Length 95th (m)	3.7	72.9	52.6	14.3			
Internal Link Dist (m)		742.1	379.9	123.9			
Turn Bay Length (m)	50.0			20.0			
Base Capacity (vph)	698	1310	1298	410			
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	0.05	0.55	0.29	0.20			

Intersection Summary	
Cycle Length: 70	
Actuated Cycle Length: 70	
Offset: 38 (54%), Referenced to phase 4:EBTL and 8:WBT, Start of Green	
Natural Cycle: 75	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.55	
Intersection Signal Delay: 8.1	Intersection LOS: A
Intersection Capacity Utilization 62.4%	ICU Level of Service B
Analysis Period (min) 15	

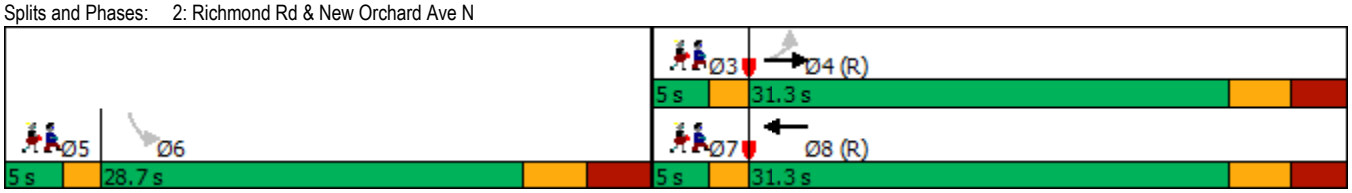
Splits and Phases: 1: Richmond Rd & McEwen Ave



Lane Group	EBL	EBT	WBT	SBL	Ø3	Ø5	Ø7
Lane Configurations							
Traffic Volume (vph)	15	743	382	128			
Future Volume (vph)	15	743	382	128			
Lane Group Flow (vph)	0	758	431	145			
Turn Type	Perm	NA	NA	Perm			
Protected Phases		4	8		3	5	7
Permitted Phases	4			6			
Detector Phase	4	4	8	6			
Switch Phase							
Minimum Initial (s)	10.0	10.0	10.0	10.0	1.0	1.0	1.0
Minimum Split (s)	24.3	24.3	27.3	28.7	5.0	5.0	5.0
Total Split (s)	31.3	31.3	31.3	28.7	5.0	5.0	5.0
Total Split (%)	44.7%	44.7%	44.7%	41.0%	7%	7%	7%
Yellow Time (s)	3.3	3.3	3.3	3.3	2.0	2.0	2.0
All-Red Time (s)	3.0	3.0	3.0	3.4	0.0	0.0	0.0
Lost Time Adjust (s)		0.0	0.0	0.0			
Total Lost Time (s)		6.3	6.3	6.7			
Lead/Lag	Lag	Lag	Lag	Lag	Lead	Lead	Lead
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Recall Mode	C-Max	C-Max	C-Max	None	None	None	None
Act Effct Green (s)		49.7	49.7	11.9			
Actuated g/C Ratio		0.71	0.71	0.17			
v/c Ratio		0.60	0.35	0.50			
Control Delay		4.8	6.7	30.1			
Queue Delay		0.0	0.0	0.0			
Total Delay		4.8	6.7	30.1			
LOS		A	A	C			
Approach Delay		4.8	6.7	30.1			
Approach LOS		A	A	C			
Queue Length 50th (m)		9.0	21.1	16.4			
Queue Length 95th (m)		13.2	43.6	29.8			
Internal Link Dist (m)		379.9	490.4	54.3			
Turn Bay Length (m)							
Base Capacity (vph)		1253	1243	530			
Starvation Cap Reductn		0	0	0			
Spillback Cap Reductn		0	0	0			
Storage Cap Reductn		0	0	0			
Reduced v/c Ratio		0.60	0.35	0.27			

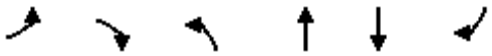
Intersection Summary	
Cycle Length: 70	
Actuated Cycle Length: 70	
Offset: 68 (97%), Referenced to phase 4:EBTL and 8:WBT, Start of Green	
Natural Cycle: 90	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.60	
Intersection Signal Delay: 8.2	Intersection LOS: A
Intersection Capacity Utilization 75.7%	ICU Level of Service D
Analysis Period (min) 15	

Splits and Phases: 2: Richmond Rd & New Orchard Ave N



Lane Group	EBL	NBT	SBT
Lane Configurations			
Traffic Volume (vph)	1	22	30
Future Volume (vph)	1	22	30
Lane Group Flow (vph)	88	76	32
Sign Control	Stop	Free	Free

Intersection Summary		
Control Type: Unsignalized		
Intersection Capacity Utilization 23.5%		ICU Level of Service A
Analysis Period (min) 15		



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	1	87	54	22	30	2
Future Volume (Veh/h)	1	87	54	22	30	2
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	1	87	54	22	30	2
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (m)				78		
pX, platoon unblocked						
vC, conflicting volume	161	31	32			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	161	31	32			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	100	92	97			
cM capacity (veh/h)	802	1043	1580			

Direction, Lane #	EB 1	NB 1	SB 1
Volume Total	88	76	32
Volume Left	1	54	0
Volume Right	87	0	2
cSH	1040	1580	1700
Volume to Capacity	0.08	0.03	0.02
Queue Length 95th (m)	2.1	0.8	0.0
Control Delay (s)	8.8	5.3	0.0
Lane LOS	A	A	
Approach Delay (s)	8.8	5.3	0.0
Approach LOS	A		

Intersection Summary			
Average Delay	6.0		
Intersection Capacity Utilization	23.5%	ICU Level of Service	A
Analysis Period (min)	15		

Lane Group	NBT	SBT
Lane Configurations		
Traffic Volume (vph)	23	32
Future Volume (vph)	23	32
Lane Group Flow (vph)	23	32
Sign Control	Free	Free

Intersection Summary		
Control Type: Unsignalized		
Intersection Capacity Utilization 6.7%		ICU Level of Service A
Analysis Period (min) 15		

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	0	0	23	0	0	32
Future Volume (Veh/h)	0	0	23	0	0	32
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	0	0	23	0	0	32
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			None			None
Median storage veh)						
Upstream signal (m)			108			
pX, platoon unblocked						
vC, conflicting volume	55	23			23	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	55	23			23	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	100	100			100	
cM capacity (veh/h)	953	1054			1592	

Direction, Lane #	WB 1	NB 1	SB 1
Volume Total	0	23	32
Volume Left	0	0	0
Volume Right	0	0	0
cSH	1700	1700	1592
Volume to Capacity	0.00	0.01	0.00
Queue Length 95th (m)	0.0	0.0	0.0
Control Delay (s)	0.0	0.0	0.0
Lane LOS	A		
Approach Delay (s)	0.0	0.0	0.0
Approach LOS	A		

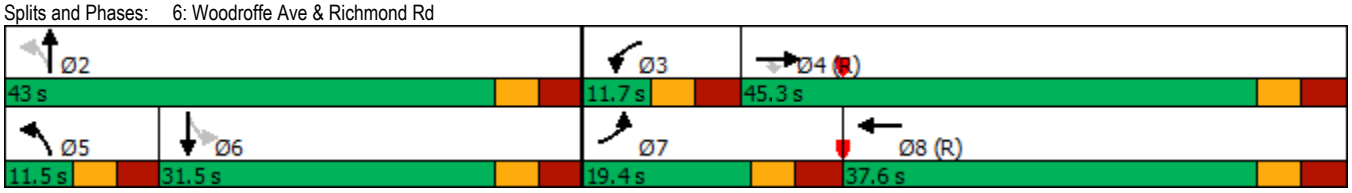
Intersection Summary			
Average Delay	0.0		
Intersection Capacity Utilization	6.7%	ICU Level of Service	A
Analysis Period (min)	15		

Lane Group	EBL	EBT	EBR	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations									
Traffic Volume (vph)	152	818	220	62	255	119	257	39	329
Future Volume (vph)	152	818	220	62	255	119	257	39	329
Lane Group Flow (vph)	152	818	220	62	275	119	349	39	390
Turn Type	Prot	NA	Perm	Prot	NA	pm+pt	NA	Perm	NA
Protected Phases	7	4		3	8	5	2		6
Permitted Phases			4			2		6	
Detector Phase	7	4	4	3	8	5	2	6	6
Switch Phase									
Minimum Initial (s)	5.0	10.0	10.0	5.0	10.0	5.0	10.0	10.0	10.0
Minimum Split (s)	11.9	28.9	28.9	11.7	33.9	11.5	31.5	31.5	31.5
Total Split (s)	19.4	45.3	45.3	11.7	37.6	11.5	43.0	31.5	31.5
Total Split (%)	19.4%	45.3%	45.3%	11.7%	37.6%	11.5%	43.0%	31.5%	31.5%
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)	3.6	3.6	3.6	3.4	3.6	3.2	3.2	3.2	3.2
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	6.9	6.9	6.9	6.7	6.9	6.5	6.5	6.5	6.5
Lead/Lag	Lead				Lag	Lead		Lag	Lag
Lead-Lag Optimize?	Yes				Yes	Yes		Yes	Yes
Recall Mode	None	C-Max	C-Max	None	C-Max	None	Max	Max	Max
Act Effct Green (s)	11.8	40.7	40.7	5.0	31.4	36.5	36.5	25.0	25.0
Actuated g/C Ratio	0.12	0.41	0.41	0.05	0.31	0.36	0.36	0.25	0.25
v/c Ratio	0.76	1.13	0.31	0.74	0.50	0.64	0.57	0.16	0.90
Control Delay	67.0	104.2	6.4	92.8	32.1	40.2	29.9	31.6	62.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	67.0	104.2	6.4	92.8	32.1	40.2	29.9	31.6	62.0
LOS	E	F	A	F	C	D	C	C	E
Approach Delay		81.4			43.2		32.5		59.3
Approach LOS		F			D		C		E
Queue Length 50th (m)	28.7	~192.8	4.6	12.1	43.6	15.5	53.5	5.9	73.3
Queue Length 95th (m)	#57.2	#262.6	19.4	#33.9	68.2	#32.1	81.5	14.7	#125.9
Internal Link Dist (m)		490.4			81.7		861.3		399.3
Turn Bay Length (m)	95.0		30.0	75.0		55.0		50.0	
Base Capacity (vph)	211	727	702	84	550	185	613	239	433
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.72	1.13	0.31	0.74	0.50	0.64	0.57	0.16	0.90

Intersection Summary	
Cycle Length: 100	
Actuated Cycle Length: 100	
Offset: 0 (0%), Referenced to phase 4:EBT and 8:WBT, Start of Green	
Natural Cycle: 120	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 1.13	
Intersection Signal Delay: 62.7	Intersection LOS: E
Intersection Capacity Utilization 101.1%	ICU Level of Service G
Analysis Period (min) 15	

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

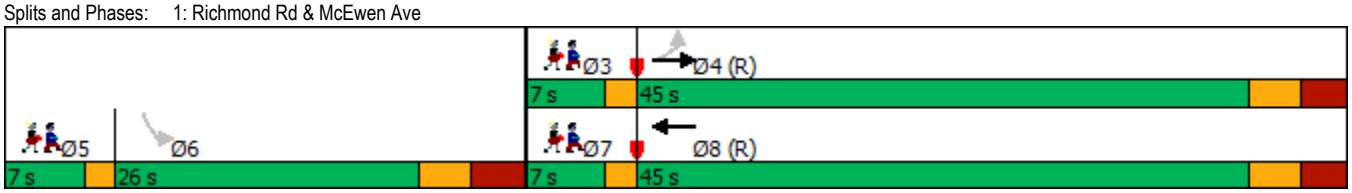
Splits and Phases: 6: Woodroffe Ave & Richmond Rd



Lane Group	EBL	EBT	WBT	SBL	Ø3	Ø5	Ø7
Lane Configurations							
Traffic Volume (vph)	81	472	906	35			
Future Volume (vph)	81	472	906	35			
Lane Group Flow (vph)	81	472	951	101			
Turn Type	Perm	NA	NA	Perm			
Protected Phases		4	8		3	5	7
Permitted Phases	4			6			
Detector Phase	4	4	8	6			
Switch Phase							
Minimum Initial (s)	10.0	10.0	10.0	10.0	1.0	1.0	1.0
Minimum Split (s)	24.3	24.3	36.3	23.8	5.0	5.0	5.0
Total Split (s)	45.0	45.0	45.0	26.0	7.0	7.0	7.0
Total Split (%)	52.9%	52.9%	52.9%	30.6%	8%	8%	8%
Yellow Time (s)	3.3	3.3	3.3	3.3	2.0	2.0	2.0
All-Red Time (s)	3.0	3.0	3.0	3.5	0.0	0.0	0.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0			
Total Lost Time (s)	6.3	6.3	6.3	6.8			
Lead/Lag	Lag	Lag	Lag	Lag	Lead	Lead	Lead
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Recall Mode	C-Max	C-Max	C-Max	None	None	None	None
Act Effct Green (s)	66.1	66.1	66.1	10.5			
Actuated g/C Ratio	0.78	0.78	0.78	0.12			
v/c Ratio	0.26	0.34	0.69	0.41			
Control Delay	6.8	4.9	5.6	20.3			
Queue Delay	0.0	0.0	0.0	0.0			
Total Delay	6.8	4.9	5.6	20.3			
LOS	A	A	A	C			
Approach Delay		5.2	5.6	20.3			
Approach LOS		A	A	C			
Queue Length 50th (m)	3.7	23.3	31.2	5.2			
Queue Length 95th (m)	10.8	40.4	54.2	18.7			
Internal Link Dist (m)		679.4	379.9	123.9			
Turn Bay Length (m)	50.0			20.0			
Base Capacity (vph)	313	1386	1376	392			
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	0.26	0.34	0.69	0.26			

Intersection Summary	
Cycle Length: 85	
Actuated Cycle Length: 85	
Offset: 17 (20%), Referenced to phase 4:EBTL and 8:WBT, Start of Green	
Natural Cycle: 90	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.69	
Intersection Signal Delay: 6.4	Intersection LOS: A
Intersection Capacity Utilization 89.5%	ICU Level of Service E
Analysis Period (min) 15	

Splits and Phases: 1: Richmond Rd & McEwen Ave

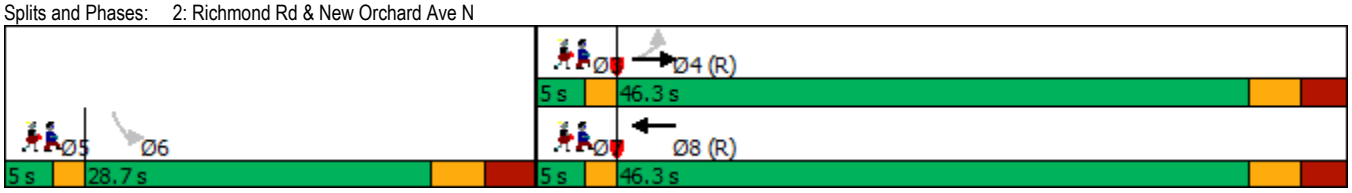


Lane Group	EBL	EBT	WBT	SBL	Ø3	Ø5	Ø7
Lane Configurations							
Traffic Volume (vph)	25	525	938	82			
Future Volume (vph)	25	525	938	82			
Lane Group Flow (vph)	0	550	1063	100			
Turn Type	Perm	NA	NA	Perm			
Protected Phases		4	8		3	5	7
Permitted Phases	4			6			
Detector Phase	4	4	8	6			
Switch Phase							
Minimum Initial (s)	10.0	10.0	10.0	10.0	1.0	1.0	1.0
Minimum Split (s)	24.3	24.3	27.3	28.7	5.0	5.0	5.0
Total Split (s)	46.3	46.3	46.3	28.7	5.0	5.0	5.0
Total Split (%)	54.5%	54.5%	54.5%	33.8%	6%	6%	6%
Yellow Time (s)	3.3	3.3	3.3	3.3	2.0	2.0	2.0
All-Red Time (s)	3.0	3.0	3.0	3.4	0.0	0.0	0.0
Lost Time Adjust (s)		0.0	0.0	0.0			
Total Lost Time (s)		6.3	6.3	6.7			
Lead/Lag	Lag	Lag	Lag	Lag	Lead	Lead	Lead
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Recall Mode	C-Max	C-Max	C-Max	None	None	None	None
Act Effct Green (s)		65.5	65.5	11.1			
Actuated g/C Ratio		0.77	0.77	0.13			
v/c Ratio		0.43	0.79	0.44			
Control Delay		6.3	14.5	35.6			
Queue Delay		0.0	0.0	0.0			
Total Delay		6.3	14.5	35.6			
LOS		A	B	D			
Approach Delay		6.3	14.5	35.6			
Approach LOS		A	B	D			
Queue Length 50th (m)		28.6	96.1	13.4			
Queue Length 95th (m)		53.6	#230.6	26.6			
Internal Link Dist (m)		379.9	495.5	54.3			
Turn Bay Length (m)							
Base Capacity (vph)		1282	1348	435			
Starvation Cap Reductn		0	0	0			
Spillback Cap Reductn		0	0	0			
Storage Cap Reductn		0	0	0			
Reduced v/c Ratio		0.43	0.79	0.23			

Intersection Summary	
Cycle Length: 85	
Actuated Cycle Length: 85	
Offset: 1 (1%), Referenced to phase 4:EBTL and 8:WBT, Start of Green	
Natural Cycle: 110	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.79	
Intersection Signal Delay: 13.1	Intersection LOS: B
Intersection Capacity Utilization 80.9%	ICU Level of Service D
Analysis Period (min) 15	

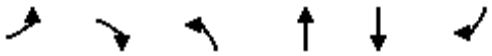
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 2: Richmond Rd & New Orchard Ave N



Lane Group	EBL	NBT	SBT
Lane Configurations			
Traffic Volume (vph)	4	31	25
Future Volume (vph)	4	31	25
Lane Group Flow (vph)	83	130	28
Sign Control	Stop	Free	Free

Intersection Summary		
Control Type: Unsignalized		
Intersection Capacity Utilization 26.2%		ICU Level of Service A
Analysis Period (min) 15		



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	4	79	99	31	25	3
Future Volume (Veh/h)	4	79	99	31	25	3
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	4	79	99	31	25	3
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (m)				78		
pX, platoon unblocked						
vC, conflicting volume	256	26	28			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	256	26	28			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	99	92	94			
cM capacity (veh/h)	687	1049	1585			

Direction, Lane #	EB 1	NB 1	SB 1
Volume Total	83	130	28
Volume Left	4	99	0
Volume Right	79	0	3
cSH	1023	1585	1700
Volume to Capacity	0.08	0.06	0.02
Queue Length 95th (m)	2.0	1.5	0.0
Control Delay (s)	8.8	5.8	0.0
Lane LOS	A	A	
Approach Delay (s)	8.8	5.8	0.0
Approach LOS	A		

Intersection Summary			
Average Delay	6.2		
Intersection Capacity Utilization	26.2%	ICU Level of Service	A
Analysis Period (min)	15		

Lane Group	NBT	SBT
Lane Configurations		
Traffic Volume (vph)	35	29
Future Volume (vph)	35	29
Lane Group Flow (vph)	35	29
Sign Control	Free	Free

Intersection Summary		
Control Type: Unsignalized		
Intersection Capacity Utilization 6.7%		ICU Level of Service A
Analysis Period (min) 15		

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	0	0	35	0	0	29
Future Volume (Veh/h)	0	0	35	0	0	29
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	0	0	35	0	0	29
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			None			None
Median storage veh)						
Upstream signal (m)			110			
pX, platoon unblocked						
vC, conflicting volume	64	35			35	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	64	35			35	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	100	100			100	
cM capacity (veh/h)	942	1038			1576	

Direction, Lane #	WB 1	NB 1	SB 1
Volume Total	0	35	29
Volume Left	0	0	0
Volume Right	0	0	0
cSH	1700	1700	1576
Volume to Capacity	0.00	0.02	0.00
Queue Length 95th (m)	0.0	0.0	0.0
Control Delay (s)	0.0	0.0	0.0
Lane LOS	A		
Approach Delay (s)	0.0	0.0	0.0
Approach LOS	A		

Intersection Summary			
Average Delay	0.0		
Intersection Capacity Utilization	6.7%	ICU Level of Service	A
Analysis Period (min)	15		

Lane Group	EBL	EBT	EBR	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations									
Traffic Volume (vph)	83	358	177	217	695	235	402	25	340
Future Volume (vph)	83	358	177	217	695	235	402	25	340
Lane Group Flow (vph)	83	358	177	217	726	235	490	25	402
Turn Type	Prot	NA	Perm	Prot	NA	pm+pt	NA	Perm	NA
Protected Phases	7	4		3	8	5	2		6
Permitted Phases			4			2		6	
Detector Phase	7	4	4	3	8	5	2	6	6
Switch Phase									
Minimum Initial (s)	5.0	10.0	10.0	5.0	10.0	5.0	10.0	10.0	10.0
Minimum Split (s)	11.9	33.9	33.9	11.7	33.9	11.5	31.5	31.5	31.5
Total Split (s)	12.0	39.5	39.5	22.0	49.5	17.0	48.5	31.5	31.5
Total Split (%)	10.9%	35.9%	35.9%	20.0%	45.0%	15.5%	44.1%	28.6%	28.6%
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)	3.6	3.6	3.6	3.4	3.6	3.2	3.2	3.2	3.2
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	2.0	0.0	0.0	0.0
Total Lost Time (s)	6.9	6.9	6.9	6.7	6.9	8.5	6.5	6.5	6.5
Lead/Lag	Lead				Lag	Lead		Lag	Lag
Lead-Lag Optimize?	Yes				Yes	Yes		Yes	Yes
Recall Mode	None	C-Max	C-Max	None	C-Max	None	Max	Max	Max
Act Effct Green (s)	5.1	32.6	32.6	15.3	42.6	40.0	42.0	25.0	25.0
Actuated g/C Ratio	0.05	0.30	0.30	0.14	0.39	0.36	0.38	0.23	0.23
v/c Ratio	1.06	0.68	0.30	0.92	1.06	1.21	0.75	0.14	1.02
Control Delay	171.5	41.7	2.6	89.6	85.1	158.5	37.9	36.5	94.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	171.5	41.7	2.6	89.6	85.1	158.5	37.9	36.5	94.1
LOS	F	D	A	F	F	F	D	D	F
Approach Delay		47.9			86.1		77.0		90.7
Approach LOS		D			F		E		F
Queue Length 50th (m)	~19.6	67.5	0.0	46.6	~171.7	~46.6	89.7	4.3	~91.9
Queue Length 95th (m)	#50.5	99.6	5.9	#90.5	#241.6	#94.9	129.7	11.9	#150.1
Internal Link Dist (m)		495.5			80.5		862.0		399.0
Turn Bay Length (m)	95.0		30.0	75.0		55.0		50.0	
Base Capacity (vph)	78	528	587	235	685	195	655	177	393
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	1.06	0.68	0.30	0.92	1.06	1.21	0.75	0.14	1.02

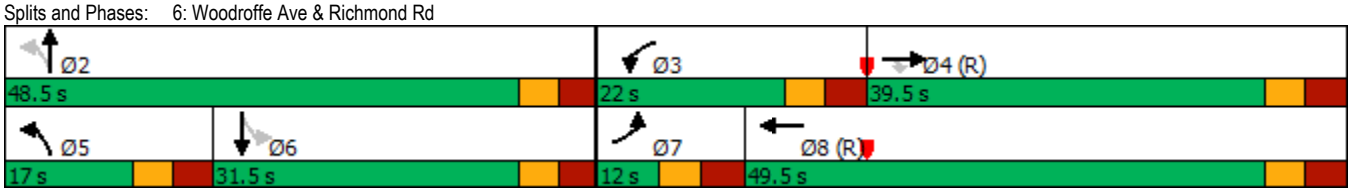
Intersection Summary

Cycle Length: 110
Actuated Cycle Length: 110
Offset: 0 (0%), Referenced to phase 4:EBT and 8:WBT, Start of Green
Natural Cycle: 130
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 1.21
Intersection Signal Delay: 75.7 — Intersection LOS: E
Intersection Capacity Utilization 106.3% — ICU Level of Service G
Analysis Period (min) 15

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

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

Splits and Phases: 6: Woodroffe Ave & Richmond Rd

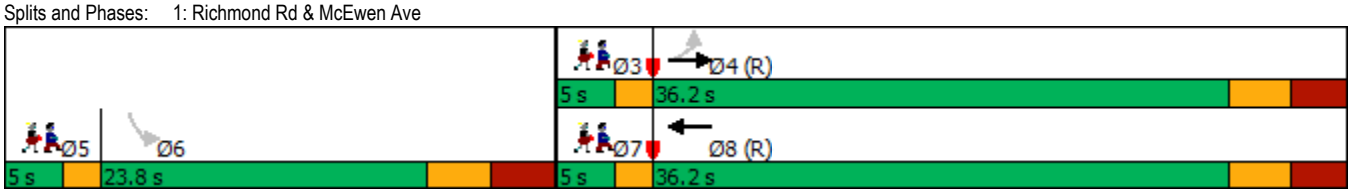


Total Future Background 2031

Lane Group	EBL	EBT	WBT	SBL	Ø3	Ø5	Ø7
Lane Configurations							
Traffic Volume (vph)	32	782	389	30			
Future Volume (vph)	32	782	389	30			
Lane Group Flow (vph)	32	782	411	81			
Turn Type	Perm	NA	NA	Perm			
Protected Phases		4	8		3	5	7
Permitted Phases	4			6			
Detector Phase	4	4	8	6			
Switch Phase							
Minimum Initial (s)	10.0	10.0	10.0	10.0	1.0	1.0	1.0
Minimum Split (s)	24.3	24.3	31.3	23.8	5.0	5.0	5.0
Total Split (s)	36.2	36.2	36.2	23.8	5.0	5.0	5.0
Total Split (%)	51.7%	51.7%	51.7%	34.0%	7%	7%	7%
Yellow Time (s)	3.3	3.3	3.3	3.3	2.0	2.0	2.0
All-Red Time (s)	3.0	3.0	3.0	3.5	0.0	0.0	0.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0			
Total Lost Time (s)	6.3	6.3	6.3	6.8			
Lead/Lag	Lag	Lag	Lag	Lag	Lead	Lead	Lead
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Recall Mode	C-Max	C-Max	C-Max	None	None	None	None
Act Effct Green (s)	51.4	51.4	51.4	10.1			
Actuated g/C Ratio	0.73	0.73	0.73	0.14			
v/c Ratio	0.05	0.60	0.32	0.31			
Control Delay	4.3	8.7	7.2	16.7			
Queue Delay	0.0	0.0	0.0	0.0			
Total Delay	4.3	8.7	7.2	16.7			
LOS	A	A	A	B			
Approach Delay		8.5	7.2	16.7			
Approach LOS		A	A	B			
Queue Length 50th (m)	1.2	50.4	34.9	3.5			
Queue Length 95th (m)	3.7	85.3	58.1	14.3			
Internal Link Dist (m)		546.0	379.9	123.9			
Turn Bay Length (m)	50.0			20.0			
Base Capacity (vph)	678	1310	1299	410			
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	0.05	0.60	0.32	0.20			

Intersection Summary	
Cycle Length: 70	
Actuated Cycle Length: 70	
Offset: 38 (54%), Referenced to phase 4:EBTL and 8:WBT, Start of Green	
Natural Cycle: 80	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.60	
Intersection Signal Delay: 8.6	Intersection LOS: A
Intersection Capacity Utilization 66.0%	ICU Level of Service C
Analysis Period (min) 15	

Splits and Phases: 1: Richmond Rd & McEwen Ave

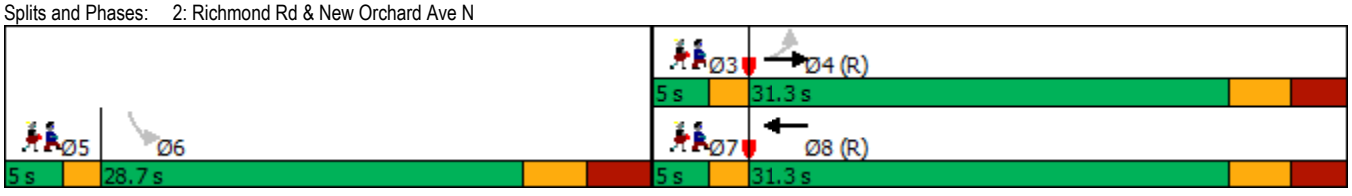


Lane Group	EBL	EBT	WBT	SBL	Ø3	Ø5	Ø7
Lane Configurations							
Traffic Volume (vph)	15	810	416	128			
Future Volume (vph)	15	810	416	128			
Lane Group Flow (vph)	0	825	465	145			
Turn Type	Perm	NA	NA	Perm			
Protected Phases		4	8		3	5	7
Permitted Phases	4			6			
Detector Phase	4	4	8	6			
Switch Phase							
Minimum Initial (s)	10.0	10.0	10.0	10.0	1.0	1.0	1.0
Minimum Split (s)	24.3	24.3	27.3	28.7	5.0	5.0	5.0
Total Split (s)	31.3	31.3	31.3	28.7	5.0	5.0	5.0
Total Split (%)	44.7%	44.7%	44.7%	41.0%	7%	7%	7%
Yellow Time (s)	3.3	3.3	3.3	3.3	2.0	2.0	2.0
All-Red Time (s)	3.0	3.0	3.0	3.4	0.0	0.0	0.0
Lost Time Adjust (s)		0.0	0.0	0.0			
Total Lost Time (s)		6.3	6.3	6.7			
Lead/Lag	Lag	Lag	Lag	Lag	Lead	Lead	Lead
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Recall Mode	C-Max	C-Max	C-Max	None	None	None	None
Act Effct Green (s)		49.7	49.7	11.9			
Actuated g/C Ratio		0.71	0.71	0.17			
v/c Ratio		0.66	0.37	0.50			
Control Delay		5.8	7.0	30.1			
Queue Delay		0.0	0.0	0.0			
Total Delay		5.8	7.0	30.1			
LOS		A	A	C			
Approach Delay		5.8	7.0	30.1			
Approach LOS		A	A	C			
Queue Length 50th (m)		9.6	23.6	16.4			
Queue Length 95th (m)		#14.6	48.2	29.8			
Internal Link Dist (m)		379.9	490.4	54.3			
Turn Bay Length (m)							
Base Capacity (vph)		1253	1245	530			
Starvation Cap Reductn		0	0	0			
Spillback Cap Reductn		0	0	0			
Storage Cap Reductn		0	0	0			
Reduced v/c Ratio		0.66	0.37	0.27			

Intersection Summary	
Cycle Length: 70	
Actuated Cycle Length: 70	
Offset: 68 (97%), Referenced to phase 4:EBTL and 8:WBT, Start of Green	
Natural Cycle: 90	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.66	
Intersection Signal Delay: 8.6	Intersection LOS: A
Intersection Capacity Utilization 79.5%	ICU Level of Service D
Analysis Period (min) 15	

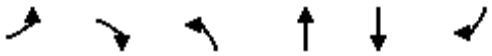
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 2: Richmond Rd & New Orchard Ave N



Lane Group	EBL	NBT	SBT
Lane Configurations			
Traffic Volume (vph)	1	22	30
Future Volume (vph)	1	22	30
Lane Group Flow (vph)	88	76	32
Sign Control	Stop	Free	Free

Intersection Summary		
Control Type: Unsignalized		
Intersection Capacity Utilization 23.5%		ICU Level of Service A
Analysis Period (min) 15		



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	1	87	54	22	30	2
Future Volume (Veh/h)	1	87	54	22	30	2
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	1	87	54	22	30	2
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (m)				78		
pX, platoon unblocked						
vC, conflicting volume	161	31	32			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	161	31	32			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	100	92	97			
cM capacity (veh/h)	802	1043	1580			

Direction, Lane #	EB 1	NB 1	SB 1
Volume Total	88	76	32
Volume Left	1	54	0
Volume Right	87	0	2
cSH	1040	1580	1700
Volume to Capacity	0.08	0.03	0.02
Queue Length 95th (m)	2.1	0.8	0.0
Control Delay (s)	8.8	5.3	0.0
Lane LOS	A	A	
Approach Delay (s)	8.8	5.3	0.0
Approach LOS	A		

Intersection Summary			
Average Delay	6.0		
Intersection Capacity Utilization	23.5%	ICU Level of Service	A
Analysis Period (min)	15		

Lane Group	NBT	SBT
Lane Configurations		
Traffic Volume (vph)	23	32
Future Volume (vph)	23	32
Lane Group Flow (vph)	23	32
Sign Control	Free	Free

Intersection Summary		
Control Type: Unsignalized		
Intersection Capacity Utilization 6.7%		ICU Level of Service A
Analysis Period (min) 15		

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	0	0	23	0	0	32
Future Volume (Veh/h)	0	0	23	0	0	32
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	0	0	23	0	0	32
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			None			None
Median storage veh)						
Upstream signal (m)			108			
pX, platoon unblocked						
vC, conflicting volume	55	23			23	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	55	23			23	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	100	100			100	
cM capacity (veh/h)	953	1054			1592	

Direction, Lane #	WB 1	NB 1	SB 1
Volume Total	0	23	32
Volume Left	0	0	0
Volume Right	0	0	0
cSH	1700	1700	1592
Volume to Capacity	0.00	0.01	0.00
Queue Length 95th (m)	0.0	0.0	0.0
Control Delay (s)	0.0	0.0	0.0
Lane LOS	A		
Approach Delay (s)	0.0	0.0	0.0
Approach LOS	A		

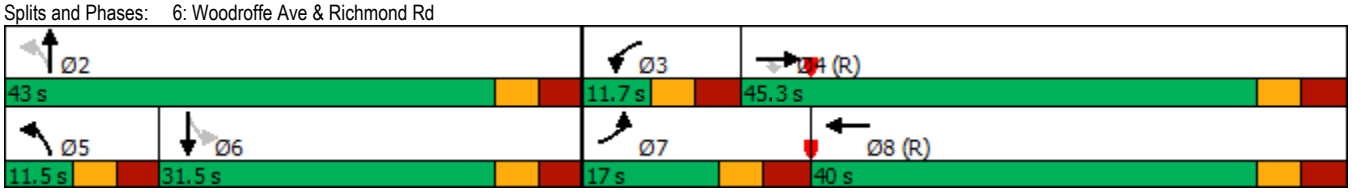
Intersection Summary			
Average Delay	0.0		
Intersection Capacity Utilization	6.7%	ICU Level of Service	A
Analysis Period (min)	15		

Lane Group	EBL	EBT	EBR	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations									
Traffic Volume (vph)	152	892	220	62	278	119	257	39	329
Future Volume (vph)	152	892	220	62	278	119	257	39	329
Lane Group Flow (vph)	152	892	220	62	298	119	349	39	390
Turn Type	Prot	NA	Perm	Prot	NA	pm+pt	NA	Perm	NA
Protected Phases	7	4		3	8	5	2		6
Permitted Phases			4			2		6	
Detector Phase	7	4	4	3	8	5	2	6	6
Switch Phase									
Minimum Initial (s)	5.0	10.0	10.0	5.0	10.0	5.0	10.0	10.0	10.0
Minimum Split (s)	11.9	28.9	28.9	11.7	33.9	11.5	31.5	31.5	31.5
Total Split (s)	17.0	45.3	45.3	11.7	40.0	11.5	43.0	31.5	31.5
Total Split (%)	17.0%	45.3%	45.3%	11.7%	40.0%	11.5%	43.0%	31.5%	31.5%
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)	3.6	3.6	3.6	3.4	3.6	3.2	3.2	3.2	3.2
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	6.9	6.9	6.9	6.7	6.9	6.5	6.5	6.5	6.5
Lead/Lag	Lead				Lag	Lead		Lag	Lag
Lead-Lag Optimize?	Yes				Yes	Yes		Yes	Yes
Recall Mode	None	C-Max	C-Max	None	C-Max	None	Max	Max	Max
Act Effct Green (s)	10.1	40.7	40.7	5.0	33.1	36.5	36.5	25.0	25.0
Actuated g/C Ratio	0.10	0.41	0.41	0.05	0.33	0.36	0.36	0.25	0.25
v/c Ratio	0.89	1.23	0.31	0.74	0.51	0.64	0.57	0.16	0.90
Control Delay	90.8	143.8	6.4	92.8	30.8	40.2	29.9	31.6	62.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	90.8	143.8	6.4	92.8	30.8	40.2	29.9	31.6	62.0
LOS	F	F	A	F	C	D	C	C	E
Approach Delay		113.5			41.5		32.5		59.3
Approach LOS		F			D		C		E
Queue Length 50th (m)	29.6	~222.8	4.6	12.1	46.1	15.5	53.5	5.9	73.3
Queue Length 95th (m)	#65.5	#294.2	19.4	#33.9	71.2	#32.1	81.5	14.7	#125.9
Internal Link Dist (m)		490.4			81.7		868.8		410.6
Turn Bay Length (m)	95.0		30.0	75.0		55.0		50.0	
Base Capacity (vph)	171	727	702	84	581	185	613	239	433
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.89	1.23	0.31	0.74	0.51	0.64	0.57	0.16	0.90

Intersection Summary	
Cycle Length: 100	
Actuated Cycle Length: 100	
Offset: 0 (0%), Referenced to phase 4:EBT and 8:WBT, Start of Green	
Natural Cycle: 150	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 1.23	
Intersection Signal Delay: 79.0	Intersection LOS: E
Intersection Capacity Utilization 105.2%	ICU Level of Service G
Analysis Period (min) 15	

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

Splits and Phases: 6: Woodroffe Ave & Richmond Rd

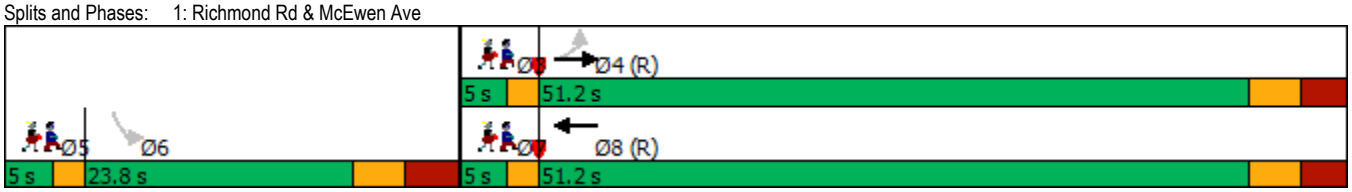


Lane Group	EBL	EBT	WBT	SBL	Ø3	Ø5	Ø7
Lane Configurations							
Traffic Volume (vph)	81	514	988	35			
Future Volume (vph)	81	514	988	35			
Lane Group Flow (vph)	81	514	1033	101			
Turn Type	Perm	NA	NA	Perm			
Protected Phases		4	8		3	5	7
Permitted Phases	4			6			
Detector Phase	4	4	8	6			
Switch Phase							
Minimum Initial (s)	10.0	10.0	10.0	10.0	1.0	1.0	1.0
Minimum Split (s)	24.3	24.3	36.3	23.8	5.0	5.0	5.0
Total Split (s)	51.2	51.2	51.2	23.8	5.0	5.0	5.0
Total Split (%)	60.2%	60.2%	60.2%	28.0%	6%	6%	6%
Yellow Time (s)	3.3	3.3	3.3	3.3	2.0	2.0	2.0
All-Red Time (s)	3.0	3.0	3.0	3.5	0.0	0.0	0.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0			
Total Lost Time (s)	6.3	6.3	6.3	6.8			
Lead/Lag	Lag	Lag	Lag	Lag	Lead	Lead	Lead
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Recall Mode	C-Max	C-Max	C-Max	None	None	None	None
Act Effct Green (s)	66.1	66.1	66.1	10.4			
Actuated g/C Ratio	0.78	0.78	0.78	0.12			
v/c Ratio	0.31	0.37	0.75	0.42			
Control Delay	8.4	5.1	5.3	20.3			
Queue Delay	0.0	0.0	0.0	0.0			
Total Delay	8.4	5.1	5.3	20.3			
LOS	A	A	A	C			
Approach Delay		5.6	5.3	20.3			
Approach LOS		A	A	C			
Queue Length 50th (m)	3.9	26.1	20.5	5.2			
Queue Length 95th (m)	12.3	44.9	m34.0	18.7			
Internal Link Dist (m)		508.0	379.9	123.9			
Turn Bay Length (m)	50.0			20.0			
Base Capacity (vph)	260	1387	1377	355			
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	0.31	0.37	0.75	0.28			

Intersection Summary	
Cycle Length: 85	
Actuated Cycle Length: 85	
Offset: 17 (20%), Referenced to phase 4:EBTL and 8:WBT, Start of Green	
Natural Cycle: 100	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.75	
Intersection Signal Delay: 6.2	Intersection LOS: A
Intersection Capacity Utilization 93.7%	ICU Level of Service F
Analysis Period (min) 15	

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

Splits and Phases: 1: Richmond Rd & McEwen Ave

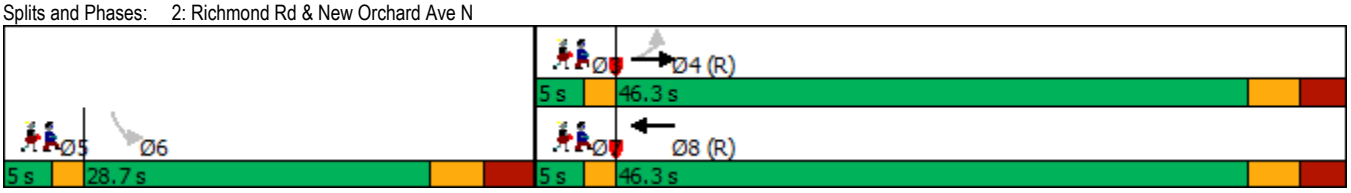


Lane Group	EBL	EBT	WBT	SBL	Ø3	Ø5	Ø7
Lane Configurations							
Traffic Volume (vph)	25	572	1024	82			
Future Volume (vph)	25	572	1024	82			
Lane Group Flow (vph)	0	597	1149	100			
Turn Type	Perm	NA	NA	Perm			
Protected Phases		4	8		3	5	7
Permitted Phases	4			6			
Detector Phase	4	4	8	6			
Switch Phase							
Minimum Initial (s)	10.0	10.0	10.0	10.0	1.0	1.0	1.0
Minimum Split (s)	24.3	24.3	27.3	28.7	5.0	5.0	5.0
Total Split (s)	46.3	46.3	46.3	28.7	5.0	5.0	5.0
Total Split (%)	54.5%	54.5%	54.5%	33.8%	6%	6%	6%
Yellow Time (s)	3.3	3.3	3.3	3.3	2.0	2.0	2.0
All-Red Time (s)	3.0	3.0	3.0	3.4	0.0	0.0	0.0
Lost Time Adjust (s)		0.0	0.0	0.0			
Total Lost Time (s)		6.3	6.3	6.7			
Lead/Lag	Lag	Lag	Lag	Lag	Lead	Lead	Lead
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Recall Mode	C-Max	C-Max	C-Max	None	None	None	None
Act Effct Green (s)		65.5	65.5	11.1			
Actuated g/C Ratio		0.77	0.77	0.13			
v/c Ratio		0.50	0.85	0.44			
Control Delay		9.9	18.2	35.6			
Queue Delay		0.0	0.0	0.0			
Total Delay		9.9	18.2	35.6			
LOS		A	B	D			
Approach Delay		9.9	18.2	35.6			
Approach LOS		A	B	D			
Queue Length 50th (m)		35.4	119.0	13.4			
Queue Length 95th (m)		98.1	#262.1	26.6			
Internal Link Dist (m)		379.9	495.5	54.3			
Turn Bay Length (m)							
Base Capacity (vph)		1183	1350	435			
Starvation Cap Reductn		0	0	0			
Spillback Cap Reductn		0	0	0			
Storage Cap Reductn		0	0	0			
Reduced v/c Ratio		0.50	0.85	0.23			

Intersection Summary

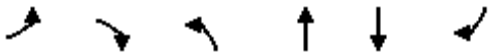
Cycle Length: 85
Actuated Cycle Length: 85
Offset: 1 (1%), Referenced to phase 4:EBTL and 8:WBT, Start of Green
Natural Cycle: 130
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.85
Intersection Signal Delay: 16.4 — Intersection LOS: B
Intersection Capacity Utilization 85.7% — ICU Level of Service E
Analysis Period (min) 15
\# 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 2: Richmond Rd & New Orchard Ave N



Lane Group	EBL	NBT	SBT
Lane Configurations			
Traffic Volume (vph)	4	31	25
Future Volume (vph)	4	31	25
Lane Group Flow (vph)	83	130	28
Sign Control	Stop	Free	Free

Intersection Summary		
Control Type: Unsignalized		
Intersection Capacity Utilization 26.2%		ICU Level of Service A
Analysis Period (min) 15		



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	4	79	99	31	25	3
Future Volume (Veh/h)	4	79	99	31	25	3
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	4	79	99	31	25	3
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (m)				78		
pX, platoon unblocked						
vC, conflicting volume	256	26	28			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	256	26	28			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	99	92	94			
cM capacity (veh/h)	687	1049	1585			

Direction, Lane #	EB 1	NB 1	SB 1
Volume Total	83	130	28
Volume Left	4	99	0
Volume Right	79	0	3
cSH	1023	1585	1700
Volume to Capacity	0.08	0.06	0.02
Queue Length 95th (m)	2.0	1.5	0.0
Control Delay (s)	8.8	5.8	0.0
Lane LOS	A	A	
Approach Delay (s)	8.8	5.8	0.0
Approach LOS	A		

Intersection Summary			
Average Delay	6.2		
Intersection Capacity Utilization	26.2%	ICU Level of Service	A
Analysis Period (min)	15		

Lane Group	NBT	SBT
Lane Configurations		
Traffic Volume (vph)	35	29
Future Volume (vph)	35	29
Lane Group Flow (vph)	35	29
Sign Control	Free	Free

Intersection Summary		
Control Type: Unsignalized		
Intersection Capacity Utilization 6.7%		ICU Level of Service A
Analysis Period (min) 15		

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	0	0	35	0	0	29
Future Volume (Veh/h)	0	0	35	0	0	29
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	0	0	35	0	0	29
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			None			None
Median storage veh)						
Upstream signal (m)			110			
pX, platoon unblocked						
vC, conflicting volume	64	35			35	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	64	35			35	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	100	100			100	
cM capacity (veh/h)	942	1038			1576	

Direction, Lane #	WB 1	NB 1	SB 1
Volume Total	0	35	29
Volume Left	0	0	0
Volume Right	0	0	0
cSH	1700	1700	1576
Volume to Capacity	0.00	0.02	0.00
Queue Length 95th (m)	0.0	0.0	0.0
Control Delay (s)	0.0	0.0	0.0
Lane LOS	A		
Approach Delay (s)	0.0	0.0	0.0
Approach LOS	A		

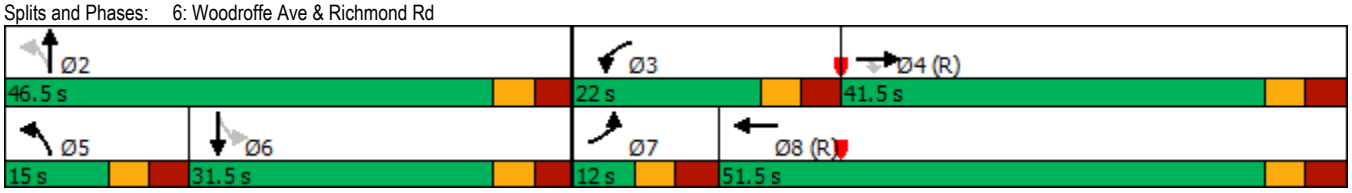
Intersection Summary			
Average Delay	0.0		
Intersection Capacity Utilization	6.7%	ICU Level of Service	A
Analysis Period (min)	15		

Lane Group	EBL	EBT	EBR	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations									
Traffic Volume (vph)	83	390	177	217	757	235	402	25	340
Future Volume (vph)	83	390	177	217	757	235	402	25	340
Lane Group Flow (vph)	83	390	177	217	788	235	490	25	402
Turn Type	Prot	NA	Perm	Prot	NA	pm+pt	NA	Perm	NA
Protected Phases	7	4		3	8	5	2		6
Permitted Phases			4			2		6	
Detector Phase	7	4	4	3	8	5	2	6	6
Switch Phase									
Minimum Initial (s)	5.0	10.0	10.0	5.0	10.0	5.0	10.0	10.0	10.0
Minimum Split (s)	11.9	33.9	33.9	11.7	33.9	11.5	31.5	31.5	31.5
Total Split (s)	12.0	41.5	41.5	22.0	51.5	15.0	46.5	31.5	31.5
Total Split (%)	10.9%	37.7%	37.7%	20.0%	46.8%	13.6%	42.3%	28.6%	28.6%
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)	3.6	3.6	3.6	3.4	3.6	3.2	3.2	3.2	3.2
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	2.0	0.0	0.0	0.0
Total Lost Time (s)	6.9	6.9	6.9	6.7	6.9	8.5	6.5	6.5	6.5
Lead/Lag	Lead				Lag	Lead		Lag	Lag
Lead-Lag Optimize?	Yes				Yes	Yes		Yes	Yes
Recall Mode	None	C-Max	C-Max	None	C-Max	None	Max	Max	Max
Act Effct Green (s)	5.1	34.6	34.6	15.3	44.6	38.0	40.0	25.0	25.0
Actuated g/C Ratio	0.05	0.31	0.31	0.14	0.41	0.35	0.36	0.23	0.23
v/c Ratio	1.06	0.70	0.29	0.92	1.10	1.42	0.79	0.16	1.02
Control Delay	171.5	40.8	2.4	89.6	96.3	249.2	41.7	37.4	94.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	171.5	40.8	2.4	89.6	96.3	249.2	41.7	37.4	94.1
LOS	F	D	A	F	F	F	D	D	F
Approach Delay		47.0			94.9		109.0		90.8
Approach LOS		D			F		F		F
Queue Length 50th (m)	~19.6	73.2	0.0	46.6	~192.2	~53.8	92.6	4.3	~91.9
Queue Length 95th (m)	#50.5	107.0	5.7	#90.5	#263.4	#102.1	#135.2	12.0	#150.1
Internal Link Dist (m)		495.5			80.5		878.5		424.0
Turn Bay Length (m)	95.0		30.0	75.0		55.0		50.0	
Base Capacity (vph)	78	561	609	235	717	165	624	156	393
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	1.06	0.70	0.29	0.92	1.10	1.42	0.79	0.16	1.02

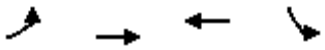
Intersection Summary	
Cycle Length: 110	
Actuated Cycle Length: 110	
Offset: 0 (0%), Referenced to phase 4:EBT and 8:WBT, Start of Green	
Natural Cycle: 140	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 1.42	
Intersection Signal Delay: 86.8	Intersection LOS: F
Intersection Capacity Utilization 109.7%	ICU Level of Service H
Analysis Period (min) 15	

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

Splits and Phases: 6: Woodroffe Ave & Richmond Rd



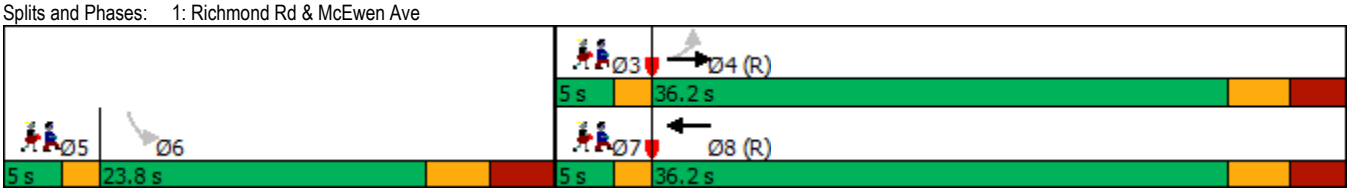
Total Projected 2026



Lane Group	EBL	EBT	WBT	SBL	Ø3	Ø5	Ø7
Lane Configurations							
Traffic Volume (vph)	32	729	375	30			
Future Volume (vph)	32	729	375	30			
Lane Group Flow (vph)	32	729	397	81			
Turn Type	Perm	NA	NA	Perm			
Protected Phases		4	8		3	5	7
Permitted Phases	4			6			
Detector Phase	4	4	8	6			
Switch Phase							
Minimum Initial (s)	10.0	10.0	10.0	10.0	1.0	1.0	1.0
Minimum Split (s)	24.3	24.3	31.3	23.8	5.0	5.0	5.0
Total Split (s)	36.2	36.2	36.2	23.8	5.0	5.0	5.0
Total Split (%)	51.7%	51.7%	51.7%	34.0%	7%	7%	7%
Yellow Time (s)	3.3	3.3	3.3	3.3	2.0	2.0	2.0
All-Red Time (s)	3.0	3.0	3.0	3.5	0.0	0.0	0.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0			
Total Lost Time (s)	6.3	6.3	6.3	6.8			
Lead/Lag	Lag	Lag	Lag	Lag	Lead	Lead	Lead
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Recall Mode	C-Max	C-Max	C-Max	None	None	None	None
Act Effct Green (s)	41.3	41.3	41.3	14.2			
Actuated g/C Ratio	0.59	0.59	0.59	0.20			
v/c Ratio	0.07	0.69	0.38	0.26			
Control Delay	12.2	21.7	9.8	12.9			
Queue Delay	0.0	0.0	0.0	0.0			
Total Delay	12.2	21.7	9.8	12.9			
LOS	B	C	A	B			
Approach Delay		21.3	9.8	12.9			
Approach LOS		C	A	B			
Queue Length 50th (m)	2.4	88.9	51.7	3.1			
Queue Length 95th (m)	7.2	#156.7	82.0	12.7			
Internal Link Dist (m)		546.0	379.9	123.9			
Turn Bay Length (m)	50.0			20.0			
Base Capacity (vph)	492	1053	1040	368			
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	0.07	0.69	0.38	0.22			

Intersection Summary	
Cycle Length: 70	
Actuated Cycle Length: 70	
Offset: 38 (54%), Referenced to phase 4:EBTL and 8:WBT, Start of Green	
Natural Cycle: 75	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.69	
Intersection Signal Delay: 17.1	Intersection LOS: B
Intersection Capacity Utilization 64.5%	ICU Level of Service C
Analysis Period (min) 15	
# 95th percentile volume exceeds capacity, queue may be longer.	
Queue shown is maximum after two cycles.	

Splits and Phases: 1: Richmond Rd & McEwen Ave

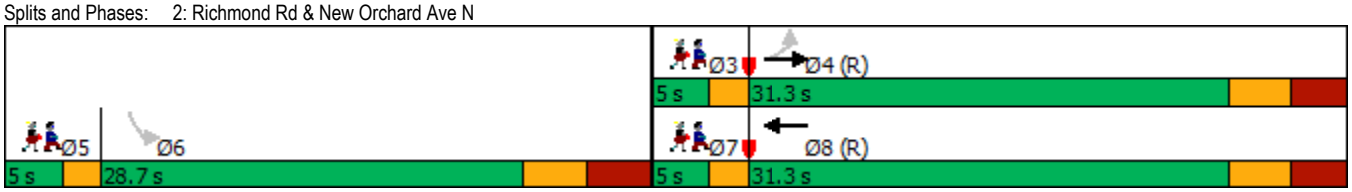


Lane Group	EBL	EBT	WBT	SBL	Ø3	Ø5	Ø7
Lane Configurations							
Traffic Volume (vph)	27	743	382	161			
Future Volume (vph)	27	743	382	161			
Lane Group Flow (vph)	0	770	443	196			
Turn Type	Perm	NA	NA	Perm			
Protected Phases		4	8		3	5	7
Permitted Phases	4			6			
Detector Phase	4	4	8	6			
Switch Phase							
Minimum Initial (s)	10.0	10.0	10.0	10.0	1.0	1.0	1.0
Minimum Split (s)	24.3	24.3	27.3	28.7	5.0	5.0	5.0
Total Split (s)	31.3	31.3	31.3	28.7	5.0	5.0	5.0
Total Split (%)	44.7%	44.7%	44.7%	41.0%	7%	7%	7%
Yellow Time (s)	3.3	3.3	3.3	3.3	2.0	2.0	2.0
All-Red Time (s)	3.0	3.0	3.0	3.4	0.0	0.0	0.0
Lost Time Adjust (s)		0.0	0.0	0.0			
Total Lost Time (s)		6.3	6.3	6.7			
Lead/Lag	Lag	Lag	Lag	Lag	Lead	Lead	Lead
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Recall Mode	C-Max	C-Max	C-Max	None	None	None	None
Act Effct Green (s)		32.7	32.7	18.3			
Actuated g/C Ratio		0.47	0.47	0.26			
v/c Ratio		0.95	0.57	0.77			
Control Delay		36.0	20.2	42.5			
Queue Delay		0.0	0.0	0.0			
Total Delay		36.0	20.2	42.5			
LOS		D	C	D			
Approach Delay		36.0	20.2	42.5			
Approach LOS		D	C	D			
Queue Length 50th (m)		~121.3	48.1	20.0			
Queue Length 95th (m)		#181.8	#88.6	#47.2			
Internal Link Dist (m)		379.9	490.4	54.3			
Turn Bay Length (m)							
Base Capacity (vph)		808	781	301			
Starvation Cap Reductn		0	0	0			
Spillback Cap Reductn		0	0	0			
Storage Cap Reductn		0	0	0			
Reduced v/c Ratio		0.95	0.57	0.65			

Intersection Summary	
Cycle Length: 70	
Actuated Cycle Length: 70	
Offset: 68 (97%), Referenced to phase 4:EBTL and 8:WBT, Start of Green	
Natural Cycle: 90	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.95	
Intersection Signal Delay: 31.9	Intersection LOS: C
Intersection Capacity Utilization 93.5%	ICU Level of Service F
Analysis Period (min) 15	

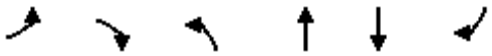
~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 2: Richmond Rd & New Orchard Ave N



Lane Group	EBL	NBT	SBT
Lane Configurations			
Traffic Volume (vph)	1	45	80
Future Volume (vph)	1	45	80
Lane Group Flow (vph)	88	99	82
Sign Control	Stop	Free	Free

Intersection Summary	
Control Type: Unsignalized	
Intersection Capacity Utilization 24.7%	ICU Level of Service A
Analysis Period (min) 15	



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	1	87	54	45	80	2
Future Volume (Veh/h)	1	87	54	45	80	2
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	1	87	54	45	80	2
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (m)				78		
pX, platoon unblocked						
vC, conflicting volume	234	81	82			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	234	81	82			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	100	91	96			
cM capacity (veh/h)	727	979	1515			

Direction, Lane #	EB 1	NB 1	SB 1
Volume Total	88	99	82
Volume Left	1	54	0
Volume Right	87	0	2
cSH	975	1515	1700
Volume to Capacity	0.09	0.04	0.05
Queue Length 95th (m)	2.3	0.8	0.0
Control Delay (s)	9.1	4.2	0.0
Lane LOS	A	A	
Approach Delay (s)	9.1	4.2	0.0
Approach LOS	A		

Intersection Summary			
Average Delay	4.5		
Intersection Capacity Utilization	24.7%	ICU Level of Service	A
Analysis Period (min)	15		

Lane Group	WBL	NBT	SBT
Lane Configurations			
Traffic Volume (vph)	50	23	32
Future Volume (vph)	50	23	32
Lane Group Flow (vph)	50	46	32
Sign Control	Stop	Free	Free

Intersection Summary		
Control Type: Unsignalized		
Intersection Capacity Utilization 13.3%		ICU Level of Service A
Analysis Period (min) 15		

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	50	0	23	23	0	32
Future Volume (Veh/h)	50	0	23	23	0	32
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	50	0	23	23	0	32
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			None			None
Median storage veh)						
Upstream signal (m)			108			
pX, platoon unblocked						
vC, conflicting volume	66	34			46	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	66	34			46	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	95	100			100	
cM capacity (veh/h)	939	1039			1562	

Direction, Lane #	WB 1	NB 1	SB 1
Volume Total	50	46	32
Volume Left	50	0	0
Volume Right	0	23	0
cSH	939	1700	1562
Volume to Capacity	0.05	0.03	0.00
Queue Length 95th (m)	1.3	0.0	0.0
Control Delay (s)	9.1	0.0	0.0
Lane LOS	A		
Approach Delay (s)	9.1	0.0	0.0
Approach LOS	A		

Intersection Summary			
Average Delay	3.5		
Intersection Capacity Utilization	13.3%	ICU Level of Service	A
Analysis Period (min)	15		

Lane Group	EBL	EBT	EBR	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations									
Traffic Volume (vph)	152	836	235	62	261	125	257	39	329
Future Volume (vph)	152	836	235	62	261	125	257	39	329
Lane Group Flow (vph)	152	836	235	62	281	125	349	39	390
Turn Type	Prot	NA	Perm	Prot	NA	pm+pt	NA	Perm	NA
Protected Phases	7	4		3	8	5	2		6
Permitted Phases			4			2		6	
Detector Phase	7	4	4	3	8	5	2	6	6
Switch Phase									
Minimum Initial (s)	5.0	10.0	10.0	5.0	10.0	5.0	10.0	10.0	10.0
Minimum Split (s)	11.9	28.9	28.9	11.7	33.9	11.5	31.5	31.5	31.5
Total Split (s)	19.4	45.3	45.3	11.7	37.6	11.5	43.0	31.5	31.5
Total Split (%)	19.4%	45.3%	45.3%	11.7%	37.6%	11.5%	43.0%	31.5%	31.5%
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)	3.6	3.6	3.6	3.4	3.6	3.2	3.2	3.2	3.2
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	6.9	6.9	6.9	6.7	6.9	6.5	6.5	6.5	6.5
Lead/Lag	Lead				Lag	Lead		Lag	Lag
Lead-Lag Optimize?	Yes				Yes	Yes		Yes	Yes
Recall Mode	None	C-Max	C-Max	None	C-Max	None	Max	Max	Max
Act Effct Green (s)	11.8	40.7	40.7	5.0	31.4	36.5	36.5	25.0	25.0
Actuated g/C Ratio	0.12	0.41	0.41	0.05	0.31	0.36	0.36	0.25	0.25
v/c Ratio	0.76	1.15	0.43	0.74	0.52	0.70	0.60	0.18	0.94
Control Delay	67.0	113.4	8.6	92.8	32.5	45.4	31.0	32.2	68.7
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	67.0	113.4	8.6	92.8	32.5	45.4	31.0	32.2	68.7
LOS	E	F	A	F	C	D	C	C	E
Approach Delay		87.5			43.4		34.8		65.3
Approach LOS		F			D		C		E
Queue Length 50th (m)	28.7	~200.1	6.6	12.1	44.8	16.4	54.2	6.0	74.1
Queue Length 95th (m)	#57.2	#270.3	25.0	#33.9	69.7	#36.5	83.3	14.8	#129.2
Internal Link Dist (m)		490.4			81.7		868.8		410.6
Turn Bay Length (m)	95.0		30.0	75.0		55.0		50.0	
Base Capacity (vph)	211	727	552	84	543	179	582	216	417
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.72	1.15	0.43	0.74	0.52	0.70	0.60	0.18	0.94

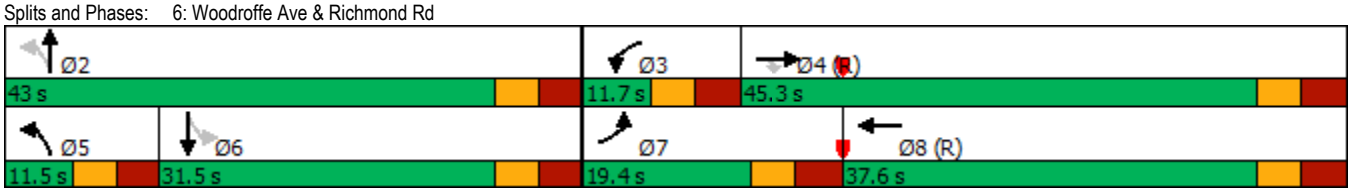
Intersection Summary

Cycle Length: 100
Actuated Cycle Length: 100
Offset: 0 (0%), Referenced to phase 4:EBT and 8:WBT, Start of Green
Natural Cycle: 130
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 1.15
Intersection Signal Delay: 67.4 — Intersection LOS: E
Intersection Capacity Utilization 103.2% — ICU Level of Service G
Analysis Period (min) 15

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

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

Splits and Phases: 6: Woodroffe Ave & Richmond Rd

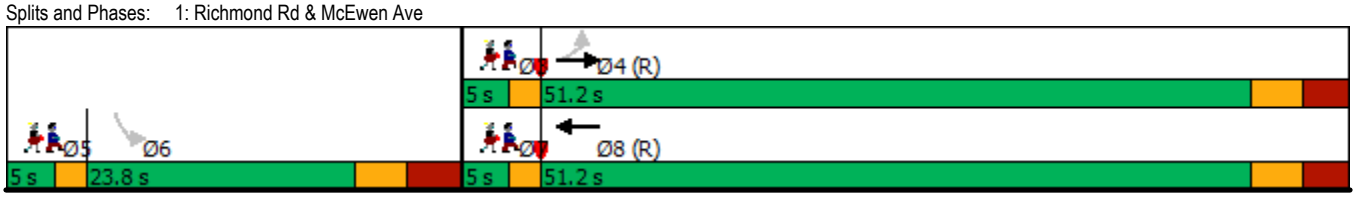


Lane Group	EBL	EBT	WBT	SBL	Ø3	Ø5	Ø7
Lane Configurations							
Traffic Volume (vph)	81	487	922	35			
Future Volume (vph)	81	487	922	35			
Lane Group Flow (vph)	81	487	967	101			
Turn Type	Perm	NA	NA	Perm			
Protected Phases		4	8		3	5	7
Permitted Phases	4			6			
Detector Phase	4	4	8	6			
Switch Phase							
Minimum Initial (s)	10.0	10.0	10.0	10.0	1.0	1.0	1.0
Minimum Split (s)	24.3	24.3	36.3	23.8	5.0	5.0	5.0
Total Split (s)	51.2	51.2	51.2	23.8	5.0	5.0	5.0
Total Split (%)	60.2%	60.2%	60.2%	28.0%	6%	6%	6%
Yellow Time (s)	3.3	3.3	3.3	3.3	2.0	2.0	2.0
All-Red Time (s)	3.0	3.0	3.0	3.5	0.0	0.0	0.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0			
Total Lost Time (s)	6.3	6.3	6.3	6.8			
Lead/Lag	Lag	Lag	Lag	Lag	Lead	Lead	Lead
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Recall Mode	C-Max	C-Max	C-Max	None	None	None	None
Act Effct Green (s)	56.3	56.3	56.3	14.2			
Actuated g/C Ratio	0.66	0.66	0.66	0.17			
v/c Ratio	0.57	0.41	0.83	0.37			
Control Delay	36.1	11.7	14.1	16.8			
Queue Delay	0.0	0.0	0.0	0.0			
Total Delay	36.1	11.7	14.1	16.8			
LOS	D	B	B	B			
Approach Delay		15.2	14.1	16.8			
Approach LOS		B	B	B			
Queue Length 50th (m)	9.3	48.3	~60.9	4.7			
Queue Length 95th (m)	#34.9	73.9	m35.4	17.7			
Internal Link Dist (m)		508.0	379.9	123.9			
Turn Bay Length (m)	50.0			20.0			
Base Capacity (vph)	143	1182	1168	314			
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	0.57	0.41	0.83	0.32			

Intersection Summary	
Cycle Length: 85	
Actuated Cycle Length: 85	
Offset: 17 (20%), Referenced to phase 4:EBTL and 8:WBT, Start of Green	
Natural Cycle: 90	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.83	
Intersection Signal Delay: 14.7	Intersection LOS: B
Intersection Capacity Utilization 92.0%	ICU Level of Service F
Analysis Period (min) 15	

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.
m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 1: Richmond Rd & McEwen Ave

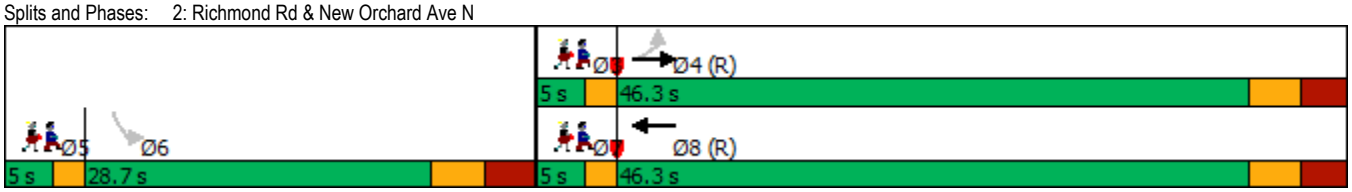


Lane Group	EBL	EBT	WBT	SBL	Ø3	Ø5	Ø7
Lane Configurations							
Traffic Volume (vph)	40	525	938	98			
Future Volume (vph)	40	525	938	98			
Lane Group Flow (vph)	0	565	1090	132			
Turn Type	Perm	NA	NA	Perm			
Protected Phases		4	8		3	5	7
Permitted Phases	4			6			
Detector Phase	4	4	8	6			
Switch Phase							
Minimum Initial (s)	10.0	10.0	10.0	10.0	1.0	1.0	1.0
Minimum Split (s)	24.3	24.3	27.3	28.7	5.0	5.0	5.0
Total Split (s)	46.3	46.3	46.3	28.7	5.0	5.0	5.0
Total Split (%)	54.5%	54.5%	54.5%	33.8%	6%	6%	6%
Yellow Time (s)	3.3	3.3	3.3	3.3	2.0	2.0	2.0
All-Red Time (s)	3.0	3.0	3.0	3.4	0.0	0.0	0.0
Lost Time Adjust (s)		0.0	0.0	0.0			
Total Lost Time (s)		6.3	6.3	6.7			
Lead/Lag	Lag	Lag	Lag	Lag	Lead	Lead	Lead
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Recall Mode	C-Max	C-Max	C-Max	None	None	None	None
Act Effct Green (s)		48.3	48.3	17.7			
Actuated g/C Ratio		0.57	0.57	0.21			
v/c Ratio		1.86	1.16	0.67			
Control Delay		420.3	107.1	41.8			
Queue Delay		0.0	0.0	0.0			
Total Delay		420.3	107.1	41.8			
LOS		F	F	D			
Approach Delay		420.3	107.1	41.8			
Approach LOS		F	F	D			
Queue Length 50th (m)		~151.3	~240.9	15.6			
Queue Length 95th (m)		#212.9	#314.2	33.9			
Internal Link Dist (m)		379.9	495.5	54.3			
Turn Bay Length (m)							
Base Capacity (vph)		304	939	241			
Starvation Cap Reductn		0	0	0			
Spillback Cap Reductn		0	0	0			
Storage Cap Reductn		0	0	0			
Reduced v/c Ratio		1.86	1.16	0.55			

Intersection Summary	
Cycle Length: 85	
Actuated Cycle Length: 85	
Offset: 1 (1%), Referenced to phase 4:EBTL and 8:WBT, Start of Green	
Natural Cycle: 140	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 1.86	
Intersection Signal Delay: 201.3	Intersection LOS: F
Intersection Capacity Utilization 93.1%	ICU Level of Service F
Analysis Period (min) 15	

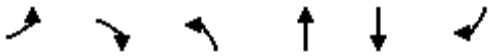
~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 2: Richmond Rd & New Orchard Ave N



Lane Group	EBL	NBT	SBT
Lane Configurations			
Traffic Volume (vph)	4	73	56
Future Volume (vph)	4	73	56
Lane Group Flow (vph)	83	172	59
Sign Control	Stop	Free	Free

Intersection Summary		
Control Type: Unsignalized		
Intersection Capacity Utilization 28.6%		ICU Level of Service A
Analysis Period (min) 15		



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	4	79	99	73	56	3
Future Volume (Veh/h)	4	79	99	73	56	3
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	4	79	99	73	56	3
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (m)				78		
pX, platoon unblocked						
vC, conflicting volume	328	58	59			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	328	58	59			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	99	92	94			
cM capacity (veh/h)	623	1009	1545			

Direction, Lane #	EB 1	NB 1	SB 1
Volume Total	83	172	59
Volume Left	4	99	0
Volume Right	79	0	3
cSH	979	1545	1700
Volume to Capacity	0.08	0.06	0.03
Queue Length 95th (m)	2.1	1.6	0.0
Control Delay (s)	9.0	4.5	0.0
Lane LOS	A	A	
Approach Delay (s)	9.0	4.5	0.0
Approach LOS	A		

Intersection Summary			
Average Delay	4.9		
Intersection Capacity Utilization	28.6%	ICU Level of Service	A
Analysis Period (min)	15		

Lane Group	WBL	NBT	SBT
Lane Configurations			
Traffic Volume (vph)	0	35	29
Future Volume (vph)	0	35	29
Lane Group Flow (vph)	31	77	29
Sign Control	Stop	Free	Free

Intersection Summary	
Control Type: Unsignalized	
Intersection Capacity Utilization 14.7%	ICU Level of Service A
Analysis Period (min) 15	

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	0	31	35	42	0	29
Future Volume (Veh/h)	0	31	35	42	0	29
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	0	31	35	42	0	29
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			None			None
Median storage veh)						
Upstream signal (m)			110			
pX, platoon unblocked						
vC, conflicting volume	85	56			77	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	85	56			77	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	100	97			100	
cM capacity (veh/h)	916	1011			1522	

Direction, Lane #	WB 1	NB 1	SB 1
Volume Total	31	77	29
Volume Left	0	0	0
Volume Right	31	42	0
cSH	1011	1700	1522
Volume to Capacity	0.03	0.05	0.00
Queue Length 95th (m)	0.7	0.0	0.0
Control Delay (s)	8.7	0.0	0.0
Lane LOS	A		
Approach Delay (s)	8.7	0.0	0.0
Approach LOS	A		

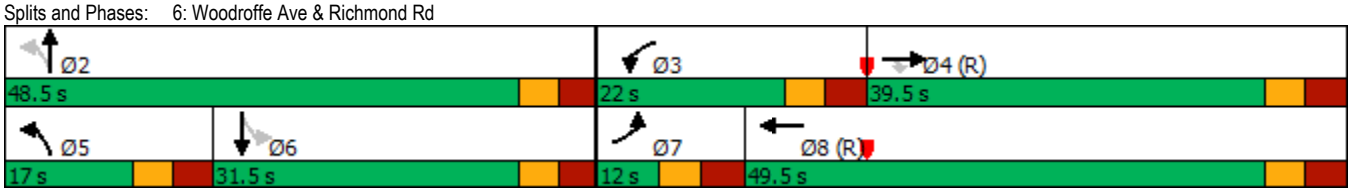
Intersection Summary			
Average Delay	2.0		
Intersection Capacity Utilization	14.7%	ICU Level of Service	A
Analysis Period (min)	15		

Lane Group	EBL	EBT	EBR	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations									
Traffic Volume (vph)	83	366	185	217	710	248	402	25	340
Future Volume (vph)	83	366	185	217	710	248	402	25	340
Lane Group Flow (vph)	83	366	185	217	741	248	490	25	402
Turn Type	Prot	NA	Perm	Prot	NA	pm+pt	NA	Perm	NA
Protected Phases	7	4		3	8	5	2		6
Permitted Phases			4			2		6	
Detector Phase	7	4	4	3	8	5	2	6	6
Switch Phase									
Minimum Initial (s)	5.0	10.0	10.0	5.0	10.0	5.0	10.0	10.0	10.0
Minimum Split (s)	11.9	33.9	33.9	11.7	33.9	11.5	31.5	31.5	31.5
Total Split (s)	12.0	39.5	39.5	22.0	49.5	17.0	48.5	31.5	31.5
Total Split (%)	10.9%	35.9%	35.9%	20.0%	45.0%	15.5%	44.1%	28.6%	28.6%
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)	3.6	3.6	3.6	3.4	3.6	3.2	3.2	3.2	3.2
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	2.0	0.0	0.0	0.0
Total Lost Time (s)	6.9	6.9	6.9	6.7	6.9	8.5	6.5	6.5	6.5
Lead/Lag	Lead				Lag	Lead		Lag	Lag
Lead-Lag Optimize?	Yes				Yes	Yes		Yes	Yes
Recall Mode	None	C-Max	C-Max	None	C-Max	None	Max	Max	Max
Act Effct Green (s)	5.1	32.6	32.6	15.3	42.6	40.0	42.0	25.0	25.0
Actuated g/C Ratio	0.05	0.30	0.30	0.14	0.39	0.36	0.38	0.23	0.23
v/c Ratio	1.06	0.69	0.39	0.92	1.09	1.27	0.78	0.16	1.07
Control Delay	171.5	42.3	4.0	89.6	95.4	183.4	40.0	37.1	106.6
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	171.5	42.3	4.0	89.6	95.4	183.4	40.0	37.1	106.6
LOS	F	D	A	F	F	F	D	D	F
Approach Delay		48.1			94.1		88.2		102.5
Approach LOS		D			F		F		F
Queue Length 50th (m)	~19.6	69.4	0.0	46.6	~179.7	~52.5	91.2	4.3	~95.4
Queue Length 95th (m)	#50.5	102.0	7.6	#90.5	#249.6	#101.8	132.8	11.9	#153.6
Internal Link Dist (m)		495.5			80.5		878.5		424.0
Turn Bay Length (m)	95.0		30.0	75.0		55.0		50.0	
Base Capacity (vph)	78	528	474	235	679	195	630	161	377
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	1.06	0.69	0.39	0.92	1.09	1.27	0.78	0.16	1.07

Intersection Summary	
Cycle Length: 110	
Actuated Cycle Length: 110	
Offset: 0 (0%), Referenced to phase 4:EBT and 8:WBT, Start of Green	
Natural Cycle: 140	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 1.27	
Intersection Signal Delay: 83.2	Intersection LOS: F
Intersection Capacity Utilization 108.8%	ICU Level of Service G
Analysis Period (min) 15	

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

Splits and Phases: 6: Woodroffe Ave & Richmond Rd



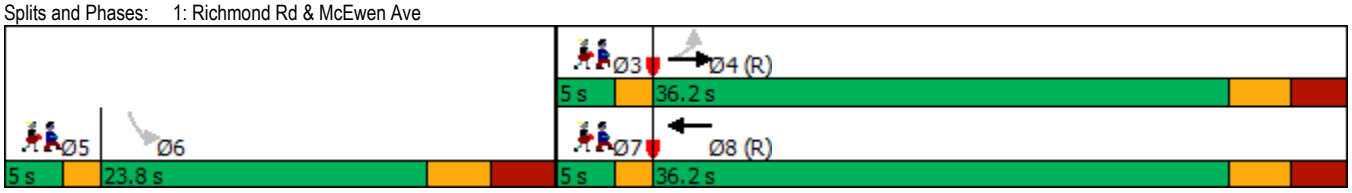
Total Projected 2031

Lane Group	EBL	EBT	WBT	SBL	Ø3	Ø5	Ø7
Lane Configurations							
Traffic Volume (vph)	32	794	407	30			
Future Volume (vph)	32	794	407	30			
Lane Group Flow (vph)	32	794	429	81			
Turn Type	Perm	NA	NA	Perm			
Protected Phases		4	8		3	5	7
Permitted Phases	4			6			
Detector Phase	4	4	8	6			
Switch Phase							
Minimum Initial (s)	10.0	10.0	10.0	10.0	1.0	1.0	1.0
Minimum Split (s)	24.3	24.3	31.3	23.8	5.0	5.0	5.0
Total Split (s)	36.2	36.2	36.2	23.8	5.0	5.0	5.0
Total Split (%)	51.7%	51.7%	51.7%	34.0%	7%	7%	7%
Yellow Time (s)	3.3	3.3	3.3	3.3	2.0	2.0	2.0
All-Red Time (s)	3.0	3.0	3.0	3.5	0.0	0.0	0.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0			
Total Lost Time (s)	6.3	6.3	6.3	6.8			
Lead/Lag	Lag	Lag	Lag	Lag	Lead	Lead	Lead
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Recall Mode	C-Max	C-Max	C-Max	None	None	None	None
Act Effct Green (s)	41.3	41.3	41.3	14.2			
Actuated g/C Ratio	0.59	0.59	0.59	0.20			
v/c Ratio	0.07	0.75	0.41	0.26			
Control Delay	12.2	24.6	10.0	12.9			
Queue Delay	0.0	0.0	0.0	0.0			
Total Delay	12.2	24.6	10.0	12.9			
LOS	B	C	B	B			
Approach Delay		24.1	10.0	12.9			
Approach LOS		C	B	B			
Queue Length 50th (m)	2.4	~115.2	57.2	3.1			
Queue Length 95th (m)	7.2	#176.3	87.6	12.7			
Internal Link Dist (m)		546.0	379.9	123.9			
Turn Bay Length (m)	50.0			20.0			
Base Capacity (vph)	465	1053	1040	368			
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	0.07	0.75	0.41	0.22			

Intersection Summary	
Cycle Length: 70	
Actuated Cycle Length: 70	
Offset: 38 (54%), Referenced to phase 4:EBTL and 8:WBT, Start of Green	
Natural Cycle: 80	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.75	
Intersection Signal Delay: 18.9	Intersection LOS: B
Intersection Capacity Utilization 68.1%	ICU Level of Service C
Analysis Period (min) 15	

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

Splits and Phases: 1: Richmond Rd & McEwen Ave

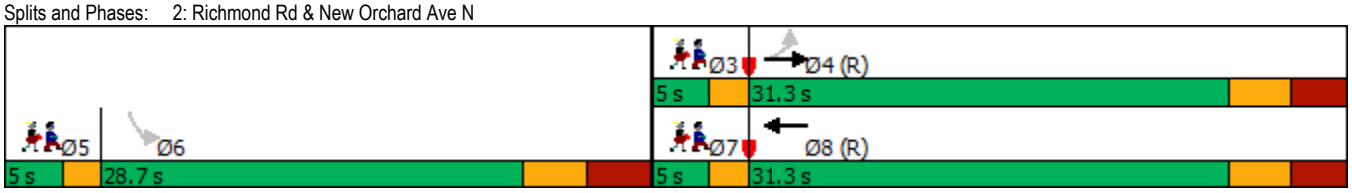


Lane Group	EBL	EBT	WBT	SBL	Ø3	Ø5	Ø7
Lane Configurations							
Traffic Volume (vph)	27	810	416	161			
Future Volume (vph)	27	810	416	161			
Lane Group Flow (vph)	0	837	477	196			
Turn Type	Perm	NA	NA	Perm			
Protected Phases		4	8		3	5	7
Permitted Phases	4			6			
Detector Phase	4	4	8	6			
Switch Phase							
Minimum Initial (s)	10.0	10.0	10.0	10.0	1.0	1.0	1.0
Minimum Split (s)	24.3	24.3	27.3	28.7	5.0	5.0	5.0
Total Split (s)	31.3	31.3	31.3	28.7	5.0	5.0	5.0
Total Split (%)	44.7%	44.7%	44.7%	41.0%	7%	7%	7%
Yellow Time (s)	3.3	3.3	3.3	3.3	2.0	2.0	2.0
All-Red Time (s)	3.0	3.0	3.0	3.4	0.0	0.0	0.0
Lost Time Adjust (s)		0.0	0.0	0.0			
Total Lost Time (s)		6.3	6.3	6.7			
Lead/Lag	Lag	Lag	Lag	Lag	Lead	Lead	Lead
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Recall Mode	C-Max	C-Max	C-Max	None	None	None	None
Act Effct Green (s)		32.7	32.7	18.3			
Actuated g/C Ratio		0.47	0.47	0.26			
v/c Ratio		1.04	0.61	0.77			
Control Delay		55.1	21.5	42.5			
Queue Delay		0.0	0.0	0.0			
Total Delay		55.1	21.5	42.5			
LOS		E	C	D			
Approach Delay		55.1	21.5	42.5			
Approach LOS		E	C	D			
Queue Length 50th (m)		~140.3	53.4	20.0			
Queue Length 95th (m)		#202.2	#99.8	#47.2			
Internal Link Dist (m)		379.9	490.4	54.3			
Turn Bay Length (m)							
Base Capacity (vph)		808	785	301			
Starvation Cap Reductn		0	0	0			
Spillback Cap Reductn		0	0	0			
Storage Cap Reductn		0	0	0			
Reduced v/c Ratio		1.04	0.61	0.65			

Intersection Summary	
Cycle Length: 70	
Actuated Cycle Length: 70	
Offset: 68 (97%), Referenced to phase 4:EBTL and 8:WBT, Start of Green	
Natural Cycle: 90	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 1.04	
Intersection Signal Delay: 42.8	Intersection LOS: D
Intersection Capacity Utilization 97.2%	ICU Level of Service F
Analysis Period (min) 15	

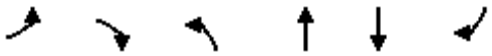
~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 2: Richmond Rd & New Orchard Ave N



Lane Group	EBL	NBT	SBT
Lane Configurations			
Traffic Volume (vph)	1	45	80
Future Volume (vph)	1	45	80
Lane Group Flow (vph)	88	99	82
Sign Control	Stop	Free	Free

Intersection Summary		
Control Type: Unsignalized		
Intersection Capacity Utilization 24.7%		ICU Level of Service A
Analysis Period (min) 15		



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	1	87	54	45	80	2
Future Volume (Veh/h)	1	87	54	45	80	2
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	1	87	54	45	80	2
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (m)				78		
pX, platoon unblocked						
vC, conflicting volume	234	81	82			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	234	81	82			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	100	91	96			
cM capacity (veh/h)	727	979	1515			

Direction, Lane #	EB 1	NB 1	SB 1
Volume Total	88	99	82
Volume Left	1	54	0
Volume Right	87	0	2
cSH	975	1515	1700
Volume to Capacity	0.09	0.04	0.05
Queue Length 95th (m)	2.3	0.8	0.0
Control Delay (s)	9.1	4.2	0.0
Lane LOS	A	A	
Approach Delay (s)	9.1	4.2	0.0
Approach LOS	A		

Intersection Summary			
Average Delay	4.5		
Intersection Capacity Utilization	24.7%	ICU Level of Service	A
Analysis Period (min)	15		

Lane Group	WBL	NBT	SBT
Lane Configurations			
Traffic Volume (vph)	50	23	32
Future Volume (vph)	50	23	32
Lane Group Flow (vph)	50	46	32
Sign Control	Stop	Free	Free

Intersection Summary		
Control Type: Unsignalized		
Intersection Capacity Utilization 13.3%		ICU Level of Service A
Analysis Period (min) 15		

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	50	0	23	23	0	32
Future Volume (Veh/h)	50	0	23	23	0	32
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	50	0	23	23	0	32
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			None			None
Median storage veh)						
Upstream signal (m)			108			
pX, platoon unblocked						
vC, conflicting volume	66	34			46	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	66	34			46	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	95	100			100	
cM capacity (veh/h)	939	1039			1562	

Direction, Lane #	WB 1	NB 1	SB 1
Volume Total	50	46	32
Volume Left	50	0	0
Volume Right	0	23	0
cSH	939	1700	1562
Volume to Capacity	0.05	0.03	0.00
Queue Length 95th (m)	1.3	0.0	0.0
Control Delay (s)	9.1	0.0	0.0
Lane LOS	A		
Approach Delay (s)	9.1	0.0	0.0
Approach LOS	A		

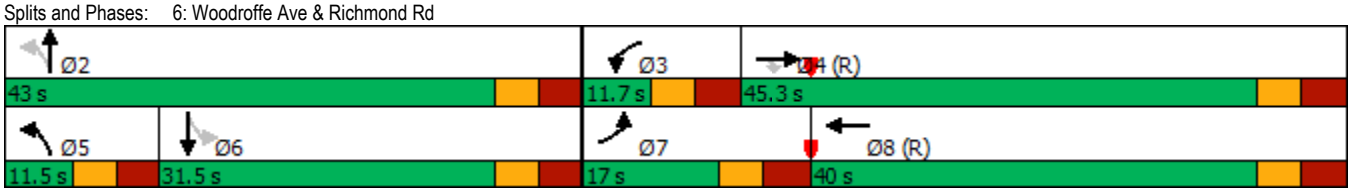
Intersection Summary			
Average Delay	3.5		
Intersection Capacity Utilization	13.3%	ICU Level of Service	A
Analysis Period (min)	15		

Lane Group	EBL	EBT	EBR	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations									
Traffic Volume (vph)	152	910	235	62	284	125	257	39	329
Future Volume (vph)	152	910	235	62	284	125	257	39	329
Lane Group Flow (vph)	152	910	235	62	304	125	349	39	390
Turn Type	Prot	NA	Perm	Prot	NA	pm+pt	NA	Perm	NA
Protected Phases	7	4		3	8	5	2		6
Permitted Phases			4			2		6	
Detector Phase	7	4	4	3	8	5	2	6	6
Switch Phase									
Minimum Initial (s)	5.0	10.0	10.0	5.0	10.0	5.0	10.0	10.0	10.0
Minimum Split (s)	11.9	28.9	28.9	11.7	33.9	11.5	31.5	31.5	31.5
Total Split (s)	17.0	45.3	45.3	11.7	40.0	11.5	43.0	31.5	31.5
Total Split (%)	17.0%	45.3%	45.3%	11.7%	40.0%	11.5%	43.0%	31.5%	31.5%
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)	3.6	3.6	3.6	3.4	3.6	3.2	3.2	3.2	3.2
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	6.9	6.9	6.9	6.7	6.9	6.5	6.5	6.5	6.5
Lead/Lag	Lead				Lag	Lead		Lag	Lag
Lead-Lag Optimize?	Yes				Yes	Yes		Yes	Yes
Recall Mode	None	C-Max	C-Max	None	C-Max	None	Max	Max	Max
Act Effct Green (s)	10.1	40.7	40.7	5.0	33.1	36.5	36.5	25.0	25.0
Actuated g/C Ratio	0.10	0.41	0.41	0.05	0.33	0.36	0.36	0.25	0.25
v/c Ratio	0.89	1.25	0.43	0.74	0.53	0.70	0.60	0.18	0.94
Control Delay	90.8	153.9	8.6	92.8	31.2	45.4	31.0	32.2	68.7
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	90.8	153.9	8.6	92.8	31.2	45.4	31.0	32.2	68.7
LOS	F	F	A	F	C	D	C	C	E
Approach Delay		120.2			41.6		34.8		65.3
Approach LOS		F			D		C		E
Queue Length 50th (m)	29.6	~230.1	6.6	12.1	47.3	16.4	54.2	6.0	74.1
Queue Length 95th (m)	#65.5	#301.9	25.0	#33.9	73.0	#36.5	83.3	14.8	#129.2
Internal Link Dist (m)		490.4			81.7		868.8		410.6
Turn Bay Length (m)	95.0		30.0	75.0		55.0		50.0	
Base Capacity (vph)	171	727	552	84	575	179	582	216	417
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.89	1.25	0.43	0.74	0.53	0.70	0.60	0.18	0.94

Intersection Summary	
Cycle Length: 100	
Actuated Cycle Length: 100	
Offset: 0 (0%), Referenced to phase 4:EBT and 8:WBT, Start of Green	
Natural Cycle: 150	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 1.25	
Intersection Signal Delay: 84.0	Intersection LOS: F
Intersection Capacity Utilization 107.3%	ICU Level of Service G
Analysis Period (min) 15	

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

Splits and Phases: 6: Woodroffe Ave & Richmond Rd

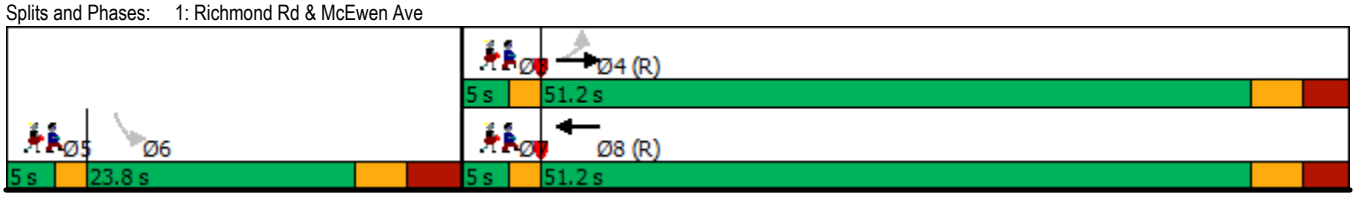


Lane Group	EBL	EBT	WBT	SBL	Ø3	Ø5	Ø7
Lane Configurations							
Traffic Volume (vph)	81	529	1004	35			
Future Volume (vph)	81	529	1004	35			
Lane Group Flow (vph)	81	529	1049	101			
Turn Type	Perm	NA	NA	Perm			
Protected Phases		4	8		3	5	7
Permitted Phases	4			6			
Detector Phase	4	4	8	6			
Switch Phase							
Minimum Initial (s)	10.0	10.0	10.0	10.0	1.0	1.0	1.0
Minimum Split (s)	24.3	24.3	36.3	23.8	5.0	5.0	5.0
Total Split (s)	51.2	51.2	51.2	23.8	5.0	5.0	5.0
Total Split (%)	60.2%	60.2%	60.2%	28.0%	6%	6%	6%
Yellow Time (s)	3.3	3.3	3.3	3.3	2.0	2.0	2.0
All-Red Time (s)	3.0	3.0	3.0	3.5	0.0	0.0	0.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0			
Total Lost Time (s)	6.3	6.3	6.3	6.8			
Lead/Lag	Lag	Lag	Lag	Lag	Lead	Lead	Lead
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Recall Mode	C-Max	C-Max	C-Max	None	None	None	None
Act Effct Green (s)	56.3	56.3	56.3	14.2			
Actuated g/C Ratio	0.66	0.66	0.66	0.17			
v/c Ratio	0.90	0.45	0.90	0.37			
Control Delay	100.1	12.2	16.7	16.8			
Queue Delay	0.0	0.0	0.0	0.0			
Total Delay	100.1	12.2	16.7	16.8			
LOS	F	B	B	B			
Approach Delay		23.9	16.7	16.8			
Approach LOS		C	B	B			
Queue Length 50th (m)	~15.3	54.2	~191.2	4.7			
Queue Length 95th (m)	#30.9	82.6	m35.6	17.7			
Internal Link Dist (m)		508.0	379.9	123.9			
Turn Bay Length (m)	50.0			20.0			
Base Capacity (vph)	90	1182	1169	314			
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	0.90	0.45	0.90	0.32			

Intersection Summary	
Cycle Length: 85	
Actuated Cycle Length: 85	
Offset: 17 (20%), Referenced to phase 4:EBTL and 8:WBT, Start of Green	
Natural Cycle: 100	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.90	
Intersection Signal Delay: 19.2	Intersection LOS: B
Intersection Capacity Utilization 95.1%	ICU Level of Service F
Analysis Period (min) 15	

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.
m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 1: Richmond Rd & McEwen Ave



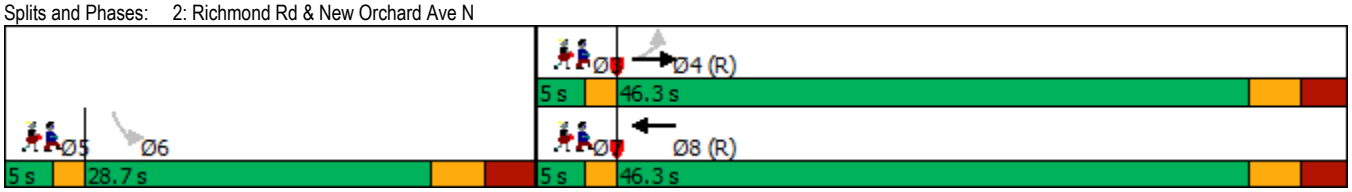
Lane Group	EBL	EBT	WBT	SBL	Ø3	Ø5	Ø7
Lane Configurations							
Traffic Volume (vph)	40	572	1024	98			
Future Volume (vph)	40	572	1024	98			
Lane Group Flow (vph)	0	612	1176	132			
Turn Type	Perm	NA	NA	Perm			
Protected Phases		4	8		3	5	7
Permitted Phases	4			6			
Detector Phase	4	4	8	6			
Switch Phase							
Minimum Initial (s)	10.0	10.0	10.0	10.0	1.0	1.0	1.0
Minimum Split (s)	24.3	24.3	27.3	28.7	5.0	5.0	5.0
Total Split (s)	46.3	46.3	46.3	28.7	5.0	5.0	5.0
Total Split (%)	54.5%	54.5%	54.5%	33.8%	6%	6%	6%
Yellow Time (s)	3.3	3.3	3.3	3.3	2.0	2.0	2.0
All-Red Time (s)	3.0	3.0	3.0	3.4	0.0	0.0	0.0
Lost Time Adjust (s)		0.0	0.0	0.0			
Total Lost Time (s)		6.3	6.3	6.7			
Lead/Lag	Lag	Lag	Lag	Lag	Lead	Lead	Lead
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Recall Mode	C-Max	C-Max	C-Max	None	None	None	None
Act Effct Green (s)		48.3	48.3	17.7			
Actuated g/C Ratio		0.57	0.57	0.21			
v/c Ratio		2.01	1.25	0.67			
Control Delay		487.5	141.7	41.8			
Queue Delay		0.0	0.0	0.0			
Total Delay		487.5	141.7	41.8			
LOS		F	F	D			
Approach Delay		487.5	141.7	41.8			
Approach LOS		F	F	D			
Queue Length 50th (m)		~168.4	~270.3	15.6			
Queue Length 95th (m)		#231.8	#345.0	33.9			
Internal Link Dist (m)		379.9	495.5	54.3			
Turn Bay Length (m)							
Base Capacity (vph)		304	944	241			
Starvation Cap Reductn		0	0	0			
Spillback Cap Reductn		0	0	0			
Storage Cap Reductn		0	0	0			
Reduced v/c Ratio		2.01	1.25	0.55			

Intersection Summary

Cycle Length: 85
Actuated Cycle Length: 85
Offset: 1 (1%), Referenced to phase 4:EBTL and 8:WBT, Start of Green
Natural Cycle: 150
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 2.01
Intersection Signal Delay: 245.0 — Intersection LOS: F
Intersection Capacity Utilization 96.8% — ICU Level of Service F
Analysis Period (min) 15

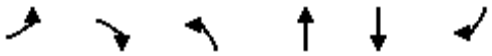
~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 2: Richmond Rd & New Orchard Ave N



Lane Group	EBL	NBT	SBT
Lane Configurations			
Traffic Volume (vph)	4	73	56
Future Volume (vph)	4	73	56
Lane Group Flow (vph)	83	172	59
Sign Control	Stop	Free	Free

Intersection Summary		
Control Type: Unsignalized		
Intersection Capacity Utilization 28.6%		ICU Level of Service A
Analysis Period (min) 15		



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	4	79	99	73	56	3
Future Volume (Veh/h)	4	79	99	73	56	3
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	4	79	99	73	56	3
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (m)				78		
pX, platoon unblocked						
vC, conflicting volume	328	58	59			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	328	58	59			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	99	92	94			
cM capacity (veh/h)	623	1009	1545			

Direction, Lane #	EB 1	NB 1	SB 1
Volume Total	83	172	59
Volume Left	4	99	0
Volume Right	79	0	3
cSH	979	1545	1700
Volume to Capacity	0.08	0.06	0.03
Queue Length 95th (m)	2.1	1.6	0.0
Control Delay (s)	9.0	4.5	0.0
Lane LOS	A	A	
Approach Delay (s)	9.0	4.5	0.0
Approach LOS	A		

Intersection Summary			
Average Delay	4.9		
Intersection Capacity Utilization	28.6%	ICU Level of Service	A
Analysis Period (min)	15		

Lane Group	WBL	NBT	SBT
Lane Configurations			
Traffic Volume (vph)	0	35	29
Future Volume (vph)	0	35	29
Lane Group Flow (vph)	31	77	29
Sign Control	Stop	Free	Free

Intersection Summary		
Control Type: Unsignalized		
Intersection Capacity Utilization 14.7%		ICU Level of Service A
Analysis Period (min) 15		

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	0	31	35	42	0	29
Future Volume (Veh/h)	0	31	35	42	0	29
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	0	31	35	42	0	29
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			None			None
Median storage veh)						
Upstream signal (m)			110			
pX, platoon unblocked						
vC, conflicting volume	85	56			77	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	85	56			77	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	100	97			100	
cM capacity (veh/h)	916	1011			1522	

Direction, Lane #	WB 1	NB 1	SB 1
Volume Total	31	77	29
Volume Left	0	0	0
Volume Right	31	42	0
cSH	1011	1700	1522
Volume to Capacity	0.03	0.05	0.00
Queue Length 95th (m)	0.7	0.0	0.0
Control Delay (s)	8.7	0.0	0.0
Lane LOS	A		
Approach Delay (s)	8.7	0.0	0.0
Approach LOS	A		

Intersection Summary			
Average Delay	2.0		
Intersection Capacity Utilization	14.7%	ICU Level of Service	A
Analysis Period (min)	15		

Lane Group	EBL	EBT	EBR	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations									
Traffic Volume (vph)	83	398	185	217	772	248	402	25	340
Future Volume (vph)	83	398	185	217	772	248	402	25	340
Lane Group Flow (vph)	83	398	185	217	803	248	490	25	402
Turn Type	Prot	NA	Perm	Prot	NA	pm+pt	NA	Perm	NA
Protected Phases	7	4		3	8	5	2		6
Permitted Phases			4			2		6	
Detector Phase	7	4	4	3	8	5	2	6	6
Switch Phase									
Minimum Initial (s)	5.0	10.0	10.0	5.0	10.0	5.0	5.0	10.0	10.0
Minimum Split (s)	11.9	33.9	33.9	11.7	33.9	11.5	31.5	31.5	31.5
Total Split (s)	12.0	41.5	41.5	22.0	51.5	15.0	46.5	31.5	31.5
Total Split (%)	10.9%	37.7%	37.7%	20.0%	46.8%	13.6%	42.3%	28.6%	28.6%
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)	3.6	3.6	3.6	3.4	3.6	3.2	3.2	3.2	3.2
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	2.0	0.0	0.0	0.0
Total Lost Time (s)	6.9	6.9	6.9	6.7	6.9	8.5	6.5	6.5	6.5
Lead/Lag	Lead				Lag	Lead		Lag	Lag
Lead-Lag Optimize?	Yes				Yes	Yes		Yes	Yes
Recall Mode	None	C-Max	C-Max	None	C-Max	None	Max	Max	Max
Act Effct Green (s)	5.1	34.6	34.6	15.3	44.6	38.0	40.0	25.0	25.0
Actuated g/C Ratio	0.05	0.31	0.31	0.14	0.41	0.35	0.36	0.23	0.23
v/c Ratio	1.06	0.71	0.38	0.92	1.13	1.50	0.82	0.17	1.07
Control Delay	171.5	41.4	3.7	89.6	107.3	281.3	44.4	38.0	106.6
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	171.5	41.4	3.7	89.6	107.3	281.3	44.4	38.0	106.6
LOS	F	D	A	F	F	F	D	D	F
Approach Delay		47.2			103.5		124.0		102.6
Approach LOS		D			F		F		F
Queue Length 50th (m)	~19.6	75.1	0.0	46.6	~200.2	~59.7	94.2	4.4	~95.4
Queue Length 95th (m)	#50.5	109.6	7.4	#90.5	#271.8	#108.9	#146.9	12.1	#153.6
Internal Link Dist (m)		495.5			80.5		878.5		424.0
Turn Bay Length (m)	95.0		30.0	75.0		55.0		50.0	
Base Capacity (vph)	78	561	490	235	711	165	600	143	377
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	1.06	0.71	0.38	0.92	1.13	1.50	0.82	0.17	1.07

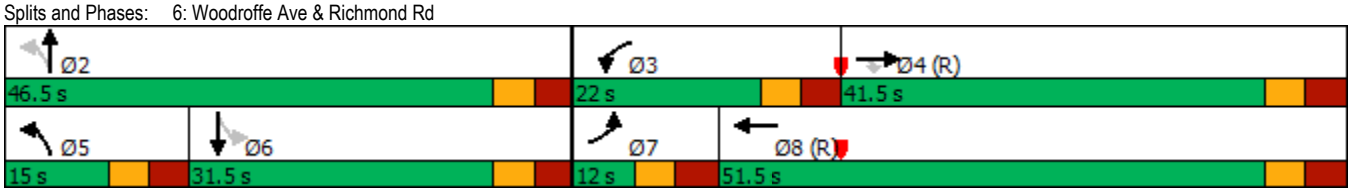
Intersection Summary

Cycle Length: 110
Actuated Cycle Length: 110
Offset: 0 (0%), Referenced to phase 4:EBT and 8:WBT, Start of Green
Natural Cycle: 140
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 1.50
Intersection Signal Delay: 95.5 Intersection LOS: F
Intersection Capacity Utilization 112.2% ICU Level of Service H
Analysis Period (min) 15

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

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

Splits and Phases: 6: Woodroffe Ave & Richmond Rd

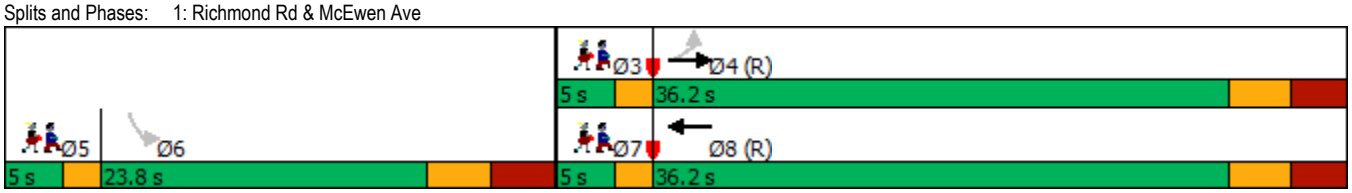


Total Projected 2031 with 30% Traffic Reductions

Lane Group	EBL	EBT	WBT	SBL	Ø3	Ø5	Ø7
Lane Configurations							
Traffic Volume (vph)	32	560	291	30			
Future Volume (vph)	32	560	291	30			
Lane Group Flow (vph)	32	560	313	81			
Turn Type	Perm	NA	NA	Perm			
Protected Phases		4	8		3	5	7
Permitted Phases	4			6			
Detector Phase	4	4	8	6			
Switch Phase							
Minimum Initial (s)	10.0	10.0	10.0	10.0	1.0	1.0	1.0
Minimum Split (s)	16.3	16.3	31.3	23.8	5.0	5.0	5.0
Total Split (s)	36.2	36.2	36.2	23.8	5.0	5.0	5.0
Total Split (%)	51.7%	51.7%	51.7%	34.0%	7%	7%	7%
Yellow Time (s)	3.3	3.3	3.3	3.3	2.0	2.0	2.0
All-Red Time (s)	3.0	3.0	3.0	3.5	0.0	0.0	0.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0			
Total Lost Time (s)	6.3	6.3	6.3	6.8			
Lead/Lag	Lag	Lag	Lag	Lag	Lead	Lead	Lead
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Recall Mode	C-Max	C-Max	C-Max	None	None	None	None
Act Effct Green (s)	41.3	41.3	41.3	14.2			
Actuated g/C Ratio	0.59	0.59	0.59	0.20			
v/c Ratio	0.06	0.53	0.30	0.26			
Control Delay	12.0	16.1	9.7	12.9			
Queue Delay	0.0	0.0	0.0	0.0			
Total Delay	12.0	16.1	9.7	12.9			
LOS	B	B	A	B			
Approach Delay		15.9	9.7	12.9			
Approach LOS		B	A	B			
Queue Length 50th (m)	2.4	58.8	37.9	3.1			
Queue Length 95th (m)	7.1	94.3	64.8	12.7			
Internal Link Dist (m)		546.0	379.9	123.9			
Turn Bay Length (m)	50.0			20.0			
Base Capacity (vph)	565	1053	1037	368			
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	0.06	0.53	0.30	0.22			

Intersection Summary	
Cycle Length: 70	
Actuated Cycle Length: 70	
Offset: 38 (54%), Referenced to phase 4:EBTL and 8:WBT, Start of Green	
Natural Cycle: 70	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.53	
Intersection Signal Delay: 13.7	Intersection LOS: B
Intersection Capacity Utilization 55.1%	ICU Level of Service B
Analysis Period (min) 15	

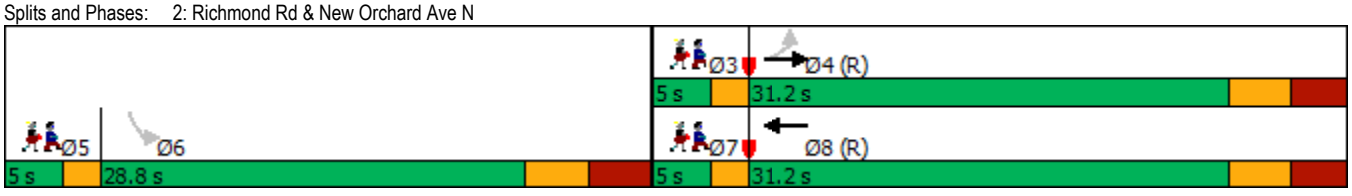
Splits and Phases: 1: Richmond Rd & McEwen Ave



Lane Group	EBL	EBT	WBT	SBL	Ø3	Ø5	Ø7
Lane Configurations							
Traffic Volume (vph)	27	567	291	161			
Future Volume (vph)	27	567	291	161			
Lane Group Flow (vph)	0	594	352	196			
Turn Type	Perm	NA	NA	Perm			
Protected Phases		4	8		3	5	7
Permitted Phases	4			6			
Detector Phase	4	4	8	6			
Switch Phase							
Minimum Initial (s)	10.0	10.0	10.0	10.0	1.0	1.0	1.0
Minimum Split (s)	16.3	16.3	27.3	28.7	5.0	5.0	5.0
Total Split (s)	31.2	31.2	31.2	28.8	5.0	5.0	5.0
Total Split (%)	44.6%	44.6%	44.6%	41.1%	7%	7%	7%
Yellow Time (s)	3.3	3.3	3.3	3.3	2.0	2.0	2.0
All-Red Time (s)	3.0	3.0	3.0	3.4	0.0	0.0	0.0
Lost Time Adjust (s)		0.0	0.0	0.0			
Total Lost Time (s)		6.3	6.3	6.7			
Lead/Lag	Lag	Lag	Lag	Lag	Lead	Lead	Lead
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Recall Mode	C-Max	C-Max	C-Max	None	None	None	None
Act Effct Green (s)		32.6	32.6	18.3			
Actuated g/C Ratio		0.47	0.47	0.26			
v/c Ratio		0.74	0.46	0.77			
Control Delay		16.6	17.5	42.3			
Queue Delay		0.0	0.0	0.0			
Total Delay		16.6	17.5	42.3			
LOS		B	B	D			
Approach Delay		16.6	17.5	42.3			
Approach LOS		B	B	D			
Queue Length 50th (m)		8.5	35.1	20.0			
Queue Length 95th (m)		#129.5	60.0	#47.1			
Internal Link Dist (m)		379.9	490.4	54.3			
Turn Bay Length (m)							
Base Capacity (vph)		802	768	302			
Starvation Cap Reductn		0	0	0			
Spillback Cap Reductn		0	0	0			
Storage Cap Reductn		0	0	0			
Reduced v/c Ratio		0.74	0.46	0.65			

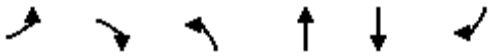
Intersection Summary	
Cycle Length: 70	
Actuated Cycle Length: 70	
Offset: 68 (97%), Referenced to phase 4:EBTL and 8:WBT, Start of Green	
Natural Cycle: 75	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.77	
Intersection Signal Delay: 21.3	Intersection LOS: C
Intersection Capacity Utilization 83.9%	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.	

Splits and Phases: 2: Richmond Rd & New Orchard Ave N



Lane Group	EBL	NBT	SBT
Lane Configurations			
Traffic Volume (vph)	1	45	80
Future Volume (vph)	1	45	80
Lane Group Flow (vph)	88	99	82
Sign Control	Stop	Free	Free

Intersection Summary		
Control Type: Unsignalized		
Intersection Capacity Utilization 24.7%		ICU Level of Service A
Analysis Period (min) 15		



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	1	87	54	45	80	2
Future Volume (Veh/h)	1	87	54	45	80	2
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	1	87	54	45	80	2
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (m)				78		
pX, platoon unblocked						
vC, conflicting volume	234	81	82			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	234	81	82			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	100	91	96			
cM capacity (veh/h)	727	979	1515			

Direction, Lane #	EB 1	NB 1	SB 1
Volume Total	88	99	82
Volume Left	1	54	0
Volume Right	87	0	2
cSH	975	1515	1700
Volume to Capacity	0.09	0.04	0.05
Queue Length 95th (m)	2.3	0.8	0.0
Control Delay (s)	9.1	4.2	0.0
Lane LOS	A	A	
Approach Delay (s)	9.1	4.2	0.0
Approach LOS	A		

Intersection Summary			
Average Delay	4.5		
Intersection Capacity Utilization	24.7%	ICU Level of Service	A
Analysis Period (min)	15		

Lane Group	WBL	NBT	SBT
Lane Configurations			
Traffic Volume (vph)	50	23	32
Future Volume (vph)	50	23	32
Lane Group Flow (vph)	50	46	32
Sign Control	Stop	Free	Free

Intersection Summary		
Control Type: Unsignalized		
Intersection Capacity Utilization 13.3%		ICU Level of Service A
Analysis Period (min) 15		

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	50	0	23	23	0	32
Future Volume (Veh/h)	50	0	23	23	0	32
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	50	0	23	23	0	32
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			None			None
Median storage veh)						
Upstream signal (m)			108			
pX, platoon unblocked						
vC, conflicting volume	66	34			46	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	66	34			46	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	95	100			100	
cM capacity (veh/h)	939	1039			1562	

Direction, Lane #	WB 1	NB 1	SB 1
Volume Total	50	46	32
Volume Left	50	0	0
Volume Right	0	23	0
cSH	939	1700	1562
Volume to Capacity	0.05	0.03	0.00
Queue Length 95th (m)	1.3	0.0	0.0
Control Delay (s)	9.1	0.0	0.0
Lane LOS	A		
Approach Delay (s)	9.1	0.0	0.0
Approach LOS	A		

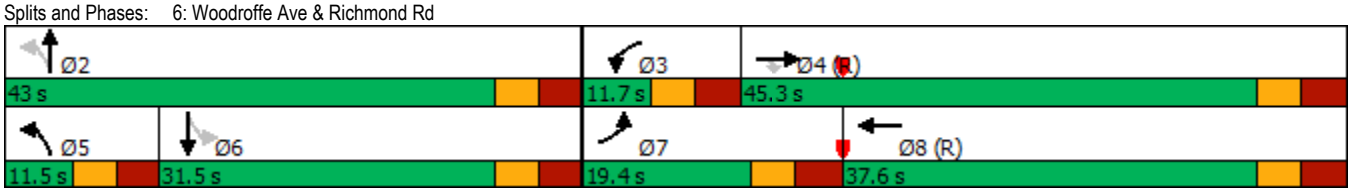
Intersection Summary			
Average Delay	3.5		
Intersection Capacity Utilization	13.3%	ICU Level of Service	A
Analysis Period (min)	15		

Lane Group	EBL	EBT	EBR	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations									
Traffic Volume (vph)	152	644	235	43	202	90	180	39	230
Future Volume (vph)	152	644	235	43	202	90	180	39	230
Lane Group Flow (vph)	152	644	235	43	222	90	272	39	291
Turn Type	Prot	NA	Perm	Prot	NA	pm+pt	NA	Perm	NA
Protected Phases	7	4		3	8	5	2		6
Permitted Phases			4			2		6	
Detector Phase	7	4	4	3	8	5	2	6	6
Switch Phase									
Minimum Initial (s)	5.0	10.0	10.0	5.0	10.0	5.0	10.0	10.0	10.0
Minimum Split (s)	11.9	28.9	28.9	11.7	33.9	11.5	31.5	31.5	31.5
Total Split (s)	19.4	45.3	45.3	11.7	37.6	11.5	43.0	31.5	31.5
Total Split (%)	19.4%	45.3%	45.3%	11.7%	37.6%	11.5%	43.0%	31.5%	31.5%
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)	3.6	3.6	3.6	3.4	3.6	3.2	3.2	3.2	3.2
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	6.9	6.9	6.9	6.7	6.9	6.5	6.5	6.5	6.5
Lead/Lag	Lead				Lag	Lead		Lag	Lag
Lead-Lag Optimize?	Yes				Yes	Yes		Yes	Yes
Recall Mode	None	C-Max	C-Max	None	C-Max	None	Max	Max	Max
Act Effct Green (s)	11.8	43.1	43.1	5.0	31.4	36.5	36.5	27.3	27.3
Actuated g/C Ratio	0.12	0.43	0.43	0.05	0.31	0.36	0.36	0.27	0.27
v/c Ratio	0.76	0.84	0.41	0.51	0.41	0.35	0.48	0.16	0.66
Control Delay	67.0	38.7	8.4	67.9	30.2	25.6	28.0	31.6	41.6
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	67.0	38.7	8.4	67.9	30.2	25.6	28.0	31.6	41.6
LOS	E	D	A	E	C	C	C	C	D
Approach Delay		36.0			36.3		27.4		40.4
Approach LOS		D			D		C		D
Queue Length 50th (m)	28.7	118.2	6.6	8.3	34.0	11.5	40.1	5.9	51.7
Queue Length 95th (m)	#57.2	#187.6	25.0	#22.2	55.0	22.4	63.8	14.7	#82.2
Internal Link Dist (m)		490.4			81.7		868.8		410.6
Turn Bay Length (m)	95.0		30.0	75.0		55.0		50.0	
Base Capacity (vph)	211	768	573	84	539	257	564	249	444
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.72	0.84	0.41	0.51	0.41	0.35	0.48	0.16	0.66

Intersection Summary	
Cycle Length: 100	
Actuated Cycle Length: 100	
Offset: 0 (0%), Referenced to phase 4:EBT and 8:WBT, Start of Green	
Natural Cycle: 90	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.84	
Intersection Signal Delay: 35.2	Intersection LOS: D
Intersection Capacity Utilization 91.3%	ICU Level of Service F
Analysis Period (min) 15	

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

Splits and Phases: 6: Woodroffe Ave & Richmond Rd

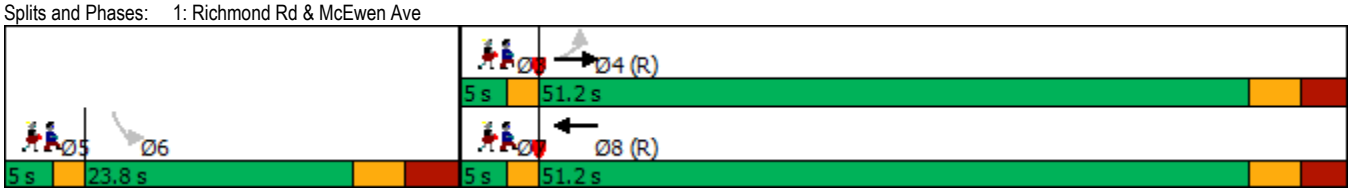


Lane Group	EBL	EBT	WBT	SBL	Ø3	Ø5	Ø7
Lane Configurations							
Traffic Volume (vph)	81	376	708	35			
Future Volume (vph)	81	376	708	35			
Lane Group Flow (vph)	81	376	753	101			
Turn Type	Perm	NA	NA	Perm			
Protected Phases		4	8		3	5	7
Permitted Phases	4			6			
Detector Phase	4	4	8	6			
Switch Phase							
Minimum Initial (s)	10.0	10.0	10.0	10.0	1.0	1.0	1.0
Minimum Split (s)	16.3	16.3	31.3	23.8	5.0	5.0	5.0
Total Split (s)	51.2	51.2	51.2	23.8	5.0	5.0	5.0
Total Split (%)	60.2%	60.2%	60.2%	28.0%	6%	6%	6%
Yellow Time (s)	3.3	3.3	3.3	3.3	2.0	2.0	2.0
All-Red Time (s)	3.0	3.0	3.0	3.5	0.0	0.0	0.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0			
Total Lost Time (s)	6.3	6.3	6.3	6.8			
Lead/Lag	Lag	Lag	Lag	Lag	Lead	Lead	Lead
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Recall Mode	C-Max	C-Max	C-Max	None	None	None	None
Act Effct Green (s)	56.3	56.3	56.3	14.2			
Actuated g/C Ratio	0.66	0.66	0.66	0.17			
v/c Ratio	0.28	0.32	0.65	0.37			
Control Delay	14.2	10.6	8.9	16.8			
Queue Delay	0.0	0.0	0.0	0.0			
Total Delay	14.2	10.6	8.9	16.8			
LOS	B	B	A	B			
Approach Delay		11.2	8.9	16.8			
Approach LOS		B	A	B			
Queue Length 50th (m)	7.2	34.3	32.4	4.7			
Queue Length 95th (m)	17.8	53.7	m34.9	17.7			
Internal Link Dist (m)		508.0	379.9	123.9			
Turn Bay Length (m)	50.0			20.0			
Base Capacity (vph)	294	1182	1165	314			
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	0.28	0.32	0.65	0.32			

Intersection Summary	
Cycle Length: 85	
Actuated Cycle Length: 85	
Offset: 17 (20%), Referenced to phase 4:EBTL and 8:WBT, Start of Green	
Natural Cycle: 80	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.65	
Intersection Signal Delay: 10.3	Intersection LOS: B
Intersection Capacity Utilization 80.1%	ICU Level of Service D
Analysis Period (min) 15	

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

Splits and Phases: 1: Richmond Rd & McEwen Ave

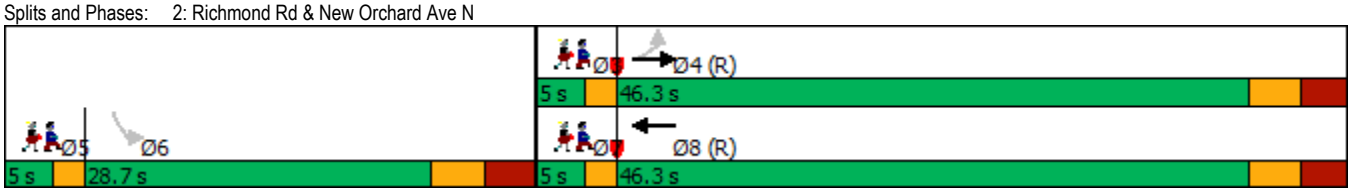


Lane Group	EBL	EBT	WBT	SBL	Ø3	Ø5	Ø7
Lane Configurations							
Traffic Volume (vph)	40	400	717	98			
Future Volume (vph)	40	400	717	98			
Lane Group Flow (vph)	0	440	869	132			
Turn Type	Perm	NA	NA	Perm			
Protected Phases		4	8		3	5	7
Permitted Phases	4			6			
Detector Phase	4	4	8	6			
Switch Phase							
Minimum Initial (s)	10.0	10.0	10.0	10.0	1.0	1.0	1.0
Minimum Split (s)	16.3	16.3	27.3	28.7	5.0	5.0	5.0
Total Split (s)	46.3	46.3	46.3	28.7	5.0	5.0	5.0
Total Split (%)	54.5%	54.5%	54.5%	33.8%	6%	6%	6%
Yellow Time (s)	3.3	3.3	3.3	3.3	2.0	2.0	2.0
All-Red Time (s)	3.0	3.0	3.0	3.4	0.0	0.0	0.0
Lost Time Adjust (s)		0.0	0.0	0.0			
Total Lost Time (s)		6.3	6.3	6.7			
Lead/Lag	Lag	Lag	Lag	Lag	Lead	Lead	Lead
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Recall Mode	C-Max	C-Max	C-Max	None	None	None	None
Act Effct Green (s)		48.3	48.3	17.7			
Actuated g/C Ratio		0.57	0.57	0.21			
v/c Ratio		0.72	0.94	0.67			
Control Delay		37.8	41.6	41.8			
Queue Delay		0.0	0.0	0.0			
Total Delay		37.8	41.6	41.8			
LOS		D	D	D			
Approach Delay		37.8	41.6	41.8			
Approach LOS		D	D	D			
Queue Length 50th (m)		77.7	~165.7	15.6			
Queue Length 95th (m)		#123.2	#235.1	33.9			
Internal Link Dist (m)		379.9	495.5	54.3			
Turn Bay Length (m)							
Base Capacity (vph)		615	920	241			
Starvation Cap Reductn		0	0	0			
Spillback Cap Reductn		0	0	0			
Storage Cap Reductn		0	0	0			
Reduced v/c Ratio		0.72	0.94	0.55			

Intersection Summary	
Cycle Length: 85	
Actuated Cycle Length: 85	
Offset: 1 (1%), Referenced to phase 4:EBTL and 8:WBT, Start of Green	
Natural Cycle: 100	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.94	
Intersection Signal Delay: 40.4	Intersection LOS: D
Intersection Capacity Utilization 86.5%	ICU Level of Service E
Analysis Period (min) 15	

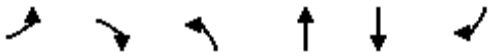
~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 2: Richmond Rd & New Orchard Ave N



Lane Group	EBL	NBT	SBT
Lane Configurations			
Traffic Volume (vph)	4	73	56
Future Volume (vph)	4	73	56
Lane Group Flow (vph)	83	172	59
Sign Control	Stop	Free	Free

Intersection Summary		
Control Type: Unsignalized		
Intersection Capacity Utilization 28.6%		ICU Level of Service A
Analysis Period (min) 15		



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	4	79	99	73	56	3
Future Volume (Veh/h)	4	79	99	73	56	3
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	4	79	99	73	56	3
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (m)				78		
pX, platoon unblocked						
vC, conflicting volume	328	58	59			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	328	58	59			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	99	92	94			
cM capacity (veh/h)	623	1009	1545			

Direction, Lane #	EB 1	NB 1	SB 1
Volume Total	83	172	59
Volume Left	4	99	0
Volume Right	79	0	3
cSH	979	1545	1700
Volume to Capacity	0.08	0.06	0.03
Queue Length 95th (m)	2.1	1.6	0.0
Control Delay (s)	9.0	4.5	0.0
Lane LOS	A	A	
Approach Delay (s)	9.0	4.5	0.0
Approach LOS	A		

Intersection Summary			
Average Delay	4.9		
Intersection Capacity Utilization	28.6%	ICU Level of Service	A
Analysis Period (min)	15		

Lane Group	WBL	NBT	SBT
Lane Configurations			
Traffic Volume (vph)	0	35	29
Future Volume (vph)	0	35	29
Lane Group Flow (vph)	31	77	29
Sign Control	Stop	Free	Free

Intersection Summary		
Control Type: Unsignalized		
Intersection Capacity Utilization 14.7%		ICU Level of Service A
Analysis Period (min) 15		

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	0	31	35	42	0	29
Future Volume (Veh/h)	0	31	35	42	0	29
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	0	31	35	42	0	29
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			None			None
Median storage veh)						
Upstream signal (m)			110			
pX, platoon unblocked						
vC, conflicting volume	85	56			77	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	85	56			77	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	100	97			100	
cM capacity (veh/h)	916	1011			1522	

Direction, Lane #	WB 1	NB 1	SB 1
Volume Total	31	77	29
Volume Left	0	0	0
Volume Right	31	42	0
cSH	1011	1700	1522
Volume to Capacity	0.03	0.05	0.00
Queue Length 95th (m)	0.7	0.0	0.0
Control Delay (s)	8.7	0.0	0.0
Lane LOS	A		
Approach Delay (s)	8.7	0.0	0.0
Approach LOS	A		

Intersection Summary			
Average Delay	2.0		
Intersection Capacity Utilization	14.7%	ICU Level of Service	A
Analysis Period (min)	15		

Lane Group	EBL	EBT	EBR	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations									
Traffic Volume (vph)	83	282	185	152	546	178	281	25	238
Future Volume (vph)	83	282	185	152	546	178	281	25	238
Lane Group Flow (vph)	83	282	185	152	577	178	369	25	300
Turn Type	Prot	NA	Perm	Prot	NA	pm+pt	NA	Perm	NA
Protected Phases	7	4		3	8	5	2		6
Permitted Phases			4			2		6	
Detector Phase	7	4	4	3	8	5	2	6	6
Switch Phase									
Minimum Initial (s)	5.0	10.0	10.0	5.0	10.0	5.0	5.0	10.0	10.0
Minimum Split (s)	11.9	28.9	28.9	11.7	33.9	11.5	31.5	31.5	31.5
Total Split (s)	14.0	41.8	41.8	20.7	48.5	16.0	47.5	31.5	31.5
Total Split (%)	12.7%	38.0%	38.0%	18.8%	44.1%	14.5%	43.2%	28.6%	28.6%
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)	3.6	3.6	3.6	3.4	3.6	3.2	3.2	3.2	3.2
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	2.0	0.0	0.0	0.0
Total Lost Time (s)	6.9	6.9	6.9	6.7	6.9	8.5	6.5	6.5	6.5
Lead/Lag	Lead				Lag	Lead		Lag	Lag
Lead-Lag Optimize?	Yes				Yes	Yes		Yes	Yes
Recall Mode	None	C-Max	C-Max	None	C-Max	None	Max	Max	Max
Act Effct Green (s)	7.1	35.9	35.9	13.0	41.6	39.0	41.0	25.0	25.0
Actuated g/C Ratio	0.06	0.33	0.33	0.12	0.38	0.35	0.37	0.23	0.23
v/c Ratio	0.76	0.48	0.41	0.76	0.88	0.80	0.62	0.13	0.82
Control Delay	90.5	33.5	8.6	70.9	47.9	54.6	33.5	36.1	59.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	90.5	33.5	8.6	70.9	47.9	54.6	33.5	36.1	59.1
LOS	F	C	A	E	D	D	C	D	E
Approach Delay		33.7			52.7		40.4		57.3
Approach LOS		C			D		D		E
Queue Length 50th (m)	17.9	48.9	2.5	31.7	113.6	27.3	63.7	4.3	61.3
Queue Length 95th (m)	#43.6	74.3	19.8	#59.6	#176.0	#58.0	95.2	11.8	#104.2
Internal Link Dist (m)		495.5			80.5		878.5		424.0
Turn Bay Length (m)	95.0		30.0	75.0		55.0		50.0	
Base Capacity (vph)	109	582	455	215	659	222	599	190	368
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.76	0.48	0.41	0.71	0.88	0.80	0.62	0.13	0.82

Intersection Summary

Cycle Length: 110
Actuated Cycle Length: 110
Offset: 0 (0%), Referenced to phase 4:EBT and 8:WBT, Start of Green
Natural Cycle: 90
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.88
Intersection Signal Delay: 45.4 — Intersection LOS: D
Intersection Capacity Utilization 92.7% — ICU Level of Service F
Analysis Period (min) 15
\# 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 6: Woodroffe Ave & Richmond Rd