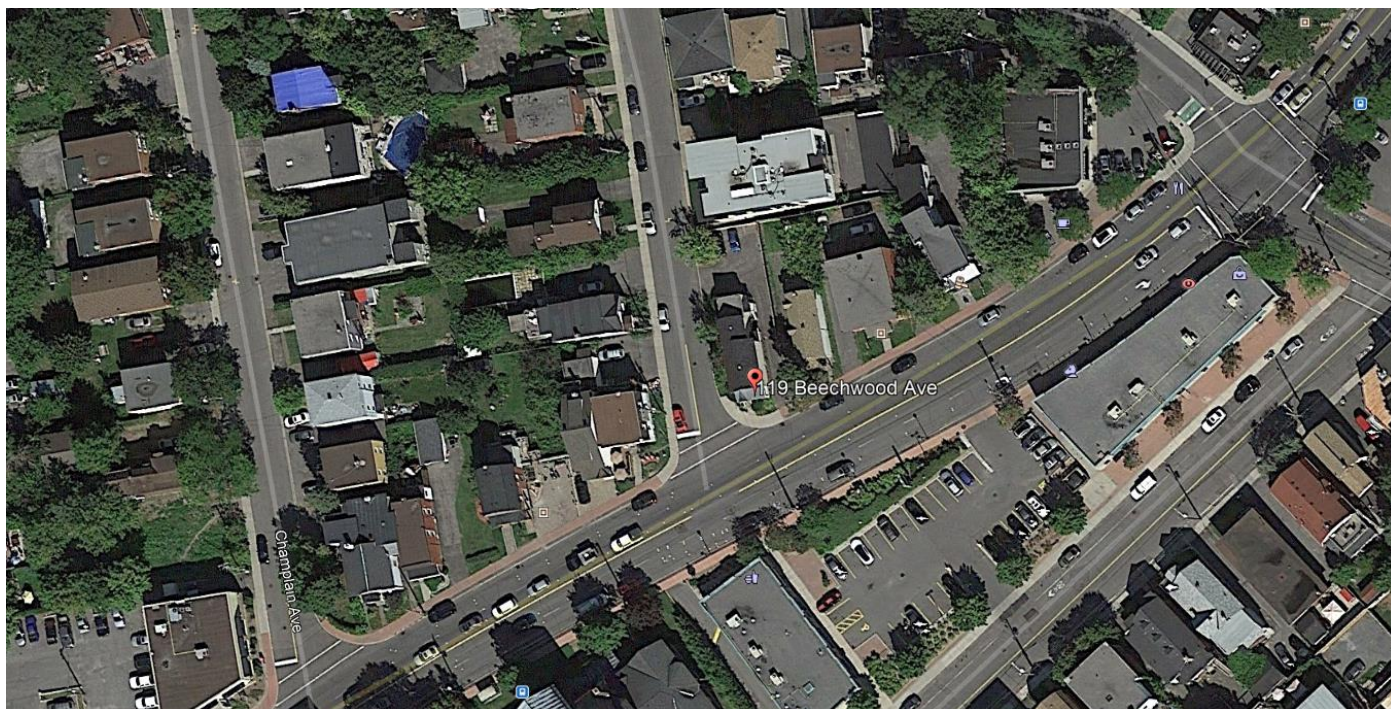


# TRAFFIC IMPACT ASSESSMENT (FINAL)



Project No.: PCP-18-0056 119-121 Beechwood Avenue

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## 1.0 SCREENING FORM

The following section describes the initial assessment of the proposed development in respect to the Traffic Impact Assessment (TIA) Screening Form and will provide reasoning for potential triggers. The TIA screening form has been attached in [Appendix A](#).

### 1.1 Trip Generation Triggers

Trip generation was calculated in accordance with the Institute of Transportation Engineers (ITE) Trip Generation Manual, 9<sup>th</sup> Edition. Trip generation for the development was split into two categories, a General Office Building with a Gross Floor Area (G.F.A) of 1,700 ft<sup>2</sup> and Medical Facility with a G.F.A of 1700 ft<sup>2</sup>. The City of Ottawa TIA Guidelines (2017) recommends that when using the ITE Trip Generation Manual, assume a 10 % non-auto mode share and an average vehicle occupancy of 1.15. As such, a factor of 1.28 was applied to the site generated trips in order to estimate the total site generated person-trips. [Table 1.1](#) shows the total person-trip generation for the AM and PM peak hour. As shown below, it is estimated that the site will generate a total of 10 person-trips in the AM and 11 in the PM peak hour. Based on [Table 2](#), located in the TIA Guidelines (2017), and due to the land use type and development size, the criteria for the trip generation trigger is not met.

**Table 1.1: Development-Generated Person-Trips**

ITE Land Use	Unit of Measure	Quantity	Rate		AM Peak Hour			PM Peak Hour		
			AM	PM	In	Out	Total	In	Out	Total
General Office Building (Code 710)	Ksf	1.7	1.56	1.49	3	0	3	1	3	4
Medical Clinic (Code 720)		1.7	2.39	3.57	3	1	4	2	4	6
Total:					6	1	7	3	7	10
* Rates shown are average rates published within ITE Trip Generation 9th Edition										
* Directional splits are published within ITE Trip Generation 9th Edition										
* Ksf = 1000 ft <sup>2</sup>										

### 1.2 Location Triggers

The proposed development will be located at 119-121 Beechwood Avenue. The proposed development is expected to make use of an existing access located on Chapleau Avenue. Although Beechwood Avenue is designated as part of the City's Transit Priority and Spine Bicycle network, no new driveways are expected to be built on Beechwood. The proposed development is not located in a Transit-Oriented Development (TOD) zone, however, is in a designated Design Priority Area (DPA) classified in [Section 2.5.1, Schedule B](#) of the City of Ottawa Official Plan as a Traditional Main Street. As such, the criteria for a Location Trigger is met.

### 1.3 Safety Triggers

Beechwood Avenue and Chapleau Avenue have a statutory speed limit of 50 km/h. Additionally, since no new driveways are proposed and the speed limits on all boundary streets are below 80 km/h, the criteria for a Safety Trigger is not met.

## 2.0 DESCRIPTION OF PROPOSED DEVELOPMENT

The proposed development is located at 119-121 Beechwood Avenue, north-east of the City of Ottawa's Central Area, bounded by the neighbourhoods of Lindenlea to the north and North Vanier to the south. The date of occupancy and build-out for this proposed development is anticipated to occur in September 2019 with the build-out expected to be completed in a single phase. The proposed development's subject lands will include the 280 m<sup>2</sup>, 119 Beechwood Avenue lot and the 263 m<sup>2</sup>, 121 Beechwood Avenue lot. 119 Beechwood Avenue is currently occupied by a two-storey single detached home which has been converted into a low-rise apartment with the ground floor occupied by a real-estate agency. 121 Beechwood Avenue is currently occupied by a two-storey single detached home which has been converted into apartments. **Figure 2.0.1** below, shows the location of the proposed developments subject lands.



*Figure 2.0.1: Subject Lands (Courtesy of Google Earth)*

Based on the preliminary Site Plan provided in **Appendix B**, and other information provided by the developer, the proposed development will consist of a two-storey building with a G.F.A of 318 m<sup>2</sup>. The 159 m<sup>2</sup> second floor will serve as general office space while the 159 m<sup>2</sup> ground floor is expected to be occupied by an optometrist clinic. The proposed development is expected to make use of the existing site entrance located on Chapleau Avenue where a surface parking lot consisting of 10 spaces will be located.

The proposed development is located in a General Urban area, however, as per *Schedule B* of the City of Ottawa Official Plan, the segment of Beechwood Avenue is classified as having a 'Traditional Mainstreet' design priority. As such, according to *Section 3.6.5* of the City of Ottawa Official Plan, Traditional Main streets are planned to provide a mix of uses and have the potential to transform over time, into more compact, pedestrian-orientated and transit friendly places. In addition, a wide range of uses is permitted on a Traditional Mainstreet including retail, offices, residential, and institutional uses.

### 3.0 EXISTING CONDITIONS

The following outlines the existing site characteristics and a summary of the expected development transportation conditions.

#### 3.1 Roadways

Figure 3.0.1 below, shows the road network within the vicinity of the proposed development. All roads within the study area are within the jurisdiction of the City of Ottawa.

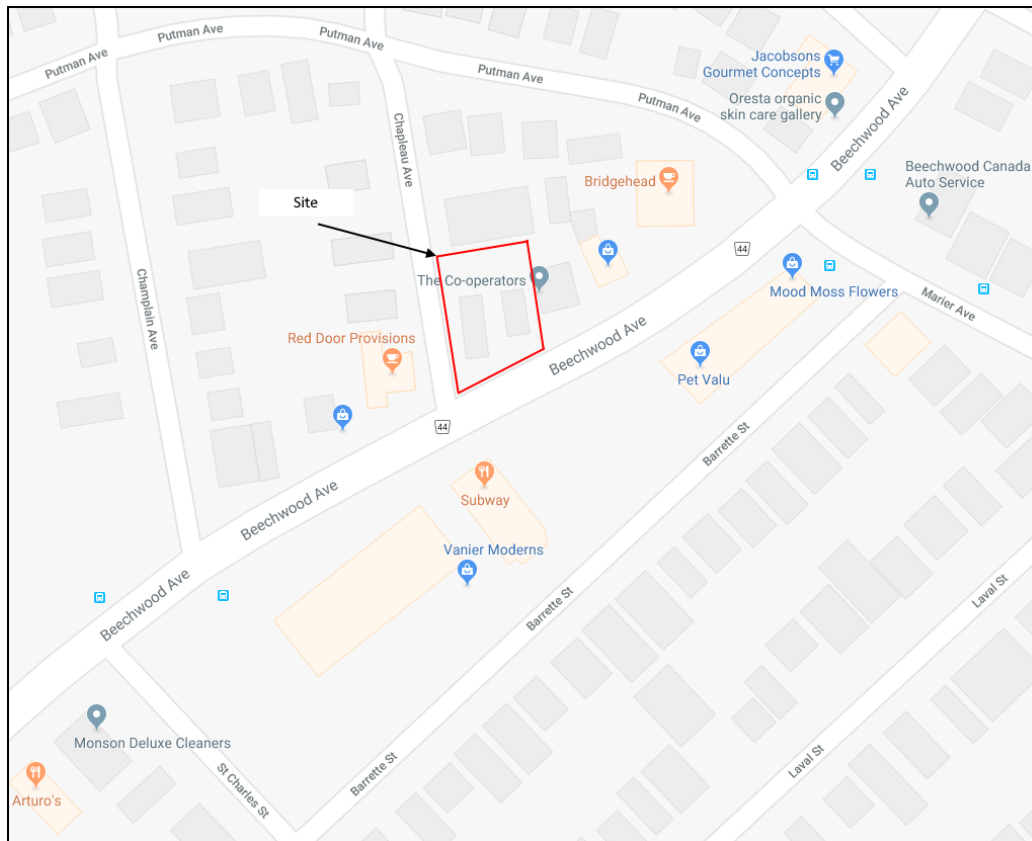


Figure 3.1.1: Study Area Road Network (Courtesy of Google Maps)

- Beechwood Avenue is an approximately 1.2 km, urban arterial roadway with a statutory speed limit of 50 km/h within the study area. The roadway joins the St. Patrick Street bridge and Vanier Parkway to the west and Hemlock Road to the east. Beechwood Avenue is a major corridor within the Vanier, Rockcliffe Park, Lindenlea, and New Edinburgh neighbourhoods, providing access to various land uses

along its route; primarily residential and commercial. Beechwood Avenue within the study area has 1.8 m concrete sidewalks on both the north and south sides.

- Marier Avenue is a 1.1 km, two-lane, urban collector roadway that runs north-south connecting Beechwood Avenue to Montreal Road to the south. The roadway has a statutory speed limit of 50 km/h and has primarily residential properties along its frontage. The roadway has 1.8 m concrete sidewalks along its length.
- Putman Avenue makes up the north approach of the Beechwood Avenue and Marier Avenue intersection. The approximate 550 m, local roadway runs north west of Beechwood Avenue to Ivy Crescent and provides access to a number of residential properties. Putman Avenue has 1.8 m concrete side walks on the east side within the study area. Putman Avenue has a statutory speed limit of 50 km/h within the study area.
- Champlain Avenue and Chapleau Avenue are local roadways that run north-south from Beechwood Avenue to Putman Drive. The two roadways have a number of residential properties along their length with a statutory speed limit of 50 km/h. Both Champlain and Chapleau Avenue have 1.8 m concrete sidewalks along their west side.
- St. Charles Street is a 400 m, local road that runs south from Beechwood Avenue to Landry Street. The roadway has a statutory speed limit of 50 km/h and serves to provide access to a number of residential properties along its length as well as a laundromat and a convenience store. The roadway has 1.8 m concrete sidewalks on both its east and west side.

Along the north side of Beechwood Avenue, and to the west of Marier Avenue, on-street parking is permitted for a duration of one hour between 7AM and 7PM. The designated on-street parking locations are identified with the use of signage indicating the permitted time periods and parking boundaries. Between the on-street parking and driving road surface is a dedicated 2 m bike lane. West of Marier Avenue the bike lane has marked buffers on either side providing extra protection from through traffic and parked vehicles. On-street parking is not permitted along the south side of Beechwood Avenue, with the exception of directly in front of the repurposed church structure. Dedicated 2 m bike lanes, also run along the south side of Beechwood Avenue with a buffer along the northern edge. Where bus stops are located, the bike lanes act as shared lanes bus lanes. There are no other apparent area traffic management measures with the exception of a corner radius reduction at the north approach at the intersection of Beechwood Avenue and Marier/Putman Avenue.

### 3.2 Study Area Intersections

For the purposes of this report, it is expected that the study area will include the Beechwood Avenue at Putman/Marier Avenue, Chapleau Avenue, Champlain Avenue, and St Charles Street intersections. Below is a description of the intersections:

- Beechwood Avenue at Putman/Marier Avenue is a four-leg, signalized intersection with one shared left/through/right lane at each approach. The intersection has Bicycle Lanes on the east and west approaches as well as a transit stop positioned approximately at the east approach Stop Bar. There are

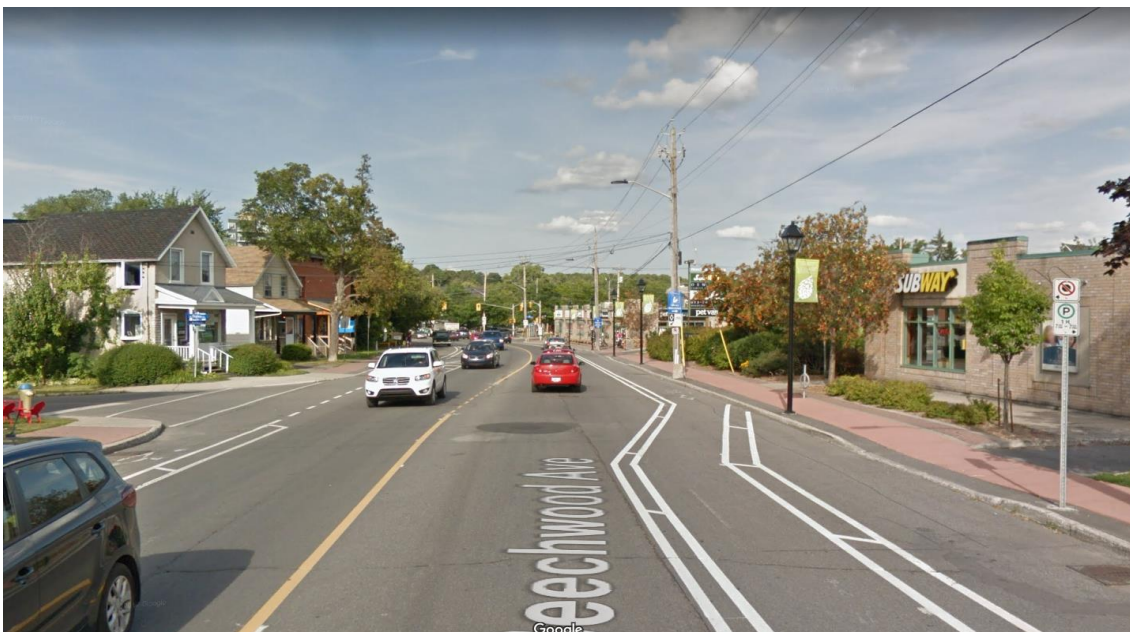


access driveways to various development within close proximity to the Stop Bars at each approach of the intersection. Figure 3.2.1 below, shows a street level view of the intersection from the perspective of the east approach.



*Figure 3.2.1: Beechwood Avenue at Putman/Marier Avenue (Courtesy of Google Earth)*

- Beechwood Avenue at Chapleau Avenue is a three-leg, two-way stop-controlled intersection. The east and west approaches have Bicycle Lanes and the north approach has access driveways on the east and west side within close proximity to the Stop Bar. Figure 3.2.2 below, shows a street level view of the intersection from the perspective of the west approach.



*Figure 3.2.2: Beechwood Avenue at Marier Avenue (Courtesy of Google Earth)*



- Beechwood Avenue at Champlain Avenue is a three-leg, two-way stop-controlled intersection. Similar in configuration to the intersection of Beechwood and Chapleau Avenue, there are Bicycle lanes on the east and west approaches as well as access driveways within close proximity to the north approach Stop Bars. Figure 3.2.3 below shows a street level view from the west approach.



*Figure 3.2.3: Beechwood Avenue at Champlain Avenue (Courtesy of Google Earth)*

- Beechwood Avenue at St Charles Street is a three-leg, signalized intersection with one shared left/through/right lane at each approach and bicycle lanes along the east and west approaches. There is a transit stop located within the westbound lane of the intersection. Figure 3.3.4 below, shows a street level view of the intersection.



*Figure 3.3.4: Beechwood Avenue at St. Charles Street (Courtesy of Google Earth)*

### 3.3 Existing Transit System

Figure 3.3.1 and Figure 3.3.2, show the bus routes that serve the area surrounding the development as well as the location of the bus stops. The following is a description of the 4 primary bus routes that provided service to Beechwood Avenue within the vicinity of the proposed development:

- Route 7 which travels from the St. Laurent Shopping Centre through the Ottawa Downtown Core and then to Carleton University. Buses from Route 7 are typically staggered every 6 minutes during evening peak hours and 15 minutes during morning peak hours.
- Route 6 travels from South Keys through the Ottawa Downtown Core to Beechwood Avenue at Putman/Marier Avenue. As shown, buses from Route 6 are typically staggered every 15 minutes in the evening peak hours and every 10 minutes in the morning peak hours.
- Route 17 travels from Alexander park in the east to the Byward Market in the west. Bus stops within the vicinity of the proposed development are typically staggered every 30 minutes during the morning peak hour with Service only between 6:00 AM and 8:30 AM.
- Route 19 travels from the Ottawa downtown core to the Montfort Hospital in the east then to the St. Laurent Shopping Center in the south. Buses are typically staggered every 10 minutes during the morning peak hour and every 15 minutes during the afternoon peak hour.

The closest bus stops, as shown in Figure 3.3.2, are at the corner of Beechwood Avenue and St. Charles Street, approximately 65 m west of the proposed development site and at Beechwood Avenue and Putman/Marier Avenue. The Bus stops located on Beechwood Avenue and St. Charles Street are weather protected shelters with benches.

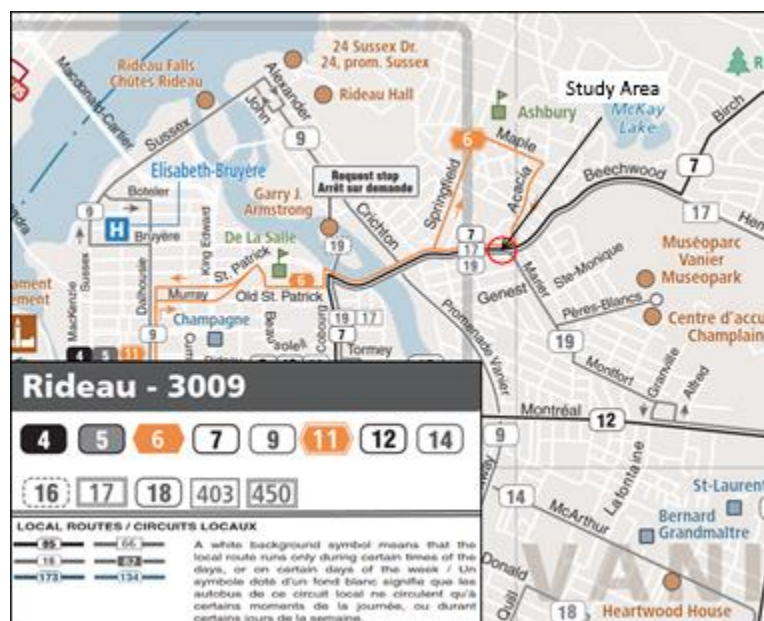


Figure 3.3.1: Bus Routes within the Development Boundary (Courtesy of OCtranspo)





Figure 3.3.2: Bus Stop Locations (Courtesy of OCtranspo)

### 3.4 Existing Driveways

The following are existing driveways adjacent to the proposed development while Figure 3.4 provides a visual reference.



Figure 3.4: Adjacent Driveways (Courtesy of Google Earth)

- Adjacent to the proposed development at 123-125 Beechwood Avenue is a two-storey building with an access driveway along its eastern and western property line. The building is occupied by various businesses such as an insurance agency, marketing agency, Scouts Canada, and a concrete contractor.
- Directly across the development on Chapeau Avenue is a Driveway for residents of the multi-use building located at 115 Beechwood Avenue. The multi-use building contains a Café, and several apartments.
- On Beechwood Avenue, Opposite the proposed development site is a strip mall containing a Subway, Pet Value and a Dental office. There is an access driveway to an approximately 28 space surface parking lot located approximately 15 m east of the proposed development.

### 3.5 Collision History

The 2014, 2015, and 2016 collision data was reviewed for the segment of Richmond Road involving the intersections identified in [Section 3.2](#) with regards to collision severity, road surface, light condition, collision classification, and impact type. The summarized findings of the collision data can be found in [Table 3.5.1](#).

As a result of the analysis on the collisions from Beechwood Avenue at St. Charles Street to Putman/Marier Avenue, the findings were as follows:

- There was a total of 14 collisions recorded. 2 occurred at an intersection while 5 were deemed to be intersection related and 5 were non-intersection related. 2 collisions occurred near a private driveway.
- 4 collisions occurred within the vicinity of the Beechwood and Putman/Marier Avenue intersection, 3 collisions occurred within the vicinity of the Beechwood Avenue and St. Charles Street intersection, and 7 occurred between Chapeau Avenue and Putman/Marier Avenue.
- 2 of the collisions recorded involved a non-fatal injury while the other 12 resulted in Property Damage Only (P.D. Only).
- All the recorded collisions occurred between the hours of 7:30 AM and 10 PM, 10 of which occurred in Daylight and 2 in Dark light conditions.
- 43% of the collisions were a result of a rear end.
- The collision rate for the 3-year collision data was calculated using the Average Annual Daily Traffic (AADT) for 2016 (8839 vehicles) and for the total number of collisions between within the study segment (220 m). The collision rate was calculated as 6.6 collisions per million vehicle kilometers (C/MVK).
- Two collisions were recorded in 2015 which involved a pedestrian or cyclist, one of which involved a pedestrian at the Beechwood Avenue and St. Charles Street intersection while the other involved a Cyclist at the intersection of Beechwood Avenue and Chapeau Avenue. No other collisions involving vulnerable road users were identified within the study area.

Table 3.5.1: Highlighted Collision Data

		Beechwood Ave Btw Champlain & Putman/Marier Ave
Number of Collisions:		14
Collisions Classification	P.D. Only	86%
	Injury	14%
	Fatal	0%
Road Surface	Dry	50%
	Wet	36%
	*Winter Conditions	14%
	Other	0%
Light Conditions	Daylight	86%
	Dark	14%
Impact Type	Rear End	43%
	Angle	7%
	Turning Movement	0%
	Sideswipe	14%
	Other	36%
Collision Location	Non Intersection	36%
	At Intersection	14%
	Intersection Related	36%
	At/Near Private Drive	14%

\* Winter conditions include; Slush, Packed Snow, Loose Snow, and Ice

### 3.6 Traffic Volume

The traffic data provided by the City of Ottawa included Turning Movement Counts (TMC) at each of the 4 intersections identified in [Section 3.2](#) and were conducted during the summer of 2015. Currently there have been no Traffic Impact Assessments completed within the study area which projected future traffic volumes. As such, Census Data for the Ottawa East Sub-Area was used in order to estimate a growth rate. In 2006, the population was approximately 49,145 which has steadily risen to an estimated population of 51,755 in 2017, resulting in an annual growth rate of 0.5%. As such, a 1% growth rate was chosen as a conservative estimate and to provide a more critical analysis of future conditions and account for a larger area of impact the proposed development might have. The traffic volumes for the AM and PM peak were projected to 2018 and applied to the network and balanced accordingly. [Figure 3.6.1](#) shows the 2018 traffic and pedestrian volumes at the study area intersections while [Figure 3.6.2](#) illustrates the bicycle volumes. The AM peak hour volume was from 8 AM to 9 AM and the PM peak hour volume was from 4 PM to 5 PM. All available traffic data has been attached in [Appendix C](#).



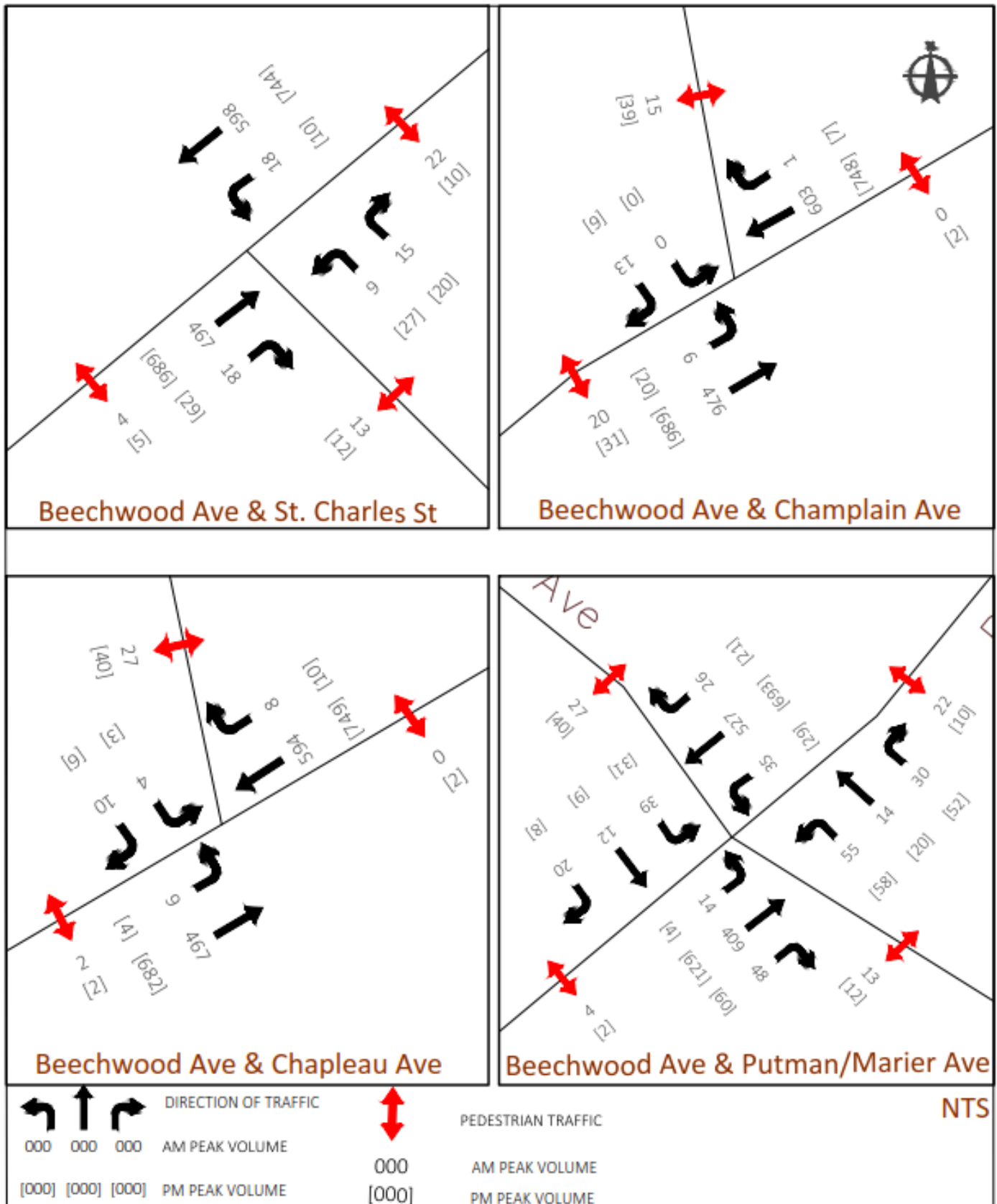


Figure 3.6.1: Existing (2018) Traffic Volume

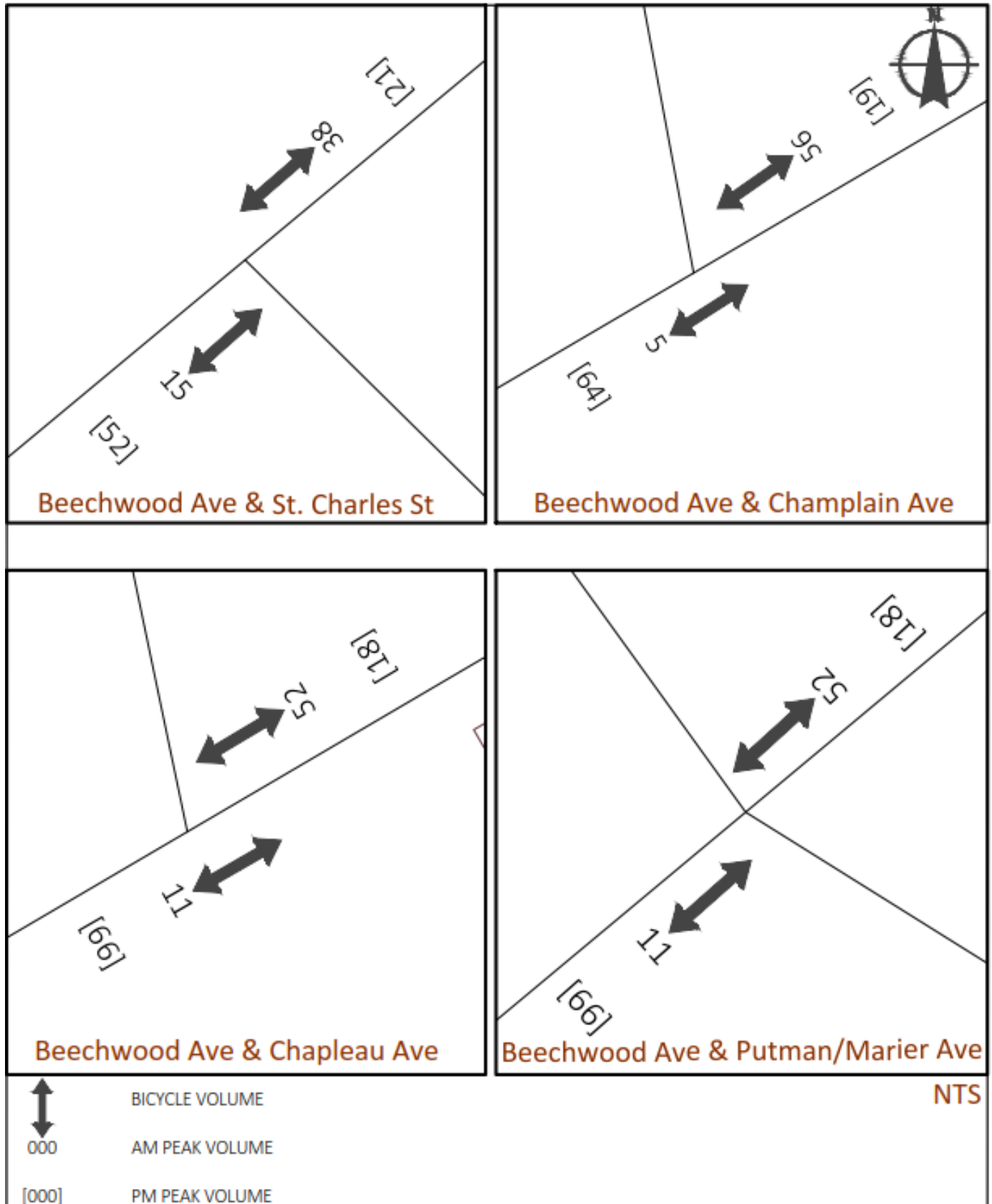


Figure 3.6.1: Existing (2018) Bicycle Volumes

Table 3.6.1 below, shows the expected travel mode percentages based on the most recent Capital Region Origin-Destination Survey which was conducted in the Fall of 2011 for the Ottawa East area and can be found in Appendix C.

**Table 3.6.1: Origin-Destination Survey Travel Mode Percentages**

Travel Mode	% of Person Trips	
	AM Peak (08:00 - 09:00)	PM Peak (16:00 - 17:00)
Auto Driver	50%	53%
Auto Passenger	11%	15%
Transit	22%	19%
Bicycle	4%	4%
Walk	5%	7%
Other	8%	2%

The TMCs provided pedestrian counts for all study area intersections with the exception of Beechwood Avenue and Putman/Marier Avenue. The total number of pedestrians inventoried in the counts during the AM peak hour was 103 while the total number of vehicles was 3,267. There was a total of 143 pedestrians inventoried during the PM peak and 4,239 vehicles. The number of Bicycles inventoried was 179 during the AM peak hour and 241 during the PM peak hour. Table 3.6.2 below, is representative of the actual modal split observed within the TMCs and assuming the percentage of Auto Passenger and Transit percentages are accurate.

**Table 3.6.1: Modal Split Representative of Provided Data**

Travel Mode	% of Person Trips	
	AM Peak (08:00 - 09:00)	PM Peak (16:00 - 17:00)
Auto Driver	61%	60%
Auto Passenger	11%	15%
Transit	22%	19%
Bicycle	4%	4%
Walk	2%	2%

The available data shows an approximately 11% increase in Auto Drivers for the AM peak hour and 7% for the PM peak hour. It is important to note however that Beechwood Avenue has installed dedicated bicycle lanes since the TMCs and O-D Surveys were conducted. As, such current Bicycle percentages may actually be higher in the summer months.

## 4.0 PLANNED CONDITIONS

Currently no changes to the study area transportation network are expected as per the City of Ottawa's Long Range Financial plan, Official Plan and TMP. There are, however, a number of Site Plan Control applications within the vicinity of the proposed development including the following:

- An application has been submitted to amend the Zoning By-laws to allow for the development of an 8-storey mixed-use development located at 135 Barrette Street. The application includes the adaptive re-use of the church for a retail store, restaurants and 53 residential units. A public park and private outdoor plaza are also proposed.
- There is currently an application for Site Plan Control at 137 Beechwood Avenue which would permit the construction of a 6-storey residential building with ground floor commercial space.
- Located at 196 Beechwood avenue, just opposite the proposed 6-storey residential development, is a proposed 3-storey commercial building.
- Located at 89-97 Beechwood Avenue, in the block between Langevin and Champlain Avenue, is a proposed 6-story building with retail space at grade and 67 residential dwelling units above. A total of 71 residential and visitor parking spaces are proposed in an underground parking area with access from Langevin Avenue.

## 5.0 STUDY AREA

The study area for the purposes of this report, at the time of writing, is expected to involve the intersection of Beechwood Avenue and St Charles Street, Champlain Avenue, Chapeau Avenue, and Putman/Marier Avenue.

## 6.0 TIME PERIODS

For the purposes of the operational analysis, both morning and afternoon peak hours will be considered for background travel demand and development-generated trips. Travel demand will be limited to the above-mentioned intersections.

## 7.0 HORIZON YEARS

At the time of writing, the date of occupancy and build-out is anticipated to occur in September 2019. As such, the horizon years to be analyzed will include 2019 and 2024.

## 8.0 EXEMPTION REVIEW

Since development-generated person trips are not expected to exceed 60, The City of Ottawa has stated that Modules 3.1, 3.3 and 4.5 to 4.9 may be omitted from this report.

## 9.0 DEVELOPMENT-GENERATED TRAFFIC

As stated in [Section 1.1](#), the development-generated person trips are expected to be 7 in the AM peak hour and 10 in the PM Peak hour. As such, this section has been omitted from this TIA.

## 10.0 BACKGROUND NETWORK TRAFFIC

As stated in [Section 3.6](#), MP received turning movement counts conducted in 2015 from the City of Ottawa at the intersections of Beechwood Avenue at St. Charles Street, Champlain Avenue, Chapleau Avenue, and Putman/Marier Avenue. The traffic volumes for the AM and PM peak were projected to 2018 and applied to the network and balanced accordingly.

### 10.1 Changes to Background Transportation Network

As previously stated in this report, the expected build out and occupancy year is 2019. Additionally, The City of Ottawa Long Range Financial Plan (2011) estimates a transit ridership increase of 3.8% from 2016 to 2020 and 2.0% increase from 2021-2025. The City of Ottawa Master Transportation Plan, also has identified mode share targets for the year of 2031. [Table 10.1.1](#) shows the mode share targets expected for the background traffic within the study area.

**Table 10.1.1: City of Ottawa Mode Share Targets**

Travel Mode	Mode Share Target	Rationale
Auto Driver	55%	Currently average of 60 % of person trips. This is expected to decrease in the future as more transit options become available
Auto Passenger	10%	% of auto passenger person trips is not expected to significantly change in proportion to Auto Drivers.
Transit	26%	Transit person trips are expected to increase over time, as predicted by City of Ottawa Long Range Financial Plan
Bicycle	6%	Beechwood Avenue has dedicated Bicycle Facilities and the proposed development will be providing adequate bicycle locks to encourage cycling.
Walk	3%	% of walking person trips is not expected to increase.

### 10.2 General Background Growth Rates

The background growth rate was previously determined in [Section 3.6](#) of this report. Since the background growth rate is conservatively estimated to be 1%, the increase in transit ridership is not purely a reflection of this background growth and is partially a result of changing primary travel modes. As such for the horizon year of 2024, a 1 % growth rate was applied annually from 2018 and adjusted according to [Table 10.1.1](#) to reflect the reduced Auto Driver percentage expected during this year. [Figure 10.2.1](#) below, shows expected background traffic volume during the horizon year of 2024 and [Figure 10.2.2](#) shows the expected bicycle volumes.



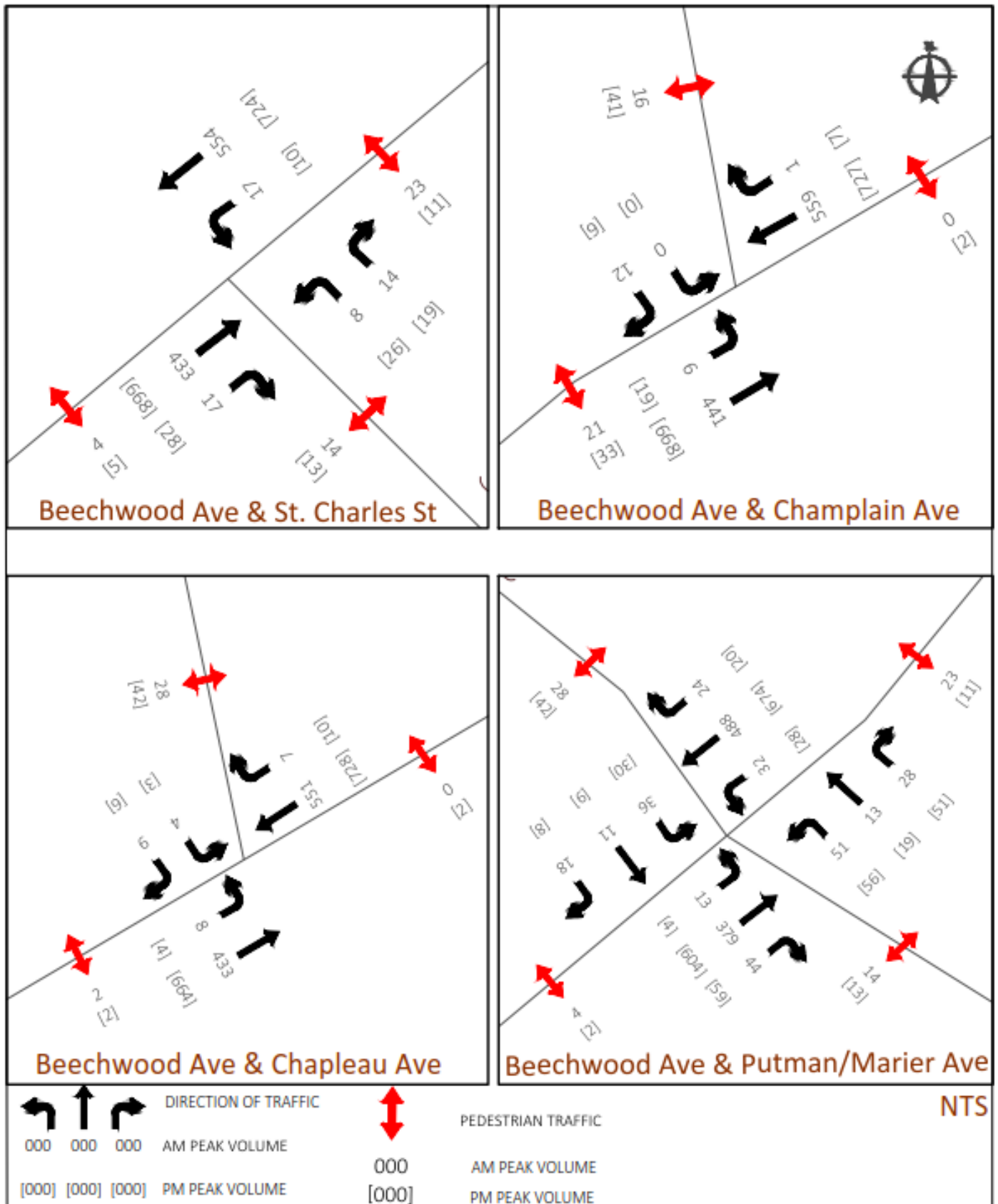


Figure 10.2.1: Background Traffic Volumes (2024)

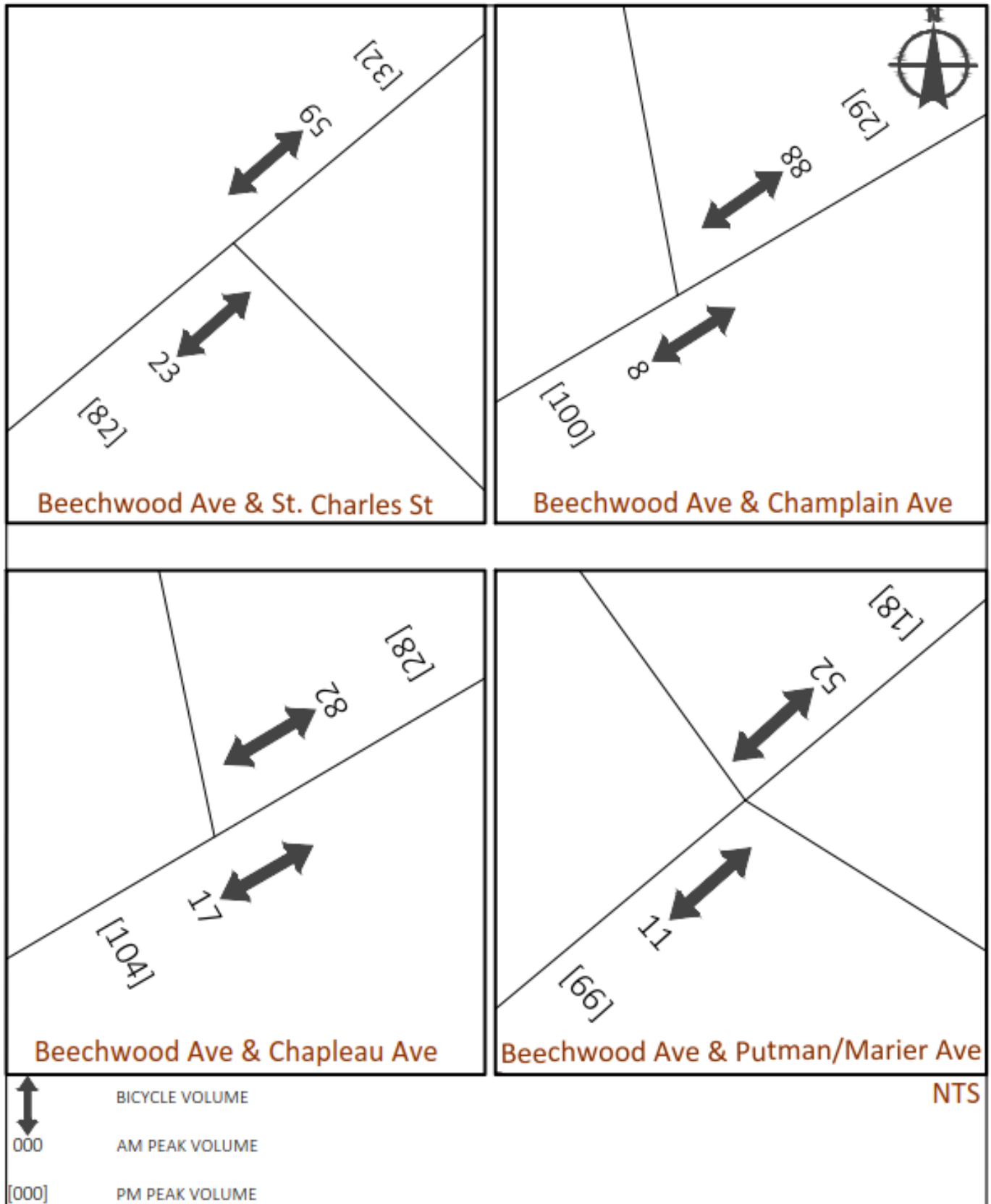


Figure 3.6.1: Background (2024) Bicycle Volumes

### 10.3 Other Developments

As stated in [Section 4.0](#), there are several planned developments within the study area that would have a direct impact on the background network travel demands. Of particular note is the planned developments at 89-97 Beechwood Avenue and 137 Beechwood Avenue. [Section 4.0](#) provides a description of all proposed developments within the study area.

## 11.0 DEMAND RATIONALIZATION

As stated previously and in [Section 8.0](#), the development-generated person trips are expected to be 7 in the AM peak hour and 10 in the PM Peak hour. As such, this section has been omitted from this TIA.

## 12.0 DEVELOPMENT DESIGN

This section will review the proposed development and its transportation network elements in order to ensure that a safe and efficient design has been proposed that will encourage walking, cycling, and transit use. The City of Ottawa's TDM-supportive Development Design and Infrastructure checklist has been completed and attached in [Appendix F](#) for reference. The TDM-supportive Development Design and Infrastructure checklist outlines the TDM elements expected to be included in the proposed development.

### 12.1 Design for Sustainable Modes

As stated previously, the proposed development is expected to have a surface parking lot on the south side of the building which will have a total of 10 parking spaces including 1 barrier free parking space. Additionally, the proposed development Site Plan includes a 6-space bicycle stand located along the west side of the building. A bicycle stand with 6 spaces would provide adequate spaces for the projected volume of peak hour cyclists expected.

As described in [Section 3.3](#) there are several transit stops located within 400 m of all of the proposed developments exterior access doors. The closest transit stop was determined to be approximately 65 m from the nearest entrance.

### 12.2 Circulation and Access

The proposed development is expected to have entrances along the Beechwood Avenue side of the building and a rear entrance on the south facing side. Permeable Pavers (Interlock) will be laid around the north and west perimeter of the building with a depressed curb at the rear of the building. The concrete sidewalk along Beechwood Avenue is expected to be extended to the edge of the property line on Chapleau Avenue with a continuous sidewalk across the access with no curb return through the sidewalk.

The proposed development will not have any loading spaces on site. As such deliveries will have to be made utilizing on-street parking or the proposed surface parking area to the rear of the building. It was observed during the field review conducted by MP in March, 2018 that delivery trucks commonly used on-street parking to make deliveries to other developments along Beechwood Avenue.

## 13.0 PARKING

As stated previously, the Site Plan has a total of 10 proposed parking spaces. The City of Ottawa *Zoning By-Law 2008-250, Section 101, Schedule 1A* lists the proposed development as being located in Area Y (Inner Urban Mainstreets). As such, *Section 101, Table 101*, states the minimum required number of parking spaces for a development with a land use type of an Office is 1 space per 100 m<sup>2</sup> of GFA. Additionally, for a development with a non-residential ground floor in Area Y and a GFA of less than 500 m<sup>2</sup> no off-street motor vehicle parking is required (By-Law 2016-249). As such, since the office space is expected to have a total GFA of 159 m<sup>2</sup>, the minimum number of required on-site parking spaces according to the City of Ottawa By-Laws is two. Since the proposed development is not located within 600 m of a rapid transit route, it is not subject to a parking supply limit. As such the proposed development meets all City of Ottawa Parking By-Law requirements.

Parking Demand was estimated in accordance with the Institute of Transportation Engineers (ITE), *Parking Generation 4<sup>th</sup> Edition*. For a 159 m<sup>2</sup> (1711 ft<sup>2</sup>) office building, the 85<sup>th</sup> percentile, peak period parking demand is expected to be approximately six vehicles. For the 159 m<sup>2</sup> (1711 ft<sup>2</sup>) medical clinic, the 85<sup>th</sup> percentile, peak period parking demand is expected to be approximately eight parking spaces. **Table 13.0.1** below, summarizes the expected parking demand according to the ITE parking generation.

**Table 13.0.1 ITE Parking Generation Summary**

Land Use	Peak Period Demand (vehicles per 1,000 sq.ft GFA)	GFA (sq.ft)	Peak Period Parking Demand
Medical Clinic (Code 630, Pg 197)	4.96	1,711	8
Office (Code 701, Pg 201)	3.45	1,711	6

Each land use type could have different parking demands during different times of day. For many land use types, ITE Parking Generation illustrates the percent of peak period parking demand throughout weekdays and weekends. Given the nature of the development land uses, it can be expected that weekend parking demand would be minimal. **Figure 13.0.1** below illustrates the 85<sup>th</sup> percentile parking demand by time of day for each of the land use types. As shown, the peak parking demand is expected to be approximately 14 vehicles. As such, the proposed development is short four parking spaces. As noted previously, in **section 3.1**, on street parking is available within walking distance, however, is only for one-hour durations. Since the turnover rate is expected to be much higher for the medical clinic, consideration should be given to assigning six parking stalls to the office tenant, and three to the medical clinic with the barrier free space available for both land uses. This would allow employees of the office to park for the entire work day and allow for overspill parking resulting from the medical clinic to make use of on-street parking. Another mitigation strategy would be to provide parking for long-term and short-term users which would encourage visitors to use off-site public parking.

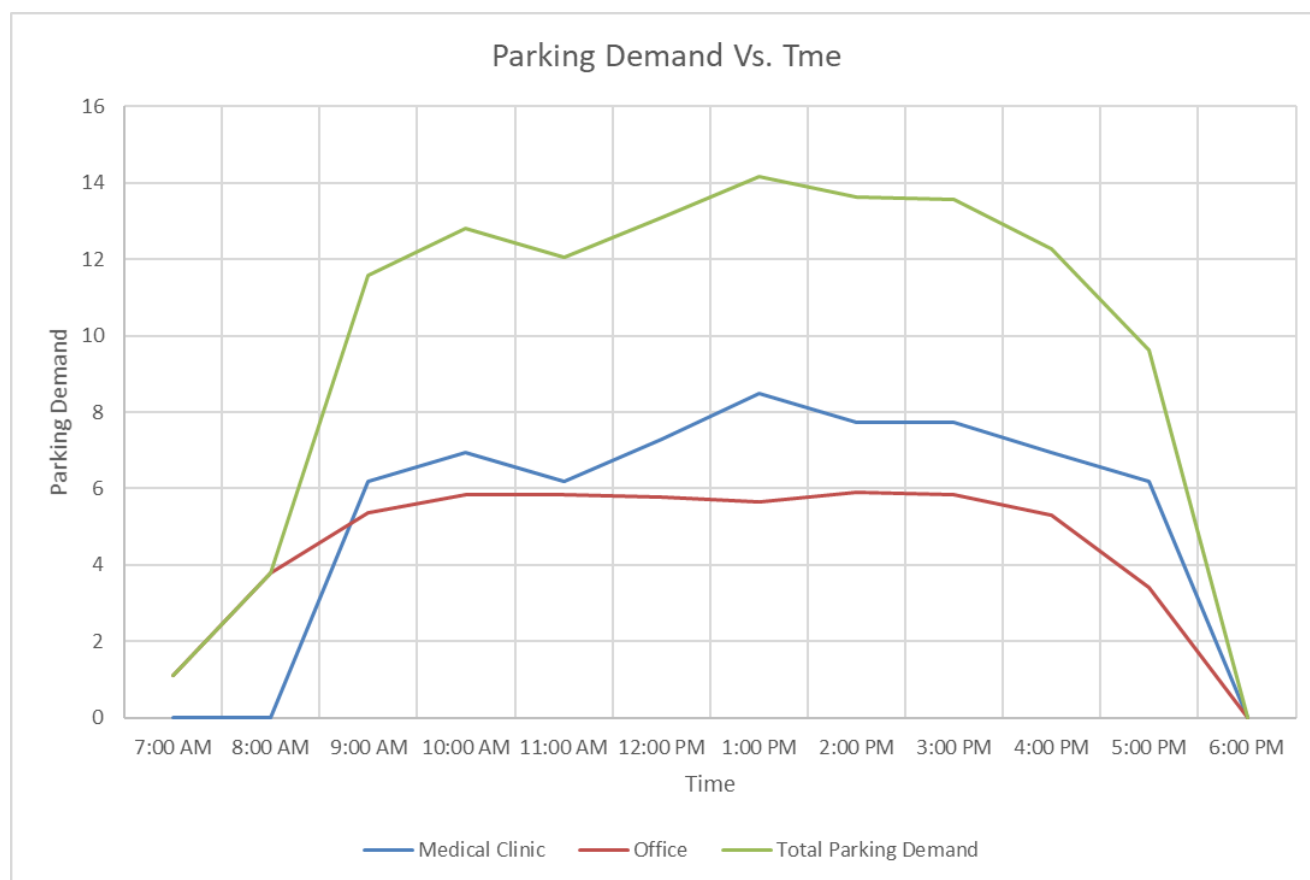


Figure 13.0.1: Parking Demand vs. Time

The City of Ottawa Zoning By-Law 2008-250 *Section 111*, states the minimum number of bicycle parking spaces for an office is 1 per every 250 m<sup>2</sup> of gross floor area. For a medical facility the minimum number is 1 per every 1,000 m<sup>2</sup> of gross floor area. As such, the minimum required number of bicycle parking spaces for the proposed development is one. Since a total of six spaces are expected to be provided the proposed development surpasses the By-Law requirements. The number of bicycle parking stalls may encourage commuters to bike and possibly alleviate the tendency for spill-over parking.

## 14.0 BOUNDARY STREETS

This section will examine the design elements of the noted boundary streets and their ability to accommodate the proposed development as well as being consistent with the City of Ottawa's complete streets philosophy as well as its urban design objectives.

### 14.1 Segment Mobility

#### 14.1.1 Pedestrian Level of Service (PLOS)

As stated previously in [Section 3.0](#), all roadways within the study area have a 50 km/h speed limit. Since historical Average Annual Daily Traffic (AADT) was not available for the segments within the study area, the AADT was estimated using the TMCs provided by the city of Ottawa. The recorded 8-hour traffic collected for



each TMC was averaged over a 24-hour period and as such is considered to be a conservative value. Using *Exhibit 4* of the Multi-Modal Level of Service (MMLOS) guidelines, the PLOS was determined for the study area segments. **Table 14.1.1** below, provides a summary.

**Table 14.1.1: Segment Pedestrian Level of Service (PLOS)**

Segment	Sidewalk Width (m)	Boulevard Width (m)	Motor Vehicle Traffic Volume (AADT)	Presence of On-street Parking	Operating Speed (Km/h)	Segment PLOS
Beechwood Avenue	1.8	0	>3000	Yes	50	C
Marier Avenue	1.8	0	>3000	Yes	50	C
Putman Avenue	1.8 (East Side)	0	>3000	Yes	50	C
Champlain Avenue	1.8 (West Side)	0	<3000	Yes (West Side)	50	B
Chapleau Avenue	1.8 (West Side)	0	<3000	Yes (West Side)	50	B
St. Charles Street	1.8	0	<3000	Yes (East Side)	50	B

Segment PLOS was reviewed only for sections of roadways which have pedestrian facilities. On roadways such as Champlain Avenue and Chapleau Avenue where sidewalks are provided on only one side, it would be expected that pedestrians would cross the street to use them rather than walk along the side without them.

#### 14.1.2 Bicycle Level of Service (BLOS)

Within the study area, Beechwood Avenue, is the only roadway with dedicated bike lanes. As stated previously in **Section 3.0**, the bike lanes are 2.0 m wide and in some locations along Beechwood Avenue are adjacent to curbside parking. BLOS was determined using Exhibit 11. **Table 14.1.2** below, provides a summary of the BLOS on the least favourable segments within each study area roadway.

**Table 14.1.2: Bicycle Level of Service (BLOS)**

Segment	BLOS
Beechwood Avenue	B
Marier Avenue	B
Putman Avenue	B
Champlain Avenue	B
Chapleau Avenue	B
St. Charles Street	B

As shown all segments within the project limits operate at a LOS of B. A BLOS of B indicates a Level of Traffic Stress (LTS) which would be acceptable to most adult cyclists.

### 14.1.3 Transit Level of Service (TLOS)

The TLOS methodologies employed in the MMLOS guideline is intended for corridors with existing or planned rapid transit or transit priority measures. The proposed development is not located along a rapid transit route, however, since there are regular bus routes along Beechwood Avenue, the TLOS can still be evaluated. For a roadway without a Bus lane, *Exhibit 15* of the MMLOS guidelines assigns a TLOS based on the ratio of average transit speed to posted speed limit ( $V_t/V_p$ ). During the field review conducted by MP, it was observed that there was minimal congestion on Beechwood Avenue during peak period conditions. As such a  $V_t/V_p$  ratio of 0.8 was used resulting in a TLOS of D.

### 14.1.4 Truck Level of Service (TkLOS)

The TkLOS is dependant on the number of lanes in each direction and the curb lane width for segments as shown in *Exhibit 20* of the MMLOS guidelines. Since Beechwood Avenue is the only arterial roadway within the study area, it is expected that the local streets will not serve as primary truck routes. As such, given that Beechwood Avenue has a curb lane width of approximately 3.2 m, the TkLOS is E.

### 14.1.5 Vehicular Level of Service (LOS)

#### 14.1.5.1 Methodology

Analysis of vehicular LOS was performed in accordance with the City of Ottawa's TIA Guidelines (2017) and MMLOS Guidelines. Level of Service (LOS) descriptions for the analysis are provided below in [Table 14.2.3.1](#). All existing and projected traffic operations were modelled in Synchro 10.

**Table 14.2.3.1: Level of Service vs. Volume to Capacity Ratio**

Level of Service	Volume to Capacity Ratio
A	0 to 0.60
B	0.61 to 0.70
C	0.71 to 0.80
D	0.81 to 0.90
E	0.91 to 1.00
F	>1.00

Volume to Capacity (V/C) ratios were analyzed for all signalized intersections overall as well as by individual movements. For unsignalized intersections with a LOS of F, the capacity was based on gap analysis.

Existing signal timing information such as phasing, pedestrian minimums and clearance intervals were provided by the City of Ottawa and used for the analysis of existing conditions for all critical intersections within the study area. The Traffic Signal Timing forms can be found in [Appendix C](#). Signal timings were optimized for all V/C calculations relating to future conditions with all Synchro 10 parameters taken in accordance with [Appendix C: Synchro Analysis Parameters of the City of Ottawa TIA Guidelines \(2017\)](#). Additionally, all pedestrian clearance timings as well as amber and all red times that were provided by the City of Ottawa were used in the analysis of the future operating conditions.

#### 14.1.5.2 Background (2024) Vehicular LOS

The segment LOS was taken as the critical V/C at all approaches within the study area. Table 14.2.3.2 below, summarizes the Approach V/C and LOS as determined by the MMLOS guidelines for the future background conditions described in Section 10.2. Synchro 10 reports can be found in Appendix D.

**Table 14.2.3.2: Background (2024) Vehicular Level of Service (LOS) by Approach**

Roadway	Approach	AM Peak Hour		PM Peak Hour	
		V/C	LOS	V/C	LOS
Beechwood Avenue	EB	0.38	A	0.64	B
	WB	0.45	A	0.48	A
Champlain Avenue	SB	0.03	A	0.02	A
Chapleau Avenue	SB	0.04	A	0.04	A
St. Charles Street	NB	0.16	A	0.28	A
Marrier Avenue	NB	0.47	A	0.46	A
Putman Avenue	SB	0.35	A	0.18	A

As shown no approaches within the area have a V/C greater than one. All approaches are expected to operate at a LOS of A during the 2024 horizon year with the exception of the EB approach of Beechwood Avenue which is expected to operate at a LOS of B during the PM peak hour. Overall all roadway segments within the study area are expected to operate well and under capacity.

## 14.2 Road Safety

Collision history was reviewed previously in this report in Section 3.5. No road safety concerns were identified at any of the boundary streets, The City of Ottawa collision records do not indicate direction of travel for the involved vehicles and as a result, collision diagrams are not feasible.

## 15.0 ACCESS INTERSECTIONS

This module will determine weather design elements of the points of access to the development align with the City of Ottawa's Complete Streets philosophy, MMLOS guidelines, and its urban design objectives.

### 15.1 Location and Design of Access

The proposed development is expected to make use of one existing access point located on Chapleau Avenue. Since it is not expected that the design parameters of this access will significantly change, *Element 4.4.1* of the City of Ottawa TIA Guidelines (2017) is not applicable.

### 15.2 Intersection Control

Due to the existing site access's close proximity to the intersection of Beechwood Avenue and Chapleau Avenue (30 m), intersection control would not be feasible. Additionally, since the access is located on a local street and the expected development-generated trips are less than 10 vph, intersection control measures would not be

expected to be required. However, since the intersection of Beechwood Avenue and Chapleau is expected to be the main ingress/egress for vehicles on Chapleau Avenue, the potential for traffic signals at this intersection were reviewed. Traffic signal warrants were performed in accordance with the methodologies outlined in the Ontario Traffic Manual (OTM) *Book 12-Traffic Signals*. Traffic Signal Warrant Calculations can be found in [Appendix E](#). In summary, signals are not warranted at either of the site entrances due to intersection configuration and low volume of traffic on Chapleau Avenue.

### 15.3 Intersection Design

Since the site entrance is not signalized, the MMLOS for all modes will be equivalent to the Chapleau Segment which was reviewed in [Section 14.0](#). MP, however, has reviewed the existing 2018 and background 2024 operating conditions expected at all the intersections within the study area. Synchro 10 reports for all analysis periods can be found in [Appendix D](#), while [Table 15.3.1](#) below, shows the traffic operations analysis summary for existing background traffic with the worst performing movements highlighted.

**Table 15.3.1: Intersection Operations, Existing Conditions (2018)**

Intersection	AM Peak Hour			PM Peak Hour		
	Critical Movement	LOS	v/c Ratio	Critical Movement	LOS	v/c Ratio
Beechwood Avenue & St. Charles Street	WBT	A	0.48	EBT	B	0.61
Beechwood Avenue & Champlain Avenue	SBL	A	0.03	SBL	A	0.03
Beechwood Avenue & Chapleau Avenue	SBL	A	0.05	SBL	A	0.05
Beechwood Avenue & Putman/Marier Avenue	WBT	A	0.54	WBT	C	0.77

As shown, currently no intersections within the study area have a movement with a volume to capacity ratio greater than one. The most critical movement during the AM peak hour is the westbound through movement at the intersection of Beechwood Avenue and Putman/Marier Avenue which has a V/C ratio of 0.54. The most critical movement during the PM peak hour was the westbound through movement at the intersection of Beechwood Avenue and Putman/Marier Avenue which had a V/C ratio of 0.77. Overall all intersections within the study area are expected to be operating well and under capacity. It is important to note however, that the methodology employed by the City of Ottawa TIA guidelines directly relates V/C to Level of Service (LOS) and not total delays as shown in the Synchro 10 outputs. During the site reviews conducted in March, 2018, no operational issues were identified. It was observed that motorists were able to clear the study area signalized intersections within one cycle. Queuing was observed during both the AM and PM site visits to be the longest at the east and west approaches at the intersection of Beechwood Avenue and Putman/Marier Avenue. However, the queues were not observed to interfere with the operations of any adjacent intersection and were observed to only occur periodically.

[Table 15.3.2](#) below, summarizes the operating conditions expected during the future horizon year of 2024 as a result of background growth only and not the additional development-generated trips.

**Table 15.3.2: Intersection Operations, Background Growth (2024) Only**

Intersection	AM Peak Hour			PM Peak Hour		
	Critical Movement	LOS	v/c Ratio	Critical Movement	LOS	v/c Ratio
Beechwood Avenue & St. Charles Street	WBT	A	0.45	EBT	A	0.59
Beechwood Avenue & Champlain Avenue	SBL	A	0.03	EBL	A	0.03
Beechwood Avenue & Chapleau Avenue	SBL	A	0.04	SBL	A	0.05
Beechwood Avenue & Putman/Marier Avenue	WBT	A	0.49	WBT	C	0.74

As shown, the V/C ratio is expected to decrease slightly, however, no changes to LOS are expected at any of the intersections. This is a result of the low predicted growth rate within the study area and the projected changes in travel modes. As shown in [Section 10.2](#), given the project mode share targets and a growth rate of 1%, the volume of vehicle volume within the study area is expected to decrease.

## 16.0 SUMMARY

This TIA Strategy Report evaluated the proposed development and its expected impact on the surrounding transportation network. Overall, all roadways within the project limits are currently operating at a LOS of A or better with the exception of the WBT movement at Beechwood Avenue and Putman/Marier Avenue which is expected to have a LOS of C. With a growth rate of 1% and projected mode share targets, the projected 2024 background traffic operations are expected to operate similarly to existing conditions. The proposed development is not expected to generate more than 7 vph in the AM peak hour and 10 vph in the PM peak hour. As such, the City of Ottawa has stated that Modules 3.1, 3.3 and 4.5-4.9 may be omitted from this TIA Report. As such, a detailed traffic analysis including the expected development-generated trips was not required. It is expected that the proposed development will have little impact on the surrounding transportation network and is expected to provide adequate facilities to meet the City of Ottawa's Complete Streets design philosophy. While the proposed development meets the City of Ottawa's parking requirement By-Laws, it is expected that some spillover parking may occur. As such, it is recommended that consideration be given to dedicating a total of six parking spaces to the office land use tenant and three be assignment to the medical clinic tenant. This would limit the number of on-site parking spaces being used by short-term users and encourage them to use off-site public parking.



Reviewed by,



**Mitchell Patenaude, EIT**

Transportation Engineering Intern

[m.patenaude@mcintoshperry.com](mailto:m.patenaude@mcintoshperry.com)

613.836.2184 x2250

Reviewed and Submitted by,



**Thomas Gryz, M.A.Sc.,P.Eng**

Transportation and Traffic Engineer

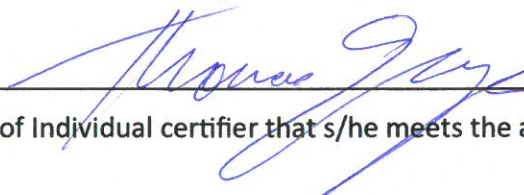
[t.gryz@mcintoshperry.com](mailto:t.gryz@mcintoshperry.com)

613.836.2184 x2231

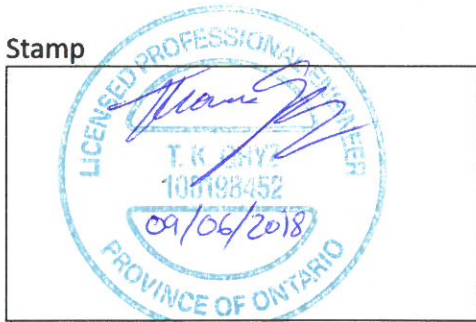
Dated at Ottawa this 6 day of September, 2018.  
(City)

Name: THOMAS GRYZ  
(Please Print)

Professional Title: TRAFFIC / TRANSPORTATION ENGINEER

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

<b>Office Contact Information (Please Print)</b>	
Address:	<u>115 Walgreen Road R.R.3</u>
City / Postal Code:	<u>Carp / KOA 1L0</u>
Telephone / Extension:	<u>613.836.2184 x 2231</u>
E-Mail Address:	<u>t.gryz@mcintoshperry.com</u>



# TRAFFIC IMPACT ASSESSMENT (FINAL)



## APPENDIX A – SCREENING & SCOPING FORM

## City of Ottawa 2017 TIA Guidelines Screening Form

### 1. Description of Proposed Development

Municipal Address	119-121 Beachwood Avenue Road
Description of Location	<b>Office Building with Ground Floor Retail</b>
Land Use Classification	<b>Commercial/Retail</b>
Development Size (units)	<b>1</b>
Development Size (m <sup>2</sup> )	<b>298 m<sup>2</sup></b>
Number of Accesses and Locations	<b>1 on Chapleau Avenue</b>
Phase of Development	<b>Planning</b>
Buildout Year	<b>2018</b>

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

### 2. Trip Generation Trigger

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

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

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

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

### 3. Location Triggers

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

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

*\* Located on a Traditional Mainstreet*

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

### 4. Safety Triggers

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

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

### 5. Summary

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



*Transportation Impact Assessment Screening Form*

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

# TRAFFIC IMPACT ASSESSMENT (FINAL)



## APPENDIX B – SITE PLAN

OWNER	DR. CORINA BELTING
	OTTAWA, ON
	1178 BEECHWOOD AVE
	K1J 1M9
DEVELOPER & DESIGNER	BLUEPRINT CONSTRUCTION SERVICES LTD.
	OTTAWA, ON
	117-1010 POLYTEX ST
	K1J 9J1
ENGINEER	STAR ENGINEERING AND CONSTRUCTION LTD.
	35- POLYTEX ST
	OTTAWA, ON
	K1J 9J1
SURVEYOR	ANNE'S CONSULTING VOLUBREX
	14 CONQUERER CIRCLE, UNIT 500
	NEPEAN, ON
	K2E 7S5
MECHANICAL	ENERGY HVAC DESIGN LTD.
	KANSTON, ON
	615-329-4250

ZONING STANDARDS			CITY OF OTTAWA		
TRADITIONAL MAINSTREET ZONE (TM8 HTS)					
SECTION	PROVISION	REQUIRED	PROPOSED		
T197	LOT AREA (M <sup>2</sup> )	NO MINIMUM	550.9m <sup>2</sup>		
T197	LOT WIDTH (MM)	NO MINIMUM	17.7m		
T197	LOT COVERAGE (MAX)	NO MINIMUM	28.9%		
T197	FRONT YARD	0m	0m		
T197	INTERIOR SIDE YARD - WEST (MM)	1m	1m		
T197	INTERIOR SIDE YARD - EAST (MM)	0m	0m		
T197	REAR YARD (MM)	7.25m	19.25m		
T197	BUILDING HEIGHT (MAX)	15m	7.33m		

SITE STATISTICS	
GROUND FLOOR AREA	159.07m <sup>2</sup>
GROSS FLOOR AREA	461.02m <sup>2</sup>
PAVED AREA	276.13m <sup>2</sup>
LANDSCAPED AREA	28.34m <sup>2</sup>
LOT AREA	550.9m <sup>2</sup>
BUILDING AREA %	28.9%
PAVED AREA %	50.14%
LANDSCAPED AREA %	14.2%

- Lot Boundary

Zoning setbacks

Concrete Curb

Exterior Wall of Building

Fire Hydrant

Manhole (Typical)

Building Entrance/Esc

Plan Sign

Concrete Curb Ramp
- Painted Lines

Barrier-free Parking Space

Proposed Bike Rack  
(8 Spaces x 1.0m x 1.0m/Space)

Proposed Bench

Proposed Waste Recycling

Proposed Sign

Proposed Steel Bolard

Proposed Wall Mounted Light

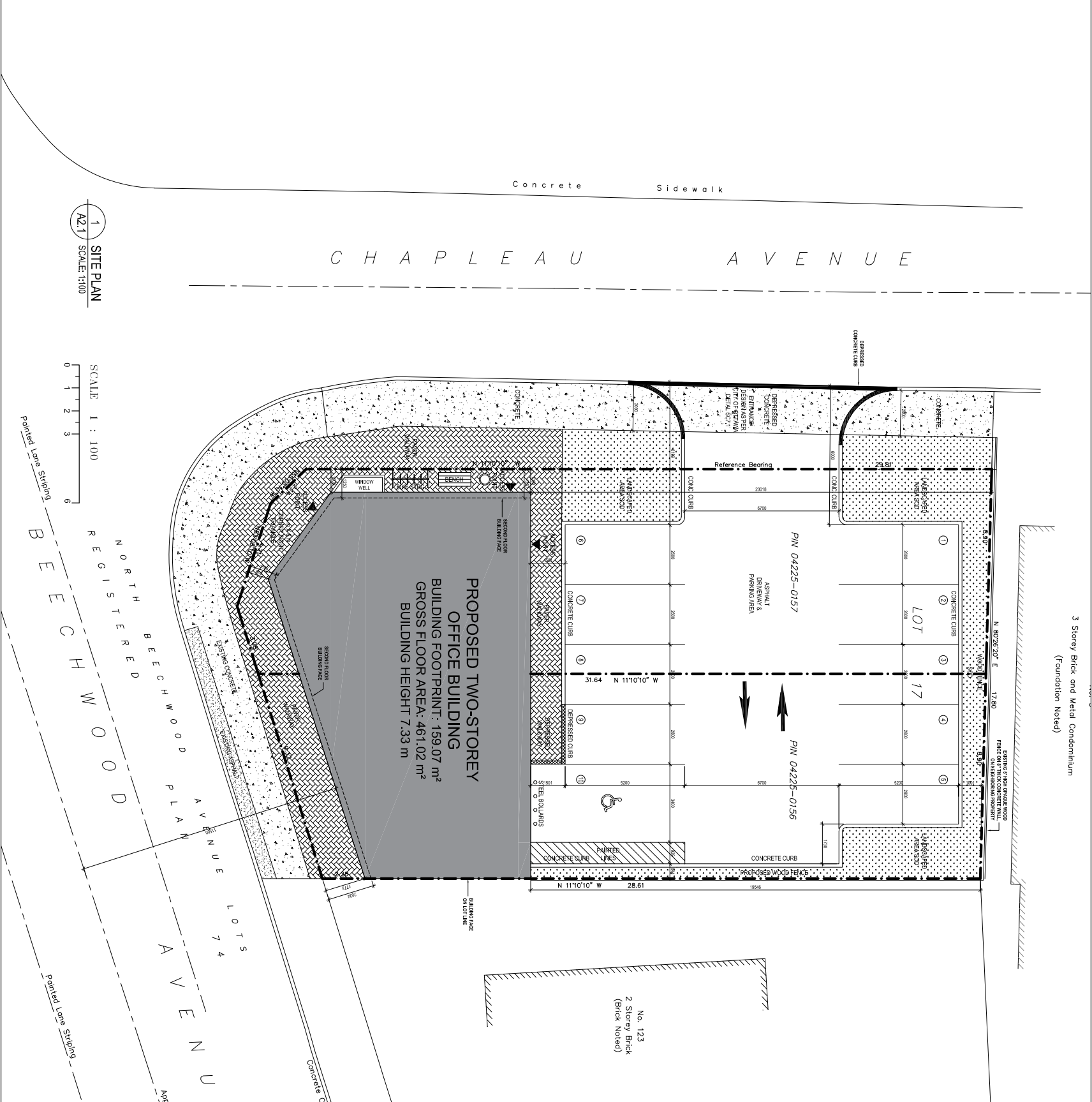
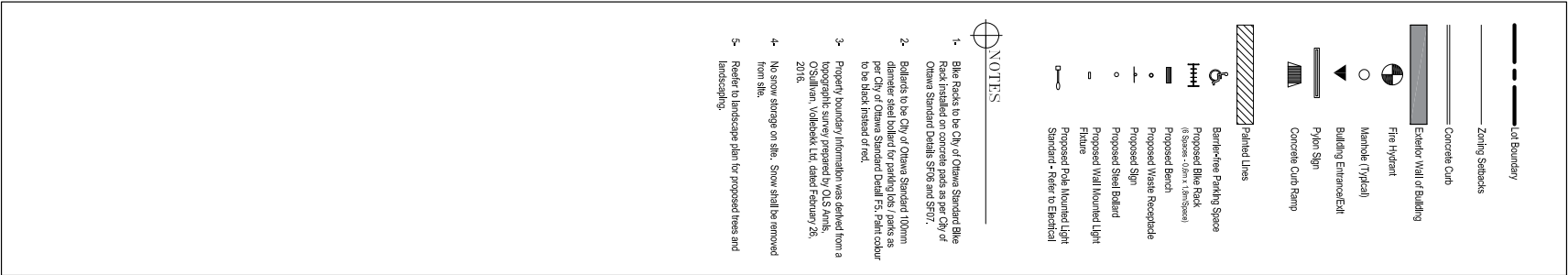
Fluores

Proposed Pole Mounted Light

Standard - Refer to Electrical

NOTES

- Bike Rack to be City of Ottawa Standard Blue Rack installed on concrete pads as per City of Ottawa Standard Details SFD6 and SFD7.
- Ballustrs to be City of Ottawa Standard 100mm diameter steel ballustr for parking lots, parks as per City of Ottawa Standard Detail P5, Paint colour to be black primed or red.
- Property boundary information was derived from a topographic survey prepared by OLS Aerials, O'Sullivan, Vollebæk Ltd dated February 26, 2016.
- No snow storage on site. Snow shall be removed from site.
- Refer to landscape plan for proposed trees and landscaping.



1. DESIGN AND TAKE RESPONSIBILITY FOR THE DESIGN WORK ON BEHALF OF A PROFESSIONAL ENGINEER OR ARCHITECT, AND THE DESIGN OF THE BUILDING CODE (LAW 44/01), AND THE BUILDING REGULATIONS IN THE APPLICABLE CODES/ORDINANCES. INDIVIDUAL BCR: 20172 P-LALONE FIRM BCR: 11957 BLUEPRINT CONSTRUCTION SERVICES LTD.

No.	Revision/Issue	Date
1.	PRELIMINARY	FEB 2018
2.	DRAFT	MARCH 2018
3.	DRAFT	JUNE 2018
4.	DRAFT	JULY 2018
5.	FINAL	SEPT 3, 2018

119 - 121 BEECHWOOD AVE  
OTTAWA, ONTARIO

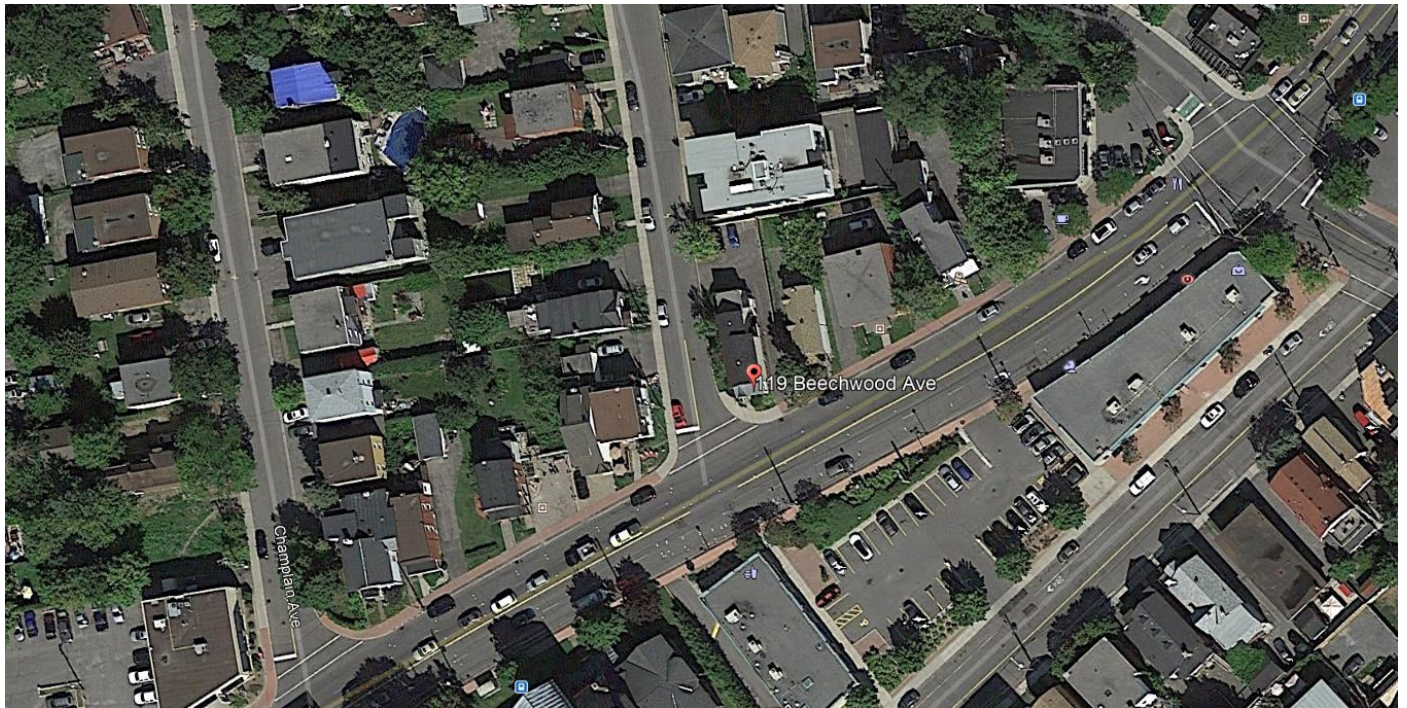
PROPOSED TWO-STOREY  
OFFICE BUILDING

SITE PLAN

A2.1



# TRAFFIC IMPACT ASSESSMENT (FINAL)



## APPENDIX C – AVAILABLE TRAFFIC DATA

# Traffic Signal Timing

City of Ottawa, Transportation Services Department

## Traffic Signal Operations Unit

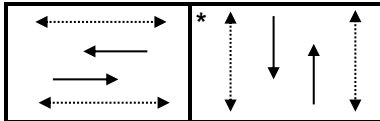
<b>Intersection:</b>	<b>Main:</b> Beechwood	<b>Side:</b> Marier/Putman
<b>Controller:</b>	<b>MS-3200A</b>	<b>TSD:</b> 5198
<b>Author:</b>	Spencer Willows	<b>Date:</b> 23-Mar-2018

## Existing Timing Plans†

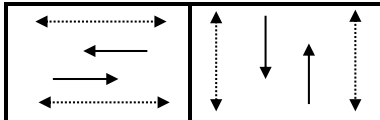
	Plan							Ped Minimum Time		
	AM Peak 1	Off Peak 2	PM Peak 3	Night 4	Weekend 5	AM Heavy 11	PM Heavy 15	Walk	DW	A+R
Cycle	90	80	90	65	90	90	100			
Offset	13	10	5	X	5	13	5			
EB Thru	64	54	64	39	64	64	74	17	13	3.3+2.2
WB Thru	64	54	64	39	64	64	74	17	13	3.3+2.2
NB Thru	26	26	26	26	26	26	26	7	13	3.3+2.2
SB Thru	26	26	26	26	26	26	26	7	13	3.3+2.2

## Phasing Sequence‡

Plan: 1, 4



Plan: 2, 3, 5, 11, 15



## Schedule

### Weekday

Time	Plan
0:15	4
6:30	1
7:00	11
9:30	2
14:30	15
17:30	3
18:30	2
19:00	4

### Weekend

Time	Plan
0:15	4
8:00	2
12:00	5
19:00	4

## Notes

†: Time for each direction includes amber and all red intervals

‡: Start of first phase should be used as reference point for offset

Asterisk (\*) Indicates actuated phase

(fp): Fully Protected Left Turn

◀.....▶ Pedestrian signal

Cost is \$56.50 (\$50 + HST)



# Traffic Signal Timing

City of Ottawa, Transportation Services Department

## Traffic Signal Operations Unit

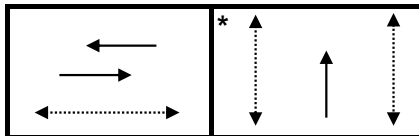
<b>Intersection:</b>	<b>Main:</b> Beechwood	<b>Side:</b> St. Charles
<b>Controller:</b>	<b>ATC-3</b>	<b>TSD:</b> 5151
<b>Author:</b>	Spencer Willows	<b>Date:</b> 23-Mar-2018

## Existing Timing Plans<sup>†</sup>

	Plan						Ped Minimum Time		
	AM Peak	Off Peak	PM Peak	Night	Weekend	PM Heavy	Walk	DW	A+R
	1	2	3	4	5	15			
<b>Cycle</b>	90	80	90	65	90	100			
<b>Offset</b>	18	10	5	X	5	5			
EB Thru	66	56	66	41	66	76	7	12	3.3+2.3
WB Thru	66	56	66	41	66	76	7	12	3.3+2.3
NB Thru	24	24	24	24	24	24	7	11	3.3+2.4

## Phasing Sequence<sup>‡</sup>

Plan: All



Notes:

## Schedule

Weekday		Weekend	
Time	Plan	Time	Plan
0:15	4	0:15	4
6:30	1	8:00	2
9:30	2	12:00	5
14:30	15	19:00	4
17:30	3		
18:30	2		
19:00	4		

## Notes

†: Time for each direction includes amber and all red intervals

‡: Start of first phase should be used as reference point for offset

Asterisk (\*) Indicates actuated phase

(fp): Fully Protected Left Turn

◀.....▶ Pedestrian signal

Cost is \$56.50 (\$50 + HST)

# Ottawa East

## Demographic Characteristics

Population	51,920	Actively Travelled	40,620
Employed Population	23,900	Number of Vehicles	24,190
Households	25,240	Area (km <sup>2</sup> )	16

Primary Occupation Status (age 5+)	Male	Female	Total
Full Time Employed	10,920	9,880	20,800
Part Time Employed	1,370	1,730	3,100
Student	4,240	4,710	8,950
Retiree	4,380	6,060	10,450
Unemployed	1,470	1,020	2,490
Homemaker	220	1,650	1,870
Other	850	910	1,760
Total:	23,450	25,970	49,420

Traveller Characteristics	Male	Female	Total
Transit Pass Holders	4,420	6,060	10,480
Licensed Drivers	16,280	16,350	32,620
Telecommuters	190	40	230
Trips made by residents	61,610	67,100	128,710

Selected Indicators	
Daily Trips per Person (age 5+)	2.60
Vehicles per Person	0.47
Number of Persons per Household	2.06
Daily Trips per Household	5.10
Vehicles per Household	0.96
Workers per Household	0.95
Population Density (Pop/km <sup>2</sup> )	3150

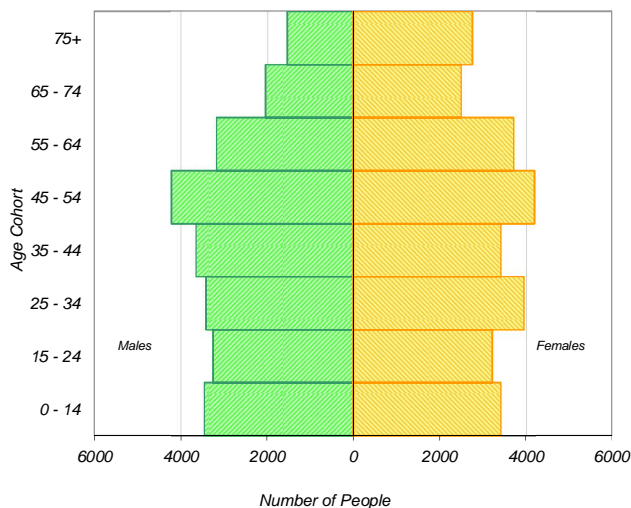


Household Size		
1 person	10,330	41%
2 persons	8,320	33%
3 persons	3,170	13%
4 persons	2,080	8%
5+ persons	1,340	5%
Total:	25,240	100%

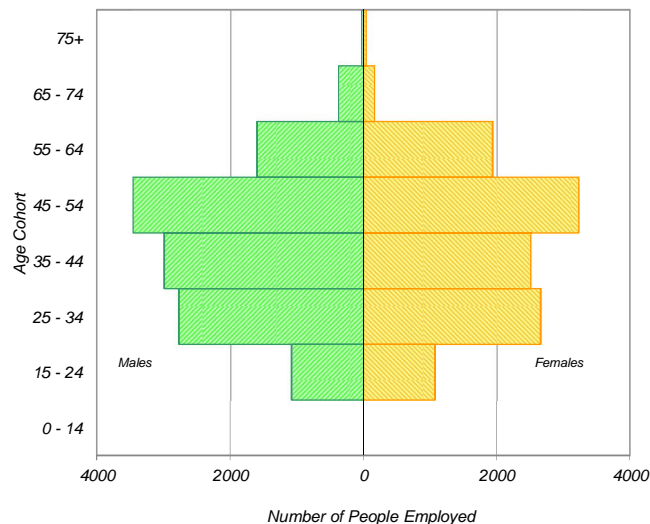
Households by Vehicle Availability		
0 vehicles	7,290	29%
1 vehicle	13,190	52%
2 vehicles	3,750	15%
3 vehicles	720	3%
4+ vehicles	290	1%
Total:	25,240	100%

Households by Dwelling Type		
Single-detached	4,700	19%
Semi-detached	1,900	8%
Townhouse	3,940	16%
Apartment/Condo	14,700	58%
Total:	25,240	100%

Population



Employed Population

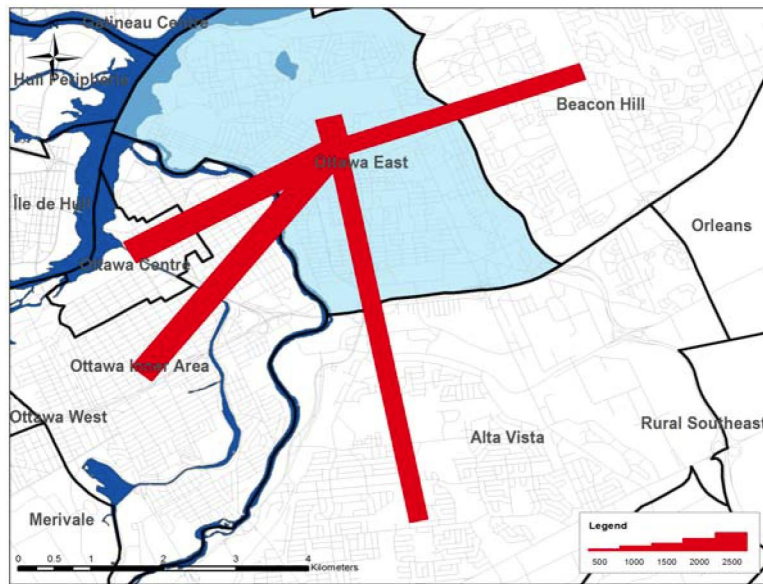


\* In 2005 data was only collected for household members aged 11+ therefore these results cannot be compared to the 2011 data.

## Travel Patterns

### Top Five Destinations of Trips from Ottawa East

#### AM Peak Period



### Summary of Trips to and from Ottawa East

#### AM Peak Period (6:30 - 8:59)

AM Peak Period (6:30 - 8:59)	Destinations of		Origins of	
	Trips From		Trips To	
Districts	District	% Total	District	% Total
Ottawa Centre	3,400 <div><div></div></div>	14%	310 <div><div></div></div>	1%
Ottawa Inner Area	3,670 <div><div></div></div>	15%	1,960 <div><div></div></div>	8%
Ottawa East	7,280 <div><div></div></div>	30%	7,280 <div><div></div></div>	32%
Beacon Hill	2,110 <div><div></div></div>	9%	1,750 <div><div></div></div>	8%
Alta Vista	2,370 <div><div></div></div>	10%	1,940 <div><div></div></div>	8%
Hunt Club	540 <div><div></div></div>	2%	960 <div><div></div></div>	4%
Merivale	1,610 <div><div></div></div>	7%	780 <div><div></div></div>	3%
Ottawa West	460 <div><div></div></div>	2%	310 <div><div></div></div>	1%
Bayshore / Cedarview	280 <div><div></div></div>	1%	310 <div><div></div></div>	1%
Orléans	600 <div><div></div></div>	2%	2,840 <div><div></div></div>	12%
Rural East	70 <div><div></div></div>	0%	160 <div><div></div></div>	1%
Rural Southeast	40 <div><div></div></div>	0%	260 <div><div></div></div>	1%
South Gloucester / Leitrim	40 <div><div></div></div>	0%	240 <div><div></div></div>	1%
South Nepean	50 <div><div></div></div>	0%	630 <div><div></div></div>	3%
Rural Southwest	20 <div><div></div></div>	0%	120 <div><div></div></div>	1%
Kanata / Stittsville	260 <div><div></div></div>	1%	660 <div><div></div></div>	3%
Rural West	90 <div><div></div></div>	0%	80 <div><div></div></div>	0%
Île de Hull	790 <div><div></div></div>	3%	240 <div><div></div></div>	1%
Hull Périphérie	450 <div><div></div></div>	2%	550 <div><div></div></div>	2%
Plateau	0 <div><div></div></div>	0%	130 <div><div></div></div>	1%
Aylmer	20 <div><div></div></div>	0%	500 <div><div></div></div>	2%
Rural Northwest	10 <div><div></div></div>	0%	190 <div><div></div></div>	1%
Pointe Gatineau	50 <div><div></div></div>	0%	420 <div><div></div></div>	2%
Gatineau Est	100 <div><div></div></div>	0%	290 <div><div></div></div>	1%
Rural Northeast	90 <div><div></div></div>	0%	100 <div><div></div></div>	0%
Buckingham / Masson-Angers	10 <div><div></div></div>	0%	90 <div><div></div></div>	0%
Ontario Sub-Total:	22,890 <div><div></div></div>	94%	20,590 <div><div></div></div>	89%
Québec Sub-Total:	1,520 <div><div></div></div>	6%	2,510 <div><div></div></div>	11%
Total:	24,410 <div><div></div></div>	100%	23,100 <div><div></div></div>	100%

### Trips by Trip Purpose

24 Hours	From District		To District		Within District	
Work or related	17,910	22%	17,810	22%	4,150	8%
School	4,920	6%	2,850	3%	3,010	6%
Shopping	7,690	9%	13,780	17%	10,880	22%
Leisure	6,320	8%	7,910	10%	4,340	9%
Medical	2,140	3%	1,850	2%	910	2%
Pick-up / drive passenger	5,200	6%	4,600	6%	2,690	5%
Return Home	35,280	43%	30,610	37%	20,780	42%
Other	3,240	4%	2,930	4%	2,450	5%
Total:	82,700	100%	82,340	100%	49,210	100%

AM Peak (06:30 - 08:59)	From District		To District		Within District	
Work or related	10,560	62%	10,340	65%	1,870	26%
School	3,480	20%	2,120	13%	2,680	37%
Shopping	260	2%	500	3%	340	5%
Leisure	470	3%	370	2%	220	3%
Medical	290	2%	300	2%	60	1%
Pick-up / drive passenger	1,140	7%	1,130	7%	1,030	14%
Return Home	360	2%	500	3%	670	9%
Other	580	3%	580	4%	430	6%
Total:	17,140	100%	15,840	100%	7,300	100%

PM Peak (15:30 - 17:59)	From District		To District		Within District	
Work or related	370	2%	1,080	5%	320	3%
School	150	1%	150	1%	40	0%
Shopping	1,490	8%	2,720	14%	1,960	17%
Leisure	990	6%	1,690	8%	1,020	9%
Medical	240	1%	320	2%	20	0%
Pick-up / drive passenger	1,380	8%	1,420	7%	720	6%
Return Home	12,630	70%	12,030	60%	6,810	60%
Other	730	4%	580	3%	460	4%
Total:	17,980	100%	19,990	100%	11,350	100%

Peak Period (%)	Total:	% of 24 Hours	Within District (%)
24 Hours	214,250		23%
AM Peak Period	40,280	19%	18%
PM Peak Period	49,320	23%	23%

### Trips by Primary Travel Mode

24 Hours	From District		To District		Within District	
Auto Driver	48,290	58%	47,600	58%	21,140	43%
Auto Passenger	12,390	15%	12,020	15%	7,390	15%
Transit	16,060	19%	16,550	20%	3,790	8%
Bicycle	2,330	3%	2,370	3%	1,290	3%
Walk	1,270	2%	1,260	2%	12,390	25%
Other	2,360	3%	2,530	3%	3,210	7%
Total:	82,700	100%	82,330	100%	49,210	100%

AM Peak (06:30 - 08:59)	From District		To District		Within District	
Auto Driver	7,690	45%	10,160	64%	2,390	33%
Auto Passenger	1,770	10%	1,720	11%	920	13%
Transit	5,160	30%	2,940	19%	660	9%
Bicycle	1,050	6%	170	1%	210	3%
Walk	380	2%	140	1%	1,730	24%
Other	1,070	6%	720	5%	1,380	19%
Total:	17,120	100%	15,850	100%	7,290	100%

PM Peak (15:30 - 17:59)	From District		To District		Within District	
Auto Driver	11,440	64%	9,660	48%	4,850	43%
Auto Passenger	2,630	15%	2,900	15%	1,800	16%
Transit	3,220	18%	5,430	27%	830	7%
Bicycle	300	2%	1,300	7%	380	3%
Walk	110	1%	390	2%	2,800	25%
Other	280	2%	300	2%	690	6%
Total:	17,980	100%	19,980	100%	11,350	100%

Avg Vehicle Occupancy	From District		To District		Within District	
24 Hours	1.26		1.25		1.35	
AM Peak Period	1.23		1.17		1.38	
PM Peak Period	1.23		1.30		1.37	

Transit Modal Split	From District		To District		Within District	
24 Hours	21%		22%		12%	
AM Peak Period	35%		20%		17%	
PM Peak Period	19%		30%		11%	

## Turning Movement Count - Full Study Summary Report

### BEECHWOOD AVE @ MARIER AVE/PUTMAN AVE

**Survey Date:** Wednesday, July 22, 2015

**Total Observed U-Turns**

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

**AADT Factor**

.90

**Full Study**

MARIER AVE/PUTMAN AVE										BEECHWOOD AVE									
Period	Northbound				Southbound				STR TOT	Eastbound				Westbound				STR TOT	Grand Total
	LT	ST	RT	NB TOT	LT	ST	RT	SB TOT		LT	ST	RT	EB TOT	LT	ST	RT	WB TOT		
07:00 08:00	42	6	20	68	30	13	9	52	120	9	360	31	400	24	485	12	521	921	1041
08:00 09:00	51	14	29	94	38	12	19	69	163	14	397	47	458	34	498	25	557	1015	1178
09:00 10:00	35	9	33	77	24	11	12	47	124	8	335	48	391	23	421	12	456	847	971
11:30 12:30	53	7	39	99	29	8	20	57	156	16	381	55	452	40	428	10	478	930	1086
12:30 13:30	44	7	37	88	23	9	12	44	132	3	402	47	452	29	445	22	496	948	1080
15:00 16:00	68	10	41	119	21	9	16	46	165	17	469	63	549	26	582	20	628	1177	1342
16:00 17:00	55	19	50	124	30	9	8	47	171	4	603	58	665	28	668	20	716	1381	1552
17:00 18:00	52	16	48	116	28	8	3	39	155	8	494	61	563	32	596	11	639	1202	1357
<b>Sub Total</b>	400	88	297	785	223	79	99	401	1186	79	3441	410	3930	236	4123	132	4491	8421	9607
<b>U Turns</b>				0				0	0				0				0	0	0
<b>Total</b>	400	88	297	785	223	79	99	401	1186	79	3441	410	3930	236	4123	132	4491	8421	9607
<b>EQ 12Hr</b>	556	122	413	1091	310	110	138	557	1648	110	4783	570	5463	328	5731	183	6242	11705	13353
Note: These values are calculated by multiplying the totals by the appropriate expansion factor.										1.39									
<b>AVG 12Hr</b>	500	110	372	982	279	99	124	502	1484	99	4305	513	4916	295	5158	165	5618	10534	12018
Note: These volumes are calculated by multiplying the Equivalent 12 hr. totals by the AADT factor.										.90									
<b>AVG 24Hr</b>	656	144	487	1286	365	129	162	657	1943	129	5639	672	6441	387	6757	216	7360	13801	15744
Note: These volumes are calculated by multiplying the Average Daily 12 hr. totals by 12 to 24 expansion factor.										1.31									

**Comments:**

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



## Turning Movement Count - 15 Minute Summary Report

### BEECHWOOD AVE @ CHAPLEAU AVE

**Survey Date:** Tuesday, August 25, 2015

#### Total Observed U-Turns

Northbound: 0 Southbound: 1  
Eastbound: 4 Westbound: 5

#### CHAPLEAU AVE

#### BEECHWOOD AVE

Time Period	Northbound			N TOT	Southbound			S TOT	STR TOT	Eastbound			E TOT	Westbound			W TOT	STR TOT	Grand Total
	LT	ST	RT		LT	ST	RT			LT	ST	RT		LT	ST	RT			
07:00 07:15	0	0	0	0	0	0	1	1	1	0	92	0	92	0	103	0	103	195	196
07:15 07:30	0	0	0	0	0	0	2	2	2	1	99	0	100	0	115	1	116	216	218
07:30 07:45	0	0	0	0	0	0	1	1	1	3	92	0	95	0	135	1	136	231	232
07:45 08:00	0	0	0	0	0	0	1	1	1	1	112	0	113	0	129	3	132	245	246
08:00 08:15	0	0	0	0	0	0	3	3	3	1	84	0	85	0	162	3	165	250	253
08:15 08:30	0	0	0	0	1	0	3	4	4	1	96	0	97	0	163	1	164	261	265
08:30 08:45	0	0	0	0	1	0	3	4	4	2	114	0	116	0	139	2	141	257	261
08:45 09:00	0	0	0	0	1	0	1	2	2	2	125	0	127	0	120	3	123	250	252
09:00 09:15	0	0	0	0	1	0	3	4	4	4	118	0	122	0	142	2	144	266	270
09:15 09:30	0	0	0	0	0	0	3	3	3	2	106	0	108	0	130	3	133	241	244
09:30 09:45	0	0	0	0	2	0	2	4	4	2	88	0	90	0	137	7	145	235	239
09:45 10:00	0	0	0	0	1	0	3	4	4	0	105	0	105	0	112	5	117	222	226
11:30 11:45	0	0	0	0	1	0	1	2	2	1	114	0	115	0	114	0	114	229	231
11:45 12:00	0	0	0	0	2	0	3	5	5	1	124	0	125	0	125	3	128	253	258
12:00 12:15	0	0	0	0	0	0	2	2	2	1	115	0	116	0	114	1	115	231	233
12:15 12:30	0	0	0	0	0	0	1	1	1	2	136	0	138	0	128	0	129	267	268
12:30 12:45	0	0	0	0	2	0	0	2	2	5	127	0	132	0	110	2	112	244	246
12:45 13:00	0	0	0	0	1	0	2	4	4	1	112	0	113	0	119	1	121	234	238
13:00 13:15	0	0	0	0	1	0	1	2	2	3	108	0	114	0	108	3	111	225	227
13:15 13:30	0	0	0	0	4	0	4	8	8	3	105	0	109	0	107	6	113	222	230
15:00 15:15	0	0	0	0	1	0	3	4	4	1	131	0	132	0	105	2	107	239	243
15:15 15:30	0	0	0	0	1	0	0	1	1	3	140	0	143	0	135	3	138	281	282
15:30 15:45	0	0	0	0	0	0	0	0	0	2	126	0	128	0	146	2	148	276	276
15:45 16:00	0	0	0	0	0	0	2	2	2	3	136	0	139	0	137	0	137	276	278
16:00 16:15	0	0	0	0	1	0	3	4	4	0	112	0	112	0	164	4	169	281	285
16:15 16:30	0	0	0	0	2	0	2	4	4	1	163	0	164	0	183	5	188	352	356
16:30 16:45	0	0	0	0	0	0	1	1	1	2	144	0	146	0	172	1	174	320	321
16:45 17:00	0	0	0	0	1	0	2	3	3	0	139	0	139	0	177	2	179	318	321
17:00 17:15	0	0	0	0	0	0	1	1	1	1	152	0	153	0	167	2	169	322	323
17:15 17:30	0	0	0	0	0	0	1	1	1	1	127	0	128	0	161	1	162	290	291
17:30 17:45	0	0	0	0	0	0	3	3	3	2	138	0	140	0	166	2	168	308	311
17:45 18:00	0	0	0	0	1	0	2	3	3	1	126	0	127	0	137	1	138	265	268
TOTAL:	0	0	0	0	25	0	60	86	86	53	3806	0	3863	0	4362	72	4439	8302	8388

Note: U-Turns are included in Totals.

Comment:





# Transportation Services - Traffic Services

## Turning Movement Count - Cyclist Volume Report

Work Order  
35325

### BEECHWOOD AVE @ CHAPLEAU AVE

**Count Date:** Tuesday, August 25, 2015

**Start Time:** 07:00

Time Period	CHAPLEAU AVE			BEECHWOOD AVE			Grand Total
	Northbound	Southbound	Street Total	Eastbound	Westbound	Street Total	
07:00 08:00	0	0	0	8	54	62	62
08:00 09:00	0	0	0	9	57	66	66
09:00 10:00	0	0	0	9	21	30	30
11:30 12:30	0	0	0	4	30	34	34
12:30 13:30	0	0	0	12	6	18	18
15:00 16:00	0	0	0	28	19	47	47
16:00 17:00	0	1	1	64	14	78	79
17:00 18:00	0	0	0	43	16	59	59
Total .....	0	1	1	177	217	394	395

**Comment:**

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

# Transportation Services - Traffic Services

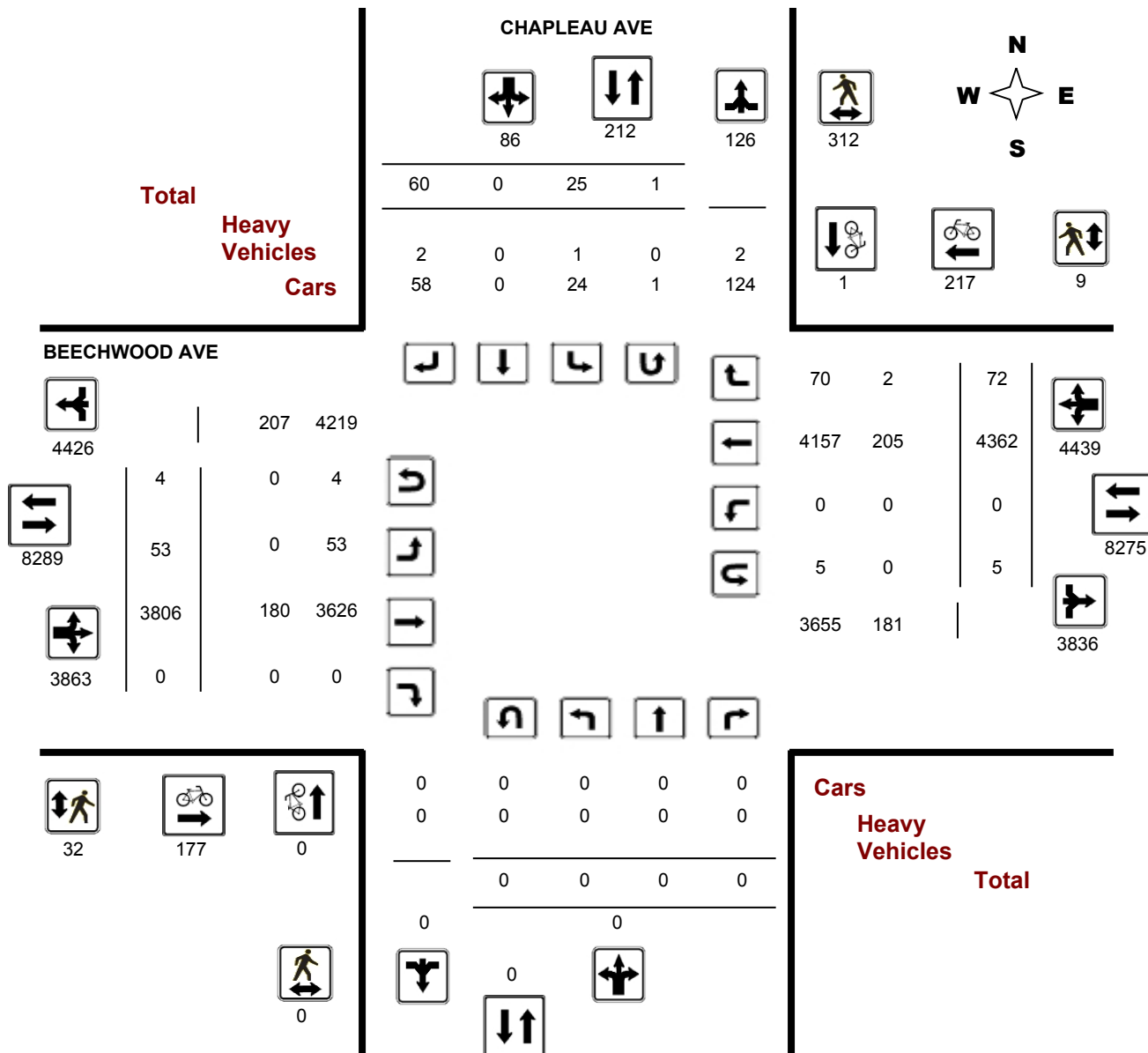
## Turning Movement Count - Full Study Diagram

### BEECHWOOD AVE @ CHAPLEAU AVE

**Survey Date:** Tuesday, August 25, 2015

**WO#:** 35325

**Device:** Miovision





# Transportation Services - Traffic Services

W.O.  
35325

## Turning Movement Count - Heavy Vehicle Report

### BEECHWOOD AVE @ CHAPLEAU AVE

**Survey Date:** Tuesday, August 25, 2015

CHAPLEAU AVE										BEECHWOOD AVE										
Time Period	Northbound			Southbound			S TOT	STR TOT	Eastbound			Westbound			W TOT	STR TOT	Grand Total			
	LT	ST	RT	N TOT	LT	ST			RT	LT	ST	RT	E TOT	LT				ST	RT	
07:00	08:00	0	0	0	0	0	0	0	0	0	24	0	24	0	31	0	31	55	55	
08:00	09:00	0	0	0	0	0	1	1	1	0	21	0	21	0	37	0	37	58	59	
09:00	10:00	0	0	0	0	1	0	0	1	1	0	24	0	24	0	28	0	28	52	53
11:30	12:30	0	0	0	0	0	0	0	0	0	23	0	23	0	22	0	22	45	45	
12:30	13:30	0	0	0	0	0	1	1	1	0	20	0	20	0	23	2	25	45	46	
15:00	16:00	0	0	0	0	0	0	0	0	0	27	0	27	0	21	0	21	48	48	
16:00	17:00	0	0	0	0	0	0	0	0	0	19	0	19	0	22	0	22	41	41	
17:00	18:00	0	0	0	0	0	0	0	0	0	22	0	22	0	21	0	21	43	43	
Sub Total		0	0	0	0	1	0	2	3	3	0	180	0	180	0	205	2	207	387	390
U-Turns (Heavy Vehicles)					0				0	0				0				0	0	0
Total		0	0	0	0	1	0	2	3	3	0	180	0	180	0	205	2	207	387	390

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



# Transportation Services - Traffic Services

Work Order

35325

## Turning Movement Count - Pedestrian Volume Report

### BEECHWOOD AVE @ CHAPLEAU AVE

**Count Date:** Tuesday, August 25, 2015

**Start Time:** 07:00

Time Period	NB Approach (E or W Crossing)	SB Approach (E or W Crossing)	Total	EB Approach (N or S Crossing)	WB Approach (N or S Crossing)	Total	Grand Total
07:00 07:15	0	5	5	1	0	1	6
07:15 07:30	0	6	6	0	0	0	6
07:30 07:45	0	4	4	1	0	1	5
07:45 08:00	0	6	6	1	0	1	7
07:00 08:00	0	21	21	3	0	3	24
08:00 08:15	0	11	11	1	0	1	12
08:15 08:30	0	12	12	0	0	0	12
08:30 08:45	0	2	2	0	0	0	2
08:45 09:00	0	5	5	2	0	2	7
08:00 09:00	0	30	30	3	0	3	33
09:00 09:15	0	7	7	0	0	0	7
09:15 09:30	0	11	11	0	3	3	14
09:30 09:45	0	10	10	2	1	3	13
09:45 10:00	0	10	10	2	0	2	12
09:00 10:00	0	38	38	4	4	8	46
11:30 11:45	0	11	11	1	0	1	12
11:45 12:00	0	9	9	1	0	1	10
12:00 12:15	0	8	8	2	0	2	10
12:15 12:30	0	17	17	2	0	2	19
11:30 12:30	0	45	45	6	0	6	51
12:30 12:45	0	23	23	1	1	2	25
12:45 13:00	0	13	13	5	1	6	19
13:00 13:15	0	6	6	3	0	3	9
13:15 13:30	0	10	10	1	0	1	11
12:30 13:30	0	52	52	10	2	12	64
15:00 15:15	0	19	19	0	0	0	19
15:15 15:30	0	12	12	3	0	3	15
15:30 15:45	0	10	10	0	1	1	11
15:45 16:00	0	9	9	1	0	1	10
15:00 16:00	0	50	50	4	1	5	55
16:00 16:15	0	7	7	0	0	0	7
16:15 16:30	0	16	16	2	1	3	19
16:30 16:45	0	7	7	0	1	1	8
16:45 17:00	0	11	11	0	0	0	11
16:00 17:00	0	41	41	2	2	4	45
17:00 17:15	0	5	5	0	0	0	5
17:15 17:30	0	6	6	0	0	0	6
17:30 17:45	0	5	5	0	0	0	5
17:45 18:00	0	19	19	0	0	0	19
17:00 18:00	0	35	35	0	0	0	35
Total .....	0	312	312	32	9	41	353

**Comment:**

## Turning Movement Count - Full Study Summary Report

### BEECHWOOD AVE @ CHAPLEAU AVE

**Survey Date:** Tuesday, August 25, 2015

**Total Observed U-Turns**

Northbound: 0 Southbound: 1  
Eastbound: 4 Westbound: 5

**AADT Factor**

.90

**Full Study**

CHAPLEAU AVE										BEECHWOOD AVE										STR TOT	Grand Total
Northbound					Southbound					Eastbound					Westbound						
Period	LT	ST	RT	NB TOT	LT	ST	RT	SB TOT	LT	ST	RT	EB TOT	LT	ST	RT	WB TOT					
07:00 08:00	0	0	0	0	0	0	5	5	5	5	395	0	400	0	482	5	487	887	892		
08:00 09:00	0	0	0	0	3	0	10	13	13	6	419	0	425	0	584	9	593	1018	1031		
09:00 10:00	0	0	0	0	4	0	11	15	15	8	417	0	425	0	521	17	538	963	978		
11:30 12:30	0	0	0	0	3	0	7	10	10	5	489	0	494	0	481	4	485	979	989		
12:30 13:30	0	0	0	0	8	0	7	15	15	12	452	0	464	0	444	12	456	920	935		
15:00 16:00	0	0	0	0	2	0	5	7	7	9	533	0	542	0	523	7	530	1072	1079		
16:00 17:00	0	0	0	0	4	0	8	12	12	3	558	0	561	0	696	12	708	1269	1281		
17:00 18:00	0	0	0	0	1	0	7	8	8	5	543	0	548	0	631	6	637	1185	1193		
Sub Total	0	0	0	0	25	0	60	85	85	53	3806	0	3859	0	4362	72	4434	8293	8378		
U Turns				0				1	1				4				5	9	10		
Total	0	0	0	0	25	0	60	86	86	53	3806	0	3863	0	4362	72	4439	8302	8388		
EQ 12Hr	0	0	0	0	35	0	83	120	120	74	5290	0	5370	0	6063	100	6170	11540	11660		
Note: These values are calculated by multiplying the totals by the appropriate expansion factor.														1.39							
AVG 12Hr	0	0	0	0	31	0	75	108	108	66	4761	0	4833	0	5457	90	5553	10386	10494		
Note: These volumes are calculated by multiplying the Equivalent 12 hr. totals by the AADT factor.														.90							
AVG 24Hr	0	0	0	0	41	0	98	141	141	87	6237	0	6331	0	7148	118	7275	13606	13747		
Note: These volumes are calculated by multiplying the Average Daily 12 hr. totals by 12 to 24 expansion factor.														1.31							

**Comments:**

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





# Transportation Services - Traffic Services

## Turning Movement Count - Full Study Peak Hour Diagram

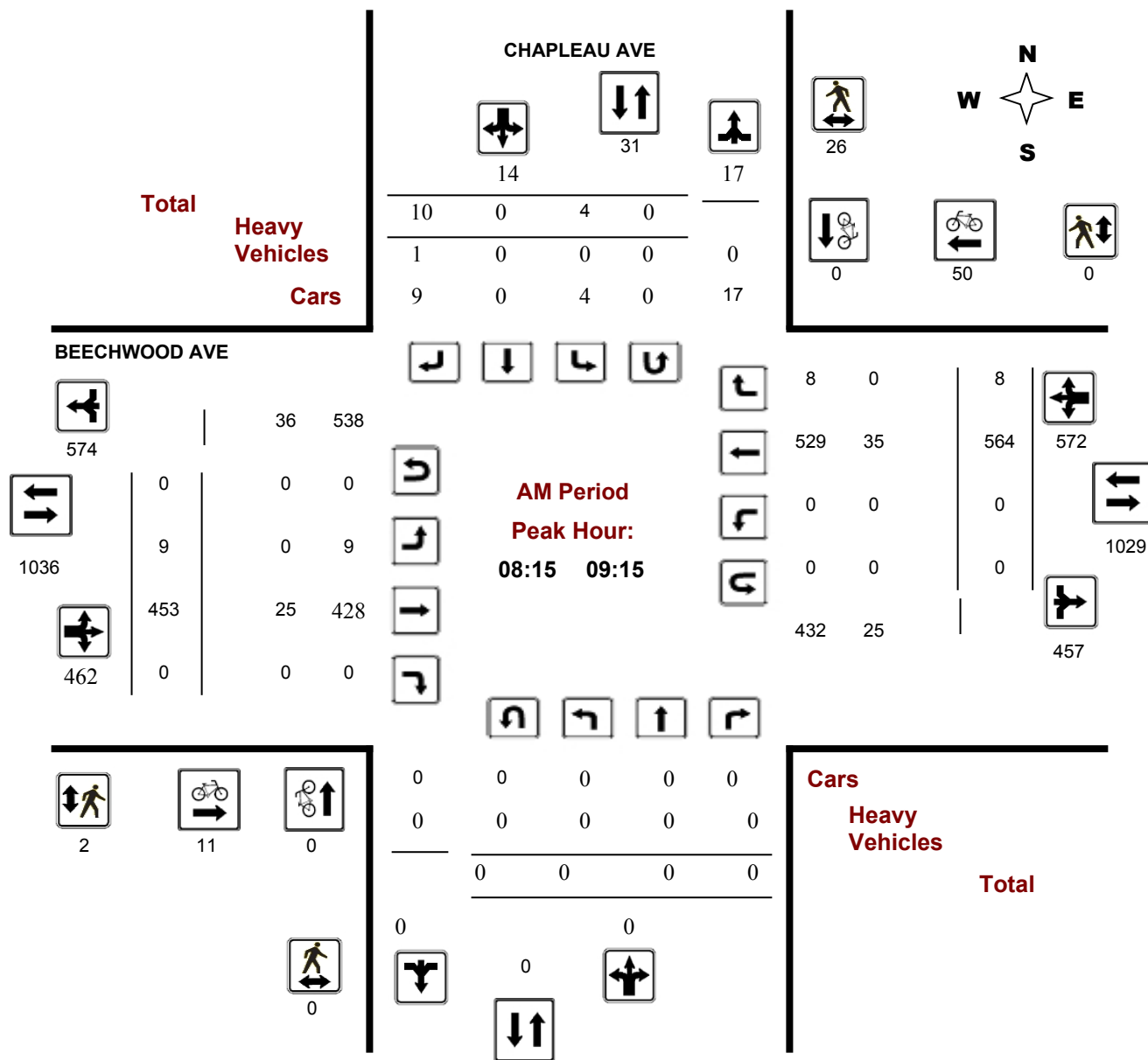
### BEECHWOOD AVE @ CHAPLEAU AVE

**Survey Date:** Tuesday, August 25, 2015

**Start Time:** 07:00

**WO No:** 35325

**Device:** Miovision

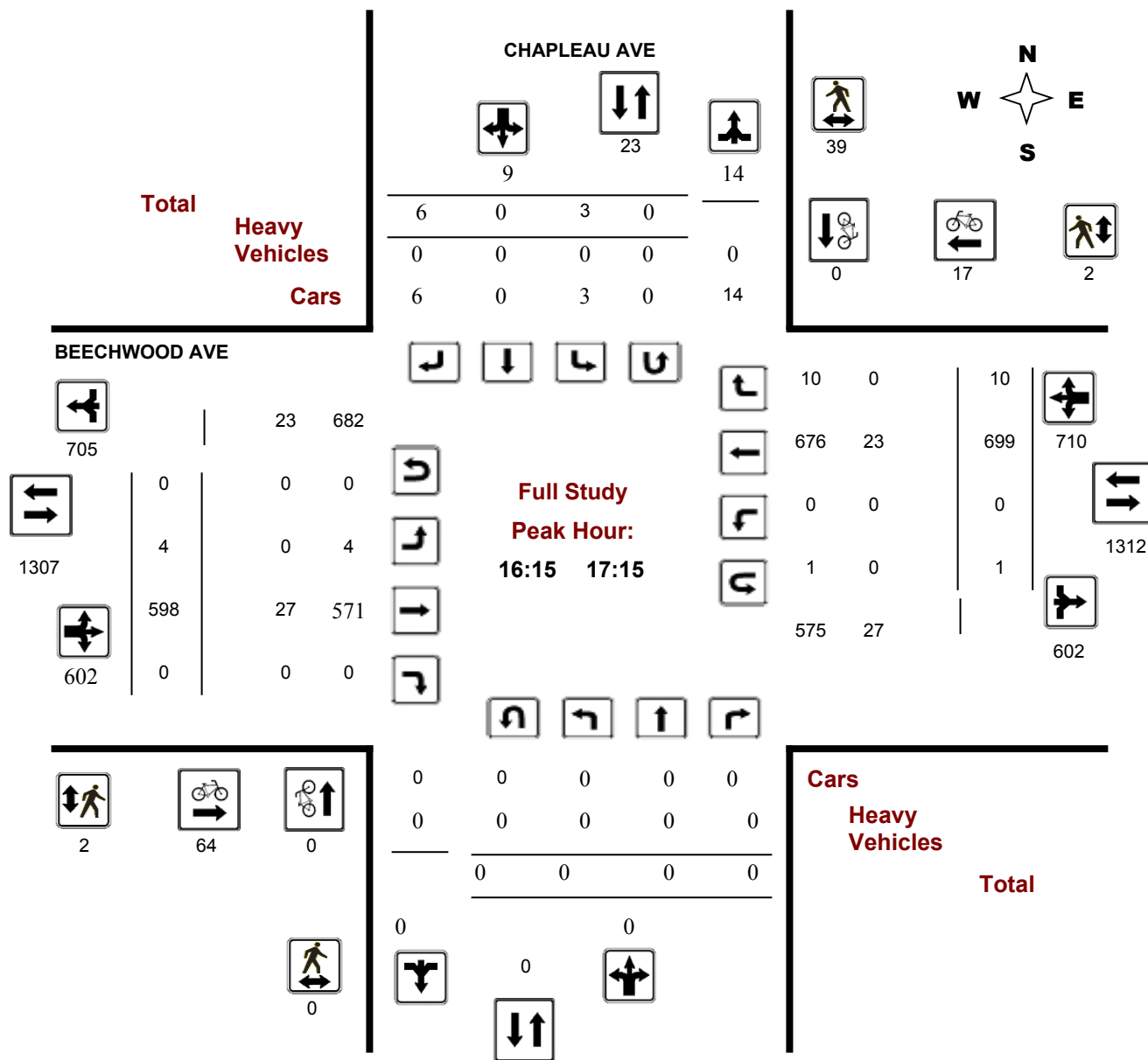


**Survey Date:** Tuesday, August 25, 2015

**Start Time:** 07:00

**WO No:** 35325

**Device:** Miovision

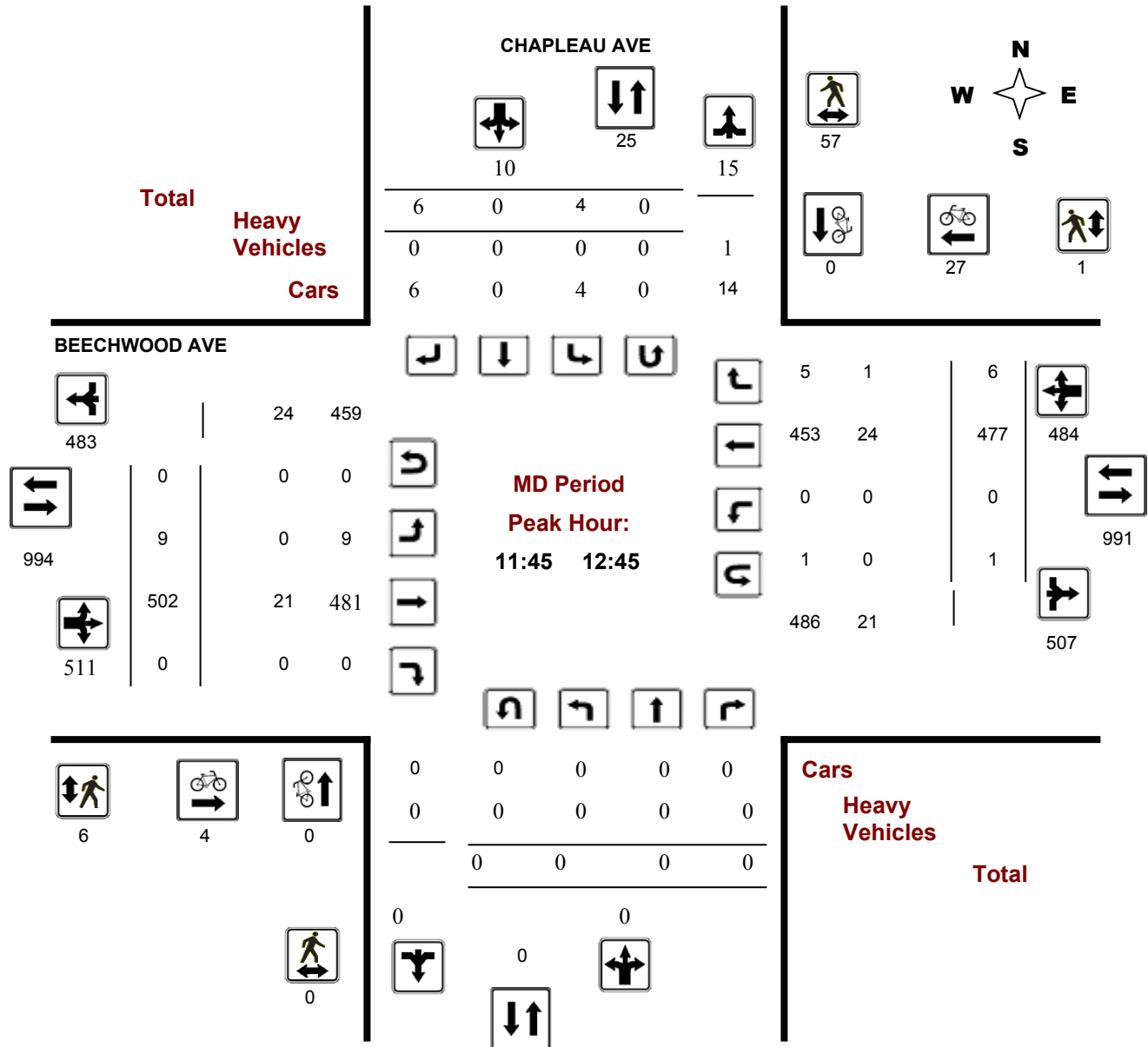


**Survey Date:** Tuesday, August 25, 2015

**Start Time:** 07:00

**WO No:** 35325

**Device:** Miovision

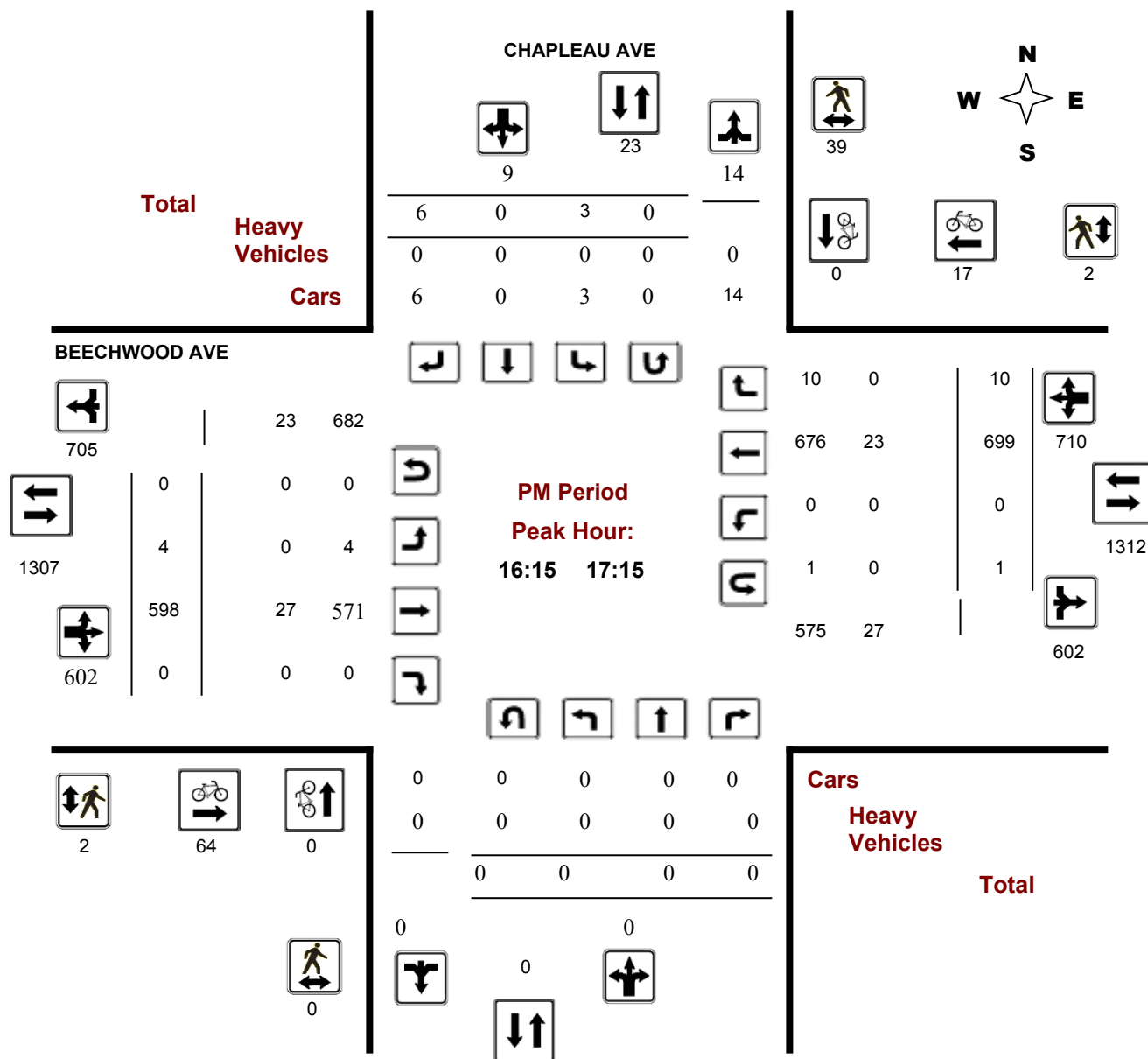


**Survey Date:** Tuesday, August 25, 2015

**Start Time:** 07:00

**WO No:** 35325

**Device:** Miovision



## Turning Movement Count - 15 Min U-Turn Total Report

### BEECHWOOD AVE @ CHAPLEAU AVE

**Survey Date:** Tuesday, August 25, 2015

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





## Turning Movement Count - 15 Minute Summary Report

### BEECHWOOD AVE @ ST. CHARLES ST

**Survey Date:** Wednesday, July 29, 2015

#### Total Observed U-Turns

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

#### ST. CHARLES ST

#### BEECHWOOD AVE

Time Period	Northbound			N TOT	Southbound			S TOT	STR TOT	Eastbound			E TOT	Westbound			W TOT	STR TOT	Grand Total
	LT	ST	RT		LT	ST	RT			LT	ST	RT		LT	ST	RT			
07:00 07:15	0	0	2	2	0	0	0	0	2	0	84	5	89	2	115	0	117	206	208
07:15 07:30	0	0	2	2	0	0	0	0	2	0	104	4	108	3	114	0	117	225	227
07:30 07:45	3	0	2	5	0	0	0	0	5	0	103	1	104	1	134	0	135	239	244
07:45 08:00	1	0	3	4	0	0	0	0	4	0	114	0	114	2	131	0	133	247	251
08:00 08:15	2	0	1	3	0	0	0	0	3	0	112	6	118	3	148	0	151	269	272
08:15 08:30	4	0	3	7	0	0	0	0	7	0	93	3	96	5	139	0	144	240	247
08:30 08:45	1	0	6	7	0	0	0	0	7	0	119	4	123	4	140	0	144	267	274
08:45 09:00	2	0	5	7	0	0	0	0	7	0	121	4	125	5	153	0	158	283	290
09:00 09:15	6	0	2	8	0	0	0	0	8	0	112	7	119	1	141	0	142	261	269
09:15 09:30	2	0	0	2	0	0	0	0	2	0	94	4	98	1	97	0	98	196	198
09:30 09:45	4	0	5	9	0	0	0	0	9	0	96	2	98	4	119	0	123	221	230
09:45 10:00	5	0	3	8	0	0	0	0	8	0	106	2	108	4	117	0	121	229	237
11:30 11:45	5	0	2	7	0	0	0	0	7	0	125	6	131	2	123	0	125	256	263
11:45 12:00	7	0	6	13	0	0	0	0	13	0	124	2	126	6	120	0	126	252	265
12:00 12:15	3	0	3	6	0	0	0	0	6	0	125	8	133	2	117	0	119	252	258
12:15 12:30	2	0	4	6	0	0	0	0	6	0	119	1	120	4	141	0	145	265	271
12:30 12:45	6	0	4	10	0	0	0	0	10	0	108	2	110	4	114	0	118	228	238
12:45 13:00	3	0	5	8	0	0	0	0	8	0	109	5	114	5	135	0	140	254	262
13:00 13:15	8	0	4	12	0	0	0	0	12	0	114	4	118	3	127	0	130	248	260
13:15 13:30	6	0	7	13	0	0	0	0	13	0	98	7	105	5	128	0	133	238	251
15:00 15:15	5	0	3	8	0	0	0	0	8	0	122	3	125	2	147	0	149	274	282
15:15 15:30	6	0	0	6	0	0	0	0	6	0	124	3	127	0	144	0	144	271	277
15:30 15:45	2	0	6	8	0	0	0	0	8	0	118	3	121	3	152	0	155	276	284
15:45 16:00	1	0	6	7	0	0	0	0	7	0	127	8	135	3	154	0	157	292	299
16:00 16:15	8	0	3	11	0	0	0	0	11	0	155	10	165	3	173	0	176	341	352
16:15 16:30	4	0	6	10	0	0	0	0	10	0	185	5	190	4	189	0	193	383	393
16:30 16:45	6	0	6	12	0	0	0	0	12	0	153	7	160	1	191	0	192	352	364
16:45 17:00	8	0	4	12	0	0	0	0	12	0	160	6	166	2	169	0	171	337	349
17:00 17:15	3	0	2	5	0	0	0	0	5	0	142	9	151	5	157	0	162	313	318
17:15 17:30	6	0	5	11	0	0	0	0	11	0	137	7	144	4	183	0	187	331	342
17:30 17:45	4	0	3	7	0	0	0	0	7	0	151	6	157	3	144	0	147	304	311
17:45 18:00	2	0	5	7	0	0	0	0	7	0	109	5	114	3	129	0	132	246	253
<b>TOTAL:</b>	<b>125</b>	<b>0</b>	<b>118</b>	<b>243</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>243</b>	<b>0</b>	<b>3863</b>	<b>149</b>	<b>4012</b>	<b>99</b>	<b>4485</b>	<b>0</b>	<b>4584</b>	<b>8596</b>	<b>8839</b>

Note: U-Turns are included in Totals.

**Comment:**



# Transportation Services - Traffic Services

## Turning Movement Count - Cyclist Volume Report

Work Order  
35150

### BEECHWOOD AVE @ ST. CHARLES ST

**Count Date:** Wednesday, July 29, 2015

**Start Time:** 07:00

Time Period	ST. CHARLES ST			BEECHWOOD AVE			Grand Total
	Northbound	Southbound	Street Total	Eastbound	Westbound	Street Total	
07:00 08:00	0	0	0	14	60	74	74
08:00 09:00	1	0	1	15	37	52	53
09:00 10:00	0	0	0	11	19	30	30
11:30 12:30	1	0	1	16	12	28	29
12:30 13:30	2	0	2	14	4	18	20
15:00 16:00	0	0	0	22	9	31	31
16:00 17:00	1	0	1	50	20	70	71
17:00 18:00	2	0	2	32	15	47	49
Total .....	7	0	7	174	176	350	357

**Comment:**

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

# Transportation Services - Traffic Services

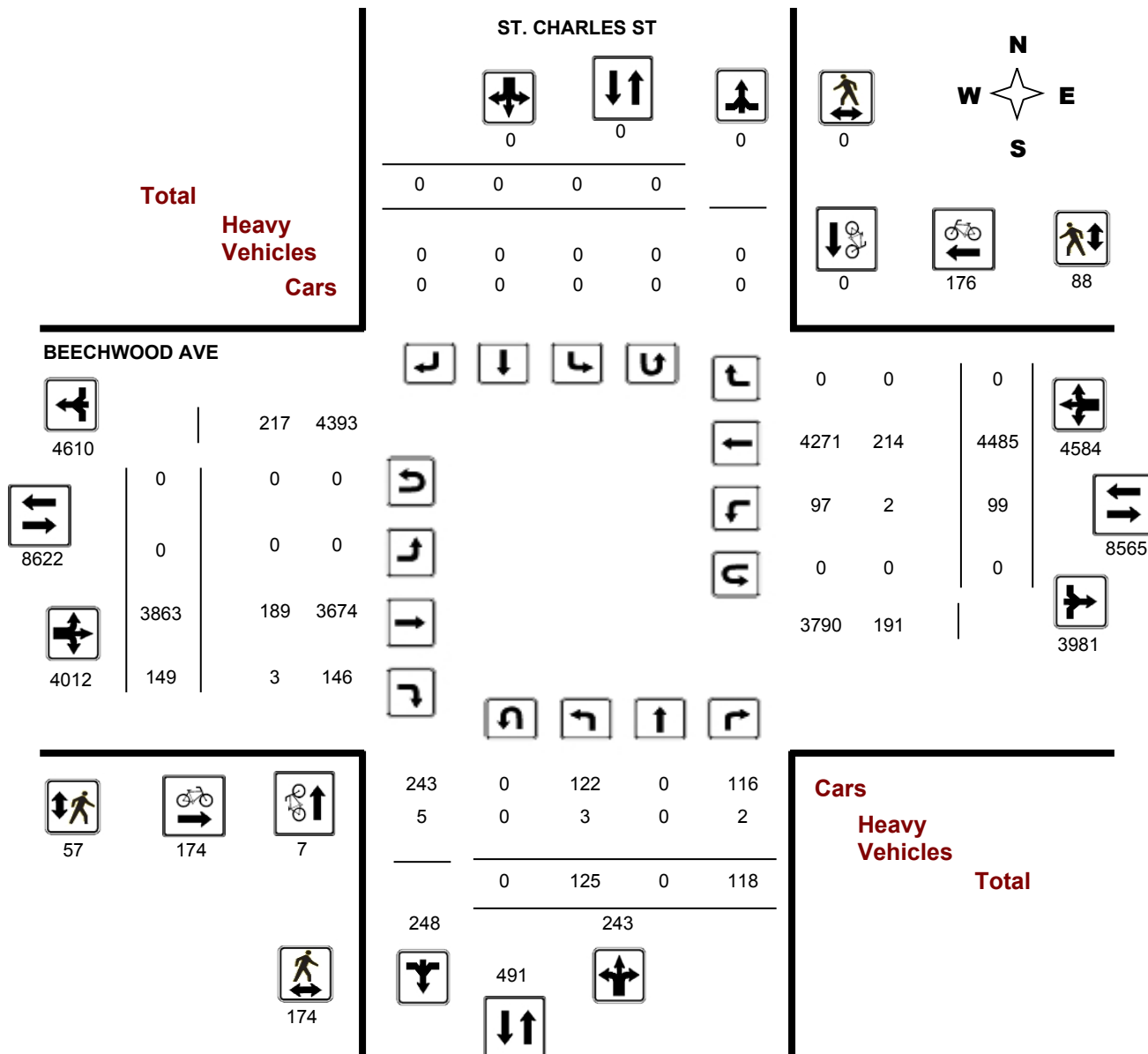
## Turning Movement Count - Full Study Diagram

### BEECHWOOD AVE @ ST. CHARLES ST

**Survey Date:** Wednesday, July 29, 2015

**WO#:** 35150

**Device:** Miovision





# Transportation Services - Traffic Services

W.O.  
35150

## Turning Movement Count - Heavy Vehicle Report

### BEECHWOOD AVE @ ST. CHARLES ST

**Survey Date:** Wednesday, July 29, 2015

ST. CHARLES ST											BEECHWOOD AVE									
Time Period		Northbound			Southbound						Eastbound			Westbound						Grand Total
		LT	ST	RT	N TOT	LT	ST	RT	S TOT	STR TOT	LT	ST	RT	E TOT	LT	ST	RT	W TOT	STR TOT	
07:00	08:00	0	0	0	0	0	0	0	0	0	0	23	0	23	0	34	0	34	57	57
08:00	09:00	0	0	0	0	0	0	0	0	0	0	33	0	33	0	42	0	42	75	75
09:00	10:00	0	0	0	0	0	0	0	0	0	0	26	0	26	0	34	0	34	60	60
11:30	12:30	1	0	0	1	0	0	0	0	1	0	21	0	21	0	21	0	21	42	43
12:30	13:30	0	0	1	1	0	0	0	0	1	0	22	1	23	2	26	0	28	51	52
15:00	16:00	1	0	1	2	0	0	0	0	2	0	21	1	22	0	16	0	16	38	40
16:00	17:00	1	0	0	1	0	0	0	0	1	0	22	0	22	0	23	0	23	45	46
17:00	18:00	0	0	0	0	0	0	0	0	0	0	21	1	22	0	18	0	18	40	40
<b>Sub Total</b>		<b>3</b>	<b>0</b>	<b>2</b>	<b>5</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>5</b>	<b>0</b>	<b>189</b>	<b>3</b>	<b>192</b>	<b>2</b>	<b>214</b>	<b>0</b>	<b>216</b>	<b>408</b>	<b>413</b>
<b>U-Turns (Heavy Vehicles)</b>					<b>0</b>				<b>0</b>	<b>0</b>				<b>0</b>				<b>0</b>	<b>0</b>	<b>0</b>
<b>Total</b>		<b>3</b>	<b>0</b>	<b>2</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>5</b>	<b>0</b>	<b>189</b>	<b>3</b>	<b>192</b>	<b>2</b>	<b>214</b>	<b>0</b>	<b>216</b>	<b>408</b>	<b>413</b>

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



# Transportation Services - Traffic Services

Work Order

35150

## Turning Movement Count - Pedestrian Volume Report

### BEECHWOOD AVE @ ST. CHARLES ST

Count Date: Wednesday, July 29, 2015

Start Time: 07:00

Time Period	NB Approach (E or W Crossing)	SB Approach (E or W Crossing)	Total	EB Approach (N or S Crossing)	WB Approach (N or S Crossing)	Total	Grand Total
07:00 07:15	7	0	7	1	4	5	12
07:15 07:30	2	0	2	0	3	3	5
07:30 07:45	4	0	4	4	2	6	10
07:45 08:00	4	0	4	0	5	5	9
07:00 08:00	17	0	17	5	14	19	36
08:00 08:15	4	0	4	0	8	8	12
08:15 08:30	1	0	1	1	2	3	4
08:30 08:45	7	0	7	1	6	7	14
08:45 09:00	1	0	1	2	5	7	8
08:00 09:00	13	0	13	4	21	25	38
09:00 09:15	5	0	5	3	4	7	12
09:15 09:30	8	0	8	2	2	4	12
09:30 09:45	4	0	4	0	1	1	5
09:45 10:00	7	0	7	0	2	2	9
09:00 10:00	24	0	24	5	9	14	38
11:30 11:45	6	0	6	2	2	4	10
11:45 12:00	3	0	3	5	0	5	8
12:00 12:15	6	0	6	0	3	3	9
12:15 12:30	5	0	5	1	1	2	7
11:30 12:30	20	0	20	8	6	14	34
12:30 12:45	8	0	8	2	3	5	13
12:45 13:00	9	0	9	1	1	2	11
13:00 13:15	9	0	9	3	3	6	15
13:15 13:30	8	0	8	5	3	8	16
12:30 13:30	34	0	34	11	10	21	55
15:00 15:15	8	0	8	2	0	2	10
15:15 15:30	6	0	6	0	4	4	10
15:30 15:45	4	0	4	0	2	2	6
15:45 16:00	5	0	5	3	4	7	12
15:00 16:00	23	0	23	5	10	15	38
16:00 16:15	1	0	1	1	2	3	4
16:15 16:30	2	0	2	0	4	4	6
16:30 16:45	4	0	4	0	2	2	6
16:45 17:00	5	0	5	4	2	6	11
16:00 17:00	12	0	12	5	10	15	27
17:00 17:15	6	0	6	1	2	3	9
17:15 17:30	5	0	5	2	4	6	11
17:30 17:45	10	0	10	5	1	6	16
17:45 18:00	10	0	10	6	1	7	17
17:00 18:00	31	0	31	14	8	22	53
Total .....	174	0	174	57	88	145	319

Comment:



## Turning Movement Count - Full Study Summary Report

### BEECHWOOD AVE @ ST. CHARLES ST

**Survey Date:** Wednesday, July 29, 2015

**Total Observed U-Turns**

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

**AADT Factor**

.90

**Full Study**

ST. CHARLES ST										BEECHWOOD AVE										STR TOT	Grand Total
Period	Northbound				Southbound				STR TOT	Eastbound				Westbound							
	LT	ST	RT	NB TOT	LT	ST	RT	SB TOT		LT	ST	RT	EB TOT	LT	ST	RT	WB TOT				
07:00	08:00	4	0	9	13	0	0	0	0	13	0	405	10	415	8	494	0	502	917	930	
08:00	09:00	9	0	15	24	0	0	0	0	24	0	445	17	462	17	580	0	597	1059	1083	
09:00	10:00	17	0	10	27	0	0	0	0	27	0	408	15	423	10	474	0	484	907	934	
11:30	12:30	17	0	15	32	0	0	0	0	32	0	493	17	510	14	501	0	515	1025	1057	
12:30	13:30	23	0	20	43	0	0	0	0	43	0	429	18	447	17	504	0	521	968	1011	
15:00	16:00	14	0	15	29	0	0	0	0	29	0	491	17	508	8	597	0	605	1113	1142	
16:00	17:00	26	0	19	45	0	0	0	0	45	0	653	28	681	10	722	0	732	1413	1458	
17:00	18:00	15	0	15	30	0	0	0	0	30	0	539	27	566	15	613	0	628	1194	1224	
Sub Total		125	0	118	243	0	0	0	0	243	0	3863	149	4012	99	4485	0	4584	8596	8839	
U Turns					0				0	0				0				0	0	0	
Total		125	0	118	243	0	0	0	0	243	0	3863	149	4012	99	4485	0	4584	8596	8839	
EQ 12Hr		174	0	164	338	0	0	0	0	338	0	5370	207	5577	138	6234	0	6372	11949	12287	
Note: These values are calculated by multiplying the totals by the appropriate expansion factor.														1.39							
AVG 12Hr		156	0	148	304	0	0	0	0	304	0	4833	186	5019	124	5611	0	5735	10754	11058	
Note: These volumes are calculated by multiplying the Equivalent 12 hr. totals by the AADT factor.														.90							
AVG 24Hr		205	0	193	398	0	0	0	0	398	0	6331	244	6575	162	7350	0	7512	14087	14485	
Note: These volumes are calculated by multiplying the Average Daily 12 hr. totals by 12 to 24 expansion factor.														1.31							

**Comments:**

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



# Transportation Services - Traffic Services

## Turning Movement Count - Full Study Peak Hour Diagram

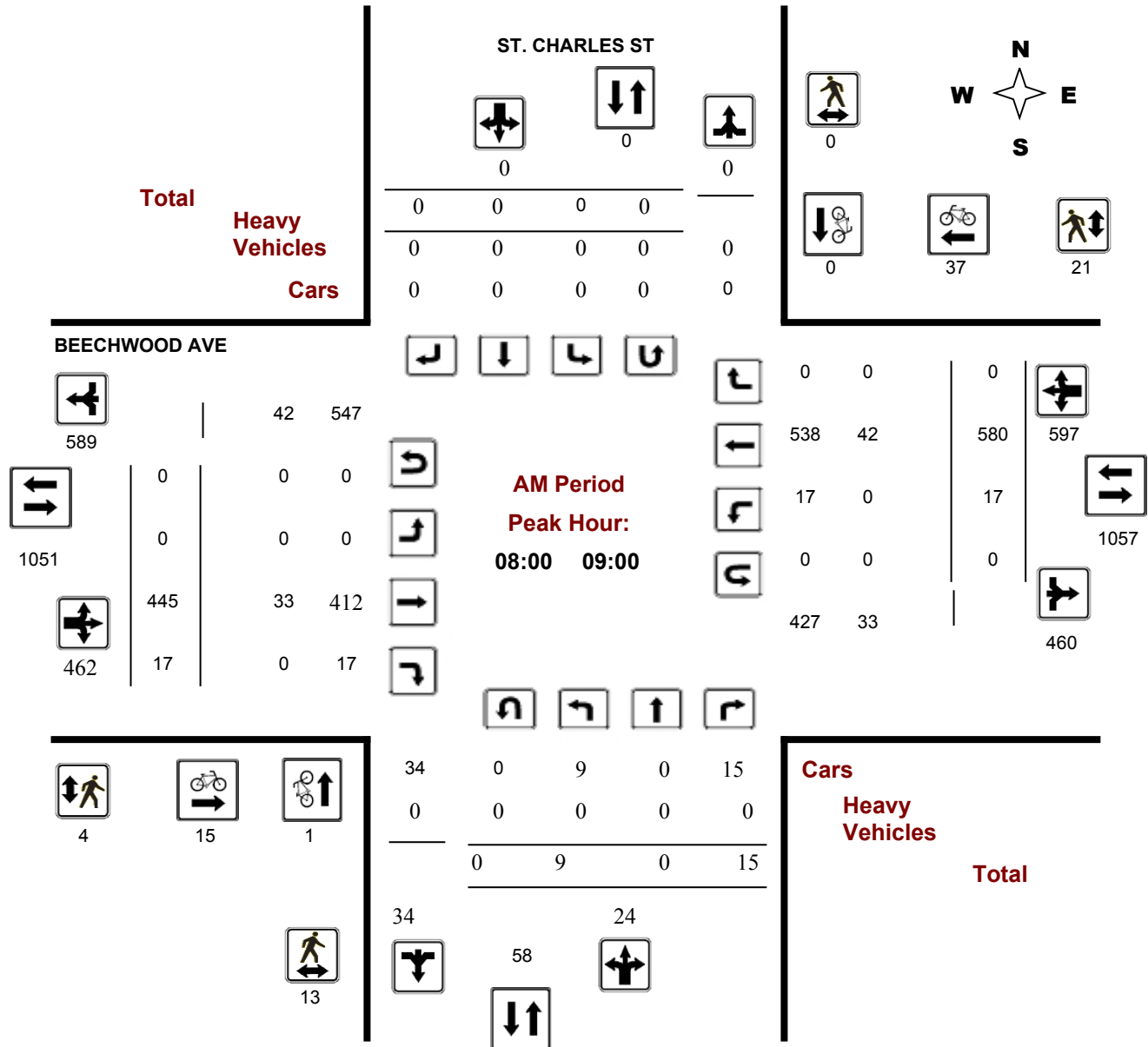
### BEECHWOOD AVE @ ST. CHARLES ST

**Survey Date:** Wednesday, July 29, 2015

**Start Time:** 07:00

**WO No:** 35150

**Device:** Miovision



### Turning Movement Count - Full Study Peak Hour Diagram

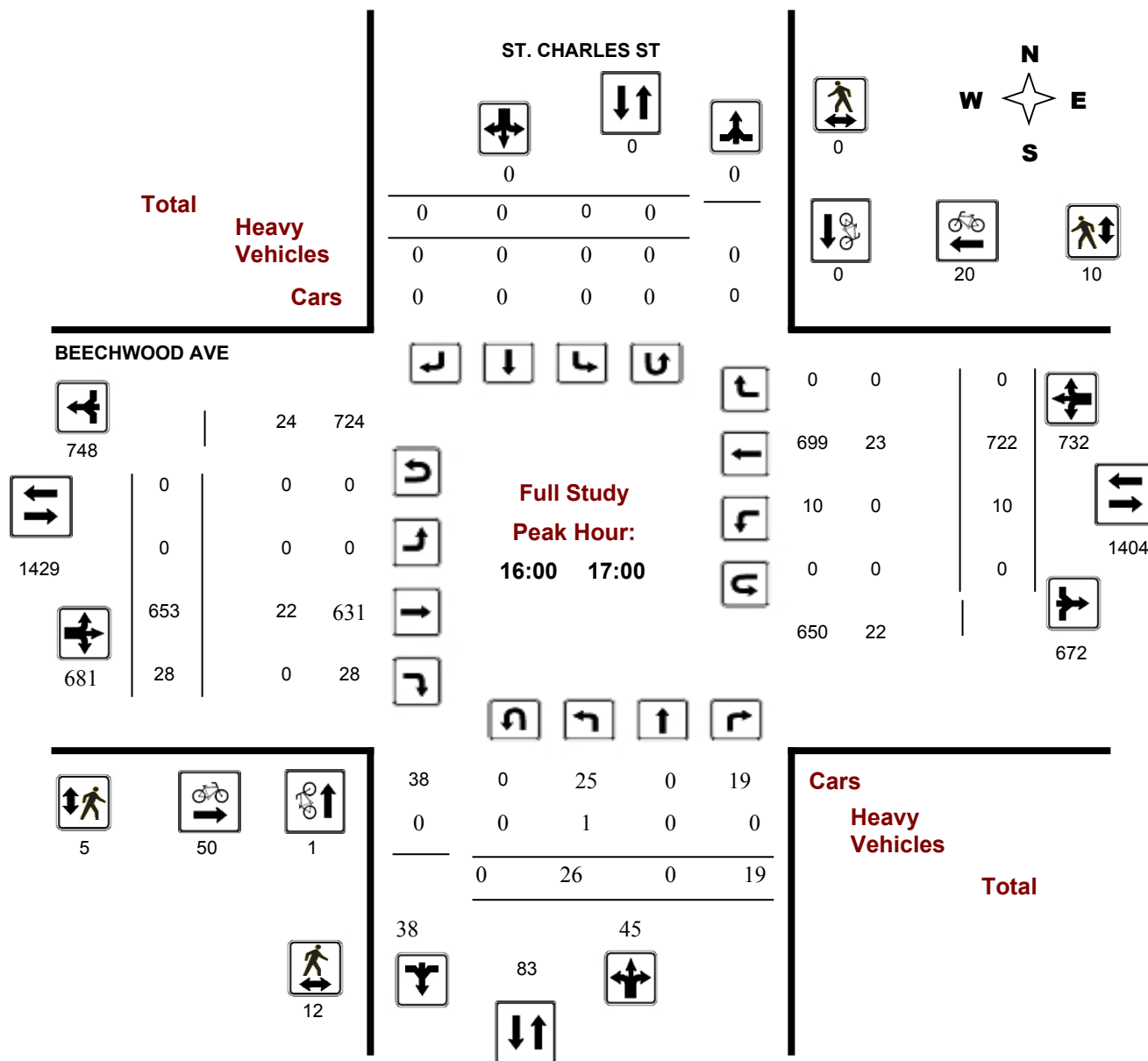
**BEECHWOOD AVE @ ST. CHARLES ST**

**Survey Date:** Wednesday, July 29, 2015

**Start Time:** 07:00

**WO No:** 35150

**Device:** Miovision



## Comments

### Turning Movement Count - Full Study Peak Hour Diagram

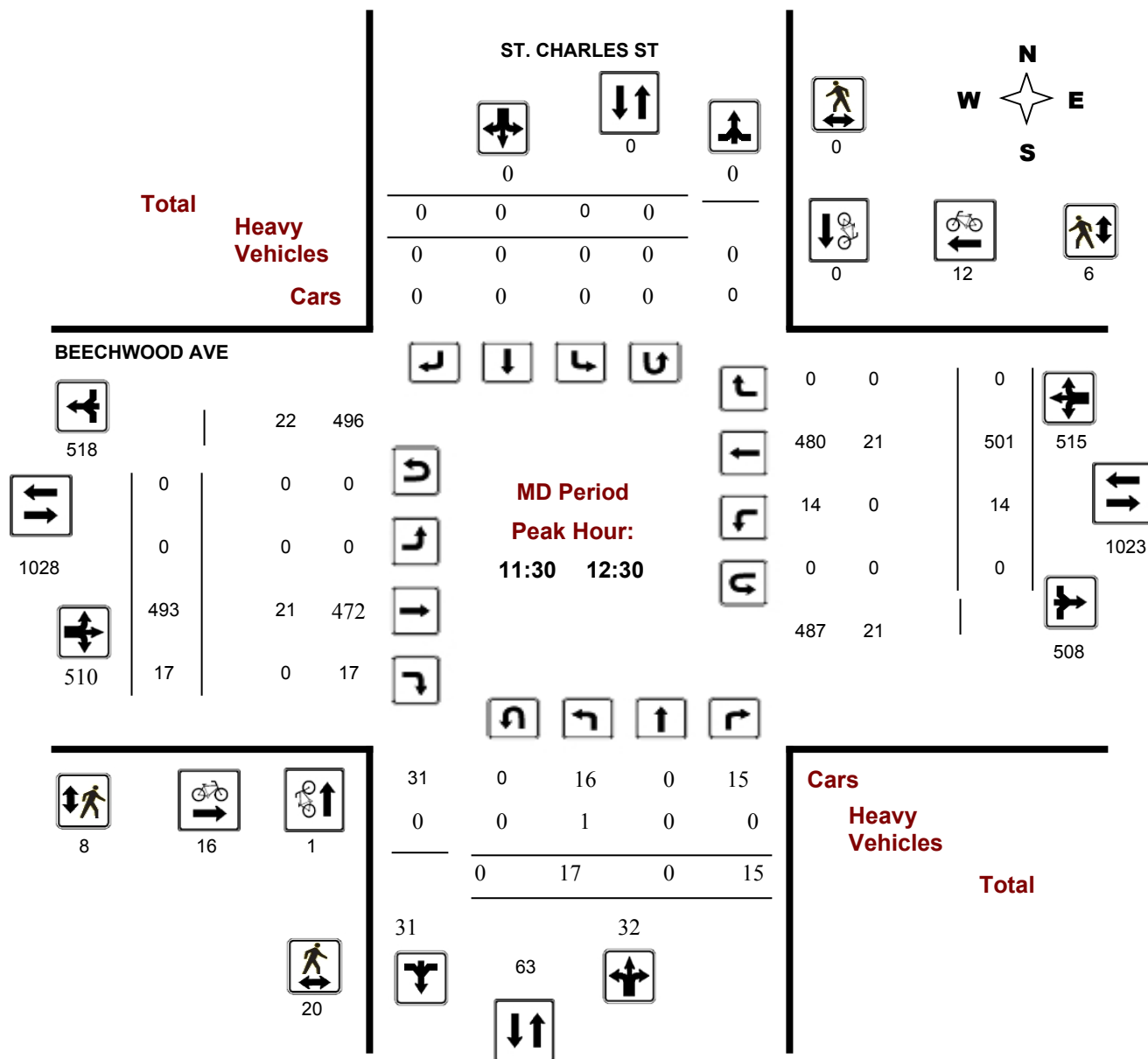
**BEECHWOOD AVE @ ST. CHARLES ST**

**Survey Date:** Wednesday, July 29, 2015

**Start Time:** 07:00

**WO No:** 35150

**Device:** Miovision



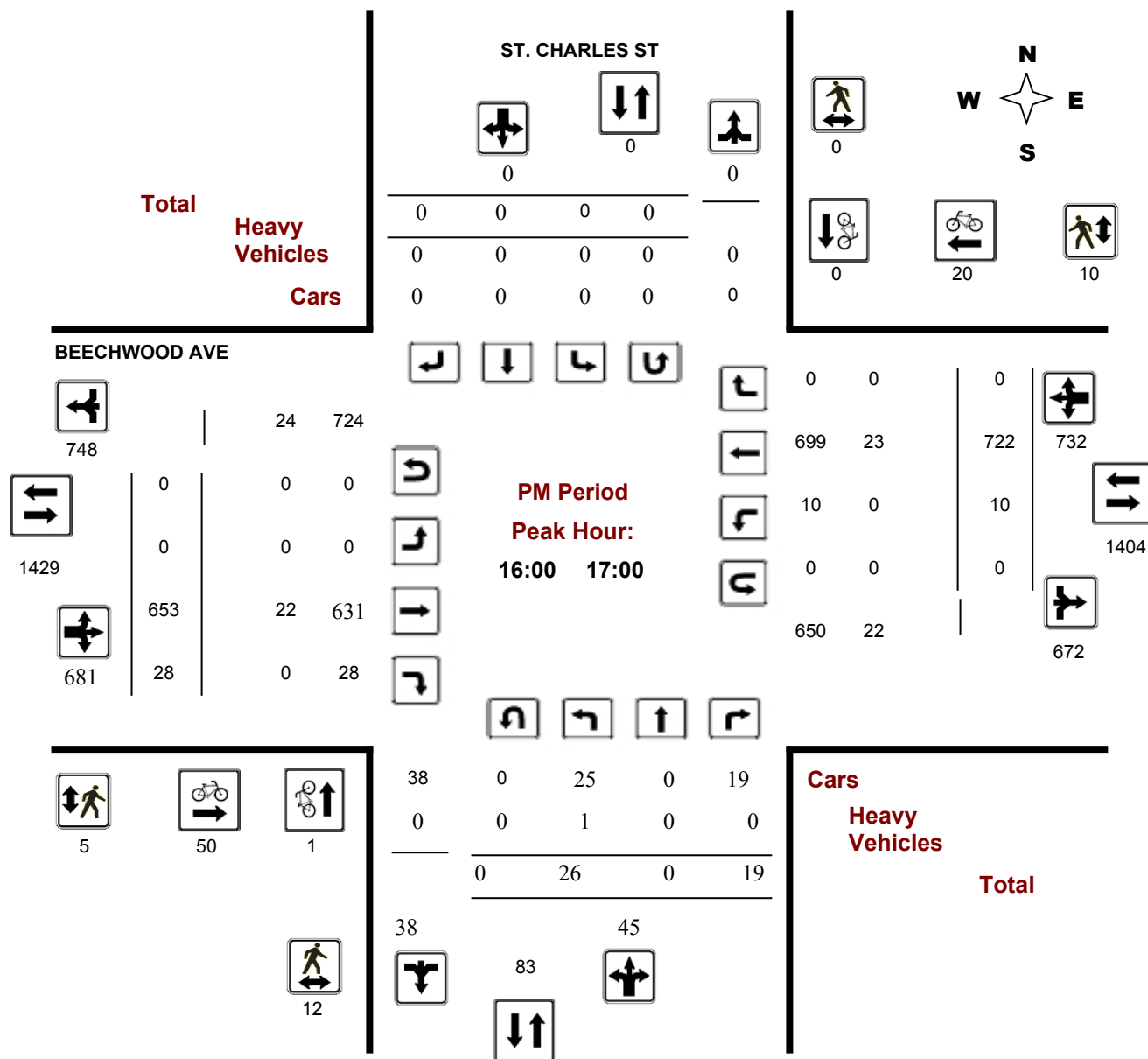
## Comments

**Survey Date:** Wednesday, July 29, 2015

**Start Time:** 07:00

**WO No:** 35150

**Device:** Miovision





## Turning Movement Count - 15 Min U-Turn Total Report

### BEECHWOOD AVE @ ST. CHARLES ST

**Survey Date:** Wednesday, July 29, 2015

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



## Turning Movement Count - 15 Minute Summary Report

### BEECHWOOD AVE @ CHAMPLAIN AVE

**Survey Date:** Tuesday, August 25, 2015

#### Total Observed U-Turns

Northbound: 0 Southbound: 0  
Eastbound: 0 Westbound: 1

CHAMPLAIN AVE											BEECHWOOD AVE										Grand Total
Northbound					Southbound					Eastbound					Westbound						
Time Period	LT	ST	RT	N TOT	LT	ST	RT	S TOT	STR TOT	LT	ST	RT	E TOT	LT	ST	RT	W TOT	STR TOT			
07:00 07:15	0	0	0	0	1	0	2	3	3	0	87	0	87	0	102	0	102	189	192		
07:15 07:30	0	0	0	0	0	0	0	0	0	0	100	0	100	0	113	0	113	213	213		
07:30 07:45	0	0	0	0	0	0	5	5	5	0	92	0	92	0	138	0	138	230	235		
07:45 08:00	0	0	0	0	0	0	3	3	3	1	110	0	111	0	127	0	127	238	241		
08:00 08:15	0	0	0	0	0	0	4	4	4	2	97	0	99	0	162	0	162	261	265		
08:15 08:30	0	0	0	0	0	0	3	3	3	2	104	0	106	0	159	1	160	266	269		
08:30 08:45	0	0	0	0	0	0	1	1	1	1	111	0	112	0	144	0	144	256	257		
08:45 09:00	0	0	0	0	0	0	5	5	5	1	124	0	125	0	120	0	120	245	250		
09:00 09:15	0	0	0	0	1	0	3	4	4	0	120	0	120	0	139	0	139	259	263		
09:15 09:30	0	0	0	0	0	0	0	0	0	3	110	0	113	0	130	1	131	244	244		
09:30 09:45	0	0	0	0	0	0	1	1	1	1	96	0	97	0	129	0	130	227	228		
09:45 10:00	0	0	0	0	0	0	4	4	4	0	103	0	103	0	113	3	116	219	223		
11:30 11:45	0	0	0	0	1	0	3	4	4	2	115	0	117	0	115	1	116	233	237		
11:45 12:00	0	0	0	0	0	0	1	1	1	1	126	0	127	0	129	3	132	259	260		
12:00 12:15	0	0	0	0	0	0	1	1	1	1	115	0	116	0	112	1	113	229	230		
12:15 12:30	0	0	0	0	1	0	2	3	3	2	142	0	144	0	128	1	129	273	276		
12:30 12:45	0	0	0	0	0	0	1	1	1	3	130	0	133	0	112	3	115	248	249		
12:45 13:00	0	0	0	0	1	0	1	2	2	0	111	0	111	0	119	1	120	231	233		
13:00 13:15	0	0	0	0	0	0	2	2	2	0	110	0	110	0	115	1	116	226	228		
13:15 13:30	0	0	0	0	0	0	2	2	2	2	107	0	109	0	113	0	113	222	224		
15:00 15:15	0	0	0	0	0	0	0	0	0	2	136	0	138	0	111	1	112	250	250		
15:15 15:30	0	0	0	0	1	0	1	2	2	3	138	0	141	0	132	0	132	273	275		
15:30 15:45	0	0	0	0	0	0	1	1	1	2	124	0	126	0	139	3	142	268	269		
15:45 16:00	0	0	0	0	0	0	1	1	1	0	131	0	131	0	141	1	142	273	274		
16:00 16:15	0	0	0	0	1	0	2	3	3	3	104	0	107	0	163	3	166	273	276		
16:15 16:30	0	0	0	0	0	0	0	0	0	5	163	0	168	0	183	3	186	354	354		
16:30 16:45	0	0	0	0	0	0	2	2	2	1	141	0	142	0	180	2	182	324	326		
16:45 17:00	0	0	0	0	0	0	1	1	1	4	138	0	142	0	181	1	182	324	325		
17:00 17:15	0	0	0	0	0	0	3	3	3	9	148	0	157	0	170	1	171	328	331		
17:15 17:30	0	0	0	0	0	0	1	1	1	2	124	0	126	0	160	1	161	287	288		
17:30 17:45	0	0	0	0	0	0	4	4	4	2	132	0	134	0	170	0	170	304	308		
17:45 18:00	0	0	0	0	0	0	2	2	2	4	127	0	131	0	137	0	137	268	270		
TOTAL:	0	0	0	0	7	0	62	69	69	59	3816	0	3875	0	4386	32	4419	8294	8363		

Note: U-Turns are included in Totals.

Comment:



# Transportation Services - Traffic Services

## Turning Movement Count - Cyclist Volume Report

Work Order  
35324

### BEECHWOOD AVE @ CHAMPLAIN AVE

**Count Date:** Tuesday, August 25, 2015

**Start Time:** 07:00

Time Period	CHAMPLAIN AVE			BEECHWOOD AVE			Grand Total
	Northbound	Southbound	Street Total	Eastbound	Westbound	Street Total	
07:00 08:00	0	0	0	5	55	60	60
08:00 09:00	0	1	1	5	54	59	60
09:00 10:00	0	1	1	7	20	27	28
11:30 12:30	0	1	1	7	32	39	40
12:30 13:30	0	0	0	10	11	21	21
15:00 16:00	0	1	1	25	21	46	47
16:00 17:00	0	0	0	61	14	75	75
17:00 18:00	0	0	0	43	17	60	60
Total .....	0	4	4	163	224	387	391

**Comment:**

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

# Transportation Services - Traffic Services

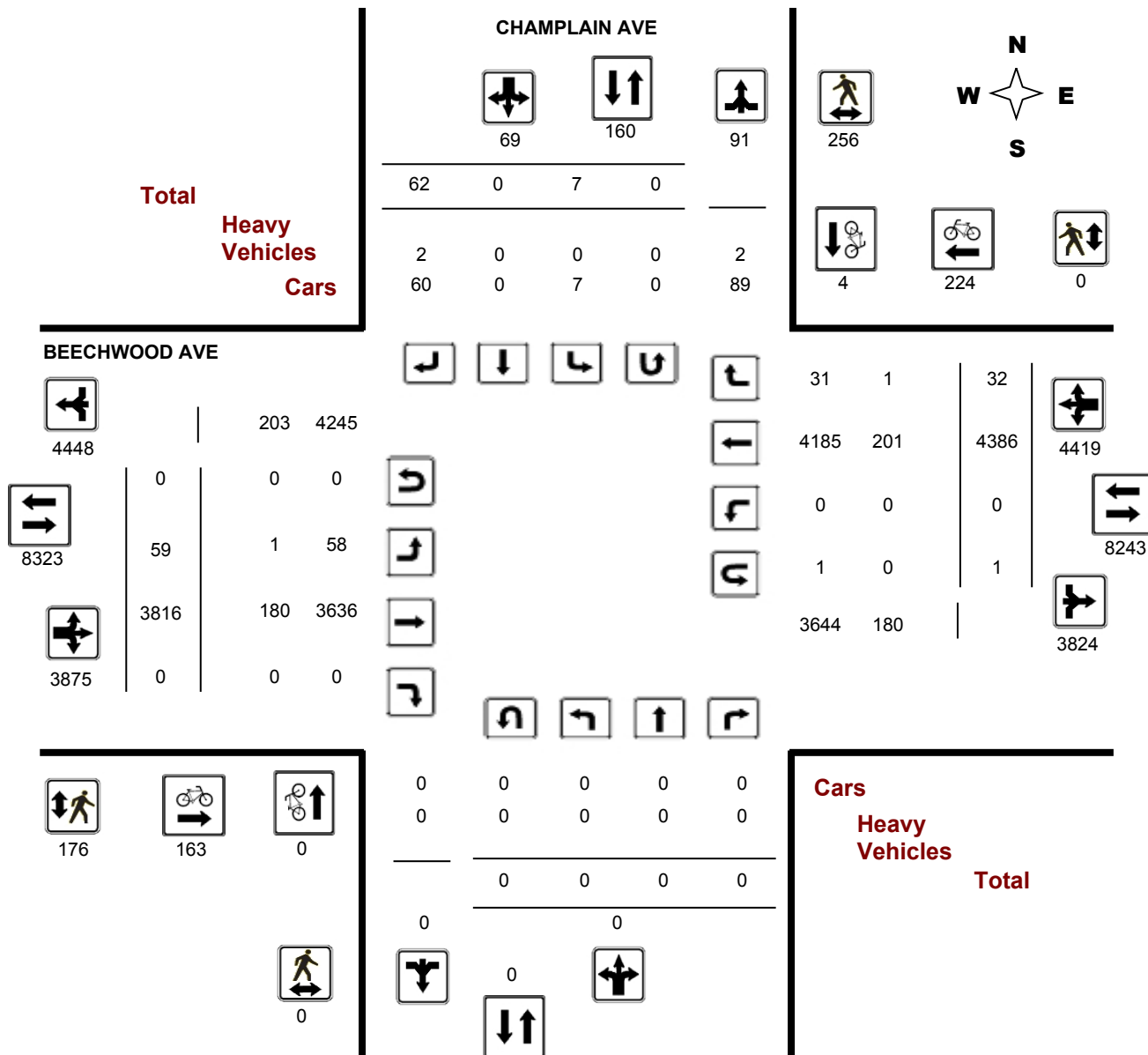
## Turning Movement Count - Full Study Diagram

### BEECHWOOD AVE @ CHAMPLAIN AVE

**Survey Date:** Tuesday, August 25, 2015

**WO#:** 35324

**Device:** Miovision





# Transportation Services - Traffic Services

W.O.  
35324

## Turning Movement Count - Heavy Vehicle Report

### BEECHWOOD AVE @ CHAMPLAIN AVE

**Survey Date:** Tuesday, August 25, 2015

CHAMPLAIN AVE											BEECHWOOD AVE									
Time Period		Northbound			Southbound						Eastbound			Westbound						Grand Total
		LT	ST	RT	N TOT	LT	ST	RT	S TOT	STR TOT	LT	ST	RT	E TOT	LT	ST	RT	W TOT	STR TOT	
07:00	08:00	0	0	0	0	0	0	0	0	0	0	22	0	22	0	31	0	31	53	53
08:00	09:00	0	0	0	0	0	0	0	0	0	0	21	0	21	0	38	0	38	59	59
09:00	10:00	0	0	0	0	0	0	0	0	0	0	26	0	26	0	28	0	28	54	54
11:30	12:30	0	0	0	0	0	0	2	2	2	1	25	0	26	0	21	0	21	47	49
12:30	13:30	0	0	0	0	0	0	0	0	0	0	19	0	19	0	21	0	21	40	40
15:00	16:00	0	0	0	0	0	0	0	0	0	0	24	0	24	0	18	1	19	43	43
16:00	17:00	0	0	0	0	0	0	0	0	0	0	20	0	20	0	23	0	23	43	43
17:00	18:00	0	0	0	0	0	0	0	0	0	0	23	0	23	0	21	0	21	44	44
<b>Sub Total</b>		0	0	0	0	0	0	2	2	2	1	180	0	181	0	201	1	202	383	385
<b>U-Turns (Heavy Vehicles)</b>					0				0	0				0				0	0	0
<b>Total</b>		0	0	0	0	0	0	2	2	2	1	180	0	181	0	201	1	202	383	385

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





# Transportation Services - Traffic Services

Work Order

35324

## Turning Movement Count - Pedestrian Volume Report

### BEECHWOOD AVE @ CHAMPLAIN AVE

**Count Date:** Tuesday, August 25, 2015

**Start Time:** 07:00

Time Period	NB Approach (E or W Crossing)	SB Approach (E or W Crossing)	Total	EB Approach (N or S Crossing)	WB Approach (N or S Crossing)	Total	Grand Total
07:00 07:15	0	5	5	9	0	9	14
07:15 07:30	0	5	5	6	0	6	11
07:30 07:45	0	8	8	4	0	4	12
07:45 08:00	0	3	3	3	0	3	6
07:00 08:00	0	21	21	22	0	22	43
08:00 08:15	0	8	8	6	0	6	14
08:15 08:30	0	5	5	5	0	5	10
08:30 08:45	0	2	2	5	0	5	7
08:45 09:00	0	0	0	3	0	3	3
08:00 09:00	0	15	15	19	0	19	34
09:00 09:15	0	2	2	6	0	6	8
09:15 09:30	0	13	13	5	0	5	18
09:30 09:45	0	4	4	1	0	1	5
09:45 10:00	0	12	12	4	0	4	16
09:00 10:00	0	31	31	16	0	16	47
11:30 11:45	0	5	5	4	0	4	9
11:45 12:00	0	10	10	2	0	2	12
12:00 12:15	0	10	10	1	0	1	11
12:15 12:30	0	12	12	2	0	2	14
11:30 12:30	0	37	37	9	0	9	46
12:30 12:45	0	14	14	1	0	1	15
12:45 13:00	0	12	12	8	0	8	20
13:00 13:15	0	4	4	5	0	5	9
13:15 13:30	0	10	10	1	0	1	11
12:30 13:30	0	40	40	15	0	15	55
15:00 15:15	0	10	10	6	0	6	16
15:15 15:30	0	14	14	8	0	8	22
15:30 15:45	0	3	3	5	0	5	8
15:45 16:00	0	9	9	1	0	1	10
15:00 16:00	0	36	36	20	0	20	56
16:00 16:15	0	7	7	9	0	9	16
16:15 16:30	0	15	15	3	0	3	18
16:30 16:45	0	6	6	12	0	12	18
16:45 17:00	0	12	12	7	0	7	19
16:00 17:00	0	40	40	31	0	31	71
17:00 17:15	0	5	5	8	0	8	13
17:15 17:30	0	9	9	9	0	9	18
17:30 17:45	0	8	8	12	0	12	20
17:45 18:00	0	14	14	15	0	15	29
17:00 18:00	0	36	36	44	0	44	80
Total .....	0	256	256	176	0	176	432

**Comment:**

## Turning Movement Count - Full Study Summary Report

### BEECHWOOD AVE @ CHAMPLAIN AVE

**Survey Date:** Tuesday, August 25, 2015

**Total Observed U-Turns**

Northbound: 0 Southbound: 0  
Eastbound: 0 Westbound: 1

**AADT Factor**

.90

**Full Study**

CHAMPLAIN AVE										BEECHWOOD AVE									
Period	Northbound				Southbound				STR TOT	Eastbound				Westbound				STR TOT	Grand Total
	LT	ST	RT	NB TOT	LT	ST	RT	SB TOT		LT	ST	RT	EB TOT	LT	ST	RT	WB TOT		
07:00 08:00	0	0	0	0	1	0	10	11	11	1	389	0	390	0	480	0	480	870	881
08:00 09:00	0	0	0	0	0	0	13	13	13	6	436	0	442	0	585	1	586	1028	1041
09:00 10:00	0	0	0	0	1	0	8	9	9	4	429	0	433	0	511	4	515	948	957
11:30 12:30	0	0	0	0	2	0	7	9	9	6	498	0	504	0	484	6	490	994	1003
12:30 13:30	0	0	0	0	1	0	6	7	7	5	458	0	463	0	459	5	464	927	934
15:00 16:00	0	0	0	0	1	0	3	4	4	7	529	0	536	0	523	5	528	1064	1068
16:00 17:00	0	0	0	0	1	0	5	6	6	13	546	0	559	0	707	9	716	1275	1281
17:00 18:00	0	0	0	0	0	0	10	10	10	17	531	0	548	0	637	2	639	1187	1197
Sub Total	0	0	0	0	7	0	62	69	69	59	3816	0	3875	0	4386	32	4418	8293	8362
U Turns				0				0	0				0				1	1	1
Total	0	0	0	0	7	0	62	69	69	59	3816	0	3875	0	4386	32	4419	8294	8363
EQ 12Hr	0	0	0	0	10	0	86	96	96	82	5304	0	5386	0	6097	44	6142	11528	11624
Note: These values are calculated by multiplying the totals by the appropriate expansion factor.														1.39					
AVG 12Hr	0	0	0	0	9	0	78	86	86	74	4774	0	4848	0	5487	40	5528	10376	10462
Note: These volumes are calculated by multiplying the Equivalent 12 hr. totals by the AADT factor.														.90					
AVG 24Hr	0	0	0	0	11	0	102	113	113	97	6254	0	6350	0	7188	52	7242	13592	13705
Note: These volumes are calculated by multiplying the Average Daily 12 hr. totals by 12 to 24 expansion factor.														1.31					

**Comments:**

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



# Transportation Services - Traffic Services

## Turning Movement Count - Full Study Peak Hour Diagram

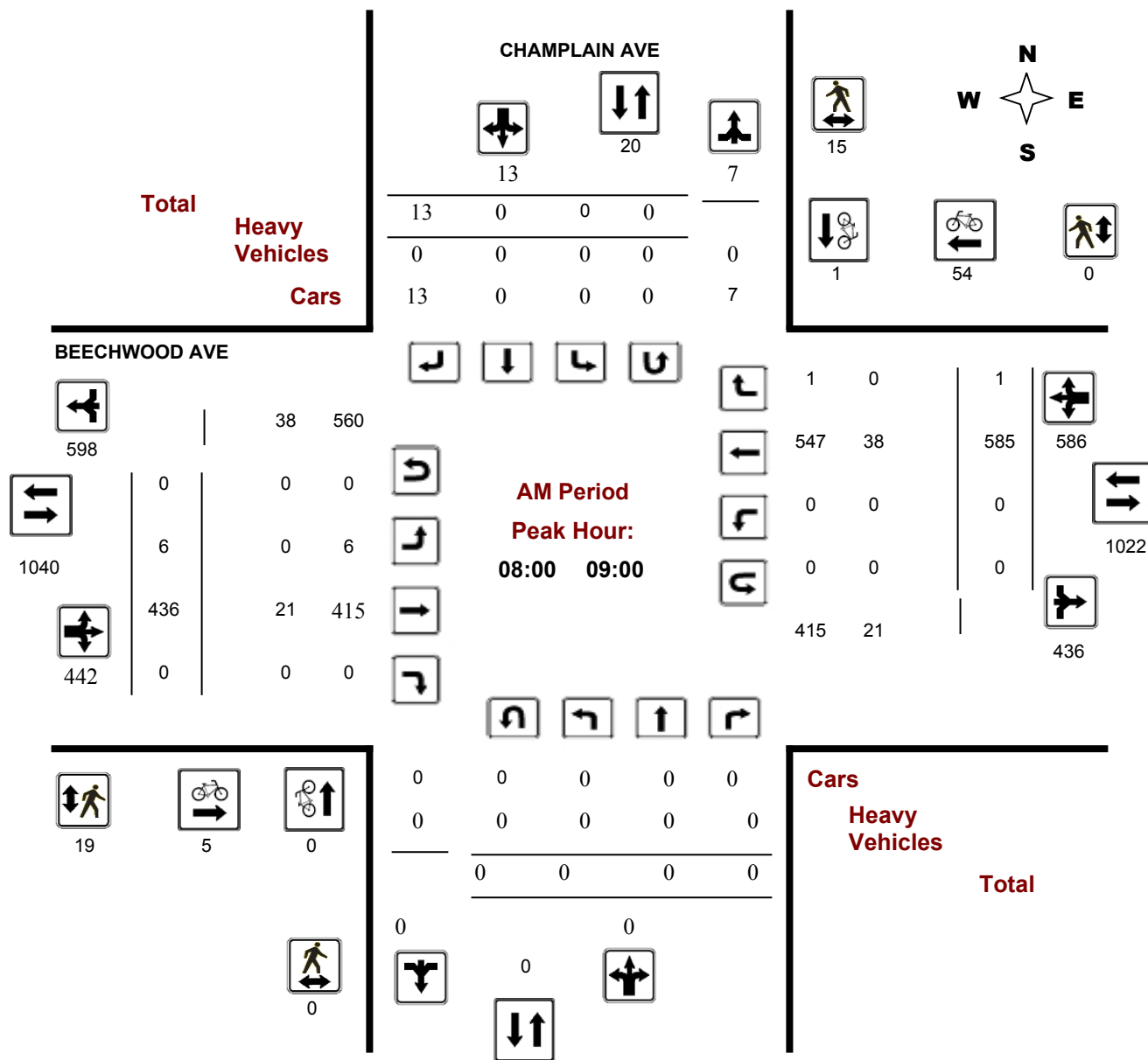
### BEECHWOOD AVE @ CHAMPLAIN AVE

**Survey Date:** Tuesday, August 25, 2015

**Start Time:** 07:00

**WO No:** 35324

**Device:** Miovision





# Transportation Services - Traffic Services

## Turning Movement Count - Full Study Peak Hour Diagram

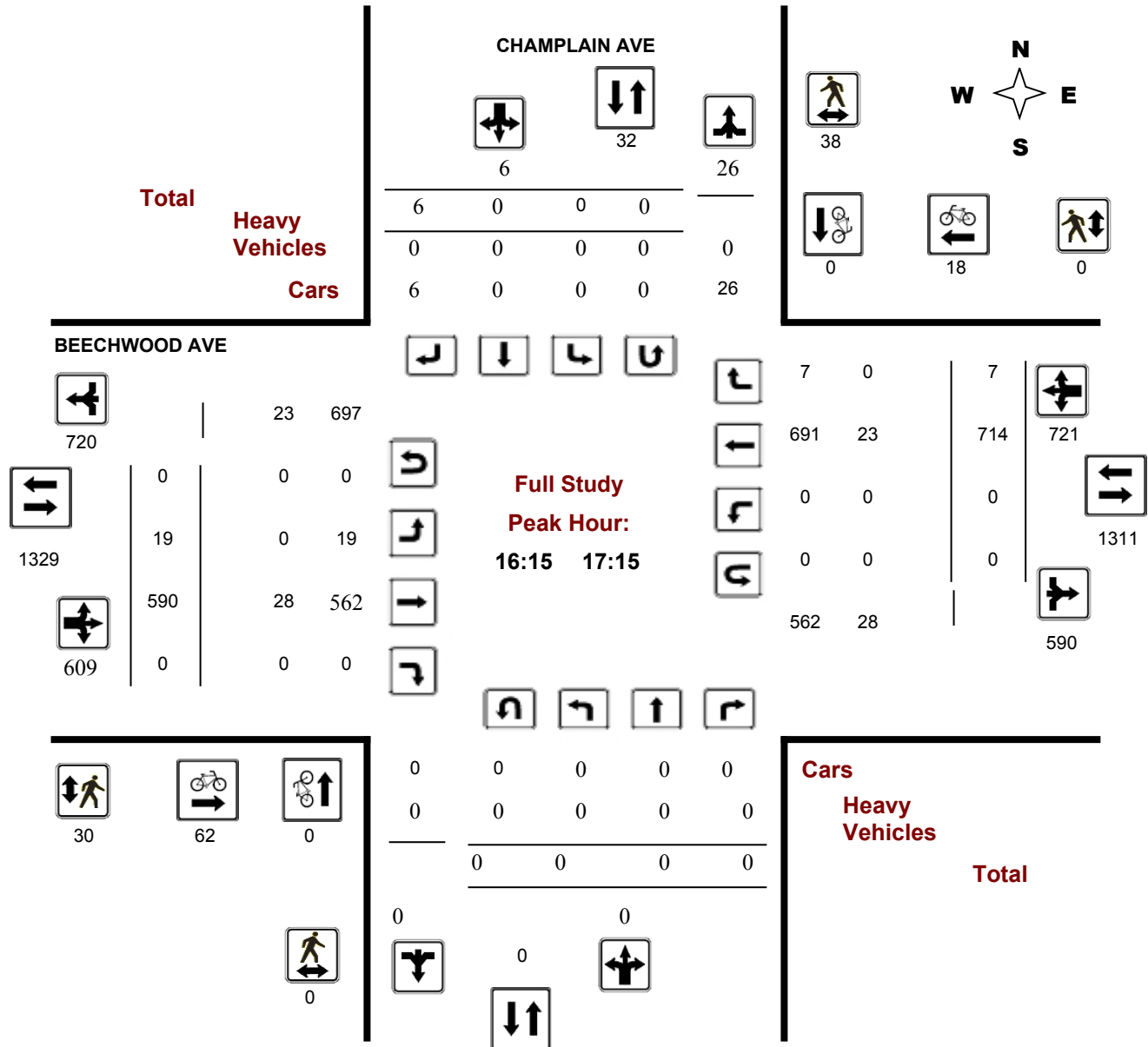
### BEECHWOOD AVE @ CHAMPLAIN AVE

**Survey Date:** Tuesday, August 25, 2015

**Start Time:** 07:00

**WO No:** 35324

**Device:** Miovision





# Transportation Services - Traffic Services

## Turning Movement Count - Full Study Peak Hour Diagram

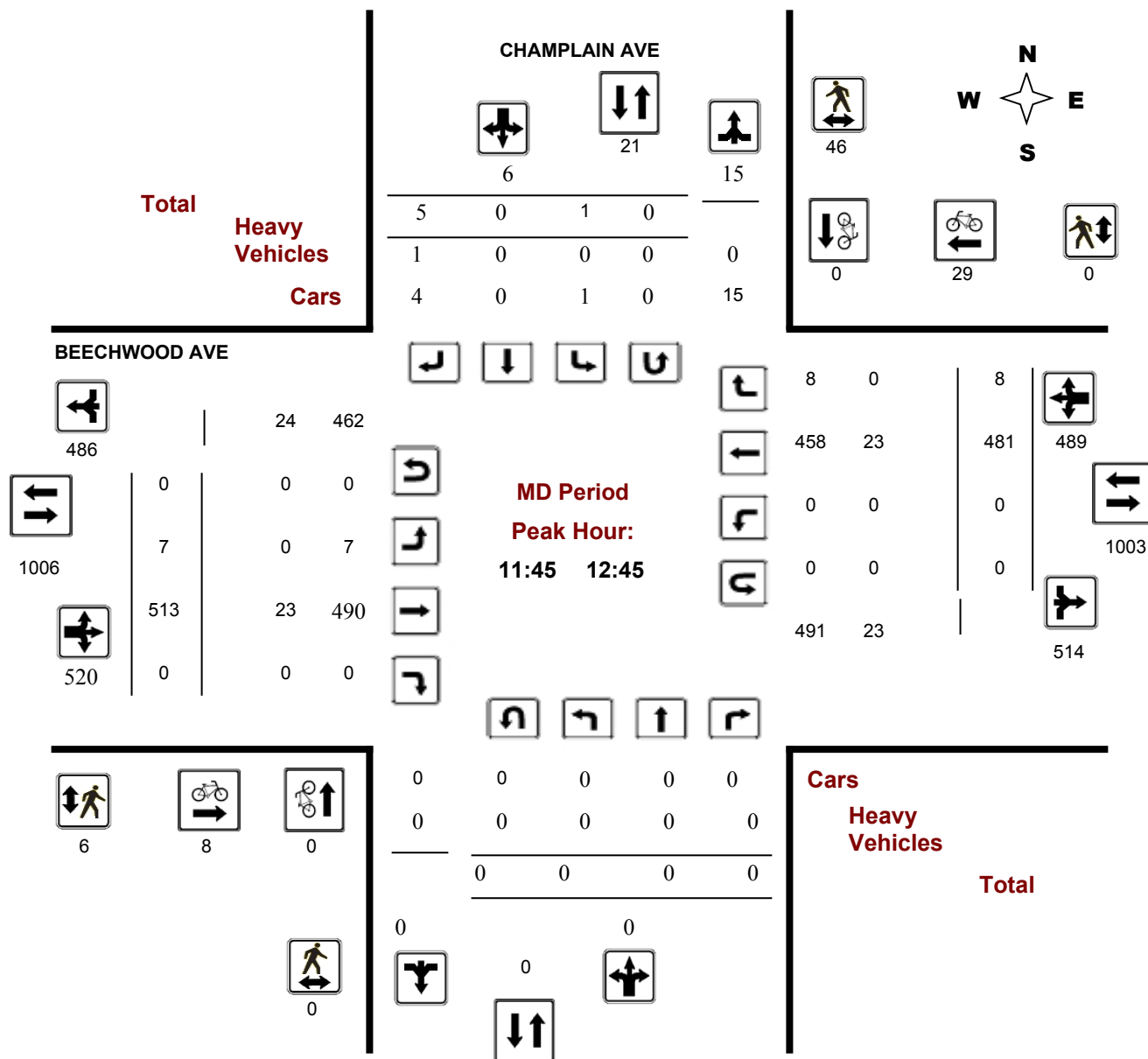
### BEECHWOOD AVE @ CHAMPLAIN AVE

**Survey Date:** Tuesday, August 25, 2015

**Start Time:** 07:00

**WO No:** 35324

**Device:** Miovision





# Transportation Services - Traffic Services

## Turning Movement Count - Full Study Peak Hour Diagram

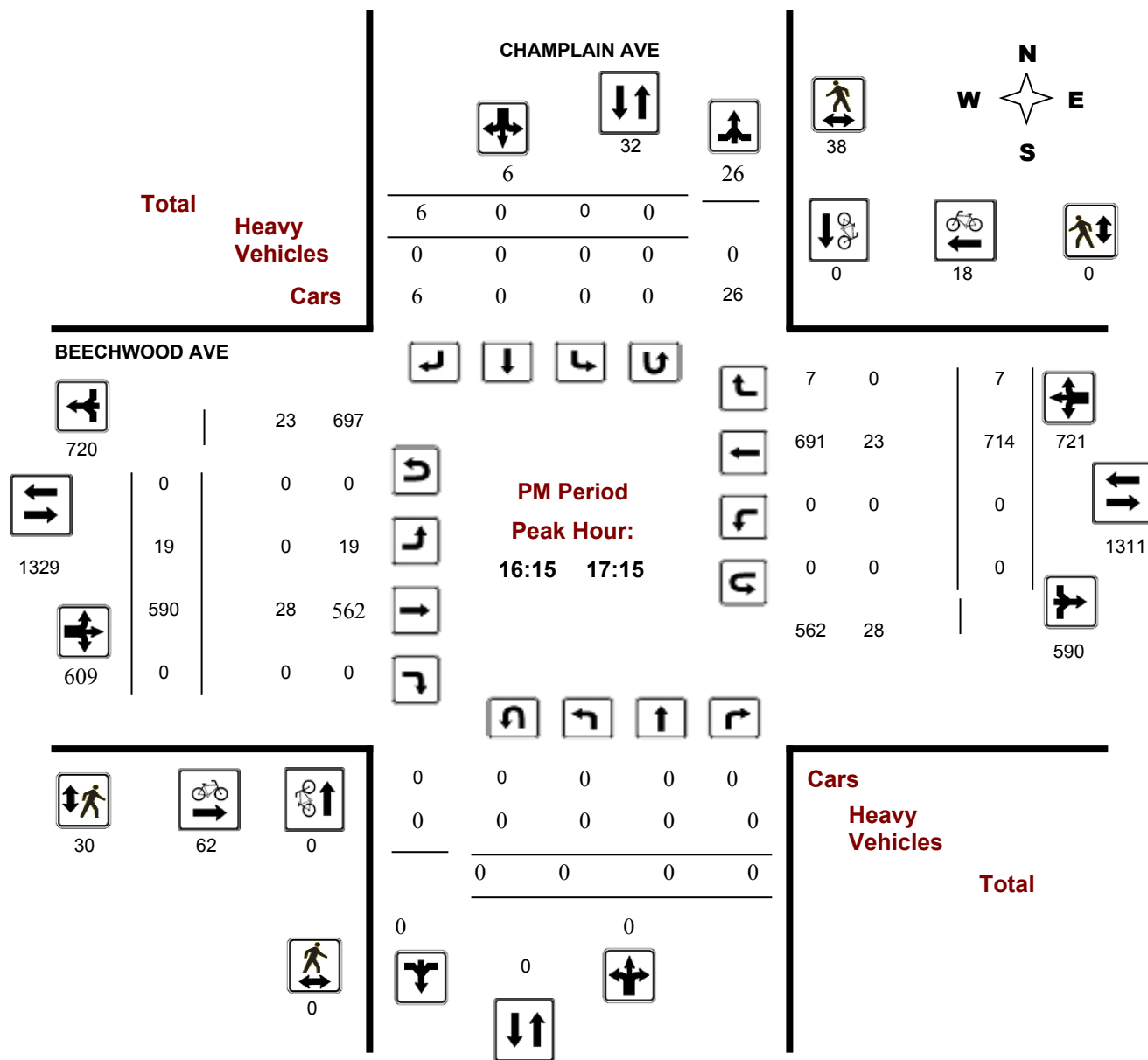
### BEECHWOOD AVE @ CHAMPLAIN AVE

**Survey Date:** Tuesday, August 25, 2015

**Start Time:** 07:00

**WO No:** 35324

**Device:** Miovision





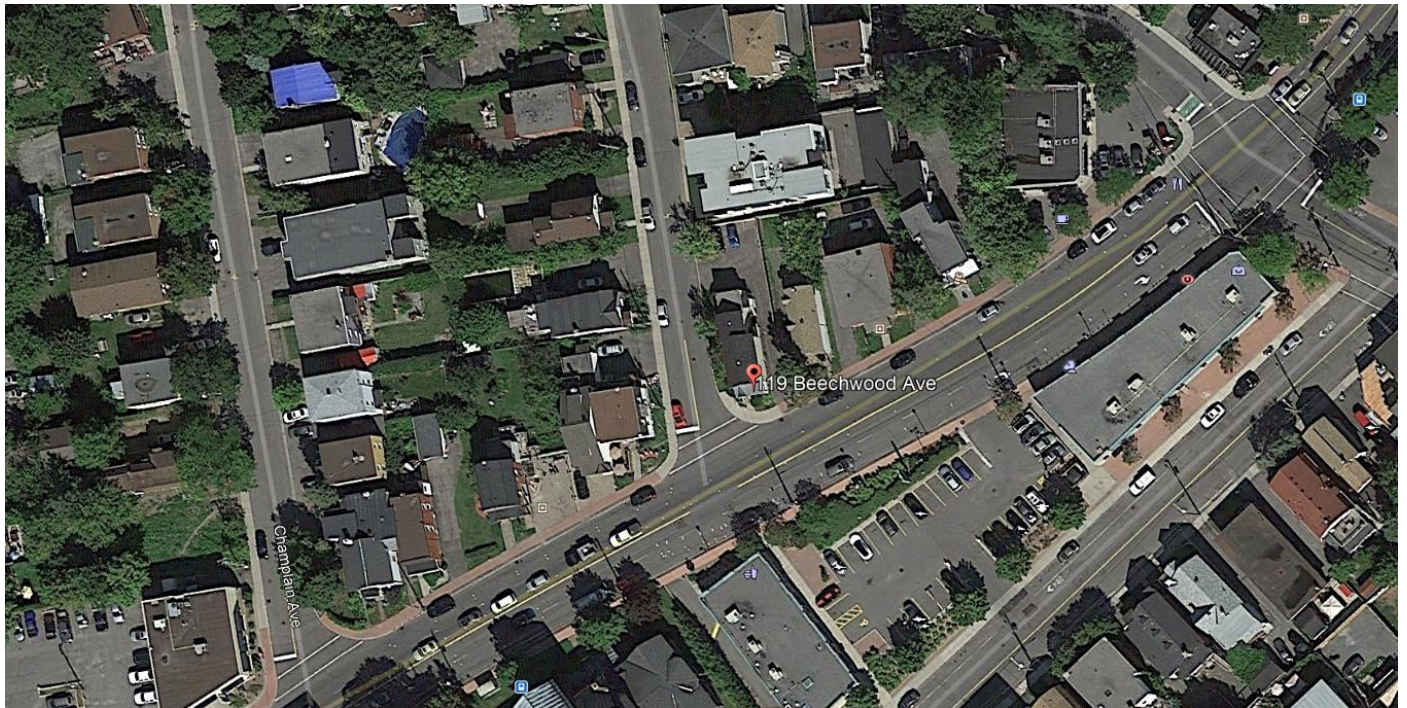
## Turning Movement Count - 15 Min U-Turn Total Report

### BEECHWOOD AVE @ CHAMPLAIN AVE

**Survey Date:** Tuesday, August 25, 2015

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




# TRAFFIC IMPACT ASSESSMENT (FINAL)



## APPENDIX D – SYNCHRO 10 REPORTS

Intersection




Int Delay, s/veh 0.3

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	9	467	594	8	4	10
Future Vol, veh/h	9	467	594	8	4	10
Conflicting Peds, #/hr	27	0	0	27	0	2
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	90	90	90	90	90	90
Heavy Vehicles, %	0	7	7	0	0	0
Mvmt Flow	10	519	660	9	4	11

Major/Minor	Major1	Major2	Minor2
Conflicting Flow All	696	0	0 1231 694
Stage 1	-	-	- 692 -
Stage 2	-	-	- 539 -
Critical Hdwy	4.1	-	- 6.4 6.2
Critical Hdwy Stg 1	-	-	- 5.4 -
Critical Hdwy Stg 2	-	-	- 5.4 -
Follow-up Hdwy	2.2	-	- 3.5 3.3
Pot Cap-1 Maneuver	909	-	- 198 446
Stage 1	-	-	- 500 -
Stage 2	-	-	- 589 -
Platoon blocked, %	-	-	-
Mov Cap-1 Maneuver	884	-	- 185 433
Mov Cap-2 Maneuver	-	-	- 185 -
Stage 1	-	-	- 479 -
Stage 2	-	-	- 573 -










Approach	EB	WB	SB
HCM Control Delay, s	0.2	0	17.1
HCM LOS			C

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	884	-	-	-	313
HCM Lane V/C Ratio	0.011	-	-	-	0.05
HCM Control Delay (s)	9.1	0	-	-	17.1
HCM Lane LOS	A	A	-	-	C
HCM 95th %tile Q(veh)	0	-	-	-	0.2

Intersection						
Int Delay, s/veh	0.2					
Movement	SBL	SBR	NEL	NET	SWT	SWR
Lane Configurations						
Traffic Vol, veh/h	0	13	6	476	603	1
Future Vol, veh/h	0	13	6	476	603	1
Conflicting Peds, #/hr	0	20	15	0	0	15
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	90	90	90	90	90	90
Heavy Vehicles, %	0	0	0	7	7	0
Mvmt Flow	0	14	7	529	670	1
Major/Minor	Minor2	Major1		Major2		
Conflicting Flow All	1229	706	686	0	-	0
Stage 1	686	-	-	-	-	-
Stage 2	543	-	-	-	-	-
Critical Hdwy	6.4	6.2	4.1	-	-	-
Critical Hdwy Stg 1	5.4	-	-	-	-	-
Critical Hdwy Stg 2	5.4	-	-	-	-	-
Follow-up Hdwy	3.5	3.3	2.2	-	-	-
Pot Cap-1 Maneuver	198	439	917	-	-	-
Stage 1	504	-	-	-	-	-
Stage 2	586	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	190	424	903	-	-	-
Mov Cap-2 Maneuver	190	-	-	-	-	-
Stage 1	491	-	-	-	-	-
Stage 2	577	-	-	-	-	-
Approach	SB	NE		SW		
HCM Control Delay, s	13.8	0.1		0		
HCM LOS	B					
Minor Lane/Major Mvmt	NEL	NETSBLn1	SWT	SWR		
Capacity (veh/h)	903	-	424	-	-	
HCM Lane V/C Ratio	0.007	-	0.034	-	-	
HCM Control Delay (s)	9	0	13.8	-	-	
HCM Lane LOS	A	A	B	-	-	
HCM 95th %tile Q(veh)	0	-	0.1	-	-	







Lanes, Volumes, Timings  
5: Beechwood Ave. & St. Charles St.

Existing Conditions (2018)  
AM Peak Hour

						
Lane Group	NWL	NWR	NET	NER	SWL	SWT
Lane Configurations						
Traffic Volume (vph)	9	15	467	18	18	598
Future Volume (vph)	9	15	467	18	18	598
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor	0.95		1.00			1.00
Frt	0.915		0.995			
Flt Protected	0.982					0.999
Satd. Flow (prot)	1542	0	1498	0	0	1684
Flt Permitted	0.982					0.980
Satd. Flow (perm)	1536	0	1498	0	0	1651
Right Turn on Red		Yes		Yes		
Satd. Flow (RTOR)	17		5			
Link Speed (k/h)	50		50			50
Link Distance (m)	65.6		83.6			34.5
Travel Time (s)	4.7		6.0			2.5
Confl. Peds. (#/hr)	4	22		13	13	
Confl. Bikes (#/hr)				15		
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Heavy Vehicles (%)	0%	0%	7%	0%	0%	7%
Parking (#/hr)			1			
Adj. Flow (vph)	10	17	519	20	20	664
Shared Lane Traffic (%)						
Lane Group Flow (vph)	27	0	539	0	0	684
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Right	Left	Left
Median Width(m)	3.6		0.0			0.0
Link Offset(m)	0.0		0.0			0.0
Crosswalk Width(m)	4.8		4.8			4.8
Two way Left Turn Lane						
Headway Factor	1.07	1.07	1.23	1.07	1.07	1.07
Turning Speed (k/h)	25	15		15	25	
Number of Detectors	1		2		1	2
Detector Template	Left		Thru		Left	Thru
Leading Detector (m)	2.0		10.0		2.0	10.0
Trailing Detector (m)	0.0		0.0		0.0	0.0
Detector 1 Position(m)	0.0		0.0		0.0	0.0
Detector 1 Size(m)	2.0		0.6		2.0	0.6
Detector 1 Type	CI+Ex		CI+Ex		CI+Ex	CI+Ex
Detector 1 Channel						
Detector 1 Extend (s)	0.0		0.0		0.0	0.0
Detector 1 Queue (s)	0.0		0.0		0.0	0.0
Detector 1 Delay (s)	0.0		0.0		0.0	0.0
Detector 2 Position(m)			9.4			9.4
Detector 2 Size(m)			0.6			0.6
Detector 2 Type			CI+Ex			CI+Ex
Detector 2 Channel						
Detector 2 Extend (s)			0.0			0.0
Turn Type	Prot		NA		Perm	NA
Protected Phases	2		4			8
Permitted Phases					8	
Detector Phase	2		4		8	8
Switch Phase						

Lanes, Volumes, Timings  
5: Beechwood Ave. & St. Charles St.

Existing Conditions (2018)  
AM Peak Hour

						
Lane Group	NWL	NWR	NET	NER	SWL	SWT
Minimum Initial (s)	5.0		5.0		5.0	5.0
Minimum Split (s)	24.7		24.6		24.6	24.6
Total Split (s)	24.0		66.0		66.0	66.0
Total Split (%)	26.7%		73.3%		73.3%	73.3%
Maximum Green (s)	18.3		60.4		60.4	60.4
Yellow Time (s)	2.4		2.3		2.3	2.3
All-Red Time (s)	3.3		3.3		3.3	3.3
Lost Time Adjust (s)	0.0		0.0			0.0
Total Lost Time (s)	5.7		5.6			5.6
Lead/Lag						
Lead-Lag Optimize?						
Vehicle Extension (s)	3.0		3.0		3.0	3.0
Recall Mode	None		C-Max		C-Max	C-Max
Walk Time (s)	7.0		7.0		7.0	7.0
Flash Dont Walk (s)	11.0		12.0		12.0	12.0
Pedestrian Calls (#/hr)	13		8		0	0
Act Effct Green (s)	8.4		77.0			77.0
Actuated g/C Ratio	0.09		0.86			0.86
v/c Ratio	0.17		0.42			0.48
Control Delay	22.2		4.7			3.1
Queue Delay	0.0		0.0			0.0
Total Delay	22.2		4.7			3.1
LOS	C		A			A
Approach Delay	22.3		4.7			3.1
Approach LOS	C		A			A
Intersection Summary						
Area Type:	Other					
Cycle Length: 90						
Actuated Cycle Length: 90						
Offset: 18 (20%), Referenced to phase 4:NET and 8:SWTL, Start of Green						
Natural Cycle: 60						
Control Type: Actuated-Coordinated						
Maximum v/c Ratio: 0.48						
Intersection Signal Delay: 4.2				Intersection LOS: A		
Intersection Capacity Utilization 67.8%				ICU Level of Service C		
Analysis Period (min) 15						

Splits and Phases: 5: Beechwood Ave. & St. Charles St.

































## Lanes, Volumes, Timings

Existing Conditions (2018)

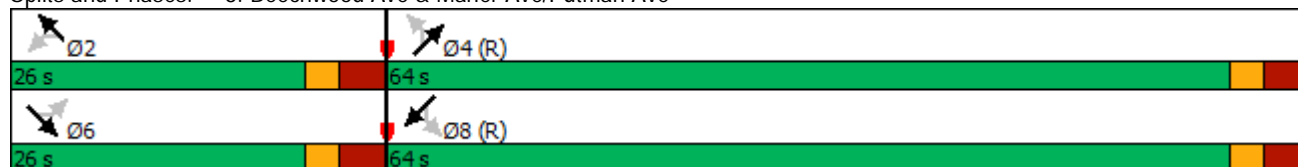
## 8: Beechwood Ave &amp; Marier Ave/Putman Ave

AM Peak Hour

												
Lane Group	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Traffic Volume (vph)	39	12	20	55	14	30	14	409	48	35	527	26
Future Volume (vph)	39	12	20	55	14	30	14	409	48	35	527	26
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor		0.97			0.98			0.99			0.99	
Frt		0.962			0.959			0.986			0.994	
Flt Protected		0.973			0.973			0.998			0.997	
Satd. Flow (prot)	0	1673	0	0	1645	0	0	1660	0	0	1644	0
Flt Permitted		0.787			0.830			0.977			0.951	
Satd. Flow (perm)	0	1324	0	0	1400	0	0	1624	0	0	1567	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		20			22			13			5	
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		95.8			106.2			112.4			86.0	
Travel Time (s)		6.9			7.6			8.1			6.2	
Confl. Peds. (#/hr)	22		2	2		22	27		13	13		27
Confl. Bikes (#/hr)									15			52
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%	0%	7%	0%	0%	7%	0%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	4	0
Adj. Flow (vph)	43	13	22	61	16	33	16	454	53	39	586	29
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	78	0	0	110	0	0	523	0	0	654	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		0.0			0.0			0.0			0.0	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.8			4.8			4.8			4.8	
Two way Left Turn Lane												
Headway Factor	1.07	1.07	1.07	1.07	1.07	1.07	1.07	1.07	1.07	1.07	1.09	1.07
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Number of Detectors	1	2		1	2		1	2		1	2	
Detector Template	Left	Thru		Left	Thru		Left	Thru		Left	Thru	
Leading Detector (m)	2.0	10.0		2.0	10.0		2.0	10.0		2.0	10.0	
Trailing Detector (m)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Position(m)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Size(m)	2.0	0.6		2.0	0.6		2.0	0.6		2.0	0.6	
Detector 1 Type	CI+Ex	CI+Ex		CI+Ex	CI+Ex		CI+Ex	CI+Ex		CI+Ex	CI+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 2 Position(m)		9.4			9.4			9.4			9.4	
Detector 2 Size(m)		0.6			0.6			0.6			0.6	
Detector 2 Type		CI+Ex			CI+Ex			CI+Ex			CI+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		6			2			4			8	
Permitted Phases	6			2			4			8		
Detector Phase	6	6		2	2		4	4		8	8	
Switch Phase												




												
Lane Group	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Minimum Initial (s)	10.0	10.0		10.0	10.0		5.0	5.0		5.0	5.0	
Minimum Split (s)	25.7	25.7		25.7	25.7		25.7	25.7		25.7	25.7	
Total Split (s)	26.0	26.0		26.0	26.0		64.0	64.0		64.0	64.0	
Total Split (%)	28.9%	28.9%		28.9%	28.9%		71.1%	71.1%		71.1%	71.1%	
Maximum Green (s)	20.3	20.3		20.3	20.3		58.3	58.3		58.3	58.3	
Yellow Time (s)	2.4	2.4		2.4	2.4		2.4	2.4		2.4	2.4	
All-Red Time (s)	3.3	3.3		3.3	3.3		3.3	3.3		3.3	3.3	
Lost Time Adjust (s)		0.0			0.0			0.0			0.0	
Total Lost Time (s)		5.7			5.7			5.7			5.7	
Lead/Lag												
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Recall Mode	None	None		None	None		C-Max	C-Max		C-Max	C-Max	
Walk Time (s)	7.0	7.0		7.0	7.0		7.0	7.0		7.0	7.0	
Flash Dont Walk (s)	13.0	13.0		13.0	13.0		13.0	13.0		13.0	13.0	
Pedestrian Calls (#/hr)	2	2		11	11		7	7		12	12	
Act Effct Green (s)		13.0			13.0			69.9			69.9	
Actuated g/C Ratio		0.14			0.14			0.78			0.78	
v/c Ratio		0.38			0.50			0.41			0.54	
Control Delay		31.0			35.2			5.0			8.0	
Queue Delay		0.0			0.0			0.0			0.0	
Total Delay		31.0			35.2			5.0			8.0	
LOS		C			D			A			A	
Approach Delay		31.0			35.2			5.0			8.0	
Approach LOS		C			D			A			A	
Intersection Summary												
Area Type:	Other											
Cycle Length: 90												
Actuated Cycle Length: 90												
Offset: 13 (14%), Referenced to phase 4:NETL and 8:SWTL, Start of Green												
Natural Cycle: 60												
Control Type: Actuated-Coordinated												
Maximum v/c Ratio: 0.54												
Intersection Signal Delay: 10.4					Intersection LOS: B							
Intersection Capacity Utilization 69.8%					ICU Level of Service C							
Analysis Period (min) 15												

Splits and Phases: 8: Beechwood Ave &amp; Marier Ave/Putman Ave



Intersection




Int Delay, s/veh 0.2

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	4	682	749	10	3	6
Future Vol, veh/h	4	682	749	10	3	6
Conflicting Peds, #/hr	40	0	0	40	0	2
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	90	90	90	90	90	90
Heavy Vehicles, %	0	4	4	0	0	0
Mvmt Flow	4	758	832	11	3	7

Major/Minor	Major1	Major2	Minor2
Conflicting Flow All	883	0	0 1644 880
Stage 1	-	-	- 878 -
Stage 2	-	-	- 766 -
Critical Hdwy	4.1	-	- 6.4 6.2
Critical Hdwy Stg 1	-	-	- 5.4 -
Critical Hdwy Stg 2	-	-	- 5.4 -
Follow-up Hdwy	2.2	-	- 3.5 3.3
Pot Cap-1 Maneuver	775	-	- 111 349
Stage 1	-	-	- 410 -
Stage 2	-	-	- 462 -
Platoon blocked, %	-	-	-
Mov Cap-1 Maneuver	744	-	- 101 334
Mov Cap-2 Maneuver	-	-	- 101 -
Stage 1	-	-	- 390 -
Stage 2	-	-	- 443 -










Approach	EB	WB	SB
HCM Control Delay, s	0.1	0	25.1
HCM LOS			D

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	744	-	-	-	189
HCM Lane V/C Ratio	0.006	-	-	-	0.053
HCM Control Delay (s)	9.9	0	-	-	25.1
HCM Lane LOS	A	A	-	-	D
HCM 95th %tile Q(veh)	0	-	-	-	0.2

Intersection						
Int Delay, s/veh	0.2					
Movement	SBL	SBR	NEL	NET	SWT	SWR
Lane Configurations						
Traffic Vol, veh/h	0	6	20	686	748	7
Future Vol, veh/h	0	6	20	686	748	7
Conflicting Peds, #/hr	2	31	39	0	0	39
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	90	90	90	90	90	90
Heavy Vehicles, %	0	0	0	4	4	0
Mvmt Flow	0	7	22	762	831	8
Major/Minor	Minor2	Major1		Major2		
Conflicting Flow All	1682	905	878	0	-	0
Stage 1	874	-	-	-	-	-
Stage 2	808	-	-	-	-	-
Critical Hdwy	6.4	6.2	4.1	-	-	-
Critical Hdwy Stg 1	5.4	-	-	-	-	-
Critical Hdwy Stg 2	5.4	-	-	-	-	-
Follow-up Hdwy	3.5	3.3	2.2	-	-	-
Pot Cap-1 Maneuver	105	338	778	-	-	-
Stage 1	412	-	-	-	-	-
Stage 2	442	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	92	314	747	-	-	-
Mov Cap-2 Maneuver	92	-	-	-	-	-
Stage 1	375	-	-	-	-	-
Stage 2	424	-	-	-	-	-
Approach	SB	NE		SW		
HCM Control Delay, s	16.7	0.3		0		
HCM LOS	C					
Minor Lane/Major Mvmt	NEL	NETSBLn1	SWT	SWR		
Capacity (veh/h)	747	-	314	-	-	
HCM Lane V/C Ratio	0.03	-	0.021	-	-	
HCM Control Delay (s)	10	0	16.7	-	-	
HCM Lane LOS	A	A	C	-	-	
HCM 95th %tile Q(veh)	0.1	-	0.1	-	-	







Lanes, Volumes, Timings  
5: Beechwood Ave. & St Charles St

Existing Conditions (2018)  
PM Peak Hour

						
Lane Group	NWL	NWR	NET	NER	SWL	SWT
Lane Configurations						
Traffic Volume (vph)	27	20	686	29	10	744
Future Volume (vph)	27	20	686	29	10	744
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor	0.97		1.00			1.00
Frt	0.943		0.995			
Flt Protected	0.972					0.999
Satd. Flow (prot)	1619	0	1539	0	0	1730
Flt Permitted	0.972					0.990
Satd. Flow (perm)	1607	0	1539	0	0	1714
Right Turn on Red		Yes		Yes		
Satd. Flow (RTOR)	22		5			
Link Speed (k/h)	50		50			50
Link Distance (m)	65.6		83.6			34.5
Travel Time (s)	4.7		6.0			2.5
Confl. Peds. (#/hr)	5	10		12	12	
Confl. Bikes (#/hr)				52		
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Heavy Vehicles (%)	0%	0%	4%	0%	0%	4%
Parking (#/hr)			1			
Adj. Flow (vph)	30	22	762	32	11	827
Shared Lane Traffic (%)						
Lane Group Flow (vph)	52	0	794	0	0	838
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Right	Left	Left
Median Width(m)	3.6		0.0			0.0
Link Offset(m)	0.0		0.0			0.0
Crosswalk Width(m)	4.8		4.8			4.8
Two way Left Turn Lane						
Headway Factor	1.07	1.07	1.23	1.07	1.07	1.07
Turning Speed (k/h)	25	15		15	25	
Number of Detectors	1		2		1	2
Detector Template	Left		Thru		Left	Thru
Leading Detector (m)	2.0		10.0		2.0	10.0
Trailing Detector (m)	0.0		0.0		0.0	0.0
Detector 1 Position(m)	0.0		0.0		0.0	0.0
Detector 1 Size(m)	2.0		0.6		2.0	0.6
Detector 1 Type	CI+Ex		CI+Ex		CI+Ex	CI+Ex
Detector 1 Channel						
Detector 1 Extend (s)	0.0		0.0		0.0	0.0
Detector 1 Queue (s)	0.0		0.0		0.0	0.0
Detector 1 Delay (s)	0.0		0.0		0.0	0.0
Detector 2 Position(m)			9.4			9.4
Detector 2 Size(m)			0.6			0.6
Detector 2 Type			CI+Ex			CI+Ex
Detector 2 Channel						
Detector 2 Extend (s)			0.0			0.0
Turn Type	Prot		NA		Perm	NA
Protected Phases	2		4			8
Permitted Phases					8	
Detector Phase	2		4		8	8
Switch Phase						

Lanes, Volumes, Timings  
5: Beechwood Ave. & St Charles St

Existing Conditions (2018)  
PM Peak Hour

						
Lane Group	NWL	NWR	NET	NER	SWL	SWT
Minimum Initial (s)	5.0		5.0		5.0	5.0
Minimum Split (s)	23.7		24.6		24.6	24.6
Total Split (s)	24.0		66.0		66.0	66.0
Total Split (%)	26.7%		73.3%		73.3%	73.3%
Maximum Green (s)	18.3		60.4		60.4	60.4
Yellow Time (s)	2.4		2.3		2.3	2.3
All-Red Time (s)	3.3		3.3		3.3	3.3
Lost Time Adjust (s)	0.0		0.0			0.0
Total Lost Time (s)	5.7		5.6			5.6
Lead/Lag						
Lead-Lag Optimize?						
Vehicle Extension (s)	3.0		3.0		3.0	3.0
Recall Mode	None		C-Max		C-Max	C-Max
Walk Time (s)	7.0		7.0		7.0	7.0
Flash Dont Walk (s)	11.0		12.0		12.0	12.0
Pedestrian Calls (#/hr)	13		8		0	0
Act Effct Green (s)	9.0		76.5			76.5
Actuated g/C Ratio	0.10		0.85			0.85
v/c Ratio	0.29		0.61			0.58
Control Delay	27.1		7.6			6.7
Queue Delay	0.0		0.0			0.2
Total Delay	27.1		7.6			6.9
LOS	C		A			A
Approach Delay	27.1		7.6			6.9
Approach LOS	C		A			A
Intersection Summary						
Area Type:	Other					
Cycle Length: 90						
Actuated Cycle Length: 90						
Offset: 18 (20%), Referenced to phase 4:NET and 8:SWTL, Start of Green						
Natural Cycle: 70						
Control Type: Actuated-Coordinated						
Maximum v/c Ratio: 0.61						
Intersection Signal Delay: 7.9				Intersection LOS: A		
Intersection Capacity Utilization 66.4%				ICU Level of Service C		
Analysis Period (min) 15						

Splits and Phases: 5: Beechwood Ave. & St Charles St

















## Lanes, Volumes, Timings

Existing Conditions (2018)

## 8: Beechwood Ave &amp; Marier Ave/Putman Ave




PM Peak Hour

Lane Group	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations		↔			↔			↔			↔	
Traffic Volume (vph)	31	9	8	57	20	52	4	621	60	29	693	21
Future Volume (vph)	31	9	8	57	20	52	4	621	60	29	693	21
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor		0.98			0.98			0.99			1.00	
Frt		0.977			0.945			0.988			0.996	
Flt Protected		0.969			0.978						0.998	
Satd. Flow (prot)	0	1697	0	0	1634	0	0	1705	0	0	1650	0
Flt Permitted		0.790			0.835			0.997			0.955	
Satd. Flow (perm)	0	1368	0	0	1392	0	0	1699	0	0	1578	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		9			31			11			3	
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		95.8			106.2			112.4			178.6	
Travel Time (s)		6.9			7.6			8.1			12.9	
Confl. Peds. (#/hr)	10		2	2		10	40		12	12		40
Confl. Bikes (#/hr)									52			18
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%	0%	4%	0%	0%	4%	0%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	10	0
Adj. Flow (vph)	34	10	9	63	22	58	4	690	67	32	770	23
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	53	0	0	143	0	0	761	0	0	825	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		0.0			0.0			0.0			0.0	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.8			4.8			4.8			4.8	
Two way Left Turn Lane												
Headway Factor	1.07	1.07	1.07	1.07	1.07	1.07	1.07	1.07	1.07	1.07	1.13	1.07
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Number of Detectors	1	2		1	2		1	2		1	2	
Detector Template	Left	Thru		Left	Thru		Left	Thru		Left	Thru	
Leading Detector (m)	2.0	10.0		2.0	10.0		2.0	10.0		2.0	10.0	
Trailing Detector (m)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Position(m)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Size(m)	2.0	0.6		2.0	0.6		2.0	0.6		2.0	0.6	
Detector 1 Type	CI+Ex	CI+Ex		CI+Ex	CI+Ex		CI+Ex	CI+Ex		CI+Ex	CI+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 2 Position(m)		9.4			9.4			9.4			9.4	
Detector 2 Size(m)		0.6			0.6			0.6			0.6	
Detector 2 Type		CI+Ex			CI+Ex			CI+Ex			CI+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		6			2			4			8	
Permitted Phases	6			2			4			8		
Detector Phase	6	6		2	2		4	4		8	8	
Switch Phase												

												
Lane Group	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Minimum Initial (s)	10.0	10.0		10.0	10.0		5.0	5.0		5.0	5.0	
Minimum Split (s)	25.7	25.7		25.7	25.7		25.7	25.7		25.7	25.7	
Total Split (s)	26.0	26.0		26.0	26.0		74.0	74.0		74.0	74.0	
Total Split (%)	26.0%	26.0%		26.0%	26.0%		74.0%	74.0%		74.0%	74.0%	
Maximum Green (s)	20.3	20.3		20.3	20.3		68.3	68.3		68.3	68.3	
Yellow Time (s)	2.4	2.4		2.4	2.4		2.4	2.4		2.4	2.4	
All-Red Time (s)	3.3	3.3		3.3	3.3		3.3	3.3		3.3	3.3	
Lost Time Adjust (s)		0.0			0.0			0.0			0.0	
Total Lost Time (s)		5.7			5.7			5.7			5.7	
Lead/Lag												
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Recall Mode	Max	Max		Max	Max		C-Max	C-Max		C-Max	C-Max	
Walk Time (s)	7.0	7.0		7.0	7.0		7.0	7.0		7.0	7.0	
Flash Dont Walk (s)	13.0	13.0		13.0	13.0		13.0	13.0		13.0	13.0	
Pedestrian Calls (#/hr)	2	2		8	8		7	7		15	15	
Act Effct Green (s)		20.3			20.3			68.3			68.3	
Actuated g/C Ratio		0.20			0.20			0.68			0.68	
v/c Ratio		0.19			0.47			0.65			0.77	
Control Delay		30.5			32.9			12.3			16.5	
Queue Delay		0.0			0.0			0.6			0.0	
Total Delay		30.5			32.9			12.9			16.5	
LOS		C			C			B			B	
Approach Delay		30.5			32.9			12.9			16.5	
Approach LOS		C			C			B			B	
Intersection Summary												
Area Type:	Other											
Cycle Length: 100												
Actuated Cycle Length: 100												
Offset: 5 (5%), Referenced to phase 4:NETL and 8:SWTL, Start of Green												
Natural Cycle: 75												
Control Type: Actuated-Coordinated												
Maximum v/c Ratio: 0.77												
Intersection Signal Delay: 16.7						Intersection LOS: B						
Intersection Capacity Utilization 87.4%						ICU Level of Service E						
Analysis Period (min) 15												




Splits and Phases: 8: Beechwood Ave &amp; Marier Ave/Putman Ave



Intersection						
Int Delay, s/veh	0.3					
Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	8	433	551	7	4	9
Future Vol, veh/h	8	433	551	7	4	9
Conflicting Peds, #/hr	28	0	0	28	0	2
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	90	90	90	90	90	90
Heavy Vehicles, %	0	7	7	0	0	0
Mvmt Flow	9	481	612	8	4	10
Major/Minor	Major1	Major2		Minor2		
Conflicting Flow All	648	0	-	0	1143	646
Stage 1	-	-	-	-	644	-
Stage 2	-	-	-	-	499	-
Critical Hdwy	4.1	-	-	-	6.4	6.2
Critical Hdwy Stg 1	-	-	-	-	5.4	-
Critical Hdwy Stg 2	-	-	-	-	5.4	-
Follow-up Hdwy	2.2	-	-	-	3.5	3.3
Pot Cap-1 Maneuver	947	-	-	-	223	475
Stage 1	-	-	-	-	527	-
Stage 2	-	-	-	-	614	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	920	-	-	-	208	461
Mov Cap-2 Maneuver	-	-	-	-	208	-
Stage 1	-	-	-	-	505	-
Stage 2	-	-	-	-	597	-
Approach	EB	WB		SB		
HCM Control Delay, s	0.2	0		16.2		
HCM LOS				C		
Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1	
Capacity (veh/h)	920	-	-	-	-	335
HCM Lane V/C Ratio	0.01	-	-	-	-	0.043
HCM Control Delay (s)	9	0	-	-	-	16.2
HCM Lane LOS	A	A	-	-	-	C
HCM 95th %tile Q(veh)	0	-	-	-	-	0.1










HCM 2010 TWSC  
2: Beechwood Ave./Beechwood Ave & Champlain Ave

Background Operations (2024)  
AM Peak Hour

Intersection						
Int Delay, s/veh	0.2					
Movement	SBL	SBR	NEL	NET	SWT	SWR
Lane Configurations						
Traffic Vol, veh/h	0	12	6	441	559	1
Future Vol, veh/h	0	12	6	441	559	1
Conflicting Peds, #/hr	0	21	16	0	0	16
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	90	90	90	90	90	90
Heavy Vehicles, %	0	0	0	7	7	0
Mvmt Flow	0	13	7	490	621	1
Major/Minor	Minor2	Major1		Major2		
Conflicting Flow All	1142	659	638	0	-	0
Stage 1	638	-	-	-	-	-
Stage 2	504	-	-	-	-	-
Critical Hdwy	6.4	6.2	4.1	-	-	-
Critical Hdwy Stg 1	5.4	-	-	-	-	-
Critical Hdwy Stg 2	5.4	-	-	-	-	-
Follow-up Hdwy	3.5	3.3	2.2	-	-	-
Pot Cap-1 Maneuver	224	467	956	-	-	-
Stage 1	530	-	-	-	-	-
Stage 2	611	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	215	450	940	-	-	-
Mov Cap-2 Maneuver	215	-	-	-	-	-
Stage 1	516	-	-	-	-	-
Stage 2	601	-	-	-	-	-
Approach	SB	NE		SW		
HCM Control Delay, s	13.2	0.1		0		
HCM LOS	B					
Minor Lane/Major Mvmt	NEL	NETSBLn1	SWT	SWR		
Capacity (veh/h)	940	-	450	-	-	
HCM Lane V/C Ratio	0.007	-	0.03	-	-	
HCM Control Delay (s)	8.9	0	13.2	-	-	
HCM Lane LOS	A	A	B	-	-	
HCM 95th %tile Q(veh)	0	-	0.1	-	-	







Lanes, Volumes, Timings  
5: Beechwood Ave. & St. Charles St.

Background Operations (2024)  
AM Peak Hour

						
Lane Group	NWL	NWR	NET	NER	SWL	SWT
Lane Configurations						
Traffic Volume (vph)	8	14	433	17	17	554
Future Volume (vph)	8	14	433	17	17	554
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor	0.95		1.00			1.00
Frt	0.914		0.995			
Flt Protected	0.982					0.999
Satd. Flow (prot)	1537	0	1498	0	0	1684
Flt Permitted	0.982					0.982
Satd. Flow (perm)	1531	0	1498	0	0	1655
Right Turn on Red		Yes		Yes		
Satd. Flow (RTOR)	16		5			
Link Speed (k/h)	50		50			50
Link Distance (m)	65.6		83.6			34.5
Travel Time (s)	4.7		6.0			2.5
Confl. Peds. (#/hr)	4	23		14	14	
Confl. Bikes (#/hr)				23		
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Heavy Vehicles (%)	0%	0%	7%	0%	0%	7%
Parking (#/hr)			1			
Adj. Flow (vph)	9	16	481	19	19	616
Shared Lane Traffic (%)						
Lane Group Flow (vph)	25	0	500	0	0	635
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Right	Left	Left
Median Width(m)	3.6		0.0			0.0
Link Offset(m)	0.0		0.0			0.0
Crosswalk Width(m)	4.8		4.8			4.8
Two way Left Turn Lane						
Headway Factor	1.07	1.07	1.23	1.07	1.07	1.07
Turning Speed (k/h)	25	15		15	25	
Number of Detectors	1		2		1	2
Detector Template	Left		Thru		Left	Thru
Leading Detector (m)	2.0		10.0		2.0	10.0
Trailing Detector (m)	0.0		0.0		0.0	0.0
Detector 1 Position(m)	0.0		0.0		0.0	0.0
Detector 1 Size(m)	2.0		0.6		2.0	0.6
Detector 1 Type	CI+Ex		CI+Ex		CI+Ex	CI+Ex
Detector 1 Channel						
Detector 1 Extend (s)	0.0		0.0		0.0	0.0
Detector 1 Queue (s)	0.0		0.0		0.0	0.0
Detector 1 Delay (s)	0.0		0.0		0.0	0.0
Detector 2 Position(m)			9.4			9.4
Detector 2 Size(m)			0.6			0.6
Detector 2 Type			CI+Ex			CI+Ex
Detector 2 Channel						
Detector 2 Extend (s)			0.0			0.0
Turn Type	Prot		NA		Perm	NA
Protected Phases	2		4			8
Permitted Phases					8	
Detector Phase	2		4		8	8
Switch Phase						

Lanes, Volumes, Timings  
5: Beechwood Ave. & St. Charles St.

Background Operations (2024)  
AM Peak Hour

						
Lane Group	NWL	NWR	NET	NER	SWL	SWT
Minimum Initial (s)	5.0		5.0		5.0	5.0
Minimum Split (s)	24.7		24.6		24.6	24.6
Total Split (s)	24.0		66.0		66.0	66.0
Total Split (%)	26.7%		73.3%		73.3%	73.3%
Maximum Green (s)	18.3		60.4		60.4	60.4
Yellow Time (s)	2.4		2.3		2.3	2.3
All-Red Time (s)	3.3		3.3		3.3	3.3
Lost Time Adjust (s)	0.0		0.0			0.0
Total Lost Time (s)	5.7		5.6			5.6
Lead/Lag						
Lead-Lag Optimize?						
Vehicle Extension (s)	3.0		3.0		3.0	3.0
Recall Mode	None		C-Max		C-Max	C-Max
Walk Time (s)	7.0		7.0		7.0	7.0
Flash Dont Walk (s)	11.0		12.0		12.0	12.0
Pedestrian Calls (#/hr)	13		8		0	0
Act Effct Green (s)	8.4		77.0			77.0
Actuated g/C Ratio	0.09		0.86			0.86
v/c Ratio	0.16		0.39			0.45
Control Delay	22.4		4.4			2.9
Queue Delay	0.0		0.0			0.0
Total Delay	22.4		4.4			2.9
LOS	C		A			A
Approach Delay	22.4		4.4			2.9
Approach LOS	C		A			A
Intersection Summary						
Area Type:	Other					
Cycle Length: 90						
Actuated Cycle Length: 90						
Offset: 18 (20%), Referenced to phase 4:NET and 8:SWTL, Start of Green						
Natural Cycle: 60						
Control Type: Actuated-Coordinated						
Maximum v/c Ratio: 0.45						
Intersection Signal Delay: 4.0				Intersection LOS: A		
Intersection Capacity Utilization 64.6%				ICU Level of Service C		
Analysis Period (min) 15						

Splits and Phases: 5: Beechwood Ave. & St. Charles St.





## Lanes, Volumes, Timings

## Background Operations (2024)

## 8: Beechwood Ave &amp; Marier Ave/Putman Ave

AM Peak Hour













Lane Group	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations		↔			↔			↔			↔	
Traffic Volume (vph)	36	11	18	51	13	28	13	379	44	32	488	24
Future Volume (vph)	36	11	18	51	13	28	13	379	44	32	488	24
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor		0.97			0.98			0.99			0.99	
Frt		0.962			0.959			0.986			0.994	
Flt Protected		0.973			0.973			0.999			0.997	
Satd. Flow (prot)	0	1673	0	0	1643	0	0	1661	0	0	1642	0
Flt Permitted		0.798			0.834			0.981			0.955	
Satd. Flow (perm)	0	1340	0	0	1406	0	0	1630	0	0	1572	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		20			23			13			5	
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		95.8			106.2			112.4			86.0	
Travel Time (s)		6.9			7.6			8.1			6.2	
Confl. Peds. (#/hr)	23		2	2		23	28		14	14		28
Confl. Bikes (#/hr)									17			82
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%	0%	7%	0%	0%	7%	0%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	4	0
Adj. Flow (vph)	40	12	20	57	14	31	14	421	49	36	542	27
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	72	0	0	102	0	0	484	0	0	605	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		0.0			0.0			0.0			0.0	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.8			4.8			4.8			4.8	
Two way Left Turn Lane												
Headway Factor	1.07	1.07	1.07	1.07	1.07	1.07	1.07	1.07	1.07	1.07	1.09	1.07
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Number of Detectors	1	2		1	2		1	2		1	2	
Detector Template	Left	Thru		Left	Thru		Left	Thru		Left	Thru	
Leading Detector (m)	2.0	10.0		2.0	10.0		2.0	10.0		2.0	10.0	
Trailing Detector (m)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Position(m)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Size(m)	2.0	0.6		2.0	0.6		2.0	0.6		2.0	0.6	
Detector 1 Type	CI+Ex	CI+Ex		CI+Ex	CI+Ex		CI+Ex	CI+Ex		CI+Ex	CI+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 2 Position(m)		9.4			9.4			9.4			9.4	
Detector 2 Size(m)		0.6			0.6			0.6			0.6	
Detector 2 Type		CI+Ex			CI+Ex			CI+Ex			CI+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		6			2			4			8	
Permitted Phases	6			2			4			8		
Detector Phase	6	6		2	2		4	4		8	8	
Switch Phase												

## Lanes, Volumes, Timings

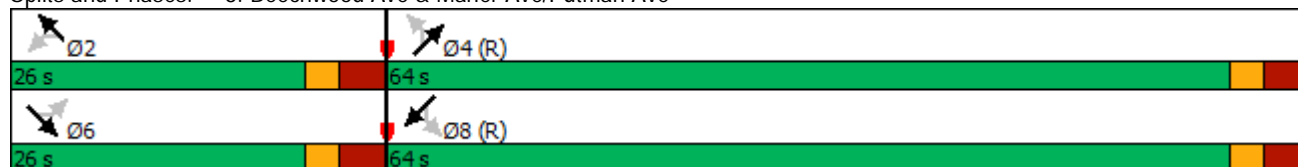
## Background Operations (2024)

## 8: Beechwood Ave &amp; Marier Ave/Putman Ave

AM Peak Hour




												
Lane Group	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Minimum Initial (s)	10.0	10.0		10.0	10.0		5.0	5.0		5.0	5.0	
Minimum Split (s)	25.7	25.7		25.7	25.7		25.7	25.7		25.7	25.7	
Total Split (s)	26.0	26.0		26.0	26.0		64.0	64.0		64.0	64.0	
Total Split (%)	28.9%	28.9%		28.9%	28.9%		71.1%	71.1%		71.1%	71.1%	
Maximum Green (s)	20.3	20.3		20.3	20.3		58.3	58.3		58.3	58.3	
Yellow Time (s)	2.4	2.4		2.4	2.4		2.4	2.4		2.4	2.4	
All-Red Time (s)	3.3	3.3		3.3	3.3		3.3	3.3		3.3	3.3	
Lost Time Adjust (s)		0.0			0.0			0.0			0.0	
Total Lost Time (s)		5.7			5.7			5.7			5.7	
Lead/Lag												
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Recall Mode	None	None		None	None		C-Max	C-Max		C-Max	C-Max	
Walk Time (s)	7.0	7.0		7.0	7.0		7.0	7.0		7.0	7.0	
Flash Dont Walk (s)	13.0	13.0		13.0	13.0		13.0	13.0		13.0	13.0	
Pedestrian Calls (#/hr)	2	2		11	11		7	7		12	12	
Act Effct Green (s)		12.7			12.7			70.2			70.2	
Actuated g/C Ratio		0.14			0.14			0.78			0.78	
v/c Ratio		0.35			0.47			0.38			0.49	
Control Delay		30.2			33.7			4.7			7.2	
Queue Delay		0.0			0.0			0.0			0.0	
Total Delay		30.2			33.7			4.7			7.2	
LOS		C			C			A			A	
Approach Delay		30.2			33.7			4.7			7.2	
Approach LOS		C			C			A			A	
Intersection Summary												
Area Type:	Other											
Cycle Length: 90												
Actuated Cycle Length: 90												
Offset: 13 (14%), Referenced to phase 4:NETL and 8:SWTL, Start of Green												
Natural Cycle: 60												
Control Type: Actuated-Coordinated												
Maximum v/c Ratio: 0.49												
Intersection Signal Delay: 9.7					Intersection LOS: A							
Intersection Capacity Utilization 66.2%					ICU Level of Service C							
Analysis Period (min) 15												

Splits and Phases: 8: Beechwood Ave &amp; Marier Ave/Putman Ave



Intersection

Int Delay, s/veh 0.2

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	4	664	728	10	3	6
Future Vol, veh/h	4	664	728	10	3	6
Conflicting Peds, #/hr	42	0	0	42	0	2
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	90	90	90	90	90	90
Heavy Vehicles, %	0	4	4	0	0	0
Mvmt Flow	4	738	809	11	3	7




Major/Minor	Major1	Major2	Minor2
Conflicting Flow All	862	0	0 1603 859
Stage 1	-	-	- 857 -
Stage 2	-	-	- 746 -
Critical Hdwy	4.1	-	- 6.4 6.2
Critical Hdwy Stg 1	-	-	- 5.4 -
Critical Hdwy Stg 2	-	-	- 5.4 -
Follow-up Hdwy	2.2	-	- 3.5 3.3
Pot Cap-1 Maneuver	789	-	- 117 359
Stage 1	-	-	- 419 -
Stage 2	-	-	- 472 -
Platoon blocked, %	-	-	-
Mov Cap-1 Maneuver	755	-	- 106 343
Mov Cap-2 Maneuver	-	-	- 106 -
Stage 1	-	-	- 397 -
Stage 2	-	-	- 452 -

Approach	EB	WB	SB
HCM Control Delay, s	0.1	0	24.2
HCM LOS			C

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	755	-	-	-	197
HCM Lane V/C Ratio	0.006	-	-	-	0.051
HCM Control Delay (s)	9.8	0	-	-	24.2
HCM Lane LOS	A	A	-	-	C
HCM 95th %tile Q(veh)	0	-	-	-	0.2

Intersection

Int Delay, s/veh 0.2

Movement	SBL	SBR	NEL	NET	SWT	SWR
Lane Configurations						
Traffic Vol, veh/h	0	6	19	668	727	7
Future Vol, veh/h	0	6	19	668	727	7
Conflicting Peds, #/hr	2	33	41	0	0	41
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	90	90	90	90	90	90
Heavy Vehicles, %	0	0	0	4	4	0
Mvmt Flow	0	7	21	742	808	8










Major/Minor	Minor2	Major1	Major2			
Conflicting Flow All	1639	886	857	0	-	0
Stage 1	853	-	-	-	-	-
Stage 2	786	-	-	-	-	-
Critical Hdwy	6.4	6.2	4.1	-	-	-
Critical Hdwy Stg 1	5.4	-	-	-	-	-
Critical Hdwy Stg 2	5.4	-	-	-	-	-
Follow-up Hdwy	3.5	3.3	2.2	-	-	-
Pot Cap-1 Maneuver	112	346	792	-	-	-
Stage 1	421	-	-	-	-	-
Stage 2	453	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	98	320	759	-	-	-
Mov Cap-2 Maneuver	98	-	-	-	-	-
Stage 1	384	-	-	-	-	-
Stage 2	434	-	-	-	-	-

Approach	SB	NE	SW
HCM Control Delay, s	16.5	0.3	0
HCM LOS	C		

Minor Lane/Major Mvmt	NEL	NETSBLn1	SWT	SWR
Capacity (veh/h)	759	-	320	-
HCM Lane V/C Ratio	0.028	-	0.021	-
HCM Control Delay (s)	9.9	0	16.5	-
HCM Lane LOS	A	A	C	-
HCM 95th %tile Q(veh)	0.1	-	0.1	-







Lanes, Volumes, Timings  
5: Beechwood Ave. & St Charles St

Background Conditions (2024)  
PM Peak Hour

						
Lane Group	NWL	NWR	NET	NER	SWL	SWT
Lane Configurations						
Traffic Volume (vph)	26	19	668	28	10	724
Future Volume (vph)	26	19	668	28	10	724
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor	0.97		1.00			1.00
Frt	0.943		0.995			
Flt Protected	0.972					0.999
Satd. Flow (prot)	1617	0	1538	0	0	1730
Flt Permitted	0.972					0.990
Satd. Flow (perm)	1606	0	1538	0	0	1714
Right Turn on Red		Yes		Yes		
Satd. Flow (RTOR)	21		5			
Link Speed (k/h)	50		50			50
Link Distance (m)	65.6		83.6			34.5
Travel Time (s)	4.7		6.0			2.5
Confl. Peds. (#/hr)	5	11		13	13	
Confl. Bikes (#/hr)				82		
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Heavy Vehicles (%)	0%	0%	4%	0%	0%	4%
Parking (#/hr)			1			
Adj. Flow (vph)	29	21	742	31	11	804
Shared Lane Traffic (%)						
Lane Group Flow (vph)	50	0	773	0	0	815
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Right	Left	Left
Median Width(m)	3.6		0.0			0.0
Link Offset(m)	0.0		0.0			0.0
Crosswalk Width(m)	4.8		4.8			4.8
Two way Left Turn Lane						
Headway Factor	1.07	1.07	1.23	1.07	1.07	1.07
Turning Speed (k/h)	25	15		15	25	
Number of Detectors	1		2		1	2
Detector Template	Left		Thru		Left	Thru
Leading Detector (m)	2.0		10.0		2.0	10.0
Trailing Detector (m)	0.0		0.0		0.0	0.0
Detector 1 Position(m)	0.0		0.0		0.0	0.0
Detector 1 Size(m)	2.0		0.6		2.0	0.6
Detector 1 Type	CI+Ex		CI+Ex		CI+Ex	CI+Ex
Detector 1 Channel						
Detector 1 Extend (s)	0.0		0.0		0.0	0.0
Detector 1 Queue (s)	0.0		0.0		0.0	0.0
Detector 1 Delay (s)	0.0		0.0		0.0	0.0
Detector 2 Position(m)			9.4			9.4
Detector 2 Size(m)			0.6			0.6
Detector 2 Type			CI+Ex			CI+Ex
Detector 2 Channel						
Detector 2 Extend (s)			0.0			0.0
Turn Type	Prot		NA		Perm	NA
Protected Phases	2		4			8
Permitted Phases					8	
Detector Phase	2		4		8	8
Switch Phase						

Lanes, Volumes, Timings  
5: Beechwood Ave. & St Charles St

Background Conditions (2024)  
PM Peak Hour

						
Lane Group	NWL	NWR	NET	NER	SWL	SWT
Minimum Initial (s)	5.0		5.0		5.0	5.0
Minimum Split (s)	23.7		24.6		24.6	24.6
Total Split (s)	24.0		66.0		66.0	66.0
Total Split (%)	26.7%		73.3%		73.3%	73.3%
Maximum Green (s)	18.3		60.4		60.4	60.4
Yellow Time (s)	2.4		2.3		2.3	2.3
All-Red Time (s)	3.3		3.3		3.3	3.3
Lost Time Adjust (s)	0.0		0.0			0.0
Total Lost Time (s)	5.7		5.6			5.6
Lead/Lag						
Lead-Lag Optimize?						
Vehicle Extension (s)	3.0		3.0		3.0	3.0
Recall Mode	None		C-Max		C-Max	C-Max
Walk Time (s)	7.0		7.0		7.0	7.0
Flash Dont Walk (s)	11.0		12.0		12.0	12.0
Pedestrian Calls (#/hr)	13		8		0	0
Act Effct Green (s)	8.9		76.6			76.6
Actuated g/C Ratio	0.10		0.85			0.85
v/c Ratio	0.28		0.59			0.56
Control Delay	27.1		7.3			6.4
Queue Delay	0.0		0.0			0.2
Total Delay	27.1		7.3			6.6
LOS	C		A			A
Approach Delay	27.1		7.3			6.6
Approach LOS	C		A			A
Intersection Summary						
Area Type:	Other					
Cycle Length: 90						
Actuated Cycle Length: 90						
Offset: 18 (20%), Referenced to phase 4:NET and 8:SWTL, Start of Green						
Natural Cycle: 70						
Control Type: Actuated-Coordinated						
Maximum v/c Ratio: 0.59						
Intersection Signal Delay: 7.5				Intersection LOS: A		
Intersection Capacity Utilization 65.6%				ICU Level of Service C		
Analysis Period (min) 15						

Splits and Phases: 5: Beechwood Ave. & St Charles St



## Lanes, Volumes, Timings

## Background Conditions (2024)

## 8: Beechwood Ave &amp; Marier Ave/Putman Ave

PM Peak Hour

Lane Group	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations		↔			↔			↔			↔	
Traffic Volume (vph)	30	9	8	56	19	51	4	604	59	28	674	20
Future Volume (vph)	30	9	8	56	19	51	4	604	59	28	674	20
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor		0.98			0.98			0.99			1.00	
Frt		0.977			0.945			0.988			0.996	
Flt Protected		0.969			0.978						0.998	
Satd. Flow (prot)	0	1697	0	0	1632	0	0	1700	0	0	1650	0
Flt Permitted		0.798			0.836			0.997			0.957	
Satd. Flow (perm)	0	1377	0	0	1392	0	0	1695	0	0	1581	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		9			31			11			3	
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		95.8			106.2			112.4			178.6	
Travel Time (s)		6.9			7.6			8.1			12.9	
Confl. Peds. (#/hr)	13		2	2		11	42		13	13		42
Confl. Bikes (#/hr)									104			28
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%	0%	4%	0%	0%	4%	0%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	10	0
Adj. Flow (vph)	33	10	9	62	21	57	4	671	66	31	749	22
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	52	0	0	140	0	0	741	0	0	802	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		0.0			0.0			0.0			0.0	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.8			4.8			4.8			4.8	
Two way Left Turn Lane												
Headway Factor	1.07	1.07	1.07	1.07	1.07	1.07	1.07	1.07	1.07	1.07	1.13	1.07
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Number of Detectors	1	2		1	2		1	2		1	2	
Detector Template	Left	Thru		Left	Thru		Left	Thru		Left	Thru	
Leading Detector (m)	2.0	10.0		2.0	10.0		2.0	10.0		2.0	10.0	
Trailing Detector (m)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Position(m)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Size(m)	2.0	0.6		2.0	0.6		2.0	0.6		2.0	0.6	
Detector 1 Type	CI+Ex	CI+Ex		CI+Ex	CI+Ex		CI+Ex	CI+Ex		CI+Ex	CI+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 2 Position(m)		9.4			9.4			9.4			9.4	
Detector 2 Size(m)		0.6			0.6			0.6			0.6	
Detector 2 Type		CI+Ex			CI+Ex			CI+Ex			CI+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		6			2			4			8	
Permitted Phases	6			2			4			8		
Detector Phase	6	6		2	2		4	4		8	8	
Switch Phase												















## Lanes, Volumes, Timings

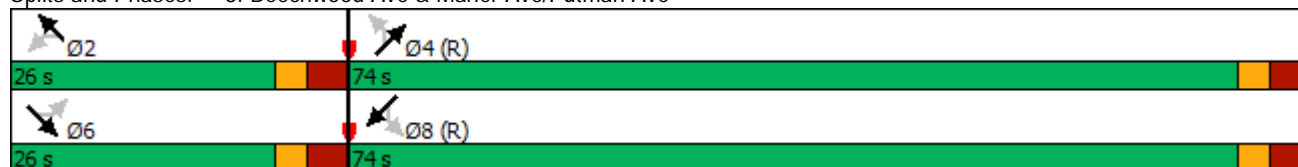
## Background Conditions (2024)

## 8: Beechwood Ave &amp; Marier Ave/Putman Ave

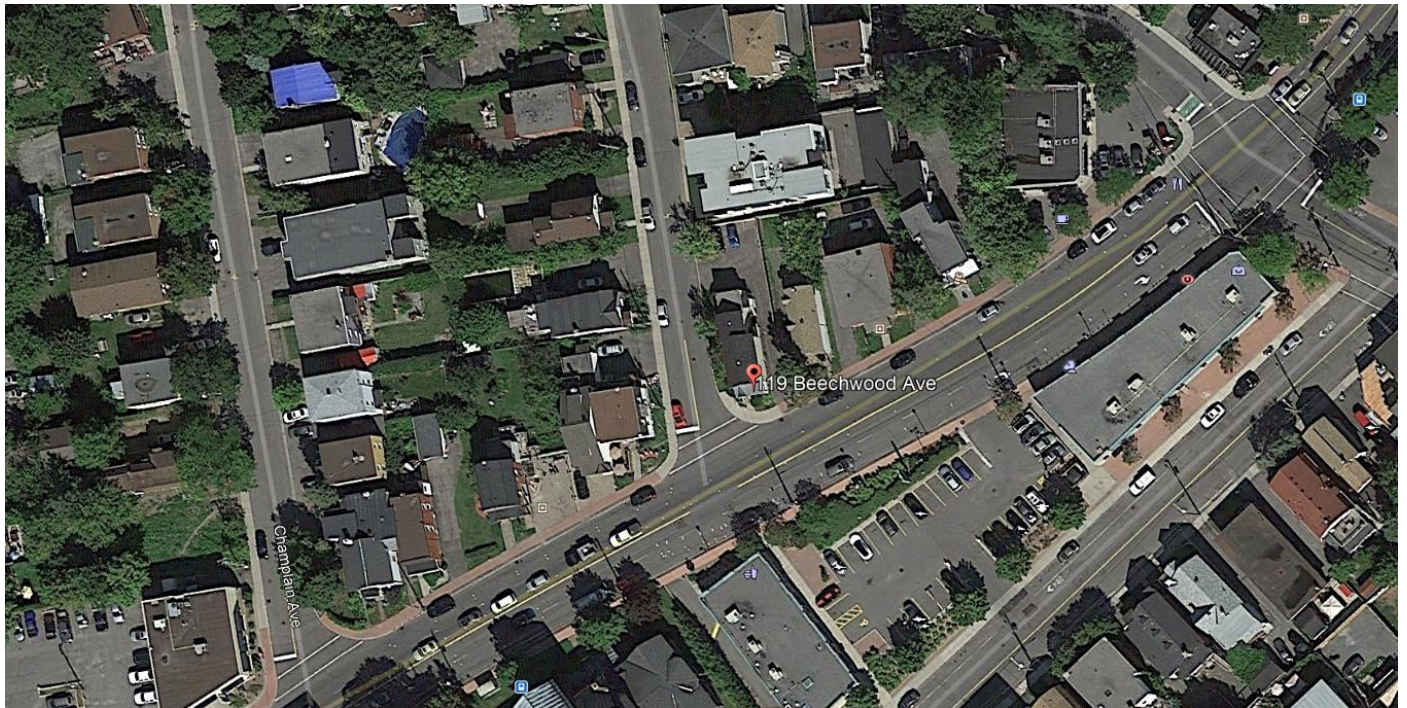
PM Peak Hour

												
Lane Group	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Minimum Initial (s)	10.0	10.0		10.0	10.0		5.0	5.0		5.0	5.0	
Minimum Split (s)	25.7	25.7		25.7	25.7		25.7	25.7		25.7	25.7	
Total Split (s)	26.0	26.0		26.0	26.0		74.0	74.0		74.0	74.0	
Total Split (%)	26.0%	26.0%		26.0%	26.0%		74.0%	74.0%		74.0%	74.0%	
Maximum Green (s)	20.3	20.3		20.3	20.3		68.3	68.3		68.3	68.3	
Yellow Time (s)	2.4	2.4		2.4	2.4		2.4	2.4		2.4	2.4	
All-Red Time (s)	3.3	3.3		3.3	3.3		3.3	3.3		3.3	3.3	
Lost Time Adjust (s)		0.0			0.0			0.0			0.0	
Total Lost Time (s)		5.7			5.7			5.7			5.7	
Lead/Lag												
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Recall Mode	Max	Max		Max	Max		C-Max	C-Max		C-Max	C-Max	
Walk Time (s)	7.0	7.0		7.0	7.0		7.0	7.0		7.0	7.0	
Flash Dont Walk (s)	13.0	13.0		13.0	13.0		13.0	13.0		13.0	13.0	
Pedestrian Calls (#/hr)	2	2		8	8		7	7		15	15	
Act Effct Green (s)		20.3			20.3			68.3			68.3	
Actuated g/C Ratio		0.20			0.20			0.68			0.68	
v/c Ratio		0.18			0.46			0.64			0.74	
Control Delay		30.3			32.5			11.9			15.5	
Queue Delay		0.0			0.0			0.5			0.0	
Total Delay		30.3			32.5			12.4			15.5	
LOS		C			C			B			B	
Approach Delay		30.3			32.5			12.4			15.5	
Approach LOS		C			C			B			B	
Intersection Summary												
Area Type:	Other											
Cycle Length: 100												
Actuated Cycle Length: 100												
Offset: 5 (5%), Referenced to phase 4:NETL and 8:SWTL, Start of Green												
Natural Cycle: 75												
Control Type: Actuated-Coordinated												
Maximum v/c Ratio: 0.74												
Intersection Signal Delay: 16.0					Intersection LOS: B							
Intersection Capacity Utilization 85.5%					ICU Level of Service E							
Analysis Period (min) 15												

Splits and Phases: 8: Beechwood Ave &amp; Marier Ave/Putman Ave



# TRAFFIC IMPACT ASSESSMENT (FINAL)



## APPENDIX E – TRAFFIC SIGNAL WARRANTS

# Signal Warrant Calculation

MAJOR STREET: Beechwood Avenue

MINOR STREET: Chapleau Avenue

COMMENT Horizon Year 2024

NUMBER OF APPROACH LANES: 1 ☐ 2 ☒

TEE INTERSECTION CONFIGURATION YES ☒ NO ☐

FLOW CONDITIONS: FREE FLOW (RURAL) ☐  
RESTRICTED FLOW (URBAN) ☒

VOLUME	AM	PM	FACTOR *	
1A - All	1,025	1,415	n/a	1,220
1B - Minor	13	9	100%	11
2A - Major	1,012	1,406	100%	1,209
2B - Cross	4	5	100%	5

\* This factor relates average of the "peak eight hours" to the average of the "am and pm peak hours"

OVERALL WARRANT	150% SATISFIED:	YES	<input type="checkbox"/>	NO	<input checked="" type="checkbox"/>	Warrant for new intersection with forecast traffic
	120% SATISFIED:	YES	<input type="checkbox"/>	NO	<input checked="" type="checkbox"/>	Warrant for existing intersection with forecast traffic
	100% SATISFIED:	YES	<input type="checkbox"/>	NO	<input checked="" type="checkbox"/>	Warrant for existing intersection with existing traffic *
	COMBO 80% SATISFIED:	YES	<input type="checkbox"/>	NO	<input checked="" type="checkbox"/>	Warrant for existing intersection with existing traffic
	80% SATISFIED:	YES	<input type="checkbox"/>	NO	<input checked="" type="checkbox"/>	

\* Consider full underground provisions if 100% for forecast traf

## WARRANT 1 - MINIMUM VEHICULAR VOLUME

APPROACH LANES	1		2 OR MORE		AVERAGE HOUR PERIOD
	FREE FLOW	REST. FLOW	FREE FLOW	REST. FLOW	
FLOW CONDITION				<input checked="" type="checkbox"/>	
ALL APPROACHES	480	720	600	900	1220
	% FULFILLED				136%

150% SATISFIED: YES ☐ NO ☒  
120% SATISFIED: YES ☐ NO ☒  
100% SATISFIED: YES ☐ NO ☒  
80% SATISFIED: YES ☐ NO ☒

APPROACH LANES	1		2 OR MORE		AVERAGE HOUR PERIOD
	FREE FLOW	REST. FLOW	FREE FLOW	REST. FLOW	
FLOW CONDITION				<input checked="" type="checkbox"/>	
MINOR STREET APPROACHES	180	255	180	255	11
	% FULFILLED				4%

## WARRANT 2 - DELAY TO CROSS TRAFFIC

APPROACH LANES	1		2 OR MORE		AVERAGE HOUR PERIOD
	FREE FLOW	REST. FLOW	FREE FLOW	REST. FLOW	
FLOW CONDITION				<input checked="" type="checkbox"/>	
MAJOR STREET APPROACHES	480	720	600	900	1209
	% FULFILLED				134%

150% SATISFIED: YES ☐ NO ☒  
120% SATISFIED: YES ☐ NO ☒  
100% SATISFIED: YES ☐ NO ☒  
80% SATISFIED: YES ☐ NO ☒

APPROACH LANES	1		2 OR MORE		AVERAGE HOUR PERIOD
	FREE FLOW	REST. FLOW	FREE FLOW	REST. FLOW	
FLOW CONDITION				<input checked="" type="checkbox"/>	
TRAFFIC CROSSING MAJOR STREET	50	75	50	75	5
	% FULFILLED				6%

1A - MINIMUM VEHICULAR VOLUME: Total vehicle volume on all approaches for average day

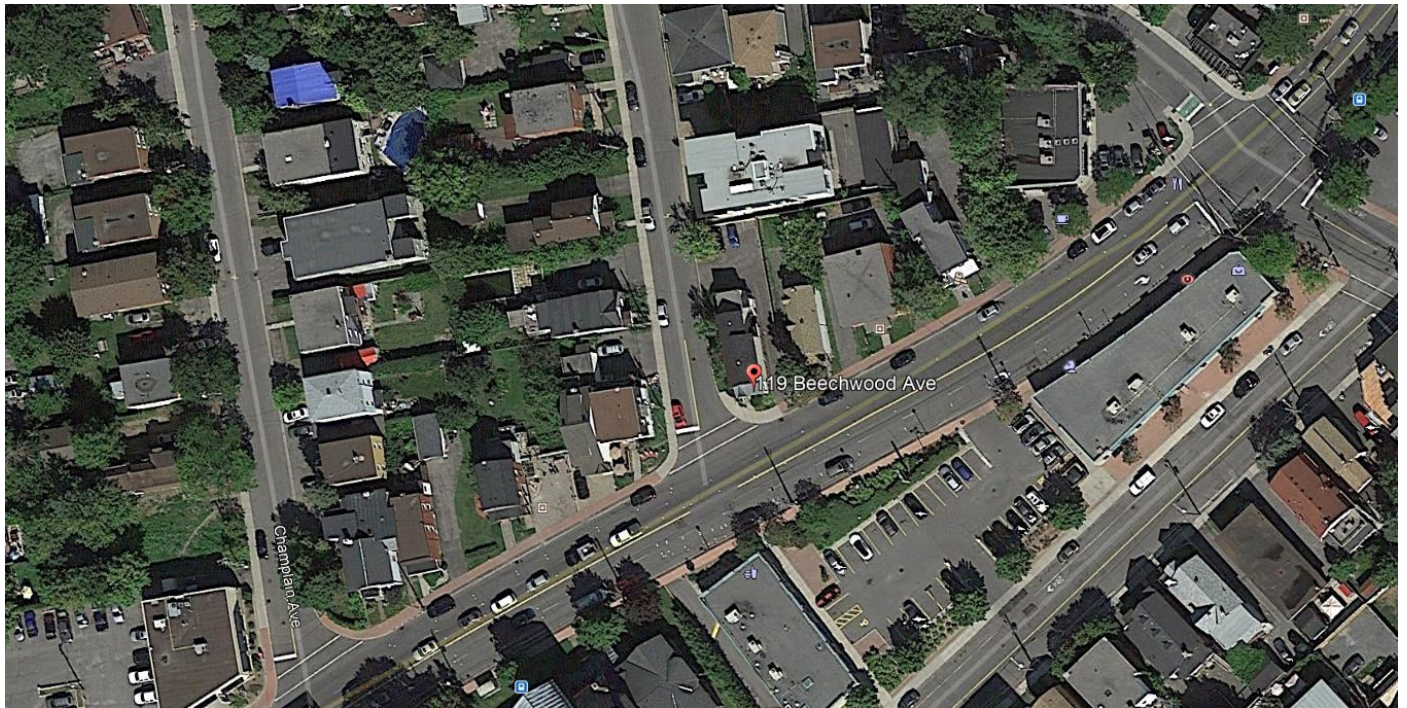
1B - MINIMUM VEHICULAR VOLUME: Total vehicle volume on minor streets

2A - DELAY TO CROSS TRAFFIC: Total vehicle volume on major street for average day

2B - DELAY TO CROSS TRAFFIC: Total vehicle and pedestrian volume crossing major street; comprising: (1) lefts from both minor streets, (2) heaviest through from minor street, (3) 50% of heavier left turn from major street when following criteria met: (a) left turn volume >120 and (b) left turn volume plus opposing volume > 720, (4) pedestrians crossing the major street.



# TRAFFIC IMPACT ASSESSMENT (FINAL)



## APPENDIX F – TDM-SUPPORTIVE DEVELOPMENT AND INFRASTRUCTURE CHECKLIST

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

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

<b>TDM-supportive design &amp; infrastructure measures: <i>Non-residential developments</i></b>		<b>Check if completed &amp; add descriptions, explanations or plan/drawing references</b>
<b>1. WALKING &amp; CYCLING: ROUTES</b>		
<b>1.1 Building location &amp; access points</b>		
<b>BASIC</b>	1.1.1 Locate building close to the street, and do not locate parking areas between the street and building entrances	<input checked="" type="checkbox"/>
<b>BASIC</b>	1.1.2 Locate building entrances in order to minimize walking distances to sidewalks and transit stops/stations	<input checked="" type="checkbox"/> Building entrances located within 65 m of the closest transit stop.
<b>BASIC</b>	1.1.3 Locate building doors and windows to ensure visibility of pedestrians from the building, for their security and comfort	<input checked="" type="checkbox"/>
<b>1.2 Facilities for walking &amp; cycling</b>		
<b>REQUIRED</b>	1.2.1 Provide convenient, direct access to stations or major stops along rapid transit routes within 600 metres; minimize walking distances from buildings to rapid transit; provide pedestrian-friendly, weather-protected (where possible) environment between rapid transit accesses and building entrances; ensure quality linkages from sidewalks through building entrances to integrated stops/stations ( <i>see Official Plan policy 4.3.3</i> )	<input checked="" type="checkbox"/> Proposed development site located adjacent to public infrastructure.
<b>REQUIRED</b>	1.2.2 Provide safe, direct and attractive pedestrian access from public sidewalks to building entrances through such measures as: reducing distances between public sidewalks and major building entrances; providing walkways from public streets to major building entrances; within a site, providing walkways along the front of adjoining buildings, between adjacent buildings, and connecting areas where people may congregate, such as courtyards and transit stops; and providing weather protection through canopies, colonnades, and other design elements wherever possible ( <i>see Official Plan policy 4.3.12</i> )	<input checked="" type="checkbox"/> Proposed development site located adjacent to public infrastructure.



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

TDM-supportive design & infrastructure measures: <i>Non-residential developments</i>		Check if completed & add descriptions, explanations or plan/drawing references
<b>2. WALKING &amp; CYCLING: END-OF-TRIP FACILITIES</b>		
<b>2.1 Bicycle parking</b>		
REQUIRED	2.1.1 Provide bicycle parking in highly visible and lighted areas, sheltered from the weather wherever possible (see <i>Official Plan policy 4.3.6</i> )	<input checked="" type="checkbox"/> Bicycle parking is provided adjacent to the main entrance, a highly visible and lighted area (not sheltered)
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 <i>Zoning By-law Section 111</i> )	<input checked="" type="checkbox"/>
REQUIRED	2.1.3 Ensure that bicycle parking spaces and access aisles meet minimum dimensions; that no more than 50% of spaces are vertical spaces; and that parking racks are securely anchored (see <i>Zoning By-law Section 111</i> )	<input checked="" type="checkbox"/> The bicycle parking space dimensions are not known
BASIC	2.1.4 Provide bicycle parking spaces equivalent to the expected number of commuter cyclists (assuming the cycling mode share target is met), plus the expected peak number of customer/visitor cyclists	<input checked="" type="checkbox"/> 10 in person trips expected during PM peak hour and 6 bicycle stalls provided
BETTER	2.1.5 Provide bicycle parking spaces equivalent to the expected number of commuter and customer/visitor cyclists, plus an additional buffer (e.g. 25 percent extra) to encourage other cyclists and ensure adequate capacity in peak cycling season	<input checked="" type="checkbox"/> Exact number of cyclists is unknown due to limited scope of TIA
<b>2.2 Secure bicycle parking</b>		
REQUIRED	2.2.1 Where more than 50 bicycle parking spaces are provided for a single office building, locate at least 25% of spaces within a building/structure, a secure area (e.g. supervised parking lot or enclosure) or bicycle lockers (see <i>Zoning By-law Section 111</i> )	<input checked="" type="checkbox"/> Not Applicable
BETTER	2.2.2 Provide secure bicycle parking spaces equivalent to the expected number of commuter cyclists (assuming the cycling mode share target is met)	<input checked="" type="checkbox"/> 10 in person trips expected during PM peak and 6 bicycle stalls provided
<b>2.3 Shower &amp; change facilities</b>		
BASIC	2.3.1 Provide shower and change facilities for the use of active commuters	<input checked="" type="checkbox"/>
BETTER	2.3.2 In addition to shower and change facilities, provide dedicated lockers, grooming stations, drying racks and laundry facilities for the use of active commuters	<input checked="" type="checkbox"/>
<b>2.4 Bicycle repair station</b>		
BETTER	2.4.1 Provide a permanent bike repair station, with commonly used tools and an air pump, adjacent to the main bicycle parking area (or secure bicycle parking area, if provided)	<input checked="" type="checkbox"/> Bike repair station located at intersection of Beechwood Ave and Marquette Avenue (270 m from proposed development)



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

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