Residential Building Development
1619-1655 Carling Avenue

TIA Report

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May 12, 2022

478213 - 01000

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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Signature of individual certifier that s/he meets the above criteria

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Document Control Page

CLIENT:	Clobracon Construction Inc.
PROJECT NAME:	Transportation Impact Assessment – 1619-1655 Carling Ave
REPORT TITLE:	1619-1655 Carling Ave – TIA Report
PARSONS PROJECT NO.:	477272 - 01000
IN SUPPORT OF:	Site Plan Application (SPA)
VERSION:	Draft
DIGITAL MASTER:	H:\ISO\478213\1000\DOCS\STEP5-Submission#5\1655 Carling_TIA Report_05.06.2022.docx
ORIGINATOR	Basel Ansari, P.Eng, Matt Mantle, P.Eng
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AUTHORIZATION:	City of Ottawa
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HISTORY:	TIA Step 1 (Screening Form) – Submitted on June 21, 2019 TIA Step 2 (Scoping Report) – Submitted on Sep 05, 2019 TIA Step 3 (Forecasting Report) – Submitted on Sep 11, 2019 TIA Step 4 (Strategy Report) – Submitted on Oct 11, 2019 TIA Step 5 (TIA Report for ZBLA) – Submitted on Feb 11, 2020 TIA Step 5 (TIA Report Submission for ZBLA and SPA) – Submitted on Nov 04, 2020 TIA Step 5 (TIA Report Submission for ZBLA and SPA) – Submitted on Apr 9, 2021 TIA Step 5 (TIA Report Submission for ZBLA and SPA) – Submitted on Feb 22, 2022 TIA Step 5 (TIA Report Submission for ZBLA and SPA) – Submitted on May 13, 2022

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TIA Report

Parsons has been retained by Clobracon Construction to prepare a TIA in support of a Site Plan Application (SPA) for a proposed residential building development in Ward 15: Kitchissippi. The following report represents Step 5 of the TIA process. Note that the previous TIA submissions reflected a development plan within 1655 Carling Ave., whereas this updated TIA includes the additional development within the neighbouring property at 1619 Carling Ave.

1. SCREENING FORM

The Screening Form was submitted to the City of Ottawa for review and verification of the need to complete a Transportation Impact Assessment (TIA). The Trip Generation, Location and Safety triggers of the Screening Form were all met based on the checklist provided by the TIA Guidelines. As such, a TIA Report was deemed required. The Screening Form and responses to City comments are provided in **Appendix A.**

2. SCOPING REPORT

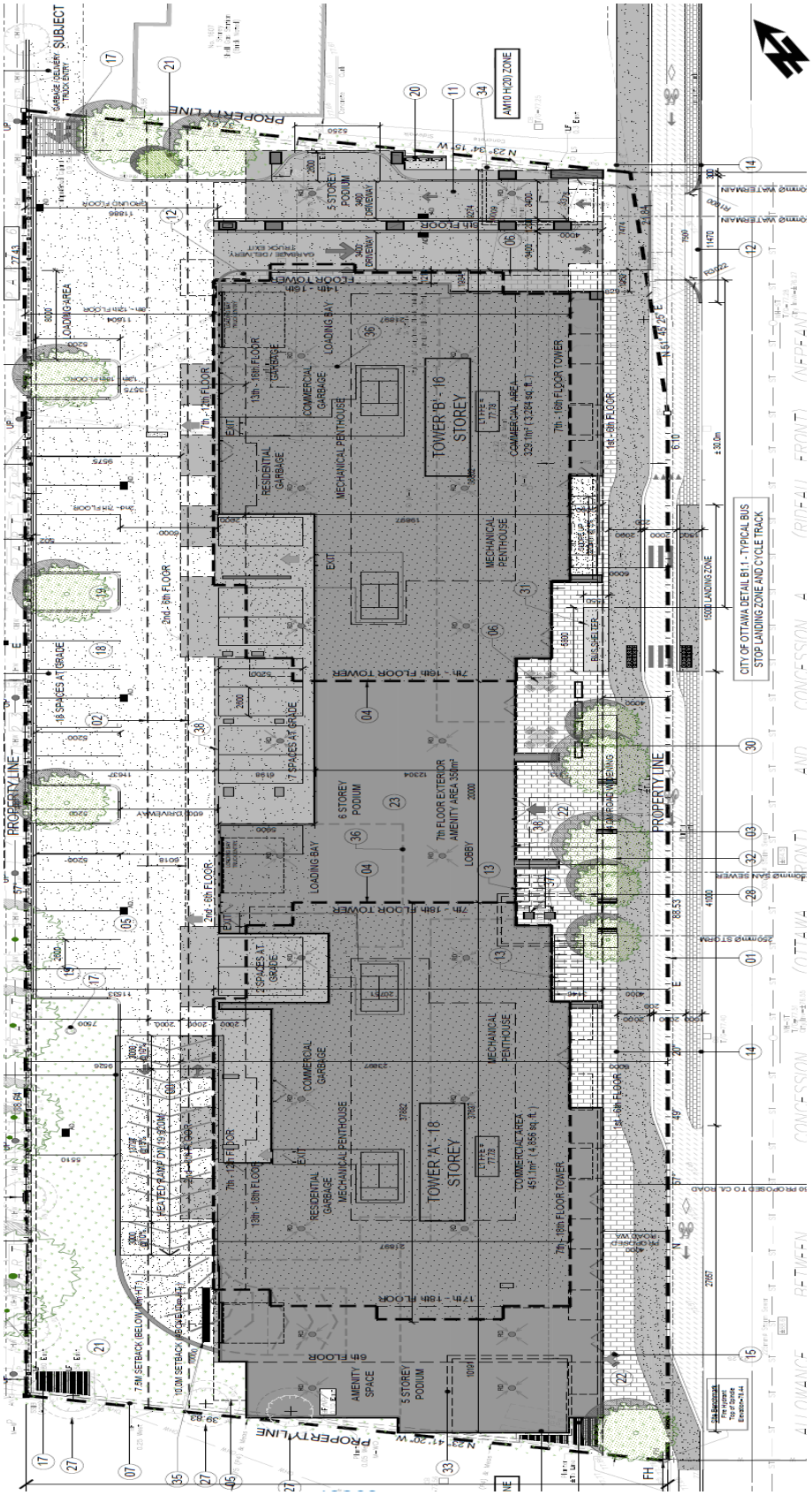
2.1. EXISTING AND PLANNED CONDITIONS

2.1.1. PROPOSED DEVELOPMENT

The proposed development is located at 1619 and 1655 Carling Ave and will consist of a total of 418 residential units and approximately 8,300 ft^2 (771 m^2) of commercial space within a 16 and 18-storey two-tower building. The site at 1655 Carling is currently occupied by an unpaved parking lot with an estimated maximum occupancy of 80 vehicles, which is being used by Carling Motors (1622 Carling Ave) and the Canadian Blood Services (1575 Carling Ave). The site at 1619 Carling is currently occupied by a furniture store and a sports bar, which are assumed to also utilize the existing parking lot on 1655 Carling. The proposed residential development will be constructed in a single phase, with an anticipated full-buildout date of 2022. **Figure 1** below provides the local context of the development site, while **Figure 2** provides the current Site Plan. The site is currently zoned as an Arterial Mainstreet (AM) zone.

Figure 1: Local Context

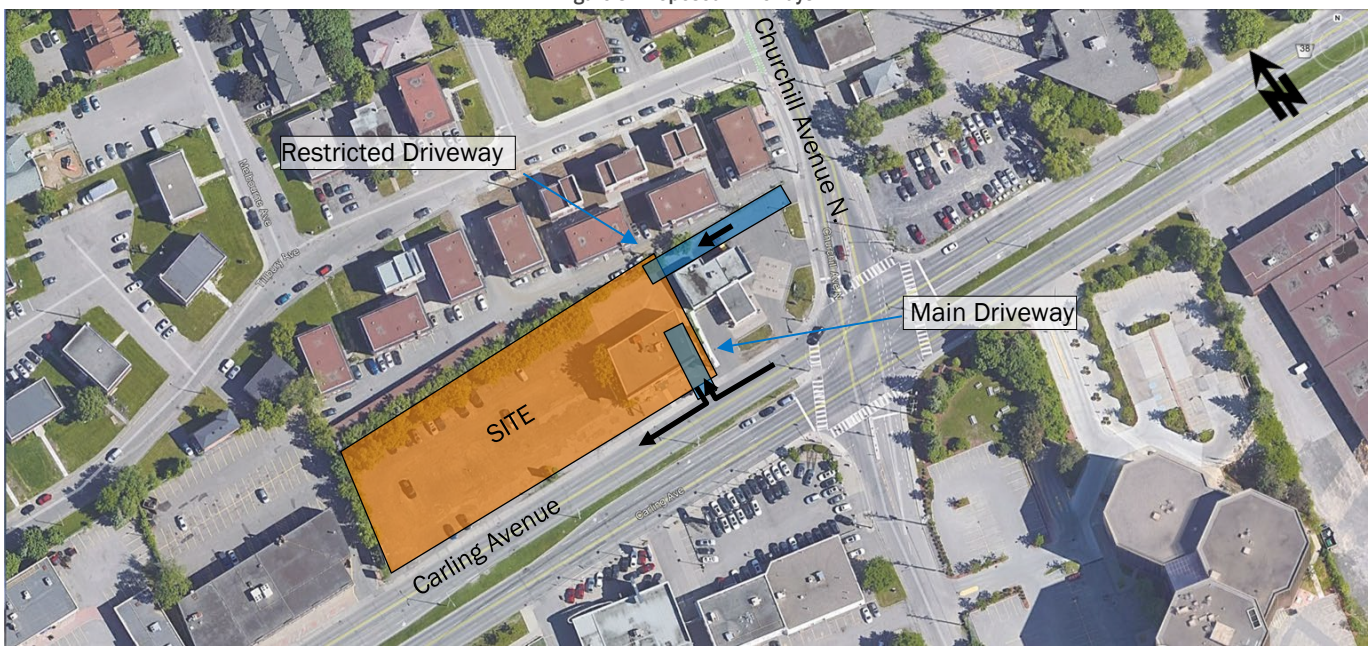
Figure 2: 1619-1655 Carling Site Plan, May 2022



Source: RLA

As shown in **Figure 2**, two driveways are proposed to serve the future development. The main driveway will be located on the east end of the site along the north side of Carling Ave, and function as a right-in/right-out only. The second driveway is located along the northeast corner of the site, which connects via an easement through the adjacent property (Shell gas station at 1607 Carling Ave) to Churchill Avenue N, as shown in **Figure 3**. This driveway is proposed to function primarily as an in-only and is understood to be restricted to authorized vehicles only, providing access to emergency vehicles, moving trucks and garbage trucks.

Figure 3: Proposed Driveways



To access the parking garage, residents will have to loop around the back of the site towards the west end of the building. Furthermore, the proposed development is anticipated to provide 230 underground parking spaces and 28 surface parking spaces (258 spaces in total).

Given the centre median on Carling Ave along the site's frontage, vehicles destined to the site from the west would be expected to complete a U-turn at the Carling/Churchill and vehicles leaving to the site to the east would be required to complete a U-turn at the intersection Carling/Clyde/Cole intersection. Alternatively, there is a possibility that drivers elect to use Tillbury Avenue (local street situated north of the site) or Saigon Crescent (located east of the site) to avoid the U-turn manoeuvres on Carling Ave; however, this routing is considered more circuitous.

2.1.2. EXISTING CONDITIONS

Area Road Network

Carling Ave is an east-west municipal arterial roadway within the City of Ottawa, that runs from Bronson Ave in the east to March Rd in the west. Within the study area, Carling Ave has a six-lane divided cross-section, with a posted speed limit of 60 km/h and auxiliary turn lanes at major intersections.

Churchill Ave N is a north-south municipal roadway within the City of Ottawa, classified as a local roadway both south of Carling Ave and north of Lanark Ave, a major collector roadway between Carling Ave and Richmond Rd, an arterial roadway between Richmond Rd and Scott St and a collector roadway between Scott St and Lanark Ave. Churchill Ave N has a two-lane cross-section, with a posted speed limit of 50 km/h and auxiliary turn-lanes at major intersections.

Cole Ave is a north-south municipal local roadway within the City of Ottawa, that extends from Dovercourt Ave in the north to connect to the north leg of Carling Ave in the south. Cole Ave has a two-lane cross-section and a posted speed limit of 40 km/h.

Clyde Ave is a north-south municipal local roadway within the City of Ottawa, that extends from the south leg of Carling Ave and terminates at 951 Clyde Ave. The roadway then continues at Castle Hill Crescent intersection down to Merivale Rd/Lotta Ave. Within the study area, Clyde Ave, with an assumed speed limit of 50 km/h and auxiliary turn lanes at major intersections

Existing Study Area Intersections

Carling/Churchill

The Carling/Churchill intersection is a four-legged full-movement signalized intersection. The east and west legs of the intersection consist of two exclusive through lanes, 1 shared through/right-turn lane and one auxiliary left-turn lane. While the north and south legs of the intersection consist of one shared through/right-turn lane and one auxiliary left-turn lane. There are no restricted movements at this intersection.

Carling/Clyde/Cole

The Carling/Clyde/Cole intersection is a four-legged full-movement signalized intersection. The east and west legs of the intersection consist of two exclusive through lanes, 1 shared through/right-turn lane and one auxiliary left-turn lane. The north leg of the intersection consists of one shared through/right-turn lane and one auxiliary left-turn lane. The south leg of the intersection consists of one exclusive through lane, one auxiliary left-turn lane and one auxiliary right-turn lane. There are no restricted movements at this intersection. However, trucks are not permitted to enter the north leg of the intersection.

Existing Driveways to Adjacent Developments

The following driveways are currently on the north side of Carling Ave, within 200 m of the proposed development driveway at 1655 Carling Ave:

- Two accesses to Shell Gas Station, less than 10m east of the proposed development;
- One access to a small mixed-use commercial and office building, approximately 85 m west of the proposed development; and,
- One access to commercial and office units, approximately 160 m west of the proposed development.

Pedestrian/Cycling Network

Pedestrian sidewalk facilities are provided throughout the study area, including both sides of Carling Ave, both sides of Churchill Ave, both sides of Cole Ave and the east side of Clyde Ave. With regards to cycling facilities, unidirectional cycle tracks are provided on both sides of Churchill Ave N, between Carling Ave and Byron Ave. There are no dedicated cycling facilities on Carling Ave, although it is identified as a spine route in the TMP.

Transit Network

The following OC Transpo routes currently operate along Carling Ave, at the frontage of the site:

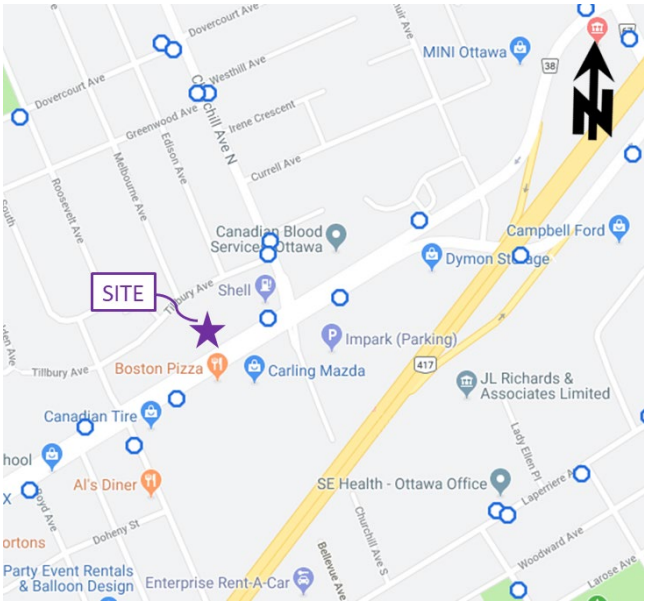
- **Route #50 (Tunney's Pasture <-> Lincoln Fields)**: identified by OC Transpo as a "Local Route", this route operates on customized routing and schedules, to serve local destinations. Route #50 operates at an average rate of every 30 minutes during weekdays. The nearest bus stops to the site are the Carling/Churchill stop, for the Lincoln Fields destination and the Carling/Clyde North stop, for the Tunney's Pasture destination.

- **Route #85 (Gatineau <-> Bayshore)**: identified by OC Transpo as a "Frequent Route", this route operates at a high frequency along Carling Ave. Route #85 operates 7 days a week, at an average rate of every 15 minutes or less during weekday peak hours. The nearest bus stops to the site are the Carling/Churchill stop, for the Bayshore destination and the Carling/Clyde North stop, for the Lees destination.

OC Transpo route maps for routes #50 and #85 have been provided in **Appendix B**. **Figure 4** below illustrates the area transit network surrounding the subject site, while **Figure 5** provides the nearest bus stop locations to the development site in the form of blue dots. The Carling/Churchill bus stop is approximately 40 m east of the site, while the Carling/Clyde North bus stop is within approximately a 300 m walking distance of the site.

Figure 4: Area Transit Network

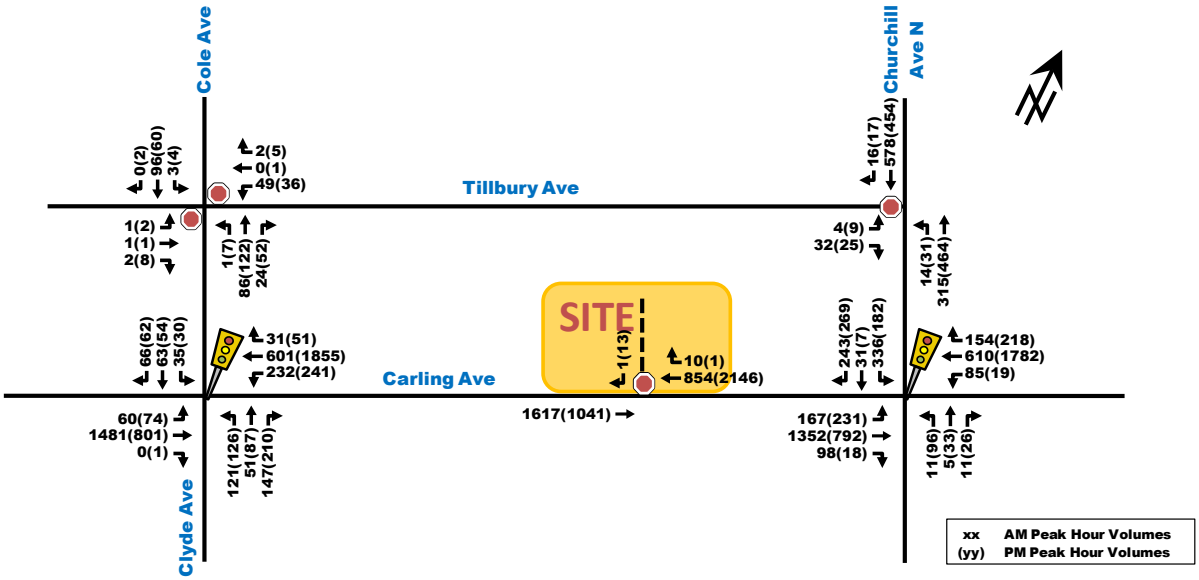
Figure 5: Bus Stop Locations



Peak Hour Travel Demand

The existing peak hour traffic volumes, which were obtained from the City of Ottawa for the intersections of Carling/Churchill and Carling/Clyde/Cole, are illustrated in **Figure 6** below. Note that the east and west traffic volumes approaching to/from the Carling/Clyde/Cole intersection were balanced according to the traffic volumes at the Carling/Churchill intersection. Similarly, the SB traffic approaching from the Tillbury/Churchill intersection was balanced based on the SB traffic volumes at the Carling/Churchill intersection. With regards to the counts conducted at the existing site, the three existing parking lot accesses were combined to assume one large access. The raw traffic count data has been provided in **Appendix C**.

Figure 6: Existing Peak Hour Traffic Volumes



Existing Road Safety Conditions

A five-year collision history data (2014-2018, inclusive) was requested and obtained from the City of Ottawa for all intersections and road segments within the study area. Upon analyzing the collision data, the total number of collisions observed within the study area was determined to be 84 collisions within the past five-years. The majority of the collisions (83%) resulted in property damage only, while the remaining collisions resulted in a non-fatal injury. Furthermore, the type of impacts that resulted in 84 collisions were broken down into the following: 32 turning movement, 24 rear end, 24 sideswipe and 4 angle.

A standard unit of measure for assessing collisions at an intersection is based on the number of collisions per million entering vehicles (MEV). At signalized intersections within the study area, reported collisions have historically taken place at a rate of:

- 0.31 Collisions/MEV at the intersection of Carling/Churchill. A total of 22 collisions took place at this intersection within the past five-years. However, breakdown of collision data shows that there are no particular collision patterns taking place at this intersection.
- 0.77 Collisions/MEV at the intersection of Carling/Clyde/Cole. A total of 50 collisions took place at this intersection within the past five-years. Of these, 29 collisions occurred as a result of turning movements, the majority of which were between the WB/EB left-turns and the opposing EB/WB through movements, respectively. The turning movement collisions along Carling Ave are assumed to be due to the following:
    - Left-turning vehicles must cross 4 lanes of traffic (3 through and 1 left-turn lanes) to complete their left-turn movement.
    - Left-turn types along Carling Ave are protected-permitted during peak hours. Hence, the collisions occur during the EB/WB through/permitted left-turns phase.
    - A high volume of traffic performs a WBLT during peak hours to access the Canadian Tire store.

As such, turning movement collisions at the Carling/Clyde/Cole intersection can potentially be reduced by replacing the existing permissive-protected left-turn phase of the EB and WB movements with a fully protected left-turn phase. As part of safety improvements at the intersection, the City indicated that the fully protected EB and WB left-turn phases will be implemented in 2022.

Lastly, 6 collisions were observed along Carling Ave, between Churchill Ave and Clyde Ave/Cole Ave. However, no particular collision patterns were observed.

Collision data obtained from the City of Ottawa is provided in **Appendix D**, along with the analysis conducted by Parsons.

2.1.3. PLANNED CONDITIONS

Planned Study Area Transportation Network Changes

Based on the City of Ottawa's TMP, the 2031 Affordable Network for Rapid Transit and Transit Priority illustrates Carling Ave as a Transit Priority Corridor (Continuous Measures) at the frontage of the site. Based on City comments, it was also specified that the intersection of Carling/Churchill will be designated as a protected intersection, as part of an integrated road, water and sewer City project expected to take place in the study area over the next 2-3 years. Coordination with regards to the cycle track between the 1655 Carling development and the City project are expected.

Additionally, City comments have also specified that the eastbound and westbound left-turns at the intersection of Carling/Clyde/Cole will be modified to fully protected left-turn movements as part of planned safety improvements. The eastbound left-turn lane's storage will also be revised as part of City funded work.

Other Area Developments

A summary of other area developments is provided below based on the latest available information from the City regarding adjacent site development applications.

689 Churchill Ave

A 3-storey low-rise apartment building is proposed at 689 Churchill Ave. The building will consist of 15 residential units, which are expected to generate minimal traffic. As such, traffic generated by this development will be accounted for in the background growth rate in the forecasting section of the report.

701 Churchill Ave

A 3-storey low-rise apartment building is proposed at 701 Churchill Ave. The building will consist of 12 residential units, which are expected to generate minimal traffic. As such, traffic generated by this development will be accounted for in the background growth rate in the forecasting section of the report.

1705 Carling Ave

A TIA was submitted by Novatech in April 2020 for a 9-storey retirement home facility with 160 units and a 22-storey residential high-rise building with 194 units located at 1705 Carling Ave. As the site is currently occupied by an 80-unit motel and a 3500 ft^2 restaurant, the number of trips forecasted for the future development are expected to be less 25 veh/h during peak hours. Thus, trips for this development are minimal and will be accounted for in the future background traffic growth rate.

861 Clyde Avenue

A TIA to support an OPA Amendment and ZBLA application was submitted by Novatech in May 2021 for a 3-phase development with potential for more than 1,700 high density residential units and approximately 90,000 ft^2 of commercial. Phase 1 is estimated to be completed by 2025, being composed of 420 high-rise dwelling units and 14 townhomes. The 861 Clyde TIA asserts that the Phase 1 (2025) development transportation impacts are "anticipated to have marginal operational effects for most movements within the study area intersections", that the Phase 1 861 Clyde Ave development would primarily result in implications at the Carling/Churchill WB-LT which has no impact on the proposed 1655 Carling site, and that the Phase 1 861 Clyde Avenue would increase Carling WB volumes west of Churchill Avenue by less than 20 veh/h in the PM peak hours. Therefore, trips for this development are to be accounted for in the future background traffic growth rate.

2.2. STUDY AREA AND TIME PERIODS

Since the proposed development consists of a residential building, the peak time periods to be assessed are the weekday morning and afternoon peak hour periods. Furthermore, the horizon years to be analyzed are the year of full-buildout of the development (2022) and five years after full-buildout (2027), as per the requirements of the TIA Guidelines. The proposed study area is shown below in **Figure 7**.

Figure 7: Study Area

Study area intersections include:

- Carling Ave/Clyde Ave/Cole Ave
- Carling Ave/Churchill Ave N

A justification letter was provided to the City of Ottawa on August 28th, 2019, explaining the rationale for using a reduced study area limit instead of the 1 km radius recommended by the TIA Guidelines. The justification letter is provided in **Appendix E**.

2.3. EXEMPTION REVIEW

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

Table 1: Exemptions Review Summary

Module	Element	Exemption Consideration
4.1 Development Design	4.1.3 New Street Networks	This element is not required for Site Plans.
4.2 Parking	4.2.2 Spillover Parking	Parking supply is anticipated to meet the City of Ottawa Parking Provision requirements.
4.8 Review of Network Concept	All elements	The site is not expected to generate 200 trips more than the established zoning.

3. FORECASTING

3.1. DEVELOPMENT GENERATED TRAVEL DEMAND

3.1.1. TRIP GENERATION AND MODE SHARES

The proposed development will consist of a two-tower apartment building containing 418 residential units and 8,811 ft² of commercial space. Appropriate trip generation rates were obtained from the "2009 TRANS Trip Generation Residential Trip Rates" report for the apartment units and from the ITE Trip Generation Manual for the commercial space, which are summarized in **Table 2**.

Table 2: Proposed Development Trip Rates

Land Use	Data Source	Trip Rates	
		AM Peak	PM Peak
High-Rise Apartments	TRANS	T = 0.24(du);	T = 0.27(du);
First Floor Commercial Space ("Shopping Centre")	ITE 820	T = 0.94(x);	T = 3.81(x);
Notes: *T = Average Vehicle Trip Ends* *du = Dwelling unit* *x = Gross Floor Area (GFA) (1,000 ft²)*			

Using the trip rates shown in **Table 2**, along with the planned number of residential units, the number of vehicles per hour generated by the apartment units are provided in **Table 3** below.

Table 3: Apartment Units Vehicle Trip Generation

Land Use	Dwelling Units	AM Peak (Vehicles/h)			PM Peak (Vehicles/h)		
		In (24%)	Out (76%)	Total	In (62%)	Out (38%)	Total
High-Rise Apartments	418	24	76	100	70	43	113

The total vehicle trips of the apartment units, provided in **Table 3**, are then converted to total person trips using mode share percentages found in the 2009 TRANS Report. The total person trips are then used to determine person trips/h for each travel mode, based on their respective mode share percentages. **Table 4** summarizes the number of person trips generated for each of the respective travel modes of the proposed development.

Table 4: Mode Shares for the Apartment Units

Travel Mode	Mode Share	AM Peak (Person Trips/h)			Mode Share	PM Peak (Person Trips/h)		
		In (24%)	Out (76%)	Total		In (62%)	Out (38%)	Total
Auto Driver	37%	24	76	100	40%	70	43	113
Auto Passenger	8%	5	17	22	9%	17	9	26
Transit	41%	26	84	110	37%	65	40	106
Non-motorized	14%	9	29	38	14%	24	15	39
Total Person Trips	**100%**	**64**	**206**	**270**	**100%**	**176**	**107**	**283**

As shown in **Table 4**, the resulting number of total person trips expected to be generated by the apartment units are approximately 270 and 283 person trips/h in the morning and afternoon peak hours respectively.

With regards to the commercial use, the total number of person trips can be calculate directly using the trip rates provided in **Table 2** and multiplied by a factor of 1.28, as per TIA standards, to account for typical North American auto occupancy values of approximately 1.15 and combined transit and non-motorized modal shares of less than 10%. The resulting total person trips/hour for the commercial land use are provided in **Table 5**.

Table 5: Commercial Space Person Trip Generation

Land Use	Area (ft^2)	AM Peak (Vehicles/h)			PM Peak (Vehicles/h)		
		In (62%)	Out (38%)	Total	In (48%)	Out (52%)	Total
Commercial Space	8,300	6	4	10	19	21	40

Furthermore, the 2011 NCR Household Origin-Destination Survey provides mode share percentages based on the district where the proposed development site is located. Based on the Ottawa West District, new mode share percentages were used in conjunction with the total person trips of the apartment units in **Table 4** and the total person trips of the commercial space in **Table 5**, thereby providing new trip generation results as shown in **Table 6**.

Table 6: OD Survey Mode Shares – Ottawa West District

Travel Mode	Mode Share	AM Peak (Person Trips/h)			PM Peak (Person Trips/h)		
		In	Out	Total	In	Out	Total
Auto Driver	50%	35	105	140	97	65	162
Auto Passenger	15%	11	31	42	29	19	48
Transit	20%	14	43	57	39	26	65
Bike	5%	3	11	14	9	7	16
Walk	10%	6	21	27	19	13	32
Total Person Trips	**100%**	**69**	**211**	**280**	**193**	**130**	**323**
Total Auto Trips		**35**	**105**	**140**	**97**	**65**	**162**

The auto trips expected to be generated by the future residential development are 140 and 162 veh/h during the morning and afternoon peak hour periods, respectively. However, considering that proposed transit movements along Carling Ave (see **Section 3.2.1**), the mode shares were adjusted as shown in **Table 7** below to reflect a higher transit usage.

Table 7: OD Survey Mode Shares with Increased Transit

Travel Mode	Mode Share	AM Peak (Person Trips/h)			PM Peak (Person Trips/h)		
		In	Out	Total	In	Out	Total
Auto Driver	40%	28	85	113	78	52	130
Auto Passenger	10%	8	21	29	19	13	32
Transit	35%	24	73	97	68	45	113
Bike	5%	3	11	14	9	7	16
Walk	10%	6	21	27	19	13	32
Total Person Trips	**100%**	**69**	**211**	**280**	**193**	**130**	**323**
Total Auto Trips		**28**	**85**	**113**	**78**	**52**	**130**

As such, the proposed development is forecasted to generate approximately 113 and 130 veh/h during the morning and afternoon peak hour periods respectively. However, the proposed development site is currently occupied by an unpaved parking lot with an assumed maximum occupancy of 80 vehicles. Morning and afternoon peak hour traffic counts were conducted at the three access points of the existing parking lot. **Table 8** provides the vehicle trips to/from the existing parking lot (as shown in **Figure 6**).

Table 8: Vehicle Trips to/from the Existing Unpaved Parking Lot

Land Use	Capacity	AM Peak (Vehicles/h)			PM Peak (Vehicles/h)		
		In	Out	Total	In	Out	Total
Existing Unpaved Parking Lot	80 Vehicles	10	1	11	1	13	14

Therefore, the net differences in vehicle trips between future and existing development conditions are provided in **Table 9**.

Table 9: Forecasted Net Change in Site Traffic

Land Use	AM Peak (Vehicles/h)			PM Peak (Vehicles/h)		
	In	Out	Total	In	Out	Total
New Trips High-Rise Apartments	28	85	113	78	52	130
Minus Existing Trips Unpaved Parking Lot	10	1	11	1	13	14
Net Change	***18***	***84***	***102***	***77***	***39***	***116***

As shown in **Table 9**, the planned residential building development is expected to result in a net increase of approximately 102 and 116 veh/h within the study area, during the morning and afternoon peak hour periods.

3.1.2. TRIP DISTRIBUTION AND ASSIGNMENT

Based on the 2011 OD Survey (Ottawa West district) and the location of adjacent arterial roadways and neighbourhoods, the distribution of site-generated traffic volumes was estimated as follows:

- 20% to/from the north;
- 10% to/from the south;
- 65% to/from the east; and,
- 5% to/from the west.

The expected site-generated auto trips in **Table 7** were then assigned to the surrounding road network as shown in **Figure 8** below. Furthermore, traffic volumes generated by the existing parking lot (see **Table 8**) are shown in **Figure 9** and the net difference in traffic (see **Table 9**) is illustrated in **Figure 10**. With regards to inbound traffic, vehicles were assumed to approach as follows:

- 65% from east Carling Ave
- 20% from north Churchill Ave N, and
- 15% from west Carling Ave (2/3 of which complete the U-turn at Carling/Churchill and 1/3 use Tillburry Ave),

Outbound vehicles were assumed to leave the site as follows:

- 15% to west Carling Ave
- 20% to north Churchill Ave N through Tillbury Ave and

- 65% to east Carling Ave (3/4 of which complete the U-turn at Carling/Clyde/Cole and 1/4 use Tillbury Ave).

Figure 8: Planned Residential Development Site-Generated Traffic

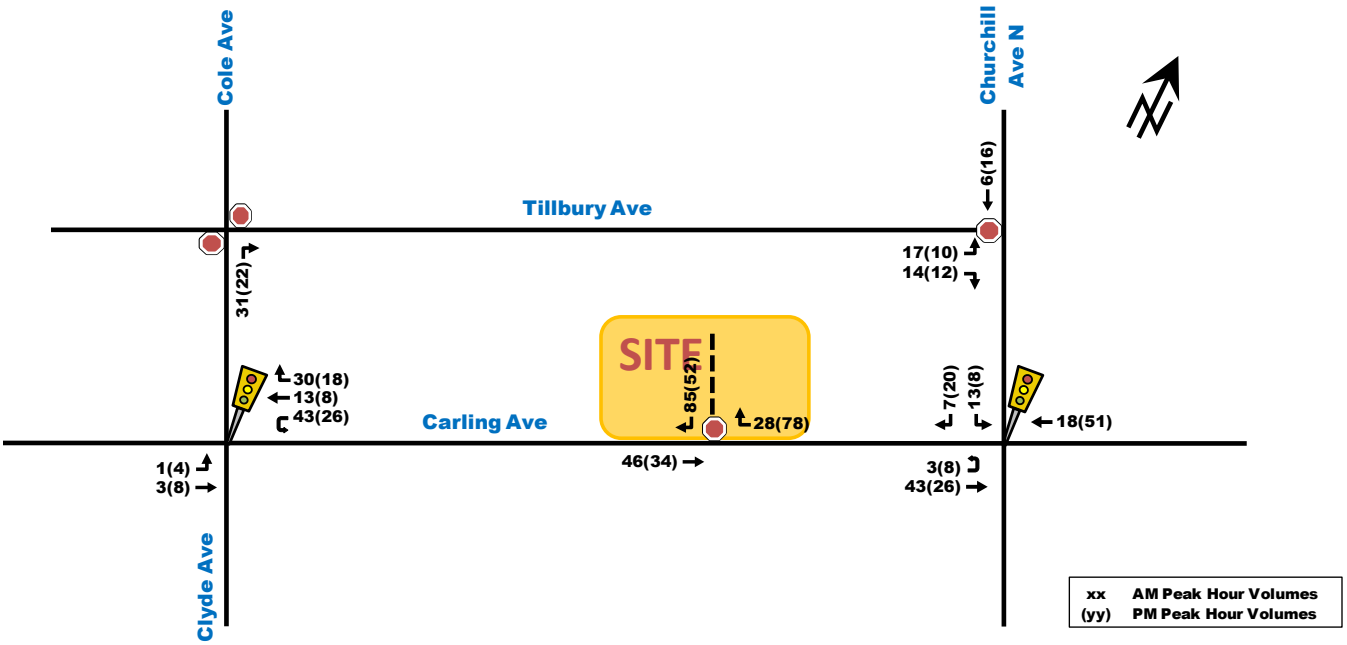


Figure 9: Existing Parking Lot Traffic Volumes

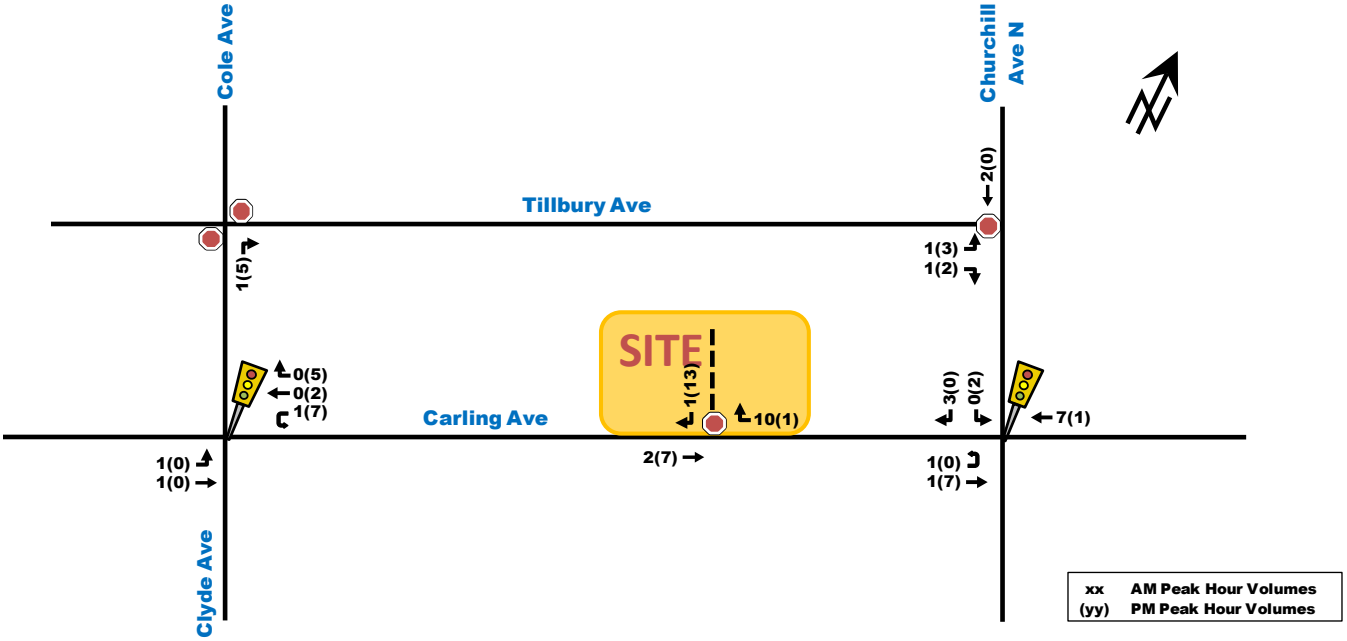
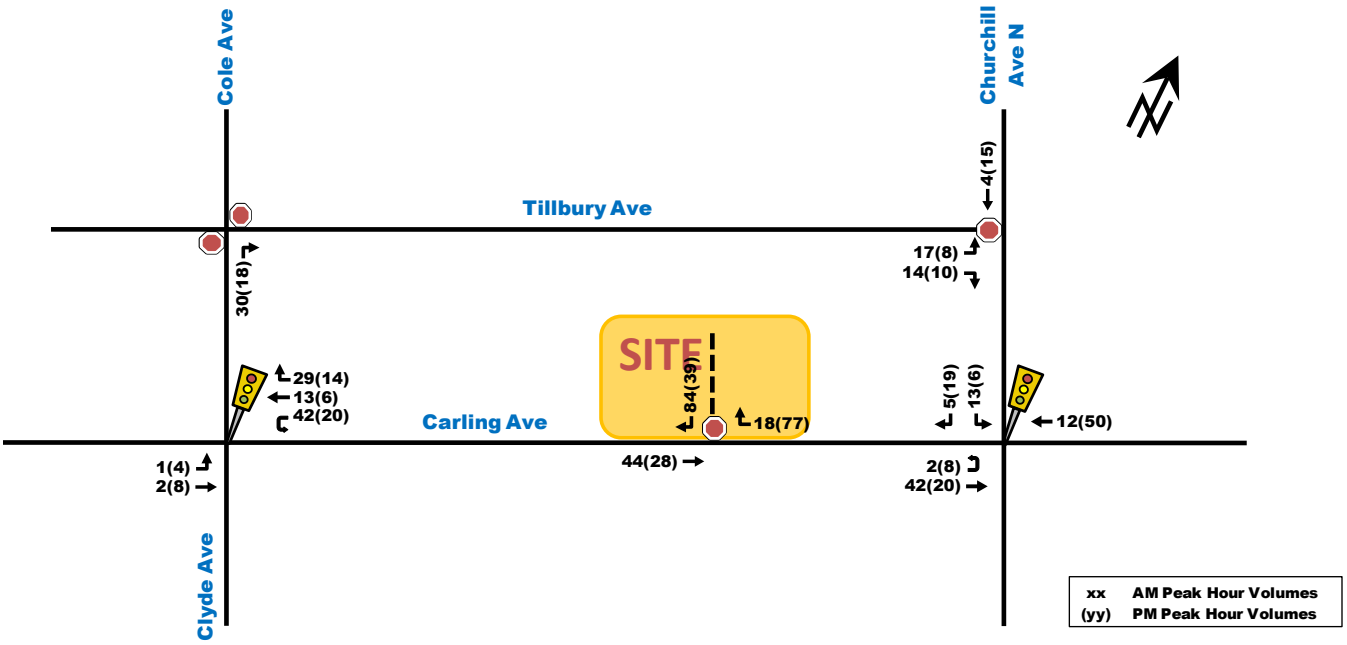


Figure 10: Net Traffic Difference

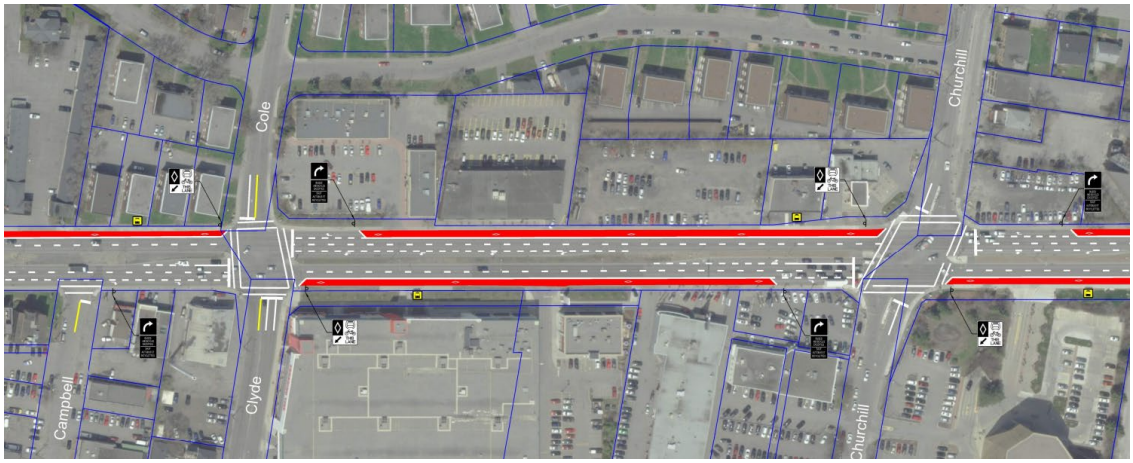


3.2. BACKGROUND NETWORK TRAFFIC

3.2.1. TRANSPORTATION NETWORK PLANS

Refer to **Section 2.1.3: Planned Study Area Transportation Network Changes.** A functional design project initiated by the City of Ottawa is currently underway to provide transit priority measures along Carling Ave, from Lincoln Fields to Bronson Ave. Between Lincoln Fields and Sherwood Dr, the plan is to provide a single designated bus lane for transit by reducing the three general purpose lanes to two general purpose lanes along both sides of Carling Ave. According to the TMP, this plan is anticipated to be implemented by 2031 as part of the Affordable Network. **Figure 11** below shows the functional plan at the frontage of the site, where red lines represent the designated transit bus lanes.

Figure 11: Carling Ave Transit Priority Measure



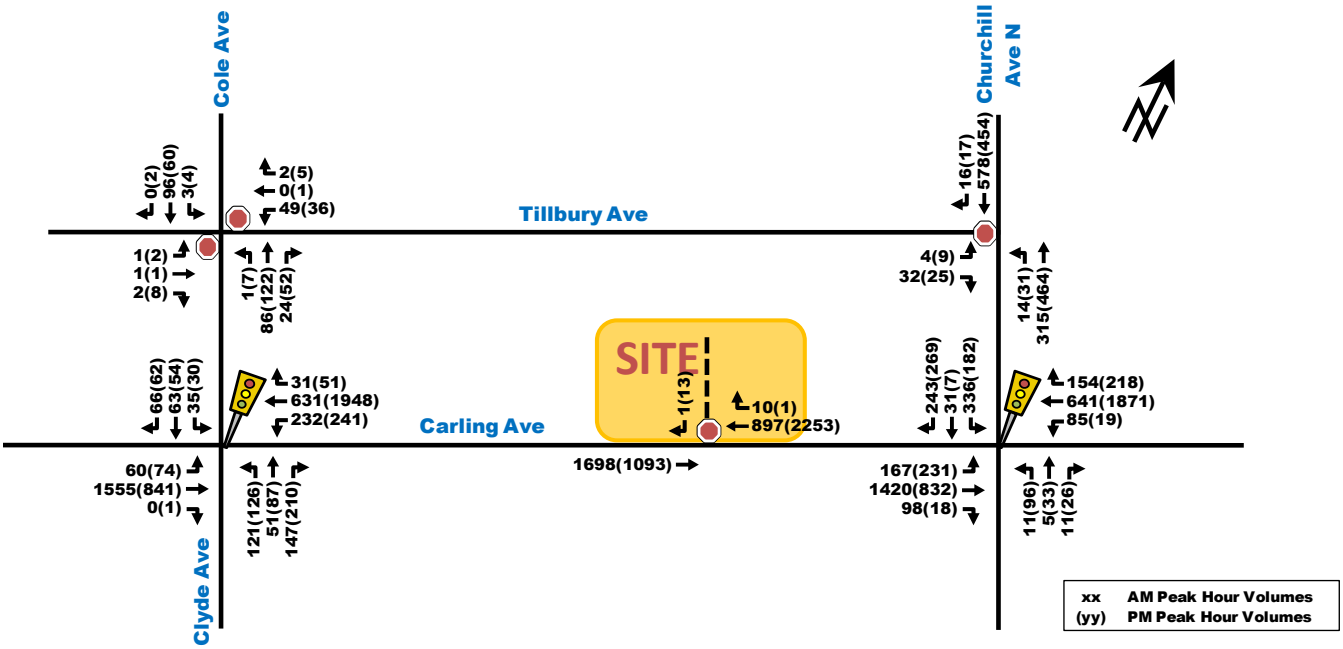
Additionally, modifications are expected to take place at study are intersections as follows:

- At Carling/Churchill, the intersection will be designated as a protected intersection over the next 2-3 years. Coordination between the 1655 Carling development and the City project are is required for the purpose of connecting the cycle track.
- At Carling/Clyde/Cole, eastbound and westbound left-turns will be modified to fully protected phases as part of planned safety improvements. Eastbound left-turn storage will be revised.

3.2.2. BACKGROUND GROWTH

The introduction of designated transit bus lanes along Carling Ave is expected to help reduce future background traffic through increasing the reliability and performance of transit services. Furthermore, since the area is well developed and there are no major other area developments planned near the subject site, traffic along Carling Ave is not anticipated to increase significantly in the next few years. As such, traffic growth is assumed to be 0% per year for the future horizon year 2022 and 1% per year thereafter for future horizon year 2027, which accommodates unforeseen or unapproved future developments (such as 861 Clyde Avenue). Traffic volumes anticipated for the future background horizon year 2027 is illustrated in **Figure 12**.

Figure 12: Future Background 2027 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 - Other Area Developments**. For the purposes of this report, there are no additional traffic volumes associated with adjacent area developments that will be included in the analysis.

3.3. DEMAND RATIONALIZATION

Given that the number of lanes along Carling Ave is anticipated to be reduced to two general-purpose lanes in each direction, capacity of the study area intersections in future horizon years will be significantly lower than the capacity of Carling Ave in existing conditions. However, based on the *Carling Avenue Transit Priority Measures and Functional Design Report (WSP, June 2017)*, east-west traffic along Carling Ave is forecasted to decrease by up to 20% due to the implementation of the continuous dedicated bus lanes. The resulting anticipated traffic volumes for future background horizon years 2022 and 2027 are illustrated in **Figure 13** and **Figure 14**. Note that, as per **Section 3.2.2**, a 1% per year background growth rate was applied to traffic volumes between horizon year 2022 and 2027.

Figure 13: Future Background 2022 Traffic Volumes, with 20% East-West Reduction

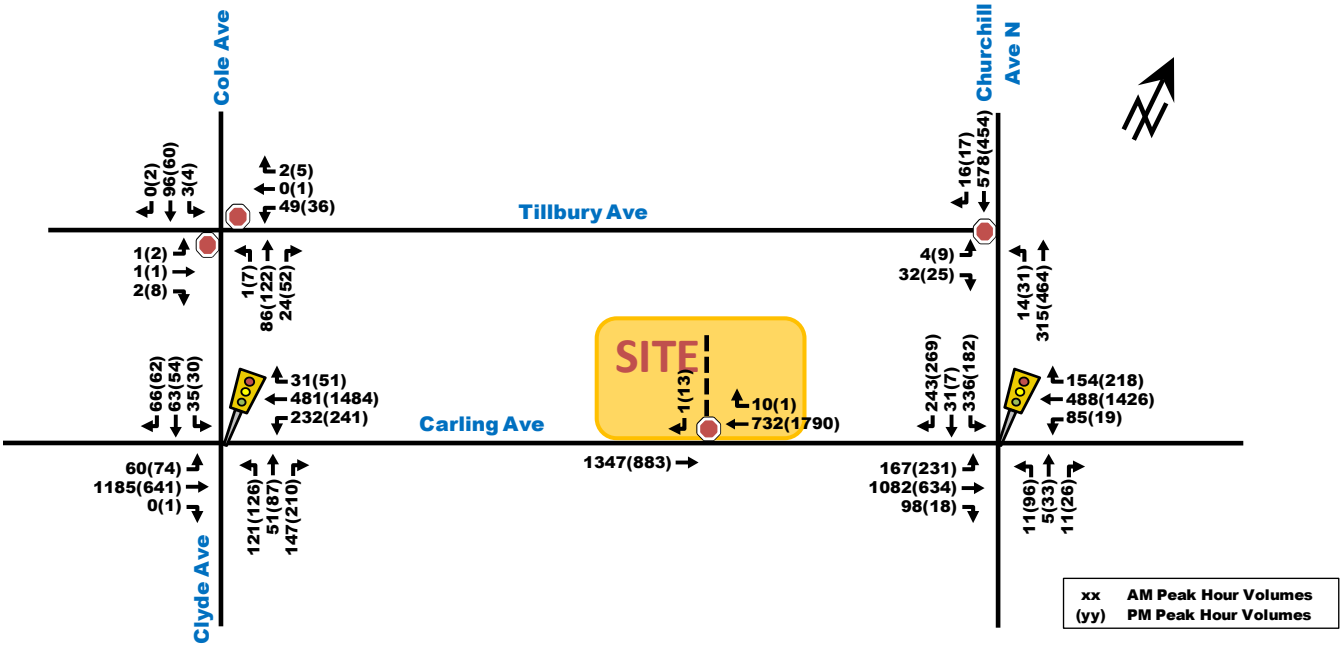
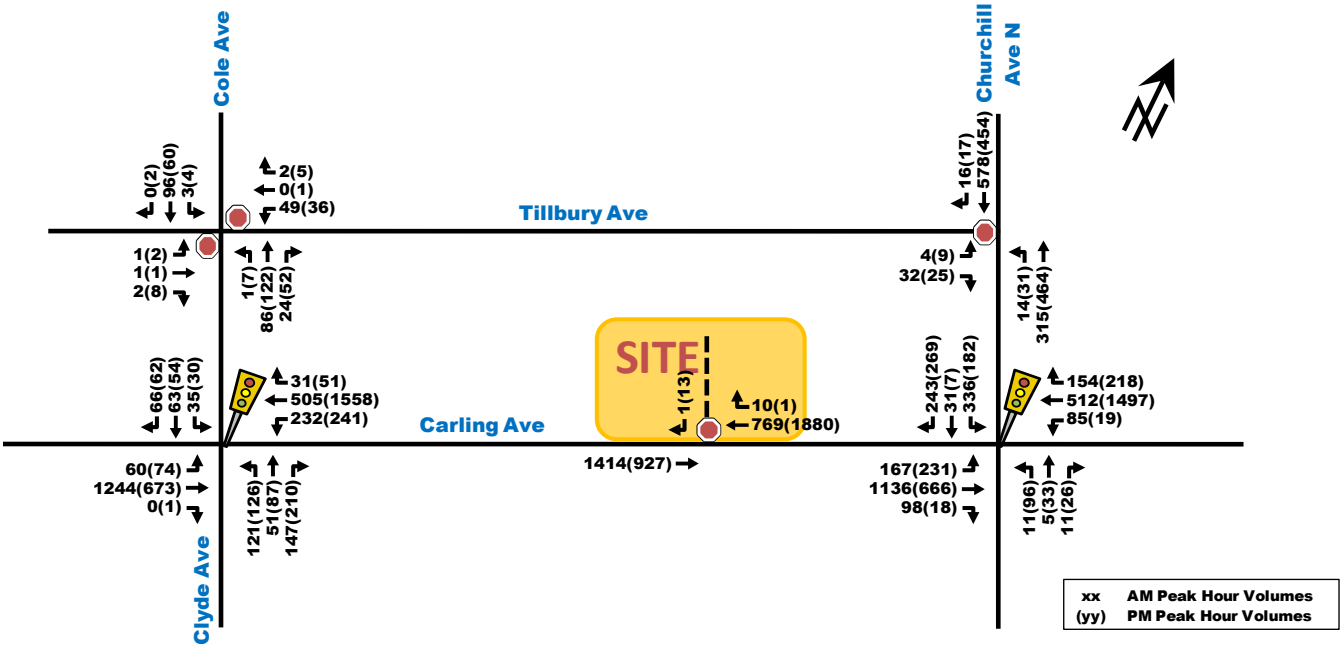


Figure 14: Future Background 2027 Traffic Volumes, with 20% East-West Reduction



4. ANALYSIS

4.1. DEVELOPMENT DESIGN

Surface parking spaces are proposed to be located along the site's internal driveway, with access to the underground parking on the west end of the driveway. Bicycle parking will be provided on the first floor of the underground parking garage. Along the east side of the site access connecting to Carling Avenue there is a single 2.6m wide by 6.7m long vehicle space that is dedicated as a short term pick-up/drop off area.

Pedestrian sidewalk and cycle track facilities will be provided at the frontage of the proposed development building as illustrated by the Site Plan. Similarly, bus routes will continue to operate throughout the study area as described in **Section 2.1.2: Transit Network**

A cycle track is also being included based on a requested by the City of Ottawa to be included along the frontage of the site with the intention to connect to the future segment of cycle track planned for the Churchill/Carling intersection and terminate at the western property limits. The cycle track is being provided as shown on the Site Plan.

As described previously, the development proposes two driveway connections, the main driveway connects to Carling Ave. that will provide day-to-day access for the residents and, on very rare occurrences, emergency vehicles such as ambulances. Fire truck vehicles are to be accommodated via the siamese connection on Carling Avenue. The second driveway located at the northeast corner of the property connects to Churchill Ave. N. via an easement. The purpose of this driveway is to provide a service route for garbage trucks, moving vehicles, service vehicles and emergency vehicles. Vehicle movement templates can be found in Appendix F.

The access has been reconfigured to better accommodate for the intended passenger car design vehicle by shifting the access to accomplish the minimum distance to the property line. Given the site design and the skew of the property line (significantly so when projected to the curb line), there is a considerable challenge to accomplish a 3.0m separation at the street line prescribed by the PABL. In recognition of PABL 25.1.p:

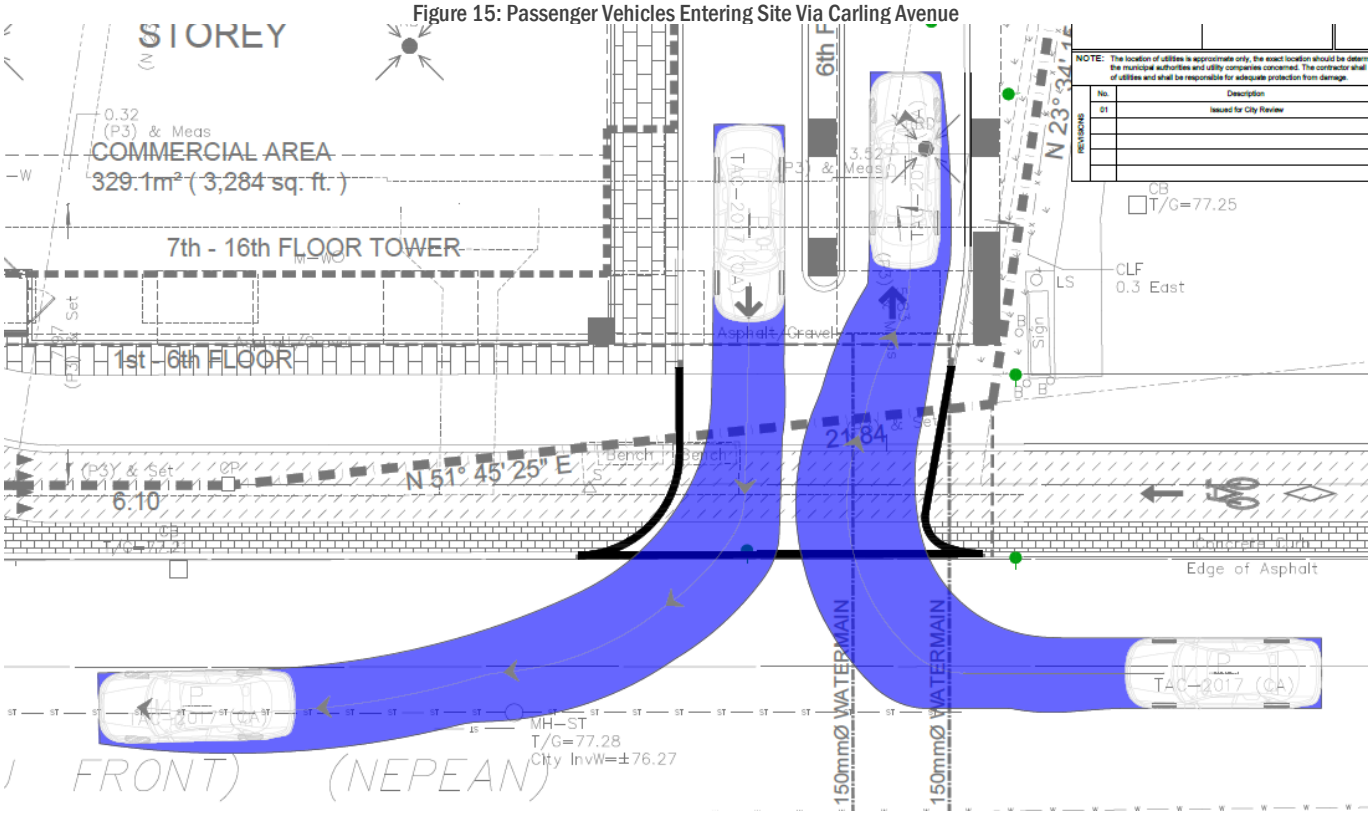
i. While there is minimal separation to the adjacent gas-station egress, given the one-way nature of Carling Avenue and the forecast traffic of the proposed development, conflicts are expected to be minimal between accesses. With the adjacent traffic signal at Churchill Avenue, sufficient gaps are anticipated in the Carling Avenue westbound traffic flow to suit the proposed access arrangement.
ii. There exists adequate sight lines along Carling Avenue Westbound and to the adjacent access for vehicles exiting the proposed site.
iii. The proposed access arrangement effectively replaces an existing access (to 1619 Carling Avenue) and serves to render useless 3 existing private approaches along the 1655 Carling Avenue frontage, thus reducing the overall number of curb-cuts along Carling Avenue and the overall hazard of multiple private approaches.

Given the above analysis, the proposed access arrangement accomplishes a 0.3m separation to the property line intersect at the curb line. The access has incorporated a minimum radii of 3.0m and the specifications laid out within SC7.1 for *unsignalized entrances*, as requested by the City (Wally Dubyk, April 28th, 2022), which reflects Carling Avenue as a significant arterial roadway. The access provides for a width of approximately 11m measured at the street which is required to achieve the desired swept path design.

Upon review of the on-site vehicle maneuvering, the following was noted:

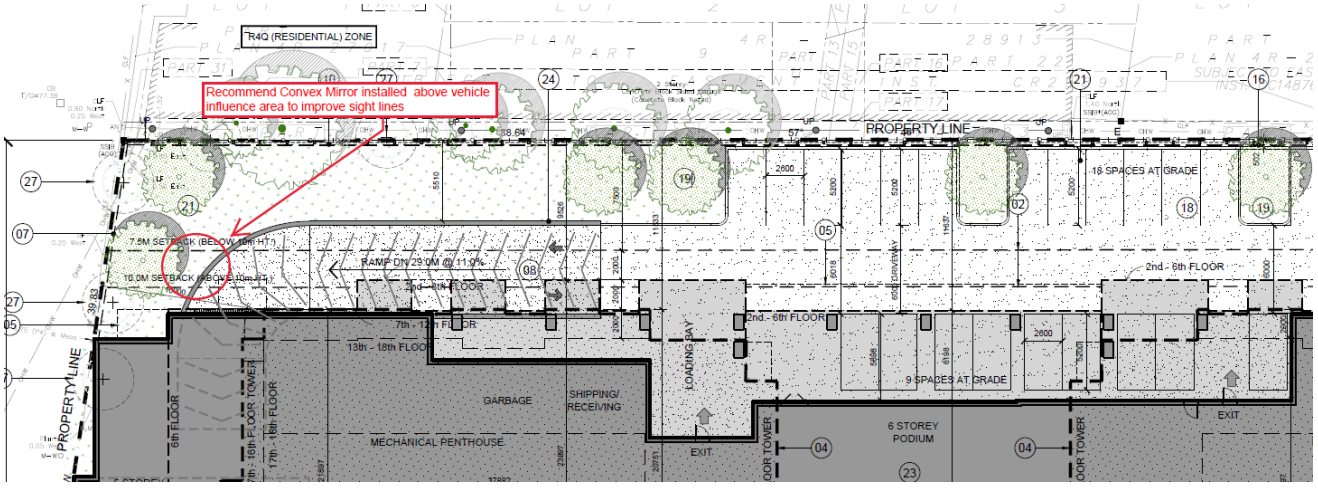
- HSU (emergency vehicles) sized vehicles may be required to reverse out the north east driveway in the rare case they need to access the rear of the building. As noted, given the Siamese connection Carling and no Code requirements to access the rear of the building for fire rescue vehicles, this movement is viewed as reasonable for such an extremely rare occurrence.
- When exiting, MSU vehicles will require several maneuvers to then exit via Carling Avenue. The trucks would have minor tracking over the pedestrian path along the west side of the driveway exit.
- Should an MSU truck utilize the west loading door, building management will need to organize closing off parking spaces opposite the truck loading door to provide sufficient room for an exit maneuver. Otherwise, the west loading door should be restricted to
- The site access design accommodates LSU-trucks as an occasional movement that must utilize the majority of the access. Passenger vehicles are the most frequent vehicle type and is permitted two-way travel from Carling Avenue, illustrated in **Figure 15**.

Figure 15: Passenger Vehicles Entering Site Via Carling Avenue



- Vehicles entering and exiting the parking garage have overlapping paths at the 90-degree turn near the building entrance, it is recommended that a convex mirror is provided on the northwest corner of the ramp as shown in **Figure 16** to improve sight lines. The path overlap is considered acceptable within the site's context

Figure 16: Parking Garage Access



The City of Ottawa's TDM-supportive Development Design and Infrastructure Checklist is provided in **Appendix G**. Some measures that go above and beyond what is required to be provided includes the following:

- Locating the building close to the street with no parking areas between the street and building entrances.
- Installing on-site carshare vehicles for residents to use.
- Displaying relevant transit maps and active mode pathways at the major site entrances.

- Provide a multi-modal travel option package for new residents.

A transit fare incentive has been noted to the proponent but is not anticipated to be provided at this time.

4.2. PARKING

Based on the Site Plan, a total of 258 (230 underground and 28 surface) parking spaces are proposed for the development. The City of Ottawa Parking Provisions requires 0.5 parking spaces per unit and 0.1 visitor spaces per unit (excluding the first 12 units) based on the location and land use of the development. Visitor parking is also not required to exceed 30 parking spaces. For the commercial uses, parking is required at a rate of 1.25 space per 100 m^2 of commercial space. In total, this equates to approximately 242 parking spaces required for this development. As such, the proposed number of vehicle parking spaces meets the requirement.

A total of 212 (200 underground and 12 surface spaces along the buildings frontage off Carling Avenue) bicycle storage spaces are proposed in the first level of the underground parking garage. The City of Ottawa Parking Provisions requires 0.5 spaces per unit based on the location and land use of the proposed development, as well as 1.0 space per 250 m^2 of commercial space. This equates to a total of approximately 212 spaces required. As such, the proposed number of bicycle parking spaces meets the requirement.

4.3. BOUNDARY STREET DESIGN

Multi-Modal Level of Service (MMLOS) analysis was conducted for existing and future conditions along the boundary road, Carling Ave, between Cole/Clyde and Churchill. Detailed analysis results are provided in **Appendix H**. The anticipated future design of Carling Ave includes the reprogramming of the existing shoulder travel lanes to transit lanes on both sides of the roadway as part of the transit priority measures that will be implemented. The existing and future features of Carling Ave are described as follows:

- 3 travel lanes in each direction.
- 1.8m sidewalks on both sides of the roadway.
- Posted speed of 60km/h along Carling Ave.
- More than 3000 avg daily curb lane traffic volumes (existing general-purpose lane); less than 3000 avg daily curb lane traffic volumes (future transit lane).
- No bike lanes (existing). Proposed westbound cycle track that terminates at west property limits (future)
- Transit travels in mixed traffic (existing); Transit travels in dedicated lanes (future).
- Lane widths of approximately 3.5m.

Table 10 below summarizes the MMLOS analysis results for the pedestrian, bicycle, transit and truck travel modes. The minimum desirable LOS target for each of the travel modes is also provided in **Table 10** and were obtained from the City of Ottawa's MMLOS Guidelines. The targets are based on the designation of Carling Ave as an "Arterial Main Street", that is classified by the City of Ottawa TMP as a bicycle spine route, is a part of the City of Ottawa Truck Route and is expected to provide transit priority measures in the future.

Table 10: MMLOS - Boundary Road Analysis

Road Segment	Level of Service							
	Pedestrian (PLOS)		Bicycle (BLOS)		Transit (TLOS)		Truck (TkLOS)	
	PLOS	Target	BLOS	Target	TLOS	Target	TkLOS	Target
Carling Ave (Existing)	F	C	F	C	D	C	D	D
Carling Ave (Future)	C	C	A	C	B	C	D	D

Red font in **Table 10** indicates that the respective target has not been met. The pedestrian LOS minimum desirable target is not met in existing conditions due to the high volume of the average daily curb lane traffic (more than 3000), as it is currently a general-purpose lane. The future pedestrian LOS improves on the premise that the shoulder lanes are converted from general purpose to transit, reducing the curb lane traffic significantly. The bicycle LOS is not met in existing but improves in future conditions, due to the introduction of bike lane facilities along the frontage of the building of Carling Ave. The transit LOS is not met in existing conditions due to the lack of dedicated bus lanes.

4.4. ACCESS INTERSECTION DESIGN

As mentioned previously, the main driveway is located on the east end of the site connecting to Carling Ave and can be used to access the surface and underground parking entrance at the back end of the building. This access will permit right-in/right-out movements only, with STOP control for vehicles exiting the development site. The access will be located approximately 45m west of the Carling/Churchill intersection. A second driveway will have restricted access and will be primarily used as a service access between the site and Churchill Ave N.

The proposed Carling Ave driveway is approximately 5m west of the adjacent existing driveway servicing the gas station to the east and less than 2m from the east property line. This driveway consists of two-way two-lane traffic aisles which are 3.4m wide each and separated by 1.2m building columns for a full driveway width of approximately 8m. The clear throat length of the driveway is approximately 18m.

MMLOS analysis was conducted for the two signalized intersections along Carling Ave, within the study area. **Table 11** below summarizes the analysis results, with detailed results provided in **Appendix H**. One lane in each direction of Carling Ave is expected to be converted to a transit lane, and a cycle track is proposed to run between the site's frontage to the intersection of Carling/Churchill. The minimum desirable LOS targets are the same as those obtained in **Table 10**.

Red font in **Table 11** indicates that the respective target has not been met. All pedestrian LOS results do not meet the minimum desirable LOS targets. With regards to pedestrians, this is caused primarily by the number of lanes that pedestrians have to cross on the east and west crosswalks (7 lanes). A PLOS 'C' can only be achieved by reducing the number of lanes to three total, which would not feasible, given the function of Carling Ave as a primary arterial roadway in the City of Ottawa.

Table 11: MMLOS - Signalized Intersections

Intersection	Level of Service							
	Pedestrian (PLOS)		Bicycle (BLOS)		Transit (TLOS)		Truck (TkLOS)	
	PLOS	Target	BLOS	Target	TLOS	Target	TkLOS	Target
Carling/Clyde/Cole (Existing)	F	C	F	C	E	No target	D	D
Carling/Clyde/Cole (Future)	F	C	F	C	B (Carling) E (NB on Clyde)	C	D	D
Carling/Churchill (Existing)	F	C	F	C	F	No target	C	D
Carling/Churchill (Future)	F	C	A	C	B (Carling) E (SB on Churchill)	C	C	D

With regards to cyclists, the minimum desirable LOS targets are not met with existing conditions; however, the introduction of a cycle track proposed by the City of Ottawa, improves conditions to BLOS 'A' exceeding the minimum desirable target.

With regards to transit, two results have been provided for the future conditions, which are reflective of transit traffic on north/southbound streets as well as movements along the future Carling Ave transit lanes. It was assumed that the delay that bus routes travelling along the future transit lanes would incur is 10 seconds or less, which is equivalent to a TLOS 'B' as provided in **Table 11**. However, the existing bus routes at the northbound approach of Cole/Clyde and the southbound approach of Churchill are expected to result in delays equivalent to TLOS 'E' in future conditions.

4.5. TRANSPORTATION DEMAND MANAGEMENT

The TDM Measures Checklist is attached in **Appendix G**. Proposed measures includes the following:

- Displaying relevant transit schedules and route maps at entrances for residents.
- Contracting with a provider to install on-site carshare vehicles and promoting their use by residents.
- Unbundling parking costs from monthly rent.
- Providing a multimodal travel option information package to new residents.
- Protect land to provide sufficient space for a bus stop.

4.6. NEIGHBOURHOOD TRAFFIC MANAGEMENT

Within the study area, some drivers may elect to use Cole Ave and Tillbury Ave (local roads) in combination with Churchill Ave N (major collector) as part of their route to/from the proposed development. Based on the City of Ottawa's TIA Guidelines, the recommended threshold for two-way traffic volumes is 120 veh/h for local roads and 600 veh/h for major collector roads. Based on the projected future background 2027 traffic volumes (**Figure 14**) and the net site-generated traffic (**Figure 10**):

- Along Tillbury Ave, the maximum number of two-way traffic anticipated 117 veh/h during peak hours, which does not exceed the 120 veh/h threshold.
- Along Cole Ave, traffic volumes between Carling Ave and Tillbury Ave exceed the 120 veh/h recommended threshold for both existing and future conditions, with volumes up to 376 veh/h during peak hours. However, there are no anticipated operational issues along Cole Ave as the threshold is exceeded over a short road segment (60m) as vehicles turn to/from Tillbury Ave. The City may elect to reclassify this section of Cole Ave as a major collector road, where the recommended threshold is 600 veh/h. since volumes are exceeding the collector road threshold.
- Along Churchill Ave N, the maximum number of two-way traffic anticipated during peak hours exceeds the recommended 600 veh/h threshold in both existing and future conditions, with volumes up to 973 veh/h. The City may elect to reclassify Churchill Ave N as an arterial road. However, collisions analysis indicate there are no safety concerns along the section of Churchill Ave N included in the study area. Intersection analysis in **Section 4.9** also indicate there are no traffic operational concerns. Given the implementation of the Carling Ave transit lanes, traffic may see a gradual decrease as transit usage increases. However, it may take some time before the influence of increased transit usage is recognized.

4.7. TRANSIT

As previously mentioned in **Section 3.2.1**, Carling Ave is planned to be a transit priority corridor (continuous measures). In order to account for the anticipated addition of a designated bus lane along Carling Ave, the number of general-purpose lanes was reduced to two lanes for the future background and future projected conditions analyzed in **Section 4.9**.

Due to the placement of the proposed driveway off Carling Ave., the existing bus stop located at the east end of the property will be relocated west of the current position. It is recommended that the bus stop be located a minimum of 20m west of the proposed driveway to provide enough space for a bus to stop without blocking vehicle movements to/from Carling Ave. The bus stop incorporates the anticipated cycle track design according to City of Ottawa standards.

As part of this review, existing conditions transit ridership data was obtained from OC Transpo for three bus stops near the proposed development site, as shown in **Figure 17**. The data, summarized in **Table 12**, is a summary of average bus boarding, alighting and occupancy information with regards to the bus routes at each of the respective stop numbers, during morning and afternoon peak hours.

Figure 17: Transit Ridership Data Bus Stop Locations

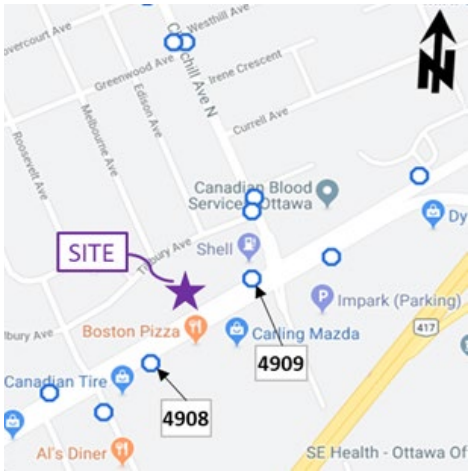


Table 12: Transit Ridership Data (5 Jan 2020 - 7 Mar 2020)

Stop No.	Location	Route	Direction	AM			PM		
				Boarding	Alighting	Avg. Load at Depart.	Boarding	Alighting	Avg. Load at Depart.
4908	Carling / Clyde North	85	EB	17	8	24	20	18	21
		50	EB	7	8	12	8	5	6
4909	Carling / Churchill	85	WB	8	17	15	10	33	22
		50	WB	2	3	9	8	11	7

As shown in **Table 12**, the average load of each bus route at its respective bus stop ranges from 9 to 24 persons during the morning peak hour and 6 to 22 persons during the afternoon peak hour. Bus route 85 is a frequent route that arrives every 15 minutes, while bus route 50 is a local route that arrives every 30 minutes or less during peak hours. Therefore, bus routes 85 and 50 provide service to their respective bus stops at least four times each during the morning and afternoon peak hours.

Based on information obtained from the OC Transpo website, the person capacity of OC Transpo buses, which includes the number of seats on the bus plus the standing capacity, ranges from approximately 65 occupants in its smallest vehicles to approximately 150 occupants in its largest vehicles. As previously calculated in **Table 7**, the proposed development is anticipated to generate 97 total in/out transit person trips during the morning peak hour and 113 in/out transit person trips during the afternoon peak hour. Based on the current bus loads and the available capacity of the existing bus routes, the proposed development is anticipated to have minor impact the available transit services.

4.8. REVIEW OF NETWORK CONCEPT

Exempt – see **Section 2.3**. As shown in **Table 7**, the number of person trips anticipated to be generated by the proposed development are 280 and 323 person trips per hour during the morning and afternoon peak hours. Based on the established zoning, a building height of 15m is permitted at this location. The proposed development building illustrates 3.0m per storey. Therefore, 5 storeys are permitted under the existing zoning. Above the 5th storey, the number of proposed units is 278 apartment units.

Using the average vehicle trip rates of a high-rise building provided in **Table 2** and multiplying by the 278 units, this equates to approximately 67 and 75 veh/h during the morning and afternoon peak hours, respectively. Based on the TRANS 2009 report, 37% of mode shares are auto driver during the morning peak hour, while 40% are auto driver during the afternoon peak hour. Dividing the vehicle trips generated from the 278 units by these mode shares, it is determined that the total person trips are 181 and 188 person trips per hour during the morning and afternoon peak hours. As such, the proposed development is not expected to generate 200 person trips in excess of the current zoning.

4.9. INTERSECTION DESIGN

4.9.1. INTERSECTION CONTROL

STOP control will be provided for the proposed development access, which will be sufficient given the low site-generated traffic volumes.

4.9.2. INTERSECTION DESIGN

The Synchro 10 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 0.9 in existing conditions and 1.0 in all future scenario conditions. In total projected scenarios, the increase in pedestrian and cyclist volumes has been accounted for as needed, including pedestrians generated by transit users at intersection crosswalks.

The number of lanes along Carling Ave were reduced to two general purpose lanes in all future background and total projected scenarios. Also, the eastbound and westbound left-turn timing at the intersection of Carling/Clyde/Cole was modified to fully protected as part of City safety improvements at the intersection. All Synchro report outputs for existing and future conditions have been provided in **Appendix I**.

Existing Conditions

Table 13 below summarizes the intersection performance of study area intersections, based on the existing conditions traffic volumes provided in **Figure 6.**

Table 13: 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
Churchill Ave N/Carling Ave (S)	D(F)	0.90(1.14)	SBL(WBT)	28.5(69.9)	C(F)	0.79(1.04)
Clyde Ave/Cole Ave/Carling Ave (S)	C(C)	0.78(0.75)	NBL(NBL)	23.7(20.1)	B(B)	0.64(0.66)
Carling Ave/Site Access (U)	A(B)	8.7(10.6)	SB(SB)	0.0(0.0)	-	-
Cole Ave/Tillbury Ave (U)	B(B)	10.3(10.4)	WB(WB)	2.2(2.1)	-	-
Tillbury Ave/Churchill Ave N (U)	B(B)	14.2(14.8)	EB(EB)	0.7(1.0)	-	-

Note: Analysis of signalized intersections assumes a PHF of 0.90 and a saturation flow rate of 1800 veh/h/lane.
(S) – Signalized intersection.
(U) - Unsignalized intersection.

As shown in **Table 13**, the critical southbound left-turn movement at Churchill Ave N/Carling Ave operates at a LOS 'D' during the morning peak hour, while the critical westbound through movement operates at capacity with LOS 'F' during the

afternoon peak hour. The critical northbound left-turn movement at Clyde Ave/Cole Ave/Carling Ave operates at a LOS 'C' during both morning and afternoon peak hour periods. Critical movements at the unsignalized intersections operate at a LOS 'B' or better during the morning and afternoon peak hour periods.

Future Background 2022 Conditions

Table 14 below summarizes the intersection performance of study area intersections, based on the future background 2022 conditions traffic volumes provided in **Figure 13.**

Table 14: Future Background 2022 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
Churchill Ave N/Carling Ave (S)	D(E)	0.86(0.97)	SBL(WBT)	26.8(39.1)	A(D)	0.58(0.87)
Clyde Ave/Cole Ave/Carling Ave (S)	C(C)	0.74(0.75)	WBL(WBL)	28.6(24.9)	B(A)	0.68(0.49)
Carling Ave/Site Access (U)	A(B)	9.2(10.8)	SB(SB)	0.0(0.1)	-	-
Cole Ave/Tillbury Ave (U)	B(B)	10.1(10.2)	WB(WB)	2.2(2.1)	-	-
Tillbury Ave/Churchill Ave N (U)	B(B)	13.3(13.7)	EB(EB)	0.7(0.9)	-	-
Note: Analysis of signalized intersections assumes a PHF of 1.0 and a saturation flow rate of 1800 veh/h/lane. (S) – Signalized intersection. (U) - Unsignalized intersection.						

As shown in **Table 14**, the critical SBL movement at Churchill Ave N/Carling Ave shows slight improvement in the morning and afternoon peak hour analysis compared to the existing conditions, which is due to the change of the peak hour factor used to assess the intersection performance.

Traffic operations at the intersection of Clyde Ave/Cole Ave/Carling Ave changed due to implementing fully protected EB and WB left-turn phases. The v/c ratio at the intersection 'as a whole' increases slightly during the morning peak hour but decreases during the afternoon peak hour compared to existing conditions.

Critical movements at the unsignalized intersections continue to operate at a LOS 'B' or better during the morning and afternoon peak hour periods.

Future Background 2027 Conditions

Table 15 below summarizes the intersection performance of study area intersections, based on the future background 2027 conditions traffic volumes provided in **Figure 14.**

Table 15: Future Background 2027 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
Churchill Ave N/Carling Ave (S)	D(F)	0.86(1.02)	SBL(WBT)	27.0(44.1)	A(E)	0.58(0.91)
Clyde Ave/Cole Ave/Carling Ave (S)	C(C)	0.74(0.75)	WBL(WBL)	28.9(25.2)	B(A)	0.70(0.50)
Carling Ave/Site Access (U)	A(B)	9.3(10.9)	SB(SB)	0.0(0.1)	-	-
Cole Ave/Tillbury Ave (U)	B(B)	10.1(10.2)	WB(WB)	2.2(2.1)	-	-
Tillbury Ave/Churchill Ave N (U)	B(B)	13.3(13.7)	EB(EB)	0.7(0.9)	-	-
Note: Analysis of signalized intersections assumes a PHF of 1.0 and a saturation flow rate of 1800 veh/h/lane. (S) – Signalized intersection. (U) - Unsignalized intersection.						

As shown in **Table 15**, the analysis results show slight increase in v/c ratios and intersection delays compared to the future background 2022 conditions. However, the WBT movement at the intersection of Churchill Ave N/Carling Ave is projected to operate at capacity during the afternoon peak hour.

Total Projected 2022 Conditions – Full Build-Out

The total projected 2022 traffic volumes were derived by superimposing the net site-generated traffic (**Figure 10**) onto future background 2022 traffic volumes (**Figure 13**). The resulting total projected 2022 traffic volumes are illustrated in **Figure 18**.

Figure 18: Total Projected 2022 Traffic Volumes

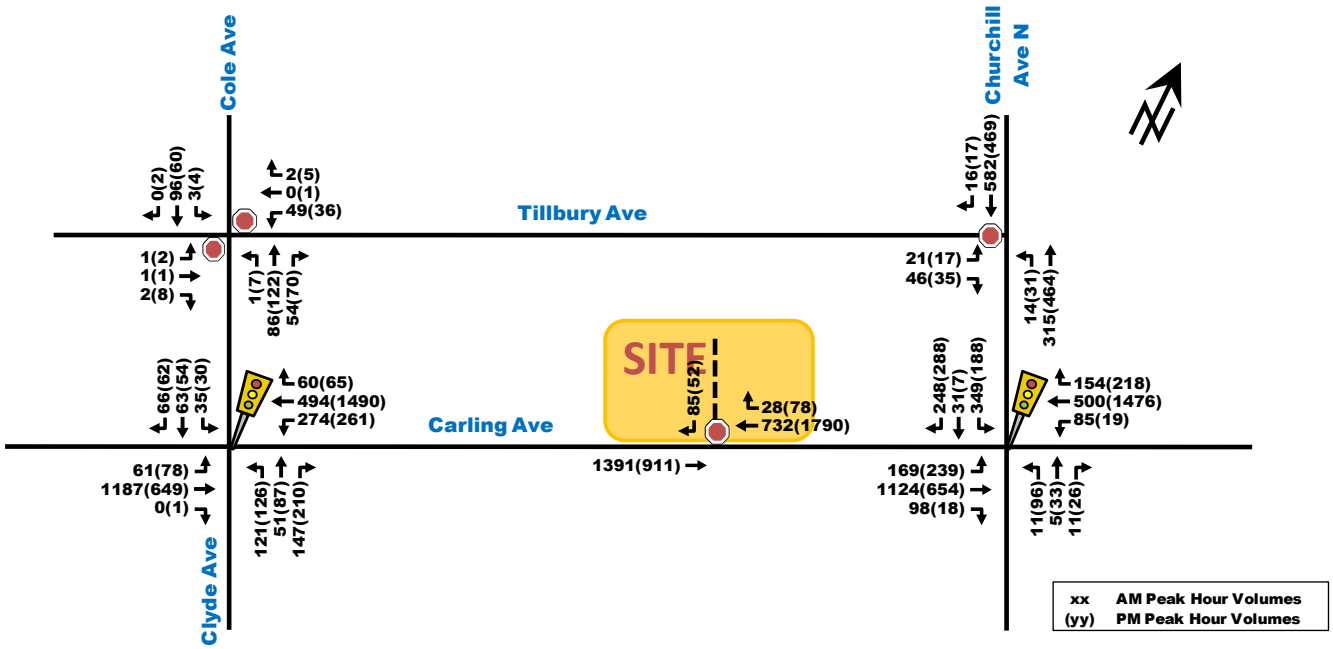


Table 16 below summarizes the intersection performance of study area intersections, based on the total projected 2022 conditions.

Table 16: Total Projected 2022 Performance at Study Area Intersections

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
Churchill Ave N/Carling Ave (S)	D(F)	0.86(1.03)	SBL(WBT)	26.9(47.1)	A(E)	0.59(0.92)
Clyde Ave/Cole Ave/Carling Ave (S)	C(C)	0.74(0.75)	EBT(WBL)	30.4(25.6)	C(A)	0.71(0.51)
Carling Ave/Proposed Access (U)	A(B)	9.7(11.2)	SB(SB)	0.4(0.2)	-	-
Cole Ave/Tillbury Ave (U)	B(B)	10.2(10.2)	WB(WB)	2.0(2.0)	-	-
Tillbury Ave/Churchill Ave N (U)	C(B)	15.4(14.9)	EB(EB)	1.2(1.2)	-	-

Note: Analysis of signalized intersections assumes a PHF of 1.0 and a saturation flow rate of 1800 veh/h/lane.
(S) – Signalized intersection.
(U) – Unsignalized intersection.

Note that U-turn movements are analyzed in Synchro as left-turn movements. As such, U-turn traffic volumes generated by the future development were added to the left-turn traffic volumes in both the Synchro model and its corresponding traffic volumes figure (**Figure 18**). Overall, the analysis results in **Table 16** show slight increase in v/c ratios and intersection delays compared to the future background 2022 conditions. The WBT movement at the intersection of Churchill Ave N/Carling Ave is projected to operate at capacity during the afternoon peak hour.

Total Projected 2027 Conditions – Build-Out Plus Five Years

The total projected 2027 traffic volumes, shown in **Figure 19**, were derived by superimposing the net site-generated traffic (**Figure 10**) onto future background 2027 traffic volumes (**Figure 14**).

Figure 19: Total Projected 2027 Traffic Volumes

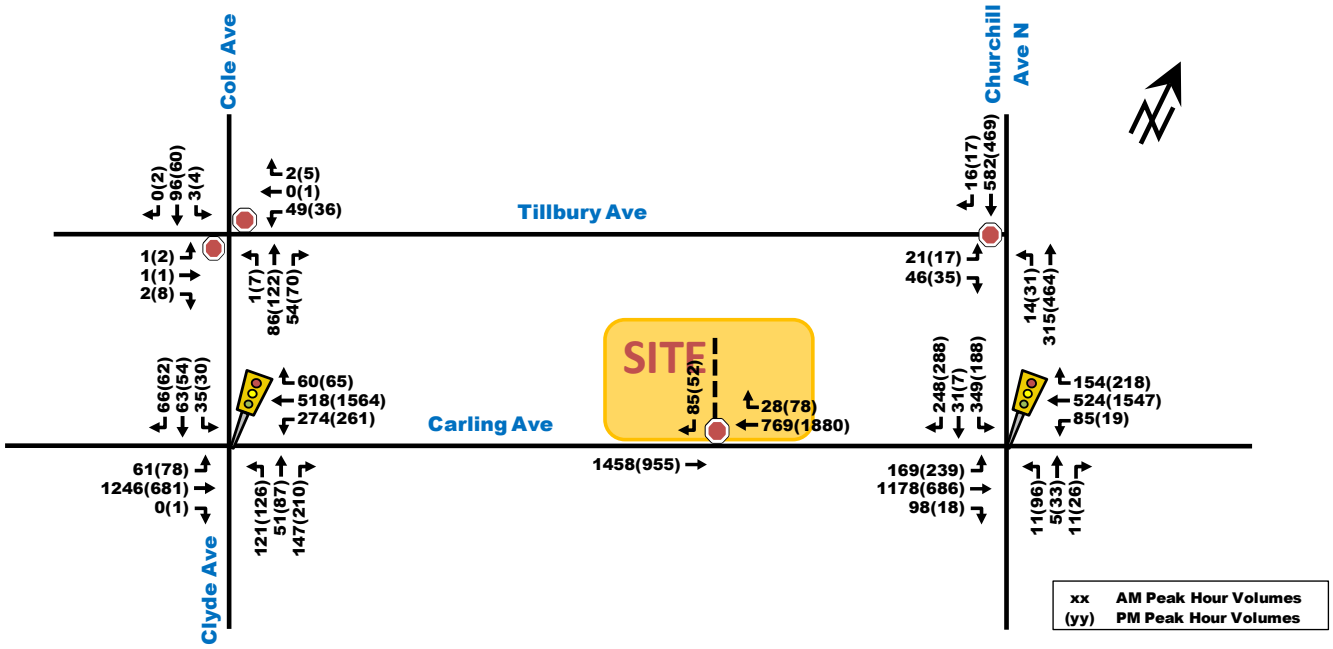


Table 17 below summarizes the intersection performance of study area intersections, based on the total projected 2027 conditions.

Table 17: Total Projected 2027 Performance at Study Area Intersections

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
Churchill Ave N/Carling Ave (S)	D(F)	0.86(1.08)	SBL(WBT)	27.2(54.6)	C(E)	0.76(0.96)
Clyde Ave/Cole Ave/Carling Ave (S)	C(C)	0.78(0.75)	EBT(WBL)	30.9(25.8)	C(A)	0.74(0.51)
Carling Ave/Proposed Access (U)	A(B)	9.7(11.2)	SB(SB)	0.4(0.2)	-	-
Cole Ave/Tillbury Ave (U)	B(B)	10.2(10.2)	WB(WB)	2.0(2.0)	-	-
Tillbury Ave/Churchill Ave N (U)	C(B)	15.4(14.9)	EB(EB)	1.2(1.2)	-	-

Note: Analysis of signalized intersections assumes a PHF of 1.00 and a saturation flow rate of 1800 veh/h/lane.
(S) – Signalized intersection.
(U) – Unsignalized intersection.

As shown in **Table 17**, there v/c ratios are naturally higher compared to future background 2027 conditions due to increase in volumes. The WBT movement at the Churchill Ave N/Carling Ave intersection continues to operate at capacity during the afternoon peak hour period. However, note that the v/c ratio only slightly exceed the 1.00 threshold. As such, a simple potential mitigation measure to reduce the v/c ratio to an acceptable level is to adjust the phase timings of the intersection of Churchill Ave N/Carling Ave.

It is acknowledged that queueing and congestion may occur at various intersections along Carling Ave as a result of City's plan to reduce the number of through lanes to two for general purpose vehicles. However, the Synchro analysis completed in support of the subject TIA does not take into account the influence of those intersections located outside of the established study area (i.e., east of Churchill N/Carling and west of Clyde/Cole/Carling).

Total Projected 2027, without 20% Reduction

To account for a worst-case scenario, analysis was conducted assuming that a 20% east-west reduction in traffic volumes is not achieved in the future. The total projected 2027 traffic volumes, shown in

Figure 20, were derived by superimposing the net site-generated traffic (**Figure 10**) onto future background 2027 traffic volumes, without the 20% east-west reduction (**Figure 12**). For comparison purposes, the difference in traffic volumes along Carling Ave, between the 20% reduction scenario (**Figure 19**) and the no reduction scenario, is shown in **Figure** 20.

Figure 20: Total Projected 2027 Traffic Volumes, WITHOUT 20% East-West Reduction

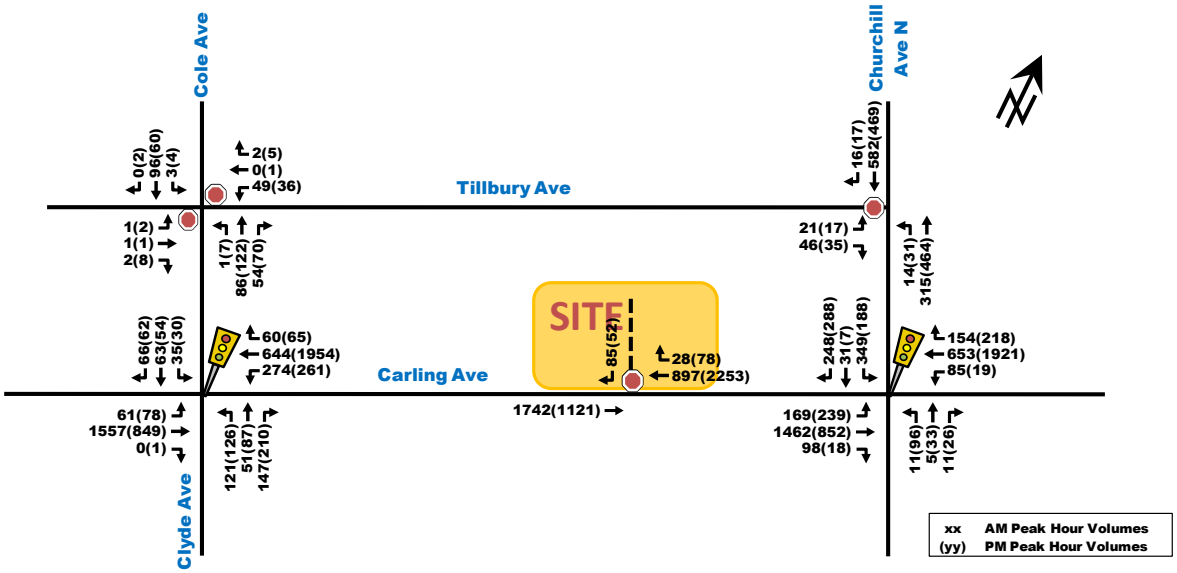
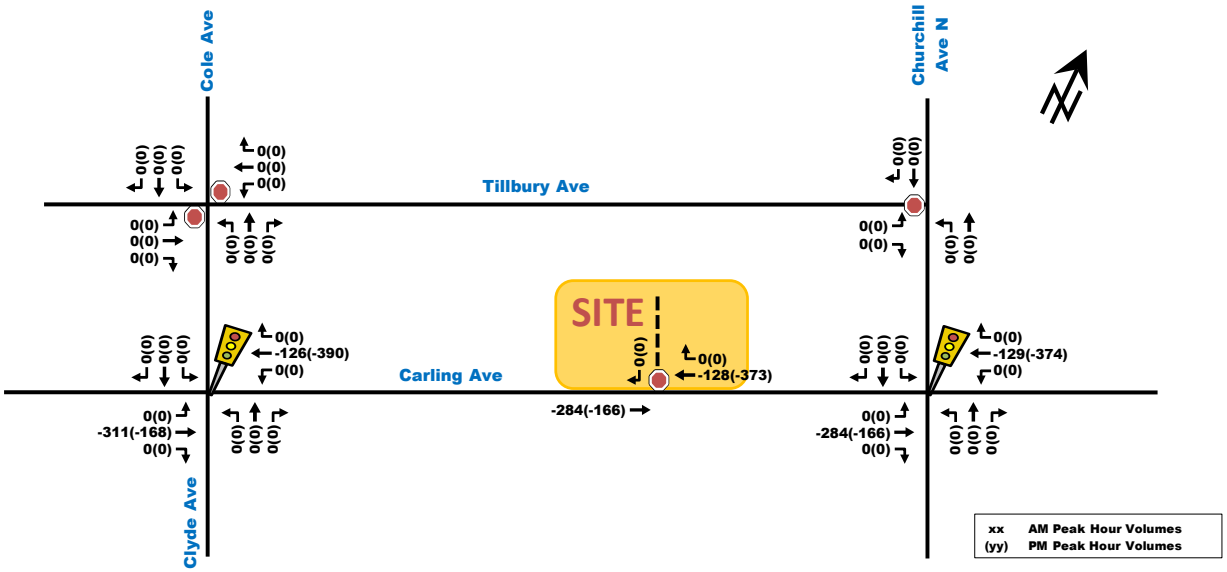


Figure 21: Total Projected 2027 Traffic Volumes Difference



As a result, **Table 18** below summarizes the intersection performance of study area intersections, based on the **Figure** 20 traffic volumes.

Table 18: Total Projected 2027 (WITHOUT 20% East-West Reduction) Performance at Study Area Intersections

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
Churchill Ave N/Carling Ave (S)	E(F)	0.94(1.35)	EBT(WBT)	30.4(108.1)	D(F)	0.90(1.18)
Clyde Ave/Cole Ave/Carling Ave (S)	E(E)	0.97(0.92)	EBT(WBT)	39.4(28.9)	D(D)	0.89(0.87)
Carling Ave/Proposed Access (U)	A(B)	9.6(11.2)	SB(SB)	0.3(0.2)	-	-
Cole Ave/Tillbury Ave (U)	B(B)	10.2(10.2)	WB(WB)	2.0(2.0)	-	-
Tillbury Ave/Churchill Ave N (U)	C(B)	15.4(14.9)	EB(EB)	1.2(1.2)	-	-

Note: Analysis of signalized intersections assumes a PHF of 1.00 and a saturation flow rate of 1800 veh/h/lane.
(S) – Signalized intersection.
(U) – Unsignalized intersection.

As shown in **Table 18**, the two signalized intersections show a significant increase in delays of the intersections 'as a whole' and in the v/c ratios of their critical movements, should the 20% reduction in east-west traffic not be met. The intersection of Churchill Ave N/Carling Ave in particular operates significantly above capacity during the PM peak hour. Optimization of cycle length or the split times does not reduce its LOS to an acceptable standard.

Auxiliary Left-Turn Lane Analysis

As illustrated by the site-generated traffic in **Figure 10**, auxiliary left-turn lanes along Carling Ave within the study area may be used as part of the access routes to/from the proposed development site. In particular, the EBLT and WBLT at the intersection of Clyde Ave/Cole Ave/Carling Ave, as well as the EBLT at the intersection of Churchill Ave N/Carling Ave require review to determine if adequate storage length is available. However, the EBLT traffic anticipated to be generated by the site at both intersections was projected to be minimal. As such, the adequacy of their respective storage length is dependent on existing traffic volumes and signal timing plans. Note that both existing conditions and total projected 2027 (with 20% east-west reduction) conditions have been reviewed.

At the intersection of Clyde Ave/Cole Ave/Carling Ave, the 95th percentile queue length in Synchro indicates that traffic slightly exceeds available storage length in existing conditions during the afternoon peak hour and in total projected 2027 conditions during both peak hours (with the fully protected left-turn phase). On the other hand, the WBLT lane provides adequate storage length in both existing and total projected 2027 conditions (with the fully protected left-turn phase). The 95th percentile queue exceeds the available storage length (20m) by approximately 10m (although the existing taper length is 20m) in total projected 2027 conditions. However, the projected average queue of approximately 18m can be accommodated. There is opportunity to extend the EBLT storage length by converting the existing centre median. On this basis, City comments have indicated that the "eastbound left-turn lane storage will be revised as part of City funded work".

At the intersection of Churchill Ave N/Carling Ave, the analysis indicates that the existing 95th percentile queue length for the EBLT is not accommodated within the available storage length of 70m. The storage is exceeded by an estimated 55m during the critical afternoon peak hour, thereby blocking the eastbound through movement. Note that the additional site traffic to this movement is less than 10 veh/h compared to the existing left-turn volume of up to 230 veh/h. On this basis, the City should consider extending EBLT storage at this location as part of their work on Carling Avenue Transit Priority Project. It should also be noted that the average queues of the EBLT do not exceed available storage length. Which means that the 95th percentile queue length may only occur over a short period during the peak hours. It is recommended that the EBLT movement be monitored by City staff during peak hours once the Carling Ave transit lanes are introduced, to determine the actual extent and impact of the traffic queue.

5. FINDINGS, CONCLUSIONS AND RECOMMENDATIONS

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

Proposed Development

- The proposed single-phase development will consist of 418 apartment units and 8,300 ft^2 commercial space within a 16 and 18-storey two-tower residential building that is expected to reach full build-out by 2022.
- The proposed development is anticipated to generate approximately 113 and 130 vehicles/hour during the morning and afternoon peak hour periods. However, due to the existing vehicle trips generated by the unpaved parking lot, the proposed development vehicle trips result in a net increase of approximately 102 and 116 veh/h during the morning and afternoon peak hour periods.

Existing and Background Conditions

- In existing conditions, the SBL operates at a LOS 'D', while the WBT operates at capacity at the intersection of Churchill Ave N/Carling Ave, during the morning and afternoon peak hour periods, respectively. The NBL at the intersection of Clyde Ave/Cole Ave/Carling Ave operates at a LOS 'C' during both morning and afternoon peak hour periods. Critical movements at unsignalized intersections operate at a LOS 'B' or better during both morning and afternoon peak hours.
- The Synchro operational analysis of existing conditions indicates inadequate storage length for the EBLT movement at Churchill Ave N/Carling Ave, and the City should consider extending EBLT storage at this location as part of their work on Carling Avenue Transit Priority Project.
- Due to the absence of major other area developments near the subject site, traffic is not anticipated to grow significantly within the study area. Nonetheless, a 1% per year background growth rate was applied along Carling Ave, between horizon years 2022 and 2027.
- A designated bus lane is anticipated to be implemented along Carling Ave as part of the 2031 affordable network, which will reduce the vehicle capacity significantly along Carling Ave, since a general-purpose lane in each travel direction will be replaced with a transit lane. However, the *Carling Avenue Transit Priority Measures and Functional Design Report* indicates that vehicle traffic along Carling Ave is expected to reduce by up to 20% once the transit lanes are implemented. These changes are reflected in the Synchro analysis conducted for all future scenarios.
- As part of City safety measures, the EB and WB left-turns at the intersection of Clyde Ave/Cole Ave/Carling Ave are anticipated to be modified to fully protected. City staff have also indicated in comments that the EBLT storage may be revised based on available City funded work.
- The Synchro operational analysis of Future Background 2022 and 2027 conditions indicated the following:
    - The SBL movement at the intersection of Churchill Ave N/Carling Ave operates at a LOS 'D' during the morning peak hour. While the WBT movement operates at a LOS 'E' for future background 2022 conditions and LOS 'F' for future background 2027 conditions during the afternoon peak hour.
    - The critical movements at the intersection of Clyde Ave/Cole Ave/Carling Ave operate at a LOS 'C' or better during the morning and afternoon peak hour periods.
    - Critical movements at all unsignalized intersections operate at a LOS 'B' or better during morning and afternoon peak hour periods.

Projected Conditions

- Analysis of Total Projected 2022 and 2027 conditions indicated results similar to Future Background 2022 and 2027 conditions, with slight increase in v/c ratios and intersection delays.

- Although critical movements at the intersection of Churchill Ave N/Carling Ave operate at capacity during the afternoon peak hour, the volume-to-capacity ratio exceeds the threshold only slightly. As such, the v/c ratios may be reduced to acceptable levels by adjusting the intersection's phase timings.
- Should the 20% east-west reduction in traffic volumes not be achieved for Total Projected 2027 conditions, the intersection of Churchill Ave N/Carling Ave would operate above capacity during the afternoon peak hour.
- Since site-generated traffic may use local roads (Cole Ave and Tillbury Ave) and a major collector road (Churchill Ave N) as part of their access route to/from the future development, anticipated future traffic volumes along these roadways was compared against the recommended thresholds set by the TIA Guidelines. It was determined that both Cole Ave and Churchill Ave N exceed their respective recommended thresholds. The City may elect to reclassify both roads based on the existing and future traffic volumes. However, collisions data and intersection analysis indicated no major concerns in the study area.
- Based on the MMLOS analysis for boundary roads (Carling Ave) and signalized intersections:
    - At the frontage of the site, Carling Ave does not currently meet the pedestrian LOS minimum desirable target due to the high volume of curb lane traffic, which will decrease significantly once the lanes are converted to transit lanes. As such, the PLOS target is anticipated to be met in the future. Bicycle LOS is not met in existing but is met future conditions due to the introduction of a cycle track along Carling Ave. Transit LOS is not met in existing conditions due to lack of dedicated bus lanes.
    - The two signalized intersections do not meet the minimum desirable target LOS for pedestrians in existing or future conditions. This is primarily due to the number of lanes that pedestrians must cross on Carling Ave. The cycling LOS is not met in existing conditions but is anticipated to improve in future conditions due to the introduction of cross-rides. The transit LOS is expected to improve significantly along Carling Ave due to reduction of delay to EB and WB, thereby meeting the target LOS.

Site Plan Review

- A total of 230 underground parking spaces and 28 surface parking spaces are anticipated to be provided for vehicles, with 200 underground bicycle storage spaces and 12 surface spaces.
- A right-in/right-out driveway is proposed as the site's main driveway at the east end of the property that connects to Carling Ave. A second one-way driveway that connects from Churchill Ave N via an existing easement through the eastern adjacent property is proposed as a restricted access to be used primarily by garbage trucks, emergency vehicles and moving trucks.
- The Carling Avenue driveway connection allows for passenger vehicles and for LSU-type emergency vehicles to enter and exit the site. It is recognized that the separation to the adjacent property line is minimized; however, remains recommended from a transportation perspective.
- It is recommended that a convex mirror be installed at the northwest corner of the garage ramp to improve sight lines for vehicles entering/exiting the building.

Based on the foregoing, the proposed residential development causes a slight variation to the performance of the nearby study area intersections and is recommended to proceed from a transportation perspective.

Prepared By:

Basel Ansari, P.Eng.
Transportation Planner

Reviewed By:

Jake Berube, P.Eng.
Transportation Engineer

Appendix A

Screening Form and City Comments

PARSONS

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

City of Ottawa 2017 TIA Guidelines

TIA Screening Form

Date	27-Aug-19
Project	1655 Carling Avenue
Project Number	477272 - 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	1655 Carling Avenue (Ottawa, ON)
Description of location	To replace the unpaved parking lot west of Hakim Optical
Land Use	Residential apartments tower
Development Size	260 residential units
Number of Accesses and Locations	1 Existing Access, 65 m west of Carling/Churchill intersection
Development Phasing	1 Phase
Buildout Year	2021
Sketch Plan / Site Plan	See attached

Module 1.2 - Trip Generation Trigger		
Land Use Type	Townhomes or Apartments	
Development Size	260	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 to continue using existing driveway
Development is in a Design Priority Area (DPA) or Transit-oriented Development (TOD) zone. (See Sheet 3)	Yes	Carling Avenue is designated as an Arterial Mainstreet
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	Within 150 m of the Carling Ave/Chuchill Ave N signalized intersection
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	

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12 May 2022

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

Attention: Wally Dubyk

Dear Wally:

Re: 1655 Carling Ave TIA

Step 5 – Response to City Comments, 3rd SPC Submission

The following response has been prepared in response to City of Ottawa comments received on April 20, 2022. City comments have been noted in black with the corresponding responses from Parsons in Green.

Transportation Engineering Services

Comment 1. In Section 4.1 of the report, access issues regarding vehicular maneuvers were identified without any recommended solutions. Please note the following:

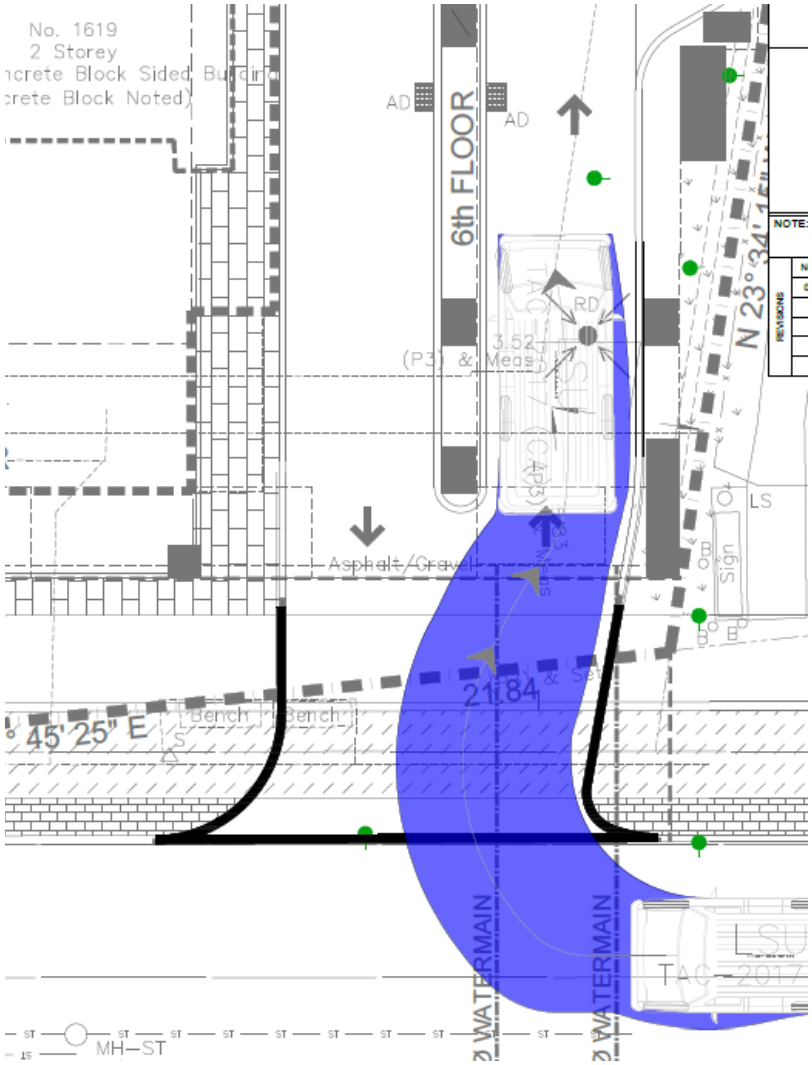
a) Provide a template for emergency vehicles that have entered the site from Carling Avenue and must leave by the Churchill Avenue.
A template has been provided for an LSU at the site access representing an ambulance vehicle. The ambulance inbound vehicle would track in front of exiting vehicles, however this maneuver is to be a rare occurrence.
All deliveries are to enter the site from the Churchill Access. See Figure 1 below.
It is unlikely to have a fire vehicle access the rear of the site as the Siamese connection is located on Carling, and access to the CACF room is via the main entrance on Carling.

b) Backing down the laneway towards Churchill Avenue for large vehicles should be reviewed carefully with the planner as this is not recommended.
Acknowledged. An MSU delivery vehicle is by far the largest type of delivery vehicle expected for the rear of the site. Adjustments have been made so that MSU-design trucks can exit via Carling Avenue, albeit with some additional maneuvers. Again, with only occasional large delivery vehicles, these movements are believed to be acceptable.
Churchill Avenue is a truck/delivery only entrance which will be used rarely should a larger vehicle must reverse out of this access.

c) Improve the access on Carling Avenue to better accommodate design vehicles
The Carling Access has been revised as per the PABL. See comment response No. 3 below

Comment 2. It is not clear why the access on Carling Avenue has been designed in this constrained manner but it is strongly recommended that it be reconfigured.
Noted. See comment response No. 3 below

Figure 1: LSU Emergency Inbound Maneuver



Comment 3. Please note that while Section 25.1.p of the PABL regarding the distance between the access and the adjacent property line may be met at the street line for the Carling Avenue access, it certainly does not appear to be met at the curb line.

The access has been reconfigured to better accommodate for the intended design vehicle, meet the PABL and accommodate the site column layout. There remains a challenge for inbound vehicles to navigate around the median that divides traffic on-site.

Given the site design there is a considerable challenge to accomplish a 3.0m separation at the street line prescribed by the PABL. In recognition of PABL 25.1.p...

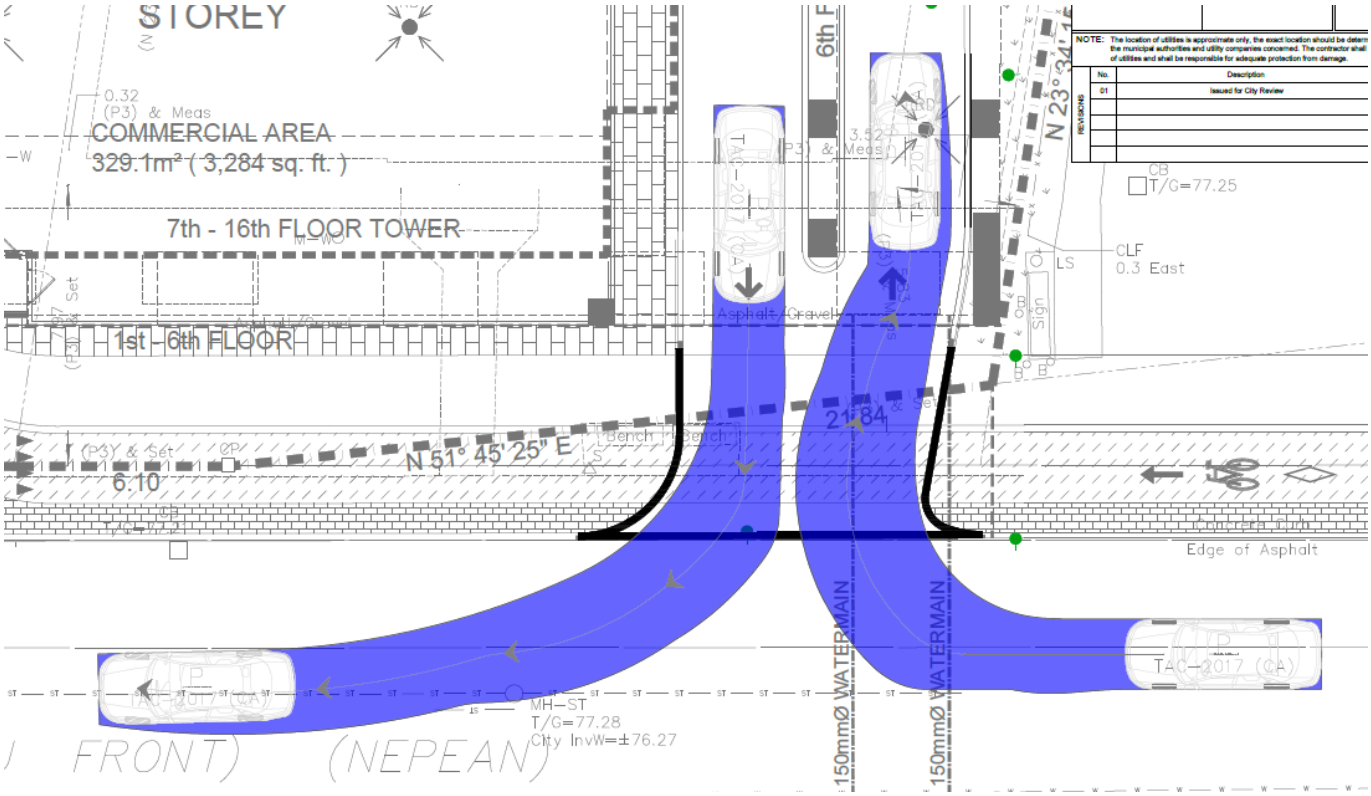
i. While there is minimal separation to the adjacent gas-station egress, given the one-way nature of Carling Avenue and the forecast traffic of the proposed development, conflicts are expected to be minimal between accesses. With the adjacent traffic signal at Churchill Avenue, sufficient gaps are anticipated in the Carling Avenue westbound traffic flow to suit the proposed access arrangement.

ii. There exists adequate sight lines along Carling Avenue Westbound and to the adjacent access for vehicles exiting the proposed site.

iii. The proposed access arrangement effectively replaces an existing access (to 1619 Carling Avenue) and serves to render useless 3 existing private approaches along the 1655 Carling Avenue frontage, thus reducing the overall number of curb-cuts along Carling Avenue and the overall hazard of multiple private approaches.

Given the above analysis, the proposed access arrangement accomplishes a 0.3m separation to the property line intersect at the curb line. The access has incorporated a minimum radii of 3.0m and the specifications laid out within SC7.1 for *unsignalized entrances*, as requested by the City (Wally Dubyk, April 28th, 2022), which reflects Carling Avenue as a significant arterial roadway. This access option has been discussed with Wally Durbyk (May 11, 2022).

Figure 2: Site Access, Carling Avenue, Passenger Car Turning Movement



Comment 4. The City recommended approach to AODA delineation between sidewalks and cycle tracks is now a half-height barrier curb (60mm high) per Section 6.1 of the Protected Intersection Design Guide. Please adjust grading of the cycle track and sidewalk as required to accommodate this curb.
Noted. Half-height curb to be provided. Grading and Drainage Plan updated.

Comment 5. The bus stop must meet the standards of the latest "Bus Stops and Off-Road Cycling Facilities Interaction Zone Design Guidelines" (current version 9.0), including delineation, pavement markings, and tactile walking surface indicators (TWSIs). Consult with Transit Services for more details.
Noted. Details from the "Typical Bus Stop with 15m Landing Zone and Uni-Directional Cycle Track" standard incorporated within the site plan frontage. Further details to be determined during detailed design.

Comment 6. Where the cycle track transitions to a bike lane, then mixed traffic, there is a depressed curb between the bike lane and the motor vehicle lanes. There should be no depressed curb. The boulevard should end in a bull-nose, the cycle track should ramp-down to the on-road bike lane with no depressed curb across the cyclist's path of travel.
Noted. Depress curb removed. Bull-nose included. See updated site plan.

Traffic Signal Operations

Comment 7. The EBLT storage lane at Carling/Churchill is inadequate for present day volumes and will be further impacted by additional demands/development on the network.
Noted. As indicated by City Comment #9 below, there are changes to Carling/Churchill beyond the influence of this application. This proposal does not include an RMA that proposes any changes to the transportation network.

Comment 8. Opportunities to increase the EBL storage lane should be considered and constructed as part of any upcoming construction projects.
Noted. This proposal does not include an RMA that proposes any changes to the transportation network.

Traffic Signal Design

Comment 9. Traffic Signals Design group is aware of upcoming changes that will occur at the intersections of Carling Ave. & Churchill Ave. and Carling Ave. & Clyde Ave./Cole St. Our group will need to be engaged should any changes occur at the signals due to this project.
Noted. This proposal does not include an RMA that proposes changes to the transportation network.

Comment 10. There are existing transit detection loops on the north side of Carling Ave., if any detection loop is damaged it will cost $2,000.00 to reinstate. The reinstatement of any damaged traffic detection loops is the responsibility of the contractor performing the works. Please contact Doug Gorman at 613-229-5529 or douglas.gorman@ottawa.ca to coordinate the reinstallation of all damage.
Noted.

Street Lighting

Comment 11. Before excavating please call Ont1CALL (1-800-400-2255) for underground locates, otherwise no comments. If conflict arises please contact Barrie Forrester (613) 580-2424 ext 23332 (Barrie.Forrester@ottawa.ca). The applicant is 100% responsible for all costs of any required streetlight plant alterations and/or repairs.
Noted.

Transit Services

Comment 12. Section 2.1.3 Other Area Developments -- include the large development at 861 Clyde Ave.
Noted. At the time of undertaking the initial Step 3: Forecasting (Sept. 2019) and subsequent Step 4: Strategy (October, 2019) and Step 5: Draft TIA (Feb. 2020), the details of 861 Clyde Avenue were entirely unknown.

The revised TIA has included the 861 Clyde Avenue development in Section 2.1.3 “Other Developments”. The revised TIA has also indicated that the 861 Clyde Avenue forecast Phase 1 traffic is accommodated within the background traffic growth assumptions presented within the 1655 Carling Avenue TIA. Therefore the background / future traffic analysis has remain unchanged as incorporating the traffic and related assumptions of 861 Clyde Avenue would result in nearly identical conclusions as currently presented.

This approach considers that…

- the 1655 Carling Avenue TIA assumed a 1% background growth on Carling Avenue and Churchill Avenue North, between build-out and build-out+5-year forecasts (5% growth on all movements),

which was intended to account for situations where developments arise following submission of the TIA;

- the 1655 TIA provided a sensitivity analysis excluding any significant transit reduction on Carling Avenue which recommended monitoring of key movements following the Carling Transit Lanes, but did not result in any significant changes to the transportation network due to the development;
- the 861 Clyde TIA asserts that the Phase 1 (2025) development transportation impacts are "anticipated to have marginal operational effects for most movements within the study area intersections", that the Phase 1 861 Clyde Ave development would primarily result in implications at the Carling/Churchill WB-LT which has no impact on the proposed 1655 Carling site, and that the Phase 1 861 Clyde Avenue would increase Carling WB volumes west of Churchill Avenue by less than 20 veh/h in the PM peak hours

Comment 13. Please include transit fare incentive (item 3.2.2 in TDM measures: Residential developments checklist) to help meet mode share targets

Comment noted to developer. It is recognized that a fare incentive is a proven TDM measure. At this time, a fare incentive is not proposed.

Sincerely

Basel Ansari, P.Eng.
Transportation Planner

Jake Berube, P.Eng.
Transportation Engineer

Appendix B

Transit Route Maps

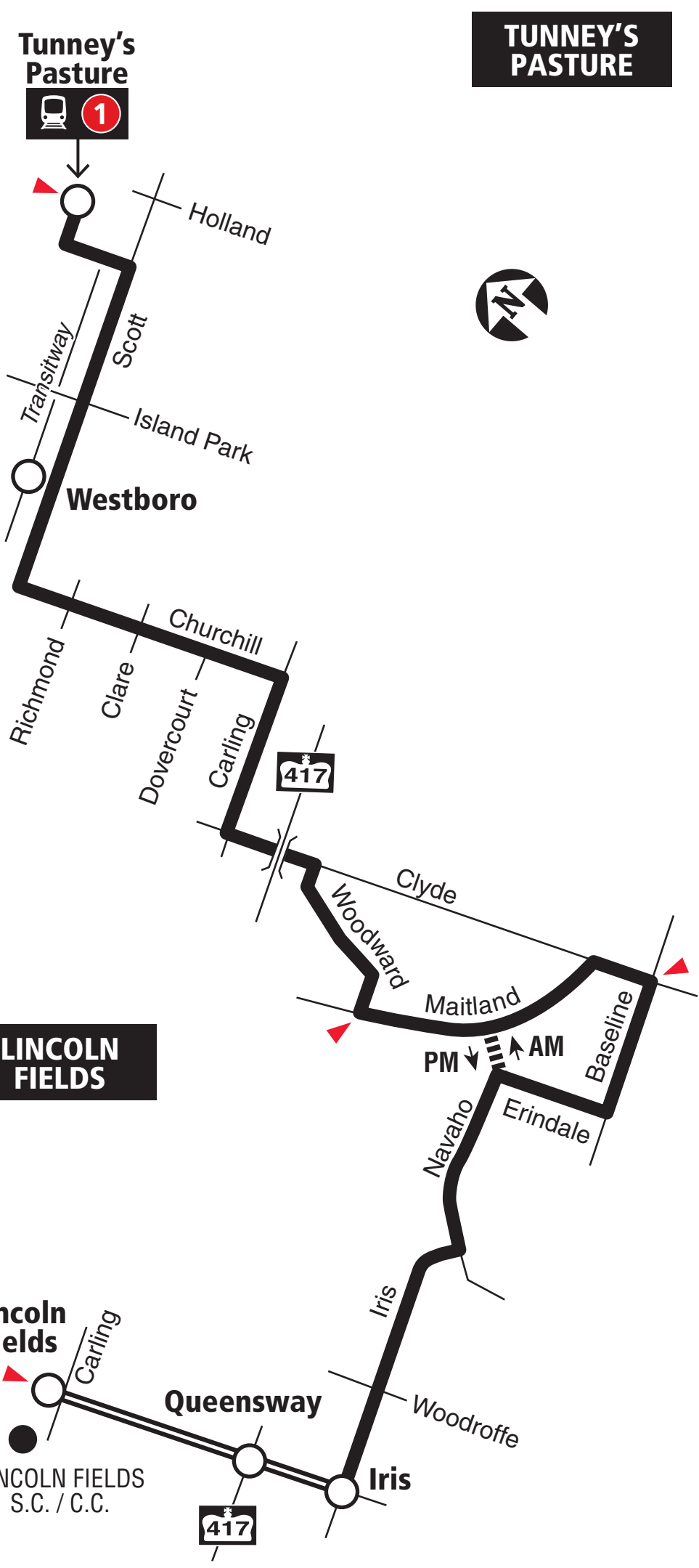
50

LINCOLN FIELDS
TUNNEY'S PASTURE

Local

Monday to Saturday / Lundi au samedi

No service Sat. eve. or all day Sunday / Aucun service le soir le sam. ou toute la journée dimanche



Transitway & Station

Peak Periods only / Périodes de pointe seulement

Timepoint / Heures de passage

2019.06

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 **613-842-3600**

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

Security / Sécurité **613-741-2478**

Effective April 24, 2017
En vigueur 24 avril 2017

OC Transpo

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Station

Timepoint / Heures de passage

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1

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

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Security / Sécurité **613-741-2478**

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Appendix C

Traffic Data

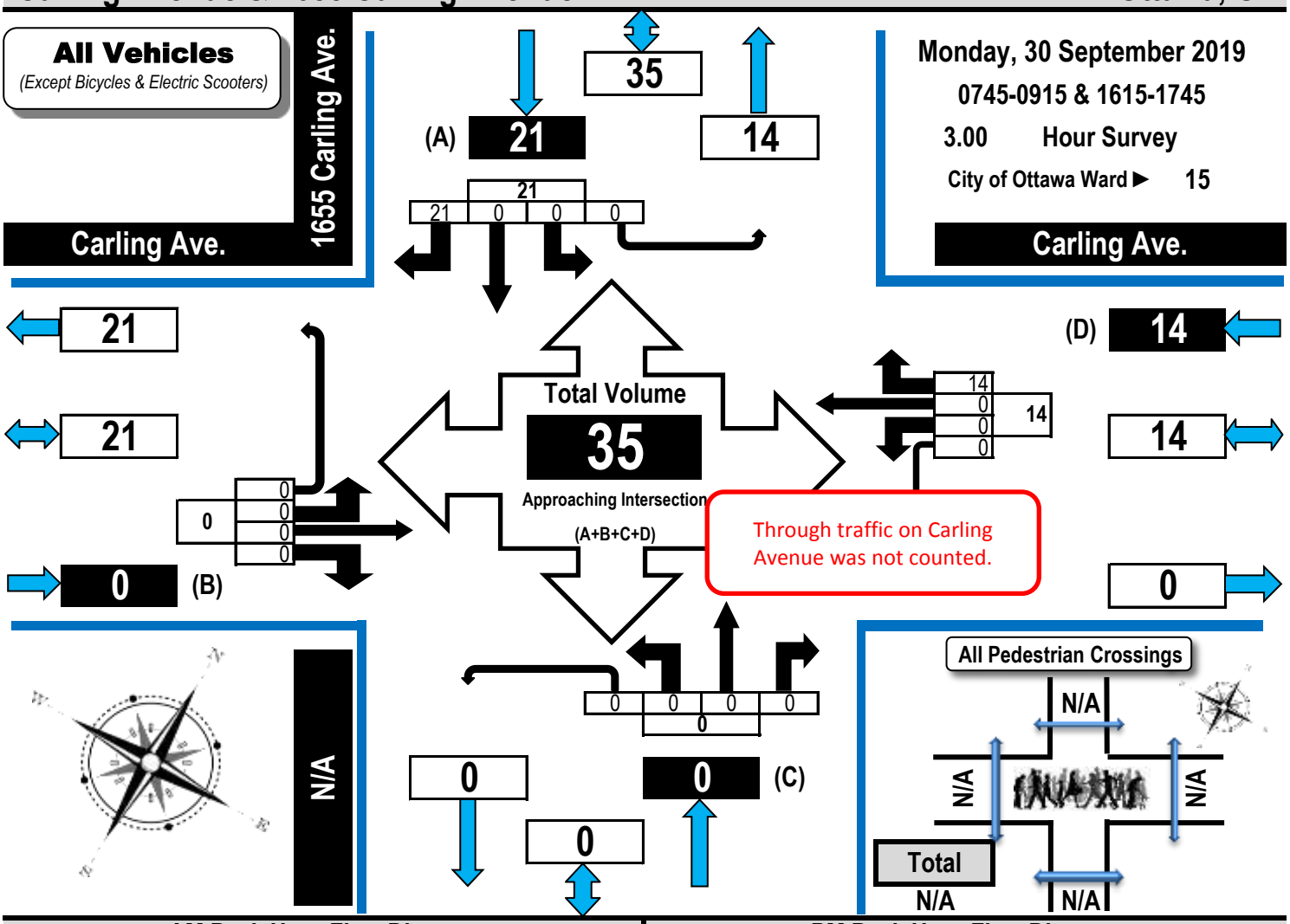
Turning Movement Count
Summary, AM and PM Peak Hour Flow Diagrams

Automobiles, Taxis, Light Trucks, Vans, SUV's, Motorcycles, Heavy Trucks, Buses, and School Buses

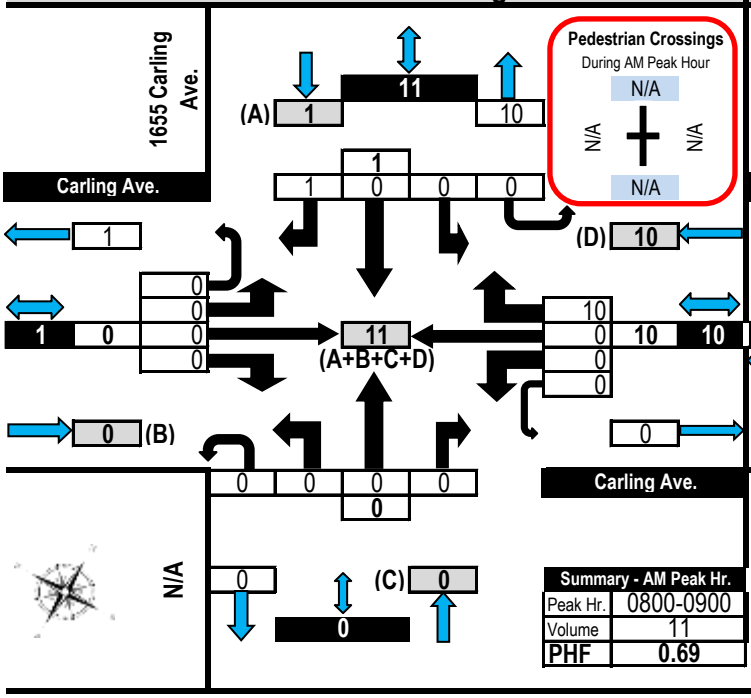
Carling Avenue & 1655 Carling Avenue — Ottawa, ON

All Vehicles
(Except Bicycles & Electric Scooters)

Monday, 30 September 2019
0745-0915 & 1615-1745
3.00 Hour Survey
City of Ottawa Ward ▶ 15

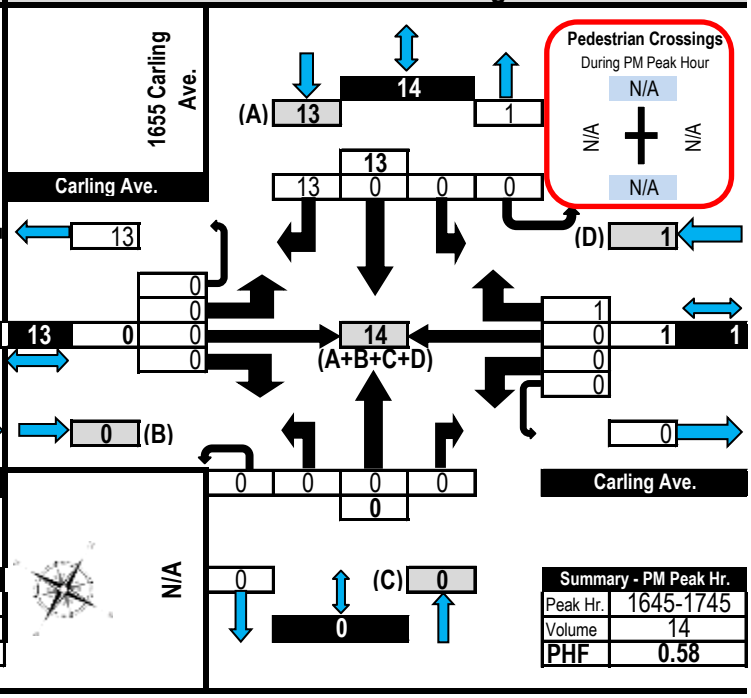


AM Peak Hour Flow Diagram



Summary - AM Peak Hr.	
Peak Hr.	0800-0900
Volume	11
PHF	0.69

PM Peak Hour Flow Diagram



Summary - PM Peak Hr.	
Peak Hr.	1645-1745
Volume	14
PHF	0.58

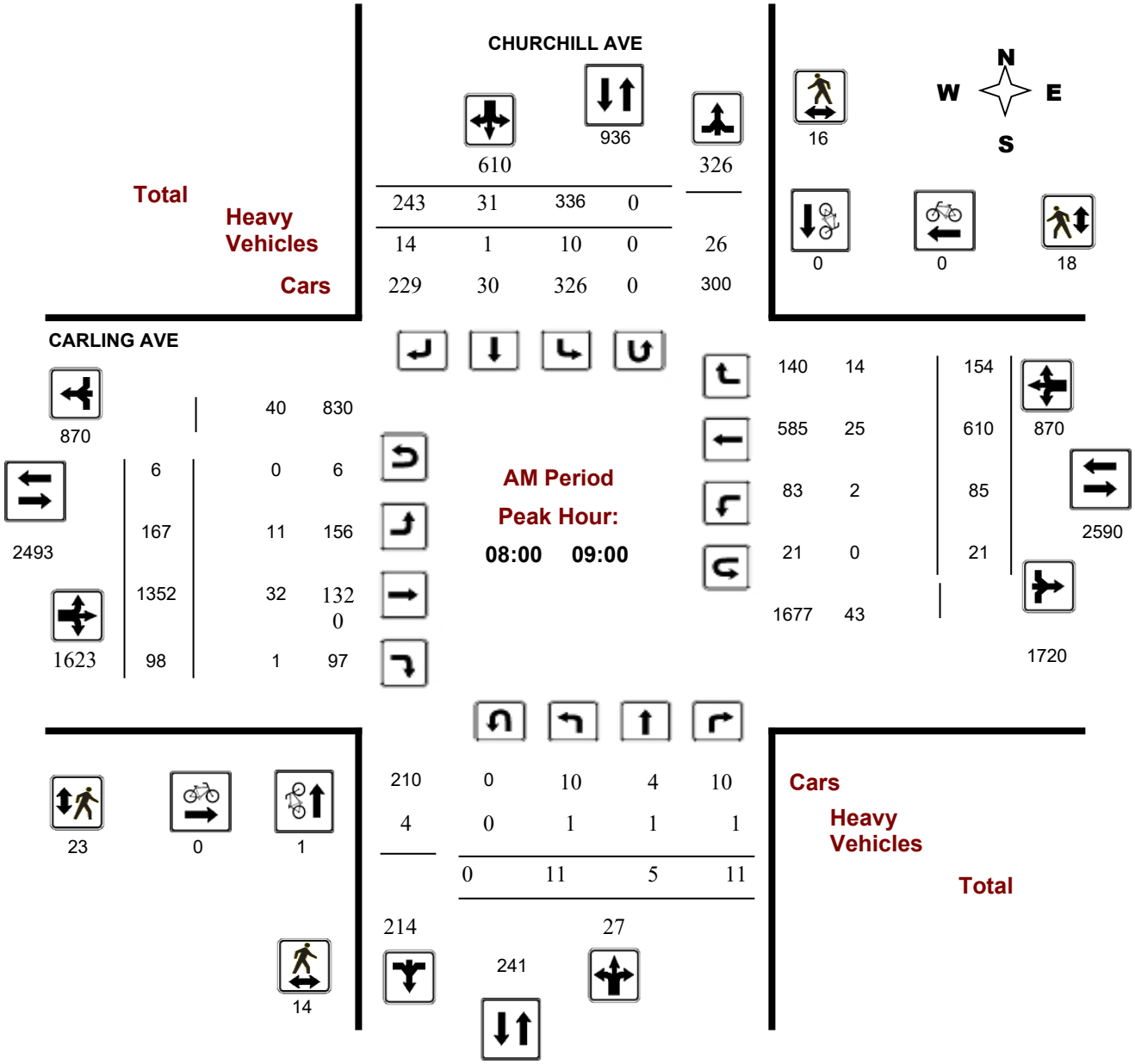
Transportation Services - Traffic Services

Turning Movement Count - Full Study Peak Hour Diagram

CARLING AVE @ CHURCHILL AVE

Survey Date: Tuesday, April 25, 2017
Start Time: 07:00

WO No: 36955
Device: Miovision



Comments

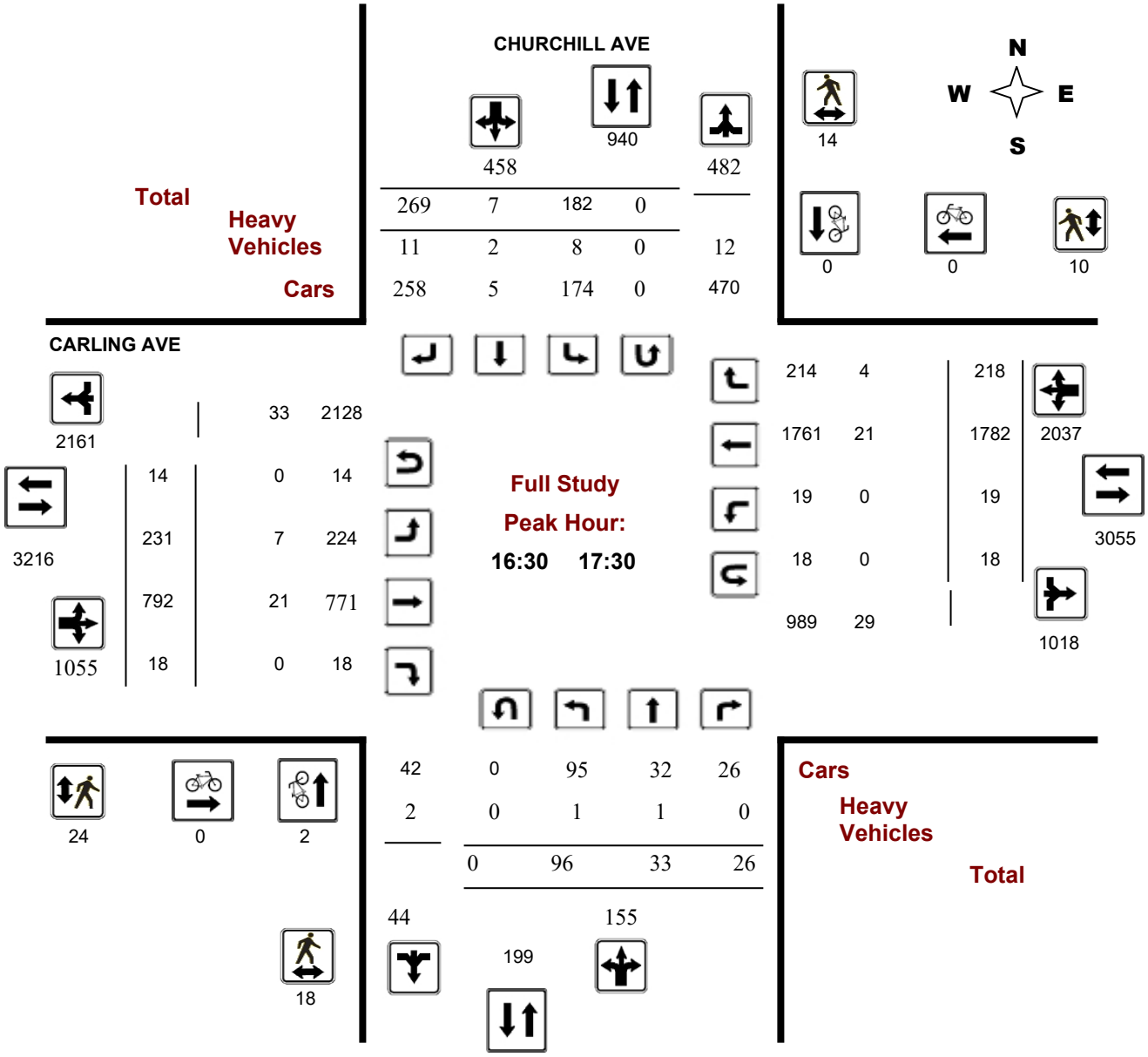
Transportation Services - Traffic Services

Turning Movement Count - Full Study Peak Hour Diagram

CARLING AVE @ CHURCHILL AVE

Survey Date: Tuesday, April 25, 2017 **WO No:** 36955

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



Comments

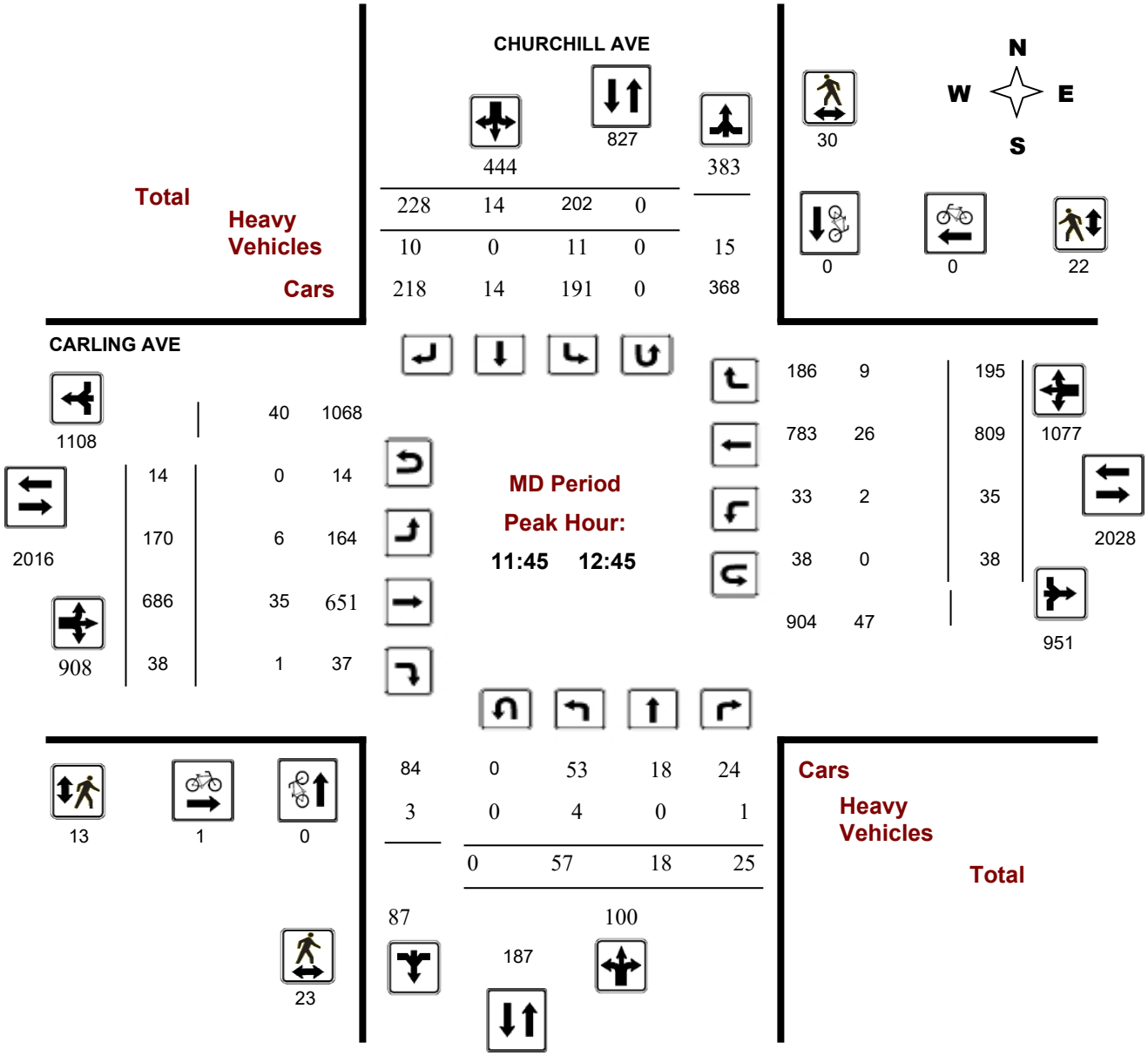
Transportation Services - Traffic Services

Turning Movement Count - Full Study Peak Hour Diagram

CARLING AVE @ CHURCHILL AVE

Survey Date: Tuesday, April 25, 2017 **WO No:** 36955

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



Comments

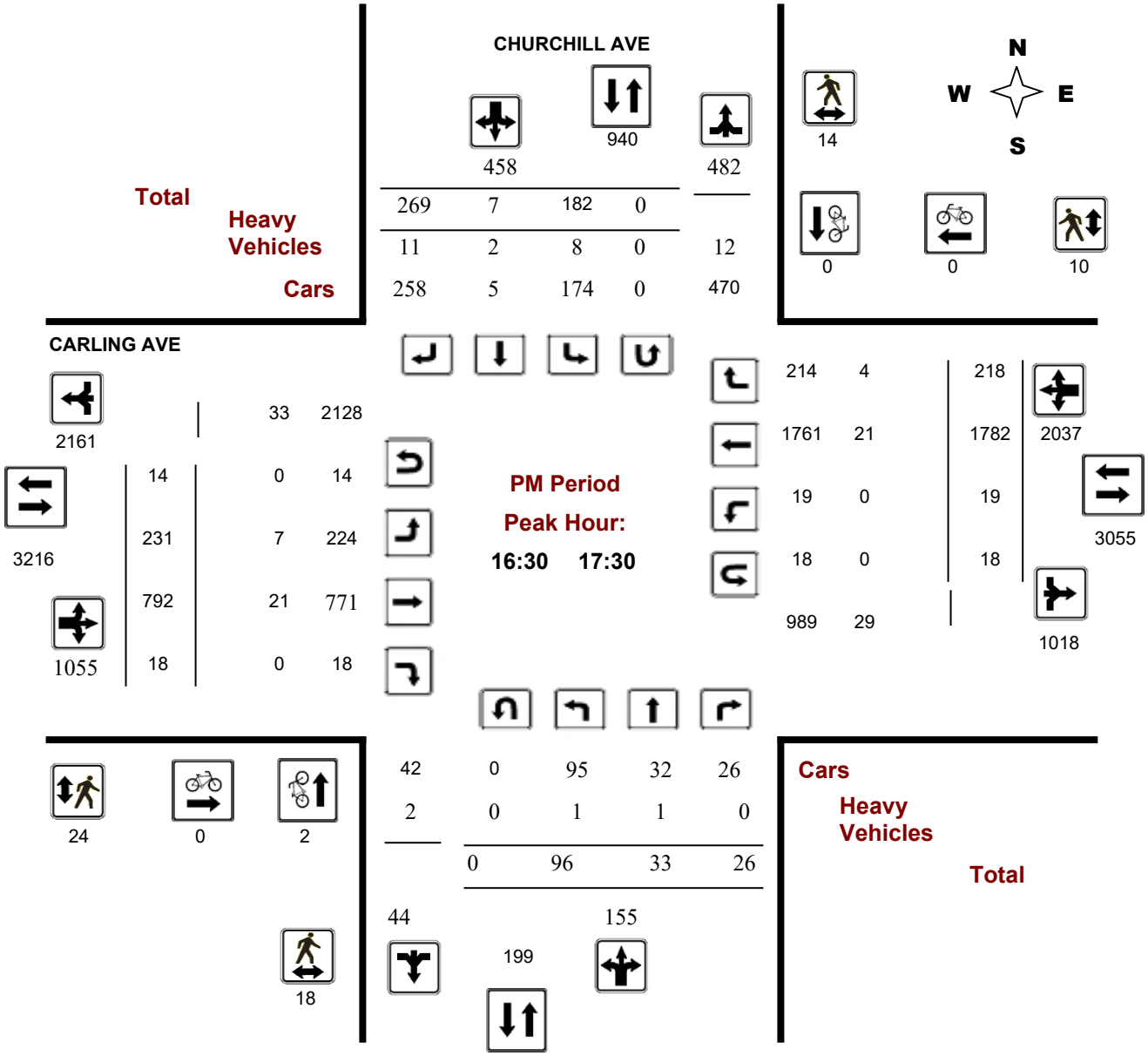
Transportation Services - Traffic Services

Turning Movement Count - Full Study Peak Hour Diagram

CARLING AVE @ CHURCHILL AVE

Survey Date: Tuesday, April 25, 2017 **WO No:** 36955

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



Comments

Transportation Services - Traffic Services

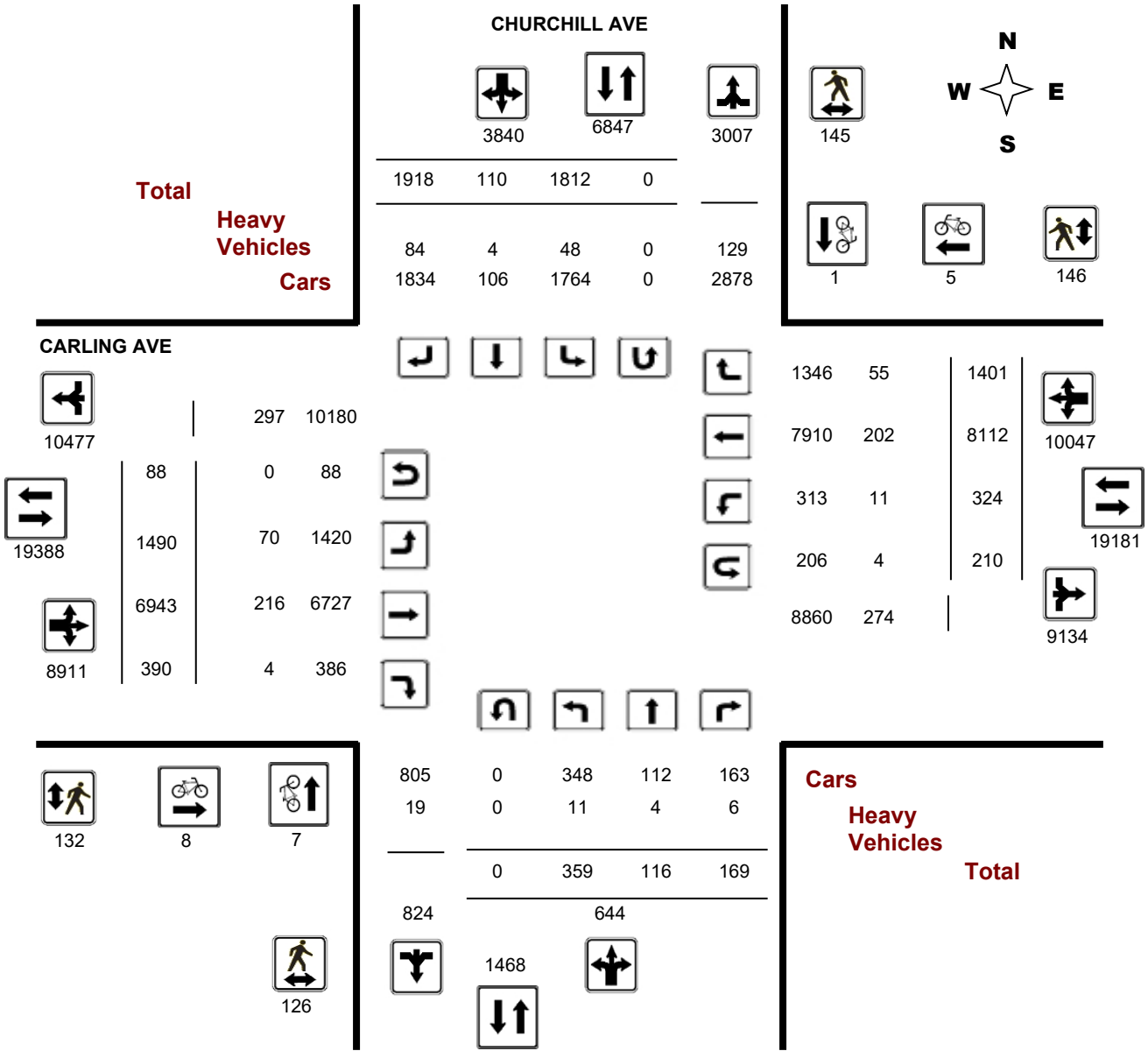
Turning Movement Count - Full Study Diagram

CARLING AVE @ CHURCHILL AVE

Survey Date: Tuesday, April 25, 2017

WO#: 36955

Device: Miovision



Comments

Transportation Services - Traffic Services

Work Order 36955

Turning Movement Count - Full Study Summary Report

CARLING AVE @ CHURCHILL AVE

Survey Date: Tuesday, April 25, 2017

Total Observed U-Turns

Northbound: 0 Southbound: 0

Eastbound: 88 Westbound: 210

AADT Factor .90

Full Study

	CHURCHILL AVE									CARLING AVE									
	Northbound				Southbound					Eastbound				Westbound					
Period	LT	ST	RT	**NB TOT**	LT	ST	RT	**SB TOT**	**STR TOT**	LT	ST	RT	**EB TOT**	LT	ST	RT	**WB TOT**	**STR TOT**	**Grand Total**
07:00 08:00	14	6	9	**29**	252	11	180	**443**	**472**	144	1213	76	**1433**	55	416	118	**589**	**2022**	**2494**
08:00 09:00	11	5	11	**27**	336	31	243	**610**	**637**	167	1352	98	**1617**	85	610	154	**849**	**2466**	**3103**
09:00 10:00	24	5	25	**54**	224	19	212	**455**	**509**	171	790	77	**1038**	47	618	151	**816**	**1854**	**2363**
11:30 12:30	54	16	23	**93**	204	10	237	**451**	**544**	164	637	34	**835**	35	823	188	**1046**	**1881**	**2425**
12:30 13:30	46	11	30	**87**	188	13	241	**442**	**529**	192	749	51	**992**	45	713	185	**943**	**1935**	**2464**
15:00 16:00	38	18	21	**77**	220	12	259	**491**	**568**	203	709	22	**934**	24	1403	174	**1601**	**2535**	**3103**
16:00 17:00	87	24	31	**142**	175	11	276	**462**	**604**	239	740	17	**996**	22	1762	208	**1992**	**2988**	**3592**
17:00 18:00	85	31	19	**135**	213	3	270	**486**	**621**	210	753	15	**978**	11	1767	223	**2001**	**2979**	**3600**
Sub Total	359	116	169	**644**	1812	110	1918	**3840**	**4484**	1490	6943	390	**8823**	324	8112	1401	**9837**	**18660**	**23144**
U Turns				**0**				**0**	**0**				**88**				**210**	**298**	**298**
Total	359	116	169	**644**	1812	110	1918	**3840**	**4484**	1490	6943	390	**8911**	324	8112	1401	**10047**	**18958**	**23442**
EQ 12Hr	499	161	235	**895**	2519	153	2666	**5338**	**6233**	2071	9651	542	**12386**	450	11276	1947	**13965**	**26351**	**32584**
Note: These values are calculated by multiplying the totals by the appropriate expansion factor.													**1.39**						
AVG 12Hr	449	145	211	**806**	2267	138	2399	**4804**	**5610**	1864	8686	488	**11148**	405	10148	1753	**12569**	**23717**	**29327**
Note: These volumes are calculated by multiplying the Equivalent 12 hr. totals by the AADT factor.													**.90**						
AVG 24Hr	588	190	277	**1055**	2970	180	3143	**6293**	**7348**	2442	11378	639	**14603**	531	13294	2296	**16465**	**31068**	**38416**
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

W.O. 36955

Turning Movement Count - 15 Minute Summary Report

CARLING AVE @ CHURCHILL AVE

Survey Date: Tuesday, April 25, 2017

Total Observed U-Turns

Northbound: 0 Southbound: 0

Eastbound: 88 Westbound: 210

CHURCHILL AVE **CARLING AVE**

Time Period		Northbound				Southbound					Eastbound				Westbound					
		LT	ST	RT	N TOT	LT	ST	RT	S TOT	STR TOT	LT	ST	RT	E TOT	LT	ST	RT	W TOT	STR TOT	Grand Total
07:00	07:15	3	2	2	**7**	48	2	36	**86**	**93**	23	227	16	**267**	14	81	25	**123**	**390**	**483**
07:15	07:30	1	0	1	**2**	43	1	40	**84**	**86**	26	295	14	**337**	12	94	32	**140**	**477**	**563**
07:30	07:45	6	1	3	**10**	76	4	54	**134**	**144**	39	328	15	**383**	15	99	25	**148**	**531**	**675**
07:45	08:00	4	3	3	**10**	85	4	50	**139**	**149**	56	363	31	**451**	14	142	36	**197**	**648**	**797**
08:00	08:15	4	0	5	**9**	85	7	67	**159**	**168**	29	370	26	**426**	11	108	35	**158**	**584**	**752**
08:15	08:30	1	1	2	**4**	73	5	53	**131**	**135**	36	330	27	**395**	24	162	42	**235**	**630**	**765**
08:30	08:45	1	2	2	**5**	95	9	71	**175**	**180**	50	322	18	**392**	24	165	38	**234**	**626**	**806**
08:45	09:00	5	2	2	**9**	83	10	52	**145**	**154**	52	330	27	**410**	26	175	39	**243**	**653**	**807**
09:00	09:15	4	2	8	**14**	86	8	51	**145**	**159**	46	211	26	**285**	9	146	32	**196**	**481**	**640**
09:15	09:30	5	1	3	**9**	34	4	43	**81**	**90**	39	213	26	**280**	12	147	40	**205**	**485**	**575**
09:30	09:45	6	1	9	**16**	59	5	58	**122**	**138**	44	203	12	**263**	16	146	42	**211**	**474**	**612**
09:45	10:00	9	1	5	**15**	45	2	60	**107**	**122**	42	163	13	**221**	10	179	37	**236**	**457**	**579**
11:30	11:45	9	1	7	**17**	47	0	60	**107**	**124**	44	149	7	**201**	8	196	47	**264**	**465**	**589**
11:45	12:00	15	3	5	**23**	63	3	58	**124**	**147**	41	165	6	**217**	8	195	45	**263**	**480**	**627**
12:00	12:15	17	6	9	**32**	54	2	63	**119**	**151**	37	146	12	**199**	12	229	48	**296**	**495**	**646**
12:15	12:30	13	6	2	**21**	40	5	56	**101**	**122**	42	177	9	**232**	7	203	48	**267**	**499**	**621**
12:30	12:45	12	3	9	**24**	45	4	51	**100**	**124**	50	198	11	**260**	8	182	54	**251**	**511**	**635**
12:45	13:00	17	3	10	**30**	46	2	69	**117**	**147**	44	164	12	**224**	18	176	42	**243**	**467**	**614**
13:00	13:15	9	4	6	**19**	47	5	62	**114**	**133**	51	173	14	**240**	7	197	46	**259**	**499**	**632**
13:15	13:30	8	1	5	**14**	50	2	59	**111**	**125**	47	214	14	**278**	12	158	43	**227**	**505**	**630**
15:00	15:15	10	3	6	**19**	53	3	61	**117**	**136**	44	186	6	**240**	9	286	32	**334**	**574**	**710**
15:15	15:30	11	4	5	**20**	51	7	69	**127**	**147**	47	172	5	**229**	5	317	38	**367**	**596**	**743**
15:30	15:45	6	9	4	**19**	63	0	70	**133**	**152**	68	175	7	**254**	5	354	48	**414**	**668**	**820**
15:45	16:00	11	2	6	**19**	53	2	59	**114**	**133**	44	176	4	**227**	5	446	56	**510**	**737**	**870**
16:00	16:15	25	4	9	**38**	47	2	79	**128**	**166**	63	175	4	**245**	7	394	45	**449**	**694**	**860**
16:15	16:30	26	4	9	**39**	54	4	63	**121**	**160**	57	182	3	**243**	4	476	50	**533**	**776**	**936**
16:30	16:45	16	6	9	**31**	45	2	55	**102**	**133**	59	194	2	**262**	6	408	59	**481**	**743**	**876**
16:45	17:00	20	10	4	**34**	29	3	79	**111**	**145**	60	189	8	**259**	5	484	54	**547**	**806**	**951**
17:00	17:15	38	10	11	**59**	43	1	68	**112**	**171**	67	205	4	**278**	3	422	54	**482**	**760**	**931**
17:15	17:30	22	7	2	**31**	65	1	67	**133**	**164**	45	204	4	**256**	5	468	51	**527**	**783**	**947**
17:30	17:45	13	6	1	**20**	48	0	62	**110**	**130**	58	161	3	**228**	2	440	49	**493**	**721**	**851**
17:45	18:00	12	8	5	**25**	57	1	73	**131**	**156**	40	183	4	**229**	1	437	69	**514**	**743**	**899**
TOTAL:		359	116	169	**644**	1812	110	1918	**3840**	**4484**	1490	6943	390	**8911**	324	8112	1401	**10047**	**18958**	**23442**

Note: U-Turns are included in Totals.

Comment:

Transportation Services - Traffic Services

Turning Movement Count - Cyclist Volume Report

Work Order
36955

CARLING AVE @ CHURCHILL AVE

Count Date: Tuesday, April 25, 2017 **Start Time:** 07:00

	CHURCHILL AVE			CARLING AVE			
Time Period	Northbound	Southbound	**Street Total**	Eastbound	Westbound	**Street Total**	**Grand Total**
07:00 08:00	0	0	**0**	2	1	**3**	**3**
08:00 09:00	1	0	**1**	0	0	**0**	**1**
09:00 10:00	2	1	**3**	2	0	**2**	**5**
11:30 12:30	0	0	**0**	0	1	**1**	**1**
12:30 13:30	0	0	**0**	3	1	**4**	**4**
15:00 16:00	2	0	**2**	1	1	**2**	**4**
16:00 17:00	0	0	**0**	0	1	**1**	**1**
17:00 18:00	2	0	**2**	0	0	**0**	**2**
Total	7	1	**8**	8	5	**13**	**21**

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

W.O. 36955

Turning Movement Count - Heavy Vehicle Report

CARLING AVE @ CHURCHILL AVE

Survey Date: Tuesday, April 25, 2017

		CHURCHILL AVE									CARLING AVE									
		Northbound				Southbound					Eastbound				Westbound					
Time Period		LT	ST	RT	N TOT	LT	ST	RT	S TOT	STR TOT	LT	ST	RT	E TOT	LT	ST	RT	W TOT	STR TOT	Grand Total
07:00	08:00	0	0	0	**0**	6	0	8	**14**	**14**	16	22	0	**38**	1	22	9	**33**	**71**	**85**
08:00	09:00	1	1	1	**3**	10	1	14	**25**	**28**	11	32	1	**44**	2	25	14	**41**	**85**	**113**
09:00	10:00	2	1	3	**6**	7	0	9	**16**	**22**	9	34	2	**45**	6	25	5	**38**	**83**	**105**
11:30	12:30	5	0	0	**5**	10	0	10	**20**	**25**	10	29	1	**40**	2	34	13	**49**	**89**	**114**
12:30	13:30	1	0	1	**2**	2	0	13	**15**	**17**	6	35	0	**41**	0	31	3	**35**	**76**	**93**
15:00	16:00	0	1	1	**2**	4	0	11	**15**	**17**	7	24	0	**31**	0	26	5	**31**	**62**	**79**
16:00	17:00	1	0	0	**1**	2	3	9	**14**	**15**	7	23	0	**30**	0	23	3	**26**	**56**	**71**
17:00	18:00	1	1	0	**2**	7	0	10	**17**	**19**	4	17	0	**21**	0	16	3	**19**	**40**	**59**
Sub Total		11	4	6	**21**	48	4	84	**136**	**157**	70	216	4	**290**	11	202	55	**272**	**562**	**719**
U-Turns (Heavy Vehicles)					**0**				**0**	**0**				**0**				**4**	**4**	**4**
Total		11	4	6	**0**	48	4	84	**136**	**157**	70	216	4	**290**	11	202	55	**276**	**566**	**723**

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
36955

Turning Movement Count - Pedestrian Volume Report

CARLING AVE @ CHURCHILL AVE

Count Date: Tuesday, April 25, 2017 **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	3	3	**6**	1	4	**5**	**11**
07:15 07:30	3	5	**8**	6	7	**13**	**21**
07:30 07:45	4	2	**6**	2	5	**7**	**13**
07:45 08:00	1	2	**3**	5	5	**10**	**13**
07:00 08:00	11	12	**23**	14	21	**35**	**58**
08:00 08:15	1	2	**3**	5	3	**8**	**11**
08:15 08:30	5	3	**8**	6	4	**10**	**18**
08:30 08:45	4	3	**7**	8	4	**12**	**19**
08:45 09:00	4	8	**12**	4	7	**11**	**23**
08:00 09:00	14	16	**30**	23	18	**41**	**71**
09:00 09:15	3	4	**7**	7	2	**9**	**16**
09:15 09:30	1	5	**6**	2	7	**9**	**15**
09:30 09:45	5	5	**10**	3	7	**10**	**20**
09:45 10:00	1	3	**4**	0	3	**3**	**7**
09:00 10:00	10	17	**27**	12	19	**31**	**58**
11:30 11:45	4	5	**9**	5	6	**11**	**20**
11:45 12:00	2	9	**11**	1	5	**6**	**17**
12:00 12:15	4	7	**11**	2	6	**8**	**19**
12:15 12:30	9	9	**18**	5	2	**7**	**25**
11:30 12:30	19	30	**49**	13	19	**32**	**81**
12:30 12:45	8	5	**13**	5	9	**14**	**27**
12:45 13:00	8	6	**14**	6	9	**15**	**29**
13:00 13:15	9	3	**12**	6	6	**12**	**24**
13:15 13:30	3	4	**7**	2	6	**8**	**15**
12:30 13:30	28	18	**46**	19	30	**49**	**95**
15:00 15:15	2	5	**7**	2	4	**6**	**13**
15:15 15:30	5	6	**11**	8	4	**12**	**23**
15:30 15:45	10	2	**12**	3	4	**7**	**19**
15:45 16:00	1	3	**4**	3	2	**5**	**9**
15:00 16:00	18	16	**34**	16	14	**30**	**64**
16:00 16:15	2	4	**6**	3	3	**6**	**12**
16:15 16:30	5	6	**11**	3	6	**9**	**20**
16:30 16:45	1	7	**8**	5	3	**8**	**16**
16:45 17:00	3	1	**4**	3	1	**4**	**8**
16:00 17:00	11	18	**29**	14	13	**27**	**56**
17:00 17:15	6	4	**10**	9	4	**13**	**23**
17:15 17:30	8	2	**10**	7	2	**9**	**19**
17:30 17:45	1	7	**8**	4	4	**8**	**16**
17:45 18:00	0	5	**5**	1	2	**3**	**8**
17:00 18:00	15	18	**33**	21	12	**33**	**66**
Total	126	145	**271**	132	146	**278**	**549**

Comment:

Transportation Services - Traffic Services

Work Order
36955

Turning Movement Count - 15 Min U-Turn Total Report

CARLING AVE @ CHURCHILL AVE

Survey Date: Tuesday, April 25, 2017

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	1	3	4
07:15	07:30	0	0	2	2	4
07:30	07:45	0	0	1	9	10
07:45	08:00	0	0	1	5	6
08:00	08:15	0	0	1	4	5
08:15	08:30	0	0	2	7	9
08:30	08:45	0	0	2	7	9
08:45	09:00	0	0	1	3	4
09:00	09:15	0	0	2	9	11
09:15	09:30	0	0	2	6	8
09:30	09:45	0	0	4	7	11
09:45	10:00	0	0	3	10	13
11:30	11:45	0	0	1	13	14
11:45	12:00	0	0	5	15	20
12:00	12:15	0	0	4	7	11
12:15	12:30	0	0	4	9	13
12:30	12:45	0	0	1	7	8
12:45	13:00	0	0	4	7	11
13:00	13:15	0	0	2	9	11
13:15	13:30	0	0	3	14	17
15:00	15:15	0	0	4	7	11
15:15	15:30	0	0	5	7	12
15:30	15:45	0	0	4	7	11
15:45	16:00	0	0	3	3	6
16:00	16:15	0	0	3	3	6
16:15	16:30	0	0	1	3	4
16:30	16:45	0	0	7	8	15
16:45	17:00	0	0	2	4	6
17:00	17:15	0	0	2	3	5
17:15	17:30	0	0	3	3	6
17:30	17:45	0	0	6	2	8
17:45	18:00	0	0	2	7	9
Total		0	0	88	210	298

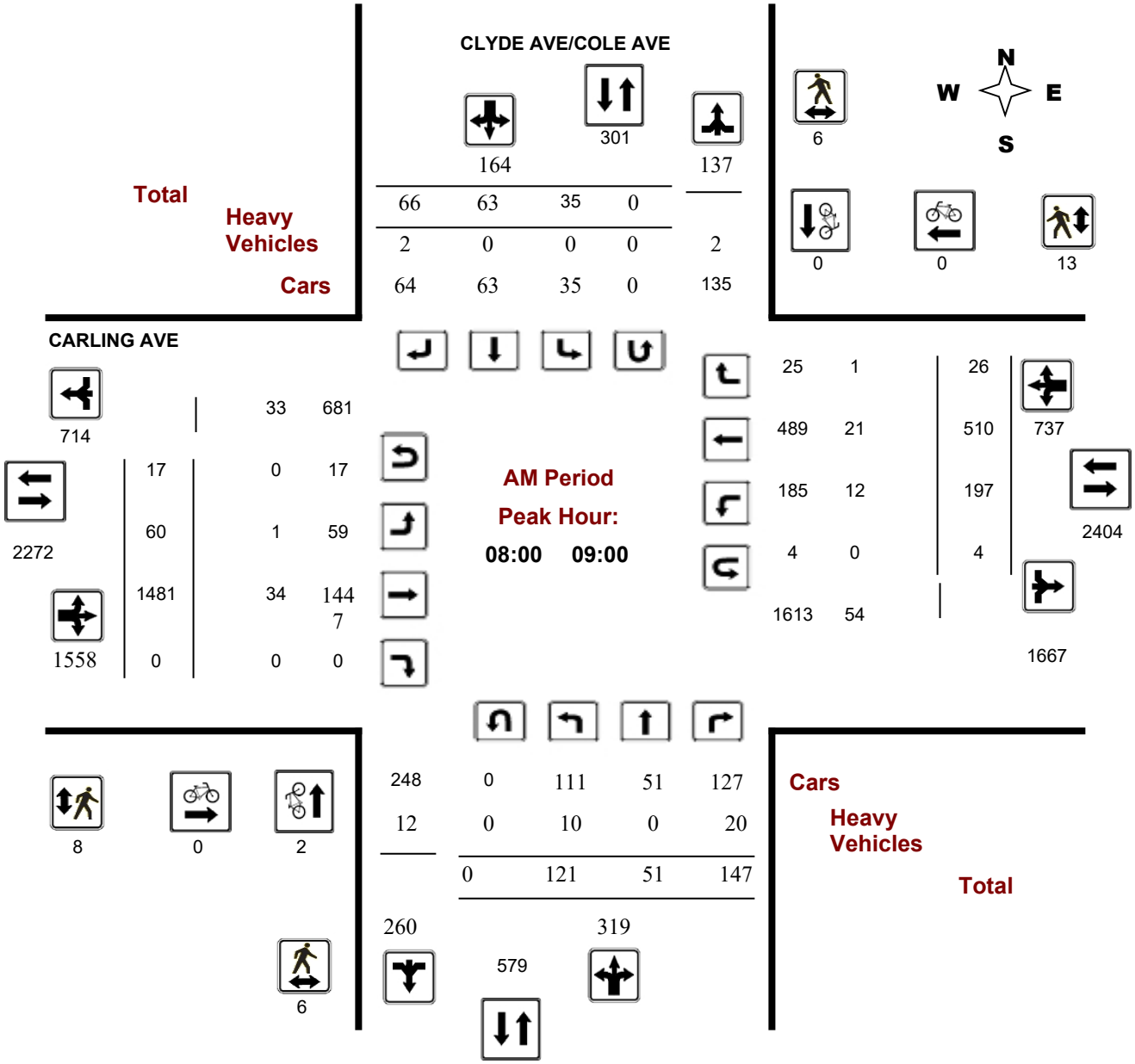
Transportation Services - Traffic Services

Turning Movement Count - Full Study Peak Hour Diagram

CARLING AVE @ CLYDE AVE/COLE AVE

Survey Date: Wednesday, January 27, 2016 **WO No:** 35669

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



Comments

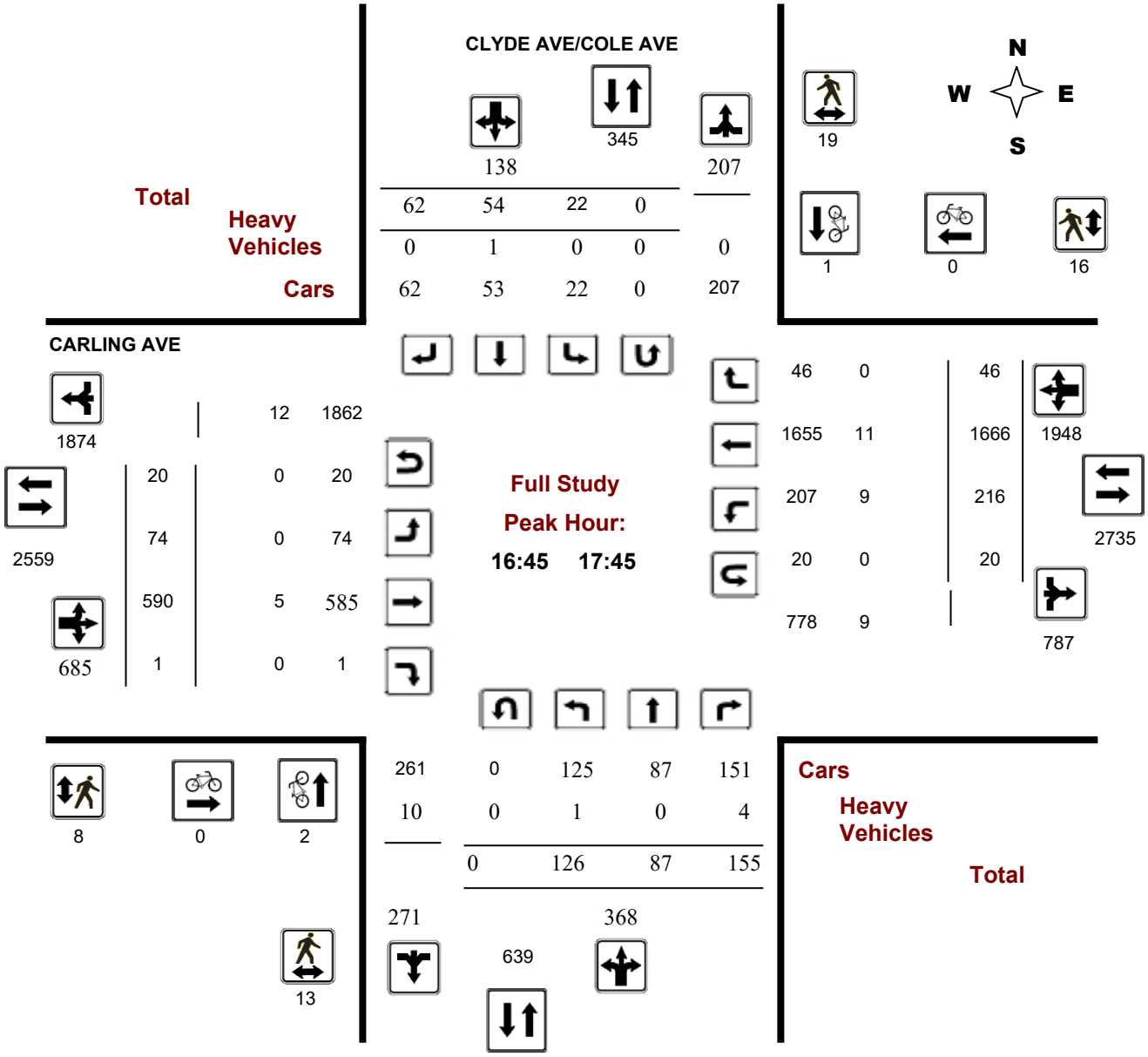
Transportation Services - Traffic Services

Turning Movement Count - Full Study Peak Hour Diagram

CARLING AVE @ CLYDE AVE/COLE AVE

Survey Date: Wednesday, January 27, 2016 **WO No:** 35669

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



Comments

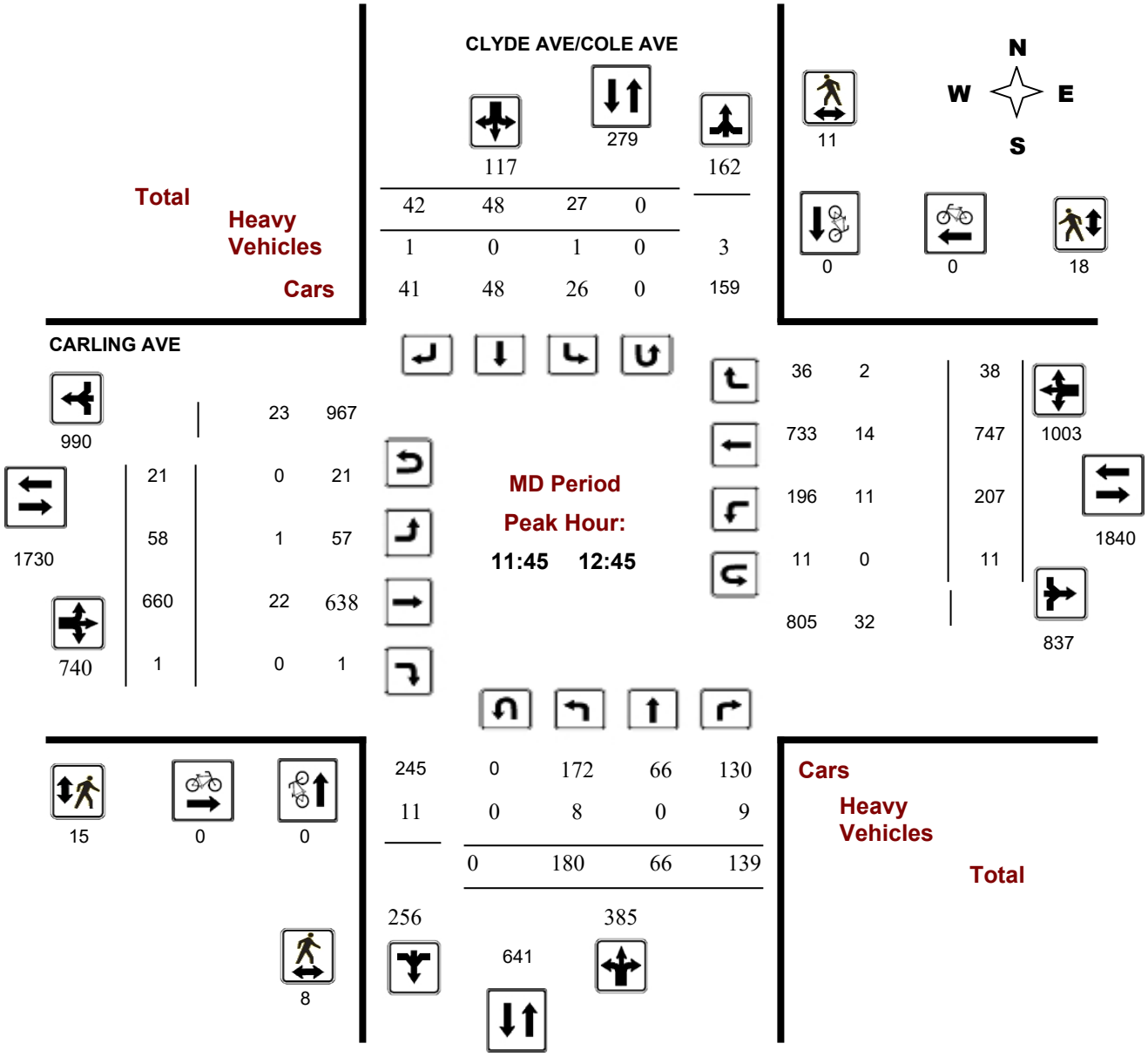
Transportation Services - Traffic Services

Turning Movement Count - Full Study Peak Hour Diagram

CARLING AVE @ CLYDE AVE/COLE AVE

Survey Date: Wednesday, January 27, 2016 **WO No:** 35669

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



Comments

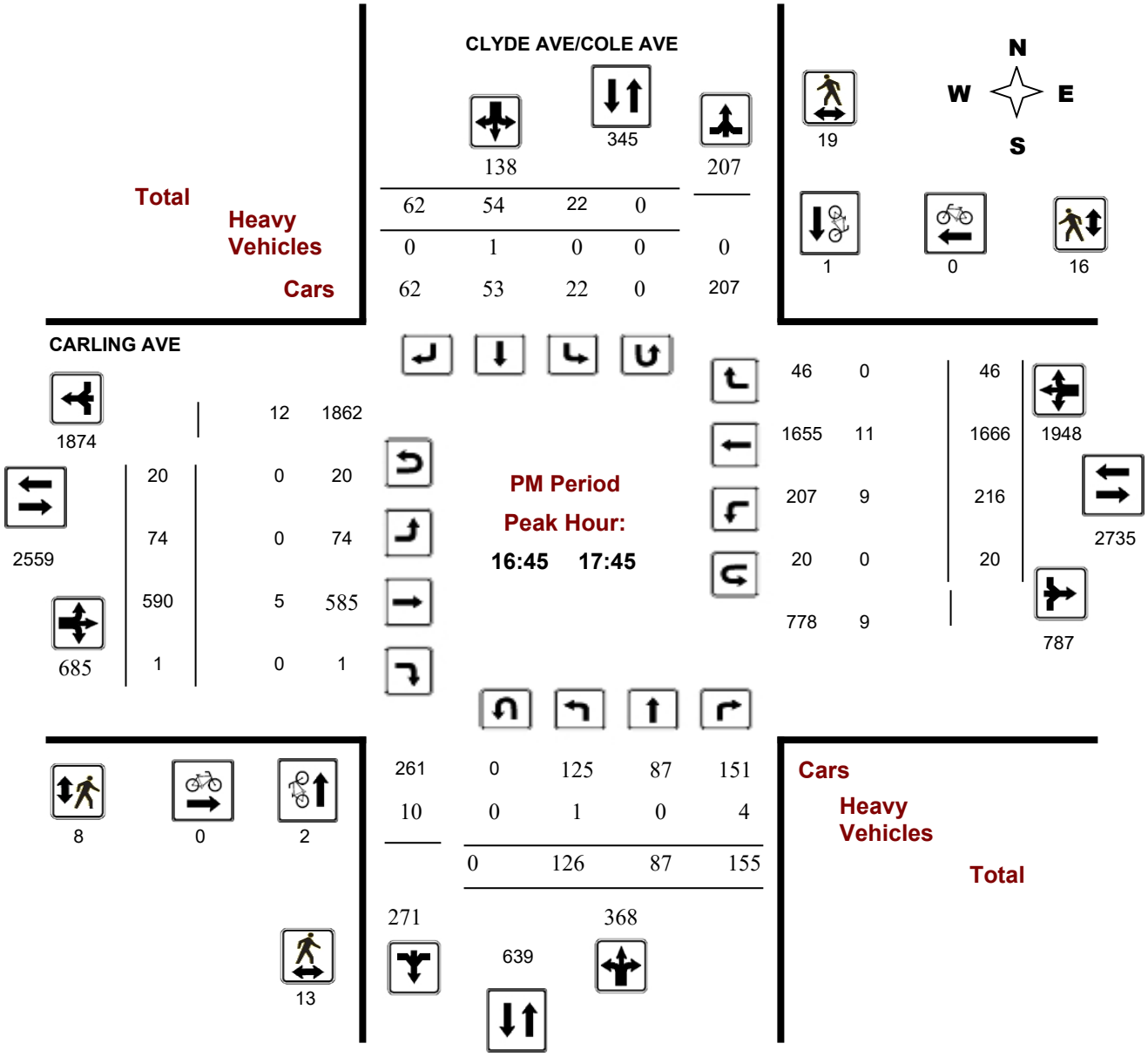
Transportation Services - Traffic Services

Turning Movement Count - Full Study Peak Hour Diagram

CARLING AVE @ CLYDE AVE/COLE AVE

Survey Date: Wednesday, January 27, 2016 **WO No:** 35669

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



Comments

Transportation Services - Traffic Services

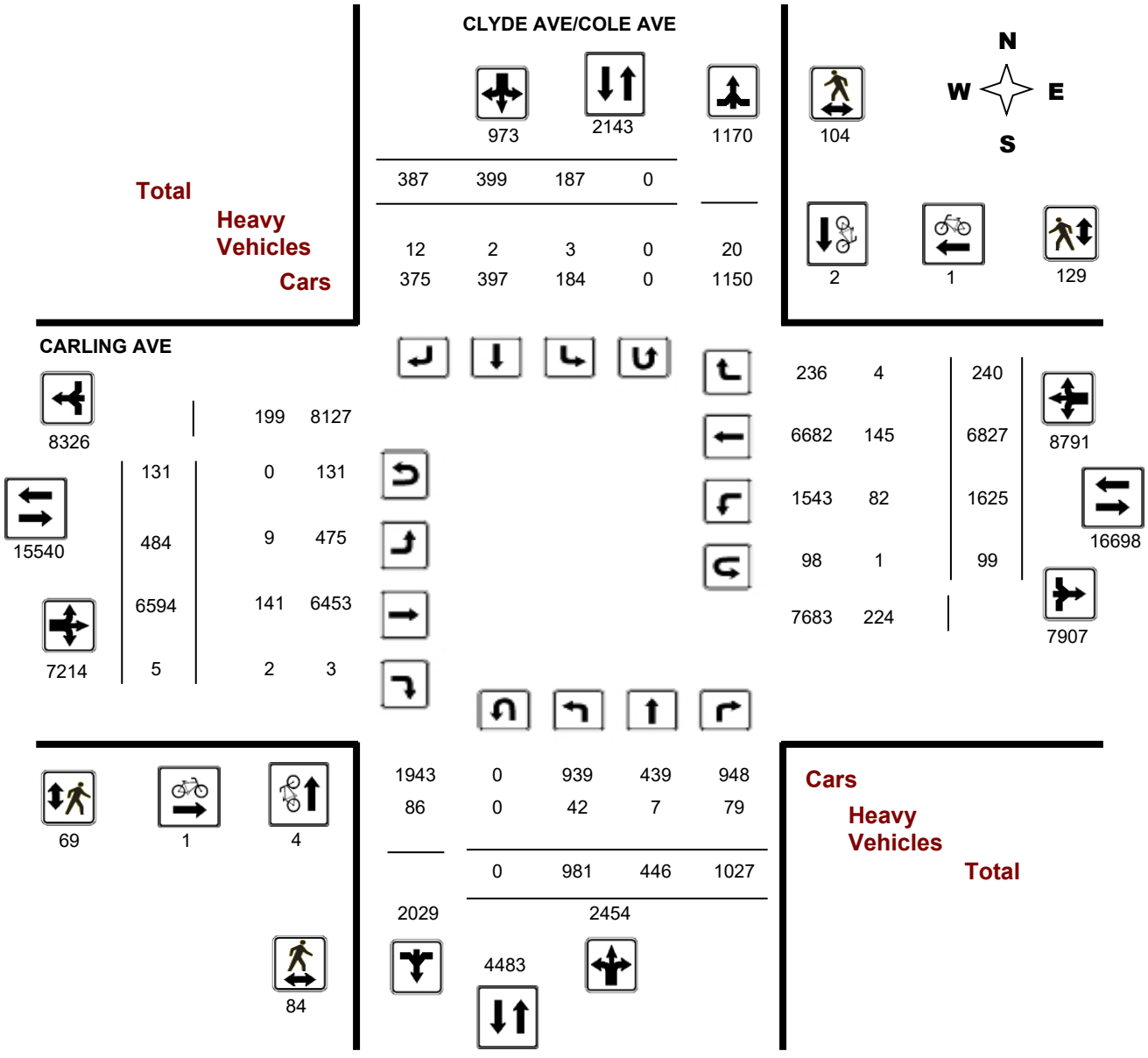
Turning Movement Count - Full Study Diagram

CARLING AVE @ CLYDE AVE/COLE AVE

Survey Date: Wednesday, January 27, 2016

WO#: 35669

Device: Miovision



Comments

Transportation Services - Traffic Services

Work Order
35669

Turning Movement Count - Full Study Summary Report

CARLING AVE @ CLYDE AVE/COLE AVE

Survey Date: Wednesday, January 27, 201

Total Observed U-Turns

Northbound: 0 Southbound: 0

Eastbound: 131 Westbound: 99

AADT Factor
1.00

Full Study

	CLYDE AVE/COLE AVE									CARLING AVE									
	Northbound				Southbound					Eastbound				Westbound					
Period	LT	ST	RT	**NB TOT**	LT	ST	RT	**SB TOT**	**STR TOT**	LT	ST	RT	**EB TOT**	LT	ST	RT	**WB TOT**	**STR TOT**	**Grand Total**
07:00 08:00	47	19	80	**146**	23	27	31	**81**	**227**	38	1209	0	**1247**	180	319	13	**512**	**1759**	**1986**
08:00 09:00	121	51	147	**319**	35	63	66	**164**	**483**	60	1481	0	**1541**	197	510	26	**733**	**2274**	**2757**
09:00 10:00	108	31	97	**236**	16	40	39	**95**	**331**	61	784	0	**845**	191	540	12	**743**	**1588**	**1919**
11:30 12:30	159	69	137	**365**	22	50	47	**119**	**484**	54	642	2	**698**	214	743	33	**990**	**1688**	**2172**
12:30 13:30	129	52	133	**314**	29	47	50	**126**	**440**	77	689	0	**766**	187	672	27	**886**	**1652**	**2092**
15:00 16:00	165	56	139	**360**	16	43	44	**103**	**463**	41	657	2	**700**	221	1117	34	**1372**	**2072**	**2535**
16:00 17:00	120	68	147	**335**	20	73	41	**134**	**469**	75	540	0	**615**	228	1381	51	**1660**	**2275**	**2744**
17:00 18:00	132	100	147	**379**	26	56	69	**151**	**530**	78	592	1	**671**	207	1545	44	**1796**	**2467**	**2997**
Sub Total	981	446	1027	**2454**	187	399	387	**973**	**3427**	484	6594	5	**7083**	1625	6827	240	**8692**	**15775**	**19202**
U Turns				**0**				**0**	**0**				**131**				**99**	**230**	**230**
Total	981	446	1027	**2454**	187	399	387	**973**	**3427**	484	6594	5	**7214**	1625	6827	240	**8791**	**16005**	**19432**
EQ 12Hr	1364	620	1428	**3411**	260	555	538	**1352**	**4763**	673	9166	7	**10027**	2259	9490	334	**12219**	**22246**	**27009**
Note: These values are calculated by multiplying the totals by the appropriate expansion factor.													**1.39**						
AVG 12Hr	1364	620	1428	**3411**	260	555	538	**1352**	**4763**	673	9166	7	**10027**	2259	9490	334	**12219**	**22246**	**27009**
Note: These volumes are calculated by multiplying the Equivalent 12 hr. totals by the AADT factor.													**1.00**						
AVG 24Hr	1786	812	1870	**4468**	341	727	705	**1772**	**6240**	881	12007	9	**13136**	2959	12431	437	**16008**	**29144**	**35384**
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

W.O. 35669

Turning Movement Count - 15 Minute Summary Report

CARLING AVE @ CLYDE AVE/COLE AVE

Survey Date: Wednesday, January 27, 2016

Total Observed U-Turns

Northbound: 0 Southbound: 0

Eastbound: 131 Westbound: 99

		CLYDE AVE/COLE AVE									CARLING AVE									
		Northbound				Southbound					Eastbound				Westbound					
Time Period		LT	ST	RT	N TOT	LT	ST	RT	S TOT	STR TOT	LT	ST	RT	E TOT	LT	ST	RT	W TOT	STR TOT	Grand Total
07:00	07:15	6	2	13	**21**	3	1	3	**7**	**28**	8	221	0	**229**	37	46	4	**89**	**318**	**346**
07:15	07:30	10	5	10	**25**	5	7	9	**21**	**46**	10	281	0	**294**	50	77	4	**133**	**427**	**473**
07:30	07:45	13	4	21	**38**	8	6	8	**22**	**60**	9	344	0	**357**	50	86	1	**141**	**498**	**558**
07:45	08:00	18	8	36	**62**	7	13	11	**31**	**93**	11	363	0	**378**	43	110	4	**158**	**536**	**629**
08:00	08:15	34	6	29	**69**	6	12	17	**35**	**104**	15	393	0	**409**	41	112	5	**159**	**568**	**672**
08:15	08:30	33	16	39	**88**	13	10	21	**44**	**132**	12	383	0	**398**	48	116	2	**166**	**564**	**696**
08:30	08:45	23	14	49	**86**	12	19	16	**47**	**133**	16	399	0	**421**	43	146	7	**198**	**619**	**752**
08:45	09:00	31	15	30	**76**	4	22	12	**38**	**114**	17	306	0	**330**	65	136	12	**214**	**544**	**658**
09:00	09:15	25	6	18	**49**	8	13	13	**34**	**83**	17	269	0	**290**	64	138	3	**206**	**496**	**579**
09:15	09:30	30	7	28	**65**	4	16	8	**28**	**93**	19	208	0	**229**	55	117	4	**178**	**407**	**500**
09:30	09:45	24	9	30	**63**	1	9	8	**18**	**81**	14	152	0	**172**	37	130	3	**171**	**343**	**424**
09:45	10:00	29	9	21	**59**	3	2	10	**15**	**74**	11	155	0	**170**	35	155	2	**194**	**364**	**438**
11:30	11:45	18	16	30	**64**	4	18	12	**34**	**98**	12	169	1	**189**	50	155	4	**212**	**401**	**499**
11:45	12:00	63	14	33	**110**	4	6	15	**25**	**135**	15	149	1	**172**	55	195	9	**261**	**433**	**568**
12:00	12:15	39	20	40	**99**	7	11	12	**30**	**129**	13	148	0	**168**	57	204	9	**274**	**442**	**571**
12:15	12:30	39	19	34	**92**	7	15	8	**30**	**122**	14	176	0	**192**	52	189	11	**254**	**446**	**568**
12:30	12:45	39	13	32	**84**	9	16	7	**32**	**116**	16	187	0	**208**	43	159	9	**214**	**422**	**538**
12:45	13:00	30	11	41	**82**	8	12	16	**36**	**118**	19	162	0	**187**	36	188	6	**236**	**423**	**541**
13:00	13:15	29	16	31	**76**	5	7	9	**21**	**97**	24	172	0	**198**	57	151	8	**220**	**418**	**515**
13:15	13:30	31	12	29	**72**	7	12	18	**37**	**109**	18	168	0	**191**	51	174	4	**231**	**422**	**531**
15:00	15:15	38	6	35	**79**	4	10	13	**27**	**106**	9	181	1	**195**	52	224	6	**285**	**480**	**586**
15:15	15:30	46	15	39	**100**	2	13	10	**25**	**125**	11	145	0	**161**	60	262	9	**335**	**496**	**621**
15:30	15:45	29	15	33	**77**	4	10	9	**23**	**100**	6	181	0	**190**	61	303	13	**382**	**572**	**672**
15:45	16:00	52	20	32	**104**	6	10	12	**28**	**132**	15	150	1	**171**	48	328	6	**386**	**557**	**689**
16:00	16:15	33	15	33	**81**	3	16	10	**29**	**110**	16	150	0	**169**	58	387	10	**460**	**629**	**739**
16:15	16:30	29	23	36	**88**	10	28	9	**47**	**135**	26	130	0	**157**	43	261	13	**321**	**478**	**613**
16:30	16:45	32	19	38	**89**	5	17	7	**29**	**118**	21	138	0	**162**	72	309	18	**402**	**564**	**682**
16:45	17:00	26	11	40	**77**	2	12	15	**29**	**106**	12	122	0	**137**	55	424	10	**489**	**626**	**732**
17:00	17:15	38	35	50	**123**	4	12	18	**34**	**157**	19	171	0	**201**	52	461	9	**527**	**728**	**885**
17:15	17:30	39	15	35	**89**	8	12	17	**37**	**126**	18	150	0	**169**	58	414	12	**488**	**657**	**783**
17:30	17:45	23	26	30	**79**	8	18	12	**38**	**117**	25	147	1	**178**	51	367	15	**444**	**622**	**739**
17:45	18:00	32	24	32	**88**	6	14	22	**42**	**130**	16	124	0	**142**	46	303	8	**363**	**505**	**635**
TOTAL:		981	446	1027	**2454**	187	399	387	**973**	**3427**	484	6594	5	**7214**	1625	6827	240	**8791**	**16005**	**19432**

Note: U-Turns are included in Totals.

Comment:

Transportation Services - Traffic Services

Turning Movement Count - Cyclist Volume Report

Work Order
35669

CARLING AVE @ CLYDE AVE/COLE AVE

Count Date: Wednesday, January 27, 2016 **Start Time:** 07:00

	CLYDE AVE/COLE AVE			CARLING AVE			
Time Period	Northbound	Southbound	**Street Total**	Eastbound	Westbound	**Street Total**	**Grand Total**
07:00 08:00	0	1	**1**	0	0	**0**	**1**
08:00 09:00	2	0	**2**	0	0	**0**	**2**
09:00 10:00	0	0	**0**	0	0	**0**	**0**
11:30 12:30	0	0	**0**	0	0	**0**	**0**
12:30 13:30	0	0	**0**	1	1	**2**	**2**
15:00 16:00	0	0	**0**	0	0	**0**	**0**
16:00 17:00	1	0	**1**	0	0	**0**	**1**
17:00 18:00	1	1	**2**	0	0	**0**	**2**
Total	4	2	**6**	1	1	**2**	**8**

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

W.O. 35669

Turning Movement Count - Heavy Vehicle Report

CARLING AVE @ CLYDE AVE/COLE AVE

Survey Date: Wednesday, January 27, 2016

		CLYDE AVE/COLE AVE									CARLING AVE									
		Northbound				Southbound					Eastbound				Westbound					
Time Period		LT	ST	RT	**N TOT**	LT	ST	RT	**S TOT**	**STR TOT**	LT	ST	RT	**E TOT**	LT	ST	RT	**W TOT**	**STR TOT**	**Grand Total**
07:00	08:00	6	1	13	**20**	0	0	4	**4**	**24**	3	12	0	**15**	6	14	0	**20**	**35**	**59**
08:00	09:00	10	0	20	**30**	0	0	2	**2**	**32**	1	34	0	**35**	12	21	1	**34**	**69**	**101**
09:00	10:00	6	1	14	**21**	1	0	1	**2**	**23**	1	27	0	**28**	12	26	0	**38**	**66**	**89**
11:30	12:30	6	0	10	**16**	1	0	0	**1**	**17**	1	25	0	**26**	15	18	2	**35**	**61**	**78**
12:30	13:30	5	3	9	**17**	0	1	2	**3**	**20**	0	16	0	**16**	12	15	0	**28**	**44**	**64**
15:00	16:00	5	2	6	**13**	0	0	3	**3**	**16**	1	13	2	**16**	7	21	1	**29**	**45**	**61**
16:00	17:00	4	0	2	**6**	1	1	0	**2**	**8**	2	8	0	**10**	8	17	0	**25**	**35**	**43**
17:00	18:00	0	0	5	**5**	0	0	0	**0**	**5**	0	6	0	**6**	10	13	0	**23**	**29**	**34**
Sub Total		42	7	79	**128**	3	2	12	**17**	**145**	9	141	2	**152**	82	145	4	**232**	**384**	**529**
U-Turns (Heavy Vehicles)					**0**				**0**	**0**				**0**				**1**	**1**	**1**
Total		42	7	79	**0**	3	2	12	**17**	**145**	9	141	2	**152**	82	145	4	**233**	**385**	**530**

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
35669

Turning Movement Count - Pedestrian Volume Report

CARLING AVE @ CLYDE AVE/COLE AVE

Count Date: Wednesday, January 27, 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	4	**5**	2	1	**3**	**8**
07:15 07:30	1	2	**3**	1	4	**5**	**8**
07:30 07:45	2	4	**6**	0	2	**2**	**8**
07:45 08:00	7	3	**10**	2	10	**12**	**22**
07:00 08:00	11	13	**24**	5	17	**22**	**46**
08:00 08:15	1	2	**3**	2	5	**7**	**10**
08:15 08:30	2	1	**3**	4	4	**8**	**11**
08:30 08:45	2	2	**4**	2	4	**6**	**10**
08:45 09:00	1	1	**2**	0	0	**0**	**2**
08:00 09:00	6	6	**12**	8	13	**21**	**33**
09:00 09:15	5	6	**11**	1	3	**4**	**15**
09:15 09:30	1	2	**3**	1	2	**3**	**6**
09:30 09:45	0	0	**0**	1	1	**2**	**2**
09:45 10:00	2	2	**4**	4	3	**7**	**11**
09:00 10:00	8	10	**18**	7	9	**16**	**34**
11:30 11:45	2	7	**9**	1	6	**7**	**16**
11:45 12:00	3	2	**5**	3	1	**4**	**9**
12:00 12:15	0	4	**4**	5	8	**13**	**17**
12:15 12:30	1	2	**3**	2	0	**2**	**5**
11:30 12:30	6	15	**21**	11	15	**26**	**47**
12:30 12:45	4	3	**7**	5	9	**14**	**21**
12:45 13:00	3	1	**4**	1	6	**7**	**11**
13:00 13:15	5	6	**11**	5	8	**13**	**24**
13:15 13:30	2	2	**4**	2	0	**2**	**6**
12:30 13:30	14	12	**26**	13	23	**36**	**62**
15:00 15:15	3	4	**7**	1	6	**7**	**14**
15:15 15:30	2	10	**12**	2	5	**7**	**19**
15:30 15:45	1	1	**2**	4	3	**7**	**9**
15:45 16:00	5	3	**8**	0	4	**4**	**12**
15:00 16:00	11	18	**29**	7	18	**25**	**54**
16:00 16:15	7	2	**9**	4	3	**7**	**16**
16:15 16:30	1	3	**4**	1	6	**7**	**11**
16:30 16:45	5	5	**10**	4	5	**9**	**19**
16:45 17:00	3	3	**6**	0	6	**6**	**12**
16:00 17:00	16	13	**29**	9	20	**29**	**58**
17:00 17:15	1	3	**4**	1	5	**6**	**10**
17:15 17:30	5	5	**10**	2	2	**4**	**14**
17:30 17:45	4	8	**12**	5	3	**8**	**20**
17:45 18:00	2	1	**3**	1	4	**5**	**8**
17:00 18:00	12	17	**29**	9	14	**23**	**52**
Total	84	104	**188**	69	129	**198**	**386**

Comment:

Transportation Services - Traffic Services

Work Order
35669

Turning Movement Count - 15 Min U-Turn Total Report

CARLING AVE @ CLYDE AVE/COLE AVE

Survey Date: Wednesday, January 27, 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	2	2
07:15	07:30	0	0	3	2	5
07:30	07:45	0	0	4	4	8
07:45	08:00	0	0	4	1	5
08:00	08:15	0	0	1	1	2
08:15	08:30	0	0	3	0	3
08:30	08:45	0	0	6	2	8
08:45	09:00	0	0	7	1	8
09:00	09:15	0	0	4	1	5
09:15	09:30	0	0	2	2	4
09:30	09:45	0	0	6	1	7
09:45	10:00	0	0	4	2	6
11:30	11:45	0	0	7	3	10
11:45	12:00	0	0	7	2	9
12:00	12:15	0	0	7	4	11
12:15	12:30	0	0	2	2	4
12:30	12:45	0	0	5	3	8
12:45	13:00	0	0	6	6	12
13:00	13:15	0	0	2	4	6
13:15	13:30	0	0	5	2	7
15:00	15:15	0	0	4	3	7
15:15	15:30	0	0	5	4	9
15:30	15:45	0	0	3	5	8
15:45	16:00	0	0	5	4	9
16:00	16:15	0	0	3	5	8
16:15	16:30	0	0	1	4	5
16:30	16:45	0	0	3	3	6
16:45	17:00	0	0	3	0	3
17:00	17:15	0	0	11	5	16
17:15	17:30	0	0	1	4	5
17:30	17:45	0	0	5	11	16
17:45	18:00	0	0	2	6	8
Total		0	0	131	99	230

ACCURATE TRUSTED TRAFFIC DATA

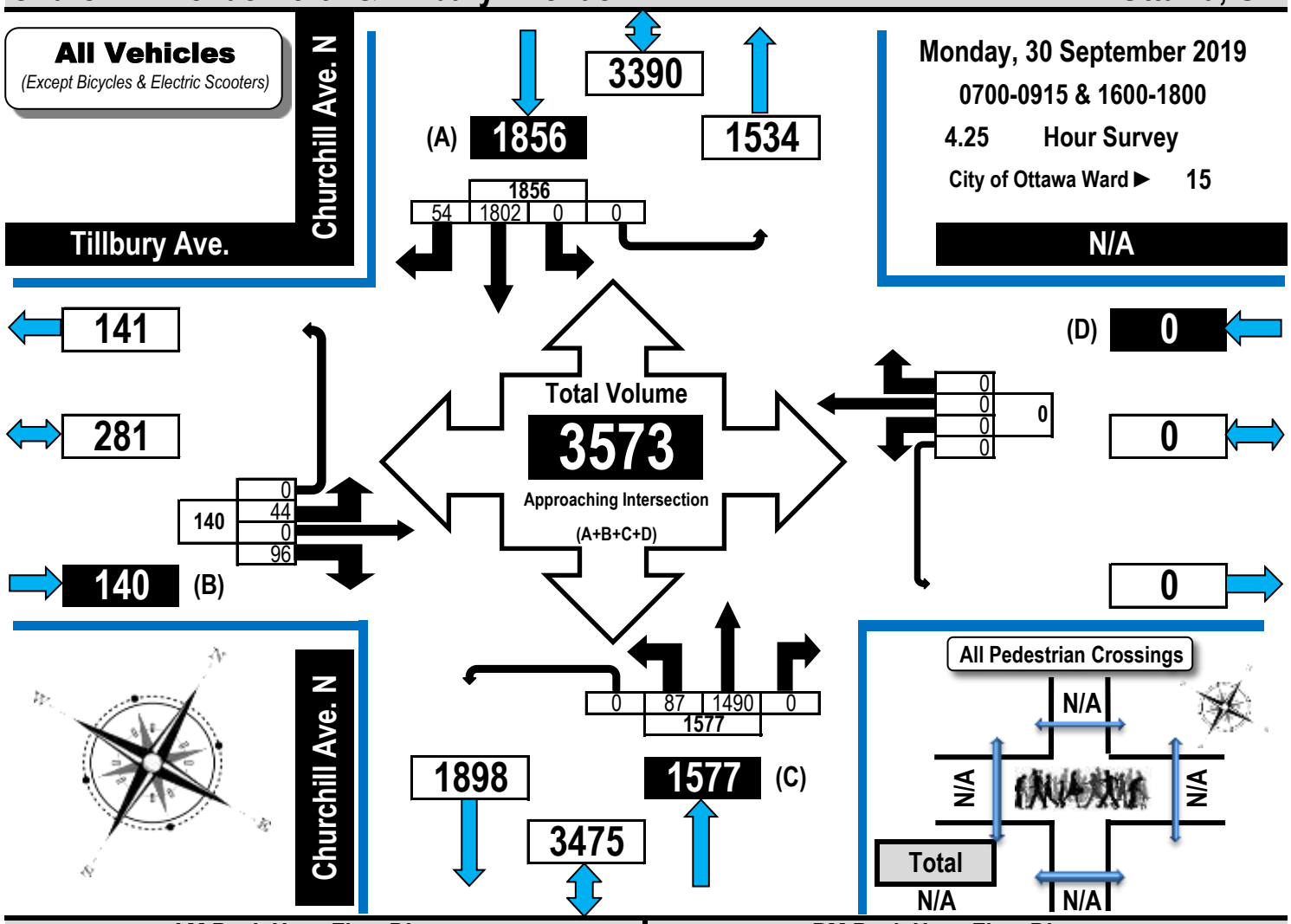
Turning Movement Count
Summary, AM and PM Peak Hour Flow Diagrams

Automobiles, Taxis, Light Trucks, Vans, SUV's, Motorcycles, Heavy Trucks, Buses, and School Buses

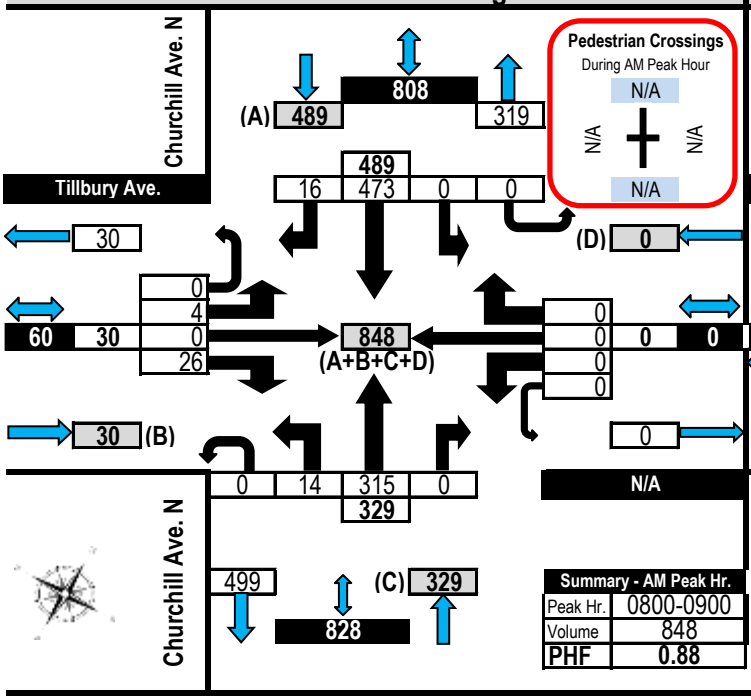
Churchill Avenue North & Tillbury Avenue — Ottawa, ON

All Vehicles
(Except Bicycles & Electric Scooters)

Monday, 30 September 2019
0700-0915 & 1600-1800
4.25 Hour Survey
City of Ottawa Ward ► 15

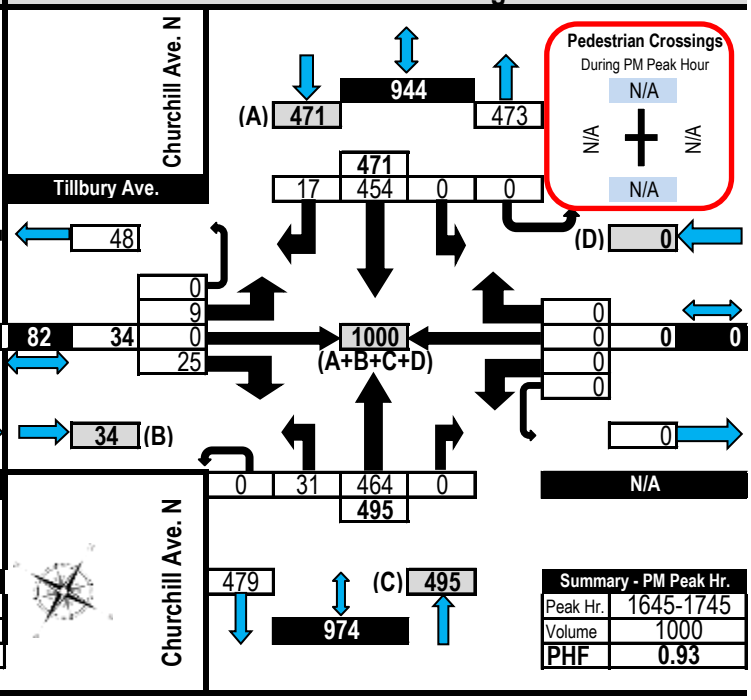


AM Peak Hour Flow Diagram



Summary - AM Peak Hr.	
Peak Hr.	0800-0900
Volume	848
PHF	0.88

PM Peak Hour Flow Diagram



Summary - PM Peak Hr.	
Peak Hr.	1645-1745
Volume	1000
PHF	0.93

ACCURATE TRUSTED TRAFFIC DATA

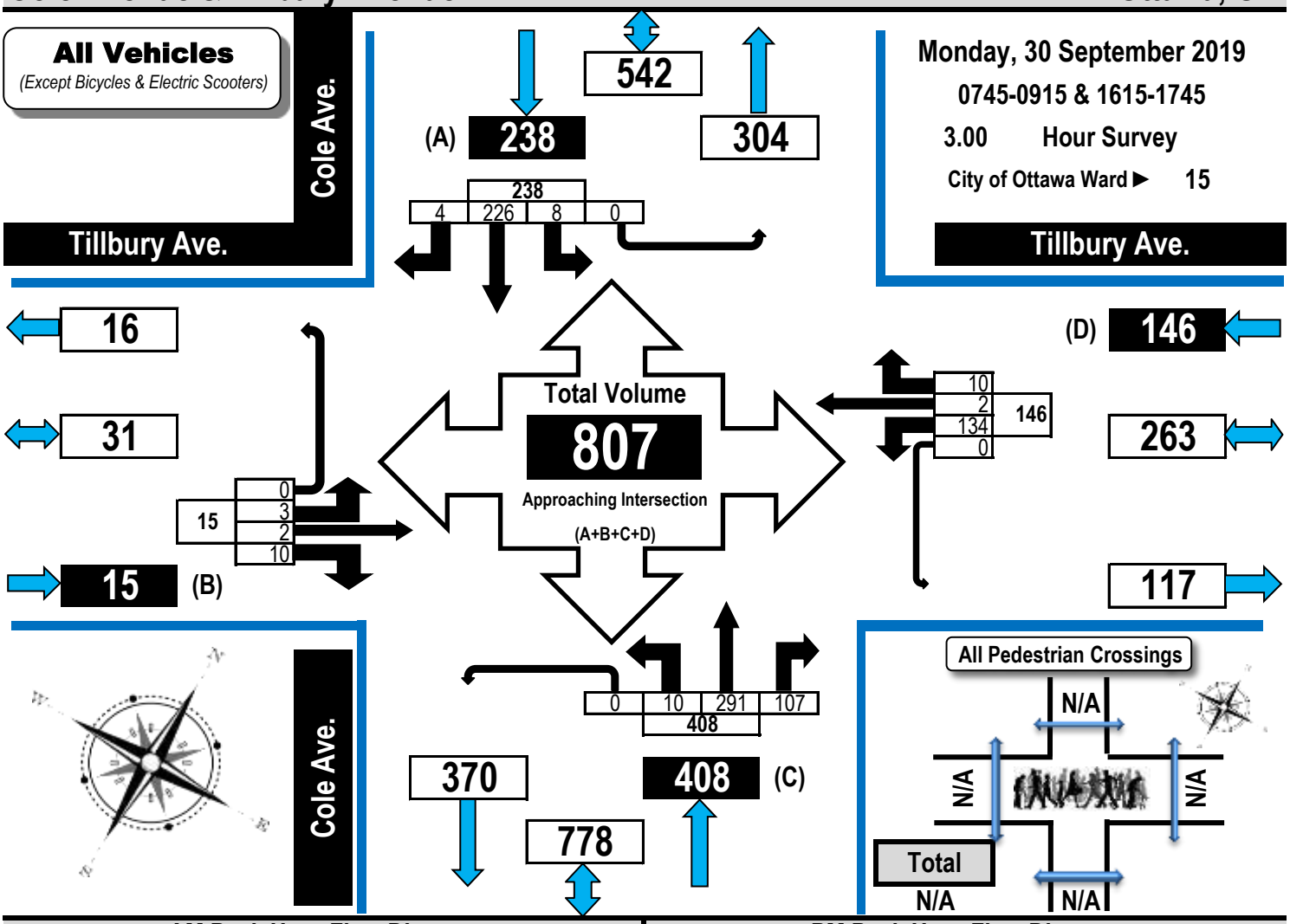
Turning Movement Count
Summary, AM and PM Peak Hour Flow Diagrams

Automobiles, Taxis, Light Trucks, Vans, SUV's, Motorcycles, Heavy Trucks, Buses, and School Buses

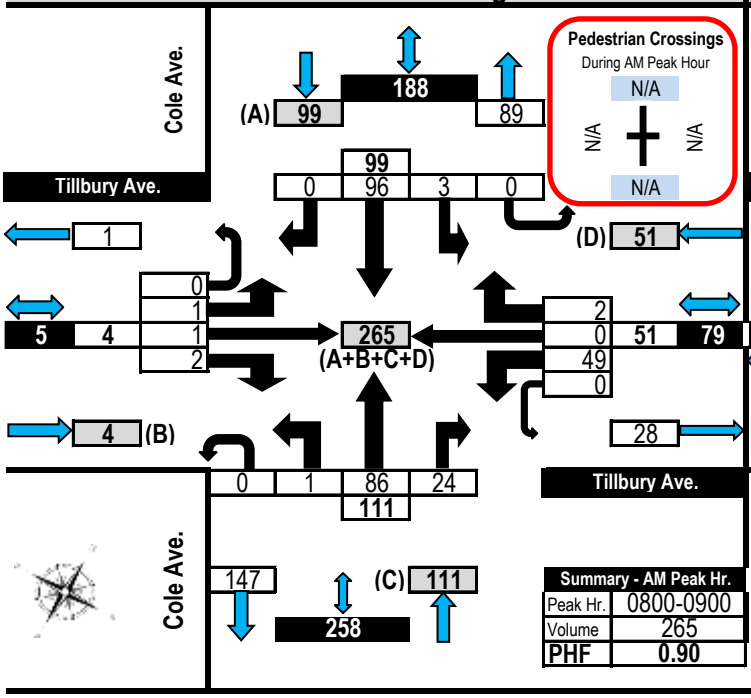
Cole Avenue & Tillbury Avenue — Ottawa, ON

All Vehicles
(Except Bicycles & Electric Scooters)

Monday, 30 September 2019
0745-0915 & 1615-1745
3.00 Hour Survey
City of Ottawa Ward ▶ 15

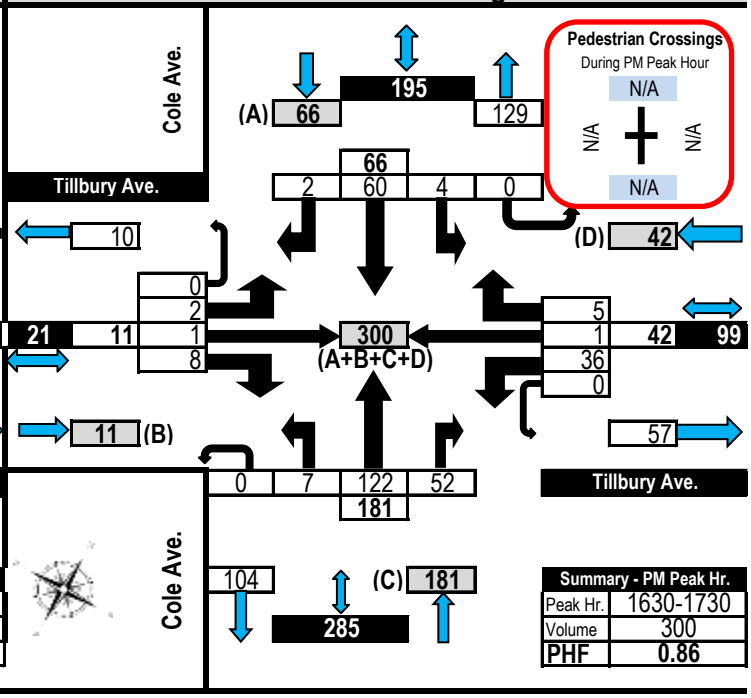


AM Peak Hour Flow Diagram



Summary - AM Peak Hr.	
Peak Hr.	0800-0900
Volume	265
PHF	0.90

PM Peak Hour Flow Diagram



Summary - PM Peak Hr.	
Peak Hr.	1630-1730
Volume	300
PHF	0.86

Appendix D

City of Ottawa Collision Data

Total Area

Classification of Accident	Rear End	Turning Movement	Sideswipe	Angle	Approaching	Single Vehicle (other)	Single vehicle (Unattended vehicle)	Other	Total	
P.D. only	19	24	20	2	0	0	0	0	65	83%
Non-fatal injury	3	7	1	2	0	0	0	0	13	17%
Non reportable	0	0	0	0	0	0	0	0	0	0%
Total	**22**	**31**	**21**	**4**	**0**	**0**	**0**	**0**	**78**	100%
	#2 or 28%	#1 or 40%	#3 or 27%	#4 or 5%	#5 or 0%	#5 or 0%	#5 or 0%	#5 or 0%		

Carling Ave / Churchill Ave

Years	Total # Collisions	24 Hr AADT Veh Volume	Days	Collisions/MEV
2014-2018	22	38,416	1825	**0.31**

Classification of Accident	Rear End	Turning Movement	Sideswipe	Angle	Approaching	Single Vehicle (other)	Single vehicle (Unattended vehicle)	Other	Total	
P.D. only	11	1	6	1	0	0	0	0	19	86%
Non-fatal injury	2	0	1	0	0	0	0	0	3	14%
Non reportable	0	0	0	0	0	0	0	0	0	0%
Total	**13**	**1**	**7**	**1**	**0**	**0**	**0**	**0**	**22**	100%
	59%	5%	32%	5%	0%	0%	0%	0%		

Carling Ave / Clyde Ave / Cole Ave

Years	Total # Collisions	24 Hr AADT Veh Volume	Days	Collisions/MEV
2014-2018	50	35,384	1825	**0.77**

Classification of Accident	Rear End	Turning Movement	Sideswipe	Angle	Approaching	Single Vehicle (other)	Single vehicle (Unattended vehicle)	Other	Total	
P.D. only	6	22	11	1	0	0	0	0	40	80%
Non-fatal injury	1	7	0	2	0	0	0	0	10	20%
Non reportable	0	0	0	0	0	0	0	0	0	0%
Total	**7**	**29**	**11**	**3**	**0**	**0**	**0**	**0**	**50**	100%
	14%	58%	22%	6%	0%	0%	0%	0%		

Carling Ave EB, Clyde Ave to Churchill Ave N

Years	Total # Collisions	24 Hr AADT Veh Volume	Days	Collisions/MEV
2014-2018	1	n/a	1825	**n/a**

Classification of Accident	Rear End	Turning Movement	Sideswipe	Angle	Approaching	Single Vehicle (other)	Single vehicle (Unattended vehicle)	Other	Total	
P.D. only	0	0	1	0	0	0	0	0	1	100%
Non-fatal injury	0	0	0	0	0	0	0	0	0	0%
Non reportable	0	0	0	0	0	0	0	0	0	0%
Total	**0**	**0**	**1**	**0**	**0**	**0**	**0**	**0**	**1**	100%
	0%	0%	100%	0%	0%	0%	0%	0%		

Carling Ave WB, Cole Ave to Churchill Ave N

Years	Total # Collisions	24 Hr AADT Veh Volume	Days	Collisions/MEV
2014-2018	5	n/a	1825	**n/a**

Classification of Accident	Rear End	Turning Movement	Sideswipe	Angle	Approaching	Single Vehicle (other)	Single vehicle (Unattended vehicle)	Other	Total	
P.D. only	2	1	2	0	0	0	0	0	5	100%
Non-fatal injury	0	0	0	0	0	0	0	0	0	0%
Non reportable	0	0	0	0	0	0	0	0	0	0%
Total	**2**	**1**	**2**	**0**	**0**	**0**	**0**	**0**	**5**	100%
	40%	20%	40%	0%	0%	0%	0%	0%		

City Operations - Transportation Services

Collision Details Report - Public Version

From: January 1, 2014 **To:** December 31, 2018

Location: CARLING AVE @ CHURCHILL AVE

Traffic Control: Traffic signal

Total Collisions: 23

Date/Day/Time	Environment	Impact Type	Classification	Surface Cond'n	Veh. Dir	Vehicle Manoeuver	Vehicle type	First Event	No. Ped
2014-Mar-04, Tue,14:04	Clear	Rear end	P.D. only	Dry	East	Going ahead	Truck and trailer	Other motor vehicle	
					East	Stopped	Automobile, station wagon	Other motor vehicle	
2014-Jun-09, Mon,08:55	Clear	Rear end	P.D. only	Dry	East	Going ahead	Automobile, station wagon	Other motor vehicle	
					East	Stopped	Automobile, station wagon	Other motor vehicle	
2014-Sep-15, Mon,16:25	Clear	Sideswipe	Non-fatal injury	Dry	East	Changing lanes	Automobile, station wagon	Other motor vehicle	
					East	Going ahead	Pick-up truck	Other motor vehicle	
2015-Mar-28, Sat,13:18	Clear	Rear end	P.D. only	Dry	East	Turning left	Municipal transit bus	Other motor vehicle	
					East	Turning left	Automobile, station wagon	Other motor vehicle	
2015-May-01, Fri,13:22	Clear	Rear end	P.D. only	Dry	South	Turning right	Pick-up truck	Other motor vehicle	
					South	Turning right	Pick-up truck	Other motor vehicle	
2015-Nov-04, Wed,16:04	Clear	Rear end	P.D. only	Dry	West	Slowing or stopping	Pick-up truck	Other motor vehicle	

					West	Stopped	Automobile, station wagon	Other motor vehicle
2015-Jul-08, Wed,13:40	Clear	Sideswipe	P.D. only	Dry	West	Changing lanes	Pick-up truck	Other motor vehicle
					West	Turning left	Automobile, station wagon	Other motor vehicle
2016-May-19, Thu,13:41	Clear	Rear end	P.D. only	Dry	West	Slowing or stopping	Automobile, station wagon	Other motor vehicle
					West	Stopped	Automobile, station wagon	Other motor vehicle
2016-Mar-04, Fri,11:19	Clear	Rear end	P.D. only	Dry	East	Going ahead	Automobile, station wagon	Other motor vehicle
					East	Stopped	Automobile, station wagon	Other motor vehicle
					East	Stopped	Automobile, station wagon	Other motor vehicle
2016-Jul-08, Fri,14:38	Clear	Sideswipe	P.D. only	Dry	East	Turning right	Truck - open	Other motor vehicle
					East	Stopped	Automobile, station wagon	Other motor vehicle
2017-Aug-16, Wed,15:00	Clear	Turning movement	P.D. only	Dry	East	Going ahead	Delivery van	Other motor vehicle
					East	Turning right	Automobile, station wagon	Other motor vehicle
2017-Feb-10, Fri,09:52	Clear	Rear end	P.D. only	Dry	East	Slowing or stopping	Pick-up truck	Other motor vehicle
					East	Stopped	Automobile, station wagon	Other motor vehicle
2017-Jul-19, Wed,16:45	Clear	Angle	P.D. only	Dry	East	Going ahead	Automobile, station wagon	Other motor vehicle

					North	Turning left	Automobile, station wagon	Other motor vehicle
2017-Sep-20, Wed,19:20	Clear	Sideswipe	P.D. only	Dry	West	Changing lanes	Automobile, station wagon	Other motor vehicle
					West	Going ahead	Automobile, station wagon	Other motor vehicle
2018-Jan-16, Tue,18:18	Clear	Rear end	P.D. only	Slush	South	Going ahead	Automobile, station wagon	Other motor vehicle
					South	Stopped	Automobile, station wagon	Other motor vehicle
2018-Feb-27, Tue,11:26	Clear	Sideswipe	P.D. only	Dry	East	Changing lanes	Truck - closed	Other motor vehicle
					East	Going ahead	Automobile, station wagon	Other motor vehicle
2018-Mar-27, Tue,10:50	Clear	SMV other	Non-fatal injury	Dry	South	Turning left	Automobile, station wagon	Curb
2018-Oct-12, Fri,10:20	Clear	Rear end	P.D. only	Dry	East	Turning left	Truck - dump	Other motor vehicle
					East	Turning left	Delivery van	Other motor vehicle
2018-Sep-05, Wed,08:46	Clear	Rear end	P.D. only	Dry	East	Changing lanes	Automobile, station wagon	Other motor vehicle
					East	Stopped	Automobile, station wagon	Other motor vehicle
2018-Sep-04, Tue,08:30	Clear	Sideswipe	P.D. only	Dry	West	Changing lanes	Truck - dump	Other motor vehicle
					West	Stopped	Automobile, station wagon	Other motor vehicle

2018-Jul-23, Mon,18:59	Clear	Rear end	Non-fatal injury	Dry	East	Going ahead	Automobile, station wagon	Other motor vehicle	
					East	Stopped	Automobile, station wagon	Other motor vehicle	
2018-Dec-25, Tue,12:19	Clear	Rear end	Non-fatal injury	Dry	South	Turning left	Automobile, station wagon	Other motor vehicle	
					South	Turning left	Automobile, station wagon	Other motor vehicle	
2018-Aug-27, Mon,12:02	Clear	Sideswipe	P.D. only	Dry	West	Changing lanes	Pick-up truck	Other motor vehicle	
					West	Stopped	Automobile, station wagon	Other motor vehicle	

Location: CARLING AVE @ CLYDE AVE/COLE AVE

Traffic Control: Traffic signal **Total Collisions:** 55

Date/Day/Time	Environment	Impact Type	Classification	Surface Cond'n	Veh. Dir	Vehicle Manoeuver	Vehicle type	First Event	No. Ped
2014-Jan-29, Wed,15:37	Clear	Turning movement	P.D. only	Slush	North	Turning left	Automobile, station wagon	Other motor vehicle	
					South	Going ahead	Delivery van	Other motor vehicle	
2014-Mar-12, Wed,17:04	Drifting Snow	Turning movement	P.D. only	Packed snow	West	Turning left	Automobile, station wagon	Other motor vehicle	
					East	Going ahead	Automobile, station wagon	Other motor vehicle	
2014-Apr-16, Wed,10:05	Clear	Sideswipe	P.D. only	Dry	North	Changing lanes	Delivery van	Other motor vehicle	
					North	Going ahead	Automobile, station wagon	Other motor vehicle	
2014-Mar-25, Tue,15:40	Clear	Turning movement	P.D. only	Dry	East	Turning left	Pick-up truck	Other motor vehicle	

					West	Going ahead	Automobile, station wagon	Other motor vehicle	
2014-Jan-30, Thu,13:05	Clear	SMV other	Non-fatal injury	Dry	North	Turning left	Automobile, station wagon	Pedestrian	1
2014-Jul-19, Sat,12:01	Clear	Turning movement	P.D. only	Dry	East	Making "U" turn	Automobile, station wagon	Other motor vehicle	
					West	Going ahead	Automobile, station wagon	Other motor vehicle	
2014-Dec-05, Fri,14:15	Clear	Turning movement	Non-fatal injury	Dry	West	Turning left	Automobile, station wagon	Other motor vehicle	
					East	Going ahead	Passenger van	Other motor vehicle	
2014-Nov-14, Fri,16:14	Snow	Turning movement	P.D. only	Wet	East	Making "U" turn	Automobile, station wagon	Other motor vehicle	
					West	Going ahead	Automobile, station wagon	Other motor vehicle	
2014-Nov-06, Thu,11:59	Clear	Sideswipe	P.D. only	Dry	East	Turning left	Truck - dump	Other motor vehicle	
					East	Stopped	Truck - dump	Other motor vehicle	
2015-Feb-10, Tue,17:34	Clear	Turning movement	P.D. only	Dry	West	Going ahead	Automobile, station wagon	Other motor vehicle	
					West	Making "U" turn	Pick-up truck	Other motor vehicle	
2014-Sep-25, Thu,12:15	Clear	Sideswipe	P.D. only	Dry	West	Unknown	Unknown	Other motor vehicle	
					West	Turning right	Automobile, station wagon	Other motor vehicle	

2014-Oct-29, Wed,15:31	Clear	Turning movement	P.D. only	Dry	West	Turning left	Unknown	Other motor vehicle
					East	Going ahead	Automobile, station wagon	Other motor vehicle
2014-Dec-11, Thu,03:15	Snow	SMV other	P.D. only	Loose snow	East	Going ahead	Automobile, station wagon	Curb
2014-Sep-04, Thu,08:20	Clear	Angle	P.D. only	Dry	East	Making "U" turn	Passenger van	Other motor vehicle
					North	Turning left	Automobile, station wagon	Other motor vehicle
2014-Nov-27, Thu,11:34	Clear	Turning movement	P.D. only	Dry	North	Turning left	Automobile, station wagon	Other motor vehicle
					South	Going ahead	Automobile, station wagon	Other motor vehicle
2015-Jan-05, Mon,17:51	Clear	Sideswipe	P.D. only	Wet	West	Changing lanes	Passenger van	Other motor vehicle
					West	Going ahead	Pick-up truck	Other motor vehicle
					West	Going ahead	Automobile, station wagon	Other motor vehicle
2015-Feb-19, Thu,16:10	Snow	Rear end	P.D. only	Loose snow	West	Going ahead	Unknown	Other motor vehicle
					West	Stopped	Automobile, station wagon	Other motor vehicle
					West	Stopped	Automobile, station wagon	Other motor vehicle
					West	Stopped	Automobile, station wagon	Other motor vehicle
2015-Mar-27, Fri,08:15	Snow	Rear end	P.D. only	Wet	West	Slowing or stopping	Automobile, station wagon	Other motor vehicle

					West	Stopped	Pick-up truck	Other motor vehicle
2015-Sep-15, Tue,14:46	Clear	Turning movement	Non-fatal injury	Dry	East	Turning left	Automobile, station wagon	Other motor vehicle
					West	Going ahead	Automobile, station wagon	Other motor vehicle
2016-Feb-12, Fri,09:41	Clear	Turning movement	Non-fatal injury	Wet	West	Turning left	Pick-up truck	Other motor vehicle
					East	Going ahead	Automobile, station wagon	Other motor vehicle
2016-Aug-02, Tue,10:00	Clear	Turning movement	Non-fatal injury	Dry	East	Turning left	Passenger van	Other motor vehicle
					West	Going ahead	Automobile, station wagon	Other motor vehicle
2015-Aug-05, Wed,18:30	Clear	Turning movement	P.D. only	Dry	South	Turning left	Passenger van	Other motor vehicle
					North	Going ahead	Passenger van	Other motor vehicle
2015-Jul-23, Thu,19:14	Clear	Turning movement	P.D. only	Dry	South	Turning right	Pick-up truck	Other motor vehicle
					South	Going ahead	Automobile, station wagon	Other motor vehicle
2015-Dec-08, Tue,09:09	Clear	Turning movement	P.D. only	Dry	East	Making "U" turn	Automobile, station wagon	Other motor vehicle
					West	Going ahead	Municipal transit bus	Other motor vehicle
2016-Oct-08, Sat,15:20	Clear	SMV other	P.D. only	Dry	East	Turning right	Truck and trailer	Pole (utility, power)

2017-Jun-28, Wed,17:55	Clear	Sideswipe	P.D. only	Dry	East	Unknown	Unknown	Other motor vehicle	
					East	Stopped	Automobile, station wagon	Other motor vehicle	
2016-Nov-28, Mon,08:41	Clear	SMV other	Non-fatal injury	Dry	North	Turning right	Automobile, station wagon	Pedestrian	1
2017-May-18, Thu,08:36	Clear	Turning movement	Non-fatal injury	Dry	West	Going ahead	Automobile, station wagon	Other motor vehicle	
					East	Turning left	Automobile, station wagon	Other motor vehicle	
2017-Jun-27, Tue,14:30	Clear	Turning movement	P.D. only	Dry	West	Turning left	Unknown	Other motor vehicle	
					East	Turning right	Automobile, station wagon	Other motor vehicle	
2017-Jul-07, Fri,15:43	Clear	Rear end	P.D. only	Dry	South	Slowing or stopping	Motorcycle	Other motor vehicle	
					South	Stopped	Automobile, station wagon	Other motor vehicle	
2017-Nov-30, Thu,14:31	Clear	Rear end	P.D. only	Wet	North	Turning right	Automobile, station wagon	Other motor vehicle	
					North	Turning right	Pick-up truck	Other motor vehicle	
2017-Jul-26, Wed,08:34	Clear	Turning movement	Non-fatal injury	Dry	West	Turning left	Automobile, station wagon	Other motor vehicle	
					East	Going ahead	Automobile, station wagon	Other motor vehicle	
2017-Jul-20, Thu,15:48	Clear	Angle	Non-fatal injury	Dry	East	Going ahead	Passenger van	Other motor vehicle	
					South	Turning left	Municipal transit bus	Other motor vehicle	

2017-Oct-14, Sat,13:15	Clear	Turning movement	P.D. only	Dry	North	Turning right	Delivery van	Other motor vehicle
					South	Turning left	Automobile, station wagon	Other motor vehicle
2017-Sep-22, Fri,15:43	Clear	Sideswipe	P.D. only	Dry	East	Changing lanes	Truck - dump	Other motor vehicle
					East	Going ahead	Automobile, station wagon	Other motor vehicle
2017-Oct-26, Thu,16:59	Clear	Turning movement	P.D. only	Dry	North	Turning left	Automobile, station wagon	Other motor vehicle
					South	Going ahead	Automobile, station wagon	Other motor vehicle
2017-Sep-21, Thu,16:00	Clear	Rear end	Non-fatal injury	Dry	East	Going ahead	Automobile, station wagon	Other motor vehicle
					East	Stopped	Automobile, station wagon	Other motor vehicle
2018-Jan-13, Sat,10:12	Drifting Snow	Sideswipe	P.D. only	Ice	West	Slowing or stopping	Automobile, station wagon	Skidding/sliding
					West	Turning left	Automobile, station wagon	Other motor vehicle
2018-Jan-09, Tue,21:41	Clear	Sideswipe	P.D. only	Slush	South	Unknown	Unknown	Other motor vehicle
					South	Stopped	Automobile, station wagon	Other motor vehicle
2018-Jan-10, Wed,21:16	Clear	Turning movement	P.D. only	Wet	West	Going ahead	Automobile, station wagon	Other motor vehicle
					East	Turning left	Automobile, station wagon	Other motor vehicle

2018-Feb-09, Fri,12:58	Clear	Rear end	P.D. only	Wet	West	Slowing or stopping	Truck - dump	Other motor vehicle
					West	Turning right	Automobile, station wagon	Other motor vehicle
2018-Feb-06, Tue,18:13	Clear	Turning movement	P.D. only	Wet	West	Going ahead	Automobile, station wagon	Other motor vehicle
					East	Turning left	Pick-up truck	Other motor vehicle
2018-Feb-01, Thu,07:07	Snow	Sideswipe	P.D. only	Loose snow	West	Turning left	School bus	Other motor vehicle
					West	Changing lanes	Pick-up truck	Other motor vehicle
2018-May-31, Thu,08:11	Clear	Turning movement	Non-fatal injury	Dry	East	Turning left	Automobile, station wagon	Other motor vehicle
					West	Going ahead	Automobile, station wagon	Other motor vehicle
2018-May-18, Fri,11:37	Clear	Sideswipe	P.D. only	Dry	East	Changing lanes	Truck - closed	Other motor vehicle
					East	Going ahead	Automobile, station wagon	Other motor vehicle
2018-May-12, Sat,14:30	Clear	Turning movement	P.D. only	Dry	West	Turning left	Automobile, station wagon	Other motor vehicle
					East	Going ahead	Automobile, station wagon	Other motor vehicle
2018-Jun-29, Fri,15:48	Clear	Rear end	P.D. only	Dry	East	Slowing or stopping	Automobile, station wagon	Other motor vehicle
					East	Slowing or stopping	Automobile, station wagon	Other motor vehicle
2018-Oct-19, Fri,09:19	Clear	Turning movement	P.D. only	Dry	West	Turning left	Pick-up truck	Other motor vehicle

					East	Going ahead	Automobile, station wagon	Other motor vehicle	
2018-Nov-23, Fri,13:08	Clear	SMV other	Non-fatal injury	Dry	North	Turning left	Automobile, station wagon	Pedestrian	1
2018-Oct-24, Wed,12:43	Clear	Turning movement	P.D. only	Dry	East	Turning left	Automobile, station wagon	Other motor vehicle	
					West	Going ahead	Automobile, station wagon	Other motor vehicle	
2018-Aug-13, Mon,16:20	Clear	Turning movement	P.D. only	Dry	East	Turning left	Pick-up truck	Other motor vehicle	
					West	Going ahead	Automobile, station wagon	Other motor vehicle	
2018-Aug-11, Sat,12:51	Clear	Turning movement	P.D. only	Dry	East	Turning left	Automobile, station wagon	Other motor vehicle	
					West	Going ahead	Automobile, station wagon	Other motor vehicle	
2018-Oct-27, Sat,22:36	Snow	Sideswipe	P.D. only	Wet	East	Changing lanes	Automobile, station wagon	Other motor vehicle	
					East	Going ahead	Automobile, station wagon	Other motor vehicle	
2018-Aug-17, Fri,10:38	Clear	Turning movement	P.D. only	Wet	West	Turning left	Automobile, station wagon	Other motor vehicle	
					East	Going ahead	Automobile, station wagon	Other motor vehicle	
					East	Going ahead	Truck - closed	Other motor vehicle	
2018-Nov-16, Fri,07:23	Snow	Angle	Non-fatal injury	Loose snow	West	Going ahead	Automobile, station wagon	Other motor vehicle	
					North	Going ahead	Automobile, station wagon	Other motor vehicle	

					South	Going ahead	Pick-up truck	Other motor vehicle	

Location: CARLING AVE EB btwn CLYDE AVE & CHURCHILL AVE N

Traffic Control: No control

Total Collisions: 1

Date/Day/Time	Environment	Impact Type	Classification	Surface Cond'n	Veh. Dir	Vehicle Manoeuver	Vehicle type	First Event	No. Ped
2017-Mar-27, Mon,15:30	Clear	Sideswipe	P.D. only	Wet	East	Changing lanes	Automobile, station wagon	Other motor vehicle	
					East	Going ahead	Passenger van	Other motor vehicle	

Location: CARLING AVE WB btwn COLE AVE & CHURCHILL AVE N

Traffic Control: No control

Total Collisions: 5

Date/Day/Time	Environment	Impact Type	Classification	Surface Cond'n	Veh. Dir	Vehicle Manoeuver	Vehicle type	First Event	No. Ped
2014-Feb-15, Sat,20:28	Clear	Rear end	P.D. only	Dry	West	Going ahead	Automobile, station wagon	Other motor vehicle	
					West	Turning right	Automobile, station wagon	Other motor vehicle	
2015-Mar-31, Tue,10:04	Clear	Sideswipe	P.D. only	Dry	West	Changing lanes	Truck and trailer	Other motor vehicle	
					West	Going ahead	Automobile, station wagon	Other motor vehicle	
2016-Oct-07, Fri,14:55	Clear	Rear end	P.D. only	Dry	East	Going ahead	Automobile, station wagon	Other motor vehicle	
					East	Turning right	Automobile, station wagon	Other motor vehicle	
2017-May-04, Thu,16:47	Clear	Sideswipe	P.D. only	Dry	West	Changing lanes	Automobile, station wagon	Other motor vehicle	
					West	Going ahead	Automobile, station wagon	Other motor vehicle	

2018-Aug-02, Thu,17:43	Clear	Turning movement	P.D. only	Dry	West	Going ahead	Automobile, station wagon	Other motor vehicle
					West	Turning right	Automobile, station wagon	Other motor vehicle

Appendix E

Study Area Justification

PARSONS

1223 Michael Street, Suite 100 | Ottawa, Ontario K1J7T2
P: +1 613.738.4160 | www.parsons.com

Technical Memo

To: Wally Dubyk (City of Ottawa)
Copy: Mark Baker, P.Eng.
From: Basel Ansari, EIT

Date: 28 August 2019
Project: 477272 – 01000

Re: TIA 1655 Carling Avenue - Proposed Study Area

This letter is prepared with the purpose of providing justification for using a smaller study area than the 1km radius noted in the City's current TIA Guidelines for a suburban context.

The proposed development is located at 1655 Carling Avenue and is anticipated to consist of a 22-storey building containing 260 residential units, which is forecasted to generate person trips as summarized in Table 1 below. The number of vehicle trips forecasted in in the order of approximately 90 vehicles/hr during each of the morning and afternoon peak hour periods.

Table 1: Forecasted Trips

Travel Mode	AM Mode Share	AM Peak (persons/h)			PM Mode Share	PM Peak (persons/h)		
		In	Out	Total		In	Out	Total
Auto Driver	50%	20	64	84	50%	53	34	87
Auto Passenger	15%	6	19	25	15%	16	10	26
Transit	20%	7	26	33	20%	21	14	35
Non-motorized	15%	6	20	26	15%	16	11	27
Total People Trips	**100%**	**39**	**129**	**168**	**100%**	**106**	**69**	**175**
Total 'New' Residential Apartment Building Auto Trips		**20**	**64**	**84**		**53**	**34**	**87**

The subject site currently consists of an unpaved parking lot with an estimated maximum occupancy of 80 vehicles. Although a driveway count has not been conducted, it is estimated that half of the parking lot's capacity is generated during the commuter peak hour. On this basis, the existing parking lot generates in the order of 40 vehicles during each peak hour, thereby resulting in a net potential increase in vehicle trips of approximately 50 veh/h two-way associated with the proposed residential development.

Parsons is recommending that the TIA limit the study area for analysis to the adjacent two signalized intersections on Carling Avenue located within approximately 400m of the site, namely Carling/Clyde (to the west) and Carling/Churchill (to the east). This is consistent with an urban context according to the TIA Guidelines. **Figure 1** below provides an illustration of the site location, with a 1 km radius from the site shown. Red circles within the radius indicate major intersections near the subject site that are proposed as part of the reduced study area, whereas the orange circles and rectangles represent intersections and highway ramps that would need to be included in the analysis based on the 1 km radius noted in the TIA Guidelines for a suburban context.

Given the relatively low volume of net forecasted site-generated traffic, an appropriate study area is considered to be the two signalized intersections on either side of the subject site. An evaluation of all eight signalized intersections and two highway ramps within a 1km radius is not considered of benefit to the approvals process.

1223 Michael Street, Suite 100 | Ottawa, Ontario K1J7T2
P: +1 613.738.4160 | www.parsons.com

Figure 1: Study Area

Appendix F

Vehicle Maneuvering Templates

EXIT
GARBAGE
LOADING BAY
14th FLOOR
MECHANICAL PENTHOUSE
7th - 16th FLOOR TOWER
No. 1619
2 Storey
Stucco & Concrete Block Sided Building
(Concrete Block Noted)
TOWER 'B' - 16 STOREY
MECHANICAL PENTHOUSE
Billboard
0.32
(P3) & Meas
COMMERCIAL AREA
329.1m² (3,284 sq. ft.)
7th - 16th FLOOR TOWER
SLOPE UP
220mm @ 5%
7.27
(P3) & Set
1st - 6th FLOOR
Asphalt / Gravel
6th FLOOR
5 STOREY PODIUM
CLF
0.2 East
AD
3.52
(P3) & Meas
TAC - 2017 (CA)
CB
T/G=77.25
CLF
0.3 East
LS
Sign
N 23° 34' 1
6.10
(P3) & Set
CP
N 51° 45' 25" E
Bench
21.84
(P3) & Set
CB
T/G=77.21
Concrete Curb
Edge of Asphalt
& Meas
CITY OF OTTAWA DETAIL B1.1 - TYPICAL BUS STOP LANDING ZONE AND CYCLE TRACK
MH - ST
T/G=77.28
City InvW=±76.27
150mmØ WATERMAIN
150mmØ WATERMAIN
CESSION A (RIDEAU FRONT) (NEPEAN)
CB
T/G=77.16
Edge of Asphalt
Concrete Curb
542mmØ Hydro
Street Lighting
Concrete Curb
Edge of Asphalt
300mmØ Storm Sewer
±85.6
5.92

1655 Carling Ave

Residential Development

P-CAR IN/OUT

PARSONS

477272	Dwg. No. 001
Sheet 1 of 7	

Des.	Chk'd.
Dwn. AEB	Chk'd.
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.

REVISIONS

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EXIT
GARBAGE
LOADING BAY
MECHANICAL PENTHOUSE
14th FLOOR
5 STOREY PODIUM
CLF
0.2 East
7th - 16th FLOOR TOWER
No. 1619
2 Storey
Stucco & Concrete Block Sided Building
(Concrete Block Noted)
TOWER 'B' - 16 STOREY
6th FLOOR
AD
RD
Billboard
MECHANICAL PENTHOUSE
0.32
(P3) & Meas
COMMERCIAL AREA
329.1m² (3,284 sq. ft.)
7th - 16th FLOOR TOWER
3.52
(P3) & Meas
N 23° 34' 1
CB
T/G=77.25
SLOPE UP
220mm @ 5%
1st - 6th FLOOR
Asphalt/Gravel
CLF
0.3 East
LS
Sign
21.84
6.10
CB
T/G=77.21
N 51° 45' 25" E
Bench
Concrete Curb
Edge of Asphalt
LSU
TAC - 2017 (CA)
150mmØ WATERMAIN
CITY OF OTTAWA DETAIL B1.1 - TYPICAL BUS STOP LANDING ZONE AND CYCLE TRACK
MH-ST
T/G=77.28
City InvW=±76.27
CESSION A (RIDEAU FRONT) (NEPEAN)
CB
T/G=77.16
542mmØ Hydro
Street Lighting
300mmØ Storm Sewer
±85.6

1655 Carling Ave

Residential Development

LSU IN

477272 | Dwg. No. 002

Sheet 2 of 7

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1655 Carling Ave

Residential Development

P-CAR GARAGE ACCESS

477272 | Dwg. No. 003

Sheet 3 of 7

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Consultant's Information:


PLAN
LOT 4
P.I.N. 04012 – 0107
PART 23
PLAN 4R – 27017
SUBJECT TO EASEMENT
INST. OC1487656
PART 25
PART 34
PART 7
PART 5
LOT 5
PART 3
PLAN
P.I.N. 04012 – 0212
PART 8
R4Q (RESIDENTI
CB
T/G=76.99
CLF
0.70 North
Dilapidated Guard Rail
0.20 North
UP
PART 6
27.43
LOADING AREA
(P3) & Set
AD
Dilapidated Guard Rail
0.9 South
GARBAGE / DELIVERY
TRUCK ENTRY
SUBJE
2nd - 7th FLOOR
13th - 18th FLOOR
8th - 12th FLOOR
GROUND FLOOR
Edge of Asphalt
(P3, P5) & Meas
16.28
2nd - 6th FLOOR
Asphalt/Gravel
Gravel
7th - 12th FLOOR
P.I.N. 04012 – 0102
MH-S
T/G=77.35
0.58
37.61
PROPERTY LINE
No. 1607
1 Storey
Shell Gas Stati
(Brick Noted)
EXIT
LOADING BAY
TRUCK ENTRY
13th - 16th FLOOR
Overhang
RESIDENTIAL
GARBAGE
GARBAGE
AC
RD
COMMERCIAL
GARBAGE
0.34
(P3) & Meas
LOADING BAY
14th - 16th
FLOOR TOWER
GARBAGE / DELIVERY
TRUCK EXIT
MSU
TAC-2017 (CA)
(P3) & Meas
0.2 East
2.16
5 STOREY
PODIUM
Concrete Curb
MECHANICAL PENTHOUSE
EXIT
No. 1619
2 Storey
Stucco & Concrete Block Sided Building
(Concrete Block Noted)
M-W
TOWER 'B' - 16
STOREY
th FLOOR
Sidewalk
15" W

1655 Carling Ave

Residential Development

MSU

477272

Dwg. No. 004

Sheet 4 of 7

PARSONS

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1655 Carling Ave

Residential Development

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PARSONS

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No.	Description	By	Date (dd/mm/yy)
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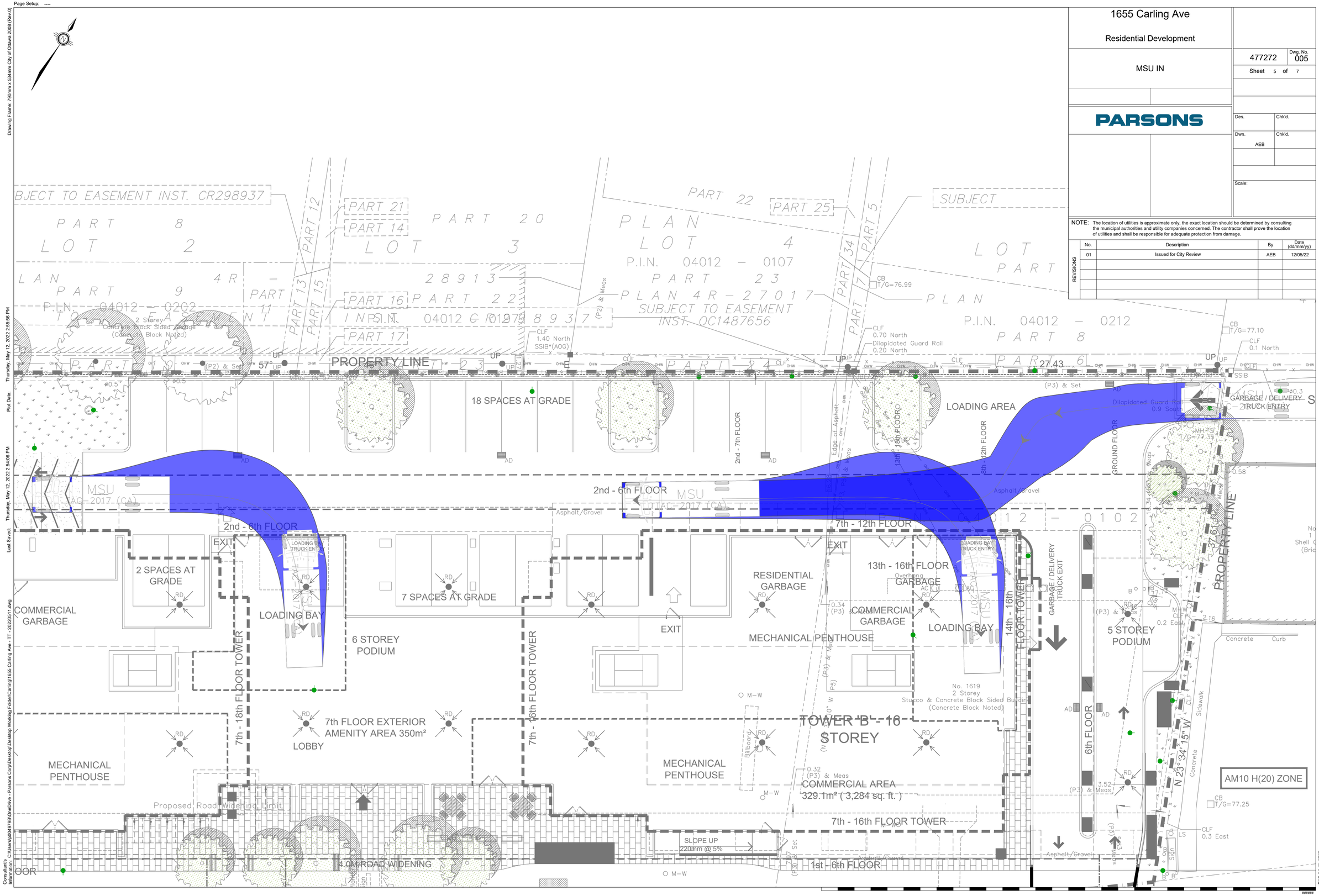

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1655 Carling Ave

Residential Development

MSU OUT

PARSONS

477272	Dwg. No. 006
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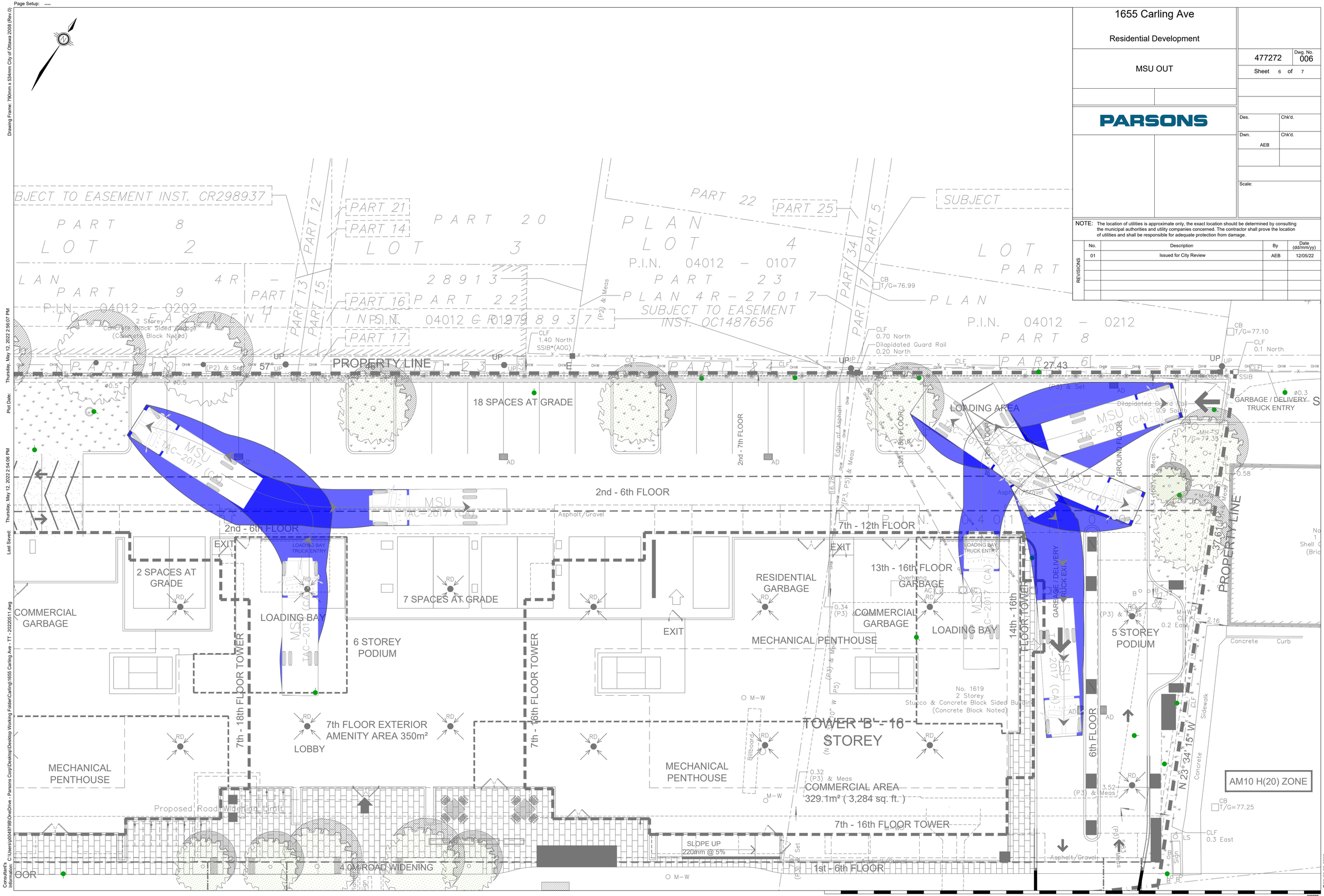

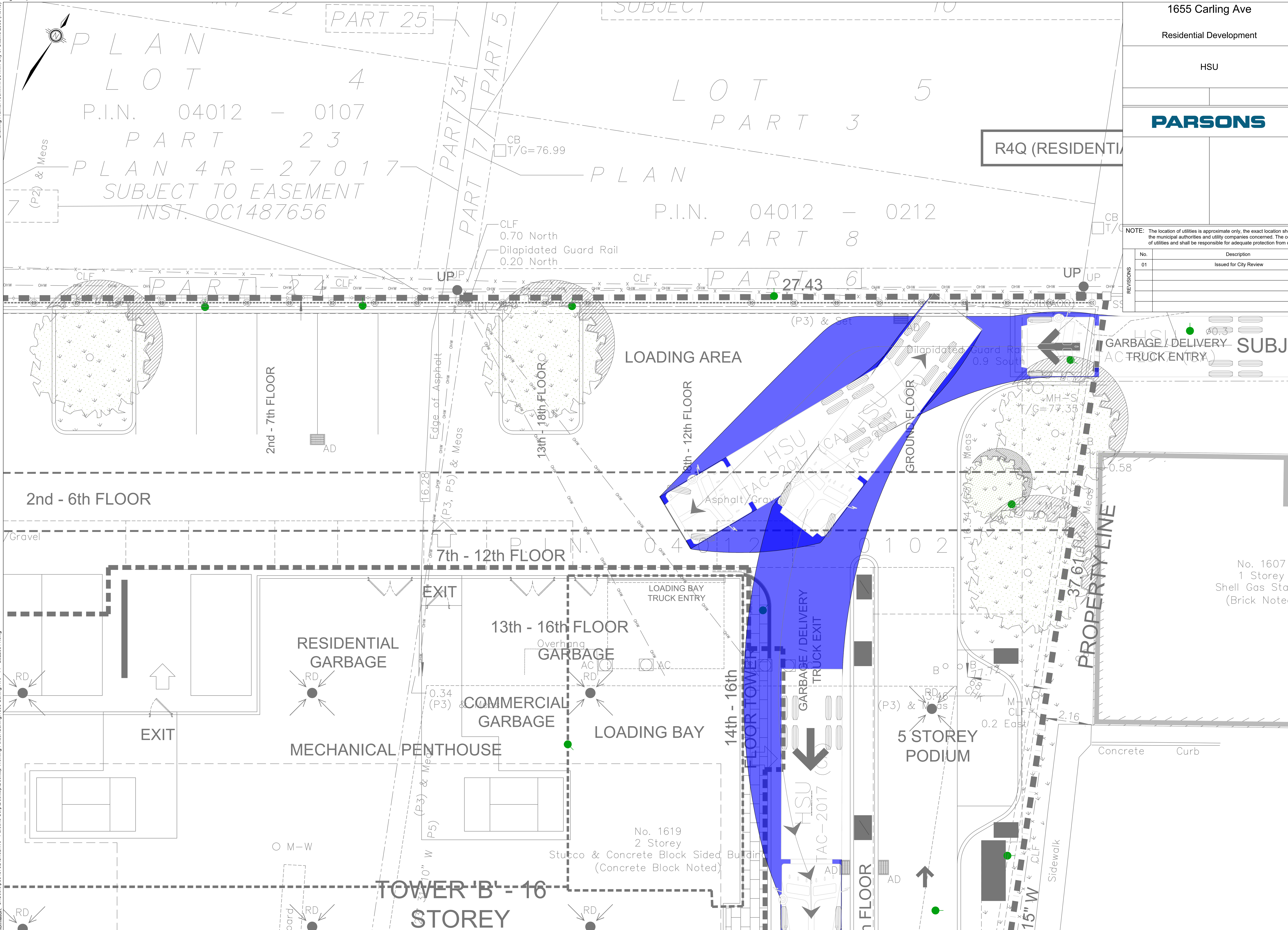

LOADING AREA
GARBAGE / DELIVERY TRUCK ENTRY
2nd - 6th FLOOR
2nd - 7th FLOOR
13th - 18th FLOOR
8th - 12th FLOOR
GROUND FLOOR
7th - 12th FLOOR
13th - 16th FLOOR
LOADING BAY TRUCK ENTRY
GARBAGE / DELIVERY TRUCK EXIT
RESIDENTIAL GARBAGE
COMMERCIAL GARBAGE
LOADING BAY
MECHANICAL PENTHOUSE
EXIT
14th - 16th FLOOR TOWER
5 STOREY PODIUM
PROPERTY LINE
TOWER 'B' - 16 STOREY
R4Q (RESIDENTI
LOT 4
LOT 5
PART 3
PART 8
P.I.N. 04012 - 0107
P.I.N. 04012 - 0212
PLAN 4R - 27017
SUBJECT TO EASEMENT
INST. OC1487656
No. 1619
2 Storey
Stucco & Concrete Block Sided Building
(Concrete Block Noted)
No. 1607
1 Storey
Shell Gas Stati
(Brick Noted)
Dilapidated Guard Rail
CLF
0.70 North
Dilapidated Guard Rail
0.20 North
Sidewalk
Concrete
Curb

1655 Carling Ave

Residential Development

HSU

477272 Dwg. No. 007

Sheet 7 of 7

PARSONS

Des. Chk'd.

Dwn. AEB Chk'd.

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.

REVISIONS

No.	Description	By	Date (dd/mm/yy)
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Appendix G

TDM Checklist

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

Completed By: Parsons Corporation
1223 Michael Street, Gloucester, ON, K1J 7T2

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)*	☐ *No rapid transit routes within 600 meters.*
REQUIRED	1.2.2	Provide safe, direct and attractive pedestrian access from public sidewalks to building entrances through such measures as: reducing distances between public sidewalks and major building entrances; providing walkways from public streets to major building entrances; within a site, providing walkways along the front of adjoining buildings, between adjacent buildings, and connecting areas where people may congregate, such as courtyards and transit stops; and providing weather protection through canopies, colonnades, and other design elements wherever possible *(see Official Plan policy 4.3.12)*	☑

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

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

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

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

Completed By: Jakub Ulak, M.Arch, RIAC
Surface Condos
88 Spadina Avenue, Ottawa, ON, K1Y 2C1

Legend

BASIC — The measure is generally feasible and effective, and in most cases would benefit the development and its users

BETTER — The measure could maximize support for users of sustainable modes, and optimize development performance

★ — The measure is one of the most dependably effective tools to encourage the use of sustainable modes

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

			TDM measures: *Residential developments*	Check if proposed & add descriptions
		3.	**TRANSIT**	
		3.1	**Transit information**	
BASIC		3.1.1	Display relevant transit schedules and route maps at entrances *(multi-family, condominium)*	☑
BETTER		3.1.2	Provide real-time arrival information display at entrances *(multi-family, condominium)*	☐
		3.2	**Transit fare incentives**	
BASIC	★	3.2.1	Offer PRESTO cards preloaded with one monthly transit pass on residence purchase/move-in, to encourage residents to use transit	☐ No fare incentive at this time
BETTER		3.2.2	Offer at least one year of free monthly transit passes on residence purchase/move-in	☐
		3.3	**Enhanced public transit service**	
BETTER	★	3.3.1	Contract with OC Transpo to provide early transit services until regular services are warranted by occupancy levels *(subdivision)*	☐
		3.4	**Private transit service**	
BETTER		3.4.1	Provide shuttle service for seniors homes or lifestyle communities (e.g. scheduled mall or supermarket runs)	☐
		4.	**CARSHARING & BIKESHARING**	
		4.1	**Bikeshare stations & memberships**	
BETTER		4.1.1	Contract with provider to install on-site bikeshare station (*multi-family)*	☐
BETTER		4.1.2	Provide residents with bikeshare memberships, either free or subsidized *(multi-family)*	☐
		4.2	**Carshare vehicles & memberships**	
BETTER		4.2.1	Contract with provider to install on-site carshare vehicles and promote their use by residents	☑
BETTER		4.2.2	Provide residents with carshare memberships, either free or subsidized	☐
		5.	**PARKING**	
		5.1	**Priced parking**	
BASIC	★	5.1.1	Unbundle parking cost from purchase price *(condominium)*	☐
BASIC	★	5.1.2	Unbundle parking cost from monthly rent *(multi-family)*	☑

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

Appendix H

MMLOS Analysis Results

Multi-Modal Level of Service - Intersections Form

Consultant	**Parsons**	**Project**	**477272-01000**
Scenario	**Existing and Future**	**Date**	**04.09.2021**
Comments			

Unlocked Rows for Replicating

INTERSECTIONS		Carling/Cole/Clyde				Carling/Churchill (Existing)				Carling/Churchill (Future)			
	Crossing Side	**NORTH**	**SOUTH**	**EAST**	**WEST**	**NORTH**	**SOUTH**	**EAST**	**WEST**	**NORTH**	**SOUTH**	**EAST**	**WEST**
Pedestrian	Lanes	3	5	7	7	3	3	7	7	3	3	7	7
	Median	No Median - 2.4 m	No Median - 2.4 m	Median > 2.4 m	Median > 2.4 m	No Median - 2.4 m	No Median - 2.4 m	Median > 2.4 m	Median > 2.4 m	No Median - 2.4 m	No Median - 2.4 m	Median > 2.4 m	Median > 2.4 m
	Conflicting Left Turns	Protected/ Permissive	Protected/ Permissive	Permissive	Permissive	Protected	Protected	Permissive	Permissive	Protected	Protected	Permissive	Permissive
	Conflicting Right Turns	Permissive or yield control	Permissive or yield control	Permissive or yield control	Permissive or yield control	Permissive or yield control	Permissive or yield control	Permissive or yield control	Permissive or yield control	Permissive or yield control	Permissive or yield control	Permissive or yield control	Permissive or yield control
	Right Turns on Red (RToR) ?	RTOR allowed	RTOR allowed	RTOR allowed	RTOR allowed	RTOR allowed	RTOR allowed	RTOR allowed	RTOR allowed	RTOR allowed	RTOR allowed	RTOR allowed	RTOR allowed
	Ped Signal Leading Interval?	No	No	No	No	No	No	Yes	Yes	No	No	Yes	Yes
	Right Turn Channel	No Channel	No Channel	No Channel	No Channel	No Channel	No Channel	No Channel	No Channel	No Channel	No Channel	No Channel	No Channel
	Corner Radius	5-10m	5-10m	5-10m	5-10m	15-25m	15-25m	10-15m	10-15m	15-25m	15-25m	10-15m	10-15m
	Crosswalk Type	Std transverse markings	Std transverse markings	Std transverse markings	Std transverse markings	Zebra stripe hi-vis markings	Zebra stripe hi-vis markings	Zebra stripe hi-vis markings	Zebra stripe hi-vis markings	Zebra stripe hi-vis markings	Zebra stripe hi-vis markings	Zebra stripe hi-vis markings	Zebra stripe hi-vis markings
	PETSI Score	**71**	**38**	**11**	**11**	**79**	**79**	**15**	**15**	**79**	**79**	**15**	**15**
	Ped. Exposure to Traffic LoS	**C**	**E**	**F**	**F**	**B**	**B**	**F**	**F**	**B**	**B**	**F**	**F**
	Cycle Length												
	Effective Walk Time												
	Average Pedestrian Delay												
	Pedestrian Delay LoS	-	-	-	-	-	-	-	-	-	-	-	-
	Level of Service	**C**	**E**	**F**	**F**	**B**	**B**	**F**	**F**	**B**	**B**	**F**	**F**
		F				**F**				**F**			
	Approach From	**NORTH**	**SOUTH**	**EAST**	**WEST**	**NORTH**	**SOUTH**	**EAST**	**WEST**	**NORTH**	**SOUTH**	**EAST**	**WEST**
Bicycle	Bicycle Lane Arrangement on Approach	Mixed Traffic	Mixed Traffic	Mixed Traffic	Mixed Traffic	Curb Bike Lane, Cycletrack or MUP	Curb Bike Lane, Cycletrack or MUP	Mixed Traffic	Mixed Traffic	Curb Bike Lane, Cycletrack or MUP	Curb Bike Lane, Cycletrack or MUP	Curb Bike Lane, Cycletrack or MUP	Curb Bike Lane, Cycletrack or MUP
	Right Turn Lane Configuration	≤ 50 m	≤ 50 m	≤ 50 m	≤ 50 m	Not Applicable	Not Applicable	≤ 50 m	≤ 50 m	Not Applicable	Not Applicable	Not Applicable	Not Applicable
	Right Turning Speed	≤ 25 km/h	≤ 25 km/h	≤ 25 km/h	≤ 25 km/h	Not Applicable	Not Applicable	≤ 25 km/h	≤ 25 km/h	Not Applicable	Not Applicable	Not Applicable	Not Applicable
	Cyclist relative to RT motorists	**D**	**D**	**D**	**D**	**Not Applicable**	**Not Applicable**	**D**	**D**	**Not Applicable**	**Not Applicable**	**Not Applicable**	**Not Applicable**
	Separated or Mixed Traffic	**Mixed Traffic**	**Mixed Traffic**	**Mixed Traffic**	**Mixed Traffic**	**Separated**	**Separated**	**Mixed Traffic**	**Mixed Traffic**	**Separated**	**Separated**	**Separated**	**Separated**
	Left Turn Approach	One lane crossed	One lane crossed	≥ 2 lanes crossed	≥ 2 lanes crossed	1 lane crossed	1 lane crossed	≥ 2 lanes crossed	≥ 2 lanes crossed	2-stage, LT box	2-stage, LT box	2-stage, LT box	2-stage, LT box
	Operating Speed	≤ 40 km/h	> 40 to ≤ 50 km/h	≥ 60 km/h	≥ 60 km/h	> 40 to ≤ 50 km/h	> 40 to ≤ 50 km/h	≥ 60 km/h	≥ 60 km/h	> 40 to ≤ 50 km/h	> 40 to ≤ 50 km/h	≥ 60 km/h	≥ 60 km/h
	Left Turning Cyclist	**B**	**D**	**F**	**F**	**C**	**C**	**F**	**F**	**A**	**A**	**A**	**A**
	Level of Service	**D**	**D**	**F**	**F**	**C**	**C**	**F**	**F**	**A**	**A**	**A**	**A**
		F				**F**				**A**			
Transit	Average Signal Delay		≤ 40 sec	≤ 20 sec	≤ 30 sec	≤ 40 sec		> 40 sec	≤ 30 sec	≤ 40 sec		> 40 sec	≤ 30 sec
	Level of Service	**-**	**E**	**C**	**D**	**E**	**-**	**F**	**D**	**E**	**-**	**F**	**D**
		E				**F**				**F**			
Truck	Effective Corner Radius		< 10 m		< 10 m	> 15 m	> 15 m	> 15 m	10 - 15 m	> 15 m	> 15 m	> 15 m	10 - 15 m
	Number of Receiving Lanes on Departure from Intersection		≥ 2		≥ 2	≥ 2	≥ 2	1	≥ 2	≥ 2	≥ 2	1	≥ 2
	Level of Service	**-**	**D**	**-**	**D**	**A**	**A**	**C**	**B**	**A**	**A**	**C**	**B**
		D				**C**				**C**			
Auto	Volume to Capacity Ratio	0.61 - 0.70				0.91 - 1.00				0.91 - 1.00			
	Level of Service	**B**				**E**				**E**			

Multi-Modal Level of Service - Segments Form

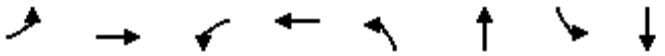
Consultant	**Parsons**	**Project**	**477272-01000**
Scenario	**Existing and Future (Full Buildout)**	**Date**	**4/9/2021**
Comments			

SEGMENTS		Street A	Existing Carling Ave	Future Carling Ave
			1	2
Pedestrian	Sidewalk Width Boulevard Width	E	≥ 2 m < 0.5	1.5 m > 2 m
	Avg Daily Curb Lane Traffic Volume		> 3000	> 3000
	Operating Speed On-Street Parking		> 50 to 60 km/h no	> 50 to 60 km/h no
	Exposure to Traffic PLoS		**E**	**E**
	Effective Sidewalk Width		2.0 m	2.0 m
	Pedestrian Volume		500 ped /hr	500 ped /hr
	Crowding PLoS		**B**	**B**
	Level of Service		**E**	**E**
Bicycle	Type of Cycling Facility	C	Curbside Bike Lane	Physically Separated
	Number of Travel Lanes		2 ea. dir. (w median)	
	Operating Speed		>50 to 70 km/h	
	# of Lanes & Operating Speed LoS		**C**	**-**
	Bike Lane (+ Parking Lane) Width		≥ 1.8 m	
	Bike Lane Width LoS		**A**	**-**
	Bike Lane Blockages		Frequent	
	Blockage LoS		**C**	**-**
	Median Refuge Width (no median = < 1.8 m)		≥ 1.8 m refuge	
	No. of Lanes at Unsignalized Crossing		≤ 3 lanes	
	Sidestreet Operating Speed		≤ 40 km/h	
	Unsignalized Crossing - Lowest LoS		**A**	**A**
	Level of Service		**C**	**A**
Transit	Facility Type	C	Bus lane	Bus lane
	Friction or Ratio Transit:Posted Speed		Cf > 60	Cf > 60
	Level of Service		**C**	**C**
Truck	Truck Lane Width	C	≤ 3.3 m	≤ 3.3 m
	Travel Lanes per Direction		> 1	> 1
	Level of Service		**C**	**C**

Appendix I

Synchro Analysis Reports

Existing Conditions

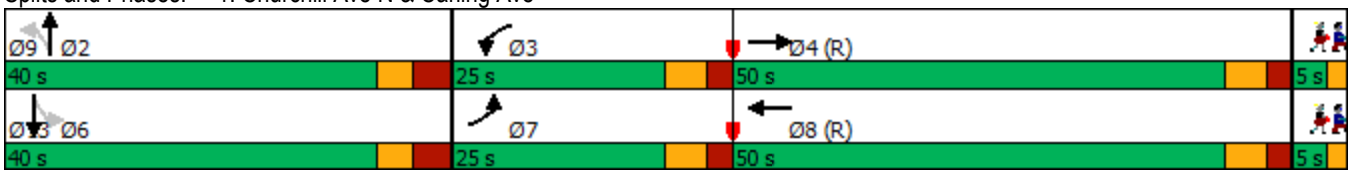


Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT	Ø9	Ø13
Lane Configurations										
Traffic Volume (vph)	167	1352	85	610	11	5	336	31		
Future Volume (vph)	167	1352	85	610	11	5	336	31		
Lane Group Flow (vph)	186	1611	94	849	12	18	373	304		
Turn Type	Prot	NA	Prot	NA	Perm	NA	Perm	NA		
Protected Phases	7	4	3	8		2		6	9	13
Permitted Phases					2		6			
Detector Phase	7	4	3	8	2	2	6	6		
Switch Phase										
Minimum Initial (s)	5.0	10.0	5.0	10.0	10.0	10.0	10.0	10.0	1.0	1.0
Minimum Split (s)	11.1	34.1	11.1	34.1	40.0	40.0	40.0	40.0	5.0	5.0
Total Split (s)	25.0	50.0	25.0	50.0	40.0	40.0	40.0	40.0	5.0	5.0
Total Split (%)	20.8%	41.7%	20.8%	41.7%	33.3%	33.3%	33.3%	33.3%	4%	4%
Yellow Time (s)	3.7	3.7	3.7	3.7	3.3	3.3	3.3	3.3	2.0	2.0
All-Red Time (s)	2.4	2.4	2.4	2.4	3.5	3.5	3.5	3.5	0.0	0.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		
Total Lost Time (s)	6.1	6.1	6.1	6.1	6.8	6.8	6.8	6.8		
Lead/Lag	Lead	Lag	Lead	Lag						
Lead-Lag Optimize?	Yes	Yes	Yes	Yes						
Recall Mode	None	C-Max	None	C-Max	None	None	None	None	None	None
Act Effct Green (s)	16.9	50.8	12.0	45.9	38.2	38.2	38.2	38.2		
Actuated g/C Ratio	0.14	0.42	0.10	0.38	0.32	0.32	0.32	0.32		
v/c Ratio	0.78	0.79	0.56	0.47	0.05	0.04	0.90	0.46		
Control Delay	92.6	15.4	63.4	27.1	29.3	16.8	64.9	7.9		
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		
Total Delay	92.6	15.4	63.4	27.1	29.3	16.8	64.9	7.9		
LOS	F	B	E	C	C	B	E	A		
Approach Delay		23.4		30.7		21.8		39.3		
Approach LOS		C		C		C		D		
Queue Length 50th (m)	45.8	41.9	21.5	51.8	2.0	1.0	83.6	5.6		
Queue Length 95th (m)	#73.7	28.3	37.1	64.7	6.6	6.2	#139.2	27.4		
Internal Link Dist (m)		99.0		113.3		62.0		67.5		
Turn Bay Length (m)	65.0		60.0		20.0		20.0			
Base Capacity (vph)	266	2042	266	1825	239	508	415	660		
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	0.70	0.79	0.35	0.47	0.05	0.04	0.90	0.46		

Intersection Summary	
Cycle Length: 120	
Actuated Cycle Length: 120	
Offset: 101 (84%), Referenced to phase 4:EBT and 8:WBT, Start of Green	
Natural Cycle: 95	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.90	
Intersection Signal Delay: 28.5	Intersection LOS: C
Intersection Capacity Utilization 77.7%	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.

Splits and Phases: 1: Churchill Ave N & Carling Ave

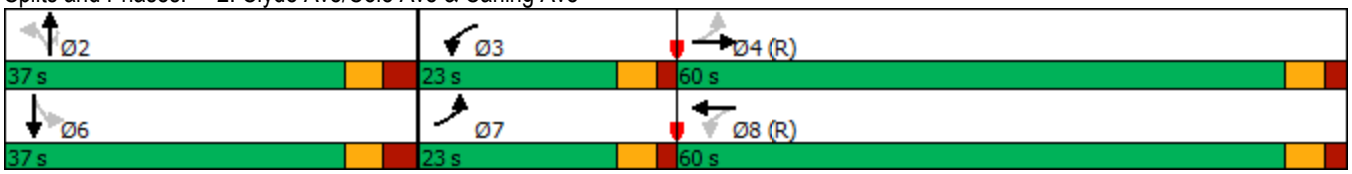


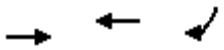
Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	NBR	SBL	SBT
Lane Configurations									
Traffic Volume (vph)	60	1481	232	601	121	51	147	35	63
Future Volume (vph)	60	1481	232	601	121	51	147	35	63
Lane Group Flow (vph)	67	1646	258	702	134	57	163	39	143
Turn Type	pm+pt	NA	pm+pt	NA	Perm	NA	Perm	Perm	NA
Protected Phases	7	4	3	8		2			6
Permitted Phases	4		8		2		2	6	
Detector Phase	7	4	3	8	2	2	2	6	6
Switch Phase									
Minimum Initial (s)	5.0	10.0	5.0	10.0	10.0	10.0	10.0	10.0	10.0
Minimum Split (s)	10.4	35.5	10.4	35.5	37.0	37.0	37.0	37.0	37.0
Total Split (s)	23.0	60.0	23.0	60.0	37.0	37.0	37.0	37.0	37.0
Total Split (%)	19.2%	50.0%	19.2%	50.0%	30.8%	30.8%	30.8%	30.8%	30.8%
Yellow Time (s)	3.7	3.7	3.7	3.7	3.3	3.3	3.3	3.3	3.3
All-Red Time (s)	1.7	2.1	1.7	2.1	3.3	3.3	3.3	3.3	3.3
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)	5.4	5.8	5.4	5.8	6.6	6.6	6.6	6.6	6.6
Lead/Lag	Lead	Lag	Lead	Lag					
Lead-Lag Optimize?	Yes	Yes	Yes	Yes					
Recall Mode	None	C-Max	None	C-Max	None	None	None	None	None
Act Effct Green (s)	71.4	64.1	88.4	77.9	19.6	19.6	19.6	19.6	19.6
Actuated g/C Ratio	0.60	0.53	0.74	0.65	0.16	0.16	0.16	0.16	0.16
v/c Ratio	0.15	0.63	0.74	0.22	0.78	0.20	0.43	0.19	0.48
Control Delay	7.8	22.6	44.3	8.7	75.9	42.3	9.6	42.5	35.6
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	7.8	22.6	44.3	8.7	75.9	42.3	9.6	42.5	35.6
LOS	A	C	D	A	E	D	A	D	D
Approach Delay		22.0		18.3		39.9			37.1
Approach LOS		C		B		D			D
Queue Length 50th (m)	3.8	99.2	48.4	17.8	30.6	11.8	0.0	8.0	21.5
Queue Length 95th (m)	10.0	133.4	#81.0	29.5	48.5	21.8	16.7	16.7	38.0
Internal Link Dist (m)		94.2		153.1		79.0			73.1
Turn Bay Length (m)	20.0		120.0				5.0	20.0	
Base Capacity (vph)	604	2601	361	3138	267	451	495	320	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	0.11	0.63	0.71	0.22	0.50	0.13	0.33	0.12	0.32

Intersection Summary	
Cycle Length: 120	
Actuated Cycle Length: 120	
Offset: 84 (70%), Referenced to phase 4:EBTL and 8:WBTL, Start of Green	
Natural Cycle: 85	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.78	
Intersection Signal Delay: 23.7	Intersection LOS: C
Intersection Capacity Utilization 86.6%	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.

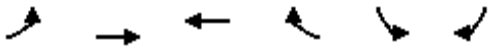
Splits and Phases: 2: Clyde Ave/Cole Ave & Carling Ave





Lane Group	EBT	WBT	SBR
Lane Configurations			
Traffic Volume (vph)	1617	854	1
Future Volume (vph)	1617	854	1
Lane Group Flow (vph)	1797	960	1
Sign Control	Free	Free	

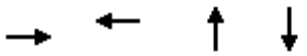
Intersection Summary		
Control Type: Unsignalized		
Intersection Capacity Utilization 36.3%		ICU Level of Service A
Analysis Period (min) 15		



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↑↑↑	↑↑↑			↱
Traffic Volume (veh/h)	0	1617	854	10	0	1
Future Volume (Veh/h)	0	1617	854	10	0	1
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	0	1797	949	11	0	1
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage veh)						
Upstream signal (m)		177	123			
pX, platoon unblocked	0.89				0.82	0.89
vC, conflicting volume	960				1554	322
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	522				14	0
tC, single (s)	4.1				6.8	6.9
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	100				100	100
cM capacity (veh/h)	926				825	965

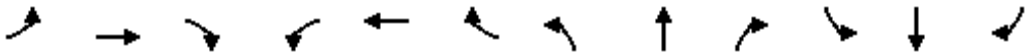
Direction, Lane #	EB 1	EB 2	EB 3	WB 1	WB 2	WB 3	SB 1
Volume Total	599	599	599	380	380	201	1
Volume Left	0	0	0	0	0	0	0
Volume Right	0	0	0	0	0	11	1
cSH	1700	1700	1700	1700	1700	1700	965
Volume to Capacity	0.35	0.35	0.35	0.22	0.22	0.12	0.00
Queue Length 95th (m)	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Control Delay (s)	0.0	0.0	0.0	0.0	0.0	0.0	8.7
Lane LOS							A
Approach Delay (s)	0.0			0.0			8.7
Approach LOS							A

Intersection Summary			
Average Delay	0.0		
Intersection Capacity Utilization	36.3%	ICU Level of Service	A
Analysis Period (min)	15		



Lane Group	EBT	WBT	NBT	SBT
Lane Configurations				
Traffic Volume (vph)	1	0	86	96
Future Volume (vph)	1	0	86	96
Lane Group Flow (vph)	4	56	124	110
Sign Control	Stop	Stop	Free	Free

Intersection Summary		
Control Type: Unsignalized		
Intersection Capacity Utilization	23.2%	ICU Level of Service A
Analysis Period (min)	15	



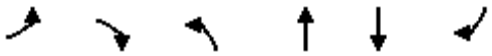
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	1	1	2	49	0	2	1	86	24	3	96	0
Future Volume (Veh/h)	1	1	2	49	0	2	1	86	24	3	96	0
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	1	1	2	54	0	2	1	96	27	3	107	0
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (m)								97				
pX, platoon unblocked												
vC, conflicting volume	226	238	107	227	224	110	107			123		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	226	238	107	227	224	110	107			123		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	100	100	100	93	100	100	100			100		
cM capacity (veh/h)	726	661	947	724	673	944	1484			1464		

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	4	56	124	110
Volume Left	1	54	1	3
Volume Right	2	2	27	0
cSH	800	730	1484	1464
Volume to Capacity	0.01	0.08	0.00	0.00
Queue Length 95th (m)	0.1	1.9	0.0	0.0
Control Delay (s)	9.5	10.3	0.1	0.2
Lane LOS	A	B	A	A
Approach Delay (s)	9.5	10.3	0.1	0.2
Approach LOS	A	B		

Intersection Summary				
Average Delay	2.2			
Intersection Capacity Utilization	23.2%	ICU Level of Service	A	
Analysis Period (min)	15			

Lane Group	EBL	NBT	SBT
Lane Configurations			
Traffic Volume (vph)	4	315	578
Future Volume (vph)	4	315	578
Lane Group Flow (vph)	40	366	660
Sign Control	Stop	Free	Free

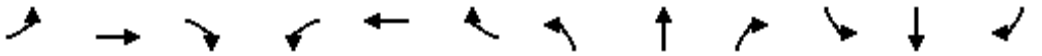
Intersection Summary		
Control Type: Unsignalized		
Intersection Capacity Utilization	43.1%	ICU Level of Service A
Analysis Period (min)	15	



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	4	32	14	315	578	16
Future Volume (Veh/h)	4	32	14	315	578	16
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	36	16	350	642	18
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (m)				91		
pX, platoon unblocked						
vC, conflicting volume	1033	651	660			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1033	651	660			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	98	92	98			
cM capacity (veh/h)	253	469	928			

Direction, Lane #	EB 1	NB 1	SB 1
Volume Total	40	366	660
Volume Left	4	16	0
Volume Right	36	0	18
cSH	432	928	1700
Volume to Capacity	0.09	0.02	0.39
Queue Length 95th (m)	2.3	0.4	0.0
Control Delay (s)	14.2	0.6	0.0
Lane LOS	B	A	
Approach Delay (s)	14.2	0.6	0.0
Approach LOS	B		

Intersection Summary			
Average Delay	0.7		
Intersection Capacity Utilization	43.1%	ICU Level of Service	A
Analysis Period (min)	15		



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	231	792	18	19	1782	218	96	33	26	182	7	269
Future Volume (vph)	231	792	18	19	1782	218	96	33	26	182	7	269
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Storage Length (m)	65.0		0.0	60.0		0.0	20.0		0.0	20.0		0.0
Storage Lanes	1		0	1		0	1		0	1		0
Taper Length (m)	25.0			15.0			20.0			25.0		
Right Turn on Red			Yes			Yes			Yes			Yes
Link Speed (k/h)		60			60			50			50	
Link Distance (m)		108.4			137.3			86.0			87.9	
Travel Time (s)		6.5			8.2			6.2			6.3	
Lane Group Flow (vph)	257	900	0	21	2222	0	107	66	0	202	307	0
Turn Type	Prot	NA		Prot	NA		Perm	NA		Perm	NA	
Protected Phases	7	4		3	8			2			6	
Permitted Phases							2			6		
Detector Phase	7	4		3	8		2	2		6	6	
Switch Phase												
Minimum Initial (s)	5.0	10.0		5.0	10.0		10.0	10.0		10.0	10.0	
Minimum Split (s)	11.1	34.1		11.1	34.1		40.0	40.0		40.0	40.0	
Total Split (s)	20.0	55.0		20.0	55.0		40.0	40.0		40.0	40.0	
Total Split (%)	16.7%	45.8%		16.7%	45.8%		33.3%	33.3%		33.3%	33.3%	
Yellow Time (s)	3.7	3.7		3.7	3.7		3.3	3.3		3.3	3.3	
All-Red Time (s)	2.4	2.4		2.4	2.4		3.5	3.5		3.5	3.5	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)	6.1	6.1		6.1	6.1		6.8	6.8		6.8	6.8	
Lead/Lag	Lead	Lag		Lead	Lag							
Lead-Lag Optimize?	Yes	Yes		Yes	Yes							
Recall Mode	None	C-Max		None	C-Max		None	None		None	None	
Act Effct Green (s)	26.7	75.9		7.1	48.9		25.4	25.4		25.4	25.4	
Actuated g/C Ratio	0.22	0.63		0.06	0.41		0.21	0.21		0.21	0.21	
v/c Ratio	0.68	0.29		0.21	1.14		1.01	0.18		0.76	0.58	
Control Delay	68.9	8.6		58.2	102.1		135.0	22.4		61.4	10.2	
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay	68.9	8.6		58.2	102.1		135.0	22.4		61.4	10.2	
LOS	E	A		E	F		F	C		E	B	
Approach Delay		22.0			101.7			92.0			30.5	
Approach LOS		C			F			F			C	
Queue Length 50th (m)	64.0	20.8		4.8	~223.0		~25.5	7.1		45.1	5.0	
Queue Length 95th (m)	#125.8	30.1		12.8	#252.2		#50.7	16.7		63.9	26.8	
Internal Link Dist (m)		84.4			113.3			62.0			63.9	
Turn Bay Length (m)	65.0			60.0			20.0			20.0		
Base Capacity (vph)	377	3069		196	1954		142	485		354	615	
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	0.68	0.29		0.11	1.14		0.75	0.14		0.57	0.50	

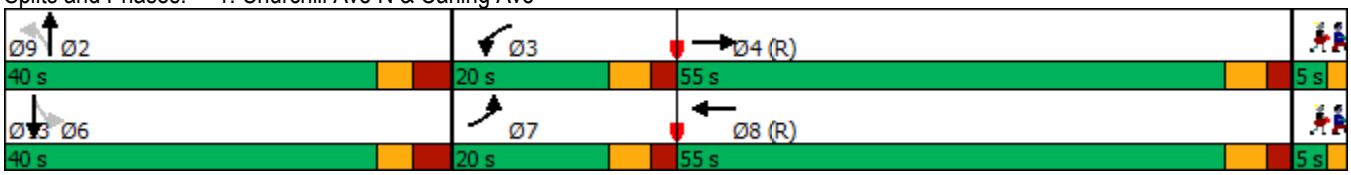
Intersection Summary	
Area Type:	Other

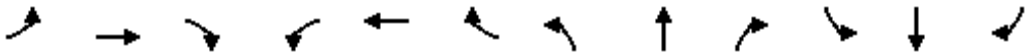
Lane Group	Ø9	Ø13
Lane Configurations		
Traffic Volume (vph)		
Future Volume (vph)		
Ideal Flow (vphpl)		
Storage Length (m)		
Storage Lanes		
Taper Length (m)		
Right Turn on Red		
Link Speed (k/h)		
Link Distance (m)		
Travel Time (s)		
Lane Group Flow (vph)		
Turn Type		
Protected Phases	9	13
Permitted Phases		
Detector Phase		
Switch Phase		
Minimum Initial (s)	1.0	1.0
Minimum Split (s)	5.0	5.0
Total Split (s)	5.0	5.0
Total Split (%)	4%	4%
Yellow Time (s)	2.0	2.0
All-Red Time (s)	0.0	0.0
Lost Time Adjust (s)		
Total Lost Time (s)		
Lead/Lag		
Lead-Lag Optimize?		
Recall Mode	None	None
Act Effct Green (s)		
Actuated g/C Ratio		
v/c Ratio		
Control Delay		
Queue Delay		
Total Delay		
LOS		
Approach Delay		
Approach LOS		
Queue Length 50th (m)		
Queue Length 95th (m)		
Internal Link Dist (m)		
Turn Bay Length (m)		
Base Capacity (vph)		
Starvation Cap Reductn		
Spillback Cap Reductn		
Storage Cap Reductn		
Reduced v/c Ratio		

Intersection Summary

Cycle Length: 120
Actuated Cycle Length: 120
Offset: 92 (77%), Referenced to phase 4:EBT and 8:WBT, Start of Green
Natural Cycle: 145
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 1.14
Intersection Signal Delay: 69.9 Intersection LOS: E
Intersection Capacity Utilization 109.2% 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: 1: Churchill Ave N & Carling Ave



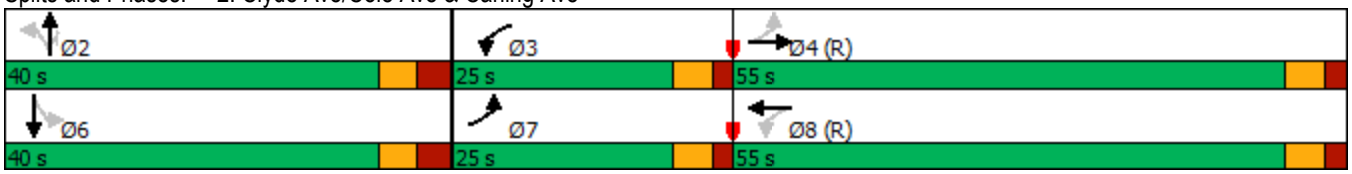


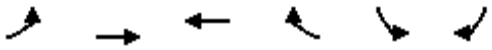
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	74	801	1	241	1855	51	126	87	210	30	54	62
Future Volume (vph)	74	801	1	241	1855	51	126	87	210	30	54	62
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Storage Length (m)	20.0		0.0	120.0		0.0	0.0		5.0	20.0		0.0
Storage Lanes	1		0	1		0	1		1	1		0
Taper Length (m)	20.0			30.0			7.6			20.0		
Right Turn on Red			Yes			Yes			Yes			Yes
Link Speed (k/h)		60			60			50			40	
Link Distance (m)		118.2			191.8			103.0			96.3	
Travel Time (s)		7.1			11.5			7.4			8.7	
Lane Group Flow (vph)	82	891	0	268	2118	0	140	97	233	33	129	0
Turn Type	pm+pt	NA		pm+pt	NA		Perm	NA	Perm	Perm	NA	
Protected Phases	7	4		3	8			2			6	
Permitted Phases	4			8			2		2	6		
Detector Phase	7	4		3	8		2	2	2	6	6	
Switch Phase												
Minimum Initial (s)	5.0	10.0		5.0	10.0		10.0	10.0	10.0	10.0	10.0	
Minimum Split (s)	10.4	35.5		10.4	35.5		37.0	37.0	37.0	37.0	37.0	
Total Split (s)	25.0	55.0		25.0	55.0		40.0	40.0	40.0	40.0	40.0	
Total Split (%)	20.8%	45.8%		20.8%	45.8%		33.3%	33.3%	33.3%	33.3%	33.3%	
Yellow Time (s)	3.7	3.7		3.7	3.7		3.3	3.3	3.3	3.3	3.3	
All-Red Time (s)	1.7	2.1		1.7	2.1		3.3	3.3	3.3	3.3	3.3	
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)	5.4	5.8		5.4	5.8		6.6	6.6	6.6	6.6	6.6	
Lead/Lag	Lead	Lag		Lead	Lag							
Lead-Lag Optimize?	Yes	Yes		Yes	Yes							
Recall Mode	None	C-Max		None	C-Max		None	None	None	None	None	
Act Effct Green (s)	77.8	69.8		87.4	76.9		19.9	19.9	19.9	19.9	19.9	
Actuated g/C Ratio	0.65	0.58		0.73	0.64		0.17	0.17	0.17	0.17	0.17	
v/c Ratio	0.49	0.31		0.57	0.68		0.75	0.33	0.61	0.16	0.42	
Control Delay	27.6	14.8		18.3	16.8		70.5	45.1	20.5	41.5	30.1	
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	
Total Delay	27.6	14.8		18.3	16.8		70.5	45.1	20.5	41.5	30.1	
LOS	C	B		B	B		E	D	C	D	C	
Approach Delay		15.9			16.9			40.5			32.4	
Approach LOS		B			B			D			C	
Queue Length 50th (m)	4.7	36.0		30.3	78.0		31.9	20.5	14.0	6.8	17.0	
Queue Length 95th (m)	22.5	61.8		m30.0	m76.1		49.5	33.0	36.3	14.7	32.2	
Internal Link Dist (m)		94.2			167.8			79.0			72.3	
Turn Bay Length (m)	20.0			120.0					5.0	20.0		
Base Capacity (vph)	334	2831		543	3105		313	496	528	339	486	
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	0.25	0.31		0.49	0.68		0.45	0.20	0.44	0.10	0.27	

Intersection Summary	
Area Type:	Other

Cycle Length: 120
Actuated Cycle Length: 120
Offset: 93 (78%), Referenced to phase 4:EBTL and 8:WBTL, Start of Green
Natural Cycle: 95
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.75
Intersection Signal Delay: 20.1 Intersection LOS: C
Intersection Capacity Utilization 76.8% ICU Level of Service D
Analysis Period (min) 15
m Volume for 95th percentile queue is metered by upstream signal.

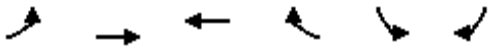
Splits and Phases: 2: Clyde Ave/Cole Ave & Carling Ave





Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↑↑↑	↑↑↑↳			↱
Traffic Volume (vph)	0	1041	2146	1	0	13
Future Volume (vph)	0	1041	2146	1	0	13
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800
Link Speed (k/h)		60	60		48	
Link Distance (m)		191.8	108.4		45.0	
Travel Time (s)		11.5	6.5		3.4	
Lane Group Flow (vph)	0	1157	2385	0	0	14
Sign Control		Free	Free		Stop	

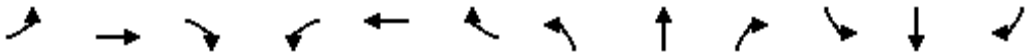
Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization 53.8%		ICU Level of Service A	
Analysis Period (min) 15			



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↑↑↑	↑↑↑↱			↱
Traffic Volume (veh/h)	0	1041	2146	1	0	13
Future Volume (Veh/h)	0	1041	2146	1	0	13
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	0	1157	2384	1	0	14
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage veh)						
Upstream signal (m)		192	109			
pX, platoon unblocked	0.60				0.64	0.60
vC, conflicting volume	2385				2770	795
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	987				942	0
tC, single (s)	4.1				6.8	6.9
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	100				100	98
cM capacity (veh/h)	419				168	653

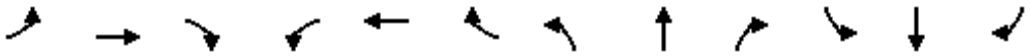
Direction, Lane #	EB 1	EB 2	EB 3	WB 1	WB 2	WB 3	SB 1
Volume Total	386	386	386	954	954	478	14
Volume Left	0	0	0	0	0	0	0
Volume Right	0	0	0	0	0	1	14
cSH	1700	1700	1700	1700	1700	1700	653
Volume to Capacity	0.23	0.23	0.23	0.56	0.56	0.28	0.02
Queue Length 95th (m)	0.0	0.0	0.0	0.0	0.0	0.0	0.5
Control Delay (s)	0.0	0.0	0.0	0.0	0.0	0.0	10.6
Lane LOS							B
Approach Delay (s)	0.0			0.0			10.6
Approach LOS							B

Intersection Summary			
Average Delay	0.0		
Intersection Capacity Utilization	53.8%	ICU Level of Service	A
Analysis Period (min)	15		



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	2	1	8	36	1	5	7	122	52	4	60	2
Future Volume (vph)	2	1	8	36	1	5	7	122	52	4	60	2
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Link Speed (k/h)		40			40			40			40	
Link Distance (m)		64.0			51.0			96.3			60.0	
Travel Time (s)		5.8			4.6			8.7			5.4	
Lane Group Flow (vph)	0	12	0	0	47	0	0	202	0	0	73	0
Sign Control		Stop			Stop			Free			Free	

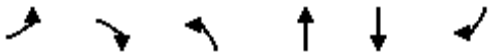
Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization 27.8%		ICU Level of Service A	
Analysis Period (min) 15			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	2	1	8	36	1	5	7	122	52	4	60	2
Future Volume (Veh/h)	2	1	8	36	1	5	7	122	52	4	60	2
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	2	1	9	40	1	6	8	136	58	4	67	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)								96				
pX, platoon unblocked	0.97	0.97		0.97	0.97	0.97				0.97		
vC, conflicting volume	264	286	68	266	258	165	69			194		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	227	250	68	230	221	125	69			155		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	100	100	99	94	100	99	99			100		
cM capacity (veh/h)	698	629	995	693	653	899	1532			1384		

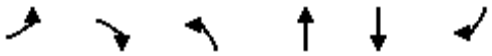
Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	12	47	202	73
Volume Left	2	40	8	4
Volume Right	9	6	58	2
cSH	889	713	1532	1384
Volume to Capacity	0.01	0.07	0.01	0.00
Queue Length 95th (m)	0.3	1.6	0.1	0.1
Control Delay (s)	9.1	10.4	0.3	0.4
Lane LOS	A	B	A	A
Approach Delay (s)	9.1	10.4	0.3	0.4
Approach LOS	A	B		

Intersection Summary				
Average Delay	2.1			
Intersection Capacity Utilization	27.8%	ICU Level of Service	A	
Analysis Period (min)	15			



Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	9	25	31	464	454	17
Future Volume (vph)	9	25	31	464	454	17
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800
Link Speed (k/h)	40			50	50	
Link Distance (m)	66.9			87.9	45.3	
Travel Time (s)	6.0			6.3	3.3	
Lane Group Flow (vph)	38	0	0	550	523	0
Sign Control	Stop			Free	Free	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization 62.6%		ICU Level of Service B	
Analysis Period (min) 15			

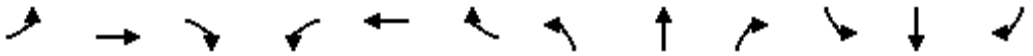


Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	9	25	31	464	454	17
Future Volume (Veh/h)	9	25	31	464	454	17
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	10	28	34	516	504	19
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (m)				88		
pX, platoon unblocked						
vC, conflicting volume	1098	514	523			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1098	514	523			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	96	95	97			
cM capacity (veh/h)	228	561	1043			

Direction, Lane #	EB 1	NB 1	SB 1
Volume Total	38	550	523
Volume Left	10	34	0
Volume Right	28	0	19
cSH	405	1043	1700
Volume to Capacity	0.09	0.03	0.31
Queue Length 95th (m)	2.3	0.8	0.0
Control Delay (s)	14.8	0.9	0.0
Lane LOS	B	A	
Approach Delay (s)	14.8	0.9	0.0
Approach LOS	B		

Intersection Summary			
Average Delay	1.0		
Intersection Capacity Utilization	62.6%	ICU Level of Service	B
Analysis Period (min)	15		

Future Background 2022



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	167	1082	98	85	488	154	11	5	11	336	31	243
Future Volume (vph)	167	1082	98	85	488	154	11	5	11	336	31	243
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Storage Length (m)	65.0		20.0	60.0		20.0	20.0		0.0	20.0		0.0
Storage Lanes	1		1	1		1	1		0	1		0
Taper Length (m)	25.0			15.0			20.0			25.0		
Right Turn on Red			Yes			Yes			Yes			Yes
Link Speed (k/h)		60			60			50			50	
Link Distance (m)		111.5			137.3			86.0			94.3	
Travel Time (s)		6.7			8.2			6.2			6.8	
Lane Group Flow (vph)	167	1082	98	85	488	154	11	16	0	336	274	0
Turn Type	Prot	NA	Perm	Prot	NA	Perm	Perm	NA		Perm	NA	
Protected Phases	7	4		3	8			2			6	
Permitted Phases			4			8	2			6		
Detector Phase	7	4	4	3	8	8	2	2		6	6	
Switch Phase												
Minimum Initial (s)	5.0	10.0	10.0	5.0	10.0	10.0	10.0	10.0		10.0	10.0	
Minimum Split (s)	11.1	34.1	34.1	11.1	34.1	34.1	40.0	40.0		40.0	40.0	
Total Split (s)	25.0	50.0	50.0	25.0	50.0	50.0	40.0	40.0		40.0	40.0	
Total Split (%)	20.8%	41.7%	41.7%	20.8%	41.7%	41.7%	33.3%	33.3%		33.3%	33.3%	
Yellow Time (s)	3.7	3.7	3.7	3.7	3.7	3.7	3.3	3.3		3.3	3.3	
All-Red Time (s)	2.4	2.4	2.4	2.4	2.4	2.4	3.5	3.5		3.5	3.5	
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Total Lost Time (s)	6.1	6.1	6.1	6.1	6.1	6.1	6.8	6.8		6.8	6.8	
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lag						
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes						
Recall Mode	None	C-Max	C-Max	None	C-Max	C-Max	None	None		None	None	
Act Effct Green (s)	16.0	56.3	56.3	11.3	49.0	49.0	36.0	36.0		36.0	36.0	
Actuated g/C Ratio	0.13	0.47	0.47	0.09	0.41	0.41	0.30	0.30		0.30	0.30	
v/c Ratio	0.74	0.68	0.13	0.53	0.35	0.24	0.05	0.03		0.86	0.44	
Control Delay	91.9	12.9	1.0	63.2	26.6	9.9	29.2	17.1		60.8	8.0	
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Total Delay	91.9	12.9	1.0	63.2	26.6	9.9	29.2	17.1		60.8	8.0	
LOS	F	B	A	E	C	A	C	B		E	A	
Approach Delay		21.9			27.4			22.0			37.1	
Approach LOS		C			C			C			D	
Queue Length 50th (m)	41.9	24.4	0.0	19.4	43.2	6.8	1.8	0.8		72.4	5.1	
Queue Length 95th (m)	m62.6	45.9	m2.2	34.4	58.8	21.6	6.2	5.9		#119.1	25.6	
Internal Link Dist (m)		87.5			113.3			62.0			70.3	
Turn Bay Length (m)	65.0		20.0	60.0		20.0	20.0			20.0		
Base Capacity (vph)	266	1589	733	266	1384	650	245	488		401	627	
Starvation Cap Reductn	0	0	0	0	0	0	0	0		0	0	
Spillback Cap Reductn	0	0	0	0	0	0	0	0		0	0	
Storage Cap Reductn	0	0	0	0	0	0	0	0		0	0	
Reduced v/c Ratio	0.63	0.68	0.13	0.32	0.35	0.24	0.04	0.03		0.84	0.44	

Intersection Summary	
Area Type:	Other

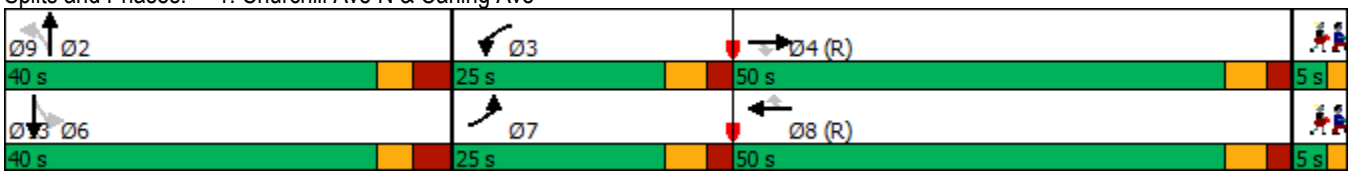
Lane Group	Ø9	Ø13
Lane Configurations		
Traffic Volume (vph)		
Future Volume (vph)		
Ideal Flow (vphpl)		
Storage Length (m)		
Storage Lanes		
Taper Length (m)		
Right Turn on Red		
Link Speed (k/h)		
Link Distance (m)		
Travel Time (s)		
Lane Group Flow (vph)		
Turn Type		
Protected Phases	9	13
Permitted Phases		
Detector Phase		
Switch Phase		
Minimum Initial (s)	1.0	1.0
Minimum Split (s)	5.0	5.0
Total Split (s)	5.0	5.0
Total Split (%)	4%	4%
Yellow Time (s)	2.0	2.0
All-Red Time (s)	0.0	0.0
Lost Time Adjust (s)		
Total Lost Time (s)		
Lead/Lag		
Lead-Lag Optimize?		
Recall Mode	None	None
Act Effct Green (s)		
Actuated g/C Ratio		
v/c Ratio		
Control Delay		
Queue Delay		
Total Delay		
LOS		
Approach Delay		
Approach LOS		
Queue Length 50th (m)		
Queue Length 95th (m)		
Internal Link Dist (m)		
Turn Bay Length (m)		
Base Capacity (vph)		
Starvation Cap Reductn		
Spillback Cap Reductn		
Storage Cap Reductn		
Reduced v/c Ratio		

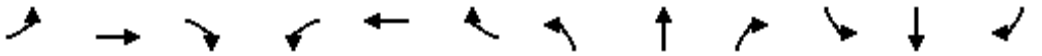
Intersection Summary

Cycle Length: 120	
Actuated Cycle Length: 120	
Offset: 101 (84%), Referenced to phase 4:EBT and 8:WBT, Start of Green	
Natural Cycle: 95	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.86	
Intersection Signal Delay: 26.8	Intersection LOS: C
Intersection Capacity Utilization 79.3%	ICU Level of Service D
Analysis Period (min) 15	

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

Splits and Phases: 1: Churchill Ave N & Carling Ave



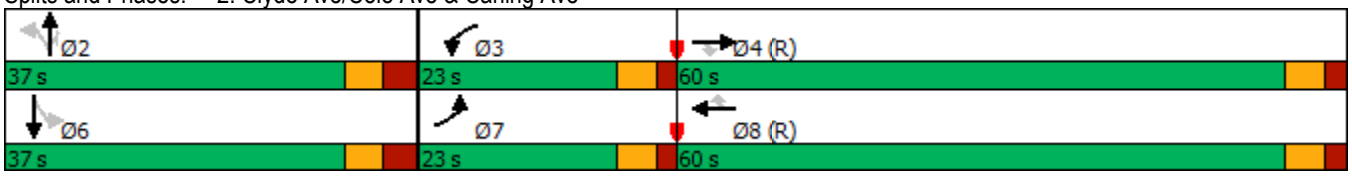


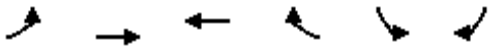
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	60	1185	0	232	481	31	121	51	147	35	63	66
Future Volume (vph)	60	1185	0	232	481	31	121	51	147	35	63	66
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Storage Length (m)	20.0		20.0	120.0		20.0	0.0		5.0	20.0		0.0
Storage Lanes	1		1	1		1	1		1	1		0
Taper Length (m)	20.0			30.0			7.6			20.0		
Right Turn on Red			Yes			Yes			Yes			Yes
Link Speed (k/h)		60			60			50			40	
Link Distance (m)		118.2			188.6			103.0			97.3	
Travel Time (s)		7.1			11.3			7.4			8.8	
Lane Group Flow (vph)	60	1185	0	232	481	31	121	51	147	35	129	0
Turn Type	Prot	NA	Perm	Prot	NA	Perm	Perm	NA	Perm	Perm	NA	
Protected Phases	7	4		3	8			2			6	
Permitted Phases			4			8	2		2	6		
Detector Phase	7	4	4	3	8	8	2	2	2	6	6	
Switch Phase												
Minimum Initial (s)	5.0	10.0	10.0	5.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	
Minimum Split (s)	10.4	35.5	35.5	10.4	35.5	35.5	37.0	37.0	37.0	37.0	37.0	
Total Split (s)	23.0	60.0	60.0	23.0	60.0	60.0	37.0	37.0	37.0	37.0	37.0	
Total Split (%)	19.2%	50.0%	50.0%	19.2%	50.0%	50.0%	30.8%	30.8%	30.8%	30.8%	30.8%	
Yellow Time (s)	3.7	3.7	3.7	3.7	3.7	3.7	3.3	3.3	3.3	3.3	3.3	
All-Red Time (s)	1.7	2.1	2.1	1.7	2.1	2.1	3.3	3.3	3.3	3.3	3.3	
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Total Lost Time (s)	5.4	5.8	5.8	5.4	5.8	5.8	6.6	6.6	6.6	6.6	6.6	
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lag						
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes						
Recall Mode	None	C-Max	C-Max	None	C-Max	C-Max	None	None	None	None	None	
Act Effct Green (s)	9.6	62.1		22.3	77.1	77.1	17.8	17.8	17.8	17.8	17.8	
Actuated g/C Ratio	0.08	0.52		0.19	0.64	0.64	0.15	0.15	0.15	0.15	0.15	
v/c Ratio	0.44	0.68		0.74	0.22	0.03	0.74	0.19	0.43	0.19	0.47	
Control Delay	62.1	25.4		60.2	9.0	0.1	73.5	43.8	10.4	44.2	35.2	
Queue Delay	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Total Delay	62.1	25.4		60.2	9.0	0.1	73.5	43.8	10.4	44.2	35.2	
LOS	E	C		E	A	A	E	D	B	D	D	
Approach Delay		27.1			24.6			39.7			37.2	
Approach LOS		C			C			D			D	
Queue Length 50th (m)	13.7	108.3		56.6	18.3	0.0	27.7	10.7	0.0	7.3	18.7	
Queue Length 95th (m)	26.7	148.4		#88.9	29.7	m0.3	44.8	20.5	16.3	15.6	34.7	
Internal Link Dist (m)		94.2			164.6			79.0			73.3	
Turn Bay Length (m)	20.0			120.0		20.0			5.0	20.0		
Base Capacity (vph)	248	1754		315	2177	970	280	451	483	322	444	
Starvation Cap Reductn	0	0		0	0	0	0	0	0	0	0	
Spillback Cap Reductn	0	0		0	0	0	0	0	0	0	0	
Storage Cap Reductn	0	0		0	0	0	0	0	0	0	0	
Reduced v/c Ratio	0.24	0.68		0.74	0.22	0.03	0.43	0.11	0.30	0.11	0.29	

Intersection Summary	
Area Type:	Other

Cycle Length: 120
Actuated Cycle Length: 120
Offset: 84 (70%), Referenced to phase 4:EBT and 8:WBT, Start of Green
Natural Cycle: 95
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.74
Intersection Signal Delay: 28.6 Intersection LOS: C
Intersection Capacity Utilization 91.0% 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.
m Volume for 95th percentile queue is metered by upstream signal.

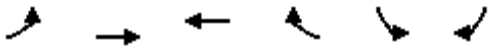
Splits and Phases: 2: Clyde Ave/Cole Ave & Carling Ave





Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	0	1347	732	10	0	1
Future Volume (vph)	0	1347	732	10	0	1
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800
Link Speed (k/h)		60	60		40	
Link Distance (m)		188.6	111.5		51.7	
Travel Time (s)		11.3	6.7		4.7	
Lane Group Flow (vph)	0	1347	742	0	0	1
Sign Control		Free	Free		Stop	

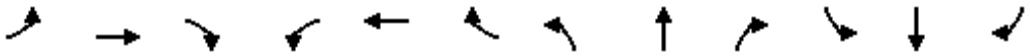
Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization 42.6%		ICU Level of Service A	
Analysis Period (min) 15			



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	0	1347	732	10	0	1
Future Volume (Veh/h)	0	1347	732	10	0	1
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	0	1347	732	10	0	1
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage veh)						
Upstream signal (m)		189	112			
pX, platoon unblocked	0.90				0.79	0.90
vC, conflicting volume	742				1410	371
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	505				437	95
tC, single (s)	4.1				6.8	6.9
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	100				100	100
cM capacity (veh/h)	956				431	853

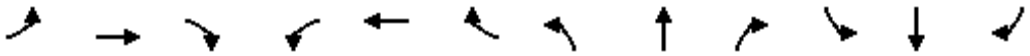
Direction, Lane #	EB 1	EB 2	WB 1	WB 2	SB 1
Volume Total	674	674	488	254	1
Volume Left	0	0	0	0	0
Volume Right	0	0	0	10	1
cSH	1700	1700	1700	1700	853
Volume to Capacity	0.40	0.40	0.29	0.15	0.00
Queue Length 95th (m)	0.0	0.0	0.0	0.0	0.0
Control Delay (s)	0.0	0.0	0.0	0.0	9.2
Lane LOS					A
Approach Delay (s)	0.0		0.0		9.2
Approach LOS					A

Intersection Summary			
Average Delay	0.0		
Intersection Capacity Utilization	42.6%	ICU Level of Service	A
Analysis Period (min)	15		



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	1	1	2	49	0	2	1	86	24	3	96	0
Future Volume (vph)	1	1	2	49	0	2	1	86	24	3	96	0
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Link Speed (k/h)		40			40			40			40	
Link Distance (m)		50.6			53.4			97.3			63.2	
Travel Time (s)		4.6			4.8			8.8			5.7	
Lane Group Flow (vph)	0	4	0	0	51	0	0	111	0	0	99	0
Sign Control		Stop			Stop			Free			Free	

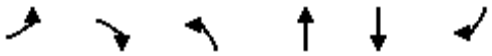
Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization 23.2%		ICU Level of Service A	
Analysis Period (min) 15			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	1	1	2	49	0	2	1	86	24	3	96	0
Future Volume (Veh/h)	1	1	2	49	0	2	1	86	24	3	96	0
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	1	1	2	49	0	2	1	86	24	3	96	0
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (m)								97				
pX, platoon unblocked												
vC, conflicting volume	204	214	96	204	202	98	96			110		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	204	214	96	204	202	98	96			110		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	100	100	100	93	100	100	100			100		
cM capacity (veh/h)	751	682	960	749	692	958	1498			1480		

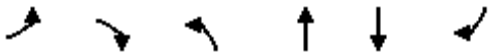
Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	4	51	111	99
Volume Left	1	49	1	3
Volume Right	2	2	24	0
cSH	819	756	1498	1480
Volume to Capacity	0.00	0.07	0.00	0.00
Queue Length 95th (m)	0.1	1.6	0.0	0.0
Control Delay (s)	9.4	10.1	0.1	0.2
Lane LOS	A	B	A	A
Approach Delay (s)	9.4	10.1	0.1	0.2
Approach LOS	A	B		

Intersection Summary				
Average Delay	2.2			
Intersection Capacity Utilization	23.2%	ICU Level of Service	A	
Analysis Period (min)	15			



Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	4	32	14	315	578	16
Future Volume (vph)	4	32	14	315	578	16
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800
Link Speed (k/h)	40			50	50	
Link Distance (m)	69.5			94.3	40.7	
Travel Time (s)	6.3			6.8	2.9	
Lane Group Flow (vph)	36	0	0	329	594	0
Sign Control	Stop			Free	Free	

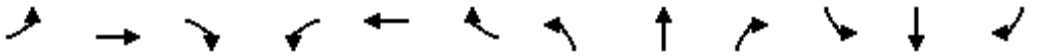
Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization 43.1%		ICU Level of Service A	
Analysis Period (min) 15			



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	4	32	14	315	578	16
Future Volume (Veh/h)	4	32	14	315	578	16
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	32	14	315	578	16
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (m)				94		
pX, platoon unblocked						
vC, conflicting volume	929	586	594			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	929	586	594			
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	94	99			
cM capacity (veh/h)	293	510	982			

Direction, Lane #	EB 1	NB 1	SB 1
Volume Total	36	329	594
Volume Left	4	14	0
Volume Right	32	0	16
cSH	471	982	1700
Volume to Capacity	0.08	0.01	0.35
Queue Length 95th (m)	1.9	0.3	0.0
Control Delay (s)	13.3	0.5	0.0
Lane LOS	B	A	
Approach Delay (s)	13.3	0.5	0.0
Approach LOS	B		

Intersection Summary			
Average Delay	0.7		
Intersection Capacity Utilization	43.1%	ICU Level of Service	A
Analysis Period (min)	15		



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	231	634	18	19	1426	218	96	33	26	182	7	269
Future Volume (vph)	231	634	18	19	1426	218	96	33	26	182	7	269
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Storage Length (m)	65.0		20.0	60.0		20.0	20.0		0.0	20.0		0.0
Storage Lanes	1		1	1		1	1		0	1		0
Taper Length (m)	25.0			15.0			20.0			25.0		
Right Turn on Red			Yes			Yes			Yes			Yes
Link Speed (k/h)		60			60			50			50	
Link Distance (m)		112.3			137.3			86.0			93.3	
Travel Time (s)		6.7			8.2			6.2			6.7	
Lane Group Flow (vph)	231	634	18	19	1426	218	96	59	0	182	276	0
Turn Type	Prot	NA	Perm	Prot	NA	Perm	Perm	NA		Perm	NA	
Protected Phases	7	4		3	8			2			6	
Permitted Phases			4			8	2			6		
Detector Phase	7	4	4	3	8	8	2	2		6	6	
Switch Phase												
Minimum Initial (s)	5.0	10.0	10.0	5.0	10.0	10.0	10.0	10.0		10.0	10.0	
Minimum Split (s)	11.1	34.1	34.1	11.1	34.1	34.1	40.0	40.0		40.0	40.0	
Total Split (s)	20.0	55.0	55.0	20.0	55.0	55.0	40.0	40.0		40.0	40.0	
Total Split (%)	16.7%	45.8%	45.8%	16.7%	45.8%	45.8%	33.3%	33.3%		33.3%	33.3%	
Yellow Time (s)	3.7	3.7	3.7	3.7	3.7	3.7	3.3	3.3		3.3	3.3	
All-Red Time (s)	2.4	2.4	2.4	2.4	2.4	2.4	3.5	3.5		3.5	3.5	
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Total Lost Time (s)	6.1	6.1	6.1	6.1	6.1	6.1	6.8	6.8		6.8	6.8	
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lag						
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes						
Recall Mode	None	C-Max	C-Max	None	C-Max	C-Max	None	None		None	None	
Act Effct Green (s)	25.9	78.4	78.4	7.0	52.2	52.2	22.9	22.9		22.9	22.9	
Actuated g/C Ratio	0.22	0.65	0.65	0.06	0.44	0.44	0.19	0.19		0.19	0.19	
v/c Ratio	0.63	0.29	0.02	0.19	0.97	0.32	0.92	0.18		0.75	0.56	
Control Delay	65.6	8.5	0.1	57.8	50.7	12.8	116.1	24.1		63.9	9.3	
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Total Delay	65.6	8.5	0.1	57.8	50.7	12.8	116.1	24.1		63.9	9.3	
LOS	E	A	A	E	D	B	F	C		E	A	
Approach Delay		23.3			45.9			81.1			31.0	
Approach LOS		C			D			F			C	
Queue Length 50th (m)	57.2	21.2	0.0	4.4	169.1	15.5	22.5	6.5		41.1	1.4	
Queue Length 95th (m)	#97.9	34.2	m0.0	11.9	#231.6	34.9	#44.9	16.2		60.1	21.9	
Internal Link Dist (m)		88.3			113.3			62.0			69.3	
Turn Bay Length (m)	65.0		20.0	60.0		20.0	20.0			20.0		
Base Capacity (vph)	366	2215	971	196	1474	688	151	475		351	600	
Starvation Cap Reductn	0	0	0	0	0	0	0	0		0	0	
Spillback Cap Reductn	0	0	0	0	0	0	0	0		0	0	
Storage Cap Reductn	0	0	0	0	0	0	0	0		0	0	
Reduced v/c Ratio	0.63	0.29	0.02	0.10	0.97	0.32	0.64	0.12		0.52	0.46	

Intersection Summary	
Area Type:	Other

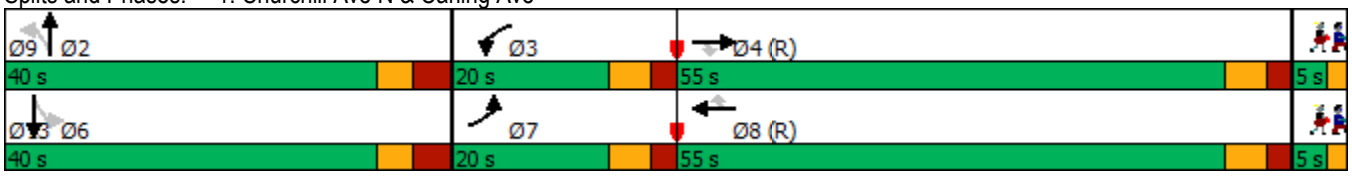
Lane Group	Ø9	Ø13
Lane Configurations		
Traffic Volume (vph)		
Future Volume (vph)		
Ideal Flow (vphpl)		
Storage Length (m)		
Storage Lanes		
Taper Length (m)		
Right Turn on Red		
Link Speed (k/h)		
Link Distance (m)		
Travel Time (s)		
Lane Group Flow (vph)		
Turn Type		
Protected Phases	9	13
Permitted Phases		
Detector Phase		
Switch Phase		
Minimum Initial (s)	1.0	1.0
Minimum Split (s)	5.0	5.0
Total Split (s)	5.0	5.0
Total Split (%)	4%	4%
Yellow Time (s)	2.0	2.0
All-Red Time (s)	0.0	0.0
Lost Time Adjust (s)		
Total Lost Time (s)		
Lead/Lag		
Lead-Lag Optimize?		
Recall Mode	None	None
Act Effct Green (s)		
Actuated g/C Ratio		
v/c Ratio		
Control Delay		
Queue Delay		
Total Delay		
LOS		
Approach Delay		
Approach LOS		
Queue Length 50th (m)		
Queue Length 95th (m)		
Internal Link Dist (m)		
Turn Bay Length (m)		
Base Capacity (vph)		
Starvation Cap Reductn		
Spillback Cap Reductn		
Storage Cap Reductn		
Reduced v/c Ratio		

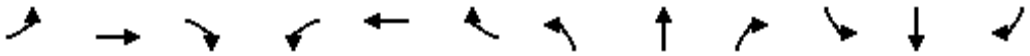
Intersection Summary

Cycle Length: 120	
Actuated Cycle Length: 120	
Offset: 92 (77%), Referenced to phase 4:EBT and 8:WBT, Start of Green	
Natural Cycle: 125	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.97	
Intersection Signal Delay: 39.1	Intersection LOS: D
Intersection Capacity Utilization 109.2%	ICU Level of Service H
Analysis Period (min) 15	

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

Splits and Phases: 1: Churchill Ave N & Carling Ave





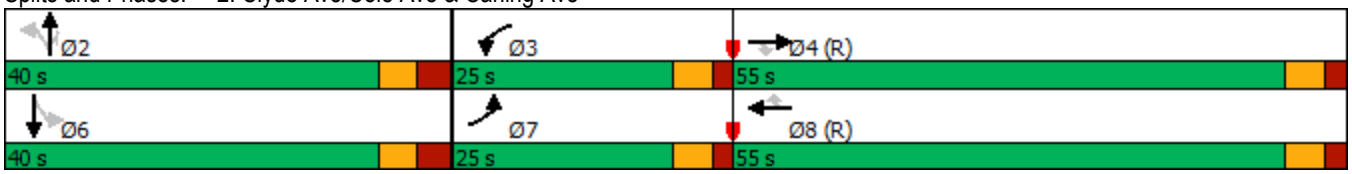
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	74	641	1	241	1484	51	126	87	210	30	54	62
Future Volume (vph)	74	641	1	241	1484	51	126	87	210	30	54	62
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Storage Length (m)	20.0		20.0	120.0		20.0	0.0		5.0	20.0		0.0
Storage Lanes	1		1	1		1	1		1	1		0
Taper Length (m)	20.0			30.0			7.6			20.0		
Right Turn on Red			Yes			Yes			Yes			Yes
Link Speed (k/h)		60			60			50			40	
Link Distance (m)		118.2			187.7			103.0			97.5	
Travel Time (s)		7.1			11.3			7.4			8.8	
Lane Group Flow (vph)	74	641	1	241	1484	51	126	87	210	30	116	0
Turn Type	Prot	NA	Perm	Prot	NA	Perm	Perm	NA	Perm	Perm	NA	
Protected Phases	7	4		3	8			2			6	
Permitted Phases			4			8	2		2	6		
Detector Phase	7	4	4	3	8	8	2	2	2	6	6	
Switch Phase												
Minimum Initial (s)	5.0	10.0	10.0	5.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	
Minimum Split (s)	10.4	35.5	35.5	10.4	35.5	35.5	37.0	37.0	37.0	37.0	37.0	
Total Split (s)	25.0	55.0	55.0	25.0	55.0	55.0	40.0	40.0	40.0	40.0	40.0	
Total Split (%)	20.8%	45.8%	45.8%	20.8%	45.8%	45.8%	33.3%	33.3%	33.3%	33.3%	33.3%	
Yellow Time (s)	3.7	3.7	3.7	3.7	3.7	3.7	3.3	3.3	3.3	3.3	3.3	
All-Red Time (s)	1.7	2.1	2.1	1.7	2.1	2.1	3.3	3.3	3.3	3.3	3.3	
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Total Lost Time (s)	5.4	5.8	5.8	5.4	5.8	5.8	6.6	6.6	6.6	6.6	6.6	
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lag						
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes						
Recall Mode	None	C-Max	C-Max	None	C-Max	C-Max	None	None	None	None	None	
Act Effct Green (s)	10.6	61.2	61.2	22.7	75.6	75.6	18.4	18.4	18.4	18.4	18.4	
Actuated g/C Ratio	0.09	0.51	0.51	0.19	0.63	0.63	0.15	0.15	0.15	0.15	0.15	
v/c Ratio	0.50	0.37	0.00	0.75	0.69	0.06	0.70	0.32	0.58	0.16	0.40	
Control Delay	62.8	20.3	0.0	56.0	16.2	3.2	67.0	46.3	17.6	42.8	29.6	
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Total Delay	62.8	20.3	0.0	56.0	16.2	3.2	67.0	46.3	17.6	42.8	29.6	
LOS	E	C	A	E	B	A	E	D	B	D	C	
Approach Delay		24.7			21.2			38.2			32.3	
Approach LOS		C			C			D			C	
Queue Length 50th (m)	16.9	47.2	0.0	59.6	72.7	0.4	28.6	18.6	9.2	6.2	14.4	
Queue Length 95th (m)	31.3	73.2	0.0	m66.7	m91.6	m1.1	45.2	30.9	30.0	13.8	29.2	
Internal Link Dist (m)		94.2			163.7			79.0			73.5	
Turn Bay Length (m)	20.0		20.0	120.0		20.0			5.0	20.0		
Base Capacity (vph)	276	1727	774	329	2137	924	328	496	528	342	486	
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	
Reduced v/c Ratio	0.27	0.37	0.00	0.73	0.69	0.06	0.38	0.18	0.40	0.09	0.24	

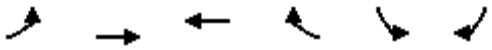
Intersection Summary	
Area Type:	Other

Cycle Length: 120	
Actuated Cycle Length: 120	
Offset: 93 (78%), Referenced to phase 4:EBT and 8:WBT, Start of Green	
Natural Cycle: 95	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.75	
Intersection Signal Delay: 24.9	Intersection LOS: C
Intersection Capacity Utilization 81.0%	ICU Level of Service D
Analysis Period (min) 15	

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

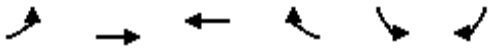
Splits and Phases: 2: Clyde Ave/Cole Ave & Carling Ave





Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	0	883	1790	1	0	13
Future Volume (vph)	0	883	1790	1	0	13
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800
Link Speed (k/h)		60	60		40	
Link Distance (m)		187.7	112.3		51.2	
Travel Time (s)		11.3	6.7		4.6	
Lane Group Flow (vph)	0	883	1791	0	0	13
Sign Control		Free	Free		Stop	

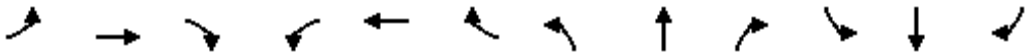
Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization 62.3%		ICU Level of Service B	
Analysis Period (min) 15			



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	0	883	1790	1	0	13
Future Volume (Veh/h)	0	883	1790	1	0	13
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	0	883	1790	1	0	13
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage veh)						
Upstream signal (m)		188	112			
pX, platoon unblocked	0.58				0.64	0.58
vC, conflicting volume	1791				2232	896
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	928				1030	0
tC, single (s)	4.1				6.8	6.9
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	100				100	98
cM capacity (veh/h)	427				146	633

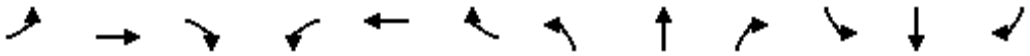
Direction, Lane #	EB 1	EB 2	WB 1	WB 2	SB 1
Volume Total	442	442	1193	598	13
Volume Left	0	0	0	0	0
Volume Right	0	0	0	1	13
cSH	1700	1700	1700	1700	633
Volume to Capacity	0.26	0.26	0.70	0.35	0.02
Queue Length 95th (m)	0.0	0.0	0.0	0.0	0.5
Control Delay (s)	0.0	0.0	0.0	0.0	10.8
Lane LOS					B
Approach Delay (s)	0.0		0.0		10.8
Approach LOS					B

Intersection Summary			
Average Delay	0.1		
Intersection Capacity Utilization	62.3%	ICU Level of Service	B
Analysis Period (min)	15		



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	2	1	8	36	1	5	7	122	52	4	60	2
Future Volume (vph)	2	1	8	36	1	5	7	122	52	4	60	2
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Link Speed (k/h)		40			40			40			40	
Link Distance (m)		53.9			51.5			97.5			66.2	
Travel Time (s)		4.9			4.6			8.8			6.0	
Lane Group Flow (vph)	0	11	0	0	42	0	0	181	0	0	66	0
Sign Control		Stop			Stop			Free			Free	

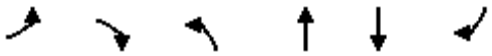
Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization 27.8%		ICU Level of Service A	
Analysis Period (min) 15			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	2	1	8	36	1	5	7	122	52	4	60	2
Future Volume (Veh/h)	2	1	8	36	1	5	7	122	52	4	60	2
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	2	1	8	36	1	5	7	122	52	4	60	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)								98				
pX, platoon unblocked	0.98	0.98		0.98	0.98	0.98				0.98		
vC, conflicting volume	236	257	61	240	232	148	62			174		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	207	228	61	210	202	116	62			143		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	100	100	99	95	100	99	100			100		
cM capacity (veh/h)	725	651	1004	719	673	914	1541			1407		

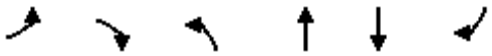
Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	11	42	181	66
Volume Left	2	36	7	4
Volume Right	8	5	52	2
cSH	897	737	1541	1407
Volume to Capacity	0.01	0.06	0.00	0.00
Queue Length 95th (m)	0.3	1.4	0.1	0.1
Control Delay (s)	9.1	10.2	0.3	0.5
Lane LOS	A	B	A	A
Approach Delay (s)	9.1	10.2	0.3	0.5
Approach LOS	A	B		

Intersection Summary				
Average Delay	2.1			
Intersection Capacity Utilization	27.8%	ICU Level of Service	A	
Analysis Period (min)	15			



Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	9	25	31	464	454	17
Future Volume (vph)	9	25	31	464	454	17
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800
Link Speed (k/h)	40			50	50	
Link Distance (m)	65.8			93.3	43.5	
Travel Time (s)	5.9			6.7	3.1	
Lane Group Flow (vph)	34	0	0	495	471	0
Sign Control	Stop			Free	Free	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization 62.6%		ICU Level of Service B	
Analysis Period (min) 15			

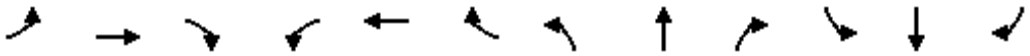


Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	9	25	31	464	454	17
Future Volume (Veh/h)	9	25	31	464	454	17
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	9	25	31	464	454	17
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (m)				93		
pX, platoon unblocked						
vC, conflicting volume	988	462	471			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	988	462	471			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	97	96	97			
cM capacity (veh/h)	266	599	1091			

Direction, Lane #	EB 1	NB 1	SB 1
Volume Total	34	495	471
Volume Left	9	31	0
Volume Right	25	0	17
cSH	450	1091	1700
Volume to Capacity	0.08	0.03	0.28
Queue Length 95th (m)	1.9	0.7	0.0
Control Delay (s)	13.7	0.8	0.0
Lane LOS	B	A	
Approach Delay (s)	13.7	0.8	0.0
Approach LOS	B		

Intersection Summary			
Average Delay	0.9		
Intersection Capacity Utilization	62.6%	ICU Level of Service	B
Analysis Period (min)	15		

Future Background 2027



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	167	1136	98	85	512	154	11	5	11	336	31	243
Future Volume (vph)	167	1136	98	85	512	154	11	5	11	336	31	243
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Storage Length (m)	65.0		20.0	60.0		20.0	20.0		0.0	20.0		0.0
Storage Lanes	1		1	1		1	1		0	1		0
Taper Length (m)	25.0			15.0			20.0			25.0		
Right Turn on Red			Yes			Yes			Yes			Yes
Link Speed (k/h)		60			60			50			50	
Link Distance (m)		113.4			137.3			90.4			92.0	
Travel Time (s)		6.8			8.2			6.5			6.6	
Lane Group Flow (vph)	167	1136	98	85	512	154	11	16	0	336	274	0
Turn Type	Prot	NA	Perm	Prot	NA	Perm	Perm	NA		Perm	NA	
Protected Phases	7	4		3	8			2			6	
Permitted Phases			4			8	2			6		
Detector Phase	7	4	4	3	8	8	2	2		6	6	
Switch Phase												
Minimum Initial (s)	5.0	10.0	10.0	5.0	10.0	10.0	10.0	10.0		10.0	10.0	
Minimum Split (s)	11.1	34.1	34.1	11.1	34.1	34.1	40.0	40.0		40.0	40.0	
Total Split (s)	25.0	50.0	50.0	25.0	50.0	50.0	40.0	40.0		40.0	40.0	
Total Split (%)	20.8%	41.7%	41.7%	20.8%	41.7%	41.7%	33.3%	33.3%		33.3%	33.3%	
Yellow Time (s)	3.7	3.7	3.7	3.7	3.7	3.7	3.3	3.3		3.3	3.3	
All-Red Time (s)	2.4	2.4	2.4	2.4	2.4	2.4	3.5	3.5		3.5	3.5	
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Total Lost Time (s)	6.1	6.1	6.1	6.1	6.1	6.1	6.8	6.8		6.8	6.8	
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lag						
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes						
Recall Mode	None	C-Max	C-Max	None	C-Max	C-Max	None	None		None	None	
Act Effct Green (s)	16.0	56.3	56.3	11.3	49.0	49.0	36.0	36.0		36.0	36.0	
Actuated g/C Ratio	0.13	0.47	0.47	0.09	0.41	0.41	0.30	0.30		0.30	0.30	
v/c Ratio	0.74	0.71	0.13	0.53	0.37	0.24	0.05	0.03		0.86	0.44	
Control Delay	90.9	14.2	1.4	63.2	26.9	9.9	29.2	17.1		60.8	8.0	
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Total Delay	90.9	14.2	1.4	63.2	26.9	9.9	29.2	17.1		60.8	8.0	
LOS	F	B	A	E	C	A	C	B		E	A	
Approach Delay		22.4			27.5			22.0			37.1	
Approach LOS		C			C			C			D	
Queue Length 50th (m)	41.9	25.2	0.0	19.4	45.7	6.8	1.8	0.8		72.4	5.1	
Queue Length 95th (m)	m59.9	77.5	m2.3	34.4	61.9	21.6	6.2	5.9		#119.1	25.6	
Internal Link Dist (m)		89.4			113.3			66.4			68.0	
Turn Bay Length (m)	65.0		20.0	60.0		20.0	20.0			20.0		
Base Capacity (vph)	266	1589	733	266	1384	650	245	488		401	627	
Starvation Cap Reductn	0	0	0	0	0	0	0	0		0	0	
Spillback Cap Reductn	0	0	0	0	0	0	0	0		0	0	
Storage Cap Reductn	0	0	0	0	0	0	0	0		0	0	
Reduced v/c Ratio	0.63	0.71	0.13	0.32	0.37	0.24	0.04	0.03		0.84	0.44	

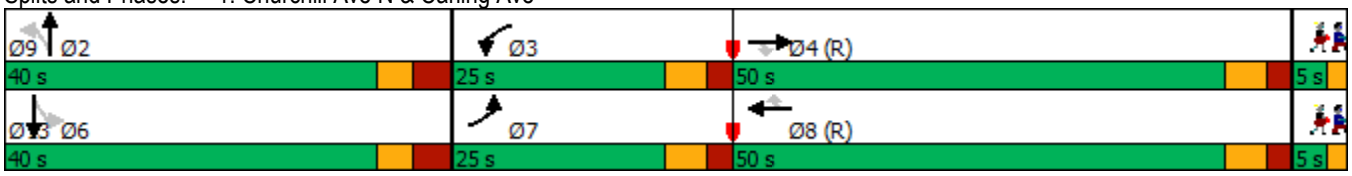
Intersection Summary	
Area Type:	Other

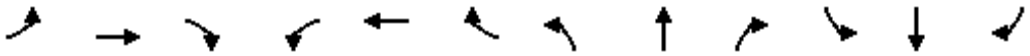
Lane Group	Ø9	Ø13
Lane Configurations		
Traffic Volume (vph)		
Future Volume (vph)		
Ideal Flow (vphpl)		
Storage Length (m)		
Storage Lanes		
Taper Length (m)		
Right Turn on Red		
Link Speed (k/h)		
Link Distance (m)		
Travel Time (s)		
Lane Group Flow (vph)		
Turn Type		
Protected Phases	9	13
Permitted Phases		
Detector Phase		
Switch Phase		
Minimum Initial (s)	1.0	1.0
Minimum Split (s)	5.0	5.0
Total Split (s)	5.0	5.0
Total Split (%)	4%	4%
Yellow Time (s)	2.0	2.0
All-Red Time (s)	0.0	0.0
Lost Time Adjust (s)		
Total Lost Time (s)		
Lead/Lag		
Lead-Lag Optimize?		
Recall Mode	None	None
Act Effct Green (s)		
Actuated g/C Ratio		
v/c Ratio		
Control Delay		
Queue Delay		
Total Delay		
LOS		
Approach Delay		
Approach LOS		
Queue Length 50th (m)		
Queue Length 95th (m)		
Internal Link Dist (m)		
Turn Bay Length (m)		
Base Capacity (vph)		
Starvation Cap Reductn		
Spillback Cap Reductn		
Storage Cap Reductn		
Reduced v/c Ratio		

Intersection Summary

Cycle Length: 120
Actuated Cycle Length: 120
Offset: 101 (84%), Referenced to phase 4:EBT and 8:WBT, Start of Green
Natural Cycle: 95
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.86
Intersection Signal Delay: 27.0 Intersection LOS: C
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.
m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 1: Churchill Ave N & Carling Ave



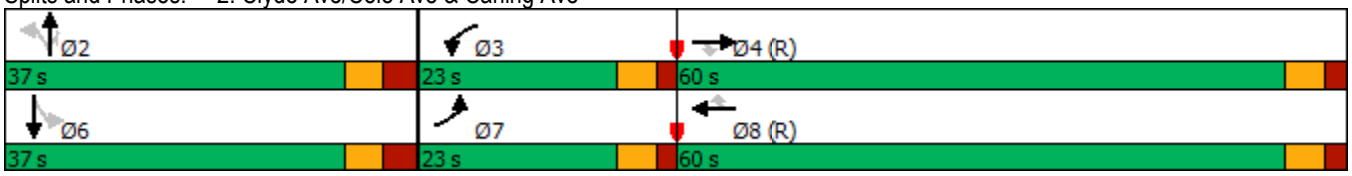


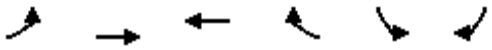
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	60	1244	0	232	505	31	121	51	147	35	63	66
Future Volume (vph)	60	1244	0	232	505	31	121	51	147	35	63	66
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Storage Length (m)	20.0		20.0	120.0		20.0	0.0		5.0	20.0		0.0
Storage Lanes	1		1	1		1	1		1	1		0
Taper Length (m)	20.0			30.0			7.6			20.0		
Right Turn on Red			Yes			Yes			Yes			Yes
Link Speed (k/h)		60			60			50			40	
Link Distance (m)		118.2			186.6			103.0			94.6	
Travel Time (s)		7.1			11.2			7.4			8.5	
Lane Group Flow (vph)	60	1244	0	232	505	31	121	51	147	35	129	0
Turn Type	Prot	NA	Perm	Prot	NA	Perm	Perm	NA	Perm	Perm	NA	
Protected Phases	7	4		3	8			2			6	
Permitted Phases			4			8	2		2	6		
Detector Phase	7	4	4	3	8	8	2	2	2	6	6	
Switch Phase												
Minimum Initial (s)	5.0	10.0	10.0	5.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	
Minimum Split (s)	10.4	35.5	35.5	10.4	35.5	35.5	37.0	37.0	37.0	37.0	37.0	
Total Split (s)	23.0	60.0	60.0	23.0	60.0	60.0	37.0	37.0	37.0	37.0	37.0	
Total Split (%)	19.2%	50.0%	50.0%	19.2%	50.0%	50.0%	30.8%	30.8%	30.8%	30.8%	30.8%	
Yellow Time (s)	3.7	3.7	3.7	3.7	3.7	3.7	3.3	3.3	3.3	3.3	3.3	
All-Red Time (s)	1.7	2.1	2.1	1.7	2.1	2.1	3.3	3.3	3.3	3.3	3.3	
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Total Lost Time (s)	5.4	5.8	5.8	5.4	5.8	5.8	6.6	6.6	6.6	6.6	6.6	
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lag						
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes						
Recall Mode	None	C-Max	C-Max	None	C-Max	C-Max	None	None	None	None	None	
Act Effct Green (s)	9.6	62.1		22.3	77.1	77.1	17.8	17.8	17.8	17.8	17.8	
Actuated g/C Ratio	0.08	0.52		0.19	0.64	0.64	0.15	0.15	0.15	0.15	0.15	
v/c Ratio	0.44	0.71		0.74	0.23	0.03	0.74	0.19	0.43	0.19	0.47	
Control Delay	62.1	26.4		60.1	8.9	0.1	73.5	43.8	10.4	44.2	35.2	
Queue Delay	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Total Delay	62.1	26.4		60.1	8.9	0.1	73.5	43.8	10.4	44.2	35.2	
LOS	E	C		E	A	A	E	D	B	D	D	
Approach Delay		28.0			24.0			39.7			37.2	
Approach LOS		C			C			D			D	
Queue Length 50th (m)	13.7	116.8		56.5	19.0	0.0	27.7	10.7	0.0	7.3	18.7	
Queue Length 95th (m)	26.7	159.7		#89.3	30.5	m0.3	44.8	20.5	16.3	15.6	34.7	
Internal Link Dist (m)		94.2			162.6			79.0			70.6	
Turn Bay Length (m)	20.0			120.0		20.0			5.0	20.0		
Base Capacity (vph)	248	1754		315	2177	970	280	451	483	322	444	
Starvation Cap Reductn	0	0		0	0	0	0	0	0	0	0	
Spillback Cap Reductn	0	0		0	0	0	0	0	0	0	0	
Storage Cap Reductn	0	0		0	0	0	0	0	0	0	0	
Reduced v/c Ratio	0.24	0.71		0.74	0.23	0.03	0.43	0.11	0.30	0.11	0.29	

Intersection Summary	
Area Type:	Other

Cycle Length: 120
Actuated Cycle Length: 120
Offset: 84 (70%), Referenced to phase 4:EBT and 8:WBT, Start of Green
Natural Cycle: 95
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.74
Intersection Signal Delay: 28.9 Intersection LOS: C
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.
m Volume for 95th percentile queue is metered by upstream signal.

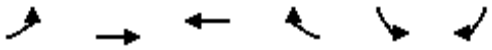
Splits and Phases: 2: Clyde Ave/Cole Ave & Carling Ave





Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	0	1414	769	10	0	1
Future Volume (vph)	0	1414	769	10	0	1
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800
Link Speed (k/h)		60	60		40	
Link Distance (m)		186.6	113.4		53.7	
Travel Time (s)		11.2	6.8		4.8	
Lane Group Flow (vph)	0	1414	779	0	0	1
Sign Control		Free	Free		Stop	

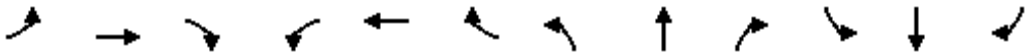
Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization 44.6%		ICU Level of Service A	
Analysis Period (min) 15			



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	0	1414	769	10	0	1
Future Volume (Veh/h)	0	1414	769	10	0	1
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	0	1414	769	10	0	1
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage veh)						
Upstream signal (m)		187	113			
pX, platoon unblocked	0.90				0.77	0.90
vC, conflicting volume	779				1481	390
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	530				429	97
tC, single (s)	4.1				6.8	6.9
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	100				100	100
cM capacity (veh/h)	929				425	846

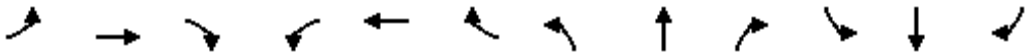
Direction, Lane #	EB 1	EB 2	WB 1	WB 2	SB 1
Volume Total	707	707	513	266	1
Volume Left	0	0	0	0	0
Volume Right	0	0	0	10	1
cSH	1700	1700	1700	1700	846
Volume to Capacity	0.42	0.42	0.30	0.16	0.00
Queue Length 95th (m)	0.0	0.0	0.0	0.0	0.0
Control Delay (s)	0.0	0.0	0.0	0.0	9.3
Lane LOS					A
Approach Delay (s)	0.0		0.0		9.3
Approach LOS					A

Intersection Summary			
Average Delay	0.0		
Intersection Capacity Utilization	44.6%	ICU Level of Service	A
Analysis Period (min)	15		



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	1	1	2	49	0	2	1	86	24	3	96	0
Future Volume (vph)	1	1	2	49	0	2	1	86	24	3	96	0
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Link Speed (k/h)		40			40			40			40	
Link Distance (m)		49.8			50.6			94.6			65.7	
Travel Time (s)		4.5			4.6			8.5			5.9	
Lane Group Flow (vph)	0	4	0	0	51	0	0	111	0	0	99	0
Sign Control		Stop			Stop			Free			Free	

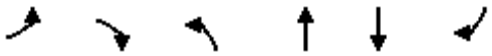
Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization 23.2%		ICU Level of Service A	
Analysis Period (min) 15			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	1	1	2	49	0	2	1	86	24	3	96	0
Future Volume (Veh/h)	1	1	2	49	0	2	1	86	24	3	96	0
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	1	1	2	49	0	2	1	86	24	3	96	0
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (m)								94				
pX, platoon unblocked												
vC, conflicting volume	204	214	96	204	202	98	96			110		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	204	214	96	204	202	98	96			110		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	100	100	100	93	100	100	100			100		
cM capacity (veh/h)	751	682	960	749	692	958	1498			1480		

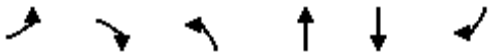
Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	4	51	111	99
Volume Left	1	49	1	3
Volume Right	2	2	24	0
cSH	819	756	1498	1480
Volume to Capacity	0.00	0.07	0.00	0.00
Queue Length 95th (m)	0.1	1.6	0.0	0.0
Control Delay (s)	9.4	10.1	0.1	0.2
Lane LOS	A	B	A	A
Approach Delay (s)	9.4	10.1	0.1	0.2
Approach LOS	A	B		

Intersection Summary				
Average Delay	2.2			
Intersection Capacity Utilization	23.2%	ICU Level of Service	A	
Analysis Period (min)	15			



Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	4	32	14	315	578	16
Future Volume (vph)	4	32	14	315	578	16
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800
Link Speed (k/h)	40			50	50	
Link Distance (m)	70.0			92.0	39.3	
Travel Time (s)	6.3			6.6	2.8	
Lane Group Flow (vph)	36	0	0	329	594	0
Sign Control	Stop			Free	Free	

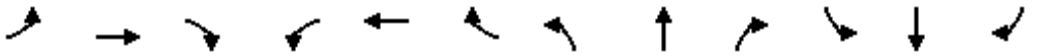
Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization 43.1%		ICU Level of Service A	
Analysis Period (min) 15			



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	4	32	14	315	578	16
Future Volume (Veh/h)	4	32	14	315	578	16
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	32	14	315	578	16
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (m)				92		
pX, platoon unblocked						
vC, conflicting volume	929	586	594			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	929	586	594			
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	94	99			
cM capacity (veh/h)	293	510	982			

Direction, Lane #	EB 1	NB 1	SB 1
Volume Total	36	329	594
Volume Left	4	14	0
Volume Right	32	0	16
cSH	471	982	1700
Volume to Capacity	0.08	0.01	0.35
Queue Length 95th (m)	1.9	0.3	0.0
Control Delay (s)	13.3	0.5	0.0
Lane LOS	B	A	
Approach Delay (s)	13.3	0.5	0.0
Approach LOS	B		

Intersection Summary			
Average Delay	0.7		
Intersection Capacity Utilization	43.1%	ICU Level of Service	A
Analysis Period (min)	15		



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	231	666	18	19	1497	218	96	33	26	182	7	269
Future Volume (vph)	231	666	18	19	1497	218	96	33	26	182	7	269
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Storage Length (m)	65.0		20.0	60.0		20.0	20.0		0.0	20.0		0.0
Storage Lanes	1		1	1		1	1		0	1		0
Taper Length (m)	25.0			15.0			20.0			25.0		
Right Turn on Red			Yes			Yes			Yes			Yes
Link Speed (k/h)		60			60			50			50	
Link Distance (m)		111.2			137.3			86.0			92.6	
Travel Time (s)		6.7			8.2			6.2			6.7	
Lane Group Flow (vph)	231	666	18	19	1497	218	96	59	0	182	276	0
Turn Type	Prot	NA	Perm	Prot	NA	Perm	Perm	NA		Perm	NA	
Protected Phases	7	4		3	8			2			6	
Permitted Phases			4			8	2			6		
Detector Phase	7	4	4	3	8	8	2	2		6	6	
Switch Phase												
Minimum Initial (s)	5.0	10.0	10.0	5.0	10.0	10.0	10.0	10.0		10.0	10.0	
Minimum Split (s)	11.1	34.1	34.1	11.1	34.1	34.1	40.0	40.0		40.0	40.0	
Total Split (s)	20.0	55.0	55.0	20.0	55.0	55.0	40.0	40.0		40.0	40.0	
Total Split (%)	16.7%	45.8%	45.8%	16.7%	45.8%	45.8%	33.3%	33.3%		33.3%	33.3%	
Yellow Time (s)	3.7	3.7	3.7	3.7	3.7	3.7	3.3	3.3		3.3	3.3	
All-Red Time (s)	2.4	2.4	2.4	2.4	2.4	2.4	3.5	3.5		3.5	3.5	
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Total Lost Time (s)	6.1	6.1	6.1	6.1	6.1	6.1	6.8	6.8		6.8	6.8	
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lag						
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes						
Recall Mode	None	C-Max	C-Max	None	C-Max	C-Max	None	None		None	None	
Act Effct Green (s)	25.9	78.4	78.4	7.0	52.2	52.2	22.9	22.9		22.9	22.9	
Actuated g/C Ratio	0.22	0.65	0.65	0.06	0.44	0.44	0.19	0.19		0.19	0.19	
v/c Ratio	0.63	0.30	0.02	0.19	1.02	0.32	0.92	0.18		0.75	0.56	
Control Delay	65.5	8.5	0.1	57.8	61.7	12.8	116.1	24.1		63.9	9.3	
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Total Delay	65.5	8.5	0.1	57.8	61.7	12.8	116.1	24.1		63.9	9.3	
LOS	E	A	A	E	E	B	F	C		E	A	
Approach Delay		22.7			55.5			81.1			31.0	
Approach LOS		C			E			F			C	
Queue Length 50th (m)	57.0	22.1	0.0	4.4	~189.1	15.5	22.5	6.5		41.1	1.4	
Queue Length 95th (m)	#97.7	35.3	m0.0	11.9	#250.2	34.9	#44.9	16.2		60.1	21.9	
Internal Link Dist (m)		87.2			113.3			62.0			68.6	
Turn Bay Length (m)	65.0		20.0	60.0		20.0	20.0			20.0		
Base Capacity (vph)	366	2215	971	196	1474	688	151	475		351	600	
Starvation Cap Reductn	0	0	0	0	0	0	0	0		0	0	
Spillback Cap Reductn	0	0	0	0	0	0	0	0		0	0	
Storage Cap Reductn	0	0	0	0	0	0	0	0		0	0	
Reduced v/c Ratio	0.63	0.30	0.02	0.10	1.02	0.32	0.64	0.12		0.52	0.46	

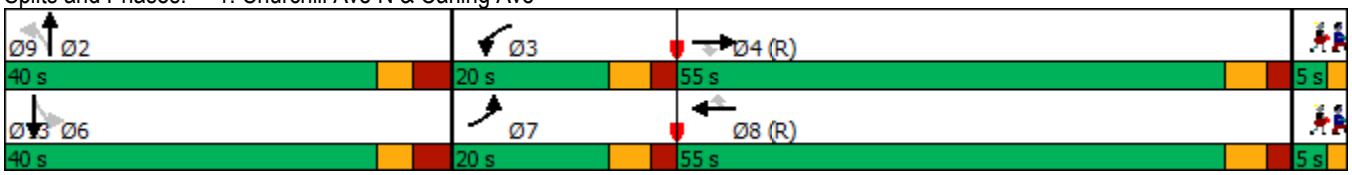
Intersection Summary	
Area Type:	Other

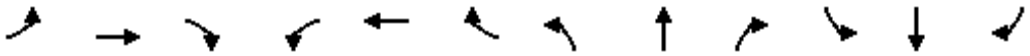
Lane Group	Ø9	Ø13
Lane Configurations		
Traffic Volume (vph)		
Future Volume (vph)		
Ideal Flow (vphpl)		
Storage Length (m)		
Storage Lanes		
Taper Length (m)		
Right Turn on Red		
Link Speed (k/h)		
Link Distance (m)		
Travel Time (s)		
Lane Group Flow (vph)		
Turn Type		
Protected Phases	9	13
Permitted Phases		
Detector Phase		
Switch Phase		
Minimum Initial (s)	1.0	1.0
Minimum Split (s)	5.0	5.0
Total Split (s)	5.0	5.0
Total Split (%)	4%	4%
Yellow Time (s)	2.0	2.0
All-Red Time (s)	0.0	0.0
Lost Time Adjust (s)		
Total Lost Time (s)		
Lead/Lag		
Lead-Lag Optimize?		
Recall Mode	None	None
Act Effct Green (s)		
Actuated g/C Ratio		
v/c Ratio		
Control Delay		
Queue Delay		
Total Delay		
LOS		
Approach Delay		
Approach LOS		
Queue Length 50th (m)		
Queue Length 95th (m)		
Internal Link Dist (m)		
Turn Bay Length (m)		
Base Capacity (vph)		
Starvation Cap Reductn		
Spillback Cap Reductn		
Storage Cap Reductn		
Reduced v/c Ratio		

Intersection Summary

Cycle Length: 120
Actuated Cycle Length: 120
Offset: 92 (77%), Referenced to phase 4:EBT and 8:WBT, Start of Green
Natural Cycle: 135
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 1.02
Intersection Signal Delay: 44.1 Intersection LOS: D
Intersection Capacity Utilization 111.2% 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.
m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 1: Churchill Ave N & Carling Ave





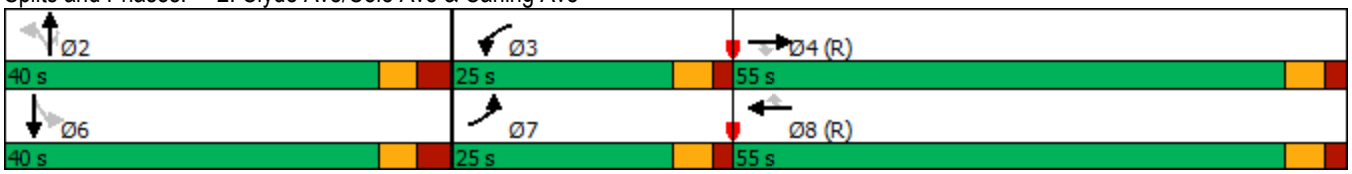
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	74	673	1	241	1558	51	126	87	210	30	54	62
Future Volume (vph)	74	673	1	241	1558	51	126	87	210	30	54	62
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Storage Length (m)	20.0		20.0	120.0		20.0	0.0		5.0	20.0		0.0
Storage Lanes	1		1	1		1	1		1	1		0
Taper Length (m)	20.0			30.0			7.6			20.0		
Right Turn on Red			Yes			Yes			Yes			Yes
Link Speed (k/h)		60			60			50			40	
Link Distance (m)		118.2			188.8			103.0			93.9	
Travel Time (s)		7.1			11.3			7.4			8.5	
Lane Group Flow (vph)	74	673	1	241	1558	51	126	87	210	30	116	0
Turn Type	Prot	NA	Perm	Prot	NA	Perm	Perm	NA	Perm	Perm	NA	
Protected Phases	7	4		3	8			2			6	
Permitted Phases			4			8	2		2	6		
Detector Phase	7	4	4	3	8	8	2	2	2	6	6	
Switch Phase												
Minimum Initial (s)	5.0	10.0	10.0	5.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	
Minimum Split (s)	10.4	35.5	35.5	10.4	35.5	35.5	37.0	37.0	37.0	37.0	37.0	
Total Split (s)	25.0	55.0	55.0	25.0	55.0	55.0	40.0	40.0	40.0	40.0	40.0	
Total Split (%)	20.8%	45.8%	45.8%	20.8%	45.8%	45.8%	33.3%	33.3%	33.3%	33.3%	33.3%	
Yellow Time (s)	3.7	3.7	3.7	3.7	3.7	3.7	3.3	3.3	3.3	3.3	3.3	
All-Red Time (s)	1.7	2.1	2.1	1.7	2.1	2.1	3.3	3.3	3.3	3.3	3.3	
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Total Lost Time (s)	5.4	5.8	5.8	5.4	5.8	5.8	6.6	6.6	6.6	6.6	6.6	
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lag						
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes						
Recall Mode	None	C-Max	C-Max	None	C-Max	C-Max	None	None	None	None	None	
Act Effct Green (s)	10.6	61.2	61.2	22.7	75.6	75.6	18.4	18.4	18.4	18.4	18.4	
Actuated g/C Ratio	0.09	0.51	0.51	0.19	0.63	0.63	0.15	0.15	0.15	0.15	0.15	
v/c Ratio	0.50	0.39	0.00	0.75	0.73	0.06	0.70	0.32	0.58	0.16	0.40	
Control Delay	62.8	20.6	0.0	55.0	17.4	3.2	67.0	46.3	17.6	42.8	29.6	
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Total Delay	62.8	20.6	0.0	55.0	17.4	3.2	67.0	46.3	17.6	42.8	29.6	
LOS	E	C	A	D	B	A	E	D	B	D	C	
Approach Delay		24.7			21.9			38.2			32.3	
Approach LOS		C			C			D			C	
Queue Length 50th (m)	16.9	50.0	0.0	59.5	80.4	0.4	28.6	18.6	9.2	6.2	14.4	
Queue Length 95th (m)	31.3	77.3	0.0	m64.4	m92.2	m1.0	45.2	30.9	30.0	13.8	29.2	
Internal Link Dist (m)		94.2			164.8			79.0			69.9	
Turn Bay Length (m)	20.0		20.0	120.0		20.0			5.0	20.0		
Base Capacity (vph)	276	1727	774	329	2137	924	328	496	528	342	486	
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	
Reduced v/c Ratio	0.27	0.39	0.00	0.73	0.73	0.06	0.38	0.18	0.40	0.09	0.24	

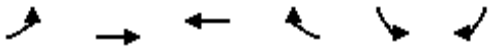
Intersection Summary	
Area Type:	Other

Cycle Length: 120	
Actuated Cycle Length: 120	
Offset: 93 (78%), Referenced to phase 4:EBT and 8:WBT, Start of Green	
Natural Cycle: 95	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.75	
Intersection Signal Delay: 25.2	Intersection LOS: C
Intersection Capacity Utilization 83.2%	ICU Level of Service E
Analysis Period (min) 15	

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

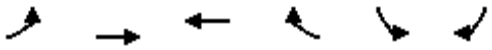
Splits and Phases: 2: Clyde Ave/Cole Ave & Carling Ave





Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	0	927	1880	1	0	13
Future Volume (vph)	0	927	1880	1	0	13
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800
Link Speed (k/h)		60	60		40	
Link Distance (m)		188.8	111.2		51.5	
Travel Time (s)		11.3	6.7		4.6	
Lane Group Flow (vph)	0	927	1881	0	0	13
Sign Control		Free	Free		Stop	

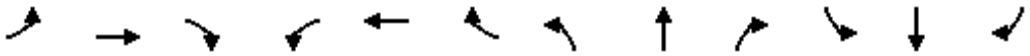
Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization 64.9%		ICU Level of Service C	
Analysis Period (min) 15			



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	0	927	1880	1	0	13
Future Volume (Veh/h)	0	927	1880	1	0	13
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	0	927	1880	1	0	13
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage veh)						
Upstream signal (m)		189	111			
pX, platoon unblocked	0.57				0.63	0.57
vC, conflicting volume	1881				2344	940
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1043				1128	0
tC, single (s)	4.1				6.8	6.9
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	100				100	98
cM capacity (veh/h)	379				125	620

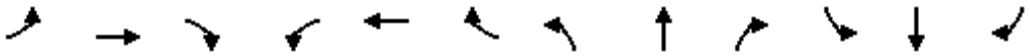
Direction, Lane #	EB 1	EB 2	WB 1	WB 2	SB 1
Volume Total	464	464	1253	628	13
Volume Left	0	0	0	0	0
Volume Right	0	0	0	1	13
cSH	1700	1700	1700	1700	620
Volume to Capacity	0.27	0.27	0.74	0.37	0.02
Queue Length 95th (m)	0.0	0.0	0.0	0.0	0.5
Control Delay (s)	0.0	0.0	0.0	0.0	10.9
Lane LOS					B
Approach Delay (s)	0.0		0.0		10.9
Approach LOS					B

Intersection Summary			
Average Delay	0.1		
Intersection Capacity Utilization	64.9%	ICU Level of Service	C
Analysis Period (min)	15		



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	2	1	8	36	1	5	7	122	52	4	60	2
Future Volume (vph)	2	1	8	36	1	5	7	122	52	4	60	2
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Link Speed (k/h)		40			40			40			40	
Link Distance (m)		45.1			46.3			93.9			62.0	
Travel Time (s)		4.1			4.2			8.5			5.6	
Lane Group Flow (vph)	0	11	0	0	42	0	0	181	0	0	66	0
Sign Control		Stop			Stop			Free			Free	

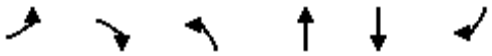
Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization 27.8%		ICU Level of Service A	
Analysis Period (min) 15			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	2	1	8	36	1	5	7	122	52	4	60	2
Future Volume (Veh/h)	2	1	8	36	1	5	7	122	52	4	60	2
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	2	1	8	36	1	5	7	122	52	4	60	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)								94				
pX, platoon unblocked	0.98	0.98		0.98	0.98	0.98				0.98		
vC, conflicting volume	236	257	61	240	232	148	62			174		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	206	227	61	209	201	115	62			142		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	100	100	99	95	100	99	100			100		
cM capacity (veh/h)	725	652	1004	720	673	915	1541			1407		

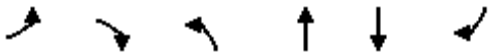
Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	11	42	181	66
Volume Left	2	36	7	4
Volume Right	8	5	52	2
cSH	897	738	1541	1407
Volume to Capacity	0.01	0.06	0.00	0.00
Queue Length 95th (m)	0.3	1.4	0.1	0.1
Control Delay (s)	9.1	10.2	0.3	0.5
Lane LOS	A	B	A	A
Approach Delay (s)	9.1	10.2	0.3	0.5
Approach LOS	A	B		

Intersection Summary				
Average Delay	2.1			
Intersection Capacity Utilization	27.8%	ICU Level of Service	A	
Analysis Period (min)	15			



Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	9	25	31	464	454	17
Future Volume (vph)	9	25	31	464	454	17
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800
Link Speed (k/h)	40			50	50	
Link Distance (m)	69.2			92.6	40.9	
Travel Time (s)	6.2			6.7	2.9	
Lane Group Flow (vph)	34	0	0	495	471	0
Sign Control	Stop			Free	Free	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization 62.6%		ICU Level of Service B	
Analysis Period (min) 15			

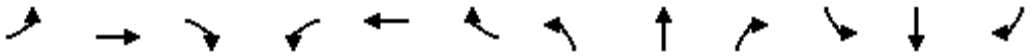


Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	9	25	31	464	454	17
Future Volume (Veh/h)	9	25	31	464	454	17
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	9	25	31	464	454	17
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (m)				93		
pX, platoon unblocked						
vC, conflicting volume	988	462	471			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	988	462	471			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	97	96	97			
cM capacity (veh/h)	266	599	1091			

Direction, Lane #	EB 1	NB 1	SB 1
Volume Total	34	495	471
Volume Left	9	31	0
Volume Right	25	0	17
cSH	450	1091	1700
Volume to Capacity	0.08	0.03	0.28
Queue Length 95th (m)	1.9	0.7	0.0
Control Delay (s)	13.7	0.8	0.0
Lane LOS	B	A	
Approach Delay (s)	13.7	0.8	0.0
Approach LOS	B		

Intersection Summary			
Average Delay	0.9		
Intersection Capacity Utilization	62.6%	ICU Level of Service	B
Analysis Period (min)	15		

Total Projected 2022



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	169	1124	98	85	500	154	11	5	11	349	31	248
Future Volume (vph)	169	1124	98	85	500	154	11	5	11	349	31	248
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Storage Length (m)	65.0		20.0	60.0		20.0	20.0		0.0	20.0		0.0
Storage Lanes	1		1	1		1	1		0	1		0
Taper Length (m)	25.0			15.0			20.0			25.0		
Right Turn on Red			Yes			Yes			Yes			Yes
Link Speed (k/h)		60			60			50			50	
Link Distance (m)		115.1			137.3			90.4			90.1	
Travel Time (s)		6.9			8.2			6.5			6.5	
Lane Group Flow (vph)	169	1124	98	85	500	154	11	16	0	349	279	0
Turn Type	Prot	NA	Perm	Prot	NA	Perm	Perm	NA		Perm	NA	
Protected Phases	7	4		3	8			2			6	
Permitted Phases			4			8	2			6		
Detector Phase	7	4	4	3	8	8	2	2		6	6	
Switch Phase												
Minimum Initial (s)	5.0	10.0	10.0	5.0	10.0	10.0	10.0	10.0		10.0	10.0	
Minimum Split (s)	11.1	34.1	34.1	11.1	34.1	34.1	40.0	40.0		40.0	40.0	
Total Split (s)	25.0	50.0	50.0	25.0	50.0	50.0	40.0	40.0		40.0	40.0	
Total Split (%)	20.8%	41.7%	41.7%	20.8%	41.7%	41.7%	33.3%	33.3%		33.3%	33.3%	
Yellow Time (s)	3.7	3.7	3.7	3.7	3.7	3.7	3.3	3.3		3.3	3.3	
All-Red Time (s)	2.4	2.4	2.4	2.4	2.4	2.4	3.5	3.5		3.5	3.5	
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Total Lost Time (s)	6.1	6.1	6.1	6.1	6.1	6.1	6.8	6.8		6.8	6.8	
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lag						
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes						
Recall Mode	None	C-Max	C-Max	None	C-Max	C-Max	None	None		None	None	
Act Effct Green (s)	16.1	55.1	55.1	11.3	47.8	47.8	37.2	37.2		37.2	37.2	
Actuated g/C Ratio	0.13	0.46	0.46	0.09	0.40	0.40	0.31	0.31		0.31	0.31	
v/c Ratio	0.75	0.72	0.14	0.53	0.37	0.25	0.04	0.03		0.86	0.44	
Control Delay	89.2	13.3	1.0	63.2	27.4	10.0	29.2	17.1		60.8	7.9	
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Total Delay	89.2	13.3	1.0	63.2	27.4	10.0	29.2	17.1		60.8	7.9	
LOS	F	B	A	E	C	B	C	B		E	A	
Approach Delay		21.7			27.9			22.0			37.3	
Approach LOS		C			C			C			D	
Queue Length 50th (m)	42.4	26.4	0.0	19.4	44.5	6.9	1.8	0.8		76.3	5.1	
Queue Length 95th (m)	m58.4	59.1	m2.0	34.4	60.4	21.7	6.2	5.9		#126.2	25.6	
Internal Link Dist (m)		91.1			113.3			66.4			66.1	
Turn Bay Length (m)	65.0		20.0	60.0		20.0	20.0			20.0		
Base Capacity (vph)	266	1556	704	266	1349	625	247	492		404	632	
Starvation Cap Reductn	0	0	0	0	0	0	0	0		0	0	
Spillback Cap Reductn	0	0	0	0	0	0	0	0		0	0	
Storage Cap Reductn	0	0	0	0	0	0	0	0		0	0	
Reduced v/c Ratio	0.64	0.72	0.14	0.32	0.37	0.25	0.04	0.03		0.86	0.44	

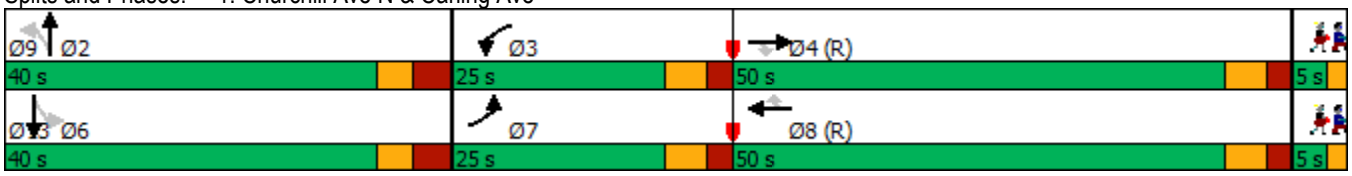
Intersection Summary	
Area Type:	Other

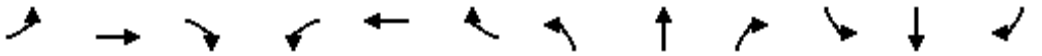
Lane Group	Ø9	Ø13
Lane Configurations		
Traffic Volume (vph)		
Future Volume (vph)		
Ideal Flow (vphpl)		
Storage Length (m)		
Storage Lanes		
Taper Length (m)		
Right Turn on Red		
Link Speed (k/h)		
Link Distance (m)		
Travel Time (s)		
Lane Group Flow (vph)		
Turn Type		
Protected Phases	9	13
Permitted Phases		
Detector Phase		
Switch Phase		
Minimum Initial (s)	1.0	1.0
Minimum Split (s)	5.0	5.0
Total Split (s)	5.0	5.0
Total Split (%)	4%	4%
Yellow Time (s)	2.0	2.0
All-Red Time (s)	0.0	0.0
Lost Time Adjust (s)		
Total Lost Time (s)		
Lead/Lag		
Lead-Lag Optimize?		
Recall Mode	None	None
Act Effct Green (s)		
Actuated g/C Ratio		
v/c Ratio		
Control Delay		
Queue Delay		
Total Delay		
LOS		
Approach Delay		
Approach LOS		
Queue Length 50th (m)		
Queue Length 95th (m)		
Internal Link Dist (m)		
Turn Bay Length (m)		
Base Capacity (vph)		
Starvation Cap Reductn		
Spillback Cap Reductn		
Storage Cap Reductn		
Reduced v/c Ratio		

Intersection Summary

Cycle Length: 120
Actuated Cycle Length: 120
Offset: 101 (84%), Referenced to phase 4:EBT and 8:WBT, Start of Green
Natural Cycle: 95
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.86
Intersection Signal Delay: 26.9 Intersection LOS: C
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.
m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 1: Churchill Ave N & Carling Ave



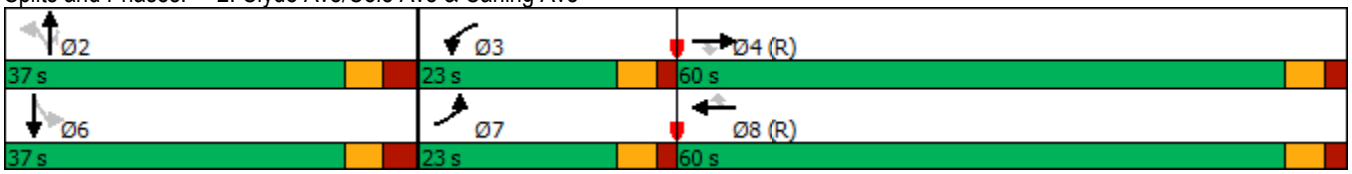


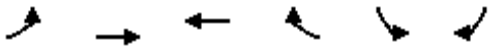
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	61	1187	0	274	494	60	121	51	147	35	63	66
Future Volume (vph)	61	1187	0	274	494	60	121	51	147	35	63	66
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Storage Length (m)	20.0		20.0	120.0		20.0	0.0		5.0	20.0		0.0
Storage Lanes	1		1	1		1	1		1	1		0
Taper Length (m)	20.0			30.0			7.6			20.0		
Right Turn on Red			Yes			Yes			Yes			Yes
Link Speed (k/h)		60			60			50			40	
Link Distance (m)		118.2			185.0			103.0			95.8	
Travel Time (s)		7.1			11.1			7.4			8.6	
Lane Group Flow (vph)	61	1187	0	274	494	60	121	51	147	35	129	0
Turn Type	Prot	NA	Perm	Prot	NA	Perm	Perm	NA	Perm	Perm	NA	
Protected Phases	7	4		3	8			2			6	
Permitted Phases			4			8	2		2	6		
Detector Phase	7	4	4	3	8	8	2	2	2	6	6	
Switch Phase												
Minimum Initial (s)	5.0	10.0	10.0	5.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	
Minimum Split (s)	10.4	35.5	35.5	10.4	35.5	35.5	37.0	37.0	37.0	37.0	37.0	
Total Split (s)	23.0	60.0	60.0	23.0	60.0	60.0	37.0	37.0	37.0	37.0	37.0	
Total Split (%)	19.2%	50.0%	50.0%	19.2%	50.0%	50.0%	30.8%	30.8%	30.8%	30.8%	30.8%	
Yellow Time (s)	3.7	3.7	3.7	3.7	3.7	3.7	3.3	3.3	3.3	3.3	3.3	
All-Red Time (s)	1.7	2.1	2.1	1.7	2.1	2.1	3.3	3.3	3.3	3.3	3.3	
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Total Lost Time (s)	5.4	5.8	5.8	5.4	5.8	5.8	6.6	6.6	6.6	6.6	6.6	
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lag						
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes						
Recall Mode	None	C-Max	C-Max	None	C-Max	C-Max	None	None	None	None	None	
Act Effct Green (s)	9.7	56.6		27.8	76.9	76.9	17.8	17.8	17.8	17.8	17.8	
Actuated g/C Ratio	0.08	0.47		0.23	0.64	0.64	0.15	0.15	0.15	0.15	0.15	
v/c Ratio	0.45	0.74		0.70	0.23	0.06	0.74	0.19	0.45	0.20	0.47	
Control Delay	62.1	29.8		55.5	9.2	0.9	73.8	43.8	10.9	44.6	35.2	
Queue Delay	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Total Delay	62.1	29.8		55.5	9.2	0.9	73.8	43.8	10.9	44.6	35.2	
LOS	E	C		E	A	A	E	D	B	D	D	
Approach Delay		31.4			23.9			40.0			37.2	
Approach LOS		C			C			D			D	
Queue Length 50th (m)	14.0	118.7		65.6	19.4	0.2	27.7	10.7	0.0	7.3	18.7	
Queue Length 95th (m)	26.9	148.5		#114.6	31.7	1.5	44.8	20.5	16.4	15.7	34.7	
Internal Link Dist (m)		94.2			161.0			79.0			71.8	
Turn Bay Length (m)	20.0			120.0		20.0			5.0	20.0		
Base Capacity (vph)	248	1597		392	2173	940	278	451	457	301	442	
Starvation Cap Reductn	0	0		0	0	0	0	0	0	0	0	
Spillback Cap Reductn	0	0		0	0	0	0	0	0	0	0	
Storage Cap Reductn	0	0		0	0	0	0	0	0	0	0	
Reduced v/c Ratio	0.25	0.74		0.70	0.23	0.06	0.44	0.11	0.32	0.12	0.29	

Intersection Summary	
Area Type:	Other

Cycle Length: 120
Actuated Cycle Length: 120
Offset: 84 (70%), Referenced to phase 4:EBT and 8:WBT, Start of Green
Natural Cycle: 95
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.74
Intersection Signal Delay: 30.4 Intersection LOS: C
Intersection Capacity Utilization 102.7% ICU Level of Service G
Analysis Period (min) 15
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

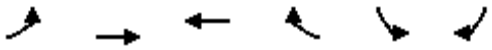
Splits and Phases: 2: Clyde Ave/Cole Ave & Carling Ave





Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	0	1391	732	28	0	85
Future Volume (vph)	0	1391	732	28	0	85
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800
Link Speed (k/h)		60	60		40	
Link Distance (m)		185.0	115.1		49.0	
Travel Time (s)		11.1	6.9		4.4	
Lane Group Flow (vph)	0	1391	760	0	0	85
Sign Control		Free	Free		Stop	

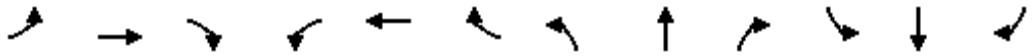
Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization 43.9%		ICU Level of Service A	
Analysis Period (min) 15			



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	0	1391	732	28	0	85
Future Volume (Veh/h)	0	1391	732	28	0	85
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	0	1391	732	28	0	85
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage veh)						
Upstream signal (m)		185	115			
pX, platoon unblocked	0.90				0.76	0.90
vC, conflicting volume	760				1442	380
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	512				367	90
tC, single (s)	4.1				6.8	6.9
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	100				100	90
cM capacity (veh/h)	945				462	856

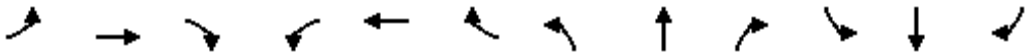
Direction, Lane #	EB 1	EB 2	WB 1	WB 2	SB 1
Volume Total	696	696	488	272	85
Volume Left	0	0	0	0	0
Volume Right	0	0	0	28	85
cSH	1700	1700	1700	1700	856
Volume to Capacity	0.41	0.41	0.29	0.16	0.10
Queue Length 95th (m)	0.0	0.0	0.0	0.0	2.5
Control Delay (s)	0.0	0.0	0.0	0.0	9.7
Lane LOS					A
Approach Delay (s)	0.0		0.0		9.7
Approach LOS					A

Intersection Summary			
Average Delay	0.4		
Intersection Capacity Utilization	43.9%	ICU Level of Service	A
Analysis Period (min)	15		



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	1	1	2	49	0	2	1	86	54	3	96	0
Future Volume (vph)	1	1	2	49	0	2	1	86	54	3	96	0
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Link Speed (k/h)		40			40			40			40	
Link Distance (m)		51.0			51.8			95.8			66.5	
Travel Time (s)		4.6			4.7			8.6			6.0	
Lane Group Flow (vph)	0	4	0	0	51	0	0	141	0	0	99	0
Sign Control		Stop			Stop			Free			Free	

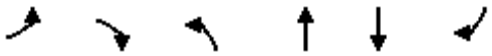
Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization 24.6%		ICU Level of Service A	
Analysis Period (min) 15			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	1	1	2	49	0	2	1	86	54	3	96	0
Future Volume (Veh/h)	1	1	2	49	0	2	1	86	54	3	96	0
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	1	1	2	49	0	2	1	86	54	3	96	0
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (m)								96				
pX, platoon unblocked												
vC, conflicting volume	219	244	96	220	217	113	96			140		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	219	244	96	220	217	113	96			140		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	100	100	100	93	100	100	100			100		
cM capacity (veh/h)	734	656	960	733	679	940	1498			1443		

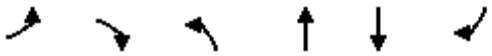
Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	4	51	141	99
Volume Left	1	49	1	3
Volume Right	2	2	54	0
cSH	805	739	1498	1443
Volume to Capacity	0.00	0.07	0.00	0.00
Queue Length 95th (m)	0.1	1.7	0.0	0.0
Control Delay (s)	9.5	10.2	0.1	0.2
Lane LOS	A	B	A	A
Approach Delay (s)	9.5	10.2	0.1	0.2
Approach LOS	A	B		

Intersection Summary				
Average Delay	2.0			
Intersection Capacity Utilization	24.6%	ICU Level of Service	A	
Analysis Period (min)	15			



Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	21	46	14	315	582	16
Future Volume (vph)	21	46	14	315	582	16
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800
Link Speed (k/h)	40			50	50	
Link Distance (m)	69.4			90.1	43.5	
Travel Time (s)	6.2			6.5	3.1	
Lane Group Flow (vph)	67	0	0	329	598	0
Sign Control	Stop			Free	Free	

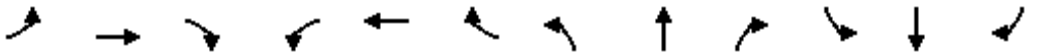
Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization 44.2%		ICU Level of Service A	
Analysis Period (min) 15			



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	21	46	14	315	582	16
Future Volume (Veh/h)	21	46	14	315	582	16
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)	21	46	14	315	582	16
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (m)				90		
pX, platoon unblocked						
vC, conflicting volume	933	590	598			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	933	590	598			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	93	91	99			
cM capacity (veh/h)	291	508	979			

Direction, Lane #	EB 1	NB 1	SB 1
Volume Total	67	329	598
Volume Left	21	14	0
Volume Right	46	0	16
cSH	412	979	1700
Volume to Capacity	0.16	0.01	0.35
Queue Length 95th (m)	4.4	0.3	0.0
Control Delay (s)	15.4	0.5	0.0
Lane LOS	C	A	
Approach Delay (s)	15.4	0.5	0.0
Approach LOS	C		

Intersection Summary			
Average Delay	1.2		
Intersection Capacity Utilization	44.2%	ICU Level of Service	A
Analysis Period (min)	15		



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	239	654	18	19	1476	218	96	33	26	188	7	288
Future Volume (vph)	239	654	18	19	1476	218	96	33	26	188	7	288
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Storage Length (m)	65.0		20.0	60.0		20.0	20.0		0.0	20.0		0.0
Storage Lanes	1		1	1		1	1		0	1		0
Taper Length (m)	25.0			15.0			20.0			25.0		
Right Turn on Red			Yes			Yes			Yes			Yes
Link Speed (k/h)		60			60			50			50	
Link Distance (m)		106.9			137.3			86.0			92.7	
Travel Time (s)		6.4			8.2			6.2			6.7	
Lane Group Flow (vph)	239	654	18	19	1476	218	96	59	0	188	295	0
Turn Type	Prot	NA	Perm	Prot	NA	Perm	Perm	NA		Perm	NA	
Protected Phases	7	4		3	8			2			6	
Permitted Phases			4			8	2			6		
Detector Phase	7	4	4	3	8	8	2	2		6	6	
Switch Phase												
Minimum Initial (s)	5.0	10.0	10.0	5.0	10.0	10.0	10.0	10.0		10.0	10.0	
Minimum Split (s)	11.1	34.1	34.1	11.1	34.1	34.1	40.0	40.0		40.0	40.0	
Total Split (s)	20.0	55.0	55.0	20.0	55.0	55.0	40.0	40.0		40.0	40.0	
Total Split (%)	16.7%	45.8%	45.8%	16.7%	45.8%	45.8%	33.3%	33.3%		33.3%	33.3%	
Yellow Time (s)	3.7	3.7	3.7	3.7	3.7	3.7	3.3	3.3		3.3	3.3	
All-Red Time (s)	2.4	2.4	2.4	2.4	2.4	2.4	3.5	3.5		3.5	3.5	
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Total Lost Time (s)	6.1	6.1	6.1	6.1	6.1	6.1	6.8	6.8		6.8	6.8	
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lag						
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes						
Recall Mode	None	C-Max	C-Max	None	C-Max	C-Max	None	None		None	None	
Act Effct Green (s)	26.6	77.6	77.6	7.0	50.6	50.6	23.8	23.8		23.8	23.8	
Actuated g/C Ratio	0.22	0.65	0.65	0.06	0.42	0.42	0.20	0.20		0.20	0.20	
v/c Ratio	0.64	0.30	0.02	0.19	1.03	0.33	0.97	0.17		0.76	0.57	
Control Delay	65.1	8.8	0.1	57.8	67.5	13.2	130.8	23.6		63.3	9.4	
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Total Delay	65.1	8.8	0.1	57.8	67.5	13.2	130.8	23.6		63.3	9.4	
LOS	E	A	A	E	E	B	F	C		E	A	
Approach Delay		23.4			60.5			90.0			30.4	
Approach LOS		C			E			F			C	
Queue Length 50th (m)	59.1	22.3	0.0	4.4	~199.6	16.2	22.6	6.4		42.0	1.9	
Queue Length 95th (m)	#104.5	35.5	m0.0	11.9	#244.8	35.1	#47.2	16.0		61.6	23.3	
Internal Link Dist (m)		82.9			113.3			62.0			68.7	
Turn Bay Length (m)	65.0		20.0	60.0		20.0	20.0			20.0		
Base Capacity (vph)	376	2191	929	196	1428	656	138	473		347	609	
Starvation Cap Reductn	0	0	0	0	0	0	0	0		0	0	
Spillback Cap Reductn	0	0	0	0	0	0	0	0		0	0	
Storage Cap Reductn	0	0	0	0	0	0	0	0		0	0	
Reduced v/c Ratio	0.64	0.30	0.02	0.10	1.03	0.33	0.70	0.12		0.54	0.48	

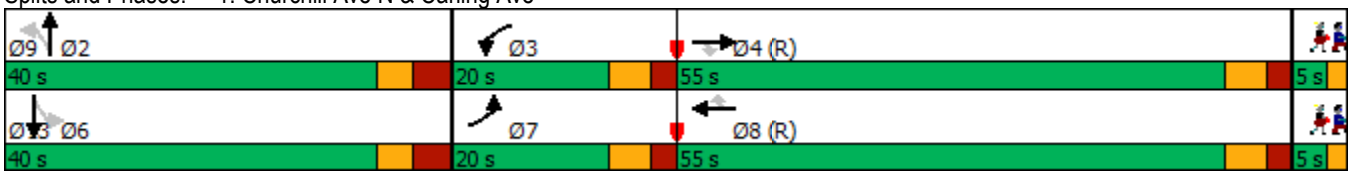
Intersection Summary	
Area Type:	Other

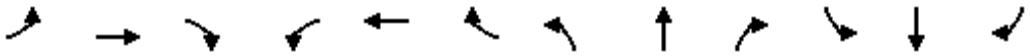
Lane Group	Ø9	Ø13
Lane Configurations		
Traffic Volume (vph)		
Future Volume (vph)		
Ideal Flow (vphpl)		
Storage Length (m)		
Storage Lanes		
Taper Length (m)		
Right Turn on Red		
Link Speed (k/h)		
Link Distance (m)		
Travel Time (s)		
Lane Group Flow (vph)		
Turn Type		
Protected Phases	9	13
Permitted Phases		
Detector Phase		
Switch Phase		
Minimum Initial (s)	1.0	1.0
Minimum Split (s)	5.0	5.0
Total Split (s)	5.0	5.0
Total Split (%)	4%	4%
Yellow Time (s)	2.0	2.0
All-Red Time (s)	0.0	0.0
Lost Time Adjust (s)		
Total Lost Time (s)		
Lead/Lag		
Lead-Lag Optimize?		
Recall Mode	None	None
Act Effct Green (s)		
Actuated g/C Ratio		
v/c Ratio		
Control Delay		
Queue Delay		
Total Delay		
LOS		
Approach Delay		
Approach LOS		
Queue Length 50th (m)		
Queue Length 95th (m)		
Internal Link Dist (m)		
Turn Bay Length (m)		
Base Capacity (vph)		
Starvation Cap Reductn		
Spillback Cap Reductn		
Storage Cap Reductn		
Reduced v/c Ratio		

Intersection Summary

Cycle Length: 120
Actuated Cycle Length: 120
Offset: 92 (77%), Referenced to phase 4:EBT and 8:WBT, Start of Green
Natural Cycle: 135
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 1.03
Intersection Signal Delay: 47.1 Intersection LOS: D
Intersection Capacity Utilization 112.3% 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.
m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 1: Churchill Ave N & Carling Ave





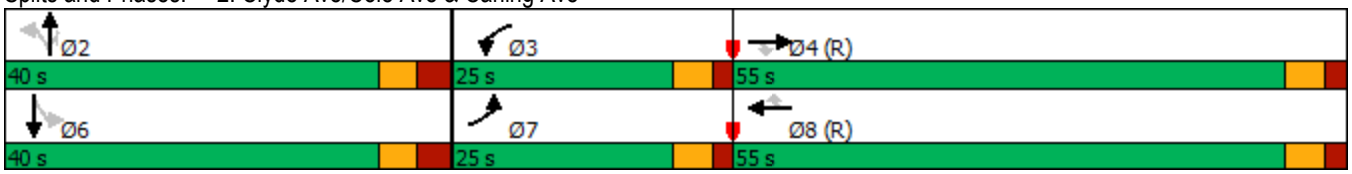
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	78	649	1	261	1490	65	126	87	210	30	54	62
Future Volume (vph)	78	649	1	261	1490	65	126	87	210	30	54	62
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Storage Length (m)	20.0		20.0	120.0		20.0	0.0		5.0	20.0		0.0
Storage Lanes	1		1	1		1	1		1	1		0
Taper Length (m)	20.0			30.0			7.6			20.0		
Right Turn on Red			Yes			Yes			Yes			Yes
Link Speed (k/h)		60			60			50			40	
Link Distance (m)		118.2			193.2			103.0			96.4	
Travel Time (s)		7.1			11.6			7.4			8.7	
Lane Group Flow (vph)	78	649	1	261	1490	65	126	87	210	30	116	0
Turn Type	Prot	NA	Perm	Prot	NA	Perm	Perm	NA	Perm	Perm	NA	
Protected Phases	7	4		3	8			2			6	
Permitted Phases			4			8	2		2	6		
Detector Phase	7	4	4	3	8	8	2	2	2	6	6	
Switch Phase												
Minimum Initial (s)	5.0	10.0	10.0	5.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	
Minimum Split (s)	10.4	35.5	35.5	10.4	35.5	35.5	37.0	37.0	37.0	37.0	37.0	
Total Split (s)	25.0	55.0	55.0	25.0	55.0	55.0	40.0	40.0	40.0	40.0	40.0	
Total Split (%)	20.8%	45.8%	45.8%	20.8%	45.8%	45.8%	33.3%	33.3%	33.3%	33.3%	33.3%	
Yellow Time (s)	3.7	3.7	3.7	3.7	3.7	3.7	3.3	3.3	3.3	3.3	3.3	
All-Red Time (s)	1.7	2.1	2.1	1.7	2.1	2.1	3.3	3.3	3.3	3.3	3.3	
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Total Lost Time (s)	5.4	5.8	5.8	5.4	5.8	5.8	6.6	6.6	6.6	6.6	6.6	
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lag						
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes						
Recall Mode	None	C-Max	C-Max	None	C-Max	C-Max	None	None	None	None	None	
Act Effct Green (s)	10.9	59.0	59.0	24.7	75.2	75.2	18.5	18.5	18.5	18.5	18.5	
Actuated g/C Ratio	0.09	0.49	0.49	0.21	0.63	0.63	0.15	0.15	0.15	0.15	0.15	
v/c Ratio	0.51	0.39	0.00	0.75	0.70	0.07	0.70	0.32	0.60	0.17	0.40	
Control Delay	62.8	21.6	0.0	53.9	17.0	4.5	67.1	46.1	18.4	43.0	29.5	
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Total Delay	62.8	21.6	0.0	53.9	17.0	4.5	67.1	46.1	18.4	43.0	29.5	
LOS	E	C	A	D	B	A	E	D	B	D	C	
Approach Delay		26.0			21.9			38.6			32.3	
Approach LOS		C			C			D			C	
Queue Length 50th (m)	17.8	50.1	0.0	64.2	80.3	1.2	28.6	18.5	9.2	6.3	14.4	
Queue Length 95th (m)	32.3	74.3	0.0	m69.5	m88.9	m1.7	45.2	30.8	30.5	13.8	29.2	
Internal Link Dist (m)		94.2			169.2			79.0			72.4	
Turn Bay Length (m)	20.0		20.0	120.0		20.0			5.0	20.0		
Base Capacity (vph)	276	1665	730	349	2124	887	325	496	502	322	482	
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	
Reduced v/c Ratio	0.28	0.39	0.00	0.75	0.70	0.07	0.39	0.18	0.42	0.09	0.24	

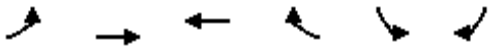
Intersection Summary	
Area Type:	Other

Cycle Length: 120	
Actuated Cycle Length: 120	
Offset: 93 (78%), Referenced to phase 4:EBT and 8:WBT, Start of Green	
Natural Cycle: 95	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.75	
Intersection Signal Delay: 25.6	Intersection LOS: C
Intersection Capacity Utilization 86.8%	ICU Level of Service E
Analysis Period (min) 15	

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

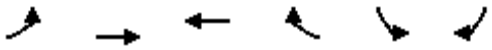
Splits and Phases: 2: Clyde Ave/Cole Ave & Carling Ave





Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	0	911	1790	78	0	52
Future Volume (vph)	0	911	1790	78	0	52
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800
Link Speed (k/h)		60	60		40	
Link Distance (m)		193.2	106.9		51.1	
Travel Time (s)		11.6	6.4		4.6	
Lane Group Flow (vph)	0	911	1868	0	0	52
Sign Control		Free	Free		Stop	

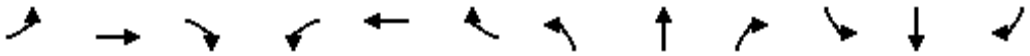
Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization 64.9%		ICU Level of Service C	
Analysis Period (min) 15			



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	0	911	1790	78	0	52
Future Volume (Veh/h)	0	911	1790	78	0	52
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	0	911	1790	78	0	52
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage veh)						
Upstream signal (m)		193	107			
pX, platoon unblocked	0.58				0.64	0.58
vC, conflicting volume	1868				2284	934
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1064				1083	0
tC, single (s)	4.1				6.8	6.9
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	100				100	92
cM capacity (veh/h)	380				136	634

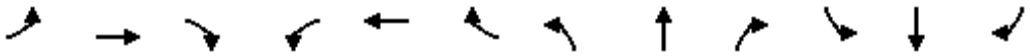
Direction, Lane #	EB 1	EB 2	WB 1	WB 2	SB 1
Volume Total	456	456	1193	675	52
Volume Left	0	0	0	0	0
Volume Right	0	0	0	78	52
cSH	1700	1700	1700	1700	634
Volume to Capacity	0.27	0.27	0.70	0.40	0.08
Queue Length 95th (m)	0.0	0.0	0.0	0.0	2.0
Control Delay (s)	0.0	0.0	0.0	0.0	11.2
Lane LOS					B
Approach Delay (s)	0.0		0.0		11.2
Approach LOS					B

Intersection Summary			
Average Delay	0.2		
Intersection Capacity Utilization	64.9%	ICU Level of Service	C
Analysis Period (min)	15		



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	2	1	8	36	1	5	7	122	70	4	60	2
Future Volume (vph)	2	1	8	36	1	5	7	122	70	4	60	2
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Link Speed (k/h)		40			40			40			40	
Link Distance (m)		45.6			49.4			96.4			68.4	
Travel Time (s)		4.1			4.4			8.7			6.2	
Lane Group Flow (vph)	0	11	0	0	42	0	0	199	0	0	66	0
Sign Control		Stop			Stop			Free			Free	

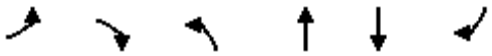
Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization 29.0%		ICU Level of Service A	
Analysis Period (min) 15			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	2	1	8	36	1	5	7	122	70	4	60	2
Future Volume (Veh/h)	2	1	8	36	1	5	7	122	70	4	60	2
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	2	1	8	36	1	5	7	122	70	4	60	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)								96				
pX, platoon unblocked	0.98	0.98		0.98	0.98	0.98				0.98		
vC, conflicting volume	246	275	61	248	241	157	62			192		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	214	245	61	218	210	124	62			160		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	100	100	99	95	100	99	100			100		
cM capacity (veh/h)	715	637	1004	710	666	905	1541			1385		

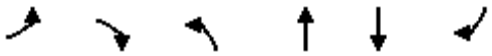
Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	11	42	199	66
Volume Left	2	36	7	4
Volume Right	8	5	70	2
cSH	892	728	1541	1385
Volume to Capacity	0.01	0.06	0.00	0.00
Queue Length 95th (m)	0.3	1.4	0.1	0.1
Control Delay (s)	9.1	10.2	0.3	0.5
Lane LOS	A	B	A	A
Approach Delay (s)	9.1	10.2	0.3	0.5
Approach LOS	A	B		

Intersection Summary				
Average Delay	2.0			
Intersection Capacity Utilization	29.0%	ICU Level of Service	A	
Analysis Period (min)	15			



Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	17	35	31	464	469	17
Future Volume (vph)	17	35	31	464	469	17
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800
Link Speed (k/h)	40			50	50	
Link Distance (m)	72.6			92.7	35.3	
Travel Time (s)	6.5			6.7	2.5	
Lane Group Flow (vph)	52	0	0	495	486	0
Sign Control	Stop			Free	Free	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization 62.6%		ICU Level of Service B	
Analysis Period (min) 15			

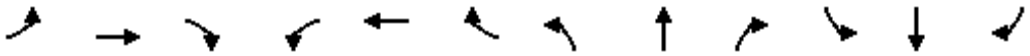


Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	17	35	31	464	469	17
Future Volume (Veh/h)	17	35	31	464	469	17
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	17	35	31	464	469	17
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (m)				93		
pX, platoon unblocked						
vC, conflicting volume	1004	478	486			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1004	478	486			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	93	94	97			
cM capacity (veh/h)	260	588	1077			

Direction, Lane #	EB 1	NB 1	SB 1
Volume Total	52	495	486
Volume Left	17	31	0
Volume Right	35	0	17
cSH	417	1077	1700
Volume to Capacity	0.12	0.03	0.29
Queue Length 95th (m)	3.2	0.7	0.0
Control Delay (s)	14.9	0.8	0.0
Lane LOS	B	A	
Approach Delay (s)	14.9	0.8	0.0
Approach LOS	B		

Intersection Summary			
Average Delay	1.2		
Intersection Capacity Utilization	62.6%	ICU Level of Service	B
Analysis Period (min)	15		

Total Projected 2027



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	169	1178	98	85	524	154	11	5	11	349	31	248
Future Volume (vph)	169	1178	98	85	524	154	11	5	11	349	31	248
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Storage Length (m)	65.0		20.0	60.0		20.0	20.0		0.0	20.0		0.0
Storage Lanes	1		1	1		1	1		0	1		0
Taper Length (m)	25.0			15.0			20.0			25.0		
Right Turn on Red			Yes			Yes			Yes			Yes
Link Speed (k/h)		60			60			50			50	
Link Distance (m)		112.5			137.3			90.4			92.6	
Travel Time (s)		6.8			8.2			6.5			6.7	
Lane Group Flow (vph)	169	1178	98	85	524	154	11	16	0	349	279	0
Turn Type	Prot	NA	Perm	Prot	NA	Perm	Perm	NA		Perm	NA	
Protected Phases	7	4		3	8			2			6	
Permitted Phases			4			8	2			6		
Detector Phase	7	4	4	3	8	8	2	2		6	6	
Switch Phase												
Minimum Initial (s)	5.0	10.0	10.0	5.0	10.0	10.0	10.0	10.0		10.0	10.0	
Minimum Split (s)	11.1	34.1	34.1	11.1	34.1	34.1	40.0	40.0		40.0	40.0	
Total Split (s)	25.0	50.0	50.0	25.0	50.0	50.0	40.0	40.0		40.0	40.0	
Total Split (%)	20.8%	41.7%	41.7%	20.8%	41.7%	41.7%	33.3%	33.3%		33.3%	33.3%	
Yellow Time (s)	3.7	3.7	3.7	3.7	3.7	3.7	3.3	3.3		3.3	3.3	
All-Red Time (s)	2.4	2.4	2.4	2.4	2.4	2.4	3.5	3.5		3.5	3.5	
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Total Lost Time (s)	6.1	6.1	6.1	6.1	6.1	6.1	6.8	6.8		6.8	6.8	
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lag						
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes						
Recall Mode	None	C-Max	C-Max	None	C-Max	C-Max	None	None		None	None	
Act Effct Green (s)	16.1	55.1	55.1	11.3	47.8	47.8	37.2	37.2		37.2	37.2	
Actuated g/C Ratio	0.13	0.46	0.46	0.09	0.40	0.40	0.31	0.31		0.31	0.31	
v/c Ratio	0.75	0.76	0.14	0.53	0.39	0.25	0.04	0.03		0.86	0.44	
Control Delay	87.8	14.8	1.4	63.2	27.7	10.0	29.2	17.1		60.8	7.9	
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Total Delay	87.8	14.8	1.4	63.2	27.7	10.0	29.2	17.1		60.8	7.9	
LOS	F	B	A	E	C	B	C	B		E	A	
Approach Delay		22.5			28.1			22.0			37.3	
Approach LOS		C			C			C			D	
Queue Length 50th (m)	42.3	27.6	0.0	19.4	47.0	6.9	1.8	0.8		76.3	5.1	
Queue Length 95th (m)	m55.9	#102.7	m2.0	34.4	63.4	21.7	6.2	5.9		#126.2	25.6	
Internal Link Dist (m)		88.5			113.3			66.4			68.6	
Turn Bay Length (m)	65.0		20.0	60.0		20.0	20.0			20.0		
Base Capacity (vph)	266	1556	704	266	1349	625	247	492		404	632	
Starvation Cap Reductn	0	0	0	0	0	0	0	0		0	0	
Spillback Cap Reductn	0	0	0	0	0	0	0	0		0	0	
Storage Cap Reductn	0	0	0	0	0	0	0	0		0	0	
Reduced v/c Ratio	0.64	0.76	0.14	0.32	0.39	0.25	0.04	0.03		0.86	0.44	

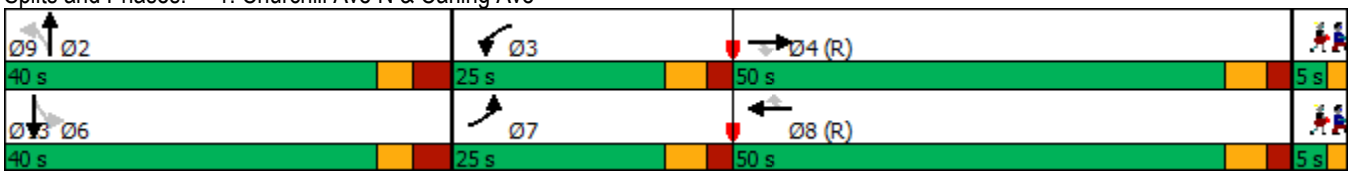
Intersection Summary	
Area Type:	Other

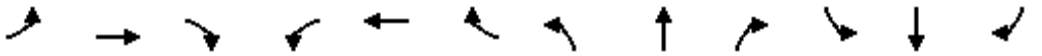
Lane Group	Ø9	Ø13
Lane Configurations		
Traffic Volume (vph)		
Future Volume (vph)		
Ideal Flow (vphpl)		
Storage Length (m)		
Storage Lanes		
Taper Length (m)		
Right Turn on Red		
Link Speed (k/h)		
Link Distance (m)		
Travel Time (s)		
Lane Group Flow (vph)		
Turn Type		
Protected Phases	9	13
Permitted Phases		
Detector Phase		
Switch Phase		
Minimum Initial (s)	1.0	1.0
Minimum Split (s)	5.0	5.0
Total Split (s)	5.0	5.0
Total Split (%)	4%	4%
Yellow Time (s)	2.0	2.0
All-Red Time (s)	0.0	0.0
Lost Time Adjust (s)		
Total Lost Time (s)		
Lead/Lag		
Lead-Lag Optimize?		
Recall Mode	None	None
Act Effct Green (s)		
Actuated g/C Ratio		
v/c Ratio		
Control Delay		
Queue Delay		
Total Delay		
LOS		
Approach Delay		
Approach LOS		
Queue Length 50th (m)		
Queue Length 95th (m)		
Internal Link Dist (m)		
Turn Bay Length (m)		
Base Capacity (vph)		
Starvation Cap Reductn		
Spillback Cap Reductn		
Storage Cap Reductn		
Reduced v/c Ratio		

Intersection Summary

Cycle Length: 120
Actuated Cycle Length: 120
Offset: 101 (84%), Referenced to phase 4:EBT and 8:WBT, Start of Green
Natural Cycle: 95
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.86
Intersection Signal Delay: 27.2 Intersection LOS: C
Intersection Capacity Utilization 82.5% ICU Level of Service E
Analysis Period (min) 15
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.
m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 1: Churchill Ave N & Carling Ave



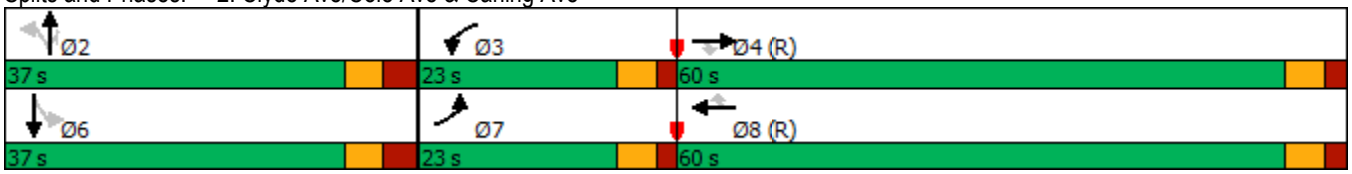


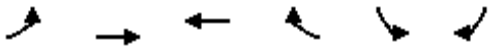
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	61	1246	0	274	518	60	121	51	147	35	63	66
Future Volume (vph)	61	1246	0	274	518	60	121	51	147	35	63	66
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Storage Length (m)	20.0		20.0	120.0		20.0	0.0		5.0	20.0		0.0
Storage Lanes	1		1	1		1	1		1	1		0
Taper Length (m)	20.0			30.0			7.6			20.0		
Right Turn on Red			Yes			Yes			Yes			Yes
Link Speed (k/h)		60			60			50			40	
Link Distance (m)		118.2			187.6			103.0			93.4	
Travel Time (s)		7.1			11.3			7.4			8.4	
Lane Group Flow (vph)	61	1246	0	274	518	60	121	51	147	35	129	0
Turn Type	Prot	NA	Perm	Prot	NA	Perm	Perm	NA	Perm	Perm	NA	
Protected Phases	7	4		3	8			2			6	
Permitted Phases			4			8	2		2	6		
Detector Phase	7	4	4	3	8	8	2	2	2	6	6	
Switch Phase												
Minimum Initial (s)	5.0	10.0	10.0	5.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	
Minimum Split (s)	10.4	35.5	35.5	10.4	35.5	35.5	37.0	37.0	37.0	37.0	37.0	
Total Split (s)	23.0	60.0	60.0	23.0	60.0	60.0	37.0	37.0	37.0	37.0	37.0	
Total Split (%)	19.2%	50.0%	50.0%	19.2%	50.0%	50.0%	30.8%	30.8%	30.8%	30.8%	30.8%	
Yellow Time (s)	3.7	3.7	3.7	3.7	3.7	3.7	3.3	3.3	3.3	3.3	3.3	
All-Red Time (s)	1.7	2.1	2.1	1.7	2.1	2.1	3.3	3.3	3.3	3.3	3.3	
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Total Lost Time (s)	5.4	5.8	5.8	5.4	5.8	5.8	6.6	6.6	6.6	6.6	6.6	
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lag						
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes						
Recall Mode	None	C-Max	C-Max	None	C-Max	C-Max	None	None	None	None	None	
Act Effct Green (s)	9.7	56.6		27.8	76.9	76.9	17.8	17.8	17.8	17.8	17.8	
Actuated g/C Ratio	0.08	0.47		0.23	0.64	0.64	0.15	0.15	0.15	0.15	0.15	
v/c Ratio	0.45	0.78		0.70	0.24	0.06	0.74	0.19	0.45	0.20	0.47	
Control Delay	62.1	31.3		55.4	9.3	0.9	73.8	43.8	10.9	44.6	35.2	
Queue Delay	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Total Delay	62.1	31.3		55.4	9.3	0.9	73.8	43.8	10.9	44.6	35.2	
LOS	E	C		E	A	A	E	D	B	D	D	
Approach Delay		32.7			23.5			40.0			37.2	
Approach LOS		C			C			D			D	
Queue Length 50th (m)	14.0	128.1		65.7	20.3	0.2	27.7	10.7	0.0	7.3	18.7	
Queue Length 95th (m)	26.9	160.1		#114.4	32.8	1.4	44.8	20.5	16.4	15.7	34.7	
Internal Link Dist (m)		94.2			163.6			79.0			69.4	
Turn Bay Length (m)	20.0			120.0		20.0			5.0	20.0		
Base Capacity (vph)	248	1597		392	2173	940	278	451	457	301	442	
Starvation Cap Reductn	0	0		0	0	0	0	0	0	0	0	
Spillback Cap Reductn	0	0		0	0	0	0	0	0	0	0	
Storage Cap Reductn	0	0		0	0	0	0	0	0	0	0	
Reduced v/c Ratio	0.25	0.78		0.70	0.24	0.06	0.44	0.11	0.32	0.12	0.29	

Intersection Summary	
Area Type:	Other

Cycle Length: 120
Actuated Cycle Length: 120
Offset: 84 (70%), Referenced to phase 4:EBT and 8:WBT, Start of Green
Natural Cycle: 105
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.78
Intersection Signal Delay: 30.9 Intersection LOS: C
Intersection Capacity Utilization 104.4% ICU Level of Service G
Analysis Period (min) 15
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

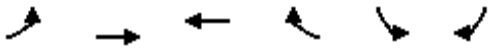
Splits and Phases: 2: Clyde Ave/Cole Ave & Carling Ave





Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	0	1458	769	28	0	85
Future Volume (vph)	0	1458	769	28	0	85
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800
Link Speed (k/h)		60	60		40	
Link Distance (m)		187.6	112.5		49.0	
Travel Time (s)		11.3	6.8		4.4	
Lane Group Flow (vph)	0	1458	797	0	0	85
Sign Control		Free	Free		Stop	

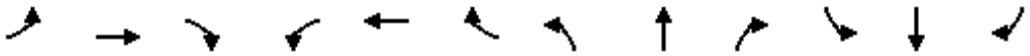
Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization 45.9%		ICU Level of Service A	
Analysis Period (min) 15			



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	0	1458	769	28	0	85
Future Volume (Veh/h)	0	1458	769	28	0	85
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	0	1458	769	28	0	85
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage veh)						
Upstream signal (m)		187	112			
pX, platoon unblocked	0.89				0.74	0.89
vC, conflicting volume	797				1512	398
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	536				351	90
tC, single (s)	4.1				6.8	6.9
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	100				100	90
cM capacity (veh/h)	919				460	849

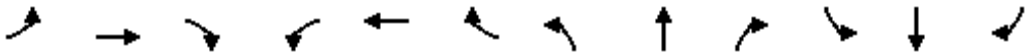
Direction, Lane #	EB 1	EB 2	WB 1	WB 2	SB 1
Volume Total	729	729	513	284	85
Volume Left	0	0	0	0	0
Volume Right	0	0	0	28	85
cSH	1700	1700	1700	1700	849
Volume to Capacity	0.43	0.43	0.30	0.17	0.10
Queue Length 95th (m)	0.0	0.0	0.0	0.0	2.5
Control Delay (s)	0.0	0.0	0.0	0.0	9.7
Lane LOS					A
Approach Delay (s)	0.0		0.0		9.7
Approach LOS					A

Intersection Summary			
Average Delay	0.4		
Intersection Capacity Utilization	45.9%	ICU Level of Service	A
Analysis Period (min)	15		



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	1	1	2	49	0	2	1	86	54	3	96	0
Future Volume (vph)	1	1	2	49	0	2	1	86	54	3	96	0
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Link Speed (k/h)		40			40			40			40	
Link Distance (m)		45.4			53.6			93.4			64.9	
Travel Time (s)		4.1			4.8			8.4			5.8	
Lane Group Flow (vph)	0	4	0	0	51	0	0	141	0	0	99	0
Sign Control		Stop			Stop			Free			Free	

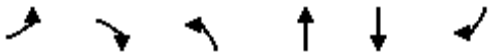
Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization 24.6%		ICU Level of Service A	
Analysis Period (min) 15			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	1	1	2	49	0	2	1	86	54	3	96	0
Future Volume (Veh/h)	1	1	2	49	0	2	1	86	54	3	96	0
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	1	1	2	49	0	2	1	86	54	3	96	0
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (m)								93				
pX, platoon unblocked												
vC, conflicting volume	219	244	96	220	217	113	96			140		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	219	244	96	220	217	113	96			140		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	100	100	100	93	100	100	100			100		
cM capacity (veh/h)	734	656	960	733	679	940	1498			1443		

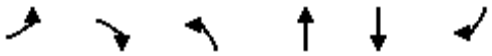
Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	4	51	141	99
Volume Left	1	49	1	3
Volume Right	2	2	54	0
cSH	805	739	1498	1443
Volume to Capacity	0.00	0.07	0.00	0.00
Queue Length 95th (m)	0.1	1.7	0.0	0.0
Control Delay (s)	9.5	10.2	0.1	0.2
Lane LOS	A	B	A	A
Approach Delay (s)	9.5	10.2	0.1	0.2
Approach LOS	A	B		

Intersection Summary				
Average Delay	2.0			
Intersection Capacity Utilization	24.6%	ICU Level of Service	A	
Analysis Period (min)	15			



Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	21	46	14	315	582	16
Future Volume (vph)	21	46	14	315	582	16
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800
Link Speed (k/h)	40			50	50	
Link Distance (m)	68.5			92.6	46.9	
Travel Time (s)	6.2			6.7	3.4	
Lane Group Flow (vph)	67	0	0	329	598	0
Sign Control	Stop			Free	Free	

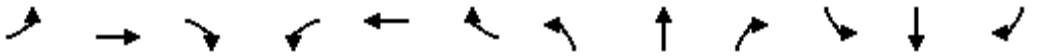
Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization 44.2%		ICU Level of Service A	
Analysis Period (min) 15			



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	21	46	14	315	582	16
Future Volume (Veh/h)	21	46	14	315	582	16
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)	21	46	14	315	582	16
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (m)				93		
pX, platoon unblocked						
vC, conflicting volume	933	590	598			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	933	590	598			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	93	91	99			
cM capacity (veh/h)	291	508	979			

Direction, Lane #	EB 1	NB 1	SB 1
Volume Total	67	329	598
Volume Left	21	14	0
Volume Right	46	0	16
cSH	412	979	1700
Volume to Capacity	0.16	0.01	0.35
Queue Length 95th (m)	4.4	0.3	0.0
Control Delay (s)	15.4	0.5	0.0
Lane LOS	C	A	
Approach Delay (s)	15.4	0.5	0.0
Approach LOS	C		

Intersection Summary			
Average Delay	1.2		
Intersection Capacity Utilization	44.2%	ICU Level of Service	A
Analysis Period (min)	15		



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	239	686	18	19	1547	218	96	33	26	188	7	288
Future Volume (vph)	239	686	18	19	1547	218	96	33	26	188	7	288
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Storage Length (m)	65.0		20.0	60.0		20.0	20.0		0.0	20.0		0.0
Storage Lanes	1		1	1		1	1		0	1		0
Taper Length (m)	25.0			15.0			20.0			25.0		
Right Turn on Red			Yes			Yes			Yes			Yes
Link Speed (k/h)		60			60			50			50	
Link Distance (m)		111.6			137.3			86.0			93.0	
Travel Time (s)		6.7			8.2			6.2			6.7	
Lane Group Flow (vph)	239	686	18	19	1547	218	96	59	0	188	295	0
Turn Type	Prot	NA	Perm	Prot	NA	Perm	Perm	NA		Perm	NA	
Protected Phases	7	4		3	8			2			6	
Permitted Phases			4			8	2			6		
Detector Phase	7	4	4	3	8	8	2	2		6	6	
Switch Phase												
Minimum Initial (s)	5.0	10.0	10.0	5.0	10.0	10.0	10.0	10.0		10.0	10.0	
Minimum Split (s)	11.1	34.1	34.1	11.1	34.1	34.1	40.0	40.0		40.0	40.0	
Total Split (s)	20.0	55.0	55.0	20.0	55.0	55.0	40.0	40.0		40.0	40.0	
Total Split (%)	16.7%	45.8%	45.8%	16.7%	45.8%	45.8%	33.3%	33.3%		33.3%	33.3%	
Yellow Time (s)	3.7	3.7	3.7	3.7	3.7	3.7	3.3	3.3		3.3	3.3	
All-Red Time (s)	2.4	2.4	2.4	2.4	2.4	2.4	3.5	3.5		3.5	3.5	
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Total Lost Time (s)	6.1	6.1	6.1	6.1	6.1	6.1	6.8	6.8		6.8	6.8	
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lag						
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes						
Recall Mode	None	C-Max	C-Max	None	C-Max	C-Max	None	None		None	None	
Act Effct Green (s)	26.6	77.6	77.6	7.0	50.6	50.6	23.8	23.8		23.8	23.8	
Actuated g/C Ratio	0.22	0.65	0.65	0.06	0.42	0.42	0.20	0.20		0.20	0.20	
v/c Ratio	0.64	0.31	0.02	0.19	1.08	0.33	0.97	0.17		0.76	0.57	
Control Delay	65.0	8.8	0.1	57.8	83.7	13.2	130.8	23.6		63.3	9.5	
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Total Delay	65.0	8.8	0.1	57.8	83.7	13.2	130.8	23.6		63.3	9.5	
LOS	E	A	A	E	F	B	F	C		E	A	
Approach Delay		22.9			74.8			90.0			30.4	
Approach LOS		C			E			F			C	
Queue Length 50th (m)	59.1	23.2	0.0	4.4	~217.8	16.2	22.6	6.4		42.0	2.1	
Queue Length 95th (m)	#105.1	36.8	m0.0	11.9	#263.1	35.1	#47.2	16.0		61.6	23.5	
Internal Link Dist (m)		87.6			113.3			62.0			69.0	
Turn Bay Length (m)	65.0		20.0	60.0		20.0	20.0			20.0		
Base Capacity (vph)	376	2191	929	196	1428	656	138	473		347	608	
Starvation Cap Reductn	0	0	0	0	0	0	0	0		0	0	
Spillback Cap Reductn	0	0	0	0	0	0	0	0		0	0	
Storage Cap Reductn	0	0	0	0	0	0	0	0		0	0	
Reduced v/c Ratio	0.64	0.31	0.02	0.10	1.08	0.33	0.70	0.12		0.54	0.49	

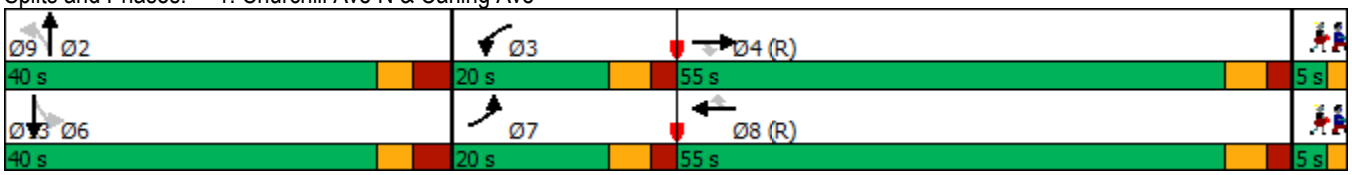
Intersection Summary	
Area Type:	Other

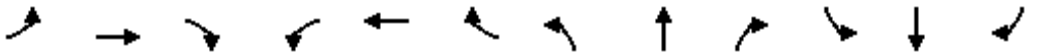
Lane Group	Ø9	Ø13
Lane Configurations		
Traffic Volume (vph)		
Future Volume (vph)		
Ideal Flow (vphpl)		
Storage Length (m)		
Storage Lanes		
Taper Length (m)		
Right Turn on Red		
Link Speed (k/h)		
Link Distance (m)		
Travel Time (s)		
Lane Group Flow (vph)		
Turn Type		
Protected Phases	9	13
Permitted Phases		
Detector Phase		
Switch Phase		
Minimum Initial (s)	1.0	1.0
Minimum Split (s)	5.0	5.0
Total Split (s)	5.0	5.0
Total Split (%)	4%	4%
Yellow Time (s)	2.0	2.0
All-Red Time (s)	0.0	0.0
Lost Time Adjust (s)		
Total Lost Time (s)		
Lead/Lag		
Lead-Lag Optimize?		
Recall Mode	None	None
Act Effct Green (s)		
Actuated g/C Ratio		
v/c Ratio		
Control Delay		
Queue Delay		
Total Delay		
LOS		
Approach Delay		
Approach LOS		
Queue Length 50th (m)		
Queue Length 95th (m)		
Internal Link Dist (m)		
Turn Bay Length (m)		
Base Capacity (vph)		
Starvation Cap Reductn		
Spillback Cap Reductn		
Storage Cap Reductn		
Reduced v/c Ratio		

Intersection Summary

Cycle Length: 120
Actuated Cycle Length: 120
Offset: 92 (77%), Referenced to phase 4:EBT and 8:WBT, Start of Green
Natural Cycle: 145
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 1.08
Intersection Signal Delay: 54.6 Intersection LOS: D
Intersection Capacity Utilization 114.4% 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.
m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 1: Churchill Ave N & Carling Ave





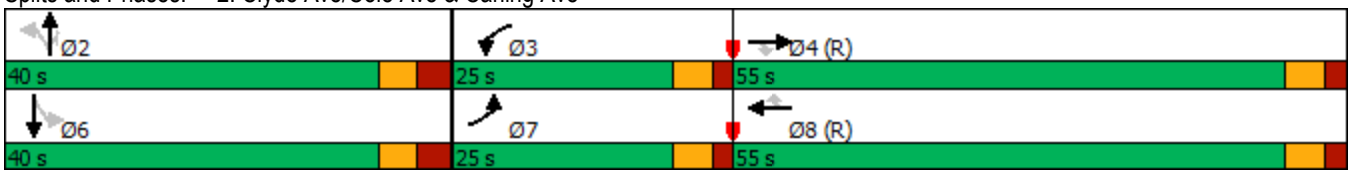
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	78	681	1	261	1564	65	126	87	210	30	54	62
Future Volume (vph)	78	681	1	261	1564	65	126	87	210	30	54	62
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Storage Length (m)	20.0		20.0	120.0		20.0	0.0		5.0	20.0		0.0
Storage Lanes	1		1	1		1	1		1	1		0
Taper Length (m)	20.0			30.0			7.6			20.0		
Right Turn on Red			Yes			Yes			Yes			Yes
Link Speed (k/h)		60			60			50			40	
Link Distance (m)		118.2			188.5			103.0			96.0	
Travel Time (s)		7.1			11.3			7.4			8.6	
Lane Group Flow (vph)	78	681	1	261	1564	65	126	87	210	30	116	0
Turn Type	Prot	NA	Perm	Prot	NA	Perm	Perm	NA	Perm	Perm	NA	
Protected Phases	7	4		3	8			2			6	
Permitted Phases			4			8	2		2	6		
Detector Phase	7	4	4	3	8	8	2	2	2	6	6	
Switch Phase												
Minimum Initial (s)	5.0	10.0	10.0	5.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	
Minimum Split (s)	10.4	35.5	35.5	10.4	35.5	35.5	37.0	37.0	37.0	37.0	37.0	
Total Split (s)	25.0	55.0	55.0	25.0	55.0	55.0	40.0	40.0	40.0	40.0	40.0	
Total Split (%)	20.8%	45.8%	45.8%	20.8%	45.8%	45.8%	33.3%	33.3%	33.3%	33.3%	33.3%	
Yellow Time (s)	3.7	3.7	3.7	3.7	3.7	3.7	3.3	3.3	3.3	3.3	3.3	
All-Red Time (s)	1.7	2.1	2.1	1.7	2.1	2.1	3.3	3.3	3.3	3.3	3.3	
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Total Lost Time (s)	5.4	5.8	5.8	5.4	5.8	5.8	6.6	6.6	6.6	6.6	6.6	
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lag						
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes						
Recall Mode	None	C-Max	C-Max	None	C-Max	C-Max	None	None	None	None	None	
Act Effct Green (s)	10.9	59.0	59.0	24.7	75.2	75.2	18.5	18.5	18.5	18.5	18.5	
Actuated g/C Ratio	0.09	0.49	0.49	0.21	0.63	0.63	0.15	0.15	0.15	0.15	0.15	
v/c Ratio	0.51	0.41	0.00	0.75	0.74	0.07	0.70	0.32	0.60	0.17	0.40	
Control Delay	62.8	21.9	0.0	52.9	18.0	4.5	67.1	46.1	18.4	43.0	29.5	
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Total Delay	62.8	21.9	0.0	52.9	18.0	4.5	67.1	46.1	18.4	43.0	29.5	
LOS	E	C	A	D	B	A	E	D	B	D	C	
Approach Delay		26.1			22.4			38.6			32.3	
Approach LOS		C			C			D			C	
Queue Length 50th (m)	17.8	53.1	0.0	64.4	84.5	1.2	28.6	18.5	9.2	6.3	14.4	
Queue Length 95th (m)	32.3	78.4	0.0	m66.7	m89.7	m1.6	45.2	30.8	30.5	13.8	29.2	
Internal Link Dist (m)		94.2			164.5			79.0			72.0	
Turn Bay Length (m)	20.0		20.0	120.0		20.0			5.0	20.0		
Base Capacity (vph)	276	1665	730	349	2124	887	325	496	502	322	482	
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	
Reduced v/c Ratio	0.28	0.41	0.00	0.75	0.74	0.07	0.39	0.18	0.42	0.09	0.24	

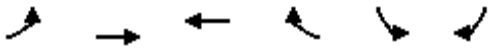
Intersection Summary	
Area Type:	Other

Cycle Length: 120	
Actuated Cycle Length: 120	
Offset: 93 (78%), Referenced to phase 4:EBT and 8:WBT, Start of Green	
Natural Cycle: 95	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.75	
Intersection Signal Delay: 25.8	Intersection LOS: C
Intersection Capacity Utilization 89.0%	ICU Level of Service E
Analysis Period (min) 15	

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

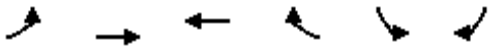
Splits and Phases: 2: Clyde Ave/Cole Ave & Carling Ave





Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	0	955	1880	78	0	52
Future Volume (vph)	0	955	1880	78	0	52
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800
Link Speed (k/h)		60	60		40	
Link Distance (m)		188.5	111.6		51.1	
Travel Time (s)		11.3	6.7		4.6	
Lane Group Flow (vph)	0	955	1958	0	0	52
Sign Control		Free	Free		Stop	

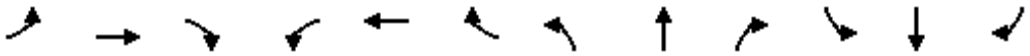
Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization 67.5%		ICU Level of Service C	
Analysis Period (min) 15			



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	0	955	1880	78	0	52
Future Volume (Veh/h)	0	955	1880	78	0	52
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	0	955	1880	78	0	52
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage veh)						
Upstream signal (m)		188	112			
pX, platoon unblocked	0.59				0.65	0.59
vC, conflicting volume	1958				2396	979
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1219				1213	0
tC, single (s)	4.1				6.8	6.9
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	100				100	92
cM capacity (veh/h)	332				113	634

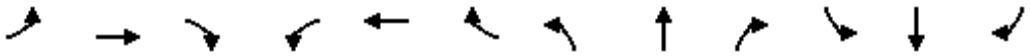
Direction, Lane #	EB 1	EB 2	WB 1	WB 2	SB 1
Volume Total	478	478	1253	705	52
Volume Left	0	0	0	0	0
Volume Right	0	0	0	78	52
cSH	1700	1700	1700	1700	634
Volume to Capacity	0.28	0.28	0.74	0.41	0.08
Queue Length 95th (m)	0.0	0.0	0.0	0.0	2.0
Control Delay (s)	0.0	0.0	0.0	0.0	11.2
Lane LOS					B
Approach Delay (s)	0.0		0.0		11.2
Approach LOS					B

Intersection Summary			
Average Delay	0.2		
Intersection Capacity Utilization	67.5%	ICU Level of Service	C
Analysis Period (min)	15		



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	2	1	8	36	1	5	7	122	70	4	60	2
Future Volume (vph)	2	1	8	36	1	5	7	122	70	4	60	2
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Link Speed (k/h)		40			40			40			40	
Link Distance (m)		50.3			47.4			96.0			64.3	
Travel Time (s)		4.5			4.3			8.6			5.8	
Lane Group Flow (vph)	0	11	0	0	42	0	0	199	0	0	66	0
Sign Control		Stop			Stop			Free			Free	

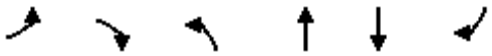
Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization 29.0%		ICU Level of Service A	
Analysis Period (min) 15			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	2	1	8	36	1	5	7	122	70	4	60	2
Future Volume (Veh/h)	2	1	8	36	1	5	7	122	70	4	60	2
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	2	1	8	36	1	5	7	122	70	4	60	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)								96				
pX, platoon unblocked	0.98	0.98		0.98	0.98	0.98				0.98		
vC, conflicting volume	246	275	61	248	241	157	62			192		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	214	244	61	217	210	123	62			159		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	100	100	99	95	100	99	100			100		
cM capacity (veh/h)	716	637	1004	710	666	905	1541			1385		

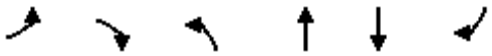
Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	11	42	199	66
Volume Left	2	36	7	4
Volume Right	8	5	70	2
cSH	892	728	1541	1385
Volume to Capacity	0.01	0.06	0.00	0.00
Queue Length 95th (m)	0.3	1.4	0.1	0.1
Control Delay (s)	9.1	10.2	0.3	0.5
Lane LOS	A	B	A	A
Approach Delay (s)	9.1	10.2	0.3	0.5
Approach LOS	A	B		

Intersection Summary				
Average Delay	2.0			
Intersection Capacity Utilization	29.0%	ICU Level of Service	A	
Analysis Period (min)	15			



Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	17	35	31	464	469	17
Future Volume (vph)	17	35	31	464	469	17
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800
Link Speed (k/h)	40			50	50	
Link Distance (m)	70.0			93.0	32.3	
Travel Time (s)	6.3			6.7	2.3	
Lane Group Flow (vph)	52	0	0	495	486	0
Sign Control	Stop			Free	Free	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization 62.6%		ICU Level of Service B	
Analysis Period (min) 15			

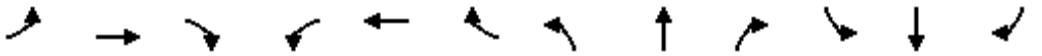


Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	17	35	31	464	469	17
Future Volume (Veh/h)	17	35	31	464	469	17
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	17	35	31	464	469	17
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (m)				93		
pX, platoon unblocked						
vC, conflicting volume	1004	478	486			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1004	478	486			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	93	94	97			
cM capacity (veh/h)	260	588	1077			

Direction, Lane #	EB 1	NB 1	SB 1
Volume Total	52	495	486
Volume Left	17	31	0
Volume Right	35	0	17
cSH	417	1077	1700
Volume to Capacity	0.12	0.03	0.29
Queue Length 95th (m)	3.2	0.7	0.0
Control Delay (s)	14.9	0.8	0.0
Lane LOS	B	A	
Approach Delay (s)	14.9	0.8	0.0
Approach LOS	B		

Intersection Summary			
Average Delay	1.2		
Intersection Capacity Utilization	62.6%	ICU Level of Service	B
Analysis Period (min)	15		

Total Projected 2027 (No Reduction)



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	169	1462	98	85	653	154	11	5	11	349	31	248
Future Volume (vph)	169	1462	98	85	653	154	11	5	11	349	31	248
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Storage Length (m)	65.0		20.0	60.0		20.0	20.0		0.0	20.0		0.0
Storage Lanes	1		1	1		1	1		0	1		0
Taper Length (m)	25.0			15.0			20.0			25.0		
Right Turn on Red			Yes			Yes			Yes			Yes
Link Speed (k/h)		60			60			50			50	
Link Distance (m)		112.5			137.3			90.4			92.6	
Travel Time (s)		6.8			8.2			6.5			6.7	
Lane Group Flow (vph)	169	1462	98	85	653	154	11	16	0	349	279	0
Turn Type	Prot	NA	Perm	Prot	NA	Perm	Perm	NA		Perm	NA	
Protected Phases	7	4		3	8			2			6	
Permitted Phases			4			8	2			6		
Detector Phase	7	4	4	3	8	8	2	2		6	6	
Switch Phase												
Minimum Initial (s)	5.0	10.0	10.0	5.0	10.0	10.0	10.0	10.0		10.0	10.0	
Minimum Split (s)	11.1	34.1	34.1	11.1	34.1	34.1	40.0	40.0		40.0	40.0	
Total Split (s)	25.0	50.0	50.0	25.0	50.0	50.0	40.0	40.0		40.0	40.0	
Total Split (%)	20.8%	41.7%	41.7%	20.8%	41.7%	41.7%	33.3%	33.3%		33.3%	33.3%	
Yellow Time (s)	3.7	3.7	3.7	3.7	3.7	3.7	3.3	3.3		3.3	3.3	
All-Red Time (s)	2.4	2.4	2.4	2.4	2.4	2.4	3.5	3.5		3.5	3.5	
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Total Lost Time (s)	6.1	6.1	6.1	6.1	6.1	6.1	6.8	6.8		6.8	6.8	
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lag						
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes						
Recall Mode	None	C-Max	C-Max	None	C-Max	C-Max	None	None		None	None	
Act Effct Green (s)	16.1	55.1	55.1	11.3	47.8	47.8	37.2	37.2		37.2	37.2	
Actuated g/C Ratio	0.13	0.46	0.46	0.09	0.40	0.40	0.31	0.31		0.31	0.31	
v/c Ratio	0.75	0.94	0.14	0.53	0.48	0.25	0.04	0.03		0.86	0.44	
Control Delay	81.2	24.3	2.1	63.2	29.3	10.0	29.2	17.1		60.8	7.9	
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Total Delay	81.2	24.3	2.1	63.2	29.3	10.0	29.2	17.1		60.8	7.9	
LOS	F	C	A	E	C	B	C	B		E	A	
Approach Delay		28.6			29.2			22.0			37.3	
Approach LOS		C			C			C			D	
Queue Length 50th (m)	42.3	~50.1	1.0	19.4	61.4	6.9	1.8	0.8		76.3	5.1	
Queue Length 95th (m)	m45.9	m#213.3	m1.3	34.4	80.9	21.7	6.2	5.9		#126.2	25.6	
Internal Link Dist (m)		88.5			113.3			66.4			68.6	
Turn Bay Length (m)	65.0		20.0	60.0		20.0	20.0			20.0		
Base Capacity (vph)	266	1556	704	266	1349	625	247	492		404	632	
Starvation Cap Reductn	0	0	0	0	0	0	0	0		0	0	
Spillback Cap Reductn	0	0	0	0	0	0	0	0		0	0	
Storage Cap Reductn	0	0	0	0	0	0	0	0		0	0	
Reduced v/c Ratio	0.64	0.94	0.14	0.32	0.48	0.25	0.04	0.03		0.86	0.44	

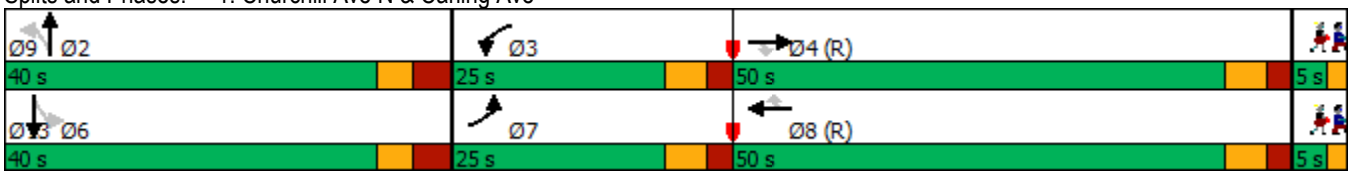
Intersection Summary	
Area Type:	Other

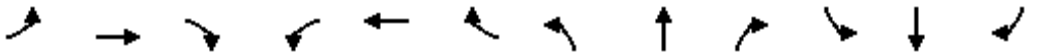
Lane Group	Ø9	Ø13
Lane Configurations		
Traffic Volume (vph)		
Future Volume (vph)		
Ideal Flow (vphpl)		
Storage Length (m)		
Storage Lanes		
Taper Length (m)		
Right Turn on Red		
Link Speed (k/h)		
Link Distance (m)		
Travel Time (s)		
Lane Group Flow (vph)		
Turn Type		
Protected Phases	9	13
Permitted Phases		
Detector Phase		
Switch Phase		
Minimum Initial (s)	1.0	1.0
Minimum Split (s)	5.0	5.0
Total Split (s)	5.0	5.0
Total Split (%)	4%	4%
Yellow Time (s)	2.0	2.0
All-Red Time (s)	0.0	0.0
Lost Time Adjust (s)		
Total Lost Time (s)		
Lead/Lag		
Lead-Lag Optimize?		
Recall Mode	None	None
Act Effct Green (s)		
Actuated g/C Ratio		
v/c Ratio		
Control Delay		
Queue Delay		
Total Delay		
LOS		
Approach Delay		
Approach LOS		
Queue Length 50th (m)		
Queue Length 95th (m)		
Internal Link Dist (m)		
Turn Bay Length (m)		
Base Capacity (vph)		
Starvation Cap Reductn		
Spillback Cap Reductn		
Storage Cap Reductn		
Reduced v/c Ratio		

Intersection Summary

Cycle Length: 120
Actuated Cycle Length: 120
Offset: 101 (84%), Referenced to phase 4:EBT and 8:WBT, Start of Green
Natural Cycle: 105
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.94
Intersection Signal Delay: 30.4 Intersection LOS: C
Intersection Capacity Utilization 90.8% 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.
m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 1: Churchill Ave N & Carling Ave



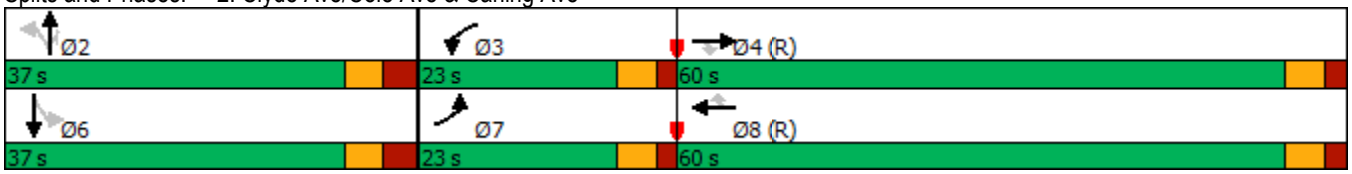


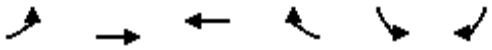
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	61	1557	0	274	644	60	121	51	147	35	63	66
Future Volume (vph)	61	1557	0	274	644	60	121	51	147	35	63	66
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Storage Length (m)	20.0		20.0	120.0		20.0	0.0		5.0	20.0		0.0
Storage Lanes	1		1	1		1	1		1	1		0
Taper Length (m)	20.0			30.0			7.6			20.0		
Right Turn on Red			Yes			Yes			Yes			Yes
Link Speed (k/h)		60			60			50			40	
Link Distance (m)		118.2			187.6			103.0			93.4	
Travel Time (s)		7.1			11.3			7.4			8.4	
Lane Group Flow (vph)	61	1557	0	274	644	60	121	51	147	35	129	0
Turn Type	Prot	NA	Perm	Prot	NA	Perm	Perm	NA	Perm	Perm	NA	
Protected Phases	7	4		3	8			2			6	
Permitted Phases			4			8	2		2	6		
Detector Phase	7	4	4	3	8	8	2	2	2	6	6	
Switch Phase												
Minimum Initial (s)	5.0	10.0	10.0	5.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	
Minimum Split (s)	10.4	35.5	35.5	10.4	35.5	35.5	37.0	37.0	37.0	37.0	37.0	
Total Split (s)	23.0	60.0	60.0	23.0	60.0	60.0	37.0	37.0	37.0	37.0	37.0	
Total Split (%)	19.2%	50.0%	50.0%	19.2%	50.0%	50.0%	30.8%	30.8%	30.8%	30.8%	30.8%	
Yellow Time (s)	3.7	3.7	3.7	3.7	3.7	3.7	3.3	3.3	3.3	3.3	3.3	
All-Red Time (s)	1.7	2.1	2.1	1.7	2.1	2.1	3.3	3.3	3.3	3.3	3.3	
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Total Lost Time (s)	5.4	5.8	5.8	5.4	5.8	5.8	6.6	6.6	6.6	6.6	6.6	
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lag						
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes						
Recall Mode	None	C-Max	C-Max	None	C-Max	C-Max	None	None	None	None	None	
Act Effct Green (s)	9.7	56.6		27.8	76.9	76.9	17.8	17.8	17.8	17.8	17.8	
Actuated g/C Ratio	0.08	0.47		0.23	0.64	0.64	0.15	0.15	0.15	0.15	0.15	
v/c Ratio	0.45	0.97		0.70	0.30	0.06	0.74	0.19	0.45	0.20	0.47	
Control Delay	62.1	49.0		54.8	11.2	2.8	73.8	43.8	10.9	44.6	35.2	
Queue Delay	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Total Delay	62.1	49.0		54.8	11.2	2.8	73.8	43.8	10.9	44.6	35.2	
LOS	E	D		D	B	A	E	D	B	D	D	
Approach Delay		49.5			22.9			40.0			37.2	
Approach LOS		D			C			D			D	
Queue Length 50th (m)	14.0	187.1		66.1	24.5	0.1	27.7	10.7	0.0	7.3	18.7	
Queue Length 95th (m)	26.9	#246.6		#114.4	48.3	4.1	44.8	20.5	16.4	15.7	34.7	
Internal Link Dist (m)		94.2			163.6			79.0			69.4	
Turn Bay Length (m)	20.0			120.0		20.0			5.0	20.0		
Base Capacity (vph)	248	1597		392	2173	940	278	451	457	301	442	
Starvation Cap Reductn	0	0		0	0	0	0	0	0	0	0	
Spillback Cap Reductn	0	0		0	0	0	0	0	0	0	0	
Storage Cap Reductn	0	0		0	0	0	0	0	0	0	0	
Reduced v/c Ratio	0.25	0.97		0.70	0.30	0.06	0.44	0.11	0.32	0.12	0.29	

Intersection Summary	
Area Type:	Other

Cycle Length: 120
Actuated Cycle Length: 120
Offset: 84 (70%), Referenced to phase 4:EBT and 8:WBT, Start of Green
Natural Cycle: 125
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.97
Intersection Signal Delay: 39.4 Intersection LOS: D
Intersection Capacity Utilization 113.5% ICU Level of Service H
Analysis Period (min) 15
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

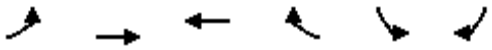
Splits and Phases: 2: Clyde Ave/Cole Ave & Carling Ave





Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	0	1742	897	28	0	85
Future Volume (vph)	0	1742	897	28	0	85
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800
Link Speed (k/h)		60	60		40	
Link Distance (m)		187.6	112.5		49.0	
Travel Time (s)		11.3	6.8		4.4	
Lane Group Flow (vph)	0	1742	925	0	0	85
Sign Control		Free	Free		Stop	

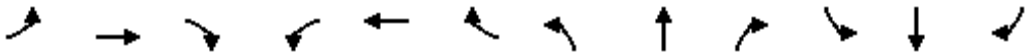
Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization 54.2%		ICU Level of Service A	
Analysis Period (min) 15			



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	0	1742	897	28	0	85
Future Volume (Veh/h)	0	1742	897	28	0	85
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	0	1742	897	28	0	85
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage veh)						
Upstream signal (m)		187	112			
pX, platoon unblocked	0.86				0.62	0.86
vC, conflicting volume	925				1782	462
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	586				12	48
tC, single (s)	4.1				6.8	6.9
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	100				100	90
cM capacity (veh/h)	846				623	868

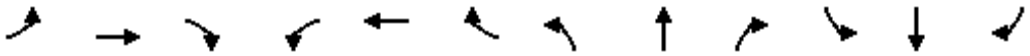
Direction, Lane #	EB 1	EB 2	WB 1	WB 2	SB 1
Volume Total	871	871	598	327	85
Volume Left	0	0	0	0	0
Volume Right	0	0	0	28	85
cSH	1700	1700	1700	1700	868
Volume to Capacity	0.51	0.51	0.35	0.19	0.10
Queue Length 95th (m)	0.0	0.0	0.0	0.0	2.5
Control Delay (s)	0.0	0.0	0.0	0.0	9.6
Lane LOS					A
Approach Delay (s)	0.0		0.0		9.6
Approach LOS					A

Intersection Summary			
Average Delay	0.3		
Intersection Capacity Utilization	54.2%	ICU Level of Service	A
Analysis Period (min)	15		



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	1	1	2	49	0	2	1	86	54	3	96	0
Future Volume (vph)	1	1	2	49	0	2	1	86	54	3	96	0
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Link Speed (k/h)		40			40			40			40	
Link Distance (m)		45.4			53.6			93.4			64.9	
Travel Time (s)		4.1			4.8			8.4			5.8	
Lane Group Flow (vph)	0	4	0	0	51	0	0	141	0	0	99	0
Sign Control		Stop			Stop			Free			Free	

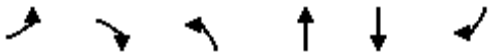
Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization 24.6%		ICU Level of Service A	
Analysis Period (min) 15			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	1	1	2	49	0	2	1	86	54	3	96	0
Future Volume (Veh/h)	1	1	2	49	0	2	1	86	54	3	96	0
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	1	1	2	49	0	2	1	86	54	3	96	0
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (m)								93				
pX, platoon unblocked												
vC, conflicting volume	219	244	96	220	217	113	96			140		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	219	244	96	220	217	113	96			140		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	100	100	100	93	100	100	100			100		
cM capacity (veh/h)	734	656	960	733	679	940	1498			1443		

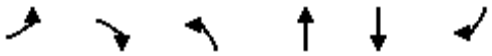
Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	4	51	141	99
Volume Left	1	49	1	3
Volume Right	2	2	54	0
cSH	805	739	1498	1443
Volume to Capacity	0.00	0.07	0.00	0.00
Queue Length 95th (m)	0.1	1.7	0.0	0.0
Control Delay (s)	9.5	10.2	0.1	0.2
Lane LOS	A	B	A	A
Approach Delay (s)	9.5	10.2	0.1	0.2
Approach LOS	A	B		

Intersection Summary				
Average Delay	2.0			
Intersection Capacity Utilization	24.6%	ICU Level of Service	A	
Analysis Period (min)	15			



Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	21	46	14	315	582	16
Future Volume (vph)	21	46	14	315	582	16
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800
Link Speed (k/h)	40			50	50	
Link Distance (m)	68.5			92.6	46.9	
Travel Time (s)	6.2			6.7	3.4	
Lane Group Flow (vph)	67	0	0	329	598	0
Sign Control	Stop			Free	Free	

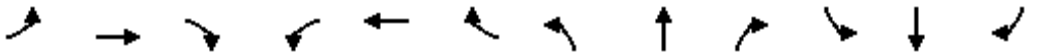
Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization 44.2%		ICU Level of Service A	
Analysis Period (min) 15			



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	21	46	14	315	582	16
Future Volume (Veh/h)	21	46	14	315	582	16
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)	21	46	14	315	582	16
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (m)				93		
pX, platoon unblocked						
vC, conflicting volume	933	590	598			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	933	590	598			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	93	91	99			
cM capacity (veh/h)	291	508	979			

Direction, Lane #	EB 1	NB 1	SB 1
Volume Total	67	329	598
Volume Left	21	14	0
Volume Right	46	0	16
cSH	412	979	1700
Volume to Capacity	0.16	0.01	0.35
Queue Length 95th (m)	4.4	0.3	0.0
Control Delay (s)	15.4	0.5	0.0
Lane LOS	C	A	
Approach Delay (s)	15.4	0.5	0.0
Approach LOS	C		

Intersection Summary			
Average Delay	1.2		
Intersection Capacity Utilization	44.2%	ICU Level of Service	A
Analysis Period (min)	15		



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	239	852	18	19	1921	218	96	33	26	188	7	288
Future Volume (vph)	239	852	18	19	1921	218	96	33	26	188	7	288
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Storage Length (m)	65.0		20.0	60.0		20.0	20.0		0.0	20.0		0.0
Storage Lanes	1		1	1		1	1		0	1		0
Taper Length (m)	25.0			15.0			20.0			25.0		
Right Turn on Red			Yes			Yes			Yes			Yes
Link Speed (k/h)		60			60			50			50	
Link Distance (m)		111.6			137.3			86.0			93.0	
Travel Time (s)		6.7			8.2			6.2			6.7	
Lane Group Flow (vph)	239	852	18	19	1921	218	96	59	0	188	295	0
Turn Type	Prot	NA	Perm	Prot	NA	Perm	Perm	NA		Perm	NA	
Protected Phases	7	4		3	8			2			6	
Permitted Phases			4			8	2			6		
Detector Phase	7	4	4	3	8	8	2	2		6	6	
Switch Phase												
Minimum Initial (s)	5.0	10.0	10.0	5.0	10.0	10.0	10.0	10.0		10.0	10.0	
Minimum Split (s)	11.1	34.1	34.1	11.1	34.1	34.1	40.0	40.0		40.0	40.0	
Total Split (s)	20.0	55.0	55.0	20.0	55.0	55.0	40.0	40.0		40.0	40.0	
Total Split (%)	16.7%	45.8%	45.8%	16.7%	45.8%	45.8%	33.3%	33.3%		33.3%	33.3%	
Yellow Time (s)	3.7	3.7	3.7	3.7	3.7	3.7	3.3	3.3		3.3	3.3	
All-Red Time (s)	2.4	2.4	2.4	2.4	2.4	2.4	3.5	3.5		3.5	3.5	
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Total Lost Time (s)	6.1	6.1	6.1	6.1	6.1	6.1	6.8	6.8		6.8	6.8	
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lag						
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes						
Recall Mode	None	C-Max	C-Max	None	C-Max	C-Max	None	None		None	None	
Act Effct Green (s)	26.6	77.6	77.6	7.0	50.6	50.6	23.8	23.8		23.8	23.8	
Actuated g/C Ratio	0.22	0.65	0.65	0.06	0.42	0.42	0.20	0.20		0.20	0.20	
v/c Ratio	0.64	0.39	0.02	0.19	1.35	0.33	0.97	0.17		0.76	0.57	
Control Delay	64.8	9.2	0.1	57.8	190.6	13.2	130.8	23.6		63.3	9.8	
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Total Delay	64.8	9.2	0.1	57.8	190.6	13.2	130.8	23.6		63.3	9.8	
LOS	E	A	A	E	F	B	F	C		E	A	
Approach Delay		21.0			171.5			90.0			30.6	
Approach LOS		C			F			F			C	
Queue Length 50th (m)	59.3	27.5	0.0	4.4	~314.3	16.2	22.6	6.4		42.0	2.7	
Queue Length 95th (m)	#105.7	45.1	m0.0	11.9	#359.3	35.1	#47.2	16.0		61.6	24.3	
Internal Link Dist (m)		87.6			113.3			62.0			69.0	
Turn Bay Length (m)	65.0		20.0	60.0		20.0	20.0			20.0		
Base Capacity (vph)	376	2191	929	196	1428	656	138	473		347	606	
Starvation Cap Reductn	0	0	0	0	0	0	0	0		0	0	
Spillback Cap Reductn	0	0	0	0	0	0	0	0		0	0	
Storage Cap Reductn	0	0	0	0	0	0	0	0		0	0	
Reduced v/c Ratio	0.64	0.39	0.02	0.10	1.35	0.33	0.70	0.12		0.54	0.49	

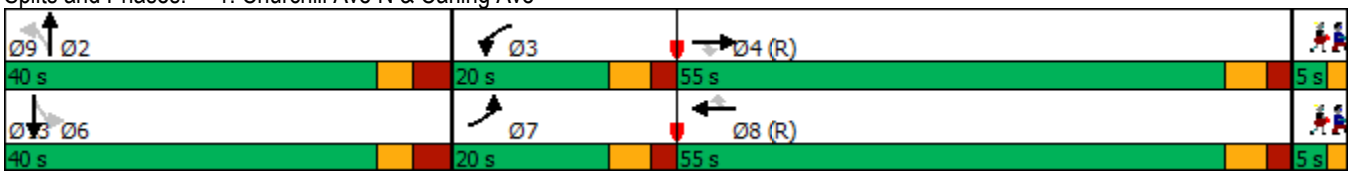
Intersection Summary	
Area Type:	Other

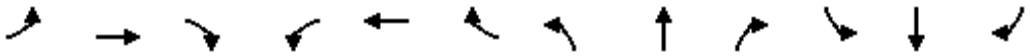
Lane Group	Ø9	Ø13
Lane Configurations		
Traffic Volume (vph)		
Future Volume (vph)		
Ideal Flow (vphpl)		
Storage Length (m)		
Storage Lanes		
Taper Length (m)		
Right Turn on Red		
Link Speed (k/h)		
Link Distance (m)		
Travel Time (s)		
Lane Group Flow (vph)		
Turn Type		
Protected Phases	9	13
Permitted Phases		
Detector Phase		
Switch Phase		
Minimum Initial (s)	1.0	1.0
Minimum Split (s)	5.0	5.0
Total Split (s)	5.0	5.0
Total Split (%)	4%	4%
Yellow Time (s)	2.0	2.0
All-Red Time (s)	0.0	0.0
Lost Time Adjust (s)		
Total Lost Time (s)		
Lead/Lag		
Lead-Lag Optimize?		
Recall Mode	None	None
Act Effct Green (s)		
Actuated g/C Ratio		
v/c Ratio		
Control Delay		
Queue Delay		
Total Delay		
LOS		
Approach Delay		
Approach LOS		
Queue Length 50th (m)		
Queue Length 95th (m)		
Internal Link Dist (m)		
Turn Bay Length (m)		
Base Capacity (vph)		
Starvation Cap Reductn		
Spillback Cap Reductn		
Storage Cap Reductn		
Reduced v/c Ratio		

Intersection Summary

Cycle Length: 120
Actuated Cycle Length: 120
Offset: 92 (77%), Referenced to phase 4:EBT and 8:WBT, Start of Green
Natural Cycle: 145
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 1.35
Intersection Signal Delay: 108.1 Intersection LOS: F
Intersection Capacity Utilization 125.3% 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.
m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 1: Churchill Ave N & Carling Ave



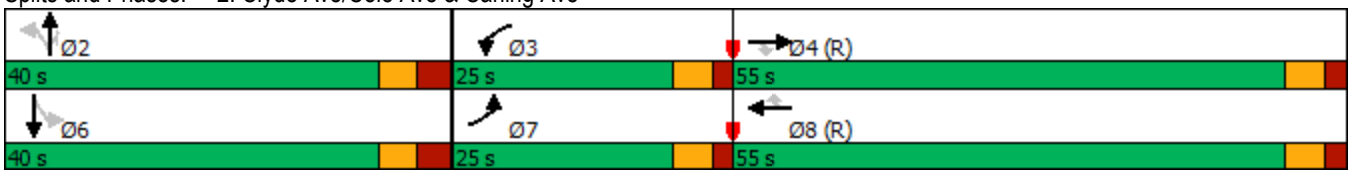


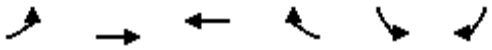
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	78	849	1	261	1954	65	126	87	210	30	54	62
Future Volume (vph)	78	849	1	261	1954	65	126	87	210	30	54	62
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Storage Length (m)	20.0		20.0	120.0		20.0	0.0		5.0	20.0		0.0
Storage Lanes	1		1	1		1	1		1	1		0
Taper Length (m)	20.0			30.0			7.6			20.0		
Right Turn on Red			Yes			Yes			Yes			Yes
Link Speed (k/h)		60			60			50			40	
Link Distance (m)		118.2			188.5			103.0			96.0	
Travel Time (s)		7.1			11.3			7.4			8.6	
Lane Group Flow (vph)	78	849	1	261	1954	65	126	87	210	30	116	0
Turn Type	Prot	NA	Perm	Prot	NA	Perm	Perm	NA	Perm	Perm	NA	
Protected Phases	7	4		3	8			2			6	
Permitted Phases			4			8	2		2	6		
Detector Phase	7	4	4	3	8	8	2	2	2	6	6	
Switch Phase												
Minimum Initial (s)	5.0	10.0	10.0	5.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	
Minimum Split (s)	10.4	35.5	35.5	10.4	35.5	35.5	37.0	37.0	37.0	37.0	37.0	
Total Split (s)	25.0	55.0	55.0	25.0	55.0	55.0	40.0	40.0	40.0	40.0	40.0	
Total Split (%)	20.8%	45.8%	45.8%	20.8%	45.8%	45.8%	33.3%	33.3%	33.3%	33.3%	33.3%	
Yellow Time (s)	3.7	3.7	3.7	3.7	3.7	3.7	3.3	3.3	3.3	3.3	3.3	
All-Red Time (s)	1.7	2.1	2.1	1.7	2.1	2.1	3.3	3.3	3.3	3.3	3.3	
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Total Lost Time (s)	5.4	5.8	5.8	5.4	5.8	5.8	6.6	6.6	6.6	6.6	6.6	
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lag						
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes						
Recall Mode	None	C-Max	C-Max	None	C-Max	C-Max	None	None	None	None	None	
Act Effct Green (s)	10.9	59.0	59.0	24.7	75.2	75.2	18.5	18.5	18.5	18.5	18.5	
Actuated g/C Ratio	0.09	0.49	0.49	0.21	0.63	0.63	0.15	0.15	0.15	0.15	0.15	
v/c Ratio	0.51	0.51	0.00	0.75	0.92	0.07	0.70	0.32	0.60	0.17	0.40	
Control Delay	62.8	23.6	0.0	49.3	25.6	4.5	67.1	46.1	18.4	43.0	29.5	
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Total Delay	62.8	23.6	0.0	49.3	25.6	4.5	67.1	46.1	18.4	43.0	29.5	
LOS	E	C	A	D	C	A	E	D	B	D	C	
Approach Delay		26.9			27.7			38.6			32.3	
Approach LOS		C			C			D			C	
Queue Length 50th (m)	17.8	70.6	0.0	64.6	132.8	1.3	28.6	18.5	9.2	6.3	14.4	
Queue Length 95th (m)	32.3	102.2	0.0	m56.2	m90.7	m1.1	45.2	30.8	30.5	13.8	29.2	
Internal Link Dist (m)		94.2			164.5			79.0			72.0	
Turn Bay Length (m)	20.0		20.0	120.0		20.0			5.0	20.0		
Base Capacity (vph)	276	1665	730	349	2124	887	325	496	502	322	482	
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	
Reduced v/c Ratio	0.28	0.51	0.00	0.75	0.92	0.07	0.39	0.18	0.42	0.09	0.24	

Intersection Summary	
Area Type:	Other

Cycle Length: 120
Actuated Cycle Length: 120
Offset: 93 (78%), Referenced to phase 4:EBT and 8:WBT, Start of Green
Natural Cycle: 125
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.92
Intersection Signal Delay: 28.9 Intersection LOS: C
Intersection Capacity Utilization 100.3% ICU Level of Service G
Analysis Period (min) 15
m Volume for 95th percentile queue is metered by upstream signal.

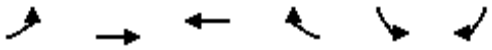
Splits and Phases: 2: Clyde Ave/Cole Ave & Carling Ave





Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	0	1121	2253	78	0	52
Future Volume (vph)	0	1121	2253	78	0	52
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800
Link Speed (k/h)		60	60		40	
Link Distance (m)		188.5	111.6		51.1	
Travel Time (s)		11.3	6.7		4.6	
Lane Group Flow (vph)	0	1121	2331	0	0	52
Sign Control		Free	Free		Stop	

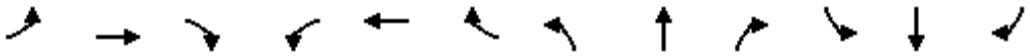
Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization 78.4%		ICU Level of Service D	
Analysis Period (min) 15			



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	0	1121	2253	78	0	52
Future Volume (Veh/h)	0	1121	2253	78	0	52
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	0	1121	2253	78	0	52
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage veh)						
Upstream signal (m)		188	112			
pX, platoon unblocked	0.59				0.67	0.59
vC, conflicting volume	2331				2852	1166
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1856				1656	0
tC, single (s)	4.1				6.8	6.9
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	100				100	92
cM capacity (veh/h)	188				59	634

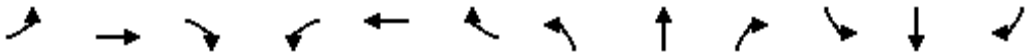
Direction, Lane #	EB 1	EB 2	WB 1	WB 2	SB 1
Volume Total	560	560	1502	829	52
Volume Left	0	0	0	0	0
Volume Right	0	0	0	78	52
cSH	1700	1700	1700	1700	634
Volume to Capacity	0.33	0.33	0.88	0.49	0.08
Queue Length 95th (m)	0.0	0.0	0.0	0.0	2.0
Control Delay (s)	0.0	0.0	0.0	0.0	11.2
Lane LOS					B
Approach Delay (s)	0.0		0.0		11.2
Approach LOS					B

Intersection Summary			
Average Delay	0.2		
Intersection Capacity Utilization	78.4%	ICU Level of Service	D
Analysis Period (min)	15		



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	2	1	8	36	1	5	7	122	70	4	60	2
Future Volume (vph)	2	1	8	36	1	5	7	122	70	4	60	2
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Link Speed (k/h)		40			40			40			40	
Link Distance (m)		50.3			47.4			96.0			64.3	
Travel Time (s)		4.5			4.3			8.6			5.8	
Lane Group Flow (vph)	0	11	0	0	42	0	0	199	0	0	66	0
Sign Control		Stop			Stop			Free			Free	

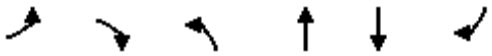
Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization 29.0%		ICU Level of Service A	
Analysis Period (min) 15			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	2	1	8	36	1	5	7	122	70	4	60	2
Future Volume (Veh/h)	2	1	8	36	1	5	7	122	70	4	60	2
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	2	1	8	36	1	5	7	122	70	4	60	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)								96				
pX, platoon unblocked	0.98	0.98		0.98	0.98	0.98				0.98		
vC, conflicting volume	246	275	61	248	241	157	62			192		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	214	244	61	217	210	123	62			159		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	100	100	99	95	100	99	100			100		
cM capacity (veh/h)	716	637	1004	710	666	905	1541			1385		

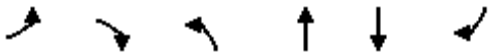
Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	11	42	199	66
Volume Left	2	36	7	4
Volume Right	8	5	70	2
cSH	892	728	1541	1385
Volume to Capacity	0.01	0.06	0.00	0.00
Queue Length 95th (m)	0.3	1.4	0.1	0.1
Control Delay (s)	9.1	10.2	0.3	0.5
Lane LOS	A	B	A	A
Approach Delay (s)	9.1	10.2	0.3	0.5
Approach LOS	A	B		

Intersection Summary				
Average Delay	2.0			
Intersection Capacity Utilization	29.0%	ICU Level of Service	A	
Analysis Period (min)	15			



Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	17	35	31	464	469	17
Future Volume (vph)	17	35	31	464	469	17
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800
Link Speed (k/h)	40			50	50	
Link Distance (m)	70.0			93.0	32.3	
Travel Time (s)	6.3			6.7	2.3	
Lane Group Flow (vph)	52	0	0	495	486	0
Sign Control	Stop			Free	Free	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization 62.6%		ICU Level of Service B	
Analysis Period (min) 15			



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	17	35	31	464	469	17
Future Volume (Veh/h)	17	35	31	464	469	17
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)	17	35	31	464	469	17
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (m)				93		
pX, platoon unblocked						
vC, conflicting volume	1004	478	486			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1004	478	486			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	93	94	97			
cM capacity (veh/h)	260	588	1077			

Direction, Lane #	EB 1	NB 1	SB 1
Volume Total	52	495	486
Volume Left	17	31	0
Volume Right	35	0	17
cSH	417	1077	1700
Volume to Capacity	0.12	0.03	0.29
Queue Length 95th (m)	3.2	0.7	0.0
Control Delay (s)	14.9	0.8	0.0
Lane LOS	B	A	
Approach Delay (s)	14.9	0.8	0.0
Approach LOS	B		

Intersection Summary			
Average Delay	1.2		
Intersection Capacity Utilization	62.6%	ICU Level of Service	B
Analysis Period (min)	15		