

Richmond Subdivision Transportation Brief Update

May 11, 2018

Prepared for:

Mattamy Homes

Prepared by:

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1.0 INTRODUCTION

1.1 STUDY PURPOSE

Stantec Consulting Ltd. was retained by Mattamy Homes provide an assessment of the transportation needs and impacts related to the future build-out of a residential development known as the "Richmond Subdivision" at 6420 Ottawa Street and 6431 Ottawa Street. These properties are in the south-western portion of the Village of Richmond, within the City of Ottawa.

This transportation brief is an update to the original transportation brief from March 2012. Since the original transportation brief was published, the proposed number of residential units has been reduced in size, the build-out horizon has been extended, and background developments have changed.

1.2 PROPOSED DEVELOPMENT

The proposed development is anticipated to consist of 177 townhome-style dwellings and 848 single family dwellings. The final number of residential units is subject to change as the plan is refined but these changes are not expected to be substantial. Full built-out is anticipated to occur by 2029.

The development site will be accessed at four locations as follows:

- Perth Street at Meynell Road vis-à-vis the extension of a new North-South Collector (i.e. Meynell Road) through the Richmond Village Development Corporation's development to the north;
- The westerly extension of Royal York Street, from Fortune Street to the subject development;
- Ottawa Street at Meynell Road; and,
- Ottawa Street at a new access to the southern portion of the property (i.e. south of Ottawa Street).

Figure 1 illustrates the location of the proposed development.

Figure 2 depicts the site plan for the proposed development.



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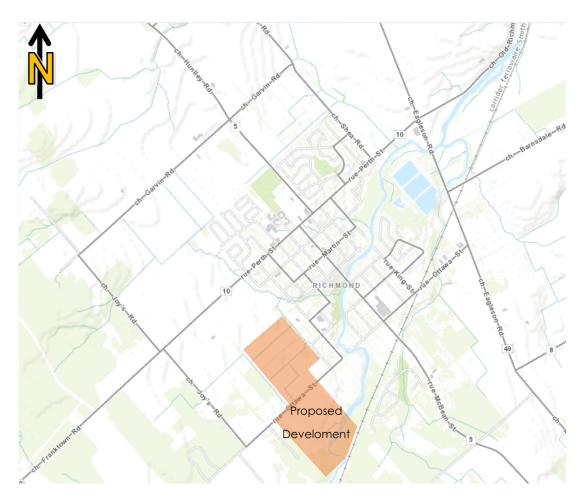


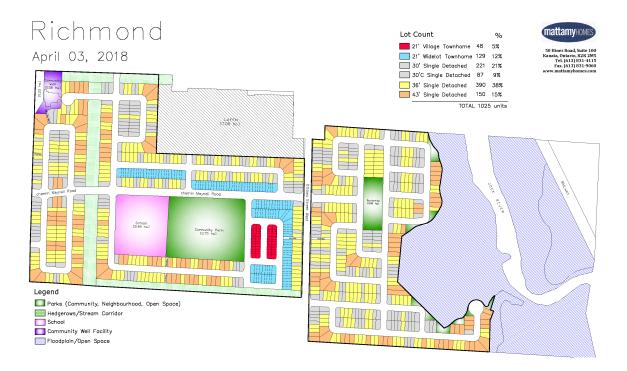
Figure 1 Location of Proposed Development

Background image source: geoOttawa, accessed January 2018



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Figure 2 Site Plan for the Proposed Development



1.3 SCOPE OF THE ASSESSMENT

This study is an update to a previous report from 2012 and therefore follows the City of Ottawa's 2006 Traffic Impact Assessment (TIA) Guidelines. The scope of the analysis was confirmed with City staff and is described below.

- Study area intersections include:
 - o Perth Street at Queen Charlotte Street / Rochelle Drive;
 - o Ottawa Street at Queen Charlotte Street;
 - Perth Street at Meynell Road (new N-S collector); and,
 - o Ottawa Street at Meynell Road.
- Study horizons include:
 - 2018 (existing conditions);
 - 2029 (site build-out); and,
 - 2034 (site build-out + 5 years).
- Analysis time periods include the weekday AM and PM peak hours.



Existing Transportation Environment May 11, 2018

The methodology used in this TIS is as follows:

- The net increase in site traffic from the proposed development will be estimated.
- Background traffic growth will be explicitly accounted for based on known developments in the study area.
- Future background traffic volumes will be combined with the net increase in site traffic volumes to determine total future traffic volumes.
- A 2% per annum growth rate will be used for the through volumes along Perth Street to account for growth outside of the immediate study area. This rate of growth is consistent with previously approved traffic studies in the area.
- Intersection analyses will be performed to determine the operating characteristics of the study area intersections under each study horizon.
- Mitigation measures will be examined where operational deficiencies are identified.

2.0 EXISTING TRANSPORTATION ENVIRONMENT

2.1 ROADS AND TRAFFIC CONTROL

limit is 50 km/h.

The roadways under consideration in the study area are described below. The road classifications were referenced from Map 8 of the City of Ottawa's 2013 Transportation Master Plan.

Perth Street	Approximately 225 m west of Queen Charlotte Street, Perth Street is a two-lane arterial road with a rural cross-section and paved shoulders are provided along both sides of the road. East of Queen Charlotte Street, Perth Street is a four-lane undivided arterial road with an urban cross-section and sidewalks along both sides of the road. The posted speed limit along Perth street transitions from 80 km/h to 50 km/h approximately 300 m west of Queen Charlotte Street.
Queen Charlotte Street	Queen Charlotte Street is a two-lane local road with a semi-urban cross-section (i.e. the west side of the road is urbanized). There are no pedestrian or cycling facilities along Queen Charlotte Street. The intersection with Perth Street is currently stop-controlled along the minor approach (i.e. along Queen Charlotte Street). The default speed limit is 50 km/h.
Rochelle Drive	Rochelle Drive represents the north leg of the intersection of Perth Street / Queen Charlotte Street / Rochelle Drive. Rochelle Drive is a two-lane local road with an urban cross-section. A sidewalk is provided along the eastern side of the road. The intersection with Perth Street is stop-controlled along the minor approach (i.e. along Rochelle Drive). The default speed

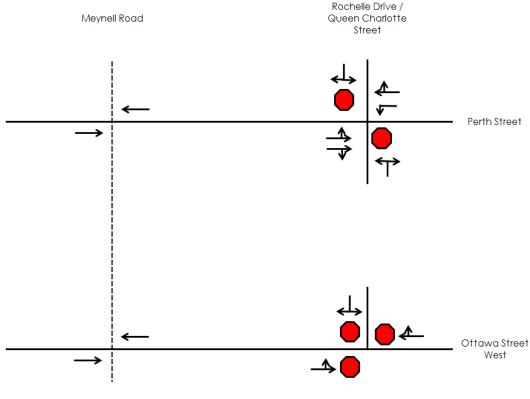


Existing Transportation Environment May 11, 2018

Ottawa Street West Ottawa Street West is a two-lane collector road with a rural cross-section. There are no pedestrian facilities, cycling facilities, or paved shoulders along Ottawa Street West. The posted speed limit is 50 km/h within the residential area and 70 km/h elsewhere. The intersection with Queen Charlotte Street is currently all-way stop-controlled.

Figure 3 illustrates the existing intersection control and lane configuration for the study area intersections.

Figure 3 Existing Intersection Control and Lane Configuration



2.2 TRANSIT

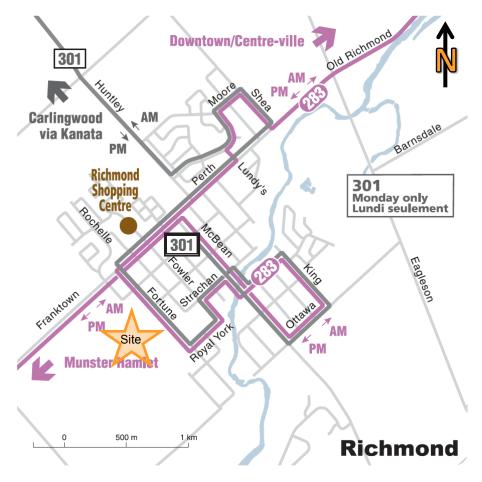
Transit service is provided along Perth Street via OC Transpo bus routes 283 and 301. Route 283 is a peak hour bus route that runs between Munster and Mackenzie King Station. Route 301 is a Monday only bus route that runs between the Village of Richmond and Carlingwood Shopping Centre.

Figure 4 illustrates the existing study area transit routes.



Existing Transportation Environment May 11, 2018

Figure 4 Existing Transit Service



Source: OC Transpo System Map, accessed January 2018

2.3 WALKING AND CYCLING

There are sidewalks along Perth Street, east of Queen Charlotte Street, as well as along Rochelle Street. The *Village of Richmond Community Design Plan,* Schedule C, indicates that Perth Street has shared use lanes, indicating that cyclists travel on the road in mixed use traffic. This is consistent with the City of Ottawa's *Cycling Plan* which outlines Perth Street as a suggested cycling route with the ultimate cycling network showing Perth Street as a spine route.

2.4 TRAFFIC VOLUMES

Traffic counts at the Perth Street at Queen Charlotte / Rochelle Drive intersection were obtained from the Richmond Oaks Health Centre Transportation Brief (D.J. Halpenny & Associates Ltd., 2016). The intersection counts were collected prior to 2018, and therefore, the count data was adjusted to the reflect the current existing condition. A 2% per annum growth rate was used to increase the through volumes along Perth Street to 2018 volumes which is consistent with previously prepared and approved traffic studies in the area.

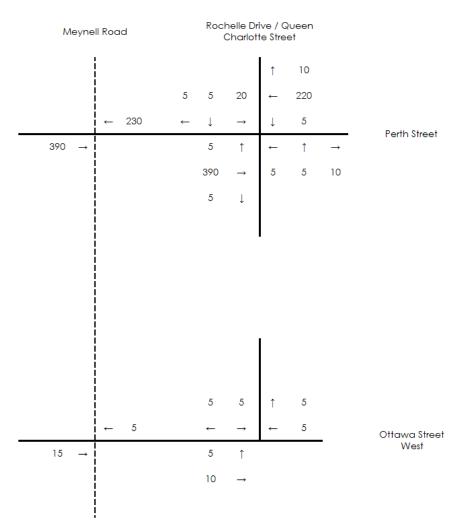


Existing Transportation Environment May 11, 2018

Stantec conducted traffic counts at the Ottawa Street at Queen Charlotte Street intersection on December 14, 2017.

Figure 5 and **Figure 6** illustrate the 2018 existing AM and PM peak hour traffic volumes at the study area intersections. **Appendix A** contains the traffic data and is provided for reference.





Future Transportation Environment May 11, 2018

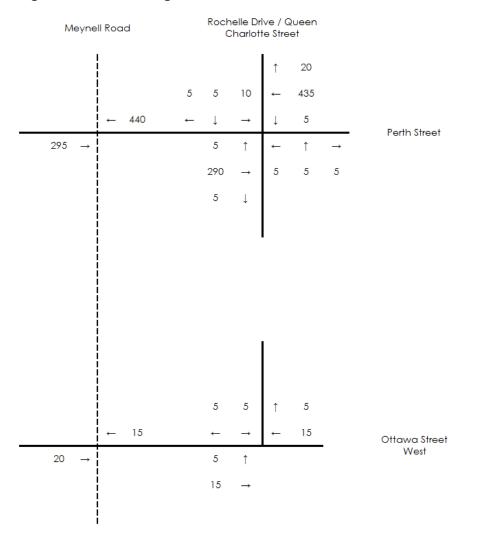


Figure 6 2018 Existing Traffic Volumes – PM Peak Hour

3.0 FUTURE TRANSPORTATION ENVIRONMENT

3.1 FUTURE NETWORK UPGRADES

3.1.1 Road Network Improvements

Several significant transportation improvements have been noted in the City of Ottawa's 2013 *Transportation Master Plan* and the Village of Richmond's 2010 *Transportation Master Plan* near the proposed site and are outlined in **Table 1** below.



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Table 1 Scheduled Upgrades

Project	Description	Ottawa TMP Phase	Richmond TMP Phase
New North-South Collector	Will ultimately connect Ottawa Street, Perth Street, and the Richmond Village By-Pass.	N/A	Stage 1 (2011 - 2020)
Perth Street Roundabout	Proposed at the intersection between Perth Street at the New North-South collector.	N/A	Stage 1 (2011 – 2020)
Richmond Village By-Pass	New two-lane road between Huntley Road and Eagleson Road.	Network Concept (i.e. beyond 2031)	Stage 2 (2021 – 2031)
Perth Street	Widen to four lanes between Shea Road and Eagleson Road and between Queen Charlotte Street and the village boundary.	Network Concept (i.e. beyond 2031)	(no timeline provided)

- The New North-South Collector road (Meynell Road) will serve as the primary access to the site.
- The roundabout at the Perth Street at New North-South collector (Meynell Road) intersection is identified within Stage 1 of the Village of Richmond's TMP and is DC eligible. The TMP outlines that once this intersection meets traffic signal warrants, a roundabout should be implemented.
- The Richmond Village By-Pass will not directly impact the subject development and is highlighted for information purposes.
- The widening of Perth Street is not scheduled to occur within the timelines of the subject study; however, adequate right-of-way width will be required to protect for the future widening.

3.1.2 Future Background Developments

There are several developments scheduled to occur near the subject site, as outlined in Table 2 below. These background developments were explicitly accounted for and added to the roadway network as background traffic volumes.

Table 2 Background Developments

Development	Location	Size	Assumed Build-Out
Richmond Village Development Corporation Phase 1	Bordered by Perth Street to the north, undeveloped/vacant land to the west and south, and the Jock River Tributary to the east.	214 residential units	2021
Richmond Oaks Health Centre	Northeast quadrant of the Perth Street at Rochelle Drive intersection.	24,000 ft2 GFA retail 31 units of senior residence	2022
Samara Square	Located north of Chestnut Green Private, east of Talos Circle. The site is bordered by outdoor recreational facilities to the east and vacant land to the north.	147 apartment units 124 senior apartments 4,920 ft2 GFA retail	2023
Richmond Village Development Corporation Phase 2	Bounded by Perth Street to the north, Richmond Village Development Corporation Phase 1 to the east, and vacant land to the south and west	205 residential units	2024
Richmond Village Development Corporation Phase 3	Bounded by Perth Street to the south, existing development to the east, and vacant land to the west and north.	308 residential units	2028



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3.2 2029 FUTURE BACKGROUND CONDITIONS

Future background conditions are assessed to differentiate between the transportation improvements that may be required to address background traffic growth and those that may be required to accommodate traffic generated by the subject development. Any improvements identified to address future background conditions are not the responsibility of the developer.

The Richmond Oaks Health Centre, Samara Square Transportation Impact Study, and Richmond Village Development Corporation Phases 1, 2, and 3 are anticipated to be fully built by the 2029 ultimate horizon. Site traffic for these proposed developments was obtained from the respective transportation impact studies and added to the roadway network as background traffic.

In addition to these background developments, a nominal 2% annual growth rate was applied to the through volumes along Perth Street. This rate of growth is consistent with industry standards and those that were applied in previously prepared / approved studies (i.e. *Richmond Oaks Health Centre Transportation Brief* and *Richmond Village Phase 1 Transportation Impact Study*).

Figure 7 and **Figure 8** illustrate the 2029 future background traffic volumes at the study area intersections during the AM and PM peak hours, respectively. **Appendix B** contains the site-generated traffic volumes for the Richmond Oaks Health Centre, Samara Square, and Richmond Village Development Corporation's Phases 1, 2, and 3.



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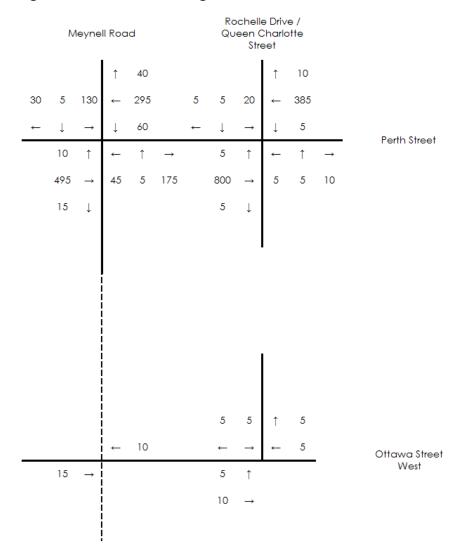


Figure 7 2029 Future Background Traffic Volumes – AM Peak Hour



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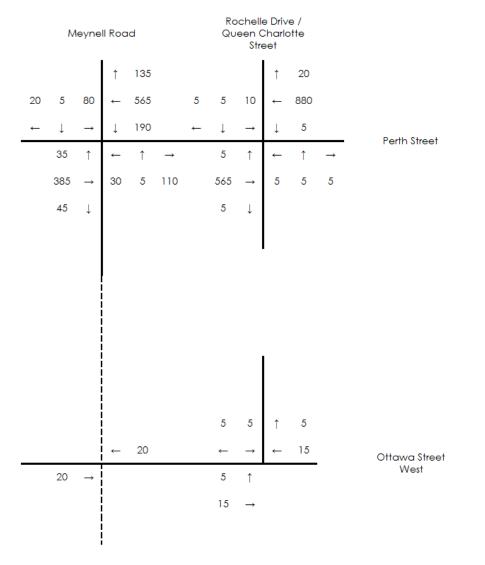


Figure 8 2029 Future Background Traffic Volumes – PM Peak Hour

3.3 SITE TRAFFIC GENERATION

3.3.1 Land Use and Trip Generation Rates

The *TRANS Trip Generation Study, 2009*, was used to estimate traffic generated by the subject site. Land use codes 210 – single detached dwellings and 224 – semi-detached dwellings, townhouses, rowhouses were thought to be most representative of the proposed land uses.

Table 3 lists the trip generation rates obtained from the TRANS Trip Generation Study.



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Table 3 TRANS Trip Generation Rates

ITE Land Use			Morr	ning Peak	Hour	Afternoon Peak Hour		
			In	Out	Total	In	Out	Total
210 Single detached dwellings	Units	848	29%	71%	0.62	62%	39%	0.92
224 Semi-detached dwellings, townhouses, rowhouses	Units	177	37%	64%	0.62	53%	47%	0.67

3.3.2 Vehicle Site Trips

Table 4 lists the vehicle trips generated by the site. The site was split north and south of Ottawa Street to facilitate trip assignment to the road network.

Table 4 Vehicle Site Trips

Location	Mo	rning Peak H	our	Afternoon Peak Hour				
Location	In	Out	Total	In	Out	Total		
Mattamy North	118	259	375	307	209	512		
Mattamy South	76	185	260	240	151	386		
Total	193	444	636	547	360	899		

3.3.3 Traffic Distribution and Assignment

The distribution of traffic to / from the study area was determined through examination of the current traffic distribution at the Perth Street at Queen Charlotte Street / Rochelle Drive intersection. The estimated distribution is as follows:

- Perth Street East 80%
- Perth Street West 20%

Figure 9 and Figure 10 illustrate the assignment of site traffic volumes to the road network for the AM and PM peak hours respectively. The abbreviated term "Neg." indicates that a negligible number of site trips are expected to utilize the turning movement.



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Figure 9 Site Traffic – AM Peak Hour

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Figure 10 Site Traffic – PM Peak Hour

3.4 2029 TOTAL FUTURE CONDITIONS

Total future conditions are examined to determine improvements that may be required as a direct result of the development. It is anticipated that by 2029 the residential development will be fully built and occupied. The 2029 total future traffic volumes were derived by adding site generated trips to future background volumes anticipated for 2029.

Figure 11 and Figure 12 illustrate the 2029 total future traffic volumes at the study area intersections during the AM and PM peak hours, respectively. Section 4.3 contains an assessment of 2029 total future traffic conditions.



Future Transportation Environment May 11, 2018

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Figure 11 2029 Total Future Traffic Volumes – AM Peak Hour



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Figure 12 2029 Total Future Traffic Volumes – PM Peak Hour



Future Transportation Environment May 11, 2018

3.5 2034 ULTIMATE CONDITIONS

Ultimate conditions for the 2034 horizon were examined to determine if other improvements may be required due to additional growth in background traffic volumes 5 years beyond the expected build-out of the subject site.

A nominal 2% annual growth rate was applied to the through volumes along Perth Street. This rate of growth is consistent with industry standards and those that were applied in previously prepared / approved studies (i.e. *Richmond Oaks Health Centre Transportation Brief* and *Richmond Village Phase 1 Transportation Impact Study*).

Figure 13 and **Figure 14** illustrate the 2034 ultimate traffic volumes at the study area intersections during the AM and PM peak hours, respectively. **Section 4.4** contains the assessment of 2034 ultimate traffic conditions.

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Figure 13 2034 Ultimate Traffic Volumes – AM Peak Hour



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Figure 14 2034 Ultimate Traffic Volumes – PM Peak Hour



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4.0 TRANSPORTATION ASSESSMENT

4.1 2018 EXISTING CONDITIONS

Figure 3 (Section 2.1) illustrates the 2018 existing intersection controls and lane configuration at the study area intersections.

4.1.1 Intersection Operational Analysis

An assessment of the study area intersections was undertaken to determine the operational characteristics of these intersections. Stop-controlled intersection operations were analyzed using the Synchro 9.2[™] software package with the Highway Capacity Manual 2010 edition (HCM 2010) methodology.

 Table 5 provides a summary of 2018 existing intersection operations.
 Appendix C contains detailed intersection performance worksheets.

The study area intersections operate acceptable under 2018 existing conditions.

Intersection	Control	A	pproach / Movement	LOS	V/C	Delay (s)	Queue 95th (veh)
		NB	Left / Through / Right	B (B)	0.05 (0.05)	13.0 (15.6)	0.1 (0.1)
		EB	Left / Through / Right	A (A)	0.00 (0.01)	7.8 (8.4)	0.0 (0.0)
Perth Street at Queen Charlotte	Two-Way Stop	WB	Left	A (A)	0.01 (0.01)	8.2 (7.9)	0.0 (0.0)
Street / Rochelle Drive	Control	WB	Through / Right	A (A)	0.00 (0.00)	0.0 (0.0)	0.0 (0.0)
Dive		SB	Left / Through / Right	B (B)	0.07 (0.06)	13.3 (15.6)	0.2 (0.2)
		(Overall Intersection	A (A)	n/a	1.1 (0.8)	n/a
		EB	Left / Through / Right	A (A)	0.02 (0.03)	7.1 (7.1)	0.1 (0.1)
Ottawa Street	All-Way Stop	WB	Left / Through / Right	A (A)	0.01 (0.02)	6.7 (6.9)	0.0 (0.1)
West at Queen Charlotte Street	Control	SB	Left / Through / Right	A (A)	0.01 (0.01)	6.8 (6.9)	0.0 (0.0)
			Overall Intersection	A (A)	n/a	6.9 (7.0)	n/a

Table 5 2018 Existing Intersection Operations

4.2 2029 FUTURE BACKGROUND CONDITIONS

Future background conditions for the 2029 horizon were assessed to determine transportation improvements that may be required to address growth in traffic exclusive from improvements that may be required to accommodate traffic generated by the proposed development.

The background development assumptions and distributions outlined in **Section 3.1** and **Section 3.2** were applied to existing traffic volumes to predict 2029 future background traffic volumes.



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4.2.1 Intersection Operational Analysis

An assessment of the study area intersections was undertaken to determine the operational characteristics of these intersections. Stop-controlled intersection operations were analyzed using the Synchro 9.2[™] software package with the Highway Capacity Manual 2010 edition (HCM 2010) methodology. Roundabout operations were analyzing using the Sidra 7.0 software package with the SIDRA Standard capacity model and SIDRA Roundabout level of service (LOS) method.

 Table 6 summarizes the operational characteristics of the study area intersections under 2029 future background conditions.

 Appendix C contains detailed intersection performance worksheets.

The intersection of Perth Street and Meynell Road was assumed to be a single-lane roundabout by the 2026 horizon as per the Village of Richmond *Transportation Master Plan* and the *Richmond Village Phase 1 Transportation Impact Study*. The study area intersections are projected to operate acceptably under 2029 future background conditions.

Intersection	Control	Ар	proach / Movement	LOS	V/C	Delay (s)	Queue 95th (veh)					
		NB	Left / Through / Right	C (D)	0.08 (0.10)	20.7 (32.7)	0.3 (0.3)					
		EB	Left / Through / Right	A (A)	0.00 (0.01)	8.1 (9.8)	0.0 (0.0)					
Perth Street at Queen Charlotte	Two-Way Stop	WB	Left	A (A)	0.01 (0.01)	9.4 (8.6)	0.0 (0.0)					
Street / Rochelle Drive	Control	VVD	Through / Right	A (A)	0.00 (0.00)	0.0 (0.0)	0.0 (0.0)					
Dive		SB	Left / Through / Right	C (D)	0.11 (0.12)	19.8 (30.5)	0.4 (0.4)					
		0	verall Intersection	A (A)	n/a	0.9 (0.8)	n/a					
	Single-lane Roundabout	NB	Left / Through / Right	A (A)	0.24 (0.14)	7.5 (6.5)	1.4 (0.7)					
		WB	Left / Through / Right	A (A)	0.27 (0.59)	4.3 (4.8)	1.5 (4.5)					
Perth Street at Meynell Road		SB	Left / Through / Right	A (B)	0.15 (0.13)	9.3 (11.5)	0.7 (0.7)					
inity for t toda	ritandaboar	EB	Left / Through / Right	A (A)	0.40 (0.39)	4.1 (4.9)	2.3 (2.1)					
		0	verall Intersection	A (A	0.40 (0.59)	5.4 (5.4)	2.3 (4.5)					
							EB	Left / Through / Right	A (A)	0.02 (0.02)	7.1 (7.1)	0.1 (0.1)
Ottawa Street at	All-Way Stop	WB	Left / Through / Right	A (A)	0.01 (0.02)	6.7 (6.9)	0.0 (0.1)					
Queen Charlotte Street	Control	SB	Left / Through / Right	A (A)	0.01 (0.01)	6.8 (6.9)	0.0 (0.0)					
		0	verall Intersection	A (A)	n/a	6.9 (7.0)	n/a					

Table 6 2029 Future Background Intersection Operations



Transportation Assessment May 11, 2018

4.3 2029 TOTAL FUTURE CONDITIONS

Total future conditions are assessed to determine transportation improvements that may be required to accommodate traffic generated by the proposed development. The site trip generation, distribution, and assignment assumptions outlined in **Section 3.3** were added to the 2029 future background traffic volumes to predict total future traffic volumes.

4.3.1 Intersection Operational Analysis

An assessment of the study area intersections was undertaken to determine the operational characteristics of these intersections. Stop-controlled intersection operations were analyzed using the Synchro 9.2[™] software package with the Highway Capacity Manual 2010 edition (HCM 2010) methodology. Roundabout operations were analyzing using the Sidra 7.0 software package with the SIDRA Standard capacity model and SIDRA Roundabout level of service (LOS) method.

Table 7 summarizes the operational characteristics of the study area intersections under 2029 total future conditions.**Figure 15** illustrates the assumed intersection control and lane geometry.

Perth Street at Queen Charlotte Street / Rochelle Drive: the northbound and southbound approaches of the intersection are anticipated to operate with a poor level of service due to high delay experienced at the minor approaches. Given that these are low-volume approaches that are expected to operate below capacity, further mitigation is not recommended.

Perth Street at Meynell Road: as a single-lane roundabout, the westbound approach is anticipated to operate at a v/c ratio of 0.84 during the PM peak hour and the sum of the entry and conflicting circulatory volumes will exceed 1,000 vehicles per hour for all approaches during either the weekday AM or PM peak hour. The National Cooperative Highway Research Program (NCHRP) *Report 672 – Roundabouts: An Informational Guide, Second Edition*, suggests that a two-lane entry may be needed when volumes exceed 1,000 vehicles per hour, and that the operation of the roundabout may become unstable when the v/c exceeds 0.85. Furthermore, the mid-block volumes east of Meynell Road exceed 1,000 vehicles per hour in each direction during the weekday peak hours and therefore widening Perth Street to 2-lanes in each direction should be considered.

Given that the Village of Richmond is expanding west, it is logical to extend the existing four-lane Perth Street cross section westwards to Meynell Road to support the proposed development, future developments, and facilitate adding a northbound right-turn channel and westbound left-turn lane to the single-lane roundabout. Widening Perth Street to four lanes will require modifications to the Perth Street and Queen Charlotte / Rochelle Drive intersection (i.e. conversion of the westbound left-turn lane to a shared westbound left/thru-turn lane).

With the above mitigation measures in place, all study area intersections are forecasted to operate acceptably.

Table 8 summarizes the operational characteristics of the mitigated intersections. Figure 16 illustrates the recommended intersection controls and lane geometry. Appendix C contains detailed intersection performance worksheets.



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Intersection	Control	А	pproach / Movement	LOS	V/C	Delay (s)	Queue 95th (veh)
		NB	Left / Through / Right	E (F)	0.16 (0.32)	39.5 (114.1)	0.6 (1.1)
Perth Street at	Two-Way Stop	EB	Left / Through / Right	A (B)	0.01 (0.01)	8.5 (12.0)	0.0 (0.0)
Queen Charlotte		WB	Left	B (A)	0.01 (0.01)	11.0 (9.6)	0.0 (0.0)
Street / Rochelle	Control	VVD	Through / Right	A (A)	0.00 (0.00)	0.0 (0.0)	0.0 (0.0)
Drive		SB	Left / Through / Right	D (F)	0.20 (0.33)	33.9 (90.5)	0.7 (1.2)
			Overall Intersection	A (A)	n/a	1.1 (1.7)	n/a
		NB	Left / Through / Right	B (A)	0.64 (0.45)	10.2 (6.4)	6.1 (3.0)
	Single-lane Roundabout	WB	Left / Through / Right	A (A)	0.37 (0.86)	5.7 (6.9)	2.4 (15.2)
Perth Street at		SB	Left / Through / Right	B (B)	0.17 (0.25)	10.1 (18.7)	0.8 (1.8)
Meynell Road		EB	Left / Through / Right	A (A)	0.46 (0.57)	5.0 (9.6)	2.7 (5.1)
			Overall Intersection	A (A)	0.64 (0.86)	7.3 (7.9)	6.1 (15.2)
		EB	Left / Through / Right	A (A)	0.06 (0.06)	7.3 (7.3)	0.2 (0.2)
Ottawa Street	All-Way Stop	WB	Left / Through / Right	A (A)	0.03 (0.08)	7.0 (7.3)	0.1 (0.2)
West at Queen	Control	SB	Left / Through / Right	A (A)	0.01 (0.01)	6.9 (7.0)	0.0 (0.0)
Charlotte Street			Overall Intersection	A (A)	n/a	7.2 (7.3)	n/a
		NB	Left / Through / Right	A (A)	0.13 (0.11)	7.8 (8.0)	0.4 (0.4)
Ottawa Street		EB	Left / Through / Right	A (A)	0.11 (0.11)	8.0 (8.4)	0.4 (0.4)
West at Meynell	All-Way Stop	WB	Left / Through / Right	A (A)	0.02 (0.08)	7.4 (8.1)	0.1 (0.3)
Road	Control	SB	Left / Through / Right	A (A)	0.09 (0.24)	7.5 (8.5)	0.3 (0.9)
			Overall Intersection	A (A)	n/a	7.8 (8.3)	n/a

Table 7 2029 Total Future Intersection Operations (prior to Mitigation)

Table 8 2029 Total Future Intersection Operations (Mitigated)

Intersection	Control	A	pproach / Movement	LOS	V/C	Delay (s)	Queue 95th (veh)
		NB	Left / Through / Right	D (F)	0.14 (0.20)	33.3 (62.7)	0.5 (0.7)
Perth Street at		EB	Left / Through / Right	A (B)	0.01 (0.01)	8.5 (12.0)	0.0 (0.0)
Queen Charlotte	Two-Way Stop	WB	Left / Through / Right	B (A)	0.01 (0.01)	11.0 (9.6)	0.0 (0.0)
Street / Rochelle	Control	SB	Left / Through / Right	D (F)	0.20 (0.34)	35.4 (94.6)	0.7 (1.2)
Drive			Overall Intersection	A (A)	n/a	1.1 (1.4)	n/a
			Left / Through	В (А)	0.05 (0.03)	10.5 (9.7)	0.3 (0.2)
		NB	Right	A (A)	0.26 (0.20)	3.2 (3.2)	0.0 (0.0)
	Single-lane		Through / Right	A (A)	0.16 (0.43)	9.3 (9.4)	0.7 (2.6)
Perth Street at	Roundabout with	WB	Left	A (A)	0.21 (0.42)	3.4 (3.5)	1.0 (2.6)
Meynell Road	NBR and WBL	SB	Left / Through / Right	A (B)	0.17 (0.14)	9.2 (10.3)	0.5 (0.5)
	turn lanes	EB	Left / Through / Right	A (A)	0.50 (0.58)	5.0 (9.4)	2.6 (4.2)
			Overall Intersection	A (A)	0.50 (0.58)	5.2 (6.6)	2.6 (4.2)



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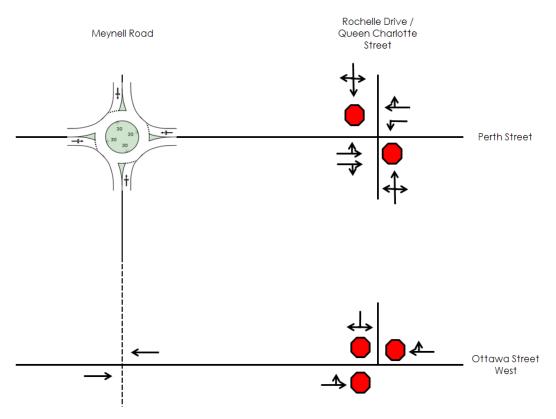
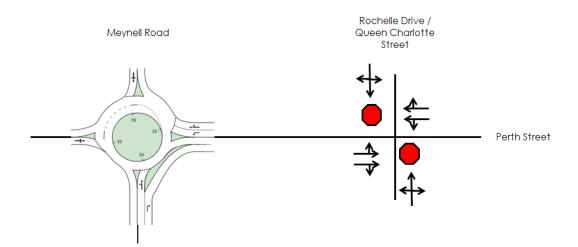


Figure 15 2029 Assumed Intersection Control and Lane Geometry

Figure 16 2029 Recommended Intersection Control and Lane Geometry Improvements





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4.4 2034 ULTIMATE CONDITIONS

Ultimate future conditions for the 2034 horizon were examined to determine if other improvements may be required due to growth in background traffic five years beyond the anticipated build-out horizon of the site.

4.4.1 Intersection Operational Analysis

Table 9 summarizes the operational characteristics of the study area intersections under 2034 ultimate conditions.**Figure 17** illustrates the intersection control and lane requirements for the 2034 total future horizon.

Consistent with the 2029 total horizon, the northbound and southbound movements at the intersection of Perth Street at Queen Charlotte Street / Rochelle Drive, are expected to experience high delays. However, those movements have very low traffic volumes, the movements are operating below capacity, and therefore mitigation is not recommended. All remaining study area intersections are forecasted to operate acceptably under 2034 conditions.

Appendix C contains detailed intersection operation summaries.

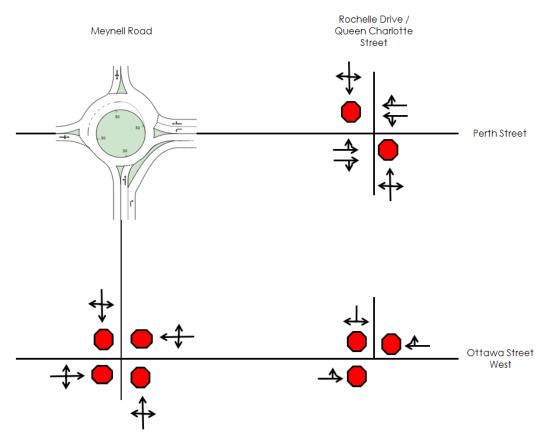
INTERSECTION		APPI	ROACH / MOVEMENT	LOS	V/C	Delay (s)	Queue 95th (veh)
		NB	Left / Through / Right	E (F)	0.15 (0.22)	36.0 (72.3)	0.5 (0.8)
Perth Street at		EB	Left / Through / Right	A (B)	0.01 (0.01)	8.6 (12.3)	0.0 (0.0)
Queen Charlotte	Two-way stop	WB	Left / Through / Right	B (A)	0.01 (0.01)	11.2 (9.7)	0.0 (0.0)
Street / Rochelle	control	SB	Left / Through / Right	E (F)	0.22 (0.51)	38.8 (138.6)	0.8 (1.9)
Drive		0	verall Intersection	A (A)	n/a	1.2 (2.1)	n/a
		ND	Left / Through	B (A)	0.05 (0.03)	10.7 (9.8)	0.3 (0.2)
	Single-lane roundabout with WBL and NBR lanes	NB	Right	A (A)	0.26 (0.20)	3.2 (3.2)	0.0 (0.0)
			Through / Right	A (A)	0.16 (0.44)	9.3 (9.4)	0.7 (2.7)
Perth Street at		WB	Left	A (A)	0.22 (0.45)	3.4 (3.5)	1.1 (2.9)
Meynell Road		SB	Left / Through / Right	A (B)	0.17 (0.14)	9.3 (10.4)	0.5 (0.5)
		EB	Left / Through / Right	A (A)	0.54 (0.62)	5.2 (9.9)	3.0 (4.8)
		0	verall Intersection	A (A)	0.54 (0.62)	5.3 (6.7)	n/a
		EB	Left / Through / Right	A (A)	0.06 (0.06)	7.3 (7.3)	0.2 (0.2)
Ottawa Street	All-way stop	WB	Left / Through / Right	A (A)	0.03 (0.08)	7.0 (7.3)	0.1 (0.2)
West at Queen	control	SB	Left / Through / Right	A (A)	0.01 (0.01)	6.9 (7.0)	0.0 (0.0)
Charlotte Street		0	verall Intersection	A (A)	n/a	7.2 (7.3)	n/a
		NB	Left / Through / Right	A (A)	0.13 (0.11)	7.8 (8.0)	0.4 (0.4)
Ottawa Street		EB	Left / Through / Right	A (A)	0.11 (0.11)	8.0 (8.4)	0.4 (0.4)
West at Meynell	All-way stop	WB	Left / Through / Right	A (A)	0.02 (0.08)	7.4 (8.1)	0.1 (0.3)
Road	control	SB	Left / Through / Right	A (A)	0.09 (0.24)	7.5 (8.5)	0.3 (0.9)
		0	verall Intersection	A (A)	n/a	7.8 (8.3)	n/a

Table 9 2034 Ultimate Intersection Operations



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5.0 DRAFT PLAN REVIEW

The objective of the draft plan review is to create an efficient, integrated, well designed transportation network that accommodates all modes of travel.

Figure 18 shows the proposed modifications to existing transit route 283 to service the new development (Figure 4 shows the existing transit routing). To create efficient routing, the existing transit route has been removed from McBean Street and a portion of Perth Street and the proposed transit route has been added to Meynell Road and Ottawa Street. The proposed transit route modifications will provide the proposed residential subdivision with transit service and will improve transit route efficiency (i.e. remove overlap). The removal of the transit route from McBean Street is not anticipated to significantly impact existing transit users.

Figure 19 shows the proposed transit routes and stops, sidewalks, and pathways. Most residents will be located within 400 metres walking distance of the two proposed transit stops on Meynell Road. Sidewalks are recommended on both sides of collector roads and on one side of several local roads to facilitate walking trips to transit stops, the school, parkettes, and the community park. The site plan also includes short blocks with pathways to facilitate walking.

Figure 20 shows the proposed cross-section for Meynell Road which is consistent with the cross-section of Meynell Road through the Richmond Village Development Corporation's proposed development. The 22-m cross-section will feature an 8.5 m asphalt surface and sidewalks on both sides.

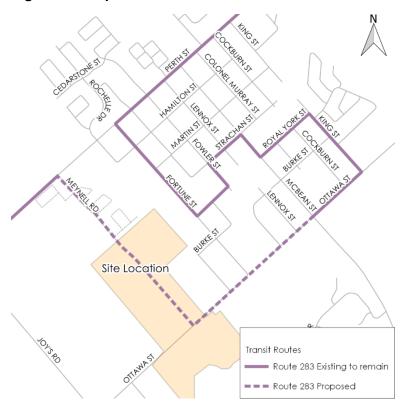


Figure 18 Proposed Transit Route Modification



Draft Plan Review May 11, 2018

Figure 19 Proposed Transit Routes and Stops, Sidewalks, and Pathways





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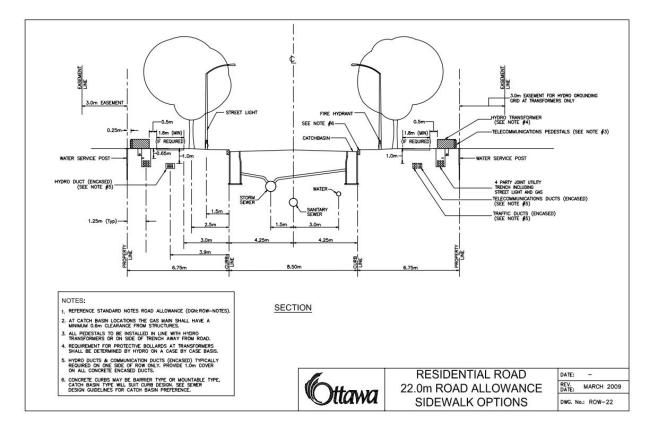


Figure 20 Proposed Meynell Road Cross Section

Transportation Demand Management May 11, 2018

6.0 TRANSPORTATION DEMAND MANAGEMENT

The City of Ottawa Transportation Demand Management (TDM) supportive design & infrastructure measures checklist was used to identify TDM measures that could be applied to the subject site. The checklist is below.

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

Transportation Demand Management May 11, 2018

	TDM-s	supportive design & infrastructure measures: Residential developments	Check if completed & descriptions, explanations
REQUIRED	1.2.3	Provide sidewalks of smooth, well-drained walking surfaces of contrasting materials or treatments to differentiate pedestrian areas from vehicle areas, and provide marked pedestrian crosswalks at intersection sidewalks (see Official Plan policy 4.3.10)	Sidewalks will be provided and crosswalks marked at intersections.
REQUIRED	1.2.4	Make sidewalks and open space areas easily accessible through features such as gradual grade transition, depressed curbs at street corners and convenient access to extra-wide parking spaces and ramps (see Official Plan policy 4.3.10)	Gradual grade transition and depressed curbs to be provided at street corners.
REQUIRED	1.2.5	Include adequately spaced inter-block/street cycling and pedestrian connections to facilitate travel by active transportation. Provide links to the existing or planned network of public sidewalks, multi-use pathways and on- road cycle routes. Where public sidewalks and multi-use pathways intersect with roads, consider providing traffic control devices to give priority to cyclists and pedestrians (see Official Plan policy 4.3.11)	Pathways identified on plan.
BASIC	1.2.6	Provide safe, direct and attractive walking routes from building entrances to nearby transit stops	Walking routes, sidewalks and pathways identified on plan.
BASIC	1.2.7	Ensure that walking routes to transit stops are secure, visible, lighted, shaded and wind-protected wherever possible	Walking routes will be on streets, sidewalks, or pathways. Lighting will be provided on pathways and may be provided for streets/sidewalks as per City standards.
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	Target operating speed for local roads will be 30 km/h to the extent possible while respecting standard City cross-sections.
	1.3	Amenities for walking & cycling	
BASIC	1.3.1	Provide lighting, landscaping and benches along walking and cycling routes between building entrances and streets, sidewalks and trails	Walking and cycling routes will be on streets, sidewalks or pathways. Lighting will be provided on pathways and may be provided for streets/sidewalks as per City standards.
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	Not applicable



Transportation Demand Management May 11, 2018

	TDM-s	supportive design & infrastructure measures: Residential developments	Check if completed & add descriptions, explanations or plan/drawing references
		directions to reach transit stops/stations, trails or other common destinations are not obvious)	
	2.	WALKING & CYCLING: END-OF-TRIP FACILITIES	
	2.1	Bicycle parking	
REQUIRED	2.1.1	Provide bicycle parking in highly visible and lighted areas, sheltered from the weather wherever possible (see Official Plan policy 4.3.6)	Not applicable
REQUIRED	2.1.2	Provide the number of bicycle parking spaces specified for various land uses in different parts of Ottawa; provide convenient access to main entrances or well- used areas (see Zoning By-law Section 111)	Not applicable
REQUIRED	2.1.3	Ensure that bicycle parking spaces and access aisles meet minimum dimensions; that no more than 50% of spaces are vertical spaces; and that parking racks are securely anchored (see Zoning By-law Section 111)	Not applicable
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	Not applicable
	2.2	Secure bicycle parking	
REQUIRED	2.2.1	Where more than 50 bicycle parking spaces are provided for a single residential building, locate at least 25% of spaces within a building/structure, a secure area (e.g. supervised parking lot or enclosure) or bicycle lockers (see Zoning By-law Section 111)	Not applicable
BETTER	2.2.2	Provide secure bicycle parking spaces equivalent to at least the number of units at condominiums or multi- family residential developments	Not applicable
	2.3	Bicycle repair station	
BETTER	2.3.1	Provide a permanent bike repair station, with commonly used tools and an air pump, adjacent to the main bicycle parking area (or secure bicycle parking area, if provided)	Not applicable



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	TDM-s	supportive design & infrastructure measures: Residential developments	Check if completed & add descriptions, explanations or plan/drawing references
	3.	TRANSIT	
	3.1	Customer amenities	
BASIC	3.1.1	Provide shelters, lighting and benches at any on-site transit stops	Transit shelters will be provided at the two proposed transit stops
BASIC	3.1.2	Where the site abuts an off-site transit stop and insufficient space exists for a transit shelter in the public right-of-way, protect land for a shelter and/or install a shelter	Not applicable
BETTER	3.1.3	Provide a secure and comfortable interior waiting area by integrating any on-site transit stops into the building	Not applicable
	4.	RIDESHARING	
	4.1	Pick-up & drop-off facilities	
BASIC	4.1.1	Provide a designated area for carpool drivers (plus taxis and ride-hailing services) to drop off or pick up passengers without using fire lanes or other no-stopping zones	Not applicable
	5.	CARSHARING & BIKESHARING	
	5.1	Carshare parking spaces	
BETTER	5.1.1	Provide up to three carshare parking spaces in an R3, R4 or R5 Zone for specified residential uses <i>(see Zoning By-law Section 94)</i>	Not applicable
	5.2	Bikeshare station location	
BETTER	5.2.1	Provide a designated bikeshare station area near a major building entrance, preferably lighted and sheltered with a direct walkway connection	Not applicable



Transportation Demand Management May 11, 2018

	TDM-s	supportive design & infrastructure measures: Residential developments	Check if completed & add descriptions, explanations or plan/drawing references
	6.	PARKING	
	6.1	Number of parking spaces	
REQUIRED	6.1.1	Do not provide more parking than permitted by zoning, nor less than required by zoning, unless a variance is being applied for	Not applicable
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	Not applicable
BASIC	6.1.3	Where a site features more than one use, provide shared parking and reduce the cumulative number of parking spaces accordingly (see Zoning By-law Section 104)	Not applicable
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>	Not applicable
	6.2	Separate long-term & short-term parking areas	
BETTER	6.2.1	Provide separate areas for short-term and long-term parking (using signage or physical barriers) to permit access controls and simplify enforcement (i.e. to discourage residents from parking in visitor spaces, and vice versa)	Not applicable



Summary and Conclusions May 11, 2018

7.0 SUMMARY AND CONCLUSIONS

Proposed Development

- Mattamy's proposed residential subdivision in the Village of Richmond (City of Ottawa) is located roughly 600
 m south of Perth Street and west of Queen Charlotte Street and extends south of Ottawa Street towards the
 Jock River. The site is bound by Richmond Village Development Corporation's plan of subdivision to the north,
 existing residential homes to the east, the Jock River to the south, and vacant agricultural lands to the west.
 The proposed development is anticipated to consist of 177 townhome-style dwellings and 848 single family
 dwellings for a total of 1025 residential units.
- The development is anticipated to generate 600 and 843 vehicle trips during the AM and PM peak hours, respectively.

2018 Existing Conditions

• The study area intersections assessed as part of this study currently operate acceptably under 2018 existing conditions.

2029 Future Background Conditions

- By 2029 the intersection of Perth Street and Meynell Road was assumed to be constructed as a single-lane roundabout as per the Village of Richmond Transportation Master Plan and consistent with the Richmond Village Phase 1 Transportation Impact Study (Richmond Village Development Corporation).
- The study area intersections are forecasted to operate acceptably under 2029 future background conditions.

2029 Total Future Conditions

- At the intersection of Perth Street at Queen Charlotte Street / Rochelle Drive, the northbound and southbound
 movements are expected to experience poor levels of service due to high delays. However, those movements
 are expected to operate below capacity as they have very low traffic volumes, and therefore, further mitigation
 is not recommended.
- Without additional mitigation, the single-lane roundabout assumed at the intersection of Perth Street and Meynell Road is forecasted to operate above capacity.
- The mid-block volumes on Perth Street east of the Meynell Road are forecasted to exceed the typical arterial lane capacity of 1,000 vehicles per hour during the AM and PM peak hours.
- It is recommended that Perth Street be widened to four lanes between Queen Charlotte Street / Rochelle
 Drive and Meynell Road. In conjunction with this, the Perth Street / Meynell Road roundabout should be
 widened to accommodate two entry lanes on the westbound approach and two departure lanes proceeding
 eastbound from the roundabout. The roundabout would function with a dedicated westbound left-turn lane and
 northbound right-turn lane with the remaining movements operating in a shared lane configuration.



Summary and Conclusions May 11, 2018

• With the above improvements in place all study area intersections are forecasted to operate acceptably under 2029 total future conditions.

2034 Ultimate Conditions

- Similar to the 2029 total future horizon, the northbound and southbound movements at the intersection of Perth Street at Queen Charlotte Street / Rochelle Drive are forecasted to experience poor level of service due to high delays. Given that these movements will have very low volumes and are projected to operate below capacity, further mitigation is not recommended.
- All remaining study area intersections are forecasted to operate acceptably under 2034 ultimate conditions.

Draft Plan Review

- Transit route modifications have been proposed in order to service the proposed residential development
 adequately and to create more efficient transit routing without significantly impacting existing transit users.
 Most residents in the proposed residential development will be located within 400 metres walking distance of
 the proposed transit stops along Meynell Road.
- The draft plan includes sidewalks along both sides of Meynell Road and along one side of several local roads. Additionally, short blocks and pathway connections will help to facilitate walking trips to transit stops, the school, parkettes, and the community park.
- The cross-section of Meynell Road through Mattamy's plan of subdivision is consistent with the cross-section of Meynell Road through Richmond Village Development Corporation's development to the north. The crosssection for Meynell Road features wide travel lanes which will facilitate cyclists and motor vehicles operating in a shared lane.

Transportation Demand Management

With the proposed development being residential in nature, opportunities for Transportation Demand Management (TDM) measures / initiatives are limited. TMD measures / initiatives for the proposed development include:

- Sidewalks along both sides of the proposed north-south collector (Meynell Road) and along several local streets within the plan of subdivision.
- Marked crosswalks at intersections and depressed curbs at street corners.
- Safe (i.e. illuminated), direct and attractive walking routes to transit stops located along Meynell Road.
- Transit shelters with lighting at transit stops; and
- The target operating speed for local roads will be 30 km/h to the extent possible while respecting standard cross-sections.



Summary and Conclusions May 11, 2018

Based on the transportation evaluation and improvements recommended in this study, Mattamy's proposed Richmond subdivision residential development should be permitted to proceed.

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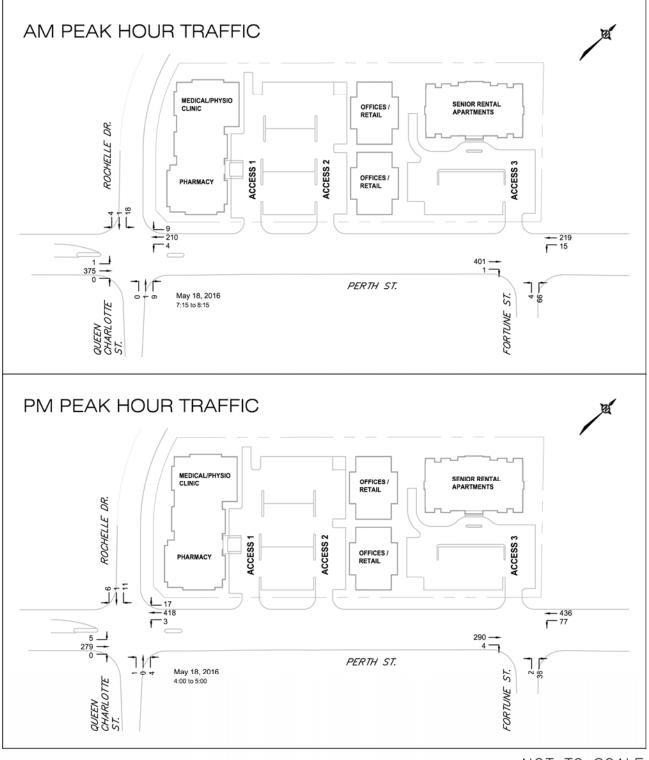
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Robert Vastag, RPP Project Manager, Senior Transportation Planner



Appendix A TRAFFIC DATA May 11, 2018

Appendix A TRAFFIC DATA



NOT TO SCALE

											L I		Č Z	0	t don	Č	Turning Movement Count Benert		t									
									Repd	ort Gen	erated (Ising Tu	rning M	loveme	ent Cou	nt for An	I ULLING INCOMPLICATION COULD NO POIL Report Generated Using Turning Movement Count for Android by PortableStudies.com	Portab	leStudie	is.com								
														Study	Study Information	ition												
				ട്	Count Name																						Peak Hou	Peak Hour Volume
	Que	Queen Charlotte Street and Ottawa Street - Weekday AM Peak Hour Count	e Street s	and Ottaw	/a Street - \	Weekday	AM Peak	Hour Coui	ŧ																		-	18
					Location																						% Bank 1	% Bank 2
ر است. مەربى		Queen Ch	iarlotte ar.	nd Ottawa	Queen Charlotte and Ottawa Street, Richmond, Ottawa, Canada	chmond,	Ottawa, C	anada			SƏ					C = C	U = U Tum L = Left Tum T = Thru F	L = Left	, mj	T = Thru R = Right Turn	R = Rigt	tt Turn					77.8%	22.2%
ng Kpnts				Per	Performed By						ION					<u> </u>	Vé	⊔riection ∋h = Total	T Vehicles 1	rz = reat or Approat	strian Uir. ch	CION 2					% Bank 3	% Bank 4
;					ERS																						%0:0	0.0%
					Date																						Pedestria	Pedestrians Volume
				Decen	December 14, 2017	17																						2
														Peak	Peak Hour Data	ata												
Time			Eastb	Eastbound Approach	proach					Westbou	Westbound Approach	ach		-		Nort	Northbound Approach	oproach					Southbou	Southbound Approach	ç		Total	Total
Period	5	-	⊢	Ľ	P1	P2	Veh	∍	_	⊢	<u>د</u>	P1 P2	2 Veh		L U	-	Ľ	P1	P2	Veh	∍	_	⊢	R F	1 P2	Veh	Vehicles	Pedestrians
7:30 AM	0	0	2	0	0	0	2	0	0	٢	0	0 0		1	0 0	0	0	0	0	0	0	0	0	0	0 0	0	3	0
7:45 AM	0	~	ъ	0	0	0	4	0	0	0	0	0	0		0	0	0	0	0	0	0	0	0	0	0	0	4	0
8:00 AM	0	~	ю	0	0	0	4	0	0	0	-	0		-	0	0	0	0	2	0	0	5	0	0	0	2	2	2
8:15 AM	0	0	3	0	0	0	ъ	0	0	0	0	0 0	0 0		0 0	0	0	0	0	0	0	0	0	1	0 0	1	4	0
													Vehi	cle Mo	vement	Vehicle Movement Summary	Å											
Movement /			Eastb	Eastbound Approach	proach					Westbou	Westbound Approach	ach				Nort	Northbound Approach	oproach					Southbou	Southbound Approach	ch		Entire In	Entire Intersection
Details	∍	L	F	Ľ	P1	P2	Veh	D	L	Ŧ	<u>د</u>	P1 P2	2 Veh		U L	+	Ц	P1	P2	Veh	∍	L	F	R P1	1 P2	Veh	Vehicles	Pedestrians
Movement Volume	ne 0	2	11	0	0	0	13	0	0	1	+	0	0 2		0 0	0	0	0	2	0	0	7	0	1	0 0	3	18	2
PHF		0.50	0.92				0.81		-	0.25 0	0.25		- 0.50						0.25			0.25	-	0.25 -		0.38	0.64	0.25
% Bank 1	0.0%	100.0%	72.7%	0.0%		•		%0.0	0.0% 0	0.0% 10	100.0%			0.1	0.0% 0.0%	%0.0%	%0.0				0.0% 1	100.0%	0.0% 10	100.0%				
% Bank 2	0.0%	0.0%	27.3%	0.0%				0.0%	0.0% 10	100.0% 0	0.0%			0.1	0.0% 0.0%	% 0.0%	0.0%				0.0%	0.0%	0.0% 0	0.0%			Need a cus	Need a custom report?
% Bank 3	%0`0	0.0%	%0.0	%0'0				%0.0	0 %0.0	0.0% 0	0.0%			0.4	0.0% 0.0%	%0.0%	%0.0				%0.0	%0.0	0.0% 0	%0.0			Con support@porta	Contact: support@portablestudies.com
% Bank 4	%0.0	0.0%	0.0%	0.0%				%0.0	0.0% 0	0.0% 0	0.0%			0.1	0.0% 0.0%	%0.0%	%0.0			1	0.0%	%0.0	0.0% 0	0.0%				

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Appendix B BACKGROUND DEVELOPMENTS May 11, 2018

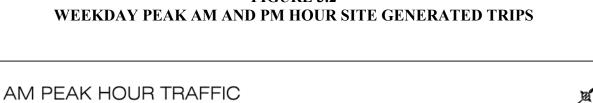
Appendix B BACKGROUND DEVELOPMENTS

Richmond Village Development Corporation Phases 1, 2, 3 Site Generated Traffic Volumes - Weekday AM Peak Hour

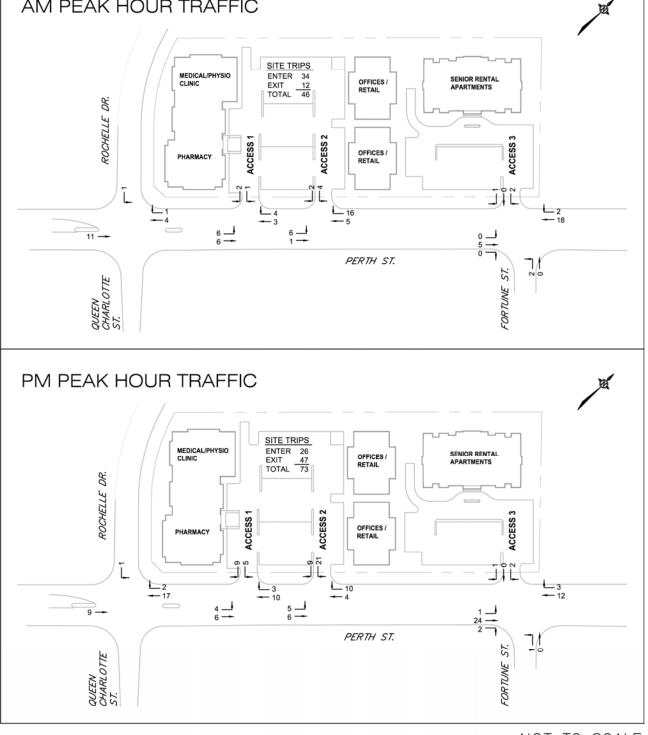
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Richmond Village Development Corporation Phases 1, 2, 3 Site Generated Traffic Volumes - Weekday PM Peak Hour

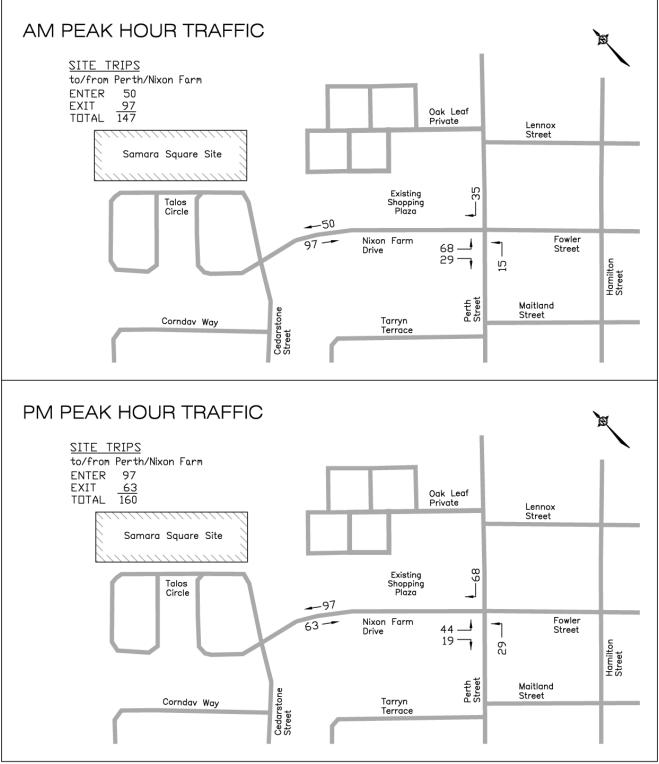
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NOT TO SCALE



NOT TO SCALE

Appendix C INTERSECTION PERFORMANCE WORKSHEETS May 11, 2018

Appendix C INTERSECTION PERFORMANCE WORKSHEETS

HCM 2010 TWSC 1: Queen Charlotte St./Rochelle Dr. & Perth St.

Western Development Lands 2018 Existing AM

Intersection												
Int Delay, s/veh	1.1											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		41>		1	ţ,			4			4	
Traffic Vol, veh/h	5	390	5	5	220	10	5	5	10	20	5	5
Future Vol, veh/h	5	390	5	5	220	10	5	5	10	20	5	5
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length			-	0		-		-				-
Veh in Median Storage	# -	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-		0			0	-
Peak Hour Factor	90	90	90	90	90	90	90	90	90	90	90	90
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	6	433	6	6	244	11	6	6	11	22	6	6
Major/Minor N	Najor1			Major2			Minor1		1	Minor2		
Conflicting Flow All	256	0	0	439	0	0	714	714	219	492	711	250
Stage 1				-		-	447	447		261	261	
Stage 2							267	267		231	450	
Critical Hdwy	4.13	-		4.13	-	-	7.33	6.53	6.93	7.33	6.53	6.23
Critical Hdwy Stg 1	-			-			6.53	5.53		6.13	5.53	-
Critical Hdwy Stg 2	-	-	-		-	-	6.13	5.53	-	6.53	5.53	-
	2.219	-		2.219	-	-	3.519	4.019	3.319	3.519	4.019	3.319
Pot Cap-1 Maneuver	1307	-	-	1119	-	-	332	356	786	473	357	788
Stage 1	-	-	-	-	-	-	561	573	-	743	692	-
Stage 2	-	-	-	-	-	-	738	687	-	752	571	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1307	-	-	1119	-	-	323	352	786	457	353	788
Mov Cap-2 Maneuver	-	-	-	-	-	-	323	352	-	457	353	-
Stage 1	-	-	-	-	-	-	558	570	-	739	688	-
Stage 2	-	-	-	-	-	-	723	683	-	730	568	-
Approach	EB			WB			NB			SB		
HCM Control Delay, s	0.1	_		0.2	_		13		_	13.3	_	
HCM LOS							В			В		
Minor Lane/Major Mvm	t I	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1	_	_	_
Capacity (veh/h)		472	1307	-	-	1119	-		467			
HCM Lane V/C Ratio		0.047	0.004			0.005			0.071			
HCM Control Delay (s)		13	7.8	0	-	8.2	-		13.3			
HCM Lane LOS		В	A	A		A			В			
		0.1	0			0			0.2			

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Synchro 9 Report

HCM 2010 TWS 1: Queen Charlo	-	St./Ro	chell	e Dr.	& Pe	erth S	St.				vves	tern L	Development Land 2018 Existing I
ntersection													
nt Delay, s/veh	0.8												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	
ane Configurations		4î þ		٦.	1			4			4		
Traffic Vol, veh/h	5	290	5	5	435	20	5	5	5	10	5	5	
Future Vol. veh/h	5	290	5	5	435	20	5	5	5	10	5	5	
Conflicting Peds, #/hr	Ű	0	0	0	0	0	0	0	0	0	Ő	0	
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop	
RT Channelized	-	-	None	1100	1100	None		otop	None	otop	otop	None	
Storage Length		-	NONG	0		NONG	-		None			None	
		0		0	0			0			0		
Veh in Median Storage Grade, %		0	-	-	0			0			0	-	
Brade, % Peak Hour Factor	- 90	90			90						90	- 90	
			90	90		90	90	90	90	90			
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2	
Wvmt Flow	6	322	6	6	483	22	6	6	6	11	6	6	
	Aajor1			Major2			Minor1			Minor2			
Conflicting Flow All	506	0	0	328	0	0	847	853	164	681	845	494	
Stage 1	-	-	-	-	-	-	336	336	-	506	506	-	
Stage 2	-	-	-	-	-	-	511	517	-	175	339	-	
Critical Hdwy	4.13	-	-	4.13	-	-	7.33	6.53	6.93	7.33	6.53	6.23	
Critical Hdwy Stg 1	-	-		-			6.53	5.53		6.13	5.53	-	
Critical Hdwy Stg 2		-	-	-	-	-	6.13	5.53	-	6.53	5.53	-	
	2.219	-		2.219		-	3,519	4.019	3.319	3 5 1 9	4.019	3.319	
Pot Cap-1 Maneuver	1057			1230			268	296	852	350	299	574	
Stage 1	-			-200			652	641		548	539	-	
Stage 2		-	-			-	544	533		810	639	-	
Platoon blocked, %							044	000		010	000		
Nov Cap-1 Maneuver	1057			1230			259	292	852	340	295	574	
Nov Cap-2 Maneuver	1037			1200			259	292	- 002	340	295	3/4	
							647	637		544	536		
Stage 1	-	-		-			531	530		792	635	-	
Stage 2							551	550		192	035		
Annraach	FB			WB			NB			SB			
Approach	0.1	_		0.1			15.6	_		15.6		_	
HCM Control Delay, s HCM LOS	0.1			0.1			15.6 C			15.6 C			
IOM EOO							Ŭ			0			
Minor Lane/Major Mvm		NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBI n1				
Capacity (veh/h)		355	1057	-		1230			363				
HCM Lane V/C Ratio		0.047	0.005	-	- 1	0.005			0.061				
		15.6	8.4	0		7.9			15.6				
HCM Control Delay (s)					-		-						
HCM Lane LOS		С	A	A	-	A	-	-	С				

HCM 2010 AWSC 2: Ottawa St. W. & Queen Charlotte St.

Western Development Lands 2018 Existing AM

Intersection	_					_
Intersection Delay, s/veh	6.9					
Intersection LOS	A					
Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		र्स	ĥ		Y	
Traffic Vol, veh/h	5	10	5	5	5	5
Future Vol, veh/h	5	10	5	5	5	5
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	6	11	6	6	6	6
Number of Lanes	0	1	1	0	1	0
Approach	EB		WB		SB	
Opposing Approach	WB		EB			
Opposing Lanes	1		1		0	
Conflicting Approach Left	SB				WB	
Conflicting Lanes Left	1		0		1	
Conflicting Approach Right			SB		EB	
Conflicting Lanes Right	0		1		1	
HCM Control Delay	7.1		6.7		6.8	
HCM LOS	А		A		A	
Lane		EBLn1	WBLn1	SBLn1		
Vol Left, %		33%	0%	50%		
Vol Thru, %		67%	50%	0%		
Vol Right, %		0%	50%	50%		
Sign Control		Stop	Stop	Stop		
Traffic Vol by Lane		15	10	10		
LT Vol		5	0	5		
Through Vol		10	5	0		
RT Vol		0	5	5		
Lane Flow Rate		17	11	11		
Geometry Grp		1	1	1		
Degree of Util (X)		0.019	0.011	0.012		
Departure Headway (Hd)		4.029	3.666	3.783		
Convergence, Y/N		Yes	Yes	Yes		
Сар		893	980	950		
Service Time		2.034	1.673	1.792		
HCM Lane V/C Ratio		0.019	0.011	0.012		
		7.1	6.7	6.8		
HCM Control Delav						
HCM Control Delay HCM Lane LOS		7.1 A	0.7 A	A		

Stantec Consulting Ltd.

Synchro 9 Report

HCM 2010 AWSC 2: Ottawa St. W. & 0	Queen	Charl	otte St				Western Development Lan 2018 Existing
Intersection							
Intersection Delay, s/veh	7						
Intersection LOS	A						
Movement	EBL	EBT	WBT	WBR	SBL	SBR	
Lane Configurations		4	4		۰Y		
Traffic Vol, veh/h	5	15	15	5	5	5	
Future Vol, veh/h	5	15	15	5	5	5	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	
Heavy Vehicles, %	2	2	2	2	2	2	
Mvmt Flow	6	17	17	6	6	6	
Number of Lanes	0	1	1	0	1	0	
Approach	EB		WB		SB		
Opposing Approach	WB		EB				
Opposing Lanes	1		1		0		
Conflicting Approach Left	SB				WB		
Conflicting Lanes Left	1		0		1		
Conflicting Approach Right			SB		EB		
Conflicting Lanes Right	0		1		1		
HCM Control Delay	7.1		6.9		6.9		
HCM LOS	А		A		Α		
Lane		EBLn1	MDL-4	SBLn1			
Vol Left, %		25%	0%	50%			
Vol Thru, %		75%	75%	0%			
Vol Right, %		0%	25%	50%			
Sign Control		Stop	Stop	Stop			
Traffic Vol by Lane		20	20	10			
LT Vol		5	0	5			
Through Vol		15	15	0			
RT Vol		0	5	5			
Lane Flow Rate		22	22	11			
Geometry Grp		1	1	1			
Degree of Util (X)		0.025	0.024	0.012			
Departure Headway (Hd)		4.02	3.82	3.812			
Convergence, Y/N		Yes	Yes	Yes			
Сар		894	940	940			
Service Time		2.028	1.829	1.829			
HCM Lane V/C Ratio		0.025	0.023	0.012			
HCM Control Delay		7.1	6.9	6.9			
HCM Lane LOS		A	A	A			
HCM 95th-tile Q		0.1	0.1	0			

1: Queen Charlotte St./Rochelle Dr. & Perth St.

Western Development Lands 2029 Background AM

Int Delay, s/veh	0.9											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		41>		<u></u>	^	40		4)	40		4	
Traffic Vol, veh/h	5	800	5	5	385	10	5	5	10	20	5	5
Future Vol, veh/h	5	800	5	5	385	10	5	5	10	20	5	5
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-		None	-		None	-	-	None
Storage Length	-	-	-	0	-		-			-	-	-
Veh in Median Storage		0	-	-	0	-	-	0	-	-	0	
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	100	100	100	100	100	100	100	100	100	100	100	100
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	5	800	5	5	385	10	5	5	10	20	5	5
	Major1			Major2			Minor1		1	Minor2		
Conflicting Flow All	395	0	0	805	0	0	1218	1218	403	813	1215	390
Stage 1	-	-	-	-	-	-	813	813	-	400	400	-
Stage 2	-	-	-	-	-	-	405	405	-	413	815	-
Critical Hdwy	4.13	-	-	4.13	-	-	7.33	6.53	6.93	7.33	6.53	6.23
Critical Hdwy Stg 1	-	-	-	-	-	-	6.53	5.53	-	6.13	5.53	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.13	5.53	-	6.53	5.53	-
Follow-up Hdwy	2.219	-	-	2.219		-	3.519	4.019	3.319	3.519	4.019	3.319
Pot Cap-1 Maneuver	1162	-	-	817	-	-	147	180	598	283	181	658
Stage 1	-	-	-	-	-	-	339	391	-	625	601	-
Stage 2	-	-	-	-	-	-	622	598	-	588	390	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1162	-	-	817	-	-	141	177	598	269	178	658
Mov Cap-2 Maneuver	-	-	-	-	-	-	141	177	-	269	178	-
Stage 1	-	-	-	-	-	-	336	388	-	620	597	-
Stage 2	-	-	-	-	-	-	608	594	-	566	387	-
Approach	EB			WB			NB			SB		
HCM Control Delay, s	0.1	_	_	0.1	_	_	20.7	_	_	19.8	_	_
HCM LOS	0.1			0.1			20.7 C			C		
							Ŭ			Ŭ		
			500	505		1110						
Minor Lane/Major Mvm	t 1	VBLn1	EBL	EBT	EBR	WBL	WBT	WBR				
Capacity (veh/h)		249	1162	-		817	-		273			
HCM Lane V/C Ratio		0.08	0.004	-			-		0.11			
HCM Control Delay (s)		20.7	8.1	0		9.4	-		19.8			
HCM Lane LOS HCM 95th %tile Q(veh)		C 0.3	A 0	A		A 0	-		C 0.4			
							-					

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HCM 2010 TWSC

Intersection Int Delay, s/veh

Movement

Lane Configurations Traffic Vol, veh/h

Traffic Vol, veh/h Future Vol, veh/h Conflicting Peds, #/hr Sign Control Fre RT Channelized Storage Length Veh in Median Storage, # Grade, % Peak Hour Factor 11 Heavy Veh/ieles %

 Major/Minor
 Major/

 Conflicting Flow All
 900

 Stage 1

 Stage 2

 Critical Hdwy 4
 4.13

 Critical Hdwy 5tg 1

 Critical Hdwy Stg 1

 Critical Hdwy Stg 1

 Critical Hdwy Stg 2

 Pollow-up Hdwy
 2.219

 Pollow-up Hdwy
 753

 Stage 1

 Stage 1

 Nov Cap-1 Maneuver
 753

 Mov Cap-2 Maneuver
 753

 Mov Cap-2 Maneuver
 753

 Stage 1

Stage 1 Stage 2

Approach EB HCM Control Delay, s 0.1 HCM LOS

Minor Lane/Major Mvmt

Capacity (veh/h) HCM Lane V/C Ratio HCM Control Delay (s) HCM Lane LOS HCM 95th %tile Q(veh)

Heavy Vehicles, % Mvmt Flow

Major/Minor

1: Queen Charlotte St./Rochelle Dr. & Perth St.

0.8

EBL EB

5 565 5 5

Major1

- 0 -

0 0 570 0

4.13 -

Major2

- 4.13 2.219 - 1000

- 1000

 NBLn1
 EBL
 EBI

 145
 753

 0.103
 0.007

 32.7
 9.8
 0

 D
 A
 A

 0.3
 0

NBLn1 EBL EBT EBR WBL WBT WBR SBLn1

- 1000 - 0.005 - 8.6

A

0

WBT WBR N

0 -

880 20 5

 Construction
 Construction<

- 0 -

5

Synchro 9 Report

Western Development Lands 2029 Background PM

0 -

5 5

2 2 5 10

Minor1 Minor2
0 1483 1488 285 1195 1480 890

 90
 122
 713
 145
 123
 341

 90
 122
 145
 123

 464
 495
 329
 354

 319
 351
 671
 494

161 0.124 - - 30.5

- D - 0.4

30.5 D

110101 201		00			
2: Ottawa	St. V	V. &	Queen	Charlotte	St.

Intersection Intersection Delay, s/veh 6.9

HCM 2010 AWSC

Stantec Consulting Ltd.

Synchro 9 Report

2: Ottawa St. W. & C	Queen	Charl	otte St				2029 Background F
Intersection							
Intersection Delay, s/veh	7						
Intersection LOS	A						
Movement	EBL	EBT	WBT	WBR	SBL	SBR	
Lane Configurations		સુ	ĥ		¥		
Traffic Vol, veh/h	5	15	15	5	5	5	
Future Vol. veh/h	5	15	15	5	5	5	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	
Heavy Vehicles, %	2	2	2	2	2	2	
Mvmt Flow	5	15	15	5	5	5	
Number of Lanes	0	1	1	0	1	0	
Approach	EB		WB		SB		
Opposing Approach	WB		EB				
Opposing Lanes	1		1		0		
Conflicting Approach Left	SB				WB		
Conflicting Lanes Left	1		0		1		
Conflicting Approach Right			SB		EB		
Conflicting Lanes Right	0		1		1		
HCM Control Delay	7.1		6.9		6.9		
HCM LOS	A		A		A		
Lane		EDI n1	WBLn1	SBLn1			
Vol Left. %		25%	0%	50%			
Vol Thru, %		75%	75%	0%			
Vol Right, %		0%	25%	50%			
Sign Control		Stop	Stop	Stop			
Traffic Vol by Lane		20	20	3i0p 10			
LT Vol		20	20	5			
Through Vol		15	15	0			
RT Vol		0	5	5			
I ane Flow Rate		20	20	10			
Geometry Grp		20	20	10			
Degree of Util (X)		0.022	0.021	0.011			
Departure Headway (Hd)		4.017	3.817	3.804			
Convergence, Y/N		4.017 Yes	Yes	3.004 Yes			
Convergence, r/w		895	942	943			
Service Time		2.023	1.824	1.818			
HCM Lane V/C Ratio		0.022	0.024	0.011			
HCM Control Delay		7.1	6.9	6.9			
HCM Lane LOS		7.1 A	0.9 A	0.9 A			
HCM 25th-tile Q		0.1	0.1	0			

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Int Delay, s/veh	1.1											
<i>.</i>	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Movement Lane Configurations	EBL	41	EBR	WBL	WBT 1	WBR	INBL		NBK	SBL	5BT	SBR
Traffic Vol. veh/h	5	1145	5	5	535	10	5	5	10	20	5	5
Future Vol. veh/h	5	1145	5	5	535	10	5	5	10	20	5	5
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	20	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	1100	1100	None	-	-	None	-	-	None	- 010	- Otop	None
Storage Length			-	0		NONG			None			-
Veh in Median Storage		0		-	0			0			0	
Grade, %		0			0			0			0	
Peak Hour Factor	100	100	100	100	100	100	100	100	100	100	100	100
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mymt Flow	5	1145	5	5	535	10	5	5	10	20	5	5
Major/Minor N	Major1		1	Major2			Minor1			Minor2		
Conflicting Flow All	545	0	0	1150	0	0	1713	1713	575	1135	1710	540
Stage 1		-	-	-	-	-	1158	1158		550	550	
Stage 2							555	555		585	1160	
Critical Hdwy	4.13		-	4.13			7.33	6.53	6.93	7.33	6.53	6.23
Critical Hdwy Stg 1	-		-	-			6.53	5.53	-	6.13	5.53	-
Critical Hdwy Stg 2	-	-		-	-	-	6.13	5.53	-	6.53	5.53	-
Follow-up Hdwy	2.219	-		2.219	-	-	3.519	4.019	3.319	3.519	4.019	3.319
Pot Cap-1 Maneuver	1022	-	-	605	-	-	64	90	462	168	90	541
Stage 1	-	-	-	-	-	-	209	269	-	518	515	-
Stage 2	-	-	-	-	-	-	515	512	-	465	269	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1022	-	-	605	-	-	60	88	462	155	88	541
Mov Cap-2 Maneuver	-	-	-	-	-	-	60	88	-	155	88	-
Stage 1	-	-	-	-	-	-	206	265	-	511	511	-
Stage 2			-	-			501	508	-	440	265	-
Approach	EB			WB			NB			SB		
HCM Control Delay, s	0.1			0.1			39.5			33.9		
HCM LOS							E			D		
Minor Lane/Major Mvm	t I	VBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1			
Capacity (veh/h)		124	1022		-	605		-	154			
HCM Lane V/C Ratio		0.161	0.005			0.008			0.195			
HCM Control Delay (s)		39.5	8.5	0.1	-	11	-	-	33.9			
HCM Lane LOS		E	A	A		В			D			

Synchro 9 Report

HCM 2010 AWSC 2: Ottawa St. W. & Queen Charlotte St.

Western Development Lands 2029 Total AM

Intersection Delay, s/veh Intersection Delay, s/veh Intersection LOS Movement Lane Configurations Traffic Vol. veh/h	7.2 A					
Intersection LOS Movement Lane Configurations						
Lane Configurations						
Lane Configurations						
	EBL	EBT	WBT	WBR	SBL	SBR
		નુ	ĥ		Y	
	5	50	20	5	5	5
Future Vol. veh/h	5	50	20	5	5	5
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Heavy Vehicles, %	2	2	2	2	2	2
Mymt Flow	5	50	20	5	5	5
Number of Lanes	0	1	1	0	1	0
Approach	FB		WB	-	SB	-
Approach Opposing Approach	WB		EB		30	
	WB 1		EB 1		0	
Opposing Lanes			1		WB	
Conflicting Approach Left	SB 1		0		WB 1	
Conflicting Lanes Left	1		0 SB		1 FB	
Conflicting Approach Right	0				EB 1	
Conflicting Lanes Right	0		1		6.9	
HCM Control Delay	7.3		7			
HCM LOS	A		A		A	
Lane			WBLn1	SBLn1		
Vol Left, %		9%	0%	50%		
Vol Thru, %		91%	80%	0%		
Vol Right, %		0%	20%	50%		
Sign Control		Stop	Stop	Stop		
Traffic Vol by Lane		55	25	10		
LT Vol		5	0	5		
Through Vol		50	20	0		
RT Vol		0	5	5		
Lane Flow Rate		55	25	10		
Geometry Grp		1	1	1		
Degree of Util (X)		0.061	0.027	0.011		
Departure Headway (Hd)		3.988	3.873	3.872		
Convergence, Y/N		Yes	Yes	Yes		
Сар		902	927	922		
Service Time		1.996	1.887	1.905		
HCM Lane V/C Ratio		0.061	0.027	0.011		
HCM Control Delay		7.3	7	6.9		
HCM Lane LOS		A	А	A		
HCM 95th-tile Q		0.2	0.1	0		

Stantec Consulting Ltd.

Synchro 9 Report

HCM 2010 AWS	-										West	ern D	evelop		
3: Meynell Rd. &	Otta	wa S	St. W											2029	Total
ntersection															
Intersection Delay, s/veh	n 7.8														
Intersection LOS	Α														
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR			
ane Configurations		4			4			4			4				
Traffic Vol, veh/h	60	25	5	5	5	5	5	90	15	15	35	30			
Future Vol, veh/h	60	25	5	5	5	5	5	90	15	15	35	30			
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	2	2	2	2	2	2	2	2	2	2	2			
Mvmt Flow	60	25	5	5	5	5	5	90	15	15	35	30			
Number of Lanes	0	1	0	0	1	0	0	1	0	0	1	0			
Approach	EB	_	_	WB	_		NB	_	_	SB	_			_	
Opposing Approach	WB			EB			SB			NB					
Opposing Lanes	1			1			1			1					
Conflicting Approach Lef	ft SB			NB			EB			WB					
Conflicting Lanes Left	1			1			1			1					
Conflicting Approach Rig	hNB			SB			WB			EB					
Conflicting Lanes Right	1			1			1			1					
HCM Control Delay	8			7.4			7.8			7.5					
HCM LOS	A			A			A			A					
ane	N	BLn1	EBLn1V	VBLn1	SBLn1										
/ol Left, %		5%	67%	33%	19%										
/ol Thru, %		82%	28%	33%	44%										
/ol Right, %		14%	6%	33%	38%										
Sign Control		Stop	Stop	Stop	Stop										
Traffic Vol by Lane		110	90	15	80										
_T Vol		5	60	5	15										
Through Vol		90	25	5	35										
RT Vol		15	5	5	30										
ane Flow Rate		110	90	15	80										
Geometry Grp		1	1	1	1										
Degree of Util (X)	1	0.125	0.109	0.018	0.089										
Departure Headway (Hd) .	4.105	4.373	4.314	4.013										
Convergence, Y/N		Yes	Yes	Yes	Yes										
Cap		861	808	835	878										
Service Time	1	2.188	2.463	2.314	2.105										
HCM Lane V/C Ratio	1	0.128	0.111	0.018	0.091										
HCM Control Delay		7.8	8	7.4	7.5										
HCM Lane LOS		A	A	A	Α										
HCM 95th-tile Q		0.4	0.4	0.1	0.3										

Synchro 9 Report

Intersection												
Int Delay, s/veh	1.7											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		416		٦	f,			4			4	
Traffic Vol, veh/h	5	845	5	5	1305	20	5	5	5	10	5	5
Future Vol, veh/h	5	845	5	5	1305	20	5	5	5	10	5	5
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	0			-	-	-	-	-	-
Veh in Median Storage	e,# -	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0		-	0	-	-	0	-
Peak Hour Factor	100	100	100	100	100	100	100	100	100	100	100	100
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	5	845	5	5	1305	20	5	5	5	10	5	5
Major/Minor	Major1		1	Major2			Minor1			Minor2		
Conflicting Flow All	1325	0	0	850	0	0	2188	2193	425	1760	2185	1315
Stage 1	-	-	-	-	-	-	858	858	-	1325	1325	-
Stage 2			-				1330	1335	-	435	860	
Critical Hdwy	4.13		-	4.13	-		7.33	6.53	6.93	7.33	6.53	6.23
Critical Hdwy Stg 1				-			6.53	5.53		6.13	5.53	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.13	5.53	-	6.53	5.53	-
Follow-up Hdwy	2.219	-		2.219	-		3.519	4.019	3.319	3.519	4.019	3.319
Pot Cap-1 Maneuver	519	-	-	786	-	-	29	45	578	60	45	192
Stage 1	-		-	-			319	373	-	191	224	-
Stage 2	-	-	-	-	-	-	190	222	-	571	372	-
Platoon blocked, %		-			-	-						
Mov Cap-1 Maneuver	519	-	-	786	-	-	25	44	578	53	44	192
Mov Cap-2 Maneuver		-	-	-	-	-	25	44	-	53	44	-
Stage 1	-	-	-	-	-	-	313	366	-	188	223	-
Stage 2		-	-	-	-	-	180	221	-	548	365	-
Approach	EB	_	_	WB	_	_	NB	_	_	SB	_	_
HCM Control Delay, s	0.2			0			114.1			90.5		
HCM LOS							F			F		
Minor Lane/Major Mvm	nt I	VBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1			
Capacity (veh/h)		47	519	-	-	786		-	61			
HCM Lane V/C Ratio		0.319	0.01			0.006			0.328			
HCM Control Delay (s)		114.1	12	0.1		9.6			90.5			
HCM Lane LOS		F	B	A		3.0 A		-	50.5			
)	1.1	0	-1		0			1.2			

HCM 2010 AWSC

Synchro 9 Report

Western Development Lands

HCM 2010 AWSC
2: Ottawa St. W. & Queen Charlotte S

Western Development Lands 2029 Total PM

Intersection						
Intersection Delay, s/veh	7.3					
Intersection LOS	A					
Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		र्भ	4		Y	
Traffic Vol, veh/h	5	50	65	5	5	5
Future Vol, veh/h	5	50	65	5	5	5
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	5	50	65	5	5	5
Number of Lanes	0	1	1	0	1	0
Approach	FB		WB		SB	
Opposing Approach	WB		FB			
Opposing Lanes	1		1		0	
Conflicting Approach Left	SB				WB	
Conflicting Lanes Left	1		0		1	
Conflicting Approach Right			SB		EB	
Conflicting Lanes Right	0		1		1	
HCM Control Delay	7.3		7.3		7	
HCM LOS	A		A		Å	
Lane		EBLn1	WBI n1	SBLn1		
Vol Left. %		9%	0%	50%		
Vol Thru, %		91%	93%	0%		
Vol Right, %		0%	7%	50%		
Sign Control		Stop	Stop	Stop		
Traffic Vol by Lane		55	70	10		
T Vol		5	0	5		
Through Vol		50	65	0		
RT Vol		0	5	5		
I ane Flow Rate		55	70	10		
Geometry Grp		1	1	1		
Degree of Util (X)		0.061	0.077	0.011		
Departure Headway (Hd)		4.022	3.95	3.948		
Convergence, Y/N		Yes	Yes	Yes		
Сар		892	909	900		
Service Time		2.038	1.964	2		
HCM Lane V/C Ratio		0.062	0.077	0.011		
HCM Control Delay		7.3	7.3	7		
HCM Lane LOS		A	A	Å		
HCM 95th-tile Q		0.2	0.2	0		
· · · · · · · · · · · · · · · · · · ·						

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Synchro 9 Report

3: Meynell Rd. &														
ntersection														
ntersection Delay, s/veh	83													
Intersection LOS	A													
Intersection 200	A													
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR		
ane Configurations		4			4			4			4			
Traffic Vol, veh/h	55	25	5	20	30	15	5	70	15	10	115	80		
Future Vol, veh/h	55	25	5	20	30	15	5	70	15	10	115	80		
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	2	2	2	2	2	2	2	2	2	2	2		
Nvmt Flow	55	25	5	20	30	15	5	70	15	10	115	80		
Number of Lanes	0	1	0	0	1	0	0	1	0	0	1	0		
Approach	EB			WB			NB			SB				
Opposing Approach	WB			EB			SB			NB				
Opposing Lanes	1			1			1			1				
Conflicting Approach Lef	t SB			NB			EB			WB				
Conflicting Lanes Left	1			1			1			1				
Conflicting Approach Rig				SB			WB			EB				
Conflicting Lanes Right	1			1			1			1				
HCM Control Delay	8.4			8.1			8			8.5				
HCM LOS	A			A			Ă			A				
ane	N	RI n1 I	EBLn1V	VRIn1	SRI n1									
/ol Left, %	14	6%	65%	31%	5%									
Vol Thru, %		78%	29%	46%	56%									
		17%	29%	23%	39%									
Vol Right, %														
Sign Control		Stop 90	Stop 85	Stop	Stop 205									
Traffic Vol by Lane		90 5	60 55	65 20	205									
		5 70	25	20	10									
Through Vol		70	25	30										
RT Vol				15	80									
ane Flow Rate		90 1	85		205									
Geometry Grp				1										
Degree of Util (X)			0.112											
Departure Headway (Hd)		4.753		4.17									
Convergence, Y/N		Yes	Yes	Yes	Yes									
Cap		812	755	778	863									
Service Time			2.777											
HCM Lane V/C Ratio	(0.113											
HCM Control Delay		8	8.4	8.1	8.5									
HCM Lane LOS		A	A	A	A									
HCM 95th-tile Q		0.4	0.4	0.3	0.9									

Synchro 9 Report

Int Delay, s/veh	1.1											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		ብጉ			ብ የ			\$			\$	
Traffic Vol, veh/h	5	1145	5	5	535	10	5	5	10	20	5	5
Future Vol, veh/h	5	1145	5	5	535	10	5	5	10	20	5	5
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None			None	-		None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage,	# -	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	100	100	100	100	100	100	100	100	100	100	100	100
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	5	1145	5	5	535	10	5	5	10	20	5	5
Major/Minor N	lajor1		1	/lajor2		l	Minor1		1	Minor2		
Conflicting Flow All	545	0	0	1150	0	0	1438	1713	575	1135	1710	273
Stage 1	-	-	-	-	-	-	1158	1158	-	550	550	-
Stage 2			-				280	555	-	585	1160	
Critical Hdwy	4.14	-		4.14	-	-	7.54	6.54	6.94	7.54	6.54	6.94
Critical Hdwy Stg 1			-				6.54	5.54	-	6.54	5.54	
Critical Hdwy Stg 2	-	-	-	-	-	-	6.54	5.54	-	6.54	5.54	-
Follow-up Hdwy	2.22		-	2.22			3.52	4.02	3.32	3.52	4.02	3.32
Pot Cap-1 Maneuver	1020	-	-	603	-	-	94	89	461	157	90	725
Stage 1	-	-		-	-	-	208	269	-	487	514	
Stage 2	-	-	-	-	-	-	703	511	-	464	268	-
Platoon blocked, %		-										
Mov Cap-1 Maneuver	1020	-	-	603	-	-	88	87	461	144	88	725
Mov Cap-2 Maneuver	-	-	-	-	-	-	88	87	-	144	88	-
Stage 1	-	-	-	-	-	-	205	265	-	480	508	-
Stage 2	-	-		-	-	-	683	505	-	439	264	
-												
Approach	FB			WB			NB			SB		
HCM Control Delay, s	0.1	_		0.2	_		33.3		_	35.4	_	
HCM LOS	0.1			0.2			00.0			55.4 E		
							0			-		
Mara 1 an - Main Mara		UDI -4	501	COT	500	WDI	MOT	WBR	001-4			
Minor Lane/Major Mvm		VBLn1 147	EBL 1020	EBT	EBR	WBL 603	WBT	WBR	148			
Capacity (veh/h)		0.136		-		0.008	-		148			
HCM Lane V/C Ratio			0.005						35.4			
HCM Control Delay (s)		33.3	8.5	0.1		11	0.1 A					
HCM Lane LOS HCM 95th %tile Q(veh)		D	A 0	A		B 0	A		E			
		0.5	0	-	-	0	-	-	0.7			

Synchro 9 Report

Stantec Consulting Ltd.

Synchro 9 Report

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HCM 2010 TWS	SC										Wes	tern D	e
Intersection													
Int Delay, s/veh	1.4												1
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	1
Lane Configurations		ብቡ			ፋፑ			4			4+		
Traffic Vol, veh/h	5	845	5	5	1305	20	5	5	5	10	5	5	
Future Vol, veh/h	5	845	5	5	1305	20	5	5	5	10	5	5	
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0	
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop	
RT Channelized	-	-	None										
Storage Length	-				-		-	-			-	-	

RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None	
Storage Length	-	-	-	-	-	-			-			-	
Veh in Median Storage	.# -	0	-	-	0	-	-	0	-	-	0	-	
Grade, %	-	0	-	-	0	-		0	-	-	0	-	
Peak Hour Factor	100	100	100	100	100	100	100	100	100	100	100	100	
Heavy Vehicles, %	2		2	2	2	2	2	2	2	2	2	2	
Mvmt Flow	5	845	5	5	1305	20	5	5	5	10	5	5	
Major/Minor I	Major1		,	Major2			Minor1			Minor2			
Conflicting Flow All	1325	0	0	850	0	0	1523	2193	425	1760	2185	663	
Stage 1	1020		-	- 000	-	-	858	858	425	1325	1325	000	
Stage 2							665	1335		435	860		
Critical Hdwy	4.14		-	4.14			7.54	6.54	6.94	7.54	6.54	6.94	
Critical Hdwy Stg 1					-		6.54	5.54	- 0.34	6.54	5.54		
Critical Hdwy Stg 2					-		6.54	5.54		6.54	5.54		
Follow-up Hdwy	2.22			2.22			3.52	4.02	3.32	3.52	4.02	3.32	
Pot Cap-1 Maneuver	517		-	784	-	-	81	45	578	54	45	404	
Stage 1	-	-	-	-			318	372		164	223	-	
Stage 2	-	-	-	-	-	-	416	221	-	570	371	-	
Platoon blocked, %		-	-		-	-							
Mov Cap-1 Maneuver	517	-	-	784	-	-	71	43	578	47	43	404	
Mov Cap-2 Maneuver	-	-	-	-	-	-	71	43	-	47	43	-	
Stage 1	-	-	-	-	-	-	312	365	-	161	218	-	
Stage 2	-	-	-		-		392	216		547	364	-	
Approach	EB			WB			NB			SB			
HCM Control Delay, s	0.2			0.1			62.7			94.6			
HCM LOS							F			F			
Minor Lane/Major Mvm	ıt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1				
Capacity (veh/h)	-	77	517	-	-	784	-	-	59	-	-	_	
HCM Lane V/C Ratio		0.195	0.01			0.006							
HCM Control Delay (s)		62.7	12	0.1	-	9.6	0.1	-	94.6				
HCM Lane LOS		F	В	A		A	A		F				
HCM 95th %tile Q(veh))	0.7	0	-	-	0	-	-	1.2				

Int Delay, s/veh	1.2											
Movement	FBI	FBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	LUL	412	LDIX	TIDL	416	TIDIX	NUL	4	NDIX	ODL	4	ODIX
Traffic Vol. veh/h	5	1185	5	5	560	10	5	5	10	20	5	5
Future Vol. veh/h	5	1185	5	5	560	10	5	5	10	20	5	5
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-		None	-	-	None	-	-	None
Storage Length			-			-			-			-
Veh in Median Storage,	# -	0	-		0	-		0	-		0	-
Grade, %	-	0			0			0			0	
Peak Hour Factor	100	100	100	100	100	100	100	100	100	100	100	100
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	5	1185	5	5	560	10	5	5	10	20	5	5
Major/Minor N	lajor1	_	1	Aajor2	_		Minor1	_		Minor2	_	_
Conflicting Flow All	570	0	0	1190	0	0	1491	1778	595	1180	1775	285
Stage 1	-	-	-	-	-	-	1198	1198	-	575	575	
Stage 2							293	580		605	1200	
Critical Hdwy	4.14			4.14			7.54	6.54	6.94	7.54	6.54	6.94
Critical Hdwy Stg 1	-			-			6.54	5.54	-	6.54	5.54	-
Critical Hdwy Stg 2	-	-	-		-	-	6.54	5.54	-	6.54	5.54	-
Follow-up Hdwy	2.22			2.22			3.52	4.02	3.32	3.52	4.02	3.32
Pot Cap-1 Maneuver	999	-	-	582	-	-	86	82	447	146	82	712
Stage 1	-	-		-	-	-	197	257	-	470	501	
Stage 2	-	-	-	-	-	-	691	498	-	451	256	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	999	-	-	582	-	-	80	80	447	133	80	712
Mov Cap-2 Maneuver	-	-	-	-	-	-	80	80	-	133	80	-
Stage 1	-	-	-	-	-	-	194	253	-	463	494	-
Stage 2	-	-	-	-	-	-	670	492	-	426	252	
Approach	EB			WB			NB			SB		
HCM Control Delay, s	0.1	_		0.2	_		36			38.8	_	
HCM LOS							E			E		
Minor Lane/Major Mvmt		VBI n1	FBI	FBT	FBR	WBL	WBT	WBR	SBI n1			
Capacity (veh/h)		136	999	-		582	-		136			
HCM Lane V/C Ratio		0.147				0.009						
HCM Control Delay (s)		36	8.6	0.1		11.2	0.1		38.8			
HCM Lane LOS		E	A	A		B	A		E			
		0.5	0			0			0.8			

Synchro 9 Report

H	CM 201	0 A'	WS	С			
2:	Ottawa	St.	W.	&	Queen	Charlotte	St

Intersection						
Intersection Delay, s/veh	7.2					
Intersection LOS	A					
Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		र्भ	1.		Y	
Traffic Vol. veh/h	5	50	20	5	5	5
Future Vol. veh/h	5	50	20	5	5	5
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Heavy Vehicles, %	2	2	2	2	2	2
Mymt Flow	5	50	20	5	5	5
Number of Lanes	0	1	20	0	1	0
	-			0		0
Approach	EB		WB		SB	
Opposing Approach	WB		EB			
Opposing Lanes	1		1		0	
Conflicting Approach Left	SB				WB	
Conflicting Lanes Left	1		0		1	
Conflicting Approach Right			SB		EB	
Conflicting Lanes Right	0		1		1	
HCM Control Delay	7.3		7		6.9	
HCM LOS	A		А		A	
Lane		FBI n1	WBLn1	SBLn1		
Vol Left. %		9%	0%	50%		
Vol Thru, %		91%	80%	0%		
Vol Right, %		0%	20%	50%		
		Stop	Stop	Stop		
Sign Control		Stop 55	5top 25	5top 10		
Traffic Vol by Lane LT Vol		55	25	10		
		50		5		
Through Vol RT Vol		50	20	5		
		55	25	5 10		
Lane Flow Rate						
Geometry Grp		1	1	1		
Degree of Util (X)		0.061	0.027	0.011		
Departure Headway (Hd)		3.988	3.873	3.872		
Convergence, Y/N		Yes	Yes	Yes		
Сар		902	927	922		
Service Time		1.996	1.887	1.905		
HCM Lane V/C Ratio		0.061	0.027	0.011		
		7.3	7	6.9		
HCM Control Delay HCM Lane LOS HCM 95th-tile Q		A 0.2	A 0.1	A		

Stantec Consulting Ltd.

Synchro 9 Report

Intersection Delay, siveh 7.8 Intersection LOS A Movement EBR EBR WBL WBT WBR NBL NBT NBR SBR san A	3: Meynell Rd. &														
Intersection LOS A Movement EBL EBR WBL WBT WBR NBL NBT NBR SBL SBT SBR Lare Configurations 40 4 2 </th <th></th>															
Intersection Delay, siveh 7.8 A Movement EBL EBT EBR WBL WBT WBR NBL NBT NBR SBL SBT SBR Lane Configurations A A A A A A A A A A A A A A A A A A A	Intersection														
Intersection LOS A Movement EBL EBR WBL WBT WBR NBL NBT NBR SBL SBT SBR Lare Configurations 40 4 2 </th <th></th> <th>178</th> <th></th>		178													
Lane Configurations 4 4 4 4 4 Traffic Val, veh/h 60 25 5 5 5 90 15 15 35 30 Traffic Val, veh/h 60 25 5 5 5 5 90 15 15 35 30 Peak Hour Factor 1.00 0.0 1.00 0.0 1.00 0.0 1.00 0.0 1.00 0.0 1.00 0.0 1.00 0.0 1.00 0.0 1.00 0.0 1.00 0.0 0.0 0.0 0.0 0.0	Intersection LOS														
Lane Ab Ab Ab Ab Ab Ab Traffic Val, whith 60 25 5 5 5 90 15 15 35 30 Traffic Val, whith 60 25 5 5 5 5 90 15 15 35 30 Peak Hour Factor 1.00 0 1 0 0 1 0 0 1 0 0 1 0 0 1 0 0 1 0 0 1 0 0 1 0 0 0 0 0 0 0 0 0 0 0 0 0 0 <th></th>															
Tartific Value hh 60 25 5 5 5 90 15 15 35 30 Future Vol, wehh 60 25 5 5 5 90 15 15 35 30 Future Vol, wehh 60 25 5 5 5 90 15 15 35 30 Heary Vehicles, % 2<	Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR		
Traffic Vol end 25 5 5 5 90 15 15 35 30 Praver Vol, velo 60 25 5 5 5 90 15 15 35 30 Peak Hour Factor 1.00 0 1 0 0 1 0 0 1 0 0 1 0 0 1 0 0 1 0 0 1 0 0 0 0 1 0 0 0 0 0 0 0 0 0	Lane Configurations		4			4			4			4			
Desk Haur Facior 1.00		60	25	5	5	5	5	5	90	15	15	35	30		
Heavy Vehicles, % 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 3 3 5 30 Wint Flow 60 25 5 5 5 5 5 90 15 15 33 30 Approach EB WB NB SB Opposing Approach WB EB SB NB Opposing Approach KISB NB EB WB Conflicting Lanes Roth 1 1 1 1 1 Conflicting Lanes Roth 1 1 1 Conflicting Lanes Roth 1 1 Conflicting	Future Vol, veh/h	60	25	5	5	5	5	5	90	15	15	35	30		
Mmm Flow 60 25 5 5 5 5 90 15 15 35 30 Number of Lanes 0 1 0 0 1 0 0 1 0 0 1 0 0 1 0 0 1 0 0 1 0 0 1 0 0 1 0 0 1 0 0 1 0 0 1 0	Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		
Num 60 25 5 5 5 90 15 15 35 30 Number of Lanes 0 1 0 0 1 0 0 1 0 0 1 0 0 1 0 0 1 0 0 1 0 0 1 0 0 1 0 0 1 0 0 1 0 0 1 0 0 1 0 <td>Heavy Vehicles, %</td> <td>2</td> <td></td> <td></td>	Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2		
Advance EB WB NB SB Opposing Approach WB EB SB NB Opposing Lanes 1 1 1 1 Conflicting Approach Left SB NB EB WB Conflicting Approach Right SB NB EB WB Conflicting Approach Right SB NB WB EB Conflicting Approach Right SB SB WB EB Conflicting Approach Right SB T 1 1 1 Conflicting Approach Right SB SB WB EB Conflicting Approach Right SB SB VB EB Conflicting Approach Right SB SB Conflicting Approach Right SB		60	25	5	5	5	5	5	90	15	15	35	30		
Opposing Approach WB EB SB NB Opposing Approach 1 1 1 1 1 0	Number of Lanes	0	1	0	0	1	0	0	1	0	0	1	0		
Opposing Lanes 1	Approach	EB			WB			NB			SB				
Conflicting Approach Left 3B NB EB WB Conflicting Approach KgINB SB WB EB Conflicting Approach KgINB S A A Lane NBLn1EBLn1MBLINSBLIN S S Lane Vol Right % S S S Sign Control Stop Stop Stop Stop Stop S Tradie Vol Lane 10 90 15 S Sign Control S <td>Opposing Approach</td> <td>WB</td> <td></td> <td></td> <td>EB</td> <td></td> <td></td> <td>SB</td> <td></td> <td></td> <td>NB</td> <td></td> <td></td> <td></td> <td></td>	Opposing Approach	WB			EB			SB			NB				
Contlicting Janes Left 1 1 1 1 Contlicting Janes Right 1 1 1 1 CCM Licting Janes Right 1 1 1 1 CCM Licting Lenes Right 1 1 1 1 CCM LOS A A A A Lane NBLn1 EBLn1WBLn1 SBLn1 Vol Left, % 5%, 67%, 33%, 19%, 33%, 44%, 33%, 44%, 33%, 44%, 33%, 44%, 33%, 44%, 33%, 44%, 33%, 44%, 33%, 44%, 33%, 44%, 33%, 44%, 33%, 44%, 33%, 33	Opposing Lanes	1			1			1			1				
Conflicting Approach Right B SB WB EB Conflicting Lanes Right 1 1 1 1 1 Conflicting Lanes Right 1 1 1 1 1 1 ChW Control Dely 8 7.4 7.8 7.5 HCM LOS A A A A Vol Left, % 5% 67% 33% 19% Vol Left, % 5% 67% 33% 19% Vol Right, % 14% 6% 33% 38% Sign Control Sign Sonto Stop Stop Stop Stop Tartific Volp Lane 10 90 15 80 Lane Flow Rate 10 90 15 80 LT Vol 5 60 5 15 Through Vol 90 25 30 Cane Flow Rate 110 90 15 80 Geometry Grip 1 1 1 Geometry Grip 1 1 1 1 1 1 </td <td>Conflicting Approach Le</td> <td>ft SB</td> <td></td> <td></td> <td>NB</td> <td></td> <td></td> <td>EB</td> <td></td> <td></td> <td>WB</td> <td></td> <td></td> <td></td> <td></td>	Conflicting Approach Le	ft SB			NB			EB			WB				
Conflicting Lanes Right 1 1 1 1 1 1 HCM Control Delay 8 7.4 7.8 7.5 HCM Control Delay 8 7.4 7.8 7.5 HCM LOS A A A A A A Val Left, % 5% 67% 33% 19% Val Lft, % 5% 67% 33% 19% Val HTru, % 82% 28% 33% 44% Val HTru, % 82% 28% 33% Caperad Val (V 0. 125 0.009 0018 0.089 Departure Headway Hdl) 4105 4373 4314 4013 Convergence, YN Yes Yes Yes Caperad Val (V 0. 125 0.019 0018 0.091 HTVO Habel 0.128 0.0111 0.018 0.091 HTVO Habel 0.128 0.091 HTVO Habel 0.128 0.091 HTVO Habel 0.110 0.9 A A A	Conflicting Lanes Left	1			1			1			1				
HCM Control Delay 8 7.4 7.8 7.5 HCM LOS A	Conflicting Approach Rig	ghNB			SB			WB			EB				
HCM LOS A A A A A Lane NBLn1 EBLn1WBLn1 SBLn1 Vol Lett, % 5% 67% 33% 19% Vol Lett, % 5% 67% 33% 19% Vol Vol Thru, % 82% 33% 44% Vol Right, % 14% 6% 33% 36% Sign Control Stop Stop Stop Stop Traffic Vol by Lane 10 90 15 80 LT Vol 5 60 5 15 Trough Vol 90 25 5 36 Lane Flow Rate 10 90 15 80 Geometry Grop 1 1 1 Degraed Vol (V) 0 25 5 30 Geometry Grop 1	Conflicting Lanes Right	1			1			1			1				
Lane NBLn1 EBLn1WBLn1 SBLn1 Vol Eft, % 5% 67% 33% 19% Vol Thru, % 82% 28% 33% 44% Vol Right, % 14% 6% 33% 3% Sign Control Stop Stop Stop Stop Traffic Vol by Lane 10 90 15 80 LT Vol 5 60 5 15 Through Vol 90 25 35 RT Vol 16 5 5 30 Lane Flow Rate 110 90 15 80 Degaret Of Ult X 0.15 80 10 20 Convergence, VM Yes Yes <yes< td=""> Yes Yes Convergence, NN Yes Yes<yes< td=""> Yes Yes Cap 861 808 835 878 Savice Time 2188 243 2145 2145 HCM Lane V/C Ratio 0.128 0.111 0.018 0.091</yes<></yes<>	HCM Control Delay	8			7.4			7.8			7.5				
Val Left, % 5% 67% 33% 19% Val Thru, % 82% 28% 33% 44% Val Right, % 14% 6% 33% 44% Val Right, % 14% 6% 33% 36% Sign Control Stop Stop Stop Stop Traffic Val by Lane 10 90 15 80 LT Vol 5 60 5 15 Through Vol 90 25 5 35 RT Vol 15 5 30 16 Geometry Orp 1 1 1 10 Depared I/U (0) 0.109 0.109 0.010 0.039 Departer Visi (1) 0.12 0.109 0.010 0.018 Convergence, YN Yes Yes <yes< td=""> Yes<yes< td=""> Yes Cap 81 808 835 878 Service Time 2.188 2.453 2.314 2.105 HCM Laner UC Ratio</yes<></yes<>	HCM LOS	Α			A			Α			Α				
Val Left, % 5% 67% 33% 19% Val Thru, % 82% 28% 33% 44% Val Right, % 14% 6% 33% 44% Val Right, % 14% 6% 33% 36% Sign Control Stop Stop Stop Stop Traffic Val by Lane 10 90 15 80 LT Vol 5 60 5 15 Through Vol 90 25 5 35 RT Vol 15 5 30 16 Geometry Orp 1 1 1 10 Depared I/U (0) 0.109 0.109 0.010 0.039 Departer Visi (1) 0.12 0.109 0.010 0.018 Convergence, YN Yes Yes <yes< td=""> Yes<yes< td=""> Yes Cap 81 808 835 878 Service Time 2.188 2.453 2.314 2.105 HCM Laner UC Ratio</yes<></yes<>															
Vid Thru, % 82% 33% 44% Vid Right, % 14% 6% 33% 44% Sign Control Slop Slop Slop Slop Taffic Volb Lane 10 90 15 80 Taffic Volb Lane 10 90 15 80 Through Vol 50 25 35 RT Vol 15 5 30 Geometry Grp 1 1 1 Departure Headway (Hd) 4.105 0.08 Convergence, N. Yes Yes Yes Service Time 2.18 2.463 2.314 2.105 Chuan E/UC Ratio 0.128 0.111 0.018 0.091 HCM Lane V/C Ratio 0.128 0.111 0.018 0.91 HCM Lane V/C Ratio 7.8 8 7.4 7.5		N	VBLn1	EBLn1V	VBLn1										
Via Right, % 14% 6% 33% 3% Sign Canttol Stop Stop Stop Stop Traffic Val by Lane 110 90 15 80 Troffic Val by Lane 110 90 15 80 Trodgh Val 90 15 80 5 Trough Val 90 15 5 30 Lane Flow Rate 110 90 15 80 Degrater Val V(X) 0.125 5 30 Geometry Grop 1 1 1 1 Degrater Val V(X) 0.125 109 015 80 Convergence, YM 4.105 109 0.15 0.089 Caper advall V(X) 0.125 13/14 4.013 0.049 Caper Mile VC Ratio 0.128 2.463 2.314 2.105 HOM Lane VC Ratio 0.128 2.463 2.314 2.105 HOM Lane VC Ratio 0.128 0.111 0.018 0.111	Vol Left, %														
Sign Control Stop	Vol Thru, %		82%	28%	33%	44%									
Taffic Vol by Lane 110 90 15 80 LT Vol 5 60 5 15 Through Vol 90 25 5 35 RT Vol 15 5 30 Lane Flow Rate 110 90 15 80 Degradue Vil Rate 10 90 15 80 Degradue Vil Roy 0.12 5 5 30 Geometry Grap 1 1 1 1 Departure Headway (Hd) 0.12 5 78 80 Convergence, YM Yes Yes Yes Yes Yes Cap 861 808 835 876 Service Time 2.188 2.463 2.514 2.105 HOM Lane V/C Ratio 0.128 2.111 0.91 1 HOM Lane V/C Ratio 0.128 0.111 0.91 1 HOM Lane V/C Ratio 0.28 7.4 7.5															
LT Vol 5 60 5 15 Through Vol 90 25 5 35 RT Vol 15 5 5 30 Lane Flow Rate 110 90 15 80 Geometry Grp 1 1 1 1 Degree of Vuli (X) 0.125 0.109 0.018 0.089 Departure Headway (Hd) 4.105 4.373 4.314 4.013 Convergence, Y.N Y es Yes Yes Cap 861 808 835 878 Service Time 2.188 2.463 2.314 2.105 HCM Lane V/C Ratio 0.128 0.111 0.018 0.091 HCM Control Delay 7.8 8 7.4 7.5 HCM Lane U/C Ratio A A A A	Sign Control														
Through Vol 90 25 35 RT Vol 15 5 30 Jane Flow Rate 110 90 15 80 Geometry Grp 1 1 1 1 Degrear UII (X) 0.125 0.089 0.089 Ocnwergence, NN Yes Yes Yes Convergence, NN Yes Yes Yes Service Time 2.188 2.433 3.14 HCM Lane V/C Ratio 0.128 0.111 0.018 HCM Lane V/C Ratio 0.128 7.4 7.5 HCM Lane V/C Ratio A A A															
RT Vol 15 5 30 Lane Flow Rate 110 90 15 80 Geometry Grp 1 1 1 1 Degree of Unit (X) 0.125 0.109 0.018 0.089 Departure Headway (Hd) 4.105 4.373 4.314 4.013 Convergence, Xin Yes Yes Yes Yes Cap 861 805 878 Service Time 2.188 2.452 2.314 2.105 HCM Lane V/C Ratio 0.128 0.111 0.018 0.091 HCM Control Delay 7.8 8 7.4 7.5 HCM Lane LOS A A A A A A	LT Vol														
Lane Flow Rate 110 90 15 80 Geometry Grp 1 1 1 1 Departer UII (X) 0.125 0.109 0.018 0.089 Departer UII (X) 0.125 0.109 0.018 0.089 Departer UII (X) 4.105 4.314 4.013 Convergence. Convergence, N Yes Yes Yes Yes Service Time 2.188 2.463 2.314 2.105 HCM Lane V/C Ratio 0.128 0.111 0.018 0.091 HCM Lane V/C Ratio 7.8 8 7.4 7.5 HCM Lane U/S A A A															
Geometry Grp 1 </td <td></td> <td></td> <td></td> <td></td> <td></td> <td>00</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td>						00									
Degree of Util (X) 0.125 0.109 0.018 0.089 Departure Headway (Hd) 4.105 4.373 4.314 4.013 Convergence, Y. Yes Yes Yes Yes Cap 861 808 835 878 Service Time 2.188 2.463 2.141 2.105 HCM Lane V/C Ratio 0.128 0.111 0.018 0.091 HCM Lane V/C Ratio 7.8 8 7.4 7.5 HCM Lane US A A A A															
Departume Headway (Hd) 4.105 4.373 4.314 4.013 Convergence, YN Yes Yes Yes Cap 861 808 835 878 Service Time 2.188 2.463 2.314 2.105 HCM Lane V/C Ratio 0.128 0.111 0.018 0.091 HCM Control Delay 7.8 8 7.4 7.5															
Convergence, YN Yes Yes Yes Cap 861 608 835 878 Service Time 2.188 2.463 2.314 2.105 HCM Lane V/C Ratio 0.128 0.111 0.018 0.091 HCM Control Delay 7.8 8 7.4 7.5 HCM Lane LOS A A A															
Cap 661 808 835 876 Service Time 2.188 2.463 2.314 2.105 KOM Lane V/C Ratio 0.128 0.111 0.018 0.091 HCM Control Delay 7.8 8 7.4 7.5 HCM Lane V/C SA A A A		I)													
Service Time 2.188 2.463 2.314 2.105 HCM Lane V/C Ratio 0.128 0.111 0.018 0.091 HCM Control Delay 7.8 8 7.4 7.5 HCM Lane LOS A A A A															
HCM Lane VIC Ratio 0.128 0.111 0.018 0.091 HCM Control Delay 7.8 8 7.4 7.5 HCM Lane LOS A A A A															
HCM Control Delay 7.8 8 7.4 7.5 HCM Lane LOS A A A A															
HCM Lane LOS A A A A															
HCM 95th-tile Q 0.4 0.4 0.1 0.3	HCM Lane LOS														
	HCM 95th-tile Q		0.4	0.4	0.1	0.3									

Synchro 9 Report

Int Delay, s/veh	2.1											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	EDL	412	EDK	WDL	412	WDR	INDL		NDR	ODL		JDK
Traffic Vol. veh/h	5	875	5	5	1350	20	5	5	5	15	5	5
Future Vol. veh/h	5	875	5	5	1350	20	5	5	5	15	5	5
Conflicting Peds, #/hr	0	0/5	0	0	0	20	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized		-	None	1100	-	None	-	-	None	-	-	None
Storage Length			-			-			-			-
Veh in Median Storage.	# -	0			0	-		0		-	0	
Grade, %	-	0			0			0			0	
Peak Hour Factor	100	100	100	100	100	100	100	100	100	100	100	100
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mymt Flow	5	875	5	5	1350	20	5	5	5	15	5	5
Major/Minor N	lajor1		N	Aajor2		1	Minor1			Minor2		
Conflicting Flow All	1370	0	0	880	0	0	1576	2268	440	1820	2260	685
Stage 1	-	-	-	-	-	-	888	888	-	1370	1370	-
Stage 2							688	1380		450	890	
Critical Hdwy	4.14	-		4.14	-	-	7.54	6.54	6.94	7.54	6.54	6.94
Critical Hdwy Stg 1							6.54	5.54		6.54	5.54	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.54	5.54	-	6.54	5.54	-
Follow-up Hdwy	2.22	-		2.22	-	-	3.52	4.02	3.32	3.52	4.02	3.32
Pot Cap-1 Maneuver	497	-	-	764	-	-	74	40	565	48	40	391
Stage 1	-	-		-	-	-	305	360	-	154	212	-
Stage 2	-	-	-	-	-	-	403	210	-	558	359	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	497	-	-	764	-	-	63	38	565	41	38	391
Mov Cap-2 Maneuver	-	-	-	-		-	63	38	-	41	38	-
Stage 1	-	-	-	-	-	-	299	353	-	151	206	-
Stage 2	-	-	-	-	-	-	377	204	-	534	352	-
Approach	EB			WB			NB			SB		
HCM Control Delay, s	0.2			0.1			72.3			138.6		
HCM LOS							F			F		
Minor Lane/Major Mvml	1	VBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1			
Capacity (veh/h)		68	497		-	764	-		49			
HCM Lane V/C Ratio		0.221	0.01			0.007		-	0.51			
HCM Control Delay (s)		72.3	12.3	0.1	-	9.7	0.1		138.6			
HCM Lane LOS		F	В	A		A	A		F			
HCM 95th %tile Q(veh)		0.8	0			0			1.9			

HCM 2010 AWSC

Synchro 9 Report

Western Development Lands

HCM 2010 AWSC 2: Ottawa St. W. & Queen Charlotte St. Western Development Lands 2034 Ultimate PM

Intersection Delay, siveh 7.3 Intersection LOS A Movement EBL EBT WBR SBL SBR Lans Configurations 4 1 Y Y Y Traffic Vol, veh/h 5 50 65 5 5 5 Future Vol, veh/h 5 50 65 5 5 5 Peak Hour Factor 1.00 1.00 1.00 1.00 1.00 1.00 1.00 Heavy Ushicles, % 2 2 2 2 2 2 2
Intersection LOS A Movement EBL EBT WBT WBR SBL SBR Lare Configurations -4 1 Y Traffic Vol, veh/h 5 5 5 Traffic Vol, veh/h 5 50 65 5 5 Four Vol, veh/h 5 50 65 5 5 Peak Hour Factor 1.00 1.00 1.00 1.00 1.00 1.00 Heavy Vehicles, % 2
Lane Configurations 4 1> Y Traffic Vol, veh/h 5 50 65 5 5 Future Vol, veh/h 5 50 65 5 5 Pourse Vol, veh/h 5 50 65 5 5 Peak Hour Factor 1.00 1.00 1.00 1.00 1.00 1.00 Heavy Vehicles, % 2
Lane Configurations 4 1> Y Traffic Vol, veh/h 5 50 65 5 5 Future Vol, veh/h 5 50 65 5 5 Pourse Vol, veh/h 5 50 65 5 5 Peak Hour Factor 1.00 1.00 1.00 1.00 1.00 1.00 Heavy Vehicles, % 2
Traffic Vol, Veh/h 5 50 65 5 5 Future Vol, veh/h 5 50 65 5 5 Future Vol, veh/h 5 50 65 5 5 Peak Hour Factor 1.00 1.00 1.00 1.00 1.00 Heavy Vehicles, % 2 2 2 2 2 2
Traffic Vol, Veh/h 5 50 65 5 5 Future Vol, veh/h 5 50 65 5 5 Future Vol, veh/h 5 50 65 5 5 Peak Hour Factor 1.00 1.00 1.00 1.00 1.00 Heavy Vehicles, % 2 2 2 2 2 2
Future Vol, veh/h 5 50 65 5 5 Peak Hour Factor 1.00 1.00 1.00 1.00 1.00 1.00 Heavy Vehicles, % 2 2 2 2 2 2 2
Peak Hour Factor 1.00 1.00 1.00 1.00 1.00 1.00 Heavy Vehicles, % 2 2 2 2 2 2 2
Heavy Vehicles, % 2 2 2 2 2 2 2
Number of Lanes 0 1 1 0 1 0
Approach EB WB SB
Opposing Lanes 1 1 0
Conflicting Approach Left SB WB
Conflicting Lanes Left 1 0 1
Conflicting Approach Right SB EB
Conflicting Lanes Right 0 1 1
HCM Control Delay 7.3 7.3 7
HCM LOS A A A
Lane EBLn1 WBLn1 SBLn1
Vol Left, % 9% 0% 50%
Vol Thru, % 91% 93% 0%
Vol Right, % 0% 7% 50%
Sign Control Stop Stop Stop
Traffic Vol by Lane 55 70 10
LT Vol 5 0 5
Through Vol 50 65 0
RT Vol 0 5 5
Lane Flow Rate 55 70 10
Geometry Grp 1 1 1
Degree of Util (X) 0.061 0.077 0.011
Departure Headway (Hd) 4.022 3.95 3.948
Convergence, Y/N Yes Yes Yes
Cap 892 909 900
Service Time 2.038 1.964 2
HCM Lane V/C Ratio 0.062 0.077 0.011
11GW Lane V/G Natio 0.002 0.077 0.011
HCM Carle Vic Ratio 0.002 0.077 0.011 HCM Control Delay 7.3 7.3 7

Stantec Consulting Ltd.

Synchro 9 Report

3: Meynell Rd. &	Ottawa	St. W									.0	2034 Ult	
Intersection													
ntersection Delay, s/veh	8.3												
Intersection LOS	А												
Movement	EBL EB		WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR		
Lane Configurations	4			4			4			4			
Traffic Vol, veh/h	55 2		20	30	15	5	70	15	10	115	80		
Future Vol, veh/h	55 2		20	30	15	5	70	15	10	115	80		
Peak Hour Factor	1.00 1.0		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		
Heavy Vehicles, %		2 2	2	2	2	2	2	2	2	2	2		
Mvmt Flow	55 2		20	30	15	5	70	15	10	115	80		
Number of Lanes	0	1 0	0	1	0	0	1	0	0	1	0		
Approach	EB		WB			NB			SB				
Opposing Approach	WB		EB			SB			NB				
Opposing Lanes	1		1			1			1				
Conflicting Approach Let	ft SB		NB			EB			WB				
Conflicting Lanes Left	1		1			1			1				
Conflicting Approach Rig	∥nNB		SB			WB			EB				
Conflicting Lanes Right	1		1			1			1				
HCM Control Delay	8.4		8.1			8			8.5				
HCM LOS	A		A			A			Α				
Lane	NBLn	1 EBLn1	WBLn1	SBLn1									
Vol Left, %	69		31%	5%									
Vol Thru, %	789	6 29%	46%	56%									
Vol Right, %	179	6%	23%	39%									
Sign Control	Sto	5 Stop	Stop	Stop									
Traffic Vol by Lane	9		65	205									
LT Vol		5 55	20	10									
Through Vol	7		30	115									
RT Vol	1		15	80									
Lane Flow Rate	9		65	205									
Geometry Grp			1	1									
Degree of Util (X)		1 0.112											
Departure Headway (Hd		2 4.753		4.17									
Convergence, Y/N	Ye		Yes	Yes									
Cap	81		778	863									
Service Time		1 2.777											
HCM Lane V/C Ratio	0.11	1 0.113	0.084										
HCM Control Delay	1	8 8.4	8.1	8.5									
HCM Lane LOS	1		A	A									
HCM 95th-tile Q	0.4	4 0.4	0.3	0.9									

Synchro 9 Report

V Site: 101 [2029 FB AM]

Perth Street and Meynell Road Roundabout

Lane Use			nce										
	Demand F							95% Back of					
South: Mevr	veh/h	%	veh/h	v/c	%	Sec	_	_	m	_	m	%	%
											=		
Lane 1 ^d	225	2.0	924	0.243	100	7.5	LOS A	1.4	9.7	Full	500	0.0	0.0
Approach	225	2.0		0.243		7.5	LOS A	1.4	9.7				
East: Perth	Street												
Lane 1 ^d	395	2.0	1469	0.269	100	4.3	LOS A	1.5	10.4	Full	500	0.0	0.0
Approach	395	2.0		0.269		4.3	LOS A	1.5	10.4				
North: Meyn	ell Road												
Lane 1 ^d	165	2.0	1107	0.149	100	9.3	LOS A	0.7	4.9	Full	500	0.0	0.0
Approach	165	2.0		0.149		9.3	LOS A	0.7	4.9				
West: Perth	Street												
Lane 1 ^d	520	2.0	1291	0.403	100	4.1	LOS A	2.3	16.5	Full	500	0.0	0.0
Approach	520	2.0		0.403		4.1	LOS A	2.3	16.5				
Intersection	1305	2.0		0.403		5.4	LOS A	2.3	16.5				

Site Level of Sarvice (LOS) Method: Delay & vic (HCM 2010). Site LOS Method is specified in the Parameter Settings dialog (Site tab). Roundabout LOS Method: SIDRA Roundabout LOS: Lane LOS values are based on average delay and vic ratio (degree of saturation) per lane. LOS F will result vic > 1 irrespective of lane delay value (does not apply for approaches and intersection). Intersection and Approach LOS values are based on average delay for all lanes (vic not used as specified in HCM 2010). Roundabout Capacity Model: IsoPA Standard. SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay. Gap-Acceptane Capacity. SIDRA Standard. HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

d Dominant lane on roundabout approach

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MOVEMENT SUMMARY

V Site: 101 [2029 FB AM]

Perth Street and Meynell Road Roundabout

	OD	Demand				Level of	95% Back	of Queue		Effective	
		veh/h	%	v/c	sec		veh	m		per veh	km/
	: Meynell F										
1	L2	45	2.0	0.243	12.0	LOS B	1.4	9.7	0.63	0.73	54.
2	T1	5	2.0	0.243	6.1	LOS A	1.4	9.7	0.63	0.73	54.
3	R2	175	2.0	0.243	6.4	LOS A	1.4	9.7	0.63	0.73	53.
Appro	ach	225	2.0	0.243	7.5	LOS A	1.4	9.7	0.63	0.73	53.
East:	Perth Stree	et									
4	L2	60	2.0	0.269	9.3	LOS A	1.5	10.4	0.20	0.41	57.
5	T1	295	2.0	0.269	3.3	LOS A	1.5	10.4	0.20	0.41	56.
6	R2	40	2.0	0.269	3.7	LOS A	1.5	10.4	0.20	0.41	55.
Appro	ach	395	2.0	0.269	4.3	LOS A	1.5	10.4	0.20	0.41	56.
North:	Meynell R	oad									
7	L2	130	2.0	0.149	10.5	LOS B	0.7	4.9	0.44	0.67	53.
8	T1	5	2.0	0.149	4.6	LOS A	0.7	4.9	0.44	0.67	53.
9	R2	30	2.0	0.149	4.9	LOS A	0.7	4.9	0.44	0.67	51.
Appro	ach	165	2.0	0.149	9.3	LOS A	0.7	4.9	0.44	0.67	53.
West:	Perth Stre	et									
10	L2	10	2.0	0.403	9.9	LOS A	2.3	16.5	0.39	0.44	56.
11	T1	495	2.0	0.403	4.0	LOS A	2.3	16.5	0.39	0.44	56.
12	R2	15	2.0	0.403	4.3	LOS A	2.3	16.5	0.39	0.44	54.
Appro	ach	520	2.0	0.403	4.1	LOS A	2.3	16.5	0.39	0.44	56.
All Ve	hicles	1305	2.0	0 403	5.4	LOSA	2.3	16.5	0.38	0.51	55.

Site Level of Service (LOS) Method: Delay & vic (HCM 2010). Site LOS Method is specified in the Parameter Settings dialog (Site tab). Roundabout LOS Method: SIDRA Roundabout LOS: Vehicle movement LOS values are based on average delay and vic ratio (degree of saturation) per movement. LOS F will result vic> 1 irrespective of movement delay value (does not apply for approaches and intersection). Intersection and Approach LOS values are based on average delay for all movements (vic not used as specified in HCM 2010). Roundabout Capacity Mode: SiDRA Standard. SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay. Gap-Acceptance Capacity. SIDRA Standard. Gap-Acceptance Capacity. SiDRA Standard (Acguilt MSD). HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

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LANE LEVEL OF SERVICE

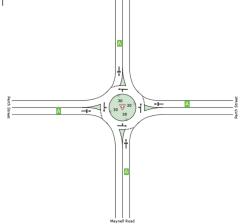
Lane Level of Service V Site: 101 [2029 FB AM]

Perth Street and Meynell Road Roundabout

All Movement Classes

 South
 East
 North
 West
 Intersection

 LOS
 A
 A
 A
 A
 A
 1^N



Site Level of Service (LOS) Method: Delay & v/c (HCM 2010). Site LOS Method is specified in the Parameter Settings dialog (Site tab). Roundabout LOS Method: SIDRA Roundabout LOS. Lane LOS values are based on average delay and v/c rate (degree of saturation) per lane. LOS F will result if v/c > 1 irrespective of lane delay value (does not apply for approaches and intersection). Intersection and Approach LOS values are based on average delay or al lanes (v/c not used as specified in HCM 2010). SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.

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V Site: 101 [2029 FB PM]

Perth Street and Meynell Road Roundabout

Lane Use			nce										
	Demand F Total	Flows HV			Lane	Average	Level of	95% Back of		Lane	Lane	Cap.	Prob.
	veh/h			Satn v/c		Delay sec			Dist m		Length m		
South: Meyr		70	Vermi	v/c	70	366						70	70
Lane 1 ^d	145	2.0	1011	0.143	100	6.5	LOS A	0.7	5.1	Full	500	0.0	0.0
Approach	145	2.0		0.143		6.5	LOS A	0.7	5.1				
East: Perth	Street												
Lane 1 ^d	890	2.0	1515	0.587	100	4.8	LOS A	4.5	32.2	Full	500	0.0	0.0
Approach	890	2.0		0.587		4.8	LOS A	4.5	32.2				
North: Meyn	ell Road												
Lane 1 ^d	105	2.0	824	0.127	100	11.5	LOS B	0.7	5.0	Full	500	0.0	0.0
Approach	105	2.0		0.127		11.5	LOS B	0.7	5.0				
West: Perth	Street												
Lane 1 ^d	465	2.0	1209	0.385	100	4.9	LOS A	2.1	15.0	Full	500	0.0	0.0
Approach	465	2.0		0.385		4.9	LOS A	2.1	15.0				
Intersection	1605	2.0		0.587		5.4	LOS A	4.5	32.2				

Site Level of Sarvice (LOS) Method: Delay & vic (HCM 2010). Site LOS Method is specified in the Parameter Settings dialog (Site tab). Roundabout LOS Method: SIDRA Roundabout LOS: Lane LOS values are based on average delay and vic ratio (degree of saturation) per lane. LOS F will result vic > 1 irrespective of lane delay value (does not apply for approaches and intersection). Intersection and Approach LOS values are based on average delay for all lanes (vic not used as specified in HCM 2010). Roundabout Capacity Model: IsoPA Standard. SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay. Gap-Acceptane Capacity. SIDRA Standard. HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

d Dominant lane on roundabout approach

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MOVEMENT SUMMARY

V Site: 101 [2029 FB PM]

Perth Street and Meynell Road Roundabout

	OD					Level of	95% Back		Prop.	Effective	
		veh/h	%	v/c	sec		veh	m		per veh	km
	: Meynell F										
1	L2	30	2.0	0.143	11.0	LOS B	0.7	5.1	0.53	0.64	55
2	T1	5	2.0	0.143	5.1	LOS A	0.7	5.1	0.53	0.64	55
3	R2	110	2.0	0.143	5.4	LOS A	0.7	5.1	0.53	0.64	53
Appro	ach	145	2.0	0.143	6.5	LOS A	0.7	5.1	0.53	0.64	54
East:	Perth Stree	et									
4	L2	190	2.0	0.587	9.5	LOS A	4.5	32.2	0.29	0.45	56
5	T1	565	2.0	0.587	3.5	LOS A	4.5	32.2	0.29	0.45	56
6	R2	135	2.0	0.587	3.8	LOS A	4.5	32.2	0.29	0.45	54
Appro	ach	890	2.0	0.587	4.8	LOS A	4.5	32.2	0.29	0.45	55
North:	Meynell R	load									
7	L2	80	2.0	0.127	12.8	LOS B	0.7	5.0	0.67	0.77	52
8	T1	5	2.0	0.127	6.9	LOS A	0.7	5.0	0.67	0.77	51
9	R2	20	2.0	0.127	7.2	LOS A	0.7	5.0	0.67	0.77	50
Appro	ach	105	2.0	0.127	11.5	LOS B	0.7	5.0	0.67	0.77	5
West:	Perth Stre	et									
10	L2	35	2.0	0.385	10.3	LOS B	2.1	15.0	0.45	0.50	56
11	T1	385	2.0	0.385	4.4	LOS A	2.1	15.0	0.45	0.50	55
12	R2	45	2.0	0.385	4.7	LOS A	2.1	15.0	0.45	0.50	54
Appro	ach	465	2.0	0.385	4.9	LOS A	2.1	15.0	0.45	0.50	55
All Ve	hidoo	1605	2.0	0.587	5.4	LOS A	4.5	32.2	0.38	0.50	55

Site Level of Service (LOS) Method: Delay & vic (HCM 2010). Site LOS Method is specified in the Parameter Settings dialog (Site tab). Roundabout LOS Method: SIDRA Roundabout LOS: Vehicle movement LOS values are based on average delay and vic ratio (degree of saturation) per movement. LOS F will result vic> 1 irrespective of movement delay value (does not apply for approaches and intersection). Intersection and Approach LOS values are based on average delay for all movements (vic not used as specified in HCM 2010). Roundabout Capacity Mode: SiDRA Standard. SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay. Gap-Acceptance Capacity. SIDRA Standard. Gap-Acceptance Capacity. SiDRA Standard (Acguilt MSD). HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

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LANE LEVEL OF SERVICE

 South
 East
 North
 West
 Intersection

 LOS
 A
 A
 B
 A
 A

Lane Level of Service V Site: 101 [2029 FB PM]

Perth Street and Meynell Road Roundabout

All Movement Classes

1^N t / A A 7

Site Level of Service (LOS) Method: Delay & v/c (HCM 2010). Site LOS Method is specified in the Parameter Settings dialog (Site tab). Roundabout LOS Method: SIDRA Roundabout LOS. Lane LOS values are based on average delay and v/c rate (degree of saturation) per lane. LOS F will result if v/c > 1 irrespective of lane delay value (does not apply for approaches and intersection). Intersection and Approach LOS values are based on average delay or al lanes (v/c not used as specified in HCM 2010). SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.

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Site: 101 [2029 TF AM]

Perth Street and Meynell Road Roundabout

Lane Use a	nd Perfe	ormai	nce										
								95% Back of					
0 11 11	veh/h	%	veh/h	v/c	%	Sec			m		m	%	%
South: Meyn													
Lane 1 ^d	575	2.0	903	0.637	100	10.2	LOS B	6.1	43.5	Full	500	0.0	0.0
Approach	575	2.0		0.637		10.2	LOS B	6.1	43.5				
East: Perth S	Street												
Lane 1 ^d	545	2.0	1475	0.369	100	5.7	LOS A	2.4	17.2	Full	500	0.0	0.0
Approach	545	2.0		0.369		5.7	LOS A	2.4	17.2				
North: Meyn	ell Road												
Lane 1 ^d	165	2.0	998	0.165	100	10.1	LOS B	0.8	5.9	Full	500	0.0	0.0
Approach	165	2.0		0.165		10.1	LOS B	0.8	5.9				
West: Perth	Street												
Lane 1 ^d	525	2.0	1152	0.456	100	5.0	LOS A	2.7	19.3	Full	500	0.0	0.0
Approach	525	2.0		0.456		5.0	LOS A	2.7	19.3				
Intersection	1810	2.0		0.637		7.3	LOS A	6.1	43.5				

Site Level of Sarvice (LOS) Method: Delay & vic (HCM 2010). Site LOS Method is specified in the Parameter Settings dialog (Site tab). Roundabout LOS Method: SIDRA Roundabout LOS: Lane LOS values are based on average delay and vic ratio (degree of saturation) per lane. LOS F will result vic > 1 irrespective of lane delay value (does not apply for approaches and intersection). Intersection and Approach LOS values are based on average delay for all lanes (vic not used as specified in HCM 2010). Roundabout Capacity Model: IsoPA Standard. SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay. Gap-Acceptane Capacity. SIDRA Standard. HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

d Dominant lane on roundabout approach

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MOVEMENT SUMMARY

V Site: 101 [2029 TF AM]

Perth Street and Meynell Road Roundabout

	OD		Flows	Deg.	Average	Level of	95% Back	of Queue	Prop.	Effective	Averag
		veh/h	%	v/c	sec		veh	m		per veh	km
	: Meynell F										
1	L2	50	2.0	0.637	15.3	LOS B	6.1	43.5	0.84	0.96	52
2	T1	5	2.0	0.637	9.3	LOS A	6.1	43.5	0.84	0.96	52
3	R2	520	2.0	0.637	9.7	LOS A	6.1	43.5	0.84	0.96	51
Appro	ach	575	2.0	0.637	10.2	LOS B	6.1	43.5	0.84	0.96	51
East:	Perth Stree	et									
4	L2	210	2.0	0.369	9.3	LOS A	2.4	17.2	0.24	0.49	55
5	T1	295	2.0	0.369	3.4	LOS A	2.4	17.2	0.24	0.49	55
6	R2	40	2.0	0.369	3.7	LOS A	2.4	17.2	0.24	0.49	53
Appro	ach	545	2.0	0.369	5.7	LOS A	2.4	17.2	0.24	0.49	55
North	Meynell R	oad									
7	L2	130	2.0	0.165	11.3	LOS B	0.8	5.9	0.54	0.72	53
8	T1	5	2.0	0.165	5.4	LOS A	0.8	5.9	0.54	0.72	52
9	R2	30	2.0	0.165	5.7	LOS A	0.8	5.9	0.54	0.72	51
Appro	ach	165	2.0	0.165	10.1	LOS B	0.8	5.9	0.54	0.72	52
West:	Perth Stre	et									
10	L2	10	2.0	0.456	10.8	LOS B	2.7	19.3	0.53	0.53	55
11	T1	495	2.0	0.456	4.9	LOS A	2.7	19.3	0.53	0.53	55
12	R2	20	2.0	0.456	5.2	LOS A	2.7	19.3	0.53	0.53	54
Appro	ach	525	2.0	0.456	5.0	LOS A	2.7	19.3	0.53	0.53	55
All Ve	hiolog	1810	2.0	0.637	7.3	LOS A	6.1	43.5	0.54	0.67	53

Site Level of Service (LOS) Method: Delay & vic (HCM 2010). Site LOS Method is specified in the Parameter Settings dialog (Site tab). Roundabout LOS Method: SIDRA Roundabout LOS: Vehicle movement LOS values are based on average delay and vic ratio (degree of saturation) per movement. LOS F will result vic> 1 irrespective of movement delay value (does not apply for approaches and intersection). Intersection and Approach LOS values are based on average delay for all movements (vic not used as specified in HCM 2010). Roundabout Capacity Mode: SiDRA Standard. SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay. Gap-Acceptance Capacity. SIDRA Standard. Gap-Acceptance Capacity. SiDRA Standard (Acguilt MSD). HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

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mattamy richmond village.sip7

LANE LEVEL OF SERVICE

Lane Level of Service

V Site: 101 [2029 TF AM] Perth Street and Meynell Road Roundabout

All Movement Classes

 South
 East
 North
 West
 Intersection

 LOS
 B
 A
 B
 A
 A
 1^N t / Α A 7

Site Level of Service (LOS) Method: Delay & v/c (HCM 2010). Site LOS Method is specified in the Parameter Settings dialog (Site tab). Roundabout LOS Method: SIDRA Roundabout LOS. Lane LOS values are based on average delay and v/c rate (degree of saturation) per lane. LOS F will result if v/c > 1 irrespective of lane delay value (does not apply for approaches and intersection). Intersection and Approach LOS values are based on average delay or al lanes (v/c not used as specified in HCM 2010). SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.

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Site: 101 [2029 TF PM]

Perth Street and Meynell Road Roundabout

Lane Use a				0			1	0500 014 -6	0			0	Dert
	Demand F Total	-lows HV		Deg. Satn	Lane Util.	Average Delay	Level of Service	95% Back of Veh		Lane	Lane		
	veh/h			Sath v/c		Sec			Dist m		Length m		
South: Mevn		70	Verun	v/c	70	360						70	70
Lane 1 ^d	430	2.0	961	0.447	100	6.4	LOS A	3.0	21.4	Full	500	0.0	0.0
Approach	430	2.0		0.447		6.4	LOS A	3.0	21.4				
East: Perth S	Street												
Lane 1 ^d	1315	2.0	1528	0.861	100	6.9	LOS A	15.2	108.5	Full	500	0.0	0.0
Approach	1315	2.0		0.861		6.9	LOS A	15.2	108.5				
North: Meyn	ell Road												
Lane 1 ^d	105	2.0	418	0.251	100	18.7	LOS B	1.8	13.1	Full	500	0.0	0.0
Approach	105	2.0		0.251		18.7	LOS B	1.8	13.1				
West: Perth	Street												
Lane 1 ^d	475	2.0	828	0.573	100	9.6	LOS A	5.1	36.0	Full	500	0.0	0.0
Approach	475	2.0		0.573		9.6	LOS A	5.1	36.0				
Intersection	2325	2.0		0.861		7.9	LOSA	15.2	108.5				

Site Level of Sarvice (LOS) Method: Delay & vic (HCM 2010). Site LOS Method is specified in the Parameter Settings dialog (Site tab). Roundabout LOS Method: SIDRA Roundabout LOS: Lane LOS values are based on average delay and vic ratio (degree of saturation) per lane. LOS F will result vic > 1 irrespective of lane delay value (does not apply for approaches and intersection). Intersection and Approach LOS values are based on average delay for all lanes (vic not used as specified in HCM 2010). Roundabout Capacity Model: IsoPA Standard. SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay. Gap-Acceptane Capacity. SIDRA Standard. HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

d Dominant lane on roundabout approach

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MOVEMENT SUMMARY

𝕂 Site: 101 [2029 TF PM]

Perth Street and Meynell Road Roundabout

Mov	OD	Demand		Deg.	Average	Level of	95% Back	of Queue	Prop.	Effective	Averag
		veh/h	%	v/c	sec		veh	m		per veh	km
South	: Meynell F										
1	L2	35	2.0	0.447	11.6	LOS B	3.0	21.4	0.70	0.75	55
2	T1	5	2.0	0.447	5.7	LOS A	3.0	21.4	0.70	0.75	55
3	R2	390	2.0	0.447	6.0	LOS A	3.0	21.4	0.70	0.75	53
Appro	ach	430	2.0	0.447	6.4	LOS A	3.0	21.4	0.70	0.75	53
East: I	Perth Stree	et									
4	L2	615	2.0	0.861	10.0	LOS B	15.2	108.5	0.61	0.50	54
5	T1	565	2.0	0.861	4.1	LOS A	15.2	108.5	0.61	0.50	53
6	R2	135	2.0	0.861	4.4	LOS A	15.2	108.5	0.61	0.50	52
Appro	ach	1315	2.0	0.861	6.9	LOS A	15.2	108.5	0.61	0.50	53
North:	Meynell R	oad									
7	L2	80	2.0	0.251	20.0	LOS C	1.8	13.1	0.98	0.95	47
8	T1	5	2.0	0.251	14.1	LOS B	1.8	13.1	0.98	0.95	47
9	R2	20	2.0	0.251	14.4	LOS B	1.8	13.1	0.98	0.95	46
Appro	ach	105	2.0	0.251	18.7	LOS B	1.8	13.1	0.98	0.95	47
West:	Perth Stre	et									
10	L2	35	2.0	0.573	15.1	LOS B	5.1	36.0	0.85	0.94	53
11	T1	385	2.0	0.573	9.1	LOS A	5.1	36.0	0.85	0.94	53
12	R2	55	2.0	0.573	9.5	LOS A	5.1	36.0	0.85	0.94	51
Appro	ach	475	2.0	0.573	9.6	LOS A	5.1	36.0	0.85	0.94	52
All Vel	hiolog	2325	2.0	0.861	7.9	LOS A	15.2	108.5	0.69	0.66	53

Site Level of Service (LOS) Method: Delay & vic (HCM 2010). Site LOS Method is specified in the Parameter Settings dialog (Site tab). Roundabout LOS Method: SIDRA Roundabout LOS: Vehicle movement LOS values are based on average delay and vic ratio (degree of saturation) per movement. LOS F will result vic> 1 irrespective of movement delay value (does not apply for approaches and intersection). Intersection and Approach LOS values are based on average delay for all movements (vic not used as specified in HCM 2010). Roundabout Capacity Mode: SiDRA Standard. SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay. Gap-Acceptance Capacity. SIDRA Standard. Gap-Acceptance Capacity. SiDRA Standard (Acguilt MSD). HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

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mattamy richmond village.sip7

LANE LEVEL OF SERVICE

Lane Level of Service

V Site: 101 [2029 TF PM] Perth Street and Meynell Road Roundabout

All Movement Classes

 South
 East
 North
 West
 Intersection

 LOS
 A
 A
 B
 A
 A
 1^N t /

A A 7

Site Level of Service (LOS) Method: Delay & v/c (HCM 2010). Site LOS Method is specified in the Parameter Settings dialog (Site tab). Roundabout LOS Method: SIDRA Roundabout LOS. Lane LOS values are based on average delay and v/c rate (degree of saturation) per lane. LOS F will result if v/c > 1 irrespective of lane delay value (does not apply for approaches and intersection). Intersection and Approach LOS values are based on average delay or al lanes (v/c not used as specified in HCM 2010). SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.

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V Site: 101 [2029 TF w/ WBL & NBR AM] Perth Street and Meynell Road Roundabout

Lane Use	and Perf	orma	nce										
	Demand I			Deg.	Lane	Average	Level of	95% Back of		Lane	Lane		Prob.
	Total veh/h		veh/h	Satn v/c		Delay sec			Dist m		Length m		
South: Mey		76	venni	V/C	70	SEC	_			_		70	70
Lane 1 ^d	55	2.0	1135	0.048	100	10.5	LOS B	0.3	1.9	Full	500	0.0	0.0
Lane 2	520	2.0	1987	0.262	100	3.2	LOS A	0.0	0.0	Full	500	0.0	0.0
Approach	575	2.0		0.262		3.9	LOS A	0.3	1.9				
East: Perth	n Street												
Lane 1	210	2.0	1356	0.155	100	9.3	LOS A	0.7	5.2	Full	500	0.0	0.0
Lane 2 ^d	335	2.0	1637	0.205	100	3.4	LOS A	1.0	7.4	Full	500	0.0	0.0
Approach	545	2.0		0.205		5.7	LOS A	1.0	7.4				
North: Mey	nell Road												
Lane 1 ^d	165	2.0	981	0.168	100	9.2	LOS A	0.5	3.7	Full	500	0.0	0.0
Approach	165	2.0		0.168		9.2	LOS A	0.5	3.7				
West: Pert	h Street												
Lane 1 ^d	525	2.0	1048	0.501	100	5.0	LOS A	2.6	18.2	Full	500	0.0	0.0
Approach	525	2.0		0.501		5.0	LOS A	2.6	18.2				
Intersection	n 1810	2.0		0.501		5.2	LOS A	2.6	18.2				

Sile Level of Service (LOS) Method: Delay & vic (HCM 2010). Sile LOS Method is specified in the Parameter Settings dialog (Sile tab). Roundabout LOS Method: SIDRA Roundabout LOS. Lane LOS Values are based on average delay and vic ratio (degree of saturation) per lane. LOS F will result if vic > 1 irrespective of lane delay value (does not apply for approaches and intersection). Intersection and Approach LOS values are based on average delay for all lanes (vic not used as specified in HCM 2010). Roundabout Capacity Model: SIDRA Standard. SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay. Gap-Acceptane Capacity: SIDRA Standard. Keylik MSD). HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

ant lane on roundabout approach d Dor

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MOVEMENT SUMMARY

₩ Site: 101 [2029 TF w/ WBL & NBR AM] Perth Street and Meynell Road Roundabout

Mov	OD	Demano		Deg.		Level of	95% Back		Prop.	Effective	Averag
										Stop Rate	Speed
Couth	Meynell F	veh/h	%	v/c	sec		veh	m		per veh	km/
1	L2	50	2.0	0.048	11.1	LOS B	0.3	1.9	0.58	0.67	52
2	T1	5	2.0	0.048	5.1	LOS A	0.3	1.9	0.58	0.67	52
3	R2	520	2.0	0.262	3.2	LOSA	0.3	0.0	0.00	0.67	56
		575	2.0	0.262	3.2	LOSA	0.0	1.9	0.00		56
Appro	acn	5/5	2.0	0.262	3.9	LOSA	0.3	1.9	0.06	0.45	56
East: F	Perth Stree	et									
4	L2	210	2.0	0.155	9.3	LOS A	0.7	5.2	0.18	0.61	53
5	T1	295	2.0	0.205	3.3	LOS A	1.0	7.4	0.18	0.36	57
6	R2	40	2.0	0.205	3.9	LOS A	1.0	7.4	0.18	0.36	55
Appro	ach	545	2.0	0.205	5.7	LOS A	1.0	7.4	0.18	0.45	55
North:	Meynell R	oad									
7	L2	130	2.0	0.168	10.4	LOS B	0.5	3.7	0.38	0.72	53
8	T1	5	2.0	0.168	4.5	LOS A	0.5	3.7	0.38	0.72	53
9	R2	30	2.0	0.168	4.8	LOS A	0.5	3.7	0.38	0.72	51
Appro	ach	165	2.0	0.168	9.2	LOS A	0.5	3.7	0.38	0.72	53
West:	Perth Stre	et									
10	L2	10	2.0	0.501	10.8	LOS B	2.6	18.2	0.48	0.54	56
11	T1	495	2.0	0.501	4.9	LOS A	2.6	18.2	0.48	0.54	55
12	R2	20	2.0	0.501	5.2	LOS A	2.6	18.2	0.48	0.54	54
Appro	ach	525	2.0	0.501	5.0	LOS A	2.6	18.2	0.48	0.54	55
All Vel	viclos	1810	2.0	0.501	5.2	LOS A	2.6	18.2	0.25	0.50	55

Site Level of Service (LOS) Method: Delay & vic (HCM 2010). Site LOS Method is specified in the Parameter Settings dialog (Site tab). Roundabout LOS Method: SIDRA Roundabout LOS: Vehicle movement LOS values are based on average delay and vic ratio (degree of saturation) per movement. LOS F will result vic> 1 irrespective of movement delay value (does not apply for approaches and intersection). Intersection and Approach LOS values are based on average delay for all movements (vic not used as specified in HCM 2010). Roundabout Capacity Mode: SiDRA Standard. SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay. Gap-Acceptance Capacity. SIDRA Standard. Gap-Acceptance Capacity. SiDRA Standard (Acguilt MSD). HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

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mattamy richmond village.sip7

LANE LEVEL OF SERVICE

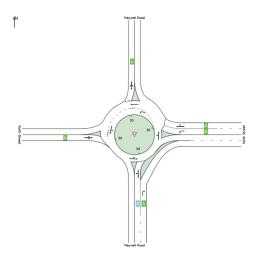
Lane Level of Service

∀ Site: 101 [2029 TF w/ WBL & NBR AM] Perth Street and Meynell Road Roundabout

All Movement Classes

 South
 East
 North
 West
 Intersection

 LOS
 A
 A
 A
 A
 A



Site Level of Service (LOS) Method: Delay & v/c (HCM 2010). Site LOS Method is specified in the Parameter Settings dialog (Site tab). Roundabout LOS Method: SIDRA Roundabout LOS. Lane LOS values are based on average delay and v/c rate (degree of saturation) per lane. LOS F will result if v/c > 1 irrespective of lane delay value (does not apply for approaches and intersection). Intersection and Approach LOS values are based on average delay or al lanes (v/c not used as specified in HCM 2010). SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.

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V Site: 101 [2029 TF w/ WBL & NBR PM] Perth Street and Meynell Road Roundabout

Lane Use			nce										
	Demand I			Deg.	Lane	Average	Level of	95% Back of		Lane	Lane	Cap.	Prob.
	Total veh/h												
South: Mey		76	veh/h	v/c	%	sec	_		m	_	m	76	%
Lane 1 ^d	40	2.0	1201	0.033	100	9.7	LOSA	0.2	1.3	Full	500	0.0	0.0
Lane 2	390	2.0	1987	0.196	100	3.2	LOSA	0.0	0.0	Full	500	0.0	0.0
	430	2.0	1907	0.190	100	3.8	LOSA	0.0	1.3	Full	500	0.0	0.0
Approach	430	2.0		0.196		3.8	LUSA	0.2	1.3				
East: Perth	Street												
Lane 1	615	2.0	1418	0.434	100	9.4	LOS A	2.6	18.9	Full	500	0.0	0.0
Lane 2 ^d	700	2.0	1657	0.422	100	3.5	LOS A	2.6	18.4	Full	500	0.0	0.0
Approach	1315	2.0		0.434		6.3	LOS A	2.6	18.9				
North: Mey	nell Road												
Lane 1 ^d	105	2.0	774	0.136	100	10.3	LOS B	0.5	3.2	Full	500	0.0	0.0
Approach	105	2.0		0.136		10.3	LOS B	0.5	3.2				
West: Perth	n Street												
Lane 1 ^d	475	2.0	818	0.581	100	9.4	LOS A	4.2	30.2	Full	500	0.0	0.0
Approach	475	2.0		0.581		9.4	LOS A	4.2	30.2				
Intersection	1 2325	2.0		0.581		6.6	LOS A	4.2	30.2				

Sile Level of Service (LOS) Method: Delay & vic (HCM 2010). Sile LOS Method is specified in the Parameter Settings dialog (Sile tab). Roundabout LOS Method: SIDRA Roundabout LOS. Lane LOS Values are based on average delay and vic ratio (degree of saturation) per lane. LOS F will result if vic > 1 irrespective of lane delay value (does not apply for approaches and intersection). Intersection and Approach LOS values are based on average delay for all lanes (vic not used as specified in HCM 2010). Roundabout Capacity Model: SIDRA Standard. SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay. Gap-Acceptane Capacity: SIDRA Standard. Keylik MSD). HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

ant lane on roundabout approach d Dor

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MOVEMENT SUMMARY

₩ Site: 101 [2029 TF w/ WBL & NBR PM] Perth Street and Meynell Road Roundabout

Mov	OD	Demand		Deg.	Average	Level of	95% Back		Prop.	Effective	Averag
Couth	Meynell F	veh/h	%	v/c	sec		veh	m		per veh	km/
1	L2	35	2.0	0.033	10.4	LOS B	0.2	1.3	0.52	0.63	52.
2	T1	5	2.0	0.033	4.5	LOS A	0.2	1.3	0.52	0.63	52
3	R2	390	2.0	0.196	3.2	LOSA	0.0	0.0	0.00	0.03	56
Appro		430	2.0	0.190	3.8	LOSA	0.0	1.3	0.00	0.43	56.
			2.0	0.100	0.0	20071	0.2	1.0	0.00	0.14	00
	Perth Stree										
4	L2	615	2.0	0.434	9.4	LOS A	2.6	18.9	0.25	0.61	53
5	T1	565	2.0	0.422	3.4	LOS A	2.6	18.4	0.23	0.38	57
6	R2	135	2.0	0.422	4.0	LOS A	2.6	18.4	0.23	0.38	55
Appro	ach	1315	2.0	0.434	6.3	LOS A	2.6	18.9	0.24	0.49	54
North:	Meynell R	oad									
7	L2	80	2.0	0.136	11.6	LOS B	0.5	3.2	0.54	0.82	52
8	T1	5	2.0	0.136	5.7	LOS A	0.5	3.2	0.54	0.82	52
9	R2	20	2.0	0.136	6.0	LOS A	0.5	3.2	0.54	0.82	51
Appro	ach	105	2.0	0.136	10.3	LOS B	0.5	3.2	0.54	0.82	52
West:	Perth Stre	et									
10	L2	35	2.0	0.581	14.8	LOS B	4.2	30.2	0.73	0.91	53
11	T1	385	2.0	0.581	8.9	LOS A	4.2	30.2	0.73	0.91	53
12	R2	55	2.0	0.581	9.2	LOS A	4.2	30.2	0.73	0.91	51
Appro	ach	475	2.0	0.581	9.4	LOS A	4.2	30.2	0.73	0.91	53
All Vel	-lates	2325	2.0	0.581	6.6	LOS A	4.2	30.2	0.32	0.58	54

Site Level of Service (LOS) Method: Delay & vic (HCM 2010). Site LOS Method is specified in the Parameter Settings dialog (Site tab). Roundabout LOS Method: SIDRA Roundabout LOS: Vehicle movement LOS values are based on average delay and vic ratio (degree of saturation) per movement. LOS F will result vic> 1 irrespective of movement delay value (does not apply for approaches and intersection). Intersection and Approach LOS values are based on average delay for all movements (vic not used as specified in HCM 2010). Roundabout Capacity Mode: SiDRA Standard. SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay. Gap-Acceptance Capacity. SIDRA Standard. Gap-Acceptance Capacity. SiDRA Standard (Acguilt MSD). HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

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LANE LEVEL OF SERVICE

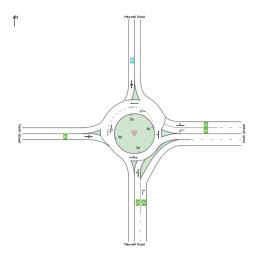
Lane Level of Service ∀ Site: 101 [2029 TF w/ WBL & NBR PM]

Perth Street and Meynell Road Roundabout

All Movement Classes

 South
 East
 North
 West
 Intersection

 LOS
 A
 A
 B
 A
 A



Site Level of Service (LOS) Method: Delay & v/c (HCM 2010). Site LOS Method is specified in the Parameter Settings dialog (Site tab). Roundabout LOS Method: SIDRA Roundabout LOS. Lane LOS values are based on average delay and v/c rate (degree of saturation) per lane. LOS F will result if v/c > 1 irrespective of lane delay value (does not apply for approaches and intersection). Intersection and Approach LOS values are based on average delay or al lanes (v/c not used as specified in HCM 2010). SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.

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V Site: 101 [2034 TF w/ WBL & NBR AM] Perth Street and Meynell Road Roundabout

Lane Use	and Perf	orma	nce										
	Demand F		0		Lane	Average	Level of	95% Back of		Lane	Lane		Prob.
	Total					Delay							
South: Mey	veh/h	%	veh/h	v/c	%	Sec	_		m	_	m	%	%
Lane 1 ^d	55	2.0	1095	0.050	100	10.7	LOS B	0.3	21	Full	500	0.0	0.0
Lane 2	520	2.0	1987	0.262	100	3.2	LOS A	0.0	0.0	Full	500	0.0	0.0
Approach	575	2.0		0.262		4.0	LOS A	0.3	2.1				
East: Perth	Street												
Lane 1	210	2.0	1342	0.156	100	9.3	LOS A	0.7	5.2	Full	500	0.0	0.0
Lane 2 ^d	360	2.0	1639	0.220	100	3.4	LOS A	1.1	8.2	Full	500	0.0	0.0
Approach	570	2.0		0.220		5.6	LOS A	1.1	8.2				
North: Meyr	nell Road												
Lane 1 ^d	165	2.0	972	0.170	100	9.3	LOS A	0.5	3.8	Full	500	0.0	0.0
Approach	165	2.0		0.170		9.3	LOS A	0.5	3.8				
West: Perth	Street												
Lane 1 ^d	565	2.0	1053	0.536	100	5.2	LOS A	3.0	21.2	Full	500	0.0	0.0
Approach	565	2.0		0.536		5.2	LOS A	3.0	21.2				
Intersection	1875	2.0		0.536		5.3	LOS A	3.0	21.2				

Sile Level of Service (LOS) Method: Delay & vic (HCM 2010). Sile LOS Method is specified in the Parameter Settings dialog (Sile tab). Roundabout LOS Method: SIDRA Roundabout LOS. Lane LOS Values are based on average delay and vic ratio (degree of saturation) per lane. LOS F will result if vic > 1 irrespective of lane delay value (does not apply for approaches and intersection). Intersection and Approach LOS values are based on average delay for all lanes (vic not used as specified in HCM 2010). Roundabout Capacity Model: SIDRA Standard. SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay. Gap-Acceptane Capacity: SIDRA Standard. Keylik MSD). HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

ant lane on roundabout approach d Dor

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MOVEMENT SUMMARY

₩ Site: 101 [2034 TF w/ WBL & NBR AM] Perth Street and Meynell Road Roundabout

Mov	OD	Demand		Deg.	Average	Level of	95% Back		Prop.	Effective	Averag
		veh/h	%	v/c	sec		veh	m		per veh	km/
	Meynell F										
1	L2	50	2.0	0.050	11.3	LOS B	0.3	2.1	0.61	0.68	52.
2	T1	5	2.0	0.050	5.3	LOS A	0.3	2.1	0.61	0.68	52
3	R2	520	2.0	0.262	3.2	LOS A	0.0	0.0	0.00	0.43	56.
Approa	ach	575	2.0	0.262	4.0	LOS A	0.3	2.1	0.06	0.45	56
East: F	Perth Stree	et									
4	L2	210	2.0	0.156	9.3	LOS A	0.7	5.2	0.19	0.61	53
5	T1	320	2.0	0.220	3.3	LOS A	1.1	8.2	0.18	0.36	57
6	R2	40	2.0	0.220	3.9	LOS A	1.1	8.2	0.18	0.36	55
Approa	ach	570	2.0	0.220	5.6	LOS A	1.1	8.2	0.19	0.45	55
North:	Meynell R	oad									
7	L2	130	2.0	0.170	10.5	LOS B	0.5	3.8	0.39	0.73	53
8	T1	5	2.0	0.170	4.5	LOS A	0.5	3.8	0.39	0.73	53
9	R2	30	2.0	0.170	4.8	LOS A	0.5	3.8	0.39	0.73	51
Approa	ach	165	2.0	0.170	9.3	LOS A	0.5	3.8	0.39	0.73	53
West:	Perth Stre	et									
10	L2	10	2.0	0.536	11.0	LOS B	3.0	21.2	0.50	0.57	56
11	T1	535	2.0	0.536	5.1	LOS A	3.0	21.2	0.50	0.57	55
12	R2	20	2.0	0.536	5.4	LOS A	3.0	21.2	0.50	0.57	54
Approa	ach	565	2.0	0.536	5.2	LOS A	3.0	21.2	0.50	0.57	55
All Veh	vicles	1875	2.0	0.536	5.3	LOS A	3.0	21.2	0.26	0.51	55

Site Level of Service (LOS) Method: Delay & vic (HCM 2010). Site LOS Method is specified in the Parameter Settings dialog (Site tab). Roundabout LOS Method: SIDRA Roundabout LOS: Vehicle movement LOS values are based on average delay and vic ratio (degree of saturation) per movement. LOS F will result vic> 1 irrespective of movement delay value (does not apply for approaches and intersection). Intersection and Approach LOS values are based on average delay for all movements (vic not used as specified in HCM 2010). Roundabout Capacity Mode: SiDRA Standard. SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay. Gap-Acceptance Capacity. SIDRA Standard. Gap-Acceptance Capacity. SiDRA Standard (Acguilt MSD). HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

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mattamy richmond village.sip7

LANE LEVEL OF SERVICE

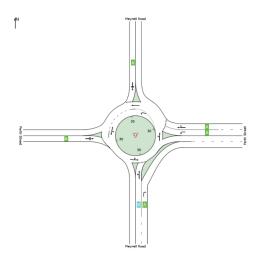
Lane Level of Service

V Site: 101 [2034 TF w/ WBL & NBR AM] Perth Street and Meynell Road Roundabout

All Movement Classes

 South
 East
 North
 West
 Intersection

 LOS
 A
 A
 A
 A
 A



Site Level of Service (LOS) Method: Delay & v/c (HCM 2010). Site LOS Method is specified in the Parameter Settings dialog (Site tab). Roundabout LOS Method: SIDRA Roundabout LOS. Lane LOS values are based on average delay and v/c rate (degree of saturation) per lane. LOS F will result if v/c > 1 irrespective of lane delay value (does not apply for approaches and intersection). Intersection and Approach LOS values are based on average delay or al lanes (v/c not used as specified in HCM 2010). SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.

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V Site: 101 [2034 TF w/ WBL & NBR PM] Perth Street and Meynell Road Roundabout

Lane Use			nce										
	Demand I			Deg.	Lane	Average	Level of	95% Back of		Lane	Lane	Cap.	Prob.
South: Mey	veh/h	%	veh/h	v/c	%	Sec	_		m	_	m	%	%
Lane 1 ^d													
	40	2.0	1169	0.034	100	9.8	LOS A	0.2	1.4	Full	500	0.0	0.0
Lane 2	390	2.0	1987	0.196	100	3.2	LOSA	0.0	0.0	Full	500	0.0	0.0
Approach	430	2.0		0.196		3.8	LOS A	0.2	1.4				
East: Perth	Street												
Lane 1	615	2.0	1410	0.436	100	9.4	LOS A	2.7	19.1	Full	500	0.0	0.0
Lane 2 ^d	745	2.0	1659	0.449	100	3.5	LOS A	2.9	20.3	Full	500	0.0	0.0
Approach	1360	2.0		0.449		6.2	LOS A	2.9	20.3				
North: Mey	nell Road												
Lane 1 ^d	105	2.0	758	0.139	100	10.4	LOS B	0.5	3.4	Full	500	0.0	0.0
Approach	105	2.0		0.139		10.4	LOS B	0.5	3.4				
West: Perth	n Street												
Lane 1 ^d	505	2.0	817	0.618	100	9.9	LOS A	4.8	34.4	Full	500	0.0	0.0
Approach	505	2.0		0.618		9.9	LOS A	4.8	34.4				
Intersection	2400	2.0		0.618		6.7	LOS A	4.8	34.4				

Sile Level of Service (LOS) Method: Delay & vic (HCM 2010). Sile LOS Method is specified in the Parameter Settings dialog (Sile tab). Roundabout LOS Method: SIDRA Roundabout LOS. Lane LOS Values are based on average delay and vic ratio (degree of saturation) per lane. LOS F will result if vic > 1 irrespective of lane delay value (does not apply for approaches and intersection). Intersection and Approach LOS values are based on average delay for all lanes (vic not used as specified in HCM 2010). Roundabout Capacity Model: SIDRA Standard. SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay. Gap-Acceptane Capacity: SIDRA Standard. Keylik MSD). HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

ant lane on roundabout approach d Dor

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MOVEMENT SUMMARY

₩ Site: 101 [2034 TF w/ WBL & NBR PM] Perth Street and Meynell Road Roundabout

Mov	OD	Demand		Deg.	Average	Level of	95% Back		Prop.	Effective	Averag
Couth	Meynell F	veh/h	%	v/c	sec		veh	m		per veh	km/
1	L2	35	2.0	0.034	10.5	LOS B	0.2	1.4	0.55	0.64	52
2	T1	5	2.0	0.034	4.6	LOS A	0.2	1.4	0.55	0.64	52
3	R2	390	2.0	0.196	3.2	LOSA	0.0	0.0	0.00	0.43	56
Appro		430	2.0	0.190	3.8	LOSA	0.0	1.4	0.00	0.45	56
Appro	acn	430	2.0	0.190	3.8	LUSA	0.2	1.4	0.05	0.45	00
East: I	Perth Stree	et									
4	L2	615	2.0	0.436	9.4	LOS A	2.7	19.1	0.25	0.61	53
5	T1	610	2.0	0.449	3.4	LOS A	2.9	20.3	0.24	0.38	57
6	R2	135	2.0	0.449	4.0	LOS A	2.9	20.3	0.24	0.38	55
Appro	ach	1360	2.0	0.449	6.2	LOS A	2.9	20.3	0.24	0.48	55
North:	Meynell R	oad									
7	L2	80	2.0	0.139	11.8	LOS B	0.5	3.4	0.56	0.83	52
8	T1	5	2.0	0.139	5.9	LOS A	0.5	3.4	0.56	0.83	52
9	R2	20	2.0	0.139	6.2	LOS A	0.5	3.4	0.56	0.83	51
Appro	ach	105	2.0	0.139	10.4	LOS B	0.5	3.4	0.56	0.83	52
West:	Perth Stre	et									
10	L2	35	2.0	0.618	15.4	LOS B	4.8	34.4	0.76	0.94	53
11	T1	415	2.0	0.618	9.4	LOS A	4.8	34.4	0.76	0.94	52
12	R2	55	2.0	0.618	9.8	LOS A	4.8	34.4	0.76	0.94	51
Appro	ach	505	2.0	0.618	9.9	LOS A	4.8	34.4	0.76	0.94	52
All Vel	-lates	2400	2.0	0.618	6.7	LOS A	4.8	34.4	0.33	0.59	54

Site Level of Service (LOS) Method: Delay & vic (HCM 2010). Site LOS Method is specified in the Parameter Settings dialog (Site tab). Roundabout LOS Method: SIDRA Roundabout LOS: Vehicle movement LOS values are based on average delay and vic ratio (degree of saturation) per movement. LOS F will result vic> 1 irrespective of movement delay value (does not apply for approaches and intersection). Intersection and Approach LOS values are based on average delay for all movements (vic not used as specified in HCM 2010). Roundabout Capacity Mode: SiDRA Standard. SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay. Gap-Acceptance Capacity. SIDRA Standard. Gap-Acceptance Capacity. SiDRA Standard (Acguilt MSD). HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

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mattamy richmond village.sip7

LANE LEVEL OF SERVICE

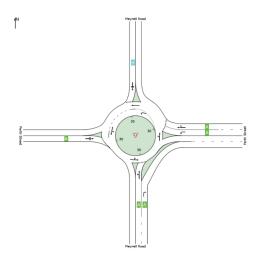
Lane Level of Service ∀ Site: 101 [2034 TF w/ WBL & NBR PM]

Perth Street and Meynell Road Roundabout

All Movement Classes

 South
 East
 North
 West
 Intersection

 LOS
 A
 A
 B
 A
 A



Site Level of Service (LOS) Method: Delay & v/c (HCM 2010). Site LOS Method is specified in the Parameter Settings dialog (Site tab). Roundabout LOS Method: SIDRA Roundabout LOS. Lane LOS values are based on average delay and v/c rate (degree of saturation) per lane. LOS F will result if v/c > 1 irrespective of lane delay value (does not apply for approaches and intersection). Intersection and Approach LOS values are based on average delay or al lanes (v/c not used as specified in HCM 2010). SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.

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