

Transportation Impact Assessment – Step 4: Analysis

# 800 Montreal Road

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# Document Control Page

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## **TIA Plan Reports - Certification**

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

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

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

### **CERTIFICATION**

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

<sup>1</sup> License or registration body that oversees the profession is required to have a code of conduct and ethics guidelines that will ensure appropriate conduct and representation for transportation planning and/or transportation engineering works.

Dated at Ottawa this 9<sup>th</sup> day of December 2020.  
(City)

Name: David Hook, P.Eng.

Professional Title: Project Engineer



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

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## Executive Summary

IBI Group (IBI) was retained by Sovima Ottawa Inc. to undertake a Transportation Impact Assessment (TIA) in support of a Site Plan Control application for a proposed mid-rise residential development with ground floor commercial to be located at 800 Montreal Road in Ottawa. The proposed development consists an 8-storey and 4-storey tower with a total of 172 apartment units and approximately 75 m<sup>2</sup> of commercial space. The development will be constructed in two phases and is projected to be fully occupied by 2024. The horizon year of this study was therefore taken as 2029. Access to the site will be provided via a full-movement site access driveway on Den Haag Drive.

The site will provide 108 vehicle parking spaces and 87 bicycle parking spaces within a single-storey underground parking garage and meets or exceeds the minimum number of parking spaces required by the Zoning By-law.

The 2013 Transportation Master Plan (TMP) identified that Montreal Road as a Transit Priority Corridor (Continuous Lanes). A Planning and Environmental Assessment Study is currently underway, however, no preferred design for this facility has been identified. As of the time of this study, there is no timeline for the implementation of these measures, and it has therefore been conservatively assumed that it will be constructed beyond the horizon year of this study.

Two future adjacent developments were identified in the vicinity of the proposed development and considered in the development of background traffic volumes as well: 807-825 Montreal Road, a mixed-use development with approximately 150 apartment units and ground floor commercial, and Wateridge Village, a large planned community located on the former Canadian Forces Base (CFB) Rockcliffe property.

As it is expected that the transit priority measures will be implemented beyond the 2029 study horizon year of this study, it is assumed that the local mode share distribution would remain unchanged within the timeframe of this study. Based on the local mode share distribution, it is expected that the proposed development will generate between 60 to 66 two-way vehicle-trips and 20 to 24 transit-trips during the weekday morning and afternoon peak hours.

Intersection capacity analysis was completed for all study area intersections. The results of the analysis demonstrated that the Montreal Road & Aviation Parkway intersection is presently exceeding its theoretical capacity during the weekday afternoon peak hour and is expected to continue operating at or beyond its theoretical capacity under future background traffic conditions. Further analysis indicates that dual westbound left-turn lanes at the intersection would improve traffic operations, however the feasibility of this solution is uncertain. It is expected that any solution to the intersection's capacity constraints will need to account for the future Montreal Road Transit Priority project with long-term solutions identified through the associated EA process. The addition of site-generated traffic was shown to have a small impact on intersection Level of Service.

The auxiliary lane analysis identified several minor deficiencies at intersections within the study area that may be encountered by the 2029 horizon year; however, no auxiliary lane modifications are recommended. Consideration could be given to extending the northbound left-turn lane at the Montreal Road & Den Haag Drive / Lang's Road intersection to 100m through adjustments to pavement markings.

A multi-modal analysis of each study area intersection identified existing deficiencies in the road network and potential remediation measures have been suggested in which the City could consider to meet the prescribed LOS targets. These remediation measures would improve mobility and comfort for all transportation modes but are not required to accommodate the proposed development.

As all road network modifications are a result of background demand, a post-development monitoring plan is not a requirement of this study. Further, the analysis conducted indicates that no off-site physical intersection improvements are necessary as a direct consequence of the proposed development in order to

accommodate the projected site-generated travel demands. The study therefore does not require an RMA for off-site roadworks.

**Based on the findings of this study, it is the overall opinion of IBI Group that the proposed development will integrate well with the adjacent transportation network and will have an overall negligible impact on the operations of study area intersections.**

# 1 Introduction

IBI Group (IBI) was retained by Sovima Ottawa Inc. to undertake a Transportation Impact Assessment (TIA) in support of a Site Plan Control application for a proposed mid-rise residential development with ground floor commercial to be located at 800 Montreal Road in Ottawa.

In accordance with the City of Ottawa's Transportation Impact Assessment Guidelines, published in June 2017, the following report is divided into four major components:

- **Screening** – Prior to the commencement of a TIA, an initial assessment of the proposed development is undertaken to establish the need for a comprehensive review of the site based on three triggers: Trip Generation, Location and Safety.
- **Scoping** – This component of the TIA report describes both the existing and planned conditions in the vicinity of the development and defines study parameters such as the study area, analysis periods and analysis years of the development. It also provides an opportunity to identify any scope exemptions that would eliminate elements of scope described in the TIA Guidelines that are not relevant to the development proposal, based on consultation with City staff.
- **Forecasting** – The Forecasting component of the TIA is intended to review both the development-generated travel demand and the background network travel demand and provides an opportunity to rationalize this demand to ensure projections are within the capacity constraints of the transportation network.
- **Analysis** – This component documents the results of any analyses undertaken to ensure that the transportation related features of the proposed development are in conformance with prescribed technical standards and that its impacts on the transportation network are both sustainable and effectively managed. It also identifies a development strategy to ensure that what is being proposed is aligned with the City of Ottawa's city-building objectives, targets and policies.

Throughout the development of a TIA report, each of the four study components above are submitted in draft form to the City of Ottawa and undergo a review by a designated Transportation Project Manager. Any comments received are addressed to the satisfaction of the City's Transportation Project Manager before proceeding with subsequent components of the study. All technical comments and responses throughout this process are included in **Appendix A**.

Dependent on the findings of this report, the complete submission of this Transportation Impact Assessment may also require Functional Design Drawings of recommended roadway improvements to support a Roadway Modification Application (RMA). The submission may also require a post-development Monitoring Plan to track performance of the planned TIA Strategy. The need for these two elements will be confirmed through the analysis undertaken for this report.

## 2 TIA Screening

An initial screening was completed to confirm the need for a Transportation Impact Assessment by reviewing the following three triggers:

- **Trip Generation:** Based on the proposed number of apartment dwelling units, the minimum development size threshold has been exceeded and therefore the Trip Generation trigger is satisfied.
- **Location:** The proposed development is located adjacent to a transit priority corridor, a Spine cycling route and is within a Design Priority Area (DPA) and, as such, the Location trigger is satisfied.
- **Safety:** Boundary street conditions were reviewed to determine if there is an elevated potential for safety concerns adjacent the site. Based on this review, the Safety Trigger is not satisfied.

As the proposed development meets the Trip Generation and Location triggers, the need to undertake a Transportation Impact Assessment is confirmed.

A copy of the Screening Form is provided in **Appendix B**.

## 3 Project Scoping

### 3.1 Description of Proposed Development

#### 3.1.1 Site Location

The proposed development is located within the community of Vanier and is approximately 0.60 hectares in size. It is bound by Montreal Road to the north, Den Hagg Drive to the west, LeBoutillier Avenue to the east and residential development to the south.

The site location and its surrounding context is illustrated in **Exhibit 1**.

#### 3.1.2 Land Use Details

The subject site is currently unoccupied and is zoned AM10[1779] – Arterial Mainstreet, based on GeoOttawa.

The proposed development includes an 8-storey and 4-storey tower with a combined total of 172 apartment units, 75 m<sup>2</sup> of commercial space and underground parking. **Table 1** summarizes the proposed land uses included in this development.

Table 1 - Land Use Statistics

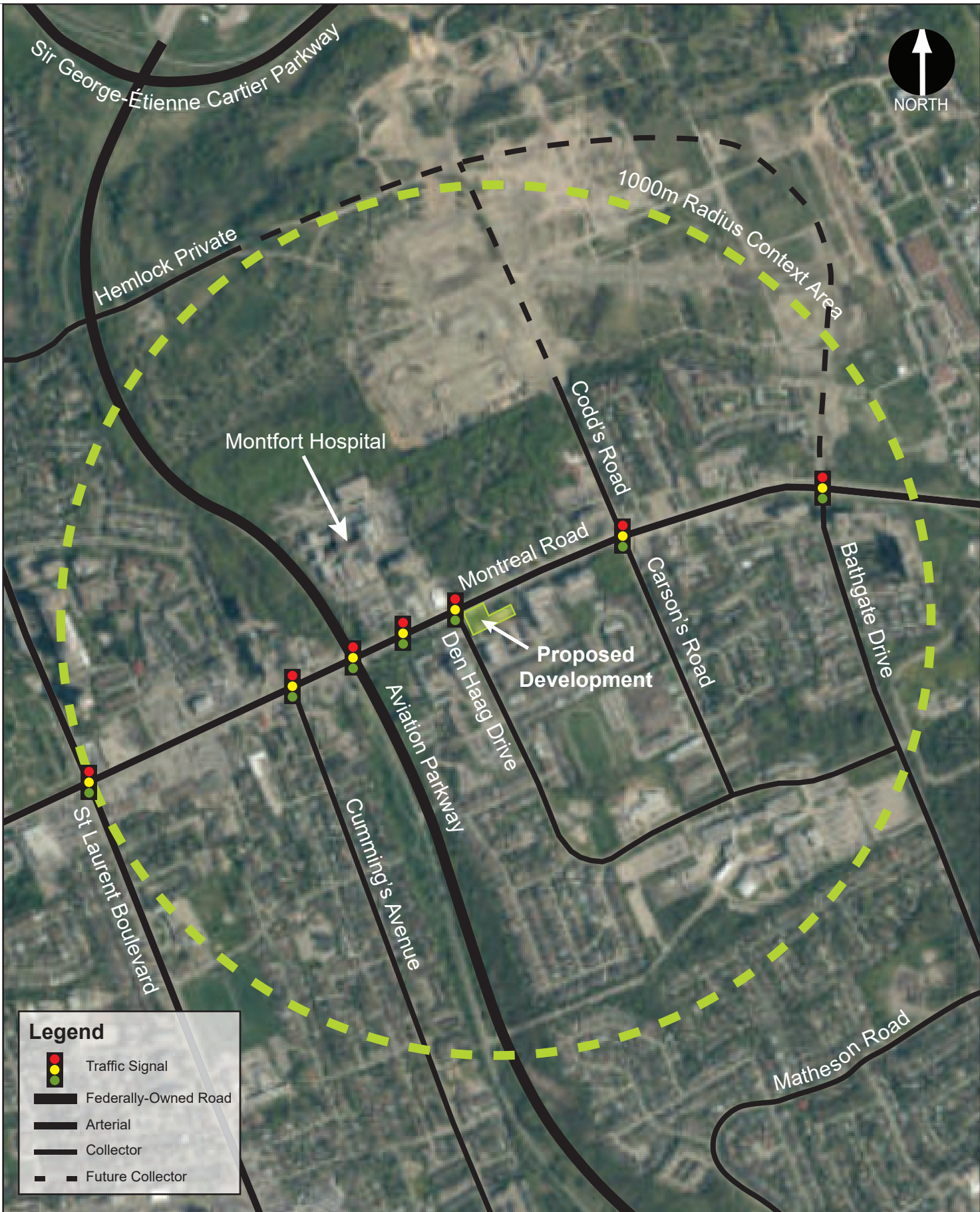
LAND USE	SIZE
Apartments	172 dwelling units
Ground Floor Commercial	~75 m <sup>2</sup>

The site will provide 108 vehicle parking spaces and 87 bicycle parking spaces within the one-level underground parking facility. Access to the site will be provided via a two-way private approach on Den Haag Drive.

The configuration of the proposed development is illustrated in **Exhibit 2**.

### **3.1.3 Development Phasing & Date of Occupancy**

The proposed development is anticipated to be constructed in two phases. Phase 1 is expected to be constructed from mid 2021 to end of 2022 with full occupancy by July 2023, followed by Phase 2 which will be constructed from mid 2022 to mid 2023 with full occupancy by the start of 2024.



**Legend**

- Traffic Signal
- Federally-Owned Road
- Arterial
- Collector
- Future Collector





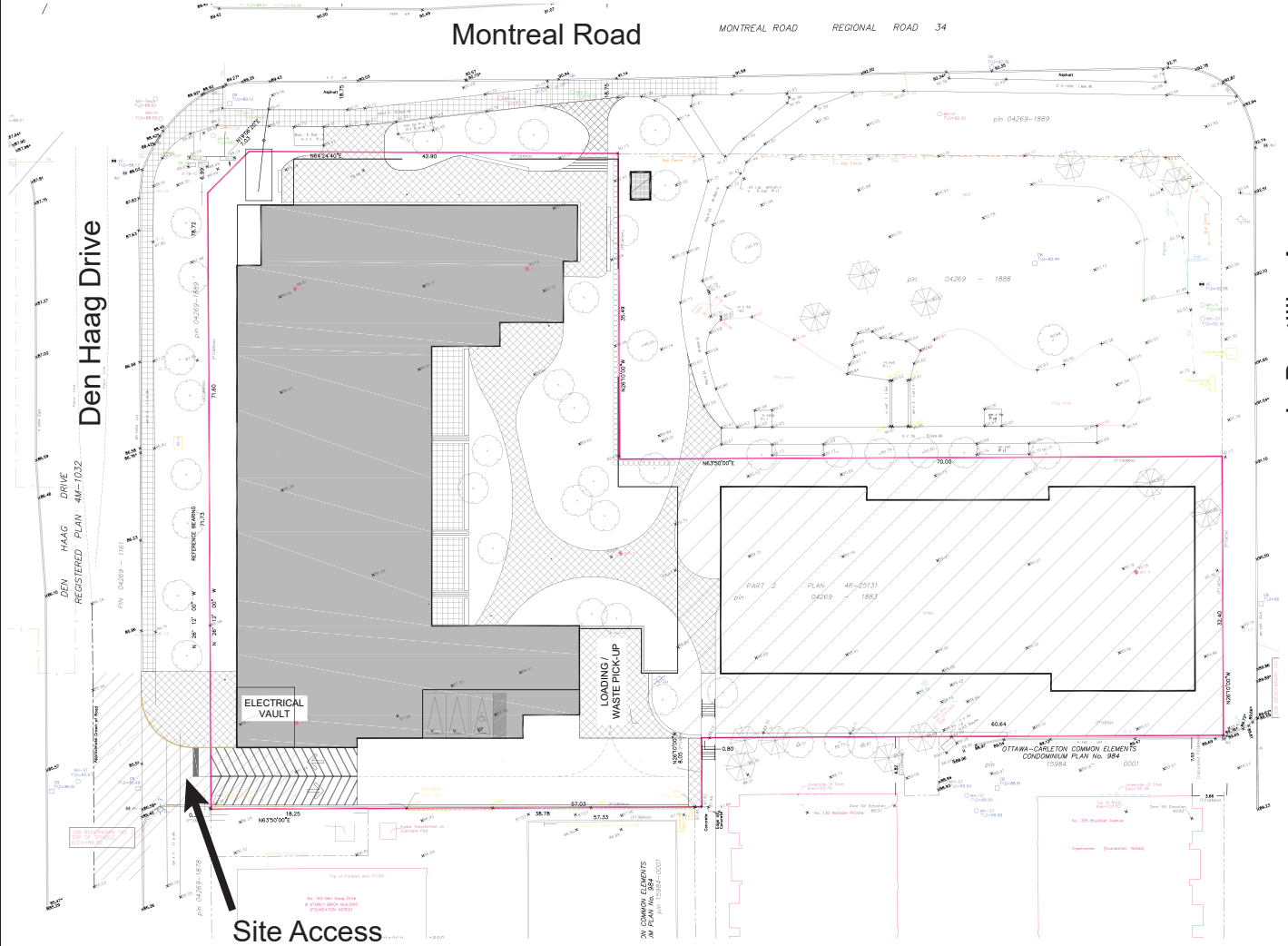


Montreal Road

MONTREAL ROAD REGIONAL ROAD 34

Den Haag Drive

LeBoutillier Avenue



Site Access



800 Montreal Road  
Transportation Impact Assessment

Exhibit 2:  
Proposed Development

PROJECT No. 125532  
DATE: December 2020  
SCALE: 0m 10m 20m



## 3.2 Existing Conditions

### 3.2.1 Existing Road Network

#### 3.2.1.1 Roadways

The proposed development is bound by Montreal Road to the north, Den Haag Drive to the west and LeBoutillier Avenue to the east. **Table 2** below summarizes the details of the boundary roadways as well as other streets within the context area of the proposed development.

Table 2 - Existing Roadways

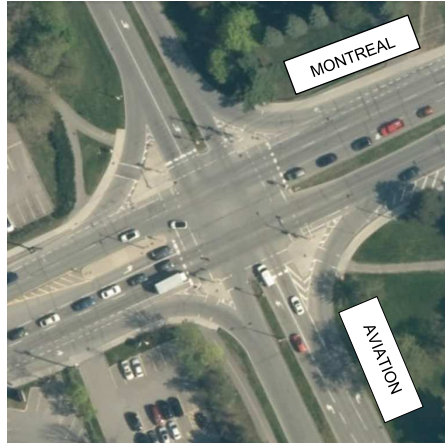
NAME	CLASS	JURISDICTION	ORIENTATION AND EXTENTS	CROSS-SECTION	RIGHT-OF-WAY	SPEED LIMIT
Montreal Road	Arterial	City of Ottawa	East-West, from North River Road to Ottawa Road 174	Urban Four-Lane Divided	37.5m	60 km/h
Aviation Parkway	N/A	National Capital Commission (NCC)	North-South, from Highway 417 to the Canada Aviation and Space Museum	Urban Four-Lane	Variable	60 km/h
Den Haag Drive	Collector	City of Ottawa	North-South then East-West, from Montreal Road to Bathgate Drive	Urban Two-Lane	27.0m	50 km/h
Lang's Road	Local	City of Ottawa	North-South, from Montreal Road to north of Greenhill Way	Rural Two-Lane	17.0m	50 km/h

#### 3.2.1.2 Nearby Driveways

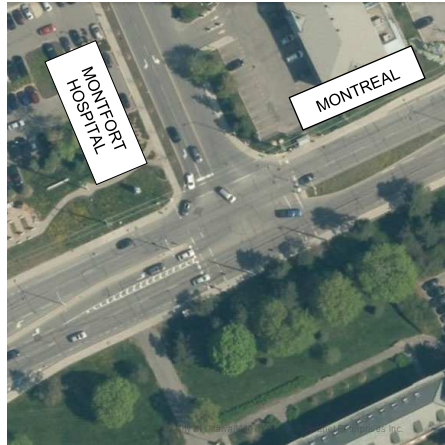
Within 200m of the proposed site access driveway, there are two driveways associated with the Canada Mortgage and Housing Corporation (CMHC) office campus: one 35m to the north and one 185m to the south.

### 3.2.1.3 Intersections

The following intersections have the greatest potential to be impacted by the proposed development:



- **Montreal Road & Aviation Parkway** is a four-legged signalized intersection with auxiliary left-turn lanes and right-turn channels on all approaches. The northbound and eastbound approaches have auxiliary right-turn lanes while the westbound approach only has a right-turn taper. This intersection is located approximately 300 metres west of the site.



- **Montreal Road & Montfort Hospital** is a three-legged signalized intersection with auxiliary left-turn lanes on the eastbound and southbound approaches. This intersection is located approximately 160 metres west of the site.

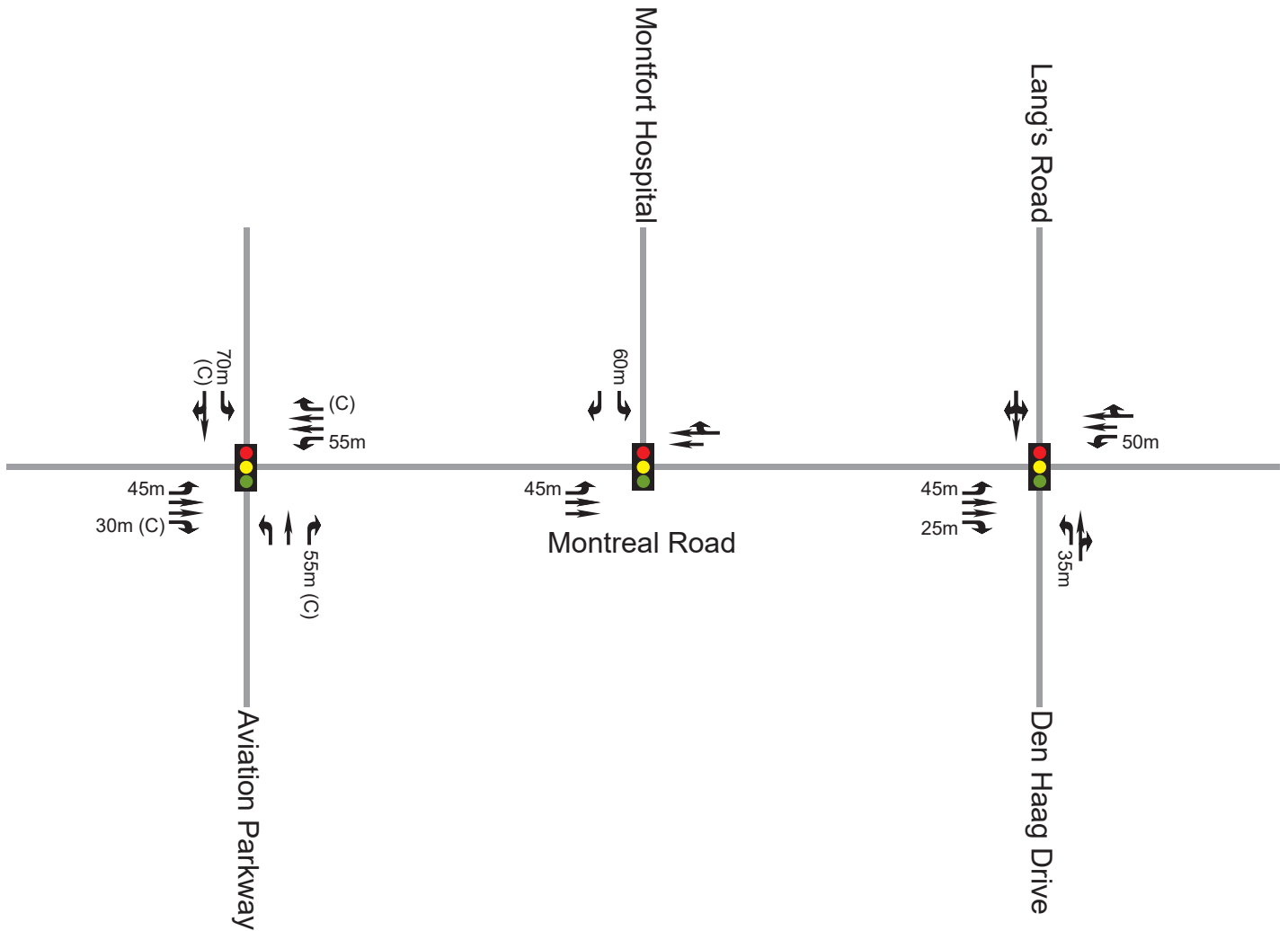


- **Montreal Road & Den Haag Drive / Lang's Road** is a four-legged signalized intersection with auxiliary left-turn lanes on the eastbound, westbound and northbound approaches and an auxiliary right-turn lane on the eastbound approach. This intersection is located directly adjacent to the proposed development.

The intersection control and lane configurations for all intersections described above are shown in **Exhibit 3**.



NORTH



### Legend



Traffic Signal



Lane Configurations

xxxm

Storage Lengths

(C)

Channelized Right-Turn



800 Montreal Road  
Transportation Impact Assessment

Exhibit 3:  
Lane Configuration  
and Intersection  
Control

PROJECT No. 125532  
DATE:  
SCALE:

December 2020  
N.T.S.

#### **3.2.1.4 Traffic Management Measures**

No traffic management measures have been implemented on any of the roadways within the context area of the proposed development.

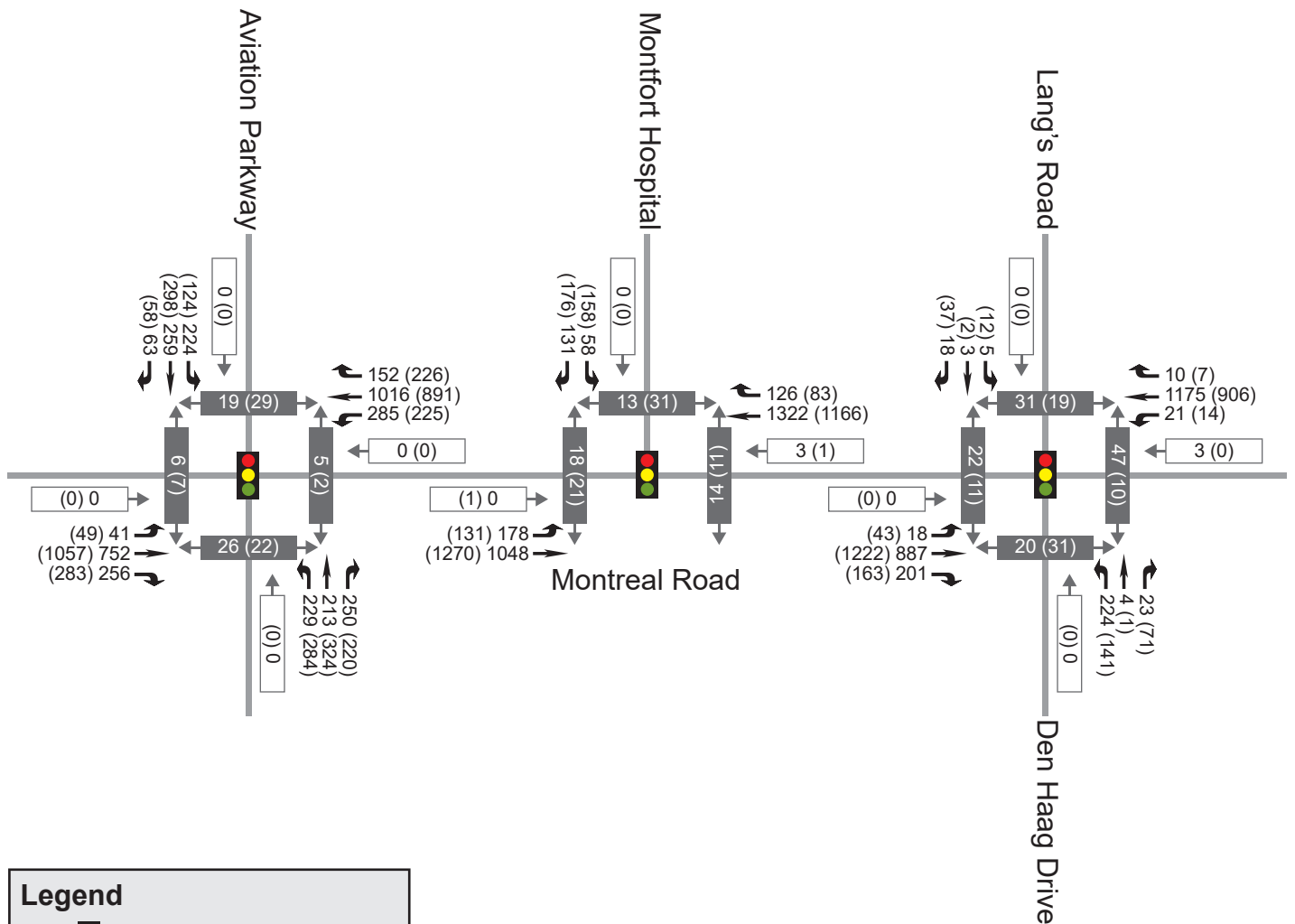
#### **3.2.1.5 Existing Traffic Volumes**

As the proposed development will consist of residential land uses, the weekday peak hour traffic conditions will be most affected by any associated increase in traffic. Weekday morning and afternoon peak hour turning movement counts were therefore obtained from the City of Ottawa at the following intersections:

- Montreal Road & Aviation Parkway (City of Ottawa, January 2018)
- Montreal Road & Montfort Hospital (City of Ottawa, January 2019)
- Montreal Road & Den Haag Drive / Lang's Road (City of Ottawa, January 2019)

A growth rate was applied to the above noted turning movement count data to approximate existing (2020) traffic volumes. Justification of background growth rates is discussed further in the Forecasting section of this TIA.

Peak hour traffic volumes representative of existing conditions are shown in **Exhibit 4**. Weekday morning and afternoon peak hour turning movement counts have been provided in **Appendix C**.



**Legend**

- Traffic Signal
- xxx (xxx) Weekday AM (PM) Peak Hour Volume
- Pedestrian Volume
- Cyclist Volume
- Permitted Movements
- Vehicular Volume



### 3.2.2 Existing Bicycle and Pedestrian Facilities

Pedestrian facilities within the context area are provided in the form of concrete sidewalks on both sides of Montreal Road and Den Haag Drive, and on the west side of Lang's Road and the Montfort Hospital access road. A shared pedestrian-cyclist multi-use path (MUP) is provided along the west side of Aviation Parkway. On-street bike lanes have also been provided on both sides of Montreal Road throughout the context area.

### 3.2.3 Existing Transit Facilities and Service

The following transit routes, operated by OC Transpo, exist within the vicinity of the site:

- **Route #12** provides regular, all-day service between Parliament Station and Blair Station, operating on 15-minute headways.
- **Route #15** provides weekday peak-period service between Laurier / Élisabeth-Bruyère and Blair Station, operating on 15-minute headways.
- **Route #17** provides weekday peak-period service between Terrasses de la Chaudière and Mikinak / Du Vedette, operating on 30-minute headways.
- **Route #20** provides regular, all-day service between St-Laurent Station and Loyer-Barrette, operating on 30-minute headways.
- **Route #25** provides regular, all-day service between Millennium Station and Carsons / Montreal, with some routes extending to the Canada Aviation and Space Museum. The route typically operates on 15-minute headways during weekdays and 10- to 20-minute headways on weekends.
- **Route #27** provides weekday peak-period service between St-Laurent Station and Mikinak / Du Vedette, operating on 30-minute headways.

The nearest bus stops to the proposed development are located on Montreal Road, east of Den Haag Drive / Lang's Road.

Within the study area, there are currently no transit priority measures implemented; all buses operate in mixed traffic. The transit maps for the above transit routes are provided in **Appendix D**.

### 3.2.4 Collision History

A review of historical collision data has been undertaken for the boundary streets with the vicinity of the proposed development. The TIA Guidelines require a safety review if at least six collisions for any one movement or of a discernible pattern, have occurred over a five-year period. **Table 3** summarizes all reported collisions between January 1, 2014 and December 31, 2018.

Table 3 - Reported Collisions within Vicinity of Proposed Development

LOCATION	# OF REPORTED COLLISIONS
<b>INTERSECTIONS</b>	
Montreal Road & Aviation Parkway	100
Montreal Road & Montfort Hospital	12
Montreal Road & Den Haag Drive / Lang's Road	28
<b>SEGMENTS</b>	
Montreal Road – Aviation Parkway to Den Haag Drive / Lang's Road	9
Montreal Road – Den Haag Drive / Lang's Road to Carson's Road / Codd's Road	12

Based on a preliminary review of the collision history noted above, all the above intersections and road segments may require further review. Detailed collision records are provided in **Appendix E**.

Another method of evaluating the relative magnitude of collision frequency at one intersection compared to another is to quantify the average historical number of collisions relative to the daily volume of traffic entering the intersection. This is commonly expressed in terms of average number of collisions per Million Vehicles Entering (MVE) and a rate of greater than 1.0 is considered significant.

The above noted intersections are therefore calculated as having the following average number of collisions per MVE:

- Montreal Road & Aviation Parkway – 1.21
- Montreal Road & Montfort Hospital – 0.20
- Montreal Road & Den Haag Drive / Lang's Road – 0.51

Of the intersections evaluated above, only the Montreal Road & Aviation Parkway has a collision frequency in excess of 1.0 which is considered significant. The collision frequencies of the other two intersections are not considered significant.

### 3.3 Planned Conditions

#### 3.3.1 Transportation Network

##### 3.3.1.1 Future Road Network Projects

The 2013 Transportation Master Plan (TMP) outlines future road network modifications required in the 2031 'Affordable Network'. A review of the TMP Affordable Plan indicates that there are no planned changes to the arterial road network within the broader area surrounding the proposed development.

##### 3.3.1.2 Future Transit Facilities and Services

The 2013 TMP outlines the future rapid transit and transit priority (RTTP) network. The following project was noted in the 'Affordable RTTP Network' that may have an impact on future travel demand in the vicinity of the proposed development:



- Montreal Road Transit Priority Corridor (Continuous Lanes):** Based on the TMP, continuous bus lanes are planned along Rideau Street and Montreal Road from Rideau Station to Blair Road. A Planning and Environmental Assessment Study is currently underway which confirmed that continuous bus lanes are the preferred transit priority treatment for Montreal Road although a preferred design (e.g. conversion of existing lanes to bus lane, roadway widening to accommodate new bus lanes, etc.) has not yet been selected.

**Figure 1** illustrates the transit infrastructure projects in the vicinity of the proposed development that are part of the TMP's 2031 Affordable Network.

Figure 1 - Future 'Affordable RTTP Network Projects'



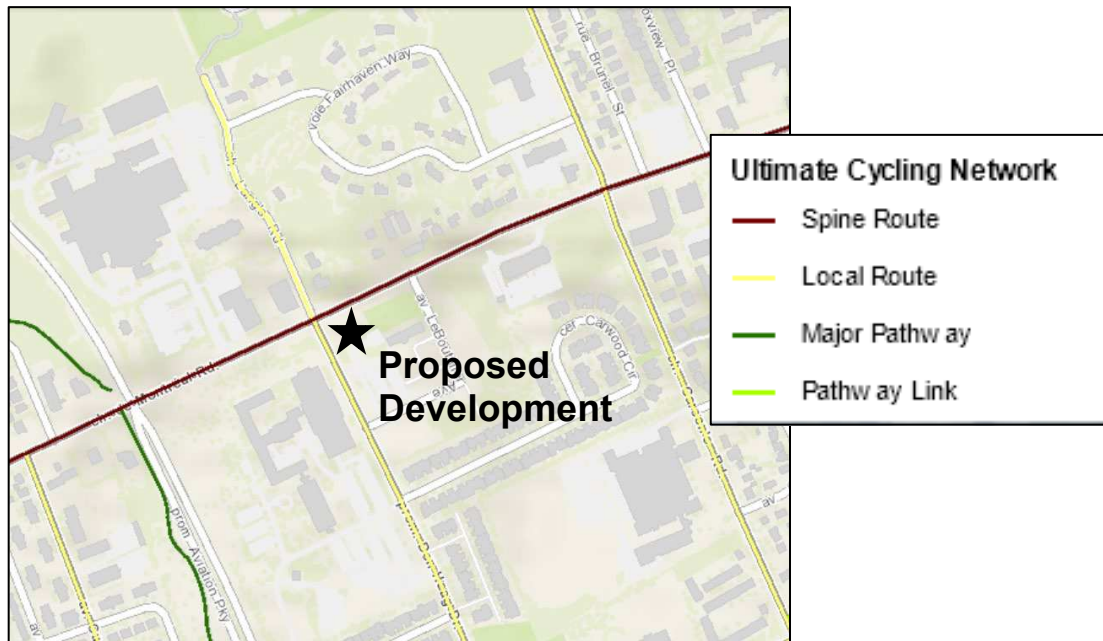
Source: 2013 Transportation Master Plan – Map 5 '2031 Affordable Network'

### 3.3.1.3 Future Cycling and Pedestrian Facilities

The 2013 Ottawa Cycling Plan (OCP) designates Montreal Road as a 'Spine Route', which form part of a system linking the commercial, employment, institutional, residential and educational nodes throughout the city. It also designates the MUP along Aviation Parkway as a 'Major Pathway' and both Den Haag Drive and Lang's Road as 'Local Routes', providing connections between 'Spine Routes' and 'Major Pathways'.

The OCP does not identify any specific planned cycling infrastructure improvements for any of the context area roadways, however, Montreal Road will be revitalized as a complete street as part of the Montreal Road Transit Priority Corridor project which is expected to result in improvements to pedestrian and cycling infrastructure along this corridor.

Figure 2 – Future Cycling Facilities within Context Area



Source: GeoOttawa

The 2013 Ottawa Pedestrian Plan (OPP) doesn't identify any specific pedestrian network improvements within the context area of the proposed development.

### 3.3.2 Future Adjacent Developments

The City of Ottawa Transportation Impact Assessment (TIA) Guidelines specify that all significant developments proposed within the surrounding area which are likely to occur within the study's horizon year must be identified and taken into consideration in the development of future background traffic projections.

There are currently only two significant development applications in the vicinity of the proposed development:

- **807-825 Montreal Road** is a proposed mixed-use development with approximately 150 apartment units and ground floor commercial space.
- **Wateridge Village** is a large planned community located on the former Canadian Forces Base (CFB) Rockcliffe property.

There are currently no other significant development applications within the context area that are either in the development application approval process, have already been approved and in pre-construction, or are currently under construction.

### 3.3.3 Network Concept Screenline

A network screenline analysis is not necessary for this development, as it does not trigger the threshold prescribed by the TIA Guidelines of 200 person-trips during the peak hour beyond what is otherwise permitted by zoning. Detailed trip generation will be provided in the Forecasting section of this report.

### 3.4 Study Area

With consideration of the information presented thus far, the following intersections have been identified as being most impacted by the proposed development and will be assessed for vehicular capacity as part of this study:

- Montreal Road & Aviation Parkway
- Montreal Road & Montfort Hospital
- Montreal Road & Den Haag Drive / Lang's Road
- Den Haag Drive & Site Access

A preliminary trip distribution indicates that approximately 75% of site-generated traffic is expected to travel to/from the north or south via Aviation Parkway. As such, the site-related impacts to the intersections to the east and west of the above intersections are anticipated to be negligible and can therefore be excluded from the intersection capacity analysis.

Multi-Modal Level of Service (MMLOS) will be conducted for all intersections listed above with the exception of the site access as no methodology currently exists for evaluating MMLOS at unsignalized intersections. The need to provide alternative means of traffic control (i.e. signals) at the stop-controlled intersections will be reviewed in the Analysis component of this study to determine whether signals are warranted or required operationally within the horizon year of this study.

Additional MMLOS analysis will be conducted for the relevant boundary street segments, which in this case is limited to the segments of Montreal Road and Den Haag Drive adjacent to the proposed development.

### 3.5 Time Periods

Based on the proposed residential land use, traffic generated during the weekday morning and afternoon peak hour is expected to result in the most significant impact to traffic operations on the adjacent road network in terms of combined development-generated and background traffic. These two time periods will therefore be considered for operational analysis in this study.

### 3.6 Analysis Years

Based on the anticipated build-out year of the proposed development, the following two analysis years will be considered in this TIA:

- Year 2024 – Full Build-Out / Occupancy of the Proposed Development
- Year 2029 – 5 Years Beyond Full Build-out / Occupancy

### 3.7 Exemptions Review

The TIA Guidelines provide exemption considerations for elements of the Design Review and Network Impact components. **Table 4** summarizes the TIA modules that are not applicable to this study.

Table 4 - Exemptions Review

TIA MODULE	ELEMENT	EXEMPTION CONSIDERATIONS	REQUIRED
<b>DESIGN REVIEW COMPONENT</b>			
4.1 Development Design	4.1.2 Circulation and Access	<ul style="list-style-type: none"> <li>Only required for site plans</li> </ul>	✓
	4.1.3 New Street Networks	<ul style="list-style-type: none"> <li>Only required for plans of subdivision</li> </ul>	✗
4.2 Parking	4.2.1 Parking Supply	<ul style="list-style-type: none"> <li>Only required for site plans</li> </ul>	✓
	4.2.2 Spillover Parking	<ul style="list-style-type: none"> <li>Only required for site plans where parking supply is 15% below unconstrained demand</li> </ul>	✗
<b>NETWORK IMPACT COMPONENT</b>			
4.5 Transportation Demand Management	All Elements	<ul style="list-style-type: none"> <li>Not required for site plans expected to have fewer than 60 employees and/or students on location at any given time</li> </ul>	✓
4.6 Neighbourhood Traffic Management	4.6.1 Adjacent Neighbourhoods	<ul style="list-style-type: none"> <li>Only required when the development relies on local or collector streets for access and total volumes exceed ATM capacity thresholds</li> </ul>	✓
4.8 Network Concept	n/a	<ul style="list-style-type: none"> <li>Only required when proposed development generates more than 200 person-trips during the peak hour in excess of the equivalent volume permitted by established zoning</li> </ul>	✗

## 4 Forecasting

### 4.1 Development Generated Traffic

#### 4.1.1 Trip Generation Methodology

Peak hour site-generated traffic volumes were developed using the 2009 TRANS Trip Generation Residential Trip Rates Study Report. The TRANS trip generation rates are based on a blended rate derived from 17 trip generation studies undertaken in 2008, the ITE Trip Generation Manual and the 2005 TRANS Origin-Destination (O-D) Travel Survey. Separate trip generation rates exist for each of the four general geographic areas in Ottawa: Core, Urban (Inside the Greenbelt), Suburban (Outside the Greenbelt) and Rural. These trip generation rates reflect existing travel behavior by dwelling type and geographic area. The TIA Guidelines recommend that the TRANS trip generation rates be converted to person-trips based on the vehicular mode share proportions detailed in the TRANS Trip Generation study.

Peak hour site-generated traffic volumes for the commercial component were developed using the ITE Trip Generation Manual (10<sup>th</sup> Edition). The TIA Guidelines indicate that vehicle-trip generation rates from the ITE Trip Generation Manual should be converted to person-trips through the application of a 1.28 vehicle-to-person-trip conversion factor.

Person-trips were then subdivided based on representative mode share percentages applicable to the study area to determine the number of vehicle, transit, pedestrian, cycling and other trip types.

#### 4.1.2 Trip Generation Results

##### 4.1.2.1 Vehicle Trip Generation

Weekday peak hour vehicular traffic volumes associated with the residential portion of the proposed development were determined using the trip generation rates published in the 2009 TRANS Trip Generation Study. The ground floor commercial component was determined using appropriate rates from the ITE Trip Generational Manual, 10<sup>th</sup> Edition. Extracts from these data sources have been included in **Appendix F**.

The base vehicular trip generation for the proposed development has been summarized in **Table 5**.

Table 5 - Base Vehicular Trip Generation

LAND USE	SIZE	PERIOD	GENERATED TRIPS (VPH)		
			IN	OUT	TOTAL
Mid-Rise Apartment	172 units	AM	10	31	41
		PM	30	18	48
Ground Floor Commercial	75 m <sup>2</sup>	AM	1	0	1
		PM	1	2	3

Note: vph = Vehicles Per Hour

##### 4.1.2.2 Person Trip Generation

The person-trip to vehicle-trip conversion factors for TRANS trip generation rates vary depending on the peak hour, geographic location and land use considered. The base vehicular trip generation

values from the previous section were divided by the vehicle mode share to determine the number of person-trips generated.

For the commercial component, the base vehicular trip generation values have been expressed in terms of person-trips through the use of a 1.28 vehicle-to-person-trip conversion factor, as prescribed in the TIA Guidelines.

The resulting number of person-trips have been summarized in **Table 6**.

Table 6 - Person-Trip Generation

LAND USE	AUTO MODE SHARE <sup>1</sup> / CONVERSION FACTOR	PERIOD	PERSON TRIPS (PPH)		
			IN	OUT	TOTAL PER HOUR
Mid-Rise Apartment	37%	AM	27	85	112
	40%	PM	75	46	121
Ground Floor Commercial	1.28	AM	1	0	1
		PM	2	2	4

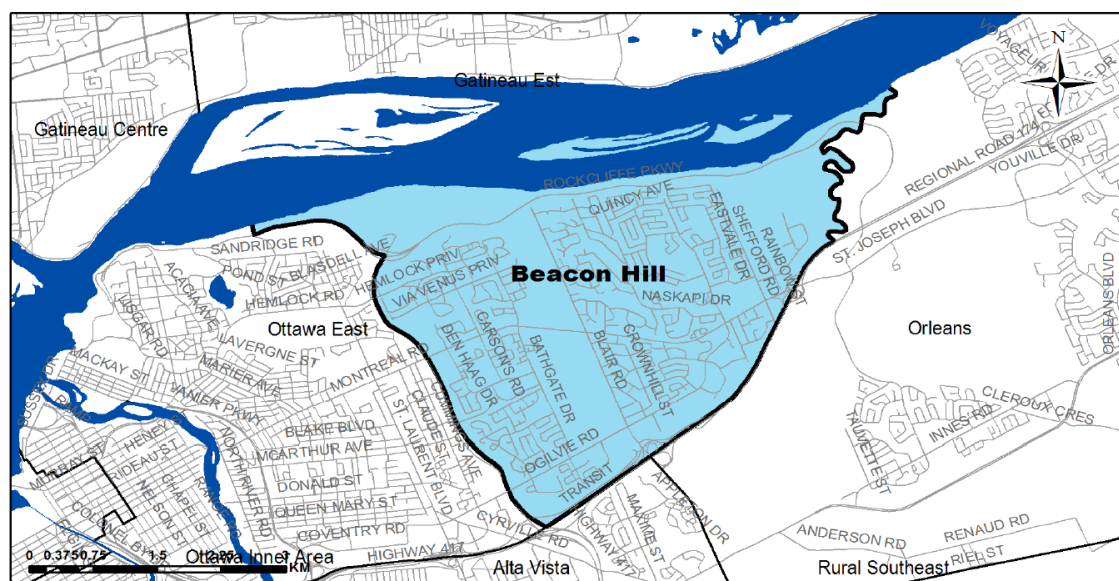
Notes:

<sup>1</sup> TRANS Trip Generation Study, Table 3.13 – Urban Area

#### 4.1.2.3 Mode Share Proportions

The 2011 TRANS Origin-Destination (O-D) Survey provides approximations of the existing modal share within the Beacon Hill Traffic Assessment Zone (TAZ). The extents of the Beacon Hill TAZ are illustrated in **Figure 3**. Relevant extracts from the 2011 O-D Survey are provided in **Appendix F**.

Figure 3 - Beacon Hill TAZ



Source: 2011 TRANS O-D Survey

The proposed weekday morning and afternoon mode share targets were developed based on the weighted average mode share of the Beacon Hill TAZ from the 2011 O-D Survey. Since 2011,

there have been no transportation network modifications in the context area of the proposed development. Outside the context area, the O-Train Confederation Line has since been completed, however, given the distance to the nearest station it is expected that its impact on local transit mode share is limited. It is also currently unknown when the Montreal Road Transit Priority Corridor will be constructed therefore it is assumed that it will be implemented beyond the horizon year of this study. As such, transit mode share is expected to remain unchanged within the timeframe of this study. No other transportation network modifications are planned in the vicinity of the proposed development.

The existing mode share and the mode share targets for the proposed development are outlined in **Table 7**.

Table 7 - Proposed Mode Share Targets

TRAVEL MODE	EXISTING MODE SHARE <sup>1</sup>						MODE SHARE TARGETS <sup>2</sup>
	AM FROM	AM TO	AM WITHIN	PM FROM	PM TO	PM WITHIN	
Auto Driver	59%	56%	32%	63%	58%	51%	53%
Auto Passenger	9%	12%	13%	12%	14%	25%	14%
Transit	26%	22%	5%	19%	24%	5%	18%
Cycling	2%	1%	2%	1%	2%	1%	2%
Walking	0%	2%	28%	2%	0%	17%	8%
Other	5%	8%	21%	2%	3%	1%	6%

Notes:

<sup>1</sup> 2011 TRANS O-D Survey for the Beacon Hill Traffic Assessment Zone

<sup>2</sup> Based on the weighted average mode share of 'AM From', 'AM Within', 'PM To' and 'PM Within'.

#### 4.1.2.4 Trip Reduction Factors

##### Deduction of Existing Development Trips

Not Applicable: The land is currently vacant and thus does not generate any traffic.

##### Pass-by Traffic

Not Applicable: Based on the size of the commercial component of the proposed development the volume of pass-by traffic is expected to be insignificant.

##### Synergy/ Internalization

Not Applicable: Given the small size of the ground floor commercial component of the proposed development, internalization is expected to be negligible.

#### 4.1.2.5 Trip Generation by Mode

The mode share targets presented above were applied to the number of development-generated person-trips to establish the number of trips per travel mode, as summarized in **Table 8**.

Table 8 – Peak Hour Person-Trips by Mode

MODE	AM Peak Hour			PM Peak Hour		
	IN	OUT	TOTAL	IN	OUT	TOTAL
Auto Driver	15	45	60	41	25	66
Auto Passenger	4	12	16	11	7	18
Transit	5	15	20	14	9	23
Cycling	0	1	1	1	0	1
Walking	2	7	9	6	4	10
Other	2	5	7	4	3	7
<b>Total</b>	<b>28</b>	<b>85</b>	<b>113</b>	<b>77</b>	<b>48</b>	<b>125</b>

Based on the above, the proposed development is expected to generate up to 66 two-way vehicular trips and 24 two-way transit trips during the weekday peak hours.

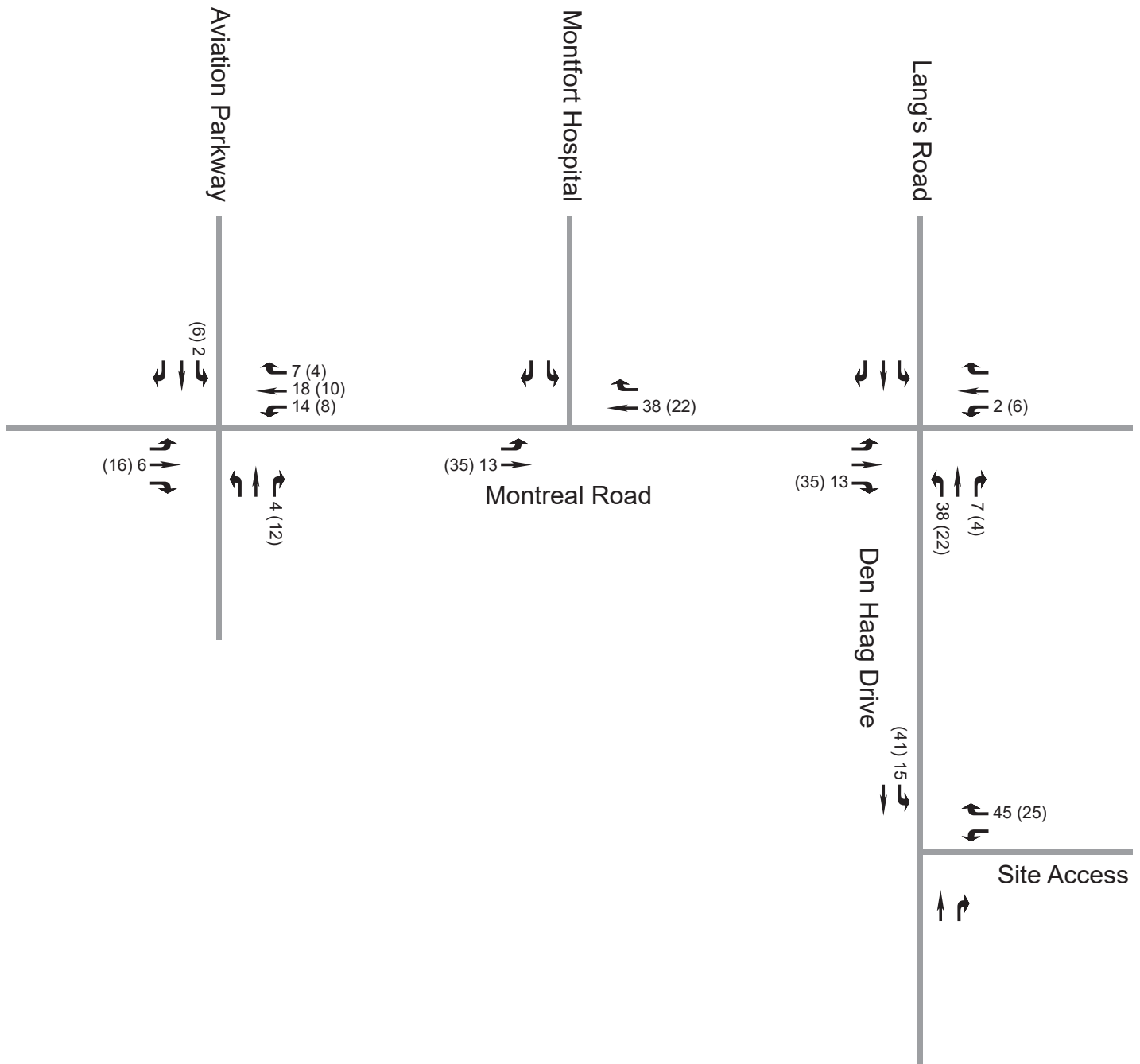
#### 4.1.3 Trip Distribution and Assignment

Consistent with the Beacon Hill TAZ origin-destination distribution, site-generated vehicle trips have been distributed in accordance with the following distribution. Assignment to specific routes was based on engineering judgement and a review of typical travel times during peak hour conditions.

- 15% to/from the North via Aviation Parkway
- 45% to/from the South
  - 30% via Aviation Parkway
  - 10% via St Laurent Boulevard
  - 5% via Blair Road
- 10% to/from the East via Montreal Road
- 30% to/from the West via Montreal Road

Utilizing the estimated number of new auto trips and applying the above distribution, future site-generated traffic volumes are illustrated for each of the study area intersections in **Exhibit 5**.





**LEGEND**

Permitted Movements

Weekday AM (PM) Peak Hour Vehicular Volume



## 4.2 Background Network Traffic

### 4.2.1 Changes to the Background Transportation Network

To properly assess future traffic conditions, planned modifications to the transportation network that may impact travel patterns or demand within the study area have been considered. The Scoping section of this report summarized the anticipated changes to the study area transportation network based on the Transportation Master Plan (TMP) and determined that within the study area, Montreal Road will be revitalized as a complete street with continuous transit priority lanes and enhanced cycling and pedestrian infrastructure. There is currently no timeline for the implementation of these measures, however, and it has therefore been conservatively assumed that it will be constructed beyond the horizon year of this study.

### 4.2.2 General Background Growth Rates

The background growth rate is intended to represent any regional growth from outside the study area that will travel along the adjacent road network. Based on the supporting traffic studies for Wateridge Village, a 0% linear background growth rate was applied to estimate future background traffic volumes. Future background traffic increases due to future adjacent developments will be accounted for separately in this analysis.

### 4.2.3 Other Area Development

Future adjacent developments in the vicinity of the proposed development have been identified previously in the Scoping section of this report. **Table 9** summarizes the land use details and expected build-out year of these future adjacent developments.

Table 9 - Future Adjacent Developments

DEVELOPMENT	LAND USE	EXPECTED BUILD-OUT YEAR
765 Montreal Road	<ul style="list-style-type: none"> <li>• 42 apartment units</li> <li>• 61.4 m<sup>2</sup> community centre space</li> </ul>	2020
807-825 Montreal Road	<ul style="list-style-type: none"> <li>• 150 apartment units</li> <li>• 600 m<sup>2</sup> ground floor commercial</li> </ul>	2020
Wateridge Village	<ul style="list-style-type: none"> <li>• 5,185 residential units                             <ul style="list-style-type: none"> <li>○ 638 low-rise apartments</li> <li>○ 1,699 mid-rise apartments</li> <li>○ 900 high-rise apartments</li> <li>○ 1,244 stacked townhomes</li> <li>○ 626 residential townhomes</li> <li>○ 78 single family homes</li> </ul> </li> <li>• 2,639 jobs                             <ul style="list-style-type: none"> <li>○ 2,282 office jobs</li> <li>○ 207 retail jobs</li> <li>○ 150 school jobs</li> </ul> </li> </ul>	Phase 1 A & B: 2020 Phase 2 A & B: 2022 Full Build-Out: 2031

Portions of Wateridge Village have already been constructed and land use statistics have been revised as development has progressed. This has been taken into account in the development of future background traffic volumes.

## 4.3 Demand Rationalization

The purpose of this section is to rationalize future travel demands within the study area to account for potential capacity limitations in the transportation network and its ability to effectively accommodate the additional demand generated by a new development.

### 4.3.1 Description of Capacity Issues

The Wateridge Phase 2A & 2B TIA (2019) indicates that the Montreal Road & Aviation Parkway intersection is currently at or approaching its theoretical capacity during the weekday morning and afternoon peak hours. There are no other documented records of existing or future capacity issues at any of the other study area intersections.

### 4.3.2 Adjustment to Development-Generated Demands

The mode share targets assumed in this study area based on the existing mode share characteristics of the surrounding area. As indicated in **Table 8** above, the site is not expected to be a major traffic generator and new trips were assigned to the most logical routes available based on engineering judgement and a review of weekday peak hour travel times. This has therefore taken into consideration the capacity constraints identified at Montreal Road & Aviation Parkway intersection. Although the proposed development will include measures for Transportation Demand Management, it has been conservatively assumed that there will be no significant increases to the documented transit mode share within the horizon year of this study.

### 4.3.3 Adjustment to Background Network Demands

As the Montreal Road & Aviation Parkway intersection is a critical link for vehicles travelling north or south it is not expected that future capacity issues will result in travel demand redirecting to alternate routes. As indicated in the transportation studies associated with Wateridge Village and 817 Montreal Road, operational conditions are expected to worsen slightly as a result of area growth until such time the planned Transit Priority measures are implemented.

## 4.4 Traffic Volume Summary

### 4.4.1 Future Background Traffic Volumes

Future background traffic volumes have been established by superimposing Existing (2020) Traffic volumes with future adjacent development traffic volumes. The Wateridge Village CTS assumed that, in the future, a new connection would be provided between Hemlock Road and Wateridge Village which would result in a redistribution of Wateridge Village generated traffic. As such, some local reductions in background traffic are anticipated between the 2024 and 2029 analysis years.

**Exhibit 6** and **Exhibit 7** present the future background traffic volumes anticipated for the 2024 and 2029 analysis years, respectively.

### 4.4.2 Future Total Traffic Volumes

Future total traffic volumes have been established by combining the site-generated traffic volumes with the future background traffic volumes.

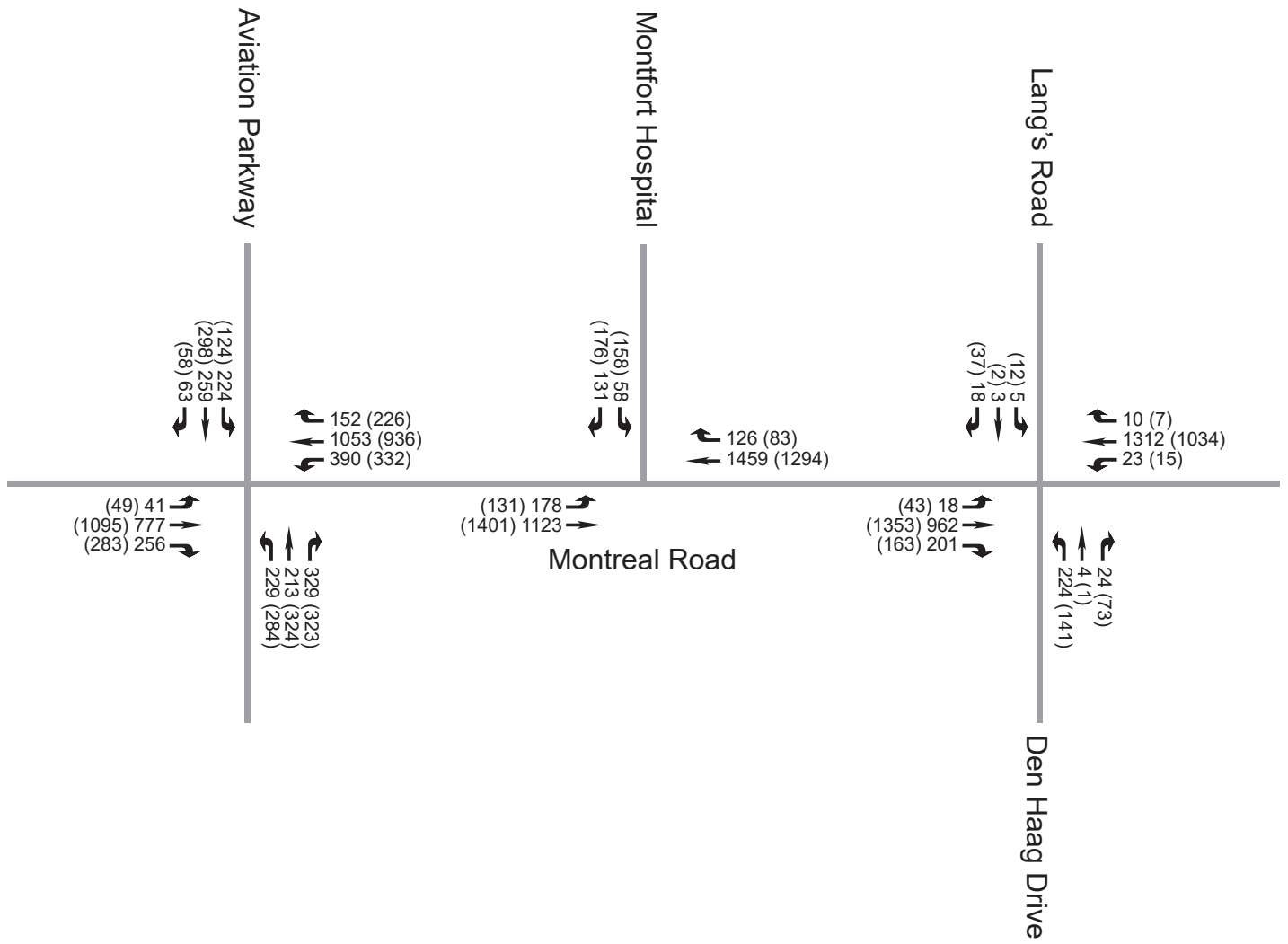
**Exhibit 8** and **Exhibit 9** present the future total traffic volumes anticipated for the 2024 and 2029 analysis years, respectively.



**LEGEND**

Permitted Movements  
 Weekday AM (PM) Peak Hour Vehicular Volume

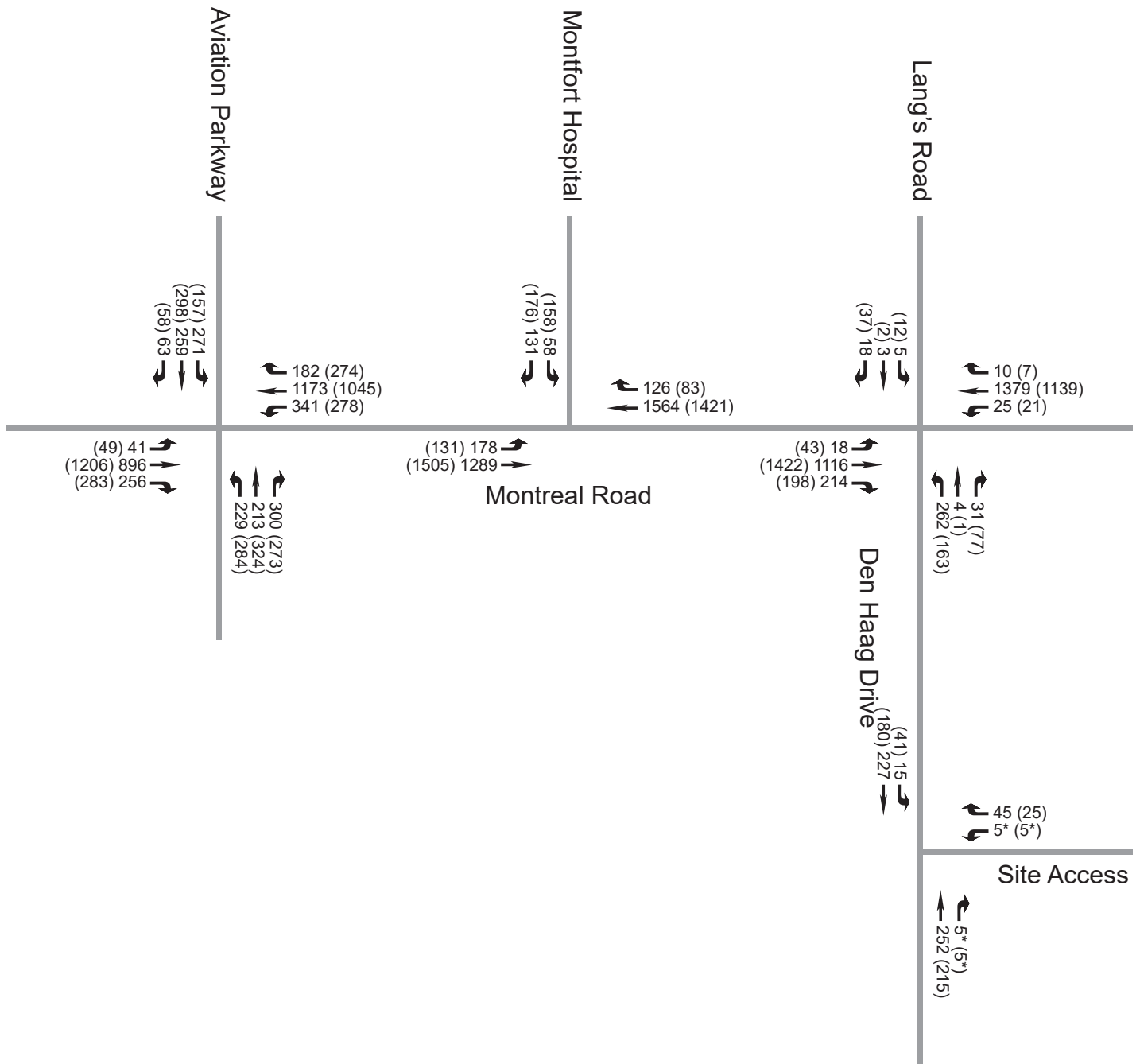




**LEGEND**

Permitted Movements

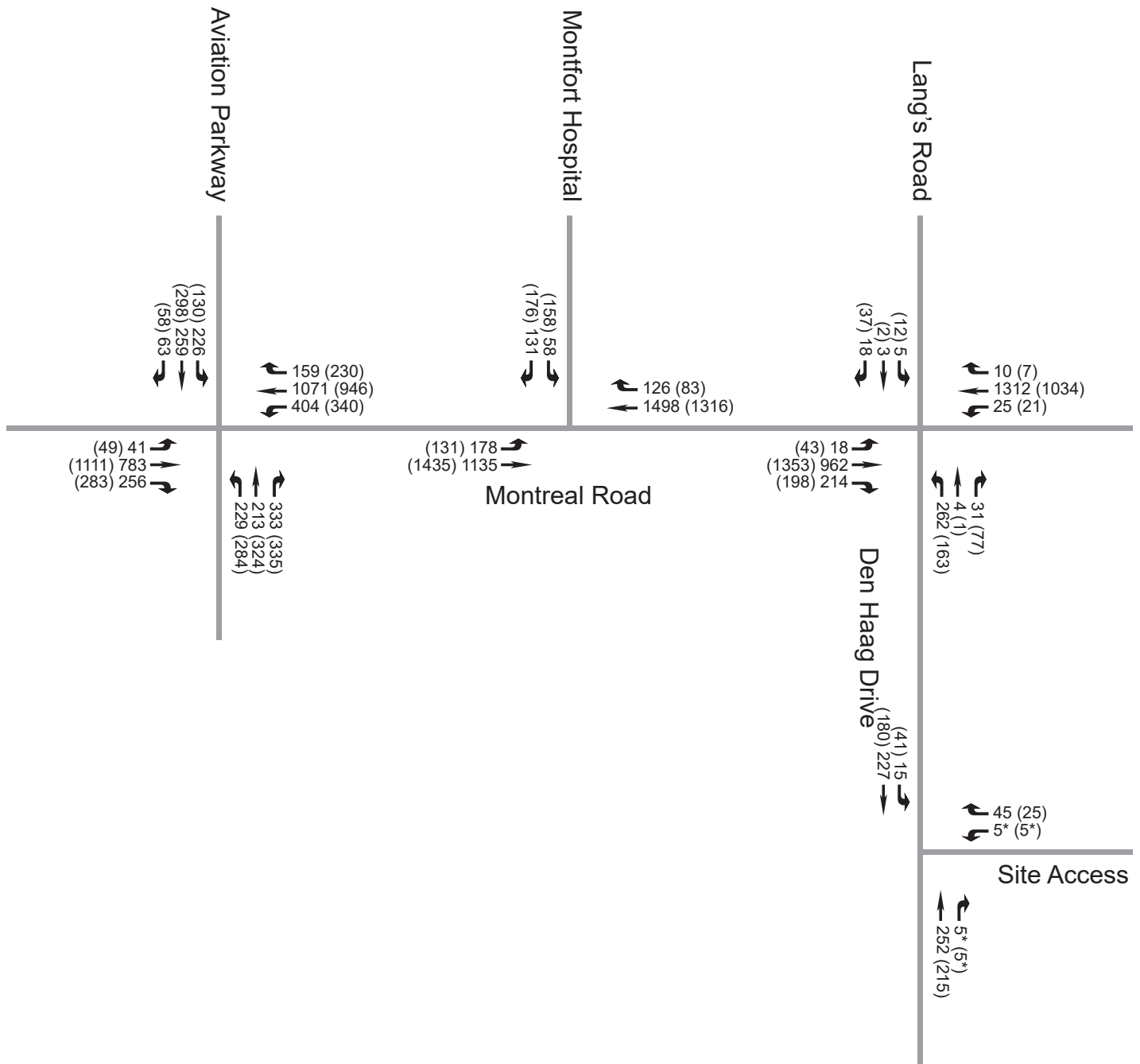
xxx (xxx)  
 xxx (xxx)  
 xxx (xxx)  
 Weekday AM (PM) Peak Hour Vehicular Volume



**LEGEND**

- Permitted Movements
- xxx (xxx)  
xxx (xxx)  
xxx (xxx) Weekday AM (PM) Peak Hour Vehicular Volume

\* Nominal volumes



**LEGEND**

- Permitted Movements
- xxx (xxx) Weekday AM (PM) Peak Hour Vehicular Volume

\* Nominal volumes



## 5 Analysis

### 5.1 Development Design

#### 5.1.1 Design for Sustainable Modes

For consistency with the City of Ottawa's Urban Design Guidelines and transportation policies, new developments shall provide safe and efficient access for all users, while creating an environment that encourages walking, cycling and transit use.

The proposed development is located adjacent to Montreal Road which is designated an Arterial Mainstreet in the Official Plan. The Montreal Road Transit Priority Corridor Planning and Environmental Assessment Study is currently underway, indicating that Montreal Road will ultimately be reconstructed in accordance with the Complete Streets philosophy and will have continuous bus lanes in both directions.

The proposed development will provide internal pedestrian connections through the site that will connect the sidewalks south of the site to LeBoutillier Park.

Currently, the nearest bus stops are located within a short walking distance of the proposed development at the Montreal Road & Den Haag Drive / Lang's Road intersection and are well within OC Transpo's service design guideline of providing peak period service within a five minute (400m) walk of 95% of residences.

The TDM-Supportive Development Design and Infrastructure Checklist was completed and is provided in **Appendix G**. This checklist identifies specific measures that are being considered in association with the proposed development to offset the vehicular impact on the adjacent road network.

Notable TDM design and infrastructure measures that will be implemented are:

- The main building entrance will be located on Montreal Road, adjacent to the bus stop, with a pedestrian connection to facilities on Montreal Road;
- Pedestrian connections will be provided between the proposed development, boundary streets and the adjacent park as well as pedestrian facilities south of the site;
- Bicycle parking will be provided inside the building and in accordance with minimum by-law requirements; and
- Three on-site parking spaces will be reserved for a car share service provider and will be for use by residential tenants only.

#### 5.1.2 Circulation and Access

All site-generated traffic will access the proposed development via a two-way private approach on Den Haag Drive. Within the underground parking facility, all drive aisles will be a minimum of 6.0m wide.

A designated area for waste collection and residential loading has been provided on-site near the entrance to the below-grade parking garage, accessed from Den Haag Drive. A vehicle swept path analysis has confirmed the ability for a standard refuse truck as well as an MSU (medium, single-unit) moving truck to enter, turn around and exit the site while not disrupting on-site vehicular circulation. The swept path analysis has been provided in **Appendix H**.

It shall be noted that both the Montreal Road and Den Haag Drive frontages of the site are signed as "No Stopping" zones, due to the presence of a transit stop on Montreal Road and the adjacency to an auxiliary lane on Den Haag Drive. Three exterior short-term 'Visitor' parking spaces have



been provided on-site, adjacent to the parking garage entry and are intended to accommodate pick-up/drop-off activities, thereby mitigating operational impacts to the adjacent roadways.

### 5.1.3 New Street Networks

Not Applicable: The New Street Networks element is exempt from this TIA, as defined in the study scope. This element is not required for development applications involving site plans.

## 5.2 Parking

### 5.2.1 Parking Supply

A single level of underground parking will be provided with a total of 108 parking spaces, including three spaces at the rear of the building that are sheltered but are not within the parking garage. A total of 87 bicycle parking spaces will also be provided.

Based on the size of the proposed development and the provisions for Area X of the Zoning By-law, a minimum of 87 vehicle parking spaces, 16 visitor parking spaces and 87 bicycle parking spaces must be provided by the proposed development. The proposed parking supply is therefore within the permissible range, as prescribed in the Zoning Bylaw.

### 5.2.2 Spillover Parking

The minimum parking supply requirement has been met; therefore, no further review of parking will be necessary for the purposes of this study.

## 5.3 Boundary Streets

There are two existing boundary streets adjacent to the proposed development: Montreal Road and Den Haag Drive.

### 5.3.1 Mobility

Segment-based Multi-Modal Level of Service (MMLOS) results for Montreal Road and Den Haag Drive along the proposed development frontage are provided in **Table 10** below.

Details of the Multi-Modal Level of Service (MMLOS) analysis are provided in **Appendix I**.

Table 10 - Segment MMLOS Results

LOCATION	LEVEL OF SERVICE BY MODE			
	PEDESTRIAN (PLOS)	BICYCLE (BLOS)	TRANSIT (TLOS)	TRUCK (TkLOS)
<b>Existing &amp; Future Conditions</b>				
Montreal Road	<b>F</b> (Target: B)	<b>E</b> (Target: C)	<b>D</b> (Target: C)	<b>A</b> (Target: D)
Den Haag Drive	<b>F</b> (Target: C)	<b>F</b> (Target: B)	<b>D</b> (Target: D)	<b>B</b> (Target: N/A)

The results of the segment-based MMLOS analysis indicates that both roadways do not presently meet their respective PLOS and BLOS targets, nor does Montreal Road meet its Transit Level of Service target.

Montreal Road will eventually be reconstructed with transit priority lanes and enhanced pedestrian and cycling infrastructure. It is expected that providing continuous bus lanes and cycle tracks

would result in a TLOS and BLOS of 'B' and 'A', respectively. Providing a 2m boulevard for the sidewalks would improve the PLOS to 'D', however, a reduction in operating speed on Montreal Road from 60km/h to 50km/h (if justified in the future) would also be required in order to meet the PLOS target.

In order to meet the PLOS target on Den Haag Drive, a 2m boulevard and wider sidewalk would be required, however there are existing utility conflicts along the site frontage that prohibit a relocation of this sidewalk. The existing sidewalk is therefore planned to remain as-is.

For Bicycle Level of Service, bicycle lanes and a speed limit reduction on Den Haag Drive would be required to meet the BLOS target of 'C', however there is insufficient pavement width to accommodate such cycling facilities nor any measures for system connectivity and therefore is not recommended at this time.

### 5.3.2 Road Safety

A summary of all reported collisions within the study area over the past five years was presented in the Scoping section of this report. The City requires a safety review if at least six collisions for any one movement or of a discernible pattern have occurred over a five-year period. Preliminary analysis identified some intersections and road segments of potential concern, therefore further review was conducted, as summarized below:

#### Montreal Road & Aviation Parkway

**Table 11** summarizes the impact types by direction for all collisions recorded in the past five years.

Table 11 - Montreal Road & Aviation Parkway - Impact Type by Direction

IMPACT TYPE	VEHICLE 1 DIRECTION				TOTAL
	Northbound	Southbound	Eastbound	Westbound	
Angle	1	1	8	1	11
Rear End	16	6	11	13	46
Sideswipe	3	0	5	4	12
Turning Movement	1	3	10	13	27
SMV	1	0	0	1	2
Other	0	1	0	1	2
<b>Total</b>	<b>22</b>	<b>11</b>	<b>34</b>	<b>33</b>	<b>100</b>

As indicated above, more than half of the collisions recorded at the intersection are rear end and sideswipe collisions which is to be expected given the high traffic volumes at this intersection. The majority of eastbound angle collisions were associated with the northbound-left movement, indicating that there may be signal visibility concerns or insufficient clearance intervals within the signal timing plan. The eastbound and westbound turning movement collisions typically were associated with failure to yield the right-of-way. Overall, these collision patterns can likely be attributed to congestion and reduced gap acceptance. It is suggested the City consider increasing clearance intervals and/or providing protected left-turn phases. A speed limit reduction to 50 km/h on the westbound approach should also be considered.

### **Montreal Road & Montfort Hospital**

In the past five years there have been a total of twelve collisions at this intersection including two angle, four rear end, three sideswipe, one turning movement and one single-motor vehicle (SMV) collision. No significant reoccurring collision patterns have therefore been observed.

### **Montreal Road & Den Haag Drive / Lang's Road**

A total of 28 collisions were recorded at this intersection in the past five years, of which there were three angle, 17 rear end, four sideswipe, one turning movement, two SMV and one 'other' collision recorded. Of the 17 rear end collisions, two involved northbound vehicles, seven involved eastbound vehicles and eight involved westbound vehicles, and typically involved vehicles following too closely or going too fast for the conditions.

### **Montreal Road – Aviation Parkway to Den Haag Drive / Lang's Road**

There have been a total nine collisions along this roadway segment in the past five years, including one angle collision, three rear end collisions, four sideswipe collisions and one SMV collision. As such, no significant reoccurring collision patterns have been observed on this segment of Montreal Road.

### **Montreal Road – Den Haag Drive / Lang's Road to Carson's Road / Codd's Road**

Twelve collisions have been observed along this segment of Montreal Road in the past five years: three angle collisions, four rear-end collisions, one sideswipe collision, three SMV collisions and one 'other' collision. As there have not been any significant reoccurring collisions patterns, further analysis is not warranted.

## **5.4 Access Intersections**

### **5.4.1 Location and Design of Access**

The proposed development will provide a new two-way private approach on Den Haag Drive. The proposed site access is in conformance with the City of Ottawa Private Approach By-law 2003-447, with particular confirmation of the following items:

- Width: A private approach shall have a minimum width of 2.4m and a maximum width of 9.0m. The City of Ottawa Zoning By-law, however, indicates that for parking garages a two-way private approach shall have a minimum width of 6.0m.
  - The private approach will be 6.7m wide. ✓
- Quantity and Spacing of Private Approaches: For sites with frontage between 46 and 150 metres, one (1) two-way private approach and two (2) one-way private approaches, or two (2) two-way private approaches are permitted. Any two private approaches must be separated by at least 9.0m and can be reduced to 2.0m in the case of two one-way driveways. On lots that abut more than one roadway, these provisions apply to each frontage separately.
  - The frontage on Den Haag Drive is approximately 72m, therefore the single two-way private approach is compliant with the by-law. ✓
- Distance from Property Line: Private approaches must be at least 3.0m from the abutting property line, however this requirement can be reduced to 0.3m provided that the access is a safe distance from the access serving the adjacent property, sight lines are adequate and that it does not create a traffic hazard.
  - The private approach will be 0.3m from the southern property line, however, since there are no driveway connections associated with the neighbouring property to

the south along Den Haag Drive, it is not expected that this configuration will present any traffic hazards. ✓

- Distance from Nearest Intersecting Street Line: For apartment buildings with 100 to 199 parking spaces located on a parcel adjacent to or within 46m of an arterial or major collector, all private approaches must be a minimum of 30m from the nearest intersecting street line.
  - The private approach is approximately 57m from the nearest intersecting street line. ✓
- Distance from Any Other Private Approach: For apartment buildings with 100 to 199 parking spaces located on a parcel adjacent to or within 46m of an arterial or major collector, all two-way private approaches must be a minimum of 30m from the any other private approach.
  - There are no other private approaches within 30m of the proposed private approach. ✓
- Grade of Private Approach: The grade of a private approach serving a parking area of more than 50 spaces must not exceed 2% within the private property for a distance of 9m from the highway/curb line.
  - The grade of the private approaches will be less than 2% within 9m of the curb line. ✓

#### **5.4.2 Access Intersection Control**

It is anticipated that the site access driveway will be unsignalized.

#### **5.4.3 Access Intersection Design (MMLOS)**

Not Applicable – The site access driveway will be unsignalized, therefore MMLOS analysis is not required.

### **5.5 Transportation Demand Management (TDM)**

The City of Ottawa is committed to implementing Transportation Demand Management (TDM) measures on a City-wide basis in an effort to reduce automobile dependence, particularly during the weekday peak travel periods. TDM initiatives are aimed at encouraging individuals to use non-auto modes of travel during the peak periods.

#### **5.5.1 Context for TDM**

As discussed previously, the proposed development is located immediately adjacent to Montreal Road which will ultimately be upgraded with continuous bus lanes and enhanced pedestrian and cyclist infrastructure, and is located within the Montreal Road Arterial Mainstreet Design Priority Area (DPA).

The mode share targets used to estimate future development traffic were based on the TRANS Origin-Destination (O-D) Survey for the Beacon Hill Traffic Assessment Zone (TAZ). As no transportation network modifications are planned in the vicinity of the proposed development within the timeframe of this study, no adjustments were applied to the mode share targets.

#### **5.5.2 Need and Opportunity**

Any failure to meet the non-auto mode share targets specified may result in increased traffic at the study area intersections, potentially resulting in reduced Levels of Service (LOS). However, it

is expected that there is a low probability that the mode share targets will not be achieved given these targets are based on the existing mode share of the Beacon Hill TAZ and are likely to balance more toward transit and active transportation modes in the future.

### 5.5.3 TDM Program

The proposed development conforms to the City's TDM principles by providing convenient and direct connections to adjacent pedestrian and transit facilities. Internal pedestrian connections will link the sidewalks in the development to the south with LeBoutillier Park.

The City of Ottawa's TDM Measures Checklist was completed for the proposed development and provided in **Appendix G**. This checklist indicates measures that are being contemplated as part of this development. Several notable TDM measures will be implemented, including:

- Designating a TDM program coordinator;
- Displaying local area maps with walking/cycling routes and key destinations;
- Displaying transit schedules and route maps at entrances;
- Offering one free monthly transit pass on resident move-in for any new rentals beginning in the first year of occupancy; and
- Contracting with a provider for on-site carshare vehicles.

## 5.6 Neighbourhood Traffic Management

### 5.6.1 Adjacent Neighbourhoods

As the development is dependent on Den Haag Drive for access, a review of Neighbourhood Traffic Management thresholds is required as part of the TIA process.

The TIA Guidelines specify a liveability threshold of 300 vehicles per hour for collector roads. Den Haag Drive currently experiences traffic volumes in the order of 475 vehicles during the weekday morning peak hour immediately south of Montreal Road and is therefore already in excess of this threshold. It is not uncommon for volumes to exceed this threshold at intersections with major arterial roads and it is likely to be significantly lower further south on Den Haag Drive where existing residential land uses are more prominent. The proposed development is projected to increase traffic volumes by up to 66 vehicles per hour during the weekday peak hours. A Neighbourhood Traffic Management (NTM) plan is not expected to be required as this additional traffic will only impact the segment between the site access and Montreal Road and will therefore not impact any existing residences.

Based on our knowledge of the study area, it is recognized that there have previously been concerns regarding the potential for traffic to infiltrate the local community by shortcutting through the CMHC campus as well as the College La Cité campus, among other routes. Barriers have since been erected at each of these institutions, thereby reducing the potential of shortcutting through the community.

## 5.7 Transit

### 5.7.1 Route Capacity

The estimated Future (2029) Total transit passenger demand within the study area was provided in Section 4.1.2.5. The results have been summarized in **Table 12**.

Table 12 – 2029 Development Generated Transit Demand

PERIOD	PEAK PERIOD DEMAND	
	IN	OUT
AM	5	15
PM	14	9

As shown above, site-generated two-way transit ridership volumes of roughly 20 and 23 passengers are expected during the weekday morning and afternoon peak hours, respectively. It is expected that these transit trips will be easily accommodated by existing transit service on Montreal Road.

### 5.7.1 Transit Priority Measures

Given the minimal increase in demand the proposed development will have on the overall transit system, no transit priority measures are deemed necessary as a consequence of this development.

## 5.8 Review of Network Concept

Not Applicable: The Network Concept element is exempt from this TIA, as defined in the study scope. This element is not required for development applications that generate less than 200 person-trips.

## 5.9 Intersection Design

The following sections summarize the methodology and results of the multi-modal intersection capacity analysis conducted within the study area.

### 5.9.1 Intersection Control

The following section evaluates the need to conduct traffic signal warrant analyses and roundabout analyses at any applicable study area intersections. The results of the intersection control warrants discussed below are provided in **Appendix J**.

#### 5.9.1.1 Traffic Signal Warrants

All study area intersections, with the exception of the site access intersection, are presently signalized. As such, traffic signal warrant analysis is not required.

#### 5.9.1.2 Roundabout Analysis

The City's Roundabout Implementation Policy indicates that intersections that satisfy any of the following criteria should be screened utilizing the Roundabout Initial Feasibility Screening Tool:

- At any new City intersection
- Where traffic signals are warranted
- At intersections where capacity or safety problems are being experienced

The intersection of Montreal Road & Aviation Parkway was therefore screened as it is expected to exceed its theoretical capacity under existing and background traffic conditions. Based on the results of the roundabout screening analysis, there is insufficient property available for implementing a roundabout at this location. Moreover, the presence of closely spaced traffic

signals and the presence of this intersection within a coordinated traffic signal system do not make this location suitable for a roundabout. As such, it is not recommended that a roundabout be considered at this intersection.

## 5.9.2 Intersection Analysis Criteria (Automobile)

The following section outlines the City of Ottawa’s methodology for determining motor vehicle Level-of-Service (LOS) at signalized and unsignalized intersections.

### 5.9.2.1 Signalized Intersections

In qualitative terms, the Level-of-Service (LOS) defines operational conditions within a traffic stream and their perception by motorists. A LOS definition generally describes these conditions in terms of such factors as delay, speed and travel time, freedom to manoeuvre, traffic interruptions, safety, comfort and convenience. LOS can also be related to the ratio of the volume to capacity (v/c) which is simply the relationship of the traffic volume (either measured or forecast) to the capability of the intersection or road section to accommodate a given traffic volume. This capability varies depending on the factors described above. LOS are given letter designations from ‘A’ to ‘F’. LOS ‘A’ represents the best operating conditions and LOS ‘E’ represents the level at which the intersection or an approach to the intersection is carrying the maximum traffic volume that can, practicably, be accommodated. LOS ‘F’ indicates that the intersection is operating beyond its theoretical capacity.

The City of Ottawa has developed criteria as part of the Transportation Impact Assessment Guidelines, which directly relate the volume to capacity (v/c) ratio of a signalized intersection to a LOS designation. These criteria are presented in **Table 13** as follows:

Table 13 - LOS Criteria for Signalized Intersections

LOS	VOLUME TO CAPACITY RATIO (v/c)
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

The intersection capacity analysis technique provides an indication of the LOS for each movement at the intersection under consideration and for the intersection as a whole. The overall v/c ratio for an intersection is defined as the sum of equivalent volumes for all critical movements at the intersection divided by the sum of capacities for all critical movements.

The Level of Service calculation is based on locally-specific parameters as described in the TIA Guidelines and incorporates existing signal timing plans obtained from the City of Ottawa. The analysis existing conditions utilized a Peak Hour Factor (PHF) of 0.90, while future conditions considers optimized signal timing plans and use of a Peak Hour Factor (PHF) of 1.0 to recognize peak spreading beyond a 15-minute period in congested conditions.

### 5.9.2.2 Unsignalized Intersections

The capacity of an unsignalized intersection can also be expressed in terms of the LOS it provides. For an unsignalized intersection, the Level of Service is defined in terms of the average movement delays at the intersection. This is defined as the total elapsed time from when a vehicle stops at the end of the queue until the vehicle departs from the stop line; this includes the time required for a vehicle to travel from the last-in-queue position to the first-in-queue position. The average delay for any particular minor movement at the un-signalized intersection is a function of the capacity of the approach and the degree of saturation.

The Highway Capacity Manual 2010 (HCM), prepared by the Transportation Research Board, includes the following Levels of Service criteria for un-signalized intersections, related to average movement delays at the intersection, as indicated in **Table 14**.

Table 14 - LOS Criteria for Unsignalized Intersections

LOS	DELAY (seconds)
A	<10
B	>10 and <15
C	>15 and <25
D	>25 and <35
E	>35 and <50
F	>50

The unsignalized intersection capacity analysis technique included in the HCM and used in the current study provides an indication of the Level of Service for each movement of the intersection under consideration. By this technique, the performance of the unsignalized intersection can be compared under varying traffic scenarios, using the Level of Service concept in a qualitative sense. One unsignalized intersection can be compared with another unsignalized intersection using this concept. Level of Service ‘E’ represents the capacity of the movement under consideration and generally, in large urban areas, Level of Service ‘D’ is considered to represent an acceptable operating condition. Level of Service ‘E’ is considered an acceptable operating condition for planning purposes for intersections located within Ottawa’s Urban Core (the downtown and its vicinity). Level of Service ‘F’ indicates that the movement is operating beyond its design capacity.

### 5.9.3 Intersection Capacity Analysis

Following the established intersection capacity analysis criteria described above, the existing and future conditions are analyzed during the weekday peak hour traffic volumes derived in this study.

The following section presents the results of the intersection capacity analysis. All tables summarize study area intersection LOS results during the weekday morning and afternoon peak hour periods.

The Synchro output files have been provided in **Appendix K**.



**5.9.3.1 Existing (2020) Traffic**

An intersection capacity analysis has been undertaken using the Existing (2020) Traffic volumes presented in **Exhibit 4. Table 15** summarizes the results of the intersection capacity analysis.

Table 15 - Intersection Capacity Analysis: Existing (2020) Traffic

INTERSECTION	TRAFFIC CONTROL	AM PEAK HOUR		PM PEAK HOUR	
		OVERALL LOS (V/C OR DELAY)	CRITICAL MOVEMENTS (V/C OR DELAY)	OVERALL LOS (V/C OR DELAY)	CRITICAL MOVEMENTS (V/C OR DELAY)
Montreal Road & Aviation Parkway	Signalized	D (0.86)	<b>WBL (0.95)</b>	<b>F (1.01)</b>	<b>WBL (1.57)</b>
Montreal Road & Montfort Hospital	Signalized	C (0.78)	WBTR (0.80)	B (0.65)	SBL (0.70)
Montreal Road & Den Haag Drive/ Lang's Road	Signalized	B (0.62)	NBL (0.87)	A (0.52)	NBL (0.68)

Based on the results of the analysis, the Montreal Road & Aviation Parkway intersection currently has several movements approaching their theoretical capacity during the weekday morning peak hour and the intersection as a whole is exceeding its theoretical capacity during the weekday afternoon peak hour. All other study area intersections are presently operating at an acceptable Level of Service (LOS 'D' or better).

**5.9.3.2 Future (2024) Background Traffic**

An intersection capacity analysis has been undertaken using the Future (2024) Background Traffic volumes presented in **Exhibit 6**, yielding the following results:

Table 16 - Intersection Capacity Analysis: Future (2024) Background Traffic

INTERSECTION	TRAFFIC CONTROL	AM PEAK HOUR		PM PEAK HOUR	
		OVERALL LOS (V/C OR DELAY)	CRITICAL MOVEMENTS (V/C OR DELAY)	OVERALL LOS (V/C OR DELAY)	CRITICAL MOVEMENTS (V/C OR DELAY)
Montreal Road & Aviation Parkway	Signalized <sup>1</sup>	D (0.86)	WBL (0.90)	<b>E (1.00)</b>	<b>NBL (1.07)</b>
	Signalized <sup>2</sup>	C (0.76)	SBTR (0.88)	<b>E (0.91)</b>	<b>NBL (0.97)</b>
Montreal Road & Montfort Hospital	Signalized	C (0.79)	WBTR (0.81)	B (0.68)	WBTR (0.70)
Montreal Road & Den Haag Drive/ Lang's Road	Signalized	B (0.62)	NBL (0.84)	A (0.58)	NBL (0.65)

Notes:

<sup>1</sup> – Optimized signal timing plan.

<sup>2</sup> – Dual westbound left-turn lane and optimized signal timing plan.

Under Future (2024) Background Traffic conditions, traffic operations at the Montreal Road & Aviation Parkway intersection are expected to improve slightly as a result of peak spreading and signal timing optimization. During the weekday afternoon peak hour, however, the intersection as a whole will be operating at its theoretical capacity and several movements are anticipated to be exceeding this threshold. Further analysis indicates that providing a dual westbound left-turn lane at the intersection would improve traffic operations such that no movements are exceeding their theoretical capacity during the afternoon peak hour, however there may be physical limitations to implementing this as a viable solution. This hypothetical scenario has been shown simply to demonstrate the existing capacity limitations of a critical turning movement.

All other study area intersections are projected to operate at an acceptable Level of Service (LOS 'D' or better) under these traffic conditions.

### 5.9.3.3 Future (2029) Background Traffic

An intersection capacity analysis has been undertaken using the Future (2029) Background Traffic volumes presented in **Exhibit 7**, yielding the following results:

Table 17 - Intersection Capacity Analysis: Future (2029) Background Traffic

INTERSECTION	TRAFFIC CONTROL	AM PEAK HOUR		PM PEAK HOUR	
		OVERALL LOS (V/C OR DELAY)	CRITICAL MOVEMENTS (V/C OR DELAY)	OVERALL LOS (V/C OR DELAY)	CRITICAL MOVEMENTS (V/C OR DELAY)
Montreal Road & Aviation Parkway	Signalized <sup>1</sup>	D (0.85)	WBL (0.92)	F (1.02)	NBL (1.08)
	Signalized <sup>2</sup>	B (0.69)	SBTR (0.87)	D (0.90)	NBL (0.94)
Montreal Road & Montfort Hospital	Signalized	C (0.76)	WBTR (0.78)	B (0.63)	SBL (0.68)
Montreal Road & Den Haag Drive/ Lang's Road	Signalized	A (0.60)	NBL (0.84)	A (0.55)	NBL (0.65)

Notes:

<sup>1</sup> – Optimized signal timing plan.

<sup>2</sup> – Dual westbound left-turn lane and optimized signal timing plan.

By the 2029 horizon year, the Level of Service at the Montreal Road & Aviation Parkway is expected to improve slightly under background traffic conditions as a result of the planned road network changes associated with Wateridge Village (i.e. the extension and formalization of Hemlock Road to the Aviation Parkway). Despite this network change, the intersection will continue to experience significant capacity issues prompting the need for mitigation measures. It should be noted that forecast volumes on the westbound left-turn are expected to be in the order of 300 vehicles per hour and therefore in the realm of when a dual left-turn lane would be typically considered. With this modification in place, the intersection may be able to operate at an improved Level of Service and within the City's performance standards of LOS 'D' or better.

As noted under Future (2024) Background Traffic conditions, all other study area intersections are expected to operate at an acceptable Level of Service (LOS 'D' or better).

**5.9.3.4 Future (2024) Total Traffic**

An intersection capacity analysis has been undertaken using the Future (2024) Total Traffic volumes presented in **Exhibit 8**, yielding the following results:

Table 18 - Intersection Capacity Analysis: Future (2024) Total Traffic

INTERSECTION	TRAFFIC CONTROL	AM PEAK HOUR		PM PEAK HOUR	
		OVERALL LOS (V/C OR DELAY)	CRITICAL MOVEMENTS (V/C OR DELAY)	OVERALL LOS (V/C OR DELAY)	CRITICAL MOVEMENTS (V/C OR DELAY)
Montreal Road & Aviation Parkway	Signalized <sup>1</sup>	D (0.87)	NBL (0.95)	F (1.02)	NBL (1.09)
	Signalized <sup>2</sup>	C (0.77)	SBTR (0.88)	E (0.92)	NBL (0.97)
Montreal Road & Montfort Hospital	Signalized	D (0.81)	WBTR (0.83)	B (0.69)	WBTR (0.71)
Montreal Road & Den Haag Drive/ Lang's Road	Signalized	B (0.65)	NBL (0.88)	A (0.59)	NBL (0.68)
Den Haag Drive & Site Access	Unsignalized	A (9.8s)	WBRL (9.8s)	A (9.5s)	WBRL (9.5s)

Notes:

<sup>1</sup> – Optimized signal timing plan.

<sup>2</sup> – Dual westbound left-turn lane and optimized signal timing plan.

Under background conditions, the Montreal Road & Aviation Parkway intersection was shown to be operating at or over capacity under its existing configuration, but with slightly improved conditions with the implementation of a dual westbound-left turn lane. Based on the above, the addition of site-generated traffic results in only a nominal impact to the Level of Service relative background traffic conditions and therefore is not expected to significantly exacerbate the capacity issues resulting from background travel demand.

All other signalized intersections as well as the site access intersection are expected to operate at an acceptable Level of Service (LOS 'D' or better) under these traffic conditions.

**5.9.3.5 Future (2029) Total Traffic**

An intersection capacity analysis has been undertaken using the Future (2029) Total Traffic volumes presented in **Exhibit 9**, yielding the following results:

Table 19 - Intersection Capacity Analysis: Future (2029) Total Traffic

INTERSECTION	TRAFFIC CONTROL	AM PEAK HOUR		PM PEAK HOUR	
		OVERALL LOS (V/C OR DELAY)	CRITICAL MOVEMENTS (V/C OR DELAY)	OVERALL LOS (V/C OR DELAY)	CRITICAL MOVEMENTS (V/C OR DELAY)
Montreal Road & Aviation Parkway	Signalized <sup>1</sup>	D (0.88)	WBL (0.94)	F (1.03)	NBL (1.08)
	Signalized <sup>2</sup>	C (0.72)	SBTR (0.87)	E (0.95)	NBL (0.99)
Montreal Road & Montfort Hospital	Signalized	C (0.78)	WBTR (0.80)	B (0.64)	SBL (0.68)
Montreal Road & Den Haag Drive/ Lang's Road	Signalized	B (0.62)	NBL (0.88)	A (0.56)	NBL (0.68)
Den Haag Drive & Site Access	Unsignalized	A (9.8s)	WBRL (9.8s)	A (9.5s)	WBRL (9.5s)

Notes:

<sup>1</sup> – Optimized signal timing plan.

<sup>2</sup> – Dual westbound left-turn lane and optimized signal timing plan.

As was noted in the 2024 analysis results, the impact of site-generated traffic on the intersection of Montreal Road & Aviation Parkway is shown to be nominal. The addition of site-generated traffic is expected to have a minor impact to the Montreal Road & Aviation Parkway intersection Level of Service. Without any intersection modifications, the overall volume-to-capacity ratio will increase slightly from 1.02 to 1.03, but has been shown to operate at LOS 'E' if existing capacity limitations are addressed by the City.

All other study area intersections are expected to continue operating at an acceptable Level of Service (LOS 'D' or better).

## **5.9.4 Intersection Design (MMLOS)**

### **5.9.4.1 Intersection MMLOS Methodology**

Analysis criteria for each of the four non-auto modes are briefly described as follows:

#### **Intersection Pedestrian Level of Service (PLOS)**

The PLOS at intersections is based on several factors including the number of traffic lanes that pedestrians must cross, corner radii, and whether the crossing allows for permissive or protective right or left turns, among others. The City of Ottawa target for PLOS along an Arterial Mainstreet is 'C'.

#### **Intersection Bicycle Level of Service (BLOS)**

The BLOS at intersections is dependent on several factors: the number of lanes that the cyclist is required to cross to make a left-turn; the presence of a dedicated right-turn lane on the approach; and the operating speed of each approach. The City target for BLOS along an Arterial Mainstreet spine route is 'C'.

#### **Intersection Transit Level of Service (TLOS)**

Intersection TLOS is based on the average signal delay experienced by transit vehicles at each intersection. The City Target TLOS along an Arterial Mainstreet with a Transit Priority Corridor (Continuous Lanes) is 'C'.

#### **Intersection Truck Level of Service (TkLOS)**

The Truck LOS (TkLOS) is based on the right-turn radii, as well as the number of receiving lanes for vehicles making a right-turn from the traffic lane being analyzed. The City of Ottawa target for TkLOS along an Arterial Mainstreet is 'D' for truck routes or 'E' for non-truck routes.

### **5.9.4.2 Intersection MMLOS Results**

An analysis of the existing and future conditions for each mode has been conducted based on the methodology prescribed in the City of Ottawa Multi-Modal Level of Service (MMLOS) Guidelines. The Level of Service (LOS) for each mode has been calculated for each intersection where signals exist or are anticipated under both existing and future conditions.

The intersection MMLOS results have been summarized in **Table 20**. Detailed intersection MMLOS analysis results are provided **Appendix I**.

Table 20 - Intersection MMLOS

LOCATION	LEVEL OF SERVICE BY MODE			
	PEDESTRIAN (PLOS)	BICYCLE (BLOS)	TRANSIT (TLOS)	TRUCK (TkLOS)
<b>Existing &amp; Future Conditions</b>				
Montreal Road & Aviation Parkway	<b>F</b> (Target: C)	<b>F</b> (Target: C)	<b>F</b> (Target: C)	N/A (Target: D)
Montreal Road & Montfort Hospital	<b>E</b> (Target: C)	<b>F</b> (Target: C)	<b>E</b> (Target: C)	<b>E</b> (Target: D)
Montreal Road & Den Haag Drive / Lang's Road	<b>F</b> (Target: C)	<b>F</b> (Target: C)	<b>F</b> (Target: C)	N/A (Target: D)

#### 5.9.4.3 Summary of Potential Improvements

Based on the MMLOS results outlined in **Table 20**, the following measures have been identified that could improve conditions for each travel mode:

##### Pedestrians

- The analysis indicates that all study area intersections are presently operating below the City's PLOS target of 'C'. Providing zebra stripe high-visibility pedestrian crosswalk markings, leading pedestrian intervals and converting all right-turn channels at the Montreal Road & Aviation Parkway intersection to smart channels would slightly improve pedestrian comfort, however, would not be sufficient to meet the PLOS target of 'C' due to the width of Montreal Road. Furthermore, the long cycle lengths at all the intersections result in long pedestrian delays which also results in poor PLOS.

##### Cyclists

- Based on the analysis, none of the study area intersections meet their respective BLOS targets. This is primarily because cyclists must cross several lanes of traffic in order to complete a left-turn movement. If pocket bike lanes were provided on Montfort Hospital's access road and on Den Haag Drive and two-stage left-turn bike boxes were provided at all intersections, then the BLOS target could be met. Alternatively, reconstructing all study area intersections as protected intersections would allow the BLOS target to be met as well.

##### Transit

- The results of the analysis indicate that all signalized study intersections do not meet the TLOS target of 'C'. The future Montreal Road Transit Priority Corridor is expected to reduce delays for transit such that eastbound and westbound delays will be minimized, however, this may result in increases in delays for other vehicles if the transit priority measures result in a reduction in capacity at the study intersections. Consideration should also be given for methods of reducing delays on the northbound and southbound approaches as these also contribute to the poor TLOS.

##### Truck

- Aviation Parkway, Den Haag Drive and Lang's Road are not designated trucking routes therefore the right-turns at these intersections do not need to meet the TkLOS target. It is expected, however, that the Montfort Hospital access road will need to accommodate large trucks. The TkLOS for the westbound right-turn movement does not meet the TkLOS target as there is only a single receiving lane. This receiving lane, however, is

approximately 7.0m wide and therefore is functionally equivalent to two lanes. As such, it is expected that it is wide enough to adequately accommodate large trucks.

The recommended measures listed above are intended only as suggestions to the City on how the MMLOS within the study area could be improved and do not identify measures to be implemented as a direct consequence of this development. The MMLOS analysis identifies existing and future deficiencies in the study area and these deficiencies are not expected to be exacerbated by the proposed development. It is recommended that the above MMLOS deficiencies be considered in the Environmental Assessment Study related to the Montreal Road Transit Priority Corridor.

## 5.10 Geometric Review

The following section reviews all geometric requirements for the study area intersections.

### 5.10.1 Sight Distance and Corner Clearances

The proposed site access is located along a straight segment of Den Haag Drive with clear sightlines in both directions. The Transportation Association of Canada (TAC) Geometric Design Guide for Canadian Roads indicates that a minimum corner clearance of 25m should be maintained between a private approach on a collector road and any intersecting roadway. The proposed site access will be located approximately 78m from Montreal Road and therefore meets this requirement.

### 5.10.2 Auxiliary Lane Analysis

Auxiliary turning lane requirements for all intersections within the study area are described as follows:

#### 5.10.2.1 Unsignalized Auxiliary Left-Turn Lane Requirements

Auxiliary left-turn lane warrant analysis was completed for the site access on Den Haag Drive. Based on the results of this analysis, an auxiliary left-turn lane is not warranted at this location under Future (2029) Total Traffic conditions. Auxiliary left-turn lane analysis results are provided in **Appendix L**.

#### 5.10.2.2 Signalized Auxiliary Left-Turn Requirements

A review of auxiliary left-turn lane storage requirements was completed at all signalized intersections within the study area under Future (2029) Total Traffic conditions. The review compared the projected 95th percentile queue lengths from Synchro operational results, and the standard queue length calculation based on the following equation:

$$\text{Storage Length} = \frac{NL}{C} \times 1.5$$

Where:

$N$  = number of vehicles per hour

$L$  = Length occupied by a vehicle in the queue = 7 m

$C$  = number of traffic signal cycles per hour

The results of the auxiliary left-turn lane analysis are summarized below in **Table 21**. The analysis assumes a dual westbound left-turn lane configuration at the Montreal Road & Aviation Parkway intersection as indicated as a likely requirement in the intersection capacity analysis presented previously.



Table 21 - Auxiliary Left-Turn Storage Analysis at Signalized Intersections

INTERSECTION	APPROACH	95TH %ILE QUEUE LENGTH / CALCULATED QUEUE (M)		EXISTING / PORPOSED PARALLEL LANE LENGTH (M)	STORAGE DEFICIENCY (M)
		AM PEAK HR	PM PEAK HR		
Montreal Road & Aviation Parkway <sup>1</sup>	NB	#55 / 80	#105 / 100	-	-
	SB	60 / 80	35 / 45	70	10
	EB	10 / 15	10 / 15	45	-
	WB	#135 / 140	#135 / 120	55	85
	WB (D)	35 / 80	#70 / 65	55	15
Montreal Road & Montfort Hospital	SB	20 / 20	55 / 55	60	-
	EB	35 / 60	m15 / 45	45	15
Montreal Road & Den Haag Drive / Lang's Road	NB	#100 / 90	55 / 55	35	65
	EB	5 / 5	10 / 15	45	-
	WB	5 / 10	5 / 5	50	-

Notes:

<sup>1</sup> – Queue length results for both the single and dual westbound left-turn lane have been provided given the uncertainty regarding the feasibility of this intersection modification.

(D) indicates dual left-turn lanes.

The results of the left-turn lane analysis indicate that auxiliary lane storage deficiencies can be expected at all intersections in the study area within the 2029 horizon year.

The existing westbound left-turn lane at the Montreal Road & Aviation Parkway intersection is limited by its proximity to the Montfort Hospital intersection therefore it is not recommended that this left-turn lane be extended.

By 2029, under total traffic conditions, the northbound left-turn lane at the Montreal Road & Den Haag Drive / Lang's Road intersection is expected to be deficient by 65m. Based on the intersection capacity analysis, the 95<sup>th</sup> percentile queue is already currently exceeding the available storage length. This is likely resulting in right-turning traffic accessing Montreal Road via LeBoutillier Drive. Should this be an existing concern, it is noted that Den Haag Drive has a minimum pavement width of 11m and therefore the left-turn lane could be extended by way of adjustments to pavement markings without requiring physical modification to the roadway or loss of on-street parking and could be considered by the City.

Based on the queue length analysis, there is the potential that the site access may be occasionally blocked by the northbound left-turn queue at the Montreal Road & Den Haag Drive / Lang's Road intersection up to 50% of the time when the signal is red. As this is only expected to occur during the weekday morning peak hour when inbound traffic to the site will be nominal and that the access is located near the tail end of this maximum queue and at the southern boundary of the site, no operational issues are anticipated.

The remaining storage length deficiencies indicated in Table 21 above are minimal and therefore left-turn lane extensions are not justified for those locations.

### 5.10.2.3 Unsignalized Auxiliary Right-Turn Lane Requirements

The Transportation Association of Canada (TAC) suggests that auxiliary right-turn lanes should be considered “when the volume of decelerating or accelerating vehicles compared with through vehicles causes undue hazard.” Consideration for auxiliary right-turn lanes is typically given when the right-turning traffic exceeds 10% of the through volume and is at least 60 vehicles per hour.

A negligible volume of traffic is expected to turn right at the site access and, therefore, an auxiliary right-turn lane is not required at this location.

### 5.10.2.4 Signalized Auxiliary Right-Turn Lane Requirements

For signalized intersections, Section 9.14 of TAC suggests that auxiliary right-turn lanes shall be considered when more than 10% of vehicles on an approach are turning right and when the peak hour demand exceeds 60 vehicles. The purpose of this guideline is to mitigate operational impacts to through-traffic, particularly on high-speed arterial roadways, and may not be applicable in all circumstances.

The results of the auxiliary right-turn lane analysis are summarized below in **Table 22** below:

Table 22 – Auxiliary Right-Turn Lane Storage Analysis at Signalized Intersections

INTERSECTION	APPROACH	NUMBER OF RIGHT-TURNS / % RIGHT-TURNS		95TH %ILE QUEUE (M) AM / PM	EXISTING / PROPOSED PARALLEL LANE LENGTH (M)	STORAGE DEFICIENCY (M)
		AM PEAK HOUR	PM PEAK HOUR			
Montreal Road & Aviation Parkway	NB	333 / 43%	335 / 36%	60 / 60	55	5
	SB	63 / 11%	58 / 12%	- / -	- <sup>1</sup>	-
	EB	256 / 24%	283 / 20%	30 / 25	30	-
	WB	159 / 10%	230 / 15%	15 / 10	25	-
Montreal Road & Montfort Hospital	SB	131 / 69%	176 / 53%	15 / 20	- <sup>2</sup>	-
	WB	126 / 8%	83 / 6%	- / -	-	-
Montreal Road & Den Haag Drive / Lang's Road	NB	31 / 10%	77 / 32%	- / -	-	- <sup>3</sup>
	SB	18 / 69%	37 / 73%	- / -	-	-
	EB	214 / 18%	198 / 12%	15 / 15	25	-
	WB	10 / 1%	7 / 1%	- / -	-	-

Notes:

<sup>1</sup> – This approach has a right-turn channel with no auxiliary lane.

<sup>2</sup> – As this is a T-intersection, there is no limit to the right-turn storage length.

<sup>3</sup> – Meets the right-turn criteria, however, as through volumes are very low the shared through-right lane effectively operates as a dedicated right-turn lane.

Based on the results presented above, the northbound right-turn lane at the Montreal Road & Aviation Parkway intersection is deficient by less than 5m and can be considered negligible. Given the small magnitude of this deficiency it is not recommended that this be addressed unless the

intersection as a whole were to be reconstructed. A southbound right-turn auxiliary lane is warranted at this intersection and could be considered as a potential future intersection modification. All other right-turn lanes are expected to be sufficiently long to accommodate the projected Future (2029) Total Traffic demand.

## 5.11 Summary of Recommended Modifications

Based on the intersection capacity, Multi-Modal Level of Service and auxiliary lane analyses results presented above, no off-site improvements to the adjacent road network are required as a direct consequence of the proposed development in order to accommodate multi-modal transportation demands generated by the site with the exception of adjustments to the left-turn lane markings on Den Haag Drive to include an additional 65 meters of storage.

It was observed that the intersection of Montreal Road & Aviation Parkway is presently approaching its theoretical capacity during the weekday afternoon peak hour and this condition is expected to worsen under future background traffic conditions. The addition of a dual westbound left-turn lane was shown to alleviate this issue; however the feasibility of this solution is uncertain. The analysis has indicated that traffic generated by the proposed development will have a negligible impact on intersection performance, therefore this is considered to be a broader issue relating to background traffic. It is expected that any solution to the intersection's capacity constraints will need to account for the future Montreal Road Transit Priority project with long-term solutions identified through the associated EA process.

The segment-based MMLOS analysis results indicated that Montreal Road will require continuous bus lanes and cycle tracks in order to meet its Transit and Bicycle Level of Service targets. A 2m boulevard for the sidewalk would improve its Pedestrian Level of Service, however, would not be sufficient to meet the target. Many of these improvements are likely to be addressed as part of the Montreal Road Transit Priority project.

On Den Haag Drive, the sidewalk on the east side would require a 2m boulevard to meet the Pedestrian Level of Service target while bike lanes would improve the Bicycle Level of Service to 'C'. Operating speed reductions would be required to meet the Bicycle Level of Service target. As a result of utility conflicts for sidewalk modifications and insufficient pavement width to accommodate bicycle lanes along the development frontage, neither of these improvements are feasible.

Intersection-based MMLOS analysis was completed for all signalized study area intersections which indicated that none of them met any of their MMLOS targets. Section 5.9.4.3 summarizes potential improvements that can be implemented in order to meet the MMLOS targets.

It should be noted that the MMLOS results identified existing deficiencies with respect to user comfort as well as potential mitigation measures that could be considered for implementation by the City but are not required to safely accommodate the proposed development. It is recommended that these deficiencies be considered in the future intersection designs as part of the Montreal Road Transit Priority project.

The auxiliary lane analysis identified several minor deficiencies at intersections within the study area that may be encountered by the 2029 horizon year; however, no auxiliary lane modifications are recommended. Consideration could be given to extending the northbound left-turn lane at the Montreal Road & Den Haag Drive / Lang's Road intersection to 100m through adjustments to pavement markings.

## 6 Conclusion

The proposed residential development at 800 Montreal Road is expected to generate up to 60 and 66 two-way vehicular trips during the weekday morning and afternoon peak hours, respectively. The intersection capacity analysis found that the Montreal Road & Aviation Parkway intersection is currently exceeding its theoretical capacity during the weekday afternoon peak hour and is expected to continue operating poorly under future background traffic conditions. The addition of a dual westbound left-turn lane was found to alleviate this issue; however, the feasibility of implementing this modification is uncertain. The analysis has indicated that traffic generated by the proposed development will have a negligible impact on intersection performance, therefore this is a broader issue relating to background traffic. It is expected that any solution to the intersection's capacity constraints will need to account for the future Montreal Road Transit Priority project with long-term solutions identified through the associated EA process.

A multi-modal analysis of each study area intersection identified deficiencies in the existing road network and potential remediation measures have been suggested which the City could consider in order to meet the prescribed targets. These remediation measures would improve mobility and comfort for all transportation modes but are not required to safely accommodate the proposed development.

An auxiliary lane analysis was completed for all of the study area intersections which identified that adjustments to the lane markings at the Montreal Road & Den Haag Drive / Lang's Road intersection should be considered by the City to address an existing storage deficiency while accommodating the 95<sup>th</sup> percentile queue length of 100m.

As no physical modifications are required as a result of site-generated demand, an RMA will not be required. Further, as all required road network modifications are a result of background demand, a post-development monitoring plan is not necessary.

**Based on the findings of this study, it is the overall opinion of IBI Group that the proposed development will integrate well with the adjacent transportation network and will have an overall negligible impact on the operations of study area intersections.**

## Appendix A – City Circulation Comments

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## **Step 1 & 2 Submission (Screening & Scoping) – Circulation Comments & Response**

Report Submitted: September 9, 2020

Comments Received: September 16, 2020

Transportation Project Manager: Mike Giampa

No comments for Step 1 & 2 Screening & Scoping report.

## **Step 3 Submission (Forecasting) – Circulation Comments & Response**

Report Submitted: September 23, 2020

Comments Received: October 9, 2020

Transportation Project Manager: Mike Giampa

### **Section 3.2.3 - Existing Transit Facilities and Service**

Include transit routes 17 and 27.

- IBI Response: Section 3.2.3 has been updated to include these two transit routes.

### **Section 4.3.3 - Adjustment to Background Network Demands**

The indication that background mode shares will only adjust once transit priority measures are in place is accepted.

- IBI Response: Acknowledged.

### **Section 4.4.2 - Future Total Traffic Volumes**

Justify the reduction of volumes between the 2024 and 2029 horizon years if the background growth rate is 0% and no demand rationalization has been applied.

- IBI Response: Section 4.4.1 has been updated to clarify the reduction in background traffic volumes and is attributed to traffic pattern changes as a result of the Hemlock Road extension to Aviation Parkway in conjunction with future phases of Wateridge Village. No reductions were applied to site-generated traffic volumes between the 2024 and 2029 analysis years.

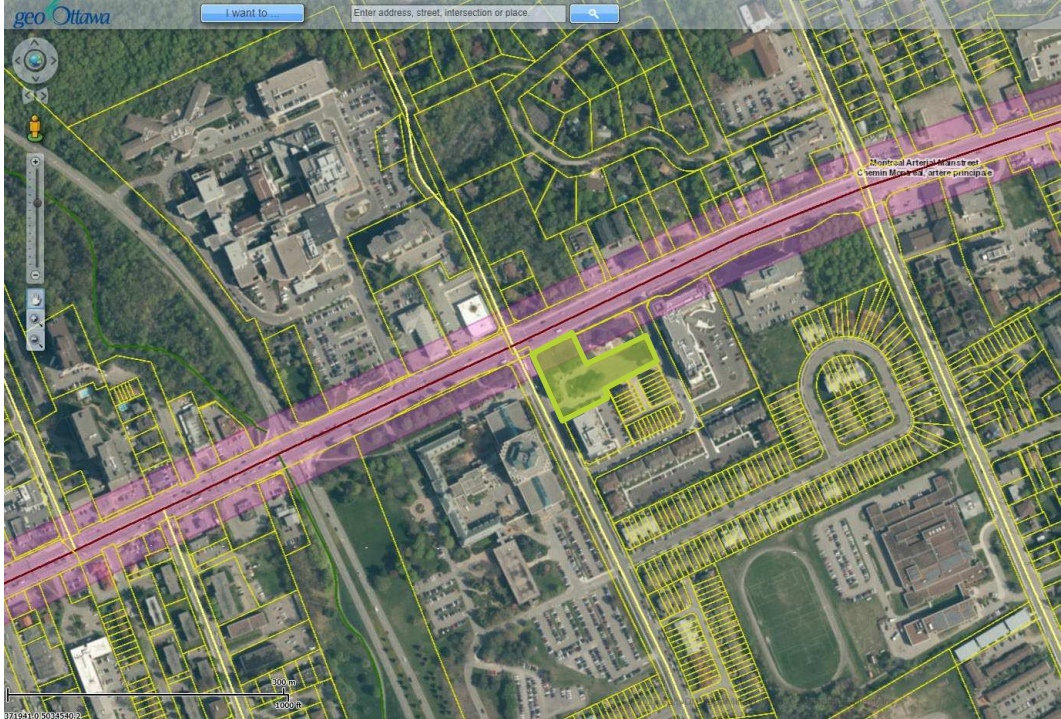
## Appendix B – Screening Form

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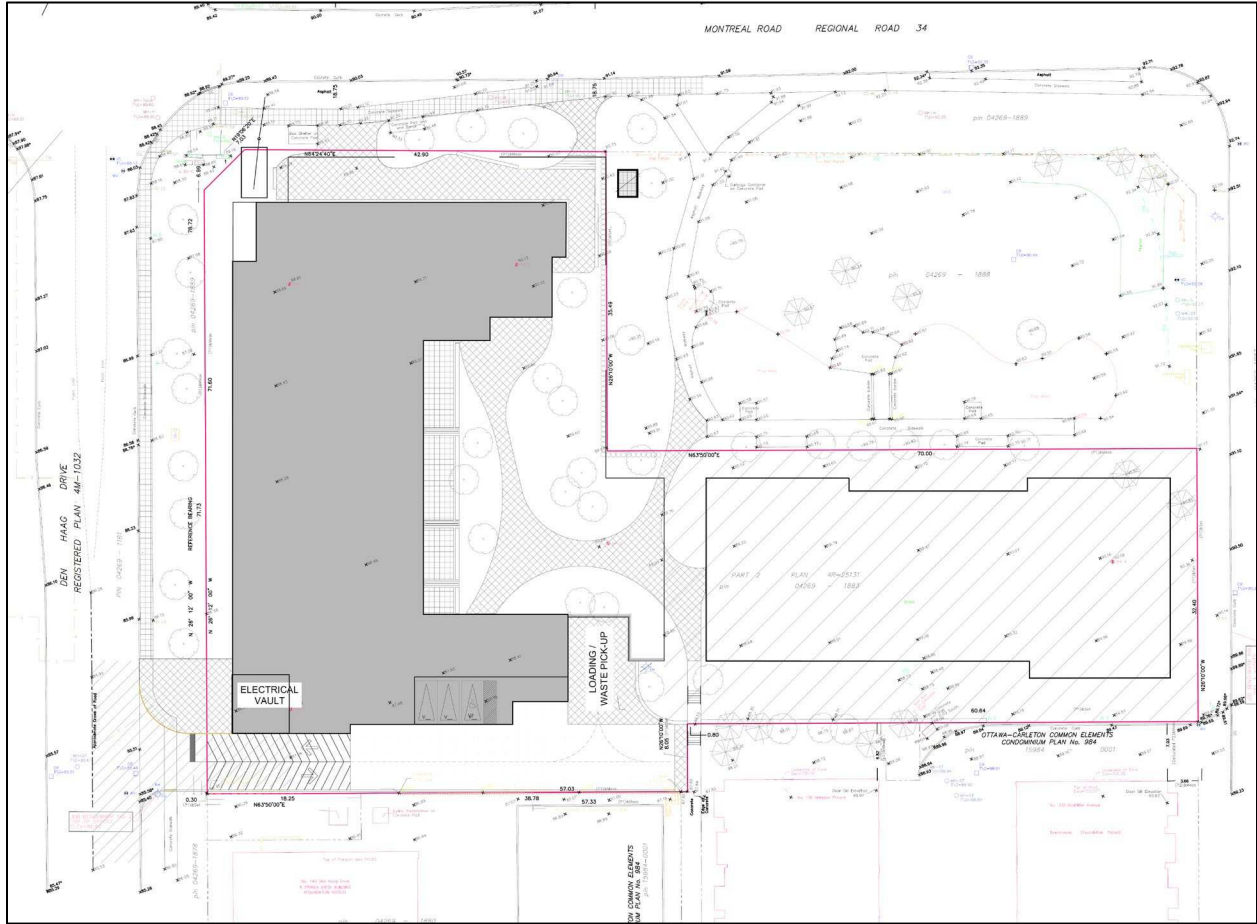


City of Ottawa 2017 TIA Guidelines Screening Form

1. Description of Proposed Development

Municipal Address	800 Montreal Road
Description of Location	<p>The site is bound by Montreal Road to the north, Den Haag Drive to the west, LeBoutillier Avenue to the east and residential development to the south.</p> 
Land Use Classification	Mid-Rise Residential
Development Size (units)	126 Apartment Units (Phase 1), 46 Apartment Units (Phase 2)
Development Size (m <sup>2</sup> )	75.6m <sup>2</sup> Retail Space
Number of Accesses and Locations	One (1) full-movement access on Den Haag Drive.
Phase of Development	Phase 1 & 2
Buildout Year	Phase 1: 2023 Phase 2: 2024

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.

➤ **Based on the results above, the Trip Generation Trigger is satisfied.**

## 3. Location Triggers

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

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

➤ **Based on the results above, the Location Trigger is satisfied.**

#### 4. Safety Triggers

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

➤ **Based on the results above, the Safety Trigger is NOT satisfied.**

#### 5. Summary

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

**CONCLUSION:** As the Trip Generation and Location triggers are satisfied, it is concluded that a TIA is required.

## Appendix C – Turning Movement Counts

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## Turning Movement Count - Peak Hour Diagram

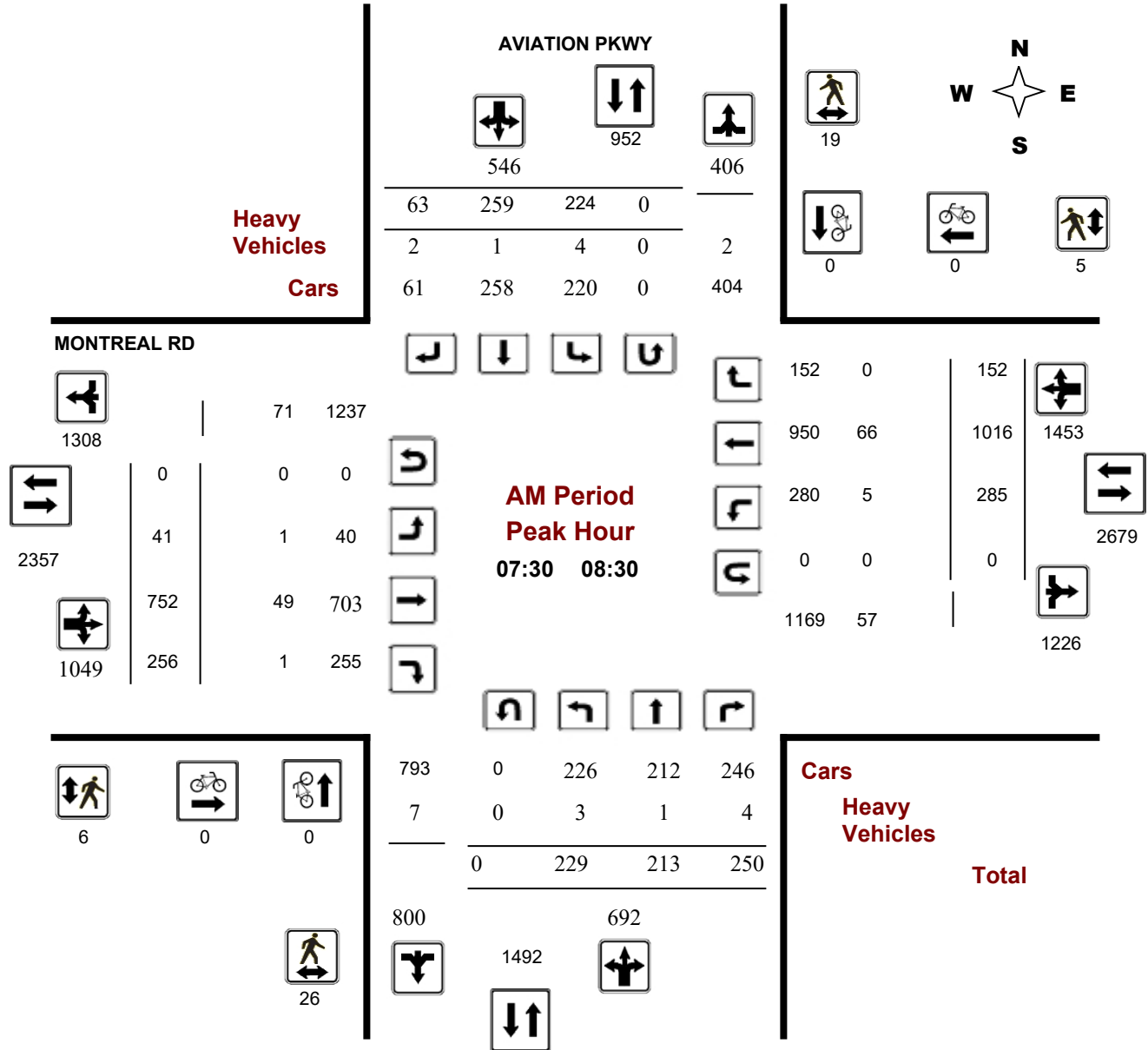
### AVIATION PKWY @ MONTREAL RD

**Survey Date:** Thursday, January 25, 2018

**Start Time:** 07:00

**WO No:** 37442

**Device:** Miovision



**Comments**

## Turning Movement Count - Peak Hour Diagram

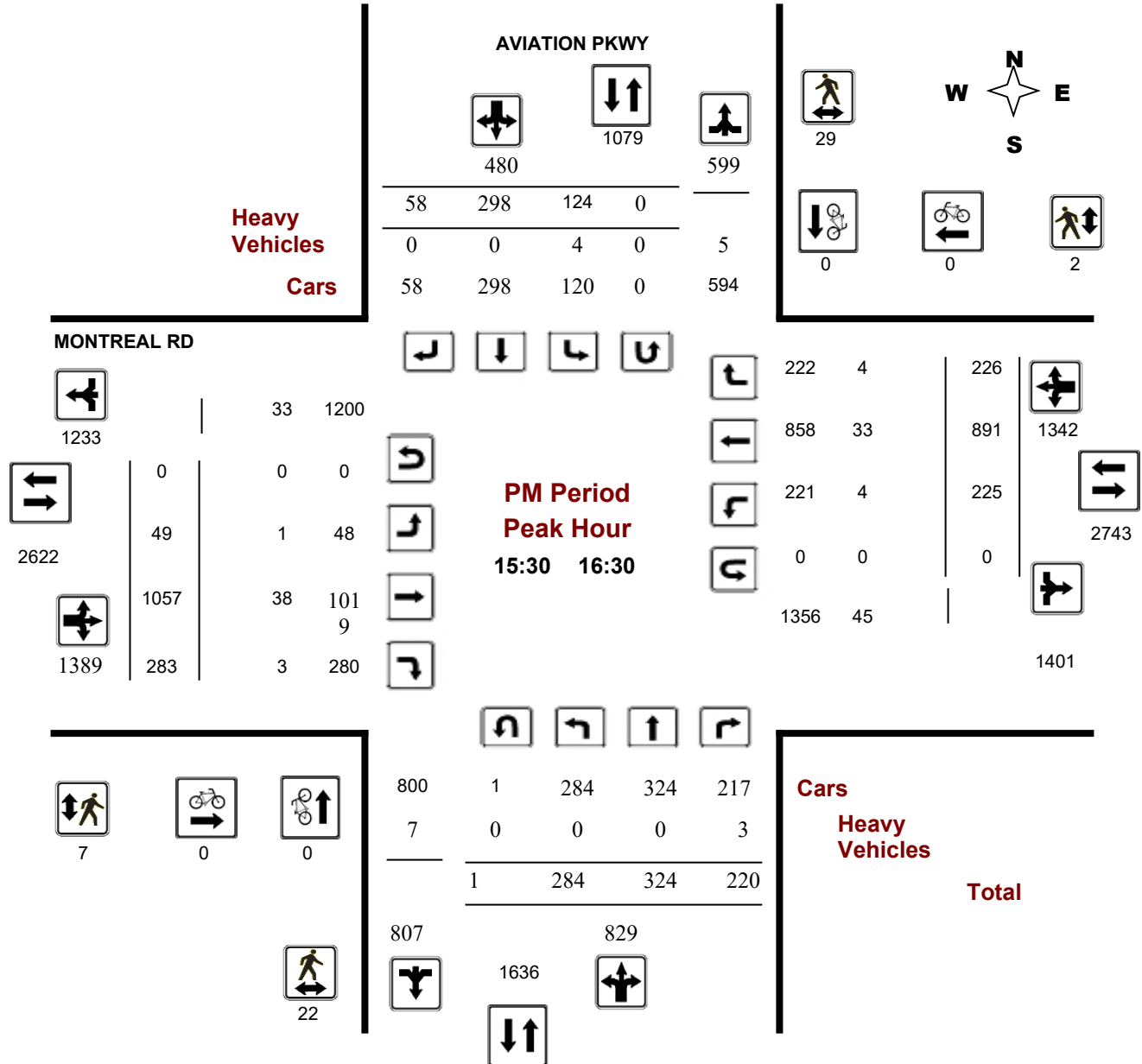
### AVIATION PKWY @ MONTREAL RD

**Survey Date:** Thursday, January 25, 2018

**Start Time:** 07:00

**WO No:** 37442

**Device:** Miovision



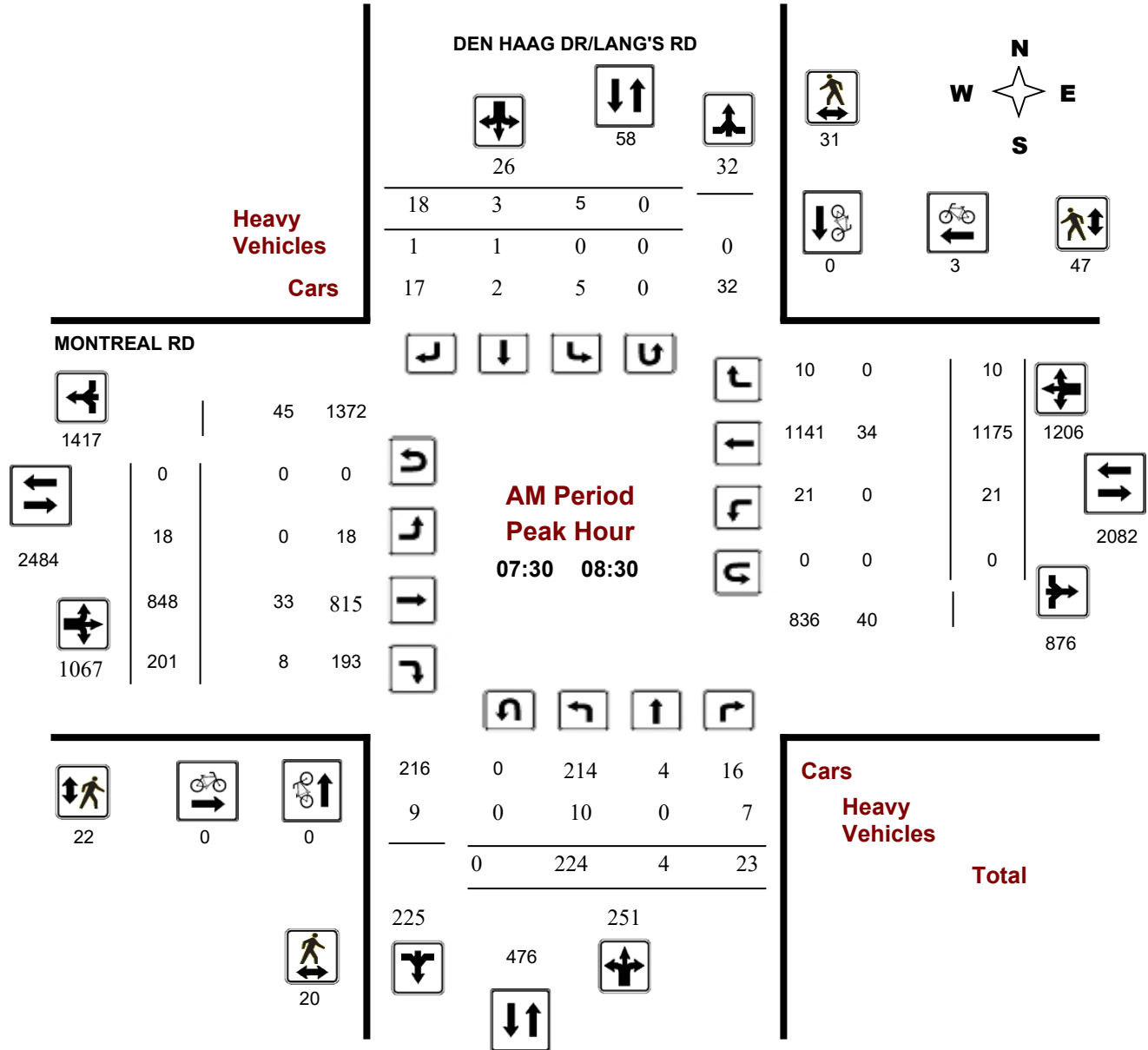
## Turning Movement Count - Peak Hour Diagram MONTREAL RD @ DEN HAAG DR/LANG'S RD

**Survey Date:** Wednesday, January 30, 2019

**Start Time:** 07:00

**WO No:** 38349

**Device:** Miovision





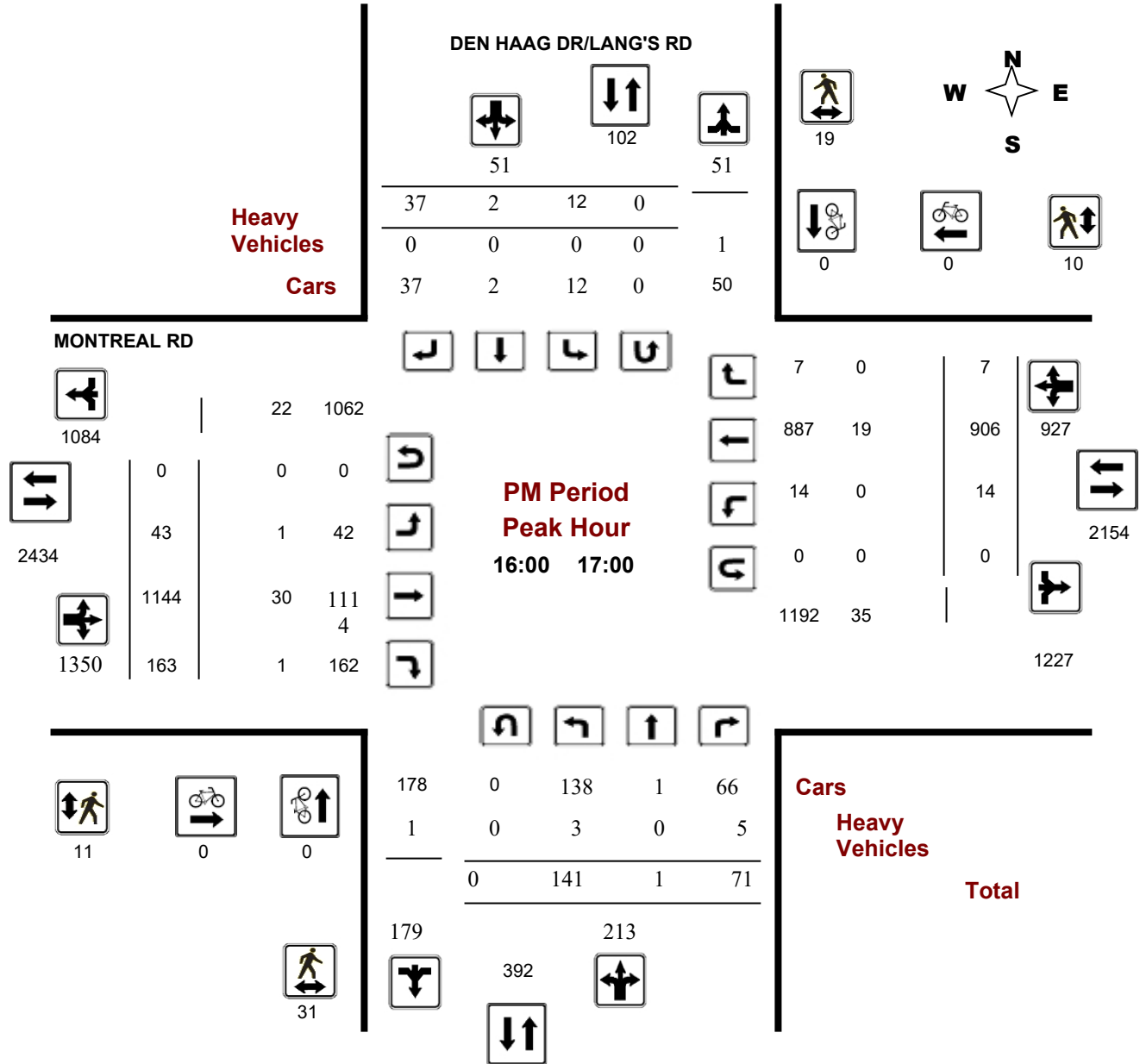
## Turning Movement Count - Peak Hour Diagram MONTREAL RD @ DEN HAAG DR/LANG'S RD

**Survey Date:** Wednesday, January 30, 2019

**WO No:** 38349

**Start Time:** 07:00

**Device:** Miovision



**Comments**

## Turning Movement Count - Peak Hour Diagram

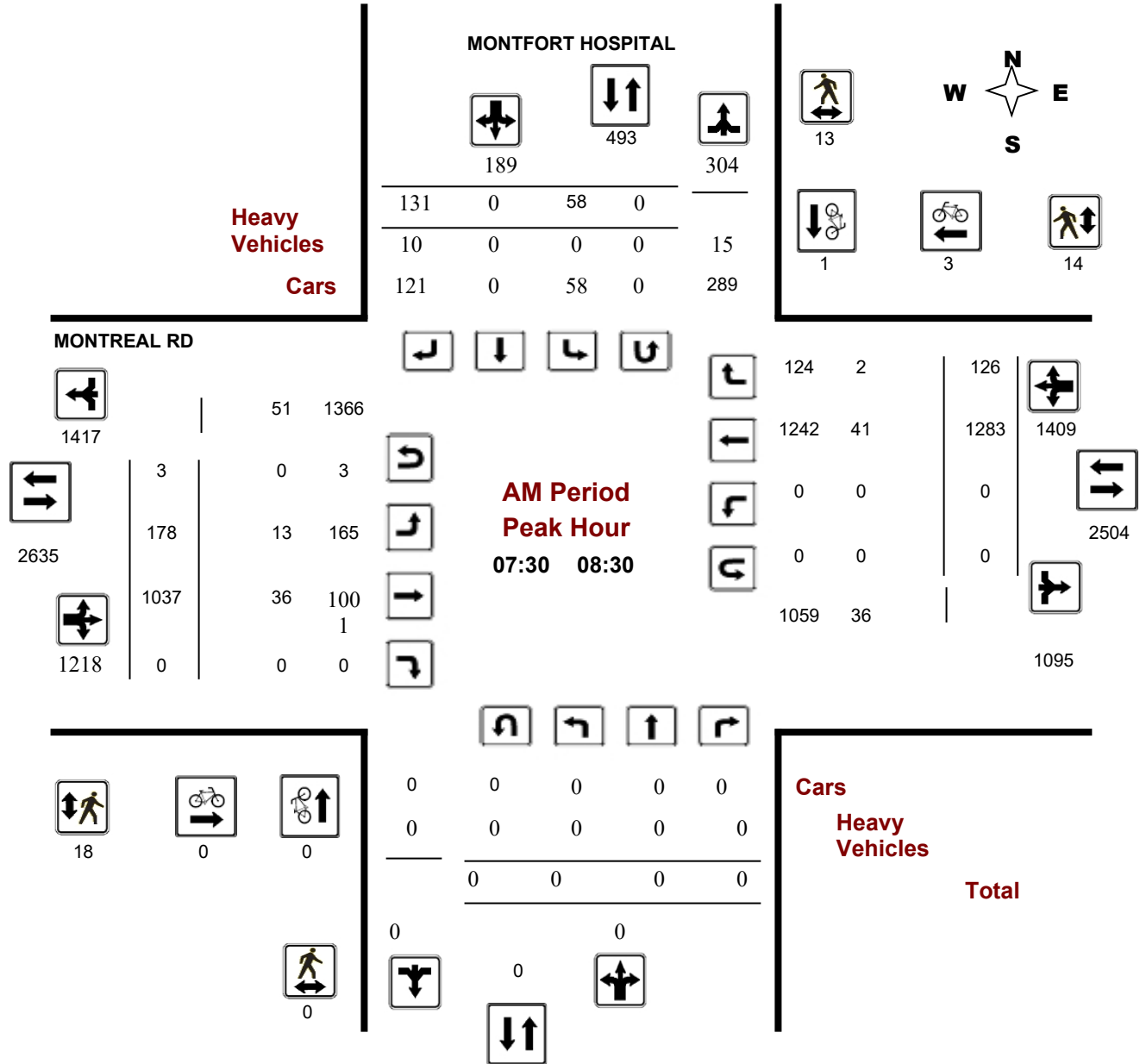
### MONTREAL RD @ MONTFORT HOSPITAL

**Survey Date:** Wednesday, January 30, 2019

**Start Time:** 07:00

**WO No:** 38342

**Device:** Miovision



## Turning Movement Count - Peak Hour Diagram

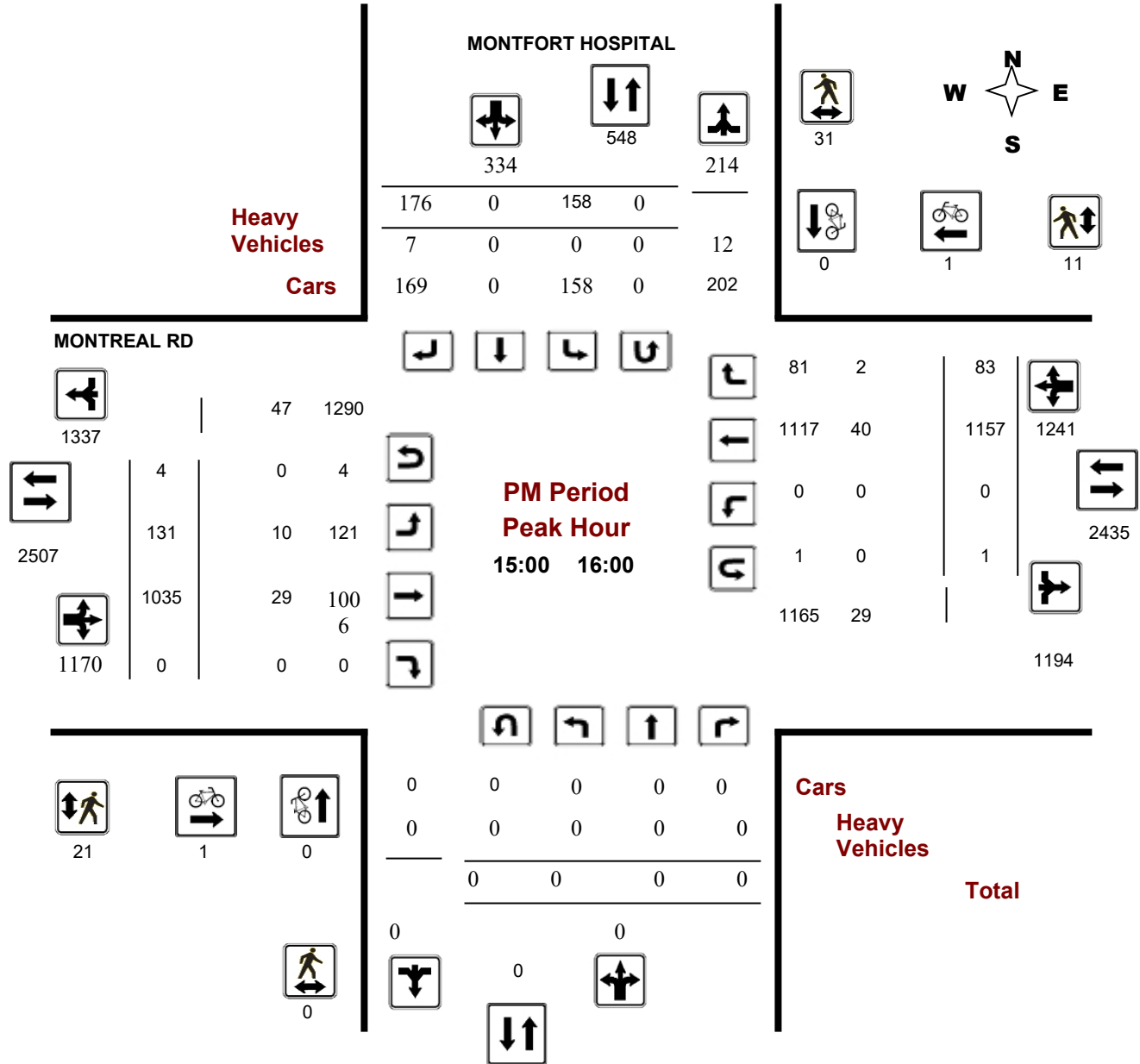
### MONTREAL RD @ MONTFORT HOSPITAL

**Survey Date:** Wednesday, January 30, 2019

**Start Time:** 07:00

**WO No:** 38342

**Device:** Miovision



## Appendix D – OC Transpo Routes

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# 12

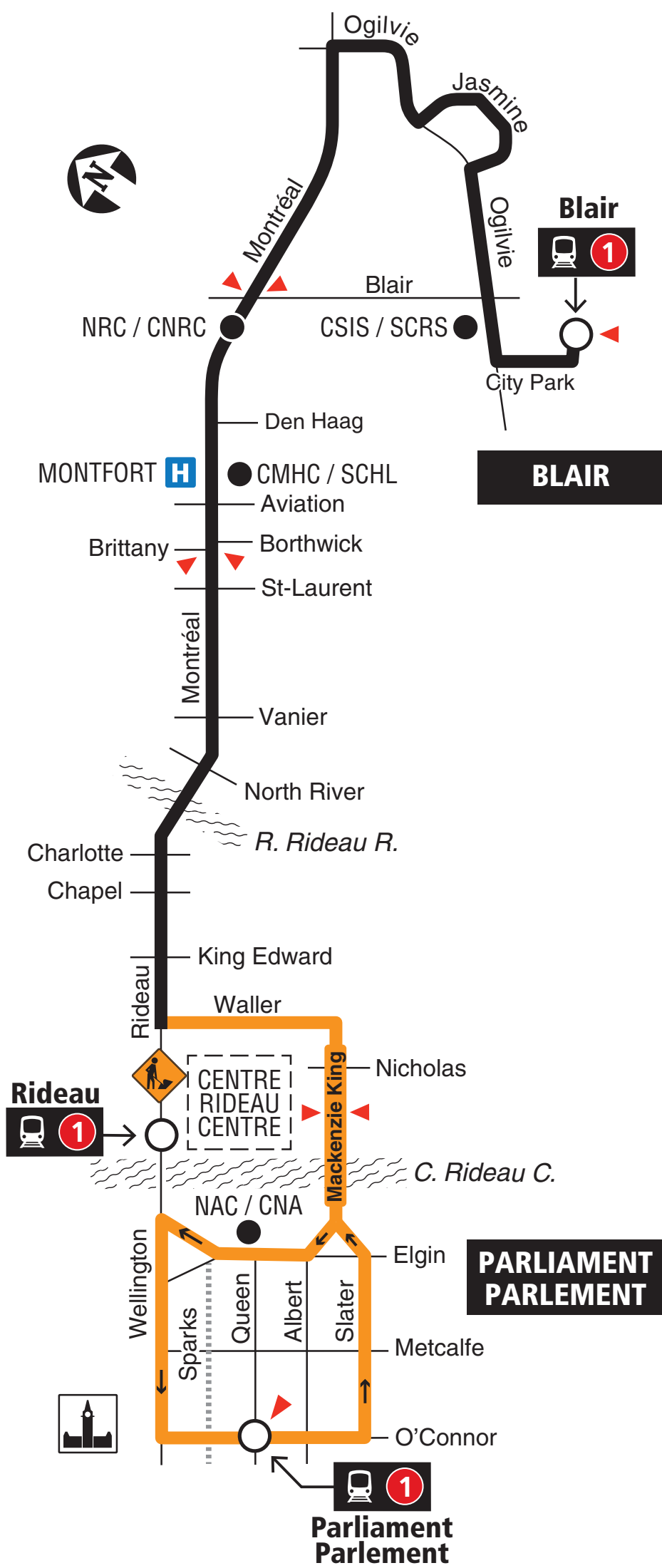
## PARLIAMENT PARLEMENT BLAIR

### Fréquent

#### 7 days a week / 7 jours par semaine

All day service

Service toute la journée



Station



Temporary routing due to Rideau St. closure /  
Trajet temporaire lors de la fermeture de la rue Rideau



Timepoint / Heures de passage

2020.04



**Schedule / Horaire.....613-560-1000**

**Text / Texto .....560560**

*plus your four digit bus stop number / plus votre numéro d'arrêt à quatre chiffres*

Customer Service

Service à la clientèle ..... **613-741-4390**

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

Security / Sécurité ..... **613-741-2478**

**Effective April 26, 2020**

**En vigueur le 26 avril 2020**



**INFO 613-741-4390**  
**octranspo.com**



# 15

## GATINEAU BLAIR

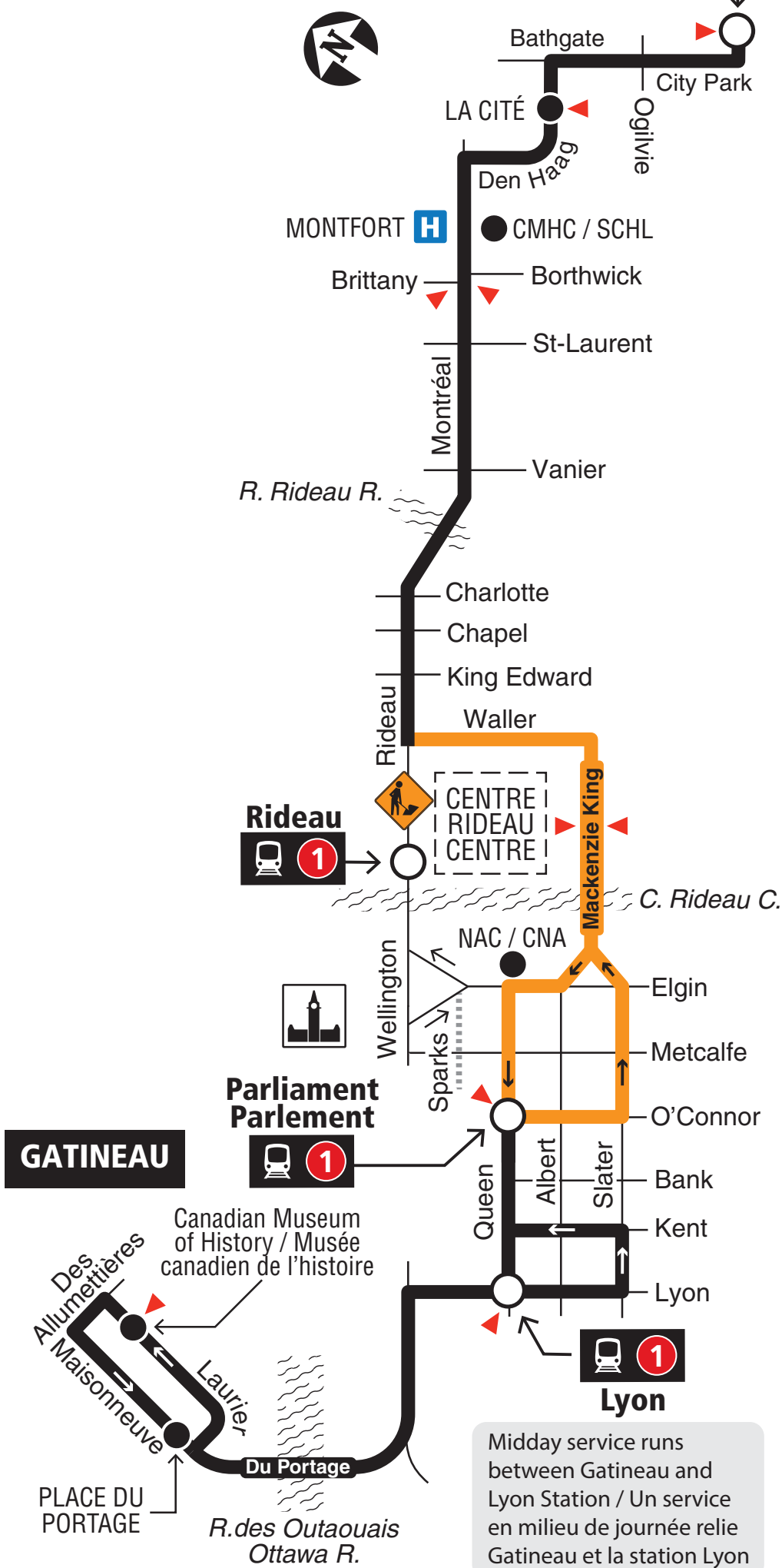
### Local

**Monday to Friday / Lundi au vendredi**

Peak periods & limited midday service / Périodes de pointe et service limité en milieu de journée

**BLAIR**

**Blair**



Station



Temporary routing due to Rideau St. closure /  
Trajet temporaire lors de la fermeture de la rue Rideau



Timepoint / Heures de passage

2020.04



**Schedule / Horaire.....613-560-1000**

**Text / Texto .....560560**

*plus your four digit bus stop number / plus votre numéro d'arrêt à quatre chiffres*

Customer Service

Service à la clientèle ..... **613-741-4390**

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

Security / Sécurité ..... **613-741-2478**

**Effective April 26, 2020**

**En vigueur 26 avril 2020**



**INFO 613-741-4390**  
**octranspo.com**

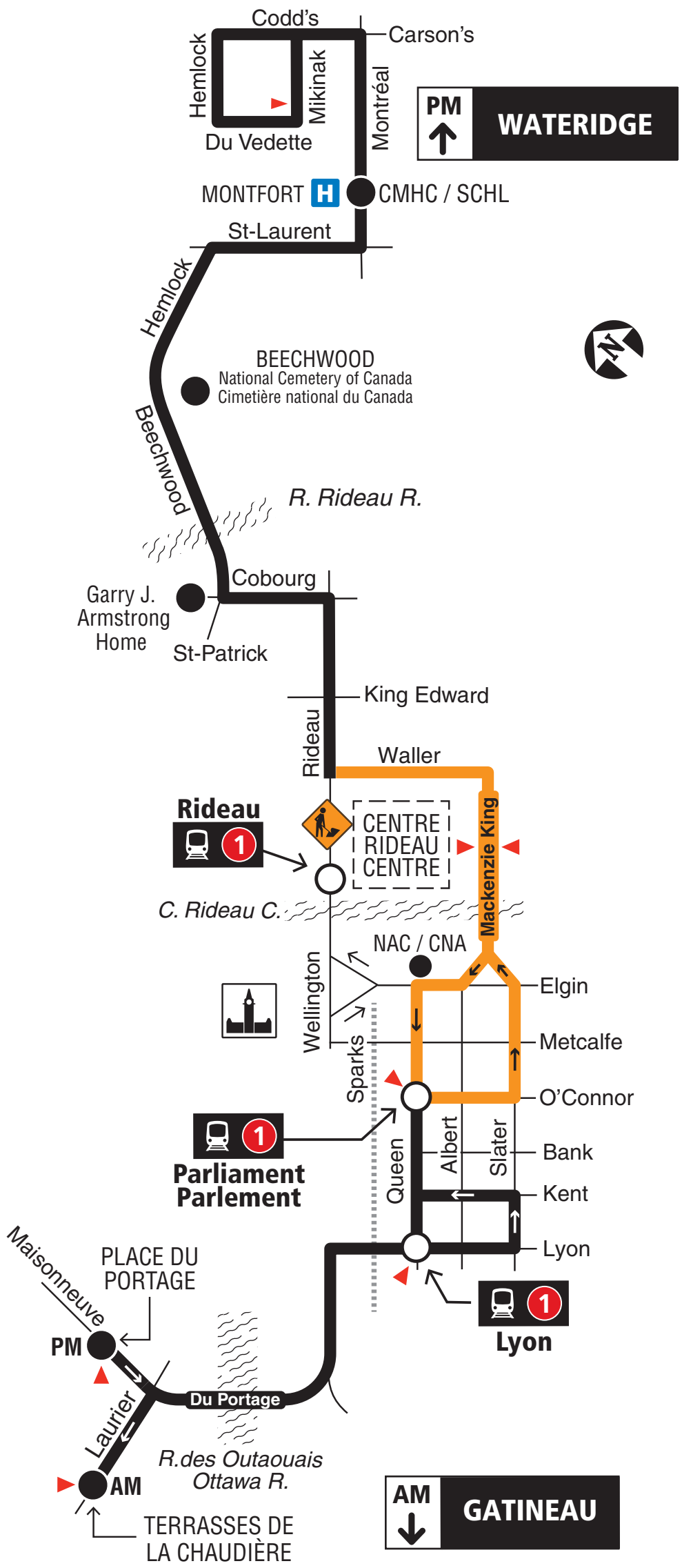


# 17

## WATERIDGE GATINEAU

### Local

**Monday to Friday / Lundi au vendredi**  
Peak periods only  
Périodes de pointe seulement



2020.04



**Schedule / Horaire.....613-560-1000**

**Text / Texto .....560560**

*plus your four digit bus stop number / plus votre numéro d'arrêt à quatre chiffres*

Customer Service

Service à la clientèle ..... **613-741-4390**

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

Security / Sécurité ..... **613-741-2478**

**Effective April 26, 2020**

**En vigueur 26 avril, 2020**



**INFO 613-741-4390**  
**octranspo.com**



# 20

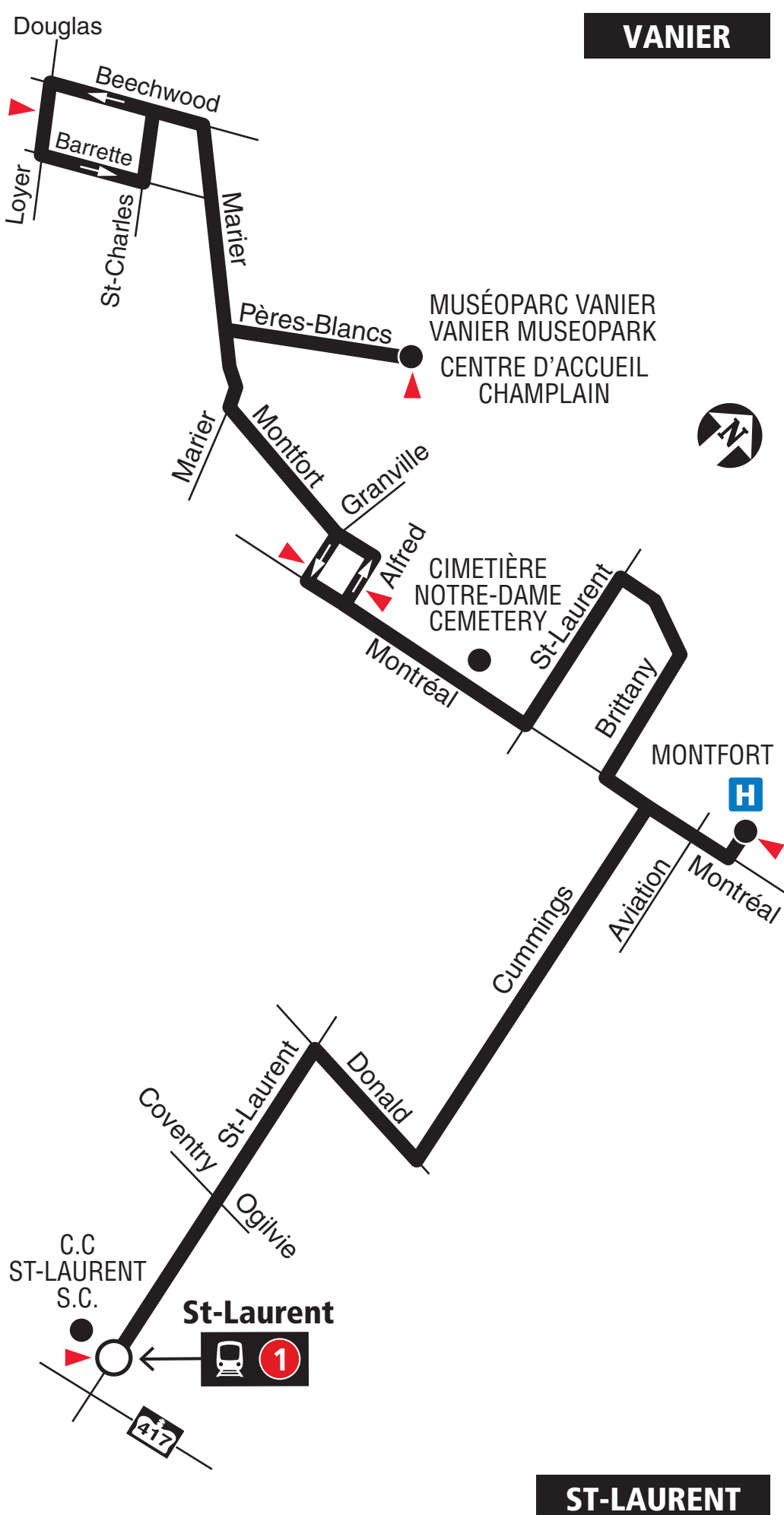
## VANIER

## ST-LAURENT

### 7 days a week / 7 jours par semaine

All day service

Service toute la journée



**VANIER**

**ST-LAURENT**



Station



Timepoint / Heures de passage

2019.06



**Schedule / Horaire.....613-560-1000**

**Text / Texto .....560560**

*plus your four digit bus stop number / plus votre numéro d'arrêt à quatre chiffres*

Customer Service

Service à la clientèle ..... **613-741-4390**

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

Security / Sécurité ..... **613-741-2478**

**Effective September 2, 2018**

**En vigueur 2 septembre 2018**



**INFO 613-741-4390**

**octranspo.com**





# 25

## MILLENNIUM

### LA CITÉ BLAIR

### Fréquent

**7 days a week / 7 jours par semaine**

All day service

Service toute la journée



2020.07



**Schedule / Horaire.....613-560-1000**

**Text / Texto .....560560**

*plus your four digit bus stop number / plus votre numéro d'arrêt à quatre chiffres*

Customer Service

Service à la clientèle ..... **613-741-4390**

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

Security / Sécurité ..... **613-741-2478**

**Effective August 8, 2020**

**En vigueur 8 août 2020**



**INFO 613-741-4390**  
**octranspo.com**



# 27

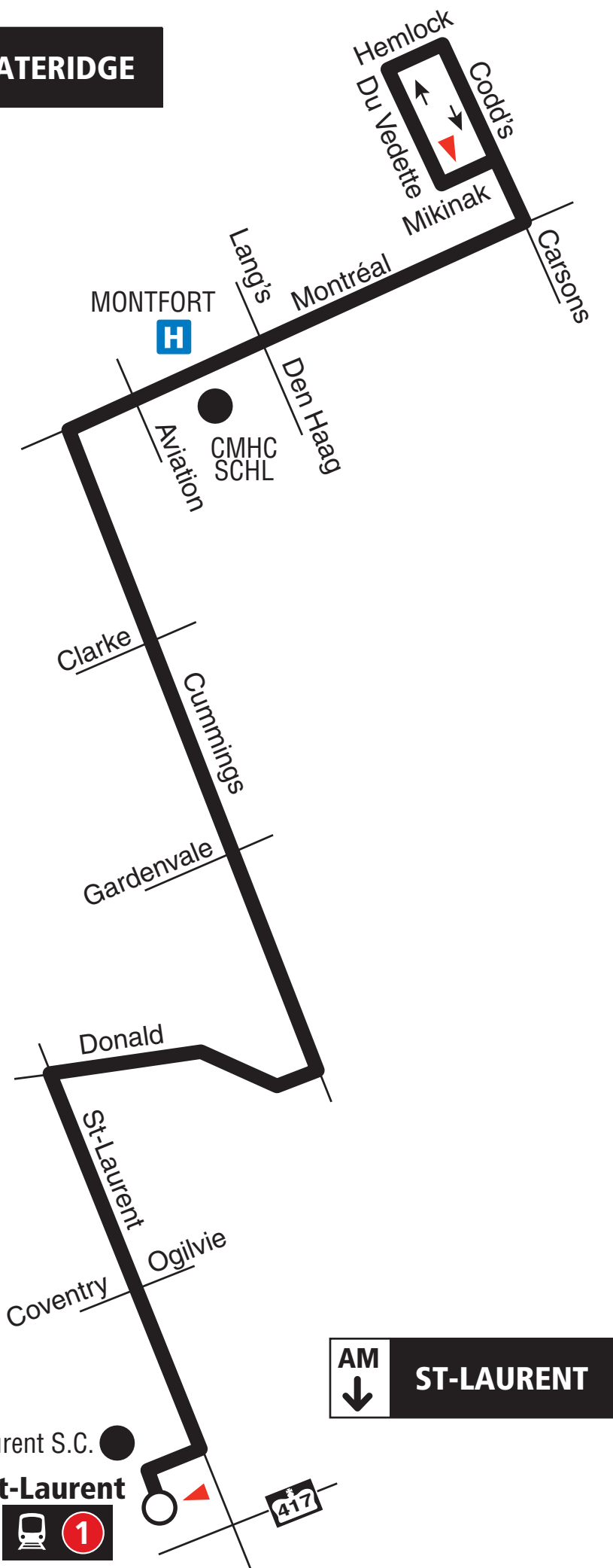
## WATERIDGE ST-LAURENT

### Local

**Monday to Friday / Lundi au vendredi**  
Peak Periods  
Périodes de pointe

PM  
↑

**WATERIDGE**



AM  
↓

**ST-LAURENT**

C.C. St-Laurent S.C. ●

**St-Laurent**



417



Station



Timepointe / Heures de passage

2019.06



**Schedule / Horaire.....613-560-1000**

**Text / Texto .....560560**

*plus your four digit bus stop number / plus votre numéro d'arrêt à quatre chiffres*

Customer Service

Service à la clientèle ..... **613-741-4390**

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

Security / Sécurité ..... **613-741-2478**

**Effective April 23, 2018**

**En vigueur 23 avril 2018**



INFO 613-741-4390  
octranspo.com

## Appendix E – Collision Data

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# Transportation Services - Traffic Services

## Collision Details Report - Public Version

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

**Location:** AVIATION PKWY @ MONTREAL RD

**Traffic Control:** Traffic signal

**Total Collisions:** 100

Date/Day/Time	Environment	Impact Type	Classification	Surface Cond'n	Veh. Dir	Vehicle Manoeuver	Vehicle type	First Event	No. Ped
2014-Jan-15, Wed,11:53	Clear	Angle	P.D. only	Wet	East	Going ahead	Automobile, station wagon	Other motor vehicle	0
					North	Turning left	Automobile, station wagon	Other motor vehicle	
2014-Jan-22, Wed,14:41	Clear	Angle	P.D. only	Dry	East	Going ahead	Pick-up truck	Other motor vehicle	0
					North	Turning left	Automobile, station wagon	Other motor vehicle	
2014-Feb-14, Fri,12:18	Snow	Rear end	P.D. only	Loose snow	West	Slowing or stopping	Automobile, station wagon	Other motor vehicle	0
					West	Stopped	Automobile, station wagon	Other motor vehicle	
					West	Stopped	Automobile, station wagon	Other motor vehicle	
2014-Apr-12, Sat,14:08	Clear	Angle	P.D. only	Dry	East	Going ahead	Automobile, station wagon	Other motor vehicle	0
					North	Turning left	Pick-up truck	Other motor vehicle	
2014-Apr-17, Thu,08:20	Clear	Turning movement	P.D. only	Dry	South	Turning left	Automobile, station wagon	Other motor vehicle	0
					North	Going ahead	Automobile, station wagon	Other motor vehicle	
2014-May-08, Thu,08:15	Clear	Rear end	P.D. only	Dry	East	Turning right	Automobile, station wagon	Other motor vehicle	0
					East	Turning right	Pick-up truck	Other motor vehicle	
2014-May-20, Tue,11:24	Clear	Sideswipe	P.D. only	Dry	East	Changing lanes	Automobile, station wagon	Other motor vehicle	0
					East	Going ahead	Ambulance	Other motor vehicle	
2014-Jul-12, Sat,07:08	Clear	SMV other	P.D. only	Dry	North	Going ahead	Automobile, station wagon	Ran off road	0
2014-Jul-15, Tue,10:52	Rain	Sideswipe	Non-fatal injury	Wet	North	Changing lanes	Passenger van	Other motor vehicle	0
					North	Turning left	Automobile, station wagon	Other motor vehicle	
2014-Sep-14, Sun,17:25	Clear	Angle	P.D. only	Dry	East	Going ahead	Pick-up truck	Other motor vehicle	0
					North	Turning left	Automobile, station wagon	Other motor vehicle	
2014-Sep-25, Thu,08:19	Clear	Sideswipe	P.D. only	Dry	West	Changing lanes	Automobile, station wagon	Other motor vehicle	0
					West	Turning left	Passenger van	Other motor vehicle	
2014-Sep-25, Thu,08:45	Clear	Rear end	P.D. only	Dry	South	Turning right	Passenger van	Other motor vehicle	0
					South	Turning right	Pick-up truck	Other motor vehicle	



# Transportation Services - Traffic Services

## Collision Details Report - Public Version

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

**Location:** AVIATION PKWY @ MONTREAL RD

**Traffic Control:** Traffic signal

**Total Collisions:** 100

Date/Day/Time	Environment	Impact Type	Classification	Surface Cond'n	Veh. Dir	Vehicle Manoeuvre	Vehicle type	First Event	No. Ped
2014-Oct-31, Fri,19:00	Clear	Rear end	Non-fatal injury	Dry	North	Turning right	Passenger van	Other motor vehicle	0
					North	Turning right	Automobile, station wagon	Other motor vehicle	
2014-Nov-19, Wed,09:20	Clear	Rear end	P.D. only	Wet	North	Turning right	Pick-up truck	Other motor vehicle	0
					North	Turning right	Automobile, station wagon	Other motor vehicle	
2014-Nov-30, Sun,12:45	Clear	Angle	Non-fatal injury	Dry	West	Going ahead	Pick-up truck	Other motor vehicle	0
					North	Going ahead	Automobile, station wagon	Other motor vehicle	
					South	Stopped	Automobile, station wagon	Other motor vehicle	
					South	Stopped	Pick-up truck	Other motor vehicle	
2014-Dec-04, Thu,13:22	Clear	Rear end	P.D. only	Dry	West	Going ahead	Pick-up truck	Other motor vehicle	0
					West	Stopped	Automobile, station wagon	Other motor vehicle	
2014-Dec-06, Sat,07:00	Clear	Rear end	Non-fatal injury	Dry	North	Turning right	Automobile, station wagon	Other motor vehicle	0
					North	Turning right	Automobile, station wagon	Other motor vehicle	
2014-Dec-21, Sun,23:42	Clear	Rear end	P.D. only	Wet	East	Going ahead	Pick-up truck	Other motor vehicle	0
					East	Stopped	Automobile, station wagon	Other motor vehicle	
2015-Jan-06, Tue,18:11	Clear	Rear end	P.D. only	Wet	South	Slowing or stopping	Automobile, station wagon	Other motor vehicle	0
					South	Stopped	Automobile, station wagon	Other motor vehicle	
2015-Jan-20, Tue,07:07	Clear	Rear end	P.D. only	Wet	North	Changing lanes	Automobile, station wagon	Other motor vehicle	0
					North	Stopped	Automobile, station wagon	Other motor vehicle	
2015-Jan-24, Sat,15:15	Clear	Rear end	P.D. only	Dry	West	Slowing or stopping	Pick-up truck	Other motor vehicle	0
					West	Slowing or stopping	Automobile, station wagon	Other motor vehicle	
2015-Jan-26, Mon,08:56	Clear	Rear end	P.D. only	Dry	West	Slowing or stopping	Automobile, station wagon	Other motor vehicle	0
					West	Stopped	Pick-up truck	Other motor vehicle	
2015-Jan-26, Mon,09:30	Clear	Turning movement	P.D. only	Dry	West	Turning left	Pick-up truck	Other motor vehicle	0
					East	Going ahead	Automobile, station wagon	Other motor vehicle	



# Transportation Services - Traffic Services

## Collision Details Report - Public Version

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

**Location:** AVIATION PKWY @ MONTREAL RD

**Traffic Control:** Traffic signal

**Total Collisions:** 100

Date/Day/Time	Environment	Impact Type	Classification	Surface Cond'n	Veh. Dir	Vehicle Manoeuver	Vehicle type	First Event	No. Ped
2015-Jan-29, Thu,18:37	Snow	Turning movement	P.D. only	Loose snow	East	Turning left	Automobile, station wagon	Other motor vehicle	0
					West	Going ahead	Tow truck	Other motor vehicle	
2015-Jan-30, Fri,14:30	Clear	Rear end	P.D. only	Loose snow	West	Going ahead	Automobile, station wagon	Other motor vehicle	0
					West	Turning left	Automobile, station wagon	Other motor vehicle	
2015-Jan-30, Fri,19:13	Clear	Turning movement	Non-fatal injury	Wet	East	Going ahead	Automobile, station wagon	Other motor vehicle	0
					West	Turning left	Automobile, station wagon	Other motor vehicle	
2015-Jan-31, Sat,16:30	Clear	Rear end	P.D. only	Dry	West	Going ahead	Automobile, station wagon	Other motor vehicle	0
					West	Stopped	Automobile, station wagon	Other motor vehicle	
2015-Feb-01, Sun,11:14	Clear	Rear end	P.D. only	Ice	East	Turning right	Automobile, station wagon	Other motor vehicle	0
					East	Turning right	Automobile, station wagon	Other motor vehicle	
2015-Mar-25, Wed,06:14	Clear	Angle	P.D. only	Dry	East	Going ahead	Automobile, station wagon	Other motor vehicle	0
					South	Going ahead	Automobile, station wagon	Other motor vehicle	
2015-Apr-04, Sat,17:38	Clear	Sideswipe	P.D. only	Dry	East	Changing lanes	Automobile, station wagon	Other motor vehicle	0
					East	Going ahead	Automobile, station wagon	Other motor vehicle	
2015-May-07, Thu,16:38	Clear	Sideswipe	P.D. only	Dry	North	Changing lanes	Passenger van	Other motor vehicle	0
					North	Going ahead	Automobile, station wagon	Other motor vehicle	
2015-Jun-29, Mon,20:45	Clear	Rear end	P.D. only	Dry	North	Turning right	Automobile, station wagon	Other motor vehicle	0
					North	Turning right	Automobile, station wagon	Other motor vehicle	
2015-Aug-10, Mon,18:38	Clear	Rear end	Non-fatal injury	Dry	North	Turning right	Automobile, station wagon	Other motor vehicle	0
					North	Turning right	Automobile, station wagon	Other motor vehicle	
2015-Aug-28, Fri,16:17	Clear	Turning movement	Non-fatal injury	Dry	East	Going ahead	Automobile, station wagon	Other motor vehicle	0
					West	Turning left	Pick-up truck	Other motor vehicle	
					North	Turning left	Pick-up truck	Other motor vehicle	



# Transportation Services - Traffic Services

## Collision Details Report - Public Version

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

**Location:** AVIATION PKWY @ MONTREAL RD

**Traffic Control:** Traffic signal

**Total Collisions:** 100

Date/Day/Time	Environment	Impact Type	Classification	Surface Cond'n	Veh. Dir	Vehicle Manoeuvre	Vehicle type	First Event	No. Ped
2015-Oct-15, Thu,15:15	Rain	Sideswipe	P.D. only	Wet	East	Going ahead	Automobile, station wagon	Other motor vehicle	0
					East	Going ahead	Automobile, station wagon	Other motor vehicle	
2015-Nov-19, Thu,17:40	Rain	SMV other	Non-fatal injury	Wet	West	Turning left	Automobile, station wagon	Pedestrian	1
2015-Dec-12, Sat,11:16	Clear	Sideswipe	P.D. only	Dry	West	Unknown	Unknown	Other motor vehicle	0
					West	Slowing or stopping	Automobile, station wagon	Other motor vehicle	
2015-Dec-18, Fri,16:32	Clear	Rear end	P.D. only	Wet	North	Slowing or stopping	Automobile, station wagon	Other motor vehicle	0
					North	Going ahead	Automobile, station wagon	Other motor vehicle	
2015-Dec-22, Tue,18:34	Rain	Turning movement	P.D. only	Wet	West	Turning left	Automobile, station wagon	Other motor vehicle	0
					East	Going ahead	Automobile, station wagon	Other motor vehicle	
2016-Jan-20, Wed,07:49	Snow	Rear end	P.D. only	Slush	South	Slowing or stopping	Pick-up truck	Other motor vehicle	0
					South	Stopped	Automobile, station wagon	Other motor vehicle	
2016-Jan-21, Thu,07:14	Clear	Turning movement	P.D. only	Dry	East	Turning left	Automobile, station wagon	Other motor vehicle	0
					West	Going ahead	Automobile, station wagon	Other motor vehicle	
2016-Feb-02, Tue,17:10	Clear	Rear end	P.D. only	Dry	North	Slowing or stopping	Automobile, station wagon	Other motor vehicle	0
					North	Stopped	Pick-up truck	Other motor vehicle	
2016-Feb-13, Sat,09:28	Clear	Turning movement	P.D. only	Dry	West	Turning right	Automobile, station wagon	Other motor vehicle	0
					East	Turning left	Automobile, station wagon	Other motor vehicle	
2016-Feb-15, Mon,17:56	Clear	Rear end	P.D. only	Dry	West	Going ahead	Automobile, station wagon	Other motor vehicle	0
					West	Going ahead	Pick-up truck	Other motor vehicle	
2016-Mar-02, Wed,18:48	Clear	Turning movement	P.D. only	Wet	West	Turning left	Automobile, station wagon	Other motor vehicle	0
					East	Going ahead	Automobile, station wagon	Other motor vehicle	
2016-Mar-17, Thu,10:40	Clear	Turning movement	P.D. only	Dry	South	Turning left	Automobile, station wagon	Other motor vehicle	0
					North	Going ahead	Passenger van	Other motor vehicle	



# Transportation Services - Traffic Services

## Collision Details Report - Public Version

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

**Location:** AVIATION PKWY @ MONTREAL RD

**Traffic Control:** Traffic signal

**Total Collisions:** 100

Date/Day/Time	Environment	Impact Type	Classification	Surface Cond'n	Veh. Dir	Vehicle Manoeuver	Vehicle type	First Event	No. Ped
2016-Jul-12, Tue,16:00	Clear	Angle	P.D. only	Dry	South	Going ahead	Automobile, station wagon	Other motor vehicle	0
					East	Turning right	Truck and trailer	Other motor vehicle	
2016-Jul-13, Wed,22:07	Clear	Rear end	Non-fatal injury	Dry	East	Going ahead	Pick-up truck	Other motor vehicle	0
					East	Stopped	Pick-up truck	Other motor vehicle	
2016-Jul-18, Mon,08:08	Clear	Turning movement	P.D. only	Dry	East	Going ahead	Automobile, station wagon	Other motor vehicle	0
					West	Turning left	Automobile, station wagon	Other motor vehicle	
2016-Jul-20, Wed,10:36	Clear	Rear end	P.D. only	Dry	East	Going ahead	Automobile, station wagon	Other motor vehicle	0
					East	Stopped	Pick-up truck	Other motor vehicle	
2016-Aug-18, Thu,00:08	Clear	Turning movement	Non-fatal injury	Dry	West	Turning left	Passenger van	Other motor vehicle	0
					East	Going ahead	Automobile, station wagon	Other motor vehicle	
2016-Oct-05, Wed,10:25	Clear	Turning movement	P.D. only	Dry	East	Turning right	Automobile, station wagon	Other motor vehicle	0
					East	Turning right	Automobile, station wagon	Other motor vehicle	
2016-Oct-05, Wed,12:30	Clear	Turning movement	P.D. only	Dry	North	Turning left	Automobile, station wagon	Other motor vehicle	0
					South	Going ahead	Automobile, station wagon	Other motor vehicle	
2016-Oct-25, Tue,10:00	Clear	Turning movement	Non-fatal injury	Dry	West	Turning left	Automobile, station wagon	Other motor vehicle	0
					East	Going ahead	Pick-up truck	Other motor vehicle	
2016-Nov-18, Fri,13:28	Clear	Rear end	Non-fatal injury	Dry	East	Going ahead	Pick-up truck	Other motor vehicle	0
					East	Stopped	Automobile, station wagon	Other motor vehicle	
2016-Dec-01, Thu,08:08	Rain	Rear end	P.D. only	Wet	East	Slowing or stopping	Automobile, station wagon	Other motor vehicle	0
					East	Stopped	Pick-up truck	Other motor vehicle	
2016-Dec-01, Thu,20:07	Clear	Turning movement	P.D. only	Wet	West	Turning left	Pick-up truck	Other motor vehicle	0
					East	Going ahead	Automobile, station wagon	Other motor vehicle	
2016-Dec-15, Thu,18:16	Clear	Turning movement	P.D. only	Wet	West	Turning left	Pick-up truck	Other motor vehicle	0
					East	Going ahead	Automobile, station wagon	Other motor vehicle	





# Transportation Services - Traffic Services

## Collision Details Report - Public Version

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

**Location:** AVIATION PKWY @ MONTREAL RD

**Traffic Control:** Traffic signal

**Total Collisions:** 100

Date/Day/Time	Environment	Impact Type	Classification	Surface Cond'n	Veh. Dir	Vehicle Manoeuver	Vehicle type	First Event	No. Ped
2016-Dec-19, Mon,15:05	Clear	Turning movement	Non-fatal injury	Dry	West	Turning left	Pick-up truck	Other motor vehicle	0
					East	Going ahead	Pick-up truck	Other motor vehicle	
2017-Jan-06, Fri,08:45	Clear	Sideswipe	P.D. only	Dry	East	Changing lanes	Unknown	Other motor vehicle	0
					East	Going ahead	Automobile, station wagon	Other motor vehicle	
2017-Jan-13, Fri,09:49	Snow	Other	P.D. only	Wet	South	Reversing	Pick-up truck	Other motor vehicle	0
					South	Stopped	Automobile, station wagon	Other motor vehicle	
2017-Feb-10, Fri,08:06	Clear	Angle	P.D. only	Dry	East	Going ahead	Automobile, station wagon	Other motor vehicle	0
					South	Turning left	School bus	Other motor vehicle	
2017-Feb-13, Mon,10:18	Snow	Rear end	P.D. only	Loose snow	West	Going ahead	Automobile, station wagon	Other motor vehicle	0
					West	Stopped	Automobile, station wagon	Other motor vehicle	
2017-Mar-11, Sat,20:00	Clear	Rear end	P.D. only	Ice	West	Going ahead	Automobile, station wagon	Other motor vehicle	0
					West	Slowing or stopping	Passenger van	Other motor vehicle	
2017-Mar-24, Fri,11:31	Snow	Rear end	P.D. only	Slush	South	Slowing or stopping	Automobile, station wagon	Other motor vehicle	0
					South	Merging	Automobile, station wagon	Other motor vehicle	
2017-Apr-05, Wed,15:30	Clear	Sideswipe	P.D. only	Dry	North	Changing lanes	Automobile, station wagon	Other motor vehicle	0
					North	Stopped	Passenger van	Other motor vehicle	
2017-Apr-09, Sun,15:31	Rain	Sideswipe	P.D. only	Wet	West	Unknown	Unknown	Other motor vehicle	0
					West	Going ahead	Automobile, station wagon	Other motor vehicle	
2017-Apr-28, Fri,07:56	Clear	Rear end	Non-fatal injury	Dry	West	Going ahead	Automobile, station wagon	Other motor vehicle	0
					West	Stopped	Automobile, station wagon	Other motor vehicle	
2017-May-08, Mon,15:48	Clear	Sideswipe	P.D. only	Dry	East	Changing lanes	Automobile, station wagon	Other motor vehicle	0
					East	Going ahead	Automobile, station wagon	Other motor vehicle	
2017-Jun-05, Mon,09:40	Clear	Rear end	P.D. only	Dry	North	Turning right	Automobile, station wagon	Other motor vehicle	0
					North	Turning right	Automobile, station wagon	Other motor vehicle	



# Transportation Services - Traffic Services

## Collision Details Report - Public Version

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

**Location:** AVIATION PKWY @ MONTREAL RD

**Traffic Control:** Traffic signal

**Total Collisions:** 100

Date/Day/Time	Environment	Impact Type	Classification	Surface Cond'n	Veh. Dir	Vehicle Manoeuver	Vehicle type	First Event	No. Ped
2017-Jun-12, Mon,16:00	Clear	Other	P.D. only	Dry	West	Going ahead	Automobile, station wagon	Debris falling off vehicle	0
					South	Stopped	Tow truck	Other	
2017-Jul-22, Sat,08:41	Clear	Angle	P.D. only	Dry	East	Overtaking	Automobile, station wagon	Other motor vehicle	0
					North	Slowing or stopping	Automobile, station wagon	Other motor vehicle	
					East	Overtaking	Automobile, station wagon	Other motor vehicle	
2017-Oct-02, Mon,18:48	Clear	Rear end	P.D. only	Dry	East	Going ahead	Pick-up truck	Other motor vehicle	0
					East	Slowing or stopping	Automobile, station wagon	Other motor vehicle	
2017-Oct-05, Thu,15:20	Clear	Rear end	P.D. only	Dry	North	Turning right	Automobile, station wagon	Other motor vehicle	0
					North	Turning right	Automobile, station wagon	Other motor vehicle	
2017-Oct-07, Sat,20:18	Clear	Rear end	Non-fatal injury	Dry	South	Going ahead	Automobile, station wagon	Other motor vehicle	0
					South	Stopped	Pick-up truck	Other motor vehicle	
2017-Oct-16, Mon,12:38	Clear	Sideswipe	P.D. only	Dry	West	Going ahead	Automobile, station wagon	Other motor vehicle	0
					West	Going ahead	Automobile, station wagon	Other motor vehicle	
2017-Oct-17, Tue,06:00	Clear	Turning movement	P.D. only	Dry	East	Turning left	Automobile, station wagon	Other motor vehicle	0
					West	Going ahead	Automobile, station wagon	Other motor vehicle	
2017-Oct-27, Fri,11:16	Clear	Angle	P.D. only	Dry	North	Turning left	Automobile, station wagon	Other motor vehicle	0
					East	Going ahead	Passenger van	Other motor vehicle	
2017-Oct-28, Sat,23:45	Rain	Turning movement	Non-fatal injury	Wet	South	Going ahead	Automobile, station wagon	Other motor vehicle	0
					North	Turning left	Automobile, station wagon	Other motor vehicle	
2017-Dec-29, Fri,18:59	Clear	Rear end	Non-fatal injury	Wet	North	Going ahead	Automobile, station wagon	Other motor vehicle	0
					North	Slowing or stopping	Automobile, station wagon	Other motor vehicle	
2018-Jan-07, Sun,17:14	Snow	Turning movement	P.D. only	Loose snow	West	Turning left	Automobile, station wagon	Other motor vehicle	0
					East	Going ahead	Passenger van	Other motor vehicle	



# Transportation Services - Traffic Services

## Collision Details Report - Public Version

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

**Location:** AVIATION PKWY @ MONTREAL RD

**Traffic Control:** Traffic signal

**Total Collisions:** 100

Date/Day/Time	Environment	Impact Type	Classification	Surface Cond'n	Veh. Dir	Vehicle Manoeuvre	Vehicle type	First Event	No. Ped
2018-Apr-17, Tue,09:03	Clear	Rear end	P.D. only	Wet	East	Going ahead	Automobile, station wagon	Other motor vehicle	0
					East	Stopped	Automobile, station wagon	Other motor vehicle	
2018-Apr-24, Tue,16:26	Clear	Rear end	P.D. only	Dry	North	Unknown	Unknown	Other motor vehicle	0
					North	Stopped	Automobile, station wagon	Other motor vehicle	
2018-May-09, Wed,16:03	Clear	Turning movement	Non-fatal injury	Dry	West	Turning left	Automobile, station wagon	Other motor vehicle	0
					East	Going ahead	Automobile, station wagon	Other motor vehicle	
2018-May-30, Wed,06:55	Clear	Rear end	P.D. only	Dry	North	Turning right	Automobile, station wagon	Other motor vehicle	0
					North	Turning right	Automobile, station wagon	Other motor vehicle	
2018-Jun-03, Sun,15:38	Clear	Rear end	P.D. only	Dry	South	Going ahead	Automobile, station wagon	Other motor vehicle	0
					South	Going ahead	Automobile, station wagon	Other motor vehicle	
2018-Jul-22, Sun,12:16	Clear	Rear end	Non-fatal injury	Dry	North	Going ahead	Automobile, station wagon	Other motor vehicle	0
					North	Stopped	Automobile, station wagon	Other motor vehicle	
2018-Aug-02, Thu,06:54	Clear	Rear end	Non-fatal injury	Dry	West	Going ahead	Automobile, station wagon	Other motor vehicle	0
					West	Stopped	Motorcycle	Other motor vehicle	
2018-Aug-07, Tue,16:32	Clear	Rear end	P.D. only	Dry	West	Slowing or stopping	Passenger van	Other motor vehicle	0
					West	Stopped	Pick-up truck	Other motor vehicle	
2018-Aug-27, Mon,11:38	Clear	Rear end	P.D. only	Dry	West	Going ahead	Unknown	Other motor vehicle	0
					West	Stopped	Automobile, station wagon	Other motor vehicle	
2018-Sep-10, Mon,10:08	Clear	Turning movement	P.D. only	Dry	West	Going ahead	Automobile, station wagon	Other motor vehicle	0
					East	Turning left	Automobile, station wagon	Other motor vehicle	
2018-Sep-14, Fri,09:35	Clear	Turning movement	P.D. only	Dry	East	Turning left	Automobile, station wagon	Other motor vehicle	0
					West	Going ahead	Automobile, station wagon	Other motor vehicle	
2018-Sep-20, Thu,13:20	Clear	Angle	P.D. only	Dry	East	Going ahead	Automobile, station wagon	Other motor vehicle	0
					North	Turning left	Automobile, station wagon	Other motor vehicle	



# Transportation Services - Traffic Services

## Collision Details Report - Public Version

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

**Location:** AVIATION PKWY @ MONTREAL RD

**Traffic Control:** Traffic signal

**Total Collisions:** 100

Date/Day/Time	Environment	Impact Type	Classification	Surface Cond'n	Veh. Dir	Vehicle Manoeuver	Vehicle type	First Event	No. Ped
2018-Sep-25, Tue,15:54	Rain	Turning movement	P.D. only	Wet	East	Turning left	Automobile, station wagon	Other motor vehicle	0
					West	Going ahead	Automobile, station wagon	Other motor vehicle	
2018-Oct-10, Wed,10:30	Clear	Turning movement	P.D. only	Dry	East	Going ahead	Automobile, station wagon	Other motor vehicle	0
					West	Turning left	Automobile, station wagon	Other motor vehicle	
2018-Oct-18, Thu,16:18	Clear	Rear end	P.D. only	Dry	East	Going ahead	Automobile, station wagon	Other motor vehicle	0
					East	Stopped	Automobile, station wagon	Other motor vehicle	
2018-Nov-07, Wed,12:45	Clear	Turning movement	P.D. only	Dry	West	Turning left	Automobile, station wagon	Other motor vehicle	0
					East	Going ahead	Automobile, station wagon	Other motor vehicle	
2018-Nov-10, Sat,12:59	Snow	Rear end	P.D. only	Wet	North	Turning right	Automobile, station wagon	Other motor vehicle	0
					North	Turning right	Automobile, station wagon	Other motor vehicle	
2018-Dec-07, Fri,13:15	Clear	Rear end	P.D. only	Dry	North	Turning right	Automobile, station wagon	Other motor vehicle	0
					North	Turning right	Automobile, station wagon	Other motor vehicle	
2018-Dec-17, Mon,16:02	Clear	Rear end	Non-fatal injury	Wet	East	Turning right	Unknown	Other motor vehicle	0
					East	Turning right	Automobile, station wagon	Other motor vehicle	

**Location:** LEBOUTILLIER AVE @ MONTREAL RD

**Traffic Control:** Stop sign

**Total Collisions:** 3

Date/Day/Time	Environment	Impact Type	Classification	Surface Cond'n	Veh. Dir	Vehicle Manoeuver	Vehicle type	First Event	No. Ped
2016-Mar-10, Thu,12:18	Clear	Rear end	P.D. only	Dry	East	Going ahead	Automobile, station wagon	Other motor vehicle	0
					East	Stopped	Automobile, station wagon	Other motor vehicle	
2016-Jun-16, Thu,15:30	Clear	Rear end	P.D. only	Dry	West	Slowing or stopping	Automobile, station wagon	Other motor vehicle	0
					West	Going ahead	Automobile, station wagon	Other motor vehicle	
2018-Nov-08, Thu,15:23	Clear	Turning movement	Non-fatal injury	Dry	East	Turning left	Automobile, station wagon	Cyclist	0
					West	Going ahead	Bicycle	Other motor vehicle	



# Transportation Services - Traffic Services

## Collision Details Report - Public Version

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

**Location:** MONTREAL RD @ DEN HAAG DR/LANG'S RD

**Traffic Control:** Traffic signal

**Total Collisions:** 28

Date/Day/Time	Environment	Impact Type	Classification	Surface Cond'n	Veh. Dir	Vehicle Manoeuvre	Vehicle type	First Event	No. Ped
2014-Jan-08, Wed,13:59	Clear	SMV other	P.D. only	Ice	North	Turning left	Automobile, station wagon	Skidding/sliding	0
2014-Jan-22, Wed,09:11	Clear	Rear end	P.D. only	Dry	East	Slowing or stopping	Pick-up truck	Other motor vehicle	0
					East	Stopped	Automobile, station wagon	Other motor vehicle	
2014-Feb-11, Tue,07:46	Clear	Rear end	P.D. only	Ice	West	Slowing or stopping	Automobile, station wagon	Skidding/sliding	0
					West	Slowing or stopping	Automobile, station wagon	Other motor vehicle	
2014-May-19, Mon,12:50	Clear	Angle	Non-fatal injury	Dry	North	Turning right	Automobile, station wagon	Cyclist	0
					West	Going ahead	Bicycle	Other motor vehicle	
2014-May-21, Wed,12:54	Clear	Rear end	P.D. only	Dry	West	Going ahead	Passenger van	Other motor vehicle	0
					West	Stopped	Automobile, station wagon	Other motor vehicle	
					West	Stopped	Pick-up truck	Other motor vehicle	
					West	Stopped	Passenger van	Other motor vehicle	
2014-Jun-18, Wed,08:30	Clear	Rear end	P.D. only	Dry	West	Slowing or stopping	Pick-up truck	Other motor vehicle	0
					West	Stopped	Pick-up truck	Other motor vehicle	
					West	Stopped	Pick-up truck	Other motor vehicle	
2014-Oct-09, Thu,11:32	Clear	Angle	P.D. only	Wet	West	Going ahead	Automobile, station wagon	Other motor vehicle	0
					North	Turning left	Pick-up truck	Other motor vehicle	
2014-Nov-15, Sat,11:42	Clear	Rear end	P.D. only	Dry	East	Going ahead	Passenger van	Other motor vehicle	0
					East	Stopped	Passenger van	Other motor vehicle	
2014-Nov-17, Mon,15:30	Snow	Rear end	P.D. only	Loose snow	West	Slowing or stopping	Automobile, station wagon	Other motor vehicle	0
					West	Stopped	Passenger van	Other motor vehicle	
					West	Slowing or stopping	Automobile, station wagon	Other motor vehicle	
					West	Stopped	Unknown	Other motor vehicle	
2014-Dec-05, Fri,18:56	Clear	Angle	P.D. only	Dry	South	Turning right	Automobile, station wagon	Other motor vehicle	0
					West	Going ahead	Automobile, station wagon	Other motor vehicle	



# Transportation Services - Traffic Services

## Collision Details Report - Public Version

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

**Location:** MONTREAL RD @ DEN HAAG DR/LANG'S RD

**Traffic Control:** Traffic signal

**Total Collisions:** 28

Date/Day/Time	Environment	Impact Type	Classification	Surface Cond'n	Veh. Dir	Vehicle Manoeuvre	Vehicle type	First Event	No. Ped
2015-Jan-20, Tue,14:57	Clear	Rear end	Non-fatal injury	Slush	East	Going ahead	Automobile, station wagon	Other motor vehicle	0
					East	Stopped	Automobile, station wagon	Other motor vehicle	
2015-Jan-26, Mon,09:10	Clear	Sideswipe	P.D. only	Ice	West	Changing lanes	Automobile, station wagon	Other motor vehicle	0
					West	Going ahead	Pick-up truck	Other motor vehicle	
2015-Feb-25, Wed,15:10	Clear	Sideswipe	P.D. only	Wet	West	Changing lanes	Automobile, station wagon	Other motor vehicle	0
					West	Going ahead	Pick-up truck	Other motor vehicle	
2015-Jul-06, Mon,18:13	Clear	Rear end	P.D. only	Dry	West	Going ahead	Automobile, station wagon	Other motor vehicle	0
					West	Going ahead	Automobile, station wagon	Other motor vehicle	
2015-Jul-09, Thu,23:31	Clear	SMV other	Non-fatal injury	Dry	North	Turning left	Passenger van	Pedestrian	1
2015-Jul-14, Tue,08:20	Clear	Sideswipe	P.D. only	Dry	North	Changing lanes	Automobile, station wagon	Other motor vehicle	0
					North	Going ahead	Pick-up truck	Other motor vehicle	
2015-Jul-20, Mon,19:46	Clear	Turning movement	P.D. only	Dry	East	Making "U" turn	Automobile, station wagon	Other motor vehicle	0
					West	Going ahead	Automobile, station wagon	Other motor vehicle	
2015-Sep-21, Mon,16:40	Clear	Rear end	P.D. only	Dry	North	Going ahead	Automobile, station wagon	Other motor vehicle	0
					North	Stopped	Pick-up truck	Other motor vehicle	
2015-Sep-28, Mon,15:09	Rain	Rear end	P.D. only	Wet	West	Slowing or stopping	Automobile, station wagon	Other motor vehicle	0
					West	Stopped	Automobile, station wagon	Other motor vehicle	
2016-Feb-17, Wed,16:45	Snow	Rear end	P.D. only	Loose snow	East	Slowing or stopping	Passenger van	Other motor vehicle	0
					East	Stopped	Pick-up truck	Other motor vehicle	
2016-Mar-15, Tue,09:23	Clear	Sideswipe	P.D. only	Wet	West	Changing lanes	Pick-up truck	Other motor vehicle	0
					West	Going ahead	Automobile, station wagon	Other motor vehicle	
					East	Turning left	Automobile, station wagon	Other motor vehicle	
2016-Jul-16, Sat,06:55	Clear	Other	P.D. only	Dry	West	Going ahead	Pick-up truck	Pole (utility, power)	0
					West	Going ahead	Automobile, station wagon	Debris falling off vehicle	



# Transportation Services - Traffic Services

## Collision Details Report - Public Version

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

**Location:** MONTREAL RD @ DEN HAAG DR/LANG'S RD

**Traffic Control:** Traffic signal

**Total Collisions:** 28

Date/Day/Time	Environment	Impact Type	Classification	Surface Cond'n	Veh. Dir	Vehicle Manoeuvre	Vehicle type	First Event	No. Ped
2016-Aug-17, Wed,13:15	Clear	Rear end	Non-fatal injury	Dry	East	Going ahead	Truck - dump	Other motor vehicle	0
					East	Stopped	Automobile, station wagon	Other motor vehicle	
2016-Oct-14, Fri,08:58	Clear	Rear end	Non-fatal injury	Dry	West	Going ahead	Automobile, station wagon	Other motor vehicle	0
					West	Stopped	Automobile, station wagon	Other motor vehicle	
2017-Feb-09, Thu,16:08	Clear	Rear end	Non-fatal injury	Dry	West	Slowing or stopping	Pick-up truck	Other motor vehicle	0
					West	Stopped	Automobile, station wagon	Other motor vehicle	
2017-Sep-15, Fri,15:42	Clear	Rear end	P.D. only	Dry	East	Slowing or stopping	Automobile, station wagon	Other motor vehicle	0
					East	Stopped	Automobile, station wagon	Other motor vehicle	
2017-Sep-20, Wed,18:00	Clear	Rear end	P.D. only	Dry	East	Stopped	Automobile, station wagon	Other motor vehicle	0
					East	Going ahead	Passenger van	Other motor vehicle	
2018-Oct-15, Mon,10:08	Clear	Rear end	Non-fatal injury	Dry	North	Going ahead	Automobile, station wagon	Other motor vehicle	0
					North	Stopped	Automobile, station wagon	Other motor vehicle	

**Location:** MONTREAL RD @ MONTFORT HOSPITAL

**Traffic Control:** Traffic signal

**Total Collisions:** 12

Date/Day/Time	Environment	Impact Type	Classification	Surface Cond'n	Veh. Dir	Vehicle Manoeuvre	Vehicle type	First Event	No. Ped
2014-Dec-24, Wed,13:33	Clear	Angle	P.D. only	Wet	South	Turning right	Automobile, station wagon	Other motor vehicle	0
					West	Stopped	Passenger van	Other motor vehicle	
2015-Feb-02, Mon,00:39	Clear	Turning movement	P.D. only	Dry	East	Turning left	Automobile, station wagon	Other motor vehicle	0
					West	Going ahead	Automobile, station wagon	Other motor vehicle	
2016-Feb-17, Wed,15:56	Snow	Rear end	Non-fatal injury	Loose snow	East	Turning left	Pick-up truck	Other motor vehicle	0
					East	Turning left	Passenger van	Other motor vehicle	
2016-Mar-24, Thu,21:34	Snow	Angle	P.D. only	Loose snow	West	Turning right	Automobile, station wagon	Other motor vehicle	0
					South	Stopped	Police vehicle	Other motor vehicle	



# Transportation Services - Traffic Services

## Collision Details Report - Public Version

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

**Location:** MONTREAL RD @ MONTFORT HOSPITAL

**Traffic Control:** Traffic signal

**Total Collisions:** 12

Date/Day/Time	Environment	Impact Type	Classification	Surface Cond'n	Veh. Dir	Vehicle Manoeuvre	Vehicle type	First Event	No. Ped
2016-Apr-20, Wed,08:44	Clear	Rear end	P.D. only	Dry	West	Slowing or stopping	Automobile, station wagon	Other motor vehicle	0
					West	Slowing or stopping	Automobile, station wagon	Other motor vehicle	
					West	Stopped	Automobile, station wagon	Other motor vehicle	
2016-Jul-11, Mon,09:33	Clear	Sideswipe	P.D. only	Dry	West	Changing lanes	Automobile, station wagon	Other motor vehicle	0
					West	Going ahead	Truck - dump	Other motor vehicle	
2017-Apr-05, Wed,06:08	Rain	SMV other	Non-fatal injury	Wet	West	Going ahead	Delivery van	Pole (sign, parking meter)	0
2017-Apr-12, Wed,14:53	Clear	Sideswipe	P.D. only	Dry	East	Unknown	Automobile, station wagon	Other motor vehicle	0
					East	Stopped	Municipal transit bus	Other motor vehicle	
2018-May-08, Tue,16:10	Clear	Rear end	P.D. only	Dry	West	Unknown	Unknown	Other motor vehicle	0
					West	Stopped	Automobile, station wagon	Other motor vehicle	
2018-Jun-20, Wed,17:31	Clear	SMV other	Non-fatal injury	Dry	East	Going ahead	Automobile, station wagon	Pedestrian	1
2018-Sep-15, Sat,14:39	Clear	Rear end	P.D. only	Dry	East	Going ahead	Automobile, station wagon	Other motor vehicle	0
					East	Stopped	Automobile, station wagon	Other motor vehicle	
2018-Oct-25, Thu,18:22	Clear	Sideswipe	P.D. only	Dry	West	Changing lanes	Unknown	Other motor vehicle	0
					West	Going ahead	Automobile, station wagon	Other motor vehicle	

**Location:** MONTREAL RD btwn AVIATION PKWY & DEN HAAG DR (1)

**Traffic Control:** No control

**Total Collisions:** 2

Date/Day/Time	Environment	Impact Type	Classification	Surface Cond'n	Veh. Dir	Vehicle Manoeuvre	Vehicle type	First Event	No. Ped
2017-Jun-23, Fri,08:45	Rain	Sideswipe	P.D. only	Wet	East	Changing lanes	Automobile, station wagon	Other motor vehicle	0
					East	Going ahead	Automobile, station wagon	Other motor vehicle	
2017-Sep-05, Tue,16:26	Clear	Sideswipe	P.D. only	Dry	West	Going ahead	Automobile, station wagon	Other motor vehicle	0
					West	Stopped	Passenger van	Other motor vehicle	





# Transportation Services - Traffic Services

## Collision Details Report - Public Version

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

**Location:** MONTREAL RD btwn AVIATION PKWY & DEN HAAG DR/LANG'S RD

**Traffic Control:** No control

**Total Collisions:** 7

Date/Day/Time	Environment	Impact Type	Classification	Surface Cond'n	Veh. Dir	Vehicle Manoeuvre	Vehicle type	First Event	No. Ped
2014-Jan-22, Wed,16:10	Clear	Rear end	P.D. only	Dry	West	Going ahead	Automobile, station wagon	Other motor vehicle	0
					West	Slowing or stopping	Automobile, station wagon	Other motor vehicle	
2014-Feb-19, Wed,06:50	Snow	Sideswipe	P.D. only	Slush	West	Changing lanes	Automobile, station wagon	Other motor vehicle	0
					West	Going ahead	Passenger van	Other motor vehicle	
2014-Sep-02, Tue,15:41	Rain	Rear end	P.D. only	Wet	West	Slowing or stopping	Automobile, station wagon	Other motor vehicle	0
					West	Stopped	Automobile, station wagon	Other motor vehicle	
					West	Stopped	Automobile, station wagon	Other motor vehicle	
2018-Feb-07, Wed,10:39	Snow	SMV unattended vehicle	P.D. only	Packed snow	Unknown	Unknown	Automobile, station wagon	Unattended vehicle	0
2018-Aug-10, Fri,11:40	Clear	Sideswipe	P.D. only	Dry	West	Changing lanes	Automobile, station wagon	Other motor vehicle	0
					West	Going ahead	Automobile, station wagon	Other motor vehicle	
2018-Oct-23, Tue,13:36	Clear	Angle	P.D. only	Dry	South	Turning right	Automobile, station wagon	Other motor vehicle	0
					West	Going ahead	Automobile, station wagon	Other motor vehicle	
2018-Nov-16, Fri,07:53	Snow	Rear end	P.D. only	Loose snow	East	Changing lanes	Automobile, station wagon	Other motor vehicle	0
					East	Going ahead	Truck - open	Other motor vehicle	
					East	Slowing or stopping	Automobile, station wagon	Other motor vehicle	

**Location:** MONTREAL RD btwn CARSON'S RD/CODD'S RD & DEN HAAG DR/LANG'S RD

**Traffic Control:** No control

**Total Collisions:** 12

Date/Day/Time	Environment	Impact Type	Classification	Surface Cond'n	Veh. Dir	Vehicle Manoeuvre	Vehicle type	First Event	No. Ped
2014-Mar-02, Sun,17:25	Clear	Rear end	Non-fatal injury	Dry	East	Going ahead	Automobile, station wagon	Other motor vehicle	0
					East	Stopped	Municipal transit bus	Other motor vehicle	
2014-Sep-08, Mon,08:28	Clear	Rear end	Non-fatal injury	Dry	West	Going ahead	Pick-up truck	Other motor vehicle	0
					West	Stopped	Pick-up truck	Other motor vehicle	
					West	Stopped	Automobile, station wagon	Other motor vehicle	



# Transportation Services - Traffic Services

## Collision Details Report - Public Version

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

**Location:** MONTREAL RD btwn CARSON'S RD/CODD'S RD & DEN HAAG DR/LANG'S RD

**Traffic Control:** No control

**Total Collisions:** 12

Date/Day/Time	Environment	Impact Type	Classification	Surface Cond'n	Veh. Dir	Vehicle Manoeuvre	Vehicle type	First Event	No. Ped
2014-Oct-22, Wed,21:44	Clear	Other	P.D. only	Dry	West	Stopped	Passenger van	Curb	0
					East	Stopped	Automobile, station wagon	Other motor vehicle	
2014-Dec-23, Tue,08:48	Freezing Rain	SMV other	Non-fatal injury	Ice	West	Pulling away from shoulder or curb	Municipal transit bus	Pedestrian	1
2015-Mar-26, Thu,19:26	Clear	SMV other	P.D. only	Dry	East	Going ahead	Pick-up truck	Animal - wild	0
2015-Sep-04, Fri,12:25	Clear	Angle	Non-fatal injury	Dry	North	Turning left	Automobile, station wagon	Other motor vehicle	0
					East	Going ahead	Automobile, station wagon	Other motor vehicle	
2015-Sep-14, Mon,07:50	Clear	Angle	P.D. only	Dry	North	Going ahead	Automobile, station wagon	Other motor vehicle	0
					West	Going ahead	Passenger van	Other motor vehicle	
2015-Nov-17, Tue,08:44	Clear	Sideswipe	Non-fatal injury	Dry	West	Changing lanes	Pick-up truck	Other motor vehicle	0
					West	Turning left	Pick-up truck	Other motor vehicle	
2017-Apr-09, Sun,01:37	Clear	SMV other	P.D. only	Dry	West	Going ahead	Automobile, station wagon	Animal - wild	0
2017-Sep-21, Thu,12:24	Clear	Angle	P.D. only	Dry	North	Turning left	Automobile, station wagon	Other motor vehicle	0
					East	Going ahead	Automobile, station wagon	Other motor vehicle	
2018-Jan-01, Mon,09:04	Clear	Rear end	P.D. only	Ice	West	Going ahead	Automobile, station wagon	Skidding/sliding	0
					West	Slowing or stopping	Automobile, station wagon	Other motor vehicle	
2018-Oct-29, Mon,18:46	Rain	Rear end	P.D. only	Wet	East	Pulling away from shoulder or curb	Automobile, station wagon	Other motor vehicle	0
					East	Going ahead	Automobile, station wagon	Other motor vehicle	

## Appendix F – Trip Generation Data

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Table 3.12: Person Trip Generation Rates – (all households with residents not older than 55 years of age)

Person Trip Generation Rates										
All Households with persons 55 years of age or less AM and PM Peak Hours										
Dwelling Unit Types \ Geographic Areas	Core Area		Urban Area (Inside the greenbelt)		Suburban (Outside the greenbelt)		Rural		All Areas	
	Person Trip Rate	% $\nabla$	Person Trip Rate	% $\nabla$	Person Trip Rate	% $\nabla$	Person Trip Rate	% $\nabla$	Person Trip Rate	
Single detached:	AM	0.85	- 7%	0.99	+ 9%	0.94	+ 3%	0.78	- 14%	0.91
	PM	0.74	- 3%	0.75	- 1%	0.79	+ 4%	0.71	- 7%	
Semi-detached:	AM	0.79	- 10%	0.97	10%	0.89	+ 1%	0.64	- 27%	0.88
	PM	0.74	- 1%	0.68	- 9%	0.82	+ 9%	0.60	- 20%	
Row Townhouse:	AM	0.71	- 3%	0.78	+ 7%	0.67	- 8%	0.74	+ 1%	0.73
	PM	0.62	- 3%	0.60	- 6%	0.69	+ 8%	0.56	- 13%	
Apartment:	AM	0.48	- 4%	0.51	+ 2%	0.53	+ 6%	0.36	- 28%	0.50
	PM	0.45	0%	0.42	- 7%	0.52	+ 16%	0.52	+ 16%	
All Types:	AM	0.62	- 23%	0.82	+ 2%	0.86	+ 8%	0.76	- 5%	0.80
	PM	0.57	- 16%	0.63	- 7%	0.75	+ 10%	0.69	+ 1%	

Note: 5 % (+ or -) represents the percentage delta change in trip rate when compared against the average trip rate across all geographic areas

Table 3.13: Mode Shares - (all households with residents not older than 55 years of age)

Reported Mode Shares																
All Households with persons 55 years of age or less AM and PM Peak Hours																
Dwelling Unit Types \ Geographic Areas	Core Area			Urban Area (Inside the greenbelt)			Suburban (Outside the greenbelt)			Rural*			All Areas			
	Vehicle Trips	Transit Share	Non-Motorised	Vehicle Trips	Transit Share	Non-Motorised	Vehicle Trips	Transit Share	Non-Motorised	Vehicle Trips	Transit Share	Non-Motorised	Vehicle Trips	Transit Share	Non-Motorised	
Single - Detached:	AM	35%	20%	33%	51%	26%	11%	55%	25%	9%	60%	27%	4%	54%	25%	10%
	PM	45%	11%	32%	58%	19%	13%	64%	19%	6%	73%	13%	2%	63%	17%	8%
Semi-Detached:	AM	38%	30%	26%	44%	35%	10%	52%	24%	12%	64%	27%	5%	49%	28%	12%
	PM	36%	20%	34%	51%	27%	13%	62%	17%	7%	77%	12%	1%	58%	20%	10%
Row / Townhouse:	AM	33%	22%	40%	45%	34%	10%	55%	27%	8%	73%	15%	3%	49%	30%	11%
	PM	39%	15%	42%	53%	28%	8%	61%	22%	6%	74%	15%	1%	57%	24%	9%
Apartment:	AM	27%	27%	43%	37%	41%	14%	44%	34%	13%	76%	8%	16%	36%	35%	23%
	PM	23%	29%	42%	40%	37%	14%	44%	33%	9%	48%	4%	17%	35%	33%	23%
All Types:	AM	32%	24%	38%	47%	31%	11%	54%	26%	9%	61%	26%	4%	51%	27%	11%
	PM	34%	21%	38%	53%	24%	12%	62%	20%	6%	73%	13%	2%	59%	20%	10%

Note: Percentages do not necessarily sum to 100% as the proportion of automobile passengers have not been tabulated. Vehicle trips reflect the percentage of vehicle drivers.  
\* - Rural area sample size is extremely low and mode shares are highly influenced by school types where public transportation levels are high during the AM versus the PM peaks.

Table 6.1: Vehicle Trip Generation Rates

Vehicle Trip Generation Rates AM and PM Peak Hours						
ITE Land Use Code	Data Source Dwelling Unit Type		Vehicle Trip Generation Rate			
			2008 Count Data	ITE	OD Survey	Blended Rate
210	Single-detached dwellings	AM	0.66	0.75	0.56	0.66
		PM	0.89	1.01	0.53	0.81
224	Semi-detached dwellings, townhouses, rowhouses	AM	0.40	0.70	0.46	0.52
		PM	0.64	0.72	0.46	0.61
231	Low-rise condominiums (1 or 2 floors)	AM	0.53	0.67	0.21	0.47
		PM	0.41	0.78	0.18	0.46
232	High-rise condominiums (3+ floors)	AM	0.53	0.34	0.21	0.36
		PM	0.41	0.38	0.18	0.32
233	Luxury condominiums	AM	0.53	0.56	0.21	0.43
		PM	0.41	0.55	0.18	0.38
221	Low-rise apartments (2 floors)	AM	0.19	0.46	0.21	0.29
		PM	0.21	0.58	0.18	0.32
223	Mid-rise apartments (3-10 floors)	AM	0.19	0.30	0.21	0.23
		PM	0.21	0.39	0.18	0.26
222	High-rise apartments (10+ floors)	AM	0.19	0.30	0.21	0.23
		PM	0.21	0.35	0.18	0.25

Table 6.2: Recommended Vehicle Trip Directional Splits

Comparison of Directional Splits (Inbound/Outbound) AM and PM Peak Hours								
ITE Land Use Code	Area Dwelling Unit Type Data Source		2008 Count Data		ITE		Blended Rate	
			Inbound	Outbound	Inbound	Outbound	Inbound	Outbound
210	Single-detached dwellings	AM	33%	67%	25%	75%	29%	71%
		PM	60%	40%	63%	37%	62%	39%
224	Semi-detached dwellings, townhouses, rowhouses	AM	40%	60%	33%	67%	37%	64%
		PM	55%	45%	51%	49%	53%	47%
231	Low-rise condominiums (1 or 2 floors)	AM	36%	64%	25%	75%	31%	70%
		PM	54%	46%	58%	42%	56%	44%
232	High-rise condominiums (3+ floors)	AM	36%	64%	19%	81%	28%	73%
		PM	54%	46%	62%	38%	58%	42%
233	Luxury condominiums	AM	36%	64%	23%	77%	30%	71%
		PM	54%	46%	63%	37%	59%	42%
221	Low-rise apartments (2 floors)	AM	22%	78%	21%	79%	22%	79%
		PM	62%	38%	65%	35%	64%	37%
223	Mid-rise apartments (3-10 floors)	AM	22%	78%	25%	75%	24%	77%
		PM	62%	38%	61%	39%	62%	39%
222	High-rise apartments (10+ floors)	AM	22%	78%	25%	75%	24%	77%
		PM	62%	38%	61%	39%	62%	39%

Table 6.3: Recommended Vehicle Trip Generation Rates for Residential Land Uses with Transit Bonus

Recommended Vehicle Trip Generation Rates with Transit Bonus AM and PM Peak Hours									
ITE Land Use Code	Geographic Area Dwelling Unit Type		Vehicle Trip Rate						
			Core		Urban (Inside the Greenbelt)		Suburban (Outside the Greenbelt)		Rural
			Base Rate	< 600m to Rapid Transit	Base Rate	< 600m to Rapid Transit	Base Rate	< 600m to Rapid Transit	Base Rate
210	Single-detached dwellings	AM	0.40	0.31	0.67	0.50	0.70	0.49	0.62
		PM	0.60	0.33	0.76	0.57	0.90	0.63	0.92
224	Semi-detached dwellings, townhouses, rowhouses	AM	0.34	0.34	0.51	0.50	0.54	0.39	0.62
		PM	0.39	0.38	0.51	0.51	0.71	0.51	0.67
231	Low-rise condominiums (1 or 2 floors)	AM	0.34	0.34	0.50	0.50	0.60	0.60	0.71
		PM	0.29	0.29	0.49	0.49	0.66	0.66	0.72
232	High-rise condominiums (3+ floors)	AM	0.26	0.26	0.38	0.38	0.46	0.46	0.54
		PM	0.20	0.20	0.34	0.34	0.46	0.46	0.50
233	Luxury condominiums	AM	0.31	0.31	0.45	0.45	0.55	0.55	0.65
		PM	0.24	0.24	0.40	0.40	0.55	0.55	0.59
221	Low-rise apartments (2 floors)	AM	0.21	0.21	0.31	0.31	0.37	0.37	0.44
		PM	0.20	0.20	0.34	0.34	0.46	0.46	0.50
223	Mid-rise apartments (3-10 floors)	AM	0.17	0.17	0.24	0.24	0.29	0.29	0.35
		PM	0.16	0.16	0.28	0.28	0.37	0.37	0.41
222	High-rise apartments (10+ floors)	AM	0.17	0.17	0.24	0.24	0.29	0.29	0.35
		PM	0.16	0.16	0.27	0.27	0.36	0.36	0.39

Note: The transit bonus was only applied to geographic areas and dwelling unit types where the reported transit mode shares were less than the transit mode share reported for residential development located within the 600m proximity to a rapid transit station. It is noted that condominium and apartment housing categories reported similar levels of transit mode shares independent of location to rapid transit stations.

## 6.5 Future Data Collection

While the rates presented in were prepared by blending the vehicle trip rates from ITE, the OD Survey and the 2008 local trip generation studies, it is important to stress the importance and need for ongoing local trip generation surveys to monitor changes in travel behaviour. The 2008 trip generation studies undertaken to support this study provide insight into local travel patterns and a well organized ongoing annual data collection program aimed at trip generation surveys of key land uses or requirement for data collection by local developers will continue to provide recent and accurate local trip generation rates. For example the high-rise apartment category of dwelling units reported the lowest peak hour vehicle trip rates.

# Shopping Center (820)

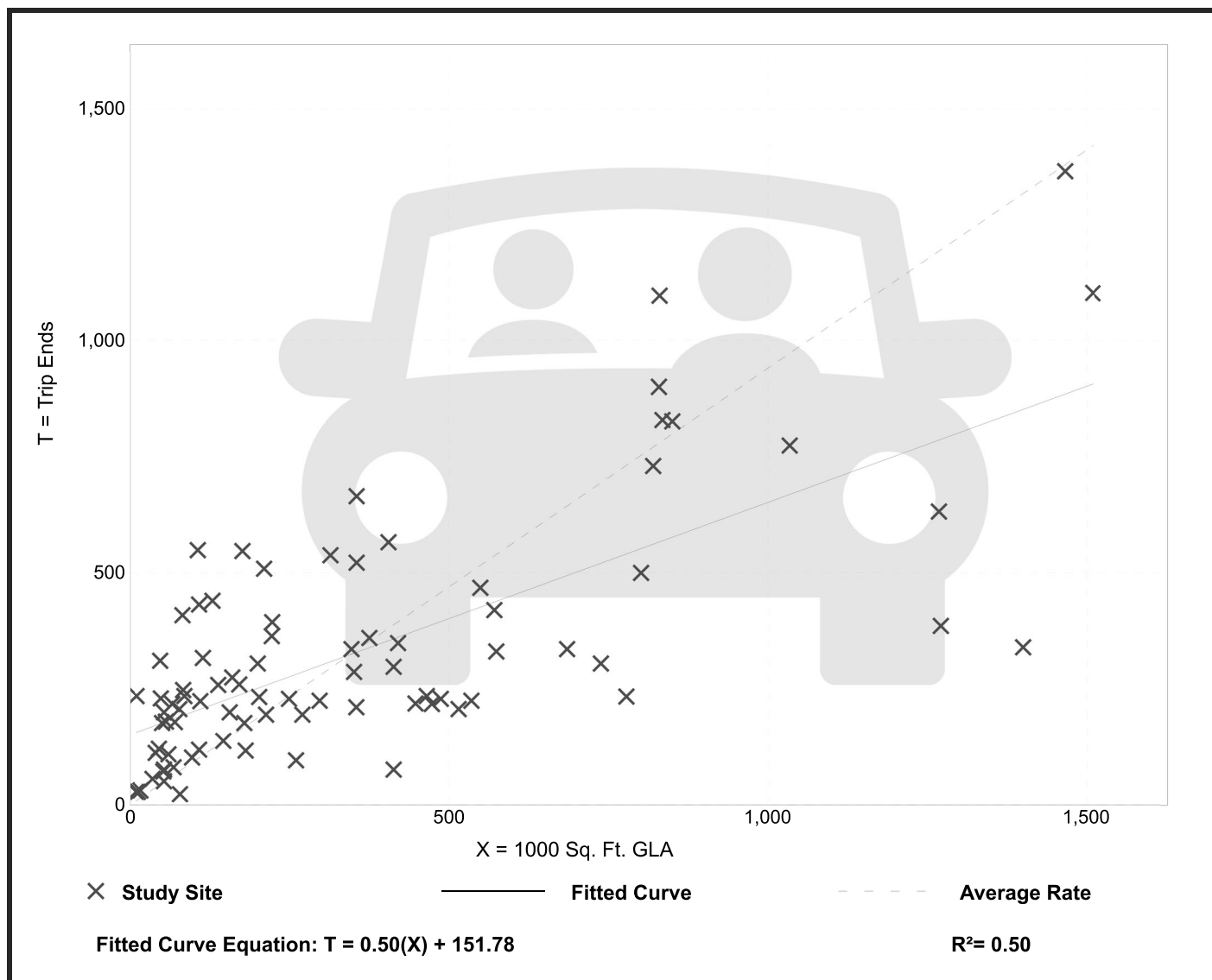
**Vehicle Trip Ends vs: 1000 Sq. Ft. GLA**  
**On a: Weekday,**  
**Peak Hour of Adjacent Street Traffic,**  
**One Hour Between 7 and 9 a.m.**

**Setting/Location: General Urban/Suburban**  
 Number of Studies: 84  
 Avg. 1000 Sq. Ft. GLA: 351  
 Directional Distribution: 62% entering, 38% exiting

## Vehicle Trip Generation per 1000 Sq. Ft. GLA

Average Rate	Range of Rates	Standard Deviation
0.94	0.18 - 23.74	0.87

## Data Plot and Equation



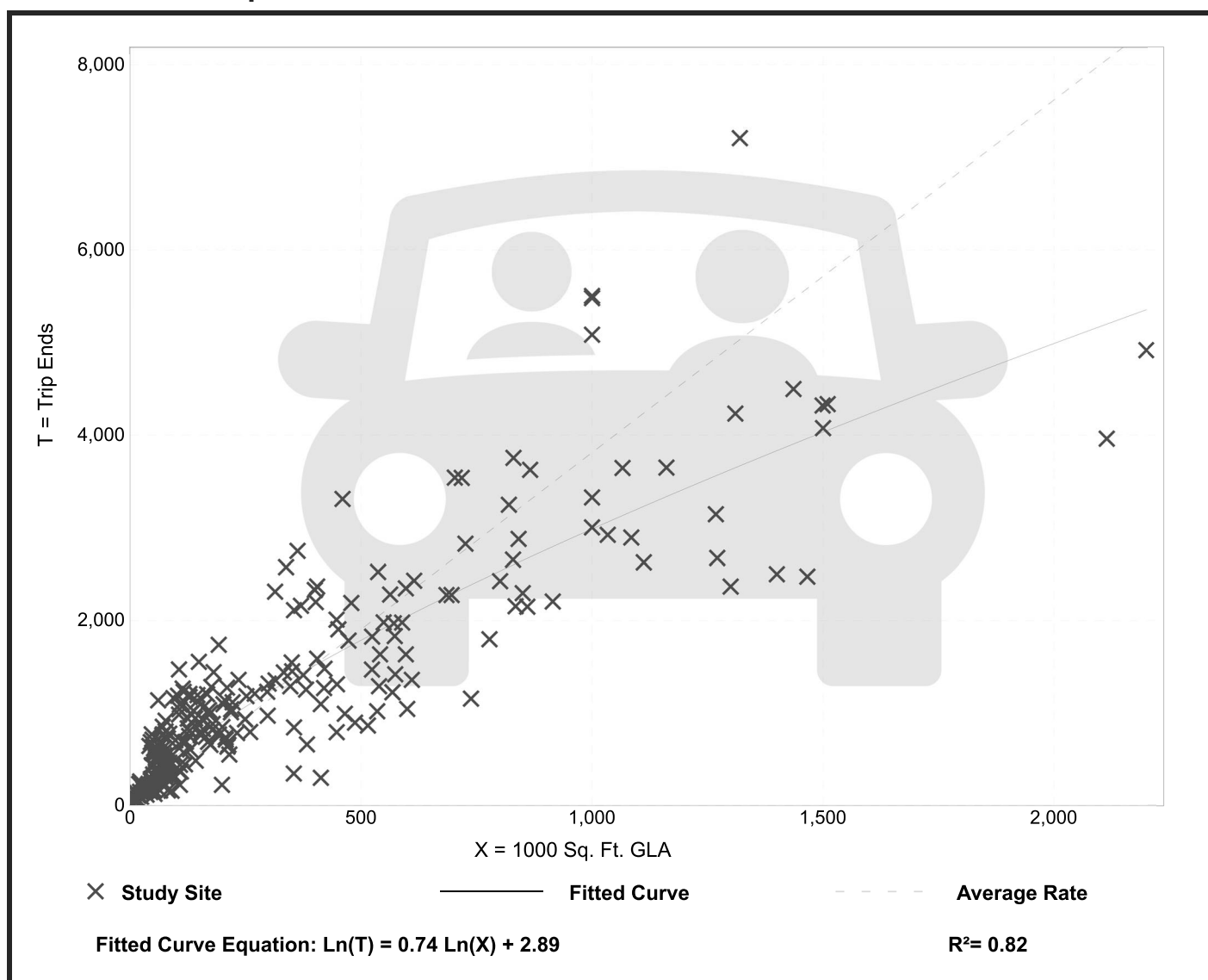
# Shopping Center (820)

**Vehicle Trip Ends vs: 1000 Sq. Ft. GLA**  
**On a: Weekday,**  
**Peak Hour of Adjacent Street Traffic,**  
**One Hour Between 4 and 6 p.m.**  
**Setting/Location: General Urban/Suburban**  
 Number of Studies: 261  
 Avg. 1000 Sq. Ft. GLA: 327  
 Directional Distribution: 48% entering, 52% exiting

## Vehicle Trip Generation per 1000 Sq. Ft. GLA

Average Rate	Range of Rates	Standard Deviation
3.81	0.74 - 18.69	2.04

## Data Plot and Equation





# Beacon Hill

## Demographic Characteristics

Population	31,270	Actively Travelled	24,100
Employed Population	13,740	Number of Vehicles	18,210
Households	14,030	Area (km <sup>2</sup> )	21.5

Occupation Status (age 5+)	Male	Female	Total
Full Time Employed	6,480	5,850	12,330
Part Time Employed	520	890	1,410
Student	3,190	3,200	6,390
Retiree	3,140	4,640	7,780
Unemployed	260	330	590
Homemaker	10	710	730
Other	260	350	610
<b>Total:</b>	<b>13,870</b>	<b>15,960</b>	<b>29,840</b>

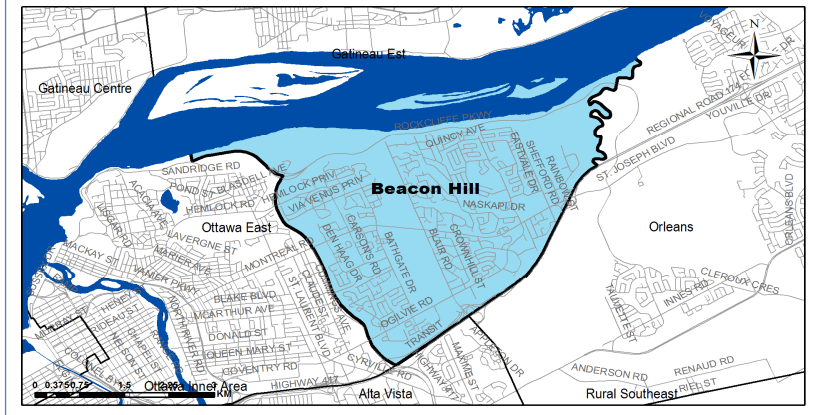
Traveller Characteristics	Male	Female	Total
Transit Pass Holders	2,890	3,340	6,220

Licensed Drivers	10,470	11,270	21,740
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Telecommuters	50	70	120
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Trips made by residents	35,950	41,850	77,800
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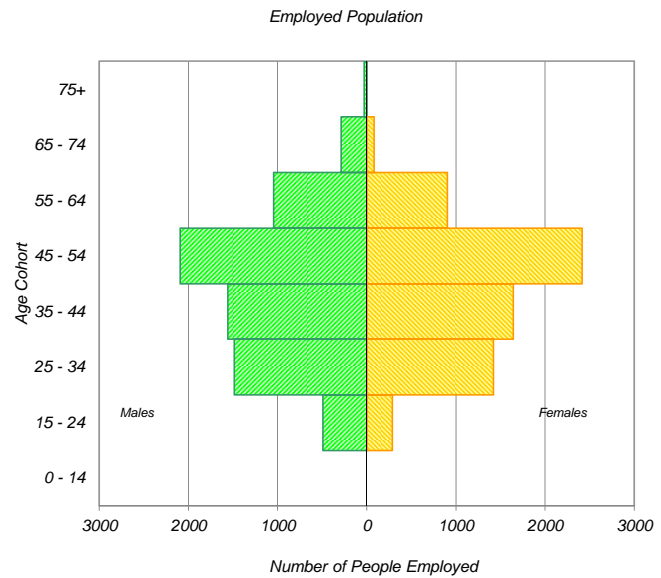
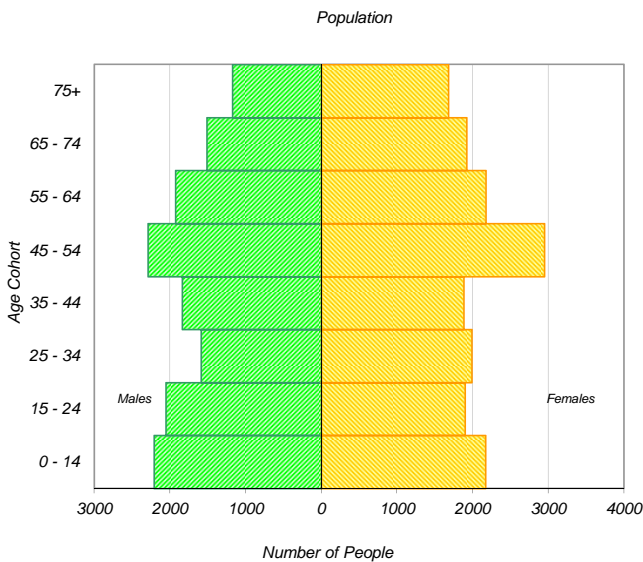
Selected Indicators	
Daily Trips per Person (age 5+)	2.61
Vehicles per Person	0.58
Number of Persons per Household	2.23
Daily Trips per Household	5.55
Vehicles per Household	1.30
Workers per Household	0.98
Population Density (Pop/km2)	1450



Household Size		
1 person	3,850	27%
2 persons	5,290	38%
3 persons	2,140	15%
4 persons	1,750	12%
5+ persons	1,000	7%
<b>Total:</b>	<b>14,030</b>	<b>100%</b>

Households by Vehicle Availability		
0 vehicles	1,600	11%
1 vehicle	7,550	54%
2 vehicles	4,230	30%
3 vehicles	470	3%
4+ vehicles	180	1%
<b>Total:</b>	<b>14,030</b>	<b>100%</b>

Households by Dwelling Type		
Single-detached	5,110	36%
Semi-detached	1,610	11%
Townhouse	3,800	27%
Apartment/Condo	3,510	25%
<b>Total:</b>	<b>14,030</b>	<b>100%</b>

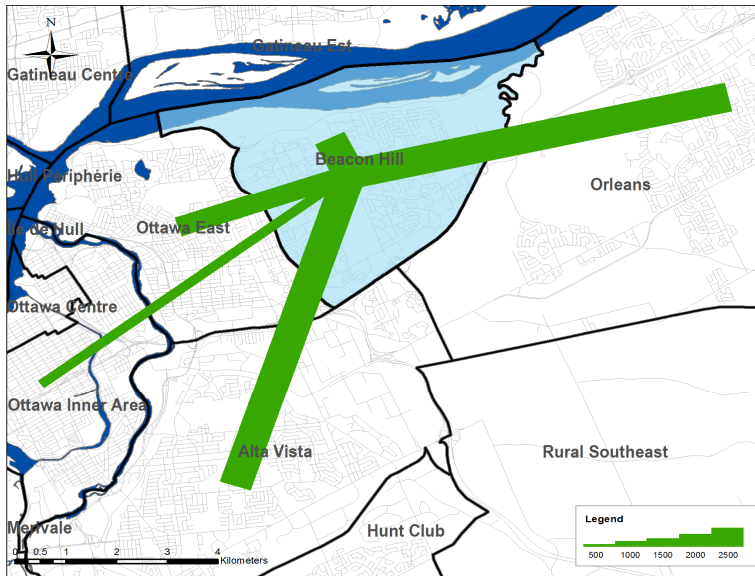


\* In 2005 data was only collected for household members aged 11+ therefore these results cannot be compared to the 2011 data.

## Travel Patterns

### Top Five Origins of Trips to Beacon Hill

#### AM Peak Period



### Summary of Trips to and from Beacon Hill

Districts	Destinations of Trips From		Origins of Trips To	
	District	% Total	District	% Total
Ottawa Centre	1,880	12%	190	1%
Ottawa Inner Area	1,380	9%	1,450	7%
Ottawa East	1,750	11%	2,110	10%
Beacon Hill	5,170	33%	5,170	25%
Alta Vista	1,850	12%	2,690	13%
Hunt Club	170	1%	380	2%
Merivale	540	3%	580	3%
Ottawa West	610	4%	150	1%
Bayshore / Cedarview	240	2%	550	3%
Orléans	760	5%	4,180	20%
Rural East	60	0%	350	2%
Rural Southeast	10	0%	480	2%
South Gloucester / Leitrim	30	0%	240	1%
South Nepean	50	0%	370	2%
Rural Southwest	0	0%	90	0%
Kanata / Stittsville	170	1%	280	1%
Rural West	40	0%	70	0%
Île de Hull	440	3%	50	0%
Hull Périphérie	240	2%	310	1%
Plateau	10	0%	130	1%
Aylmer	0	0%	250	1%
Rural Northwest	30	0%	90	0%
Pointe Gatineau	70	0%	560	3%
Gatineau Est	40	0%	250	1%
Rural Northeast	90	1%	80	0%
Buckingham / Masson-Angers	0	0%	50	0%
Ontario Sub-Total:	14,710	94%	19,330	92%
Québec Sub-Total:	920	6%	1,770	8%
Total:	15,630	100%	21,100	100%

### Trips by Trip Purpose

24 Hours	From District		To District		Within District	
Work or related	10,440	19%	12,360	22%	2,750	9%
School	2,230	4%	6,640	12%	3,100	11%
Shopping	5,550	10%	5,310	10%	4,960	17%
Leisure	5,440	10%	4,840	9%	2,720	9%
Medical	1,410	3%	1,250	2%	360	1%
Pick-up / drive passenger	3,780	7%	3,930	7%	2,440	8%
Return Home	24,470	44%	19,210	35%	11,910	41%
Other	1,810	3%	1,680	3%	870	3%
Total:	55,130	100%	55,220	100%	29,110	100%

AM Peak (06:30 - 08:59)	From District		To District		Within District	
Work or related	6,900	66%	8,100	51%	1,230	24%
School	1,380	13%	5,220	33%	2,520	49%
Shopping	190	2%	130	1%	150	3%
Leisure	310	3%	180	1%	310	6%
Medical	230	2%	320	2%	10	0%
Pick-up / drive passenger	660	6%	1,230	8%	580	11%
Return Home	490	5%	350	2%	230	4%
Other	280	3%	400	3%	140	3%
Total:	10,440	100%	15,930	100%	5,170	100%

PM Peak (15:30 - 17:59)	From District		To District		Within District	
Work or related	450	3%	420	4%	110	2%
School	80	1%	180	2%	40	1%
Shopping	1,380	9%	1,380	12%	840	13%
Leisure	1,230	8%	1,080	9%	490	8%
Medical	70	0%	120	1%	140	2%
Pick-up / drive passenger	1,470	10%	760	7%	860	13%
Return Home	9,610	66%	7,240	63%	3,800	58%
Other	360	2%	320	3%	220	3%
Total:	14,650	100%	11,500	100%	6,500	100%

Peak Period (%)	Total:	% of 24 Hours	Within District (%)
24 Hours	139,460		21%
AM Peak Period	31,540	23%	16%
PM Peak Period	32,650	23%	20%

### Trips by Primary Travel Mode

24 Hours	From District		To District		Within District	
Auto Driver	33,590	61%	33,580	61%	13,320	46%
Auto Passenger	7,800	14%	8,280	15%	5,370	18%
Transit	10,220	19%	10,180	18%	1,370	5%
Bicycle	560	1%	590	1%	340	1%
Walk	820	1%	640	1%	6,730	23%
Other	2,140	4%	1,970	4%	1,960	7%
Total:	55,130	100%	55,240	100%	29,090	100%

AM Peak (06:30 - 08:59)	From District		To District		Within District	
Auto Driver	6,100	59%	8,970	56%	1,640	32%
Auto Passenger	970	9%	1,860	12%	670	13%
Transit	2,680	26%	3,500	22%	270	5%
Bicycle	170	2%	150	1%	80	2%
Walk	20	0%	240	2%	1,450	28%
Other	480	5%	1,200	8%	1,060	21%
Total:	10,420	100%	15,920	100%	5,170	100%

PM Peak (15:30 - 17:59)	From District		To District		Within District	
Auto Driver	9,280	63%	6,640	58%	3,320	51%
Auto Passenger	1,810	12%	1,590	14%	1,640	25%
Transit	2,760	19%	2,750	24%	340	5%
Bicycle	110	1%	210	2%	50	1%
Walk	330	2%	20	0%	1,080	17%
Other	350	2%	300	3%	70	1%
Total:	14,640	100%	11,510	100%	6,500	100%

Avg Vehicle Occupancy	From District		To District		Within District	
24 Hours	1.23		1.25		1.40	
AM Peak Period	1.16		1.21		1.41	
PM Peak Period	1.20		1.24		1.49	

Transit Modal Split	From District		To District		Within District	
24 Hours	20%		20%		7%	
AM Peak Period	27%		24%		10%	
PM Peak Period	20%		25%		6%	

## Appendix G – TDM Checklists

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

<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

TDM-supportive design & infrastructure measures: <i>Residential developments</i>		Check if completed & add descriptions, explanations or plan/drawing references
<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"/> Main entrance located along Montreal Rd.
<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"/> Main entrance located at property line setback, adjacent to 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"/> Building Entrance will be glazed will lead directly to building Lobby.
<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 type="checkbox"/> Property not located near rapid-transit routes.
<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 hardscape surface between the main building entrance and pedestrian sidewalk. The buildings main entrance proposed to have awning above entrance.

TDM-supportive design & infrastructure measures: <i>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"/> Proposed smooth hardscape surface at all exterior walkways. At grade pedestrian crosswalk at driveway will be indicated by material.
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"/> Property pathways are proposed to be at grade with adjacent sidewalks.
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 link to existing park pathway thought the site to existing neighborhood path.
BASIC	1.2.6 Provide safe, direct and attractive walking routes from building entrances to nearby transit stops	<input checked="" type="checkbox"/> Hardscape surface provide between building and city 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"/> On site pathways will be illuminated.
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 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"/> Lighting, landscaping, and benches will be provide between building entrance and public sidewalk.
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 type="checkbox"/> N/A

TDM-supportive design & infrastructure measures: <i>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 will be provided in building.
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"/> Bicycle storage will be provided as per by-law requirements.
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"/> Typical bicycle storage will be the standard, not vertical spaces will be included.
BASIC	2.1.4 Provide bicycle parking spaces equivalent to the expected number of resident-owned bicycles, plus the expected peak number of visitor cyclists	<input checked="" type="checkbox"/> Bicycle storage will be provided as per by-law requirements.
<b>2.2 Secure bicycle parking</b>		
REQUIRED	2.2.1 Where more than 50 bicycle parking spaces are provided for a single residential building, locate at least 25% of spaces within a building/structure, a secure area (e.g. supervised parking lot or enclosure) or bicycle lockers (see <i>Zoning By-law Section 111</i> )	<input checked="" type="checkbox"/> Bicycle parking will be provided in building.
BETTER	2.2.2 Provide secure bicycle parking spaces equivalent to at least the number of units at condominiums or multi-family residential developments	<input type="checkbox"/> Bicycle storage requirements are at 0.5/unit. Bicycle parking spaces will not be at 1/unit.
<b>2.3 Bicycle repair station</b>		
BETTER	2.3.1 Provide a permanent bike repair station, with commonly used tools and an air pump, adjacent to the main bicycle parking area (or secure bicycle parking area, if provided)	<input type="checkbox"/> No bike repair station to be provided.
<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 type="checkbox"/> N/A, No on-site transit stop.
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"/> Existing transit shelter in place and the proposed building does not encroach into this space.
BETTER	3.1.3 Provide a secure and comfortable interior waiting area by integrating any on-site transit stops into the building	<input type="checkbox"/> No on-site waiting area to be provided.

TDM-supportive design & infrastructure measures: <i>Residential developments</i>		Check if completed & add descriptions, explanations or plan/drawing references
<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 type="checkbox"/> No drop off area available. Short-term exterior 'visitor' spaces are proposed at the building's south edge
<b>5. CARSHARING &amp; BIKESHARING</b>		
<b>5.1 Carshare parking spaces</b>		
BETTER	5.1.1 Provide up to three carshare parking spaces in an R3, R4 or R5 Zone for specified residential uses ( <i>see Zoning By-law Section 94</i> )	<input checked="" type="checkbox"/> Three carshare parking spaces will be provided for a carshare provided and will be for use by residential tenants only.
<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 type="checkbox"/>
<b>6. PARKING</b>		
<b>6.1 Number of parking spaces</b>		
REQUIRED	6.1.1 Do not provide more parking than permitted by zoning, nor less than required by zoning, unless a variance is being applied for	<input checked="" type="checkbox"/> Zoning specifies minimum amount of parking which the proposed design meets.
BASIC	6.1.2 Provide parking for long-term and short-term users that is consistent with mode share targets, considering the potential for visitors to use off-site public parking	<input type="checkbox"/> No off-site parking available.
BASIC	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 type="checkbox"/>
BETTER	6.1.4 Reduce the minimum number of parking spaces required by zoning by one space for each 13 square metres of gross floor area provided as shower rooms, change rooms, locker rooms and other facilities for cyclists in conjunction with bicycle parking ( <i>see Zoning By-law Section 111</i> )	<input type="checkbox"/> N/A Building has Residential Major occupancy.
<b>6.2 Separate long-term &amp; short-term parking areas</b>		
BETTER	6.2.1 Provide separate areas for short-term and long-term parking (using signage or physical barriers) to permit access controls and simplify enforcement (i.e. to discourage residents from parking in visitor spaces, and vice versa)	<input type="checkbox"/> Residents to use personal parking space. Visitors to use dedicated parking spaces.

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

<b>Legend</b>	
<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
★	The measure is one of the most dependably effective tools to encourage the use of sustainable modes

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



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

<b>TDM measures: <i>Residential developments</i></b>		<b>Check if proposed &amp; add descriptions</b>
<b>6. TDM MARKETING &amp; COMMUNICATIONS</b>		
<b>6.1 Multimodal travel information</b>		
<b>BASIC</b> ★	6.1.1 Provide a multimodal travel option information package to new residents	<input type="checkbox"/>
<b>6.2 Personalized trip planning</b>		
<b>BETTER</b> ★	6.2.1 Offer personalized trip planning to new residents	<input type="checkbox"/>

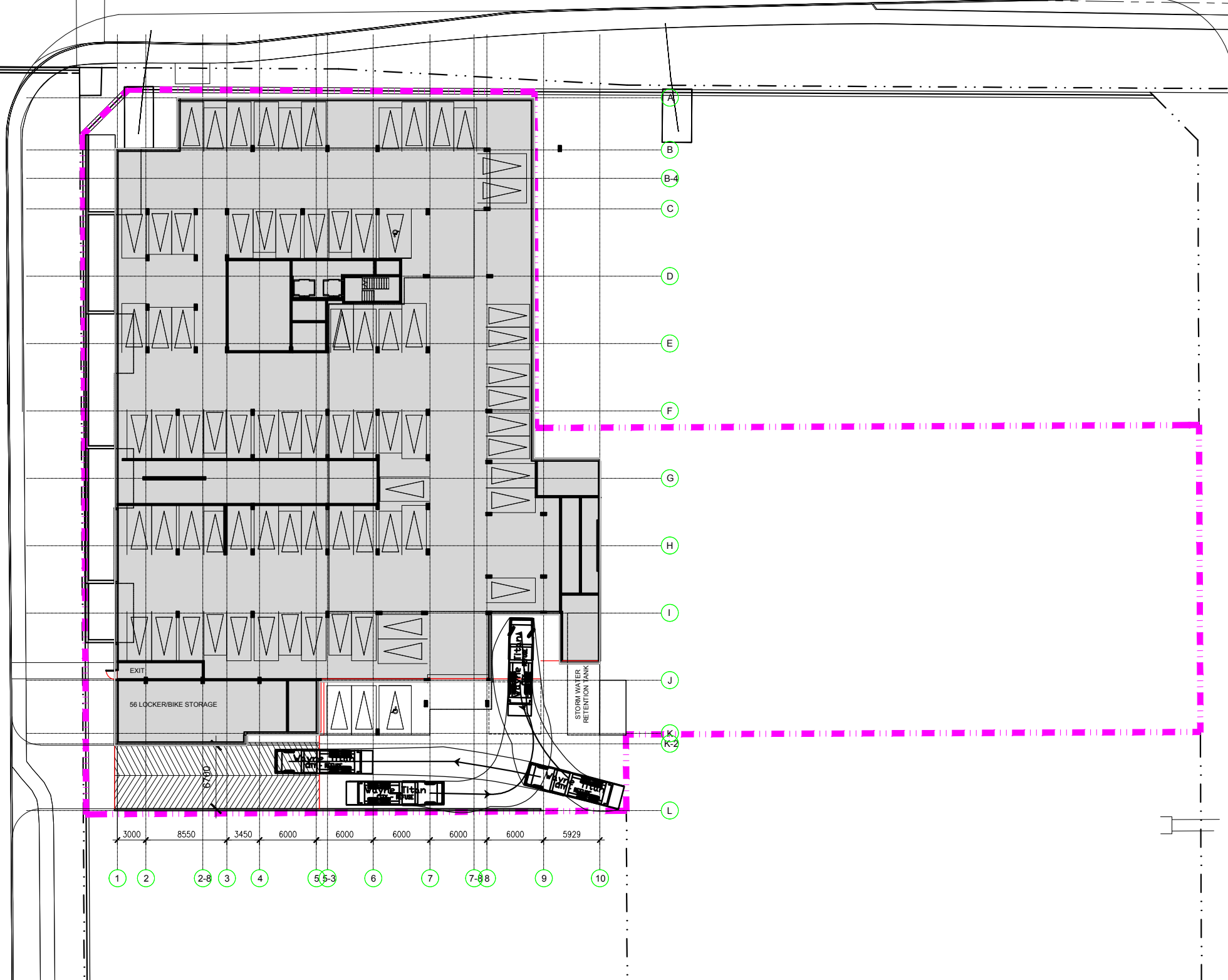
## Appendix H – Swept Path Analysis

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# MONTREAL ROAD

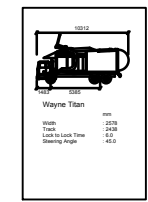
# DEN HAAG DRIVE

# LEBOUTILLIER AVE.



3000 8550 3450 6000 6000 6000 6000 6000 5929

1 2 2-8 3 4 5-5-3 6 7 7-8 8 9 10



CLIENT Client

SOVIMA

OUVRAGE Project

SOVIMA OTTAWA

EMPLACEMENT Location  
OTTAWA, ON

NO.PROJET Project No.  
12263

DESSINE PAR Drawn by  
OC

VÉRIFIÉ PAR Checked by  
FP



TITRE DU DESSIN Drawing Title

Parking floor Plan-autoturn

DATE (aa.mm.jj)  
20.10.01

RÉVISION Revision

ÉCHELLE Scale  
1:500

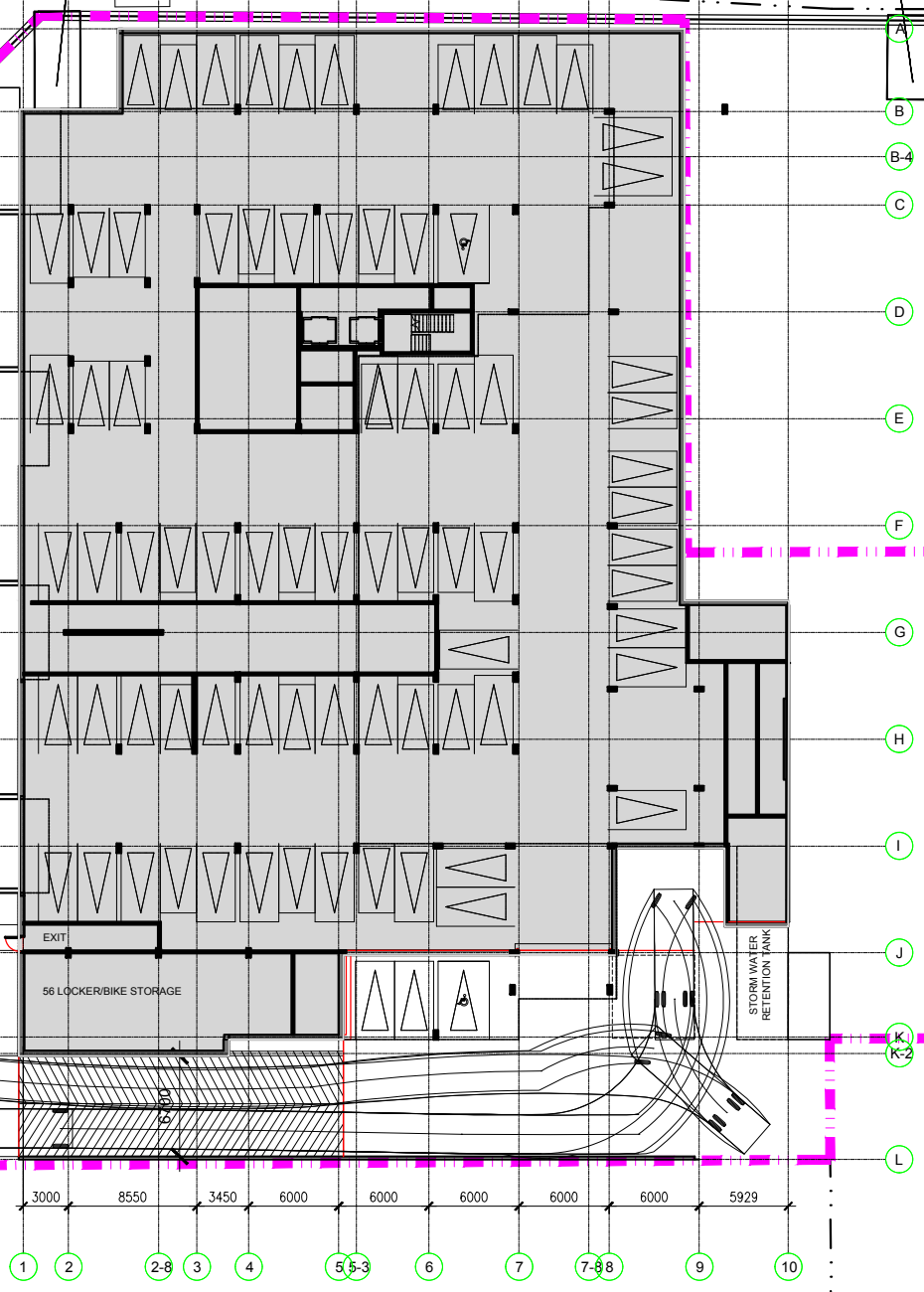
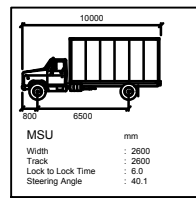
NO. DESSIN Dwg Number

A-200a

# MONTREAL ROAD

DEN HAAG DRIVE

LEBOUTILLIER AVE.



CLIENT Client

SOVIMA

OUVRAGE Project

SOVIMA OTTAWA

EMPLACEMENT Location  
OTTAWA, ON

NO.PROJET Project No.  
12263

DESSINE PAR Drawn by  
OC

VÉRIFIÉ PAR Checked by  
FP



TITRE DU DESSIN Drawing Title

Parking floor Plan-autoturn

DATE (aa.mm.jj)  
20.10.01

RÉVISION Revision

ÉCHELLE Scale  
1:500

NO. DESSIN Dwg Number

A-200a

## Appendix I – MMLOS Analysis

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## Appendix J – Intersection Control Warrants

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## City of Ottawa Roundabout Initial Feasibility Screening Tool

The intent of this screening tool is to provide a relatively quick assessment of the feasibility of a roundabout at a particular intersection in comparison to other appropriate forms of traffic control or road modifications including all-way stop control, traffic signals, auxiliary lanes, etc. The intended outcome of this tool is to provide enough information to assist staff in deciding whether or not to proceed with an Intersection Control Study to investigate the feasibility of a roundabout in more

- |   |   |  |
|---|---|--|
| 1 | Project Name:   | 800 Montreal Road  |
| 2 | Intersection:   | Montreal Road & Aviation Parkway   |
| 3 | <b>Location and Description of Intersection:</b><br>Lane Configuration, total or approach AADT, distance to nearby intersection(s), etc. Attach or sketch a diagram and include existing and/or horizon-year turning movements. If an existing intersection then indicate type of control | The current signalized intersection has right-turn channels and left-turn lanes on all approaches. The eastbound and westbound approaches have two through lanes while the northbound and southbound approaches only have one. The intersection experiences Average Annual Daily Traffic (AADT) volumes in the order of 45,400 vehicles per day. |
| 4 | <b>What traditional modifications are proposed?</b><br>All-way stop control, traffic signals, auxiliary lanes, etc. Attach or sketch a diagram if necessary.  | Dual left-turn lanes   |
| 5 | <b>What size of roundabout is being considered?</b><br>Describe, and attach a Roundabout Traffic Flow Worksheet   | Two-lane roundabout  |
| 6 | <b>Why is a roundabout being considered?</b>  | A roundabout is being considered as a potential measure to address capacity issues at the intersection.  |

- 7 Are there contra-indications for
- If "Yes" is indicated for one or more of the contra-indications then a roundabout may be problematic at the subject intersection. That is not to say that a roundabout is not possible, just that there may be difficulties or high

No.	Contra-Indication	Outcome
1	Is there insufficient property at the intersection (i.e. less than 44 metres diameter if considering a single-lane roundabout, and less than 60 metres if considering a two-lane roundabout) or property constraints that would require demolition of adjacent	Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>
2	Are there any instances where stopping sight distance (SSD) of a roundabout yield line may not be attainable (i.e. the intersection is on a crest vertical curve)?	Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>
3	Is there an existing uncontrolled approach with a grade in excess of 4 percent?	Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>
4	Is the intersection located within a coordinated signal system?	Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>
5	Is there a closely-spaced traffic signal or railway crossing that could not be controlled with a nearby roundabout?	Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>
6	Are significant differences in directional flows or any situations of sudden high demand expected?	Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>
7	Are there known visually-impaired pedestrians that cross this intersection?	Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>

- 8 Are there suitability factors for a roundabout?
- If "Yes" is indicated for two or more of the suitability factors then a roundabout should be technically feasible at the subject intersection..

No.	Suitability Factor	Outcome
1	Does the intersection currently experience an average collision frequency of more than 1.5 injury crashes per year, or a collision rate in excess of 1 injury crash per 1 million vehicles entering (MVE)?	Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>
2	Has there been a fatal crash at the intersection in the last 10 years?	Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>
3	Are capacity problems currently being experienced, or expected in the future?	Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>
4	Are traffic signals warranted, or expected to be warranted in the future?	Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>
5	Does the intersection have more than 4 legs, or unusual geometry?	Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>
6	Will Planned modifications to the intersection require that nearby structures be widened (i.e. to accommodate left-turn lanes)?	Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>
7	Is the intersection located at a transition between rural and urban environments (i.e. an urban boundary) such that a roundabout could act as a means of speed transition?	Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>

- 9 Conclusions/recommendation whether to proceed with an Intersection Control Study:

Although this location meets many of the suitability criteria, there are a number of contra-indications that have been met including insufficient property, its presence within a coordinated signal system and closely-spaced traffic signals. As such, a roundabout is not recommended for this location.

DRAFT

## City of Ottawa Mini-Roundabout Screening Criteria

Mini roundabouts are best suited and most effective when they meet the following conditions;

No.	Criteria	Outcome
1	Located at minor collector road intersecting a minor collector road or a local residential road	Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>
2	ADT lesser than 15,000 (estimated ADT in case of new development area)	Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>
3	At least 10% of the total traffic has generated from minor road (estimated in case of new development area)	Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>
4	Operating speed <55km/hr or posted speed ≤ 50km/hr in a new development area	Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>
5	A right of way wide enough to accommodate a 13 m to 27 m Inscribed Circle Diameter roundabout and adjacent sidewalks	Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>
6	Situated on a non truck route or roads without heavy truck movements	Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>
7	Intersections with no more than four legs	Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>

### Conclusion

























As many of the suitability criteria have not been met, a mini-roundabout is not recommended for this location.

# Appendix K – Intersection Capacity Analyses

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1: Aviation Parkway & Montreal Road  
800 Montreal Road

Existing (2020) Traffic  
AM Peak Hour

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	41	752	256	285	1016	152	229	213	250	224	259	63
Future Volume (vph)	41	752	256	285	1016	152	229	213	250	224	259	63
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Storage Length (m)	45.0		30.0	55.0		25.0	0.0		55.0	70.0		0.0
Storage Lanes	1		1	1		1	1		1	1		0
Taper Length (m)	2.5			2.5			2.5			2.5		
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor	0.99		0.96	0.99		0.94	1.00		0.98	1.00	1.00	
Frt			0.850			0.850			0.850		0.971	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1695	3232	1547	1695	3262	1547	1712	1820	1517	1695	1750	0
Flt Permitted	0.139			0.141			0.184			0.433		
Satd. Flow (perm)	247	3232	1478	250	3262	1454	330	1820	1488	769	1750	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			190			136			248			9
Link Speed (k/h)		60			60			60			60	
Link Distance (m)		150.7			144.0			388.7			332.0	
Travel Time (s)		9.0			8.6			23.3			19.9	
Confl. Peds. (#/hr)	19		26	26		19	6		5	5		6
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 (%)	2%	7%	0%	2%	6%	0%	1%	0%	2%	2%	0%	3%
Adj. Flow (vph)	46	836	284	317	1129	169	254	237	278	249	288	70
Shared Lane Traffic (%)												
Lane Group Flow (vph)	46	836	284	317	1129	169	254	237	278	249	358	0
Turn Type	pm+pt	NA	Perm	pm+pt	NA	Perm	pm+pt	NA	Perm	pm+pt	NA	
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases	2		2	6		6	8		8	4		
Detector Phase	5	2	2	1	6	6	3	8	8	7	4	
Switch Phase												
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Minimum Split (s)	10.9	33.9	33.9	10.9	39.0	39.0	10.9	32.2	32.2	10.9	32.2	
Total Split (s)	14.0	45.0	45.0	22.0	53.0	53.0	20.0	33.0	33.0	20.0	33.0	
Total Split (%)	11.7%	37.5%	37.5%	18.3%	44.2%	44.2%	16.7%	27.5%	27.5%	16.7%	27.5%	
Maximum Green (s)	8.1	39.1	39.1	16.1	47.1	47.1	14.1	26.8	26.8	14.1	26.8	
Yellow Time (s)	3.7	3.7	3.7	3.7	3.7	3.7	3.7	3.7	3.7	3.7	3.7	
All-Red Time (s)	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.5	2.5	2.2	2.5	
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Total Lost Time (s)	5.9	5.9	5.9	5.9	5.9	5.9	5.9	6.2	6.2	5.9	6.2	
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag	
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	
Recall Mode	None	C-Max	C-Max	None	C-Max	C-Max	None	None	None	None	None	
Walk Time (s)		16.0	16.0		16.0	16.0		7.0	7.0		7.0	
Flash Dont Walk (s)		12.0	12.0		12.0	12.0		19.0	19.0		19.0	
Pedestrian Calls (#/hr)		0	0		0	0		0	0		0	
Act Effct Green (s)	46.1	39.1	39.1	61.9	51.3	51.3	40.7	26.3	26.3	40.0	26.0	
Actuated g/C Ratio	0.38	0.33	0.33	0.52	0.43	0.43	0.34	0.22	0.22	0.33	0.22	
v/c Ratio	0.26	0.79	0.47	0.95	0.81	0.24	0.93	0.59	0.54	0.69	0.93	

1: Aviation Parkway & Montreal Road  
800 Montreal Road

Existing (2020) Traffic  
AM Peak Hour

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Control Delay	19.7	43.4	13.4	65.4	36.9	7.2	68.6	48.9	11.2	38.2	76.6	
Queue Delay	0.0	0.0	0.0	0.0	10.2	0.0	0.0	0.0	0.0	0.0	0.0	
Total Delay	19.7	43.4	13.4	65.4	47.1	7.2	68.6	48.9	11.2	38.2	76.6	
LOS	B	D	B	E	D	A	E	D	B	D	E	
Approach Delay		35.2			46.5			41.8			60.8	
Approach LOS		D			D			D			E	
Queue Length 50th (m)	5.3	93.8	15.9	51.4	126.5	4.7	42.1	50.2	5.6	41.2	80.7	
Queue Length 95th (m)	11.4	118.2	40.3	#108.7	#160.2	18.7	#89.7	76.5	29.8	62.8	#134.2	
Internal Link Dist (m)		126.7			120.0			364.7			308.0	
Turn Bay Length (m)	45.0		30.0	55.0		25.0			55.0	70.0		
Base Capacity (vph)	194	1053	609	333	1395	699	274	406	524	367	397	
Starvation Cap Reductn	0	0	0	0	251	0	0	0	0	0	0	
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	
Reduced v/c Ratio	0.24	0.79	0.47	0.95	0.99	0.24	0.93	0.58	0.53	0.68	0.90	

Intersection Summary

Area Type: Other  
 Cycle Length: 120  
 Actuated Cycle Length: 120  
 Offset: 55 (46%), Referenced to phase 2:EBTL and 6:WBTL, Start of Green  
 Natural Cycle: 95  
 Control Type: Actuated-Coordinated  
 Maximum v/c Ratio: 0.95  
 Intersection Signal Delay: 44.6  
 Intersection LOS: D  
 Intersection Capacity Utilization 92.4%  
 ICU Level of Service F  
 Analysis Period (min) 15  
 # 95th percentile volume exceeds capacity, queue may be longer.  
 Queue shown is maximum after two cycles.

Splits and Phases: 1: Aviation Parkway & Montreal Road



2: Montreal Road & Montford Hospital  
800 Montreal Road

Existing (2020) Traffic  
AM Peak Hour



Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	178	1037	1283	126	58	131
Future Volume (vph)	178	1037	1283	126	58	131
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800
Storage Length (m)	45.0			0.0	60.0	0.0
Storage Lanes	1			0	1	1
Taper Length (m)	2.5				2.5	
Lane Util. Factor	1.00	0.95	0.95	0.95	1.00	1.00
Ped Bike Factor			1.00		0.99	0.97
Frt			0.987			0.850
Flt Protected	0.950				0.950	
Satd. Flow (prot)	1616	3357	3303	0	1729	1432
Flt Permitted	0.077				0.950	
Satd. Flow (perm)	131	3357	3303	0	1703	1389
Right Turn on Red				Yes		Yes
Satd. Flow (RTOR)			14			146
Link Speed (k/h)		60	60		25	
Link Distance (m)		144.0	126.0		127.2	
Travel Time (s)		8.6	7.6		18.3	
Confl. Peds. (#/hr)	13			13	14	18
Confl. Bikes (#/hr)				3		
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Heavy Vehicles (%)	7%	3%	3%	2%	0%	8%
Adj. Flow (vph)	198	1152	1426	140	64	146
Shared Lane Traffic (%)						
Lane Group Flow (vph)	198	1152	1566	0	64	146
Turn Type	pm+pt	NA	NA		Prot	Perm
Protected Phases	5	2	6		4	
Permitted Phases	2					4
Detector Phase	5	2	6		4	4
Switch Phase						
Minimum Initial (s)	5.0	5.0	5.0		5.0	5.0
Minimum Split (s)	9.7	33.1	33.1		32.9	32.9
Total Split (s)	13.0	62.0	49.0		33.0	33.0
Total Split (%)	13.7%	65.3%	51.6%		34.7%	34.7%
Maximum Green (s)	8.3	55.9	42.9		27.1	27.1
Yellow Time (s)	3.7	3.7	3.7		3.3	3.3
All-Red Time (s)	1.0	2.4	2.4		2.6	2.6
Lost Time Adjust (s)	0.0	0.0	0.0		0.0	0.0
Total Lost Time (s)	4.7	6.1	6.1		5.9	5.9
Lead/Lag	Lead		Lag			
Lead-Lag Optimize?	Yes		Yes			
Vehicle Extension (s)	3.0	3.0	3.0		3.0	3.0
Recall Mode	None	C-Max	C-Max		None	None
Walk Time (s)		7.0	7.0		7.0	7.0
Flash Dont Walk (s)		20.0	20.0		20.0	20.0
Pedestrian Calls (#/hr)		0	0		0	0
Act Effct Green (s)	75.4	74.0	55.9		9.0	9.0
Actuated g/C Ratio	0.79	0.78	0.59		0.09	0.09



2: Montreal Road & Montford Hospital  
800 Montreal Road

Existing (2020) Traffic  
AM Peak Hour



Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
v/c Ratio	0.63	0.44	0.80		0.39	0.56
Control Delay	25.2	4.4	20.8		46.6	15.4
Queue Delay	0.0	0.5	21.9		0.0	0.0
Total Delay	25.2	4.9	42.6		46.6	15.4
LOS	C	A	D		D	B
Approach Delay		7.8	42.6		24.9	
Approach LOS		A	D		C	
Queue Length 50th (m)	16.5	29.1	108.2		11.3	0.0
Queue Length 95th (m)	38.3	46.4	#188.6		22.9	16.5
Internal Link Dist (m)		120.0	102.0		103.2	
Turn Bay Length (m)	45.0				60.0	
Base Capacity (vph)	314	2616	1948		493	500
Starvation Cap Reductn	0	907	435		0	0
Spillback Cap Reductn	0	0	0		0	0
Storage Cap Reductn	0	0	0		0	0
Reduced v/c Ratio	0.63	0.67	1.04		0.13	0.29

Intersection Summary





















Area Type: Other  
 Cycle Length: 95  
 Actuated Cycle Length: 95  
 Offset: 33 (35%), Referenced to phase 2:EBTL and 6:WBT, Start of Green  
 Natural Cycle: 100  
 Control Type: Actuated-Coordinated  
 Maximum v/c Ratio: 0.80  
 Intersection Signal Delay: 26.4  
 Intersection LOS: C  
 Intersection Capacity Utilization 78.6%  
 ICU Level of Service D  
 Analysis Period (min) 15  
 # 95th percentile volume exceeds capacity, queue may be longer.  
 Queue shown is maximum after two cycles.

Splits and Phases: 2: Montreal Road & Montford Hospital



3: Den Haag Drive/Lang's Road & Montreal Road  
800 Montreal Road

Existing (2020) Traffic  
AM Peak Hour

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	18	848	201	21	1175	10	224	4	23	5	3	18
Future Volume (vph)	18	848	201	21	1175	10	224	4	23	5	3	18
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Storage Length (m)	45.0		25.0	50.0		0.0	35.0		0.0	0.0		0.0
Storage Lanes	1		1	1		0	1		0	0		0
Taper Length (m)	2.5			2.5			2.5			2.5		
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	0.95	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor	0.99		0.93	0.99	1.00		0.97	0.94			0.96	
Frt			0.850		0.999			0.870			0.907	
Flt Protected	0.950			0.950			0.950				0.990	
Satd. Flow (prot)	1729	3325	1488	1729	3352	0	1662	1179	0	0	1478	0
Flt Permitted	0.160			0.269			0.738				0.961	
Satd. Flow (perm)	289	3325	1382	484	3352	0	1256	1179	0	0	1417	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			159		1			26			20	
Link Speed (k/h)		60			60			50			50	
Link Distance (m)		126.0			138.4			84.1			143.9	
Travel Time (s)		7.6			8.3			6.1			10.4	
Confl. Peds. (#/hr)	31		20	20		31	22		47	47		22
Confl. Bikes (#/hr)						3						
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%	4%	4%	0%	3%	0%	4%	0%	30%	0%	33%	6%
Adj. Flow (vph)	20	942	223	23	1306	11	249	4	26	6	3	20
Shared Lane Traffic (%)												
Lane Group Flow (vph)	20	942	223	23	1317	0	249	30	0	0	29	0
Turn Type	Perm	NA	Perm	Perm	NA		Perm	NA		Perm	NA	
Protected Phases		2			6			8			4	
Permitted Phases	2		2	6			8			4		
Detector Phase	2	2	2	6	6		8	8		4	4	
Switch Phase												
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0		5.0	5.0		5.0	5.0	
Minimum Split (s)	28.8	28.8	28.8	28.8	28.8		34.2	34.2		34.2	34.2	
Total Split (s)	82.0	82.0	82.0	82.0	82.0		38.0	38.0		38.0	38.0	
Total Split (%)	68.3%	68.3%	68.3%	68.3%	68.3%		31.7%	31.7%		31.7%	31.7%	
Maximum Green (s)	76.2	76.2	76.2	76.2	76.2		31.8	31.8		31.8	31.8	
Yellow Time (s)	3.7	3.7	3.7	3.7	3.7		3.3	3.3		3.3	3.3	
All-Red Time (s)	2.1	2.1	2.1	2.1	2.1		2.9	2.9		2.9	2.9	
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0			0.0	
Total Lost Time (s)	5.8	5.8	5.8	5.8	5.8		6.2	6.2			6.2	
Lead/Lag												
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0		3.0	3.0	
Recall Mode	C-Max	C-Max	C-Max	C-Max	C-Max		None	None		None	None	
Walk Time (s)	7.0	7.0	7.0	7.0	7.0		7.0	7.0		7.0	7.0	
Flash Dont Walk (s)	16.0	16.0	16.0	16.0	16.0		21.0	21.0		21.0	21.0	
Pedestrian Calls (#/hr)	0	0	0	0	0		0	0		0	0	
Act Effct Green (s)	80.5	80.5	80.5	80.5	80.5		27.5	27.5			27.5	
Actuated g/C Ratio	0.67	0.67	0.67	0.67	0.67		0.23	0.23			0.23	

3: Den Haag Drive/Lang's Road & Montreal Road  
800 Montreal Road

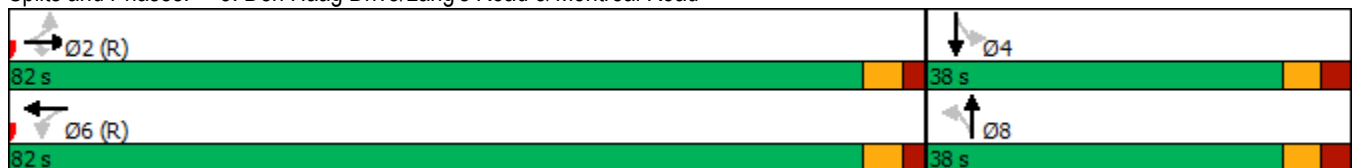
Existing (2020) Traffic  
AM Peak Hour

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
v/c Ratio	0.10	0.42	0.23	0.07	0.59		0.87	0.10			0.09	
Control Delay	10.0	10.4	3.3	8.9	12.7		71.9	14.7			17.8	
Queue Delay	0.0	1.0	0.0	0.0	0.0		0.0	0.0			0.0	
Total Delay	10.0	11.4	3.3	8.9	12.7		71.9	14.7			17.8	
LOS	A	B	A	A	B		E	B			B	
Approach Delay		9.8			12.6			65.8			17.8	
Approach LOS		A			B			E			B	
Queue Length 50th (m)	1.6	51.9	5.0	1.8	85.6		55.4	0.7			1.6	
Queue Length 95th (m)	5.3	68.7	14.7	5.4	111.3		#90.9	8.1			9.0	
Internal Link Dist (m)		102.0			114.4			60.1			119.9	
Turn Bay Length (m)	45.0		25.0	50.0			35.0					
Base Capacity (vph)	193	2229	979	324	2247		332	331			390	
Starvation Cap Reductn	0	955	0	0	0		0	0			0	
Spillback Cap Reductn	0	0	0	0	0		0	0			0	
Storage Cap Reductn	0	0	0	0	0		0	0			0	
Reduced v/c Ratio	0.10	0.74	0.23	0.07	0.59		0.75	0.09			0.07	

Intersection Summary

Area Type: Other  
 Cycle Length: 120  
 Actuated Cycle Length: 120  
 Offset: 27 (23%), Referenced to phase 2:EBTL and 6:WBTL, Start of Green  
 Natural Cycle: 70  
 Control Type: Actuated-Coordinated  
 Maximum v/c Ratio: 0.87  
 Intersection Signal Delay: 16.7  
 Intersection LOS: B  
 Intersection Capacity Utilization 67.2%  
 ICU Level of Service C  
 Analysis Period (min) 15  
 # 95th percentile volume exceeds capacity, queue may be longer.  
 Queue shown is maximum after two cycles.

Splits and Phases: 3: Den Haag Drive/Lang's Road & Montreal Road



1: Aviation Parkway & Montreal Road  
800 Montreal Road

Existing (2020) Traffic  
PM Peak Hour

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	49	1057	283	225	891	226	284	324	220	124	298	58
Future Volume (vph)	49	1057	283	225	891	226	284	324	220	124	298	58
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Storage Length (m)	45.0		30.0	55.0		25.0	0.0		55.0	70.0		0.0
Storage Lanes	1		1	1		1	1		1	1		0
Taper Length (m)	2.5			2.5			2.5			2.5		
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor	0.99		0.96			0.92	1.00		0.99	1.00	1.00	
Frt			0.850			0.850			0.850		0.976	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1695	3325	1532	1695	3325	1517	1729	1820	1532	1679	1770	0
Flt Permitted	0.145			0.086			0.125			0.333		
Satd. Flow (perm)	256	3325	1471	153	3325	1394	227	1820	1509	588	1770	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			136			136			216			7
Link Speed (k/h)		60			60			60				60
Link Distance (m)		150.7			144.0			388.7				332.0
Travel Time (s)		9.0			8.6			23.3				19.9
Confl. Peds. (#/hr)	29		22	22		29	7		2	2		7
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 (%)	2%	4%	1%	2%	4%	2%	0%	0%	1%	3%	0%	0%
Adj. Flow (vph)	54	1174	314	250	990	251	316	360	244	138	331	64
Shared Lane Traffic (%)												
Lane Group Flow (vph)	54	1174	314	250	990	251	316	360	244	138	395	0
Turn Type	pm+pt	NA	Perm	pm+pt	NA	Perm	pm+pt	NA	Perm	pm+pt	NA	
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases	2		2	6		6	8		8	4		
Detector Phase	5	2	2	1	6	6	3	8	8	7	4	
Switch Phase												
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Minimum Split (s)	10.9	33.9	33.9	10.9	39.0	39.0	10.9	32.2	32.2	10.9	32.2	32.2
Total Split (s)	13.0	51.0	51.0	13.0	51.0	51.0	23.0	33.0	33.0	23.0	33.0	33.0
Total Split (%)	10.8%	42.5%	42.5%	10.8%	42.5%	42.5%	19.2%	27.5%	27.5%	19.2%	27.5%	27.5%
Maximum Green (s)	7.1	45.1	45.1	7.1	45.1	45.1	17.1	26.8	26.8	17.1	26.8	26.8
Yellow Time (s)	3.7	3.7	3.7	3.7	3.7	3.7	3.7	3.7	3.7	3.7	3.7	3.7
All-Red Time (s)	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.5	2.5	2.2	2.5	2.5
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	5.9	5.9	5.9	5.9	5.9	5.9	5.9	6.2	6.2	5.9	6.2	6.2
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag	Lag
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Recall Mode	None	C-Max	C-Max	None	C-Max	C-Max	None	None	None	None	None	None
Walk Time (s)		16.0	16.0		16.0	16.0		7.0	7.0		7.0	
Flash Dont Walk (s)		12.0	12.0		12.0	12.0		19.0	19.0		19.0	
Pedestrian Calls (#/hr)		0	0		0	0		0	0		0	
Act Effct Green (s)	51.8	45.1	45.1	53.5	47.8	47.8	48.6	32.1	32.1	38.9	26.8	
Actuated g/C Ratio	0.43	0.38	0.38	0.45	0.40	0.40	0.40	0.27	0.27	0.32	0.22	
v/c Ratio	0.28	0.94	0.49	1.57	0.75	0.39	1.04	0.74	0.43	0.46	0.99	

1: Aviation Parkway & Montreal Road  
800 Montreal Road

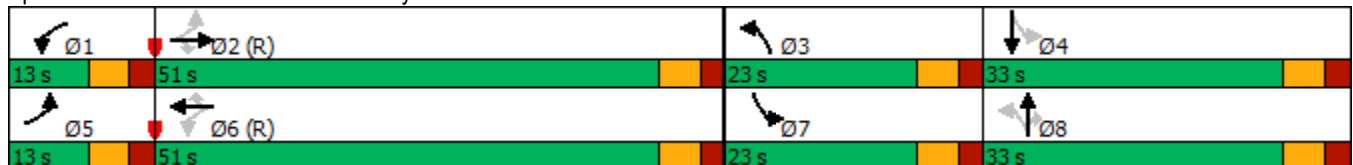
Existing (2020) Traffic  
PM Peak Hour

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Control Delay	20.6	51.2	18.6	310.1	24.9	6.6	94.7	51.4	9.8	28.2	88.1	
Queue Delay	0.0	0.0	0.0	0.0	0.8	0.0	0.0	0.0	0.0	0.0	0.0	
Total Delay	20.6	51.2	18.6	310.1	25.7	6.6	94.7	51.4	9.8	28.2	88.1	
LOS	C	D	B	F	C	A	F	D	A	C	F	
Approach Delay		43.5			70.2			55.2			72.6	
Approach LOS		D			E			E			E	
Queue Length 50th (m)	6.6	139.0	30.8	-68.0	108.5	7.1	-63.9	77.5	4.9	20.3	91.8	
Queue Length 95th (m)	13.6	#183.1	57.2	#123.7	92.3	15.4	#123.8	#130.6	27.4	34.2	#154.7	
Internal Link Dist (m)		126.7			120.0			364.7			308.0	
Turn Bay Length (m)	45.0		30.0	55.0		25.0			55.0	70.0		
Base Capacity (vph)	196	1249	637	159	1323	636	305	486	561	372	400	
Starvation Cap Reductn	0	0	0	0	120	0	0	0	0	0	0	
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	
Reduced v/c Ratio	0.28	0.94	0.49	1.57	0.82	0.39	1.04	0.74	0.43	0.37	0.99	

Intersection Summary

Area Type: Other  
 Cycle Length: 120  
 Actuated Cycle Length: 120  
 Offset: 106 (88%), Referenced to phase 2:EBTL and 6:WBTL, Start of Green  
 Natural Cycle: 125  
 Control Type: Actuated-Coordinated  
 Maximum v/c Ratio: 1.57  
 Intersection Signal Delay: 58.2  
 Intersection LOS: E  
 Intersection Capacity Utilization 101.2%  
 ICU Level of Service G  
 Analysis Period (min) 15  
 ~ Volume exceeds capacity, queue is theoretically infinite.  
 Queue shown is maximum after two cycles.  
 # 95th percentile volume exceeds capacity, queue may be longer.  
 Queue shown is maximum after two cycles.

Splits and Phases: 1: Aviation Parkway & Montreal Road



2: Montreal Road & Montford Hospital  
800 Montreal Road

Existing (2020) Traffic  
PM Peak Hour



Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	131	1035	1157	83	158	176
Future Volume (vph)	131	1035	1157	83	158	176
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800
Storage Length (m)	45.0			0.0	60.0	0.0
Storage Lanes	1			0	1	1
Taper Length (m)	2.5				2.5	
Lane Util. Factor	1.00	0.95	0.95	0.95	1.00	1.00
Ped Bike Factor			0.99		0.99	0.96
Frt			0.990			0.850
Flt Protected	0.950				0.950	
Satd. Flow (prot)	1601	3357	3306	0	1729	1488
Flt Permitted	0.127				0.950	
Satd. Flow (perm)	214	3357	3306	0	1704	1429
Right Turn on Red				Yes		Yes
Satd. Flow (RTOR)			9			170
Link Speed (k/h)		60	60		25	
Link Distance (m)		144.0	126.0		127.2	
Travel Time (s)		8.6	7.6		18.3	
Confl. Peds. (#/hr)	31			31	11	21
Confl. Bikes (#/hr)				1		
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Heavy Vehicles (%)	8%	3%	3%	2%	0%	4%
Adj. Flow (vph)	146	1150	1286	92	176	196
Shared Lane Traffic (%)						
Lane Group Flow (vph)	146	1150	1378	0	176	196
Turn Type	pm+pt	NA	NA		Prot	Perm
Protected Phases	5	2	6		4	
Permitted Phases	2					4
Detector Phase	5	2	6		4	4
Switch Phase						
Minimum Initial (s)	5.0	5.0	5.0		5.0	5.0
Minimum Split (s)	9.7	33.1	33.1		32.9	32.9
Total Split (s)	14.0	84.0	70.0		36.0	36.0
Total Split (%)	11.7%	70.0%	58.3%		30.0%	30.0%
Maximum Green (s)	9.3	77.9	63.9		30.1	30.1
Yellow Time (s)	3.7	3.7	3.7		3.3	3.3
All-Red Time (s)	1.0	2.4	2.4		2.6	2.6
Lost Time Adjust (s)	0.0	0.0	0.0		0.0	0.0
Total Lost Time (s)	4.7	6.1	6.1		5.9	5.9
Lead/Lag	Lead		Lag			
Lead-Lag Optimize?	Yes		Yes			
Vehicle Extension (s)	3.0	3.0	3.0		3.0	3.0
Recall Mode	None	C-Max	C-Max		None	None
Walk Time (s)		7.0	7.0		7.0	7.0
Flash Dont Walk (s)		20.0	20.0		20.0	20.0
Pedestrian Calls (#/hr)		0	0		0	0
Act Effct Green (s)	91.9	90.5	75.9		17.5	17.5
Actuated g/C Ratio	0.77	0.75	0.63		0.15	0.15

2: Montreal Road & Montford Hospital  
800 Montreal Road

Existing (2020) Traffic  
PM Peak Hour

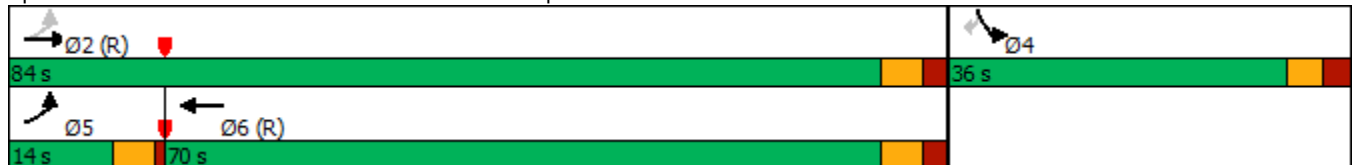


Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
v/c Ratio	0.53	0.45	0.66		0.70	0.56
Control Delay	24.0	2.8	17.1		62.9	15.7
Queue Delay	0.0	0.2	8.8		0.0	0.0
Total Delay	24.0	3.1	25.9		62.9	15.7
LOS	C	A	C		E	B
Approach Delay		5.4	25.9		38.1	
Approach LOS		A	C		D	
Queue Length 50th (m)	11.6	17.8	95.9		39.9	5.4
Queue Length 95th (m)	m19.2	m26.5	159.1		59.8	26.0
Internal Link Dist (m)		120.0	102.0		103.2	
Turn Bay Length (m)	45.0				60.0	
Base Capacity (vph)	289	2531	2095		433	485
Starvation Cap Reductn	0	584	689		0	0
Spillback Cap Reductn	0	0	39		0	2
Storage Cap Reductn	0	0	0		0	0
Reduced v/c Ratio	0.51	0.59	0.98		0.41	0.41

Intersection Summary






















Area Type: Other  
 Cycle Length: 120  
 Actuated Cycle Length: 120  
 Offset: 99 (83%), Referenced to phase 2:EBTL and 6:WBT, Start of Green  
 Natural Cycle: 90  
 Control Type: Actuated-Coordinated  
 Maximum v/c Ratio: 0.70  
 Intersection Signal Delay: 18.7  
 Intersection LOS: B  
 Intersection Capacity Utilization 74.2%  
 ICU Level of Service D  
 Analysis Period (min) 15  
 m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 2: Montreal Road & Montford Hospital



3: Den Haag Drive/Lang's Road & Montreal Road  
800 Montreal Road

Existing (2020) Traffic  
PM Peak Hour

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	43	1144	163	14	906	7	141	1	71	12	2	37
Future Volume (vph)	43	1144	163	14	906	7	141	1	71	12	2	37
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Storage Length (m)	45.0		25.0	50.0		0.0	35.0		0.0	0.0		0.0
Storage Lanes	1		1	1		0	1		0	0		0
Taper Length (m)	2.5			2.5			2.5			2.5		
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	0.95	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor	0.99		0.90	0.99	1.00		0.99	0.98			0.98	
Frt			0.850		0.999			0.852			0.901	
Flt Protected	0.950			0.950			0.950				0.989	
Satd. Flow (prot)	1695	3357	1532	1729	3385	0	1695	1415	0	0	1591	0
Flt Permitted	0.258			0.186			0.790				0.927	
Satd. Flow (perm)	456	3357	1376	336	3385	0	1391	1415	0	0	1487	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			95		1			70			41	
Link Speed (k/h)		60			60			50			50	
Link Distance (m)		126.0			138.4			84.1			143.9	
Travel Time (s)		7.6			8.3			6.1			10.4	
Confl. Peds. (#/hr)	19		31	31		19	11		10	10		11
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 (%)	2%	3%	1%	0%	2%	0%	2%	0%	7%	0%	0%	0%
Adj. Flow (vph)	48	1271	181	16	1007	8	157	1	79	13	2	41
Shared Lane Traffic (%)												
Lane Group Flow (vph)	48	1271	181	16	1015	0	157	80	0	0	56	0
Turn Type	Perm	NA	Perm	Perm	NA		Perm	NA		Perm	NA	
Protected Phases		2			6			8			4	
Permitted Phases	2		2	6			8			4		
Detector Phase	2	2	2	6	6		8	8		4	4	
Switch Phase												
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0		5.0	5.0		5.0	5.0	
Minimum Split (s)	28.8	28.8	28.8	28.8	28.8		34.2	34.2		34.2	34.2	
Total Split (s)	86.0	86.0	86.0	86.0	86.0		38.0	38.0		34.0	34.0	
Total Split (%)	69.4%	69.4%	69.4%	69.4%	69.4%		30.6%	30.6%		27.4%	27.4%	
Maximum Green (s)	80.2	80.2	80.2	80.2	80.2		31.8	31.8		27.8	27.8	
Yellow Time (s)	3.7	3.7	3.7	3.7	3.7		3.3	3.3		3.3	3.3	
All-Red Time (s)	2.1	2.1	2.1	2.1	2.1		2.9	2.9		2.9	2.9	
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0			0.0	
Total Lost Time (s)	5.8	5.8	5.8	5.8	5.8		6.2	6.2			6.2	
Lead/Lag												
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0		3.0	3.0	
Recall Mode	C-Max	C-Max	C-Max	C-Max	C-Max		None	None		None	None	
Walk Time (s)	7.0	7.0	7.0	7.0	7.0		7.0	7.0		7.0	7.0	
Flash Dont Walk (s)	16.0	16.0	16.0	16.0	16.0		21.0	21.0		21.0	21.0	
Pedestrian Calls (#/hr)	0	0	0	0	0		0	0		0	0	
Act Effct Green (s)	91.4	91.4	91.4	91.4	91.4		20.6	20.6			20.6	
Actuated g/C Ratio	0.74	0.74	0.74	0.74	0.74		0.17	0.17			0.17	
v/c Ratio	0.14	0.51	0.17	0.06	0.41		0.68	0.27			0.20	



3: Den Haag Drive/Lang's Road & Montreal Road  
800 Montreal Road

Existing (2020) Traffic  
PM Peak Hour



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Control Delay	7.4	8.5	3.3	6.9	7.3		62.4	13.9			18.4	
Queue Delay	0.0	1.8	0.0	0.0	0.0		0.0	0.0			0.0	
Total Delay	7.4	10.3	3.3	6.9	7.3		62.4	13.9			18.4	
LOS	A	B	A	A	A		E	B			B	
Approach Delay		9.4			7.3			46.0			18.4	
Approach LOS		A			A			D			B	
Queue Length 50th (m)	3.0	60.7	5.2	1.0	43.0		36.4	2.1			3.1	
Queue Length 95th (m)	9.2	96.4	14.8	3.9	69.1		54.9	14.5			13.6	
Internal Link Dist (m)		102.0			114.4			60.1			119.9	
Turn Bay Length (m)	45.0		25.0	50.0			35.0					
Base Capacity (vph)	336	2473	1039	247	2494		356	414			411	
Starvation Cap Reductn	0	984	0	0	0		0	0			0	
Spillback Cap Reductn	0	0	0	0	0		0	0			0	
Storage Cap Reductn	0	0	0	0	0		0	0			0	
Reduced v/c Ratio	0.14	0.85	0.17	0.06	0.41		0.44	0.19			0.14	

Intersection Summary

Area Type:	Other
Cycle Length:	124
Actuated Cycle Length:	124
Offset:	104 (84%), Referenced to phase 2:EBTL and 6:WBTL, Start of Green
Natural Cycle:	70
Control Type:	Actuated-Coordinated
Maximum v/c Ratio:	0.68
Intersection Signal Delay:	11.9
Intersection LOS:	B
Intersection Capacity Utilization:	65.0%
ICU Level of Service:	C
Analysis Period (min):	15

Splits and Phases: 3: Den Haag Drive/Lang's Road & Montreal Road



1: Aviation Parkway & Montreal Road  
800 Montreal Road

Future (2024) Background Traffic  
AM Peak Hour

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	41	890	256	327	1155	175	229	213	296	269	259	63
Future Volume (vph)	41	890	256	327	1155	175	229	213	296	269	259	63
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Storage Length (m)	45.0		30.0	55.0		25.0	0.0		55.0	70.0		0.0
Storage Lanes	1		1	1		1	1		1	1		0
Taper Length (m)	2.5			2.5			2.5			2.5		
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor	0.99		0.96			0.94	1.00		0.98	1.00	1.00	
Frt			0.850			0.850			0.850		0.971	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1695	3232	1547	1695	3262	1547	1712	1820	1517	1695	1750	0
Flt Permitted	0.175			0.123			0.219			0.471		
Satd. Flow (perm)	310	3232	1478	219	3262	1454	393	1820	1488	837	1750	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			190			136			290			9
Link Speed (k/h)		60			60			60				60
Link Distance (m)		150.7			144.0			388.7				332.0
Travel Time (s)		9.0			8.6			23.3				19.9
Confl. Peds. (#/hr)	19		26	26		19	6		5	5		6
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Heavy Vehicles (%)	2%	7%	0%	2%	6%	0%	1%	0%	2%	2%	0%	3%
Adj. Flow (vph)	41	890	256	327	1155	175	229	213	296	269	259	63
Shared Lane Traffic (%)												
Lane Group Flow (vph)	41	890	256	327	1155	175	229	213	296	269	322	0
Turn Type	pm+pt	NA	Perm	pm+pt	NA	Perm	pm+pt	NA	Perm	pm+pt	NA	
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases	2		2	6		6	8		8	4		
Detector Phase	5	2	2	1	6	6	3	8	8	7	4	
Switch Phase												
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Minimum Split (s)	10.9	33.9	33.9	10.9	39.0	39.0	10.9	32.2	32.2	10.9	32.2	
Total Split (s)	11.0	43.7	43.7	26.0	58.7	58.7	18.0	32.9	32.9	17.4	32.3	
Total Split (%)	9.2%	36.4%	36.4%	21.7%	48.9%	48.9%	15.0%	27.4%	27.4%	14.5%	26.9%	
Maximum Green (s)	5.1	37.8	37.8	20.1	52.8	52.8	12.1	26.7	26.7	11.5	26.1	
Yellow Time (s)	3.7	3.7	3.7	3.7	3.7	3.7	3.7	3.7	3.7	3.7	3.7	
All-Red Time (s)	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.5	2.5	2.2	2.5	
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Total Lost Time (s)	5.9	5.9	5.9	5.9	5.9	5.9	5.9	6.2	6.2	5.9	6.2	
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag	
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	
Recall Mode	None	C-Max	C-Max	None	C-Max	C-Max	None	None	None	None	None	None
Walk Time (s)		16.0	16.0		16.0	16.0		7.0	7.0		7.0	
Flash Dont Walk (s)		12.0	12.0		12.0	12.0		19.0	19.0		19.0	
Pedestrian Calls (#/hr)		0	0		0	0		0	0		0	
Act Effct Green (s)	45.2	39.8	39.8	65.6	56.5	56.5	37.3	24.9	24.9	36.1	24.3	
Actuated g/C Ratio	0.38	0.33	0.33	0.55	0.47	0.47	0.31	0.21	0.21	0.30	0.20	
v/c Ratio	0.23	0.83	0.41	0.90	0.75	0.23	0.90	0.56	0.55	0.81	0.89	

1: Aviation Parkway & Montreal Road  
800 Montreal Road

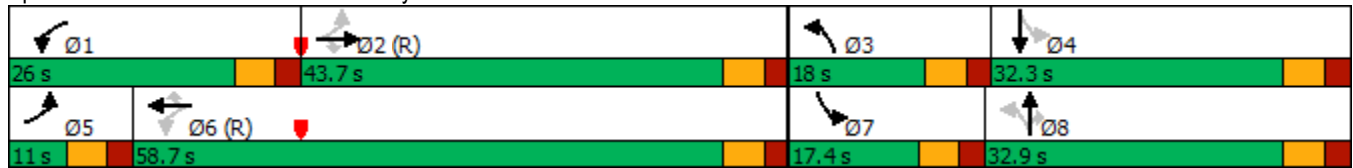
Future (2024) Background Traffic  
AM Peak Hour

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Control Delay	18.9	45.5	11.3	55.8	31.0	6.5	66.8	48.6	9.0	51.2	71.7	
Queue Delay	0.0	0.0	0.0	0.0	6.4	0.0	0.0	0.0	0.0	0.0	0.0	
Total Delay	18.9	45.5	11.3	55.8	37.5	6.5	66.8	48.6	9.0	51.2	71.7	
LOS	B	D	B	E	D	A	E	D	A	D	E	
Approach Delay		37.2			37.8			38.4			62.4	
Approach LOS		D			D			D			E	
Queue Length 50th (m)	4.5	104.0	11.1	55.3	121.7	5.2	38.9	44.5	1.1	47.0	71.1	
Queue Length 95th (m)	10.0	#137.7	33.0	#107.4	149.8	18.3	#74.7	68.9	24.5	#79.3	#117.3	
Internal Link Dist (m)		126.7			120.0			364.7			308.0	
Turn Bay Length (m)	45.0		30.0	55.0		25.0			55.0	70.0		
Base Capacity (vph)	179	1073	617	371	1537	756	255	404	556	334	387	
Starvation Cap Reductn	0	0	0	0	333	0	0	0	0	0	0	
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	
Reduced v/c Ratio	0.23	0.83	0.41	0.88	0.96	0.23	0.90	0.53	0.53	0.81	0.83	

Intersection Summary

























Area Type: Other  
 Cycle Length: 120  
 Actuated Cycle Length: 120  
 Offset: 55 (46%), Referenced to phase 2:EBTL and 6:WBTL, Start of Green  
 Natural Cycle: 95  
 Control Type: Actuated-Coordinated  
 Maximum v/c Ratio: 0.90  
 Intersection Signal Delay: 41.2  
 Intersection LOS: D  
 Intersection Capacity Utilization 97.5%  
 ICU Level of Service F  
 Analysis Period (min) 15  
 # 95th percentile volume exceeds capacity, queue may be longer.  
 Queue shown is maximum after two cycles.

Splits and Phases: 1: Aviation Parkway & Montreal Road



1: Aviation Parkway & Montreal Road  
800 Montreal Road

Future (2024) Background Traffic - Dual WBL  
AM Peak Hour

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	41	890	256	327	1155	175	229	213	296	269	259	63
Future Volume (vph)	41	890	256	327	1155	175	229	213	296	269	259	63
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Storage Length (m)	45.0		30.0	55.0		25.0	0.0		55.0	70.0		0.0
Storage Lanes	1		1	2		1	1		1	1		0
Taper Length (m)	2.5			2.5			2.5			2.5		
Lane Util. Factor	1.00	0.95	1.00	0.97	0.95	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor	1.00		0.96	0.99		0.94	1.00		0.98	1.00	1.00	
Frt			0.850			0.850			0.850		0.971	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1695	3232	1547	3288	3262	1547	1712	1820	1517	1695	1750	0
Flt Permitted	0.127			0.178			0.234			0.452		
Satd. Flow (perm)	226	3232	1478	613	3262	1454	420	1820	1488	803	1750	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			136			136			163			9
Link Speed (k/h)		60			60			60				60
Link Distance (m)		150.7			144.0			388.7				332.0
Travel Time (s)		9.0			8.6			23.3				19.9
Confl. Peds. (#/hr)	19		26	26		19	6		5	5		6
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Heavy Vehicles (%)	2%	7%	0%	2%	6%	0%	1%	0%	2%	2%	0%	3%
Adj. Flow (vph)	41	890	256	327	1155	175	229	213	296	269	259	63
Shared Lane Traffic (%)												
Lane Group Flow (vph)	41	890	256	327	1155	175	229	213	296	269	322	0
Turn Type	pm+pt	NA	Perm	pm+pt	NA	Perm	pm+pt	NA	Perm	pm+pt	NA	
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases	2		2	6		6	8		8	4		
Detector Phase	5	2	2	1	6	6	3	8	8	7	4	
Switch Phase												
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Minimum Split (s)	10.9	33.9	33.9	10.9	39.0	39.0	10.9	32.2	32.2	10.9	32.2	
Total Split (s)	11.0	52.8	52.8	14.2	56.0	56.0	20.0	33.0	33.0	20.0	33.0	
Total Split (%)	9.2%	44.0%	44.0%	11.8%	46.7%	46.7%	16.7%	27.5%	27.5%	16.7%	27.5%	
Maximum Green (s)	5.1	46.9	46.9	8.3	50.1	50.1	14.1	26.8	26.8	14.1	26.8	
Yellow Time (s)	3.7	3.7	3.7	3.7	3.7	3.7	3.7	3.7	3.7	3.7	3.7	
All-Red Time (s)	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.5	2.5	2.2	2.5	
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Total Lost Time (s)	5.9	5.9	5.9	5.9	5.9	5.9	5.9	6.2	6.2	5.9	6.2	
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag	
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	
Recall Mode	None	C-Max	C-Max	None	C-Max	C-Max	None	None	None	None	None	
Walk Time (s)		16.0	16.0		16.0	16.0		7.0	7.0		7.0	
Flash Dont Walk (s)		12.0	12.0		12.0	12.0		19.0	19.0		19.0	
Pedestrian Calls (#/hr)		0	0		0	0		0	0		0	
Act Effct Green (s)	54.2	48.8	48.8	61.6	54.5	54.5	38.5	24.4	24.4	39.0	24.7	
Actuated g/C Ratio	0.45	0.41	0.41	0.51	0.45	0.45	0.32	0.20	0.20	0.32	0.21	
v/c Ratio	0.24	0.68	0.38	0.64	0.78	0.24	0.81	0.58	0.69	0.74	0.88	

1: Aviation Parkway & Montreal Road  
800 Montreal Road

Future (2024) Background Traffic - Dual WBL  
AM Peak Hour

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Control Delay	18.8	32.9	13.5	21.8	33.7	7.0	50.2	49.2	27.7	42.1	69.5	
Queue Delay	0.0	0.0	0.0	0.0	7.2	0.0	0.0	0.0	0.0	0.0	0.0	
Total Delay	18.8	32.9	13.5	21.8	40.9	7.0	50.2	49.2	27.7	42.1	69.5	
LOS	B	C	B	C	D	A	D	D	C	D	E	
Approach Delay		28.2			33.5			40.9			57.0	
Approach LOS		C			C			D			E	
Queue Length 50th (m)	4.7	91.5	18.5	20.9	127.1	5.4	37.4	44.4	28.0	45.2	70.5	
Queue Length 95th (m)	10.5	114.8	39.7	29.3	156.5	19.2	#64.6	68.8	58.8	68.1	#114.7	
Internal Link Dist (m)		126.7			120.0			364.7			308.0	
Turn Bay Length (m)	45.0		30.0	55.0		25.0			55.0	70.0		
Base Capacity (vph)	168	1314	681	512	1481	734	288	406	458	366	397	
Starvation Cap Reductn	0	0	0	0	287	0	0	0	0	0	0	
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	
Reduced v/c Ratio	0.24	0.68	0.38	0.64	0.97	0.24	0.80	0.52	0.65	0.73	0.81	

Intersection Summary

Area Type: Other  
 Cycle Length: 120  
 Actuated Cycle Length: 120  
 Offset: 55 (46%), Referenced to phase 2:EBTL and 6:WBTL, Start of Green  
 Natural Cycle: 95  
 Control Type: Actuated-Coordinated  
 Maximum v/c Ratio: 0.88  
 Intersection Signal Delay: 36.6  
 Intersection LOS: D  
 Intersection Capacity Utilization 90.3%  
 ICU Level of Service E  
 Analysis Period (min) 15  
 # 95th percentile volume exceeds capacity, queue may be longer.  
 Queue shown is maximum after two cycles.

Splits and Phases: 1: Aviation Parkway & Montreal Road



2: Montreal Road & Montford Hospital  
800 Montreal Road

Future (2024) Background Traffic  
AM Peak Hour



Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	178	1277	1526	126	58	131
Future Volume (vph)	178	1277	1526	126	58	131
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800
Storage Length (m)	45.0			0.0	60.0	0.0
Storage Lanes	1			0	1	1
Taper Length (m)	2.5				2.5	
Lane Util. Factor	1.00	0.95	0.95	0.95	1.00	1.00
Ped Bike Factor			1.00		0.99	0.97
Frt			0.989			0.850
Flt Protected	0.950				0.950	
Satd. Flow (prot)	1616	3357	3311	0	1729	1432
Flt Permitted	0.071				0.950	
Satd. Flow (perm)	121	3357	3311	0	1703	1389
Right Turn on Red				Yes		Yes
Satd. Flow (RTOR)			12			131
Link Speed (k/h)		60	60		25	
Link Distance (m)		144.0	126.0		127.2	
Travel Time (s)		8.6	7.6		18.3	
Confl. Peds. (#/hr)	13			13	14	18
Confl. Bikes (#/hr)				3		
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Heavy Vehicles (%)	7%	3%	3%	2%	0%	8%
Adj. Flow (vph)	178	1277	1526	126	58	131
Shared Lane Traffic (%)						
Lane Group Flow (vph)	178	1277	1652	0	58	131
Turn Type	pm+pt	NA	NA		Prot	Perm
Protected Phases	5	2	6		4	
Permitted Phases	2					4
Detector Phase	5	2	6		4	4
Switch Phase						
Minimum Initial (s)	5.0	5.0	5.0		5.0	5.0
Minimum Split (s)	9.7	33.1	33.1		32.9	32.9
Total Split (s)	13.0	62.0	49.0		33.0	33.0
Total Split (%)	13.7%	65.3%	51.6%		34.7%	34.7%
Maximum Green (s)	8.3	55.9	42.9		27.1	27.1
Yellow Time (s)	3.7	3.7	3.7		3.3	3.3
All-Red Time (s)	1.0	2.4	2.4		2.6	2.6
Lost Time Adjust (s)	0.0	0.0	0.0		0.0	0.0
Total Lost Time (s)	4.7	6.1	6.1		5.9	5.9
Lead/Lag	Lead		Lag			
Lead-Lag Optimize?	Yes		Yes			
Vehicle Extension (s)	3.0	3.0	3.0		3.0	3.0
Recall Mode	None	C-Max	C-Max		None	None
Walk Time (s)		7.0	7.0		7.0	7.0
Flash Dont Walk (s)		20.0	20.0		20.0	20.0
Pedestrian Calls (#/hr)		0	0		0	0
Act Effct Green (s)	75.7	74.3	58.2		8.7	8.7
Actuated g/C Ratio	0.80	0.78	0.61		0.09	0.09



Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
v/c Ratio	0.64	0.49	0.81		0.37	0.53
Control Delay	27.0	4.6	19.8		46.3	15.7
Queue Delay	0.0	0.6	25.7		0.0	0.0
Total Delay	27.0	5.2	45.5		46.3	15.7
LOS	C	A	D		D	B
Approach Delay		7.9	45.5		25.1	
Approach LOS		A	D		C	
Queue Length 50th (m)	14.3	33.5	110.4		10.2	0.0
Queue Length 95th (m)	35.2	53.0	#198.9		21.3	15.8
Internal Link Dist (m)		120.0	102.0		103.2	
Turn Bay Length (m)	45.0				60.0	
Base Capacity (vph)	278	2627	2033		493	489
Starvation Cap Reductn	0	860	454		0	0
Spillback Cap Reductn	0	0	0		0	0
Storage Cap Reductn	0	0	0		0	0
Reduced v/c Ratio	0.64	0.72	1.05		0.12	0.27

Intersection Summary

Area Type: Other  
 Cycle Length: 95  
 Actuated Cycle Length: 95  
 Offset: 33 (35%), Referenced to phase 2:EBTL and 6:WBT, Start of Green  
 Natural Cycle: 100  
 Control Type: Actuated-Coordinated  
 Maximum v/c Ratio: 0.81  
 Intersection Signal Delay: 27.7  
 Intersection LOS: C  
 Intersection Capacity Utilization 85.6%  
 ICU Level of Service E  
 Analysis Period (min) 15  
 # 95th percentile volume exceeds capacity, queue may be longer.  
 Queue shown is maximum after two cycles.

Splits and Phases: 2: Montreal Road & Montford Hospital



3: Den Haag Drive/Lang's Road & Montreal Road  
800 Montreal Road

Future (2024) Background Traffic  
AM Peak Hour

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	18	1116	201	23	1379	10	224	4	24	5	3	18
Future Volume (vph)	18	1116	201	23	1379	10	224	4	24	5	3	18
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Storage Length (m)	45.0		25.0	50.0		0.0	35.0		0.0	0.0		0.0
Storage Lanes	1		1	1		0	1		0	0		0
Taper Length (m)	2.5			2.5			2.5			2.5		
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	0.95	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor			0.93	0.99	1.00		0.97	0.94				0.96
Frt			0.850		0.999			0.871				0.907
Flt Protected	0.950			0.950			0.950					0.990
Satd. Flow (prot)	1729	3325	1488	1729	3352	0	1662	1184	0	0	1472	0
Flt Permitted	0.147			0.217			0.740					0.964
Satd. Flow (perm)	268	3325	1382	392	3352	0	1260	1184	0	0	1417	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			121		1			24				18
Link Speed (k/h)		60			60			50				50
Link Distance (m)		126.0			138.4			84.1				143.9
Travel Time (s)		7.6			8.3			6.1				10.4
Confl. Peds. (#/hr)	31		20	20		31	22		47	47		22
Confl. Bikes (#/hr)						3						
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Heavy Vehicles (%)	0%	4%	4%	0%	3%	0%	4%	0%	30%	0%	33%	6%
Adj. Flow (vph)	18	1116	201	23	1379	10	224	4	24	5	3	18
Shared Lane Traffic (%)												
Lane Group Flow (vph)	18	1116	201	23	1389	0	224	28	0	0	26	0
Turn Type	Perm	NA	Perm	Perm	NA		Perm	NA		Perm	NA	
Protected Phases		2			6			8				4
Permitted Phases	2		2	6			8			4		
Detector Phase	2	2	2	6	6		8	8		4	4	
Switch Phase												
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0		5.0	5.0		5.0	5.0	
Minimum Split (s)	28.8	28.8	28.8	28.8	28.8		34.2	34.2		34.2	34.2	
Total Split (s)	82.0	82.0	82.0	82.0	82.0		38.0	38.0		38.0	38.0	
Total Split (%)	68.3%	68.3%	68.3%	68.3%	68.3%		31.7%	31.7%		31.7%	31.7%	
Maximum Green (s)	76.2	76.2	76.2	76.2	76.2		31.8	31.8		31.8	31.8	
Yellow Time (s)	3.7	3.7	3.7	3.7	3.7		3.3	3.3		3.3	3.3	
All-Red Time (s)	2.1	2.1	2.1	2.1	2.1		2.9	2.9		2.9	2.9	
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0				0.0
Total Lost Time (s)	5.8	5.8	5.8	5.8	5.8		6.2	6.2				6.2
Lead/Lag												
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0		3.0	3.0	
Recall Mode	C-Max	C-Max	C-Max	C-Max	C-Max		None	None		None	None	
Walk Time (s)	7.0	7.0	7.0	7.0	7.0		7.0	7.0		7.0	7.0	
Flash Dont Walk (s)	16.0	16.0	16.0	16.0	16.0		21.0	21.0		21.0	21.0	
Pedestrian Calls (#/hr)	0	0	0	0	0		0	0		0	0	
Act Effct Green (s)	82.4	82.4	82.4	82.4	82.4		25.6	25.6				25.6
Actuated g/C Ratio	0.69	0.69	0.69	0.69	0.69		0.21	0.21				0.21



3: Den Haag Drive/Lang's Road & Montreal Road  
800 Montreal Road

Future (2024) Background Traffic  
AM Peak Hour

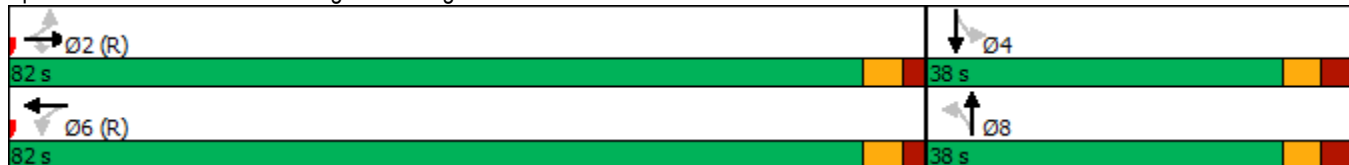


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
v/c Ratio	0.10	0.49	0.20	0.09	0.60		0.84	0.10			0.08	
Control Delay	9.6	10.5	3.9	8.9	12.3		69.9	15.3			18.7	
Queue Delay	0.0	1.5	0.0	0.0	0.0		0.0	0.0			0.0	
Total Delay	9.6	12.0	3.9	8.9	12.3		69.9	15.3			18.7	
LOS	A	B	A	A	B		E	B			B	
Approach Delay		10.7			12.2			63.8			18.7	
Approach LOS		B			B			E			B	
Queue Length 50th (m)	1.3	60.6	5.9	1.7	85.6		50.3	0.7			1.5	
Queue Length 95th (m)	4.9	86.8	16.0	5.6	121.5		75.4	7.9			8.4	
Internal Link Dist (m)		102.0			114.4			60.1			119.9	
Turn Bay Length (m)	45.0		25.0	50.0			35.0					
Base Capacity (vph)	184	2283	987	269	2302		333	331			388	
Starvation Cap Reductn	0	917	0	0	0		0	0			0	
Spillback Cap Reductn	0	0	0	0	0		0	0			0	
Storage Cap Reductn	0	0	0	0	0		0	0			0	
Reduced v/c Ratio	0.10	0.82	0.20	0.09	0.60		0.67	0.08			0.07	

Intersection Summary

























Area Type:	Other
Cycle Length:	120
Actuated Cycle Length:	120
Offset:	27 (23%), Referenced to phase 2:EBTL and 6:WBTL, Start of Green
Natural Cycle:	75
Control Type:	Actuated-Coordinated
Maximum v/c Ratio:	0.84
Intersection Signal Delay:	15.9
Intersection LOS:	B
Intersection Capacity Utilization:	73.2%
ICU Level of Service:	D
Analysis Period (min):	15

Splits and Phases: 3: Den Haag Drive/Lang's Road & Montreal Road



1: Aviation Parkway & Montreal Road  
800 Montreal Road

Future (2024) Background Traffic  
PM Peak Hour

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	49	1190	283	270	1035	270	284	324	261	151	298	58
Future Volume (vph)	49	1190	283	270	1035	270	284	324	261	151	298	58
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Storage Length (m)	45.0		30.0	55.0		25.0	0.0		55.0	70.0		0.0
Storage Lanes	1		1	1		1	1		1	1		0
Taper Length (m)	2.5			2.5			2.5			2.5		
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor	0.99		0.96			0.92	1.00		0.99	1.00	1.00	
Frt			0.850			0.850			0.850		0.976	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1695	3325	1532	1695	3325	1517	1729	1820	1532	1679	1770	0
Flt Permitted	0.189			0.083			0.145			0.412		
Satd. Flow (perm)	334	3325	1471	148	3325	1394	263	1820	1509	727	1770	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			244			190			200			7
Link Speed (k/h)		60			60			60			60	
Link Distance (m)		150.7			144.0			388.7			332.0	
Travel Time (s)		9.0			8.6			23.3			19.9	
Confl. Peds. (#/hr)	29		22	22		29	7		2	2		7
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Heavy Vehicles (%)	2%	4%	1%	2%	4%	2%	0%	0%	1%	3%	0%	0%
Adj. Flow (vph)	49	1190	283	270	1035	270	284	324	261	151	298	58
Shared Lane Traffic (%)												
Lane Group Flow (vph)	49	1190	283	270	1035	270	284	324	261	151	356	0
Turn Type	pm+pt	NA	Perm	pm+pt	NA	Perm	pm+pt	NA	Perm	pm+pt	NA	
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases	2		2	6		6	8		8	4		
Detector Phase	5	2	2	1	6	6	3	8	8	7	4	
Switch Phase												
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Minimum Split (s)	10.9	33.9	33.9	10.9	39.0	39.0	10.9	32.2	32.2	10.9	32.2	
Total Split (s)	11.8	48.3	48.3	20.0	56.5	56.5	19.5	38.5	38.5	13.2	32.2	
Total Split (%)	9.8%	40.3%	40.3%	16.7%	47.1%	47.1%	16.3%	32.1%	32.1%	11.0%	26.8%	
Maximum Green (s)	5.9	42.4	42.4	14.1	50.6	50.6	13.6	32.3	32.3	7.3	26.0	
Yellow Time (s)	3.7	3.7	3.7	3.7	3.7	3.7	3.7	3.7	3.7	3.7	3.7	
All-Red Time (s)	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.5	2.5	2.2	2.5	
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Total Lost Time (s)	5.9	5.9	5.9	5.9	5.9	5.9	5.9	6.2	6.2	5.9	6.2	
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag	
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	
Recall Mode	None	C-Max	C-Max	None	C-Max	C-Max	None	None	None	None	None	
Walk Time (s)		16.0	16.0		16.0	16.0		7.0	7.0		7.0	
Flash Dont Walk (s)		12.0	12.0		12.0	12.0		19.0	19.0		19.0	
Pedestrian Calls (#/hr)		0	0		0	0		0	0		0	
Act Effct Green (s)	48.2	42.4	42.4	63.0	53.6	53.6	45.2	31.7	31.7	33.0	25.4	
Actuated g/C Ratio	0.40	0.35	0.35	0.52	0.45	0.45	0.38	0.26	0.26	0.28	0.21	
v/c Ratio	0.24	1.01	0.42	1.01	0.70	0.37	1.07	0.68	0.48	0.59	0.94	

1: Aviation Parkway & Montreal Road  
800 Montreal Road

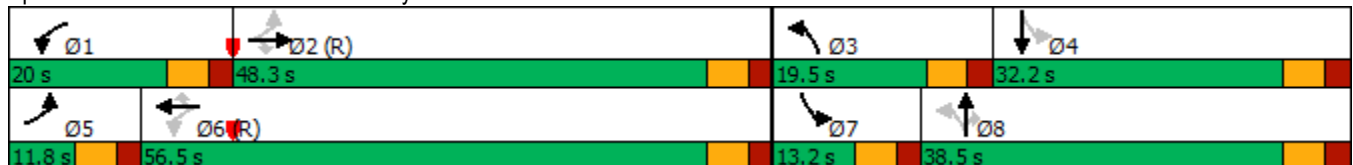
Future (2024) Background Traffic  
PM Peak Hour

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Control Delay	18.4	68.5	7.5	98.3	20.2	4.8	106.3	47.4	12.7	38.4	79.1	
Queue Delay	0.0	0.0	0.0	0.0	0.7	0.0	0.0	0.0	0.0	0.0	0.0	
Total Delay	18.4	68.5	7.5	98.3	20.9	4.8	106.3	47.4	12.7	38.4	79.1	
LOS	B	E	A	F	C	A	F	D	B	D	E	
Approach Delay	55.5			31.4			56.2			67.0		
Approach LOS	E			C			E			E		
Queue Length 50th (m)	5.5	~150.4	6.1	~51.4	82.4	3.0	~56.1	68.0	11.0	23.9	81.1	
Queue Length 95th (m)	11.7	#196.9	26.4	#109.8	75.3	19.7	#110.0	99.2	34.5	39.5	#135.8	
Internal Link Dist (m)	126.7			120.0			364.7			308.0		
Turn Bay Length (m)	45.0		30.0	55.0		25.0			55.0	70.0		
Base Capacity (vph)	201	1174	677	267	1484	727	265	489	552	257	388	
Starvation Cap Reductn	0	0	0	0	173	0	0	0	0	0	0	
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	
Reduced v/c Ratio	0.24	1.01	0.42	1.01	0.79	0.37	1.07	0.66	0.47	0.59	0.92	

Intersection Summary

Area Type: Other  
 Cycle Length: 120  
 Actuated Cycle Length: 120  
 Offset: 106 (88%), Referenced to phase 2:EBTL and 6:WBTL, Start of Green  
 Natural Cycle: 125  
 Control Type: Actuated-Coordinated  
 Maximum v/c Ratio: 1.07  
 Intersection Signal Delay: 48.5  
 Intersection LOS: D  
 Intersection Capacity Utilization 107.7%  
 ICU Level of Service G  
 Analysis Period (min) 15  
 ~ Volume exceeds capacity, queue is theoretically infinite.  
 Queue shown is maximum after two cycles.  
 # 95th percentile volume exceeds capacity, queue may be longer.  
 Queue shown is maximum after two cycles.

Splits and Phases: 1: Aviation Parkway & Montreal Road



1: Aviation Parkway & Montreal Road  
800 Montreal Road

Future (2024) Background Traffic - Dual WBL  
PM Peak Hour

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	49	1190	283	270	1035	270	284	324	261	151	298	58
Future Volume (vph)	49	1190	283	270	1035	270	284	324	261	151	298	58
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Storage Length (m)	45.0		30.0	55.0		25.0	0.0		55.0	70.0		0.0
Storage Lanes	1		1	2		1	1		1	1		0
Taper Length (m)	2.5			2.5			2.5			2.5		
Lane Util. Factor	1.00	0.95	1.00	0.97	0.95	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor	0.99		0.96			0.92	1.00		0.99	1.00	1.00	
Frt			0.850			0.850			0.850		0.976	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1695	3325	1532	3288	3325	1517	1729	1820	1532	1679	1770	0
Flt Permitted	0.158			0.078			0.145			0.474		
Satd. Flow (perm)	279	3325	1471	270	3325	1394	263	1820	1509	836	1770	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			190			190			145			7
Link Speed (k/h)		60			60			60				60
Link Distance (m)		150.7			144.0			388.7				332.0
Travel Time (s)		9.0			8.6			23.3				19.9
Confl. Peds. (#/hr)	29		22	22		29	7		2	2		7
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Heavy Vehicles (%)	2%	4%	1%	2%	4%	2%	0%	0%	1%	3%	0%	0%
Adj. Flow (vph)	49	1190	283	270	1035	270	284	324	261	151	298	58
Shared Lane Traffic (%)												
Lane Group Flow (vph)	49	1190	283	270	1035	270	284	324	261	151	356	0
Turn Type	pm+pt	NA	Perm	pm+pt	NA	Perm	pm+pt	NA	Perm	pm+pt	NA	
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases	2		2	6		6	8		8	4		
Detector Phase	5	2	2	1	6	6	3	8	8	7	4	
Switch Phase												
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Minimum Split (s)	10.9	33.9	33.9	10.9	39.0	39.0	10.9	32.2	32.2	10.9	32.2	
Total Split (s)	11.0	53.2	53.2	13.2	55.4	55.4	21.4	40.8	40.8	12.8	32.2	
Total Split (%)	9.2%	44.3%	44.3%	11.0%	46.2%	46.2%	17.8%	34.0%	34.0%	10.7%	26.8%	
Maximum Green (s)	5.1	47.3	47.3	7.3	49.5	49.5	15.5	34.6	34.6	6.9	26.0	
Yellow Time (s)	3.7	3.7	3.7	3.7	3.7	3.7	3.7	3.7	3.7	3.7	3.7	
All-Red Time (s)	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.5	2.5	2.2	2.5	
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Total Lost Time (s)	5.9	5.9	5.9	5.9	5.9	5.9	5.9	6.2	6.2	5.9	6.2	
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag	
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	
Recall Mode	None	C-Max	C-Max	None	C-Max	C-Max	None	None	None	None	None	
Walk Time (s)		16.0	16.0		16.0	16.0		7.0	7.0		7.0	
Flash Dont Walk (s)		12.0	12.0		12.0	12.0		19.0	19.0		19.0	
Pedestrian Calls (#/hr)		0	0		0	0		0	0		0	
Act Effct Green (s)	52.7	47.5	47.5	58.1	52.3	52.3	47.1	34.0	34.0	32.6	25.4	
Actuated g/C Ratio	0.44	0.40	0.40	0.48	0.44	0.44	0.39	0.28	0.28	0.27	0.21	
v/c Ratio	0.27	0.90	0.41	0.83	0.71	0.38	0.97	0.63	0.49	0.55	0.94	

1: Aviation Parkway & Montreal Road  
800 Montreal Road

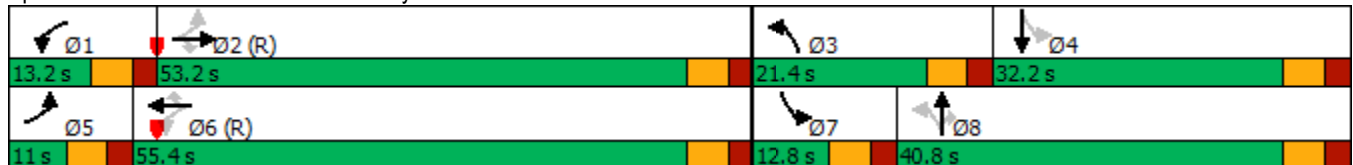
Future (2024) Background Traffic - Dual WBL  
PM Peak Hour

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Control Delay	19.3	45.0	10.4	54.6	20.4	4.0	77.4	43.7	18.7	35.9	79.1	
Queue Delay	0.0	0.0	0.0	0.0	0.8	0.0	0.0	0.0	0.0	0.0	0.0	
Total Delay	19.3	45.0	10.4	54.6	21.2	4.0	77.4	43.7	18.7	35.9	79.1	
LOS	B	D	B	D	C	A	E	D	B	D	E	
Approach Delay		37.8			24.0			47.2			66.2	
Approach LOS		D			C			D			E	
Queue Length 50th (m)	5.7	137.4	14.0	16.5	107.6	4.7	49.2	66.1	21.3	23.3	81.1	
Queue Length 95th (m)	12.1	#179.4	35.6	#42.9	82.0	14.5	#103.0	96.4	46.5	38.4	#135.8	
Internal Link Dist (m)		126.7			120.0			364.7			308.0	
Turn Bay Length (m)	45.0		30.0	55.0		25.0			55.0	70.0		
Base Capacity (vph)	184	1316	696	324	1449	714	292	524	538	275	388	
Starvation Cap Reductn	0	0	0	0	163	0	0	0	0	0	0	
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	
Reduced v/c Ratio	0.27	0.90	0.41	0.83	0.80	0.38	0.97	0.62	0.49	0.55	0.92	

Intersection Summary

Area Type: Other  
 Cycle Length: 120  
 Actuated Cycle Length: 120  
 Offset: 106 (88%), Referenced to phase 2:EBTL and 6:WBTL, Start of Green  
 Natural Cycle: 105  
 Control Type: Actuated-Coordinated  
 Maximum v/c Ratio: 0.97  
 Intersection Signal Delay: 38.0  
 Intersection LOS: D  
 Intersection Capacity Utilization 100.0%  
 ICU Level of Service G  
 Analysis Period (min) 15  
 # 95th percentile volume exceeds capacity, queue may be longer.  
 Queue shown is maximum after two cycles.

Splits and Phases: 1: Aviation Parkway & Montreal Road



2: Montreal Road & Montford Hospital  
800 Montreal Road

Future (2024) Background Traffic  
PM Peak Hour



Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	131	1470	1399	83	158	176
Future Volume (vph)	131	1470	1399	83	158	176
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800
Storage Length (m)	45.0			0.0	60.0	0.0
Storage Lanes	1			0	1	1
Taper Length (m)	2.5				2.5	
Lane Util. Factor	1.00	0.95	0.95	0.95	1.00	1.00
Ped Bike Factor			1.00		0.99	0.96
Frt			0.992			0.850
Flt Protected	0.950				0.950	
Satd. Flow (prot)	1601	3357	3316	0	1729	1488
Flt Permitted	0.109				0.950	
Satd. Flow (perm)	184	3357	3316	0	1704	1429
Right Turn on Red				Yes		Yes
Satd. Flow (RTOR)			8			162
Link Speed (k/h)		60	60		25	
Link Distance (m)		144.0	126.0		127.2	
Travel Time (s)		8.6	7.6		18.3	
Confl. Peds. (#/hr)	31			31	11	21
Confl. Bikes (#/hr)				1		
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Heavy Vehicles (%)	8%	3%	3%	2%	0%	4%
Adj. Flow (vph)	131	1470	1399	83	158	176
Shared Lane Traffic (%)						
Lane Group Flow (vph)	131	1470	1482	0	158	176
Turn Type	pm+pt	NA	NA		Prot	Perm
Protected Phases	5	2	6		4	
Permitted Phases	2					4
Detector Phase	5	2	6		4	4
Switch Phase						
Minimum Initial (s)	5.0	5.0	5.0		5.0	5.0
Minimum Split (s)	9.7	33.1	33.1		32.9	32.9
Total Split (s)	14.0	84.0	70.0		36.0	36.0
Total Split (%)	11.7%	70.0%	58.3%		30.0%	30.0%
Maximum Green (s)	9.3	77.9	63.9		30.1	30.1
Yellow Time (s)	3.7	3.7	3.7		3.3	3.3
All-Red Time (s)	1.0	2.4	2.4		2.6	2.6
Lost Time Adjust (s)	0.0	0.0	0.0		0.0	0.0
Total Lost Time (s)	4.7	6.1	6.1		5.9	5.9
Lead/Lag	Lead		Lag			
Lead-Lag Optimize?	Yes		Yes			
Vehicle Extension (s)	3.0	3.0	3.0		3.0	3.0
Recall Mode	None	C-Max	C-Max		None	None
Walk Time (s)		7.0	7.0		7.0	7.0
Flash Dont Walk (s)		20.0	20.0		20.0	20.0
Pedestrian Calls (#/hr)		0	0		0	0
Act Effct Green (s)	93.1	91.7	77.0		16.3	16.3
Actuated g/C Ratio	0.78	0.76	0.64		0.14	0.14

2: Montreal Road & Montford Hospital  
800 Montreal Road

Future (2024) Background Traffic  
PM Peak Hour

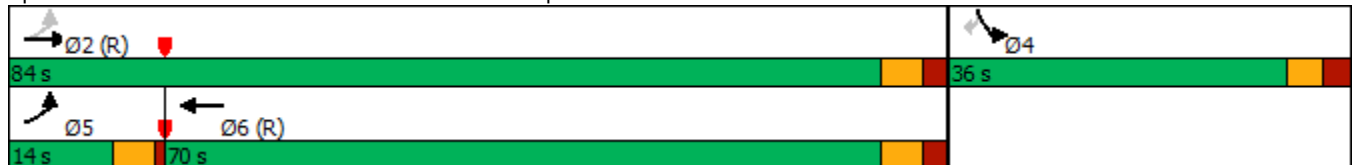


Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
v/c Ratio	0.50	0.57	0.70		0.68	0.53
Control Delay	24.2	4.2	17.6		63.1	14.5
Queue Delay	0.0	0.3	16.2		0.0	0.0
Total Delay	24.2	4.5	33.8		63.1	14.5
LOS	C	A	C		E	B
Approach Delay		6.1	33.8		37.5	
Approach LOS		A	C		D	
Queue Length 50th (m)	11.6	28.6	106.5		35.9	2.9
Queue Length 95th (m)	m16.6	m37.0	175.0		55.0	22.2
Internal Link Dist (m)		120.0	102.0		103.2	
Turn Bay Length (m)	45.0				60.0	
Base Capacity (vph)	272	2565	2130		433	479
Starvation Cap Reductn	0	458	670		0	0
Spillback Cap Reductn	0	0	13		0	0
Storage Cap Reductn	0	0	0		0	0
Reduced v/c Ratio	0.48	0.70	1.02		0.36	0.37

Intersection Summary






















Area Type: Other  
 Cycle Length: 120  
 Actuated Cycle Length: 120  
 Offset: 99 (83%), Referenced to phase 2:EBTL and 6:WBT, Start of Green  
 Natural Cycle: 90  
 Control Type: Actuated-Coordinated  
 Maximum v/c Ratio: 0.70  
 Intersection Signal Delay: 21.2 Intersection LOS: C  
 Intersection Capacity Utilization 81.3% ICU Level of Service D  
 Analysis Period (min) 15  
 m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 2: Montreal Road & Montford Hospital



3: Den Haag Drive/Lang's Road & Montreal Road  
800 Montreal Road













Future (2024) Background Traffic  
PM Peak Hour

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	43	1422	163	15	1139	7	141	1	73	12	2	37
Future Volume (vph)	43	1422	163	15	1139	7	141	1	73	12	2	37
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Storage Length (m)	45.0		25.0	50.0		0.0	35.0		0.0	0.0		0.0
Storage Lanes	1		1	1		0	1		0	0		0
Taper Length (m)	2.5			2.5			2.5			2.5		
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	0.95	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor	0.99		0.90		1.00		0.99	0.98				0.98
Frt			0.850		0.999			0.852				0.902
Flt Protected	0.950			0.950			0.950					0.988
Satd. Flow (prot)	1695	3357	1532	1729	3386	0	1695	1415	0	0	1591	0
Flt Permitted	0.222			0.155			0.811					0.926
Satd. Flow (perm)	393	3357	1376	282	3386	0	1427	1415	0	0	1487	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			77		1			50				37
Link Speed (k/h)		60			60			50				50
Link Distance (m)		126.0			138.4			84.1				143.9
Travel Time (s)		7.6			8.3			6.1				10.4
Confl. Peds. (#/hr)	19		31	31		19	11		10	10		11
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Heavy Vehicles (%)	2%	3%	1%	0%	2%	0%	2%	0%	7%	0%	0%	0%
Adj. Flow (vph)	43	1422	163	15	1139	7	141	1	73	12	2	37
Shared Lane Traffic (%)												
Lane Group Flow (vph)	43	1422	163	15	1146	0	141	74	0	0	51	0
Turn Type	Perm	NA	Perm	Perm	NA		Perm	NA		Perm	NA	
Protected Phases		2			6			8				4
Permitted Phases	2		2	6			8			4		
Detector Phase	2	2	2	6	6		8	8		4	4	
Switch Phase												
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0		5.0	5.0		5.0	5.0	
Minimum Split (s)	28.8	28.8	28.8	28.8	28.8		34.2	34.2		34.2	34.2	
Total Split (s)	86.0	86.0	86.0	86.0	86.0		38.0	38.0		34.0	34.0	
Total Split (%)	69.4%	69.4%	69.4%	69.4%	69.4%		30.6%	30.6%		27.4%	27.4%	
Maximum Green (s)	80.2	80.2	80.2	80.2	80.2		31.8	31.8		27.8	27.8	
Yellow Time (s)	3.7	3.7	3.7	3.7	3.7		3.3	3.3		3.3	3.3	
All-Red Time (s)	2.1	2.1	2.1	2.1	2.1		2.9	2.9		2.9	2.9	
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0				0.0
Total Lost Time (s)	5.8	5.8	5.8	5.8	5.8		6.2	6.2				6.2
Lead/Lag												
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0		3.0	3.0	
Recall Mode	C-Max	C-Max	C-Max	C-Max	C-Max		None	None		None	None	
Walk Time (s)	7.0	7.0	7.0	7.0	7.0		7.0	7.0		7.0	7.0	
Flash Dont Walk (s)	16.0	16.0	16.0	16.0	16.0		21.0	21.0		21.0	21.0	
Pedestrian Calls (#/hr)	0	0	0	0	0		0	0		0	0	
Act Effct Green (s)	93.0	93.0	93.0	93.0	93.0		19.0	19.0				19.0
Actuated g/C Ratio	0.75	0.75	0.75	0.75	0.75		0.15	0.15				0.15
v/c Ratio	0.15	0.57	0.16	0.07	0.45		0.65	0.29				0.20



3: Den Haag Drive/Lang's Road & Montreal Road  
800 Montreal Road

Future (2024) Background Traffic  
PM Peak Hour

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Control Delay	7.1	8.5	3.2	6.5	7.1		61.9	20.4			19.7	
Queue Delay	0.0	2.6	0.0	0.0	0.0		0.0	0.0			0.0	
Total Delay	7.1	11.1	3.2	6.5	7.1		61.9	20.4			19.7	
LOS	A	B	A	A	A		E	C			B	
Approach Delay		10.2			7.1			47.6			19.7	
Approach LOS		B			A			D			B	
Queue Length 50th (m)	2.6	68.9	4.9	0.8	48.3		32.7	5.1			3.0	
Queue Length 95th (m)	8.2	109.1	13.6	3.6	77.2		50.3	17.4			13.3	
Internal Link Dist (m)		102.0			114.4			60.1			119.9	
Turn Bay Length (m)	45.0		25.0	50.0			35.0					
Base Capacity (vph)	294	2516	1050	211	2538		365	400			408	
Starvation Cap Reductn	0	933	0	0	0		0	0			0	
Spillback Cap Reductn	0	0	0	0	0		0	0			0	
Storage Cap Reductn	0	0	0	0	0		0	0			0	
Reduced v/c Ratio	0.15	0.90	0.16	0.07	0.45		0.39	0.18			0.13	

Intersection Summary

























Area Type:	Other
Cycle Length:	124
Actuated Cycle Length:	124
Offset:	104 (84%), Referenced to phase 2:EBTL and 6:WBTL, Start of Green
Natural Cycle:	75
Control Type:	Actuated-Coordinated
Maximum v/c Ratio:	0.65
Intersection Signal Delay:	11.8
Intersection LOS:	B
Intersection Capacity Utilization:	68.8%
ICU Level of Service:	C
Analysis Period (min):	15

Splits and Phases: 3: Den Haag Drive/Lang's Road & Montreal Road



1: Aviation Parkway & Montreal Road  
800 Montreal Road

Future (2029) Background Traffic  
AM Peak Hour

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	41	777	256	390	1053	152	229	213	329	224	259	63
Future Volume (vph)	41	777	256	390	1053	152	229	213	329	224	259	63
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Storage Length (m)	45.0		30.0	55.0		25.0	0.0		55.0	70.0		0.0
Storage Lanes	1		1	1		1	1		1	1		0
Taper Length (m)	2.5			2.5			2.5			2.5		
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor	0.99		0.96	0.99		0.94	1.00		0.98	1.00	1.00	
Frt			0.850			0.850			0.850		0.971	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1695	3232	1547	1695	3262	1547	1712	1820	1517	1695	1750	0
Flt Permitted	0.244			0.147			0.212			0.495		
Satd. Flow (perm)	432	3232	1478	261	3262	1454	381	1820	1488	879	1750	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			190			136			329			9
Link Speed (k/h)		60			60			60			60	
Link Distance (m)		150.7			144.0			388.7			332.0	
Travel Time (s)		9.0			8.6			23.3			19.9	
Confl. Peds. (#/hr)	19		26	26		19	6		5	5		6
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Heavy Vehicles (%)	2%	7%	0%	2%	6%	0%	1%	0%	2%	2%	0%	3%
Adj. Flow (vph)	41	777	256	390	1053	152	229	213	329	224	259	63
Shared Lane Traffic (%)												
Lane Group Flow (vph)	41	777	256	390	1053	152	229	213	329	224	322	0
Turn Type	pm+pt	NA	Perm	pm+pt	NA	Perm	pm+pt	NA	Perm	pm+pt	NA	
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases	2		2	6		6	8		8	4		
Detector Phase	5	2	2	1	6	6	3	8	8	7	4	
Switch Phase												
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Minimum Split (s)	10.9	33.9	33.9	10.9	39.0	39.0	10.9	32.2	32.2	10.9	32.2	
Total Split (s)	11.2	39.8	39.8	30.0	58.6	58.6	18.0	33.6	33.6	16.6	32.2	
Total Split (%)	9.3%	33.2%	33.2%	25.0%	48.8%	48.8%	15.0%	28.0%	28.0%	13.8%	26.8%	
Maximum Green (s)	5.3	33.9	33.9	24.1	52.7	52.7	12.1	27.4	27.4	10.7	26.0	
Yellow Time (s)	3.7	3.7	3.7	3.7	3.7	3.7	3.7	3.7	3.7	3.7	3.7	
All-Red Time (s)	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.5	2.5	2.2	2.5	
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Total Lost Time (s)	5.9	5.9	5.9	5.9	5.9	5.9	5.9	6.2	6.2	5.9	6.2	
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag	
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	
Recall Mode	None	C-Max	C-Max	None	C-Max	C-Max	None	None	None	None	None	
Walk Time (s)		16.0	16.0		16.0	16.0		7.0	7.0		7.0	
Flash Dont Walk (s)		12.0	12.0		12.0	12.0		19.0	19.0		19.0	
Pedestrian Calls (#/hr)		0	0		0	0		0	0		0	
Act Effct Green (s)	41.6	36.1	36.1	65.6	56.5	56.5	38.1	25.7	25.7	35.3	24.3	
Actuated g/C Ratio	0.35	0.30	0.30	0.55	0.47	0.47	0.32	0.21	0.21	0.29	0.20	
v/c Ratio	0.20	0.80	0.44	0.92	0.69	0.20	0.90	0.55	0.57	0.68	0.89	

1: Aviation Parkway & Montreal Road  
800 Montreal Road

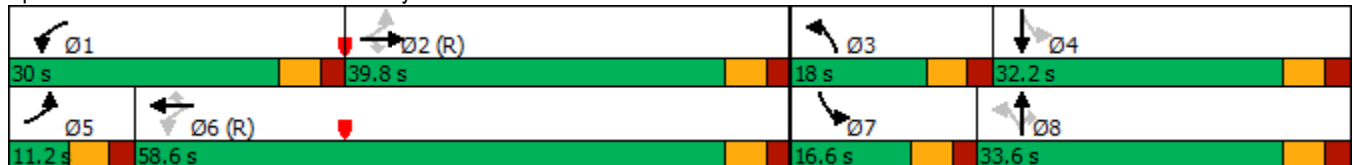
Future (2029) Background Traffic  
AM Peak Hour

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Control Delay	18.6	46.6	12.6	55.4	28.9	5.1	67.0	47.4	8.3	41.6	71.8	
Queue Delay	0.0	0.0	0.0	0.0	2.6	0.0	0.0	0.0	0.0	0.0	0.0	
Total Delay	18.6	46.6	12.6	55.4	31.5	5.1	67.0	47.4	8.3	41.6	71.8	
LOS	B	D	B	E	C	A	E	D	A	D	E	
Approach Delay		37.4			34.8			36.6			59.4	
Approach LOS		D			C			D			E	
Queue Length 50th (m)	4.5	91.0	11.7	67.6	105.9	2.1	38.9	44.1	0.0	38.0	71.2	
Queue Length 95th (m)	10.0	#117.4	34.8	#124.6	131.2	14.1	#74.9	68.4	23.8	58.8	#117.6	
Internal Link Dist (m)		126.7			120.0			364.7			308.0	
Turn Bay Length (m)	45.0		30.0	55.0		25.0			55.0	70.0		
Base Capacity (vph)	207	973	577	434	1534	755	255	415	593	331	386	
Starvation Cap Reductn	0	0	0	0	348	0	0	0	0	0	0	
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	
Reduced v/c Ratio	0.20	0.80	0.44	0.90	0.89	0.20	0.90	0.51	0.55	0.68	0.83	

Intersection Summary

























Area Type: Other  
 Cycle Length: 120  
 Actuated Cycle Length: 120  
 Offset: 55 (46%), Referenced to phase 2:EBTL and 6:WBTL, Start of Green  
 Natural Cycle: 105  
 Control Type: Actuated-Coordinated  
 Maximum v/c Ratio: 0.92  
 Intersection Signal Delay: 39.2  
 Intersection LOS: D  
 Intersection Capacity Utilization 98.6%  
 ICU Level of Service F  
 Analysis Period (min) 15  
 # 95th percentile volume exceeds capacity, queue may be longer.  
 Queue shown is maximum after two cycles.

Splits and Phases: 1: Aviation Parkway & Montreal Road



1: Aviation Parkway & Montreal Road  
800 Montreal Road

Future (2029) Background Traffic - Dual WBL  
AM Peak Hour

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	41	777	256	390	1053	152	229	213	329	224	259	63
Future Volume (vph)	41	777	256	390	1053	152	229	213	329	224	259	63
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Storage Length (m)	45.0		30.0	55.0		25.0	0.0		55.0	70.0		0.0
Storage Lanes	1		1	2		1	1		1	1		0
Taper Length (m)	2.5			2.5			2.5			2.5		
Lane Util. Factor	1.00	0.95	1.00	0.97	0.95	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor	0.99		0.96	0.99		0.94	1.00		0.98	1.00	1.00	
Frt			0.850			0.850			0.850		0.971	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1695	3232	1547	3288	3262	1547	1712	1820	1517	1695	1750	0
Flt Permitted	0.167			0.205			0.212			0.555		
Satd. Flow (perm)	296	3232	1478	705	3262	1454	381	1820	1488	985	1750	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			190			136			188			9
Link Speed (k/h)		60			60			60				60
Link Distance (m)		150.7			144.0			388.7				332.0
Travel Time (s)		9.0			8.6			23.3				19.9
Confl. Peds. (#/hr)	19		26	26		19	6		5	5		6
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Heavy Vehicles (%)	2%	7%	0%	2%	6%	0%	1%	0%	2%	2%	0%	3%
Adj. Flow (vph)	41	777	256	390	1053	152	229	213	329	224	259	63
Shared Lane Traffic (%)												
Lane Group Flow (vph)	41	777	256	390	1053	152	229	213	329	224	322	0
Turn Type	pm+pt	NA	Perm	pm+pt	NA	Perm	pm+pt	NA	Perm	pm+pt	NA	
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases	2		2	6		6	8		8	4		
Detector Phase	5	2	2	1	6	6	3	8	8	7	4	
Switch Phase												
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Minimum Split (s)	10.9	33.9	33.9	10.9	39.0	39.0	10.9	32.2	32.2	10.9	32.2	
Total Split (s)	11.0	48.0	48.0	17.0	54.0	54.0	21.0	38.0	38.0	17.0	34.0	
Total Split (%)	9.2%	40.0%	40.0%	14.2%	45.0%	45.0%	17.5%	31.7%	31.7%	14.2%	28.3%	
Maximum Green (s)	5.1	42.1	42.1	11.1	48.1	48.1	15.1	31.8	31.8	11.1	27.8	
Yellow Time (s)	3.7	3.7	3.7	3.7	3.7	3.7	3.7	3.7	3.7	3.7	3.7	
All-Red Time (s)	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.5	2.5	2.2	2.5	
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Total Lost Time (s)	5.9	5.9	5.9	5.9	5.9	5.9	5.9	6.2	6.2	5.9	6.2	
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag	
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	
Recall Mode	None	C-Max	C-Max	None	C-Max	C-Max	None	None	None	None	None	
Walk Time (s)		16.0	16.0		16.0	16.0		7.0	7.0		7.0	
Flash Dont Walk (s)		12.0	12.0		12.0	12.0		19.0	19.0		19.0	
Pedestrian Calls (#/hr)		0	0		0	0		0	0		0	
Act Effct Green (s)	51.1	45.6	45.6	62.5	53.4	53.4	43.1	28.4	28.4	36.4	25.0	
Actuated g/C Ratio	0.43	0.38	0.38	0.52	0.44	0.44	0.36	0.24	0.24	0.30	0.21	
v/c Ratio	0.22	0.63	0.38	0.64	0.73	0.21	0.77	0.50	0.66	0.62	0.87	

1: Aviation Parkway & Montreal Road  
800 Montreal Road

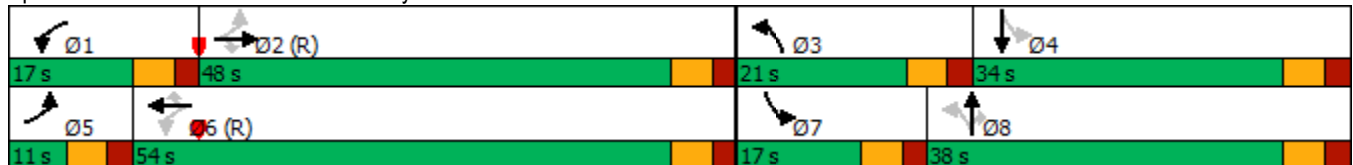
Future (2029) Background Traffic - Dual WBL  
AM Peak Hour

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Control Delay	19.0	34.2	9.8	21.7	32.6	5.8	44.3	43.1	23.6	35.5	67.2	
Queue Delay	0.0	0.0	0.0	0.0	2.5	0.0	0.0	0.0	0.0	0.0	0.0	
Total Delay	19.0	34.2	9.8	21.7	35.0	5.8	44.3	43.1	23.6	35.5	67.2	
LOS	B	C	A	C	D	A	D	D	C	D	E	
Approach Delay		27.8			29.0			35.1			54.2	
Approach LOS		C			C			D			D	
Queue Length 50th (m)	4.8	81.7	10.5	26.1	113.8	2.3	36.6	42.2	28.7	35.8	70.3	
Queue Length 95th (m)	10.9	103.5	31.0	36.1	141.1	15.1	#57.7	64.9	59.7	54.7	#111.1	
Internal Link Dist (m)		126.7			120.0			364.7			308.0	
Turn Bay Length (m)	45.0		30.0	55.0		25.0			55.0	70.0		
Base Capacity (vph)	190	1226	678	612	1450	722	306	482	532	364	412	
Starvation Cap Reductn	0	0	0	0	266	0	0	0	0	0	0	
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	
Reduced v/c Ratio	0.22	0.63	0.38	0.64	0.89	0.21	0.75	0.44	0.62	0.62	0.78	

Intersection Summary

Area Type: Other  
 Cycle Length: 120  
 Actuated Cycle Length: 120  
 Offset: 55 (46%), Referenced to phase 2:EBTL and 6:WBTL, Start of Green  
 Natural Cycle: 95  
 Control Type: Actuated-Coordinated  
 Maximum v/c Ratio: 0.87  
 Intersection Signal Delay: 33.3  
 Intersection LOS: C  
 Intersection Capacity Utilization 87.5%  
 ICU Level of Service E  
 Analysis Period (min) 15  
 # 95th percentile volume exceeds capacity, queue may be longer.  
 Queue shown is maximum after two cycles.

Splits and Phases: 1: Aviation Parkway & Montreal Road



2: Montreal Road & Montford Hospital  
800 Montreal Road

Future (2029) Background Traffic  
AM Peak Hour



Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	178	1123	1459	126	58	131
Future Volume (vph)	178	1123	1459	126	58	131
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800
Storage Length (m)	45.0			0.0	60.0	0.0
Storage Lanes	1			0	1	1
Taper Length (m)	2.5				2.5	
Lane Util. Factor	1.00	0.95	0.95	0.95	1.00	1.00
Ped Bike Factor			1.00		0.99	0.97
Frt			0.988			0.850
Flt Protected	0.950				0.950	
Satd. Flow (prot)	1616	3357	3308	0	1729	1432
Flt Permitted	0.082				0.950	
Satd. Flow (perm)	139	3357	3308	0	1703	1389
Right Turn on Red				Yes		Yes
Satd. Flow (RTOR)			12			131
Link Speed (k/h)		60	60		25	
Link Distance (m)		144.0	126.0		127.2	
Travel Time (s)		8.6	7.6		18.3	
Confl. Peds. (#/hr)	13			13	14	18
Confl. Bikes (#/hr)				3		
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Heavy Vehicles (%)	7%	3%	3%	2%	0%	8%
Adj. Flow (vph)	178	1123	1459	126	58	131
Shared Lane Traffic (%)						
Lane Group Flow (vph)	178	1123	1585	0	58	131
Turn Type	pm+pt	NA	NA		Prot	Perm
Protected Phases	5	2	6		4	
Permitted Phases	2					4
Detector Phase	5	2	6		4	4
Switch Phase						
Minimum Initial (s)	5.0	5.0	5.0		5.0	5.0
Minimum Split (s)	9.7	33.1	33.1		32.9	32.9
Total Split (s)	13.0	62.0	49.0		33.0	33.0
Total Split (%)	13.7%	65.3%	51.6%		34.7%	34.7%
Maximum Green (s)	8.3	55.9	42.9		27.1	27.1
Yellow Time (s)	3.7	3.7	3.7		3.3	3.3
All-Red Time (s)	1.0	2.4	2.4		2.6	2.6
Lost Time Adjust (s)	0.0	0.0	0.0		0.0	0.0
Total Lost Time (s)	4.7	6.1	6.1		5.9	5.9
Lead/Lag	Lead		Lag			
Lead-Lag Optimize?	Yes		Yes			
Vehicle Extension (s)	3.0	3.0	3.0		3.0	3.0
Recall Mode	None	C-Max	C-Max		None	None
Walk Time (s)		7.0	7.0		7.0	7.0
Flash Dont Walk (s)		20.0	20.0		20.0	20.0
Pedestrian Calls (#/hr)		0	0		0	0
Act Effct Green (s)	75.7	74.3	58.2		8.7	8.7
Actuated g/C Ratio	0.80	0.78	0.61		0.09	0.09



Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
v/c Ratio	0.62	0.43	0.78		0.37	0.53
Control Delay	22.7	4.2	18.5		46.3	15.7
Queue Delay	0.0	0.5	16.1		0.0	0.0
Total Delay	22.7	4.6	34.7		46.3	15.7
LOS	C	A	C		D	B
Approach Delay		7.1	34.7		25.1	
Approach LOS		A	C		C	
Queue Length 50th (m)	11.6	27.3	102.1		10.2	0.0
Queue Length 95th (m)	32.6	43.6	#184.8		21.3	15.8
Internal Link Dist (m)		120.0	102.0		103.2	
Turn Bay Length (m)	45.0				60.0	
Base Capacity (vph)	289	2627	2031		493	489
Starvation Cap Reductn	0	929	473		0	0
Spillback Cap Reductn	0	0	0		0	0
Storage Cap Reductn	0	0	0		0	0
Reduced v/c Ratio	0.62	0.66	1.02		0.12	0.27

Intersection Summary























Area Type: Other  
 Cycle Length: 95  
 Actuated Cycle Length: 95  
 Offset: 33 (35%), Referenced to phase 2:EBTL and 6:WBT, Start of Green  
 Natural Cycle: 100  
 Control Type: Actuated-Coordinated  
 Maximum v/c Ratio: 0.78  
 Intersection Signal Delay: 22.4  
 Intersection LOS: C  
 Intersection Capacity Utilization 83.7%  
 ICU Level of Service E  
 Analysis Period (min) 15  
 # 95th percentile volume exceeds capacity, queue may be longer.  
 Queue shown is maximum after two cycles.

Splits and Phases: 2: Montreal Road & Montford Hospital



3: Den Haag Drive/Lang's Road & Montreal Road  
800 Montreal Road













Future (2029) Background Traffic  
AM Peak Hour

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	18	962	201	23	1312	10	224	4	24	5	3	18
Future Volume (vph)	18	962	201	23	1312	10	224	4	24	5	3	18
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Storage Length (m)	45.0		25.0	50.0		0.0	35.0		0.0	0.0		0.0
Storage Lanes	1		1	1		0	1		0	0		0
Taper Length (m)	2.5			2.5			2.5			2.5		
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	0.95	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor	0.99		0.93	0.99	1.00		0.97	0.94			0.96	
Frt			0.850		0.999			0.871			0.907	
Flt Protected	0.950			0.950			0.950				0.990	
Satd. Flow (prot)	1729	3325	1488	1729	3352	0	1662	1184	0	0	1472	0
Flt Permitted	0.163			0.265			0.740				0.964	
Satd. Flow (perm)	295	3325	1382	477	3352	0	1260	1184	0	0	1417	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			140		1			24			18	
Link Speed (k/h)		60			60			50			50	
Link Distance (m)		126.0			138.4			84.1			143.9	
Travel Time (s)		7.6			8.3			6.1			10.4	
Confl. Peds. (#/hr)	31		20	20		31	22		47	47		22
Confl. Bikes (#/hr)						3						
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Heavy Vehicles (%)	0%	4%	4%	0%	3%	0%	4%	0%	30%	0%	33%	6%
Adj. Flow (vph)	18	962	201	23	1312	10	224	4	24	5	3	18
Shared Lane Traffic (%)												
Lane Group Flow (vph)	18	962	201	23	1322	0	224	28	0	0	26	0
Turn Type	Perm	NA	Perm	Perm	NA		Perm	NA		Perm	NA	
Protected Phases		2			6			8			4	
Permitted Phases	2		2	6			8			4		
Detector Phase	2	2	2	6	6		8	8		4	4	
Switch Phase												
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0		5.0	5.0		5.0	5.0	
Minimum Split (s)	28.8	28.8	28.8	28.8	28.8		34.2	34.2		34.2	34.2	
Total Split (s)	82.0	82.0	82.0	82.0	82.0		38.0	38.0		38.0	38.0	
Total Split (%)	68.3%	68.3%	68.3%	68.3%	68.3%		31.7%	31.7%		31.7%	31.7%	
Maximum Green (s)	76.2	76.2	76.2	76.2	76.2		31.8	31.8		31.8	31.8	
Yellow Time (s)	3.7	3.7	3.7	3.7	3.7		3.3	3.3		3.3	3.3	
All-Red Time (s)	2.1	2.1	2.1	2.1	2.1		2.9	2.9		2.9	2.9	
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)	5.8	5.8	5.8	5.8	5.8		6.2	6.2		6.2	6.2	
Lead/Lag												
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0		3.0	3.0	
Recall Mode	C-Max	C-Max	C-Max	C-Max	C-Max		None	None		None	None	
Walk Time (s)	7.0	7.0	7.0	7.0	7.0		7.0	7.0		7.0	7.0	
Flash Dont Walk (s)	16.0	16.0	16.0	16.0	16.0		21.0	21.0		21.0	21.0	
Pedestrian Calls (#/hr)	0	0	0	0	0		0	0		0	0	
Act Effct Green (s)	82.4	82.4	82.4	82.4	82.4		25.6	25.6		25.6	25.6	
Actuated g/C Ratio	0.69	0.69	0.69	0.69	0.69		0.21	0.21		0.21	0.21	



3: Den Haag Drive/Lang's Road & Montreal Road  
800 Montreal Road

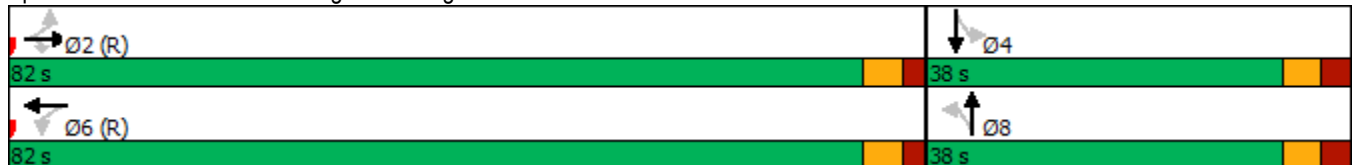
Future (2029) Background Traffic  
AM Peak Hour

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
v/c Ratio	0.09	0.42	0.20	0.07	0.57		0.84	0.10			0.08	
Control Delay	9.3	9.6	3.2	8.4	11.7		69.9	15.3			18.7	
Queue Delay	0.0	1.0	0.0	0.0	0.0		0.0	0.0			0.0	
Total Delay	9.3	10.6	3.2	8.4	11.7		69.9	15.3			18.7	
LOS	A	B	A	A	B		E	B			B	
Approach Delay		9.4			11.7			63.8			18.7	
Approach LOS		A			B			E			B	
Queue Length 50th (m)	1.3	48.8	4.4	1.7	78.7		50.3	0.7			1.5	
Queue Length 95th (m)	4.8	70.6	14.1	5.4	112.0		75.4	7.9			8.4	
Internal Link Dist (m)		102.0			114.4			60.1			119.9	
Turn Bay Length (m)	45.0		25.0	50.0			35.0					
Base Capacity (vph)	202	2283	992	327	2302		333	331			388	
Starvation Cap Reductn	0	985	0	0	0		0	0			0	
Spillback Cap Reductn	0	0	0	0	0		0	0			0	
Storage Cap Reductn	0	0	0	0	0		0	0			0	
Reduced v/c Ratio	0.09	0.74	0.20	0.07	0.57		0.67	0.08			0.07	

Intersection Summary

























Area Type:	Other
Cycle Length:	120
Actuated Cycle Length:	120
Offset:	27 (23%), Referenced to phase 2:EBTL and 6:WBTL, Start of Green
Natural Cycle:	70
Control Type:	Actuated-Coordinated
Maximum v/c Ratio:	0.84
Intersection Signal Delay:	15.5
Intersection LOS:	B
Intersection Capacity Utilization	71.2%
ICU Level of Service	C
Analysis Period (min)	15

Splits and Phases: 3: Den Haag Drive/Lang's Road & Montreal Road



1: Aviation Parkway & Montreal Road  
800 Montreal Road

Future (2029) Background Traffic  
PM Peak Hour

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	49	1095	283	332	936	226	284	324	323	124	298	58
Future Volume (vph)	49	1095	283	332	936	226	284	324	323	124	298	58
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Storage Length (m)	45.0		30.0	55.0		25.0	0.0		55.0	70.0		0.0
Storage Lanes	1		1	1		1	1		1	1		0
Taper Length (m)	2.5			2.5			2.5			2.5		
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor	0.99		0.96			0.92	1.00		0.99	1.00	1.00	
Frt			0.850			0.850			0.850		0.976	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1695	3325	1532	1695	3325	1517	1729	1820	1532	1679	1770	0
Flt Permitted	0.260			0.089			0.145			0.458		
Satd. Flow (perm)	457	3325	1471	159	3325	1394	263	1820	1509	808	1770	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			244			190			272			7
Link Speed (k/h)		60			60			60			60	
Link Distance (m)		150.7			144.0			388.7			332.0	
Travel Time (s)		9.0			8.6			23.3			19.9	
Confl. Peds. (#/hr)	29		22	22		29	7		2	2		7
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Heavy Vehicles (%)	2%	4%	1%	2%	4%	2%	0%	0%	1%	3%	0%	0%
Adj. Flow (vph)	49	1095	283	332	936	226	284	324	323	124	298	58
Shared Lane Traffic (%)												
Lane Group Flow (vph)	49	1095	283	332	936	226	284	324	323	124	356	0
Turn Type	pm+pt	NA	Perm	pm+pt	NA	Perm	pm+pt	NA	Perm	pm+pt	NA	
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases	2		2	6		6	8		8	4		
Detector Phase	5	2	2	1	6	6	3	8	8	7	4	
Switch Phase												
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Minimum Split (s)	10.9	33.9	33.9	10.9	39.0	39.0	10.9	32.2	32.2	10.9	32.2	
Total Split (s)	11.6	44.8	44.8	23.6	56.8	56.8	19.4	40.2	40.2	11.4	32.2	
Total Split (%)	9.7%	37.3%	37.3%	19.7%	47.3%	47.3%	16.2%	33.5%	33.5%	9.5%	26.8%	
Maximum Green (s)	5.7	38.9	38.9	17.7	50.9	50.9	13.5	34.0	34.0	5.5	26.0	
Yellow Time (s)	3.7	3.7	3.7	3.7	3.7	3.7	3.7	3.7	3.7	3.7	3.7	
All-Red Time (s)	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.5	2.5	2.2	2.5	
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Total Lost Time (s)	5.9	5.9	5.9	5.9	5.9	5.9	5.9	6.2	6.2	5.9	6.2	
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag	
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	
Recall Mode	None	C-Max	C-Max	None	C-Max	C-Max	None	None	None	None	None	
Walk Time (s)		16.0	16.0		16.0	16.0		7.0	7.0		7.0	
Flash Dont Walk (s)		12.0	12.0		12.0	12.0		19.0	19.0		19.0	
Pedestrian Calls (#/hr)		0	0		0	0		0	0		0	
Act Effct Green (s)	44.6	38.9	38.9	63.1	53.8	53.8	45.1	33.4	33.4	31.2	25.4	
Actuated g/C Ratio	0.37	0.32	0.32	0.53	0.45	0.45	0.38	0.28	0.28	0.26	0.21	
v/c Ratio	0.22	1.02	0.44	1.05	0.63	0.31	1.08	0.64	0.52	0.50	0.94	

1: Aviation Parkway & Montreal Road  
800 Montreal Road

Future (2029) Background Traffic  
PM Peak Hour

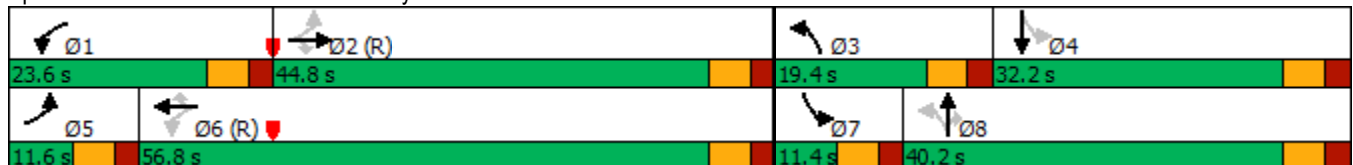


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Control Delay	18.1	72.1	8.3	104.0	19.3	3.5	107.6	44.6	10.3	36.2	79.1	
Queue Delay	0.0	0.0	0.0	0.0	0.4	0.0	0.0	0.0	0.0	0.0	0.0	
Total Delay	18.1	72.1	8.3	104.0	19.7	3.5	107.6	44.6	10.3	36.2	79.1	
LOS	B	E	A	F	B	A	F	D	B	D	E	
Approach Delay	57.6			36.0			51.9			68.0		
Approach LOS	E			D			D			E		
Queue Length 50th (m)	5.5	~139.5	6.4	~68.7	63.6	1.6	~56.5	66.6	8.9	19.3	81.1	
Queue Length 95th (m)	11.7	#184.4	27.9	#132.2	54.1	12.5	#110.3	97.1	34.4	33.1	#135.8	
Internal Link Dist (m)	126.7			120.0			364.7			308.0		
Turn Bay Length (m)	45.0		30.0	55.0		25.0			55.0	70.0		
Base Capacity (vph)	228	1077	641	317	1491	729	264	515	622	250	388	
Starvation Cap Reductn	0	0	0	0	190	0	0	0	0	0	0	
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	
Reduced v/c Ratio	0.21	1.02	0.44	1.05	0.72	0.31	1.08	0.63	0.52	0.50	0.92	

Intersection Summary

























Area Type: Other  
 Cycle Length: 120  
 Actuated Cycle Length: 120  
 Offset: 106 (88%), Referenced to phase 2:EBTL and 6:WBTL, Start of Green  
 Natural Cycle: 125  
 Control Type: Actuated-Coordinated  
 Maximum v/c Ratio: 1.08  
 Intersection Signal Delay: 50.1  
 Intersection LOS: D  
 Intersection Capacity Utilization 108.5%  
 ICU Level of Service G  
 Analysis Period (min) 15  
 ~ Volume exceeds capacity, queue is theoretically infinite.  
 Queue shown is maximum after two cycles.  
 # 95th percentile volume exceeds capacity, queue may be longer.  
 Queue shown is maximum after two cycles.

Splits and Phases: 1: Aviation Parkway & Montreal Road



1: Aviation Parkway & Montreal Road  
800 Montreal Road

Future (2029) Background Traffic - Dual WBL  
AM Peak Hour

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	41	777	256	390	1053	152	229	213	329	224	259	63
Future Volume (vph)	41	777	256	390	1053	152	229	213	329	224	259	63
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Storage Length (m)	45.0		30.0	55.0		25.0	0.0		55.0	70.0		0.0
Storage Lanes	1		1	2		1	1		1	1		0
Taper Length (m)	2.5			2.5			2.5			2.5		
Lane Util. Factor	1.00	0.95	1.00	0.97	0.95	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor	0.99		0.96	0.99		0.94	1.00		0.98	1.00	1.00	
Frt			0.850			0.850			0.850		0.971	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1695	3232	1547	3288	3262	1547	1712	1820	1517	1695	1750	0
Flt Permitted	0.167			0.205			0.212			0.555		
Satd. Flow (perm)	296	3232	1478	705	3262	1454	381	1820	1488	985	1750	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			190			136			188			9
Link Speed (k/h)		60			60			60			60	
Link Distance (m)		150.7			144.0			388.7			332.0	
Travel Time (s)		9.0			8.6			23.3			19.9	
Confl. Peds. (#/hr)	19		26	26		19	6		5	5		6
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Heavy Vehicles (%)	2%	7%	0%	2%	6%	0%	1%	0%	2%	2%	0%	3%
Adj. Flow (vph)	41	777	256	390	1053	152	229	213	329	224	259	63
Shared Lane Traffic (%)												
Lane Group Flow (vph)	41	777	256	390	1053	152	229	213	329	224	322	0
Turn Type	pm+pt	NA	Perm	pm+pt	NA	Perm	pm+pt	NA	Perm	pm+pt	NA	
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases	2		2	6		6	8		8	4		
Detector Phase	5	2	2	1	6	6	3	8	8	7	4	
Switch Phase												
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Minimum Split (s)	10.9	33.9	33.9	10.9	39.0	39.0	10.9	32.2	32.2	10.9	32.2	
Total Split (s)	11.0	48.0	48.0	17.0	54.0	54.0	21.0	38.0	38.0	17.0	34.0	
Total Split (%)	9.2%	40.0%	40.0%	14.2%	45.0%	45.0%	17.5%	31.7%	31.7%	14.2%	28.3%	
Maximum Green (s)	5.1	42.1	42.1	11.1	48.1	48.1	15.1	31.8	31.8	11.1	27.8	
Yellow Time (s)	3.7	3.7	3.7	3.7	3.7	3.7	3.7	3.7	3.7	3.7	3.7	
All-Red Time (s)	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.5	2.5	2.2	2.5	
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Total Lost Time (s)	5.9	5.9	5.9	5.9	5.9	5.9	5.9	6.2	6.2	5.9	6.2	
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag	
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	
Recall Mode	None	C-Max	C-Max	None	C-Max	C-Max	None	None	None	None	None	
Walk Time (s)		16.0	16.0		16.0	16.0		7.0	7.0		7.0	
Flash Dont Walk (s)		12.0	12.0		12.0	12.0		19.0	19.0		19.0	
Pedestrian Calls (#/hr)		0	0		0	0		0	0		0	
Act Effct Green (s)	51.1	45.6	45.6	62.5	53.4	53.4	43.1	28.4	28.4	36.4	25.0	
Actuated g/C Ratio	0.43	0.38	0.38	0.52	0.44	0.44	0.36	0.24	0.24	0.30	0.21	
v/c Ratio	0.22	0.63	0.38	0.64	0.73	0.21	0.77	0.50	0.66	0.62	0.87	

1: Aviation Parkway & Montreal Road  
800 Montreal Road

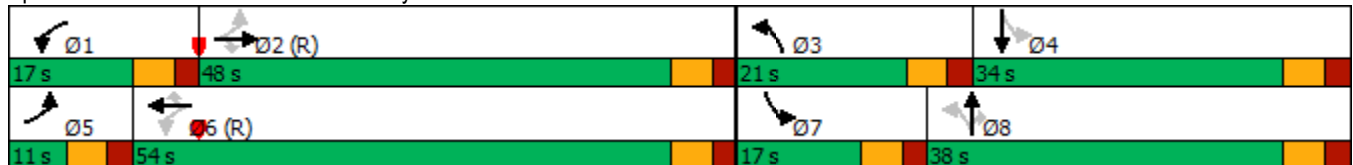
Future (2029) Background Traffic - Dual WBL  
AM Peak Hour

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Control Delay	19.0	34.2	9.8	21.7	32.6	5.8	44.3	43.1	23.6	35.5	67.2	
Queue Delay	0.0	0.0	0.0	0.0	2.5	0.0	0.0	0.0	0.0	0.0	0.0	
Total Delay	19.0	34.2	9.8	21.7	35.0	5.8	44.3	43.1	23.6	35.5	67.2	
LOS	B	C	A	C	D	A	D	D	C	D	E	
Approach Delay		27.8			29.0			35.1			54.2	
Approach LOS		C			C			D			D	
Queue Length 50th (m)	4.8	81.7	10.5	26.1	113.8	2.3	36.6	42.2	28.7	35.8	70.3	
Queue Length 95th (m)	10.9	103.5	31.0	36.1	141.1	15.1	#57.7	64.9	59.7	54.7	#111.1	
Internal Link Dist (m)		126.7			120.0			364.7			308.0	
Turn Bay Length (m)	45.0		30.0	55.0		25.0			55.0	70.0		
Base Capacity (vph)	190	1226	678	612	1450	722	306	482	532	364	412	
Starvation Cap Reductn	0	0	0	0	266	0	0	0	0	0	0	
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	
Reduced v/c Ratio	0.22	0.63	0.38	0.64	0.89	0.21	0.75	0.44	0.62	0.62	0.78	

Intersection Summary

Area Type: Other  
 Cycle Length: 120  
 Actuated Cycle Length: 120  
 Offset: 55 (46%), Referenced to phase 2:EBTL and 6:WBTL, Start of Green  
 Natural Cycle: 95  
 Control Type: Actuated-Coordinated  
 Maximum v/c Ratio: 0.87  
 Intersection Signal Delay: 33.3  
 Intersection LOS: C  
 Intersection Capacity Utilization 87.5%  
 ICU Level of Service E  
 Analysis Period (min) 15  
 # 95th percentile volume exceeds capacity, queue may be longer.  
 Queue shown is maximum after two cycles.

Splits and Phases: 1: Aviation Parkway & Montreal Road



2: Montreal Road & Montford Hospital  
800 Montreal Road

Future (2029) Background Traffic  
PM Peak Hour



Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	131	1401	1294	83	158	176
Future Volume (vph)	131	1401	1294	83	158	176
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800
Storage Length (m)	45.0			0.0	60.0	0.0
Storage Lanes	1			0	1	1
Taper Length (m)	2.5				2.5	
Lane Util. Factor	1.00	0.95	0.95	0.95	1.00	1.00
Ped Bike Factor			0.99		0.99	0.96
Frt			0.991			0.850
Flt Protected	0.950				0.950	
Satd. Flow (prot)	1601	3357	3311	0	1729	1488
Flt Permitted	0.133				0.950	
Satd. Flow (perm)	224	3357	3311	0	1704	1429
Right Turn on Red				Yes		Yes
Satd. Flow (RTOR)			8			169
Link Speed (k/h)		60	60		25	
Link Distance (m)		144.0	126.0		127.2	
Travel Time (s)		8.6	7.6		18.3	
Confl. Peds. (#/hr)	31			31	11	21
Confl. Bikes (#/hr)				1		
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Heavy Vehicles (%)	8%	3%	3%	2%	0%	4%
Adj. Flow (vph)	131	1401	1294	83	158	176
Shared Lane Traffic (%)						
Lane Group Flow (vph)	131	1401	1377	0	158	176
Turn Type	pm+pt	NA	NA		Prot	Perm
Protected Phases	5	2	6		4	
Permitted Phases	2					4
Detector Phase	5	2	6		4	4
Switch Phase						
Minimum Initial (s)	5.0	5.0	5.0		5.0	5.0
Minimum Split (s)	9.7	33.1	33.1		32.9	32.9
Total Split (s)	14.0	84.0	70.0		36.0	36.0
Total Split (%)	11.7%	70.0%	58.3%		30.0%	30.0%
Maximum Green (s)	9.3	77.9	63.9		30.1	30.1
Yellow Time (s)	3.7	3.7	3.7		3.3	3.3
All-Red Time (s)	1.0	2.4	2.4		2.6	2.6
Lost Time Adjust (s)	0.0	0.0	0.0		0.0	0.0
Total Lost Time (s)	4.7	6.1	6.1		5.9	5.9
Lead/Lag	Lead		Lag			
Lead-Lag Optimize?	Yes		Yes			
Vehicle Extension (s)	3.0	3.0	3.0		3.0	3.0
Recall Mode	None	C-Max	C-Max		None	None
Walk Time (s)		7.0	7.0		7.0	7.0
Flash Dont Walk (s)		20.0	20.0		20.0	20.0
Pedestrian Calls (#/hr)		0	0		0	0
Act Effct Green (s)	93.1	91.7	78.3		16.3	16.3
Actuated g/C Ratio	0.78	0.76	0.65		0.14	0.14

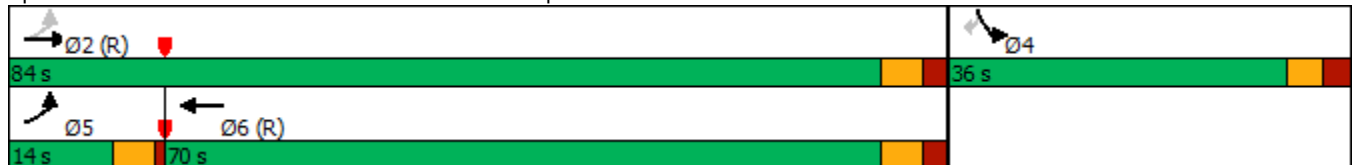


Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
v/c Ratio	0.48	0.55	0.64		0.68	0.52
Control Delay	19.2	3.3	15.2		63.1	13.1
Queue Delay	0.0	0.3	6.3		0.0	0.0
Total Delay	19.2	3.6	21.5		63.1	13.1
LOS	B	A	C		E	B
Approach Delay		4.9	21.5		36.8	
Approach LOS		A	C		D	
Queue Length 50th (m)	6.8	20.2	90.5		35.9	1.5
Queue Length 95th (m)	m13.0	m33.7	148.1		55.0	20.4
Internal Link Dist (m)		120.0	102.0		103.2	
Turn Bay Length (m)	45.0				60.0	
Base Capacity (vph)	290	2565	2162		433	485
Starvation Cap Reductn	0	483	729		0	0
Spillback Cap Reductn	0	0	0		0	0
Storage Cap Reductn	0	0	0		0	0
Reduced v/c Ratio	0.45	0.67	0.96		0.36	0.36

Intersection Summary






















Area Type: Other  
 Cycle Length: 120  
 Actuated Cycle Length: 120  
 Offset: 99 (83%), Referenced to phase 2:EBTL and 6:WBT, Start of Green  
 Natural Cycle: 90  
 Control Type: Actuated-Coordinated  
 Maximum v/c Ratio: 0.68  
 Intersection Signal Delay: 15.3  
 Intersection Capacity Utilization 78.2%  
 Analysis Period (min) 15  
 Intersection LOS: B  
 ICU Level of Service D  
 m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 2: Montreal Road & Montford Hospital



3: Den Haag Drive/Lang's Road & Montreal Road  
800 Montreal Road

Future (2029) Background Traffic  
PM Peak Hour

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	43	1353	163	15	1034	7	141	1	73	12	2	37
Future Volume (vph)	43	1353	163	15	1034	7	141	1	73	12	2	37
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Storage Length (m)	45.0		25.0	50.0		0.0	35.0		0.0	0.0		0.0
Storage Lanes	1		1	1		0	1		0	0		0
Taper Length (m)	2.5			2.5			2.5			2.5		
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	0.95	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor	0.99		0.90	0.99	1.00		0.99	0.98			0.98	
Frt			0.850		0.999			0.852			0.902	
Flt Protected	0.950			0.950			0.950				0.988	
Satd. Flow (prot)	1695	3357	1532	1729	3386	0	1695	1415	0	0	1591	0
Flt Permitted	0.252			0.170			0.811				0.926	
Satd. Flow (perm)	446	3357	1376	307	3386	0	1427	1415	0	0	1487	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			81		1			58				37
Link Speed (k/h)		60			60			50				50
Link Distance (m)		126.0			138.4			84.1				143.9
Travel Time (s)		7.6			8.3			6.1				10.4
Confl. Peds. (#/hr)	19		31	31		19	11		10	10		11
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Heavy Vehicles (%)	2%	3%	1%	0%	2%	0%	2%	0%	7%	0%	0%	0%
Adj. Flow (vph)	43	1353	163	15	1034	7	141	1	73	12	2	37
Shared Lane Traffic (%)												
Lane Group Flow (vph)	43	1353	163	15	1041	0	141	74	0	0	51	0
Turn Type	Perm	NA	Perm	Perm	NA		Perm	NA		Perm	NA	
Protected Phases		2			6			8				4
Permitted Phases	2		2	6			8			4		
Detector Phase	2	2	2	6	6		8	8		4	4	
Switch Phase												
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0		5.0	5.0		5.0	5.0	
Minimum Split (s)	28.8	28.8	28.8	28.8	28.8		34.2	34.2		34.2	34.2	
Total Split (s)	86.0	86.0	86.0	86.0	86.0		38.0	38.0		34.0	34.0	
Total Split (%)	69.4%	69.4%	69.4%	69.4%	69.4%		30.6%	30.6%		27.4%	27.4%	
Maximum Green (s)	80.2	80.2	80.2	80.2	80.2		31.8	31.8		27.8	27.8	
Yellow Time (s)	3.7	3.7	3.7	3.7	3.7		3.3	3.3		3.3	3.3	
All-Red Time (s)	2.1	2.1	2.1	2.1	2.1		2.9	2.9		2.9	2.9	
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0			0.0	
Total Lost Time (s)	5.8	5.8	5.8	5.8	5.8		6.2	6.2			6.2	
Lead/Lag												
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0		3.0	3.0	
Recall Mode	C-Max	C-Max	C-Max	C-Max	C-Max		None	None		None	None	
Walk Time (s)	7.0	7.0	7.0	7.0	7.0		7.0	7.0		7.0	7.0	
Flash Dont Walk (s)	16.0	16.0	16.0	16.0	16.0		21.0	21.0		21.0	21.0	
Pedestrian Calls (#/hr)	0	0	0	0	0		0	0		0	0	
Act Effct Green (s)	93.0	93.0	93.0	93.0	93.0		19.0	19.0			19.0	
Actuated g/C Ratio	0.75	0.75	0.75	0.75	0.75		0.15	0.15			0.15	
v/c Ratio	0.13	0.54	0.16	0.07	0.41		0.65	0.28			0.20	



3: Den Haag Drive/Lang's Road & Montreal Road  
800 Montreal Road

Future (2029) Background Traffic  
PM Peak Hour

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Control Delay	6.7	8.2	3.1	6.3	6.8		61.9	17.3			19.7	
Queue Delay	0.0	2.1	0.0	0.0	0.0		0.0	0.0			0.0	
Total Delay	6.7	10.2	3.1	6.3	6.8		61.9	17.3			19.7	
LOS	A	B	A	A	A		E	B			B	
Approach Delay		9.4			6.7			46.6			19.7	
Approach LOS		A			A			D			B	
Queue Length 50th (m)	2.5	63.2	4.6	0.8	41.8		32.7	3.4			3.0	
Queue Length 95th (m)	8.0	100.6	13.2	3.6	67.4		50.3	15.7			13.3	
Internal Link Dist (m)		102.0			114.4			60.1			119.9	
Turn Bay Length (m)	45.0		25.0	50.0			35.0					
Base Capacity (vph)	334	2516	1051	230	2538		365	406			408	
Starvation Cap Reductn	0	969	0	0	0		0	0			0	
Spillback Cap Reductn	0	0	0	0	0		0	0			0	
Storage Cap Reductn	0	0	0	0	0		0	0			0	
Reduced v/c Ratio	0.13	0.87	0.16	0.07	0.41		0.39	0.18			0.13	

Intersection Summary

























Area Type:	Other
Cycle Length:	124
Actuated Cycle Length:	124
Offset:	104 (84%), Referenced to phase 2:EBTL and 6:WBTL, Start of Green
Natural Cycle:	70
Control Type:	Actuated-Coordinated
Maximum v/c Ratio:	0.65
Intersection Signal Delay:	11.4
Intersection LOS:	B
Intersection Capacity Utilization:	66.8%
ICU Level of Service:	C
Analysis Period (min):	15

Splits and Phases: 3: Den Haag Drive/Lang's Road & Montreal Road



1: Aviation Parkway & Montreal Road  
800 Montreal Road

Future (2024) Total Traffic  
AM Peak Hour

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	41	896	256	341	1173	182	229	213	300	271	259	63
Future Volume (vph)	41	896	256	341	1173	182	229	213	300	271	259	63
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Storage Length (m)	45.0		30.0	55.0		25.0	0.0		55.0	70.0		0.0
Storage Lanes	1		1	1		1	1		1	1		0
Taper Length (m)	2.5			2.5			2.5			2.5		
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor	0.99		0.96			0.94	1.00		0.98	1.00	1.00	
Frt			0.850			0.850			0.850		0.971	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1695	3232	1547	1695	3262	1547	1712	1820	1517	1695	1750	0
Flt Permitted	0.173			0.124			0.220			0.475		
Satd. Flow (perm)	307	3232	1478	221	3262	1454	395	1820	1488	844	1750	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			190			136			286			9
Link Speed (k/h)		60			60			60				60
Link Distance (m)		150.7			144.0			388.7				332.0
Travel Time (s)		9.0			8.6			23.3				19.9
Confl. Peds. (#/hr)	19		26	26		19	6		5	5		6
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Heavy Vehicles (%)	2%	7%	0%	2%	6%	0%	1%	0%	2%	2%	0%	3%
Adj. Flow (vph)	41	896	256	341	1173	182	229	213	300	271	259	63
Shared Lane Traffic (%)												
Lane Group Flow (vph)	41	896	256	341	1173	182	229	213	300	271	322	0
Turn Type	pm+pt	NA	Perm	pm+pt	NA	Perm	pm+pt	NA	Perm	pm+pt	NA	
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases	2		2	6		6	8		8	4		
Detector Phase	5	2	2	1	6	6	3	8	8	7	4	
Switch Phase												
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Minimum Split (s)	10.9	33.9	33.9	10.9	39.0	39.0	10.9	32.2	32.2	10.9	32.2	
Total Split (s)	11.0	44.6	44.6	26.0	59.6	59.6	17.0	33.1	33.1	16.3	32.4	
Total Split (%)	9.2%	37.2%	37.2%	21.7%	49.7%	49.7%	14.2%	27.6%	27.6%	13.6%	27.0%	
Maximum Green (s)	5.1	38.7	38.7	20.1	53.7	53.7	11.1	26.9	26.9	10.4	26.2	
Yellow Time (s)	3.7	3.7	3.7	3.7	3.7	3.7	3.7	3.7	3.7	3.7	3.7	
All-Red Time (s)	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.5	2.5	2.2	2.5	
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Total Lost Time (s)	5.9	5.9	5.9	5.9	5.9	5.9	5.9	6.2	6.2	5.9	6.2	
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag	
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	
Recall Mode	None	C-Max	C-Max	None	C-Max	C-Max	None	None	None	None	None	
Walk Time (s)		16.0	16.0		16.0	16.0		7.0	7.0		7.0	
Flash Dont Walk (s)		12.0	12.0		12.0	12.0		19.0	19.0		19.0	
Pedestrian Calls (#/hr)		0	0		0	0		0	0		0	
Act Effct Green (s)	45.9	40.5	40.5	66.5	57.5	57.5	36.5	25.1	25.1	35.1	24.4	
Actuated g/C Ratio	0.38	0.34	0.34	0.55	0.48	0.48	0.30	0.21	0.21	0.29	0.20	
v/c Ratio	0.23	0.82	0.41	0.92	0.75	0.24	0.95	0.56	0.56	0.85	0.89	

1: Aviation Parkway & Montreal Road  
800 Montreal Road

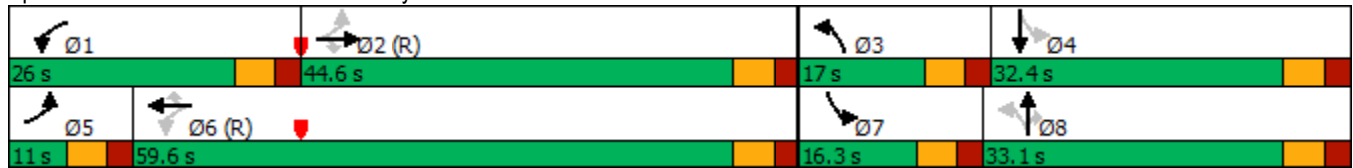
Future (2024) Total Traffic  
AM Peak Hour

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Control Delay	18.4	44.5	11.0	58.9	30.4	6.8	79.5	48.4	9.8	57.6	71.4	
Queue Delay	0.0	0.0	0.0	0.0	6.7	0.0	0.0	0.0	0.0	0.0	0.0	
Total Delay	18.4	44.5	11.0	58.9	37.1	6.8	79.5	48.4	9.8	57.6	71.4	
LOS	B	D	B	E	D	A	E	D	A	E	E	
Approach Delay		36.4			38.2			42.4			65.1	
Approach LOS		D			D			D			E	
Queue Length 50th (m)	4.4	103.6	11.0	58.6	122.8	6.1	39.4	44.4	2.6	48.0	71.0	
Queue Length 95th (m)	9.8	#131.2	32.6	#113.7	151.2	19.5	#77.6	68.8	26.5	#85.3	#116.9	
Internal Link Dist (m)		126.7			120.0			364.7			308.0	
Turn Bay Length (m)	45.0		30.0	55.0		25.0			55.0	70.0		
Base Capacity (vph)	180	1089	624	374	1563	767	241	407	555	320	389	
Starvation Cap Reductn	0	0	0	0	344	0	0	0	0	0	0	
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	
Reduced v/c Ratio	0.23	0.82	0.41	0.91	0.96	0.24	0.95	0.52	0.54	0.85	0.83	

Intersection Summary

























Area Type: Other  
 Cycle Length: 120  
 Actuated Cycle Length: 120  
 Offset: 55 (46%), Referenced to phase 2:EBTL and 6:WBTL, Start of Green  
 Natural Cycle: 105  
 Control Type: Actuated-Coordinated  
 Maximum v/c Ratio: 0.95  
 Intersection Signal Delay: 42.2  
 Intersection LOS: D  
 Intersection Capacity Utilization 98.5%  
 ICU Level of Service F  
 Analysis Period (min) 15  
 # 95th percentile volume exceeds capacity, queue may be longer.  
 Queue shown is maximum after two cycles.

Splits and Phases: 1: Aviation Parkway & Montreal Road



1: Aviation Parkway & Montreal Road  
800 Montreal Road

Future (2024) Total Traffic - Dual WBL  
AM Peak Hour

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	41	896	256	341	1173	182	229	213	300	271	259	63
Future Volume (vph)	41	896	256	341	1173	182	229	213	300	271	259	63
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Storage Length (m)	45.0		30.0	55.0		25.0	0.0		55.0	70.0		0.0
Storage Lanes	1		1	2		1	1		1	1		0
Taper Length (m)	2.5			2.5			2.5			2.5		
Lane Util. Factor	1.00	0.95	1.00	0.97	0.95	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor	1.00		0.96	0.99		0.94	1.00		0.98	1.00	1.00	
Frt			0.850			0.850			0.850		0.971	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1695	3232	1547	3288	3262	1547	1712	1820	1517	1695	1750	0
Flt Permitted	0.124			0.173			0.241			0.439		
Satd. Flow (perm)	220	3232	1478	596	3262	1454	433	1820	1488	780	1750	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			136			136			160			9
Link Speed (k/h)		60			60			60				60
Link Distance (m)		150.7			144.0			388.7				332.0
Travel Time (s)		9.0			8.6			23.3				19.9
Confl. Peds. (#/hr)	19		26	26		19	6		5	5		6
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Heavy Vehicles (%)	2%	7%	0%	2%	6%	0%	1%	0%	2%	2%	0%	3%
Adj. Flow (vph)	41	896	256	341	1173	182	229	213	300	271	259	63
Shared Lane Traffic (%)												
Lane Group Flow (vph)	41	896	256	341	1173	182	229	213	300	271	322	0
Turn Type	pm+pt	NA	Perm	pm+pt	NA	Perm	pm+pt	NA	Perm	pm+pt	NA	
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases	2		2	6		6	8		8	4		
Detector Phase	5	2	2	1	6	6	3	8	8	7	4	
Switch Phase												
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Minimum Split (s)	10.9	33.9	33.9	10.9	39.0	39.0	10.9	32.2	32.2	10.9	32.2	
Total Split (s)	11.0	52.4	52.4	15.0	56.4	56.4	19.4	32.6	32.6	20.0	33.2	
Total Split (%)	9.2%	43.7%	43.7%	12.5%	47.0%	47.0%	16.2%	27.2%	27.2%	16.7%	27.7%	
Maximum Green (s)	5.1	46.5	46.5	9.1	50.5	50.5	13.5	26.4	26.4	14.1	27.0	
Yellow Time (s)	3.7	3.7	3.7	3.7	3.7	3.7	3.7	3.7	3.7	3.7	3.7	
All-Red Time (s)	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.5	2.5	2.2	2.5	
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Total Lost Time (s)	5.9	5.9	5.9	5.9	5.9	5.9	5.9	6.2	6.2	5.9	6.2	
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag	
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	
Recall Mode	None	C-Max	C-Max	None	C-Max	C-Max	None	None	None	None	None	
Walk Time (s)		16.0	16.0		16.0	16.0		7.0	7.0		7.0	
Flash Dont Walk (s)		12.0	12.0		12.0	12.0		19.0	19.0		19.0	
Pedestrian Calls (#/hr)		0	0		0	0		0	0		0	
Act Effct Green (s)	54.0	48.6	48.6	62.5	54.9	54.9	37.7	24.1	24.1	39.1	24.8	
Actuated g/C Ratio	0.45	0.40	0.40	0.52	0.46	0.46	0.31	0.20	0.20	0.33	0.21	
v/c Ratio	0.25	0.68	0.38	0.65	0.79	0.25	0.83	0.58	0.70	0.75	0.88	

1: Aviation Parkway & Montreal Road  
800 Montreal Road

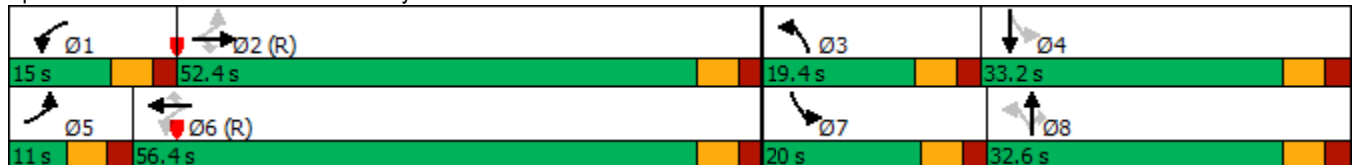
Future (2024) Total Traffic - Dual WBL  
AM Peak Hour

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Control Delay	18.8	33.3	13.6	21.7	33.7	7.5	52.9	49.9	29.6	43.4	68.9	
Queue Delay	0.0	0.0	0.0	0.0	8.4	0.0	0.0	0.0	0.0	0.0	0.0	
Total Delay	18.8	33.3	13.6	21.7	42.1	7.5	52.9	49.9	29.6	43.4	68.9	
LOS	B	C	B	C	D	A	D	D	C	D	E	
Approach Delay		28.5			34.3			42.6			57.2	
Approach LOS		C			C			D			E	
Queue Length 50th (m)	4.7	92.9	18.6	21.7	129.3	6.4	37.6	44.6	29.9	45.9	70.3	
Queue Length 95th (m)	10.4	116.6	40.0	30.3	159.2	20.7	#66.0	69.2	61.0	#69.1	#114.0	
Internal Link Dist (m)		126.7			120.0			364.7			308.0	
Turn Bay Length (m)	45.0		30.0	55.0		25.0			55.0	70.0		
Base Capacity (vph)	165	1309	679	522	1491	738	280	400	452	362	400	
Starvation Cap Reductn	0	0	0	0	290	0	0	0	0	0	0	
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	
Reduced v/c Ratio	0.25	0.68	0.38	0.65	0.98	0.25	0.82	0.53	0.66	0.75	0.81	

Intersection Summary

Area Type: Other  
 Cycle Length: 120  
 Actuated Cycle Length: 120  
 Offset: 55 (46%), Referenced to phase 2:EBTL and 6:WBTL, Start of Green  
 Natural Cycle: 95  
 Control Type: Actuated-Coordinated  
 Maximum v/c Ratio: 0.88  
 Intersection Signal Delay: 37.4  
 Intersection LOS: D  
 Intersection Capacity Utilization 90.8%  
 ICU Level of Service E  
 Analysis Period (min) 15  
 # 95th percentile volume exceeds capacity, queue may be longer.  
 Queue shown is maximum after two cycles.

Splits and Phases: 1: Aviation Parkway & Montreal Road



2: Montreal Road & Montford Hospital  
800 Montreal Road

Future (2024) Total Traffic  
AM Peak Hour



Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	178	1289	1564	126	58	131
Future Volume (vph)	178	1289	1564	126	58	131
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800
Storage Length (m)	45.0			0.0	60.0	0.0
Storage Lanes	1			0	1	1
Taper Length (m)	2.5				2.5	
Lane Util. Factor	1.00	0.95	0.95	0.95	1.00	1.00
Ped Bike Factor			1.00		0.99	0.97
Frt			0.989			0.850
Flt Protected	0.950				0.950	
Satd. Flow (prot)	1616	3357	3312	0	1729	1432
Flt Permitted	0.064				0.950	
Satd. Flow (perm)	109	3357	3312	0	1703	1389
Right Turn on Red				Yes		Yes
Satd. Flow (RTOR)			11			131
Link Speed (k/h)		60	60		25	
Link Distance (m)		144.0	126.0		127.2	
Travel Time (s)		8.6	7.6		18.3	
Confl. Peds. (#/hr)	13			13	14	18
Confl. Bikes (#/hr)				3		
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Heavy Vehicles (%)	7%	3%	3%	2%	0%	8%
Adj. Flow (vph)	178	1289	1564	126	58	131
Shared Lane Traffic (%)						
Lane Group Flow (vph)	178	1289	1690	0	58	131
Turn Type	pm+pt	NA	NA		Prot	Perm
Protected Phases	5	2	6		4	
Permitted Phases	2					4
Detector Phase	5	2	6		4	4
Switch Phase						
Minimum Initial (s)	5.0	5.0	5.0		5.0	5.0
Minimum Split (s)	9.7	33.1	33.1		32.9	32.9
Total Split (s)	13.0	62.0	49.0		33.0	33.0
Total Split (%)	13.7%	65.3%	51.6%		34.7%	34.7%
Maximum Green (s)	8.3	55.9	42.9		27.1	27.1
Yellow Time (s)	3.7	3.7	3.7		3.3	3.3
All-Red Time (s)	1.0	2.4	2.4		2.6	2.6
Lost Time Adjust (s)	0.0	0.0	0.0		0.0	0.0
Total Lost Time (s)	4.7	6.1	6.1		5.9	5.9
Lead/Lag	Lead		Lag			
Lead-Lag Optimize?	Yes		Yes			
Vehicle Extension (s)	3.0	3.0	3.0		3.0	3.0
Recall Mode	None	C-Max	C-Max		None	None
Walk Time (s)		7.0	7.0		7.0	7.0
Flash Dont Walk (s)		20.0	20.0		20.0	20.0
Pedestrian Calls (#/hr)		0	0		0	0
Act Effct Green (s)	75.7	74.3	58.2		8.7	8.7
Actuated g/C Ratio	0.80	0.78	0.61		0.09	0.09

2: Montreal Road & Montford Hospital  
800 Montreal Road

Future (2024) Total Traffic  
AM Peak Hour

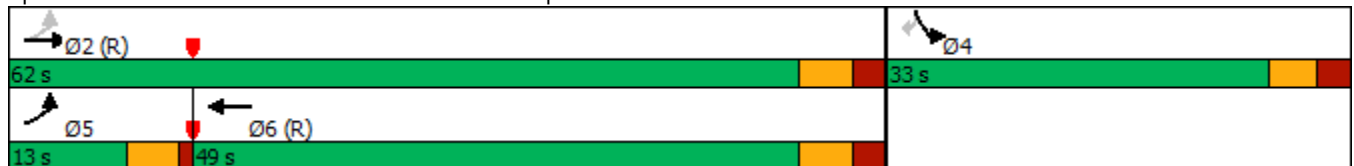


Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
v/c Ratio	0.66	0.49	0.83		0.37	0.53
Control Delay	30.4	4.6	20.6		46.3	15.7
Queue Delay	0.0	0.6	31.6		0.0	0.0
Total Delay	30.4	5.2	52.3		46.3	15.7
LOS	C	A	D		D	B
Approach Delay		8.3	52.3		25.1	
Approach LOS		A	D		C	
Queue Length 50th (m)	16.2	34.0	115.6		10.2	0.0
Queue Length 95th (m)	36.9	53.8	#206.6		21.3	15.8
Internal Link Dist (m)		120.0	102.0		103.2	
Turn Bay Length (m)	45.0				60.0	
Base Capacity (vph)	269	2627	2034		493	489
Starvation Cap Reductn	0	855	443		0	0
Spillback Cap Reductn	0	0	0		0	0
Storage Cap Reductn	0	0	0		0	0
Reduced v/c Ratio	0.66	0.73	1.06		0.12	0.27

Intersection Summary

Area Type: Other  
 Cycle Length: 95  
 Actuated Cycle Length: 95  
 Offset: 33 (35%), Referenced to phase 2:EBTL and 6:WBT, Start of Green  
 Natural Cycle: 110  
 Control Type: Actuated-Coordinated  
 Maximum v/c Ratio: 0.83  
 Intersection Signal Delay: 31.5  
 Intersection LOS: C  
 Intersection Capacity Utilization 86.7%  
 ICU Level of Service E  
 Analysis Period (min) 15  
 # 95th percentile volume exceeds capacity, queue may be longer.  
 Queue shown is maximum after two cycles.

Splits and Phases: 2: Montreal Road & Montford Hospital



3: Den Haag Drive/Lang's Road & Montreal Road  
800 Montreal Road

Future (2024) Total Traffic  
AM Peak Hour

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	18	1116	214	25	1379	10	262	4	31	5	3	18
Future Volume (vph)	18	1116	214	25	1379	10	262	4	31	5	3	18
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Storage Length (m)	45.0		25.0	50.0		0.0	35.0		0.0	0.0		0.0
Storage Lanes	1		1	1		0	1		0	0		0
Taper Length (m)	2.5			2.5			2.5			2.5		
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	0.95	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor			0.93	0.99	1.00		0.97	0.94				0.96
Frt			0.850		0.999			0.867				0.907
Flt Protected	0.950			0.950			0.950					0.990
Satd. Flow (prot)	1729	3325	1488	1729	3352	0	1662	1168	0	0	1472	0
Flt Permitted	0.141			0.211			0.740					0.965
Satd. Flow (perm)	257	3325	1382	381	3352	0	1260	1168	0	0	1419	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			129		1			31				18
Link Speed (k/h)		60			60			50				50
Link Distance (m)		126.0			138.4			84.1				143.9
Travel Time (s)		7.6			8.3			6.1				10.4
Confl. Peds. (#/hr)	31		20	20		31	22		47	47		22
Confl. Bikes (#/hr)						3						
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Heavy Vehicles (%)	0%	4%	4%	0%	3%	0%	4%	0%	30%	0%	33%	6%
Adj. Flow (vph)	18	1116	214	25	1379	10	262	4	31	5	3	18
Shared Lane Traffic (%)												
Lane Group Flow (vph)	18	1116	214	25	1389	0	262	35	0	0	26	0
Turn Type	Perm	NA	Perm	Perm	NA		Perm	NA		Perm	NA	
Protected Phases		2			6			8				4
Permitted Phases	2		2	6			8			4		
Detector Phase	2	2	2	6	6		8	8		4	4	
Switch Phase												
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0		5.0	5.0		5.0	5.0	
Minimum Split (s)	28.8	28.8	28.8	28.8	28.8		34.2	34.2		34.2	34.2	
Total Split (s)	82.0	82.0	82.0	82.0	82.0		38.0	38.0		38.0	38.0	
Total Split (%)	68.3%	68.3%	68.3%	68.3%	68.3%		31.7%	31.7%		31.7%	31.7%	
Maximum Green (s)	76.2	76.2	76.2	76.2	76.2		31.8	31.8		31.8	31.8	
Yellow Time (s)	3.7	3.7	3.7	3.7	3.7		3.3	3.3		3.3	3.3	
All-Red Time (s)	2.1	2.1	2.1	2.1	2.1		2.9	2.9		2.9	2.9	
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0				0.0
Total Lost Time (s)	5.8	5.8	5.8	5.8	5.8		6.2	6.2				6.2
Lead/Lag												
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0		3.0	3.0	
Recall Mode	C-Max	C-Max	C-Max	C-Max	C-Max		None	None		None	None	
Walk Time (s)	7.0	7.0	7.0	7.0	7.0		7.0	7.0		7.0	7.0	
Flash Dont Walk (s)	16.0	16.0	16.0	16.0	16.0		21.0	21.0		21.0	21.0	
Pedestrian Calls (#/hr)	0	0	0	0	0		0	0		0	0	
Act Effct Green (s)	79.7	79.7	79.7	79.7	79.7		28.3	28.3				28.3
Actuated g/C Ratio	0.66	0.66	0.66	0.66	0.66		0.24	0.24				0.24



3: Den Haag Drive/Lang's Road & Montreal Road  
800 Montreal Road

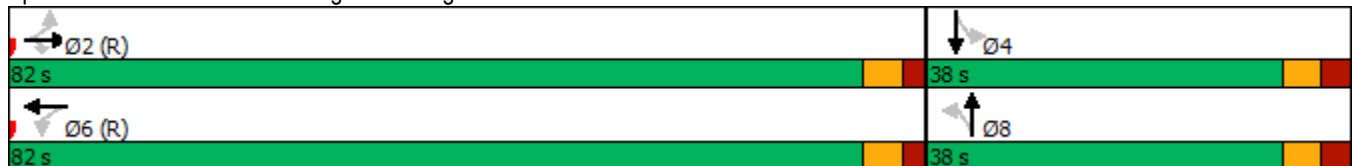
Future (2024) Total Traffic  
AM Peak Hour

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
v/c Ratio	0.11	0.51	0.22	0.10	0.62		0.88	0.12			0.07	
Control Delay	10.3	11.7	4.2	9.6	13.7		73.4	13.9			18.2	
Queue Delay	0.0	1.7	0.0	0.0	0.0		0.0	0.0			0.0	
Total Delay	10.3	13.4	4.2	9.6	13.7		73.4	13.9			18.2	
LOS	B	B	A	A	B		E	B			B	
Approach Delay		11.9			13.6			66.4			18.2	
Approach LOS		B			B			E			B	
Queue Length 50th (m)	1.5	68.8	7.1	2.1	97.2		58.0	0.7			1.4	
Queue Length 95th (m)	5.0	86.8	16.7	6.0	121.5		#98.0	8.7			8.4	
Internal Link Dist (m)		102.0			114.4			60.1			119.9	
Turn Bay Length (m)	45.0		25.0	50.0			35.0					
Base Capacity (vph)	170	2207	960	252	2226		333	332			389	
Starvation Cap Reductn	0	863	0	0	0		0	0			0	
Spillback Cap Reductn	0	0	0	0	0		0	0			0	
Storage Cap Reductn	0	0	0	0	0		0	0			0	
Reduced v/c Ratio	0.11	0.83	0.22	0.10	0.62		0.79	0.11			0.07	

Intersection Summary

Area Type: Other  
 Cycle Length: 120  
 Actuated Cycle Length: 120  
 Offset: 27 (23%), Referenced to phase 2:EBTL and 6:WBTL, Start of Green  
 Natural Cycle: 75  
 Control Type: Actuated-Coordinated  
 Maximum v/c Ratio: 0.88  
 Intersection Signal Delay: 18.0  
 Intersection Capacity Utilization 73.6%  
 Analysis Period (min) 15  
 Intersection LOS: B  
 ICU Level of Service D  
 # 95th percentile volume exceeds capacity, queue may be longer.  
 Queue shown is maximum after two cycles.

Splits and Phases: 3: Den Haag Drive/Lang's Road & Montreal Road



4: Den Haag Drive & Site Access  
800 Montreal Road

Future (2024) Total Traffic  
AM Peak Hour

Intersection						
Int Delay, s/veh	1					
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	0	45	252	0	15	227
Future Vol, veh/h	0	45	252	0	15	227
Conflicting Peds, #/hr	0	0	0	0	0	0
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	100	100	100	100	100	100
Heavy Vehicles, %	0	0	7	0	0	4
Mvmt Flow	0	45	252	0	15	227

Major/Minor	Minor1	Major1	Major2			
Conflicting Flow All	509	252	0	0	252	0
Stage 1	252	-	-	-	-	-
Stage 2	257	-	-	-	-	-
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	528	792	-	-	1325	-
Stage 1	795	-	-	-	-	-
Stage 2	791	-	-	-	-	-
Platoon blocked, %			-	-	-	-
Mov Cap-1 Maneuver	521	792	-	-	1325	-
Mov Cap-2 Maneuver	521	-	-	-	-	-
Stage 1	795	-	-	-	-	-
Stage 2	781	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	9.8	0	0.5
HCM LOS	A		

Minor Lane/Major Mvmt	NBT	NBRWBLn1	SBL	SBT
Capacity (veh/h)	-	-	792	1325
HCM Lane V/C Ratio	-	-	0.057	0.011
HCM Control Delay (s)	-	-	9.8	7.7
HCM Lane LOS	-	-	A	A
HCM 95th %tile Q(veh)	-	-	0.2	0

1: Aviation Parkway & Montreal Road  
800 Montreal Road

Future (2024) Total Traffic  
PM Peak Hour

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	49	1206	283	278	1045	274	284	324	273	157	298	58
Future Volume (vph)	49	1206	283	278	1045	274	284	324	273	157	298	58
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Storage Length (m)	45.0		30.0	55.0		25.0	0.0		55.0	70.0		0.0
Storage Lanes	1		1	1		1	1		1	1		0
Taper Length (m)	2.5			2.5			2.5			2.5		
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor	0.99		0.96			0.92	1.00		0.99	1.00	1.00	
Frt			0.850			0.850			0.850		0.976	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1695	3325	1532	1695	3325	1517	1729	1820	1532	1679	1770	0
Flt Permitted	0.187			0.083			0.148			0.384		
Satd. Flow (perm)	330	3325	1471	148	3325	1394	268	1820	1509	678	1770	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			190			136			201		7	
Link Speed (k/h)		60			60			60			60	
Link Distance (m)		150.7			144.0			388.7			332.0	
Travel Time (s)		9.0			8.6			23.3			19.9	
Confl. Peds. (#/hr)	29		22	22		29	7		2	2		7
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Heavy Vehicles (%)	2%	4%	1%	2%	4%	2%	0%	0%	1%	3%	0%	0%
Adj. Flow (vph)	49	1206	283	278	1045	274	284	324	273	157	298	58
Shared Lane Traffic (%)												
Lane Group Flow (vph)	49	1206	283	278	1045	274	284	324	273	157	356	0
Turn Type	pm+pt	NA	Perm	pm+pt	NA	Perm	pm+pt	NA	Perm	pm+pt	NA	
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases	2		2	6		6	8		8	4		
Detector Phase	5	2	2	1	6	6	3	8	8	7	4	
Switch Phase												
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Minimum Split (s)	10.9	33.9	33.9	10.9	39.0	39.0	10.9	32.2	32.2	10.9	32.2	
Total Split (s)	11.8	48.4	48.4	20.2	56.8	56.8	19.2	37.5	37.5	13.9	32.2	
Total Split (%)	9.8%	40.3%	40.3%	16.8%	47.3%	47.3%	16.0%	31.3%	31.3%	11.6%	26.8%	
Maximum Green (s)	5.9	42.5	42.5	14.3	50.9	50.9	13.3	31.3	31.3	8.0	26.0	
Yellow Time (s)	3.7	3.7	3.7	3.7	3.7	3.7	3.7	3.7	3.7	3.7	3.7	
All-Red Time (s)	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.5	2.5	2.2	2.5	
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Total Lost Time (s)	5.9	5.9	5.9	5.9	5.9	5.9	5.9	6.2	6.2	5.9	6.2	
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag	
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	
Recall Mode	None	C-Max	C-Max	None	C-Max	C-Max	None	None	None	None	None	
Walk Time (s)		16.0	16.0		16.0	16.0		7.0	7.0		7.0	
Flash Dont Walk (s)		12.0	12.0		12.0	12.0		19.0	19.0		19.0	
Pedestrian Calls (#/hr)		0	0		0	0		0	0		0	
Act Effct Green (s)	48.3	42.5	42.5	63.3	53.9	53.9	44.3	30.7	30.7	33.7	25.4	
Actuated g/C Ratio	0.40	0.35	0.35	0.53	0.45	0.45	0.37	0.26	0.26	0.28	0.21	
v/c Ratio	0.25	1.02	0.44	1.03	0.70	0.39	1.09	0.70	0.51	0.61	0.94	

1: Aviation Parkway & Montreal Road  
800 Montreal Road

Future (2024) Total Traffic  
PM Peak Hour

	↖	→	↘	↙	←	↖	↙	↑	↘	↘	↓	↙
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Control Delay	18.3	71.2	12.0	102.3	20.1	7.2	111.7	49.3	14.3	39.4	79.1	
Queue Delay	0.0	0.0	0.0	0.0	0.7	0.0	0.0	0.0	0.0	0.0	0.0	
Total Delay	18.3	71.2	12.0	102.3	20.8	7.2	111.7	49.3	14.3	39.4	79.1	
LOS	B	E	B	F	C	A	F	D	B	D	E	
Approach Delay	58.6			32.7			58.6			66.9		
Approach LOS	E			C			E			E		
Queue Length 50th (m)	5.5	~159.1	15.0	~54.8	78.0	5.4	~57.2	68.9	13.2	25.1	81.1	
Queue Length 95th (m)	11.6	#200.6	38.4	#113.5	77.5	24.5	#111.1	100.4	38.4	41.1	#135.8	
Internal Link Dist (m)	126.7			120.0			364.7			308.0		
Turn Bay Length (m)	45.0		30.0	55.0		25.0			55.0	70.0		
Base Capacity (vph)	200	1177	643	270	1492	700	261	474	542	257	388	
Starvation Cap Reductn	0	0	0	0	177	0	0	0	0	0	0	
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	
Reduced v/c Ratio	0.24	1.02	0.44	1.03	0.79	0.39	1.09	0.68	0.50	0.61	0.92	

Intersection Summary

Area Type: Other  
 Cycle Length: 120  
 Actuated Cycle Length: 120  
 Offset: 106 (88%), Referenced to phase 2:EBTL and 6:WBTL, Start of Green  
 Natural Cycle: 125  
 Control Type: Actuated-Coordinated  
 Maximum v/c Ratio: 1.09  
 Intersection Signal Delay: 50.4  
 Intersection LOS: D  
 Intersection Capacity Utilization 108.6%  
 ICU Level of Service G  
 Analysis Period (min) 15  
 ~ Volume exceeds capacity, queue is theoretically infinite.  
 Queue shown is maximum after two cycles.  
 # 95th percentile volume exceeds capacity, queue may be longer.  
 Queue shown is maximum after two cycles.

Splits and Phases: 1: Aviation Parkway & Montreal Road



1: Aviation Parkway & Montreal Road  
800 Montreal Road

Future (2024) Total Traffic - Dual WBL  
PM Peak Hour

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	49	1206	283	278	1045	274	284	324	273	157	298	58
Future Volume (vph)	49	1206	283	278	1045	274	284	324	273	157	298	58
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Storage Length (m)	45.0		30.0	55.0		25.0	0.0		55.0	70.0		0.0
Storage Lanes	1		1	2		1	1		1	1		0
Taper Length (m)	2.5			2.5			2.5			2.5		
Lane Util. Factor	1.00	0.95	1.00	0.97	0.95	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor	0.99		0.96			0.92	1.00		0.99	1.00	1.00	
Frt			0.850			0.850			0.850		0.976	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1695	3325	1532	3288	3325	1517	1729	1820	1532	1679	1770	0
Flt Permitted	0.155			0.078			0.145			0.466		
Satd. Flow (perm)	274	3325	1471	270	3325	1394	263	1820	1509	822	1770	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			190			190			144			7
Link Speed (k/h)		60			60			60				60
Link Distance (m)		150.7			144.0			388.7				332.0
Travel Time (s)		9.0			8.6			23.3				19.9
Confl. Peds. (#/hr)	29		22	22		29	7		2	2		7
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Heavy Vehicles (%)	2%	4%	1%	2%	4%	2%	0%	0%	1%	3%	0%	0%
Adj. Flow (vph)	49	1206	283	278	1045	274	284	324	273	157	298	58
Shared Lane Traffic (%)												
Lane Group Flow (vph)	49	1206	283	278	1045	274	284	324	273	157	356	0
Turn Type	pm+pt	NA	Perm	pm+pt	NA	Perm	pm+pt	NA	Perm	pm+pt	NA	
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases	2		2	6		6	8		8	4		
Detector Phase	5	2	2	1	6	6	3	8	8	7	4	
Switch Phase												
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Minimum Split (s)	10.9	33.9	33.9	10.9	39.0	39.0	10.9	32.2	32.2	10.9	32.2	
Total Split (s)	11.0	53.0	53.0	13.4	55.4	55.4	21.4	40.5	40.5	13.1	32.2	
Total Split (%)	9.2%	44.2%	44.2%	11.2%	46.2%	46.2%	17.8%	33.8%	33.8%	10.9%	26.8%	
Maximum Green (s)	5.1	47.1	47.1	7.5	49.5	49.5	15.5	34.3	34.3	7.2	26.0	
Yellow Time (s)	3.7	3.7	3.7	3.7	3.7	3.7	3.7	3.7	3.7	3.7	3.7	
All-Red Time (s)	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.5	2.5	2.2	2.5	
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Total Lost Time (s)	5.9	5.9	5.9	5.9	5.9	5.9	5.9	6.2	6.2	5.9	6.2	
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag	
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	
Recall Mode	None	C-Max	C-Max	None	C-Max	C-Max	None	None	None	None	None	
Walk Time (s)		16.0	16.0		16.0	16.0		7.0	7.0		7.0	
Flash Dont Walk (s)		12.0	12.0		12.0	12.0		19.0	19.0		19.0	
Pedestrian Calls (#/hr)		0	0		0	0		0	0		0	
Act Effct Green (s)	52.5	47.3	47.3	58.3	52.3	52.3	47.1	33.7	33.7	32.9	25.4	
Actuated g/C Ratio	0.44	0.39	0.39	0.49	0.44	0.44	0.39	0.28	0.28	0.27	0.21	
v/c Ratio	0.27	0.92	0.41	0.84	0.72	0.38	0.97	0.63	0.52	0.57	0.94	

1: Aviation Parkway & Montreal Road  
800 Montreal Road

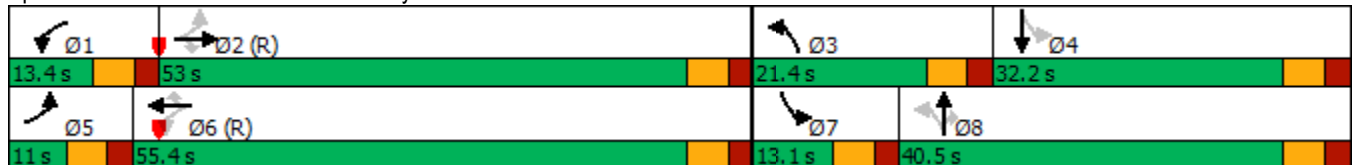
Future (2024) Total Traffic - Dual WBL  
PM Peak Hour

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Control Delay	19.5	46.9	10.5	56.0	20.6	4.3	77.4	44.1	20.3	36.6	79.1	
Queue Delay	0.0	0.0	0.0	0.0	0.8	0.0	0.0	0.0	0.0	0.0	0.0	
Total Delay	19.5	46.9	10.5	56.0	21.5	4.3	77.4	44.1	20.3	36.6	79.1	
LOS	B	D	B	E	C	A	E	D	C	D	E	
Approach Delay		39.4			24.5			47.5			66.1	
Approach LOS		D			C			D			E	
Queue Length 50th (m)	5.7	140.6	14.0	17.8	103.8	3.9	49.2	66.3	24.3	24.3	81.1	
Queue Length 95th (m)	12.1	#184.2	35.7	#44.5	86.1	16.7	#103.0	96.7	50.7	39.8	#135.8	
Internal Link Dist (m)		126.7			120.0			364.7			308.0	
Turn Bay Length (m)	45.0		30.0	55.0		25.0			55.0	70.0		
Base Capacity (vph)	181	1311	694	329	1449	714	292	520	534	276	388	
Starvation Cap Reductn	0	0	0	0	164	0	0	0	0	0	0	
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	
Reduced v/c Ratio	0.27	0.92	0.41	0.84	0.81	0.38	0.97	0.62	0.51	0.57	0.92	

Intersection Summary

Area Type: Other  
 Cycle Length: 120  
 Actuated Cycle Length: 120  
 Offset: 106 (88%), Referenced to phase 2:EBTL and 6:WBTL, Start of Green  
 Natural Cycle: 105  
 Control Type: Actuated-Coordinated  
 Maximum v/c Ratio: 0.97  
 Intersection Signal Delay: 38.7  
 Intersection LOS: D  
 Intersection Capacity Utilization 100.7%  
 ICU Level of Service G  
 Analysis Period (min) 15  
 # 95th percentile volume exceeds capacity, queue may be longer.  
 Queue shown is maximum after two cycles.

Splits and Phases: 1: Aviation Parkway & Montreal Road



2: Montreal Road & Montford Hospital  
800 Montreal Road

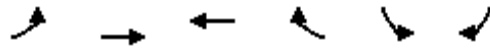
Future (2024) Total Traffic  
PM Peak Hour



Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	131	1505	1421	83	158	176
Future Volume (vph)	131	1505	1421	83	158	176
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800
Storage Length (m)	45.0			0.0	60.0	0.0
Storage Lanes	1			0	1	1
Taper Length (m)	2.5				2.5	
Lane Util. Factor	1.00	0.95	0.95	0.95	1.00	1.00
Ped Bike Factor			1.00		0.99	0.96
Frt			0.992			0.850
Flt Protected	0.950				0.950	
Satd. Flow (prot)	1601	3357	3316	0	1729	1488
Flt Permitted	0.104				0.950	
Satd. Flow (perm)	175	3357	3316	0	1704	1429
Right Turn on Red				Yes		Yes
Satd. Flow (RTOR)			8			160
Link Speed (k/h)		60	60		25	
Link Distance (m)		144.0	126.0		127.2	
Travel Time (s)		8.6	7.6		18.3	
Confl. Peds. (#/hr)	31			31	11	21
Confl. Bikes (#/hr)				1		
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Heavy Vehicles (%)	8%	3%	3%	2%	0%	4%
Adj. Flow (vph)	131	1505	1421	83	158	176
Shared Lane Traffic (%)						
Lane Group Flow (vph)	131	1505	1504	0	158	176
Turn Type	pm+pt	NA	NA		Prot	Perm
Protected Phases	5	2	6		4	
Permitted Phases	2					4
Detector Phase	5	2	6		4	4
Switch Phase						
Minimum Initial (s)	5.0	5.0	5.0		5.0	5.0
Minimum Split (s)	9.7	33.1	33.1		32.9	32.9
Total Split (s)	14.0	84.0	70.0		36.0	36.0
Total Split (%)	11.7%	70.0%	58.3%		30.0%	30.0%
Maximum Green (s)	9.3	77.9	63.9		30.1	30.1
Yellow Time (s)	3.7	3.7	3.7		3.3	3.3
All-Red Time (s)	1.0	2.4	2.4		2.6	2.6
Lost Time Adjust (s)	0.0	0.0	0.0		0.0	0.0
Total Lost Time (s)	4.7	6.1	6.1		5.9	5.9
Lead/Lag	Lead		Lag			
Lead-Lag Optimize?	Yes		Yes			
Vehicle Extension (s)	3.0	3.0	3.0		3.0	3.0
Recall Mode	None	C-Max	C-Max		None	None
Walk Time (s)		7.0	7.0		7.0	7.0
Flash Dont Walk (s)		20.0	20.0		20.0	20.0
Pedestrian Calls (#/hr)		0	0		0	0
Act Effct Green (s)	93.1	91.7	76.7		16.3	16.3
Actuated g/C Ratio	0.78	0.76	0.64		0.14	0.14

2: Montreal Road & Montford Hospital  
800 Montreal Road

Future (2024) Total Traffic  
PM Peak Hour

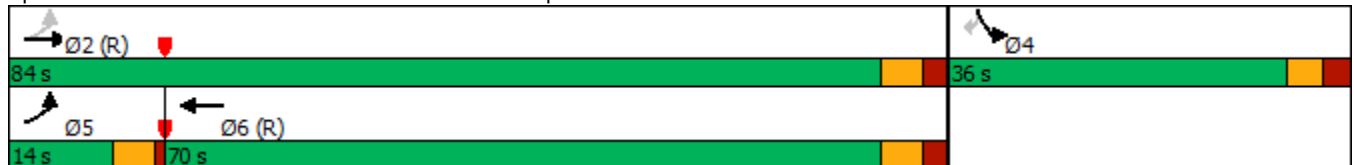


Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
v/c Ratio	0.51	0.59	0.71		0.68	0.53
Control Delay	25.1	4.5	18.2		63.1	14.9
Queue Delay	0.0	0.3	19.5		0.0	0.0
Total Delay	25.1	4.9	37.7		63.1	14.9
LOS	C	A	D		E	B
Approach Delay		6.5	37.7		37.7	
Approach LOS		A	D		D	
Queue Length 50th (m)	12.5	30.8	111.0		35.9	3.4
Queue Length 95th (m)	m17.3	m38.8	181.0		55.0	22.7
Internal Link Dist (m)		120.0	102.0		103.2	
Turn Bay Length (m)	45.0				60.0	
Base Capacity (vph)	269	2565	2121		433	478
Starvation Cap Reductn	0	447	655		0	0
Spillback Cap Reductn	0	0	17		0	0
Storage Cap Reductn	0	0	0		0	0
Reduced v/c Ratio	0.49	0.71	1.03		0.36	0.37

Intersection Summary

Area Type: Other  
 Cycle Length: 120  
 Actuated Cycle Length: 120  
 Offset: 99 (83%), Referenced to phase 2:EBTL and 6:WBT, Start of Green  
 Natural Cycle: 90  
 Control Type: Actuated-Coordinated  
 Maximum v/c Ratio: 0.71  
 Intersection Signal Delay: 23.0  
 Intersection LOS: C  
 Intersection Capacity Utilization 81.9%  
 ICU Level of Service D  
 Analysis Period (min) 15  
 m Volume for 95th percentile queue is metered by upstream signal.






















Splits and Phases: 2: Montreal Road & Montford Hospital





3: Den Haag Drive/Lang's Road & Montreal Road  
800 Montreal Road

Future (2024) Total Traffic  
PM Peak Hour

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	43	1422	198	21	1139	7	163	1	77	12	2	37
Future Volume (vph)	43	1422	198	21	1139	7	163	1	77	12	2	37
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Storage Length (m)	45.0		25.0	50.0		0.0	35.0		0.0	0.0		0.0
Storage Lanes	1		1	1		0	1		0	0		0
Taper Length (m)	2.5			2.5			2.5			2.5		
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	0.95	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor	0.99		0.90		1.00		0.99	0.98			0.98	
Frt			0.850		0.999			0.852			0.902	
Flt Protected	0.950			0.950			0.950				0.988	
Satd. Flow (prot)	1695	3357	1532	1729	3386	0	1695	1415	0	0	1591	0
Flt Permitted	0.218			0.151			0.806				0.929	
Satd. Flow (perm)	386	3357	1376	275	3386	0	1419	1415	0	0	1492	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			93		1			50			37	
Link Speed (k/h)		60			60			50			50	
Link Distance (m)		126.0			138.4			84.1			143.9	
Travel Time (s)		7.6			8.3			6.1			10.4	
Confl. Peds. (#/hr)	19		31	31		19	11		10	10		11
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Heavy Vehicles (%)	2%	3%	1%	0%	2%	0%	2%	0%	7%	0%	0%	0%
Adj. Flow (vph)	43	1422	198	21	1139	7	163	1	77	12	2	37
Shared Lane Traffic (%)												
Lane Group Flow (vph)	43	1422	198	21	1146	0	163	78	0	0	51	0
Turn Type	Perm	NA	Perm	Perm	NA		Perm	NA		Perm	NA	
Protected Phases		2			6			8			4	
Permitted Phases	2		2	6			8			4		
Detector Phase	2	2	2	6	6		8	8		4	4	
Switch Phase												
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0		5.0	5.0		5.0	5.0	
Minimum Split (s)	28.8	28.8	28.8	28.8	28.8		34.2	34.2		34.2	34.2	
Total Split (s)	86.0	86.0	86.0	86.0	86.0		38.0	38.0		34.0	34.0	
Total Split (%)	69.4%	69.4%	69.4%	69.4%	69.4%		30.6%	30.6%		27.4%	27.4%	
Maximum Green (s)	80.2	80.2	80.2	80.2	80.2		31.8	31.8		27.8	27.8	
Yellow Time (s)	3.7	3.7	3.7	3.7	3.7		3.3	3.3		3.3	3.3	
All-Red Time (s)	2.1	2.1	2.1	2.1	2.1		2.9	2.9		2.9	2.9	
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)	5.8	5.8	5.8	5.8	5.8		6.2	6.2		6.2	6.2	
Lead/Lag												
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0		3.0	3.0	
Recall Mode	C-Max	C-Max	C-Max	C-Max	C-Max		None	None		None	None	
Walk Time (s)	7.0	7.0	7.0	7.0	7.0		7.0	7.0		7.0	7.0	
Flash Dont Walk (s)	16.0	16.0	16.0	16.0	16.0		21.0	21.0		21.0	21.0	
Pedestrian Calls (#/hr)	0	0	0	0	0		0	0		0	0	
Act Effct Green (s)	90.9	90.9	90.9	90.9	90.9		21.1	21.1		21.1	21.1	
Actuated g/C Ratio	0.73	0.73	0.73	0.73	0.73		0.17	0.17		0.17	0.17	
v/c Ratio	0.15	0.58	0.19	0.10	0.46		0.68	0.28		0.18	0.18	

3: Den Haag Drive/Lang's Road & Montreal Road  
800 Montreal Road

Future (2024) Total Traffic  
PM Peak Hour

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Control Delay	8.0	9.6	3.8	7.9	8.1		61.3	20.3			18.5	
Queue Delay	0.0	3.0	0.0	0.0	0.0		0.0	0.0			0.0	
Total Delay	8.0	12.6	3.8	7.9	8.1		61.3	20.3			18.5	
LOS	A	B	A	A	A		E	C			B	
Approach Delay		11.4			8.1			48.0			18.5	
Approach LOS		B			A			D			B	
Queue Length 50th (m)	2.8	74.6	6.5	1.3	52.3		37.6	5.8			2.9	
Queue Length 95th (m)	8.9	117.5	17.3	5.3	83.1		56.2	18.0			12.9	
Internal Link Dist (m)		102.0			114.4			60.1			119.9	
Turn Bay Length (m)	45.0		25.0	50.0			35.0					
Base Capacity (vph)	283	2461	1033	201	2482		363	400			410	
Starvation Cap Reductn	0	900	0	0	0		0	0			0	
Spillback Cap Reductn	0	0	0	0	0		0	0			0	
Storage Cap Reductn	0	0	0	0	0		0	0			0	
Reduced v/c Ratio	0.15	0.91	0.19	0.10	0.46		0.45	0.20			0.12	

Intersection Summary

Area Type:	Other
Cycle Length:	124
Actuated Cycle Length:	124
Offset:	104 (84%), Referenced to phase 2:EBTL and 6:WBTL, Start of Green
Natural Cycle:	75
Control Type:	Actuated-Coordinated
Maximum v/c Ratio:	0.68
Intersection Signal Delay:	13.1
Intersection LOS:	B
Intersection Capacity Utilization:	69.7%
ICU Level of Service:	C
Analysis Period (min):	15

Splits and Phases: 3: Den Haag Drive/Lang's Road & Montreal Road



4: Den Haag Drive & Site Access  
800 Montreal Road

Future (2024) Total Traffic  
PM Peak Hour

Intersection						
Int Delay, s/veh	1.2					
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	0	25	215	0	41	180
Future Vol, veh/h	0	25	215	0	41	180
Conflicting Peds, #/hr	0	0	0	0	0	0
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	100	100	100	100	100	100
Heavy Vehicles, %	0	0	4	0	0	1
Mvmt Flow	0	25	215	0	41	180

























Major/Minor	Minor1	Major1	Major2			
Conflicting Flow All	477	215	0	0	215	0
Stage 1	215	-	-	-	-	-
Stage 2	262	-	-	-	-	-
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	551	830	-	-	1367	-
Stage 1	826	-	-	-	-	-
Stage 2	786	-	-	-	-	-
Platoon blocked, %			-	-	-	-
Mov Cap-1 Maneuver	533	830	-	-	1367	-
Mov Cap-2 Maneuver	533	-	-	-	-	-
Stage 1	826	-	-	-	-	-
Stage 2	760	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	9.5	0	1.4
HCM LOS	A		

Minor Lane/Major Mvmt	NBT	NBRWBLn1	SBL	SBT
Capacity (veh/h)	-	-	830	1367
HCM Lane V/C Ratio	-	-	0.03	0.03
HCM Control Delay (s)	-	-	9.5	7.7
HCM Lane LOS	-	-	A	A
HCM 95th %tile Q(veh)	-	-	0.1	0.1

1: Aviation Parkway & Montreal Road  
800 Montreal Road

Future (2029) Total Traffic  
AM Peak Hour

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	41	783	256	404	1071	159	229	213	333	226	259	63
Future Volume (vph)	41	783	256	404	1071	159	229	213	333	226	259	63
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Storage Length (m)	45.0		30.0	55.0		25.0	0.0		55.0	70.0		0.0
Storage Lanes	1		1	1		1	1		1	1		0
Taper Length (m)	2.5			2.5			2.5			2.5		
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor	0.99		0.96	0.99		0.94	1.00		0.98	1.00	1.00	
Frt			0.850			0.850			0.850		0.971	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1695	3232	1547	1695	3262	1547	1712	1820	1517	1695	1750	0
Flt Permitted	0.242			0.134			0.216			0.483		
Satd. Flow (perm)	428	3232	1478	238	3262	1454	388	1820	1488	858	1750	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			190			136			333			9
Link Speed (k/h)		60			60			60			60	
Link Distance (m)		150.7			144.0			388.7			332.0	
Travel Time (s)		9.0			8.6			23.3			19.9	
Confl. Peds. (#/hr)	19		26	26		19	6		5	5		6
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Heavy Vehicles (%)	2%	7%	0%	2%	6%	0%	1%	0%	2%	2%	0%	3%
Adj. Flow (vph)	41	783	256	404	1071	159	229	213	333	226	259	63
Shared Lane Traffic (%)												
Lane Group Flow (vph)	41	783	256	404	1071	159	229	213	333	226	322	0
Turn Type	pm+pt	NA	Perm	pm+pt	NA	Perm	pm+pt	NA	Perm	pm+pt	NA	
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases	2		2	6		6	8		8	4		
Detector Phase	5	2	2	1	6	6	3	8	8	7	4	
Switch Phase												
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Minimum Split (s)	10.9	33.9	33.9	10.9	39.0	39.0	10.9	32.2	32.2	10.9	32.2	
Total Split (s)	11.3	38.8	38.8	31.0	58.5	58.5	18.0	33.2	33.2	17.0	32.2	
Total Split (%)	9.4%	32.3%	32.3%	25.8%	48.8%	48.8%	15.0%	27.7%	27.7%	14.2%	26.8%	
Maximum Green (s)	5.4	32.9	32.9	25.1	52.6	52.6	12.1	27.0	27.0	11.1	26.0	
Yellow Time (s)	3.7	3.7	3.7	3.7	3.7	3.7	3.7	3.7	3.7	3.7	3.7	
All-Red Time (s)	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.5	2.5	2.2	2.5	
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Total Lost Time (s)	5.9	5.9	5.9	5.9	5.9	5.9	5.9	6.2	6.2	5.9	6.2	
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag	
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	
Recall Mode	None	C-Max	C-Max	None	C-Max	C-Max	None	None	None	None	None	
Walk Time (s)		16.0	16.0		16.0	16.0		7.0	7.0		7.0	
Flash Dont Walk (s)		12.0	12.0		12.0	12.0		19.0	19.0		19.0	
Pedestrian Calls (#/hr)		0	0		0	0		0	0		0	
Act Effct Green (s)	40.3	34.8	34.8	65.6	56.4	56.4	37.7	25.3	25.3	35.7	24.3	
Actuated g/C Ratio	0.34	0.29	0.29	0.55	0.47	0.47	0.31	0.21	0.21	0.30	0.20	
v/c Ratio	0.20	0.84	0.45	0.94	0.70	0.21	0.90	0.56	0.58	0.68	0.89	

1: Aviation Parkway & Montreal Road  
800 Montreal Road

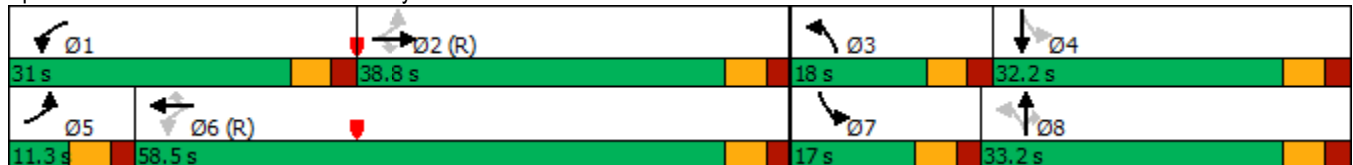
Future (2029) Total Traffic  
AM Peak Hour

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Control Delay	19.0	49.8	13.0	59.6	29.3	5.6	66.9	48.0	8.5	41.5	71.8	
Queue Delay	0.0	0.0	0.0	0.0	3.0	0.0	0.0	0.0	0.0	0.0	0.0	
Total Delay	19.0	49.8	13.0	59.6	32.2	5.6	66.9	48.0	8.5	41.5	71.8	
LOS	B	D	B	E	C	A	E	D	A	D	E	
Approach Delay		39.9			36.4			36.6			59.3	
Approach LOS		D			D			D			E	
Queue Length 50th (m)	4.5	93.1	11.8	73.9	108.8	3.0	38.9	44.3	0.0	38.4	71.2	
Queue Length 95th (m)	10.0	#126.1	35.3	#133.8	134.5	15.4	#74.7	68.6	24.0	59.2	#117.6	
Internal Link Dist (m)		126.7			120.0			364.7			308.0	
Turn Bay Length (m)	45.0		30.0	55.0		25.0			55.0	70.0		
Base Capacity (vph)	202	936	563	439	1533	755	255	409	592	332	386	
Starvation Cap Reductn	0	0	0	0	343	0	0	0	0	0	0	
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	
Reduced v/c Ratio	0.20	0.84	0.45	0.92	0.90	0.21	0.90	0.52	0.56	0.68	0.83	

Intersection Summary

Area Type: Other  
 Cycle Length: 120  
 Actuated Cycle Length: 120  
 Offset: 55 (46%), Referenced to phase 2:EBTL and 6:WBTL, Start of Green  
 Natural Cycle: 105  
 Control Type: Actuated-Coordinated  
 Maximum v/c Ratio: 0.94  
 Intersection Signal Delay: 40.5  
 Intersection LOS: D  
 Intersection Capacity Utilization 99.4%  
 ICU Level of Service F  
 Analysis Period (min) 15  
 # 95th percentile volume exceeds capacity, queue may be longer.  
 Queue shown is maximum after two cycles.

Splits and Phases: 1: Aviation Parkway & Montreal Road



1: Aviation Parkway & Montreal Road  
800 Montreal Road

Future (2029) Total Traffic - Dual WBL  
AM Peak Hour

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	41	783	256	404	1071	159	229	213	333	226	259	63
Future Volume (vph)	41	783	256	404	1071	159	229	213	333	226	259	63
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Storage Length (m)	45.0		30.0	55.0		25.0	0.0		55.0	70.0		0.0
Storage Lanes	1		1	2		1	1		1	1		0
Taper Length (m)	2.5			2.5			2.5			2.5		
Lane Util. Factor	1.00	0.95	1.00	0.97	0.95	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor	0.99		0.96	0.99		0.94	1.00		0.98	1.00	1.00	
Frt			0.850			0.850			0.850		0.971	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1695	3232	1547	3288	3262	1547	1712	1820	1517	1695	1750	0
Flt Permitted	0.165			0.203			0.217			0.535		
Satd. Flow (perm)	293	3232	1478	698	3262	1454	390	1820	1488	950	1750	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			190			136			200			9
Link Speed (k/h)		60			60			60				60
Link Distance (m)		150.7			144.0			388.7				332.0
Travel Time (s)		9.0			8.6			23.3				19.9
Confl. Peds. (#/hr)	19		26	26		19	6		5	5		6
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Heavy Vehicles (%)	2%	7%	0%	2%	6%	0%	1%	0%	2%	2%	0%	3%
Adj. Flow (vph)	41	783	256	404	1071	159	229	213	333	226	259	63
Shared Lane Traffic (%)												
Lane Group Flow (vph)	41	783	256	404	1071	159	229	213	333	226	322	0
Turn Type	pm+pt	NA	Perm	pm+pt	NA	Perm	pm+pt	NA	Perm	pm+pt	NA	
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases	2		2	6		6	8		8	4		
Detector Phase	5	2	2	1	6	6	3	8	8	7	4	
Switch Phase												
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Minimum Split (s)	10.9	33.9	33.9	10.9	39.0	39.0	10.9	32.2	32.2	10.9	32.2	
Total Split (s)	11.0	48.0	48.0	18.0	55.0	55.0	20.0	37.0	37.0	17.0	34.0	
Total Split (%)	9.2%	40.0%	40.0%	15.0%	45.8%	45.8%	16.7%	30.8%	30.8%	14.2%	28.3%	
Maximum Green (s)	5.1	42.1	42.1	12.1	49.1	49.1	14.1	30.8	30.8	11.1	27.8	
Yellow Time (s)	3.7	3.7	3.7	3.7	3.7	3.7	3.7	3.7	3.7	3.7	3.7	
All-Red Time (s)	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.5	2.5	2.2	2.5	
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Total Lost Time (s)	5.9	5.9	5.9	5.9	5.9	5.9	5.9	6.2	6.2	5.9	6.2	
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag	
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	
Recall Mode	None	C-Max	C-Max	None	C-Max	C-Max	None	None	None	None	None	None
Walk Time (s)		16.0	16.0		16.0	16.0		7.0	7.0		7.0	
Flash Dont Walk (s)		12.0	12.0		12.0	12.0		19.0	19.0		19.0	
Pedestrian Calls (#/hr)		0	0		0	0		0	0		0	
Act Effct Green (s)	51.1	45.6	45.6	63.2	54.1	54.1	41.7	27.7	27.7	36.4	25.0	
Actuated g/C Ratio	0.43	0.38	0.38	0.53	0.45	0.45	0.35	0.23	0.23	0.30	0.21	
v/c Ratio	0.22	0.64	0.38	0.65	0.73	0.22	0.80	0.51	0.67	0.63	0.87	

1: Aviation Parkway & Montreal Road  
800 Montreal Road

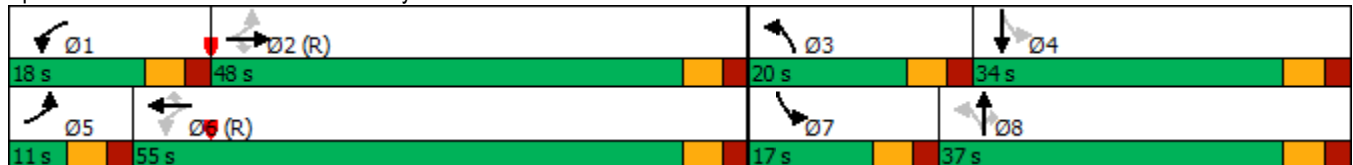
Future (2029) Total Traffic - Dual WBL  
AM Peak Hour

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Control Delay	18.7	34.3	9.8	21.3	32.1	6.2	48.3	44.1	22.9	36.9	67.2	
Queue Delay	0.0	0.0	0.0	0.0	2.8	0.0	0.0	0.0	0.0	0.0	0.0	
Total Delay	18.7	34.3	9.8	21.3	35.0	6.2	48.3	44.1	22.9	36.9	67.2	
LOS	B	C	A	C	C	A	D	D	C	D	E	
Approach Delay		27.9			28.8			36.2			54.7	
Approach LOS		C			C			D			D	
Queue Length 50th (m)	4.7	82.6	10.5	26.6	115.0	3.2	37.2	42.8	27.1	36.7	70.3	
Queue Length 95th (m)	10.7	104.6	31.0	36.8	142.2	16.3	#61.6	65.7	58.5	56.0	#111.1	
Internal Link Dist (m)		126.7			120.0			364.7			308.0	
Turn Bay Length (m)	45.0		30.0	55.0		25.0			55.0	70.0		
Base Capacity (vph)	189	1227	678	631	1469	729	292	467	530	357	412	
Starvation Cap Reductn	0	0	0	0	281	0	0	0	0	0	0	
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	
Reduced v/c Ratio	0.22	0.64	0.38	0.64	0.90	0.22	0.78	0.46	0.63	0.63	0.78	

Intersection Summary

Area Type: Other  
 Cycle Length: 120  
 Actuated Cycle Length: 120  
 Offset: 55 (46%), Referenced to phase 2:EBTL and 6:WBTL, Start of Green  
 Natural Cycle: 95  
 Control Type: Actuated-Coordinated  
 Maximum v/c Ratio: 0.87  
 Intersection Signal Delay: 33.5  
 Intersection LOS: C  
 Intersection Capacity Utilization 87.9%  
 ICU Level of Service E  
 Analysis Period (min) 15  
 # 95th percentile volume exceeds capacity, queue may be longer.  
 Queue shown is maximum after two cycles.

Splits and Phases: 1: Aviation Parkway & Montreal Road



2: Montreal Road & Montford Hospital  
800 Montreal Road

Future (2029) Total Traffic  
AM Peak Hour



Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	178	1135	1498	126	58	131
Future Volume (vph)	178	1135	1498	126	58	131
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800
Storage Length (m)	45.0			0.0	60.0	0.0
Storage Lanes	1			0	1	1
Taper Length (m)	2.5				2.5	
Lane Util. Factor	1.00	0.95	0.95	0.95	1.00	1.00
Ped Bike Factor			1.00		0.99	0.97
Frt			0.988			0.850
Flt Protected	0.950				0.950	
Satd. Flow (prot)	1616	3357	3308	0	1729	1432
Flt Permitted	0.075				0.950	
Satd. Flow (perm)	128	3357	3308	0	1703	1389
Right Turn on Red				Yes		Yes
Satd. Flow (RTOR)			12			131
Link Speed (k/h)		60	60		25	
Link Distance (m)		144.0	126.0		127.2	
Travel Time (s)		8.6	7.6		18.3	
Confl. Peds. (#/hr)	13			13	14	18
Confl. Bikes (#/hr)				3		
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Heavy Vehicles (%)	7%	3%	3%	2%	0%	8%
Adj. Flow (vph)	178	1135	1498	126	58	131
Shared Lane Traffic (%)						
Lane Group Flow (vph)	178	1135	1624	0	58	131
Turn Type	pm+pt	NA	NA		Prot	Perm
Protected Phases	5	2	6		4	
Permitted Phases	2					4
Detector Phase	5	2	6		4	4
Switch Phase						
Minimum Initial (s)	5.0	5.0	5.0		5.0	5.0
Minimum Split (s)	9.7	33.1	33.1		32.9	32.9
Total Split (s)	13.0	62.0	49.0		33.0	33.0
Total Split (%)	13.7%	65.3%	51.6%		34.7%	34.7%
Maximum Green (s)	8.3	55.9	42.9		27.1	27.1
Yellow Time (s)	3.7	3.7	3.7		3.3	3.3
All-Red Time (s)	1.0	2.4	2.4		2.6	2.6
Lost Time Adjust (s)	0.0	0.0	0.0		0.0	0.0
Total Lost Time (s)	4.7	6.1	6.1		5.9	5.9
Lead/Lag	Lead		Lag			
Lead-Lag Optimize?	Yes		Yes			
Vehicle Extension (s)	3.0	3.0	3.0		3.0	3.0
Recall Mode	None	C-Max	C-Max		None	None
Walk Time (s)		7.0	7.0		7.0	7.0
Flash Dont Walk (s)		20.0	20.0		20.0	20.0
Pedestrian Calls (#/hr)		0	0		0	0
Act Effct Green (s)	75.7	74.3	58.2		8.7	8.7
Actuated g/C Ratio	0.80	0.78	0.61		0.09	0.09



2: Montreal Road & Montford Hospital  
800 Montreal Road

Future (2029) Total Traffic  
AM Peak Hour



Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
v/c Ratio	0.64	0.43	0.80		0.37	0.53
Control Delay	25.3	4.2	19.3		46.3	15.7
Queue Delay	0.0	0.5	21.8		0.0	0.0
Total Delay	25.3	4.7	41.0		46.3	15.7
LOS	C	A	D		D	B
Approach Delay		7.5	41.0		25.1	
Approach LOS		A	D		C	
Queue Length 50th (m)	13.3	27.9	107.0		10.2	0.0
Queue Length 95th (m)	34.2	44.2	#193.1		21.3	15.8
Internal Link Dist (m)		120.0	102.0		103.2	
Turn Bay Length (m)	45.0				60.0	
Base Capacity (vph)	282	2627	2031		493	489
Starvation Cap Reductn	0	923	462		0	0
Spillback Cap Reductn	0	0	0		0	0
Storage Cap Reductn	0	0	0		0	0
Reduced v/c Ratio	0.63	0.67	1.04		0.12	0.27

Intersection Summary

Area Type: Other  
 Cycle Length: 95  
 Actuated Cycle Length: 95  
 Offset: 33 (35%), Referenced to phase 2:EBTL and 6:WBT, Start of Green  
 Natural Cycle: 100  
 Control Type: Actuated-Coordinated  
 Maximum v/c Ratio: 0.80  
 Intersection Signal Delay: 26.0  
 Intersection LOS: C  
 Intersection Capacity Utilization 84.8%  
 ICU Level of Service E  
 Analysis Period (min) 15  
 # 95th percentile volume exceeds capacity, queue may be longer.  
 Queue shown is maximum after two cycles.

Splits and Phases: 2: Montreal Road & Montford Hospital



3: Den Haag Drive/Lang's Road & Montreal Road  
800 Montreal Road

Future (2029) Total Traffic  
AM Peak Hour

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	18	962	214	25	1312	10	262	4	31	5	3	18
Future Volume (vph)	18	962	214	25	1312	10	262	4	31	5	3	18
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Storage Length (m)	45.0		25.0	50.0		0.0	35.0		0.0	0.0		0.0
Storage Lanes	1		1	1		0	1		0	0		0
Taper Length (m)	2.5			2.5			2.5			2.5		
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	0.95	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor	0.99		0.93	0.99	1.00		0.97	0.94			0.96	
Frt			0.850		0.999			0.867			0.907	
Flt Protected	0.950			0.950			0.950				0.990	
Satd. Flow (prot)	1729	3325	1488	1729	3352	0	1662	1168	0	0	1472	0
Flt Permitted	0.157			0.260			0.740				0.965	
Satd. Flow (perm)	284	3325	1382	468	3352	0	1260	1168	0	0	1419	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			149		1			31			18	
Link Speed (k/h)		60			60			50			50	
Link Distance (m)		126.0			138.4			84.1			143.9	
Travel Time (s)		7.6			8.3			6.1			10.4	
Confl. Peds. (#/hr)	31		20	20		31	22		47	47		22
Confl. Bikes (#/hr)						3						
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Heavy Vehicles (%)	0%	4%	4%	0%	3%	0%	4%	0%	30%	0%	33%	6%
Adj. Flow (vph)	18	962	214	25	1312	10	262	4	31	5	3	18
Shared Lane Traffic (%)												
Lane Group Flow (vph)	18	962	214	25	1322	0	262	35	0	0	26	0
Turn Type	Perm	NA	Perm	Perm	NA		Perm	NA		Perm	NA	
Protected Phases		2			6			8			4	
Permitted Phases	2		2	6			8			4		
Detector Phase	2	2	2	6	6		8	8		4	4	
Switch Phase												
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0		5.0	5.0		5.0	5.0	
Minimum Split (s)	28.8	28.8	28.8	28.8	28.8		34.2	34.2		34.2	34.2	
Total Split (s)	82.0	82.0	82.0	82.0	82.0		38.0	38.0		38.0	38.0	
Total Split (%)	68.3%	68.3%	68.3%	68.3%	68.3%		31.7%	31.7%		31.7%	31.7%	
Maximum Green (s)	76.2	76.2	76.2	76.2	76.2		31.8	31.8		31.8	31.8	
Yellow Time (s)	3.7	3.7	3.7	3.7	3.7		3.3	3.3		3.3	3.3	
All-Red Time (s)	2.1	2.1	2.1	2.1	2.1		2.9	2.9		2.9	2.9	
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)	5.8	5.8	5.8	5.8	5.8		6.2	6.2		6.2	6.2	
Lead/Lag												
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0		3.0	3.0	
Recall Mode	C-Max	C-Max	C-Max	C-Max	C-Max		None	None		None	None	
Walk Time (s)	7.0	7.0	7.0	7.0	7.0		7.0	7.0		7.0	7.0	
Flash Dont Walk (s)	16.0	16.0	16.0	16.0	16.0		21.0	21.0		21.0	21.0	
Pedestrian Calls (#/hr)	0	0	0	0	0		0	0		0	0	
Act Effct Green (s)	79.7	79.7	79.7	79.7	79.7		28.3	28.3		28.3	28.3	
Actuated g/C Ratio	0.66	0.66	0.66	0.66	0.66		0.24	0.24		0.24	0.24	

3: Den Haag Drive/Lang's Road & Montreal Road  
800 Montreal Road

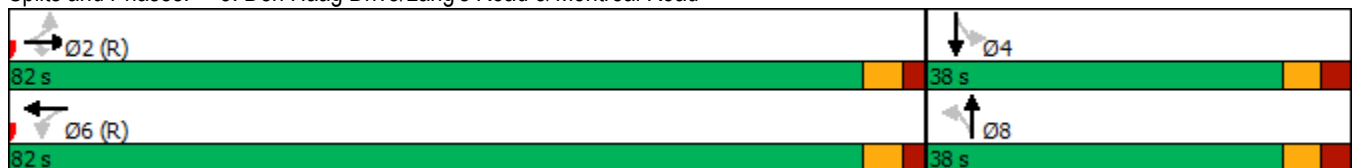
Future (2029) Total Traffic  
AM Peak Hour

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
v/c Ratio	0.10	0.44	0.22	0.08	0.59		0.88	0.12			0.07	
Control Delay	10.0	10.8	3.5	9.1	13.1		73.4	13.9			18.2	
Queue Delay	0.0	1.1	0.0	0.0	0.0		0.0	0.0			0.0	
Total Delay	10.0	11.8	3.5	9.1	13.1		73.4	13.9			18.2	
LOS	A	B	A	A	B		E	B			B	
Approach Delay		10.3			13.1			66.4			18.2	
Approach LOS		B			B			E			B	
Queue Length 50th (m)	1.5	55.5	5.3	2.1	89.4		58.0	0.7			1.4	
Queue Length 95th (m)	4.8	70.6	14.7	5.8	112.0		#98.0	8.7			8.4	
Internal Link Dist (m)		102.0			114.4			60.1			119.9	
Turn Bay Length (m)	45.0		25.0	50.0			35.0					
Base Capacity (vph)	188	2207	967	310	2226		333	332			389	
Starvation Cap Reductn	0	927	0	0	0		0	0			0	
Spillback Cap Reductn	0	0	0	0	0		0	0			0	
Storage Cap Reductn	0	0	0	0	0		0	0			0	
Reduced v/c Ratio	0.10	0.75	0.22	0.08	0.59		0.79	0.11			0.07	

Intersection Summary

Area Type: Other  
 Cycle Length: 120  
 Actuated Cycle Length: 120  
 Offset: 27 (23%), Referenced to phase 2:EBTL and 6:WBTL, Start of Green  
 Natural Cycle: 70  
 Control Type: Actuated-Coordinated  
 Maximum v/c Ratio: 0.88  
 Intersection Signal Delay: 17.5  
 Intersection Capacity Utilization 71.7%  
 Analysis Period (min) 15  
 Intersection LOS: B  
 ICU Level of Service C  
 # 95th percentile volume exceeds capacity, queue may be longer.  
 Queue shown is maximum after two cycles.

Splits and Phases: 3: Den Haag Drive/Lang's Road & Montreal Road



4: Den Haag Drive & Site Access  
800 Montreal Road

Future (2029) Total Traffic  
AM Peak Hour

Intersection						
Int Delay, s/veh	1					
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	0	45	252	0	15	227
Future Vol, veh/h	0	45	252	0	15	227
Conflicting Peds, #/hr	0	0	0	0	0	0
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	100	100	100	100	100	100
Heavy Vehicles, %	0	0	7	0	0	4
Mvmt Flow	0	45	252	0	15	227

























Major/Minor	Minor1	Major1	Major2			
Conflicting Flow All	509	252	0	0	252	0
Stage 1	252	-	-	-	-	-
Stage 2	257	-	-	-	-	-
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	528	792	-	-	1325	-
Stage 1	795	-	-	-	-	-
Stage 2	791	-	-	-	-	-
Platoon blocked, %			-	-	-	-
Mov Cap-1 Maneuver	521	792	-	-	1325	-
Mov Cap-2 Maneuver	521	-	-	-	-	-
Stage 1	795	-	-	-	-	-
Stage 2	781	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	9.8	0	0.5
HCM LOS	A		

Minor Lane/Major Mvmt	NBT	NBRWBLn1	SBL	SBT
Capacity (veh/h)	-	-	792	1325
HCM Lane V/C Ratio	-	-	0.057	0.011
HCM Control Delay (s)	-	-	9.8	7.7
HCM Lane LOS	-	-	A	A
HCM 95th %tile Q(veh)	-	-	0.2	0

1: Aviation Parkway & Montreal Road  
800 Montreal Road

Future (2029) Total Traffic  
PM Peak Hour

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	49	1111	283	340	946	230	284	324	335	130	298	58
Future Volume (vph)	49	1111	283	340	946	230	284	324	335	130	298	58
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Storage Length (m)	45.0		30.0	55.0		25.0	0.0		55.0	70.0		0.0
Storage Lanes	1		1	1		1	1		1	1		0
Taper Length (m)	2.5			2.5			2.5			2.5		
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor	0.99		0.96			0.92	1.00		0.99	1.00	1.00	
Frt			0.850			0.850			0.850		0.976	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1695	3325	1532	1695	3325	1517	1729	1820	1532	1679	1770	0
Flt Permitted	0.257			0.090			0.145			0.439		
Satd. Flow (perm)	452	3325	1471	161	3325	1394	263	1820	1509	774	1770	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			244			190			278			7
Link Speed (k/h)		60			60			60			60	
Link Distance (m)		150.7			144.0			388.7			332.0	
Travel Time (s)		9.0			8.6			23.3			19.9	
Confl. Peds. (#/hr)	29		22	22		29	7		2	2		7
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Heavy Vehicles (%)	2%	4%	1%	2%	4%	2%	0%	0%	1%	3%	0%	0%
Adj. Flow (vph)	49	1111	283	340	946	230	284	324	335	130	298	58
Shared Lane Traffic (%)												
Lane Group Flow (vph)	49	1111	283	340	946	230	284	324	335	130	356	0
Turn Type	pm+pt	NA	Perm	pm+pt	NA	Perm	pm+pt	NA	Perm	pm+pt	NA	
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases	2		2	6		6	8		8	4		
Detector Phase	5	2	2	1	6	6	3	8	8	7	4	
Switch Phase												
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Minimum Split (s)	10.9	33.9	33.9	10.9	39.0	39.0	10.9	32.2	32.2	10.9	32.2	
Total Split (s)	11.6	44.4	44.4	24.0	56.8	56.8	19.4	39.5	39.5	12.1	32.2	
Total Split (%)	9.7%	37.0%	37.0%	20.0%	47.3%	47.3%	16.2%	32.9%	32.9%	10.1%	26.8%	
Maximum Green (s)	5.7	38.5	38.5	18.1	50.9	50.9	13.5	33.3	33.3	6.2	26.0	
Yellow Time (s)	3.7	3.7	3.7	3.7	3.7	3.7	3.7	3.7	3.7	3.7	3.7	
All-Red Time (s)	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.5	2.5	2.2	2.5	
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Total Lost Time (s)	5.9	5.9	5.9	5.9	5.9	5.9	5.9	6.2	6.2	5.9	6.2	
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag	
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	
Recall Mode	None	C-Max	C-Max	None	C-Max	C-Max	None	None	None	None	None	
Walk Time (s)		16.0	16.0		16.0	16.0		7.0	7.0		7.0	
Flash Dont Walk (s)		12.0	12.0		12.0	12.0		19.0	19.0		19.0	
Pedestrian Calls (#/hr)		0	0		0	0		0	0		0	
Act Effct Green (s)	44.2	38.5	38.5	63.1	53.8	53.8	45.1	32.7	32.7	31.9	25.4	
Actuated g/C Ratio	0.37	0.32	0.32	0.53	0.45	0.45	0.38	0.27	0.27	0.27	0.21	
v/c Ratio	0.22	1.04	0.44	1.05	0.63	0.32	1.08	0.65	0.55	0.52	0.94	

1: Aviation Parkway & Montreal Road  
800 Montreal Road

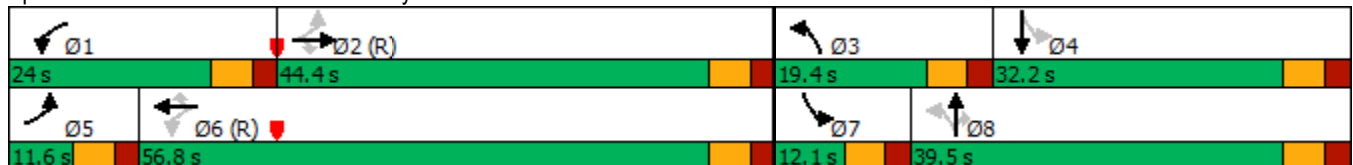
Future (2029) Total Traffic  
PM Peak Hour

	↖	→	↘	↙	←	↖	↙	↑	↘	↘	↓	↙
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Control Delay	18.3	79.2	8.4	105.0	19.6	3.9	107.6	45.7	11.0	36.2	79.1	
Queue Delay	0.0	0.0	0.0	0.0	0.5	0.0	0.0	0.0	0.0	0.0	0.0	
Total Delay	18.3	79.2	8.4	105.0	20.1	3.9	107.6	45.7	11.0	36.2	79.1	
LOS	B	E	A	F	C	A	F	D	B	D	E	
Approach Delay	63.2			36.7			52.0			67.6		
Approach LOS	E			D			D			E		
Queue Length 50th (m)	5.5	~148.9	6.4	~71.1	62.7	1.8	~56.5	67.2	10.1	20.3	81.1	
Queue Length 95th (m)	11.7	#190.0	28.0	#135.4	57.4	14.6	#110.3	97.9	36.8	34.7	#135.8	
Internal Link Dist (m)	126.7			120.0			364.7			308.0		
Turn Bay Length (m)	45.0		30.0	55.0		25.0			55.0	70.0		
Base Capacity (vph)	225	1066	637	323	1491	729	264	505	619	252	388	
Starvation Cap Reductn	0	0	0	0	191	0	0	0	0	0	0	
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	
Reduced v/c Ratio	0.22	1.04	0.44	1.05	0.73	0.32	1.08	0.64	0.54	0.52	0.92	

Intersection Summary

Area Type: Other  
 Cycle Length: 120  
 Actuated Cycle Length: 120  
 Offset: 106 (88%), Referenced to phase 2:EBTL and 6:WBTL, Start of Green  
 Natural Cycle: 125  
 Control Type: Actuated-Coordinated  
 Maximum v/c Ratio: 1.08  
 Intersection Signal Delay: 52.1  
 Intersection LOS: D  
 Intersection Capacity Utilization 109.5%  
 ICU Level of Service H  
 Analysis Period (min) 15  
 ~ Volume exceeds capacity, queue is theoretically infinite.  
 Queue shown is maximum after two cycles.  
 # 95th percentile volume exceeds capacity, queue may be longer.  
 Queue shown is maximum after two cycles.

Splits and Phases: 1: Aviation Parkway & Montreal Road



1: Aviation Parkway & Montreal Road  
800 Montreal Road

Future (2029) Total Traffic - Dual WBL  
PM Peak Hour

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	49	1111	283	340	946	230	284	324	335	130	298	58
Future Volume (vph)	49	1111	283	340	946	230	284	324	335	130	298	58
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Storage Length (m)	45.0		30.0	55.0		25.0	0.0		55.0	70.0		0.0
Storage Lanes	1		1	2		1	1		1	1		0
Taper Length (m)	2.5			2.5			2.5			2.5		
Lane Util. Factor	1.00	0.95	1.00	0.97	0.95	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor	0.99		0.96	0.99		0.92	1.00		0.99	1.00	1.00	
Frt			0.850			0.850			0.850		0.976	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1695	3325	1532	3288	3325	1517	1729	1820	1532	1679	1770	0
Flt Permitted	0.219			0.950			0.145			0.471		
Satd. Flow (perm)	386	3325	1471	3269	3325	1394	263	1820	1509	831	1770	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			244			190			196			7
Link Speed (k/h)		60			60			60				60
Link Distance (m)		150.7			144.0			388.7				332.0
Travel Time (s)		9.0			8.6			23.3				19.9
Confl. Peds. (#/hr)	29		22	22		29	7		2	2		7
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Heavy Vehicles (%)	2%	4%	1%	2%	4%	2%	0%	0%	1%	3%	0%	0%
Adj. Flow (vph)	49	1111	283	340	946	230	284	324	335	130	298	58
Shared Lane Traffic (%)												
Lane Group Flow (vph)	49	1111	283	340	946	230	284	324	335	130	356	0
Turn Type	pm+pt	NA	Perm	Prot	NA	Perm	pm+pt	NA	Perm	pm+pt	NA	
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases	2		2			6	8		8	4		
Detector Phase	5	2	2	1	6	6	3	8	8	7	4	
Switch Phase												
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Minimum Split (s)	10.9	33.9	33.9	10.9	39.0	39.0	10.9	32.2	32.2	10.9	32.2	
Total Split (s)	11.6	47.8	47.8	19.0	55.2	55.2	21.0	40.7	40.7	12.5	32.2	
Total Split (%)	9.7%	39.8%	39.8%	15.8%	46.0%	46.0%	17.5%	33.9%	33.9%	10.4%	26.8%	
Maximum Green (s)	5.7	41.9	41.9	13.1	49.3	49.3	15.1	34.5	34.5	6.6	26.0	
Yellow Time (s)	3.7	3.7	3.7	3.7	3.7	3.7	3.7	3.7	3.7	3.7	3.7	
All-Red Time (s)	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.5	2.5	2.2	2.5	
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Total Lost Time (s)	5.9	5.9	5.9	5.9	5.9	5.9	5.9	6.2	6.2	5.9	6.2	
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag	
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	
Recall Mode	None	C-Max	C-Max	None	C-Max	C-Max	None	None	None	None	None	
Walk Time (s)		16.0	16.0		16.0	16.0		7.0	7.0		7.0	
Flash Dont Walk (s)		12.0	12.0		12.0	12.0		19.0	19.0		19.0	
Pedestrian Calls (#/hr)		0	0		0	0		0	0		0	
Act Effct Green (s)	47.7	42.1	42.1	13.5	52.2	52.2	46.7	33.9	33.9	32.3	25.4	
Actuated g/C Ratio	0.40	0.35	0.35	0.11	0.44	0.44	0.39	0.28	0.28	0.27	0.21	
v/c Ratio	0.23	0.95	0.42	0.92	0.65	0.32	0.99	0.63	0.59	0.48	0.94	

1: Aviation Parkway & Montreal Road  
800 Montreal Road

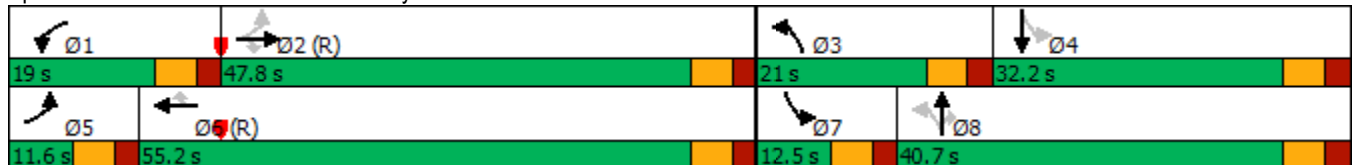
Future (2029) Total Traffic - Dual WBL  
PM Peak Hour

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Control Delay	18.6	55.9	7.6	92.4	20.1	3.3	82.3	43.8	19.4	33.5	79.1	
Queue Delay	0.0	0.0	0.0	0.0	0.5	0.0	0.0	0.0	0.0	0.0	0.0	
Total Delay	18.6	55.9	7.6	92.4	20.6	3.3	82.3	43.8	19.4	33.5	79.1	
LOS	B	E	A	F	C	A	F	D	B	C	E	
Approach Delay		45.1			34.1			46.7			66.9	
Approach LOS		D			C			D			E	
Queue Length 50th (m)	5.7	133.6	6.1	38.1	83.3	1.5	49.5	66.2	26.8	19.9	81.1	
Queue Length 95th (m)	12.0	#177.8	26.6	#71.8	60.2	11.3	#104.5	96.5	57.3	33.8	#135.8	
Internal Link Dist (m)		126.7			120.0			364.7			308.0	
Turn Bay Length (m)	45.0		30.0	55.0		25.0			55.0	70.0		
Base Capacity (vph)	215	1165	674	370	1447	713	287	523	573	270	388	
Starvation Cap Reductn	0	0	0	0	175	0	0	0	0	0	0	
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	
Reduced v/c Ratio	0.23	0.95	0.42	0.92	0.74	0.32	0.99	0.62	0.58	0.48	0.92	

Intersection Summary

Area Type: Other  
 Cycle Length: 120  
 Actuated Cycle Length: 120  
 Offset: 106 (88%), Referenced to phase 2:EBTL and 6:WBT, Start of Green  
 Natural Cycle: 115  
 Control Type: Actuated-Coordinated  
 Maximum v/c Ratio: 0.99  
 Intersection Signal Delay: 44.1  
 Intersection LOS: D  
 Intersection Capacity Utilization 99.8%  
 ICU Level of Service F  
 Analysis Period (min) 15  
 # 95th percentile volume exceeds capacity, queue may be longer.  
 Queue shown is maximum after two cycles.

Splits and Phases: 1: Aviation Parkway & Montreal Road





2: Montreal Road & Montford Hospital  
800 Montreal Road

Future (2029) Total Traffic  
PM Peak Hour



Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	131	1435	1316	83	158	176
Future Volume (vph)	131	1435	1316	83	158	176
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800
Storage Length (m)	45.0			0.0	60.0	0.0
Storage Lanes	1			0	1	1
Taper Length (m)	2.5				2.5	
Lane Util. Factor	1.00	0.95	0.95	0.95	1.00	1.00
Ped Bike Factor			0.99		0.99	0.96
Frt			0.991			0.850
Flt Protected	0.950				0.950	
Satd. Flow (prot)	1601	3357	3312	0	1729	1488
Flt Permitted	0.128				0.950	
Satd. Flow (perm)	216	3357	3312	0	1704	1429
Right Turn on Red				Yes		Yes
Satd. Flow (RTOR)			8			167
Link Speed (k/h)		60	60		25	
Link Distance (m)		144.0	126.0		127.2	
Travel Time (s)		8.6	7.6		18.3	
Confl. Peds. (#/hr)	31			31	11	21
Confl. Bikes (#/hr)				1		
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Heavy Vehicles (%)	8%	3%	3%	2%	0%	4%
Adj. Flow (vph)	131	1435	1316	83	158	176
Shared Lane Traffic (%)						
Lane Group Flow (vph)	131	1435	1399	0	158	176
Turn Type	pm+pt	NA	NA		Prot	Perm
Protected Phases	5	2	6		4	
Permitted Phases	2					4
Detector Phase	5	2	6		4	4
Switch Phase						
Minimum Initial (s)	5.0	5.0	5.0		5.0	5.0
Minimum Split (s)	9.7	33.1	33.1		32.9	32.9
Total Split (s)	14.0	84.0	70.0		36.0	36.0
Total Split (%)	11.7%	70.0%	58.3%		30.0%	30.0%
Maximum Green (s)	9.3	77.9	63.9		30.1	30.1
Yellow Time (s)	3.7	3.7	3.7		3.3	3.3
All-Red Time (s)	1.0	2.4	2.4		2.6	2.6
Lost Time Adjust (s)	0.0	0.0	0.0		0.0	0.0
Total Lost Time (s)	4.7	6.1	6.1		5.9	5.9
Lead/Lag	Lead		Lag			
Lead-Lag Optimize?	Yes		Yes			
Vehicle Extension (s)	3.0	3.0	3.0		3.0	3.0
Recall Mode	None	C-Max	C-Max		None	None
Walk Time (s)		7.0	7.0		7.0	7.0
Flash Dont Walk (s)		20.0	20.0		20.0	20.0
Pedestrian Calls (#/hr)		0	0		0	0
Act Effct Green (s)	93.1	91.7	78.0		16.3	16.3
Actuated g/C Ratio	0.78	0.76	0.65		0.14	0.14

2: Montreal Road & Montford Hospital  
800 Montreal Road

Future (2029) Total Traffic  
PM Peak Hour

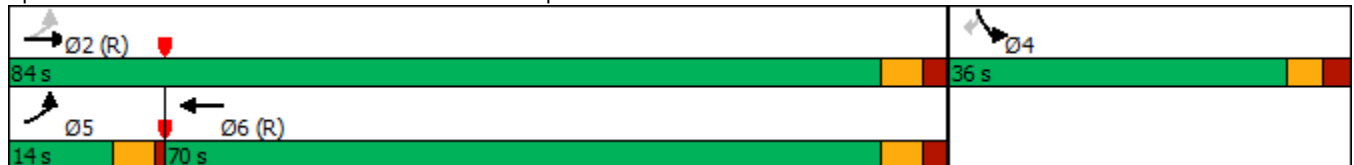


Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
v/c Ratio	0.48	0.56	0.65		0.68	0.52
Control Delay	20.0	3.6	15.7		63.1	13.5
Queue Delay	0.0	0.3	7.6		0.0	0.0
Total Delay	20.0	3.9	23.3		63.1	13.5
LOS	B	A	C		E	B
Approach Delay		5.3	23.3		37.0	
Approach LOS		A	C		D	
Queue Length 50th (m)	7.7	21.4	93.4		35.9	1.9
Queue Length 95th (m)	m13.5	m34.8	153.2		55.0	21.0
Internal Link Dist (m)		120.0	102.0		103.2	
Turn Bay Length (m)	45.0				60.0	
Base Capacity (vph)	286	2565	2156		433	483
Starvation Cap Reductn	0	482	718		0	0
Spillback Cap Reductn	0	0	0		0	0
Storage Cap Reductn	0	0	0		0	0
Reduced v/c Ratio	0.46	0.69	0.97		0.36	0.36

Intersection Summary





















Area Type: Other  
 Cycle Length: 120  
 Actuated Cycle Length: 120  
 Offset: 99 (83%), Referenced to phase 2:EBTL and 6:WBT, Start of Green  
 Natural Cycle: 90  
 Control Type: Actuated-Coordinated  
 Maximum v/c Ratio: 0.68  
 Intersection Signal Delay: 16.1  
 Intersection LOS: B  
 Intersection Capacity Utilization 78.8%  
 ICU Level of Service D  
 Analysis Period (min) 15  
 m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 2: Montreal Road & Montford Hospital



3: Den Haag Drive/Lang's Road & Montreal Road  
800 Montreal Road

Future (2029) Total Traffic  
PM Peak Hour

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	43	1353	198	21	1034	7	163	1	77	12	2	37
Future Volume (vph)	43	1353	198	21	1034	7	163	1	77	12	2	37
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Storage Length (m)	45.0		25.0	50.0		0.0	35.0		0.0	0.0		0.0
Storage Lanes	1		1	1		0	1		0	0		0
Taper Length (m)	2.5			2.5			2.5			2.5		
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	0.95	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor	0.99		0.90	0.99	1.00		0.99	0.98			0.98	
Frt			0.850		0.999			0.852			0.902	
Flt Protected	0.950			0.950			0.950				0.988	
Satd. Flow (prot)	1695	3357	1532	1729	3386	0	1695	1415	0	0	1591	0
Flt Permitted	0.249			0.166			0.806				0.929	
Satd. Flow (perm)	440	3357	1376	300	3386	0	1419	1415	0	0	1492	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			98		1			58			37	
Link Speed (k/h)		60			60			50			50	
Link Distance (m)		126.0			138.4			84.1			143.9	
Travel Time (s)		7.6			8.3			6.1			10.4	
Confl. Peds. (#/hr)	19		31	31		19	11		10	10		11
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Heavy Vehicles (%)	2%	3%	1%	0%	2%	0%	2%	0%	7%	0%	0%	0%
Adj. Flow (vph)	43	1353	198	21	1034	7	163	1	77	12	2	37
Shared Lane Traffic (%)												
Lane Group Flow (vph)	43	1353	198	21	1041	0	163	78	0	0	51	0
Turn Type	Perm	NA	Perm	Perm	NA		Perm	NA		Perm	NA	
Protected Phases		2			6			8			4	
Permitted Phases	2		2	6			8			4		
Detector Phase	2	2	2	6	6		8	8		4	4	
Switch Phase												
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0		5.0	5.0		5.0	5.0	
Minimum Split (s)	28.8	28.8	28.8	28.8	28.8		34.2	34.2		34.2	34.2	
Total Split (s)	86.0	86.0	86.0	86.0	86.0		38.0	38.0		34.0	34.0	
Total Split (%)	69.4%	69.4%	69.4%	69.4%	69.4%		30.6%	30.6%		27.4%	27.4%	
Maximum Green (s)	80.2	80.2	80.2	80.2	80.2		31.8	31.8		27.8	27.8	
Yellow Time (s)	3.7	3.7	3.7	3.7	3.7		3.3	3.3		3.3	3.3	
All-Red Time (s)	2.1	2.1	2.1	2.1	2.1		2.9	2.9		2.9	2.9	
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)	5.8	5.8	5.8	5.8	5.8		6.2	6.2		6.2	6.2	
Lead/Lag												
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0		3.0	3.0	
Recall Mode	C-Max	C-Max	C-Max	C-Max	C-Max		None	None		None	None	
Walk Time (s)	7.0	7.0	7.0	7.0	7.0		7.0	7.0		7.0	7.0	
Flash Dont Walk (s)	16.0	16.0	16.0	16.0	16.0		21.0	21.0		21.0	21.0	
Pedestrian Calls (#/hr)	0	0	0	0	0		0	0		0	0	
Act Effct Green (s)	90.9	90.9	90.9	90.9	90.9		21.1	21.1		21.1	21.1	
Actuated g/C Ratio	0.73	0.73	0.73	0.73	0.73		0.17	0.17		0.17	0.17	
v/c Ratio	0.13	0.55	0.19	0.10	0.42		0.68	0.27		0.18	0.18	

3: Den Haag Drive/Lang's Road & Montreal Road  
800 Montreal Road

Future (2029) Total Traffic  
PM Peak Hour



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Control Delay	7.5	9.2	3.6	7.6	7.6		61.3	17.2				18.5
Queue Delay	0.0	2.3	0.0	0.0	0.0		0.0	0.0				0.0
Total Delay	7.5	11.6	3.6	7.6	7.6		61.3	17.2				18.5
LOS	A	B	A	A	A		E	B				B
Approach Delay		10.5			7.6			47.0				18.5
Approach LOS		B			A			D				B
Queue Length 50th (m)	2.7	68.6	6.2	1.3	45.3		37.6	4.2				2.9
Queue Length 95th (m)	8.6	108.2	16.8	5.2	72.5		56.2	16.3				12.9
Internal Link Dist (m)		102.0			114.4			60.1				119.9
Turn Bay Length (m)	45.0		25.0	50.0			35.0					
Base Capacity (vph)	322	2461	1034	219	2482		363	406				410
Starvation Cap Reductn	0	934	0	0	0		0	0				0
Spillback Cap Reductn	0	0	0	0	0		0	0				0
Storage Cap Reductn	0	0	0	0	0		0	0				0
Reduced v/c Ratio	0.13	0.89	0.19	0.10	0.42		0.45	0.19				0.12

Intersection Summary

Area Type:	Other
Cycle Length:	124
Actuated Cycle Length:	124
Offset:	104 (84%), Referenced to phase 2:EBTL and 6:WBTL, Start of Green
Natural Cycle:	70
Control Type:	Actuated-Coordinated
Maximum v/c Ratio:	0.68
Intersection Signal Delay:	12.6
Intersection LOS:	B
Intersection Capacity Utilization	67.7%
ICU Level of Service	C
Analysis Period (min)	15

Splits and Phases: 3: Den Haag Drive/Lang's Road & Montreal Road



4: Den Haag Drive & Site Access  
800 Montreal Road

Future (2029) Total Traffic  
PM Peak Hour

Intersection						
Int Delay, s/veh	1.2					
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	0	25	215	0	41	180
Future Vol, veh/h	0	25	215	0	41	180
Conflicting Peds, #/hr	0	0	0	0	0	0
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	100	100	100	100	100	100
Heavy Vehicles, %	0	0	4	0	0	1
Mvmt Flow	0	25	215	0	41	180

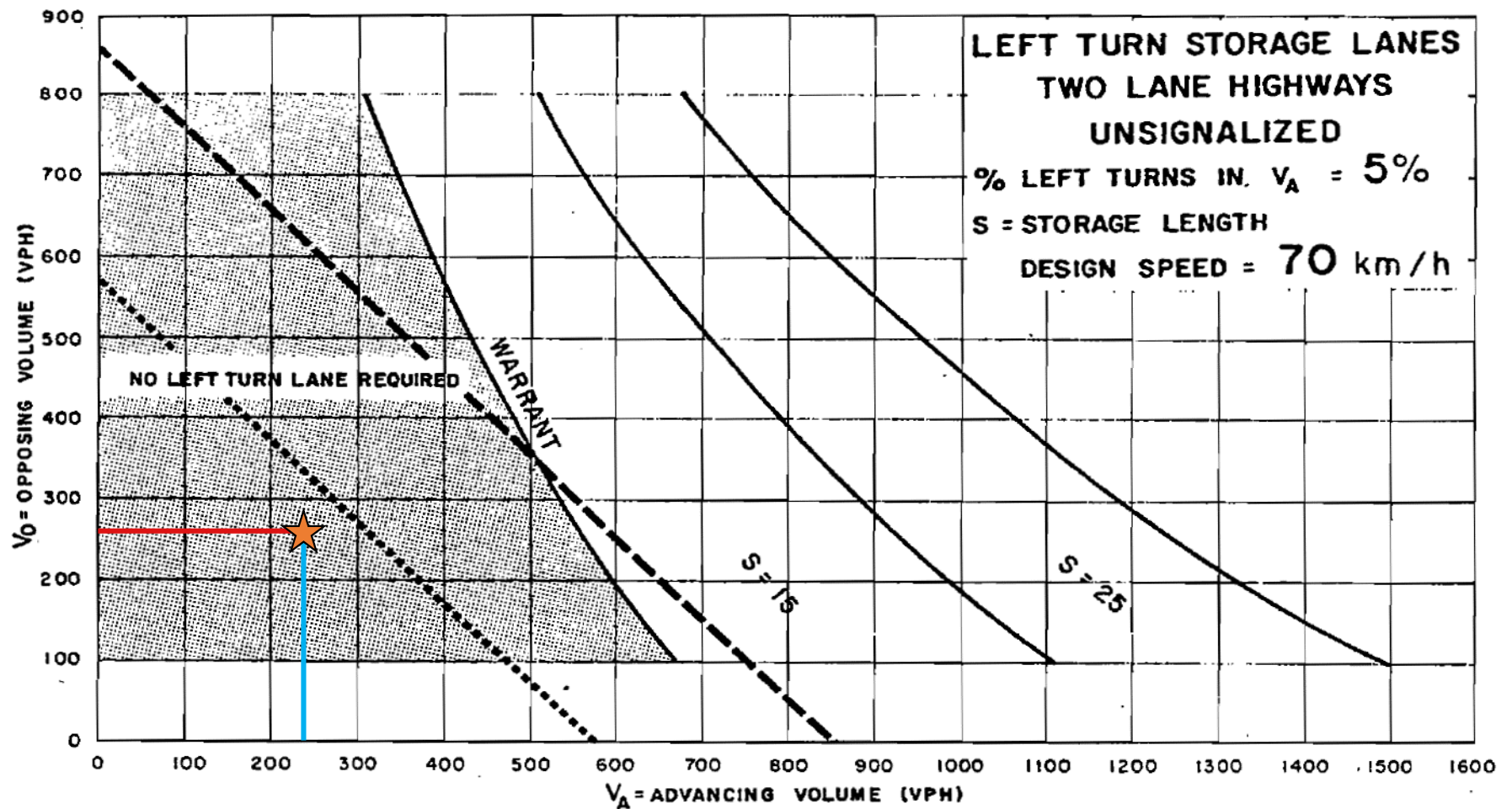
Major/Minor	Minor1	Major1	Major2			
Conflicting Flow All	477	215	0	0	215	0
Stage 1	215	-	-	-	-	-
Stage 2	262	-	-	-	-	-
Critical Hdwy	6.4	6.2	-	-	4.1	-
Critical Hdwy Stg 1	5.4	-	-	-	-	-
Critical Hdwy Stg 2	5.4	-	-	-	-	-
Follow-up Hdwy	3.5	3.3	-	-	2.2	-
Pot Cap-1 Maneuver	551	830	-	-	1367	-
Stage 1	826	-	-	-	-	-
Stage 2	786	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	533	830	-	-	1367	-
Mov Cap-2 Maneuver	533	-	-	-	-	-
Stage 1	826	-	-	-	-	-
Stage 2	760	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	9.5	0	1.4
HCM LOS	A		

Minor Lane/Major Mvmt	NBT	NBRWBLn1	SBL	SBT
Capacity (veh/h)	-	-	830	1367
HCM Lane V/C Ratio	-	-	0.03	0.03
HCM Control Delay (s)	-	-	9.5	7.7
HCM Lane LOS	-	-	A	A
HCM 95th %tile Q(veh)	-	-	0.1	0.1

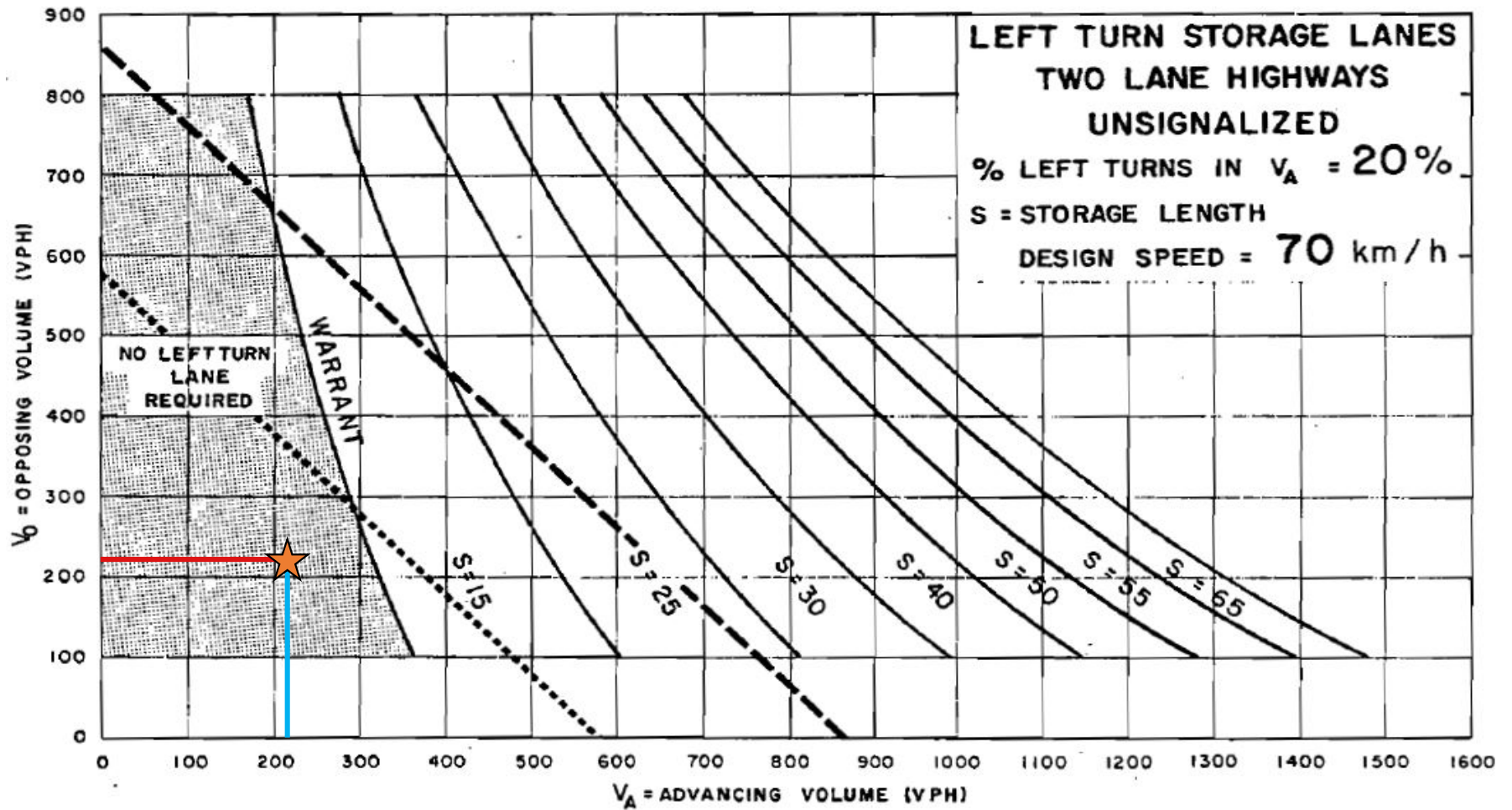
## Appendix L – Left-Turn Lane Warrants

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- TRAFFIC SIGNALS MAY BE WARRANTED IN RURAL AREAS OR URBAN AREAS WITH RESTRICTED FLOW
 
 Opposing Volume
- TRAFFIC SIGNALS MAY BE WARRANTED IN "FREE FLOW" URBAN AREAS
 
 Advancing Volume

Den Haag Drive & Site Access - Southbound Left-Turn - AM Peak Hour



- TRAFFIC SIGNALS MAY BE WARRANTED IN RURAL AREAS OR URBAN AREAS WITH RESTRICTED FLOW
 
 Opposing Volume
- TRAFFIC SIGNALS MAY BE WARRANTED IN "FREE FLOW" URBAN AREAS
 
 Advancing Volume

Den Haag Drive & Site Access - Southbould Left-Turn - PM Peak Hour