93 Norman Street

TIA Strategy Report

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TIA Plan Reports

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

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

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

CERTIFICATION

1. I have reviewed and have a sound understanding of the objectives, needs and requirements of the City of Ottawa's Official Plan, Transportation Master Plan and the Transportation Impact Assessment (2017) Guidelines;
2. I have a sound knowledge of industry standard practice with respect to the preparation of transportation impact assessment reports, including multi modal level of service review;
3. I have substantial experience (more than 5 years) in undertaking and delivering transportation impact studies (analysis, reporting and geometric design) with strong background knowledge in transportation planning, engineering or traffic operations; and
4. I am either a licensed1 or registered 2 professional in good standing, whose field of expertise [check ✓ appropriate field(s)] is either transportation engineering ☑ or transportation planning □.

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

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Dated at Ottawa this 22nd day of February, 2021. (City)

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

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Strategy Report

Parsons has been retained by Taggart Realty Management to prepare a Transportation Impact Assessment (TIA) in support of a Site Plan Application (SPA) for a residential development located at 93 Norman Street within Little Italy community. This document follows the TIA process, as outlined in the City Transportation Impact Assessment (TIA) Guidelines (2017). The following report represents Step 4 – Strategy Report.

1. Screening Form

The screening form confirmed the need for a TIA Report based on the site meeting the trip generation and location triggers due to the development having more than 90 residential units and being located within a Transit Oriented Development Zone (TOD), within 600 meters of the Carling LRT Station. The Screening Form has been provided in **Appendix A**.

2. Scoping Report

2.1. Existing and Planned Conditions

2.1.1. Proposed Development

The proposed development is located at the municipal address of 93 Norman Street, which is located on the north side of the street between Preston Street and the Trillium Line LRT tracks/multi-use pathway (as shown in **Figure 1**). The lot is currently vacant land following the demolition of the old developments in 2019 and formerly vacant since 2017. It is understood that the development proposes a 9-storey residential building that includes 121 apartment units, 104 underground parking spaces, 116 bicycle parking spaces, a single driveway connection off Norman Street and an anticipated buildout year of 2022. The proposed site is permitted under the current zoning, R5B [2147] S329. **Figure 2** displays the latest proposed site plan.

Figure 1: Local Context

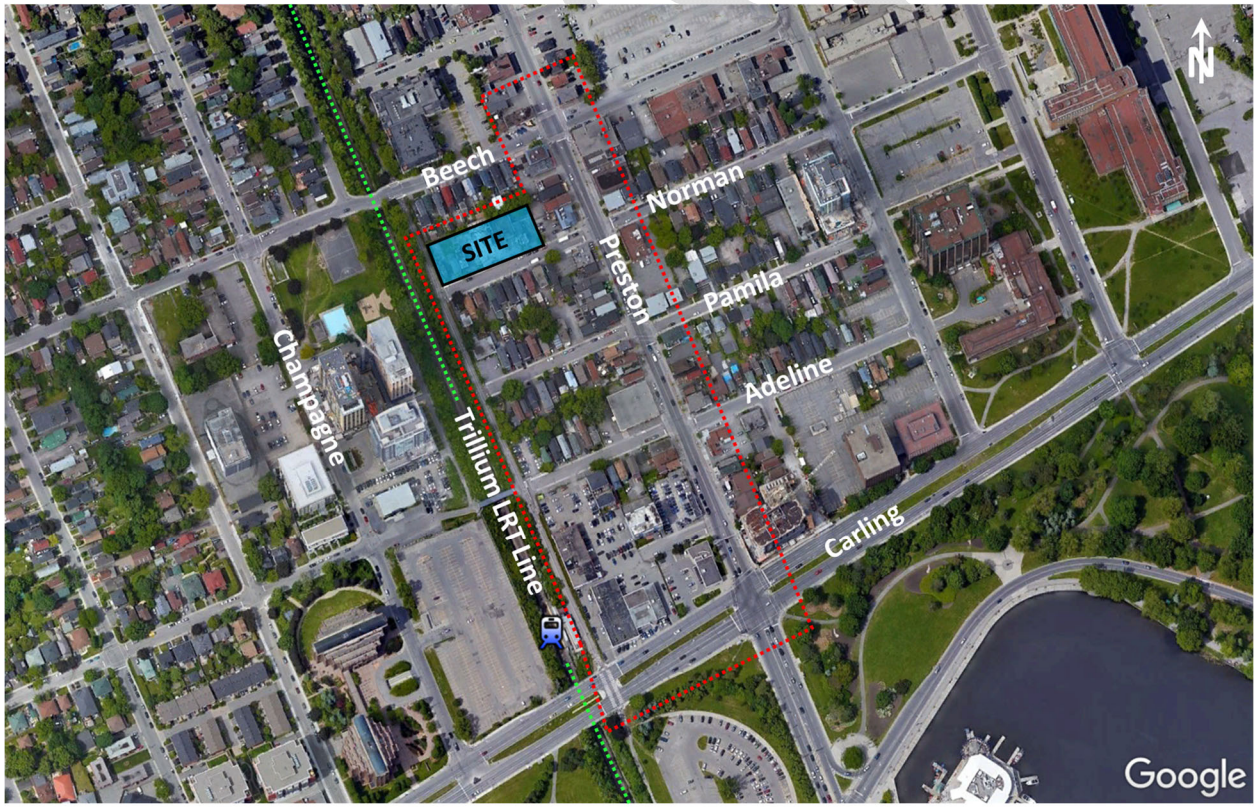
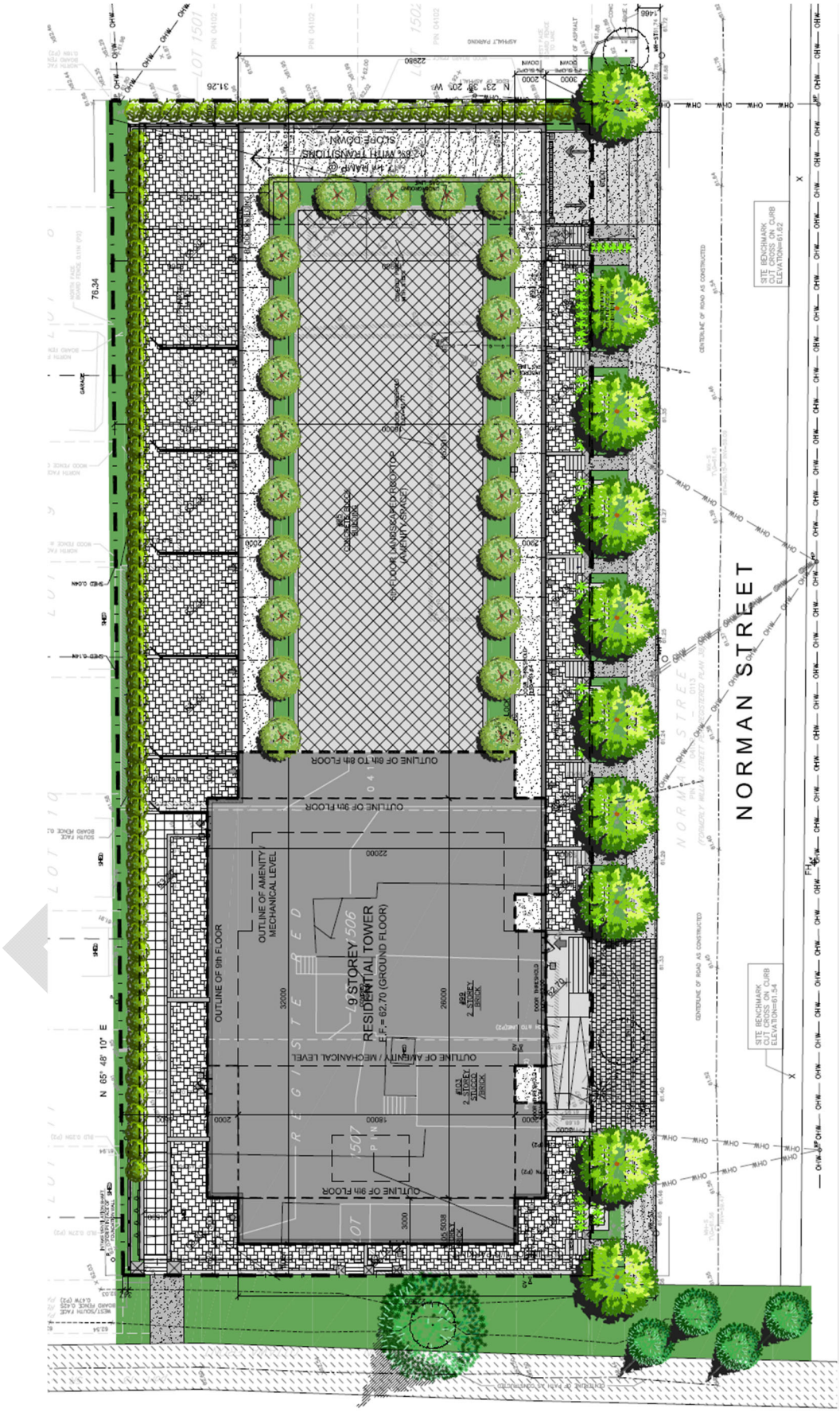


Figure 2: Proposed Site Plan



2.1.2. Existing Conditions

Area Road Network

Carling Avenue is an east-west arterial roadway which extends from March Road in the west to Bronson Avenue in the east and then continues as Glebe Avenue. The cross section in the study area consists of two travel lane per direction with an additional bus only lane in each direction. Major intersections have left and right auxiliary turn lanes. The posted speed limit is 60km/h.

Preston Street is a north-south arterial roadway, which extends from Queen Elizabeth Drive in the south to Albert Street in the north. The cross section within the study area is an undivided roadway with a single travel lane in each direction and auxiliary left-turn lanes at main intersections. The unposted speed limit within the study area is assumed 50 km/h.

Beech Street is an east-west local roadway extending east of Rochester Street and finishing on a crescent which continues as Lynwood Avenue. The cross section consists of a single travel lane in each direction with no auxiliary turn lanes. The unposted speed limit is assumed to be 50 km/h.

Norman Street is an east-west local roadway extending east of the Trillium multi-use pathway (MUP) and finishing on Booth Street. The cross section consists of a single travel lane in each direction with no auxiliary turn lanes. East of Preston Street, Norman Street is a one-way roadway with westbound traffic only. The unposted speed limit is assumed to be 50 km/h.

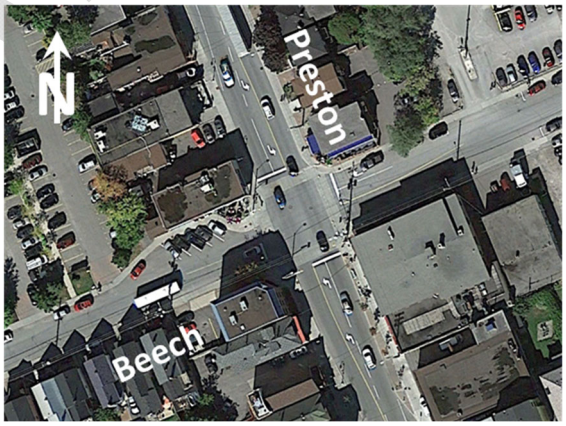
Pamila Street is an east-west local roadway extending east of the Trillium multi-use pathway (MUP) and finishing on Rochester Street. The cross section consists of a single travel lane in each direction with no auxiliary turn lanes. East of Preston Street, Norman Street is a one-way roadway with eastbound traffic only. The unposted speed limit is assumed to be 50 km/h.

Existing Study Area Intersections

The following describes the existing physical geometry of the study area intersections.

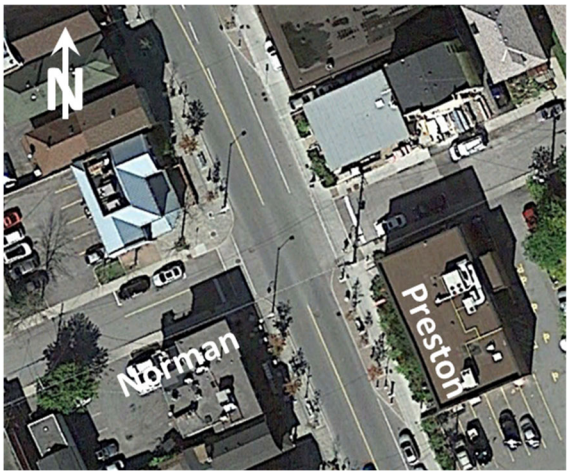
Beech/Preston

The Beech/Preston intersection is a signalized four-legged intersection. The eastbound and westbound approaches consist of a single all movement lane. The northbound and southbound approaches consist of a left turn lane and a right-through lane. All movements are permitted at this location. Painted/textured crosswalks are provided across each leg.



Norman/Preston

The Norman/Preston intersection is an unsignalized four-legged intersection. The westbound approach is a one-way roadway with an all movement lane and is STOP controlled. The eastbound approach consists of a single shared left and right-turn movement lane and is STOP controlled. The northbound and southbound approaches consist of a single all movement lane with restrictions on turning to the east and is free flow movement. Painted/textured crosswalks are provided across east and west legs.



Pamila/Preston

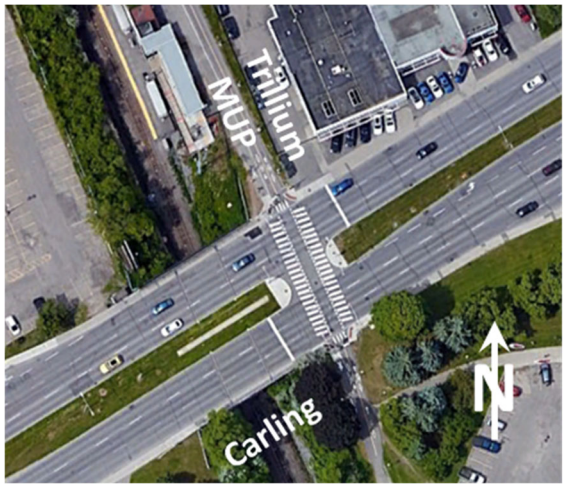
The Pamila/Preston intersection is a signalized four-legged intersection. The east approach is a one-way roadway with traffic moving away from the intersection. The eastbound approach consists of a single shared all-movement lane. The northbound and southbound approaches consist of a single all movement lane. Painted/textured crosswalks are provided across east and west legs and simple paint crosswalks on the north and south legs.

Carling/Preston

The Carling/Preston intersection is a signalized four-legged intersection. The eastbound approach consists of a left turn lane, a right turn lane and three through lanes. The westbound approach consists of a left turn lane, a shared right-through lane and two through lanes. The northbound approach consists of a left turn lane, a right-through lane and a through lane. The southbound approach consists of a left-turn lane and a right-through lane. All movements are permitted at this location. Painted crosswalks are provided across each leg.

Trillium MUP/Carling

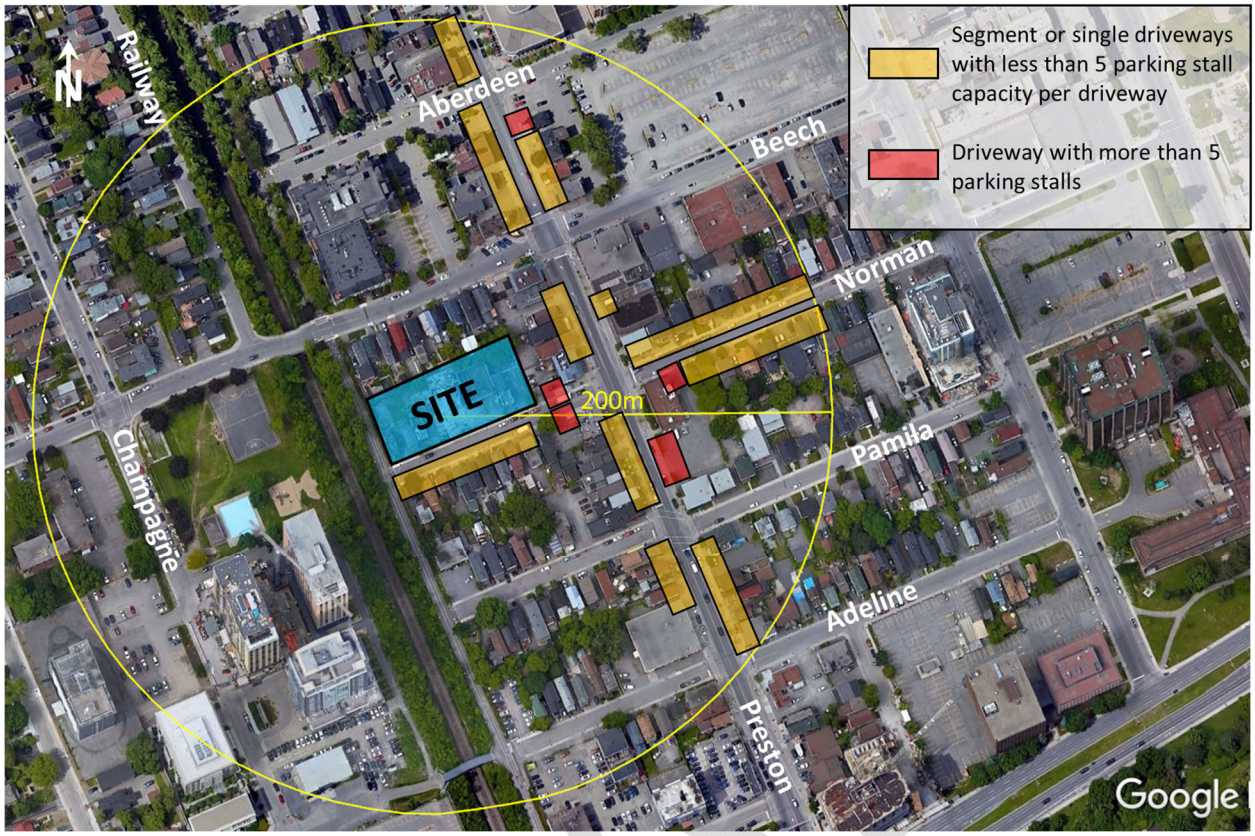
The Trillium MUP/Carling intersection is a signalized four-legged intersection, with the north and south legs being for pedestrians and cyclists only. The eastbound and westbound approaches consist of triple vehicle through lanes. A pedestrian/cyclist zebra stripe marking of approximately 8.5 meters is protected by approximately 7 meters of setback for vehicles



Existing Driveways to Adjacent Developments

Due to the urban nature of the surrounding study area, smaller driveways consisting of parking for 5 or less vehicles were grouped together within the areas highlighted orange in the Figure below. Major driveways with access to 6 or more vehicle parking spots were marked on the map with red boxes as shown in **Figure 3** and described below. Note that only driveways within area of influence to the site and within 200-meters of the sites' proposed driveway on roadways that border the property were considered.

Figure 3: Existing Driveways Adjacent to Development



- Preston Street:
  - Multiple small driveways for mixed use residential/commercial units
  - 2 major driveways: 361 Preston has a lot for approximately 16 vehicles for small commercial businesses; 427 Preston is a Scotiabank with approximately 30 parking spaces
  - No driveway is within the influence zone or anticipated to impact this development

- Norman Street:
  - Approximately 25 small private driveways, which include 10 that are located directly across Norman Street, south of the development
  - 3 major driveways: for a restaurant directly east of the development with capacity for approximately 10 vehicles; a restaurant at 430 Preston with capacity for approximately 10 vehicles located across the road from the edge of the proposed development; access to the parking lot at Scotiabank located at 427 Preston with capacity for approximately 30 vehicles
  - Given that the majority of the driveways are single private driveways across the road to the proposed development and that the two restaurants west of Preston Street have small parking lots of approximately 10 parking spots each, it is unlikely that these driveways will generate conflicts with the newly proposed driveway for this development

Existing Area Traffic Management Measures

Below are the existing area traffic management measures within the study area:

- On-street parking at various locations
- Textured pedestrian crosswalk at Beech/Preston intersection & Beech/Trillium MUP
- Painted pedestrian crossings at Carling/Preston intersection
- Flex stakes on Beech Street centerline with children playing sign
- Stop for pedestrian sign at Beech/Trillium MUP

Pedestrian/Cycling Network

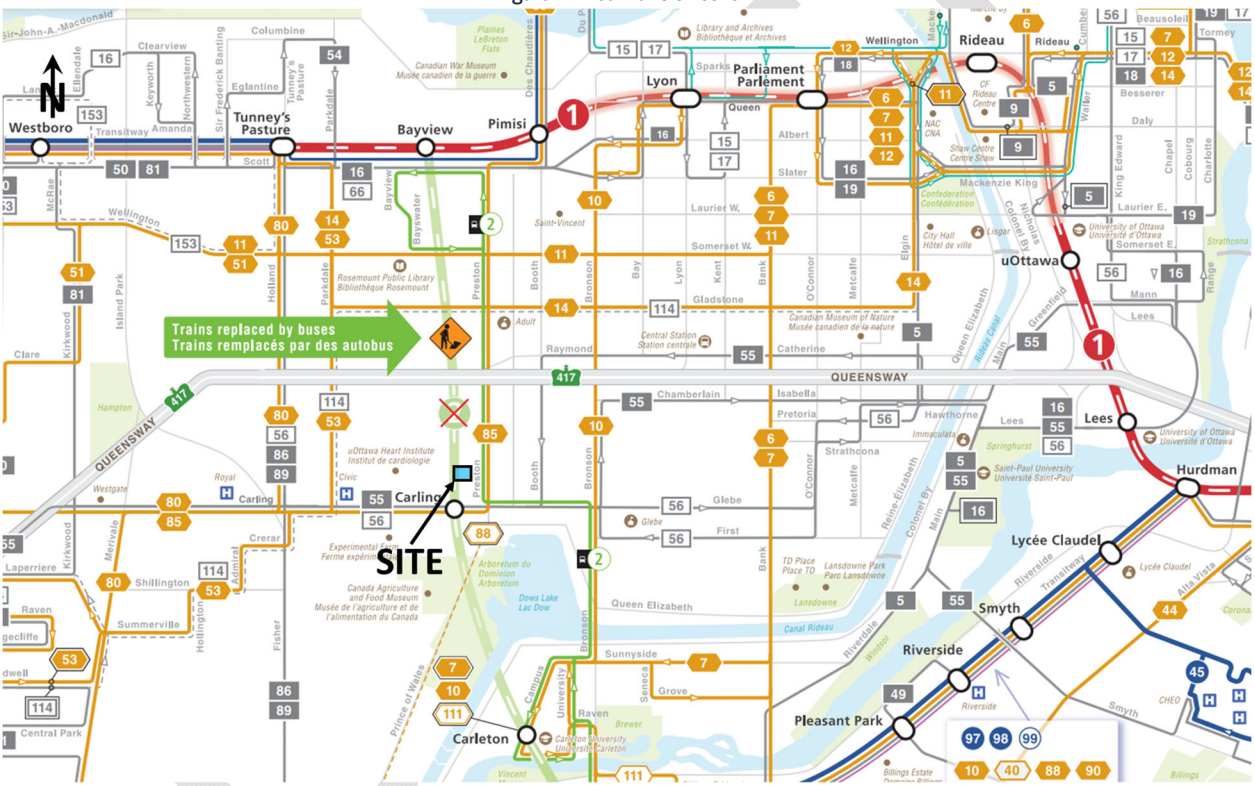
Sidewalk facilities are provided along all study area roadways. The west edge of the proposed development will front the Trillium Multi-Use Pathway (MUP) which provides direct access to the Carling LRT Station.

According to the City's Cycling Plan, Gladstone Avenue as well as nearby Booth Street are suggested bicycle routes. The Trillium MUP which borders the Trillium Light Rail Line and provides north-south mobility for active travel modes is located adjacent to the site. There are various MUP's south of Carling Avenue, which border Queen Elizabeth Drive and Dows Lake, as well as the Rideau Canal. Carling Avenue has bicycle painted shared space with bus only lanes east of Preston Street and is identified in the Transportation Master Plan as a 'spine' route. There is a pedestrian/cycling bridge over the Trillium LRT Line which connects Hickory Street to Adeline Street and provides connection to the Trillium MUP.

Transit Network

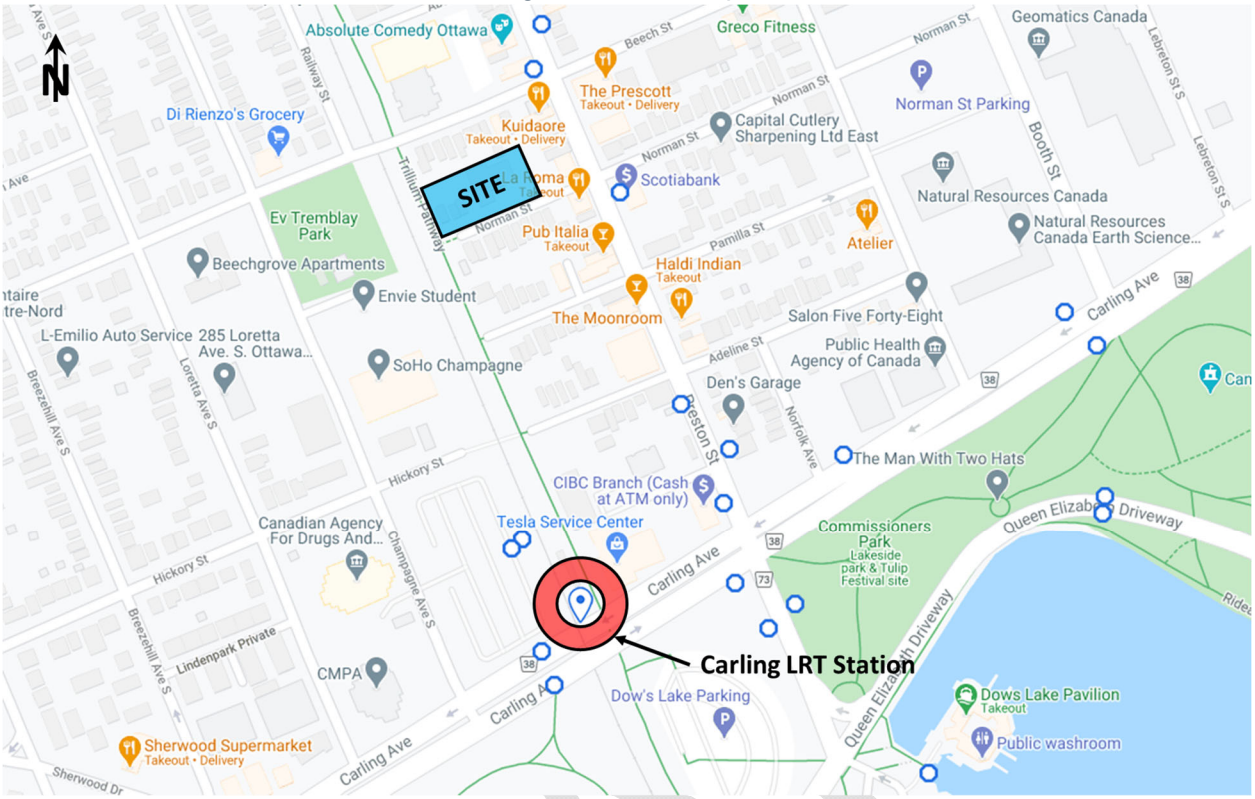
The transit network for the study area is illustrated in **Figure 4** and the nearest bus stop locations are represented as blue circles within **Figure 5**. Note that Trillium Line 2 LRT appears shaded out as the LRT line is currently closed for construction. Line 2 is anticipated to be functional by opening day for this development.

Figure 4: Area Transit Network



Source: https://www.octranspo.com/images/files/maps/systemmap.pdf

Figure 5: Area Transit Stops



Source: https://plan.octranspo.com/plan/StopSchedules?showOptions=true

The following OC Transpo routes currently operate within 600-meter radius of the site:

- **Trillium Line LRT (Greenboro<-> Bayview)**: identified by OC Transpo as a "rapid transit", this route operates 7 days a week in all time periods with grade separation. The Trillium Line has stops at major stations which provide connections to the Confederation Line LRT at Bayview Station and local bus routes at other stations along its route. Currently the LRT is not operational due to construction of the Stage 2 extension and has been replaced by bus route 2 in the interim. The nearest station is approximately 300 meters south at Carling LRT Station.
- **Route #85 (Gatineau <-> Bayshore)**: Identified by OC Transpo as a 'Frequent' route that operates 7 days a week with all-day service. During weekdays between business hours, the bus frequency is approximately one every 15 minutes or less. Route #85 provides service between Terrasses de la Chaudiere in Gatineau and Bayshore Shopping Center, with connection to Confederation Line 1 at Pimisi Station and Trillium Line 2 at Carling Station. Route #85 has stops located on Preston Street, located less than 200 meters to the future site.
- **Route #88 (Hurdman <-> Terry Fox)**: Route #88 provides service between Hurdman and Terry Fox. With connection to Confederation Line 1 at Hurman Station and Trillium Line 2 at Mooney's Bay. Route #88 has stops located on Prince of Wales during Sunday service only, located approximately 550 meters to the future site.
- **Route #55 (Elmvale <-> Bayshore)**: Identified by OC Transpo as a 'local' route that operates on custom routing to local destinations. Normally has closer bunched stops and provides connection to larger stations for transfer. Route #55 provides service between Elmvale and Bayshore with connection to Confederation Line 1 at Lees Station and Trillium Line 2 at Carling Station. Route #55 has stops located on Carling Avenue, located approximately 300 meters south of the future site.
- **Route #56 (King Edward <-> Tunney's Pasture)**: Identified by OC Transpo as a 'local' route that operates on custom routing to local destinations. Normally has closer bunched stops and provides connection to larger stations for transfer. Route #56 provides service between Union Street/King Edward and Tunney's Pasture Station with connection to Confederation Line 1 at uOttawa, Lees and Tunney's Pasture Station and Trillium

Line 2 at Carling Station. Route #56 has stops located on Carling Avenue, located approximately 300 meters south of the future site.

Peak Hour Travel Demands

The existing peak hour traffic volumes within the study area were obtained from the City of Ottawa. **Figure 6** displays the existing vehicle traffic volumes while **Figure 7** shows the existing pedestrian and cyclist volumes. Peak hour traffic volume count data is provided in **Appendix B**. Note that the counts for Norman/Preston were conducted in 2019, after the demolition of the former development.

Figure 6: Existing Peak Hour Vehicle Traffic Volumes

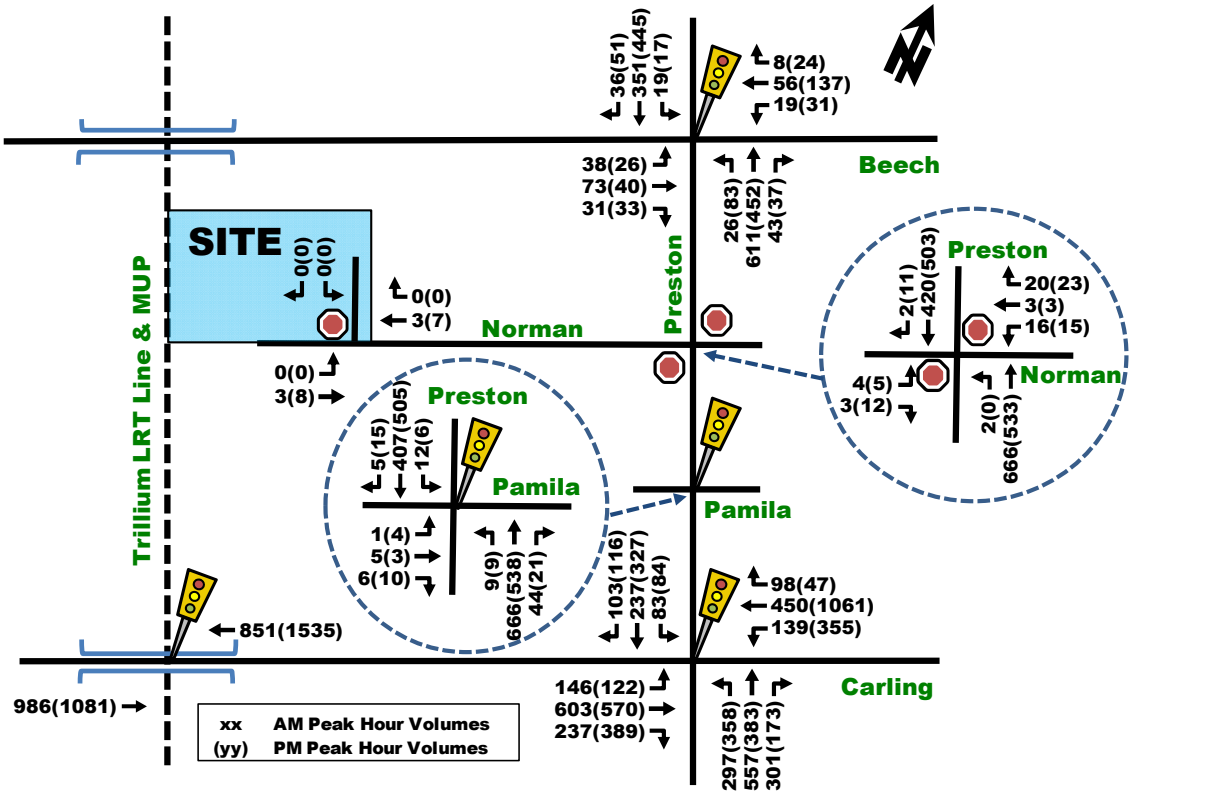
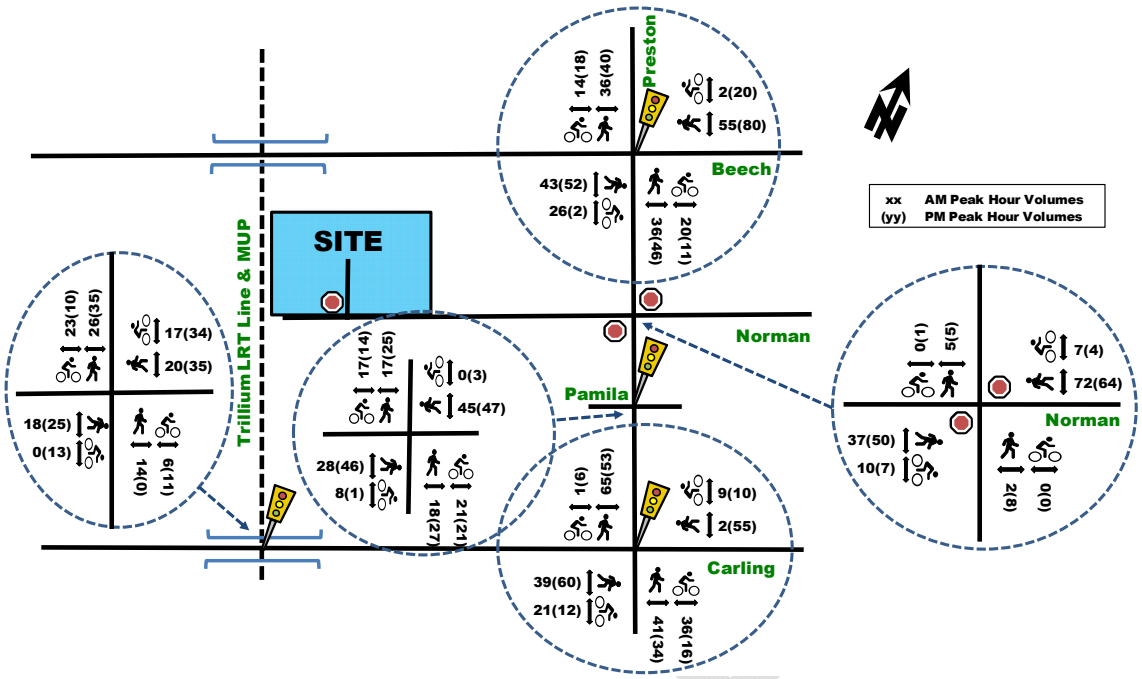


Figure 7: Existing Peak Hour Pedestrian and Cyclist Volumes



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 99 collisions within the past five-years. About two thirds of the collisions 67 (68%) resulted in property damage only, 31 (31%) resulted in non-fatal injury and 1 (1%) is non reportable. The types of impact were broken down into the following: 29 (30%) rear end, 25 (25%) angle, 17 (17%) turning movement, 12 (12%) sideswipe, 7 (7%) Single Vehicle (unattended), 6 (6%) Single Vehicle (other), 2 (2%) other, and 1 (1%) Approaching.

To help quantify the relative safety risk at intersections within the study area, an industry standard unit of measure for assessing collisions at an intersection was used based on the number of collisions per million entering vehicles (MEV). An MEV value greater than 1.00 indicates a relatively high frequency of collisions; however, it does not explain the type or severity of collision. A secondary analysis is done to determine the severity of collision by representing the number of personal injuries as a percentage of the total number of collisions at a given intersection.

A high propensity (MEV > 1.00 or %PIR > 30%) would signal a potential intersection design deficiency or other contributing factor, such as poor intersection geometry, blind spaces, poor lighting, excessive speeds, high amount of entry/exit driveways etc.

At intersections within the study area, reported collisions have historically taken place at a rate of:

- Carling/Preston intersection experienced 49 collisions, where 30 (61%) involved property damage only, 18 (37%) involved non-fatal injury, and 1 (2%) involved non reportable. The type of collisions that occurred are comprised of 20 (41%) Rear End, 11 (22%) Turning Movement, 8 (16%) Sideswipe, 7 (14%) Angle, and 3 (6%) Single Vehicle (other). The collision rate is estimated at 0.75 Collisions/MEV. Though the collision rate is medium risk due to the MEV below 1.0, the percentage of non-fatal injury is high as it is above 30% (i.e PIR > 30%). On a closer inspection, it can be seen that 9 of 49 collisions (18%) involved cyclists. This is a high rate of cyclist collisions at a single intersection. The collisions with cyclists involved 3 left-turns and 4 right-turns. There is 1 (2%) recorded collision with a pedestrian at this intersection.
- Beech/Preston intersection experienced 6 collisions, where 4 (67%) involved property damage only and 2 (33%) involved non-fatal injury. The collision rate is estimated at 0.25 collisions/MEV. 1 non-fatal injury collision was reported involving a left-turning vehicle and a pedestrian.

- Norman/Preston intersection experienced 3 collisions, where 2 (67%) involved property damage only and 1 (33%) involved non-fatal injury. The collision rate is estimated at 0.11 collisions/MEV. 1 non-fatal injury reported involving a vehicle heading northbound through the intersection collided with a pedestrian crossing Preston Street.
- Pamila/Preston intersection experienced 6 collisions, where 5 (83%) involved property damage only and 1 (17%) involved non-fatal injury. The collision rate is estimated at 0.41 collisions/MEV.
- Trillium MUP/Carling intersection experienced 4 collisions, where 4 (100%) involved non-fatal injury. The collision rate is estimated at 0.10 collisions/MEV which is low, however, given that this is a pedestrian/cyclist intersection, all of them resulted in injury. Of the 4 collisions at this location, 3 involved cyclists and 1 involved a vehicle that was rear ended.
- Other minor intersections within study area intersection experienced 21 collisions, where 18 (86%) involved property damage only and 3 (14%) involved non-fatal injury. There are no concerns at other minor intersections within the study area.

Other collisions within the study area include:

- There was a total of 16 midblock collisions experienced, where only 3 (19%) involved non-fatal injury and 13 (81%) involved property damage only. 2 of 16 (13%) occurred on Norman Street between the road end and Preston Street, adjacent to the development. Neither of the collisions on Norman Street resulted in non-fatal injury.
- A total of 15 collisions involved cyclists, with 9 of them occurring at Carling/Preston intersection and 3 at the Trillium MUP/Carling intersection.
- There were 4 collisions with pedestrians recorded, all occurring at different intersections.

The source collision data as provided by the City of Ottawa and related analysis is provided as **Appendix C**.

2.1.3. Planned Conditions

Planned Study Area Transportation Network Changes

Within the study area, notable transportation network changes are described as follows.

Preston-Carling District Secondary Plan (2016)

The Preston-Carling District Secondary Plan, prepared by the City of Ottawa in 2016, provides policy guidelines for public and private development within the Preston-Carling District. The district includes the lands bounded by Beech Street and HWY 417 to the north, Rochester Street to the east, Carling Avenue and Prince of Wales Drive to the south and Loretta Avenue and O-Train/future Trillium Line to the west, as shown in **Figure 8**.

Figure 8: Preston Carling District

An important part of the Preston-Carling District Secondary Plan is a focus on quality facilities for active modes and public spaces. The Public Realm Plan of the Preston-Carling District Secondary Plan is included as **Appendix D** and shows the following transportation-related strategies:

- Bicycle lanes/track planned along both sides of Rochester Street with wide sidewalks and on-street parking;
- Improvements to the existing multi-use pathway (MUP) along the east side of the Trillium Line corridor and plans to extend MUP across Carling Avenue [COMPLETED];
- A planned MUP along the west side of the Trillium Line corridor between Beech Street, Carling Avenue and Prince of Wales Drive [PARTIALLY COMPLETED];
- Bicycle lanes/tracks planned along both sides of Carling Avenue; and
- Improvements to Preston Street and Beech Street as active Main Streets.

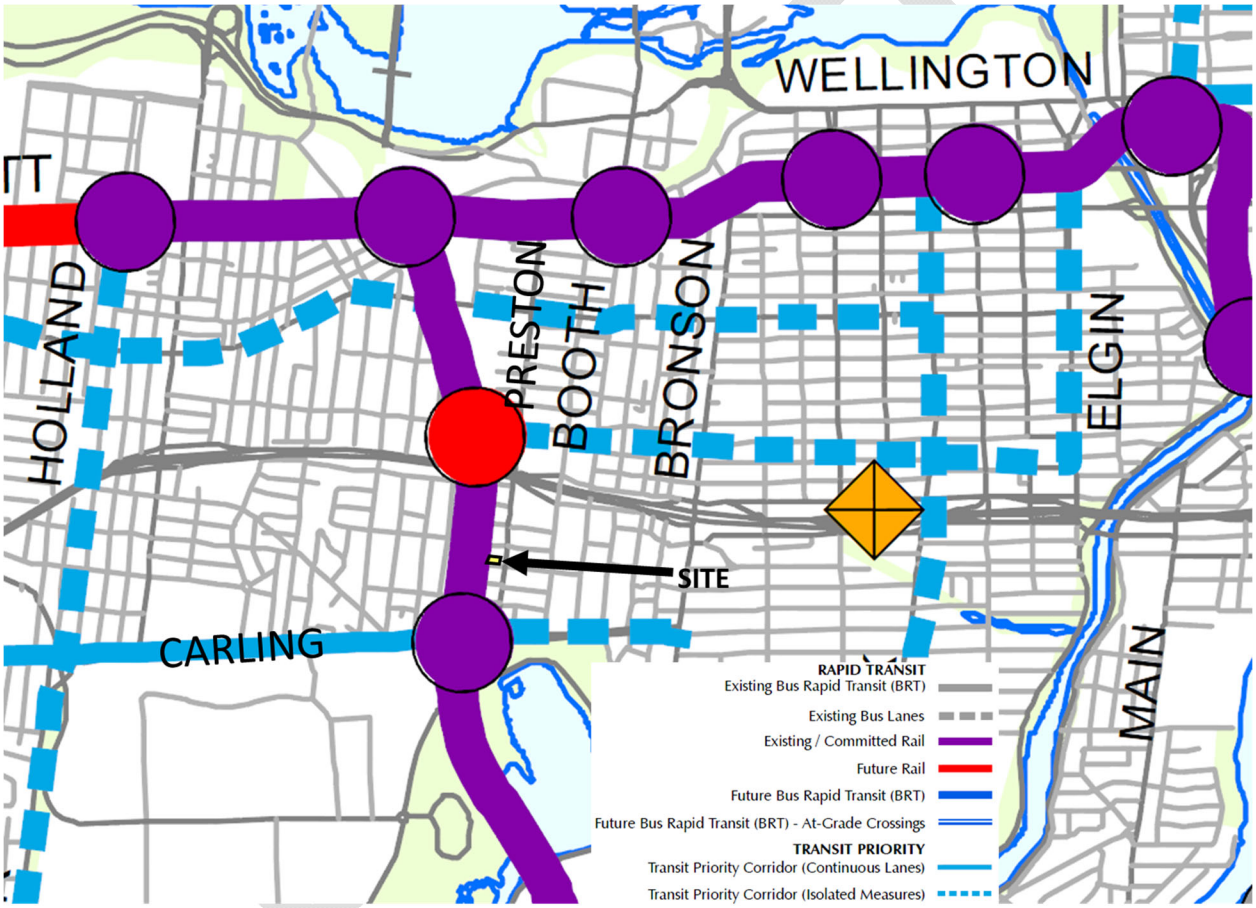
The Secondary Plan promotes a focus on "pedestrian-first" development with accessible sidewalks and pedestrian paths connecting neighbourhood amenities. Cycling will be promoted by the implementation of the City's cycling plan and some additional east-west connections as well as the Rochester Street bike lanes/tracks. Improving connections to the Carling Trillium LRT station and focusing on a quality transit station area will help promote transit in the area. The Secondary Plan aims to reduce passenger vehicle dependence while maintaining

appropriate vehicle connections for business and residential streets, and it aims to provide the appropriate amount of on-street/public parking spaces to serve the area's local commercial businesses.

Transportation Master Plan

Notable transportation network changes within the study area are included in the City's 2013 Transportation Master Plan. Identified as part of the 2031 Affordable Network is a Transit Priority Corridor (continuous lanes) along Carling Avenue between the Carling Trillium Line Station and the Lincoln Fields Transit Station Transit Priority (isolated measures) are planned along Bronson Avenue from Heron Road to Carling Avenue and along Carling Avenue between Bronson Avenue and the Carling Trillium Line Station. There are existing transit priority lanes along Carling Avenue between Bronson Avenue and Booth Street. A future transit station is planned along the Trillium Line at Gladstone Avenue as part of Stage 2 LRT (expected to be completed in 2022), approximately 600 meters from the development. These plans are outlined in **Figure 9** below from the TMP's Affordable Network Plan.

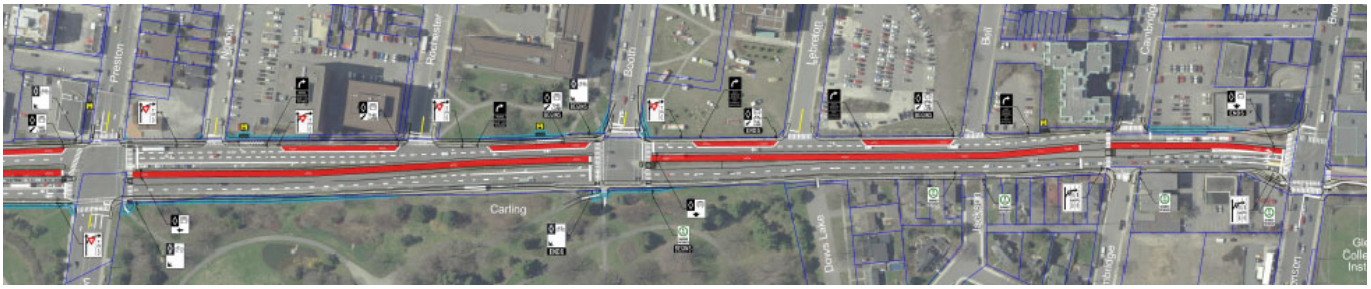
Figure 9: Affordable Network Plan - TMP



Carling Transit Priority Study

The Carling Avenue Transit Priority Study is currently underway to identify a recommended functional design. The current plan within the vicinity of the site is shown as **Figure 10**. The functional design includes transit priority (continuous lanes) with plans in the future to expand to an at-grade LRT to Baseline Station. The timing of the planned modifications is unknown at this time; however, it is understood that implementation would occur in the next five years.

Figure 10: Carling Avenue Transit Priority Plan



Source: https://ottawa.ca/en/carling-avenue-transit-priority-measures

Cycling Network

Future cycling infrastructure plans include the addition of cycling facilities to Gladstone Avenue west of Preston Street and on Booth Street from Carling Avenue to Arlington Avenue. As mentioned in the Preston-Carling Secondary Plan, bicycle lanes or tracks are identified for both sides of Rochester Street as seen in **Appendix D**, Preston-Carling Public Realm and Mobility Map.

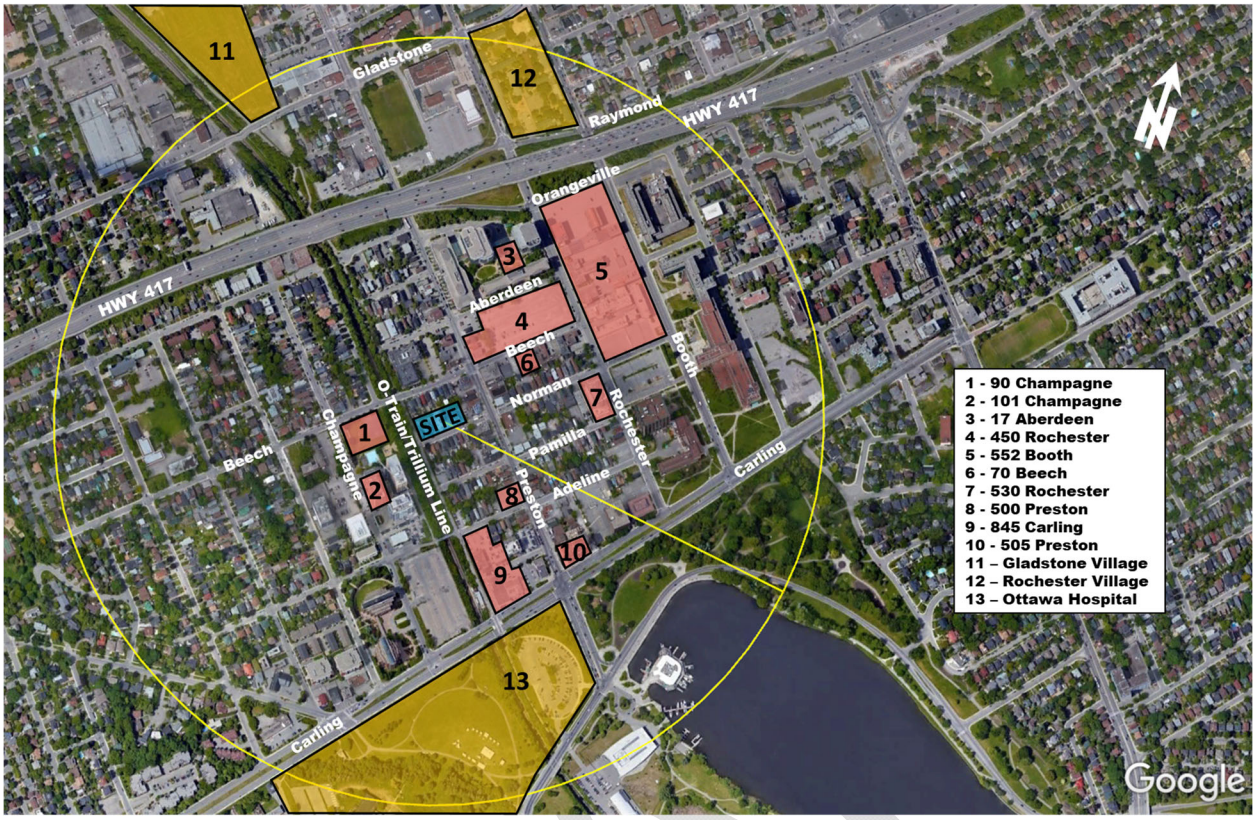
Within the study area, the City of Ottawa Ultimate Cycling Plan, Booth Street is classified a spine route, Preston Street is classified a local route, and Adeline/Hickory connected by the pedestrian bridge are classified as a suggested route. **Figure 11** depicts the existing and future Ultimate Cycling Network.

Figure 11: Existing and Future "Ultimate Cycling Network"

Other Area Developments

According to the City's development application search tool, the following developments are planned within the vicinity of the subject site (600 meter radius) and are illustrated in **Figure 12**.

Figure 12: Other Area Development



1 - 90 Champagne

The proposed development is a 14-storey residential building. A total of 336 units are proposed. The Transportation Brief (prepared by Novatech) projects an increase in two-way traffic volumes of approximately 25 veh/h during peak hours.

2 - 101-105 Champagne

The proposed development is a 25-storey residential building with at grade commercial. A total of 352 units are proposed. No Transportation Brief was found for this development.

3 - 17 Aberdeen / 300 Preston

The proposed development is a 30-storey residential building. A total of 254 units are proposed. The Transportation Brief (prepared by IBI Group) projects an increase in two-way traffic volumes of approximately 40 to 50 veh/h during peak hours.

4 - 450 Rochester

The proposed development consists of a 9 and 15-storey residential buildings with 59,182 ft^2 of commercial space. A total of 540 units are proposed. The Transportation Brief (prepared by Parsons) projects an increase in two-way traffic volumes of approximately 80 to 75 veh/h during peak hours

5 - 552 Booth

The proposed development consists of approximately 1,000 dwelling units in five buildings and 142,200 square feet of retail and office. The Transportation Brief (prepared by Parsons) projects an increase in two-way traffic volumes of approximately 175 veh/h during peak hours.

6 - 70 Beech

The proposed development is a 6-storey residential building with at grade commercial. A total of 40 units are proposed. No Transportation Brief was found for this development.

7 - 530 Rochester

The proposed development is a 20-storey residential building. A total of 117 units are proposed. The Transportation Brief (prepared by Delcan) projects no net change in two-way traffic volumes compared to trips generated from the existing development.

8 - 500 Preston

The proposed development is a 30-storey residential building with at grade commercial. A total of 224 units are proposed. The Transportation Brief (prepared by Delcan) projects an increase in two-way traffic volumes of approximately 25 veh/h during peak hours.

9 - 845 Carling

The proposed development consists of approximately 1,123 dwelling units in three buildings (55, 48 and 18 storeys) and a large public plaza. The Transportation Brief (prepared by Delcan) projects an increase in two-way traffic volumes of approximately 150 to 175 veh/h during peak hours.

10 - 505 Preston

The proposed development is a 45-storey mixed-use building. A total of 262 units are proposed. The Transportation Brief (prepared by IBI) projects an increase in two-way traffic volumes of approximately 60 to 70 veh/h during peak hours.

11 – Gladstone Village

The proposed development is anticipated to consist of 206 low-rise (townhomes) residential units, 176 mid-rise residential units, 687 high-rise residential units, approximately 100,000 ft^2 of first floor retail, commercial and institutional space. The Transportation Impact Study for this development is currently being prepared.

12 – Rochester Village

The proposed development is a mixed-use development comprised of 749 residential units (666 apartment units across 6 mid to high-rise towers and 84 townhomes), 35,610 ft^2 of retail space, and 46,560 ft^2 of general office space. The Transportation Impact Study for this development is currently being prepared.

13 – New Ottawa Hospital

The proposed development intends to relocate the existing Ottawa Civic Hospital located near Parkdale Avenue on Carling Avenue. The New Ottawa Hospital is anticipated to be expanded from 2.12 million ft^2 to 4.75 million ft^2 and anticipated to have 5,000 employees and 972 patient beds. The Transportation Impact Study for this development is currently being prepared.

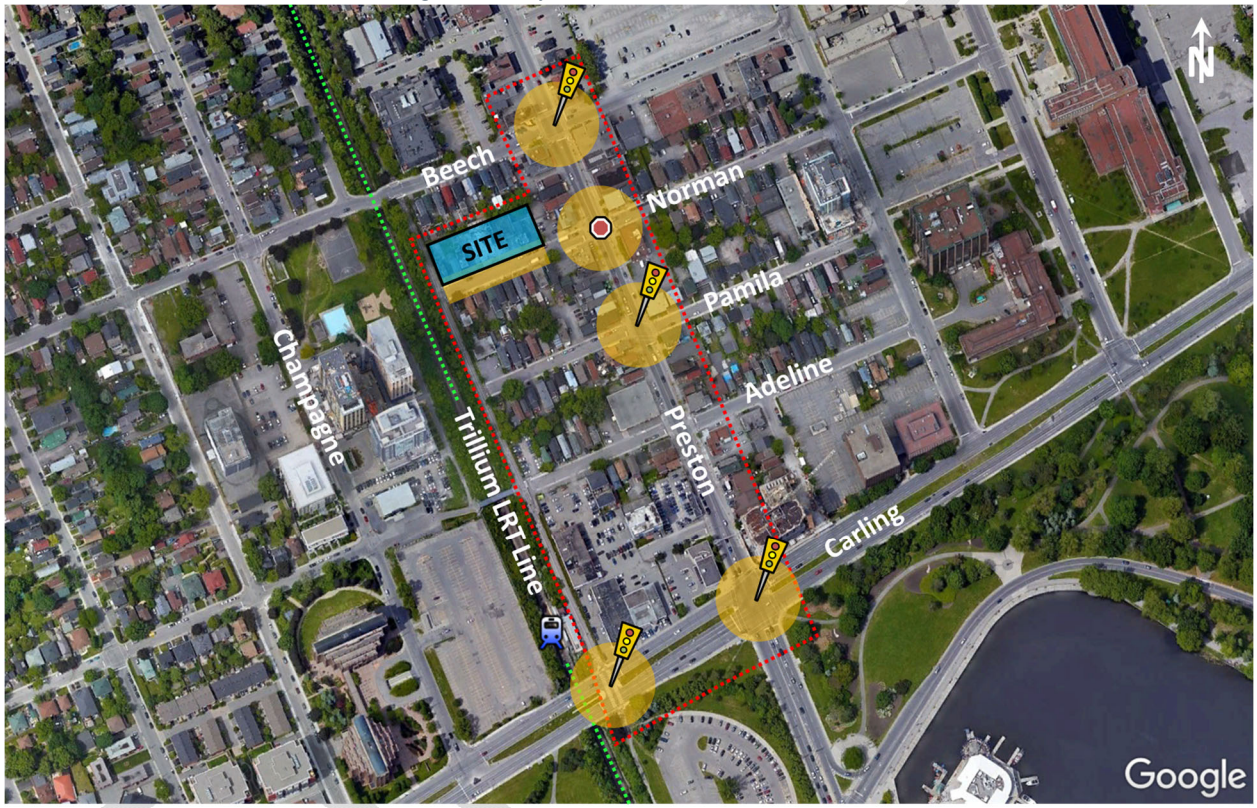
2.2. Study Area and Time Periods

Full buildout of the proposed residential development is assumed to be 2022. As such, the horizon years being analyzed in this report are 2022 and 2027 (five years after full buildout) horizon years, using the weekday morning and afternoon peak hour time periods.

Proposed study area intersections and boundary roads are outlined below and highlighted in **Figure 13**.

- Beech/Preston intersection (Signalized)
- Carling/Preston intersection (Signalized)
- Pamila/Preston intersection (Signalized)
- Norman/Preston (Unsignalized)
- Trillium MUP/Preston intersection (Signalized)
- Along site's Norman Street property frontage

Figure 13: Study Area Boundaries and Intersections



2.3. Exemption Review

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

Table 1: Exemptions Review Summary

Module	Element	Exemption Consideration
4.1 Development Design	4.1.3 New Streets Networks	Only required for plans of subdivision
4.8 Network Concept	4.8 Network Concept	Only required if proposed development is anticipated to generate more than 200 person-trips over the permitted zoning

3. Forecasting Report

3.1. Development Generated Travel Demand

3.1.1. Trip Generation and Mode Shares

Appropriate trip generation rates for the proposed development consisting of approximately 121 mid-rise apartment units were obtained from the City's 2009 TRANS Trip Generation – Residential Trip Rates Report. These rates are summarized in **Table 2**.

Table 2: 2009 TRANS Residential Trip Generation Rates

Land Use	Data Source	Trip Rates	
		AM Peak	PM Peak
Mid-Rise Apartments	223	T = 0.17(du)	T = 0.16(du)
Note: T = Average Vehicle Trip Ends; du = dwelling units			

Using the TRANS Trip Generation rates, the total amount of vehicle trips generated by the proposed 121 residential units was calculated. The results are summarized in **Table 3**.

Table 3: Projected Site Vehicle Trip Generation – TRANS Model

Land Use	Area	AM Peak (Veh/h)			PM Peak (Veh/h)		
		In	Out	Total	In	Out	Total
Mid-Rise Apartments	121 units	5	16	21	11	8	19

As shown in **Table 3**, a total of 20 veh/h two-way are projected to travel to/from the proposed development during the weekday morning and afternoon commuter peak hours. Using the TRANS Auto Trips projected in **Table 3** and the mode share percentages in the TRANS Trip Generation Report (Table 3.13), the total projected number of person trips by mode for the residential development were calculated and are summarized in **Table 4**. The 'person trip generation' for the development was then converted to 'vehicle trip generation' using mode shares extrapolated from the 2011 OD-Survey for Ottawa Inner District Area and are summarized in **Table 5**.

Table 4: Site Person Trip Generation

Travel Mode	Mode Share	AM Peak (Person Trips/h)			Mode Share	PM Peak (Person Trips/h)		
		In	Out	Total		In	Out	Total
Auto Driver	27%	5	16	21	23%	11	8	19
Auto Passenger	3%	0	2	2	6%	3	1	4
Transit	27%	5	17	22	29%	15	10	25
Non-motorized	43%	7	26	33	42%	21	14	35
Total Person Trips	**100%**	**17**	**61**	**78**	**100%**	**50**	**33**	**83**

Table 5: Site Vehicle Trip Generation with Ottawa Inner Mode Shares

Travel Mode	Mode Share	AM Peak (veh/h)			Mode Share	PM Peak (veh/h)		
		In	Out	Total		In	Out	Total
Auto Driver	35%	6	22	28	40%	20	13	33
Auto Passenger	10%	2	5	7	10%	5	4	9
Transit	30%	5	18	23	25%	13	8	21
Non-motorized	25%	4	16	20	25%	12	8	20
Total People Trips	**100%**	**17**	**61**	**78**	**100%**	**50**	**33**	**83**
Total 'New' Auto Trips		**6**	**22**	**28**	-	**20**	**13**	**33**

As shown in **Table 5**, based on the TRANS Trip Generation method and 2011 OD-Survey modal shares, the proposed site is projected to generate approximately 30 to 35 new auto-trips per hour during thpoe weekday commuter peak hours. The increase in two-way transit trips is estimated to be approximately 25 persons per hour, and the increase in bike/walk trips is approximately 20 persons per hour for the and afternoon peak hours.

3.1.2. Mode Shares

Given the location of the site, within close proximity to the Carling LRT Transit Station and local walking/cycling incentives as part of the Preston-Carling Secondary Plan, a higher transit and non-motorized modal share is appropriate. **Table 6** illustrates future modal shares which reflect the site's location within close proximity to the existing Carling LRT Station and focus on walking/cycling as per neighborhood goals.

Table 6: Future Mode Share Targets for the Development

Travel Mode	Mode Share Target	Rationale
Transit	40%	Development is located within 300m walk of Carling LRT Station, making it a Transit-Oriented Development (TOD) which have transit targets of 65%. A slight reduction in transit use was done to account for higher pedestrian and cycling mode shares.
Walking	30%	This value is higher than the City's TMP and TOD areas and the existing TRANS trip-generation report, but it is closer to the Ottawa Inner district mode shares for walking and Little Italy neighborhood.
Biking	10%	This value is slightly higher than the City's TMP and TOD areas and the existing TRANS trip-generation report and similar to the Ottawa Inner district mode shares for biking. The development is located adjacent to major Trillium MUP.
Auto Passenger	5%	This is consistent with TOD targets.
Auto Driver	15%	This is consistent with TOD targets.

Based on a hybrid of the City's TOD future mode share targets and Inner Ottawa District mode shares for this development, the project site-generated trips with adjusted modal shares were calculated using the person trips from **Table 4** and are outlined in **Table 7**

Table 7.

Table 7: Future Projected Site Generated Traffic Based on Custom Mode Shares

Travel Mode	Mode Share	AM Peak (Person Trips/h)			PM Peak (Person Trips/h)		
		In	Out	Total	In	Out	Total
Auto Driver	15%	2	10	12	7	5	12
Auto Passenger	5%	1	2	3	3	2	5
Transit	40%	7	24	31	20	13	33
Walk	30%	5	15	20	12	8	20
Bike	10%	2	10	12	8	5	13
Total Person Trips	**100%**	**17**	**61**	**78**	**83**	**83**	**83**
Total 'New' Auto Trips		**2**	**10**	**12**	**7**	**5**	**12**

Based on **Table 7**, it is anticipated that the proposed development will generate approximately 10 'new' vehicles trips, 30 to 35 'new' transit trips, 20 'new' walk trips and 10 to 15 'new' bike trips, two-way per during the weekday morning and afternoon peak hours.

3.1.3. Trip Distribution

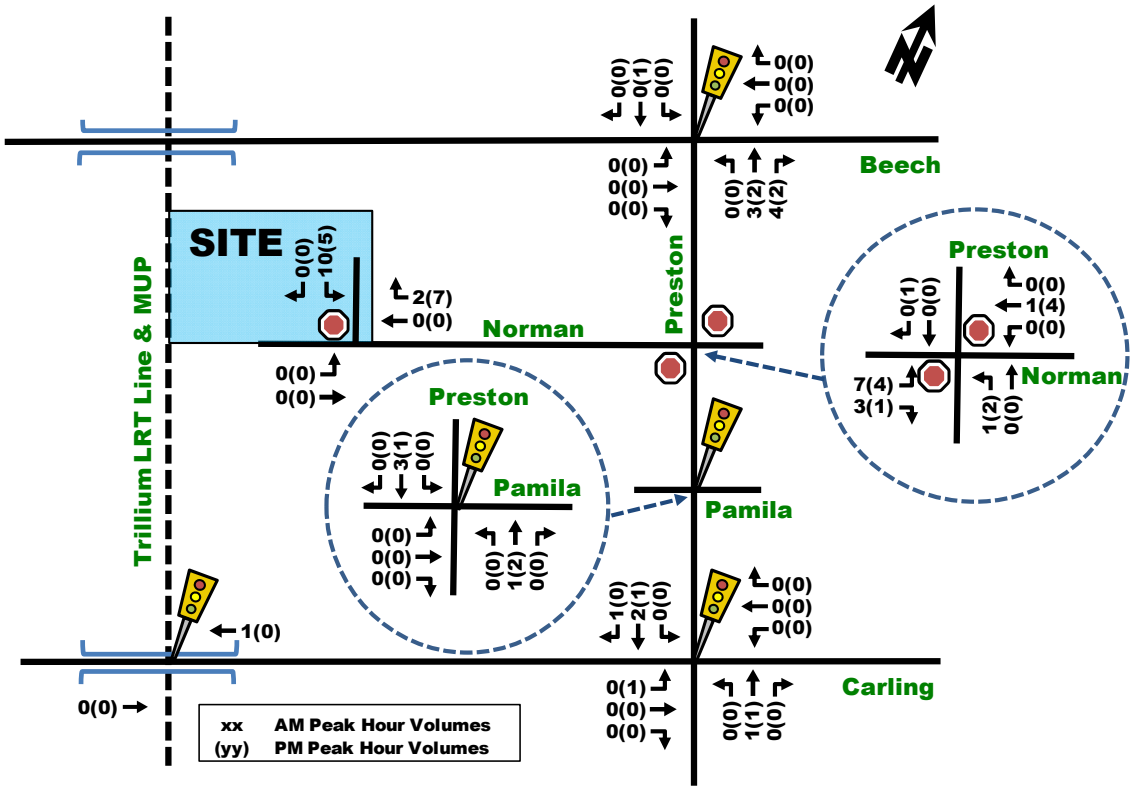
Based on the OD Mode Share Survey, existing traffic volume counts and the location of adjacent arterial roadways and neighborhoods, the distribution of site-generated traffic volumes is as follows:

- (From/To) the North: 40%;
- (From/To) the East: 15%;
- (From/To) the South: 20%; and,
- (From/To) the West: 25%.

3.1.4. Trip Assignment

A full movement driveway on to Norman Street is proposed. The new driveway will be approximately 40 meters west of the intersection of Norman/Preston and approximately 5m west of an adjacent existing driveway. The 'new' site-generated vehicle trips outlined in **Table 7** were assigned to the study area network and are illustrated as **Figure 14**.

Figure 14: 'New' Site-Generated Traffic



3.2. Background Network Travel Demands

3.2.1. Transportation Network Plans

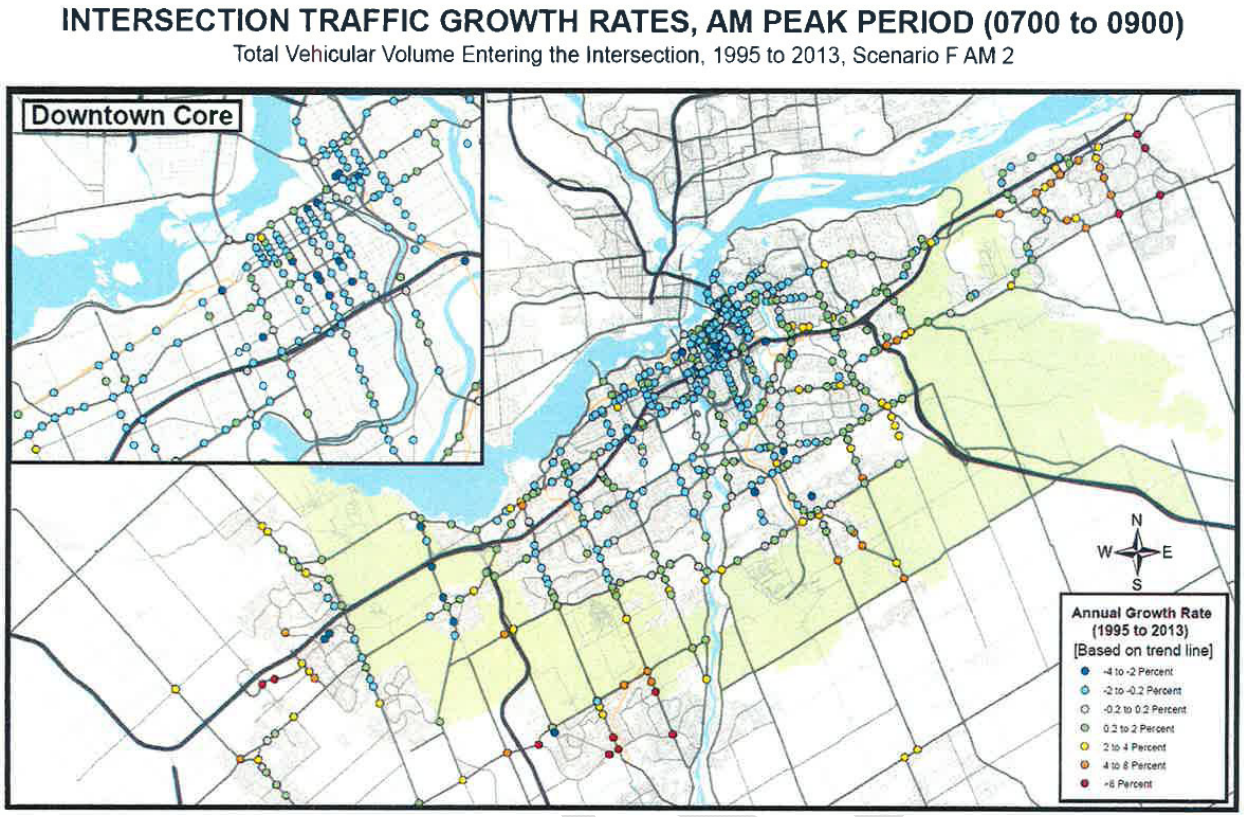
Refer to section 2.1.3 Planned Conditions – Planned Study Area Transportation Network Changes.

3.2.2. Background Growth

As the study area is developed, person trips in the area are expected to increase, which can be in the form of vehicle trips, transit ridership and active modes. As the roadways within the inner area approach capacity, a shift to more active and increased transit ridership will be required as there are no planned road widenings for the study area. There are capacity constraints experienced at Carling/Preston intersection today and with the planned improvements to transit and active mode infrastructure in the area, it is expected that traffic volumes will have to stabilize within the area.

The future plans for Carling Avenue include median and curb side transit priority lanes. With the expansion of transit priority along Carling Avenue, the number of general-purpose vehicle travel lanes will be reduced from two/three lanes in each direction today to one/two lanes in each direction in the future. **Figure 15** depicts the estimated percent growth per major intersections based on historical growth.

Figure 15: Percent Vehicular Growth Rates (City of Ottawa)



The background traffic growth through the immediate study area, summarized in **Table 8**, was calculated based on historical traffic count data (2008, 2010, 2011 and 2017) provided by the City of Ottawa at the Carling/Preston intersection. Detailed analysis of the background growth is included in **Appendix E**.

Table 8: Carling/Preston Historical Background Growth (2011 – 2017)

Time Period	Percent Annual Change				
	North Leg	South Leg	East Leg	West Leg	Overall
8 hrs	0.06%	1.29%	1.54%	1.64%	1.25%
AM Peak	0.70%	2.00%	1.48%	1.64%	1.53%
PM Peak	-3.14%	-4.86%	-5.10%	-6.05%	-4.93%

As shown in **Table 8**

Table 8, in past years Carling/Preston has generally experienced mixed growth rates, with large variability. **Figure 15** provided from the City of Ottawa suggests an average growth rate of -0.2% to 0.2% annually, which is lower than the 8-hr counts and morning peak and significantly higher than the afternoon peak. On a closer inspection, eliminating data from 2017 for the afternoon peak (high variance from previous years) changes the overall PM peak growth to 0.27% which is closer to the AM peak and 8-hr count and the City of Ottawa historic data.

Following the City's growth rates and accounting for the transit and active mode infrastructure improvements planned for the study area, as well as taking historical count growth into account, a 1% growth rate for vehicle traffic was assumed for Preston Street and Carling Avenue.

3.2.3. Other Area Developments

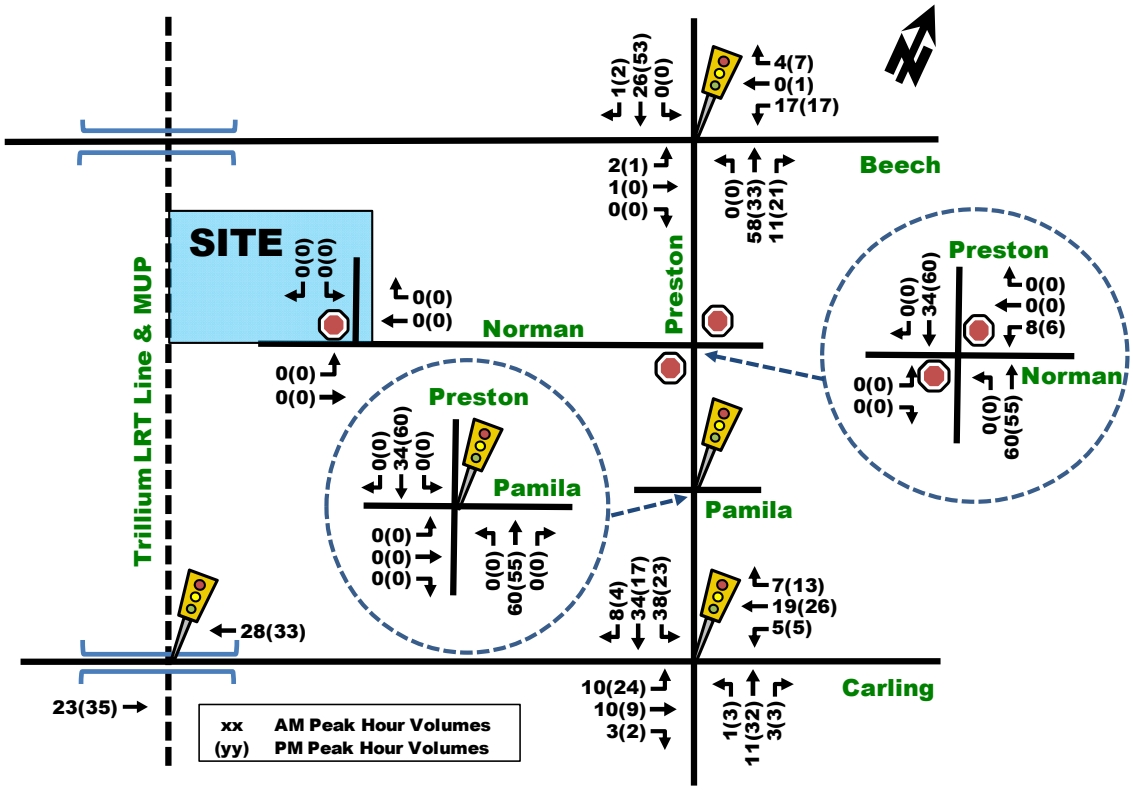
Other area developments were outlined in **Section 2.1.3**. **Table 9** summarizes relevant other area development vehicle trips generated. Note that developments such as the New Hospital, Gladstone and Rochester Village have TIA's currently being developed and as such, do not have trip generations available yet. Some developments were not included and are captured within the 1% annual growth as either their location was not likely to influence this study area or vehicle trip generations was less than a vehicle per minute thus making them have negligible impacts to the study area.

Table 9: Other Area Development Vehicle Trip Generation

Proposed Development	AM Peak (persons/h)			PM Peak (persons/h)		
	In	Out	Total	In	Out	Total
90 Champagne	6	17	23	15	9	24
450 Rochester	5	73	78	51	22	73
552 Booth	64	111	175	89	86	175
845 Carling	33	118	151	104	71	175
505 Preston	22	37	59	37	35	72
Total	130	356	486	296	223	519

Figure 16 illustrates the projected traffic volumes for all other area development vehicle trips at full build-out, obtained from their respective TIA Reports.

Figure 16: All Other Area Development Vehicle Trip Generation– Full Build Out



The adjacent developments site-generated traffic volumes are combined with the future background horizons of future background 2022 (**Figure 17**) and future background 2027 (**Figure 18**) as shown below.

Figure 17: 2022 - Future Background Traffic Volumes

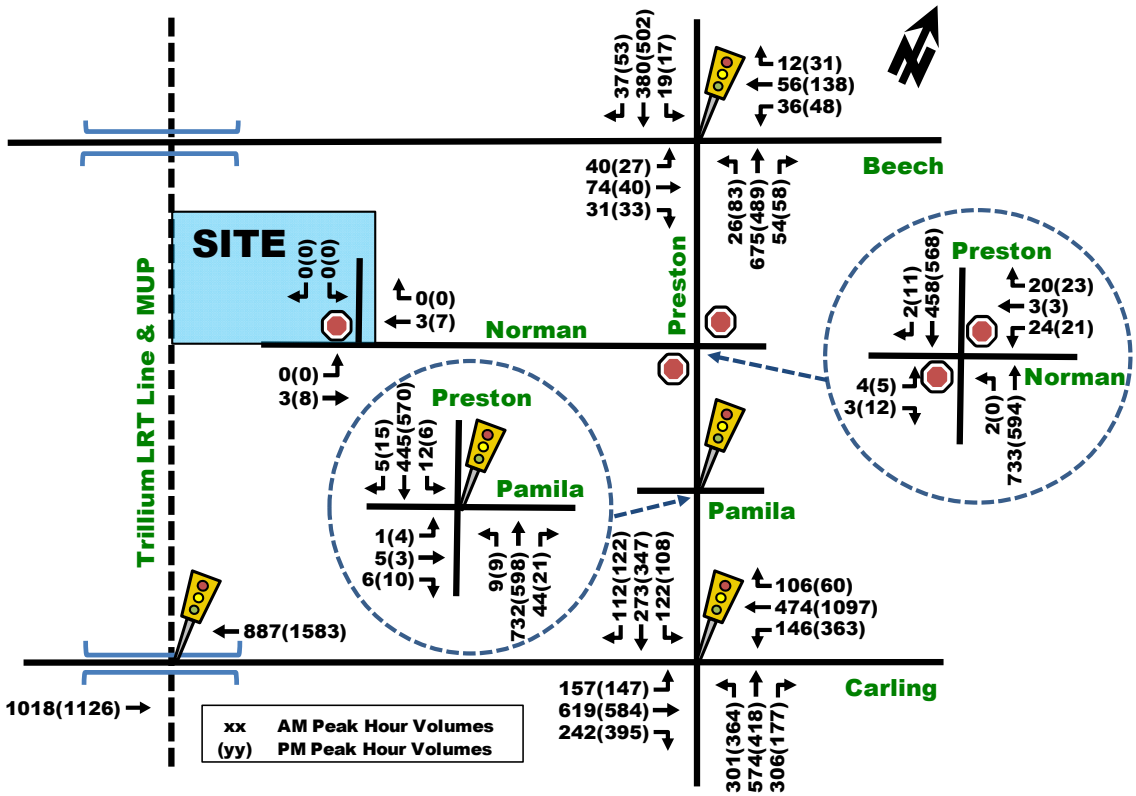
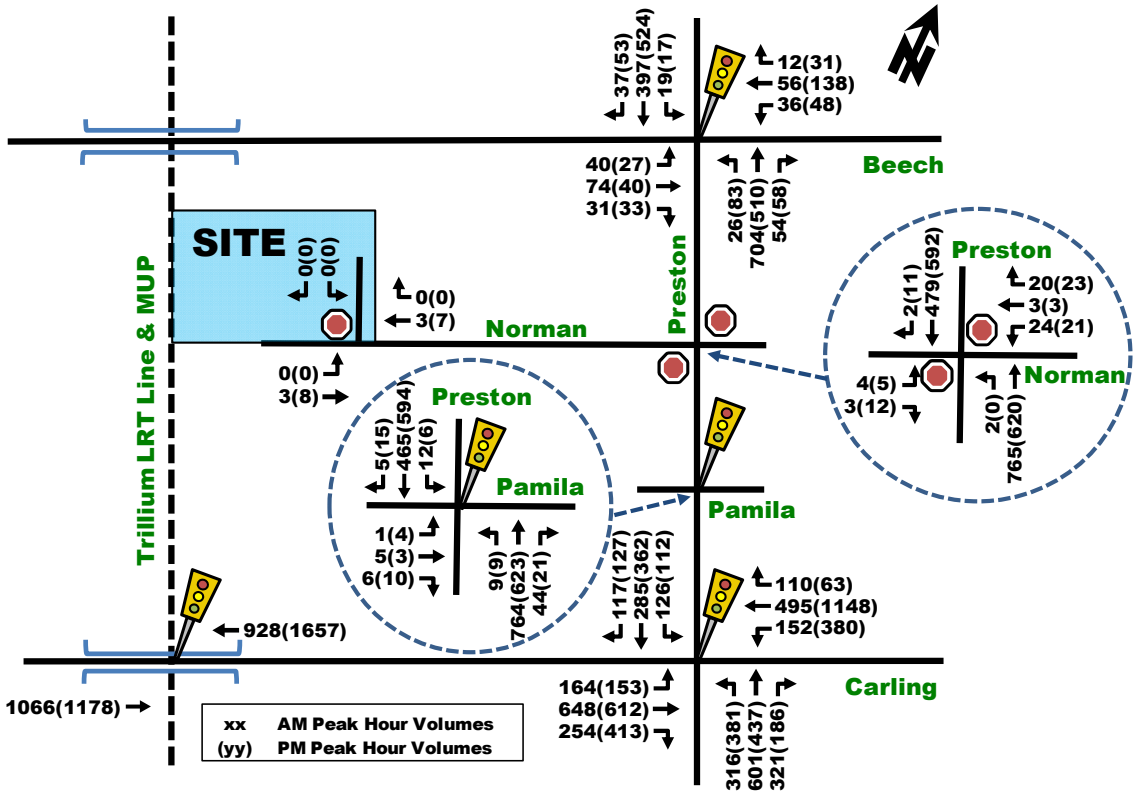


Figure 18: 2027 - Future Background Traffic Volumes



3.3. Demand Rationalization

Since the development is estimated to generate less than 10 vehicle trips/h during the peak hours, it is anticipated to have negligible impact on traffic operations in the study area; However, the Level of Service (LoS) at study area intersections for the existing and future conditions will be analyzed with Synchro (V10) within the next step (Step 4) of the TIA process to verify.

The total project future traffic volumes can be determined by superimposing the site-generated traffic volumes in **Figure 14**, onto the respective total future background traffic volumes in **Figure 17** and **Figure 18**, resulting in the total projected traffic volumes 2022 and 2027 illustrated in **Figure 19** and **Figure 20**.

Figure 19: 2022 - Future Total Traffic Volumes

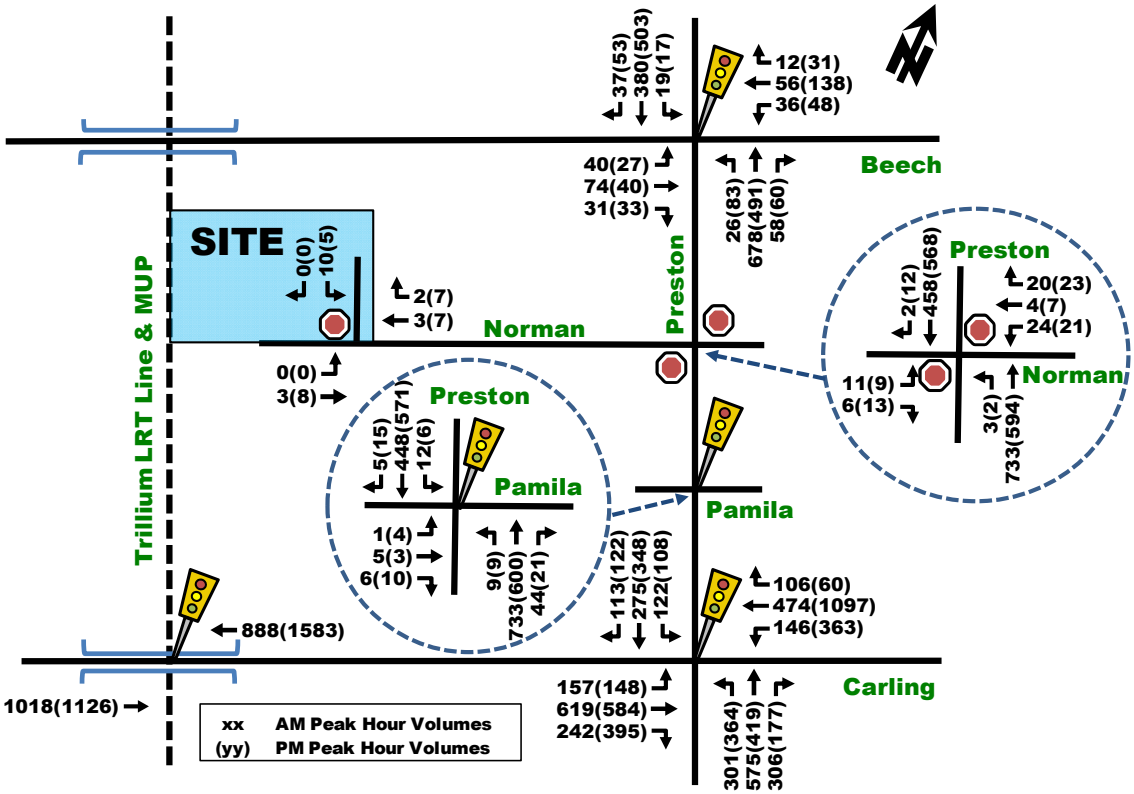
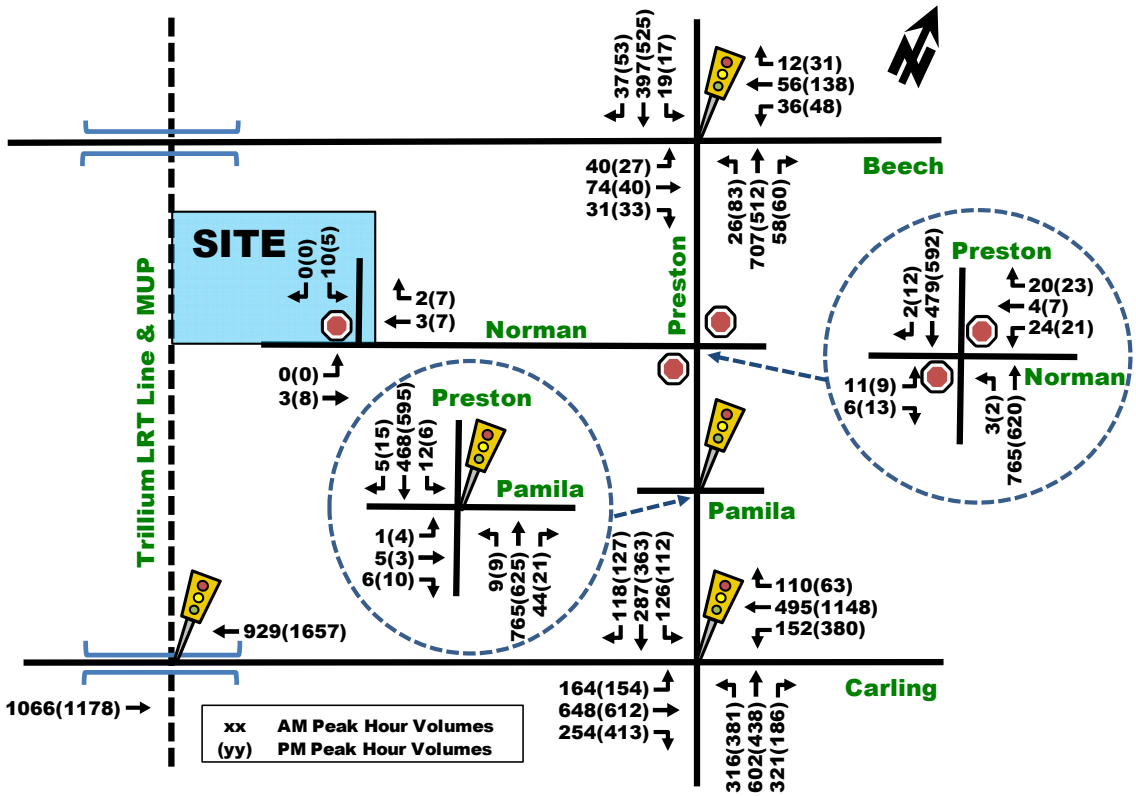


Figure 20: 2027 - Future Total Traffic Volumes



4. Strategy Report

4.1. Development Design

4.1.1. Design for Sustainable Modes

Location of Transit Facilities

The proposed development will have three major transit corridors within a 300-meter radius. The Trillium MUP, located just west of the development provides direct access to Carling Station on the Trillium LRT Line 2 without having to cross any roads. Slightly further south on the Trillium MUP, Carling Avenue provides bus service with a future proposed transit priority corridor with continuous lane measures according the Transportation Master Plan, Affordable Network. Lastly, there are bus stops located on both sides of Preston Street, approximately 200 meters from the site, which are accessible via sidewalks on Norman Street and Preston Street.

Pedestrian/Cycling Routes and Facilities

The proposed building will have direct pedestrian and cycling access to Norman Street and to the Trillium MUP. Within the study area, all roadways have sidewalks on both sides and are all interconnected. The Trillium MUP provides north-south mobility for active travel modes and provides connectivity to various other existing and future proposed pathways and cycle facilities such as the Ottawa River Pathway and Albert Street MUP to the north. To the south, the Trillium MUP connects to the Rideau Canal Pathway, future Carling Avenue MUP, Experimental Farm MUP and Dow's Lake Trails.

4.1.2. Circulation and Access

A single vehicular driveway is proposed to provide two-way access. The driveway is proposed at 6 meters wide combined for two-way vehicular access, meeting City By-Laws.

Garbage pick-up is proposed along the property frontage at ground level on Norman Street.

4.1.3. New Streets Network

Exempt. See **Table 1**.

4.2. Parking

4.2.1. Parking Supply

According to the City of Ottawa Zoning By-Law, the site is located in Area B according to Schedule 1 and Area Z in Schedule 1A, given that it is within 600m walk to Carling Rapid Transit Station within Schedule 2A. **Table 10** summarizes the vehicle parking minimum and maximums allowed within the parking by-law. **Table 11** summarizes the bicycle parking requirements as per City of Ottawa Zoning By-Law-Part 4, sections 100-114.

Table 10: Vehicle Parking Space Supply

Land Use		Rate per Unit		Required Vehicle Spaces				Proposed Spaces
		Base	Visitor	Base	Visitors	Min Req	Max Allowed[3]	
Residential Tower	121 units	0.0 per unit[1]	0.1 per unit[2]	0	11	11	212	104

1) no off-street motor vehicle parking is required in area Z
2) no off-street motor vehicle parking is required for the first 12 dwelling units with a max of 30 visitor spots
3) maximum parking allowed is at a rate of 1.75 parking stalls per unit (combined base and visitor)

Table 11: Bicycle Parking Requirements

Land Use		Rate	Required Bicycle Spaces	Proposed Spaces
			Required	
Residential Tower	121 units	0.5 per unit	61	116

The proposed number of parking spaces meet City guidelines by being a number between the minimum and maximum number of parking spots required. All vehicular parking is proposed indoors in an underground lot, consisting of 95 resident stalls and 9 visitor stalls.

Bicycle parking is provided at a rate of almost 1.0 per unit, exceeding the minimum rate of 0.5 required. Of the 116 bicycle parking stalls, 112 will be indoors in a well-lit area and 4 will be provided in the exterior of the building.

4.2.2. Spillover Parking

Exempt. See table **Table 1**.

4.3. Boundary Street Design

4.3.1. Existing Conditions

The boundary street for the development is Norman Street. There are no anticipated roadway or active facility changes for Norman Street fronting the site. The existing and future roadway geometries consist of the following features:

- *Norman Street:*
  - 1 vehicle travel lane in each direction;
  - 1.5m sidewalk on both sides with no boulevard separation;
  - Less than 3,000 vehicles per day;
  - Assumed unposted speed 50km/h with parking on north side of road;
  - Classified as local roadway;
  - Not a bike route;
  - Not a transit route; and,
  - Not identified as a Truck Route.

The proposed site is located within 600m of Carling LRT Station. Multi-modal Level of Service analysis for the subject road segments adjacent to the site is summarized in **Table 12** with detail analysis provided in **Appendix F**.

Table 12: MMLOS – Boundary Street Segment Existing

Road Segment	Level of Service							
	Pedestrian (PLoS)		Bicycle (BLoS)		Transit (TLoS)		Truck (TkLoS)	
	PLoS	Target	BLoS	Target	TLoS	Target	TkLoS	Target
Norman Street between Preston St. and Trillium	E	A	B	D	-	N/A	-	N/A

Pedestrian

- *Norman Street* does not meet pedestrian PLoS. Increasing the sidewalk width to 2 meters or more and boulevard separation to 2 meters or more would meet the desirable target; however, this may not be feasible based on the right of way available.

Bicycle

- *Norman Street* meets the BLoS desirable targets.

Transit

- *Norman Street* does not have any active transit routes.

Truck

- *Norman Street* is not a truck route.

4.4. Access Intersection Design

4.4.1. Location and Design of Access

The proposed vehicular access to the site relies on a single two-way driveway to Norman Street. The driveway is proposed on the easternmost edge of the site and provides access to a ramp for underground parking. The nearest arterial intersection street is Preston Street which is located approximately 35 meters east of the site access, meeting the by-law (No. 2003-447) section 25 1m.ii which suggests a separation between the site access and nearest arterial intersection of 30 meters for a site with 100 to 199 parking spaces.

4.4.2. Intersection Control

A traffic signal warrant and an all-way stop control warrant was completed at Norman/Preston and neither were warranted due to the very low traffic volumes generated by the site. All warrant analysis has been provided in Appendix G.

4.4.3. Intersection Design

The ramp gradient exceeds private approach by-law (No. 2003-447) section u which requires slope of driveway to be less than 2% for the first 9 meters, and will be seeking relief on this requirement to elevate the garage entrance high enough to prevent Norman Streets stormwater runoff from entering the parking garage. Given that the development is accessed by a local roadway, there are no clear throat minimums. Given the low site generated volumes and that the development is at the end of a dead ended street, no turn lanes are required.

4.5. Transportation Demand Management

4.5.1. Context for TDM

Based on the type of development, it is assumed that most trips generated by the proposed site will be residents leaving the site in the AM peak to go to work and returning from work to the proposed site in the PM peak. Sections 3.1.1 and 3.1.2 describe how many trips are anticipated per travel mode and anticipates the likely locations that they will travel to and from based on the OD-Survey 2011 for Ottawa. The site is located in a Transit-Oriented Development (TOD) zone according to the Official Plan.

4.5.2. Need and Opportunity

Developments located in a Transit-Oriented Development (TOD) zone such as the proposed site are expected to utilize measures to provide sustainable active mode shares. Such measures are described in more detail in Section 4.5.3 below, but can include more aggressive desirable Multi-Modal Levels of Service (MMLOS) targets as described in Section 4.3 and 4.9 and safe and efficient connectivity to public transit as described in Section 4.7, to name a few.

4.5.3. TDM Program

The TDM infrastructure and measures checklist is attached as Appendix H. Some of the TDM measures proposed include:

Items to be provided identified in the TDM Measures Checklist are:

- No identified items

TDM-Supportive development design and infrastructure checklist items identified to be provided are:

- Locate building close to the street, and do not locate parking areas between the street and building
- Locate building entrances in order to minimize walking distances to sidewalks and transit stops/stations
- Locate building doors and windows to ensure visibility of pedestrians from the building, for their security and comfort
- 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
- 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
- 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
- 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
- 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
- Provide safe, direct and attractive walking routes from building entrances to nearby transit stops
- Provide lighting, landscaping and benches along walking and cycling routes between building entrances and streets, sidewalks and trails
- Provide bicycle parking in highly visible and lighted areas, sheltered from the weather wherever possible
- 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
- 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
- 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
- Do not provide more parking than permitted by zoning, nor less than required by zoning, unless a variance is being applied for

4.6. Neighborhood Traffic Management

4.6.1. Adjacent Neighborhoods

The future projected 2027 volumes along Norman Street are anticipated to be less than 50 vehicles per hour during peak hours, which is consistent with a local road. Given that this development will add approximately 10 'new' vehicle trips two-way per peak hour, it is not anticipated that this development will impact Norman Street's roadway classification.

4.7. Transit

4.7.1. Route Capacity

It is projected that 25 to 35 'new' two-way transit passenger trips per hour will be generated for the AM and PM peak hours. The envisioned Trillium LRT Line is projected to operate with a capacity of approximately 500 passengers per train (Stadler Flirt 3/Alstom Lint 41) and 6 trains per hour per direction during peak hours. 35 two-way transit trips equate to approximately 1% of the total capacity of the Confederation Line per hour at that

given station assuming that all trips were headed the same direction. Additionally, added capacity is available on local bus routes on Carling Avenue (future transit priority corridor with continuous measures) and Preston Street. It is anticipated that the future transit network will have sufficient capacity to accommodate the subject development transit demand.

4.7.2. Transit Priority

Since the Trillium LRT Line is grade separated, the development's driveways will not impact travel times. On average, the LRT stations are approximately 90m long, providing enough station distance to efficiently load and off-load the passengers without creating delays.

4.8. Review of Network Concept

Exempt, refer to **Table 1**.

4.9. Intersection Design

4.9.1. Intersection Control

See **Section 4.4.2**.

4.9.2. Intersection Design

Multi-Modal Level of Service

As stated in the MMLOS Guidelines, only signalized intersections are considered for the intersection Level of Service measures. Given that this location has a high pedestrian mode share, all signalized intersections within the study area will be assed. The MMLOS analysis is summarized in **Table 13**, with detailed analyses provided in **Appendix I**.

Table 13: MMLOS – Existing and Future Intersections

Intersection	Level of Service							
	Pedestrian		Bicycle (BLoS)		Transit (TLoS)		Truck (TkLoS)	
	PLoS	Target	BLoS	Target[1]	TLoS	Target[2]	TkLoS	Target
Existing								
Beech/Preston	D	A	D	B	B	D	-	N/A
Pamila/Preston	D	A	D	B	B	D	-	N/A
Carling/Preston	F	A	F	B	F	C	D	D
Trillium MUP/Carling	F	A	D	C	B	C	-	N/A

1.) Preston Street is a 'local' bike route and Carling Avenue a 'spine' route according to the ultimate cycling plan
2.) Carling Avenue assumed transit priority corridor with continuous lanes as proposed by in the TMP

Pedestrian

- No intersection met the pedestrian minimum desirable target of PLoS 'A'. All intersections had a PLoS of 'D' or worse, predominantly based on the number of lanes that would need to be crossed (on average 4 lanes when measured as distance side to side divided by 3.5 meters). No mitigation would lower the PLoS to a level close to the desired MMLOS target without significantly reducing the vehicle capacity or without adding grade separated crossings at an expensive price-tag

Bicycle

- No intersection met the bicycle minimum desirable target of BLoS 'B' for intersections on Preston Street or 'C' on Carling Avenue. The Carling Avenue transit priority measures are anticipated sometime between now and 2031. A final design hasn't been submitted, but it is understood that cycling facilities will be added, improving the BLoS. Cycling facilities are also proposed on Rochester Street or Booth Street.

Transit

- Transit TLoS targets were met at all intersections except for Preston/Carling given the modest delays. Preston/Carling had certain movements used by buses which surpassed 40 second delays and triggers the TLoS of 'F'.

Truck

- Truck target level of service was met for Carling/Preston which have truck routes that turn from one roadway to the other. The other intersections did not have receiving truck routes and trucks were assumed to only travel through.

Existing Conditions

The following **Table 14** provides a summary of the existing traffic operations at the study area intersection based on the Synchro (V10) traffic analysis software. The volumes from **Figure 6** were used. The subject intersections were assessed in terms of the volume-to-capacity (v/c) ratio and the corresponding Level of Service (LoS) for the critical movement(s). The Synchro model outputs of existing conditions are provided within **Appendix J**.

Table 14: Existing Intersection Performance

Intersection	Weekday AM Peak (PM Peak)					
	Critical Movement			Intersection		
	LoS	max. v/c or avg. delay (s)	Movement	Delay (s)	LoS	v/c
Signalized Intersections						
Beech/Preston	A(B)	0.60(0.62)	NBT(WBT)	15.9(13.6)	A(A)	0.56(0.46)
Carling/Preston	D(F)	0.87(1.54)	NBL(NBL)	37.5(108.8)	B(F)	0.70(1.04)
Pamila/Preston	A(A)	0.57(0.47)	NBT(NBT)	7.3(6.7)	A(A)	0.48(0.45)
Trillium MUP/Carling	A(A)	0.31(0.53)	EBT(WBT)	8.9(18.8)	A(A)	0.31(0.53)
Unsignalized Intersections						
Norman/Preston	C(C)	24(22)	EB(WB)	1(1)	A(A)	-
Note: Analysis of signalized intersections assumes a PHF of 0.90 and a saturation flow rate of 1800 veh/h/lane.						

As shown in **Table 14**, the intersections of Beech and Norman with Preston operate overall at very good LoS 'A' while Carling/Preston is operating at capacity in the PM peak hour and overall well (LoS 'B') in the AM peak. All critical movements operate at a LoS 'C' or better with the exception of Carling/Preston in the PM peak hour, where the there is an overall LoS 'F', regarding critical movements the intersection is anticipated to operate at capacity (LoS 'F') for the northbound left-turn, the westbound left-turn and the southbound through. During the AM peak hour at Carling/Preston intersection is anticipated to experience an overall intersection performance of LoS 'C' or better and LoS 'D' regarding the northbound left-turn critical movement.

Background Conditions

Given that a low annual growth of 1% on through movements only on network roads (based on vehicular growth discussed in **Section 3.2.2**), and the addition of other area developments, it is anticipated that 2022 background volumes will operate similar to 2027 background volumes. The projected background volumes from **Figure 18**, which are anticipated to be the more conservative horizon years, was used to projected future operations with outputs displayed in **Table 15**. The detailed Synchro results can be found in **Appendix K**.

Table 15: Background 2027 Intersection Performance

Intersection	Weekday AM Peak (PM Peak)					
	Critical Movement			Intersection		
	LoS	max. v/c or avg. delay (s)	Movement	Delay (s)	LoS	v/c
Signalized Intersections						
Beech/Preston	B(B)	0.62(0.64)	NBT(WBT)	16.4(13.6)	A(A)	0.58(0.47)
Carling/Preston	D(F)	0.85(1.48)	NBL(NBL)	38.7(102.4)	C(F)	0.71(1.01)
Pamila/Preston	A(A)	0.58(0.48)	NBT(NBT)	7.3(6.9)	A(A)	0.49(0.46)
Trillium MUP/Carling	A(A)	0.30(0.52)	EBT(WBT)	9.2(18.0)	A(A)	0.30(0.52)
Unsignalized Intersections						
Norman/Preston	D(D)	28(25)	WB(WB)	1(1)	A(A)	-
Note: Analysis of signalized intersections assumes a PHF of 1.00 and a saturation flow rate of 1800 veh/h/lane.						

As seen in **Table 15**, all intersections operate overall at good LoS 'C' or better with critical movements operating at LoS 'D' or better during the future background volumes, with the exception of Carling/Preston which continues

to operate overall at capacity and at LoS 'F' for critical movements. Operations are slightly better than existing intersection performance given that a peak hour factor of 1.0 is used for future operations compared to 0.9 for existing performance, as per the TIA guidelines.

Future Conditions Post Full-Buildout

Given that a low annual growth of 1% on through movements only on network roads (based on vehicular growth discussed in **Section 3.2.2**), the addition of other area developments, and limited trip generation volumes were generated, it is assumed that 2022 future projected volumes will be more or less the same as 2027 future projected volumes. The projected background volumes from **Figure 20** which are anticipated to be the more conservative horizon years, was used to projected future operations with outputs displayed in **Table 16.** The detailed Synchro results can be found in **Appendix L**.

Table 16: 2027 Full-Buildout Intersection Performance

Intersection	Weekday AM Peak (PM Peak)					
	Critical Movement			Intersection		
	LoS	max. v/c or avg. delay (s)	Movement	Delay (s)	LoS	v/c
Signalized Intersections						
Beech/Preston	B(B)	0.63(0.64)	NBT(WBT)	18.0(13.7)	A(A)	0.59(0.49)
Carling/Preston	D(F)	0.88(1.48)	NBL(NBL)	39.4(103.1)	C(F)	0.71(1.01)
Pamila/Preston	A(A)	0.57(0.48)	NBT(NBT)	6.9(6.9)	A(A)	0.48(0.46)
Trillium MUP/Carling	A(A)	0.30(0.52)	EBT(WBT)	8.7(18.0)	A(A)	0.30(0.52)
Unsignalized Intersections						
Norman/Preston	D(D)	30(27)	EB(WB)	2(2)	A(A)	-
Note: Analysis of signalized intersections assumes a PHF of 1.00 and a saturation flow rate of 1800 veh/h/lane. Pedestrians and cyclists were added to the Synchro network to account for new trips by this development and other area developments.						

As seen in **Table 16**, all study area intersections are expected to operate better than existing conditions with minor delays except for Carling/Preston and Norman/Preston which has a slight increase in critical delay. Optimizing the timing plan at Carling/Preston improves the operations but still operates at capacity.

Future Conditions if Custom Mode Share not Met

The trips generated based on the OD Survey - Ottawa Inner mode shares is shown in **Figure 21** in the event that the TOD mode shares are not met. The projected intersection performance is shown in **Table 17** with detailed output in **Appendix M**.

Figure 21: TOD Mode Share not Met Projected Volumes

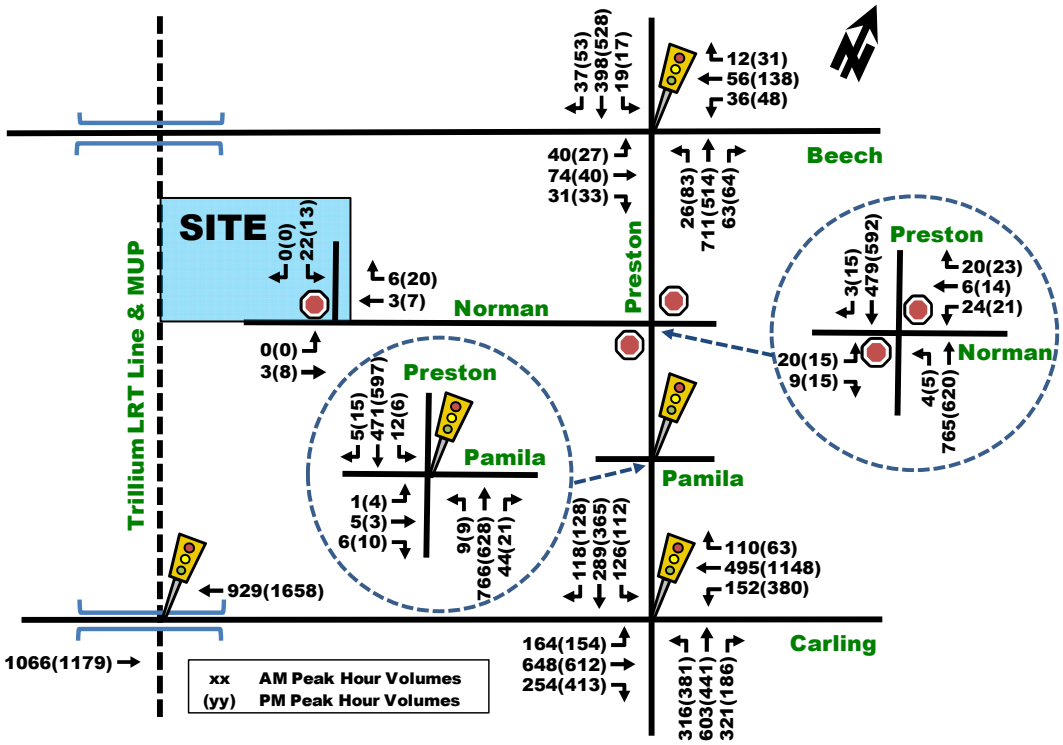


Table 17: Intersection Performance if TOD Mode Shares Not Met

Intersection	Weekday AM Peak (PM Peak)					
	Critical Movement			Intersection		
	LoS	max. v/c or avg. delay (s)	Movement	Delay (s)	LoS	v/c
Signalized Intersections						
Beech/Preston	B(B)	0.64(0.64)	NBT(WBT)	17.6(13.6)	A(A)	0.60(0.49)
Carling/Preston	D(F)	0.86(1.48)	NBL(NBL)	38.9(102.8)	C(F)	0.71(1.02)
Pamila/Preston	A(A)	0.58(0.48)	NBT(NBT)	7.5(6.9)	A(A)	0.49(0.46)
Trillium MUP/Carling	A(A)	0.30(0.52)	EBT(WBT)	9.2(18.0)	A(A)	0.30(0.52)
Unsignalized Intersections						
Norman/Preston	D(D)	33(29)	EB(WB)	2(2)	A(A)	-
Note: Analysis of signalized intersections assumes a PHF of 1.00 and a saturation flow rate of 1800 veh/h/lane.						

As seen in **Table 17**, all study area intersections operate similar to future projected conditions if TOD mode shares are not met.

5. Findings and Recommendations

Based on the results summarized herein the following findings and recommendations are provided:

Existing Conditions

- The site is currently vacant following the demolition of the old developments in 2019 and formerly vacant since 2017
- The site is located within 300 meters walk of the existing Carling LRT Station and is located adjacent to the Trillium Line multi-use pathway (MUP).
- Carling Avenue is anticipated to be retrofitted to include transit priority measures and MUP facilities
- Overall, there are no existing safety concerns along the proposed development frontage and study area intersections. Therefore, no mitigation measures were considered.

- Existing intersections operate at good overall LoS 'C' or better with critical movements of 'D' or better during the weekday peak hours with the exception of Carling/Preston which operates at capacity for the PM peak period.

Proposed Development

- The proposed development will comprise of approximately 121 apartment units in a 9-storey building.
- The proposed development is projected to generate 'new' vehicle volumes of approximately 10 veh/h two-way total during the weekday morning and afternoon peak hours.
- The proposed development is projected to generate approximately 30 to 35 'new' transit trips during the AM and PM peak hour periods respectively, which can be accommodated by the nearby high-capacity Trillium LRT Line. Additional capacity is available on local bus routes on Preston Street and Carling Avenue.
- A total of 104 parking spaces are proposed which would meet the City's minimum and maximum parking requirements for this development. Bike parking spots also meet and exceed the City's minimum requirement, with a rate of 0.96 bike parking spots per unit.
- The access to the site proposes a new full movement driveway off Norman Street.

Future Conditions

- Other nearby developments and a 1% growth rate were applied to existing volumes to estimate future conditions. Given that there is minimal traffic growth and that the development is assumed as a single-phase development, 2022 buildout year and 2027 (buildout year +5, only the more critical 2027 year was analyzed.
- Future conditions with the addition of approximately 10 veh/h two-way vehicle trips and transit trips modelled as pedestrians heading to/from the site to Carling Station performed at good levels of service with overall LoS 'C' or better and with critical movement of 'D' or better, with the exception of Carling/Preston which is anticipated to operate similar to existing conditions.
- If the TOD modal shares are not met, all intersections are anticipated to perform similar to existing.
- The MMLOS road segment analysis shows that conditions on boundary streets do not meet MMLOS area targets for pedestrians due to lack of sidewalk width and lack of boulevard separation. All other MMLOS targets including bike BLoS, transit TLoS and truck TkLoS were met or are not applicable.
- The MMLOS intersection analysis shows no intersection met the pedestrian PLoS targets due to the length required to cross at each intersection. The bike BLoS targets were not met either due to the lack of cycling facilities. Transit TLoS targets were met on all intersections except for Carling/Preston due to the intersection delays. Only Carling/Preston intersection was eligible for truck TkLoS and the targets were met.

Based on the foregoing findings, the proposed development located at 93 Norman Street is recommended from a transportation perspective

Prepared By:	Reviewed By:
Juan Lavin, E.I.T.	Matthew Mantle, P.Eng. Transportation Engineer

APPENDIX A

SCREENING FORM

PARSONS

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

City of Ottawa 2017 TIA Guidelines

TIA Screening Form

Date: Nov. 24, 2020
Project: Taggart 93 Norman Road
Project Number: 908979-10040

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

Module 1.1 - Description of Proposed Development	
Municipal Address	93 Nornman Street
Description of location	
Land Use	Residential R5B
Development Size	
Number of Accesses and Locations	1 driveway located at west side of propety along north side of Norman Street
Development Phasing	1 phase
Buildout Year	2022
Sketch Plan / Site Plan	See attached

Module 1.2 - Trip Generation Trigger		
Land Use Type	Townhomes or Apartments	
Development Size	121	Units
Trip Generation Trigger Met?	Yes	

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

Module 1.4 - Safety Triggers		
Posted Speed Limit on any boundary road	<80	km/h
Horizontal / Vertical Curvature on a boundary street limits sight lines at a proposed driveway	No	
A proposed driveway is within the area of influence of an adjacent traffic signal or roundabout (i.e. within 300 m of intersection in rural conditions, or within 150 m of intersection in urban/ suburban conditions) or within auxiliary lanes of an intersection;	No	
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?	No	

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

23 February 2021

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

Attention: Neeti Paudel, P.Eng.

Dear Neeti:

Re: 93 Norman TIA
Step 3 – Response to City Comments

The following response form has been prepared to address City of Ottawa comments received on February 3, 2021. City comments are noted in black with the corresponding responses from Parsons in Green.

Transportation Engineering Services

Section 2.1.1 Proposed Development:

Ensure that the anticipated build-out date is consistent throughout the report (2023 vs 2022). Noted, text revised

Section 2.1.2 Existing Conditions

Note the flex stakes along Beech Street in the report. Noted, included

Note the pedestrian/cycling bridge connecting Adeline Street to Hickory Street. Noted, included in pedestrian network

Correct the mention of Union Station in the description of route 56. Noted, text revised

Ensure that all appendices are included in the report. Noted

Indicate when the previous buildings were demolished and whether they may have been counted as part of the existing traffic counts presented. Noted, previous development was demolished before the most recent counts

Section 2.1.3 Planned Conditions

The southern extension of Line 2 is expected to be completed by 2022, not 2021. Noted, text updated

Section 3.1.2 Mode Shares

Consider increasing the pedestrian mode share target. Existing from/within district trips in the AM Peak and to/within district trips in the PM Peak are nearly 30%. Noted, mode shares adjusted to reflect this area more closely

Section 3.3 Demand Rationalization

While it is acknowledged that the development will not have a large impact on the traffic operations in the study area, the amount of demand anticipated to require nationalization should be discussed in this section in this step. Ensure that any expected pedestrian and cycling trips are applied to the study area intersections. Noted, further discussion added

Traffic Signal Operations

Please add Pamilla/Preston and Carling/120m West of Preston at the MUP Crossing to the study area. Noted, these intersections were added to the study area

Ensure projected pedestrian and cycling volumes are captured in future synchro analysis submissions for all study area intersections. Noted, added to Synchro

With 104 proposed parking spaces being provided in the development, the number of total vehicle trips noted in the report (7 AM Peak & 7 PM peak) seems to be a low assumption. Noted, an error in the excel sheet was fixed which raised the 2-way vehicle trips to 12. It is however understood that residents that cater to this market prefer to purchase units with parking for use on weekends/leisure and not necessarily for daily commute.

Please provide impact on transportation network if the auto driver mode share is greater than the 15% target. Noted, Section 4.9 has scenario if TOD targets not met

The development should consider reducing the number of on-site parking spaces to achieve TOD / active transportation targets noted in the report. Proponent advised.

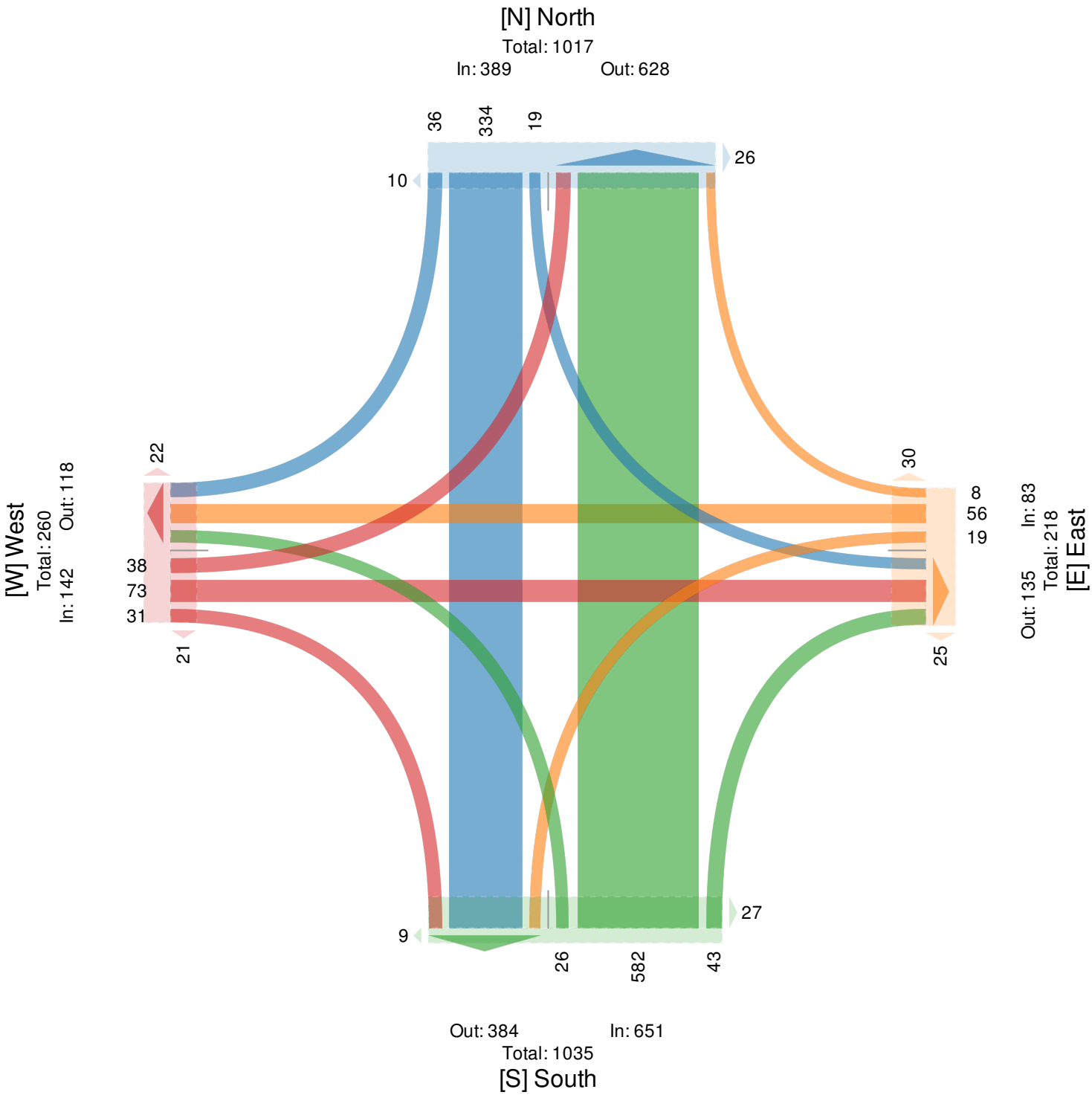
APPENDIX B

TRAFFIC COUNT DATA

5268230 - Preston and Beech - Sept - 7th - TMC

Wed Sep 7, 2016
AM Peak (8:15AM - 9:15AM)
All Classes (Lights and Motorcycles, Heavy, Pedestrians, Bicycles on Road)
All Movements
ID: 341683, Location: 45.40071, -75.70962, Site Code: 36281103

Provided by: City of Ottawa
100 Constellation Dr, Nepean, ON, K2G 5J9, CA



5268230 - Preston and Beech - Sept - 7th - TMC

Wed Sep 7, 2016

PM Peak (4:30PM - 5:30PM) - Overall Peak Hour

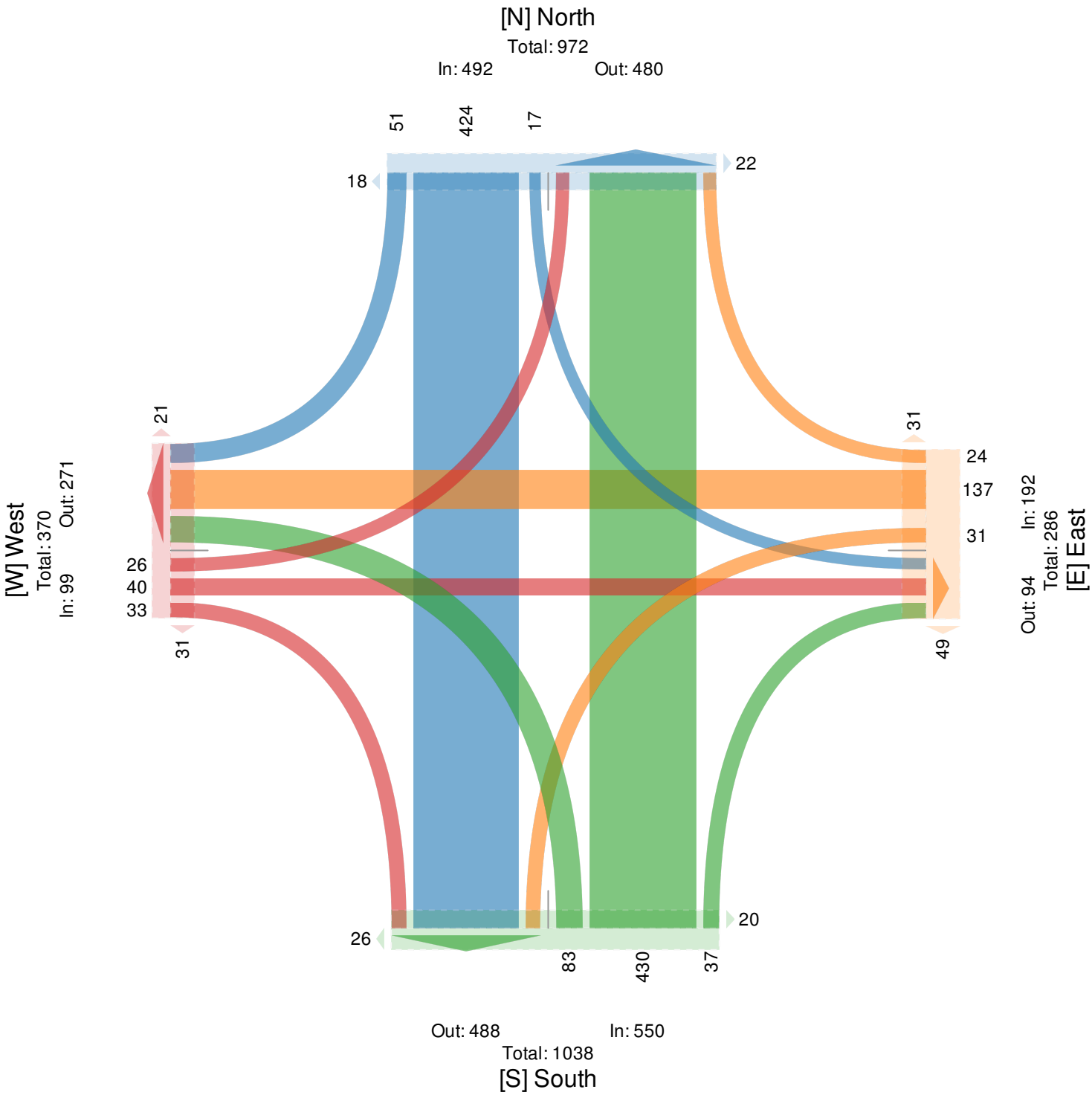
All Classes (Lights and Motorcycles, Heavy, Pedestrians, Bicycles on Road)

All Movements

ID: 341683, Location: 45.40071, -75.70962, Site Code: 36281103

Provided by: City of Ottawa

100 Constellation Dr, Nepean, ON, K2G 5J9, CA



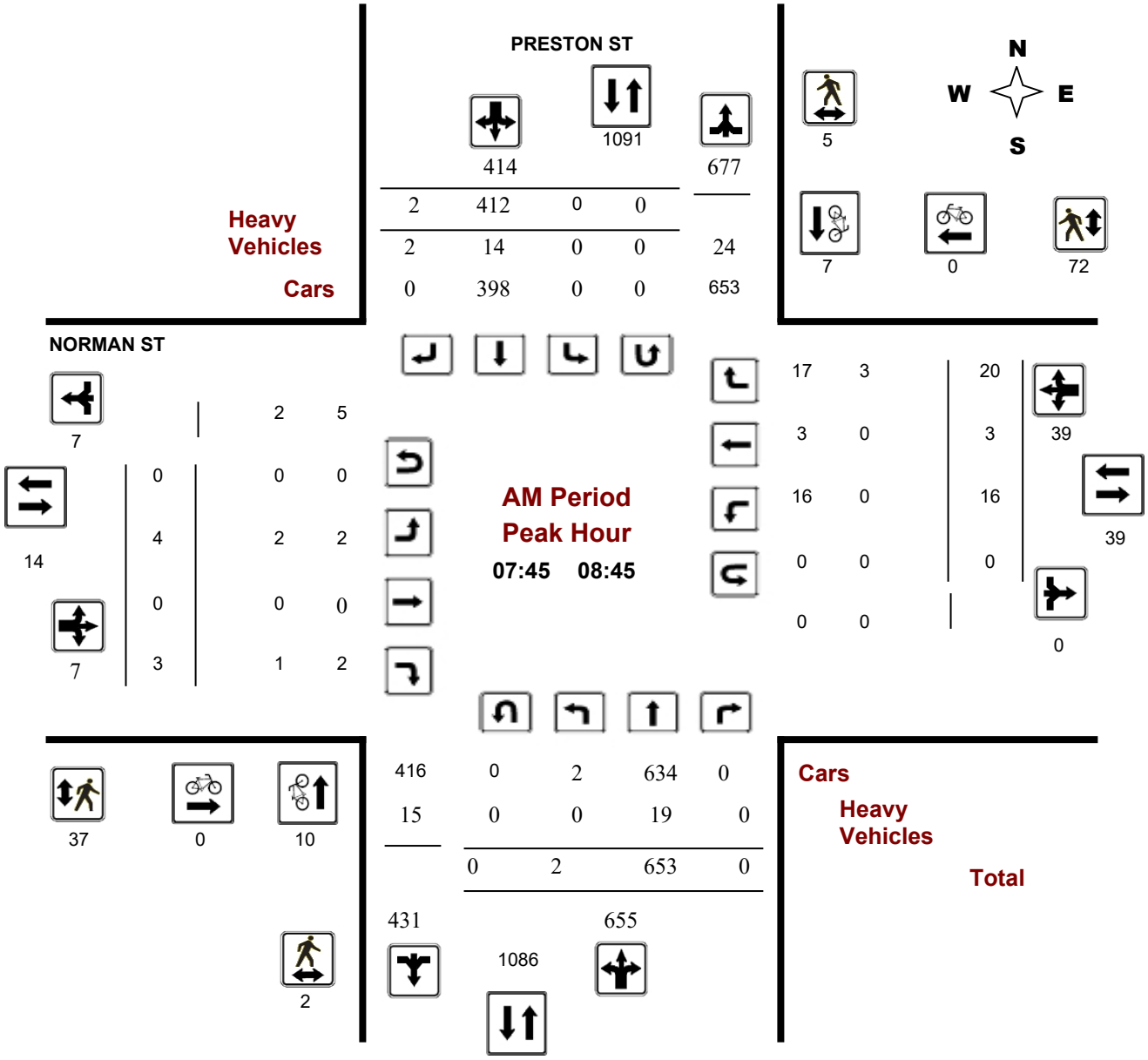
Transportation Services - Traffic Services

Turning Movement Count - Peak Hour Diagram

NORMAN ST @ PRESTON ST

Survey Date: Tuesday, November 26, 2019 **WO No:** 39061

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



Comments

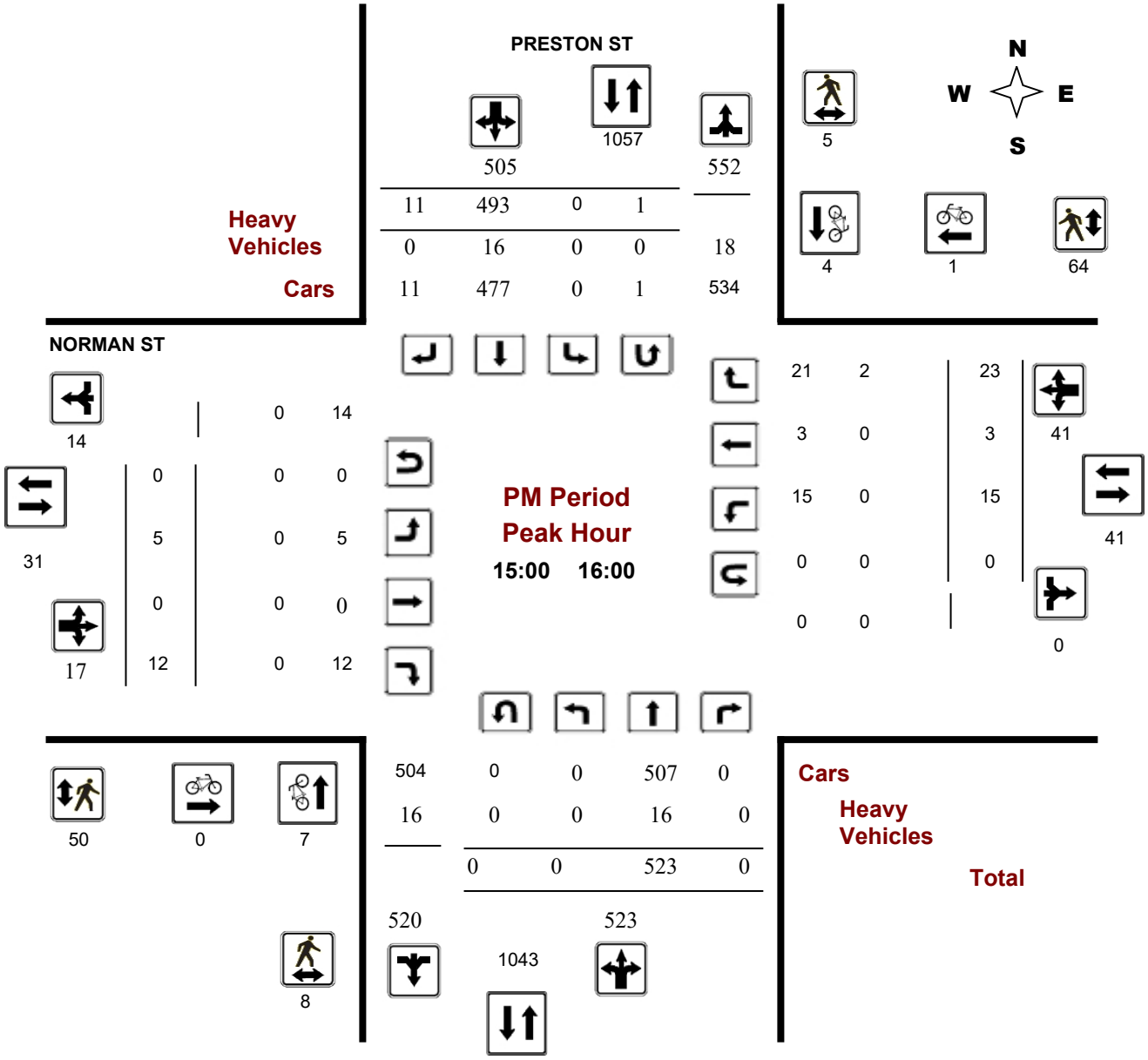
Transportation Services - Traffic Services

Turning Movement Count - Peak Hour Diagram

NORMAN ST @ PRESTON ST

Survey Date: Tuesday, November 26, 2019 **WO No:** 39061

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



Comments

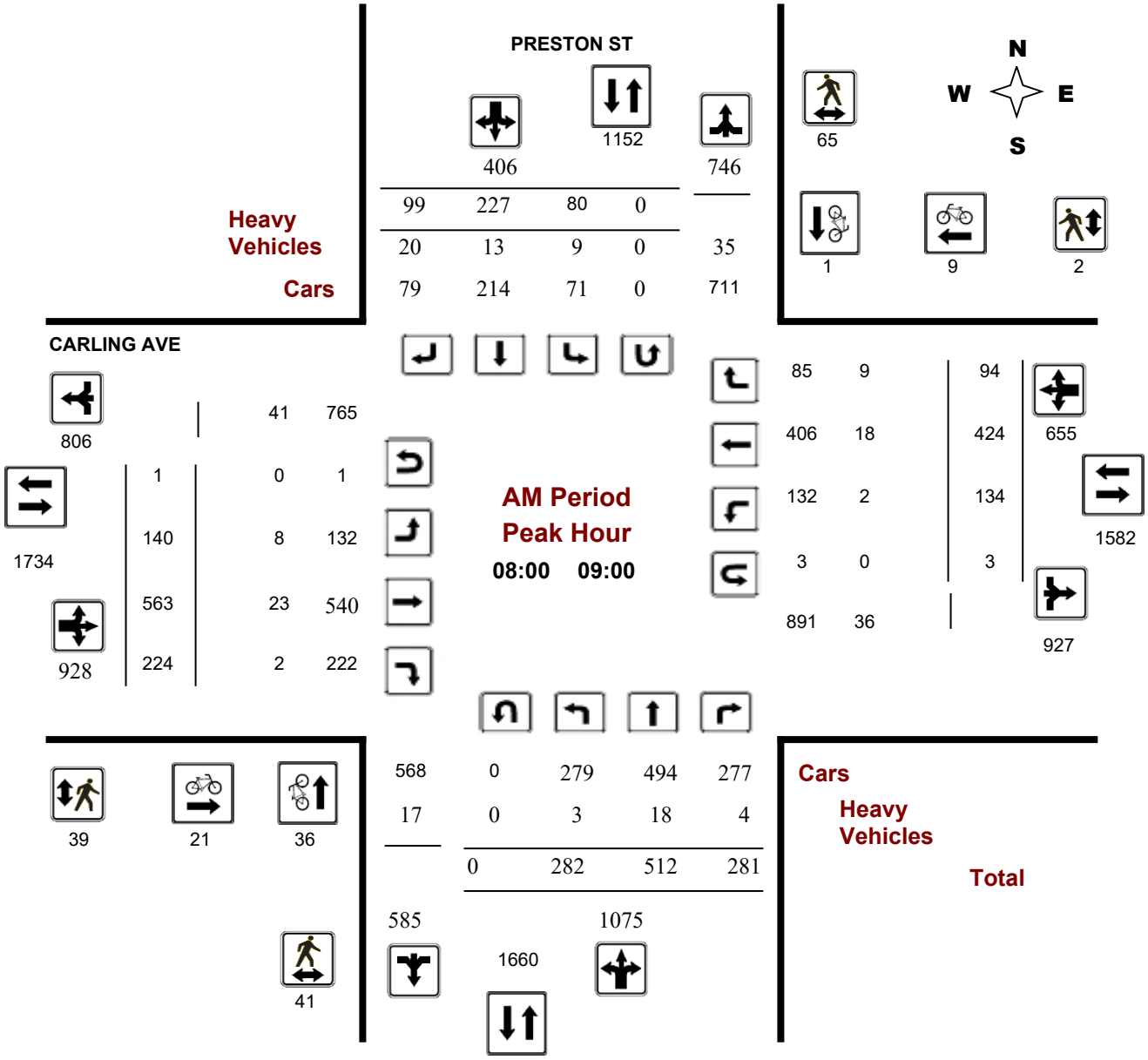
Transportation Services - Traffic Services

Turning Movement Count - Peak Hour Diagram

CARLING AVE @ PRESTON ST

Survey Date: Tuesday, June 20, 2017 **WO No:** 37131

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



Comments

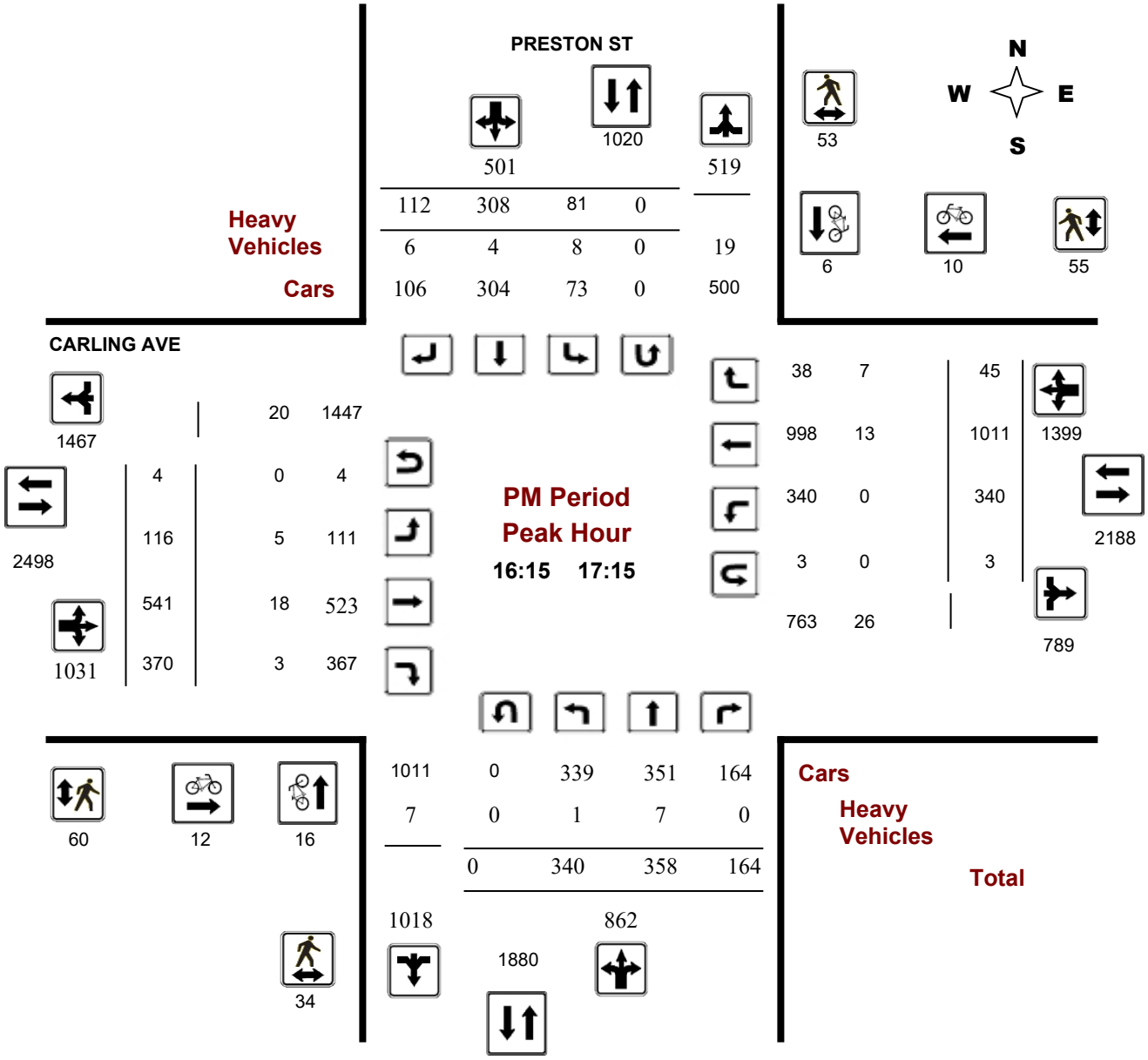
Transportation Services - Traffic Services

Turning Movement Count - Peak Hour Diagram

CARLING AVE @ PRESTON ST

Survey Date: Tuesday, June 20, 2017
Start Time: 07:00

WO No: 37131
Device: Miovision



Comments

5268232 - Preston and Pamilla - Sept - 7th - TMC

Wed Sep 7, 2016

AM Peak (8:15AM - 9:15AM) - Overall Peak Hour

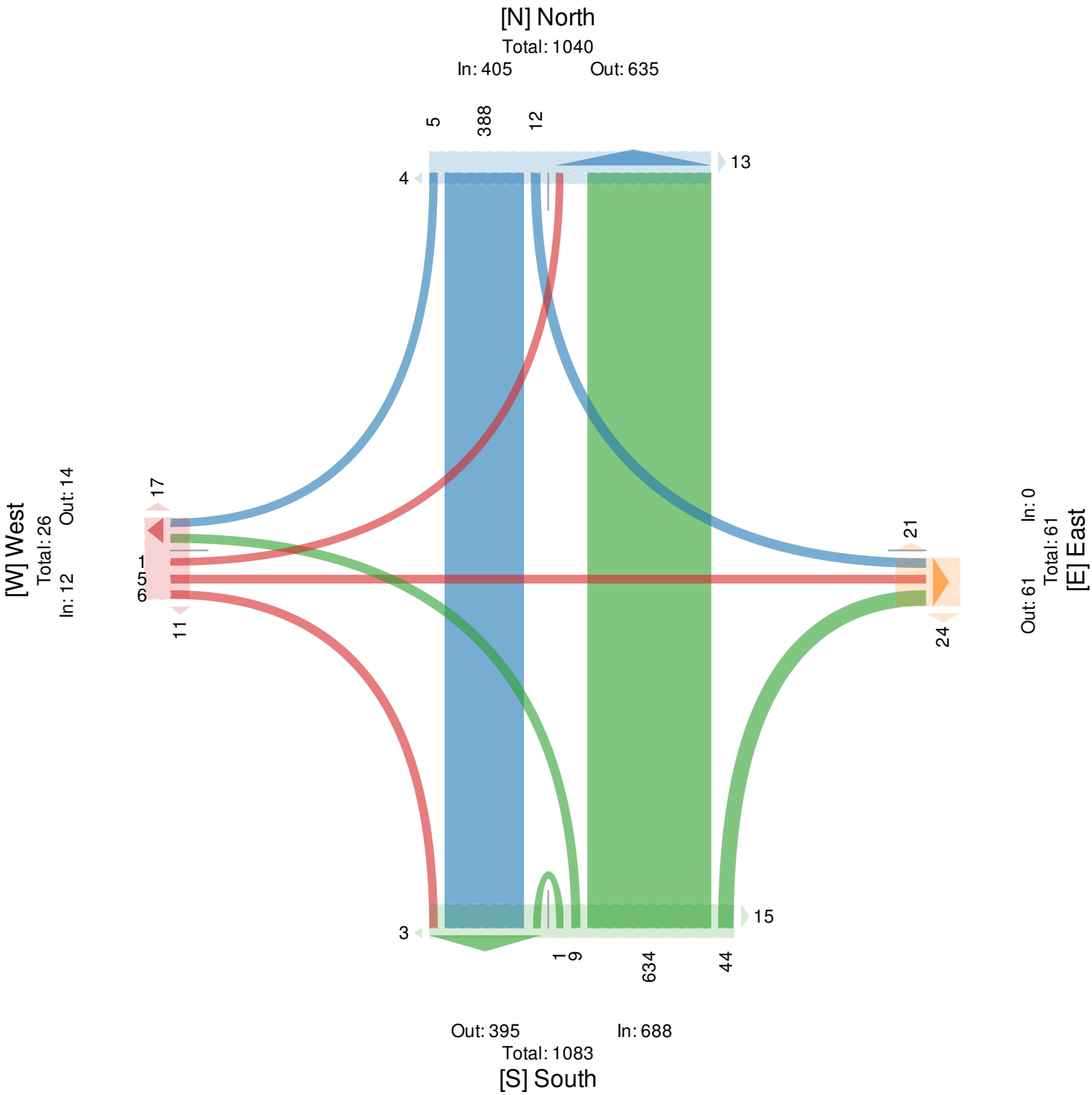
All Classes (Lights and Motorcycles, Heavy, Pedestrians, Bicycles on Road)

All Movements

ID: 341680, Location: 45.39933, -75.708743, Site Code: 36279103

Provided by: City of Ottawa

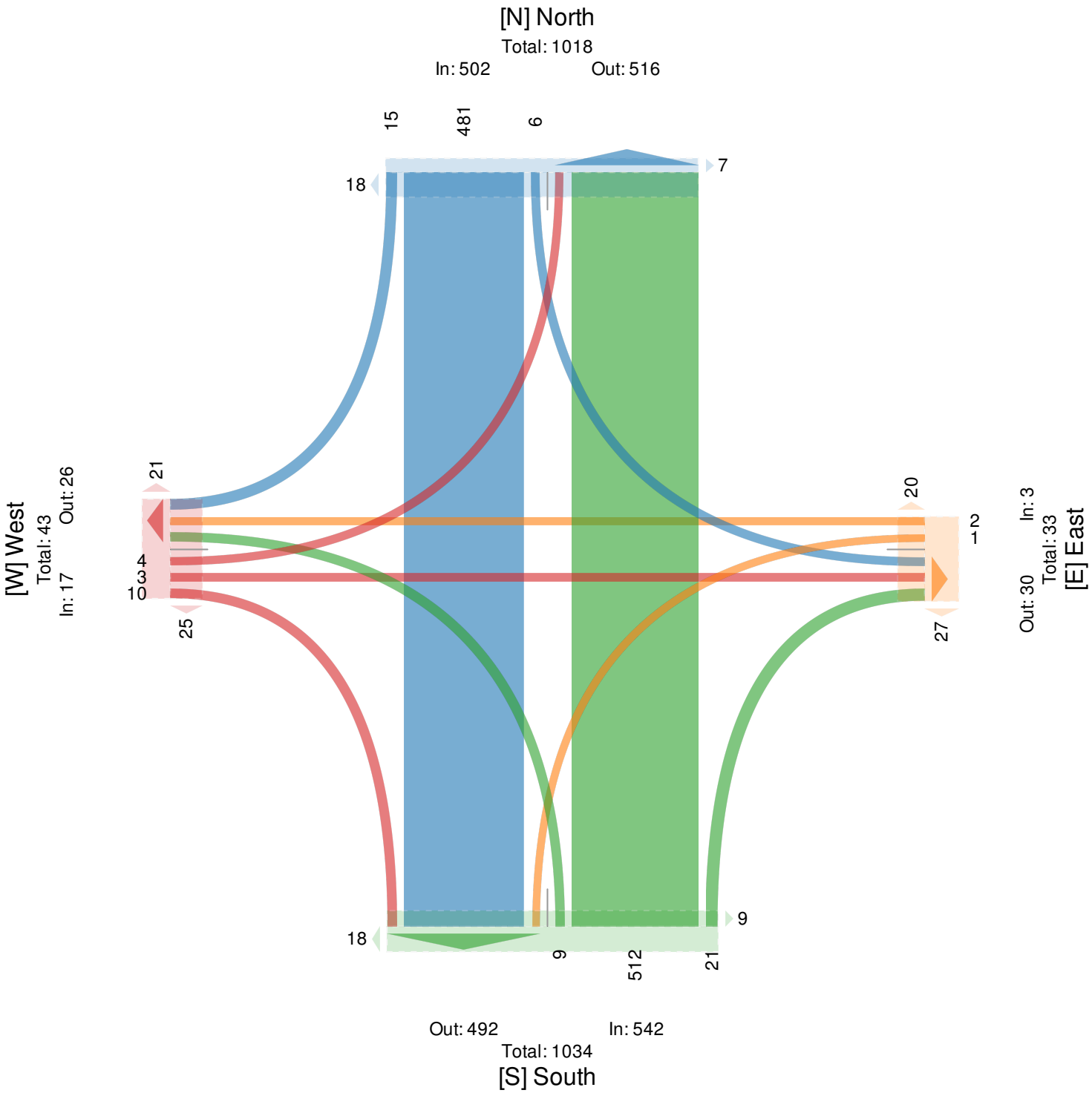
100 Constellation Dr, Nepean, ON, K2G 5J9, CA



5268232 - Preston and Pamilla - Sept - 7th - TMC

Wed Sep 7, 2016
PM Peak (4:30PM - 5:30PM)
All Classes (Lights and Motorcycles, Heavy, Pedestrians, Bicycles on Road)
All Movements
ID: 341680, Location: 45.39933, -75.708743, Site Code: 36279103

Provided by: City of Ottawa
100 Constellation Dr, Nepean, ON, K2G 5J9, CA



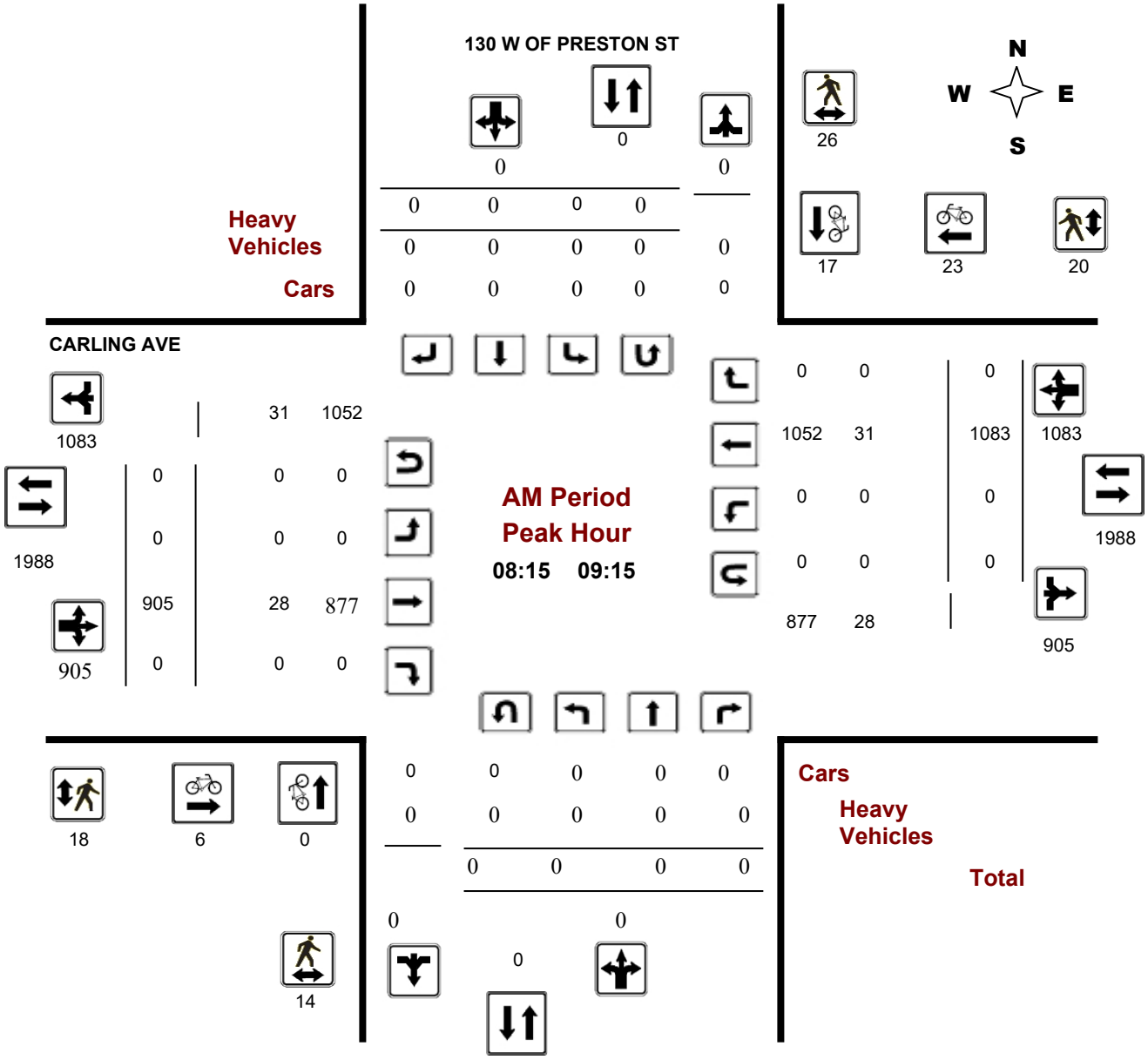
Transportation Services - Traffic Services

Turning Movement Count - Peak Hour Diagram

130 W OF PRESTON ST @ CARLING AVE

Survey Date: Wednesday, July 13, 2016 **WO No:** 36033

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



Comments INTERSECTION : CARLING AVE 130M WEST OF PRESTON ST

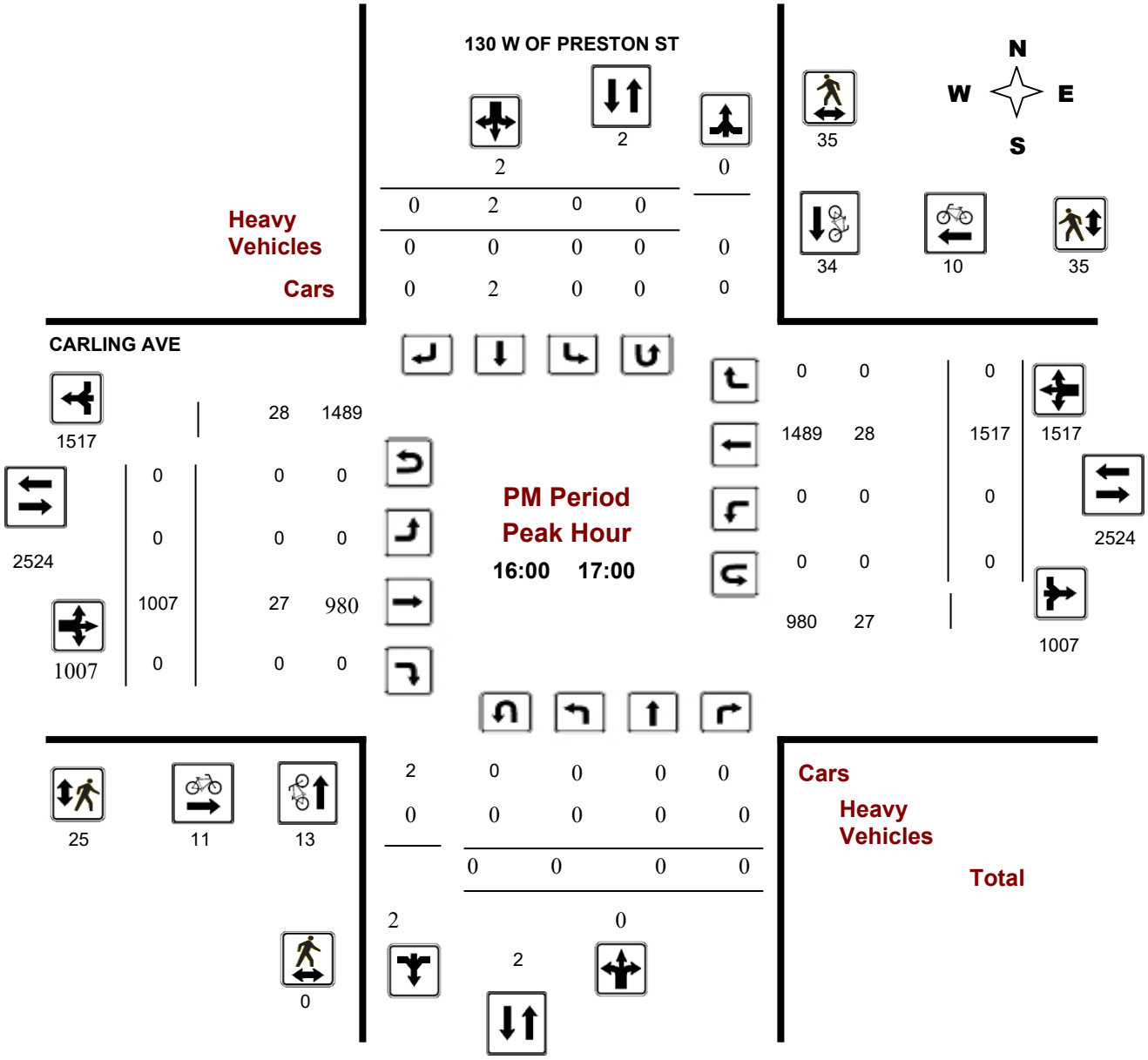
Transportation Services - Traffic Services

Turning Movement Count - Peak Hour Diagram

130 W OF PRESTON ST @ CARLING AVE

Survey Date: Wednesday, July 13, 2016 **WO No:** 36033

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



Comments INTERSECTION : CARLING AVE 130M WEST OF PRESTON ST

APPENDIX C

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	21	7	10	17	1	2	7	2	67	68%
Non-fatal injury	8	10	1	8	0	4	0	0	31	31%
Non reportable	0	0	1	0	0	0	0	0	1	1%
Total	**29**	**17**	**12**	**25**	**1**	**6**	**7**	**2**	**99**	100%
	#1 or 29%	#3 or 17%	#4 or 12%	#2 or 25%	#8 or 1%	#6 or 6%	#5 or 7%	#7 or 2%		

BEECH ST / PRESTON ST (0006160)

Years	Total # Collisions	24 Hr AADT Veh Volume	Days	Collisions/MEV
2014-2018	6	12,990	1825	**0.25**

Classification of Accident	Rear End	Turning Movement	Sideswipe	Angle	Approaching	Single Vehicle (other)	Single vehicle (Unattended vehicle)	Other	Total	
P.D. only	0	2	1	0	0	0	0	1	4	67%
Non-fatal injury	0	0	0	1	0	1	0	0	2	33%
Non reportable	0	0	0	0	0	0	0	0	0	0%
Total	**0**	**2**	**1**	**1**	**0**	**1**	**0**	**1**	**6**	100%
	0%	33%	17%	17%	0%	17%	0%	17%		

NORMAN ST / PRESTON ST (0006127)

Years	Total # Collisions	24 Hr AADT Veh Volume	Days	Collisions/MEV
2014-2018	3	14,661	1825	**0.11**

Classification of Accident	Rear End	Turning Movement	Sideswipe	Angle	Approaching	Single Vehicle (other)	Single vehicle (Unattended vehicle)	Other	Total	
P.D. only	0	0	0	2	0	0	0	0	2	67%
Non-fatal injury	0	0	0	0	0	1	0	0	1	33%
Non reportable	0	0	0	0	0	0	0	0	0	0%
Total	**0**	**0**	**0**	**2**	**0**	**1**	**0**	**0**	**3**	100%
	0%	0%	0%	67%	0%	33%	0%	0%		

PAMILLA ST / PRESTON ST (0006134)

Years	Total # Collisions	24 Hr AADT Veh Volume	Days	Collisions/MEV
2014-2018	6	7,979	1825	**0.41**

Classification of Accident	Rear End	Turning Movement	Sideswipe	Angle	Approaching	Single Vehicle (other)	Single vehicle (Unattended vehicle)	Other	Total	
P.D. only	2	1	0	1	1	0	0	0	5	83%
Non-fatal injury	0	0	0	0	0	1	0	0	1	17%
Non reportable	0	0	0	0	0	0	0	0	0	0%
Total	**2**	**1**	**0**	**1**	**1**	**1**	**0**	**0**	**6**	100%
	33%	17%	0%	17%	17%	17%	0%	0%		

ADELINE ST / PRESTON ST (0006113)

Years	Total # Collisions	24 Hr AADT Veh Volume	Days	Collisions/MEV
2014-2018	6	11,000	1825	**0.30**

Classification of Accident	Rear End	Turning Movement	Sideswipe	Angle	Approaching	Single Vehicle (other)	Single vehicle (Unattended vehicle)	Other	Total	
P.D. only	2	0	0	1	0	0	2	0	5	83%
Non-fatal injury	0	1	0	0	0	0	0	0	1	17%
Non reportable	0	0	0	0	0	0	0	0	0	0%
Total	**2**	**1**	**0**	**1**	**0**	**0**	**2**	**0**	**6**	100%
	33%	17%	0%	17%	0%	0%	33%	0%		

PRESTON ST / SIDNEY ST (0011959)

Years	Total # Collisions	24 Hr AADT Veh Volume	Days	Collisions/MEV
2014-2018	9	11,000	1825	**0.45**

Classification of Accident	Rear End	Turning Movement	Sideswipe	Angle	Approaching	Single Vehicle (other)	Single vehicle (Unattended vehicle)	Other	Total	
P.D. only	0	1	1	6	0	0	0	0	8	89%
Non-fatal injury	0	0	0	1	0	0	0	0	1	11%
Non reportable	0	0	0	0	0	0	0	0	0	0%
Total	**0**	**1**	**1**	**7**	**0**	**0**	**0**	**0**	**9**	100%
	0%	11%	11%	78%	0%	0%	0%	0%		

CARLING AVE / PRESTON ST (0002161)

Years	Total # Collisions	24 Hr AADT Veh Volume	Days	Collisions/MEV
2014-2018	49	35,627	1825	**0.75**

Classification of Accident	Rear End	Turning Movement	Sideswipe	Angle	Approaching	Single Vehicle (other)	Single vehicle (Unattended vehicle)	Other	Total	
P.D. only	14	3	7	4	0	2	0	0	30	61%
Non-fatal injury	6	8	0	3	0	1	0	0	18	37%
Non reportable	0	0	1	0	0	0	0	0	1	2%
Total	**20**	**11**	**8**	**7**	**0**	**3**	**0**	**0**	**49**	100%
	41%	22%	16%	14%	0%	6%	0%	0%		

130 W of Preston St / Carling Ave (0016879)

Years	Total # Collisions	24 Hr AADT Veh Volume	Days	Collisions/MEV
2014-2018	4	21,540	1825	**0.10**

Classification of Accident	Rear End	Turning Movement	Sideswipe	Angle	Approaching	Single Vehicle (other)	Single vehicle (Unattended vehicle)	Other	Total	
P.D. only	0	0	0	0	0	0	0	0	0	0%
Non-fatal injury	1	0	0	3	0	0	0	0	4	100%
Non reportable	0	0	0	0	0	0	0	0	0	0%
Total	**1**	**0**	**0**	**3**	**0**	**0**	**0**	**0**	**4**	100%
	25%	0%	0%	75%	0%	0%	0%	0%		

Road Segments

NORMAN ST /twn PRESTON ST & END (__3ZA04T)

Years	Total # Collisions	24 Hr AADT Veh Volume	Days	Collisions/MEV
2014-2018	2	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	0	0	0	0	2	0	2	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**	**0**	**0**	**0**	**0**	**2**	**0**	**2**	100%
	0%	0%	0%	0%	0%	0%	100%	0%		

PRESTON ST /twn BEECH ST & NORMAN ST (__3ZA4QS)

Years	Total # Collisions	24 Hr AADT Veh Volume	Days	Collisions/MEV
2014-2018	4	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	0	1	0	0	0	0	0	3	75%
Non-fatal injury	0	1	0	0	0	0	0	0	1	25%
Non reportable	0	0	0	0	0	0	0	0	0	0%
Total	**2**	**1**	**1**	**0**	**0**	**0**	**0**	**0**	**4**	100%
	50%	25%	25%	0%	0%	0%	0%	0%		

PRESTON ST /twn NORMAN ST & PAMILLA ST (__3ZA4QJ)

Years	Total # Collisions	24 Hr AADT Veh Volume	Days	Collisions/MEV
2014-2018	3	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	0	3	0	0	0	0	3	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**	**0**	**3**	**0**	**0**	**0**	**0**	**3**	100%
	0%	0%	0%	100%	0%	0%	0%	0%		

PRESTON ST /twn PAMILLA ST & ADELINE ST (__3ZBODV)

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	1	0	0	0	0	0	2	1	4	80%
Non-fatal injury	1	0	0	0	0	0	0	0	1	20%
Non reportable	0	0	0	0	0	0	0	0	0	0%
Total	**2**	**0**	**0**	**0**	**0**	**0**	**2**	**1**	**5**	100%
	40%	0%	0%	0%	0%	0%	40%	20%		

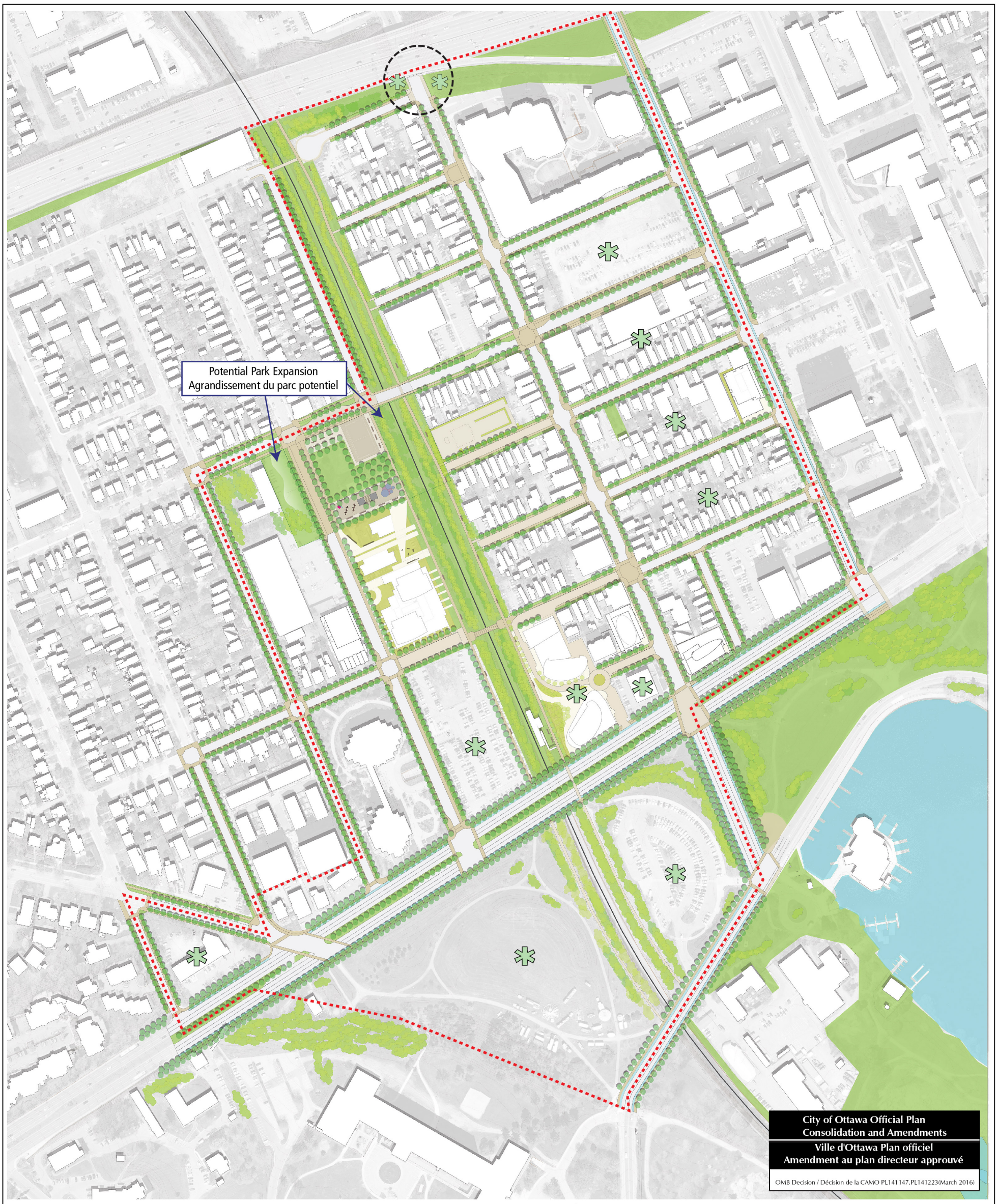
PRESTON ST /twn SIDNEY ST & CARLING AVE (__3ZBODW)

Years	Total # Collisions	24 Hr AADT Veh Volume	Days	Collisions/MEV
2014-2018	2	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	0	0	0	0	1	0	1	50%
Non-fatal injury	0	0	1	0	0	0	0	0	1	50%
Non reportable	0	0	0	0	0	0	0	0	0	0%
Total	**0**	**0**	**1**	**0**	**0**	**0**	**1**	**0**	**2**	100%
	0%	0%	50%	0%	0%	0%	50%	0%		

APPENDIX D

PRESTON CARLING SECONDARY PLAN



Preston-Carling District Secondary Plan Boundary/
Limite du Plan secondaire du secteur Preston-Carling

Special Woonerf-Type Streets / rues aménagées selon le concept de woonerf

Public Open Space / espace vert public

Multi-Use Pathway / sentier polyvalent

Bike Lanes / voies cyclables

Streetscape Tree Planting / plantation d'arbres le long des rues

Existing Buildings / bâtiments actuels

Building Applications as of Jan 2014 and Buildings Under Construction /
demandes de permis de construire en date du 24 janvier et bâtiments en construction

Urban Square/Park (in association with new development) /
jardin public (associé au nouvel aménagement)

Potential Urban Square / place publique potentielle

Ottawa

Preston-Carling District / Secteur Preston-Carling

SECONDARY PLAN - Volume 2A
Schedule C - Public Realm Plan

PLAN SECONDAIRE - Volume 2A
Annexe C – Plan du domaine public

0 50 100 200 300 400 Meters

Prepared by: Planning and Growth Management Department, Mapping & Graphics Unit
Préparé par: Service de l'urbanisme et de la gestion de la croissance, Unité de la cartographie et des graphiques

APPENDIX E

BACKGROUND VOLUME GROWTH

Carling/Preston
8 hrs

Year	Date	North Leg		South Leg		East Leg		West Leg		Total
		SB	NB	NB	SB	WB	EB	EB	WB	
2008	Thurs May 8	4020	4413	5416	5189	6363	4920	5299	6576	42196
2010	Fri July 9	4030	4113	5701	5058	5520	5880	5927	6127	42356
2011	Tues July 5	2699	4159	6079	5916	6116	5256	6554	6117	42896
2017	Tue June 20	3723	4525	6563	5415	6879	5934	6204	7495	46738

North Leg

Year	Counts				% Change			
	NB	*SB*	*NB+SB*	*INT*	*NB*	*SB*	*NB+SB*	*INT*
2008	4413	4020	8433	42196				
2010	4113	4030	8143	42356	-6.8%	0.2%	-3.4%	0.4%
2011	4159	2699	6858	42896	1.1%	-33.0%	-15.8%	1.3%
2017	4525	3723	8248	46738	8.8%	37.9%	20.3%	9.0%

Regression Estimate	2008	4210	3695	7905
Regression Estimate	2017	4448	3497	7946
Average Annual Change		**0.61%**	**-0.61%**	**0.06%**

West Leg

Year	Counts				% Change			
	EB	*WB*	*EB+WB*	*INT*	*EB*	*WB*	*EB+WB*	*INT*
2008	5299	6576	11875	42196				
2010	5927	6127	12054	42356	11.9%	-6.8%	1.5%	0.4%
2011	6554	6117	12671	42896	10.6%	-0.2%	5.1%	1.3%
2017	6204	7495	13699	46738	-5.3%	22.5%	8.1%	9.0%

Regression Estimate	2008	5731	6115	11846
Regression Estimate	2017	6413	7307	13719
Average Annual Change		**1.26%**	**2.00%**	**1.64%**

East Leg

Year	Counts				% Change			
	EB	*WB*	*EB+WB*	*INT*	*EB*	*WB*	*EB+WB*	*INT*
2008	4920	6363	11283	42196				
2010	5880	5520	11400	42356	19.5%	-13.2%	1.0%	0.4%
2011	5256	6116	11372	42896	-10.6%	10.8%	-0.2%	1.3%
2017	5934	6879	12813	46738	12.9%	12.5%	12.7%	9.0%

Regression Estimate	2008	5189	5891	11080
Regression Estimate	2017	5983	6736	12719
Average Annual Change		**1.59%**	**1.50%**	**1.54%**

South Leg

Year	Counts				% Change			
	NB	*SB*	*NB+SB*	*INT*	*NB*	*SB*	*NB+SB*	*INT*
2008	5416	5189	10605	42196				
2010	5701	5058	10759	42356	5.3%	-2.5%	1.5%	0.4%
2011	6079	5916	11995	42896	6.6%	17.0%	11.5%	1.3%
2017	6563	5415	11978	46738	8.0%	-8.5%	-0.1%	9.0%

Regression Estimate	2008	5508	5311	10819
Regression Estimate	2017	6618	5526	12144
Average Annual Change		**2.06%**	**0.44%**	**1.29%**

Carling/Preston
AM Peak

Year	Date	North Leg		South Leg		East Leg		West Leg		Total
		SB	NB	NB	SB	WB	EB	EB	WB	
2008	Thurs May 8	483	686	798	628	725	701	781	770	5572
2010	Fri July 9	399	641	844	544	630	762	760	686	5266
2011	Tues July 5	378	579	895	836	791	810	986	825	6100
2017	Tue June 20	407	770	1111	590	664	952	949	819	6262

North Leg

Year	Counts				% Change			
	NB	*SB*	*NB+SB*	*INT*	*NB*	*SB*	*NB+SB*	*INT*
2008	686	483	1169	5572				
2010	641	399	1040	5266	-6.6%	-17.4%	-11.0%	-5.5%
2011	579	378	957	6100	-9.7%	-5.3%	-8.0%	15.8%
2017	770	407	1177	6262	33.0%	7.7%	23.0%	2.7%

Regression Estimate	2008	624	435	1059
Regression Estimate	2017	740	387	1128
Average Annual Change		**1.92%**	**-1.29%**	**0.70%**

West Leg

Year	Counts				% Change			
	EB	*WB*	*EB+WB*	*INT*	*EB*	*WB*	*EB+WB*	*INT*
2008	781	770	1551	5572				
2010	760	686	1446	5266	-2.7%	-10.9%	-6.8%	-5.5%
2011	986	825	1811	6100	29.7%	20.3%	25.2%	15.8%
2017	949	819	1768	6262	-3.8%	-0.7%	-2.4%	2.7%

Regression Estimate	2008	803	746	1549
Regression Estimate	2017	973	820	1793
Average Annual Change		**2.16%**	**1.05%**	**1.64%**

East Leg

Year	Counts				% Change			
	EB	*WB*	*EB+WB*	*INT*	*EB*	*WB*	*EB+WB*	*INT*
2008	701	725	1426	5572				
2010	762	630	1392	5266	8.7%	-13.1%	-2.4%	-5.5%
2011	810	791	1601	6100	6.3%	25.6%	15.0%	15.8%
2017	952	664	1616	6262	17.5%	-16.1%	0.9%	2.7%

Regression Estimate	2008	710	720	1430
Regression Estimate	2017	957	675	1632
Average Annual Change		**3.37%**	**-0.72%**	**1.48%**

South Leg

Year	Counts				% Change			
	NB	*SB*	*NB+SB*	*INT*	*NB*	*SB*	*NB+SB*	*INT*
2008	798	628	1426	5572				
2010	844	544	1388	5266	5.8%	-13.4%	-2.7%	-5.5%
2011	895	836	1731	6100	6.0%	53.7%	24.7%	15.8%
2017	1111	590	1701	6262	24.1%	-29.4%	-1.7%	2.7%

Regression Estimate	2008	787	664	1451
Regression Estimate	2017	1108	627	1735
Average Annual Change		**3.87%**	**-0.64%**	**2.00%**

Carling/Preston
PM Peak

Year	Date	North Leg		South Leg		East Leg		West Leg		Total
		SB	NB	NB	SB	WB	EB	EB	WB	
2008	Thurs May 8	626	572	773	916	1233	688	855	1311	6974
2010	Fri July 9	779	557	701	1016	953	982	1201	1079	7268
2011	Tues July 5	395	618	959	1046	982	743	1119	1048	6910
2017	Tue June 20	494	443	609	494	591	635	575	697	4538

North Leg

Year	Counts				% Change			
	NB	*SB*	*NB+SB*	*INT*	*NB*	*SB*	*NB+SB*	*INT*
2008	572	626	1198	6974				
2010	557	779	1336	7268	-2.6%	24.4%	11.5%	4.2%
2011	618	395	1013	6910	11.0%	-49.3%	-24.2%	-4.9%
2017	443	494	937	4538	-28.3%	25.1%	-7.5%	-34.3%

Regression Estimate	2008	603	639	1242
Regression Estimate	2017	461	471	932
Average Annual Change		**-2.94%**	**-3.33%**	**-3.14%**

West Leg

Year	Counts				% Change			
	EB	*WB*	*EB+WB*	*INT*	*EB*	*WB*	*EB+WB*	*INT*
2008	855	1311	2166	6974				
2010	1201	1079	2280	7268	40.5%	-17.7%	5.3%	4.2%
2011	1119	1048	2167	6910	-6.8%	-2.9%	-5.0%	-4.9%
2017	575	697	1272	4538	-48.6%	-33.5%	-41.3%	-34.3%

Regression Estimate	2008	1108	1259	2367
Regression Estimate	2017	670	680	1349
Average Annual Change		**-5.44%**	**-6.62%**	**-6.05%**

East Leg

Year	Counts				% Change			
	EB	*WB*	*EB+WB*	*INT*	*EB*	*WB*	*EB+WB*	*INT*
2008	688	1233	1921	6974				
2010	982	953	1935	7268	42.7%	-22.7%	0.7%	4.2%
2011	743	982	1725	6910	-24.3%	3.0%	-10.9%	-4.9%
2017	635	591	1226	4538	-14.5%	-39.8%	-28.9%	-34.3%

Regression Estimate	2008	821	1172	1993
Regression Estimate	2017	669	575	1244
Average Annual Change		**-2.25%**	**-7.61%**	**-5.10%**

South Leg

Year	Counts				% Change			
	NB	*SB*	*NB+SB*	*INT*	*NB*	*SB*	*NB+SB*	*INT*
2008	773	916	1689	6974				
2010	701	1016	1717	7268	-9.3%	10.9%	1.7%	4.2%
2011	959	1046	2005	6910	36.8%	3.0%	16.8%	-4.9%
2017	609	494	1103	4538	-36.5%	-52.8%	-45.0%	-34.3%

Regression Estimate	2008	829	1065	1895
Regression Estimate	2017	652	558	1210
Average Annual Change		**-2.64%**	**-6.93%**	**-4.86%**

APPENDIX F

MMLOS ANALYSIS: SEGMENTS

Multi-Modal Level of Service - Segments Form

Consultant	**Parsons**	**Project**	**477732**
Scenario	**93 Norman**	**Date**	**11-Feb-21**
Comments			

SEGMENTS		**Street A**	Norman St	Improve	Section	Section	Section	Section	Section	Section	Section
			1	2	3	4	5	6	7	8	9
Pedestrian	Sidewalk Width Boulevard Width	**E**	1.5 m < 0.5 m	≥ 2 m > 2 m							
	Avg Daily Curb Lane Traffic Volume		≤ 3000	≤ 3000							
	Operating Speed On-Street Parking		> 30 to 50 km/h yes	> 30 to 50 km/h yes							
	Exposure to Traffic PLoS		**E**	**A**	-	-	-	-	-	-	-
	Effective Sidewalk Width		1.5 m	3.0 m							
	Pedestrian Volume		250 ped/hr	250 ped/hr							
	Crowding PLoS		**B**	**A**	-	-	-	-	-	-	-
	Level of Service		**E**	**A**	-	-	-	-	-	-	-
Bicycle	Type of Cycling Facility	**B**	Mixed Traffic								
	Number of Travel Lanes		≤ 2 (no centreline)								
	Operating Speed		>40 to <50 km/h								
	# of Lanes & Operating Speed LoS		**B**	-	-	-	-	-	-	-	-
	Bike Lane (+ Parking Lane) Width										
	Bike Lane Width LoS		-	-	-	-	-	-	-	-	-
	Bike Lane Blockages										
	Blockage LoS		-	-	-	-	-	-	-	-	-
	Median Refuge Width (no median = < 1.8 m)		< 1.8 m refuge								
	No. of Lanes at Unsignalized Crossing		≤ 3 lanes								
	Sidestreet Operating Speed		>40 to 50 km/h								
	Unsignalized Crossing - Lowest LoS		**B**	-	-	-	-	-	-	-	-
	Level of Service		**B**	-	-	-	-	-	-	-	-
Transit	Facility Type	-									
	Friction or Ratio Transit:Posted Speed										
	Level of Service		-	-	-	-	-	-	-	-	-
Truck	Truck Lane Width	-									
	Travel Lanes per Direction										
	Level of Service		-	-	-	-	-	-	-	-	-

APPENDIX G

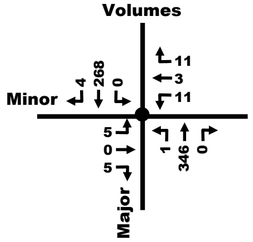
WARRANT ANALYSIS

Norman/Preston - Future

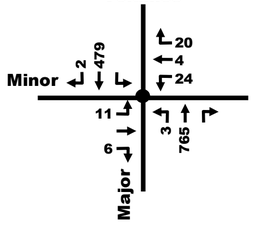
AWSC Warrant			Description	Minimum Requirement for a four-leg intersection	Compliance		
					Sectional %	Entire %	Warrant
Intersection	1. Minimum Volume Criterion	A	Vehicle Volume, All Approaches for Each of the Heaviest 8 Hours of on Average Day, or	200	327%	11%	**No**
		B	Vehicle Volume, All Approaches for the Heaviest Peak Hour, and	350	375%		
		C	Vehicle and pedestrian Volume, Along Minor Streets for Each of the Same 8 Hours, and	80	44%		
		D	The volume split between the major and minor streets	65/35	11%		
	2. Minimum Collision Criterion	A	Vehicle Volume, Along Major Street for Each of the Heaviest 8 Hours of an Average Day, and	9	22%	22%	

Note: **2** *preventable by AWSC collisions (i.e. right angle and turning movement collisions) were reported during a 3 year time period*

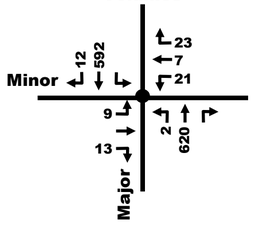
Average 8 Hour Volumes



AM Peak Hour Volumes



PM Peak Hour Volumes



		Major Preston								Minor Norman			
	Peak	NBL	NBT	NBR	SBL	SBT	SBR	EBL	EBT	EBR	WBL	WBT	WBR
Existing	8 hr												
	AM	3	765			479	2	11		6	24	4	20
	PM	2	620			592	12	9		13	21	7	23
Site Generated	AM												
	PM												
	Avg. 8 hr	1	346	0	0	268	4	5	0	5	11	3	11

Norman/Preston - (peak hour signal warrant)

Signal Warrant			Description	Minimum Requirement for Two-Lane Roadways	Compliance		
				Restricted Flow - Operating Speed Less Than 70 km/h	Sectional %	Entire %	Warrant
Intersection	1. Minimum Vehicular Volume	(1) A	Vehicle Volume, All Approaches for Each of the Heaviest 8 Hours of on Average Day, and	720	91%	21%	**25% No**
		(4) B	Vehicle Volume, Along Minor Streets for Each of the Same 8 Hours	170	21%		
	2. Delay to Cross Traffic	(1) A	Vehicle Volume, Along Major Street for Each of the Heaviest 8 Hours of an Average Day, and	720	86%	25%	
		(2) B	Combined Vehicle and Pedestrian Volume Crossing the Major Street for Each of the Same 8 Hours	75	25%		

Notes

1 *Vehicle Volume Warrants (1A), (2A) and (5B) for Roadways Having Two or More Moving Lanes in one Direction Should Be 25% Higher Than Values Given Above*

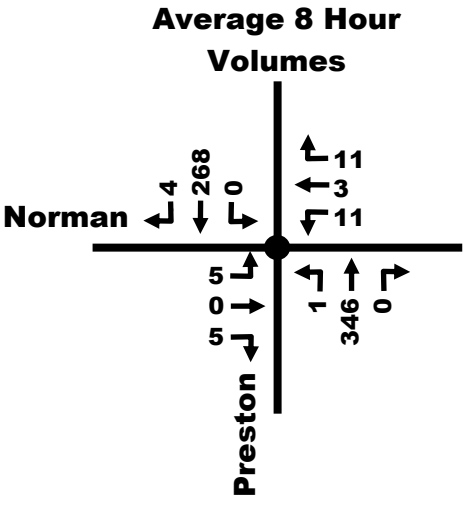
No

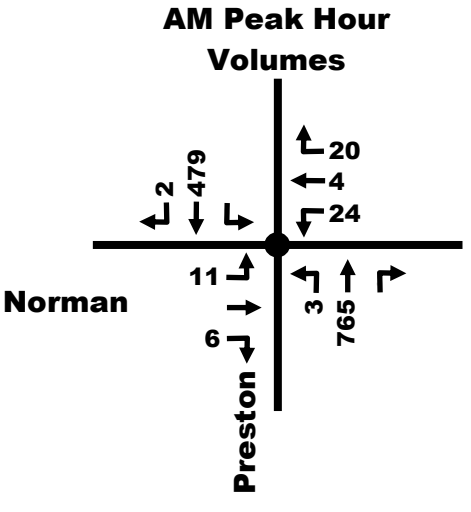
2 *For Definition of Crossing Volume Refer to Note 4 on the Signal Warrant Analysis Form B2.03.08*

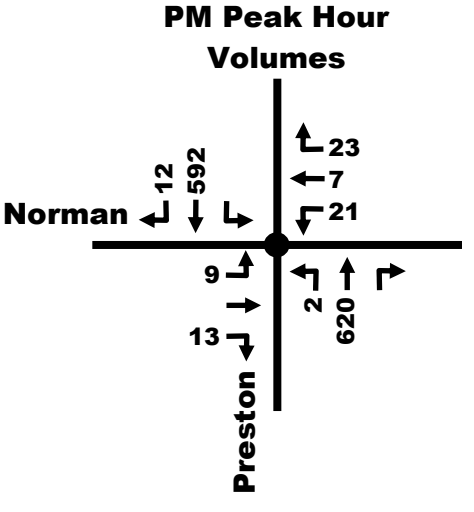
3 *The Lowest Sectional Percentage Governs the Entire Warrant*

4 *For "T" Intersections the Warrant Values for Minor Street Should be Increased by 50% (Warrant 1B only)*

No







APPENDIX H

TDM MEASURES

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

Legend

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

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

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

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

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

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

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

Legend

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

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

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

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

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

APPENDIX I

MMLOS ANALYSIS: INTERSECTIONS

Multi-Modal Level of Service - Intersections Form

Consultant	**Parsons**	**Project**	**477732**
Scenario	**93 Norman**	**Date**	**11-Feb-21**
Comments			

Unlocked Rows for Replicating

INTERSECTIONS		Beech/Preston				Pamila/Preston				Carling/Preston				Trillium MUP/Carling			
Crossing Side		NORTH	SOUTH	EAST	WEST	NORTH	SOUTH	EAST	WEST	NORTH	SOUTH	EAST	WEST	NORTH	SOUTH	EAST	WEST
Pedestrian	Lanes	4	4	4	0 - 2	4	4	0 - 2	0 - 2	5	7	10+	9			8	8
	Median	No Median - 2.4 m	No Median - 2.4 m	No Median - 2.4 m	No Median - 2.4 m	No Median - 2.4 m	No Median - 2.4 m	No Median - 2.4 m	No Median - 2.4 m	No Median - 2.4 m	No Median - 2.4 m	Median > 2.4 m	Median > 2.4 m			Median > 2.4 m	Median > 2.4 m
	Conflicting Left Turns	Permissive	Permissive	Permissive	Permissive	Permissive	Permissive	Permissive	Permissive	Protected	Protected	Permissive	Protected/ Permissive			No left turn / Prohib.	No left turn / Prohib.
	Conflicting Right Turns	Permissive or yield control	Permissive or yield control	Permissive or yield control	Permissive or yield control	Permissive or yield control	Permissive or yield control	Permissive or yield control	Permissive or yield control	Permissive or yield control	Permissive or yield control	Permissive or yield control	Permissive or yield control			No right turn	No right turn
	Right Turns on Red (RToR) ?	RTOR allowed	RTOR allowed	RTOR allowed	RTOR allowed	RTOR allowed	RTOR allowed	RTOR allowed	RTOR allowed	RTOR allowed	RTOR allowed	RTOR allowed	RTOR allowed			RTOR prohibited	RTOR prohibited
	Ped Signal Leading Interval?	No	No	No	No	No	No	No	No	No	No	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			No Right Turn	No Right Turn
	Corner Radius	5-10m	5-10m	5-10m	5-10m	5-10m	5-10m	5-10m	5-10m	5-10m	10-15m	5-10m	5-10m			No Right Turn	No Right Turn
	Crosswalk Type	Textured/coloured pavement	Textured/coloured pavement	Textured/coloured pavement	Textured/coloured pavement	Std transverse markings	Std transverse markings	Textured/coloured pavement	Textured/coloured pavement	Std transverse markings	Std transverse markings	Std transverse markings	Std transverse markings			Zebra stripe hi-vis markings	Zebra stripe hi-vis markings
	PETSI Score	**57**	**57**	**57**	**89**	**54**	**54**	**89**	**89**	**46**	**12**	**-34**	**-19**			**26**	**26**
	Ped. Exposure to Traffic LoS	**D**	**D**	**D**	**B**	**D**	**D**	**B**	**B**	**D**	**F**	**#N/A**	**#N/A**	**-**	**-**	**F**	**F**
	Cycle Length	57	57	23	23	69	69	21	21	41	41	69	45			70	70
	Effective Walk Time	28	28	17	17	23	23	15	15	24	24	37	37			35	35
	Average Pedestrian Delay	**7**	**7**	**1**	**1**	**15**	**15**	**1**	**1**	**4**	**4**	**7**	**1**			**9**	**9**
	Pedestrian Delay LoS	**A**	**A**	**A**	**A**	**B**	**B**	**A**	**A**	**A**	**A**	**A**	**A**	**-**	**-**	**A**	**A**
	Level of Service	**D**	**D**	**D**	**B**	**D**	**D**	**B**	**B**	**D**	**F**	**#N/A**	**#N/A**	**-**	**-**	**F**	**F**
		D				**D**				**#N/A**				**F**			
Approach From		NORTH	SOUTH	EAST	WEST	NORTH	SOUTH	EAST	WEST	NORTH	SOUTH	EAST	WEST	NORTH	SOUTH	EAST	WEST
Bicycle	Bicycle Lane Arrangement on Approach	Mixed Traffic	Mixed Traffic	Mixed Traffic	Mixed Traffic	Mixed Traffic	Mixed Traffic	Mixed Traffic	Mixed Traffic	Mixed Traffic	Mixed Traffic	Mixed Traffic	Mixed Traffic			Mixed Traffic	Mixed Traffic
	Right Turn Lane Configuration	≤ 50 m	≤ 50 m	≤ 50 m	≤ 50 m	≤ 50 m	≤ 50 m	≤ 50 m	≤ 50 m	≤ 50 m	≤ 50 m	≤ 50 m	≤ 50 m			≤ 50 m	≤ 50 m
	Right Turning Speed	≤ 25 km/h	≤ 25 km/h	≤ 25 km/h	≤ 25 km/h	≤ 25 km/h	≤ 25 km/h	≤ 25 km/h	≤ 25 km/h	≤ 25 km/h	≤ 25 km/h	≤ 25 km/h	≤ 25 km/h			≤ 25 km/h	≤ 25 km/h
	Cyclist relative to RT motorists	**D**	**D**	**D**	**D**	**D**	**D**	**D**	**D**	**D**	**D**	**D**	**D**	**-**	**-**	**D**	**D**
	Separated or Mixed Traffic	**Mixed Traffic**	**Mixed Traffic**	**Mixed Traffic**	**Mixed Traffic**	**Mixed Traffic**	**Mixed Traffic**	**Mixed Traffic**	**Mixed Traffic**	**Mixed Traffic**	**Mixed Traffic**	**Mixed Traffic**	**Mixed Traffic**	**-**	**-**	**Mixed Traffic**	**Mixed Traffic**
	Left Turn Approach	No lane crossed	No lane crossed	No lane crossed	No lane crossed	No lane crossed	No lane crossed	No lane crossed	No lane crossed	One lane crossed	≥ 2 lanes crossed	≥ 2 lanes crossed	≥ 2 lanes crossed			No lane crossed	No lane crossed
	Operating Speed	> 40 to ≤ 50 km/h	> 40 to ≤ 50 km/h	> 40 to ≤ 50 km/h	> 40 to ≤ 50 km/h	> 40 to ≤ 50 km/h	> 40 to ≤ 50 km/h	> 40 to ≤ 50 km/h	> 40 to ≤ 50 km/h	> 50 to < 60 km/h	> 50 to < 60 km/h	> 50 to < 60 km/h	> 50 to < 60 km/h			> 50 to < 60 km/h	> 50 to < 60 km/h
	Left Turning Cyclist	**B**	**B**	**B**	**B**	**B**	**B**	**B**	**B**	**E**	**F**	**F**	**F**	**-**	**-**	**C**	**C**
	Level of Service	**D**	**D**	**D**	**D**	**D**	**D**	**D**	**D**	**E**	**F**	**F**	**F**	**-**	**-**	**D**	**D**
		D				**D**				**F**				**D**			
Transit	Average Signal Delay	≤ 10 sec	≤ 10 sec			≤ 10 sec	≤ 10 sec			> 40 sec	> 40 sec	> 40 sec	> 40 sec			≤ 10 sec	≤ 10 sec
	Level of Service	**B**	**B**	**-**	**-**	**B**	**B**	**-**	**-**	**F**	**F**	**F**	**F**	**-**	**-**	**B**	**B**
		B				**B**				**F**				**B**			
Truck	Effective Corner Radius									< 10 m	10 - 15 m	< 10 m	< 10 m				
	Number of Receiving Lanes on Departure from Intersection									≥ 2	≥ 2	≥ 2	≥ 2				
	Level of Service	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**D**	**B**	**D**	**D**	**-**	**-**	**-**	**-**
		-				**-**				**D**				**-**			
Auto	Volume to Capacity Ratio																
	Level of Service	**-**				**-**				**-**				**-**			

APPENDIX J

SYNCHRO ANAYLYSIS: EXISTING

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	38	73	31	19	56	8	26	611	43	19	351	36
Future Volume (vph)	38	73	31	19	56	8	26	611	43	19	351	36
Satd. Flow (prot)	0	1660	0	0	1763	1517	1695	1755	0	1695	1744	0
Flt Permitted		0.885			0.905		0.491			0.309		
Satd. Flow (perm)	0	1459	0	0	1590	1327	848	1755	0	539	1744	0
Satd. Flow (RTOR)		16				34		9			13	
Lane Group Flow (vph)	0	157	0	0	83	9	29	727	0	21	430	0
Turn Type	Perm	NA		Perm	NA	Perm	Perm	NA		Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases	4			8		8	2			6		
Detector Phase	4	4		8	8	8	2	2		6	6	
Switch Phase												
Minimum Initial (s)	10.0	10.0		10.0	10.0	10.0	10.0	10.0		10.0	10.0	
Minimum Split (s)	22.6	22.6		22.6	22.6	22.6	33.5	33.5		33.5	33.5	
Total Split (s)	23.0	23.0		23.0	23.0	23.0	57.0	57.0		57.0	57.0	
Total Split (%)	28.8%	28.8%		28.8%	28.8%	28.8%	71.3%	71.3%		71.3%	71.3%	
Yellow Time (s)	3.3	3.3		3.3	3.3	3.3	3.3	3.3		3.3	3.3	
All-Red Time (s)	2.3	2.3		2.3	2.3	2.3	2.2	2.2		2.2	2.2	
Lost Time Adjust (s)		0.0			0.0	0.0	0.0	0.0		0.0	0.0	
Total Lost Time (s)		5.6			5.6	5.6	5.5	5.5		5.5	5.5	
Lead/Lag												
Lead-Lag Optimize?												
Recall Mode	None	None		None	None	None	C-Min	C-Min		C-Min	C-Min	
Act Effct Green (s)		13.8			13.8	13.8	55.1	55.1		55.1	55.1	
Actuated g/C Ratio		0.17			0.17	0.17	0.69	0.69		0.69	0.69	
v/c Ratio		0.59			0.30	0.04	0.05	0.60		0.06	0.36	
Control Delay		36.0			30.5	0.6	6.1	14.3		5.7	6.6	
Queue Delay		0.0			0.0	0.0	0.0	2.1		0.0	0.0	
Total Delay		36.0			30.5	0.6	6.1	16.3		5.7	6.6	
LOS		D			C	A	A	B		A	A	
Approach Delay		36.0			27.6			15.9			6.5	
Approach LOS		D			C			B			A	
Queue Length 50th (m)		20.2			11.3	0.0	1.2	86.8		0.8	20.9	
Queue Length 95th (m)		35.5			21.7	0.5	m3.8	154.1		3.7	43.7	
Internal Link Dist (m)		209.3			157.6			59.1			55.0	
Turn Bay Length (m)						5.0	25.0			25.0		
Base Capacity (vph)		333			350	319	586	1216		372	1209	
Starvation Cap Reductn		0			0	0	0	331		0	0	
Spillback Cap Reductn		0			0	0	0	0		0	0	
Storage Cap Reductn		0			0	0	0	0		0	0	
Reduced v/c Ratio		0.47			0.24	0.03	0.05	0.82		0.06	0.36	

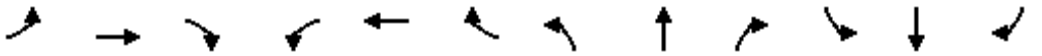
Intersection Summary
Cycle Length: 80
Actuated Cycle Length: 80
Offset: 0 (0%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green
Natural Cycle: 60
Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.60

Intersection Signal Delay: 15.9	Intersection LOS: B
Intersection Capacity Utilization 75.9%	ICU Level of Service D
Analysis Period (min) 15	

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

Splits and Phases: 1: Preston & Beech



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	146	603	237	139	450	98	297	557	301	83	237	103
Future Volume (vph)	146	603	237	139	450	98	297	557	301	83	237	103
Satd. Flow (prot)	1695	4871	1517	1695	4648	0	1695	3190	0	1695	1672	0
Flt Permitted	0.950			0.950			0.244			0.300		
Satd. Flow (perm)	1624	4871	1259	1627	4648	0	428	3190	0	535	1672	0
Satd. Flow (RTOR)			263		38			119			20	
Lane Group Flow (vph)	162	670	263	154	609	0	330	953	0	92	377	0
Turn Type	Prot	NA	Perm	Prot	NA		pm+pt	NA		Perm	NA	
Protected Phases	5	2		1	6		3	8			4	
Permitted Phases			2				8			4		
Detector Phase	5	2	2	1	6		3	8		4	4	
Switch Phase												
Minimum Initial (s)	5.0	10.0	10.0	5.0	10.0		5.0	10.0		10.0	10.0	
Minimum Split (s)	11.2	30.0	30.0	11.2	30.0		11.9	43.9		43.9	43.9	
Total Split (s)	18.0	35.0	35.0	18.0	35.0		20.0	67.0		47.0	47.0	
Total Split (%)	15.0%	29.2%	29.2%	15.0%	29.2%		16.7%	55.8%		39.2%	39.2%	
Yellow Time (s)	3.7	3.7	3.7	3.7	3.7		3.3	3.3		3.3	3.3	
All-Red Time (s)	2.5	2.3	2.3	2.5	2.3		3.6	3.6		3.6	3.6	
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)	6.2	6.0	6.0	6.2	6.0		6.9	6.9		6.9	6.9	
Lead/Lag	Lead	Lag	Lag	Lead	Lag		Lead			Lag	Lag	
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes		Yes			Yes	Yes	
Recall Mode	None	C-Min	C-Min	None	C-Min		None	None		None	None	
Act Effct Green (s)	14.4	29.1	29.1	13.9	28.6		57.9	57.9		34.5	34.5	
Actuated g/C Ratio	0.12	0.24	0.24	0.12	0.24		0.48	0.48		0.29	0.29	
v/c Ratio	0.80	0.57	0.52	0.79	0.54		0.87	0.60		0.60	0.76	
Control Delay	71.2	36.2	21.9	78.5	39.9		45.5	20.8		52.7	46.8	
Queue Delay	0.0	0.0	0.6	0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay	71.2	36.2	22.4	78.5	39.9		45.5	20.8		52.7	46.8	
LOS	E	D	C	E	D		D	C		D	D	
Approach Delay		38.1			47.7			27.2			48.0	
Approach LOS		D			D			C			D	
Queue Length 50th (m)	37.5	54.6	24.4	35.5	45.4		45.2	67.8		18.1	74.6	
Queue Length 95th (m)	#81.8	65.1	54.4	#76.3	55.4		#97.2	89.6		35.6	105.6	
Internal Link Dist (m)		95.0			162.0			66.0			47.4	
Turn Bay Length (m)	70.0		40.0	75.0			80.0			35.0		
Base Capacity (vph)	203	1277	523	196	1227		380	1675		178	572	
Starvation Cap Reductn	0	0	67	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	0.80	0.52	0.58	0.79	0.50		0.87	0.57		0.52	0.66	

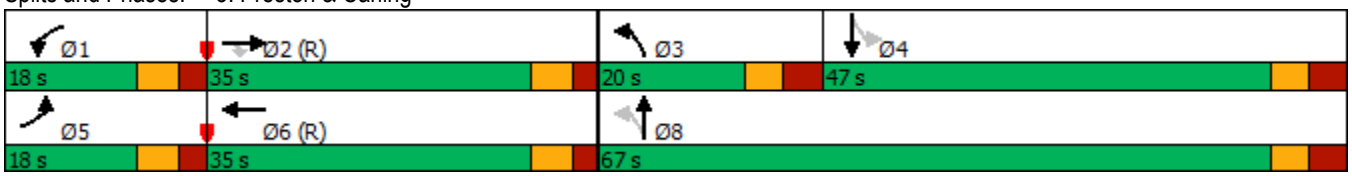
Intersection Summary
Cycle Length: 120
Actuated Cycle Length: 120
Offset: 116 (97%), Referenced to phase 2:EBT and 6:WBT, Start of Green
Natural Cycle: 100
Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.87

Intersection Signal Delay: 37.5	Intersection LOS: D
Intersection Capacity Utilization 95.7%	ICU Level of Service F
Analysis Period (min) 15	

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

Splits and Phases: 3: Preston & Carling



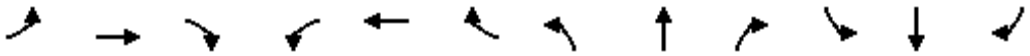
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	1	5	6	0	0	0	9	666	44	12	407	5
Future Volume (vph)	1	5	6	0	0	0	9	666	44	12	407	5
Satd. Flow (prot)	0	1569	0	0	0	0	0	1758	0	0	1777	0
Flt Permitted		0.996						0.994			0.978	
Satd. Flow (perm)	0	1564	0	0	0	0	0	1748	0	0	1739	0
Satd. Flow (RTOR)		7						9			2	
Lane Group Flow (vph)	0	14	0	0	0	0	0	799	0	0	471	0
Turn Type	Perm	NA					Perm	NA		Perm	NA	
Protected Phases		4						2			6	
Permitted Phases	4						2			6		
Detector Phase	4	4					2	2		6	6	
Switch Phase												
Minimum Initial (s)	10.0	10.0					10.0	10.0		10.0	10.0	
Minimum Split (s)	20.5	20.5					34.1	34.1		34.1	34.1	
Total Split (s)	21.0	21.0					59.0	59.0		59.0	59.0	
Total Split (%)	26.3%	26.3%					73.8%	73.8%		73.8%	73.8%	
Yellow Time (s)	3.3	3.3					3.3	3.3		3.3	3.3	
All-Red Time (s)	2.2	2.2					1.8	1.8		1.8	1.8	
Lost Time Adjust (s)		0.0						0.0			0.0	
Total Lost Time (s)		5.5						5.1			5.1	
Lead/Lag												
Lead-Lag Optimize?												
Recall Mode	None	None					C-Min	C-Min		C-Min	C-Min	
Act Effct Green (s)		13.0						64.6			64.6	
Actuated g/C Ratio		0.16						0.81			0.81	
v/c Ratio		0.05						0.57			0.34	
Control Delay		20.5						7.6			6.2	
Queue Delay		0.0						0.1			0.0	
Total Delay		20.5						7.7			6.2	
LOS		C						A			A	
Approach Delay		20.5						7.7			6.2	
Approach LOS		C						A			A	
Queue Length 50th (m)		0.9						60.2			22.9	
Queue Length 95th (m)		5.5						95.7			63.1	
Internal Link Dist (m)		206.9			156.6			101.5			55.4	
Turn Bay Length (m)												
Base Capacity (vph)		308						1414			1405	
Starvation Cap Reductn		0						98			0	
Spillback Cap Reductn		0						82			0	
Storage Cap Reductn		0						0			0	
Reduced v/c Ratio		0.05						0.61			0.34	

Intersection Summary
Cycle Length: 80
Actuated Cycle Length: 80
Offset: 48 (60%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green
Natural Cycle: 60
Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.57

Intersection Signal Delay: 7.3	Intersection LOS: A
Intersection Capacity Utilization 63.3%	ICU Level of Service B
Analysis Period (min) 15	

Splits and Phases: 5: Preston & Pamila



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↑↑↑			↑↑↑							
Traffic Volume (vph)	0	986	0	0	851	0	0	0	0	0	0	0
Future Volume (vph)	0	986	0	0	851	0	0	0	0	0	0	0
Satd. Flow (prot)	0	4871	0	0	4871	0	0	0	0	0	0	0
Flt Permitted												
Satd. Flow (perm)	0	4871	0	0	4871	0	0	0	0	0	0	0
Satd. Flow (RTOR)												
Lane Group Flow (vph)	0	1096	0	0	946	0	0	0	0	0	0	0
Turn Type		NA			NA							
Protected Phases		2			6							
Permitted Phases												
Detector Phase		2			6							
Switch Phase												
Minimum Initial (s)		10.0			10.0							
Minimum Split (s)		32.9			32.9							
Total Split (s)		84.0			84.0							
Total Split (%)		70.0%			70.0%							
Yellow Time (s)		3.7			3.7							
All-Red Time (s)		1.4			1.4							
Lost Time Adjust (s)		0.0			0.0							
Total Lost Time (s)		5.1			5.1							
Lead/Lag												
Lead-Lag Optimize?												
Recall Mode		C-Min			C-Min							
Act Effct Green (s)		87.4			87.4							
Actuated g/C Ratio		0.73			0.73							
v/c Ratio		0.31			0.27							
Control Delay		7.9			9.9							
Queue Delay		0.0			0.2							
Total Delay		7.9			10.2							
LOS		A			B							
Approach Delay		7.9			10.2							
Approach LOS		A			B							
Queue Length 50th (m)		38.0			39.7							
Queue Length 95th (m)		45.3			m40.6							
Internal Link Dist (m)		343.9			95.0			79.9			89.7	
Turn Bay Length (m)												
Base Capacity (vph)		3549			3549							
Starvation Cap Reductn		0			1685							
Spillback Cap Reductn		0			0							
Storage Cap Reductn		0			0							
Reduced v/c Ratio		0.31			0.51							

Intersection Summary
Cycle Length: 120
Actuated Cycle Length: 120
Offset: 112 (93%), Referenced to phase 2:EBT and 6:WBT, Start of Green
Natural Cycle: 70
Control Type: Actuated-Coordinated

Lane Group	Ø4	Ø8
Lane Configurations		
Traffic Volume (vph)		
Future Volume (vph)		
Satd. Flow (prot)		
Flt Permitted		
Satd. Flow (perm)		
Satd. Flow (RTOR)		
Lane Group Flow (vph)		
Turn Type		
Protected Phases	4	8
Permitted Phases		
Detector Phase		
Switch Phase		
Minimum Initial (s)	1.0	1.0
Minimum Split (s)	36.0	36.0
Total Split (s)	36.0	36.0
Total Split (%)	30%	30%
Yellow Time (s)	3.0	3.0
All-Red Time (s)	3.6	3.6
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

Maximum v/c Ratio: 0.31

Intersection Signal Delay: 8.9	Intersection LOS: A
Intersection Capacity Utilization 24.4%	ICU Level of Service A
Analysis Period (min) 15	

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

Splits and Phases: 6: Carling & Trillium MUP

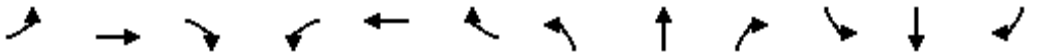
Intersection	
Int Delay, s/veh	1

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	4	0	3	16	3	20	2	666	0	0	420	2
Future Vol, veh/h	4	0	3	16	3	20	2	666	0	0	420	2
Conflicting Peds, #/hr	5	0	2	2	0	5	37	0	72	72	0	37
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	90	90	90	90	90	90	90	90	90	90	90	90
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	4	0	3	18	3	22	2	740	0	0	467	2

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	1267	1249	507	1216	1250	745	506	0	-	-	-	0
Stage 1	505	505	-	744	744	-	-	-	-	-	-	-
Stage 2	762	744	-	472	506	-	-	-	-	-	-	-
Critical Hdwy	7.12	6.52	6.22	7.12	6.52	6.22	4.12	-	-	-	-	-
Critical Hdwy Stg 1	6.12	5.52	-	6.12	5.52	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.12	5.52	-	6.12	5.52	-	-	-	-	-	-	-
Follow-up Hdwy	3.518	4.018	3.318	3.518	4.018	3.318	2.218	-	-	-	-	-
Pot Cap-1 Maneuver	146	173	566	158	173	414	1059	-	0	0	-	-
Stage 1	549	540	-	407	421	-	-	-	0	0	-	-
Stage 2	397	421	-	573	540	-	-	-	0	0	-	-
Platoon blocked, %								-			-	-
Mov Cap-1 Maneuver	131	167	547	156	167	412	1026	-	-	-	-	-
Mov Cap-2 Maneuver	131	167	-	156	167	-	-	-	-	-	-	-
Stage 1	530	523	-	406	420	-	-	-	-	-	-	-
Stage 2	370	420	-	569	523	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	24.3	24.1	0	0
HCM LOS	C	C		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	WBLn1	SBT	SBR
Capacity (veh/h)	1026	-	194	231	-	-
HCM Lane V/C Ratio	0.002	-	0.04	0.188	-	-
HCM Control Delay (s)	8.5	0	24.3	24.1	-	-
HCM Lane LOS	A	A	C	C	-	-
HCM 95th %tile Q(veh)	0	-	0.1	0.7	-	-



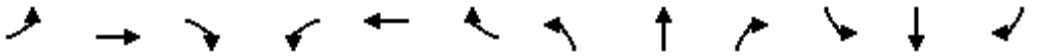
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	26	40	33	31	137	24	83	452	37	17	445	51
Future Volume (vph)	26	40	33	31	137	24	83	452	37	17	445	51
Satd. Flow (prot)	0	1593	0	0	1768	1517	1695	1744	0	1695	1737	0
Flt Permitted		0.861			0.931		0.409			0.414		
Satd. Flow (perm)	0	1362	0	0	1632	1282	705	1744	0	699	1737	0
Satd. Flow (RTOR)		25				30		10			15	
Lane Group Flow (vph)	0	110	0	0	186	27	92	543	0	19	551	0
Turn Type	Perm	NA		Perm	NA	Perm	Perm	NA		Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases	4			8		8	2			6		
Detector Phase	4	4		8	8	8	2	2		6	6	
Switch Phase												
Minimum Initial (s)	10.0	10.0		10.0	10.0	10.0	10.0	10.0		10.0	10.0	
Minimum Split (s)	22.6	22.6		22.6	22.6	22.6	33.5	33.5		33.5	33.5	
Total Split (s)	23.0	23.0		23.0	23.0	23.0	67.0	67.0		67.0	67.0	
Total Split (%)	25.6%	25.6%		25.6%	25.6%	25.6%	74.4%	74.4%		74.4%	74.4%	
Yellow Time (s)	3.3	3.3		3.3	3.3	3.3	3.3	3.3		3.3	3.3	
All-Red Time (s)	2.3	2.3		2.3	2.3	2.3	2.2	2.2		2.2	2.2	
Lost Time Adjust (s)		0.0			0.0	0.0	0.0	0.0		0.0	0.0	
Total Lost Time (s)		5.6			5.6	5.6	5.5	5.5		5.5	5.5	
Lead/Lag												
Lead-Lag Optimize?												
Recall Mode	None	None		None	None	None	C-Min	C-Min		C-Min	C-Min	
Act Effct Green (s)		16.6			16.6	16.6	62.3	62.3		62.3	62.3	
Actuated g/C Ratio		0.18			0.18	0.18	0.69	0.69		0.69	0.69	
v/c Ratio		0.41			0.62	0.10	0.19	0.45		0.04	0.46	
Control Delay		28.4			42.5	10.6	6.8	7.7		5.6	8.1	
Queue Delay		0.0			0.0	0.0	0.0	0.1		0.0	0.0	
Total Delay		28.4			42.5	10.6	6.8	7.7		5.6	8.1	
LOS		C			D	B	A	A		A	A	
Approach Delay		28.4			38.5			7.6			8.0	
Approach LOS		C			D			A			A	
Queue Length 50th (m)		12.8			29.7	0.0	4.9	36.1		0.9	36.4	
Queue Length 95th (m)		26.3			47.9	5.9	12.7	53.8		3.5	65.9	
Internal Link Dist (m)		209.3			157.6			59.1			55.0	
Turn Bay Length (m)						5.0	25.0			25.0		
Base Capacity (vph)		295			330	283	494	1226		490	1223	
Starvation Cap Reductn		0			0	0	0	77		0	0	
Spillback Cap Reductn		0			0	0	0	0		0	0	
Storage Cap Reductn		0			0	0	0	0		0	0	
Reduced v/c Ratio		0.37			0.56	0.10	0.19	0.47		0.04	0.45	

Intersection Summary
Cycle Length: 90
Actuated Cycle Length: 90
Offset: 0 (0%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green
Natural Cycle: 60
Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.62

Intersection Signal Delay: 13.6	Intersection LOS: B
Intersection Capacity Utilization 81.1%	ICU Level of Service D
Analysis Period (min) 15	

Splits and Phases: 1: Preston & Beech



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	122	570	389	355	1061	47	358	383	173	84	327	116
Future Volume (vph)	122	570	389	355	1061	47	358	383	173	84	327	116
Satd. Flow (prot)	1695	4871	1517	1695	4820	0	1695	3153	0	1695	1675	0
Flt Permitted	0.950			0.950			0.089			0.418		
Satd. Flow (perm)	1667	4871	1307	1625	4820	0	159	3153	0	726	1675	0
Satd. Flow (RTOR)			301		4			67			13	
Lane Group Flow (vph)	136	633	432	394	1231	0	398	618	0	93	492	0
Turn Type	Prot	NA	Perm	Prot	NA		pm+pt	NA		Perm	NA	
Protected Phases	5	2		1	6		3	8			4	
Permitted Phases			2				8			4		
Detector Phase	5	2	2	1	6		3	8		4	4	
Switch Phase												
Minimum Initial (s)	5.0	10.0	10.0	5.0	10.0		5.0	10.0		10.0	10.0	
Minimum Split (s)	11.2	30.0	30.0	11.2	30.0		11.9	43.9		43.9	43.9	
Total Split (s)	30.0	41.0	41.0	30.0	41.0		24.0	69.0		45.0	45.0	
Total Split (%)	21.4%	29.3%	29.3%	21.4%	29.3%		17.1%	49.3%		32.1%	32.1%	
Yellow Time (s)	3.7	3.7	3.7	3.7	3.7		3.3	3.3		3.3	3.3	
All-Red Time (s)	2.5	2.3	2.3	2.5	2.3		3.6	3.6		3.6	3.6	
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)	6.2	6.0	6.0	6.2	6.0		6.9	6.9		6.9	6.9	
Lead/Lag	Lead	Lag	Lag	Lead	Lag		Lead			Lag	Lag	
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes		Yes			Yes	Yes	
Recall Mode	None	C-Min	C-Min	None	C-Min		None	None		None	None	
Act Effct Green (s)	16.5	35.0	35.0	23.8	42.3		62.1	62.1		38.1	38.1	
Actuated g/C Ratio	0.12	0.25	0.25	0.17	0.30		0.44	0.44		0.27	0.27	
v/c Ratio	0.68	0.52	0.78	1.37	0.84		1.54	0.43		0.47	1.06	
Control Delay	62.9	61.3	40.6	229.0	52.3		293.0	24.7		52.0	105.0	
Queue Delay	0.0	0.0	17.6	0.0	48.4		7.8	0.0		0.0	6.8	
Total Delay	62.9	61.3	58.2	229.0	100.7		300.9	24.7		52.0	111.7	
LOS	E	E	E	F	F		F	C		D	F	
Approach Delay		60.3			131.8			132.9			102.2	
Approach LOS		E			F			F			F	
Queue Length 50th (m)	28.9	68.5	64.3	~143.6	116.9		~140.5	54.2		21.6	~146.4	
Queue Length 95th (m)	47.6	82.1	97.7	#206.8	#157.3		#204.7	70.1		40.2	#214.6	
Internal Link Dist (m)		95.0			162.0			66.0			47.4	
Turn Bay Length (m)	70.0		40.0	75.0			80.0			35.0		
Base Capacity (vph)	288	1217	552	288	1460		258	1435		197	465	
Starvation Cap Reductn	0	0	115	0	0		0	0		0	0	
Spillback Cap Reductn	0	0	0	0	462		102	0		0	8	
Storage Cap Reductn	0	0	0	0	0		0	0		0	0	
Reduced v/c Ratio	0.47	0.52	0.99	1.37	1.23		2.55	0.43		0.47	1.08	

Intersection Summary
Cycle Length: 140
Actuated Cycle Length: 140
Offset: 116 (83%), Referenced to phase 2:EBT and 6:WBT, Start of Green
Natural Cycle: 120
Control Type: Actuated-Coordinated

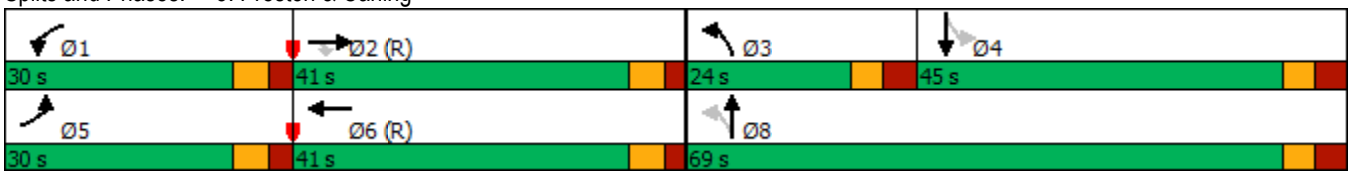
Maximum v/c Ratio: 1.54

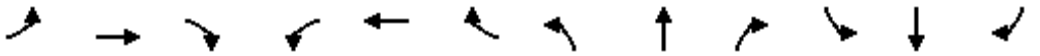
Intersection Signal Delay: 108.8	Intersection LOS: F
Intersection Capacity Utilization 113.6%	ICU Level of Service H
Analysis Period (min) 15	

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

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

Splits and Phases: 3: Preston & Carling





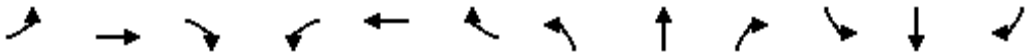
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	4	3	10	0	0	0	9	538	21	6	505	15
Future Volume (vph)	4	3	10	0	0	0	9	538	21	6	505	15
Satd. Flow (prot)	0	1479	0	0	0	0	0	1766	0	0	1770	0
Flt Permitted		0.989						0.991			0.994	
Satd. Flow (perm)	0	1454	0	0	0	0	0	1751	0	0	1760	0
Satd. Flow (RTOR)		11						5			4	
Lane Group Flow (vph)	0	18	0	0	0	0	0	631	0	0	585	0
Turn Type	Perm	NA					Perm	NA		Perm	NA	
Protected Phases		4						2			6	
Permitted Phases	4						2			6		
Detector Phase	4	4					2	2		6	6	
Switch Phase												
Minimum Initial (s)	10.0	10.0					10.0	10.0		10.0	10.0	
Minimum Split (s)	20.5	20.5					34.1	34.1		34.1	34.1	
Total Split (s)	21.0	21.0					69.0	69.0		69.0	69.0	
Total Split (%)	23.3%	23.3%					76.7%	76.7%		76.7%	76.7%	
Yellow Time (s)	3.3	3.3					3.3	3.3		3.3	3.3	
All-Red Time (s)	2.2	2.2					1.8	1.8		1.8	1.8	
Lost Time Adjust (s)		0.0						0.0			0.0	
Total Lost Time (s)		5.5						5.1			5.1	
Lead/Lag												
Lead-Lag Optimize?												
Recall Mode	None	None					C-Min	C-Min		C-Min	C-Min	
Act Effct Green (s)		14.0						69.5			69.5	
Actuated g/C Ratio		0.16						0.77			0.77	
v/c Ratio		0.08						0.47			0.43	
Control Delay		21.4						6.4			6.4	
Queue Delay		0.0						0.0			0.3	
Total Delay		21.4						6.4			6.7	
LOS		C						A			A	
Approach Delay		21.4						6.4			6.7	
Approach LOS		C						A			A	
Queue Length 50th (m)		1.0						40.6			54.6	
Queue Length 95th (m)		6.8						61.0			70.9	
Internal Link Dist (m)		206.9			156.6			101.5			55.4	
Turn Bay Length (m)												
Base Capacity (vph)		259						1353			1360	
Starvation Cap Reductn		0						0			261	
Spillback Cap Reductn		0						0			0	
Storage Cap Reductn		0						0			0	
Reduced v/c Ratio		0.07						0.47			0.53	

Intersection Summary
Cycle Length: 90
Actuated Cycle Length: 90
Offset: 27 (30%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green
Natural Cycle: 55
Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.47

Intersection Signal Delay: 6.7	Intersection LOS: A
Intersection Capacity Utilization 56.7%	ICU Level of Service B
Analysis Period (min) 15	

Splits and Phases: 5: Preston & Pamila



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↑↑↑			↑↑↑							
Traffic Volume (vph)	0	1081	0	0	1535	0	0	0	0	0	0	0
Future Volume (vph)	0	1081	0	0	1535	0	0	0	0	0	0	0
Satd. Flow (prot)	0	4871	0	0	4871	0	0	0	0	0	0	0
Flt Permitted												
Satd. Flow (perm)	0	4871	0	0	4871	0	0	0	0	0	0	0
Satd. Flow (RTOR)												
Lane Group Flow (vph)	0	1201	0	0	1706	0	0	0	0	0	0	0
Turn Type		NA			NA							
Protected Phases		2			6							
Permitted Phases												
Detector Phase		2			6							
Switch Phase												
Minimum Initial (s)		10.0			10.0							
Minimum Split (s)		31.1			31.1							
Total Split (s)		35.0			35.0							
Total Split (%)		50.0%			50.0%							
Yellow Time (s)		3.7			3.7							
All-Red Time (s)		1.4			1.4							
Lost Time Adjust (s)		0.0			0.0							
Total Lost Time (s)		5.1			5.1							
Lead/Lag												
Lead-Lag Optimize?												
Recall Mode		C-Min			C-Min							
Act Effct Green (s)		45.9			45.9							
Actuated g/C Ratio		0.66			0.66							
v/c Ratio		0.38			0.53							
Control Delay		11.1			24.3							
Queue Delay		0.0			0.0							
Total Delay		11.1			24.3							
LOS		B			C							
Approach Delay		11.1			24.3							
Approach LOS		B			C							
Queue Length 50th (m)		42.1			162.7							
Queue Length 95th (m)		54.3			m157.6							
Internal Link Dist (m)		366.8			95.0			72.0			87.6	
Turn Bay Length (m)												
Base Capacity (vph)		3196			3196							
Starvation Cap Reductn		0			190							
Spillback Cap Reductn		25			0							
Storage Cap Reductn		0			0							
Reduced v/c Ratio		0.38			0.57							

Intersection Summary
Cycle Length: 70
Actuated Cycle Length: 70
Offset: 6 (9%), Referenced to phase 2:EBT and 6:WBT, Start of Green
Natural Cycle: 70
Control Type: Actuated-Coordinated

Lane Group	Ø4	Ø8
Lane Configurations		
Traffic Volume (vph)		
Future Volume (vph)		
Satd. Flow (prot)		
Flt Permitted		
Satd. Flow (perm)		
Satd. Flow (RTOR)		
Lane Group Flow (vph)		
Turn Type		
Protected Phases	4	8
Permitted Phases		
Detector Phase		
Switch Phase		
Minimum Initial (s)	10.0	10.0
Minimum Split (s)	35.0	35.0
Total Split (s)	35.0	35.0
Total Split (%)	50%	50%
Yellow Time (s)	3.0	3.0
All-Red Time (s)	3.6	3.6
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		

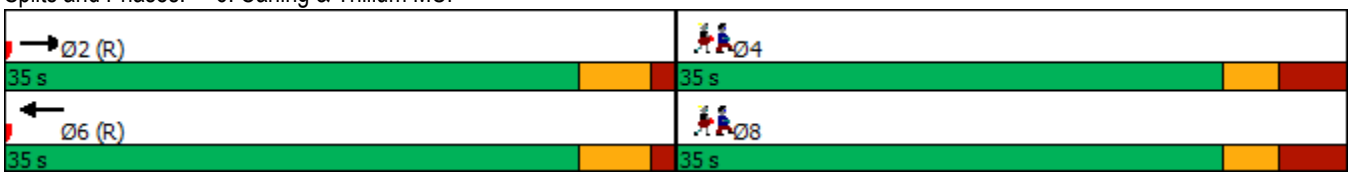
Intersection Summary

Maximum v/c Ratio: 0.53

Intersection Signal Delay: 18.8	Intersection LOS: B
Intersection Capacity Utilization 35.6%	ICU Level of Service A
Analysis Period (min) 15	

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

Splits and Phases: 6: Carling & Trillium MUP



Intersection	
Int Delay, s/veh	1.1

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	5	0	12	15	3	23	0	533	0	0	503	11
Future Vol, veh/h	5	0	12	15	3	23	0	533	0	0	503	11
Conflicting Peds, #/hr	5	0	8	8	0	5	50	0	64	64	0	50
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	90	90	90	90	90	90	90	90	90	90	90	90
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	6	0	13	17	3	26	0	592	0	0	559	12

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	1227	1207	623	1172	1213	597	621	0	-	-	-	0
Stage 1	615	615	-	592	592	-	-	-	-	-	-	-
Stage 2	612	592	-	580	621	-	-	-	-	-	-	-
Critical Hdwy	7.12	6.52	6.22	7.12	6.52	6.22	4.12	-	-	-	-	-
Critical Hdwy Stg 1	6.12	5.52	-	6.12	5.52	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.12	5.52	-	6.12	5.52	-	-	-	-	-	-	-
Follow-up Hdwy	3.518	4.018	3.318	3.518	4.018	3.318	2.218	-	-	-	-	-
Pot Cap-1 Maneuver	155	183	486	169	182	503	960	-	0	0	-	-
Stage 1	479	482	-	493	494	-	-	-	0	0	-	-
Stage 2	480	494	-	500	479	-	-	-	0	0	-	-
Platoon blocked, %								-			-	-
Mov Cap-1 Maneuver	138	175	462	163	174	501	919	-	-	-	-	-
Mov Cap-2 Maneuver	138	175	-	163	174	-	-	-	-	-	-	-
Stage 1	459	462	-	493	494	-	-	-	-	-	-	-
Stage 2	451	494	-	482	459	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	19.2	21.5	0	0
HCM LOS	C	C		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	WBLn1	SBT	SBR
Capacity (veh/h)	919	-	273	264	-	-
HCM Lane V/C Ratio	-	-	0.069	0.173	-	-
HCM Control Delay (s)	0	-	19.2	21.5	-	-
HCM Lane LOS	A	-	C	C	-	-
HCM 95th %tile Q(veh)	0	-	0.2	0.6	-	-

APPENDIX K

SYNCHRO ANAYLYSIS: BACKGROUND

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	40	74	31	36	56	12	26	704	54	19	397	37
Future Volume (vph)	40	74	31	36	56	12	26	704	54	19	397	37
Satd. Flow (prot)	0	1659	0	0	1750	1517	1695	1752	0	1695	1747	0
Flt Permitted		0.879			0.820		0.489			0.294		
Satd. Flow (perm)	0	1449	0	0	1428	1327	845	1752	0	514	1747	0
Satd. Flow (RTOR)		16				34		10			12	
Lane Group Flow (vph)	0	145	0	0	92	12	26	758	0	19	434	0
Turn Type	Perm	NA		Perm	NA	Perm	Perm	NA		Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases	4			8		8	2			6		
Detector Phase	4	4		8	8	8	2	2		6	6	
Switch Phase												
Minimum Initial (s)	10.0	10.0		10.0	10.0	10.0	10.0	10.0		10.0	10.0	
Minimum Split (s)	22.6	22.6		22.6	22.6	22.6	33.5	33.5		33.5	33.5	
Total Split (s)	23.0	23.0		23.0	23.0	23.0	57.0	57.0		57.0	57.0	
Total Split (%)	28.8%	28.8%		28.8%	28.8%	28.8%	71.3%	71.3%		71.3%	71.3%	
Yellow Time (s)	3.3	3.3		3.3	3.3	3.3	3.3	3.3		3.3	3.3	
All-Red Time (s)	2.3	2.3		2.3	2.3	2.3	2.2	2.2		2.2	2.2	
Lost Time Adjust (s)		0.0			0.0	0.0	0.0	0.0		0.0	0.0	
Total Lost Time (s)		5.6			5.6	5.6	5.5	5.5		5.5	5.5	
Lead/Lag												
Lead-Lag Optimize?												
Recall Mode	None	None		None	None	None	C-Min	C-Min		C-Min	C-Min	
Act Effct Green (s)		13.4			13.4	13.4	55.5	55.5		55.5	55.5	
Actuated g/C Ratio		0.17			0.17	0.17	0.69	0.69		0.69	0.69	
v/c Ratio		0.57			0.39	0.05	0.04	0.62		0.05	0.36	
Control Delay		35.4			33.4	2.9	5.7	14.5		5.4	6.4	
Queue Delay		0.0			0.0	0.0	0.0	2.9		0.0	0.0	
Total Delay		35.4			33.4	2.9	5.7	17.4		5.4	6.4	
LOS		D			C	A	A	B		A	A	
Approach Delay		35.4			29.9			17.0			6.3	
Approach LOS		D			C			B			A	
Queue Length 50th (m)		18.5			12.8	0.0	1.0	92.0		0.7	20.5	
Queue Length 95th (m)		33.5			24.3	1.3	m3.3	159.8		3.2	42.3	
Internal Link Dist (m)		209.3			157.6			59.1			55.0	
Turn Bay Length (m)						5.0	25.0			25.0		
Base Capacity (vph)		327			310	315	586	1219		356	1216	
Starvation Cap Reductn		0			0	0	0	339		0	0	
Spillback Cap Reductn		0			0	0	0	0		0	0	
Storage Cap Reductn		0			0	0	0	0		0	0	
Reduced v/c Ratio		0.44			0.30	0.04	0.04	0.86		0.05	0.36	

Intersection Summary

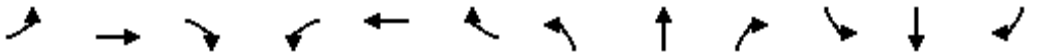
Cycle Length: 80
Actuated Cycle Length: 80
Offset: 0 (0%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green
Natural Cycle: 60
Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.62

Intersection Signal Delay: 16.4	Intersection LOS: B
Intersection Capacity Utilization 81.8%	ICU Level of Service D
Analysis Period (min) 15	

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

Splits and Phases: 1: Preston & Beech



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	164	648	254	152	495	110	316	601	321	126	285	117
Future Volume (vph)	164	648	254	152	495	110	316	601	321	126	285	117
Satd. Flow (prot)	1695	4871	1517	1695	4646	0	1695	3194	0	1695	1675	0
Flt Permitted	0.950			0.950			0.224			0.310		
Satd. Flow (perm)	1624	4871	1259	1624	4646	0	394	3194	0	553	1675	0
Satd. Flow (RTOR)			254		39			118			18	
Lane Group Flow (vph)	164	648	254	152	605	0	316	922	0	126	402	0
Turn Type	Prot	NA	Perm	Prot	NA		pm+pt	NA		Perm	NA	
Protected Phases	5	2		1	6		3	8			4	
Permitted Phases			2				8			4		
Detector Phase	5	2	2	1	6		3	8		4	4	
Switch Phase												
Minimum Initial (s)	5.0	10.0	10.0	5.0	10.0		5.0	10.0		10.0	10.0	
Minimum Split (s)	11.2	30.0	30.0	11.2	30.0		11.9	43.9		43.9	43.9	
Total Split (s)	18.0	35.0	35.0	18.0	35.0		20.0	67.0		47.0	47.0	
Total Split (%)	15.0%	29.2%	29.2%	15.0%	29.2%		16.7%	55.8%		39.2%	39.2%	
Yellow Time (s)	3.7	3.7	3.7	3.7	3.7		3.3	3.3		3.3	3.3	
All-Red Time (s)	2.5	2.3	2.3	2.5	2.3		3.6	3.6		3.6	3.6	
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)	6.2	6.0	6.0	6.2	6.0		6.9	6.9		6.9	6.9	
Lead/Lag	Lead	Lag	Lag	Lead	Lag		Lead			Lag	Lag	
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes		Yes			Yes	Yes	
Recall Mode	None	C-Min	C-Min	None	C-Min		None	None		None	None	
Act Effct Green (s)	14.0	28.8	28.8	13.2	28.1		58.8	58.8		35.5	35.5	
Actuated g/C Ratio	0.12	0.24	0.24	0.11	0.23		0.49	0.49		0.30	0.30	
v/c Ratio	0.83	0.55	0.51	0.82	0.54		0.85	0.57		0.77	0.79	
Control Delay	77.7	36.6	22.1	84.1	40.1		42.6	19.7		68.1	48.7	
Queue Delay	0.0	0.0	0.5	0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay	77.7	36.6	22.6	84.1	40.1		42.6	19.7		68.1	48.7	
LOS	E	D	C	F	D		D	B		E	D	
Approach Delay		39.6			48.9			25.6			53.3	
Approach LOS		D			D			C			D	
Queue Length 50th (m)	38.0	52.8	23.3	34.9	45.0		42.7	64.2		26.5	81.9	
Queue Length 95th (m)	#82.9	63.2	52.8	#75.3	54.9		#92.3	85.3		#54.7	114.9	
Internal Link Dist (m)		95.0			162.0			66.0			47.4	
Turn Bay Length (m)	70.0		40.0	75.0			80.0			35.0		
Base Capacity (vph)	197	1274	516	186	1216		371	1691		184	571	
Starvation Cap Reductn	0	0	65	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	0.83	0.51	0.56	0.82	0.50		0.85	0.55		0.68	0.70	

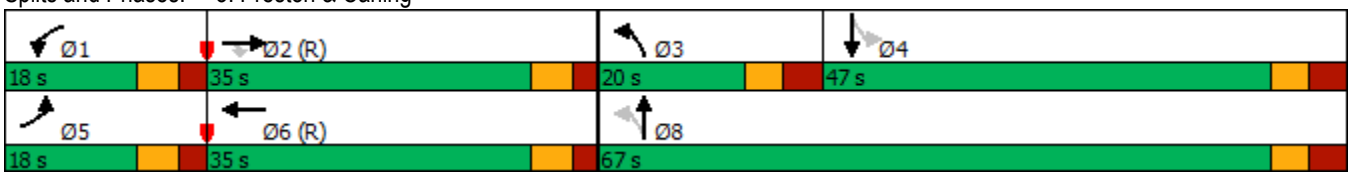
Intersection Summary
Cycle Length: 120
Actuated Cycle Length: 120
Offset: 116 (97%), Referenced to phase 2:EBT and 6:WBT, Start of Green
Natural Cycle: 100
Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.85

Intersection Signal Delay: 38.7	Intersection LOS: D
Intersection Capacity Utilization 98.8%	ICU Level of Service F
Analysis Period (min) 15	

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

Splits and Phases: 3: Preston & Carling



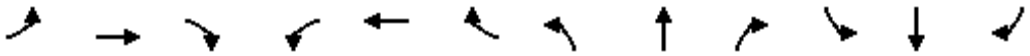
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	1	5	6	0	0	0	9	764	44	12	465	5
Future Volume (vph)	1	5	6	0	0	0	9	764	44	12	465	5
Satd. Flow (prot)	0	1569	0	0	0	0	0	1761	0	0	1779	0
Flt Permitted		0.996						0.995			0.980	
Satd. Flow (perm)	0	1563	0	0	0	0	0	1753	0	0	1745	0
Satd. Flow (RTOR)		6						8			1	
Lane Group Flow (vph)	0	12	0	0	0	0	0	817	0	0	482	0
Turn Type	Perm	NA					Perm	NA		Perm	NA	
Protected Phases		4						2			6	
Permitted Phases	4						2			6		
Detector Phase	4	4					2	2		6	6	
Switch Phase												
Minimum Initial (s)	10.0	10.0					10.0	10.0		10.0	10.0	
Minimum Split (s)	20.5	20.5					34.1	34.1		34.1	34.1	
Total Split (s)	21.0	21.0					59.0	59.0		59.0	59.0	
Total Split (%)	26.3%	26.3%					73.8%	73.8%		73.8%	73.8%	
Yellow Time (s)	3.3	3.3					3.3	3.3		3.3	3.3	
All-Red Time (s)	2.2	2.2					1.8	1.8		1.8	1.8	
Lost Time Adjust (s)		0.0						0.0			0.0	
Total Lost Time (s)		5.5						5.1			5.1	
Lead/Lag												
Lead-Lag Optimize?												
Recall Mode	None	None					C-Min	C-Min		C-Min	C-Min	
Act Effct Green (s)		13.0						64.6			64.6	
Actuated g/C Ratio		0.16						0.81			0.81	
v/c Ratio		0.05						0.58			0.34	
Control Delay		21.0						7.8			5.9	
Queue Delay		0.0						0.1			0.0	
Total Delay		21.0						7.9			5.9	
LOS		C						A			A	
Approach Delay		21.0						7.9			5.9	
Approach LOS		C						A			A	
Queue Length 50th (m)		0.8						62.6			23.0	
Queue Length 95th (m)		5.0						99.9			59.8	
Internal Link Dist (m)		206.9			156.6			101.5			55.4	
Turn Bay Length (m)												
Base Capacity (vph)		307						1418			1410	
Starvation Cap Reductn		0						98			0	
Spillback Cap Reductn		0						100			0	
Storage Cap Reductn		0						0			0	
Reduced v/c Ratio		0.04						0.62			0.34	

Intersection Summary
Cycle Length: 80
Actuated Cycle Length: 80
Offset: 48 (60%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green
Natural Cycle: 60
Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.58

Intersection Signal Delay: 7.3	Intersection LOS: A
Intersection Capacity Utilization 68.9%	ICU Level of Service C
Analysis Period (min) 15	

Splits and Phases: 5: Preston & Pamila



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↑↑↑			↑↑↑							
Traffic Volume (vph)	0	1066	0	0	928	0	0	0	0	0	0	0
Future Volume (vph)	0	1066	0	0	928	0	0	0	0	0	0	0
Satd. Flow (prot)	0	4871	0	0	4871	0	0	0	0	0	0	0
Flt Permitted												
Satd. Flow (perm)	0	4871	0	0	4871	0	0	0	0	0	0	0
Satd. Flow (RTOR)												
Lane Group Flow (vph)	0	1066	0	0	928	0	0	0	0	0	0	0
Turn Type		NA			NA							
Protected Phases		2			6							
Permitted Phases												
Detector Phase		2			6							
Switch Phase												
Minimum Initial (s)		10.0			10.0							
Minimum Split (s)		32.9			32.9							
Total Split (s)		84.0			84.0							
Total Split (%)		70.0%			70.0%							
Yellow Time (s)		3.7			3.7							
All-Red Time (s)		1.4			1.4							
Lost Time Adjust (s)		0.0			0.0							
Total Lost Time (s)		5.1			5.1							
Lead/Lag												
Lead-Lag Optimize?												
Recall Mode		C-Min			C-Min							
Act Effct Green (s)		87.4			87.4							
Actuated g/C Ratio		0.73			0.73							
v/c Ratio		0.30			0.26							
Control Delay		7.8			10.5							
Queue Delay		0.0			0.2							
Total Delay		7.8			10.8							
LOS		A			B							
Approach Delay		7.8			10.8							
Approach LOS		A			B							
Queue Length 50th (m)		36.6			39.4							
Queue Length 95th (m)		43.8			40.8							
Internal Link Dist (m)		343.9			95.0			79.9			89.7	
Turn Bay Length (m)												
Base Capacity (vph)		3549			3549							
Starvation Cap Reductn		0			1704							
Spillback Cap Reductn		0			0							
Storage Cap Reductn		0			0							
Reduced v/c Ratio		0.30			0.50							

Intersection Summary
Cycle Length: 120
Actuated Cycle Length: 120
Offset: 112 (93%), Referenced to phase 2:EBT and 6:WBT, Start of Green
Natural Cycle: 70
Control Type: Actuated-Coordinated

Lane Group	Ø4	Ø8
Lane Configurations		
Traffic Volume (vph)		
Future Volume (vph)		
Satd. Flow (prot)		
Flt Permitted		
Satd. Flow (perm)		
Satd. Flow (RTOR)		
Lane Group Flow (vph)		
Turn Type		
Protected Phases	4	8
Permitted Phases		
Detector Phase		
Switch Phase		
Minimum Initial (s)	1.0	1.0
Minimum Split (s)	36.0	36.0
Total Split (s)	36.0	36.0
Total Split (%)	30%	30%
Yellow Time (s)	3.0	3.0
All-Red Time (s)	3.6	3.6
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

Maximum v/c Ratio: 0.30

Intersection Signal Delay: 9.2	Intersection LOS: A
Intersection Capacity Utilization 26.0%	ICU Level of Service A
Analysis Period (min) 15	

Splits and Phases: 6: Carling & Trillium MUP

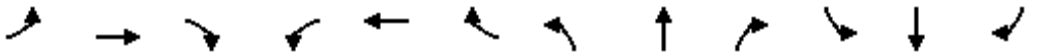
Intersection	
Int Delay, s/veh	1.1

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↔			↔			↰			↕	
Traffic Vol, veh/h	4	0	3	24	3	20	2	765	0	0	479	2
Future Vol, veh/h	4	0	3	24	3	20	2	765	0	0	479	2
Conflicting Peds, #/hr	5	0	2	2	0	5	37	0	72	72	0	37
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	100	100	100	100	100	100	100	100	100	100	100	100
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	4	0	3	24	3	20	2	765	0	0	479	2

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	1303	1286	519	1253	1287	770	518	0	-	-	-	0
Stage 1	517	517	-	769	769	-	-	-	-	-	-	-
Stage 2	786	769	-	484	518	-	-	-	-	-	-	-
Critical Hdwy	7.12	6.52	6.22	7.12	6.52	6.22	4.12	-	-	-	-	-
Critical Hdwy Stg 1	6.12	5.52	-	6.12	5.52	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.12	5.52	-	6.12	5.52	-	-	-	-	-	-	-
Follow-up Hdwy	3.518	4.018	3.318	3.518	4.018	3.318	2.218	-	-	-	-	-
Pot Cap-1 Maneuver	138	164	557	149	164	401	1048	-	0	0	-	-
Stage 1	541	534	-	394	411	-	-	-	0	0	-	-
Stage 2	385	411	-	564	533	-	-	-	0	0	-	-
Platoon blocked, %								-			-	-
Mov Cap-1 Maneuver	124	158	539	148	158	399	1015	-	-	-	-	-
Mov Cap-2 Maneuver	124	158	-	148	158	-	-	-	-	-	-	-
Stage 1	523	517	-	393	410	-	-	-	-	-	-	-
Stage 2	360	410	-	560	516	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	25.2	28	0	0
HCM LOS	D	D		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	WBLn1	SBT	SBR
Capacity (veh/h)	1015	-	185	203	-	-
HCM Lane V/C Ratio	0.002	-	0.038	0.232	-	-
HCM Control Delay (s)	8.6	0	25.2	28	-	-
HCM Lane LOS	A	A	D	D	-	-
HCM 95th %tile Q(veh)	0	-	0.1	0.9	-	-



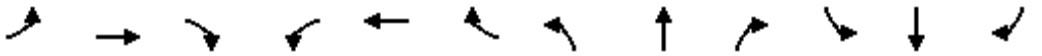
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	27	40	33	48	138	31	83	510	58	17	524	53
Future Volume (vph)	27	40	33	48	138	31	83	510	58	17	524	53
Satd. Flow (prot)	0	1594	0	0	1761	1517	1695	1730	0	1695	1743	0
Flt Permitted		0.873			0.901		0.392			0.397		
Satd. Flow (perm)	0	1382	0	0	1567	1282	677	1730	0	673	1743	0
Satd. Flow (RTOR)		24				30		14			13	
Lane Group Flow (vph)	0	100	0	0	186	31	83	568	0	17	577	0
Turn Type	Perm	NA		Perm	NA	Perm	Perm	NA		Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases	4			8		8	2			6		
Detector Phase	4	4		8	8	8	2	2		6	6	
Switch Phase												
Minimum Initial (s)	10.0	10.0		10.0	10.0	10.0	10.0	10.0		10.0	10.0	
Minimum Split (s)	22.6	22.6		22.6	22.6	22.6	33.5	33.5		33.5	33.5	
Total Split (s)	23.0	23.0		23.0	23.0	23.0	67.0	67.0		67.0	67.0	
Total Split (%)	25.6%	25.6%		25.6%	25.6%	25.6%	74.4%	74.4%		74.4%	74.4%	
Yellow Time (s)	3.3	3.3		3.3	3.3	3.3	3.3	3.3		3.3	3.3	
All-Red Time (s)	2.3	2.3		2.3	2.3	2.3	2.2	2.2		2.2	2.2	
Lost Time Adjust (s)		0.0			0.0	0.0	0.0	0.0		0.0	0.0	
Total Lost Time (s)		5.6			5.6	5.6	5.5	5.5		5.5	5.5	
Lead/Lag												
Lead-Lag Optimize?												
Recall Mode	None	None		None	None	None	C-Min	C-Min		C-Min	C-Min	
Act Effct Green (s)		16.8			16.8	16.8	62.1	62.1		62.1	62.1	
Actuated g/C Ratio		0.19			0.19	0.19	0.69	0.69		0.69	0.69	
v/c Ratio		0.36			0.64	0.12	0.18	0.47		0.04	0.48	
Control Delay		27.0			43.4	11.7	6.9	7.9		5.8	8.6	
Queue Delay		0.0			0.0	0.0	0.0	0.1		0.0	0.0	
Total Delay		27.0			43.4	11.7	6.9	7.9		5.8	8.6	
LOS		C			D	B	A	A		A	A	
Approach Delay		27.0			38.8			7.8			8.5	
Approach LOS		C			D			A			A	
Queue Length 50th (m)		11.4			29.9	0.2	4.4	38.4		0.8	39.1	
Queue Length 95th (m)		23.9			47.8	6.9	11.7	52.8		3.3	72.1	
Internal Link Dist (m)		209.3			157.6			59.1			55.0	
Turn Bay Length (m)						5.0	25.0			25.0		
Base Capacity (vph)		302			320	286	474	1217		471	1226	
Starvation Cap Reductn		0			0	0	0	62		0	0	
Spillback Cap Reductn		0			0	0	0	0		0	0	
Storage Cap Reductn		0			0	0	0	0		0	0	
Reduced v/c Ratio		0.33			0.58	0.11	0.18	0.49		0.04	0.47	

Intersection Summary
Cycle Length: 90
Actuated Cycle Length: 90
Offset: 0 (0%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green
Natural Cycle: 60
Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.64

Intersection Signal Delay: 13.6	Intersection LOS: B
Intersection Capacity Utilization 85.8%	ICU Level of Service E
Analysis Period (min) 15	

Splits and Phases: 1: Preston & Beech



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	153	612	413	380	1148	63	381	437	186	112	362	127
Future Volume (vph)	153	612	413	380	1148	63	381	437	186	112	362	127
Satd. Flow (prot)	1695	4871	1517	1695	4805	0	1695	3163	0	1695	1676	0
Flt Permitted	0.950			0.950			0.089			0.416		
Satd. Flow (perm)	1666	4871	1307	1623	4805	0	159	3163	0	723	1676	0
Satd. Flow (RTOR)			303		6			61			12	
Lane Group Flow (vph)	153	612	413	380	1211	0	381	623	0	112	489	0
Turn Type	Prot	NA	Perm	Prot	NA		pm+pt	NA		Perm	NA	
Protected Phases	5	2		1	6		3	8			4	
Permitted Phases			2				8			4		
Detector Phase	5	2	2	1	6		3	8		4	4	
Switch Phase												
Minimum Initial (s)	5.0	10.0	10.0	5.0	10.0		5.0	10.0		10.0	10.0	
Minimum Split (s)	11.2	30.0	30.0	11.2	30.0		11.9	43.9		43.9	43.9	
Total Split (s)	30.0	41.0	41.0	30.0	41.0		24.0	69.0		45.0	45.0	
Total Split (%)	21.4%	29.3%	29.3%	21.4%	29.3%		17.1%	49.3%		32.1%	32.1%	
Yellow Time (s)	3.7	3.7	3.7	3.7	3.7		3.3	3.3		3.3	3.3	
All-Red Time (s)	2.5	2.3	2.3	2.5	2.3		3.6	3.6		3.6	3.6	
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)	6.2	6.0	6.0	6.2	6.0		6.9	6.9		6.9	6.9	
Lead/Lag	Lead	Lag	Lag	Lead	Lag		Lead			Lag	Lag	
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes		Yes			Yes	Yes	
Recall Mode	None	C-Min	C-Min	None	C-Min		None	None		None	None	
Act Effct Green (s)	17.8	35.0	35.0	23.8	41.0		62.1	62.1		38.1	38.1	
Actuated g/C Ratio	0.13	0.25	0.25	0.17	0.29		0.44	0.44		0.27	0.27	
v/c Ratio	0.71	0.50	0.75	1.32	0.86		1.48	0.43		0.57	1.05	
Control Delay	63.4	61.0	37.5	210.3	53.9		265.7	25.1		57.1	104.0	
Queue Delay	0.0	0.0	10.3	0.0	48.1		7.8	0.0		0.0	1.6	
Total Delay	63.4	61.0	47.8	210.3	102.0		273.5	25.1		57.1	105.6	
LOS	E	E	D	F	F		F	C		E	F	
Approach Delay		56.7			127.9			119.4			96.5	
Approach LOS		E			F			F			F	
Queue Length 50th (m)	34.4	66.2	58.2	~135.5	116.0		~130.6	55.3		26.8	~145.0	
Queue Length 95th (m)	55.1	79.6	91.3	#198.1	#157.3		#194.2	71.4		48.5	#213.2	
Internal Link Dist (m)		95.0			162.0			66.0			47.4	
Turn Bay Length (m)	70.0		40.0	75.0			80.0			35.0		
Base Capacity (vph)	288	1217	554	288	1412		258	1436		196	464	
Starvation Cap Reductn	0	0	115	0	0		0	0		0	0	
Spillback Cap Reductn	0	0	0	0	408		102	0		0	2	
Storage Cap Reductn	0	0	0	0	0		0	0		0	0	
Reduced v/c Ratio	0.53	0.50	0.94	1.32	1.21		2.44	0.43		0.57	1.06	

Intersection Summary
Cycle Length: 140
Actuated Cycle Length: 140
Offset: 116 (83%), Referenced to phase 2:EBT and 6:WBT, Start of Green
Natural Cycle: 120
Control Type: Actuated-Coordinated

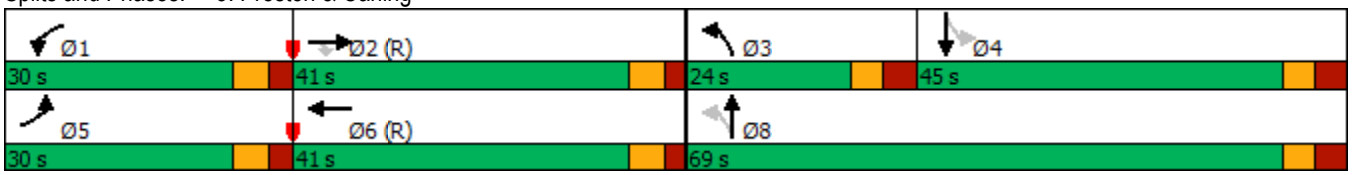
Maximum v/c Ratio: 1.48

Intersection Signal Delay: 102.4	Intersection LOS: F
Intersection Capacity Utilization 116.8%	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: 3: Preston & Carling



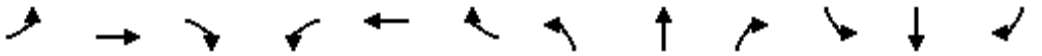
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	4	3	10	0	0	0	9	623	21	6	594	15
Future Volume (vph)	4	3	10	0	0	0	9	623	21	6	594	15
Satd. Flow (prot)	0	1489	0	0	0	0	0	1769	0	0	1774	0
Flt Permitted		0.988						0.992			0.995	
Satd. Flow (perm)	0	1463	0	0	0	0	0	1756	0	0	1765	0
Satd. Flow (RTOR)		10						5			3	
Lane Group Flow (vph)	0	17	0	0	0	0	0	653	0	0	615	0
Turn Type	Perm	NA					Perm	NA		Perm	NA	
Protected Phases		4						2			6	
Permitted Phases	4						2			6		
Detector Phase	4	4					2	2		6	6	
Switch Phase												
Minimum Initial (s)	10.0	10.0					10.0	10.0		10.0	10.0	
Minimum Split (s)	20.5	20.5					34.1	34.1		34.1	34.1	
Total Split (s)	21.0	21.0					69.0	69.0		69.0	69.0	
Total Split (%)	23.3%	23.3%					76.7%	76.7%		76.7%	76.7%	
Yellow Time (s)	3.3	3.3					3.3	3.3		3.3	3.3	
All-Red Time (s)	2.2	2.2					1.8	1.8		1.8	1.8	
Lost Time Adjust (s)		0.0						0.0			0.0	
Total Lost Time (s)		5.5						5.1			5.1	
Lead/Lag												
Lead-Lag Optimize?												
Recall Mode	None	None					C-Min	C-Min		C-Min	C-Min	
Act Effct Green (s)		14.0						69.5			69.5	
Actuated g/C Ratio		0.16						0.77			0.77	
v/c Ratio		0.07						0.48			0.45	
Control Delay		22.1						6.6			6.3	
Queue Delay		0.0						0.3			0.3	
Total Delay		22.1						6.8			6.5	
LOS		C						A			A	
Approach Delay		22.1						6.8			6.5	
Approach LOS		C						A			A	
Queue Length 50th (m)		1.0						42.7			56.9	
Queue Length 95th (m)		6.6						64.2			42.6	
Internal Link Dist (m)		206.9			156.6			101.5			55.4	
Turn Bay Length (m)												
Base Capacity (vph)		260						1357			1363	
Starvation Cap Reductn		0						221			240	
Spillback Cap Reductn		0						0			0	
Storage Cap Reductn		0						0			0	
Reduced v/c Ratio		0.07						0.57			0.55	

Intersection Summary
Cycle Length: 90
Actuated Cycle Length: 90
Offset: 27 (30%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green
Natural Cycle: 55
Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.48

Intersection Signal Delay: 6.9	Intersection LOS: A
Intersection Capacity Utilization 61.6%	ICU Level of Service B
Analysis Period (min) 15	

Splits and Phases: 5: Preston & Pamila



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↑↑↑			↑↑↑							
Traffic Volume (vph)	0	1178	0	0	1657	0	0	0	0	0	0	0
Future Volume (vph)	0	1178	0	0	1657	0	0	0	0	0	0	0
Satd. Flow (prot)	0	4871	0	0	4871	0	0	0	0	0	0	0
Flt Permitted												
Satd. Flow (perm)	0	4871	0	0	4871	0	0	0	0	0	0	0
Satd. Flow (RTOR)												
Lane Group Flow (vph)	0	1178	0	0	1657	0	0	0	0	0	0	0
Turn Type		NA			NA							
Protected Phases		2			6							
Permitted Phases												
Detector Phase		2			6							
Switch Phase												
Minimum Initial (s)		10.0			10.0							
Minimum Split (s)		31.1			31.1							
Total Split (s)		35.0			35.0							
Total Split (%)		50.0%			50.0%							
Yellow Time (s)		3.7			3.7							
All-Red Time (s)		1.4			1.4							
Lost Time Adjust (s)		0.0			0.0							
Total Lost Time (s)		5.1			5.1							
Lead/Lag												
Lead-Lag Optimize?												
Recall Mode		C-Min			C-Min							
Act Effct Green (s)		45.9			45.9							
Actuated g/C Ratio		0.66			0.66							
v/c Ratio		0.37			0.52							
Control Delay		11.0			22.9							
Queue Delay		0.0			0.0							
Total Delay		11.0			23.0							
LOS		B			C							
Approach Delay		11.0			23.0							
Approach LOS		B			C							
Queue Length 50th (m)		40.9			157.4							
Queue Length 95th (m)		53.0			m153.8							
Internal Link Dist (m)		366.8			95.0			72.0			87.6	
Turn Bay Length (m)												
Base Capacity (vph)		3196			3196							
Starvation Cap Reductn		0			190							
Spillback Cap Reductn		19			0							
Storage Cap Reductn		0			0							
Reduced v/c Ratio		0.37			0.55							

Intersection Summary
Cycle Length: 70
Actuated Cycle Length: 70
Offset: 6 (9%), Referenced to phase 2:EBT and 6:WBT, Start of Green
Natural Cycle: 70
Control Type: Actuated-Coordinated

Lane Group	Ø4	Ø8
Lane Configurations		
Traffic Volume (vph)		
Future Volume (vph)		
Satd. Flow (prot)		
Flt Permitted		
Satd. Flow (perm)		
Satd. Flow (RTOR)		
Lane Group Flow (vph)		
Turn Type		
Protected Phases	4	8
Permitted Phases		
Detector Phase		
Switch Phase		
Minimum Initial (s)	10.0	10.0
Minimum Split (s)	35.0	35.0
Total Split (s)	35.0	35.0
Total Split (%)	50%	50%
Yellow Time (s)	3.0	3.0
All-Red Time (s)	3.6	3.6
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		

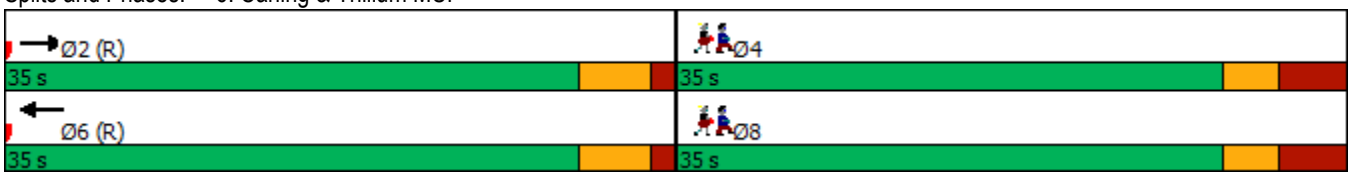
Intersection Summary

Maximum v/c Ratio: 0.52

Intersection Signal Delay: 18.0	Intersection LOS: B
Intersection Capacity Utilization 38.0%	ICU Level of Service A
Analysis Period (min) 15	

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

Splits and Phases: 6: Carling & Trillium MUP



Intersection	
Int Delay, s/veh	1.2

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	5	0	12	21	3	23	0	620	0	0	592	11
Future Vol, veh/h	5	0	12	21	3	23	0	620	0	0	592	11
Conflicting Peds, #/hr	5	0	8	8	0	5	50	0	64	64	0	50
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	100	100	100	100	100	100	100	100	100	100	100	100
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	5	0	12	21	3	23	0	620	0	0	592	11

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	1286	1268	656	1232	1273	625	653	0	-	-	-	0
Stage 1	648	648	-	620	620	-	-	-	-	-	-	-
Stage 2	638	620	-	612	653	-	-	-	-	-	-	-
Critical Hdwy	7.12	6.52	6.22	7.12	6.52	6.22	4.12	-	-	-	-	-
Critical Hdwy Stg 1	6.12	5.52	-	6.12	5.52	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.12	5.52	-	6.12	5.52	-	-	-	-	-	-	-
Follow-up Hdwy	3.518	4.018	3.318	3.518	4.018	3.318	2.218	-	-	-	-	-
Pot Cap-1 Maneuver	141	168	465	154	167	485	934	-	0	0	-	-
Stage 1	459	466	-	476	480	-	-	-	0	0	-	-
Stage 2	465	480	-	480	464	-	-	-	0	0	-	-
Platoon blocked, %								-			-	-
Mov Cap-1 Maneuver	126	161	442	149	160	483	894	-	-	-	-	-
Mov Cap-2 Maneuver	126	161	-	149	160	-	-	-	-	-	-	-
Stage 1	440	446	-	476	480	-	-	-	-	-	-	-
Stage 2	438	480	-	464	445	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	20.2	25	0	0
HCM LOS	C	D		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	WBLn1	SBT	SBR
Capacity (veh/h)	894	-	254	227	-	-
HCM Lane V/C Ratio	-	-	0.067	0.207	-	-
HCM Control Delay (s)	0	-	20.2	25	-	-
HCM Lane LOS	A	-	C	D	-	-
HCM 95th %tile Q(veh)	0	-	0.2	0.8	-	-

APPENDIX L

SYNCHRO ANAYLYSIS: FUTURE

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	40	74	31	36	56	12	26	707	58	19	397	37
Future Volume (vph)	40	74	31	36	56	12	26	707	58	19	397	37
Satd. Flow (prot)	0	1633	0	0	1750	1517	1695	1747	0	1695	1742	0
Flt Permitted		0.880			0.822		0.489			0.290		
Satd. Flow (perm)	0	1395	0	0	1393	1203	825	1747	0	504	1742	0
Satd. Flow (RTOR)		16				34		10			12	
Lane Group Flow (vph)	0	145	0	0	92	12	26	765	0	19	434	0
Turn Type	Perm	NA		Perm	NA	Perm	Perm	NA		Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases	4			8		8	2			6		
Detector Phase	4	4		8	8	8	2	2		6	6	
Switch Phase												
Minimum Initial (s)	10.0	10.0		10.0	10.0	10.0	10.0	10.0		10.0	10.0	
Minimum Split (s)	22.6	22.6		22.6	22.6	22.6	33.5	33.5		33.5	33.5	
Total Split (s)	23.0	23.0		23.0	23.0	23.0	57.0	57.0		57.0	57.0	
Total Split (%)	28.8%	28.8%		28.8%	28.8%	28.8%	71.3%	71.3%		71.3%	71.3%	
Yellow Time (s)	3.3	3.3		3.3	3.3	3.3	3.3	3.3		3.3	3.3	
All-Red Time (s)	2.3	2.3		2.3	2.3	2.3	2.2	2.2		2.2	2.2	
Lost Time Adjust (s)		0.0			0.0	0.0	0.0	0.0		0.0	0.0	
Total Lost Time (s)		5.6			5.6	5.6	5.5	5.5		5.5	5.5	
Lead/Lag												
Lead-Lag Optimize?												
Recall Mode	None	None		None	None	None	C-Min	C-Min		C-Min	C-Min	
Act Effct Green (s)		13.5			13.5	13.5	55.4	55.4		55.4	55.4	
Actuated g/C Ratio		0.17			0.17	0.17	0.69	0.69		0.69	0.69	
v/c Ratio		0.58			0.39	0.05	0.05	0.63		0.05	0.36	
Control Delay		36.4			33.7	2.9	6.7	16.0		5.4	6.4	
Queue Delay		0.0			0.0	0.0	0.0	4.1		0.0	0.0	
Total Delay		36.4			33.7	2.9	6.7	20.1		5.4	6.4	
LOS		D			C	A	A	C		A	A	
Approach Delay		36.4			30.1			19.7			6.4	
Approach LOS		D			C			B			A	
Queue Length 50th (m)		18.4			12.8	0.0	2.0	101.8		0.8	20.9	
Queue Length 95th (m)		33.8			24.4	1.3	m3.2	160.6		3.2	42.1	
Internal Link Dist (m)		209.3			157.6			59.1			55.0	
Turn Bay Length (m)						5.0	25.0			25.0		
Base Capacity (vph)		315			302	288	571	1213		349	1210	
Starvation Cap Reductn		0			0	0	0	357		0	0	
Spillback Cap Reductn		0			0	0	0	0		0	0	
Storage Cap Reductn		0			0	0	0	0		0	0	
Reduced v/c Ratio		0.46			0.30	0.04	0.05	0.89		0.05	0.36	

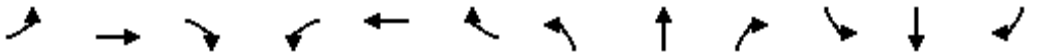
Intersection Summary
Cycle Length: 80
Actuated Cycle Length: 80
Offset: 0 (0%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green
Natural Cycle: 60
Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.63

Intersection Signal Delay: 18.0	Intersection LOS: B
Intersection Capacity Utilization 84.8%	ICU Level of Service E
Analysis Period (min) 15	

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

Splits and Phases: 1: Preston & Beech



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	164	648	254	152	495	110	316	602	321	126	287	118
Future Volume (vph)	164	648	254	152	495	110	316	602	321	126	287	118
Satd. Flow (prot)	1695	4871	1517	1695	4631	0	1695	3177	0	1695	1669	0
Flt Permitted	0.950			0.950			0.204			0.309		
Satd. Flow (perm)	1613	4871	1219	1609	4631	0	357	3177	0	549	1669	0
Satd. Flow (RTOR)			254		39			117			19	
Lane Group Flow (vph)	164	648	254	152	605	0	316	923	0	126	405	0
Turn Type	Prot	NA	Perm	Prot	NA		pm+pt	NA		Perm	NA	
Protected Phases	5	2		1	6		3	8			4	
Permitted Phases			2				8			4		
Detector Phase	5	2	2	1	6		3	8		4	4	
Switch Phase												
Minimum Initial (s)	5.0	10.0	10.0	5.0	10.0		5.0	10.0		10.0	10.0	
Minimum Split (s)	11.2	30.0	30.0	11.2	30.0		11.9	43.9		43.9	43.9	
Total Split (s)	18.0	35.0	35.0	18.0	35.0		20.0	67.0		47.0	47.0	
Total Split (%)	15.0%	29.2%	29.2%	15.0%	29.2%		16.7%	55.8%		39.2%	39.2%	
Yellow Time (s)	3.7	3.7	3.7	3.7	3.7		3.3	3.3		3.3	3.3	
All-Red Time (s)	2.5	2.3	2.3	2.5	2.3		3.6	3.6		3.6	3.6	
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)	6.2	6.0	6.0	6.2	6.0		6.9	6.9		6.9	6.9	
Lead/Lag	Lead	Lag	Lag	Lead	Lag		Lead			Lag	Lag	
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes		Yes			Yes	Yes	
Recall Mode	None	C-Min	C-Min	None	C-Min		None	None		None	None	
Act Effct Green (s)	14.7	29.5	29.5	13.5	28.4		57.9	57.9		34.0	34.0	
Actuated g/C Ratio	0.12	0.25	0.25	0.11	0.24		0.48	0.48		0.28	0.28	
v/c Ratio	0.79	0.54	0.52	0.80	0.54		0.88	0.58		0.81	0.83	
Control Delay	71.2	35.5	22.0	81.3	39.9		46.9	20.4		75.1	53.1	
Queue Delay	0.0	0.0	0.6	0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay	71.2	35.5	22.5	81.3	39.9		46.9	20.4		75.1	53.1	
LOS	E	D	C	F	D		D	C		E	D	
Approach Delay		37.9			48.2			27.2			58.3	
Approach LOS		D			D			C			E	
Queue Length 50th (m)	38.0	52.8	23.6	34.9	45.0		42.7	64.6		26.6	82.6	
Queue Length 95th (m)	#82.9	63.2	53.5	#75.3	55.0		#95.6	85.8		#55.0	115.5	
Internal Link Dist (m)		95.0			162.0			66.0			47.4	
Turn Bay Length (m)	70.0		40.0	75.0			80.0			35.0		
Base Capacity (vph)	207	1269	505	190	1208		361	1673		183	570	
Starvation Cap Reductn	0	0	63	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	0.79	0.51	0.57	0.80	0.50		0.88	0.55		0.69	0.71	

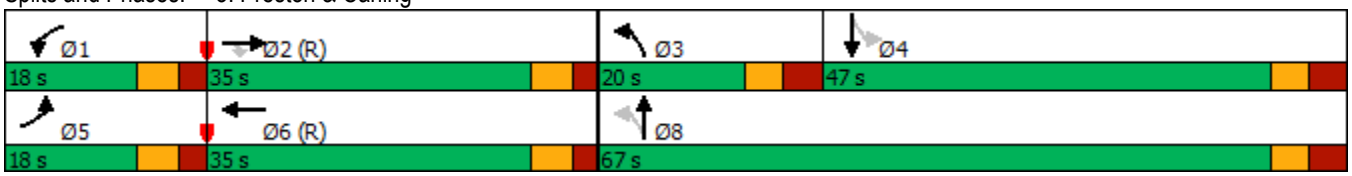
Intersection Summary
Cycle Length: 120
Actuated Cycle Length: 120
Offset: 116 (97%), Referenced to phase 2:EBT and 6:WBT, Start of Green
Natural Cycle: 100
Control Type: Actuated-Coordinated

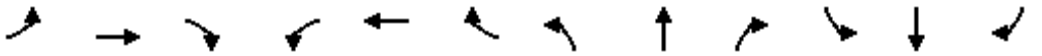
Maximum v/c Ratio: 0.88

Intersection Signal Delay: 39.4	Intersection LOS: D
Intersection Capacity Utilization 99.4%	ICU Level of Service F
Analysis Period (min) 15	

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

Splits and Phases: 3: Preston & Carling





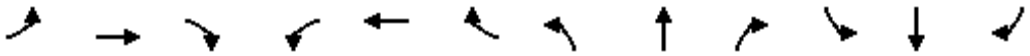
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	1	5	6	0	0	0	9	765	44	12	468	5
Future Volume (vph)	1	5	6	0	0	0	9	765	44	12	468	5
Satd. Flow (prot)	0	1559	0	0	0	0	0	1760	0	0	1779	0
Flt Permitted		0.996						0.995			0.980	
Satd. Flow (perm)	0	1552	0	0	0	0	0	1752	0	0	1744	0
Satd. Flow (RTOR)		6						8			1	
Lane Group Flow (vph)	0	12	0	0	0	0	0	818	0	0	485	0
Turn Type	Perm	NA					Perm	NA		Perm	NA	
Protected Phases		4						2			6	
Permitted Phases	4						2			6		
Detector Phase	4	4					2	2		6	6	
Switch Phase												
Minimum Initial (s)	10.0	10.0					10.0	10.0		10.0	10.0	
Minimum Split (s)	20.5	20.5					34.1	34.1		34.1	34.1	
Total Split (s)	21.0	21.0					59.0	59.0		59.0	59.0	
Total Split (%)	26.3%	26.3%					73.8%	73.8%		73.8%	73.8%	
Yellow Time (s)	3.3	3.3					3.3	3.3		3.3	3.3	
All-Red Time (s)	2.2	2.2					1.8	1.8		1.8	1.8	
Lost Time Adjust (s)		0.0						0.0			0.0	
Total Lost Time (s)		5.5						5.1			5.1	
Lead/Lag												
Lead-Lag Optimize?												
Recall Mode	None	None					C-Min	C-Min		C-Min	C-Min	
Act Effct Green (s)		12.0						65.6			65.6	
Actuated g/C Ratio		0.15						0.82			0.82	
v/c Ratio		0.05						0.57			0.34	
Control Delay		21.4						7.2			5.7	
Queue Delay		0.0						0.2			0.0	
Total Delay		21.4						7.4			5.7	
LOS		C						A			A	
Approach Delay		21.4						7.4			5.7	
Approach LOS		C						A			A	
Queue Length 50th (m)		0.8						46.7			17.4	
Queue Length 95th (m)		5.0						100.6			59.5	
Internal Link Dist (m)		206.9			156.6			101.5			55.4	
Turn Bay Length (m)												
Base Capacity (vph)		305						1438			1431	
Starvation Cap Reductn		0						137			0	
Spillback Cap Reductn		0						103			0	
Storage Cap Reductn		0						0			0	
Reduced v/c Ratio		0.04						0.63			0.34	

Intersection Summary
Cycle Length: 80
Actuated Cycle Length: 80
Offset: 48 (60%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green
Natural Cycle: 60
Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.57

Intersection Signal Delay: 6.9	Intersection LOS: A
Intersection Capacity Utilization 69.1%	ICU Level of Service C
Analysis Period (min) 15	

Splits and Phases: 5: Preston & Pamila



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↑↑↑			↑↑↑							
Traffic Volume (vph)	0	1066	0	0	929	0	0	0	0	0	0	0
Future Volume (vph)	0	1066	0	0	929	0	0	0	0	0	0	0
Satd. Flow (prot)	0	4871	0	0	4871	0	0	0	0	0	0	0
Flt Permitted												
Satd. Flow (perm)	0	4871	0	0	4871	0	0	0	0	0	0	0
Satd. Flow (RTOR)												
Lane Group Flow (vph)	0	1066	0	0	929	0	0	0	0	0	0	0
Turn Type		NA			NA							
Protected Phases		2			6							
Permitted Phases												
Detector Phase		2			6							
Switch Phase												
Minimum Initial (s)		10.0			10.0							
Minimum Split (s)		32.9			32.9							
Total Split (s)		84.0			84.0							
Total Split (%)		70.0%			70.0%							
Yellow Time (s)		3.7			3.7							
All-Red Time (s)		1.4			1.4							
Lost Time Adjust (s)		0.0			0.0							
Total Lost Time (s)		5.1			5.1							
Lead/Lag												
Lead-Lag Optimize?												
Recall Mode		C-Min			C-Min							
Act Effct Green (s)		87.4			87.4							
Actuated g/C Ratio		0.73			0.73							
v/c Ratio		0.30			0.26							
Control Delay		7.8			9.4							
Queue Delay		0.0			0.2							
Total Delay		7.8			9.7							
LOS		A			A							
Approach Delay		7.8			9.7							
Approach LOS		A			A							
Queue Length 50th (m)		36.6			39.4							
Queue Length 95th (m)		43.8			m41.6							
Internal Link Dist (m)		343.9			95.0			79.9			89.7	
Turn Bay Length (m)												
Base Capacity (vph)		3549			3549							
Starvation Cap Reductn		0			1709							
Spillback Cap Reductn		0			0							
Storage Cap Reductn		0			0							
Reduced v/c Ratio		0.30			0.50							

Intersection Summary
Cycle Length: 120
Actuated Cycle Length: 120
Offset: 112 (93%), Referenced to phase 2:EBT and 6:WBT, Start of Green
Natural Cycle: 70
Control Type: Actuated-Coordinated

Lane Group	Ø4	Ø8
Lane Configurations		
Traffic Volume (vph)		
Future Volume (vph)		
Satd. Flow (prot)		
Flt Permitted		
Satd. Flow (perm)		
Satd. Flow (RTOR)		
Lane Group Flow (vph)		
Turn Type		
Protected Phases	4	8
Permitted Phases		
Detector Phase		
Switch Phase		
Minimum Initial (s)	1.0	1.0
Minimum Split (s)	36.0	36.0
Total Split (s)	36.0	36.0
Total Split (%)	30%	30%
Yellow Time (s)	3.0	3.0
All-Red Time (s)	3.6	3.6
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

Maximum v/c Ratio: 0.30

Intersection Signal Delay: 8.7	Intersection LOS: A
Intersection Capacity Utilization 26.0%	ICU Level of Service A
Analysis Period (min) 15	

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

Splits and Phases: 6: Carling & Trillium MUP

Intersection	
Int Delay, s/veh	1.5

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↔			↔			↰			↕	
Traffic Vol, veh/h	11	0	6	24	4	20	3	765	0	0	479	2
Future Vol, veh/h	11	0	6	24	4	20	3	765	0	0	479	2
Conflicting Peds, #/hr	10	0	10	10	0	10	50	0	80	80	0	50
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	100	100	100	100	100	100	100	100	100	100	100	100
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	11	0	6	24	4	20	3	765	0	0	479	2

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	1323	1301	540	1264	1302	775	531	0	-	-	-	0
Stage 1	530	530	-	771	771	-	-	-	-	-	-	-
Stage 2	793	771	-	493	531	-	-	-	-	-	-	-
Critical Hdwy	7.12	6.52	6.22	7.12	6.52	6.22	4.12	-	-	-	-	-
Critical Hdwy Stg 1	6.12	5.52	-	6.12	5.52	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.12	5.52	-	6.12	5.52	-	-	-	-	-	-	-
Follow-up Hdwy	3.518	4.018	3.318	3.518	4.018	3.318	2.218	-	-	-	-	-
Pot Cap-1 Maneuver	133	161	542	146	161	398	1036	-	0	0	-	-
Stage 1	533	527	-	393	410	-	-	-	0	0	-	-
Stage 2	382	410	-	558	526	-	-	-	0	0	-	-
Platoon blocked, %								-			-	-
Mov Cap-1 Maneuver	117	153	515	142	153	395	992	-	-	-	-	-
Mov Cap-2 Maneuver	117	153	-	142	153	-	-	-	-	-	-	-
Stage 1	508	505	-	391	408	-	-	-	-	-	-	-
Stage 2	354	408	-	547	504	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	30	29.4	0	0
HCM LOS	D	D		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	WBLn1	SBT	SBR
Capacity (veh/h)	992	-	161	195	-	-
HCM Lane V/C Ratio	0.003	-	0.106	0.246	-	-
HCM Control Delay (s)	8.6	0	30	29.4	-	-
HCM Lane LOS	A	A	D	D	-	-
HCM 95th %tile Q(veh)	0	-	0.3	0.9	-	-

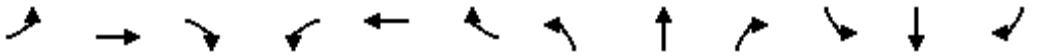
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	27	40	33	48	138	31	83	512	60	17	525	53
Future Volume (vph)	27	40	33	48	138	31	83	512	60	17	525	53
Satd. Flow (prot)	0	1554	0	0	1761	1517	1695	1722	0	1695	1736	0
Flt Permitted		0.874			0.902		0.391			0.395		
Satd. Flow (perm)	0	1324	0	0	1543	1168	665	1722	0	661	1736	0
Satd. Flow (RTOR)		24				30		15			13	
Lane Group Flow (vph)	0	100	0	0	186	31	83	572	0	17	578	0
Turn Type	Perm	NA		Perm	NA	Perm	Perm	NA		Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases	4			8		8	2			6		
Detector Phase	4	4		8	8	8	2	2		6	6	
Switch Phase												
Minimum Initial (s)	10.0	10.0		10.0	10.0	10.0	10.0	10.0		10.0	10.0	
Minimum Split (s)	22.6	22.6		22.6	22.6	22.6	33.5	33.5		33.5	33.5	
Total Split (s)	23.0	23.0		23.0	23.0	23.0	67.0	67.0		67.0	67.0	
Total Split (%)	25.6%	25.6%		25.6%	25.6%	25.6%	74.4%	74.4%		74.4%	74.4%	
Yellow Time (s)	3.3	3.3		3.3	3.3	3.3	3.3	3.3		3.3	3.3	
All-Red Time (s)	2.3	2.3		2.3	2.3	2.3	2.2	2.2		2.2	2.2	
Lost Time Adjust (s)		0.0			0.0	0.0	0.0	0.0		0.0	0.0	
Total Lost Time (s)		5.6			5.6	5.6	5.5	5.5		5.5	5.5	
Lead/Lag												
Lead-Lag Optimize?												
Recall Mode	None	None		None	None	None	C-Min	C-Min		C-Min	C-Min	
Act Effct Green (s)		16.9			16.9	16.9	62.0	62.0		62.0	62.0	
Actuated g/C Ratio		0.19			0.19	0.19	0.69	0.69		0.69	0.69	
v/c Ratio		0.37			0.64	0.13	0.18	0.48		0.04	0.48	
Control Delay		27.4			43.8	11.8	6.9	7.9		5.8	8.7	
Queue Delay		0.0			0.0	0.0	0.0	0.1		0.0	0.0	
Total Delay		27.4			43.8	11.8	6.9	8.0		5.8	8.7	
LOS		C			D	B	A	A		A	A	
Approach Delay		27.4			39.2			7.9			8.6	
Approach LOS		C			D			A			A	
Queue Length 50th (m)		11.4			30.0	0.2	4.4	38.8		0.8	39.3	
Queue Length 95th (m)		24.0			47.8	6.9	11.5	52.4		3.4	72.8	
Internal Link Dist (m)		209.3			157.6			59.1			55.0	
Turn Bay Length (m)						5.0	25.0			25.0		
Base Capacity (vph)		291			317	264	466	1212		463	1222	
Starvation Cap Reductn		0			0	0	0	60		0	0	
Spillback Cap Reductn		0			0	0	0	0		0	0	
Storage Cap Reductn		0			0	0	0	0		0	0	
Reduced v/c Ratio		0.34			0.59	0.12	0.18	0.50		0.04	0.47	

Intersection Summary
Cycle Length: 90
Actuated Cycle Length: 90
Offset: 0 (0%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green
Natural Cycle: 60
Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.64

Intersection Signal Delay: 13.7	Intersection LOS: B
Intersection Capacity Utilization 87.4%	ICU Level of Service E
Analysis Period (min) 15	

Splits and Phases: 1: Preston & Beech



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	154	612	413	380	1148	63	381	438	186	112	363	127
Future Volume (vph)	154	612	413	380	1148	63	381	438	186	112	363	127
Satd. Flow (prot)	1695	4871	1517	1695	4799	0	1695	3139	0	1695	1668	0
Flt Permitted	0.950			0.950			0.089			0.415		
Satd. Flow (perm)	1659	4871	1231	1589	4799	0	159	3139	0	714	1668	0
Satd. Flow (RTOR)			295		6			61			12	
Lane Group Flow (vph)	154	612	413	380	1211	0	381	624	0	112	490	0
Turn Type	Prot	NA	Perm	Prot	NA		pm+pt	NA		Perm	NA	
Protected Phases	5	2		1	6		3	8			4	
Permitted Phases			2				8			4		
Detector Phase	5	2	2	1	6		3	8		4	4	
Switch Phase												
Minimum Initial (s)	5.0	10.0	10.0	5.0	10.0		5.0	10.0		10.0	10.0	
Minimum Split (s)	11.2	30.0	30.0	11.2	30.0		11.9	43.9		43.9	43.9	
Total Split (s)	30.0	41.0	41.0	30.0	41.0		24.0	69.0		45.0	45.0	
Total Split (%)	21.4%	29.3%	29.3%	21.4%	29.3%		17.1%	49.3%		32.1%	32.1%	
Yellow Time (s)	3.7	3.7	3.7	3.7	3.7		3.3	3.3		3.3	3.3	
All-Red Time (s)	2.5	2.3	2.3	2.5	2.3		3.6	3.6		3.6	3.6	
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)	6.2	6.0	6.0	6.2	6.0		6.9	6.9		6.9	6.9	
Lead/Lag	Lead	Lag	Lag	Lead	Lag		Lead			Lag	Lag	
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes		Yes			Yes	Yes	
Recall Mode	None	C-Min	C-Min	None	C-Min		None	None		None	None	
Act Effct Green (s)	17.8	35.0	35.0	23.8	41.0		62.1	62.1		38.1	38.1	
Actuated g/C Ratio	0.13	0.25	0.25	0.17	0.29		0.44	0.44		0.27	0.27	
v/c Ratio	0.72	0.50	0.78	1.32	0.86		1.48	0.44		0.58	1.06	
Control Delay	63.6	61.0	40.4	210.3	54.1		265.7	25.2		57.6	105.9	
Queue Delay	0.0	0.0	11.1	0.0	48.0		7.8	0.0		0.0	1.7	
Total Delay	63.6	61.0	51.5	210.3	102.2		273.5	25.2		57.6	107.6	
LOS	E	E	D	F	F		F	C		E	F	
Approach Delay		58.0			128.0			119.3			98.3	
Approach LOS		E			F			F			F	
Queue Length 50th (m)	34.6	66.1	59.8	~135.5	116.1		~130.6	55.6		26.9	~146.2	
Queue Length 95th (m)	55.9	79.7	92.8	#198.1	#157.5		#194.2	71.6		48.7	#215.0	
Internal Link Dist (m)		95.0			162.0			66.0			47.4	
Turn Bay Length (m)	70.0		40.0	75.0			80.0			35.0		
Base Capacity (vph)	288	1217	529	288	1408		258	1426		194	462	
Starvation Cap Reductn	0	0	95	0	0		0	0		0	0	
Spillback Cap Reductn	0	0	0	0	405		102	0		0	2	
Storage Cap Reductn	0	0	0	0	0		0	0		0	0	
Reduced v/c Ratio	0.53	0.50	0.95	1.32	1.21		2.44	0.44		0.58	1.07	

Intersection Summary
Cycle Length: 140
Actuated Cycle Length: 140
Offset: 116 (83%), Referenced to phase 2:EBT and 6:WBT, Start of Green
Natural Cycle: 120
Control Type: Actuated-Coordinated

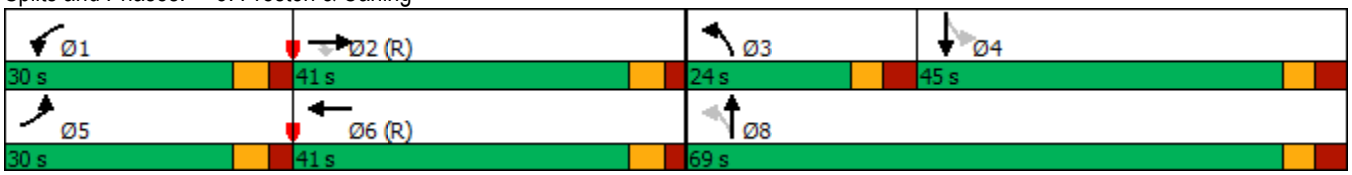
Maximum v/c Ratio: 1.48

Intersection Signal Delay: 103.1	Intersection LOS: F
Intersection Capacity Utilization 116.9%	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: 3: Preston & Carling



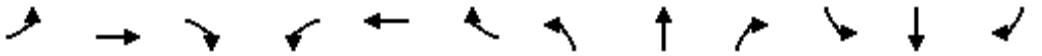
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	4	3	10	0	0	0	9	625	21	6	595	15
Future Volume (vph)	4	3	10	0	0	0	9	625	21	6	595	15
Satd. Flow (prot)	0	1474	0	0	0	0	0	1767	0	0	1773	0
Flt Permitted		0.988						0.992			0.995	
Satd. Flow (perm)	0	1442	0	0	0	0	0	1754	0	0	1763	0
Satd. Flow (RTOR)		10						5			3	
Lane Group Flow (vph)	0	17	0	0	0	0	0	655	0	0	616	0
Turn Type	Perm	NA					Perm	NA		Perm	NA	
Protected Phases		4						2			6	
Permitted Phases	4						2			6		
Detector Phase	4	4					2	2		6	6	
Switch Phase												
Minimum Initial (s)	10.0	10.0					10.0	10.0		10.0	10.0	
Minimum Split (s)	20.5	20.5					34.1	34.1		34.1	34.1	
Total Split (s)	21.0	21.0					69.0	69.0		69.0	69.0	
Total Split (%)	23.3%	23.3%					76.7%	76.7%		76.7%	76.7%	
Yellow Time (s)	3.3	3.3					3.3	3.3		3.3	3.3	
All-Red Time (s)	2.2	2.2					1.8	1.8		1.8	1.8	
Lost Time Adjust (s)		0.0						0.0			0.0	
Total Lost Time (s)		5.5						5.1			5.1	
Lead/Lag												
Lead-Lag Optimize?												
Recall Mode	None	None					C-Min	C-Min		C-Min	C-Min	
Act Effct Green (s)		14.0						69.5			69.5	
Actuated g/C Ratio		0.16						0.77			0.77	
v/c Ratio		0.07						0.48			0.45	
Control Delay		22.1						6.6			6.2	
Queue Delay		0.0						0.3			0.2	
Total Delay		22.1						6.9			6.4	
LOS		C						A			A	
Approach Delay		22.1						6.9			6.4	
Approach LOS		C						A			A	
Queue Length 50th (m)		1.0						43.0			57.3	
Queue Length 95th (m)		6.6						64.6			33.1	
Internal Link Dist (m)		206.9			156.6			101.5			55.4	
Turn Bay Length (m)												
Base Capacity (vph)		256						1356			1362	
Starvation Cap Reductn		0						219			236	
Spillback Cap Reductn		0						0			0	
Storage Cap Reductn		0						0			0	
Reduced v/c Ratio		0.07						0.58			0.55	

Intersection Summary
Cycle Length: 90
Actuated Cycle Length: 90
Offset: 27 (30%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green
Natural Cycle: 55
Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.48

Intersection Signal Delay: 6.9	Intersection LOS: A
Intersection Capacity Utilization 61.9%	ICU Level of Service B
Analysis Period (min) 15	

Splits and Phases: 5: Preston & Pamila



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↑↑↑			↑↑↑							
Traffic Volume (vph)	0	1178	0	0	1657	0	0	0	0	0	0	0
Future Volume (vph)	0	1178	0	0	1657	0	0	0	0	0	0	0
Satd. Flow (prot)	0	4871	0	0	4871	0	0	0	0	0	0	0
Flt Permitted												
Satd. Flow (perm)	0	4871	0	0	4871	0	0	0	0	0	0	0
Satd. Flow (RTOR)												
Lane Group Flow (vph)	0	1178	0	0	1657	0	0	0	0	0	0	0
Turn Type		NA			NA							
Protected Phases		2			6							
Permitted Phases												
Detector Phase		2			6							
Switch Phase												
Minimum Initial (s)		10.0			10.0							
Minimum Split (s)		31.1			31.1							
Total Split (s)		35.0			35.0							
Total Split (%)		50.0%			50.0%							
Yellow Time (s)		3.7			3.7							
All-Red Time (s)		1.4			1.4							
Lost Time Adjust (s)		0.0			0.0							
Total Lost Time (s)		5.1			5.1							
Lead/Lag												
Lead-Lag Optimize?												
Recall Mode		C-Min			C-Min							
Act Effct Green (s)		45.9			45.9							
Actuated g/C Ratio		0.66			0.66							
v/c Ratio		0.37			0.52							
Control Delay		11.0			22.9							
Queue Delay		0.0			0.0							
Total Delay		11.0			23.0							
LOS		B			C							
Approach Delay		11.0			23.0							
Approach LOS		B			C							
Queue Length 50th (m)		40.9			157.4							
Queue Length 95th (m)		53.0			m153.7							
Internal Link Dist (m)		366.8			95.0			72.0			87.6	
Turn Bay Length (m)												
Base Capacity (vph)		3196			3196							
Starvation Cap Reductn		0			190							
Spillback Cap Reductn		22			0							
Storage Cap Reductn		0			0							
Reduced v/c Ratio		0.37			0.55							

Intersection Summary
Cycle Length: 70
Actuated Cycle Length: 70
Offset: 6 (9%), Referenced to phase 2:EBT and 6:WBT, Start of Green
Natural Cycle: 70
Control Type: Actuated-Coordinated

Lane Group	Ø4	Ø8
Lane Configurations		
Traffic Volume (vph)		
Future Volume (vph)		
Satd. Flow (prot)		
Flt Permitted		
Satd. Flow (perm)		
Satd. Flow (RTOR)		
Lane Group Flow (vph)		
Turn Type		
Protected Phases	4	8
Permitted Phases		
Detector Phase		
Switch Phase		
Minimum Initial (s)	10.0	10.0
Minimum Split (s)	35.0	35.0
Total Split (s)	35.0	35.0
Total Split (%)	50%	50%
Yellow Time (s)	3.0	3.0
All-Red Time (s)	3.6	3.6
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		

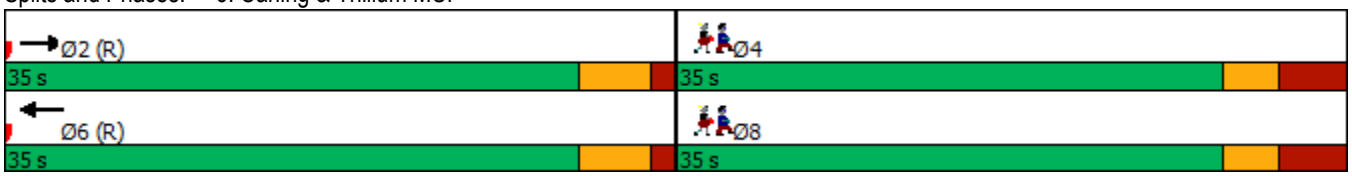
Intersection Summary

Maximum v/c Ratio: 0.52

Intersection Signal Delay: 18.0	Intersection LOS: B
Intersection Capacity Utilization 38.0%	ICU Level of Service A
Analysis Period (min) 15	

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

Splits and Phases: 6: Carling & Trillium MUP



Intersection	
Int Delay, s/veh	1.5

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	9	0	13	21	7	23	2	620	0	0	592	12
Future Vol, veh/h	9	0	13	21	7	23	2	620	0	0	592	12
Conflicting Peds, #/hr	10	0	10	10	0	10	60	0	80	80	0	60
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	100	100	100	100	100	100	100	100	100	100	100	100
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	9	0	13	21	7	23	2	620	0	0	592	12

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	1307	1282	668	1239	1288	630	664	0	-	-	-	0
Stage 1	658	658	-	624	624	-	-	-	-	-	-	-
Stage 2	649	624	-	615	664	-	-	-	-	-	-	-
Critical Hdwy	7.12	6.52	6.22	7.12	6.52	6.22	4.12	-	-	-	-	-
Critical Hdwy Stg 1	6.12	5.52	-	6.12	5.52	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.12	5.52	-	6.12	5.52	-	-	-	-	-	-	-
Follow-up Hdwy	3.518	4.018	3.318	3.518	4.018	3.318	2.218	-	-	-	-	-
Pot Cap-1 Maneuver	137	165	458	152	164	482	925	-	0	0	-	-
Stage 1	453	461	-	473	478	-	-	-	0	0	-	-
Stage 2	458	478	-	479	458	-	-	-	0	0	-	-
Platoon blocked, %								-			-	-
Mov Cap-1 Maneuver	118	156	431	146	155	478	878	-	-	-	-	-
Mov Cap-2 Maneuver	118	156	-	146	155	-	-	-	-	-	-	-
Stage 1	429	437	-	472	477	-	-	-	-	-	-	-
Stage 2	425	477	-	461	435	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	24.4	26.9	0	0
HCM LOS	C	D		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	WBLn1	SBT	SBR
Capacity (veh/h)	878	-	207	215	-	-
HCM Lane V/C Ratio	0.002	-	0.106	0.237	-	-
HCM Control Delay (s)	9.1	0	24.4	26.9	-	-
HCM Lane LOS	A	A	C	D	-	-
HCM 95th %tile Q(veh)	0	-	0.4	0.9	-	-

APPENDIX M

SYNCHRO ANAYLYSIS: FUTURE IF TOD TARGETS NOT MET

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	40	74	31	36	56	12	26	711	63	19	398	37
Future Volume (vph)	40	74	31	36	56	12	26	711	63	19	398	37
Satd. Flow (prot)	0	1659	0	0	1750	1517	1695	1749	0	1695	1747	0
Flt Permitted		0.879			0.820		0.489			0.285		
Satd. Flow (perm)	0	1449	0	0	1428	1327	845	1749	0	499	1747	0
Satd. Flow (RTOR)		16				34		11			12	
Lane Group Flow (vph)	0	145	0	0	92	12	26	774	0	19	435	0
Turn Type	Perm	NA		Perm	NA	Perm	Perm	NA		Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases	4			8		8	2			6		
Detector Phase	4	4		8	8	8	2	2		6	6	
Switch Phase												
Minimum Initial (s)	10.0	10.0		10.0	10.0	10.0	10.0	10.0		10.0	10.0	
Minimum Split (s)	22.6	22.6		22.6	22.6	22.6	33.5	33.5		33.5	33.5	
Total Split (s)	23.0	23.0		23.0	23.0	23.0	57.0	57.0		57.0	57.0	
Total Split (%)	28.8%	28.8%		28.8%	28.8%	28.8%	71.3%	71.3%		71.3%	71.3%	
Yellow Time (s)	3.3	3.3		3.3	3.3	3.3	3.3	3.3		3.3	3.3	
All-Red Time (s)	2.3	2.3		2.3	2.3	2.3	2.2	2.2		2.2	2.2	
Lost Time Adjust (s)		0.0			0.0	0.0	0.0	0.0		0.0	0.0	
Total Lost Time (s)		5.6			5.6	5.6	5.5	5.5		5.5	5.5	
Lead/Lag												
Lead-Lag Optimize?												
Recall Mode	None	None		None	None	None	C-Min	C-Min		C-Min	C-Min	
Act Effct Green (s)		13.4			13.4	13.4	55.5	55.5		55.5	55.5	
Actuated g/C Ratio		0.17			0.17	0.17	0.69	0.69		0.69	0.69	
v/c Ratio		0.57			0.39	0.05	0.04	0.64		0.05	0.36	
Control Delay		35.5			33.5	2.9	6.1	15.4		5.4	6.4	
Queue Delay		0.0			0.0	0.0	0.0	4.3		0.0	0.0	
Total Delay		35.5			33.5	2.9	6.1	19.7		5.4	6.4	
LOS		D			C	A	A	B		A	A	
Approach Delay		35.5			29.9			19.2			6.3	
Approach LOS		D			C			B			A	
Queue Length 50th (m)		18.5			12.8	0.0	1.2	99.1		0.7	20.5	
Queue Length 95th (m)		33.6			24.3	1.3	m3.2	162.1		3.2	42.2	
Internal Link Dist (m)		209.3			157.6			59.1			55.0	
Turn Bay Length (m)						5.0	25.0			25.0		
Base Capacity (vph)		327			310	315	586	1217		346	1216	
Starvation Cap Reductn		0			0	0	0	356		0	0	
Spillback Cap Reductn		0			0	0	0	0		0	0	
Storage Cap Reductn		0			0	0	0	0		0	0	
Reduced v/c Ratio		0.44			0.30	0.04	0.04	0.90		0.05	0.36	

Intersection Summary

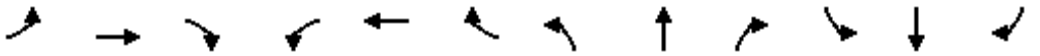
Cycle Length: 80
Actuated Cycle Length: 80
Offset: 0 (0%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green
Natural Cycle: 60
Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.64

Intersection Signal Delay: 17.6	Intersection LOS: B
Intersection Capacity Utilization 82.8%	ICU Level of Service E
Analysis Period (min) 15	

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

Splits and Phases: 1: Preston & Beech



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	164	648	254	152	495	110	316	603	321	126	289	118
Future Volume (vph)	164	648	254	152	495	110	316	603	321	126	289	118
Satd. Flow (prot)	1695	4871	1517	1695	4646	0	1695	3194	0	1695	1677	0
Flt Permitted	0.950			0.950			0.219			0.309		
Satd. Flow (perm)	1624	4871	1259	1624	4646	0	385	3194	0	551	1677	0
Satd. Flow (RTOR)			254		39			117			18	
Lane Group Flow (vph)	164	648	254	152	605	0	316	924	0	126	407	0
Turn Type	Prot	NA	Perm	Prot	NA		pm+pt	NA		Perm	NA	
Protected Phases	5	2		1	6		3	8			4	
Permitted Phases			2				8			4		
Detector Phase	5	2	2	1	6		3	8		4	4	
Switch Phase												
Minimum Initial (s)	5.0	10.0	10.0	5.0	10.0		5.0	10.0		10.0	10.0	
Minimum Split (s)	11.2	30.0	30.0	11.2	30.0		11.9	43.9		43.9	43.9	
Total Split (s)	18.0	35.0	35.0	18.0	35.0		20.0	67.0		47.0	47.0	
Total Split (%)	15.0%	29.2%	29.2%	15.0%	29.2%		16.7%	55.8%		39.2%	39.2%	
Yellow Time (s)	3.7	3.7	3.7	3.7	3.7		3.3	3.3		3.3	3.3	
All-Red Time (s)	2.5	2.3	2.3	2.5	2.3		3.6	3.6		3.6	3.6	
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)	6.2	6.0	6.0	6.2	6.0		6.9	6.9		6.9	6.9	
Lead/Lag	Lead	Lag	Lag	Lead	Lag		Lead			Lag	Lag	
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes		Yes			Yes	Yes	
Recall Mode	None	C-Min	C-Min	None	C-Min		None	None		None	None	
Act Effct Green (s)	14.0	28.7	28.7	13.2	28.0		58.9	58.9		35.5	35.5	
Actuated g/C Ratio	0.12	0.24	0.24	0.11	0.23		0.49	0.49		0.30	0.30	
v/c Ratio	0.83	0.56	0.51	0.82	0.54		0.86	0.57		0.77	0.80	
Control Delay	77.7	36.7	22.1	84.1	40.2		43.4	19.7		68.3	49.2	
Queue Delay	0.0	0.0	0.5	0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay	77.7	36.7	22.6	84.1	40.2		43.4	19.7		68.3	49.2	
LOS	E	D	C	F	D		D	B		E	D	
Approach Delay		39.6			49.0			25.8			53.7	
Approach LOS		D			D			C			D	
Queue Length 50th (m)	38.0	52.8	23.3	34.9	45.0		42.7	64.5		26.6	83.2	
Queue Length 95th (m)	#82.9	63.2	52.8	#75.3	54.9		#93.3	85.8		#54.9	116.5	
Internal Link Dist (m)		95.0			162.0			66.0			47.4	
Turn Bay Length (m)	70.0		40.0	75.0			80.0			35.0		
Base Capacity (vph)	197	1269	515	186	1212		368	1691		184	572	
Starvation Cap Reductn	0	0	65	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	0.83	0.51	0.56	0.82	0.50		0.86	0.55		0.68	0.71	

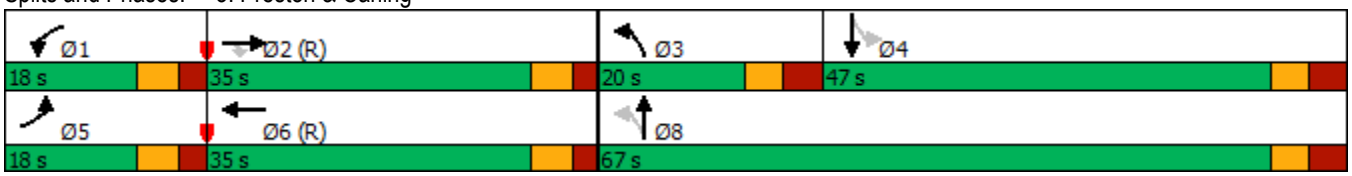
Intersection Summary
Cycle Length: 120
Actuated Cycle Length: 120
Offset: 116 (97%), Referenced to phase 2:EBT and 6:WBT, Start of Green
Natural Cycle: 100
Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.86

Intersection Signal Delay: 38.9	Intersection LOS: D
Intersection Capacity Utilization 98.9%	ICU Level of Service F
Analysis Period (min) 15	

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

Splits and Phases: 3: Preston & Carling



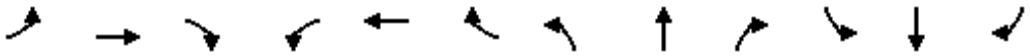
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	1	5	6	0	0	0	9	766	44	12	471	5
Future Volume (vph)	1	5	6	0	0	0	9	766	44	12	471	5
Satd. Flow (prot)	0	1569	0	0	0	0	0	1761	0	0	1779	0
Flt Permitted		0.996						0.995			0.980	
Satd. Flow (perm)	0	1563	0	0	0	0	0	1753	0	0	1745	0
Satd. Flow (RTOR)		6						8			1	
Lane Group Flow (vph)	0	12	0	0	0	0	0	819	0	0	488	0
Turn Type	Perm	NA					Perm	NA		Perm	NA	
Protected Phases		4						2			6	
Permitted Phases	4						2			6		
Detector Phase	4	4					2	2		6	6	
Switch Phase												
Minimum Initial (s)	10.0	10.0					10.0	10.0		10.0	10.0	
Minimum Split (s)	20.5	20.5					34.1	34.1		34.1	34.1	
Total Split (s)	21.0	21.0					59.0	59.0		59.0	59.0	
Total Split (%)	26.3%	26.3%					73.8%	73.8%		73.8%	73.8%	
Yellow Time (s)	3.3	3.3					3.3	3.3		3.3	3.3	
All-Red Time (s)	2.2	2.2					1.8	1.8		1.8	1.8	
Lost Time Adjust (s)		0.0						0.0			0.0	
Total Lost Time (s)		5.5						5.1			5.1	
Lead/Lag												
Lead-Lag Optimize?												
Recall Mode	None	None					C-Min	C-Min		C-Min	C-Min	
Act Effct Green (s)		13.0						64.6			64.6	
Actuated g/C Ratio		0.16						0.81			0.81	
v/c Ratio		0.05						0.58			0.35	
Control Delay		21.0						7.8			6.3	
Queue Delay		0.0						0.2			0.0	
Total Delay		21.0						8.0			6.3	
LOS		C						A			A	
Approach Delay		21.0						8.0			6.3	
Approach LOS		C						A			A	
Queue Length 50th (m)		0.8						62.9			23.6	
Queue Length 95th (m)		5.0						100.7			59.9	
Internal Link Dist (m)		206.9			156.6			101.5			55.4	
Turn Bay Length (m)												
Base Capacity (vph)		307						1418			1410	
Starvation Cap Reductn		0						98			0	
Spillback Cap Reductn		0						106			0	
Storage Cap Reductn		0						0			0	
Reduced v/c Ratio		0.04						0.62			0.35	

Intersection Summary
Cycle Length: 80
Actuated Cycle Length: 80
Offset: 48 (60%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green
Natural Cycle: 60
Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.58

Intersection Signal Delay: 7.5	Intersection LOS: A
Intersection Capacity Utilization 69.0%	ICU Level of Service C
Analysis Period (min) 15	

Splits and Phases: 5: Preston & Pamila



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↑↑↑			↑↑↑							
Traffic Volume (vph)	0	1066	0	0	929	0	0	0	0	0	0	0
Future Volume (vph)	0	1066	0	0	929	0	0	0	0	0	0	0
Satd. Flow (prot)	0	4871	0	0	4871	0	0	0	0	0	0	0
Flt Permitted												
Satd. Flow (perm)	0	4871	0	0	4871	0	0	0	0	0	0	0
Satd. Flow (RTOR)												
Lane Group Flow (vph)	0	1066	0	0	929	0	0	0	0	0	0	0
Turn Type		NA			NA							
Protected Phases		2			6							
Permitted Phases												
Detector Phase		2			6							
Switch Phase												
Minimum Initial (s)		10.0			10.0							
Minimum Split (s)		32.9			32.9							
Total Split (s)		84.0			84.0							
Total Split (%)		70.0%			70.0%							
Yellow Time (s)		3.7			3.7							
All-Red Time (s)		1.4			1.4							
Lost Time Adjust (s)		0.0			0.0							
Total Lost Time (s)		5.1			5.1							
Lead/Lag												
Lead-Lag Optimize?												
Recall Mode		C-Min			C-Min							
Act Effct Green (s)		87.4			87.4							
Actuated g/C Ratio		0.73			0.73							
v/c Ratio		0.30			0.26							
Control Delay		7.8			10.5							
Queue Delay		0.0			0.2							
Total Delay		7.8			10.7							
LOS		A			B							
Approach Delay		7.8			10.7							
Approach LOS		A			B							
Queue Length 50th (m)		36.6			39.4							
Queue Length 95th (m)		43.8			41.1							
Internal Link Dist (m)		343.9			95.0			79.9			89.7	
Turn Bay Length (m)												
Base Capacity (vph)		3549			3549							
Starvation Cap Reductn		0			1705							
Spillback Cap Reductn		0			0							
Storage Cap Reductn		0			0							
Reduced v/c Ratio		0.30			0.50							

Intersection Summary
Cycle Length: 120
Actuated Cycle Length: 120
Offset: 112 (93%), Referenced to phase 2:EBT and 6:WBT, Start of Green
Natural Cycle: 70
Control Type: Actuated-Coordinated

Lane Group	Ø4	Ø8
Lane Configurations		
Traffic Volume (vph)		
Future Volume (vph)		
Satd. Flow (prot)		
Flt Permitted		
Satd. Flow (perm)		
Satd. Flow (RTOR)		
Lane Group Flow (vph)		
Turn Type		
Protected Phases	4	8
Permitted Phases		
Detector Phase		
Switch Phase		
Minimum Initial (s)	1.0	1.0
Minimum Split (s)	36.0	36.0
Total Split (s)	36.0	36.0
Total Split (%)	30%	30%
Yellow Time (s)	3.0	3.0
All-Red Time (s)	3.6	3.6
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

Maximum v/c Ratio: 0.30

Intersection Signal Delay: 9.2	Intersection LOS: A
Intersection Capacity Utilization 26.0%	ICU Level of Service A
Analysis Period (min) 15	

Splits and Phases: 6: Carling & Trillium MUP

Intersection	
Int Delay, s/veh	1.8

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	20	0	9	24	6	20	4	765	0	0	479	3
Future Vol, veh/h	20	0	9	24	6	20	4	765	0	0	479	3
Conflicting Peds, #/hr	5	0	2	2	0	5	37	0	72	72	0	37
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	100	100	100	100	100	100	100	100	100	100	100	100
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	20	0	9	24	6	20	4	765	0	0	479	3

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	1309	1291	520	1260	1292	770	519	0	-	-	-	0
Stage 1	518	518	-	773	773	-	-	-	-	-	-	-
Stage 2	791	773	-	487	519	-	-	-	-	-	-	-
Critical Hdwy	7.12	6.52	6.22	7.12	6.52	6.22	4.12	-	-	-	-	-
Critical Hdwy Stg 1	6.12	5.52	-	6.12	5.52	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.12	5.52	-	6.12	5.52	-	-	-	-	-	-	-
Follow-up Hdwy	3.518	4.018	3.318	3.518	4.018	3.318	2.218	-	-	-	-	-
Pot Cap-1 Maneuver	136	163	556	147	163	401	1047	-	0	0	-	-
Stage 1	541	533	-	392	409	-	-	-	0	0	-	-
Stage 2	383	409	-	562	533	-	-	-	0	0	-	-
Platoon blocked, %								-			-	-
Mov Cap-1 Maneuver	120	157	538	143	157	399	1014	-	-	-	-	-
Mov Cap-2 Maneuver	120	157	-	143	157	-	-	-	-	-	-	-
Stage 1	520	516	-	389	406	-	-	-	-	-	-	-
Stage 2	354	406	-	552	516	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	32.8	29.7	0	0
HCM LOS	D	D		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	WBLn1	SBT	SBR
Capacity (veh/h)	1014	-	158	195	-	-
HCM Lane V/C Ratio	0.004	-	0.184	0.256	-	-
HCM Control Delay (s)	8.6	0	32.8	29.7	-	-
HCM Lane LOS	A	A	D	D	-	-
HCM 95th %tile Q(veh)	0	-	0.6	1	-	-

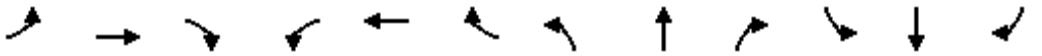
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	27	40	33	48	138	31	83	514	64	17	528	53
Future Volume (vph)	27	40	33	48	138	31	83	514	64	17	528	53
Satd. Flow (prot)	0	1594	0	0	1761	1517	1695	1724	0	1695	1743	0
Flt Permitted		0.873			0.901		0.390			0.391		
Satd. Flow (perm)	0	1382	0	0	1567	1282	674	1724	0	663	1743	0
Satd. Flow (RTOR)		24				30		16			13	
Lane Group Flow (vph)	0	100	0	0	186	31	83	578	0	17	581	0
Turn Type	Perm	NA		Perm	NA	Perm	Perm	NA		Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases	4			8		8	2			6		
Detector Phase	4	4		8	8	8	2	2		6	6	
Switch Phase												
Minimum Initial (s)	10.0	10.0		10.0	10.0	10.0	10.0	10.0		10.0	10.0	
Minimum Split (s)	22.6	22.6		22.6	22.6	22.6	33.5	33.5		33.5	33.5	
Total Split (s)	23.0	23.0		23.0	23.0	23.0	67.0	67.0		67.0	67.0	
Total Split (%)	25.6%	25.6%		25.6%	25.6%	25.6%	74.4%	74.4%		74.4%	74.4%	
Yellow Time (s)	3.3	3.3		3.3	3.3	3.3	3.3	3.3		3.3	3.3	
All-Red Time (s)	2.3	2.3		2.3	2.3	2.3	2.2	2.2		2.2	2.2	
Lost Time Adjust (s)		0.0			0.0	0.0	0.0	0.0		0.0	0.0	
Total Lost Time (s)		5.6			5.6	5.6	5.5	5.5		5.5	5.5	
Lead/Lag												
Lead-Lag Optimize?												
Recall Mode	None	None		None	None	None	C-Min	C-Min		C-Min	C-Min	
Act Effct Green (s)		16.8			16.8	16.8	62.1	62.1		62.1	62.1	
Actuated g/C Ratio		0.19			0.19	0.19	0.69	0.69		0.69	0.69	
v/c Ratio		0.36			0.64	0.12	0.18	0.48		0.04	0.48	
Control Delay		27.0			43.4	11.7	6.9	7.9		5.8	8.6	
Queue Delay		0.0			0.0	0.0	0.0	0.1		0.0	0.0	
Total Delay		27.0			43.4	11.7	6.9	8.0		5.8	8.6	
LOS		C			D	B	A	A		A	A	
Approach Delay		27.0			38.8			7.9			8.5	
Approach LOS		C			D			A			A	
Queue Length 50th (m)		11.4			29.9	0.2	4.4	39.2		0.8	39.6	
Queue Length 95th (m)		23.9			47.8	6.9	11.4	52.9		3.4	72.7	
Internal Link Dist (m)		209.3			157.6			59.1			55.0	
Turn Bay Length (m)						5.0	25.0			25.0		
Base Capacity (vph)		302			320	286	472	1214		465	1226	
Starvation Cap Reductn		0			0	0	0	60		0	0	
Spillback Cap Reductn		0			0	0	0	0		0	0	
Storage Cap Reductn		0			0	0	0	0		0	0	
Reduced v/c Ratio		0.33			0.58	0.11	0.18	0.50		0.04	0.47	

Intersection Summary
Cycle Length: 90
Actuated Cycle Length: 90
Offset: 0 (0%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green
Natural Cycle: 60
Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.64

Intersection Signal Delay: 13.6	Intersection LOS: B
Intersection Capacity Utilization 86.2%	ICU Level of Service E
Analysis Period (min) 15	

Splits and Phases: 1: Preston & Beech



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	154	612	413	380	1148	63	381	441	186	112	365	128
Future Volume (vph)	154	612	413	380	1148	63	381	441	186	112	365	128
Satd. Flow (prot)	1695	4871	1517	1695	4805	0	1695	3166	0	1695	1676	0
Flt Permitted	0.950			0.950			0.089			0.414		
Satd. Flow (perm)	1666	4871	1307	1623	4805	0	159	3166	0	719	1676	0
Satd. Flow (RTOR)			302		6			60			12	
Lane Group Flow (vph)	154	612	413	380	1211	0	381	627	0	112	493	0
Turn Type	Prot	NA	Perm	Prot	NA		pm+pt	NA		Perm	NA	
Protected Phases	5	2		1	6		3	8			4	
Permitted Phases			2				8			4		
Detector Phase	5	2	2	1	6		3	8		4	4	
Switch Phase												
Minimum Initial (s)	5.0	10.0	10.0	5.0	10.0		5.0	10.0		10.0	10.0	
Minimum Split (s)	11.2	30.0	30.0	11.2	30.0		11.9	43.9		43.9	43.9	
Total Split (s)	30.0	41.0	41.0	30.0	41.0		24.0	69.0		45.0	45.0	
Total Split (%)	21.4%	29.3%	29.3%	21.4%	29.3%		17.1%	49.3%		32.1%	32.1%	
Yellow Time (s)	3.7	3.7	3.7	3.7	3.7		3.3	3.3		3.3	3.3	
All-Red Time (s)	2.5	2.3	2.3	2.5	2.3		3.6	3.6		3.6	3.6	
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)	6.2	6.0	6.0	6.2	6.0		6.9	6.9		6.9	6.9	
Lead/Lag	Lead	Lag	Lag	Lead	Lag		Lead			Lag	Lag	
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes		Yes			Yes	Yes	
Recall Mode	None	C-Min	C-Min	None	C-Min		None	None		None	None	
Act Effct Green (s)	17.8	35.0	35.0	23.8	41.0		62.1	62.1		38.1	38.1	
Actuated g/C Ratio	0.13	0.25	0.25	0.17	0.29		0.44	0.44		0.27	0.27	
v/c Ratio	0.72	0.50	0.75	1.32	0.86		1.48	0.44		0.57	1.06	
Control Delay	63.6	61.0	37.7	210.3	54.1		265.7	25.2		57.4	106.4	
Queue Delay	0.0	0.0	10.9	0.0	48.0		7.8	0.0		0.0	1.7	
Total Delay	63.6	61.0	48.6	210.3	102.1		273.5	25.2		57.4	108.0	
LOS	E	E	D	F	F		F	C		E	F	
Approach Delay		57.0			127.9			119.1			98.6	
Approach LOS		E			F			F			F	
Queue Length 50th (m)	34.6	66.3	58.4	~135.5	116.0		~130.6	55.9		26.9	~147.4	
Queue Length 95th (m)	55.9	79.6	91.5	#198.1	#157.3		#194.2	72.0		48.6	#215.5	
Internal Link Dist (m)		95.0			162.0			66.0			47.4	
Turn Bay Length (m)	70.0		40.0	75.0			80.0			35.0		
Base Capacity (vph)	288	1217	553	288	1410		258	1437		195	464	
Starvation Cap Reductn	0	0	116	0	0		0	0		0	0	
Spillback Cap Reductn	0	0	0	0	406		102	0		0	2	
Storage Cap Reductn	0	0	0	0	0		0	0		0	0	
Reduced v/c Ratio	0.53	0.50	0.95	1.32	1.21		2.44	0.44		0.57	1.07	

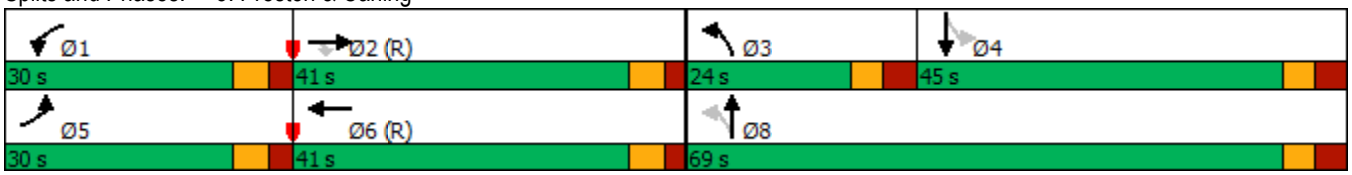
Intersection Summary
Cycle Length: 140
Actuated Cycle Length: 140
Offset: 116 (83%), Referenced to phase 2:EBT and 6:WBT, Start of Green
Natural Cycle: 120
Control Type: Actuated-Coordinated

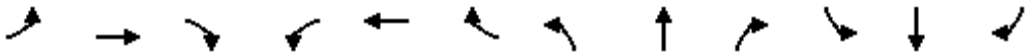
Maximum v/c Ratio: 1.48

Intersection Signal Delay: 102.8	Intersection LOS: F
Intersection Capacity Utilization 116.8%	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: 3: Preston & Carling





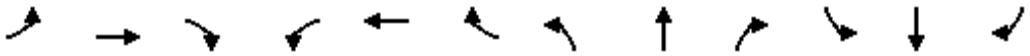
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	4	3	10	0	0	0	9	628	21	6	597	15
Future Volume (vph)	4	3	10	0	0	0	9	628	21	6	597	15
Satd. Flow (prot)	0	1529	0	0	0	0	0	1769	0	0	1774	0
Flt Permitted		0.988						0.992			0.995	
Satd. Flow (perm)	0	1502	0	0	0	0	0	1756	0	0	1765	0
Satd. Flow (RTOR)		10						5			3	
Lane Group Flow (vph)	0	17	0	0	0	0	0	658	0	0	618	0
Turn Type	Perm	NA					Perm	NA		Perm	NA	
Protected Phases		4						2			6	
Permitted Phases	4						2			6		
Detector Phase	4	4					2	2		6	6	
Switch Phase												
Minimum Initial (s)	10.0	10.0					10.0	10.0		10.0	10.0	
Minimum Split (s)	20.5	20.5					34.1	34.1		34.1	34.1	
Total Split (s)	21.0	21.0					69.0	69.0		69.0	69.0	
Total Split (%)	23.3%	23.3%					76.7%	76.7%		76.7%	76.7%	
Yellow Time (s)	3.3	3.3					3.3	3.3		3.3	3.3	
All-Red Time (s)	2.2	2.2					1.8	1.8		1.8	1.8	
Lost Time Adjust (s)		0.0						0.0			0.0	
Total Lost Time (s)		5.5						5.1			5.1	
Lead/Lag												
Lead-Lag Optimize?												
Recall Mode	None	None					C-Min	C-Min		C-Min	C-Min	
Act Effct Green (s)		14.0						69.5			69.5	
Actuated g/C Ratio		0.16						0.77			0.77	
v/c Ratio		0.07						0.48			0.45	
Control Delay		22.1						6.6			6.2	
Queue Delay		0.0						0.3			0.3	
Total Delay		22.1						6.9			6.5	
LOS		C						A			A	
Approach Delay		22.1						6.9			6.5	
Approach LOS		C						A			A	
Queue Length 50th (m)		1.0						43.1			57.3	
Queue Length 95th (m)		6.6						65.2			35.4	
Internal Link Dist (m)		206.9			156.6			101.5			55.4	
Turn Bay Length (m)												
Base Capacity (vph)		266						1357			1363	
Starvation Cap Reductn		0						220			236	
Spillback Cap Reductn		0						0			0	
Storage Cap Reductn		0						0			0	
Reduced v/c Ratio		0.06						0.58			0.55	

Intersection Summary
Cycle Length: 90
Actuated Cycle Length: 90
Offset: 27 (30%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green
Natural Cycle: 55
Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.48

Intersection Signal Delay: 6.9	Intersection LOS: A
Intersection Capacity Utilization 61.9%	ICU Level of Service B
Analysis Period (min) 15	

Splits and Phases: 5: Preston & Pamila



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↑↑↑			↑↑↑							
Traffic Volume (vph)	0	1179	0	0	1658	0	0	0	0	0	0	0
Future Volume (vph)	0	1179	0	0	1658	0	0	0	0	0	0	0
Satd. Flow (prot)	0	4871	0	0	4871	0	0	0	0	0	0	0
Flt Permitted												
Satd. Flow (perm)	0	4871	0	0	4871	0	0	0	0	0	0	0
Satd. Flow (RTOR)												
Lane Group Flow (vph)	0	1179	0	0	1658	0	0	0	0	0	0	0
Turn Type		NA			NA							
Protected Phases		2			6							
Permitted Phases												
Detector Phase		2			6							
Switch Phase												
Minimum Initial (s)		10.0			10.0							
Minimum Split (s)		31.1			31.1							
Total Split (s)		35.0			35.0							
Total Split (%)		50.0%			50.0%							
Yellow Time (s)		3.7			3.7							
All-Red Time (s)		1.4			1.4							
Lost Time Adjust (s)		0.0			0.0							
Total Lost Time (s)		5.1			5.1							
Lead/Lag												
Lead-Lag Optimize?												
Recall Mode		C-Min			C-Min							
Act Effct Green (s)		45.9			45.9							
Actuated g/C Ratio		0.66			0.66							
v/c Ratio		0.37			0.52							
Control Delay		11.0			22.9							
Queue Delay		0.0			0.0							
Total Delay		11.0			23.0							
LOS		B			C							
Approach Delay		11.0			23.0							
Approach LOS		B			C							
Queue Length 50th (m)		41.0			157.5							
Queue Length 95th (m)		53.1			m153.7							
Internal Link Dist (m)		366.8			95.0			72.0			87.6	
Turn Bay Length (m)												
Base Capacity (vph)		3196			3196							
Starvation Cap Reductn		0			190							
Spillback Cap Reductn		20			0							
Storage Cap Reductn		0			0							
Reduced v/c Ratio		0.37			0.55							

Intersection Summary
Cycle Length: 70
Actuated Cycle Length: 70
Offset: 6 (9%), Referenced to phase 2:EBT and 6:WBT, Start of Green
Natural Cycle: 70
Control Type: Actuated-Coordinated

Lane Group	Ø4	Ø8
Lane Configurations		
Traffic Volume (vph)		
Future Volume (vph)		
Satd. Flow (prot)		
Flt Permitted		
Satd. Flow (perm)		
Satd. Flow (RTOR)		
Lane Group Flow (vph)		
Turn Type		
Protected Phases	4	8
Permitted Phases		
Detector Phase		
Switch Phase		
Minimum Initial (s)	10.0	10.0
Minimum Split (s)	35.0	35.0
Total Split (s)	35.0	35.0
Total Split (%)	50%	50%
Yellow Time (s)	3.0	3.0
All-Red Time (s)	3.6	3.6
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		

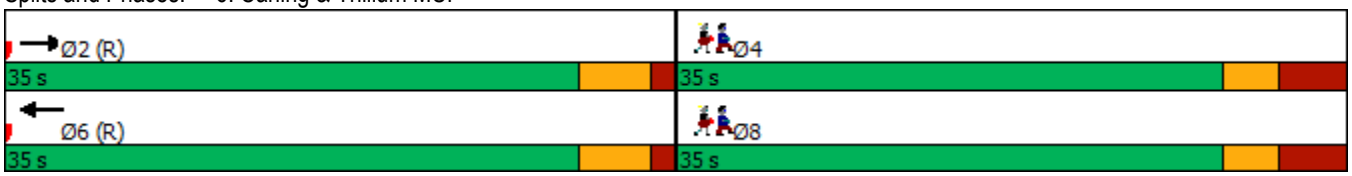
Intersection Summary

Maximum v/c Ratio: 0.52

Intersection Signal Delay: 18.0	Intersection LOS: B
Intersection Capacity Utilization 38.1%	ICU Level of Service A
Analysis Period (min) 15	

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

Splits and Phases: 6: Carling & Trillium MUP



Intersection	
Int Delay, s/veh	2

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	15	0	15	21	14	23	5	620	0	0	592	15
Future Vol, veh/h	15	0	15	21	14	23	5	620	0	0	592	15
Conflicting Peds, #/hr	5	0	8	8	0	5	50	0	64	64	0	50
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	100	100	100	100	100	100	100	100	100	100	100	100
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	15	0	15	21	14	23	5	620	0	0	592	15

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	1304	1280	658	1245	1287	625	657	0	-	-	-	0
Stage 1	650	650	-	630	630	-	-	-	-	-	-	-
Stage 2	654	630	-	615	657	-	-	-	-	-	-	-
Critical Hdwy	7.12	6.52	6.22	7.12	6.52	6.22	4.12	-	-	-	-	-
Critical Hdwy Stg 1	6.12	5.52	-	6.12	5.52	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.12	5.52	-	6.12	5.52	-	-	-	-	-	-	-
Follow-up Hdwy	3.518	4.018	3.318	3.518	4.018	3.318	2.218	-	-	-	-	-
Pot Cap-1 Maneuver	137	166	464	151	164	485	931	-	0	0	-	-
Stage 1	458	465	-	470	475	-	-	-	0	0	-	-
Stage 2	456	475	-	479	462	-	-	-	0	0	-	-
Platoon blocked, %								-			-	-
Mov Cap-1 Maneuver	115	158	441	144	156	483	892	-	-	-	-	-
Mov Cap-2 Maneuver	115	158	-	144	156	-	-	-	-	-	-	-
Stage 1	435	445	-	466	471	-	-	-	-	-	-	-
Stage 2	416	471	-	460	443	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	28.6	29.3	0.1	0
HCM LOS	D	D		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	WBLn1	SBT	SBR
Capacity (veh/h)	892	-	182	205	-	-
HCM Lane V/C Ratio	0.006	-	0.165	0.283	-	-
HCM Control Delay (s)	9.1	0	28.6	29.3	-	-
HCM Lane LOS	A	A	D	D	-	-
HCM 95th %tile Q(veh)	0	-	0.6	1.1	-	-