



## **Hazeldean Crossing Inc.**

### **TIA Forecasting & Strategy Report**

**Type of Document**  
Final Report

**Project Name**  
5924 Hazeldean Road

**Project Number**  
OTT-00250806-B0

**Prepared By:**  
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**Date Submitted**  
November 2019

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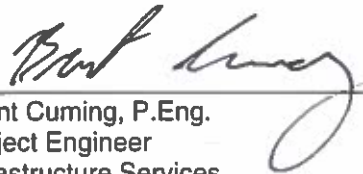
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## Legal Notification

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## 1 Screening Form

EXP completed a TIA screening form for the proposed development and submitted on March 29, 2019. A copy of the completed screening form is attached to this report as Appendix A.

The proposed development only satisfies the Safety Trigger due to the proximity of the proposed access to the existing signalized intersection of Hazeldean Road and Victor Street. Neither the Trip Generation Trigger (proposed development is less than 90 units) nor the Location Trigger (proposed development is not in a priority area nor proposes access to a priority street) are satisfied. Considering this, it is proposed that the scope of the TIA be limited to the design review component (Modules 4.1-4.4) and that the network analysis components (Modules 3.1-3.3 and 4.5-4.9) be omitted.

## 2 Description of Proposed Development

Hazeldean Crossing Inc. is proposing a residential development consisting of 86 residential units (76 stacked townhouses and 10 traditional townhouses) located on the southwest corner of Hazeldean Road and Victor Street. A site plan is shown in Figure 1 and provided full-size as Appendix B.

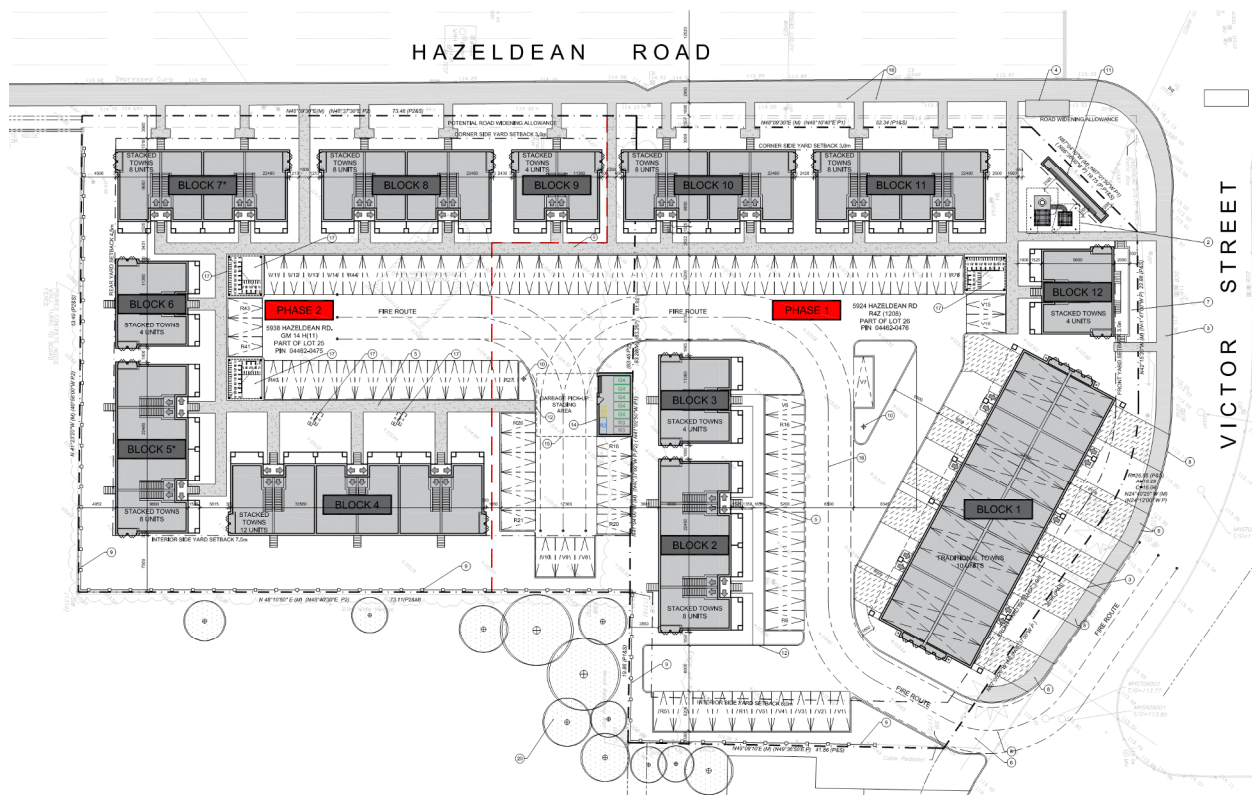


Figure 1 – Site Plan

The proposed residential development allocates 92 parking spaces (76 residential and 16 visitor spaces) for the stacked townhouses and an additional 35 parking spaces (18 residential, 17 visitor) for the traditional townhouses.

The proposed residential development is located in a General Urban Area (section 3.6.1) of the Official Plan and spans two properties which are zoned as follows:

- **5924 Hazeldean Road** is currently a vacant property on the southwest corner of Hazeldean Road and Victor Street. It is zoned R4Z – Residential Fourth Density Zone (Subzone Z).
- **5938 Hazeldean Road** is currently vacant and previously housed an equipment rental shop. An existing 1-storey building is located on the property. It is zoned GM14 – General Mixed-Use Zone (Subzone 14)

Both R4Z – Residential Fourth Density Zone (Subzone Z) and GM14 – General Mixed-Use Zone (Subzone 14) permit stacked dwellings and townhouse dwellings as detailed in Part 5, Section 138 of the Zoning By-Law. Additional applicable planning regulations are noted as By-Laws 2010-307, 2012-334 and 2018-206.

A total of 86 residential units (76 stacked townhouses and 10 traditional townhouses) are proposed and will be phased as follows:

- Phase 1 – 32 stacked townhouses and 10 traditional townhouses to be occupied in 2020; and
- Phase 2 – 44 stacked townhouses to be occupied in 2021.

The proposed development is arranged with most of the residential buildings around the perimeter of the property and parking in the center. Direct pedestrian access to the existing sidewalk on Hazeldean Road and a proposed new sidewalk on Victor Street to the dwellings fronting the boundary streets are proposed. Pedestrian connections to the center common area, with connections to each dwelling and the parking lot, are proposed at the east side of the property to the corner of Hazeldean Road & Victor Street and near the west side of the property to Hazeldean Road.

Access to the central parking area of the development is provided via a driveway on Victor Street located approximately 110m south of the signalized intersection of Hazeldean Road & Victor Street. There are no access restrictions proposed for this entrance. There are five townhouses with driveway access off of Victor Street with the northernmost driveway located approximately 45m south of the signalized intersection. There are no access restrictions proposed for these five driveways.

### 3 Existing Conditions

The following boundary roads are adjacent to the proposed development:

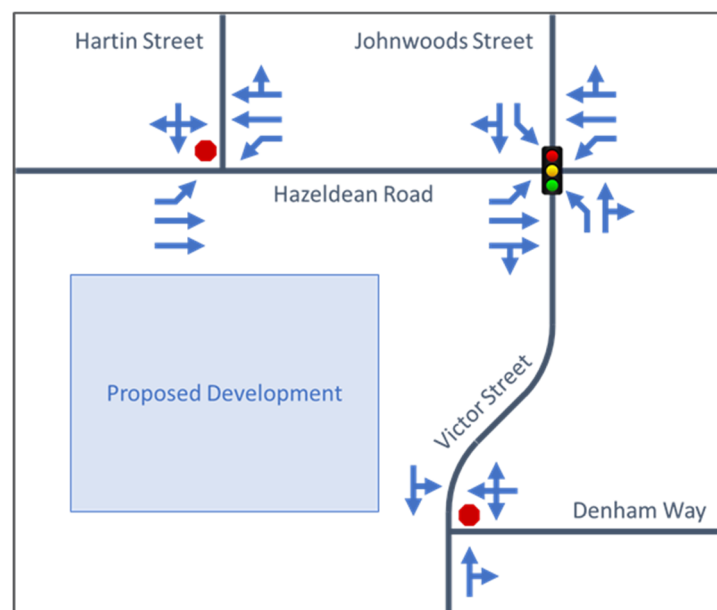
- **Hazeldean Road** is an arterial road (TMP Map 6, 2016 Revision) under the jurisdiction of the City of Ottawa with a 5-lane cross-section (two travel lanes in each direction plus a two-way left turn lane) and painted bicycle lanes. The posted speed limit is 60 km/h.
- **Victor Street** is a local road (TMP Map 6, 2016 Revision) under the jurisdiction of the City of Ottawa with a two-lane cross-section. The posted speed is 40 km/h.

Hazeldean Road & Victor Street is a signalized intersection with left-turn auxiliary lanes on all approaches. Two three-leg, one-way, stop-controlled intersections are also located near the proposed development: Hazeldean Road (major) & Hartin Street (minor) and Victor Street (major) & Denham Way (minor). The existing control and lane configuration at each intersection is shown in Figure 2. Several driveways exist within 200 m of the proposed site access on Victor Street. North of the proposed access (i.e. closer to Hazeldean Road) is a driveway to a small massage therapist on the opposite side of Victor Street. South of the proposed access, detached houses/ duplexes are served by individual driveways on both sides of Victor Street.

There are existing on-street painted cycle lanes provided on each side of Hazeldean Road. Sidewalks abut Hazeldean Road on both sides. No sidewalks or cycle lanes are provided on Victor Street.

The following bus routes stop at the intersection of Hazeldean Road & Victor Street; both the westbound and eastbound bus stops are located on the west side of the intersection:

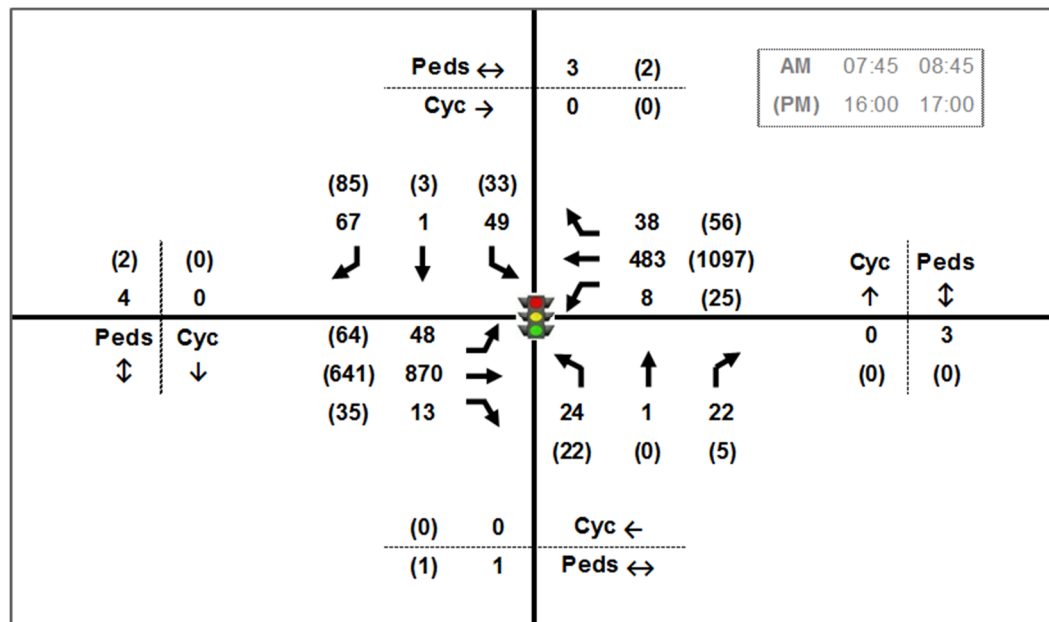
- **Route 61** is a Transitway route (limited stops in Transitway sections, local stops when on Hazeldean Road) which connects to the Transitway at Eagleson Station and proceeds downtown and further east. When Line 1 opens, this route will terminate at Tunney's Pasture.
- **Routes 261 and 263** are peak-only connection routes which travel direct to downtown via Huntmar Drive, Highway 417, and the Transitway. When Line 1 opens, these routes will terminate at Tunney's Pasture.
- **Route 162** is a local route which terminates at Terry Fox Transitway Station.



**Figure 2 – Existing Traffic Control and Lane Configuration**

An examination of the existing traffic management measures was completed by completing a site visit and through the use of Street View in Google Earth to assess the study area. No existing traffic management measures were identified on-site within the study area during the examination.

The existing peak hour travel demands (by mode) at the signalized intersection of Hazeldean Road & Victor Street are shown in Figure 3. The demands were obtained from a City of Ottawa traffic count conducted in December 2015 (attached as Appendix C). While the observed active transportation mode split is very low, it is noted that these counts were taken in winter and the mode split may change during warmer weather.



**Figure 3 – Existing Peak Hour Travel Demands by Mode**

Nine collisions occurred at the subject intersection for the five most recent years for which data is available (January 2013 to December 2017), an average of 1.8 collisions per year. The collision details report is provided as Appendix D. Seven of these collisions were sideswipe or rear end collisions where vehicles were travelling East or West along Hazeldean Road, and two of these collisions were angle collisions between a vehicle travelling East on Hazeldean Road and a vehicle travelling North on Victor Street. One of the collisions was classified as non-fatal injury while the rest were classified as property damage only.

## 4 Planned Conditions

No road widening, or other improvements are planned in the 2031 horizon to either of the boundary streets, per Map 10 (Road Network – 2031 Concept) of the Transportation Master Plan. A new north-south arterial connecting to Highway 417 is planned in 2020-2025 east of Huntmar Drive, per Map 11 (Road Network – 2031 Affordable Network). Hazeldean Road is a proposed transit priority corridor (isolated measures) is proposed for Hazeldean Road near the proposed development, per Map 5 (Rapid Transit and Transit Priority Network - 2031 Affordable Network).

It is understood there are four proposed developments within approximately one kilometer of the site which are currently under construction, approved or in the approval process. The first site is located at 5835 Hazeldean Road and Canadian Auto Mall is proposing a 531sq.m one-storey building with a mezzanine to house an automotive sales dealership replacing the existing gravel automotive sales dealership located on the property. The second proposed development is a mixed-use development for Huntington Properties consisting of retail, office, pharmacy and medical space located at 5754 Hazeldean Road. The third proposes a single-story pub-style restaurant and a two-storey office building located at 6150 Hazeldean Road. The final adjacent development is a residential development for the construction of 67 townhomes and 7 single-family homes at 5 Orchard Road by Campanale Homes.

Based upon the nature of these developments, it is anticipated the existing and future transit provision on Hazeldean Road should easily absorb the impact of the proposed developments and their impact can be considered negligible and included in the annual growth factor discussed in Section 9.

## 5 Study Area

The proposed study area is as outlined below and highlighted in Figure 4.

- Hazeldean Road & Victor Street Intersection; and
- Victor Street – adjacent to the site.



Figure 4 – Study Area

## 6 Time Periods

The proposed residential development will generate peak traffic in the weekday AM and PM peak periods. Considering the existing travel demand peaks and the relatively minor impact of the site generated traffic, it is anticipated that the combined AM and PM peak periods on the boundary roads will remain the same. Therefore, it is proposed to study the weekday AM and PM peak periods.

## 7 Horizon Years

The proposed residential development of 86 units is anticipated to generate a relatively small number of trips. Therefore, it is proposed to analyze only the full build-out year of the development (2021).

## 8 Exemptions Review

The proposed development satisfies both the Location Trigger and Safety Trigger of the screening form but does not satisfy the Trip Generation Trigger (see Section 1).

Based upon Table 4 in the City of Ottawa TIA Guidelines, the following exemptions are proposed:

- Module 3.3 – Demand Rationalization is only required when the existing network cannot support the future vehicle volumes, which is not the case for this proposed development; and
- Modules 4.5 – 4.9 – As the Trip Generation Trigger was not satisfied, the Traffic Impact Assessment is exempt from the Network Impact Component.

## 9 Development-generated Travel Demand

Following public comments regarding the development proposal, the City of Ottawa has requested that Module 3.1 be completed as part of the final Traffic Impact Assessment.

### 9.1 Trip generation and Mode Shares

The ITE Trip Generation manual, 10<sup>th</sup> edition, was used to estimate the number automobile trips generated. The ITE rates typically represent suburban or low-density conditions which reflect low transit modal shares. Person Trips are calculated by applying a 1.28 expansion factor which includes a default 10% transit mode share and a 1.15 average vehicle occupancy rate. The estimated trip generation calculations were completed for full build-out of the development expected in 2021. Table 1 shows the number of 'person trips' generated by the proposed development.

**Table 1 – Estimated Trip Generation (ITE 10th Edition)**

ITE Land Use	Size	Period	Rate	Total Person Trips	Entering	Exiting
#220 Multi-Family Housing (Low Rise)	86 units	AM Peak	0.46	65	23%	77%
		PM Peak	0.56	63	63%	37%

The 2011 Trans O-D study provides modal splits that are required to convert the proposed 'person trips' into trips for different modes of transportation. The O-D table for Kanata-Stittsville will be used to represent current travel patterns for the area. Since the development is residential in nature, and we expect that the majority of trips generated by the development will be from and to the 'Kanata-Stittsville' district in the AM and PM peak hours respectively.

**Table 2 – Estimated Trip Generation by travel mode**

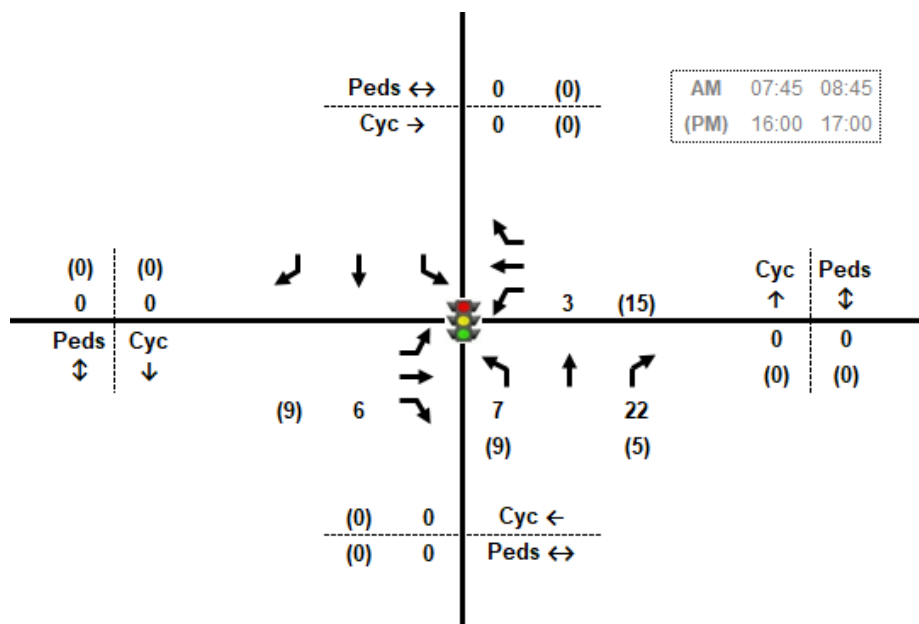
Travel Mode	AM Peak	TRIPS	IN	OUT	PM Peak	TRIPS	IN	OUT
Auto Driver	59%	38	9	29	61%	38	24	14
Auto Passenger	9%	6	1	5	15%	9	6	3
Transit	24%	16	4	12	21%	13	8	5
Walking	0%	0	0	0	0%	0	0	0
Cycling	0%	0	0	0	0%	0	0	0
Other	7%	5	1	4	3%	2	1	1

From the City of Ottawa Transportation Master Plan, the AM Peak hour modal splits are as follows:

**Table 3 – City of Ottawa TMP Modal Share targets for 2031**

Future Mode Share Targets for the Development		
Travel Mode	Mode Share Target	Rationale
Transit	21%	TMP Exhibit 2.13 for Kanata/Stittsville to 'All Areas'
Walking	23%	TMP Exhibit 2.14 for Kanata/Stittsville
Cycling	4%	TMP Exhibit 2.14 for Kanata/Stittsville
Auto Passenger	8%	TMP Exhibit 2.12 9/50 'Auto Driver' split
Auto Driver	44%	$[100 - (\text{Transit} + \text{Walking} + \text{Cycling})] \times (50/59)$

The 2031 projections show a substantial reduction in the 'Auto Driver' mode by 2031. For the purposes of this Traffic Impact Assessment Report, we will use the current (2011) O-D mode splits and existing turning vehicle counts to complete the trip assignment which is illustrated by Figure 5.



**Figure 5 – Trip Assignment**

## 10 Background Network Travel Demands

As outlined in Section 4 – Planned Conditions, there are no road widening or other improvements planned to either of the boundary streets in the 2031 horizon as per Map 10 (Road Network – 2031 Concept) of the Transportation Master Plan. For adjacent road improvements, refer to Section 4.

An examination of the existing and proposed intersection capacity was completed using the existing intersection geometry and signal timing to evaluate the Intersection Capacity Utilization (ICU) Level of Service. A summary of this examination is provided below in Table 2 with details of the analysis included in Appendix E.

**Table 4 – Hazeldean Rd. & Victor St. Intersection Capacity**

Intersection	ICU Level of Service (2021 Existing Conditions & 2021 Existing + Proposed)			
	Morning (AM)		Evening (PM)	
	Existing	Proposed	Existing	Proposed
<b>Hazeldean Rd. &amp; Victor Street</b>	<b>B</b>	<b>B</b>	<b>C</b>	<b>C</b>

An examination of the traffic growth through the Hazeldean/Stittsville study area was examined based upon historical traffic count data from 2008, 2009, 2012 and 2016 provided by the City of Ottawa and detailed through Traffic Impact Assessments completed in the immediately adjacent area. The Hazeldean/Stittsville Main intersection has experienced an approximate 2-4% annual increase in vehicular traffic within recent years. Therefore, a growth factor of 3% per annum is expected for the traffic volumes in the area.

As outlined in Section 4 – Planned Conditions, the additional vehicular traffic generated by the adjacent developments are considered within the 3% per annum growth factor. Furthermore, as the surrounding residential area is enclosed and at full build-out, it is not anticipated there will be additional vehicular traffic generated from Victor Street in the future.

## 11 Development Design

The proposed development provides residential parking spaces and visitor spaces for the proposed stacked townhouses and shared off-road driveways for the traditional townhouses. The stacked townhouses will each be provided a storage unit and the traditional townhouses are provided a garage to accommodate bicycle storage.

Concrete sidewalks are proposed providing ease of access to Hazeldean Road to promote the use of public transit. Transit service within the vicinity of the site is provided by OC Transpo Routes #61, #162, #261 and #263. Details of the transit routes are provided in Section 3. All residential units are within the 400m walk distance to the nearest transit stop.

All short-stay deliveries and garbage pickup are accommodated within the internal roadway layout. Sufficient turning radii have been provided to accommodate the proposed movement of these vehicles.

## 12 Parking Supply

The proposed development provides 91 parking spaces (76 for residents, 15 for visitors) for the stacked townhouses and an additional 24 spaces (14 for residents, 10 for visitors) for the traditional townhouses. The stacked townhouses do not meet the City requirements of 1.2 parking spaces per dwelling but instead limit each dwelling to 1.0 parking spaces per dwelling. The proposed supply of parking is consistent with parking requirements for elsewhere in the City of Ottawa. Due to the proximity to transit routes and accessibility to bike lanes, overflow parking requirements are not anticipated. Traditional townhouse parking meets the City requirements for 1.0 parking spaces per dwelling and all visitor parking requirements meet the City requirement of 0.2 parking spaces per dwelling.

Garages are provided for each traditional townhouse and storage units are provided for each stacked townhouse unit to accommodate bicycle parking/storage. No additional bicycle parking is required.

## 13 Boundary Street Design

The boundary street for the proposed development is Victor Street. At this time, there have not been any complete street concepts prepared for the boundary street. The existing roadway geometry consists of the following features:

- 1 vehicular traffic lane in each direction with 1 auxiliary turning lane at the Hazeldean intersection (2-3 lanes);
- Less than 3,000 vehicles per day;
- Posted speed limit of 40km/h, assumed operating speed of 30-40km;
- No dedicated transit facilities;
- No shoulder of road; and
- No on-street parking.

The proposed site extends a 1.8m concrete sidewalk from the development entrance, north to Hazeldean Road. The multi-modal level of service analysis for the road segment along Victor Street is summarized below in Table 3 (below). The truck level of service has not been analyzed as Victor Street is not a designated truck route.

**Table 5 – MMLOS – Projected Victor Street Segment (West Side of Roadway)**

Road Segment	Level of Service					
	Pedestrian (PLOS)		Bicycle (BLOS)		Transit (TLOS)	
	PLOS	Target	BLOS	Target	TLOS	Target
<b>Victor Street</b>	<b>B</b>	<b>C</b>	<b>B</b>	<b>B</b>	<b>D</b>	<b>N/A</b>

Based upon the location of the development in a general urban area, adjacent to a bicycle route and a local roadway, the target levels of service for pedestrians and cyclists are PLOS 'C' and BLOS 'B'. There are currently no transit stops or transit priority plans for Victor Street and therefore there is no level of service target for transit.

## 14 Access Intersection Design

The development access driveway is proposed on Victor Street approximately 110m south of the signalized intersection of Hazeldean Road & Victor Street. The driveway is proposed as full-movement and is noted as 7.1m wide. The proposed access is opposite to a stop-controlled roadway (Denham Way) and will operate similarly to the two residential driveways located to the south of the proposed access. The proximity of the proposed access to the signalized intersection is considered acceptable given the auxiliary turning lane does not extend to the proposed access. It is not anticipated that queues along Victor Street will spill back to the proposed access due to the volumes of traffic travelling northbound being low.

As the Trip Generation Trigger has not been satisfied and the projected traffic volumes are considered negligible, the proposed development access will operate acceptably.

## 15 Conclusions

Based upon the information examined and presented in this report, the following transportation related conclusions are provided:

- A total of 76 stacked townhouses and 10 traditional townhouses are being proposed at 5924 Hazeldean Road for a total of 86 residential units;
- Vehicle parking will be provided via parking lot and visitor parking spaces for the stacked townhouses and via individual driveways and garages for the traditional townhouses;
- Transit services are provided by OC Transpo and are located immediately to the north of the site at the Hazeldean Road & Victor Street intersection within 400m walking distance of the site;
- The traffic impacts from the proposed development can be considered negligible on the Hazeldean Road & Victor Street signalized intersection;
- One access is proposed to the development which is proposed to be located on Victor Street approximately 110m south of the signalized intersection of Hazeldean Road & Victor Street. The driveway has been located as far south as the site frontage will allow and will not conflict with the operations of the signalized intersection to the north; and
- Based upon the results of the report, no Roadway Modification Application or Monitoring Plan is required.

## Appendix A - TIA Screening Form

## City of Ottawa 2017 TIA Guidelines Screening Form

### 1. Description of Proposed Development

Municipal Address	5938 - 5924 Hazeldean Road
Description of Location	Residential Development (48 Unit)
Land Use Classification	R4Z[1208]
Development Size (units)	86 Units
Development Size (m <sup>2</sup> )	9578
Number of Accesses and Locations	5 driveways / main entrance
Phase of Development	Site Plan Approval
Buildout Year	2019-2020

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 >86
Office	3,500 m <sup>2</sup>
Industrial	5,000 m <sup>2</sup>
Fast-food restaurant or coffee shop	100 m <sup>2</sup>
Destination retail	1,000 m <sup>2</sup>
Gas station or convenience market	75 m <sup>2</sup>

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

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

### 3. Location Triggers

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

\*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).

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

### 4. Safety Triggers

	Yes	No
Are posted speed limits on a boundary street are 80 km/hr or greater?		X
Are there any horizontal/vertical curvatures on a boundary street limits sight lines at a proposed driveway?	X	
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)?	X	
Is the proposed driveway within auxiliary lanes of an intersection?		X
Does the proposed driveway make use of an existing median break that serves an existing site?		X
Is there is a documented history of traffic operations or safety concerns on the boundary streets within 500 m of the development?		X
Does the development include a drive-thru facility?		X

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

### 5. Summary

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

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

## Appendix B - Site Plan



## **Appendix C - Existing Turning Movement Counts**

## Turning Movement Count - Peak Hour Diagram

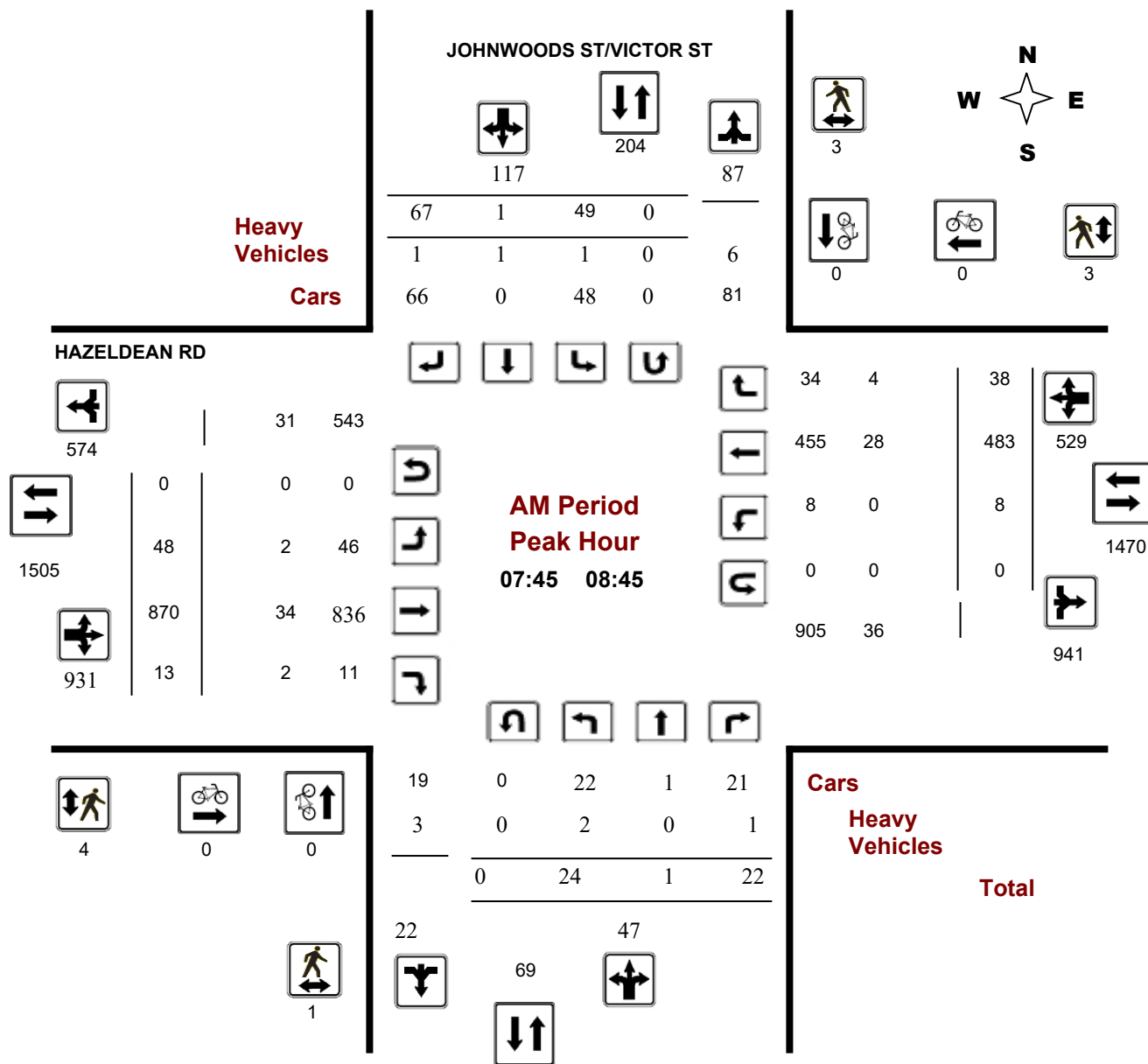
### HAZELDEAN RD @ JOHNWOODS ST/VICTOR ST

**Survey Date:** Tuesday, December 01, 2015

**Start Time:** 07:00

**WO No:** 35539

**Device:** Miovision



## Turning Movement Count - Peak Hour Diagram

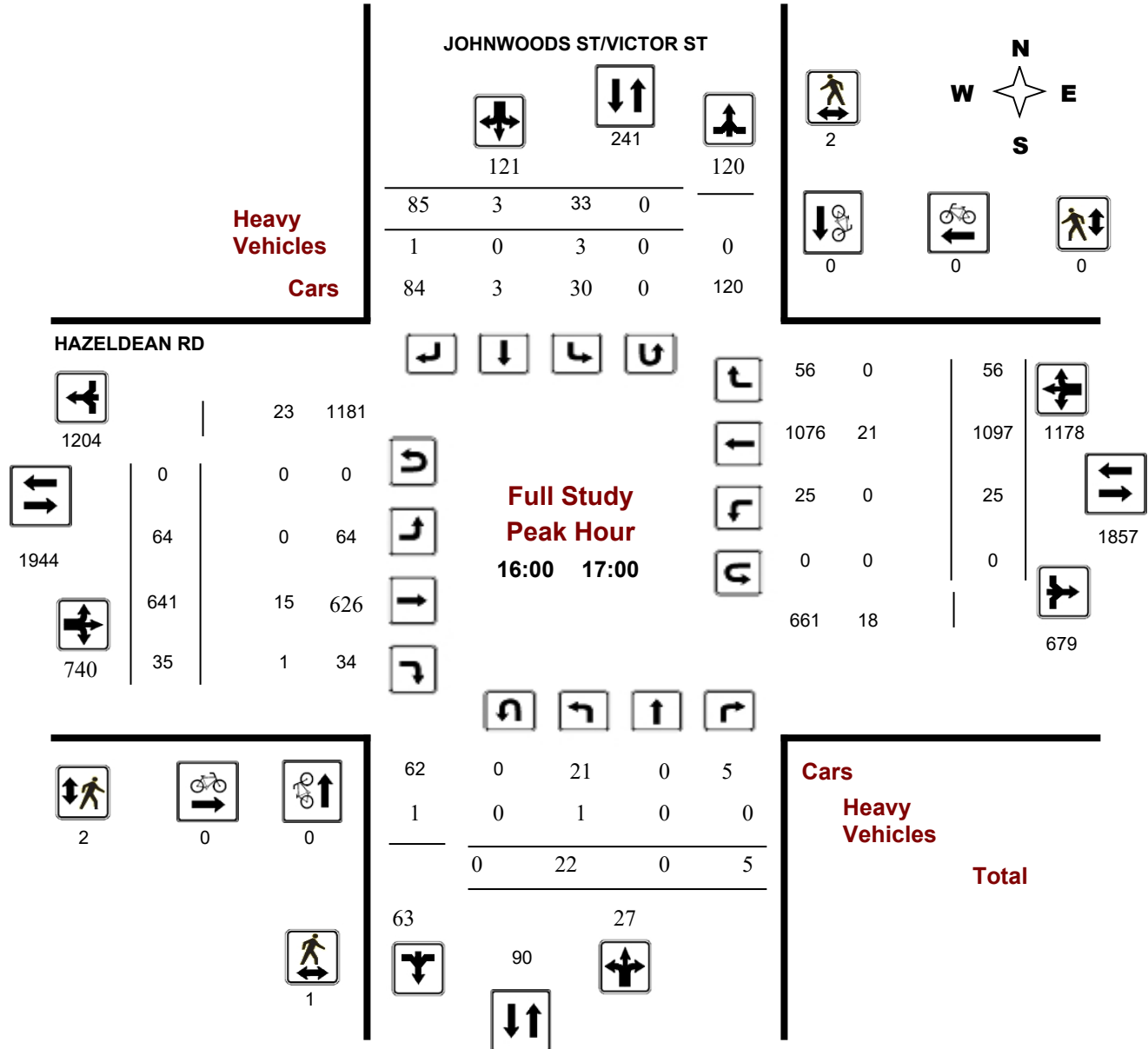
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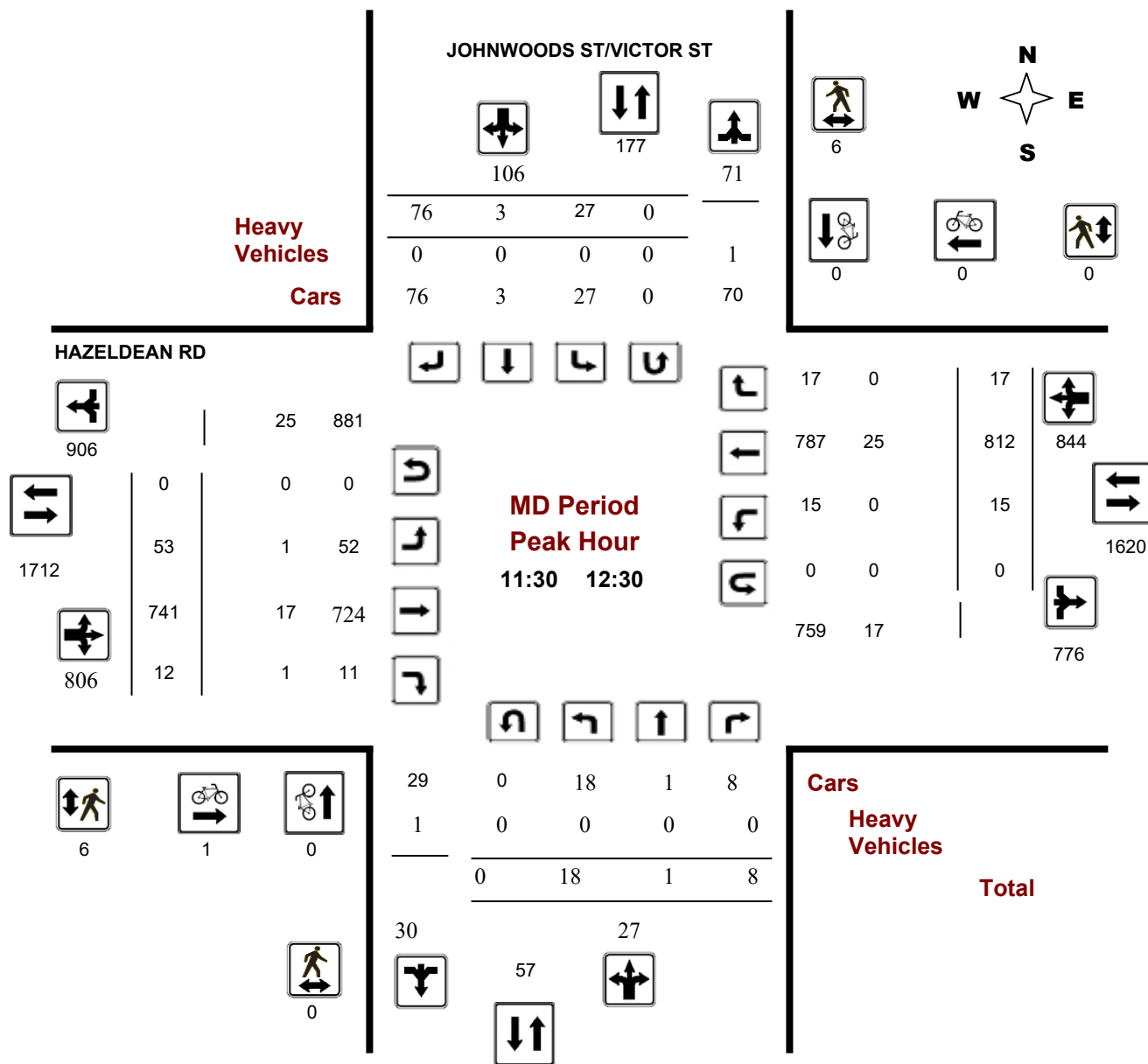
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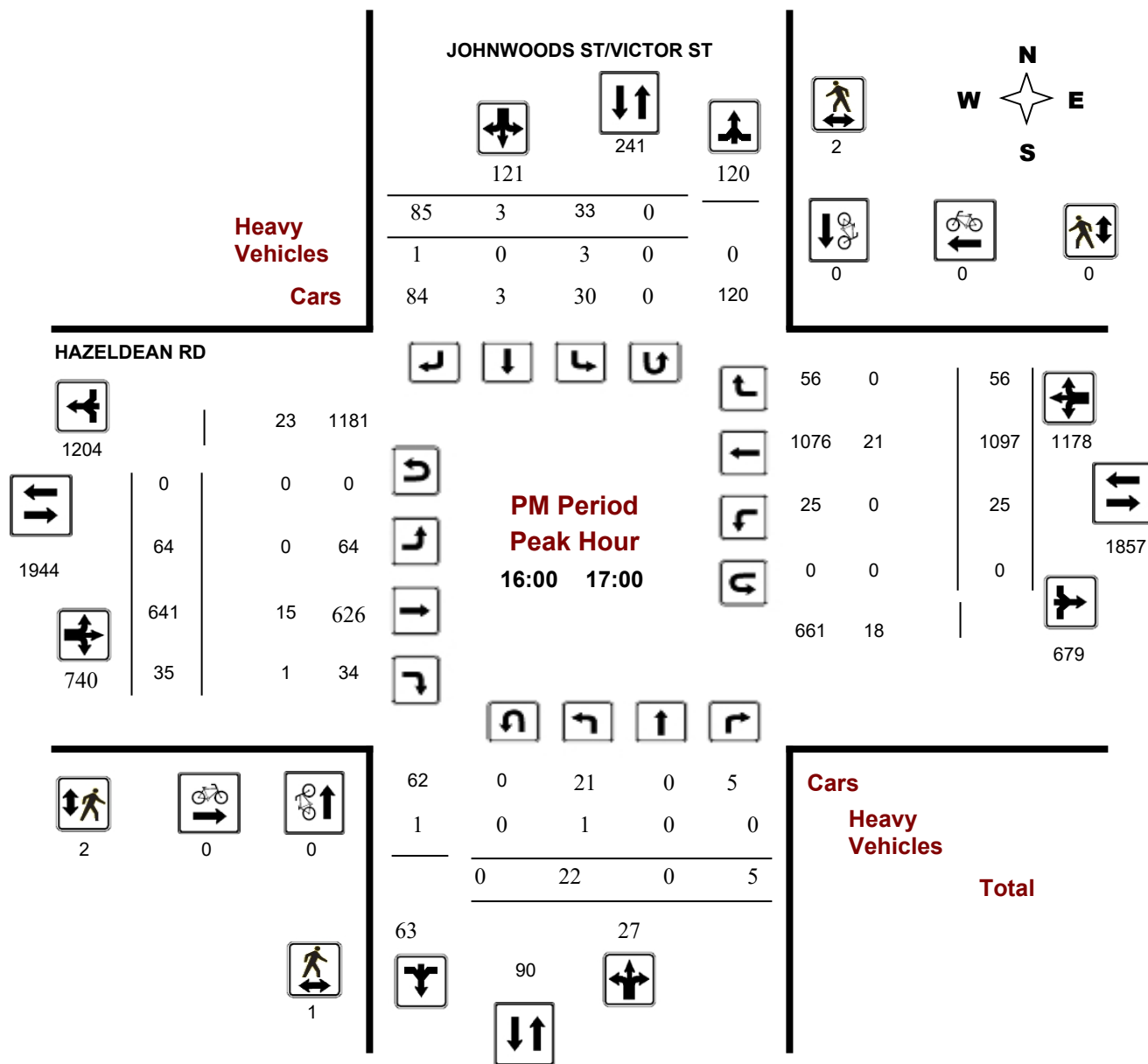
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**Survey Date:** Tuesday, December 01, 2015

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## Transportation Services - Traffic Services

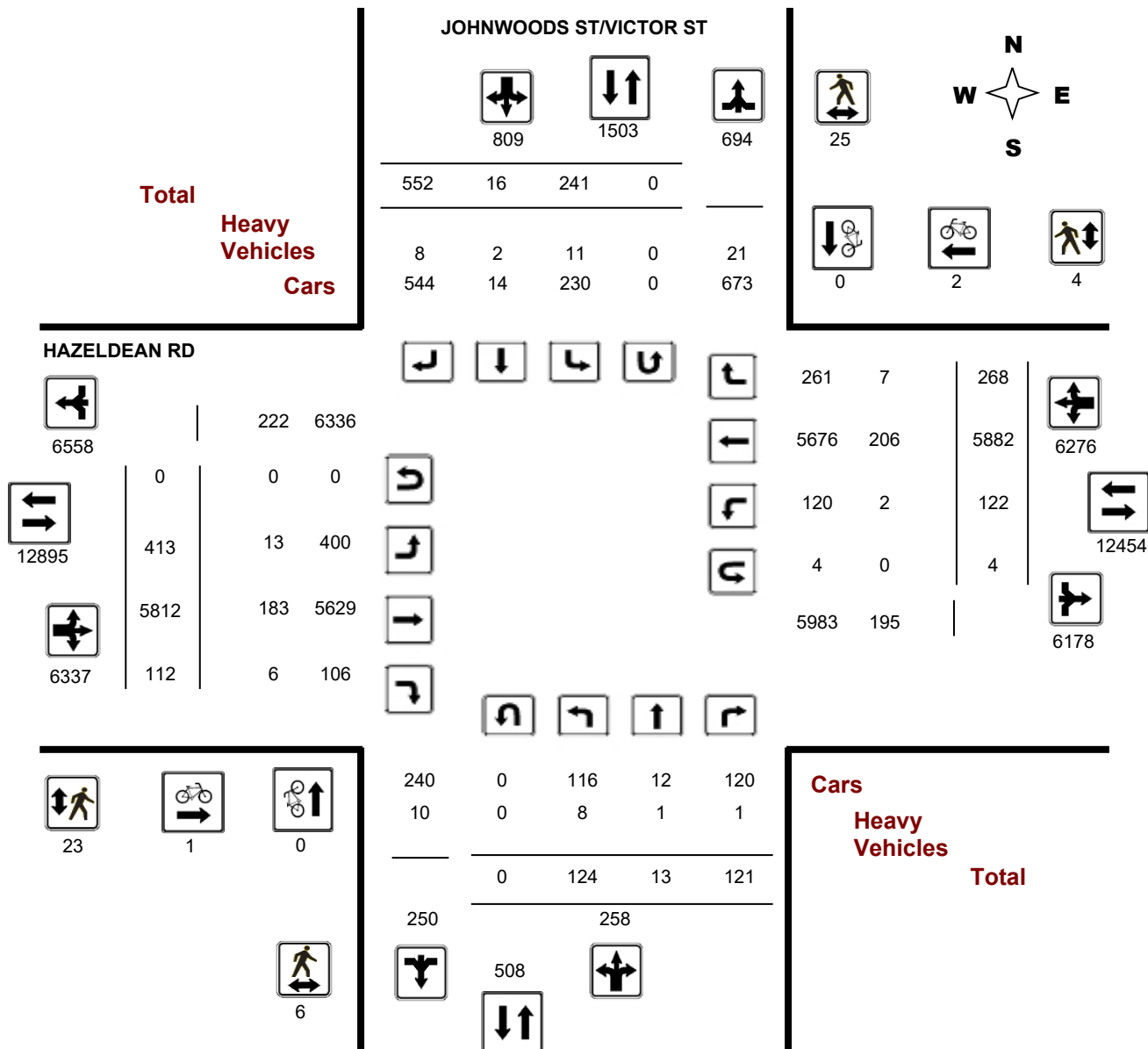
### Turning Movement Count - Full Study Diagram

## HAZELDEAN RD @ JOHNWOODS ST/VICTOR ST

**Survey Date:** Tuesday, December 01, 2015

WO#: 35539

**Device:** Miovision



## Comments

## Turning Movement Count - Full Study Summary Report

### HAZELDEAN RD @ JOHNWOODS ST/VICTOR ST

**Survey Date:** Tuesday, December 01, 2015

**Total Observed U-Turns**

Northbound: 0 Southbound: 0  
Eastbound: 0 Westbound: 4

**AADT Factor**

1.30

#### Full Study

JOHNWOODS ST/VICTOR ST										HAZELDEAN RD									
Period	Northbound				Southbound				STR TOT	Eastbound				Westbound				STR TOT	Grand Total
	LT	ST	RT	NB TOT	LT	ST	RT	SB TOT		LT	ST	RT	EB TOT	LT	ST	RT	WB TOT		
07:00 08:00	15	4	24	43	39	2	62	103	146	47	840	8	895	6	329	30	365	1260	1406
08:00 09:00	23	1	25	49	44	2	56	102	151	48	835	17	900	11	510	35	556	1456	1607
09:00 10:00	8	1	24	33	29	2	61	92	125	41	766	6	813	5	439	19	463	1276	1401
11:30 12:30	18	1	8	27	27	3	76	106	133	53	741	12	806	15	812	17	844	1650	1783
12:30 13:30	5	1	16	22	19	2	66	87	109	46	725	0	771	12	782	36	830	1601	1710
15:00 16:00	25	2	5	32	27	1	81	109	141	57	650	21	728	22	953	45	1020	1748	1889
16:00 17:00	22	0	5	27	33	3	85	121	148	64	641	35	740	25	1097	56	1178	1918	2066
17:00 18:00	8	3	14	25	23	1	65	89	114	57	614	13	684	26	960	30	1016	1700	1814
Sub Total	124	13	121	258	241	16	552	809	1067	413	5812	112	6337	122	5882	268	6272	12609	13676
U Turns				0				0	0				0				4	4	4
Total	124	13	121	258	241	16	552	809	1067	413	5812	112	6337	122	5882	268	6276	12613	13680
EQ 12Hr	172	18	168	359	335	22	767	1125	1484	574	8079	156	8808	170	8176	373	8724	17532	19016
Note: These values are calculated by multiplying the totals by the appropriate expansion factor.														1.39					
AVG 12Hr	224	23	219	466	435	29	997	1462	1928	746	10502	202	11451	220	10629	484	11341	22792	24720
Note: These volumes are calculated by multiplying the Equivalent 12 hr. totals by the AADT factor.														1.30					
AVG 24Hr	294	31	286	611	570	38	1307	1915	2526	978	13758	265	15001	289	13924	634	14856	29857	32383
Note: These volumes are calculated by multiplying the Average Daily 12 hr. totals by 12 to 24 expansion factor.														1.31					

**Comments:**

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



## Turning Movement Count - 15 Minute Summary Report

### HAZELDEAN RD @ JOHNWOODS ST/VICTOR ST

**Survey Date:** Tuesday, December 01, 2015

#### Total Observed U-Turns

Northbound: 0 Southbound: 0  
Eastbound: 0 Westbound: 4

JOHNWOODS ST/VICTOR ST										HAZELDEAN RD										Grand Total
Northbound					Southbound					Eastbound					Westbound					
Time Period	LT	ST	RT	N TOT	LT	ST	RT	S TOT	STR TOT	LT	ST	RT	E TOT	LT	ST	RT	W TOT	STR TOT	Grand Total	
07:00 07:15	2	1	6	9	7	0	11	18	27	11	193	2	206	2	52	3	57	263	290	
07:15 07:30	3	3	5	11	11	2	17	30	41	15	211	2	228	1	87	12	100	328	369	
07:30 07:45	6	0	8	14	7	0	15	22	36	11	201	2	214	3	90	5	98	312	348	
07:45 08:00	4	0	5	9	14	0	19	33	42	10	235	2	247	0	100	10	110	357	399	
08:00 08:15	14	0	5	19	7	0	14	21	40	14	228	4	246	1	109	5	115	361	401	
08:15 08:30	2	0	8	10	15	0	15	30	40	10	218	4	232	2	132	15	149	381	421	
08:30 08:45	4	1	4	9	13	1	19	33	42	14	189	3	206	5	142	8	155	361	403	
08:45 09:00	3	0	8	11	9	1	8	18	29	10	200	6	216	3	127	7	137	353	382	
09:00 09:15	3	0	7	10	8	1	15	24	34	5	187	1	193	0	97	8	105	298	332	
09:15 09:30	1	0	8	9	6	0	15	21	30	15	199	1	215	2	103	4	109	324	354	
09:30 09:45	0	0	7	7	8	1	16	25	32	13	190	2	205	1	116	4	122	327	359	
09:45 10:00	4	1	2	7	7	0	15	22	29	8	190	2	200	2	123	3	128	328	357	
11:30 11:45	5	0	0	5	5	2	20	27	32	13	182	3	198	5	179	3	187	385	417	
11:45 12:00	3	1	5	9	6	1	12	19	28	11	173	6	190	5	225	4	234	424	452	
12:00 12:15	4	0	3	7	8	0	24	32	39	19	199	2	220	3	208	5	216	436	475	
12:15 12:30	6	0	0	6	8	0	20	28	34	10	187	1	198	2	200	5	207	405	439	
12:30 12:45	0	0	4	4	3	0	16	19	23	14	170	0	184	2	193	6	201	385	408	
12:45 13:00	4	0	3	7	7	0	19	26	33	7	193	0	200	7	184	15	206	406	439	
13:00 13:15	0	1	7	8	2	2	9	13	21	11	187	0	198	2	209	9	220	418	439	
13:15 13:30	1	0	2	3	7	0	22	29	32	14	175	0	189	1	196	6	203	392	424	
15:00 15:15	4	0	0	4	2	0	20	22	26	10	161	3	174	9	250	9	268	442	468	
15:15 15:30	10	0	0	10	9	1	16	26	36	17	151	5	173	4	218	12	234	407	443	
15:30 15:45	3	1	2	6	7	0	18	25	31	13	170	4	187	5	254	15	274	461	492	
15:45 16:00	8	1	3	12	9	0	27	36	48	17	168	9	194	4	231	9	244	438	486	
16:00 16:15	2	0	1	3	8	0	19	27	30	14	160	8	182	6	273	22	301	483	513	
16:15 16:30	11	0	2	13	11	1	25	37	50	19	141	7	167	4	239	7	250	417	467	
16:30 16:45	6	0	1	7	4	0	19	23	30	12	181	11	204	6	288	12	306	510	540	
16:45 17:00	3	0	1	4	10	2	22	34	38	19	159	9	187	9	297	15	321	508	546	
17:00 17:15	1	1	1	3	5	0	14	19	22	13	172	7	192	3	263	9	275	467	489	
17:15 17:30	4	0	3	7	5	1	19	25	32	18	146	4	168	7	228	7	243	411	443	
17:30 17:45	2	1	2	5	5	0	16	21	26	17	156	2	175	9	260	6	277	452	478	
17:45 18:00	1	1	8	10	8	0	16	24	34	9	140	0	149	7	209	8	224	373	407	
TOTAL:	124	13	121	258	241	16	552	809	1067	413	5812	112	6337	122	5882	268	6276	12613	13680	

Note: U-Turns are included in Totals.

Comment:



# Transportation Services - Traffic Services

## Turning Movement Count - Cyclist Volume Report

Work Order  
35539

### HAZELDEAN RD @ JOHNWOODS ST/VICTOR ST

**Count Date:** Tuesday, December 01, 2015

**Start Time:** 07:00

Time Period	JOHNWOODS ST/VICTOR ST			HAZELDEAN RD			Grand Total
	Northbound	Southbound	Street Total	Eastbound	Westbound	Street Total	
07:00 08:00	0	0	0	0	0	0	0
08:00 09:00	0	0	0	0	0	0	0
09:00 10:00	0	0	0	0	0	0	0
11:30 12:30	0	0	0	1	0	1	1
12:30 13:30	0	0	0	0	1	1	1
15:00 16:00	0	0	0	0	1	1	1
16:00 17:00	0	0	0	0	0	0	0
17:00 18:00	0	0	0	0	0	0	0
Total .....	0	0	0	1	2	3	3

**Comment:**

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



# Transportation Services - Traffic Services

W.O.  
35539

## Turning Movement Count - Heavy Vehicle Report

### HAZELDEAN RD @ JOHNWOODS ST/VICTOR ST

**Survey Date:** Tuesday, December 01, 2015

JOHNWOODS ST/VICTOR ST											HAZELDEAN RD									
Time Period		Northbound			Southbound			Eastbound			Westbound									Grand Total
		LT	ST	RT	N TOT	LT	ST	RT	S TOT	STR TOT	LT	ST	RT	E TOT	LT	ST	RT	W TOT	STR TOT	
07:00	08:00	2	0	0	2	2	1	1	4	6	2	42	1	45	0	18	1	19	64	70
08:00	09:00	2	0	1	3	1	1	1	3	6	2	26	2	30	0	29	3	32	62	68
09:00	10:00	0	0	0	0	1	0	1	2	2	1	19	0	20	0	30	0	30	50	52
11:30	12:30	0	0	0	0	0	0	0	0	0	1	17	1	19	0	25	0	25	44	44
12:30	13:30	0	0	0	0	1	0	2	3	3	2	36	0	38	0	32	0	32	70	73
15:00	16:00	3	1	0	4	3	0	2	5	9	4	22	1	27	2	39	3	44	71	80
16:00	17:00	1	0	0	1	3	0	1	4	5	0	15	1	16	0	21	0	21	37	42
17:00	18:00	0	0	0	0	0	0	0	0	0	1	6	0	7	0	12	0	12	19	19
<b>Sub Total</b>		8	1	1	10	11	2	8	21	31	13	183	6	202	2	206	7	215	417	448
<b>U-Turns (Heavy Vehicles)</b>					0				0	0				0				0	0	0
<b>Total</b>		8	1	1	0	11	2	8	21	31	13	183	6	202	2	206	7	215	417	448

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



# Transportation Services - Traffic Services

Work Order

35539

## Turning Movement Count - Pedestrian Volume Report

### HAZELDEAN RD @ JOHNWOODS ST/VICTOR ST

**Count Date:** Tuesday, December 01, 2015

**Start Time:** 07:00

Time Period	NB Approach (E or W Crossing)	SB Approach (E or W Crossing)	Total	EB Approach (N or S Crossing)	WB Approach (N or S Crossing)	Total	Grand Total
07:00 07:15	1	0	1	0	0	0	1
07:15 07:30	1	1	2	2	0	2	4
07:30 07:45	0	0	0	3	0	3	3
07:45 08:00	0	1	1	1	0	1	2
07:00 08:00	2	2	4	6	0	6	10
08:00 08:15	0	0	0	0	3	3	3
08:15 08:30	0	1	1	2	0	2	3
08:30 08:45	1	1	2	1	0	1	3
08:45 09:00	1	1	2	1	0	1	3
08:00 09:00	2	3	5	4	3	7	12
09:00 09:15	0	2	2	0	0	0	2
09:15 09:30	0	0	0	0	0	0	0
09:30 09:45	0	0	0	0	1	1	1
09:45 10:00	0	0	0	2	0	2	2
09:00 10:00	0	2	2	2	1	3	5
11:30 11:45	0	2	2	2	0	2	4
11:45 12:00	0	2	2	0	0	0	2
12:00 12:15	0	0	0	1	0	1	1
12:15 12:30	0	2	2	3	0	3	5
11:30 12:30	0	6	6	6	0	6	12
12:30 12:45	0	0	0	0	0	0	0
12:45 13:00	0	1	1	0	0	0	1
13:00 13:15	0	0	0	0	0	0	0
13:15 13:30	0	2	2	0	0	0	2
12:30 13:30	0	3	3	0	0	0	3
15:00 15:15	0	0	0	2	0	2	2
15:15 15:30	0	1	1	1	0	1	2
15:30 15:45	1	1	2	0	0	0	2
15:45 16:00	0	0	0	0	0	0	0
15:00 16:00	1	2	3	3	0	3	6
16:00 16:15	0	0	0	0	0	0	0
16:15 16:30	1	1	2	1	0	1	3
16:30 16:45	0	0	0	1	0	1	1
16:45 17:00	0	1	1	0	0	0	1
16:00 17:00	1	2	3	2	0	2	5
17:00 17:15	0	5	5	0	0	0	5
17:15 17:30	0	0	0	0	0	0	0
17:30 17:45	0	0	0	0	0	0	0
17:45 18:00	0	0	0	0	0	0	0
17:00 18:00	0	5	5	0	0	0	5
Total .....	6	25	31	23	4	27	58

**Comment:**

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

### HAZELDEAN RD @ JOHNWOODS ST/VICTOR ST

**Survey Date:** Tuesday, December 01, 2015

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

## **Appendix D - Collision Details Report**



# City Operations - Transportation Services

## Collision Details Report - Public Version

**From:** January 1, 2013 **To:** December 31, 2017

**Location:** HAZELDEAN RD @ JOHNWOODS ST/VICTOR ST

**Traffic Control:** Traffic signal

**Total Collisions:** 9

Date/Day/Time	Environment	Impact Type	Classification	Surface Cond'n	Veh. Dir	Vehicle Manoeuvre	Vehicle type	First Event	No. Ped
2013-May-10, Fri,21:00	Clear	Sideswipe	P.D. only	Dry	West	Turning right	Automobile, station wagon	Other motor vehicle	
					West	Turning right	Automobile, station wagon	Other motor vehicle	
2013-May-24, Fri,15:00	Clear	Rear end	P.D. only	Dry	West	Slowing or stopping	Pick-up truck	Other motor vehicle	
					West	Stopped	Automobile, station wagon	Other motor vehicle	
2014-Apr-09, Wed,17:33	Clear	Sideswipe	P.D. only	Dry	West	Going ahead	Passenger van	Other motor vehicle	
					West	Going ahead	Pick-up truck	Other motor vehicle	
2014-Apr-22, Tue,19:11	Rain	Angle	Non-fatal injury	Wet	East	Going ahead	Automobile, station wagon	Other motor vehicle	
					North	Going ahead	Pick-up truck	Other motor vehicle	
2014-Jun-13, Fri,10:30	Rain	Rear end	P.D. only	Wet	East	Slowing or stopping	Automobile, station wagon	Other motor vehicle	
					East	Going ahead	Automobile, station wagon	Other motor vehicle	
2015-Jan-09, Fri,17:30	Snow	Angle	P.D. only	Loose snow	East	Turning right	Passenger van	Other motor vehicle	

					North	Stopped	Pick-up truck	Other motor vehicle
2016-Aug-24, Wed,10:49	Clear	Rear end	P.D. only	Dry	East	Slowing or stopping	Automobile, station wagon	Other motor vehicle
					East	Stopped	Automobile, station wagon	Other motor vehicle
2016-Dec-17, Sat,13:31	Clear	Sideswipe	P.D. only	Ice	East	Slowing or stopping	Pick-up truck	Other motor vehicle
					East	Stopped	Automobile, station wagon	Other motor vehicle
					East	Stopped	Pick-up truck	Other motor vehicle
2017-May-30, Tue,18:28	Clear	Rear end	P.D. only	Dry	West	Going ahead	Pick-up truck	Other motor vehicle
					West	Going ahead	Pick-up truck	Other motor vehicle





















## Appendix E - Intersection Capacity Analysis

# HCM Signalized Intersection Capacity Analysis

## 3: Victor St/Johnwoods St & Hazeldean Rd

Future Background (2021) - AM

07/29/2019





















												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	52	951	14	9	528	42	26	1	24	54	1	73
Future Volume (vph)	52	951	14	9	528	42	26	1	24	54	1	73
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Lane Width	3.5	3.6	3.7	3.5	3.5	3.7	3.7	3.3	3.7	3.4	3.4	3.7
Total Lost time (s)	5.1	6.1		6.1	7.3		6.4	6.4		6.6	6.6	
Lane Util. Factor	1.00	0.95		1.00	0.95		1.00	1.00		1.00	1.00	
Frpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	0.98		1.00	0.98	
Flpb, ped/bikes	1.00	1.00		1.00	1.00		0.99	1.00		1.00	1.00	
Frt	1.00	1.00		1.00	0.99		1.00	0.86		1.00	0.85	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1609	3275		1691	3138		1686	1436		1632	1441	
Flt Permitted	0.39	1.00		0.25	1.00		0.70	1.00		0.74	1.00	
Satd. Flow (perm)	667	3275		448	3138		1249	1436		1270	1441	
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	58	1057	16	10	587	47	29	1	27	60	1	81
RTOR Reduction (vph)	0	1	0	0	3	0	0	25	0	0	74	0
Lane Group Flow (vph)	58	1072	0	10	631	0	29	3	0	60	8	0
Confl. Peds. (#/hr)	3		1	1		3	4		3	3		4
Heavy Vehicles (%)	5%	4%	15%	0%	6%	11%	2%	2%	2%	2%	100%	1%
Turn Type	pm+pt	NA		pm+pt	NA		Perm	NA		Perm	NA	
Protected Phases	5	2		1	6			8			4	
Permitted Phases	2			6			8			4		
Actuated Green, G (s)	90.4	85.1		82.0	80.8		10.1	10.1		9.9	9.9	
Effective Green, g (s)	90.4	85.1		82.0	80.8		10.1	10.1		9.9	9.9	
Actuated g/C Ratio	0.79	0.74		0.71	0.70		0.09	0.09		0.09	0.09	
Clearance Time (s)	5.1	6.1		6.1	7.3		6.4	6.4		6.6	6.6	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	567	2423		332	2204		109	126		109	124	
v/s Ratio Prot	c0.00	c0.33		0.00	0.20			0.00			0.01	
v/s Ratio Perm	0.08			0.02			0.02			c0.05		
v/c Ratio	0.10	0.44		0.03	0.29		0.27	0.03		0.55	0.06	
Uniform Delay, d1	2.8	5.8		4.9	6.4		49.0	48.0		50.4	48.3	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.1	0.6		0.0	0.3		1.3	0.1		5.9	0.2	
Delay (s)	2.9	6.4		4.9	6.7		50.3	48.0		56.3	48.5	
Level of Service	A	A		A	A		D	D		E	D	
Approach Delay (s)		6.2			6.7			49.2			51.8	
Approach LOS		A			A			D			D	
<b>Intersection Summary</b>												
HCM 2000 Control Delay			10.9			HCM 2000 Level of Service			B			
HCM 2000 Volume to Capacity ratio			0.45									
Actuated Cycle Length (s)			115.0			Sum of lost time (s)			19.0			
Intersection Capacity Utilization			59.1%			ICU Level of Service			B			
Analysis Period (min)			15									
c Critical Lane Group												

# HCM Signalized Intersection Capacity Analysis

## 3: Victor St/Johnwoods St & Hazeldean Rd

Future Background (2021) - PM

07/29/2019





















												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	70	700	38	27	1199	61	24	0	5	36	3	93
Future Volume (vph)	70	700	38	27	1199	61	24	0	5	36	3	93
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Lane Width	3.5	3.6	3.7	3.5	3.5	3.7	3.7	3.3	3.7	3.4	3.4	3.7
Total Lost time (s)	6.1	6.1		6.1	6.1		6.6	6.6		6.6	6.6	
Lane Util. Factor	1.00	0.95		1.00	0.95		1.00	1.00		1.00	1.00	
Frpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00		1.00	0.99	
Flpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Frt	1.00	0.99		1.00	0.99		1.00	0.85		1.00	0.85	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1691	3322		1691	3291		1642	1479		1534	1467	
Flt Permitted	0.15	1.00		0.33	1.00		0.67	1.00		0.75	1.00	
Satd. Flow (perm)	262	3322		591	3291		1166	1479		1217	1467	
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	78	778	42	30	1332	68	27	0	6	40	3	103
RTOR Reduction (vph)	0	2	0	0	2	0	0	5	0	0	94	0
Lane Group Flow (vph)	78	818	0	30	1398	0	27	1	0	40	12	0
Confl. Peds. (#/hr)	2		1	1		2	2					2
Heavy Vehicles (%)	0%	2%	3%	0%	2%	0%	5%	0%	0%	9%	0%	1%
Turn Type	pm+pt	NA		pm+pt	NA		Perm	NA		Perm	NA	
Protected Phases	5	2		1	6			8			4	
Permitted Phases	2			6			8			4		
Actuated Green, G (s)	92.1	86.6		88.5	84.8		10.9	10.9		10.9	10.9	
Effective Green, g (s)	92.1	86.6		88.5	84.8		10.9	10.9		10.9	10.9	
Actuated g/C Ratio	0.77	0.72		0.74	0.71		0.09	0.09		0.09	0.09	
Clearance Time (s)	6.1	6.1		6.1	6.1		6.6	6.6		6.6	6.6	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	266	2397		469	2325		105	134		110	133	
v/s Ratio Prot	c0.01	0.25		0.00	c0.42			0.00			0.01	
v/s Ratio Perm	0.21			0.05			0.02			c0.03		
v/c Ratio	0.29	0.34		0.06	0.60		0.26	0.00		0.36	0.09	
Uniform Delay, d1	5.6	6.2		4.2	9.0		50.8	49.6		51.3	50.0	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.6	0.4		0.1	1.2		1.3	0.0		2.0	0.3	
Delay (s)	6.2	6.6		4.3	10.1		52.1	49.6		53.3	50.3	
Level of Service	A	A		A	B		D	D		D	D	
Approach Delay (s)		6.5			10.0			51.6			51.1	
Approach LOS		A			B			D			D	
<b>Intersection Summary</b>												
HCM 2000 Control Delay			11.7			HCM 2000 Level of Service			B			
HCM 2000 Volume to Capacity ratio			0.56									
Actuated Cycle Length (s)			120.0			Sum of lost time (s)			18.8			
Intersection Capacity Utilization			66.4%			ICU Level of Service			C			
Analysis Period (min)			15									
c Critical Lane Group												

# HCM Signalized Intersection Capacity Analysis

## 3: Victor St/Johnwoods St & Hazeldean Rd

Future Total (2021) - AM

11/07/2019





















												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	52	951	20	12	528	42	33	1	46	54	1	73
Future Volume (vph)	52	951	20	12	528	42	33	1	46	54	1	73
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Lane Width	3.5	3.6	3.7	3.5	3.5	3.7	3.7	3.3	3.7	3.4	3.4	3.7
Total Lost time (s)	5.1	6.1		6.1	7.3		6.4	6.4		6.6	6.6	
Lane Util. Factor	1.00	0.95		1.00	0.95		1.00	1.00		1.00	1.00	
Frpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	0.98		1.00	0.98	
Flpb, ped/bikes	1.00	1.00		1.00	1.00		0.99	1.00		1.00	1.00	
Frt	1.00	1.00		1.00	0.99		1.00	0.85		1.00	0.85	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1609	3270		1691	3138		1686	1432		1633	1441	
Flt Permitted	0.40	1.00		0.24	1.00		0.70	1.00		0.72	1.00	
Satd. Flow (perm)	676	3270		434	3138		1249	1432		1243	1441	
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	58	1057	22	13	587	47	37	1	51	60	1	81
RTOR Reduction (vph)	0	1	0	0	3	0	0	46	0	0	74	0
Lane Group Flow (vph)	58	1078	0	13	631	0	37	6	0	60	8	0
Confl. Peds. (#/hr)	3		1	1		3	4		3	3		4
Heavy Vehicles (%)	5%	4%	15%	0%	6%	11%	2%	2%	2%	2%	100%	1%
Turn Type	pm+pt	NA		pm+pt	NA		Perm	NA		Perm	NA	
Protected Phases	5	2		1	6			8			4	
Permitted Phases	2			6			8			4		
Actuated Green, G (s)	89.1	83.8		83.1	80.7		10.2	10.2		10.0	10.0	
Effective Green, g (s)	89.1	83.8		83.1	80.7		10.2	10.2		10.0	10.0	
Actuated g/C Ratio	0.77	0.73		0.72	0.70		0.09	0.09		0.09	0.09	
Clearance Time (s)	5.1	6.1		6.1	7.3		6.4	6.4		6.6	6.6	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	566	2382		339	2202		110	127		108	125	
v/s Ratio Prot	c0.00	c0.33		0.00	0.20			0.00			0.01	
v/s Ratio Perm	0.07			0.03			0.03			c0.05		
v/c Ratio	0.10	0.45		0.04	0.29		0.34	0.04		0.56	0.06	
Uniform Delay, d1	3.1	6.3		4.6	6.4		49.2	47.9		50.4	48.2	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.1	0.6		0.0	0.3		1.8	0.1		6.1	0.2	
Delay (s)	3.1	6.9		4.7	6.7		51.0	48.1		56.4	48.4	
Level of Service	A	A		A	A		D	D		E	D	
Approach Delay (s)		6.7			6.7			49.3			51.8	
Approach LOS		A			A			D			D	
<b>Intersection Summary</b>												
HCM 2000 Control Delay			11.8			HCM 2000 Level of Service			B			
HCM 2000 Volume to Capacity ratio			0.46									
Actuated Cycle Length (s)			115.0			Sum of lost time (s)			19.0			
Intersection Capacity Utilization			59.4%			ICU Level of Service			B			
Analysis Period (min)			15									
c Critical Lane Group												

# HCM Signalized Intersection Capacity Analysis

## 3: Victor St/Johnwoods St & Hazeldean Rd

Future Total (2021) - PM

11/07/2019

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	70	700	47	42	1199	61	33	0	10	36	3	93
Future Volume (vph)	70	700	47	42	1199	61	33	0	10	36	3	93
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Lane Width	3.5	3.6	3.7	3.5	3.5	3.7	3.7	3.3	3.7	3.4	3.4	3.7
Total Lost time (s)	6.1	6.1		6.1	6.1		6.6	6.6		6.6	6.6	
Lane Util. Factor	1.00	0.95		1.00	0.95		1.00	1.00		1.00	1.00	
Frpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00		1.00	0.99	
Flpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Frt	1.00	0.99		1.00	0.99		1.00	0.85		1.00	0.85	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1691	3315		1691	3291		1642	1479		1534	1467	
Flt Permitted	0.15	1.00		0.32	1.00		0.67	1.00		0.75	1.00	
Satd. Flow (perm)	266	3315		570	3291		1167	1479		1212	1467	
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	78	778	52	47	1332	68	37	0	11	40	3	103
RTOR Reduction (vph)	0	3	0	0	2	0	0	10	0	0	94	0
Lane Group Flow (vph)	78	827	0	47	1398	0	37	1	0	40	12	0
Confl. Peds. (#/hr)	2		1	1		2	2					2
Heavy Vehicles (%)	0%	2%	3%	0%	2%	0%	5%	0%	0%	9%	0%	1%
Turn Type	pm+pt	NA		pm+pt	NA		Perm	NA		Perm	NA	
Protected Phases	5	2		1	6			8			4	
Permitted Phases	2			6			8			4		
Actuated Green, G (s)	90.6	85.1		89.8	84.7		11.0	11.0		11.0	11.0	
Effective Green, g (s)	90.6	85.1		89.8	84.7		11.0	11.0		11.0	11.0	
Actuated g/C Ratio	0.75	0.71		0.75	0.71		0.09	0.09		0.09	0.09	
Clearance Time (s)	6.1	6.1		6.1	6.1		6.6	6.6		6.6	6.6	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	266	2350		474	2322		106	135		111	134	
v/s Ratio Prot	c0.01	0.25		0.00	c0.42			0.00			0.01	
v/s Ratio Perm	0.21			0.07			0.03			c0.03		
v/c Ratio	0.29	0.35		0.10	0.60		0.35	0.01		0.36	0.09	
Uniform Delay, d1	5.7	6.8		4.0	9.0		51.1	49.5		51.2	49.9	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.6	0.4		0.1	1.2		2.0	0.0		2.0	0.3	
Delay (s)	6.3	7.2		4.1	10.2		53.1	49.6		53.2	50.2	
Level of Service	A	A		A	B		D	D		D	D	
Approach Delay (s)		7.1			10.0			52.3			51.0	
Approach LOS		A			A			D			D	
<b>Intersection Summary</b>												
HCM 2000 Control Delay			12.1			HCM 2000 Level of Service			B			
HCM 2000 Volume to Capacity ratio			0.56									
Actuated Cycle Length (s)			120.0			Sum of lost time (s)			18.8			
Intersection Capacity Utilization			66.4%			ICU Level of Service			C			
Analysis Period (min)			15									
c Critical Lane Group												