Richmond Subdivision
Transportation Brief Update

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Prepared for:

Mattamy Homes

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Table of Contents

1.0 INTRODUCTION 1
1.1 STUDY PURPOSE 1
1.2 PROPOSED DEVELOPMENT 1
1.3 SCOPE OF THE ASSESSMENT 4

2.0 EXISTING TRANSPORTATION ENVIRONMENT 5
2.1 ROADS AND TRAFFIC CONTROL 5
2.2 TRANSIT 6
2.3 WALKING AND CYCLING 7
2.4 TRAFFIC VOLUMES 7

3.0 FUTURE TRANSPORTATION ENVIRONMENT 9
3.1 FUTURE NETWORK UPGRADES 9
3.1.1 Road Network Improvements 9
3.1.2 Future Background Developments 10
3.2 2029 FUTURE BACKGROUND CONDITIONS 11
3.3 SITE TRAFFIC GENERATION 13
3.3.1 Land Use and Trip Generation Rates 13
3.3.2 Vehicle Site Trips 14
3.3.3 Traffic Distribution and Assignment 14
3.4 2029 TOTAL FUTURE CONDITIONS 16
3.5 2034 ULTIMATE CONDITIONS 19

4.0 TRANSPORTATION ASSESSMENT 22
4.1 2018 EXISTING CONDITIONS 22
4.1.1 Intersection Operational Analysis 22
4.2 2029 FUTURE BACKGROUND CONDITIONS 22
4.2.1 Intersection Operational Analysis 23
4.3 2029 TOTAL FUTURE CONDITIONS 24
4.3.1 Intersection Operational Analysis 24
4.4 2034 ULTIMATE CONDITIONS 27
4.4.1 Intersection Operational Analysis 27

5.0 DRAFT PLAN REVIEW 30

6.0 TRANSPORTATION DEMAND MANAGEMENT 34

7.0 SUMMARY AND CONCLUSIONS 38

List of Tables

Table 1 - Scheduled Upgrades....10
Table 2 - Background Developments....10
Table 3 - TRANS Trip Generation Rates....14
Table 4 - Vehicle Site Trips....14
Table 5 – Traffic Distribution....14
Table 6 - 2018 Existing Intersection Operations....22
Table 7 - 2029 Future Background Intersection Operations....23
Table 8 - 2029 Total Future Intersection Operations....25
Table 9 - 2034 Ultimate Intersection Operations....28

List of Figures

Figure 1 - Location of Proposed Development....2
Figure 2 - Site Plan for the Proposed Development....3
Figure 3 - Existing Intersection Control and Lane Configuration....6
Figure 4 - Existing Transit Service....7
Figure 5 - 2018 Existing Traffic Volumes – AM Peak Hour....8
Figure 6 - 2018 Existing Traffic Volumes – PM Peak Hour....9
Figure 7 - 2029 Future Background Traffic Volumes – AM Peak Hour....12
Figure 8 - 2029 Future Background Traffic Volumes – PM Peak Hour....13
Figure 9 - Site Traffic – AM Peak Hour....15
Figure 10 - Site Traffic – PM Peak Hour....16
Figure 11 - 2029 Total Future Traffic Volumes – AM Peak Hour....17
Figure 12 - 2029 Total Future Traffic Volumes – PM Peak Hour....18
Figure 13 - 2034 Ultimate Traffic Volumes – AM Peak Hour....20
Figure 14 - 2034 Ultimate Traffic Volumes – PM Peak Hour....21
Figure 15 - 2029 Assumed Intersection Control and Lane Geometry....26
Figure 16 - 2029 Recommended Intersection Control and Lane Geometry Improvements....26
Figure 17 - 2034 Intersection Control and Lane Geometry....29
Figure 18 - Proposed Transit Route and Transit Stops....31
Figure 19 - Proposed Pedestrian Facilities....32
Figure 20 - Proposed Meynell Road Cross-Section – without Parking....33

List of Appendices

APPENDIX A TRAFFIC DATA....A.1

APPENDIX B BACKGROUND DEVELOPMENTS....B.1

APPENDIX C INTERSECTION PERFORMANCE WORKSHEETS....C.1

1.0 INTRODUCTION

1.1 STUDY PURPOSE

Stantec Consulting Ltd. was retained by Mattamy Homes to 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 and has been prepared to support a draft plan application. 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 296 townhome-style dwellings and 802 single family dwellings for a total of 1098 residential units. The final number of residential units is subject to change as the plan is refined but these changes are not expected to be substantial. It is noted that recent changes to the plan of subdivision resulted in minor modifications to the unit counts. The minor discrepancy between the unit count on **Figure 2** below and the analysis contained in this report is acknowledged, however, it does not impact the findings or recommendations of this report. Full built-out is anticipated to occur by 2029.

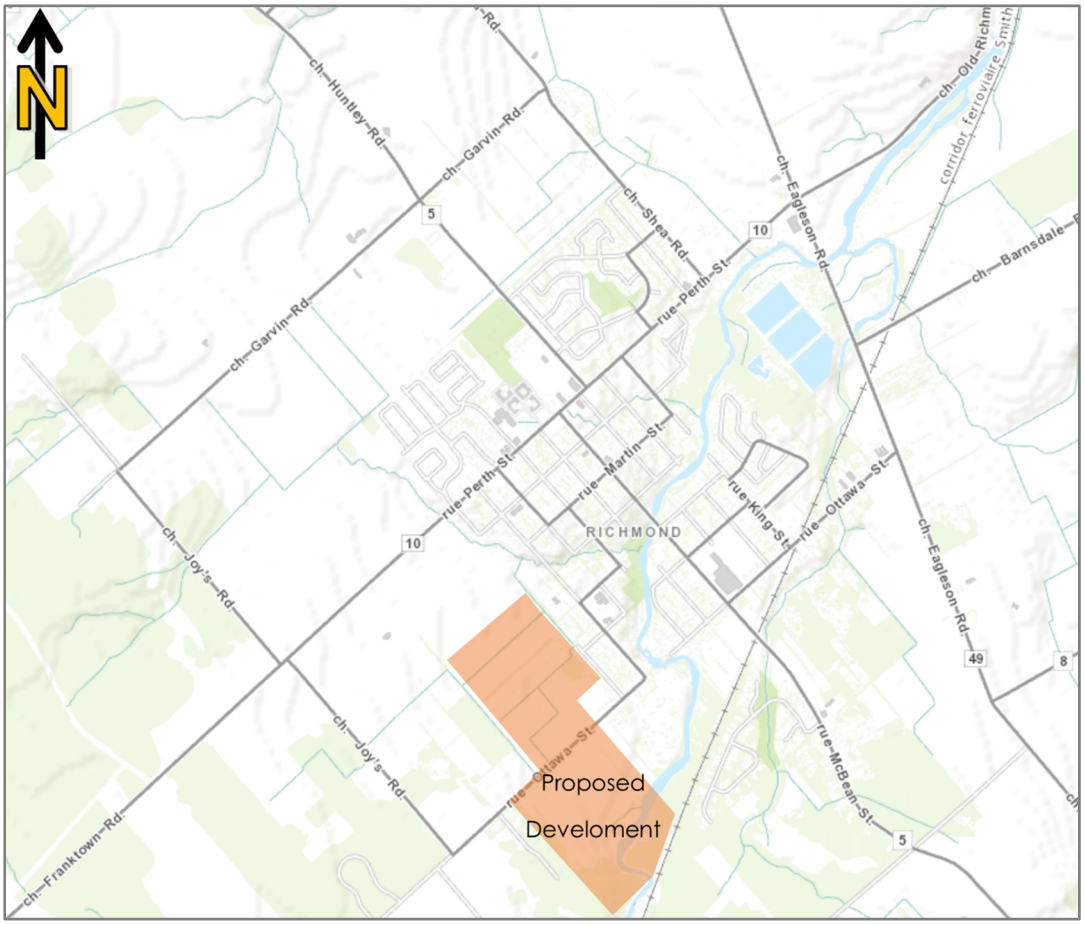
The development site will be accessed at four locations as follows:

- 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.

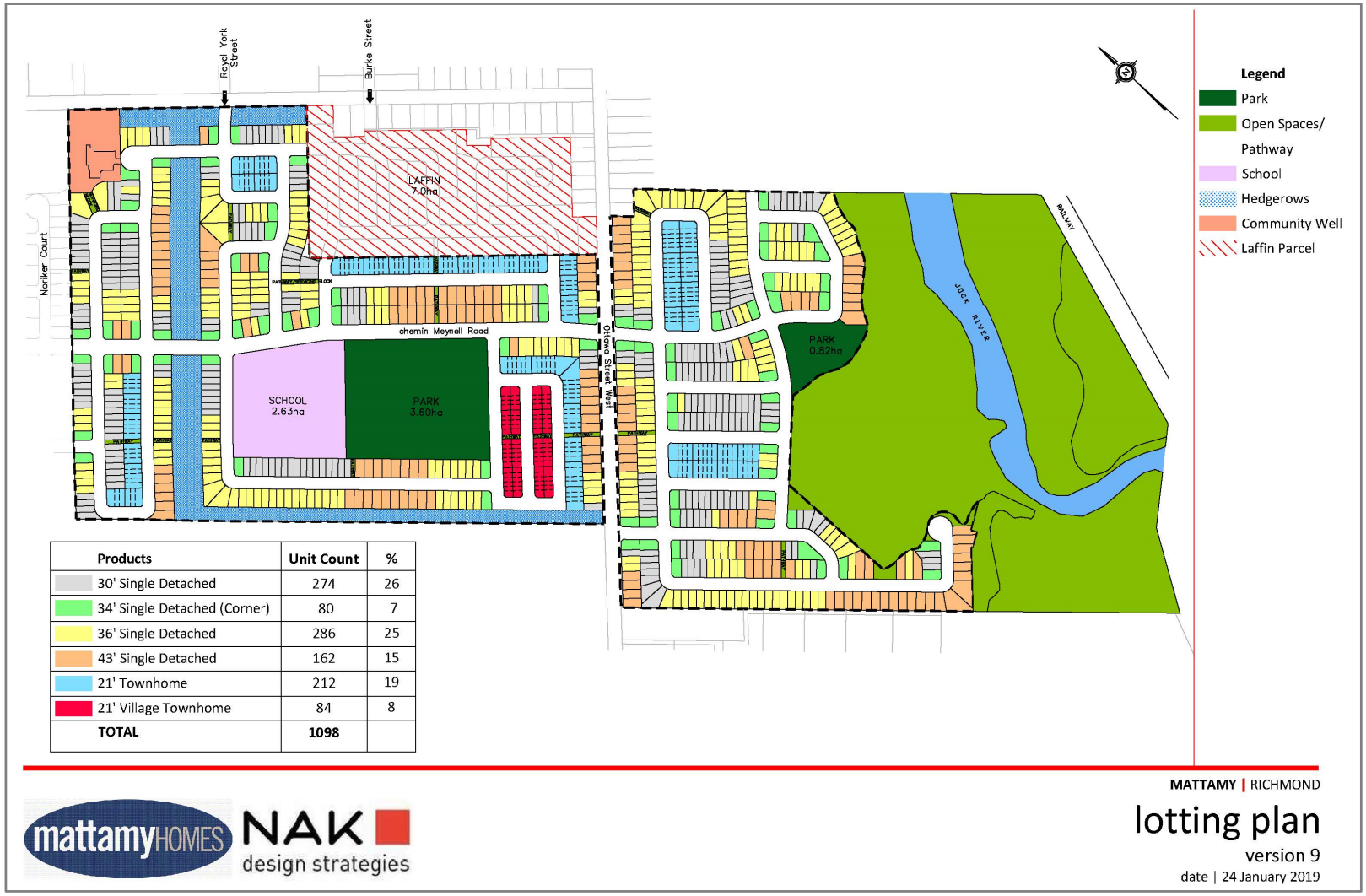
Figure 2 depicts the site plan for the proposed development.

Figure 1 - Location of Proposed Development



Background image source: geoOttawa, accessed January 2018

Figure 2 - Site Plan for the Proposed Development



Products	Unit Count	%
30' Single Detached	274	26
34' Single Detached (Corner)	80	7
36' Single Detached	286	25
43' Single Detached	162	15
21' Townhome	212	19
21' Village Townhome	84	8
TOTAL	**1098**	

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:
    - Perth Street at Queen Charlotte Street / Rochelle Drive;
    - Ottawa Street at Queen Charlotte Street;
    - Perth Street at Meynell Road (new N-S collector); and
    - 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.

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

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.

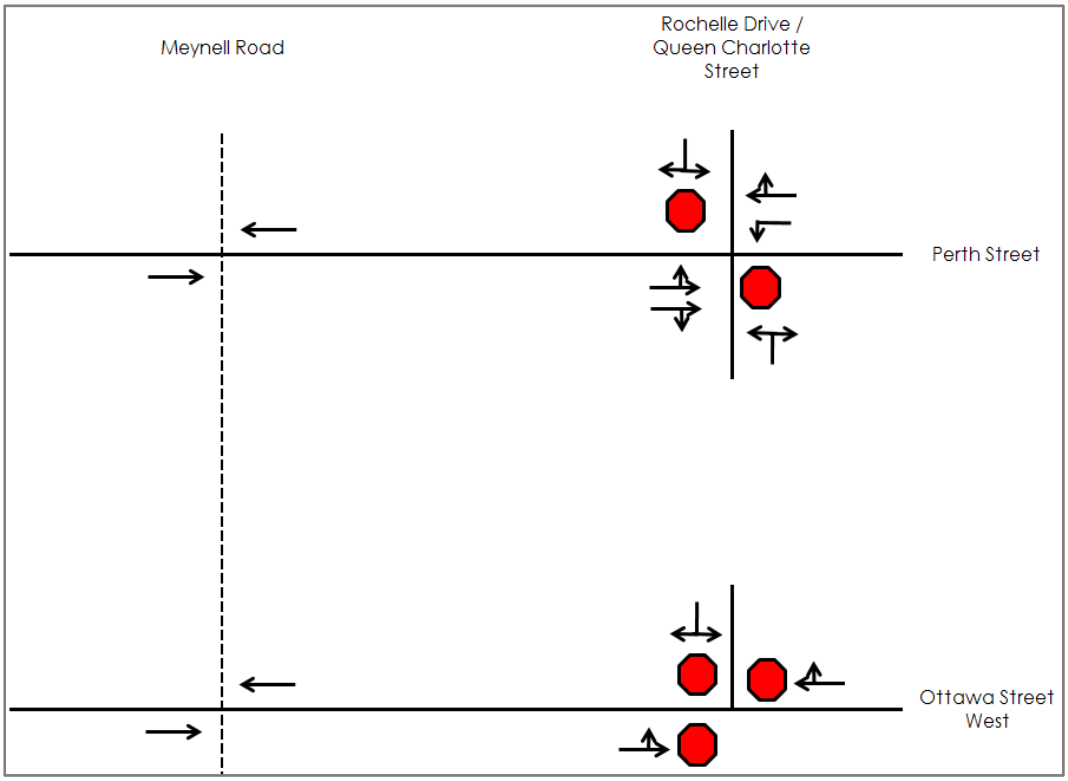
Queen Charlotte Street — Queen Charlotte Street is a two-lane local road with a semi-urban cross-section (i.e. the west side of the road is urbanized). There are no pedestrian or cycling facilities along Queen Charlotte Street. The intersection with Perth Street is currently stop-controlled along the 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 limit is 50 km/h.

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 to the west of the subject development. 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

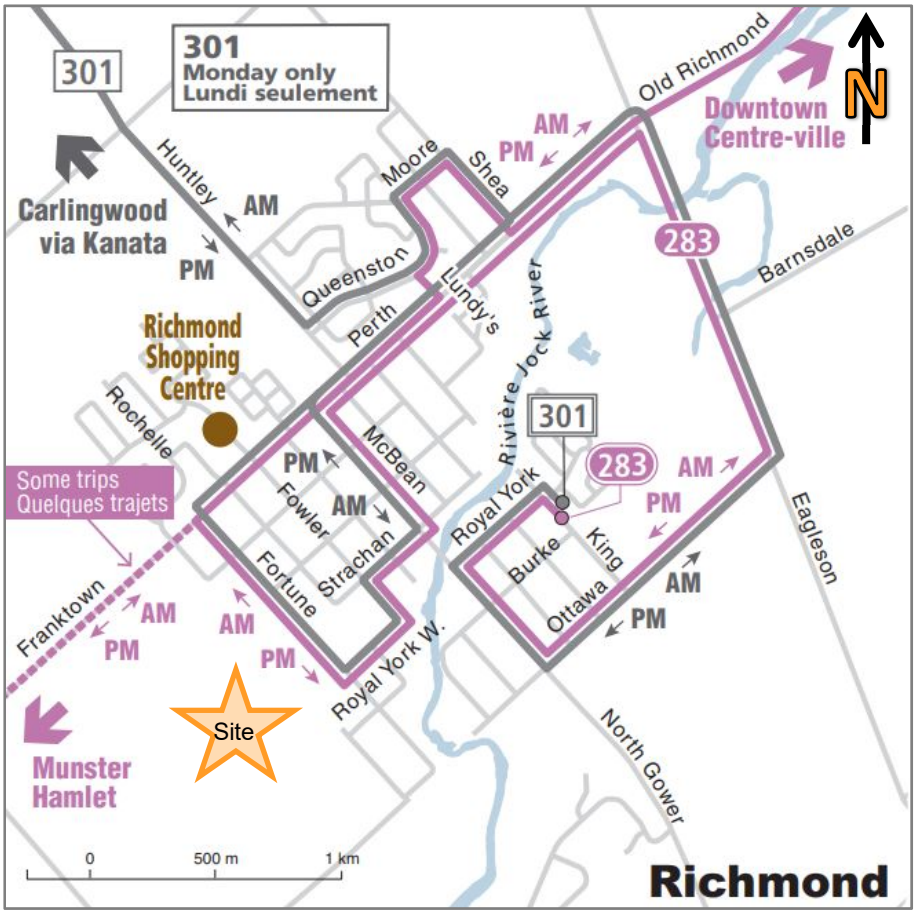


2.2 TRANSIT

Transit service is provided along Perth Street via OC Transpo bus routes 283 and 301. Route 283 is a peak direction 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.

Figure 4 - Existing Transit Service



(Source: OC Transpo System Map, accessed January 2019)

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. The City of Ottawa's Ultimate Cycling Network designates Perth Street as a spine route east of Queen Charlotte Street.

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.

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.

Figure 5 - 2018 Existing Traffic Volumes – AM Peak Hour

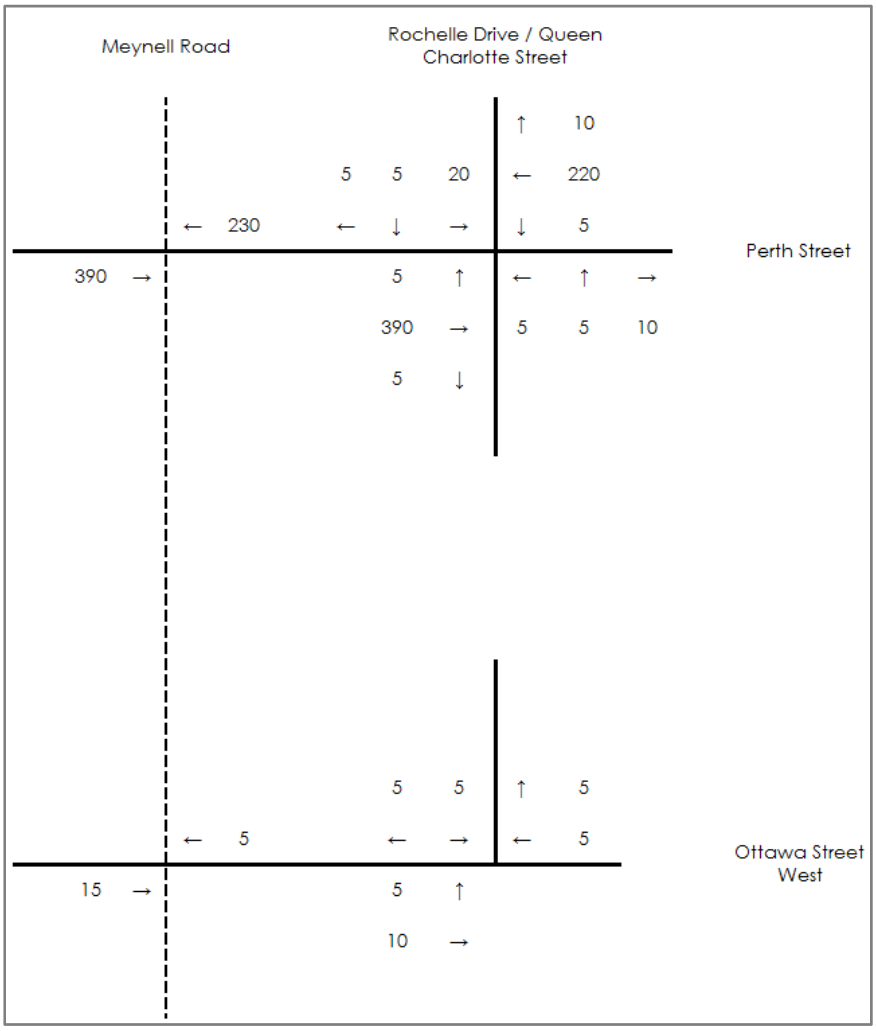
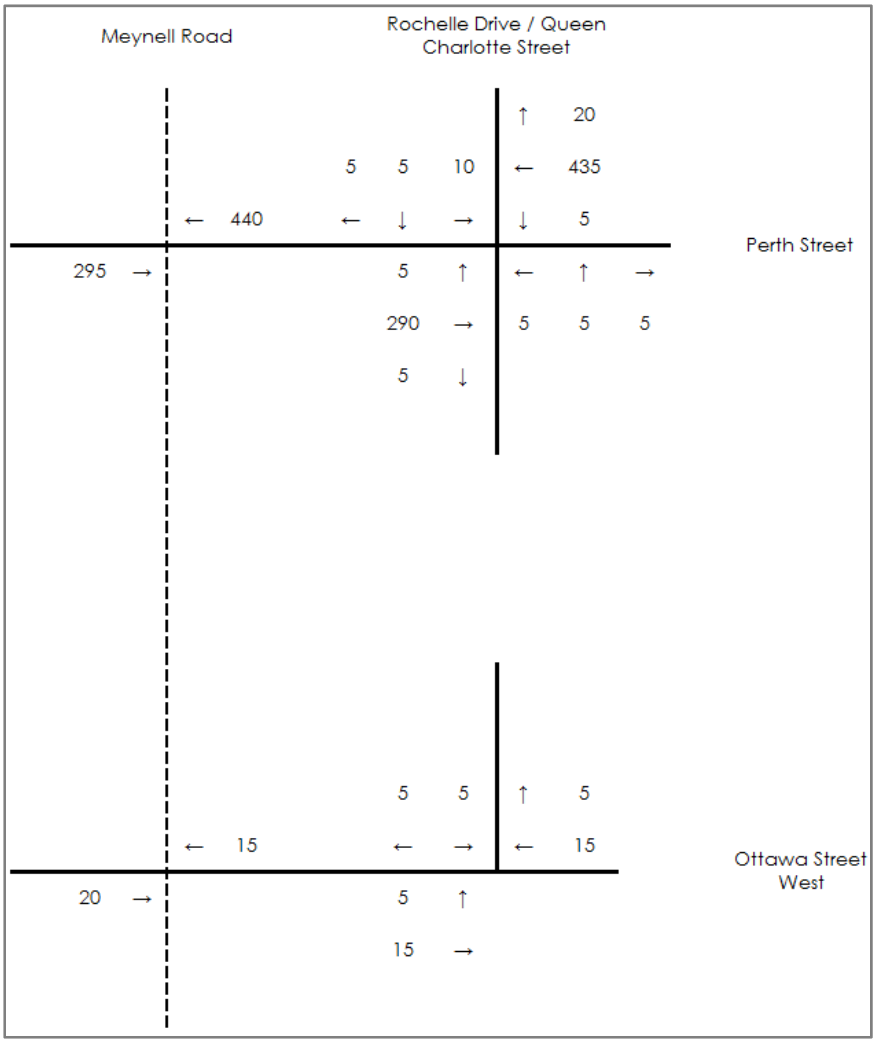


Figure 6 - 2018 Existing Traffic Volumes – PM Peak Hour



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.

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 from the above table is called Meynell Road in the proposed plan of subdivision and this roadway 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 need to be dedicated by adjacent developments to protect for the future widening.

3.1.2 Future Background Developments

There are several developments scheduled to occur in the vicinity of 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
Laffin Lands	Bounded by existing residential to the east, Ottawa Street to the south, and Mattamy's proposed Richmond Village development to the north and west.	In the absence of a development application, the number of residential units was estimated based on the densities in the proposed Mattamy Richmond Village draft plan. This equates to approximately 160 residential units.	In the absence of a development application, the build-out year was assumed to occur sometime between 2029 and 2034

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, and Richmond Village Development Corporation's 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.

Figure 7 - 2029 Future Background Traffic Volumes – AM Peak Hour

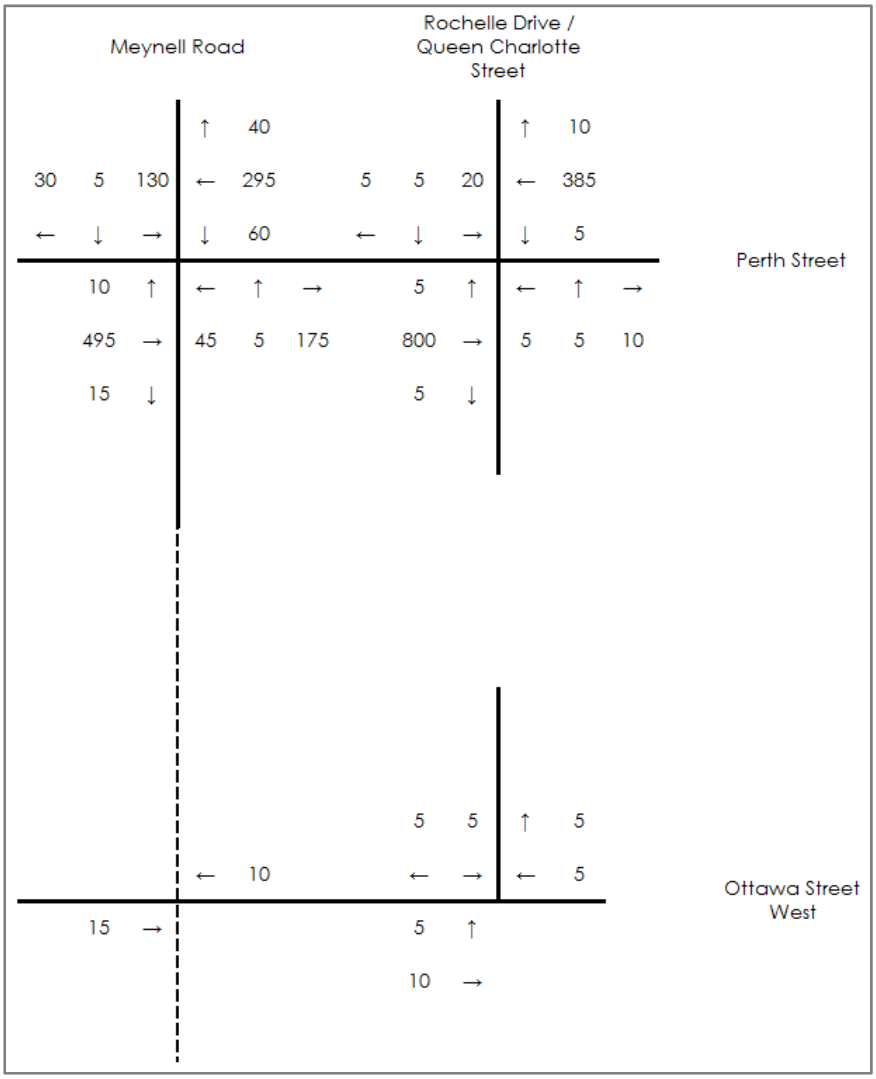
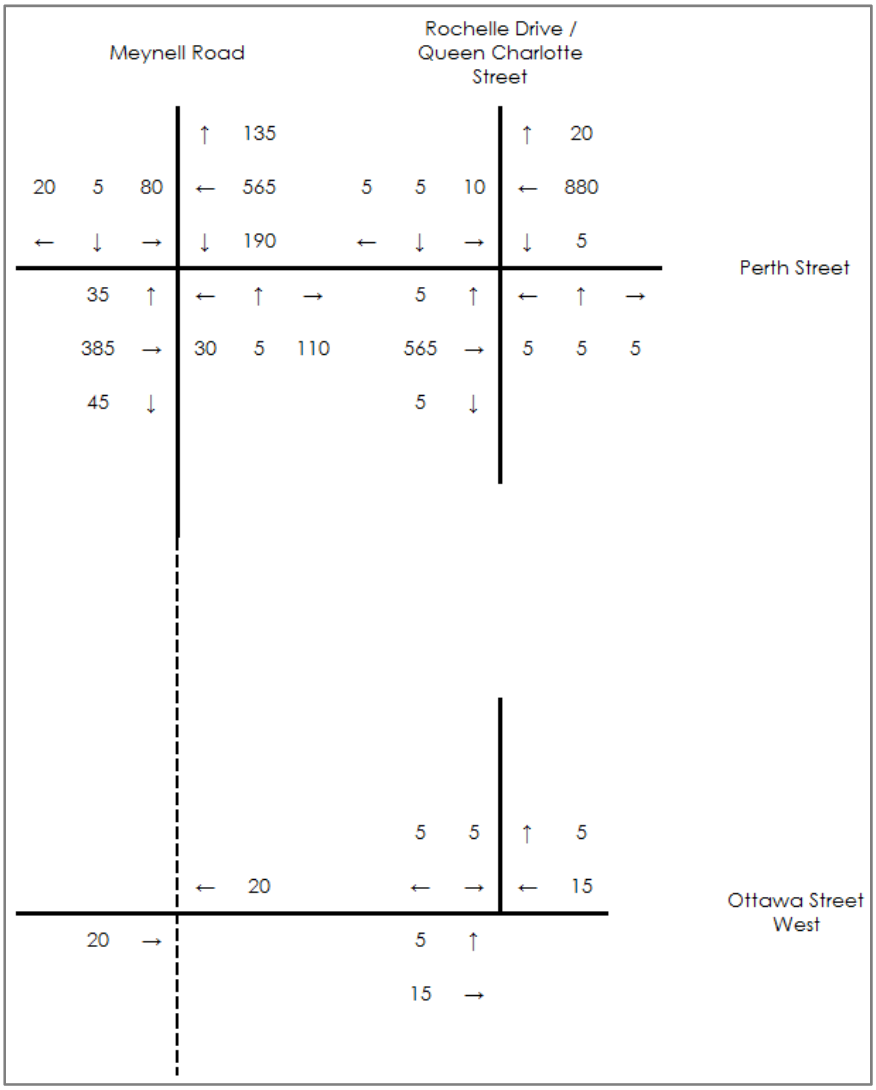


Figure 8 - 2029 Future Background Traffic Volumes – PM Peak Hour



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*.

Table 3 - TRANS Trip Generation Rates

ITE Land Use			Morning Peak Hour			Afternoon Peak Hour		
			In	Out	Total	In	Out	Total
210 Single detached dwellings	Units	805	29%	71%	0.62	62%	39%	0.92
224 Semi-detached dwellings, townhouses, rowhouses	Units	296	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	Morning Peak Hour			Afternoon Peak Hour		
	In	Out	Total	In	Out	Total
Mattamy North of Ottawa St.	127	274	401	319	221	540
Mattamy South of Ottawa St.	86	198	284	245	161	406
Total	**213**	**472**	**685**	**564**	**382**	**946**

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 in combination with engineering judgement. As Ottawa Street bisects the proposed development, two separate distributions were developed: one for the lands north of Ottawa Street and one for the lands south of Ottawa Street.

Table 5 below outlines the assumed trip distribution for the lands north of Ottawa Street.

Table 5 – Traffic Distribution

	Via (to/from)				
	Perth Street (East)	Perth Street (West)	Ottawa Street (East)	Ottawa Street (West)	Royal York Street (East)
Mattamy North of Ottawa St	78%	2%	5%	3%	12%
Mattamy South of Ottawa St	78%	0%	15%	5%	2%

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.

Figure 9 - Site Traffic – AM Peak Hour

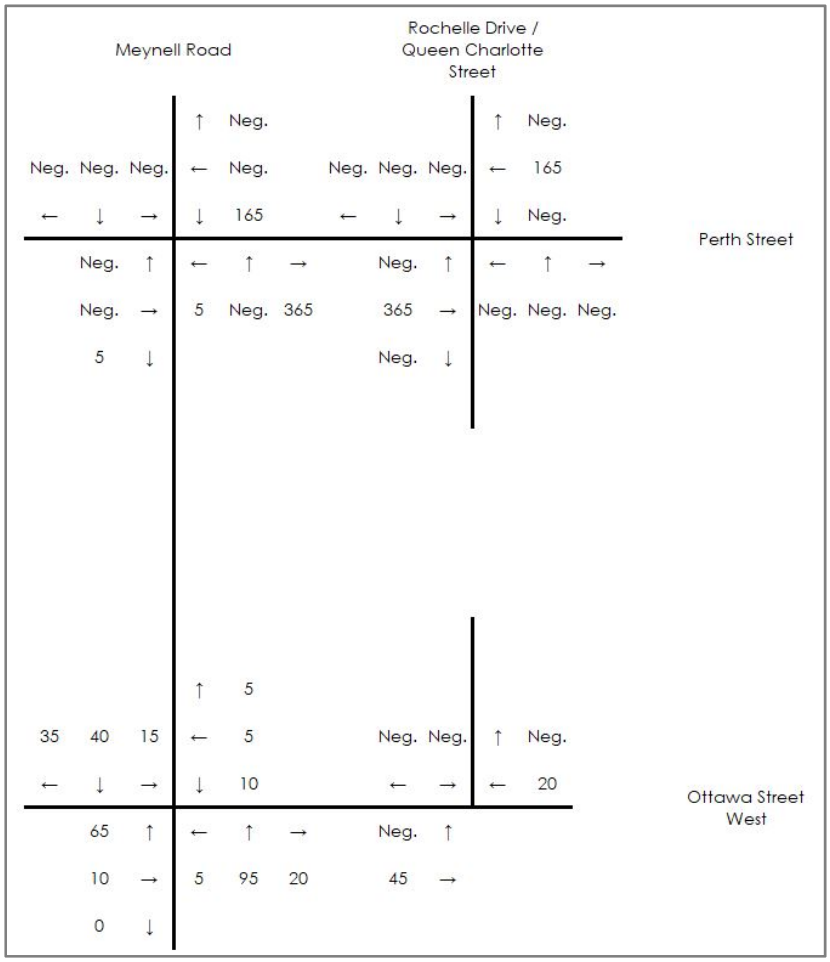
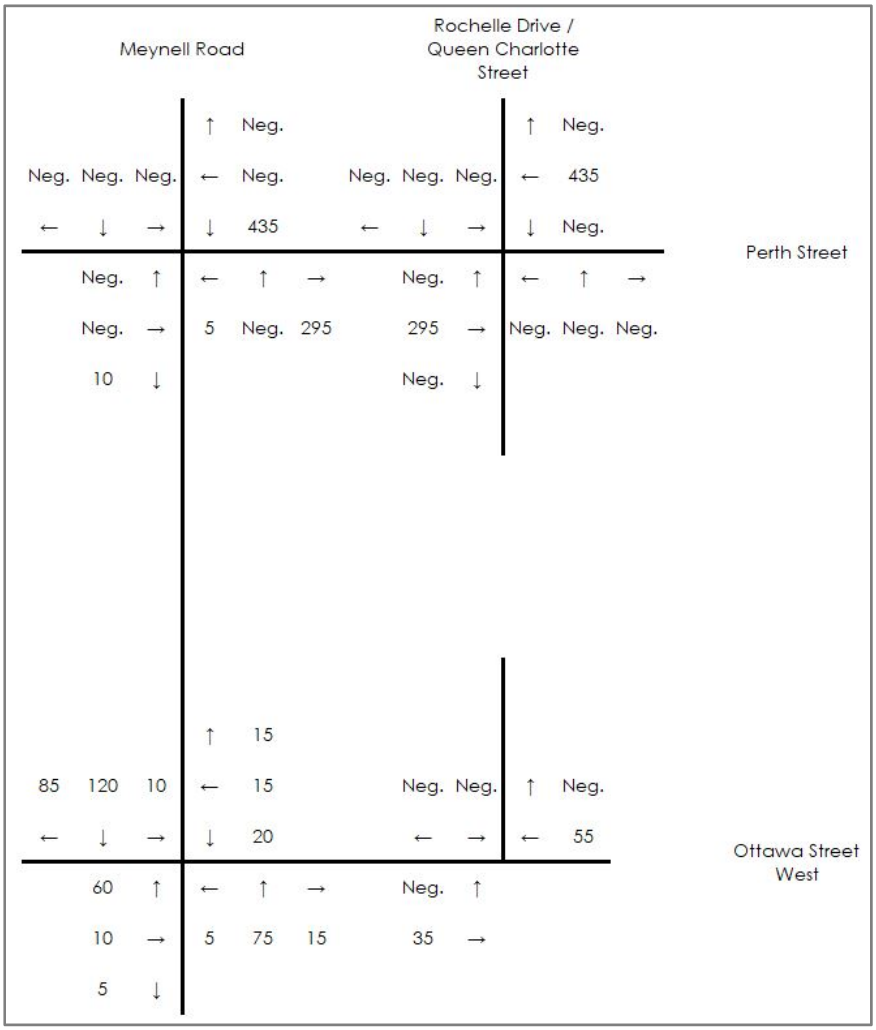


Figure 10 - Site Traffic – PM Peak Hour



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.

Figure 11 - 2029 Total Future Traffic Volumes – AM Peak Hour

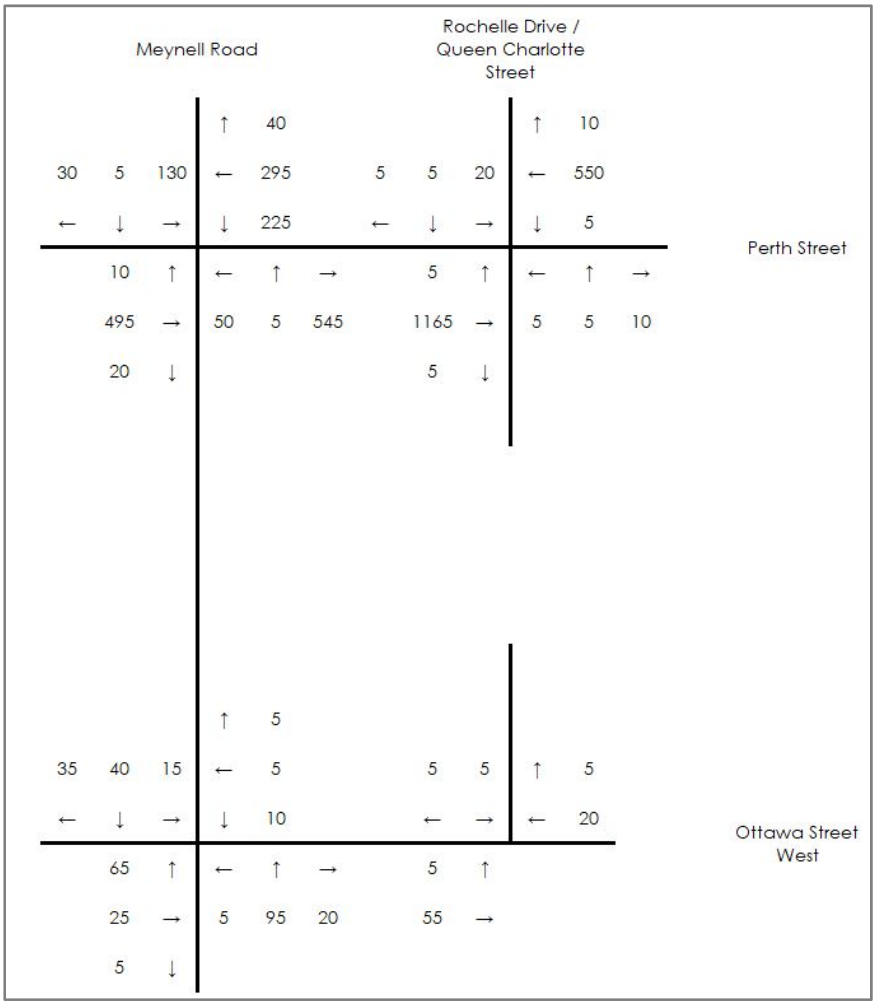
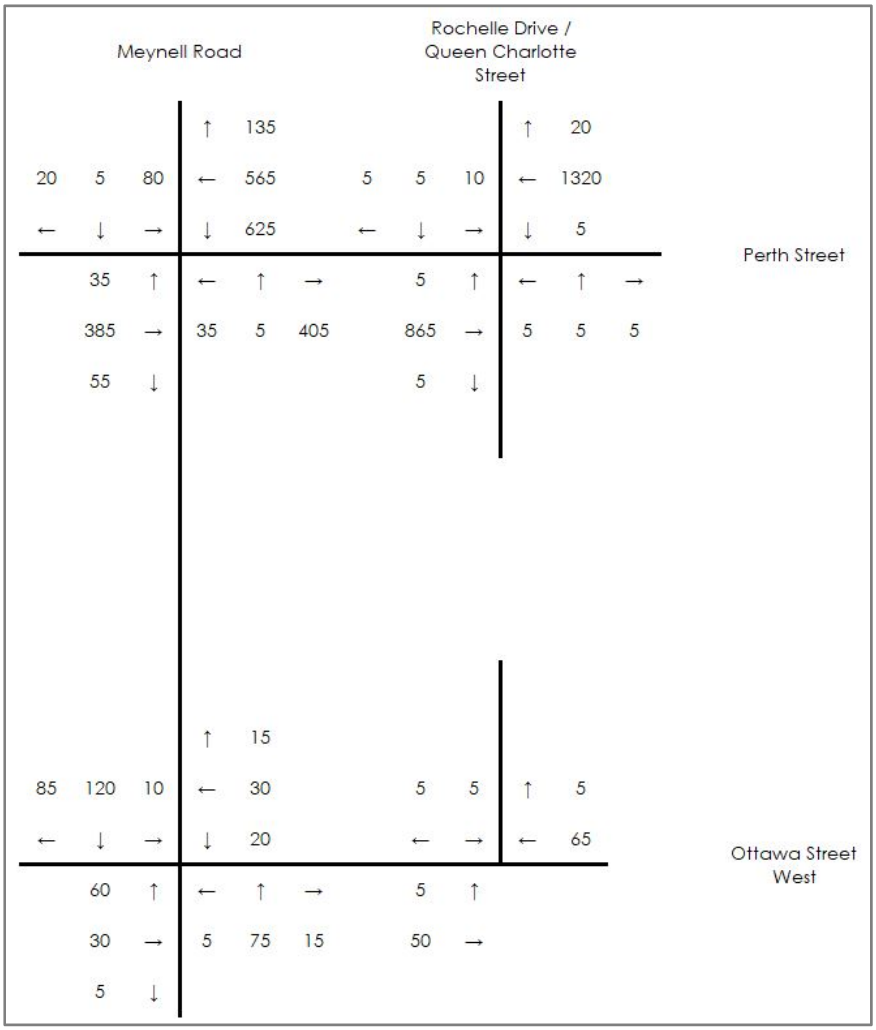


Figure 12 - 2029 Total Future Traffic Volumes – PM Peak Hour



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.

The Laffin Lands were assumed to be developed by the 2034 ultimate horizon. In the absence of a development application for these lands, the number of residential units was approximated using the same unit densities as the subject development. A trip generation was completed using these residential units and the site trips were added to the roadway network as background traffic. In addition, 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.

Appendix B contains the assumed background traffic generated by the Laffin Lands.

Figure 13 - 2034 Ultimate Traffic Volumes – AM Peak Hour

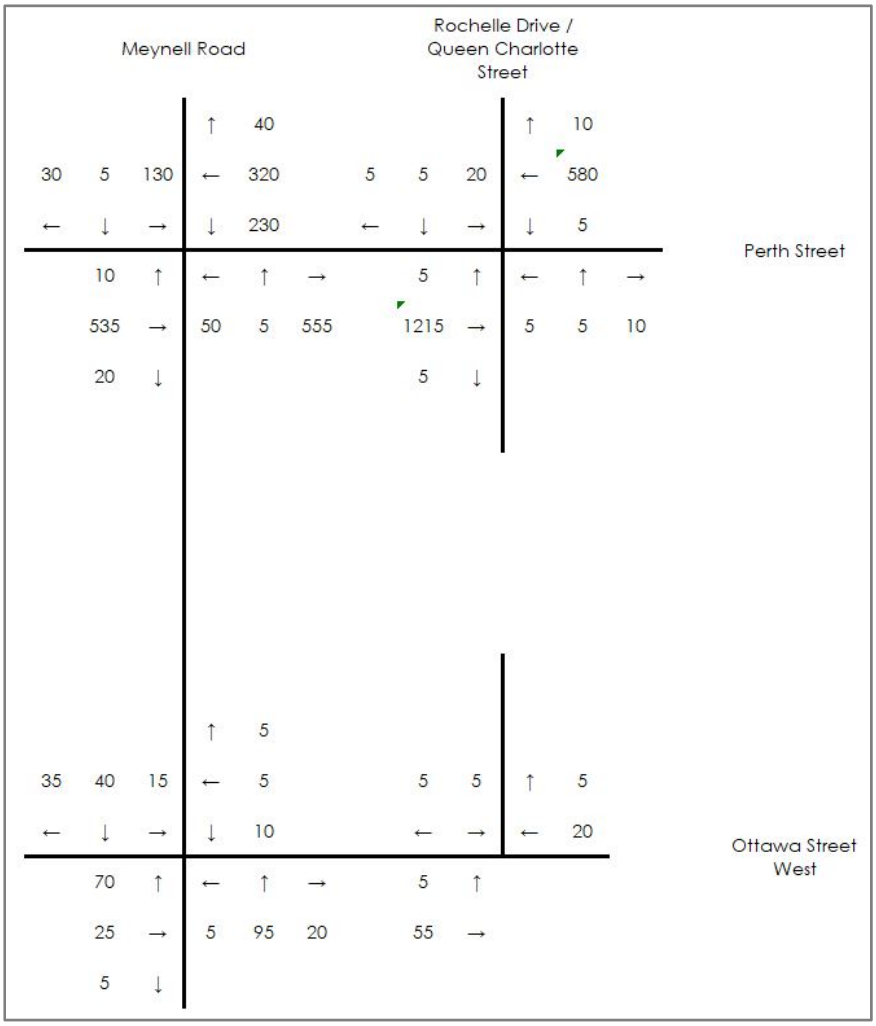
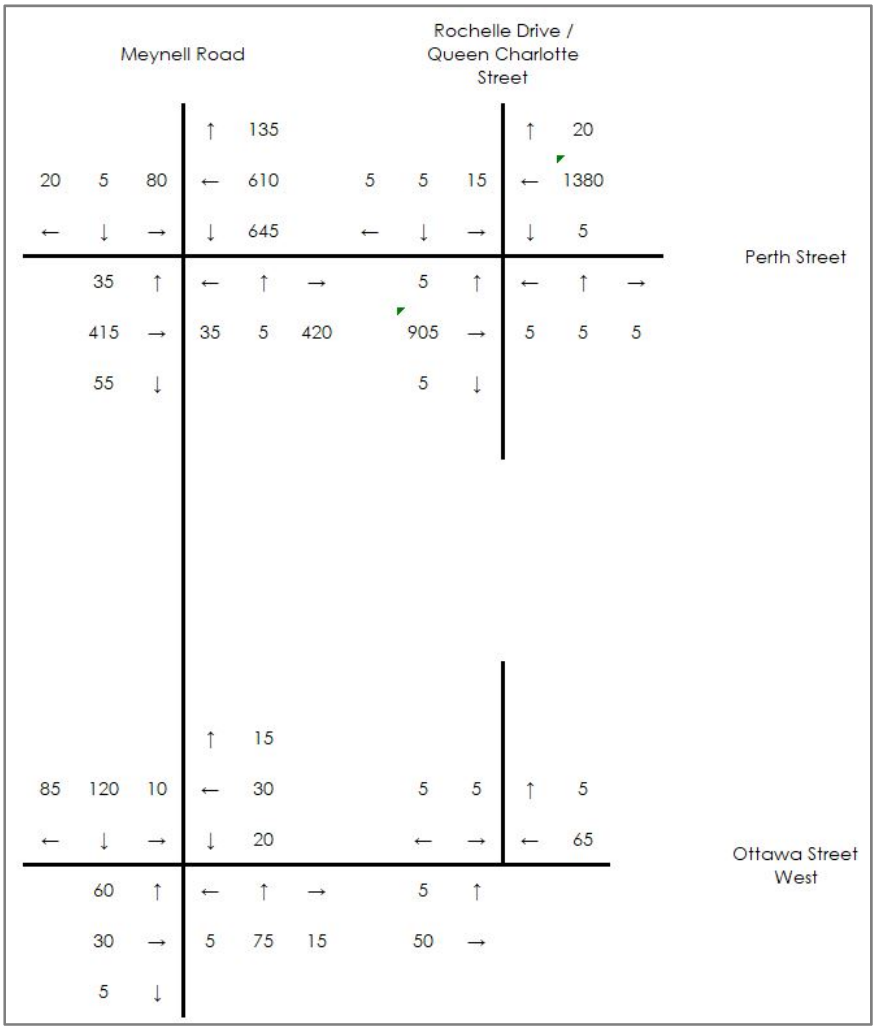


Figure 14 - 2034 Ultimate Traffic Volumes – PM Peak Hour



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 10.0™ software package with the Highway Capacity Manual 2010 edition (HCM 2010) methodology.

Table 6 provides a summary of 2018 existing intersection operations. All study area intersections operate acceptably under 2018 existing conditions, and therefore, no improvements are required to supplement existing conditions.

Appendix C contains detailed intersection performance worksheets.

Table 6 - 2018 Existing Intersection Operations

Intersection	Control	Approach / Movement		LOS	V/C	Delay (s)	Queue 95th (veh)
Perth Street at Queen Charlotte Street / Rochelle Drive	Two-Way Stop Control	NB	Left / Through / Right	B (C)	0.05 (0.05)	13.0 (15.7)	0.1 (0.1)
		EB	Left / Through / Right	A (A)	0.00 (0.01)	7.8 (8.4)	0.0 (0.0)
		WB	Left	A (A)	0.01 (0.01)	8.2 (7.9)	0.0 (0.0)
			Through / Right	A (A)	0.00 (0.00)	0.0 (0.0)	0.0 (0.0)
		SB	Left / Through / Right	B (C)	0.07 (0.06)	13.3 (15.6)	0.2 (0.2)
		Overall Intersection		**A (A)**	**-**	**1.1 (0.8)**	**-**
Ottawa Street West at Queen Charlotte Street	All-Way Stop Control	EB	Left / Through / Right	A (A)	0.02 (0.03)	7.1 (7.1)	0.1 (0.1)
		WB	Left / Through / Right	A (A)	0.01 (0.02)	6.7 (6.9)	0.0 (0.1)
		SB	Left / Through / Right	A (A)	0.01 (0.01)	6.8 (6.9)	0.0 (0.0)
		Overall Intersection		**A (A)**	**-**	**6.9 (7.0)**	**-**
Notes: Table format AM Peak (PM Peak)							

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.

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 10.0™ software package with the Highway Capacity Manual 2010 edition (HCM 2010) methodology. Roundabout operations were analyzed 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 future background conditions.

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's *Transportation Master Plan* and Richmond Village Development Corporation's *Richmond Village Phase 1 Transportation Impact Study* (Stantec, 2017).

The study area intersections are projected to operate acceptably under 2029 future background conditions.

Appendix C contains detailed intersection performance worksheets.

Table 7 - 2029 Future Background Intersection Operations

Intersection	Control	Approach / Movement		LOS	V/C	Delay (s)	Queue 95th (veh)
Perth Street at Queen Charlotte Street / Rochelle Drive	Two-Way Stop Control	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)
		WB	Left	A (A)	0.01 (0.01)	9.4 (8.6)	0.0 (0.0)
			Through / Right	A (A)	0.00 (0.00)	0.0 (0.0)	0.0 (0.0)
		SB	Left / Through / Right	C (D)	0.11 (0.12)	19.8 (30.5)	0.4 (0.4)
		Overall Intersection		**A (A)**	**-**	**0.9 (0.8)**	**-**
Perth Street at Meynell Road	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)
		SB	Left / Through / Right	A (B)	0.15 (0.13)	9.3 (11.5)	0.7 (0.7)
		EB	Left / Through / Right	A (A)	0.40 (0.39)	4.1 (4.9)	2.3 (2.1)
		Overall Intersection		**A (A)**	**0.40 (0.59)**	**5.4 (5.4)**	**2.3 (4.5)**
Ottawa Street at Queen Charlotte Street	All-Way Stop Control	EB	Left / Through / Right	A (A)	0.02 (0.02)	7.1 (7.1)	0.1 (0.1)
		WB	Left / Through / Right	A (A)	0.01 (0.02)	6.7 (6.9)	0.0 (0.1)
		SB	Left / Through / Right	A (A)	0.01 (0.01)	6.8 (6.9)	0.0 (0.0)
		Overall Intersection		**A (A)**	**-**	**6.9 (7.0)**	**-**

Notes: Table format AM Peak (PM Peak)

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 10.0™ software package with the Highway Capacity Manual 2010 edition (HCM 2010) methodology. Roundabout operations were analyzed using the Sidra 7.0 software package with the SIDRA Standard capacity model and SIDRA Roundabout level of service (LOS) method.

Table 8 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 0.87 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 required 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 on Perth Street 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 and future developments, and to facilitate the addition of a northbound right-turn channel and a 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 / through lane).

With the above mitigation measures in place, all remaining study area intersections are forecasted to operate acceptably, however, the Perth Street intersection with Queen Charlotte Street / Rochelle Drive is forecasted to continue to operate with high delays along the minor approaches.

Figure 16 illustrates the recommended intersection controls and lane geometry.

Appendix C contains detailed intersection performance worksheets.

Table 8 - 2029 Total Future Intersection Operations

Intersection	Control	Approach / Movement		LOS	V/C	Delay (s)	Queue 95th (veh)
Perth Street at Queen Charlotte Street / Rochelle Drive	Two-Way Stop Control	NB	Left / Through / Right	E (F)	0.17 (0.35)	41.6 (128.2)	0.6 (1.2)
		EB	Left / Through / Right	A (B)	0.01 (0.01)	8.6 (12.1)	0.0 (0.0)
		WB	Left	B (A)	0.01 (0.01)	11.1 (9.7)	0.0 (0.0)
			Through / Right	A (A)	0.00 (0.00)	0.0 (0.0)	0.0 (0.0)
		SB	Left / Through / Right	E (F)	0.20 (0.35)	35.7 (96.7)	0.7 (1.2)
		Overall Intersection		**A (A)**	-	**1.2 (1.8)**	-
		Recommended Upgrade: Widening Perth Street to Four Lanes					
		NB	Left / Through / Right	E (F)	0.14 (0.21)	35.0 (67.7)	0.5 (0.7)
		EB	Left / Through / Right	A (B)	0.01 (0.01)	8.6 (12.1)	0.0 (0.0)
		WB	Left / Through / Right	B (A)	0.01 (0.01)	11.1 (9.7)	0.0 (0.0)
		SB	Left / Through / Right	E (F)	0.21 (0.36)	37.3 (103.9)	0.8 (1.3)
		Overall Intersection		**A (A)**	-	**1.1 (1.5)**	-
Perth Street at Meynell Road	Single-lane Roundabout	NB	Left / Through / Right	B (A)	0.67 (0.46)	10.7 (6.6)	6.8 (3.2)
		WB	Left / Through / Right	A (A)	0.38 (0.87)	5.8 (7.0)	2.5 (15.9)
		SB	Left / Through / Right	B (C)	0.17 (0.26)	10.2 (19.0)	0.8 (1.9)
		EB	Left / Through / Right	A (A)	0.46 (0.58)	5.1 (9.9)	2.7 (5.2)
		Overall Intersection		**A (A)**	**0.67 (0.87)**	**7.6 (8.0)**	**6.8 (15.9)**
		Recommended Upgrade: Implementing NBR and WBL Turning Lanes					
		NB	Left / Through	B (A)	0.05 (0.03)	10.5 (9.7)	0.3 (0.2)
			Right	A (A)	0.27 (0.20)	3.2 (3.2)	0.0 (0.0)
		WB	Through / Right	A (A)	0.16 (0.44)	9.3 (9.4)	0.8 (2.7)
			Left	A (A)	0.21 (0.42)	3.4 (3.5)	1.0 (2.6)
		SB	Left / Through / Right	A (B)	0.17 (0.14)	9.2 (10.3)	0.5 (0.5)
		EB	Left / Through / Right	A (A)	0.51 (0.59)	5.1 (9.6)	2.6 (4.3)
		Overall Intersection		**A (A)**	**0.51 (0.59)**	**5.3 (6.7)**	**2.6 (4.3)**
Ottawa Street West at Queen Charlotte Street	All-Way Stop Control	EB	Left / Through / Right	A (A)	0.07 (0.06)	7.3 (7.3)	0.2 (0.2)
		WB	Left / Through / Right	A (A)	0.03 (0.08)	7.0 (7.3)	0.1 (0.2)
		SB	Left / Through / Right	A (A)	0.01 (0.01)	7.0 (7.0)	0.0 (0.0)
		Overall Intersection		**A (A)**	-	**7.2 (7.3)**	-
Ottawa Street West at Meynell Road	All-Way Stop Control	NB	Left / Through / Right	A (A)	0.14 (0.12)	7.9 (8.1)	0.5 (0.4)
		EB	Left / Through / Right	A (A)	0.12 (0.13)	8.1 (8.5)	0.4 (0.4)
		WB	Left / Through / Right	A (A)	0.03 (0.09)	7.6 (8.1)	0.1 (0.3)
		SB	Left / Through / Right	A (A)	0.10 (0.25)	7.6 (8.6)	0.3 (1.0)
		Overall Intersection		**A (A)**	-	**7.9 (8.4)**	-

Notes: Table format AM Peak (PM Peak)

Figure 15 - 2029 Assumed Intersection Control and Lane Geometry

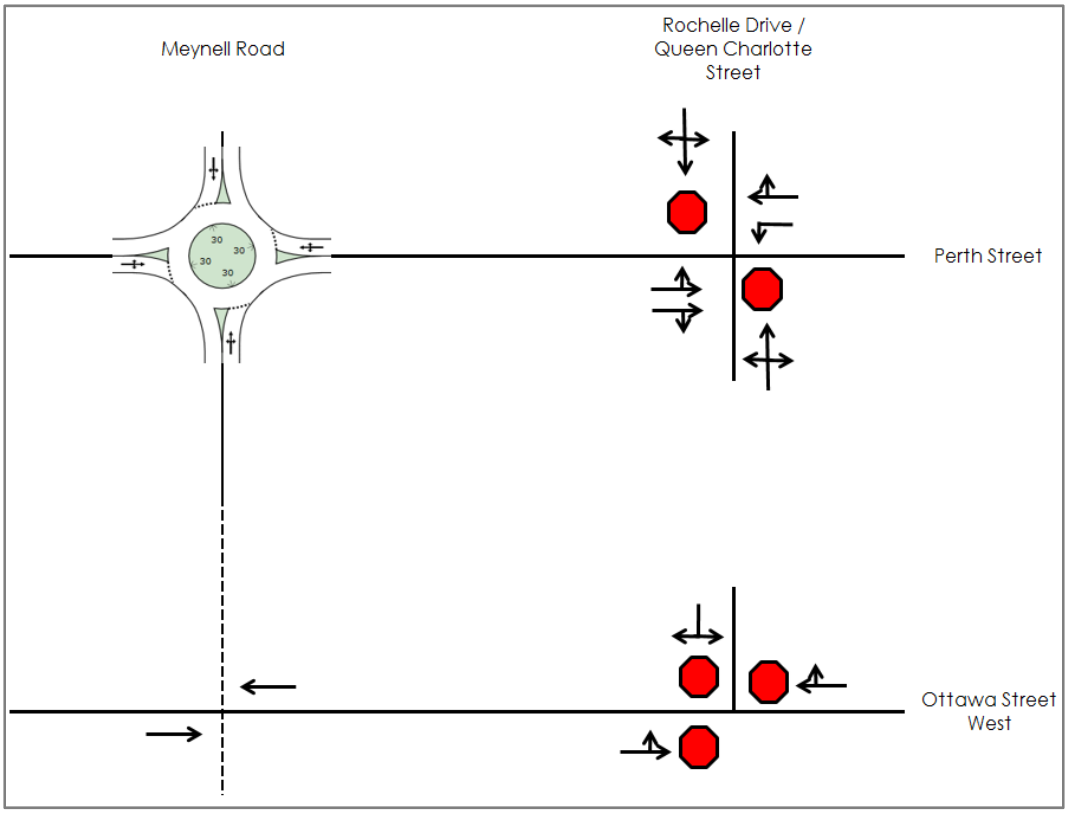
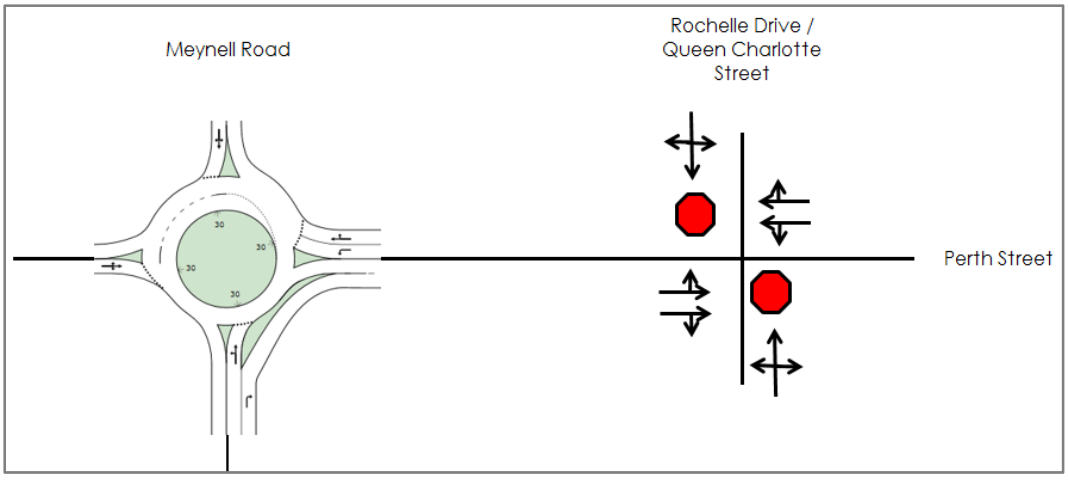


Figure 16 - 2029 Recommended Intersection Control and Lane Geometry Improvements



4.4 2034 ULTIMATE CONDITIONS

Ultimate 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 future 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, these movements have very low traffic volumes and the movements are operating below capacity, therefore, further mitigation is not recommended. All remaining study area intersections are forecasted to operate acceptably under 2034 conditions.

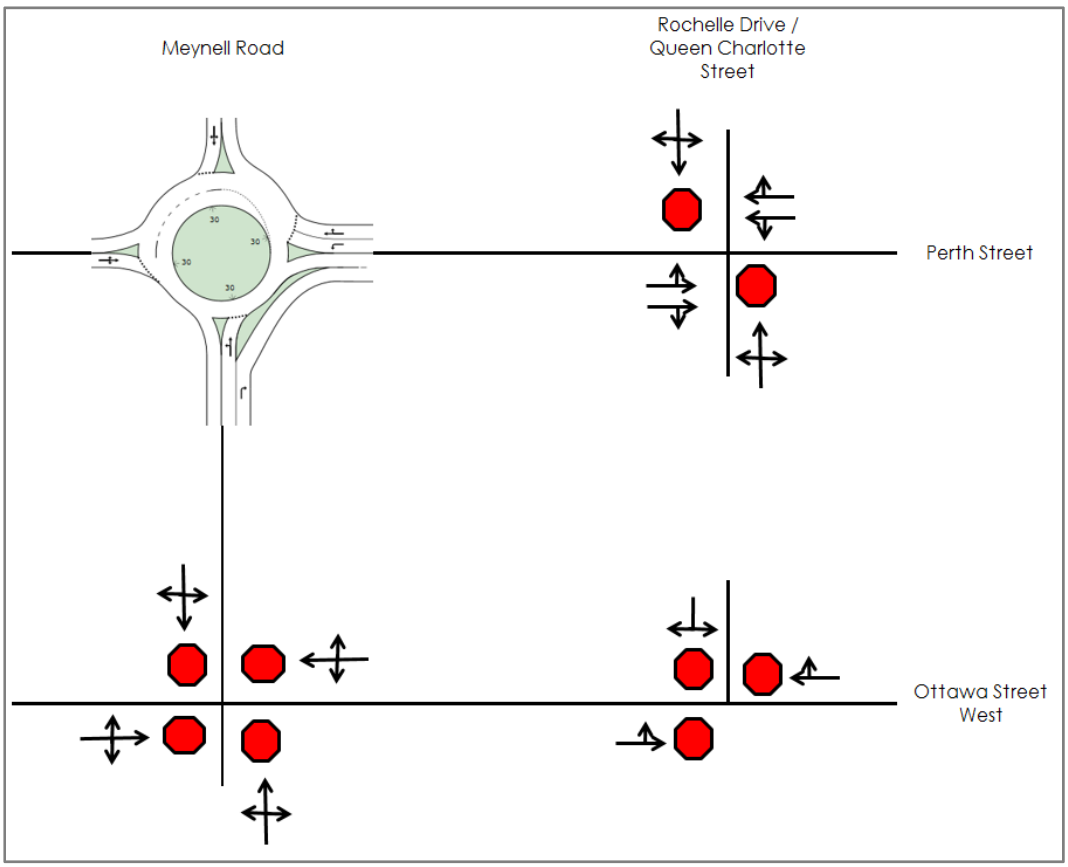
Appendix C contains detailed intersection operation summaries.

Table 9 - 2034 Ultimate Intersection Operations

INTERSECTION	INTERSECTION CONTROL	APPROACH / MOVEMENT		LOS	V/C	Delay (s)	Queue 95th (veh)
Perth Street at Queen Charlotte Street / Rochelle Drive	Two-way stop control	NB	Left / Through / Right	E (F)	0.16 (0.24)	38.6 (79.2)	0.5 (0.8)
		EB	Left / Through / Right	A (B)	0.01 (0.01)	8.7 (12.5)	0.0 (0.0)
		WB	Left / Through / Right	B (A)	0.01 (0.01)	11.4 (9.9)	0.0 (0.0)
		SB	Left / Through / Right	E (F)	0.24 (0.56)	41.9 (158.2)	0.9 (2.1)
		Overall Intersection		**A (A)**	**-**	**1.2 (2.4)**	**-**
Perth Street at Meynell Road	Single-lane roundabout with WBL and NBR lanes	NB	Left / Through	B (A)	0.05 (0.03)	10.7 (9.8)	0.3 (0.2)
			Right	A (A)	0.28 (0.21)	3.2 (3.2)	0.0 (0.0)
		WB	Through / Right	A (A)	0.17 (0.46)	9.3 (9.4)	0.8 (2.9)
			Left	A (A)	0.22 (0.45)	3.4 (3.5)	1.1 (2.9)
		SB	Left / Through / Right	A (B)	0.17 (0.14)	9.3 (10.5)	0.5 (0.5)
		EB	Left / Through / Right	A (B)	0.54 (0.63)	5.4 (10.5)	3.1 (5.2)
		Overall Intersection		**A (A)**	**0.54 (0.63)**	**5.4 (6.9)**	**-**
Ottawa Street West at Queen Charlotte Street	All-way stop control	EB	Left / Through / Right	A (A)	0.07 (0.06)	7.3 (7.3)	0.2 (0.2)
		WB	Left / Through / Right	A (A)	0.03 (0.08)	7.0 (7.3)	0.1 (0.2)
		SB	Left / Through / Right	A (A)	0.01 (0.01)	7.0 (7.0)	0.0 (0.0)
		Overall Intersection		**A (A)**	**-**	**7.2 (7.3)**	**-**
Ottawa Street West at Meynell Road	All-way stop control	NB	Left / Through / Right	A (A)	0.14 (0.12)	7.9 (8.1)	0.5 (0.4)
		EB	Left / Through / Right	A (A)	0.13 (0.13)	8.2 (8.5)	0.4 (0.4)
		WB	Left / Through / Right	A (A)	0.03 (0.09)	7.6 (8.1)	0.1 (0.3)
		SB	Left / Through / Right	A (A)	0.10 (0.25)	7.6 (8.6)	0.3 (1.0)
		Overall Intersection		**A (A)**	**-**	**7.9 (8.4)**	**-**

Notes: Table format AM Peak (PM Peak)

Figure 17 - 2034 Intersection Control and Lane Geometry



5.0 DRAFT PLAN REVIEW

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

Figure 18 illustrates the proposed transit route through the subject development, including potential transit stop locations. As per Richmond Village Development Corporation's *Richmond Village Phase 1 Transportation Impact Study* (Stantec 2017), there is a proposed northbound transit stop located along Meynell Road just north of the subject Mattamy development. To complement this, a southbound transit stop is proposed on the west side of Meynell Road, at the northernmost limits of the subject development. Two transit stops are proposed (i.e. one northbound and one southbound) along Meynell Road at the school location. Two more transit stops are proposed (i.e. one northbound and one southbound) along Meynell Road just north of Ottawa Street. With the proposed transit stop locations, 95% of the residents will be within a 400m radius of the transit stops.

Figure 19 illustrates the proposed sidewalks, pathway connections, pedestrian crossovers, and locations for curb radii reductions. Sidewalks are recommended on both sides of Meynell Road and Ottawa Street and on one side of several local roads to facilitate walking trips to transit stops, the school, and parks. Two pedestrian crossovers are proposed: one crossing Ottawa Street and one crossing Meynell Street at the park. The curb radii at all intersections along Meynell Road are proposed to be reduced to act as a form of proactive traffic calming and to reduce the crossing distances for pedestrians. The exception to this is at the Meynell Road at Ottawa Street intersection where the curb radii will be dictated by the required turning movements of transit vehicles. The required curb radii will be determined at registration as part of the detailed design of the road.

Figure 20 illustrates the proposed cross-section for Meynell Road which is consistent with the cross-section of Meynell Road through the Richmond Village Development Corporation's development to the north. The 22m cross-section will feature an 8.5m asphalt surface and sidewalks will be provided along both sides. It should be noted that the cross-section of Meynell Road across the frontage of the park and school may differ from what is illustrated in **Figure 20** below. In front of the school and park, parking lay-bys may potentially be included to facilitate parking for both the park and the school. A similar treatment has been implemented along Kilbirnie Drive in Barrhaven South, where Kilbirnie Drive has a ROW width of 22m which includes sidewalks along both sides and parking lay-bys along one side. The detailed cross-section of Meynell Road will be further refined in subsequent TIAs as the development proceeds through to registration.

Figure 18 - Proposed Transit Route and Transit Stops

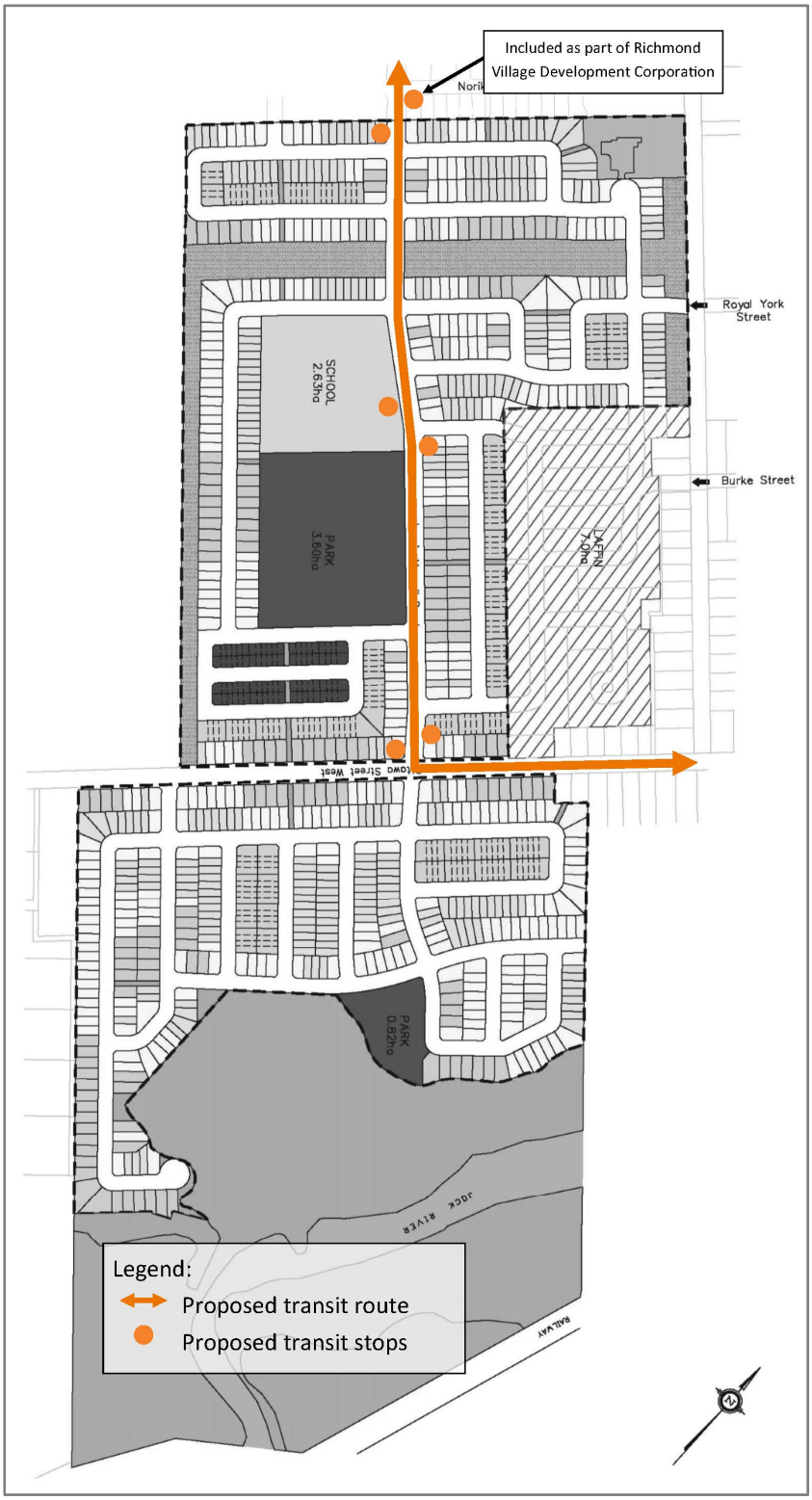


Figure 19 - Proposed Pedestrian Facilities

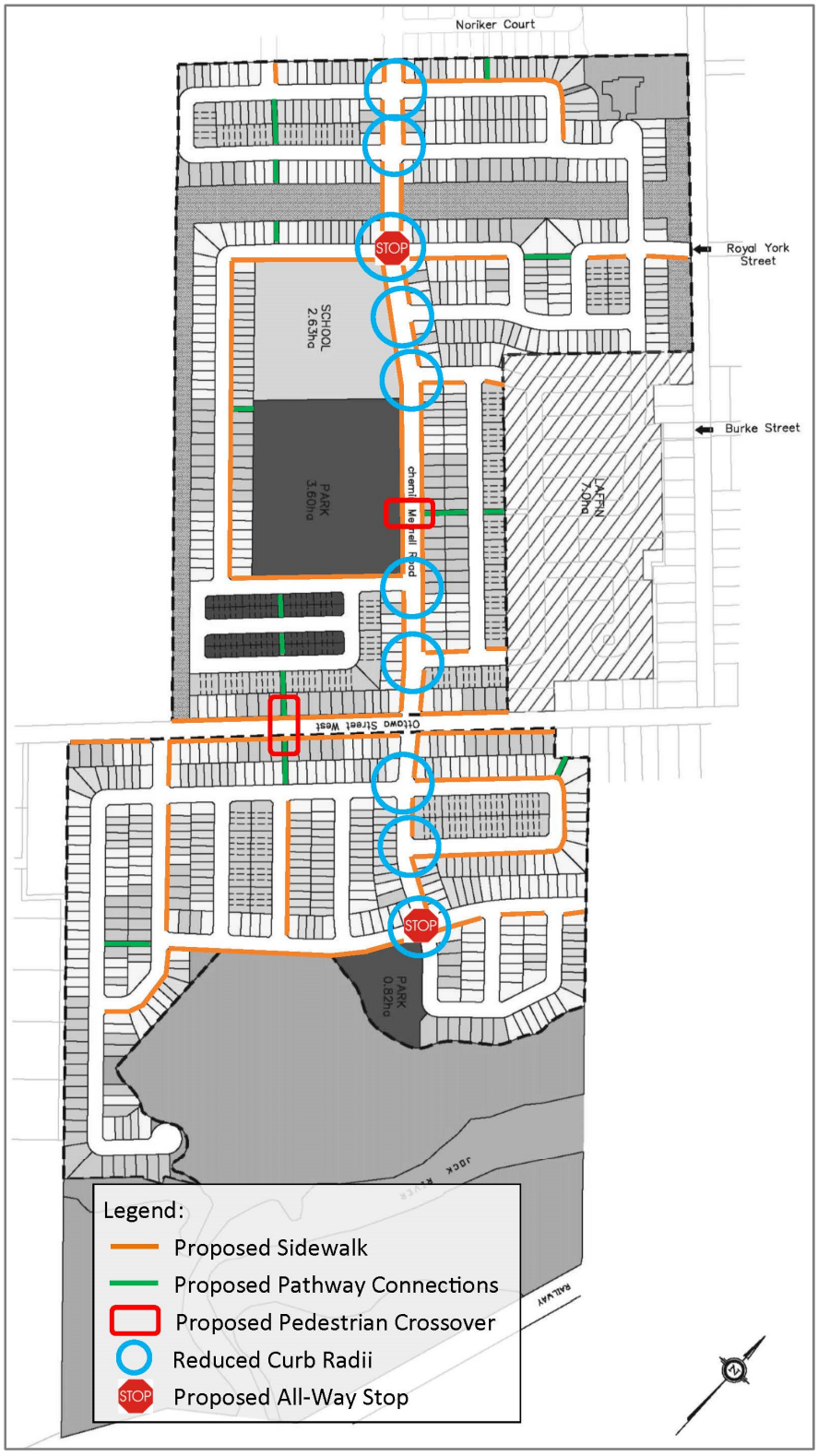
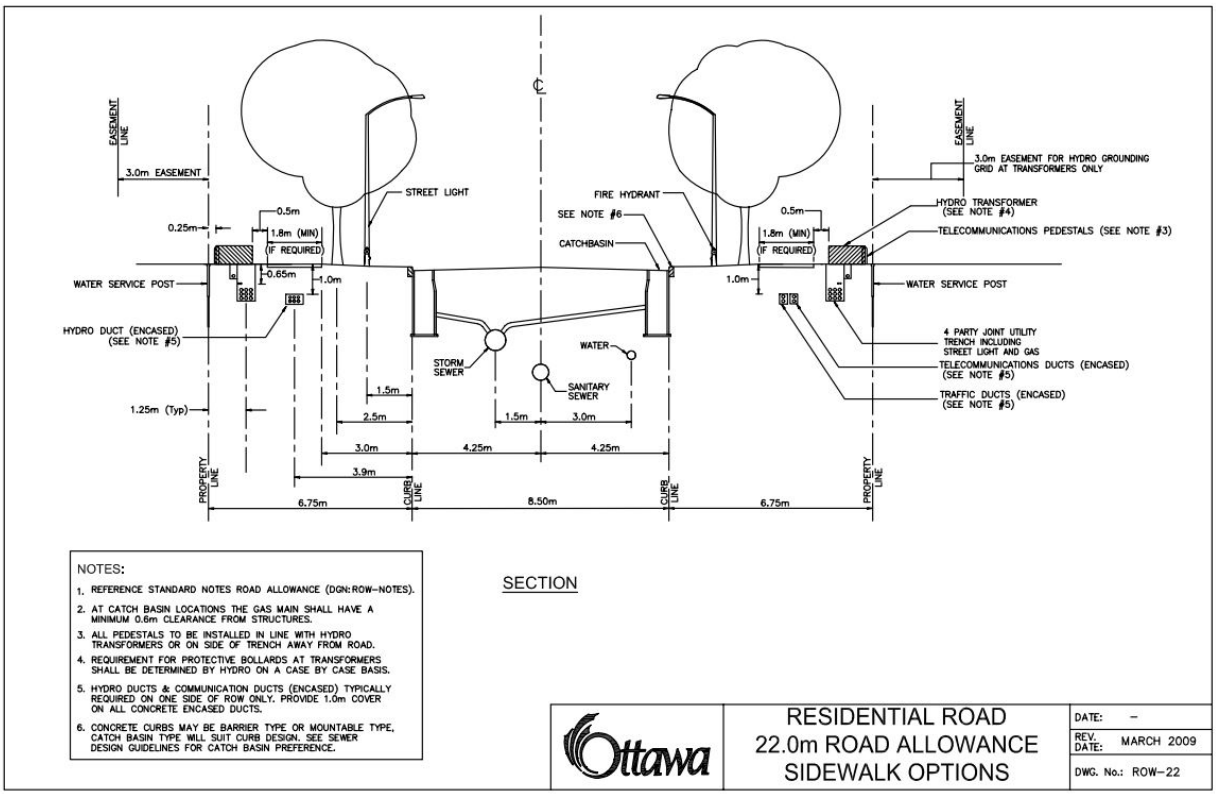


Figure 20 - Proposed Meynell Road Cross-Section – without Parking



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 outlined below.

	TDM-supportive design & infrastructure measures: *Residential developments*		Check if completed & add descriptions, explanations or plan/drawing references
	1.	**WALKING & CYCLING: ROUTES**	
	1.1	**Building location & access points**	
BASIC	1.1.1	Locate building close to the street, and do not locate parking areas between the street and building entrances	☐ 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 Plan policy 4.3.12)*	☐ Not applicable

		TDM-supportive design & infrastructure measures: *Residential developments*	Check if completed & add descriptions, explanations or plan/drawing references
REQUIRED	1.2.3	Provide sidewalks of smooth, well-drained walking surfaces of contrasting materials or treatments to differentiate pedestrian areas from vehicle areas, and provide marked pedestrian crosswalks at intersection sidewalks *(see Official Plan policy 4.3.10)*	☒ 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	☐
	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 directions to reach transit stops/stations, trails or other common destinations are not obvious)	☐ Not applicable

		TDM-supportive design & infrastructure measures: *Residential developments*	Check if completed & add descriptions, explanations or plan/drawing references
	2.	**WALKING & CYCLING: END-OF-TRIP FACILITIES**	
	2.1	**Bicycle parking**	
REQUIRED	2.1.1	Provide bicycle parking in highly visible and lighted areas, sheltered from the weather wherever possible *(see Official Plan policy 4.3.6)*	☐ 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
	3.	**TRANSIT**	
	3.1	**Customer amenities**	
BASIC	3.1.1	Provide shelters, lighting and benches at any on-site transit stops	☐ Not applicable
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

		TDM-supportive design & infrastructure measures: *Residential developments*	Check if completed & add descriptions, explanations or plan/drawing references
	4.	**RIDESHARING**	
	4.1	**Pick-up & drop-off facilities**	
BASIC	4.1.1	Provide a designated area for carpool drivers (plus taxis and ride-hailing services) to drop off or pick up passengers without using fire lanes or other no-stopping zones	☐ 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 *(see Zoning By-law Section 94)*	☐ 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
	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 *(see Zoning By-law Section 111)*	☐ 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

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 296 townhome-style dwellings and 805 single family dwellings for a total of 1101 residential units.
- The development is anticipated to generate 685 and 946 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 consistent with the Village of Richmond's *Transportation Master Plan* and Richmond Village Development Corporation's *Richmond Village Phase 1 Transportation Impact Study* (Stantec, 2017)
- 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.

- With the above improvements in place all remaining study area intersections are forecasted to operate acceptably under 2029 total future conditions, however, the Perth Street intersection with Queen Charlotte Street / Rochelle Drive is forecasted to continue to operate with high delays along the minor approaches.

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

- A transit route is proposed through the subject development along Meynell Road and Ottawa Street. Transit stops are proposed to be located along Meynell Road at the northernmost edge of the subject development, at the proposed school, and just north of Ottawa Street. With these transit stops in place, 95% of the subject development will be located within a 400m radius of the transit stops.

- The draft plan includes sidewalks along both sides of Meynell Road and Ottawa Street and along one side of several local roads. Two pedestrian crossovers are proposed: one crossing Ottawa Street and one crossing Meynell Street at the park. The curb radii at all intersections along Meynell Road are proposed to be reduced to act as a form of traffic calming and to reduce the crossing distances for pedestrians. The exception to this is at the Meynell Road at Ottawa Street intersection where the curb radii will be dictated by the required turning movements of transit vehicles.

- 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 cross-section for Meynell Road features wide travel lanes which will facilitate cyclists and motor vehicles operating in a shared lane. It should be noted that the cross-section of Meynell Road in front of the school and park may differ to accommodate parking via parking lay-bys. The detailed cross-section of Meynell Road will be further refined in subsequent TIAs as the development proceeds through to registration.

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), both sides of Ottawa Street, 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.

- Curb radii reductions at specified intersections to act as a preventative form of traffic calming as well as to reduce the pedestrian crossing distances.
- Two pedestrian crossovers are proposed within the subject development: one along Meynell Road and one along Ottawa Street.

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

*****

STANTEC CONSULTING LTD.

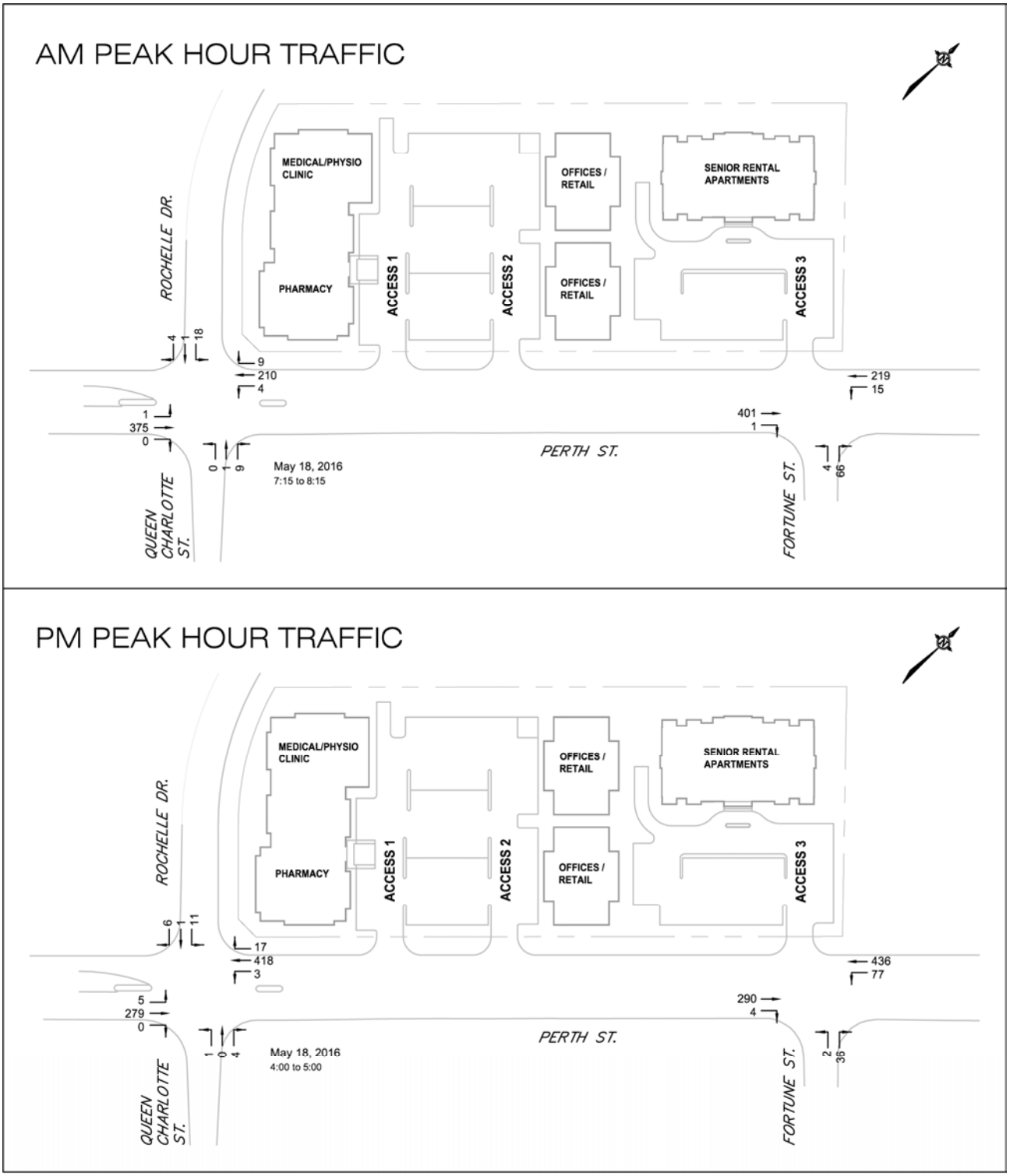
(Original signed and stamped)

Robert Vastag, RPP
Project Manager, Senior Transportation Planner

Lauren O'Grady, P. Eng.
Transportation Engineer

Appendix A TRAFFIC DATA

FIGURE 2.1
EXISTING 2016 WEEKDAY PEAK AM AND PM HOUR TRAFFIC COUNTS



NOT TO SCALE

Turning Movement Count Report

Report Generated Using Turning Movement Count for Android by PortableStudies.com

Study Information

Study Summary

Count Name
Queen Charlotte Street and Ottawa Street - Weekday AM Peak Hour Count
Location
Queen Charlotte and Ottawa Street, Richmond, Ottawa, Canada
Performed By
ERS
Date
December 14, 2017

Notes

U = U Turn L = Left Turn T = Thru R = Right Turn
P1 = Pedestrian Direction 1 P2 = Pedestrian Direction 2
Veh = Total Vehicles for Approach

Peak Hour Volume	
18	
% Bank 1	**% Bank 2**
77.8%	22.2%
% Bank 3	**% Bank 4**
0.0%	0.0%
Pedestrians Volume	
2	

Peak Hour Data

Time Period	Eastbound Approach							Westbound Approach							Northbound Approach							Southbound Approach							Total Vehicles	Total Pedestrians
	U	L	T	R	P1	P2	Veh	U	L	T	R	P1	P2	Veh	U	L	T	R	P1	P2	Veh	U	L	T	R	P1	P2	Veh		
7:30 AM	0	0	2	0	0	0	2	0	0	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	0
7:45 AM	0	1	3	0	0	0	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4	0
8:00 AM	0	1	3	0	0	0	4	0	0	0	1	0	0	1	0	0	0	0	0	2	0	0	2	0	0	0	0	2	7	2
8:15 AM	0	0	3	0	0	0	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	4	0

Vehicle Movement Summary

Movement / Details	Eastbound Approach							Westbound Approach							Northbound Approach							Southbound Approach							Entire Intersection	
	U	L	T	R	P1	P2	Veh	U	L	T	R	P1	P2	Veh	U	L	T	R	P1	P2	Veh	U	L	T	R	P1	P2	Veh	Vehicles	Pedestrians
Movement Volume	0	2	11	0	0	0	13	0	0	1	1	0	0	2	0	0	0	0	0	2	0	0	2	0	1	0	0	3	18	2
PHF	-	0.50	0.92	-	-	-	0.81	-	-	0.25	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%	100.0%				0.0%	0.0%	0.0%	0.0%				0.0%	100.0%	0.0%	100.0%					
% Bank 2	0.0%	0.0%	27.3%	0.0%				0.0%	0.0%	100.0%	0.0%				0.0%	0.0%	0.0%	0.0%				0.0%	0.0%	0.0%	0.0%				**Need a custom report?**	
% Bank 3	0.0%	0.0%	0.0%	0.0%				0.0%	0.0%	0.0%	0.0%				0.0%	0.0%	0.0%	0.0%				0.0%	0.0%	0.0%	0.0%				**Contact: support@portablestudies.com**	
% Bank 4	0.0%	0.0%	0.0%	0.0%				0.0%	0.0%	0.0%	0.0%				0.0%	0.0%	0.0%	0.0%				0.0%	0.0%	0.0%	0.0%					

Turning Movement Count Report

Report Generated Using Turning Movement Count for Android by PortableStudies.com

Study Information

Study Summary

Count Name
Queen Charlotte Street and Ottawa Street - Weekday PM Peak Hour Count
Location
Queen Charlotte and Ottawa Street, Richmond, Ottawa, Canada
Performed By
ERS
Date
December 14, 2017

Notes

U = U Turn L = Left Turn T = Thru R = Right Turn
P1 = Pedestrian Direction 1 P2 = Pedestrian Direction 2
Veh = Total Vehicles for Approach

Peak Hour Volume	
39	
% Bank 1	**% Bank 2**
94.9%	5.1%
% Bank 3	**% Bank 4**
0.0%	0.0%
Pedestrians Volume	
1	

Peak Hour Data

Time Period	Eastbound Approach							Westbound Approach							Northbound Approach							Southbound Approach							Total Vehicles	Total Pedestrians
	U	L	T	R	P1	P2	Veh	U	L	T	R	P1	P2	Veh	U	L	T	R	P1	P2	Veh	U	L	T	R	P1	P2	Veh		
4:40 PM	0	1	5	0	0	0	6	0	0	3	1	0	0	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	10	0
4:55 PM	0	1	4	0	0	0	5	0	0	6	1	0	0	7	0	0	0	0	0	0	0	0	2	0	1	0	0	3	15	0
5:10 PM	0	1	3	0	0	0	4	0	0	1	1	1	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	6	1
5:25 PM	0	0	3	0	0	0	3	0	0	4	1	0	0	5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	8	0

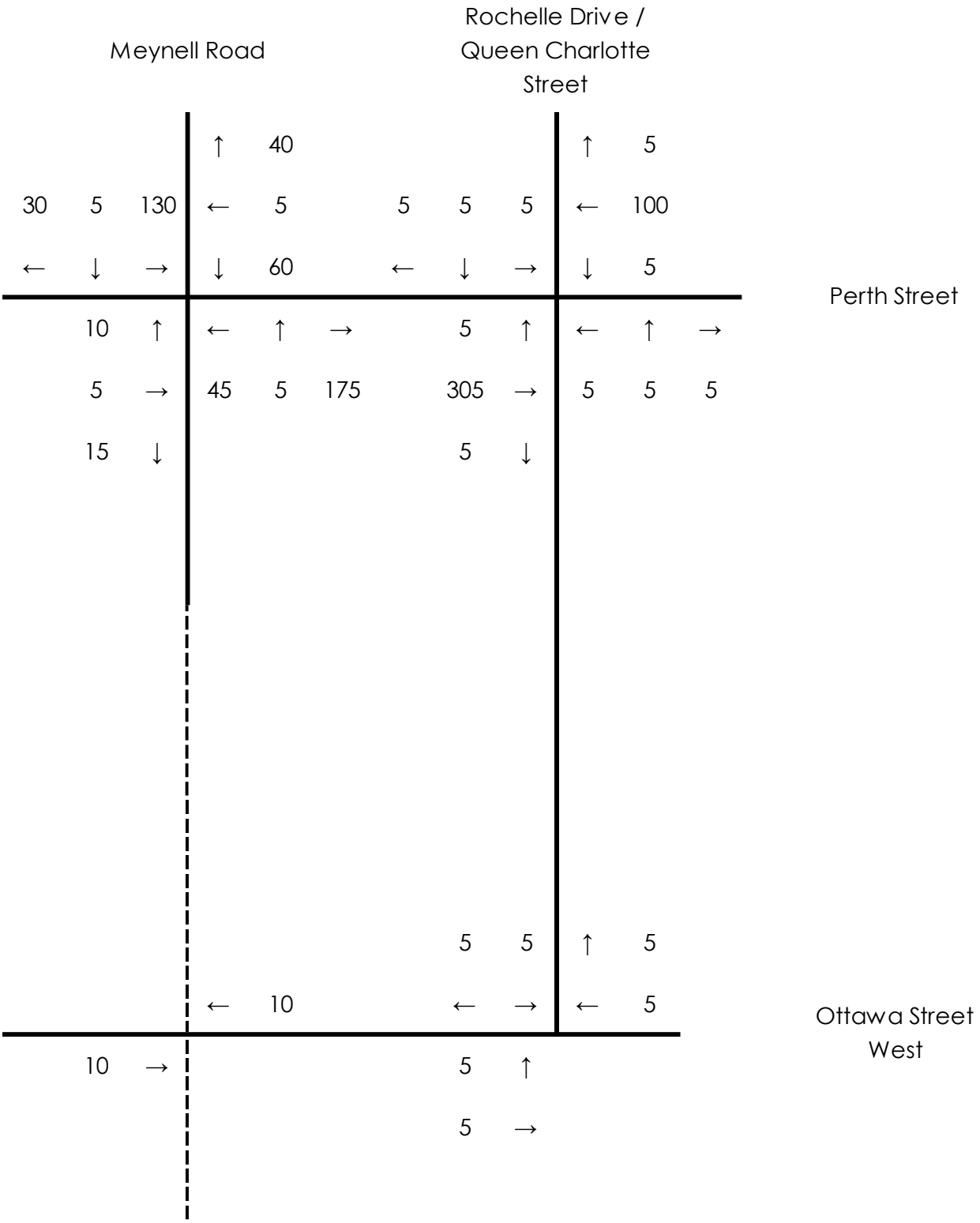
Vehicle Movement Summary

Movement / Details	Eastbound Approach							Westbound Approach							Northbound Approach							Southbound Approach							Entire Intersection	
	U	L	T	R	P1	P2	Veh	U	L	T	R	P1	P2	Veh	U	L	T	R	P1	P2	Veh	U	L	T	R	P1	P2	Veh	Vehicles	Pedestrians
Movement Volume	0	3	15	0	0	0	18	0	0	14	4	1	0	18	0	0	0	0	0	0	0	0	2	0	1	0	0	3	39	1
PHF	-	0.75	0.75	-	-	-	0.75	-	-	0.58	1.00	0.25	-	0.64	-	-	-	-	-	-	-	-	0.25	-	0.25	-	-	0.25	0.65	0.25
% Bank 1	0.0%	100.0%	93.3%	0.0%				0.0%	0.0%	92.9%	100.0%				0.0%	0.0%	0.0%	0.0%				0.0%	100.0%	0.0%	100.0%					
% Bank 2	0.0%	0.0%	6.7%	0.0%				0.0%	0.0%	7.1%	0.0%				0.0%	0.0%	0.0%	0.0%				0.0%	0.0%	0.0%	0.0%				**Need a custom report?**	
% Bank 3	0.0%	0.0%	0.0%	0.0%				0.0%	0.0%	0.0%	0.0%				0.0%	0.0%	0.0%	0.0%				0.0%	0.0%	0.0%	0.0%				**Contact: support@portablestudies.com**	
% Bank 4	0.0%	0.0%	0.0%	0.0%				0.0%	0.0%	0.0%	0.0%				0.0%	0.0%	0.0%	0.0%				0.0%	0.0%	0.0%	0.0%					

Appendix B BACKGROUND DEVELOPMENTS

Richmond Village Development Corporation Phases 1, 2, 3

Site Generated Traffic Volumes - Weekday AM Peak Hour



Richmond Village Development Corporation Phases 1, 2, 3

Site Generated Traffic Volumes - Weekday PM Peak Hour

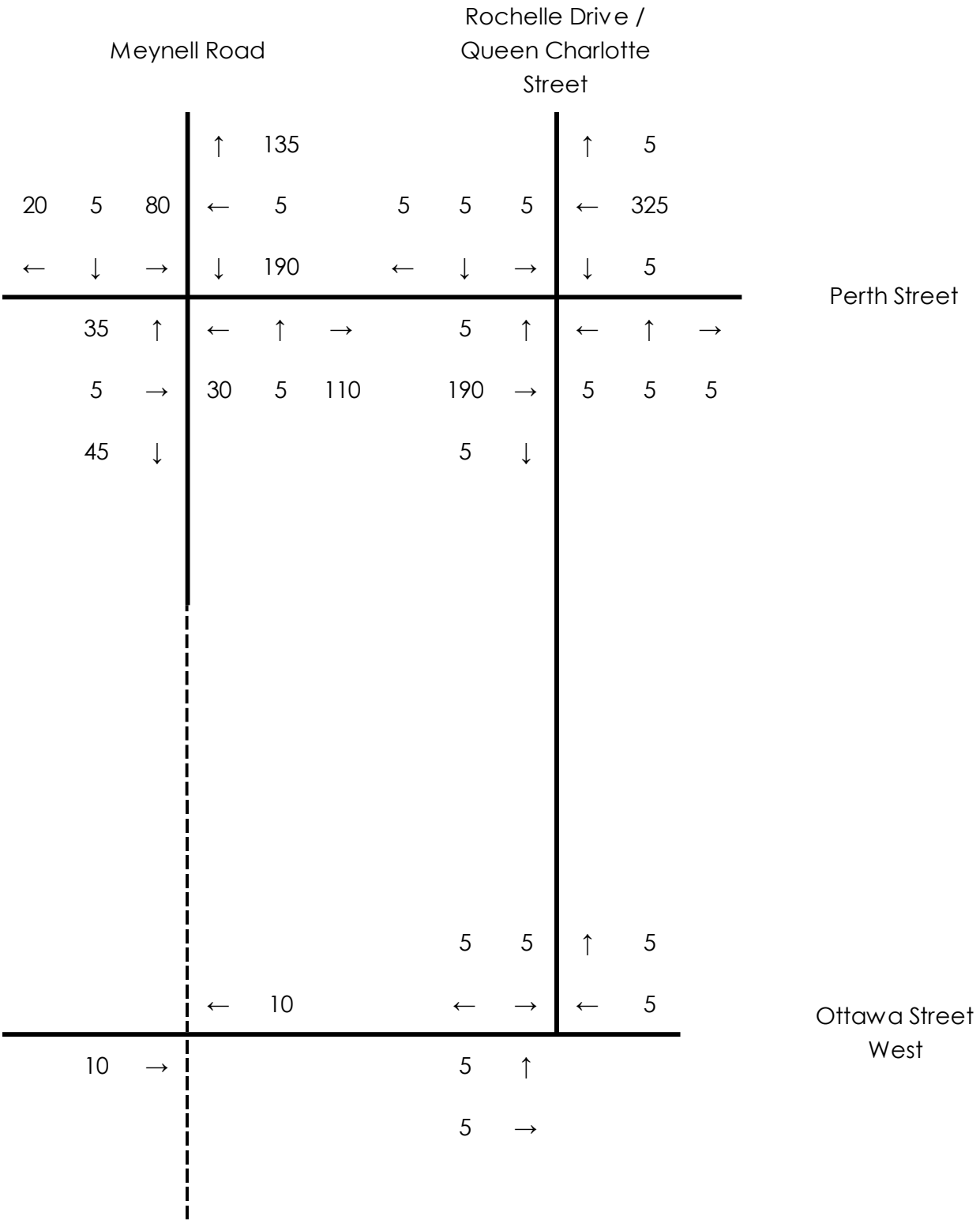


FIGURE 3.2
WEEKDAY PEAK AM AND PM HOUR SITE GENERATED TRIPS

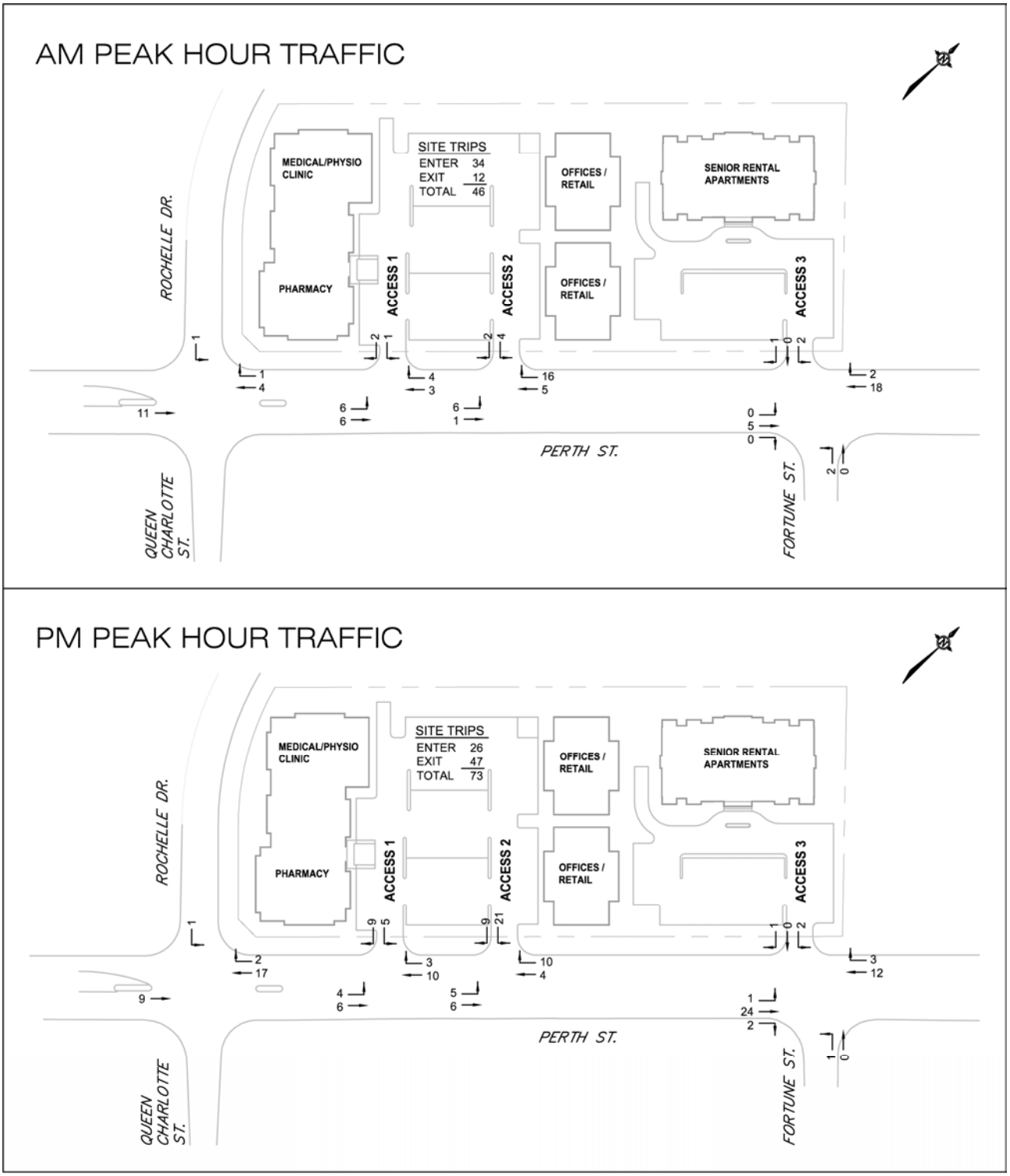
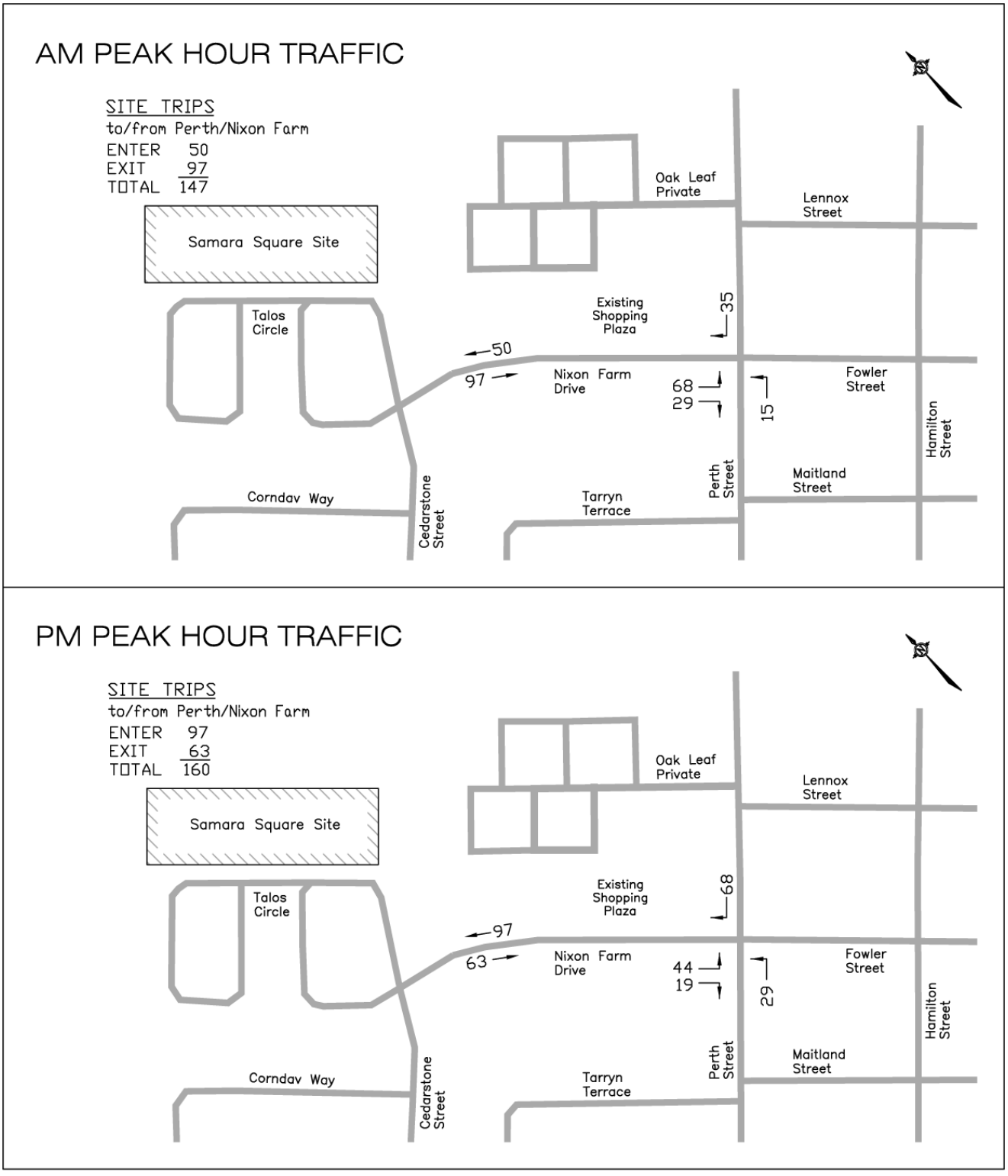
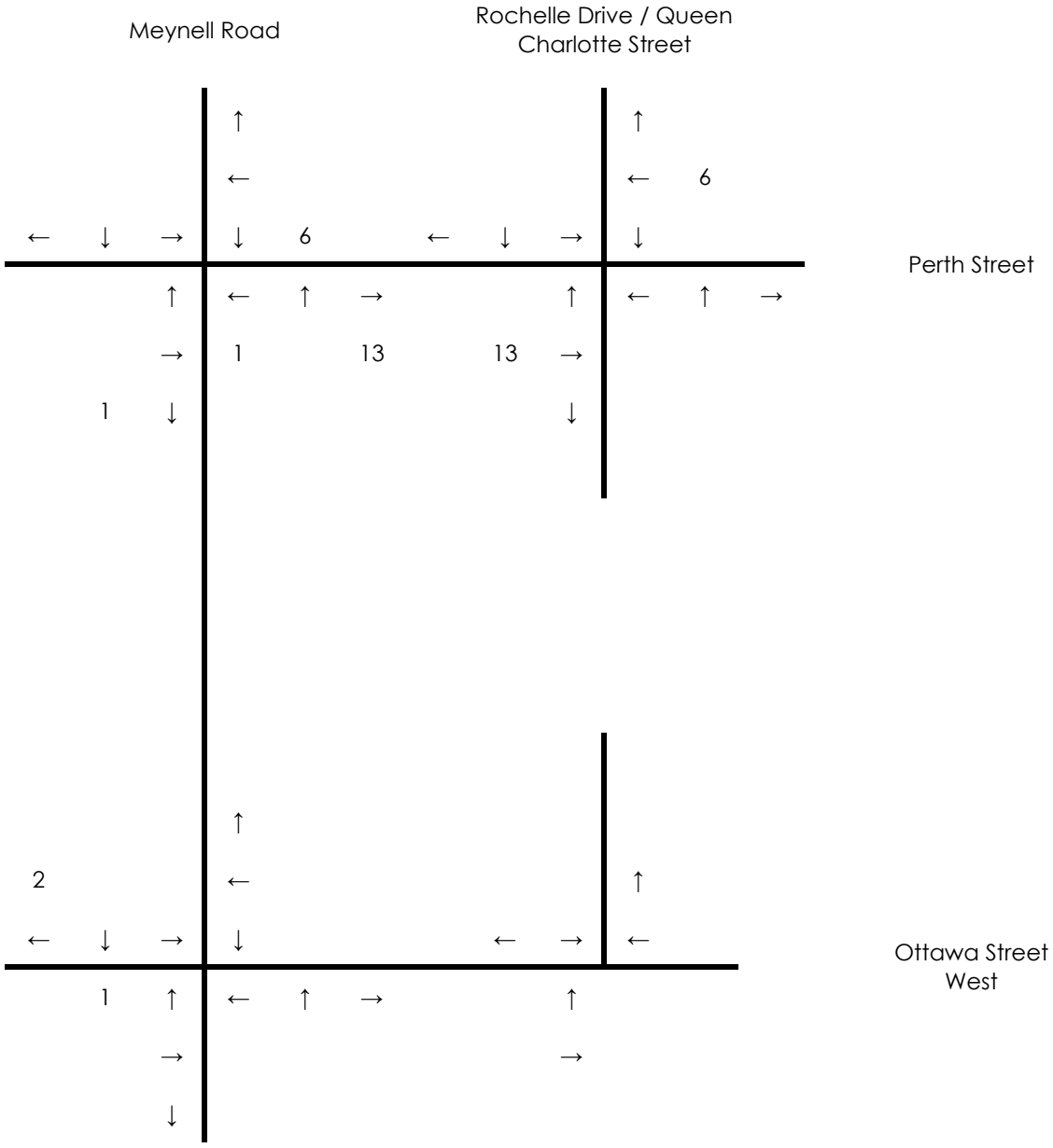


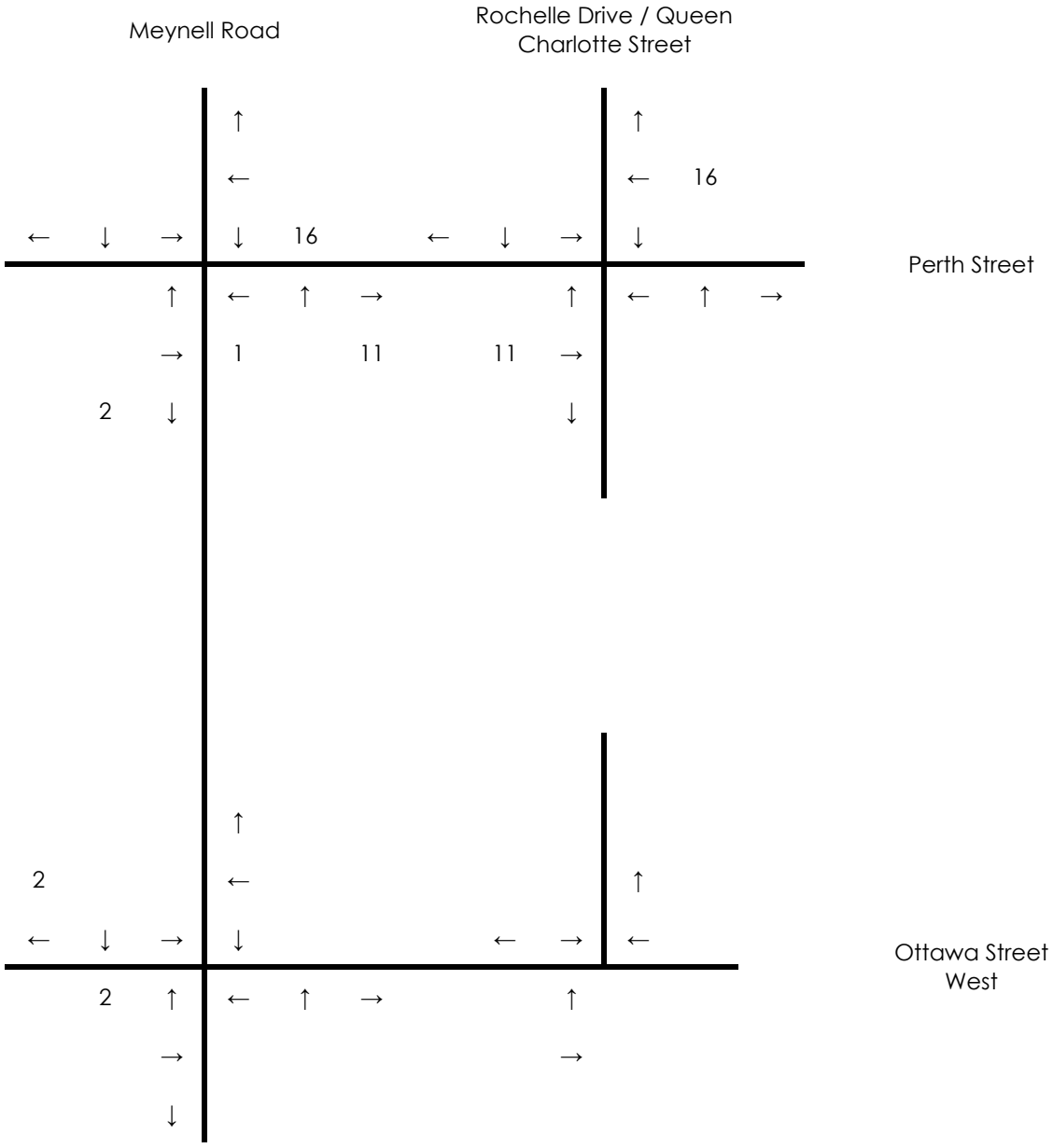
FIGURE 3.2
WEEKDAY PEAK AM AND PM HOUR SITE GENERATED TRIPS



Laffin Lands Site Generated Traffic Volumes - AM Peak Hour



Laffin Lands Site Generated Traffic Volumes - PM Peak Hour



Appendix C INTERSECTION PERFORMANCE WORKSHEETS

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

Mattamy Richmond Village
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												
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	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	255	0	0	439	0	0	716	715	220	494	713	250
Stage 1	-	-	-	-	-	-	448	448	-	262	262	-
Stage 2	-	-	-	-	-	-	268	267	-	232	451	-
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	1309	-	-	1119	-	-	331	355	785	472	356	788
Stage 1	-	-	-	-	-	-	561	572	-	742	691	-
Stage 2	-	-	-	-	-	-	737	687	-	751	570	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1309	-	-	1119	-	-	322	351	785	456	352	788
Mov Cap-2 Maneuver	-	-	-	-	-	-	322	351	-	456	352	-
Stage 1	-	-	-	-	-	-	558	569	-	738	688	-
Stage 2	-	-	-	-	-	-	722	684	-	729	567	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0.1	0.2	13	13.3
HCM LOS			B	B

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	470	1309	-	-	1119	-	-	466
HCM Lane V/C Ratio	0.047	0.004	-	-	0.005	-	-	0.072
HCM Control Delay (s)	13	7.8	0	-	8.2	-	-	13.3
HCM Lane LOS	B	A	A	-	A	-	-	B
HCM 95th %tile Q(veh)	0.1	0	-	-	0	-	-	0.2

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

Mattamy Richmond Village
2018 Existing AM

Intersection	
Intersection Delay, s/veh	6.9
Intersection LOS	A

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
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	A	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
Cap	893	980	950
Service Time	2.034	1.673	1.792
HCM Lane V/C Ratio	0.019	0.011	0.012
HCM Control Delay	7.1	6.7	6.8
HCM Lane LOS	A	A	A
HCM 95th-tile Q	0.1	0	0

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

Mattamy Richmond Village
2018 Existing PM

Intersection	
Int Delay, s/veh	0.8

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
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	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	322	6	6	483	22	6	6	6	11	6	6

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	505	0	0	328	0	0	849	854	164	682	846	494
Stage 1	-	-	-	-	-	-	337	337	-	506	506	-
Stage 2	-	-	-	-	-	-	512	517	-	176	340	-
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	1058	-	-	1230	-	-	267	295	852	350	298	574
Stage 1	-	-	-	-	-	-	652	640	-	548	539	-
Stage 2	-	-	-	-	-	-	544	533	-	809	639	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1058	-	-	1230	-	-	258	291	852	340	294	574
Mov Cap-2 Maneuver	-	-	-	-	-	-	258	291	-	340	294	-
Stage 1	-	-	-	-	-	-	647	636	-	544	536	-
Stage 2	-	-	-	-	-	-	531	530	-	791	635	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0.1	0.1	15.7	15.6
HCM LOS			C	C

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	354	1058	-	-	1230	-	-	363
HCM Lane V/C Ratio	0.047	0.005	-	-	0.005	-	-	0.061
HCM Control Delay (s)	15.7	8.4	0	-	7.9	-	-	15.6
HCM Lane LOS	C	A	A	-	A	-	-	C
HCM 95th %tile Q(veh)	0.1	0	-	-	0	-	-	0.2

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

Mattamy Richmond Village
2018 Existing PM

Intersection	
Intersection Delay, s/veh	7
Intersection LOS	A

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
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	A	A	A

Lane	EBLn1	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	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
Cap	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

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

Mattamy Richmond Village
2029 Background AM

Intersection	
Int Delay, s/veh	0.9

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
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

Major/Minor	Major1			Major2			Minor1			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			C	C

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	249	1162	-	-	817	-	-	273
HCM Lane V/C Ratio	0.08	0.004	-	-	0.006	-	-	0.11
HCM Control Delay (s)	20.7	8.1	0	-	9.4	-	-	19.8
HCM Lane LOS	C	A	A	-	A	-	-	C
HCM 95th %tile Q(veh)	0.3	0	-	-	0	-	-	0.4

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

Mattamy Richmond Village
2029 Background AM

Intersection	
Intersection Delay, s/veh	6.9
Intersection LOS	A

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	5	10	5	5	5	5
Future Vol, veh/h	5	10	5	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	10	5	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	6.7	6.8
HCM LOS	A	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	15	10	10
Geometry Grp	1	1	1
Degree of Util (X)	0.017	0.01	0.01
Departure Headway (Hd)	4.026	3.663	3.777
Convergence, Y/N	Yes	Yes	Yes
Cap	894	982	951
Service Time	2.029	1.668	1.787
HCM Lane V/C Ratio	0.017	0.01	0.011
HCM Control Delay	7.1	6.7	6.8
HCM Lane LOS	A	A	A
HCM 95th-tile Q	0.1	0	0

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

Western Development Lands
2029 Background PM

Intersection	
Int Delay, s/veh	0.8

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	5	565	5	5	880	20	5	5	5	10	5	5
Future Vol, veh/h	5	565	5	5	880	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, #	-	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	565	5	5	880	20	5	5	5	10	5	5

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	900	0	0	570	0	0	1483	1488	285	1195	1480	890
Stage 1	-	-	-	-	-	-	578	578	-	900	900	-
Stage 2	-	-	-	-	-	-	905	910	-	295	580	-
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	753	-	-	1000	-	-	95	124	713	152	125	341
Stage 1	-	-	-	-	-	-	469	500	-	332	356	-
Stage 2	-	-	-	-	-	-	330	353	-	690	499	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	753	-	-	1000	-	-	90	122	713	145	123	341
Mov Cap-2 Maneuver	-	-	-	-	-	-	90	122	-	145	123	-
Stage 1	-	-	-	-	-	-	464	495	-	329	354	-
Stage 2	-	-	-	-	-	-	319	351	-	671	494	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0.1	0	32.7	30.5
HCM LOS			D	D

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	145	753	-	-	1000	-	-	161
HCM Lane V/C Ratio	0.103	0.007	-	-	0.005	-	-	0.124
HCM Control Delay (s)	32.7	9.8	0	-	8.6	-	-	30.5
HCM Lane LOS	D	A	A	-	A	-	-	D
HCM 95th %tile Q(veh)	0.3	0	-	-	0	-	-	0.4

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

Western Development Lands
2029 Background PM

Intersection	
Intersection Delay, s/veh	7
Intersection LOS	A

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
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	EBLn1	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	10
LT Vol	5	0	5
Through Vol	15	15	0
RT Vol	0	5	5
Lane Flow Rate	20	20	10
Geometry Grp	1	1	1
Degree of Util (X)	0.022	0.021	0.011
Departure Headway (Hd)	4.017	3.817	3.804
Convergence, Y/N	Yes	Yes	Yes
Cap	895	942	943
Service Time	2.023	1.824	1.818
HCM Lane V/C Ratio	0.022	0.021	0.011
HCM Control Delay	7.1	6.9	6.9
HCM Lane LOS	A	A	A
HCM 95th-tile Q	0.1	0.1	0

LANE SUMMARY

Site: 101 [2029 FB AM]

Perth Street and Meynell Road
Roundabout

Lane Use and Performance

	Demand Flows Total veh/h	HV %	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Average Delay sec	Level of Service	95% Back of Queue Veh	Dist m	Lane Config	Lane Length m	Cap. Adj. %	Prob. Block. %
South: Meynell Road													
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: Meynell 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 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 ratio (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 for all lanes (v/c not used as specified in HCM 2010).
Roundabout Capacity Model: SIDRA Standard.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

d Dominant lane on roundabout approach

MOVEMENT SUMMARY

Site: 101 [2029 FB AM]

Perth Street and Meynell Road
Roundabout

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Meynell Road											
1	L2	45	2.0	0.243	12.0	LOS B	1.4	9.7	0.63	0.73	54.9
2	T1	5	2.0	0.243	6.1	LOS A	1.4	9.7	0.63	0.73	54.7
3	R2	175	2.0	0.243	6.4	LOS A	1.4	9.7	0.63	0.73	53.1
Approach		225	2.0	0.243	7.5	LOS A	1.4	9.7	0.63	0.73	53.5
East: Perth Street											
4	L2	60	2.0	0.269	9.3	LOS A	1.5	10.4	0.20	0.41	57.0
5	T1	295	2.0	0.269	3.3	LOS A	1.5	10.4	0.20	0.41	56.7
6	R2	40	2.0	0.269	3.7	LOS A	1.5	10.4	0.20	0.41	55.0
Approach		395	2.0	0.269	4.3	LOS A	1.5	10.4	0.20	0.41	56.6
North: Meynell Road											
7	L2	130	2.0	0.149	10.5	LOS B	0.7	4.9	0.44	0.67	53.3
8	T1	5	2.0	0.149	4.6	LOS A	0.7	4.9	0.44	0.67	53.1
9	R2	30	2.0	0.149	4.9	LOS A	0.7	4.9	0.44	0.67	51.6
Approach		165	2.0	0.149	9.3	LOS A	0.7	4.9	0.44	0.67	53.0
West: Perth Street											
10	L2	10	2.0	0.403	9.9	LOS A	2.3	16.5	0.39	0.44	56.5
11	T1	495	2.0	0.403	4.0	LOS A	2.3	16.5	0.39	0.44	56.3
12	R2	15	2.0	0.403	4.3	LOS A	2.3	16.5	0.39	0.44	54.6
Approach		520	2.0	0.403	4.1	LOS A	2.3	16.5	0.39	0.44	56.3
All Vehicles		1305	2.0	0.403	5.4	LOS A	2.3	16.5	0.38	0.51	55.4

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.
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement.
LOS F will result if v/c > 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 (v/c not used as specified in HCM 2010).
Roundabout Capacity Model: SIDRA Standard.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

LANE LEVEL OF SERVICE

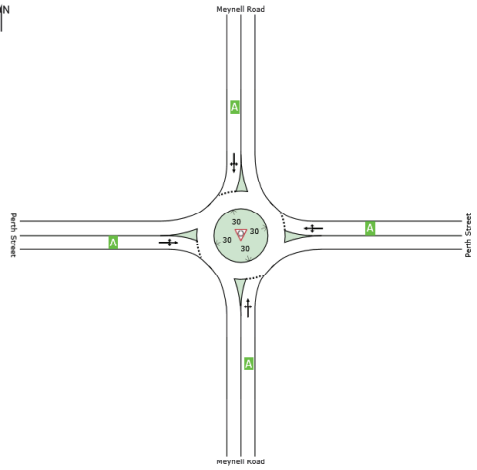
Lane Level of Service

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



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 ratio (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 for all lanes (v/c not used as specified in HCM 2010).
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.

LANE SUMMARY

Site: 101 [2029 FB PM]

Perth Street and Meynell Road
Roundabout

Lane Use and Performance

	Demand Flows Total veh/h	HV %	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Average Delay sec	Level of Service	95% Back of Queue Veh	Dist m	Lane Config	Lane Length m	Cap. Adj. %	Prob. Block. %
South: Meynell Road													
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: Meynell 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 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 ratio (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 for all lanes (v/c not used as specified in HCM 2010).
Roundabout Capacity Model: SIDRA Standard.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

d Dominant lane on roundabout approach

MOVEMENT SUMMARY

Site: 101 [2029 FB PM]

Perth Street and Meynell Road
Roundabout

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Meynell Road											
1	L2	30	2.0	0.143	11.0	LOS B	0.7	5.1	0.53	0.64	55.5
2	T1	5	2.0	0.143	5.1	LOS A	0.7	5.1	0.53	0.64	55.2
3	R2	110	2.0	0.143	5.4	LOS A	0.7	5.1	0.53	0.64	53.6
Approach		145	2.0	0.143	6.5	LOS A	0.7	5.1	0.53	0.64	54.0
East: Perth Street											
4	L2	190	2.0	0.587	9.5	LOS A	4.5	32.2	0.29	0.45	56.3
5	T1	565	2.0	0.587	3.5	LOS A	4.5	32.2	0.29	0.45	56.1
6	R2	135	2.0	0.587	3.8	LOS A	4.5	32.2	0.29	0.45	54.4
Approach		890	2.0	0.587	4.8	LOS A	4.5	32.2	0.29	0.45	55.8
North: Meynell Road											
7	L2	80	2.0	0.127	12.8	LOS B	0.7	5.0	0.67	0.77	52.0
8	T1	5	2.0	0.127	6.9	LOS A	0.7	5.0	0.67	0.77	51.8
9	R2	20	2.0	0.127	7.2	LOS A	0.7	5.0	0.67	0.77	50.5
Approach		105	2.0	0.127	11.5	LOS B	0.7	5.0	0.67	0.77	51.7
West: Perth Street											
10	L2	35	2.0	0.385	10.3	LOS B	2.1	15.0	0.45	0.50	56.1
11	T1	385	2.0	0.385	4.4	LOS A	2.1	15.0	0.45	0.50	55.9
12	R2	45	2.0	0.385	4.7	LOS A	2.1	15.0	0.45	0.50	54.2
Approach		465	2.0	0.385	4.9	LOS A	2.1	15.0	0.45	0.50	55.7
All Vehicles		1605	2.0	0.587	5.4	LOS A	4.5	32.2	0.38	0.50	55.3

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.
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement.
LOS F will result if v/c > 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 (v/c not used as specified in HCM 2010).
Roundabout Capacity Model: SIDRA Standard.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

LANE LEVEL OF SERVICE

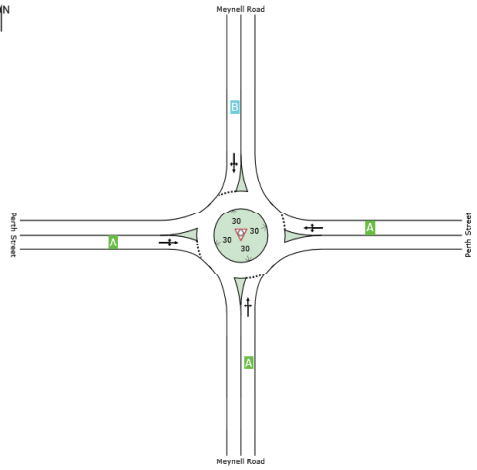
Lane Level of Service

Site: 101 [2029 FB 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 ratio (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 for all lanes (v/c not used as specified in HCM 2010).
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.

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

Mattamy Richmond Village
2029 Total AM

Intersection	
Int Delay, s/veh	1.2

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	5	1165	5	5	550	10	5	5	10	20	5	5
Future Vol, veh/h	5	1165	5	5	550	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	1165	5	5	550	10	5	5	10	20	5	5

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	560	0	0	1170	0	0	1748	1748	585	1160	1745	555
Stage 1	-	-	-	-	-	-	1178	1178	-	565	565	-
Stage 2	-	-	-	-	-	-	570	570	-	595	1180	-
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	1009	-	-	595	-	-	61	86	455	161	86	530
Stage 1	-	-	-	-	-	-	203	264	-	509	507	-
Stage 2	-	-	-	-	-	-	506	504	-	459	263	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1009	-	-	595	-	-	57	84	455	148	84	530
Mov Cap-2 Maneuver	-	-	-	-	-	-	57	84	-	148	84	-
Stage 1	-	-	-	-	-	-	200	260	-	502	503	-
Stage 2	-	-	-	-	-	-	492	500	-	434	259	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0.1	0.1	41.6	35.7
HCM LOS			E	E

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	118	1009	-	-	595	-	-	147
HCM Lane V/C Ratio	0.169	0.005	-	-	0.008	-	-	0.204
HCM Control Delay (s)	41.6	8.6	0.1	-	11.1	-	-	35.7
HCM Lane LOS	E	A	A	-	B	-	-	E
HCM 95th %tile Q(veh)	0.6	0	-	-	0	-	-	0.7

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

Mattamy Richmond Village
2029 Total AM

Intersection	
Intersection Delay, s/veh	7.2
Intersection LOS	A

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	5	55	20	5	5	5
Future Vol, veh/h	5	55	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
Mvmt Flow	5	55	20	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	7.3	7	7
HCM LOS	A	A	A

Lane	EBLn1	WBLn1	SBLn1
Vol Left, %	8%	0%	50%
Vol Thru, %	92%	80%	0%
Vol Right, %	0%	20%	50%
Sign Control	Stop	Stop	Stop
Traffic Vol by Lane	60	25	10
LT Vol	5	0	5
Through Vol	55	20	0
RT Vol	0	5	5
Lane Flow Rate	60	25	10
Geometry Grp	1	1	1
Degree of Util (X)	0.066	0.027	0.011
Departure Headway (Hd)	3.987	3.876	3.879
Convergence, Y/N	Yes	Yes	Yes
Cap	902	926	920
Service Time	1.995	1.891	1.914
HCM Lane V/C Ratio	0.067	0.027	0.011
HCM Control Delay	7.3	7	7
HCM Lane LOS	A	A	A
HCM 95th-tile Q	0.2	0.1	0

HCM 2010 AWSC
3: Meynell Rd. & Ottawa St. W.

Mattamy Richmond Village
2029 Total AM

Intersection	
Intersection Delay, s/veh	7.9
Intersection LOS	A

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	65	25	5	10	5	5	5	95	15	15	40	35
Future Vol, veh/h	65	25	5	10	5	5	5	95	15	15	40	35
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	65	25	5	10	5	5	5	95	15	15	40	35
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 Left	SB	NB	EB	WB
Conflicting Lanes Left	1	1	1	1
Conflicting Approach Right	NB	SB	WB	EB
Conflicting Lanes Right	1	1	1	1
HCM Control Delay	8.1	7.6	7.9	7.6
HCM LOS	A	A	A	A

Lane	NBLn1	EBLn1	WBLn1	SBLn1
Vol Left, %	4%	68%	50%	17%
Vol Thru, %	83%	26%	25%	44%
Vol Right, %	13%	5%	25%	39%
Sign Control	Stop	Stop	Stop	Stop
Traffic Vol by Lane	115	95	20	90
LT Vol	5	65	10	15
Through Vol	95	25	5	40
RT Vol	15	5	5	35
Lane Flow Rate	115	95	20	90
Geometry Grp	1	1	1	1
Degree of Util (X)	0.135	0.119	0.025	0.103
Departure Headway (Hd)	4.237	4.51	4.441	4.124
Convergence, Y/N	Yes	Yes	Yes	Yes
Cap	851	798	809	872
Service Time	2.237	2.52	2.454	2.135
HCM Lane V/C Ratio	0.135	0.119	0.025	0.103
HCM Control Delay	7.9	8.1	7.6	7.6
HCM Lane LOS	A	A	A	A
HCM 95th-tile Q	0.5	0.4	0.1	0.3

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

Mattamy Richmond Village
2029 Total PM

Intersection	
Int Delay, s/veh	1.8

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	5	865	5	5	1320	20	5	5	5	10	5	5
Future Vol, veh/h	5	865	5	5	1320	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, #	-	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	865	5	5	1320	20	5	5	5	10	5	5

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	1340	0	0	870	0	0	2223	2228	435	1785	2220	1330
Stage 1	-	-	-	-	-	-	878	878	-	1340	1340	-
Stage 2	-	-	-	-	-	-	1345	1350	-	445	880	-
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	512	-	-	773	-	-	27	43	570	57	43	188
Stage 1	-	-	-	-	-	-	310	365	-	187	220	-
Stage 2	-	-	-	-	-	-	186	218	-	563	364	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	512	-	-	773	-	-	23	42	570	50	42	188
Mov Cap-2 Maneuver	-	-	-	-	-	-	23	42	-	50	42	-
Stage 1	-	-	-	-	-	-	304	358	-	183	219	-
Stage 2	-	-	-	-	-	-	176	217	-	540	357	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0.2	0	128.2	96.7
HCM LOS			F	F

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	43	512	-	-	773	-	-	58
HCM Lane V/C Ratio	0.349	0.01	-	-	0.006	-	-	0.345
HCM Control Delay (s)	128.2	12.1	0.1	-	9.7	-	-	96.7
HCM Lane LOS	F	B	A	-	A	-	-	F
HCM 95th %tile Q(veh)	1.2	0	-	-	0	-	-	1.2

Intersection	
Intersection Delay, s/veh	7.3
Intersection LOS	A

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
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	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	7.3	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
HCM Control Delay	7.3	7.3	7
HCM Lane LOS	A	A	A
HCM 95th-tile Q	0.2	0.2	0

Intersection	
Intersection Delay, s/veh	8.4
Intersection LOS	A

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	60	30	5	20	30	15	5	75	15	10	120	85
Future Vol, veh/h	60	30	5	20	30	15	5	75	15	10	120	85
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	30	5	20	30	15	5	75	15	10	120	85
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 Left	SB	NB	EB	WB
Conflicting Lanes Left	1	1	1	1
Conflicting Approach Right	NB	SB	WB	EB
Conflicting Lanes Right	1	1	1	1
HCM Control Delay	8.5	8.1	8.1	8.6
HCM LOS	A	A	A	A

Lane	NBLn1	EBLn1	WBLn1	SBLn1
Vol Left, %	5%	63%	31%	5%
Vol Thru, %	79%	32%	46%	56%
Vol Right, %	16%	5%	23%	40%
Sign Control	Stop	Stop	Stop	Stop
Traffic Vol by Lane	95	95	65	215
LT Vol	5	60	20	10
Through Vol	75	30	30	120
RT Vol	15	5	15	85
Lane Flow Rate	95	95	65	215
Geometry Grp	1	1	1	1
Degree of Util (X)	0.118	0.126	0.084	0.251
Departure Headway (Hd)	4.466	4.789	4.657	4.201
Convergence, Y/N	Yes	Yes	Yes	Yes
Cap	804	749	769	856
Service Time	2.488	2.818	2.688	2.22
HCM Lane V/C Ratio	0.118	0.127	0.085	0.251
HCM Control Delay	8.1	8.5	8.1	8.6
HCM Lane LOS	A	A	A	A
HCM 95th-tile Q	0.4	0.4	0.3	1

LANE SUMMARY

Site: 101 [2029 TF AM]

Perth Street and Meynell Road
Roundabout

Lane Use and Performance

	Demand Flows Total veh/h	HV %	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Average Delay sec	Level of Service	95% Back of Queue Veh	Dist m	Lane Config	Lane Length m	Cap. Adj. %	Prob. Block. %
South: Meynell Road													
Lane 1[d]	600	2.0	901	0.666	100	10.7	LOS B	6.8	48.2	Full	500	0.0	0.0
Approach	600	2.0		0.666		10.7	LOS B	6.8	48.2				
East: Perth Street													
Lane 1[d]	560	2.0	1477	0.379	100	5.8	LOS A	2.5	17.9	Full	500	0.0	0.0
Approach	560	2.0		0.379		5.8	LOS A	2.5	17.9				
North: Meynell Road													
Lane 1[d]	165	2.0	987	0.167	100	10.2	LOS B	0.8	6.0	Full	500	0.0	0.0
Approach	165	2.0		0.167		10.2	LOS B	0.8	6.0				
West: Perth Street													
Lane 1[d]	525	2.0	1140	0.461	100	5.1	LOS A	2.7	19.6	Full	500	0.0	0.0
Approach	525	2.0		0.461		5.1	LOS A	2.7	19.6				
Intersection	1850	2.0		0.666		7.6	LOS A	6.8	48.2				

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 ratio (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 for all lanes (v/c not used as specified in HCM 2010).
Roundabout Capacity Model: SIDRA Standard.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

d Dominant lane on roundabout approach

MOVEMENT SUMMARY

Site: 101 [2029 TF AM]

Perth Street and Meynell Road
Roundabout

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Meynell Road											
1	L2	50	2.0	0.666	15.8	LOS B	6.8	48.2	0.86	0.99	52.4
2	T1	5	2.0	0.666	9.9	LOS A	6.8	48.2	0.86	0.99	52.2
3	R2	545	2.0	0.666	10.2	LOS B	6.8	48.2	0.86	0.99	50.7
Approach		600	2.0	0.666	10.7	LOS B	6.8	48.2	0.86	0.99	50.9
East: Perth Street											
4	L2	225	2.0	0.379	9.3	LOS A	2.5	17.9	0.25	0.49	55.7
5	T1	295	2.0	0.379	3.4	LOS A	2.5	17.9	0.25	0.49	55.4
6	R2	40	2.0	0.379	3.7	LOS A	2.5	17.9	0.25	0.49	53.8
Approach		560	2.0	0.379	5.8	LOS A	2.5	17.9	0.25	0.49	55.4
North: Meynell Road											
7	L2	130	2.0	0.167	11.4	LOS B	0.8	6.0	0.55	0.73	52.9
8	T1	5	2.0	0.167	5.5	LOS A	0.8	6.0	0.55	0.73	52.7
9	R2	30	2.0	0.167	5.8	LOS A	0.8	6.0	0.55	0.73	51.3
Approach		165	2.0	0.167	10.2	LOS B	0.8	6.0	0.55	0.73	52.6
West: Perth Street											
10	L2	10	2.0	0.461	10.9	LOS B	2.7	19.6	0.54	0.54	55.8
11	T1	495	2.0	0.461	5.0	LOS A	2.7	19.6	0.54	0.54	55.5
12	R2	20	2.0	0.461	5.3	LOS A	2.7	19.6	0.54	0.54	53.9
Approach		525	2.0	0.461	5.1	LOS A	2.7	19.6	0.54	0.54	55.5
All Vehicles		1850	2.0	0.666	7.6	LOS A	6.8	48.2	0.56	0.69	53.7

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.
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement.
LOS F will result if v/c > 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 (v/c not used as specified in HCM 2010).
Roundabout Capacity Model: SIDRA Standard.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

LANE LEVEL OF SERVICE

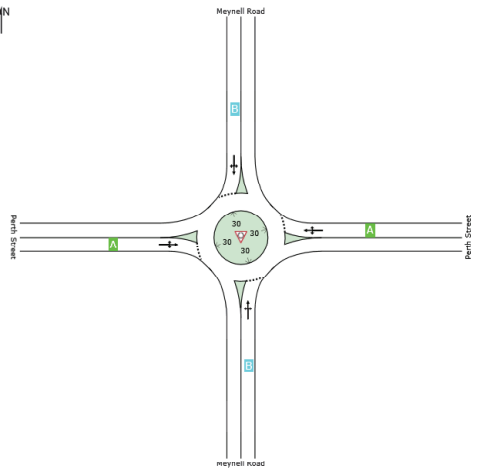
Lane Level of Service

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



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 ratio (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 for all lanes (v/c not used as specified in HCM 2010).
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.

LANE SUMMARY

Site: 101 [2029 TF PM]

Perth Street and Meynell Road
Roundabout

Lane Use and Performance

	Demand Flows Total veh/h	HV %	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Average Delay sec	Level of Service	95% Back of Queue Veh	Dist m	Lane Config	Lane Length m	Cap. Adj. %	Prob. Block. %
South: Meynell Road													
Lane 1[d]	445	2.0	960	0.464	100	6.6	LOS A	3.2	23.0	Full	500	0.0	0.0
Approach	445	2.0		0.464		6.6	LOS A	3.2	23.0				
East: Perth Street													
Lane 1[d]	1325	2.0	1528	0.867	100	7.0	LOS A	15.9	113.0	Full	500	0.0	0.0
Approach	1325	2.0		0.867		7.0	LOS A	15.9	113.0				
North: Meynell Road													
Lane 1[d]	105	2.0	407	0.258	100	19.0	LOS B	1.9	13.6	Full	500	0.0	0.0
Approach	105	2.0		0.258		19.0	LOS B	1.9	13.6				
West: Perth Street													
Lane 1[d]	475	2.0	817	0.582	100	9.9	LOS A	5.2	37.1	Full	500	0.0	0.0
Approach	475	2.0		0.582		9.9	LOS A	5.2	37.1				
Intersection	2350	2.0		0.867		8.0	LOS A	15.9	113.0				

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 ratio (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 for all lanes (v/c not used as specified in HCM 2010).
Roundabout Capacity Model: SIDRA Standard.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

d Dominant lane on roundabout approach

MOVEMENT SUMMARY

Site: 101 [2029 TF PM]

Perth Street and Meynell Road
Roundabout

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Meynell Road											
1	L2	35	2.0	0.464	11.7	LOS B	3.2	23.0	0.71	0.76	55.3
2	T1	5	2.0	0.464	5.8	LOS A	3.2	23.0	0.71	0.76	55.1
3	R2	405	2.0	0.464	6.1	LOS A	3.2	23.0	0.71	0.76	53.5
Approach		445	2.0	0.464	6.6	LOS A	3.2	23.0	0.71	0.76	53.7
East: Perth Street											
4	L2	625	2.0	0.867	10.1	LOS B	15.9	113.0	0.63	0.50	54.0
5	T1	565	2.0	0.867	4.1	LOS A	15.9	113.0	0.63	0.50	53.8
6	R2	135	2.0	0.867	4.4	LOS A	15.9	113.0	0.63	0.50	52.3
Approach		1325	2.0	0.867	7.0	LOS A	15.9	113.0	0.63	0.50	53.7
North: Meynell Road											
7	L2	80	2.0	0.258	20.3	LOS C	1.9	13.6	0.98	0.95	47.2
8	T1	5	2.0	0.258	14.4	LOS B	1.9	13.6	0.98	0.95	47.0
9	R2	20	2.0	0.258	14.7	LOS B	1.9	13.6	0.98	0.95	45.9
Approach		105	2.0	0.258	19.0	LOS B	1.9	13.6	0.98	0.95	46.9
West: Perth Street											
10	L2	35	2.0	0.582	15.3	LOS B	5.2	37.1	0.86	0.96	53.1
11	T1	385	2.0	0.582	9.4	LOS A	5.2	37.1	0.86	0.96	52.9
12	R2	55	2.0	0.582	9.7	LOS A	5.2	37.1	0.86	0.96	51.4
Approach		475	2.0	0.582	9.9	LOS A	5.2	37.1	0.86	0.96	52.7
All Vehicles		2350	2.0	0.867	8.0	LOS A	15.9	113.0	0.71	0.66	53.2

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.
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement.
LOS F will result if v/c > 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 (v/c not used as specified in HCM 2010).
Roundabout Capacity Model: SIDRA Standard.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

LANE LEVEL OF SERVICE

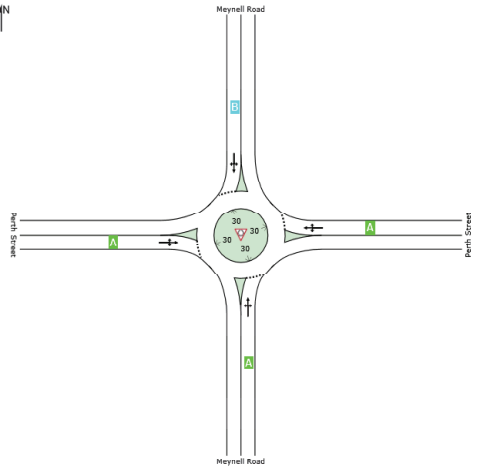
Lane Level of Service

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



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 ratio (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 for all lanes (v/c not used as specified in HCM 2010).
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.

Intersection	
Int Delay, s/veh	1.1

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	5	1165	5	5	550	10	5	5	10	20	5	5
Future Vol, veh/h	5	1165	5	5	550	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	1165	5	5	550	10	5	5	10	20	5	5

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	560	0	0	1170	0	0	1466	1748	585	1160	1745	280
Stage 1	-	-	-	-	-	-	1178	1178	-	565	565	-
Stage 2	-	-	-	-	-	-	288	570	-	595	1180	-
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	1007	-	-	593	-	-	89	85	454	151	85	717
Stage 1	-	-	-	-	-	-	203	263	-	477	506	-
Stage 2	-	-	-	-	-	-	695	504	-	458	262	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1007	-	-	593	-	-	83	83	454	138	83	717
Mov Cap-2 Maneuver	-	-	-	-	-	-	83	83	-	138	83	-
Stage 1	-	-	-	-	-	-	200	259	-	470	500	-
Stage 2	-	-	-	-	-	-	675	498	-	433	258	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0.1	0.2	35	37.3
HCM LOS			E	E

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	140	1007	-	-	593	-	-	141
HCM Lane V/C Ratio	0.143	0.005	-	-	0.008	-	-	0.213
HCM Control Delay (s)	35	8.6	0.1	-	11.1	0.1	-	37.3
HCM Lane LOS	E	A	A	-	B	A	-	E
HCM 95th %tile Q(veh)	0.5	0	-	-	0	-	-	0.8

Intersection	
Int Delay, s/veh	1.5

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	5	865	5	5	1320	20	5	5	5	10	5	5
Future Vol, veh/h	5	865	5	5	1320	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	-	-	-	-	-	-	-	-	-	-	-	-
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	865	5	5	1320	20	5	5	5	10	5	5

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	1340	0	0	870	0	0	1551	2228	435	1785	2220	670
Stage 1	-	-	-	-	-	-	878	878	-	1340	1340	-
Stage 2	-	-	-	-	-	-	673	1350	-	445	880	-
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	510	-	-	770	-	-	77	42	569	51	43	399
Stage 1	-	-	-	-	-	-	309	364	-	161	220	-
Stage 2	-	-	-	-	-	-	411	217	-	562	363	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	510	-	-	770	-	-	67	40	569	44	41	399
Mov Cap-2 Maneuver	-	-	-	-	-	-	67	40	-	44	41	-
Stage 1	-	-	-	-	-	-	303	357	-	158	214	-
Stage 2	-	-	-	-	-	-	386	211	-	539	356	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0.2	0.1	67.7	103.9
HCM LOS			F	F

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	72	510	-	-	770	-	-	55
HCM Lane V/C Ratio	0.208	0.01	-	-	0.006	-	-	0.364
HCM Control Delay (s)	67.7	12.1	0.1	-	9.7	0.1	-	103.9
HCM Lane LOS	F	B	A	-	A	A	-	F
HCM 95th %tile Q(veh)	0.7	0	-	-	0	-	-	1.3

LANE SUMMARY

Site: 101 [2029 TF w/ WBL & NBR AM]

Perth Street and Meynell Road
Roundabout

Lane Use and Performance

	Demand Flows Total veh/h	HV %	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Average Delay sec	Level of Service	95% Back of Queue Veh	Dist m	Lane Config	Lane Length m	Cap. Adj. %	Prob. Block. %
South: Meynell Road													
Lane 1[d]	55	2.0	1132	0.049	100	10.5	LOS B	0.3	1.9	Full	500	0.0	0.0
Lane 2	545	2.0	1987	0.274	100	3.2	LOS A	0.0	0.0	Full	500	0.0	0.0
Approach	600	2.0		0.274		3.9	LOS A	0.3	1.9				
East: Perth Street													
Lane 1	225	2.0	1369	0.164	100	9.3	LOS A	0.8	5.5	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	560	2.0		0.205		5.7	LOS A	1.0	7.4				
North: Meynell Road													
Lane 1[d]	165	2.0	978	0.169	100	9.2	LOS A	0.5	3.7	Full	500	0.0	0.0
Approach	165	2.0		0.169		9.2	LOS A	0.5	3.7				
West: Perth Street													
Lane 1[d]	525	2.0	1038	0.506	100	5.1	LOS A	2.6	18.8	Full	500	0.0	0.0
Approach	525	2.0		0.506		5.1	LOS A	2.6	18.8				
Intersection	1850	2.0		0.506		5.3	LOS A	2.6	18.8				

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 ratio (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 for all lanes (v/c not used as specified in HCM 2010).
Roundabout Capacity Model: SIDRA Standard.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

d Dominant lane on roundabout approach

MOVEMENT SUMMARY

Site: 101 [2029 TF w/ WBL & NBR AM]

Perth Street and Meynell Road
Roundabout

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Meynell Road											
1	L2	50	2.0	0.049	11.1	LOS B	0.3	1.9	0.58	0.67	52.3
2	T1	5	2.0	0.049	5.1	LOS A	0.3	1.9	0.58	0.67	52.1
3	R2	545	2.0	0.274	3.2	LOS A	0.0	0.0	0.00	0.43	56.6
Approach		600	2.0	0.274	3.9	LOS A	0.3	1.9	0.05	0.45	56.2
East: Perth Street											
4	L2	225	2.0	0.164	9.3	LOS A	0.8	5.5	0.19	0.61	53.2
5	T1	295	2.0	0.205	3.3	LOS A	1.0	7.4	0.18	0.36	57.5
6	R2	40	2.0	0.205	3.9	LOS A	1.0	7.4	0.18	0.36	55.6
Approach		560	2.0	0.205	5.7	LOS A	1.0	7.4	0.18	0.46	55.5
North: Meynell Road											
7	L2	130	2.0	0.169	10.4	LOS B	0.5	3.7	0.39	0.72	53.5
8	T1	5	2.0	0.169	4.5	LOS A	0.5	3.7	0.39	0.72	53.3
9	R2	30	2.0	0.169	4.8	LOS A	0.5	3.7	0.39	0.72	51.8
Approach		165	2.0	0.169	9.2	LOS A	0.5	3.7	0.39	0.72	53.1
West: Perth Street											
10	L2	10	2.0	0.506	11.0	LOS B	2.6	18.8	0.49	0.56	56.0
11	T1	495	2.0	0.506	5.0	LOS A	2.6	18.8	0.49	0.56	55.8
12	R2	20	2.0	0.506	5.3	LOS A	2.6	18.8	0.49	0.56	54.2
Approach		525	2.0	0.506	5.1	LOS A	2.6	18.8	0.49	0.56	55.7
All Vehicles		1850	2.0	0.506	5.3	LOS A	2.6	18.8	0.25	0.51	55.6

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.
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement.
LOS F will result if v/c > 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 (v/c not used as specified in HCM 2010).
Roundabout Capacity Model: SIDRA Standard.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

LANE LEVEL OF SERVICE

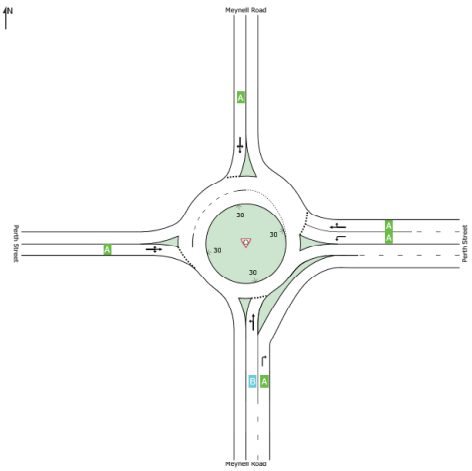
Lane Level of Service

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 ratio (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 for all lanes (v/c not used as specified in HCM 2010).
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.

LANE SUMMARY

Site: 101 [2029 TF w/ WBL & NBR PM]

Perth Street and Meynell Road
Roundabout

Lane Use and Performance

	Demand Flows Total veh/h	HV %	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Average Delay sec	Level of Service	95% Back of Queue Veh	Dist m	Lane Config	Lane Length m	Cap. Adj. %	Prob. Block. %
South: Meynell Road													
Lane 1[d]	40	2.0	1200	0.033	100	9.7	LOS A	0.2	1.3	Full	500	0.0	0.0
Lane 2	405	2.0	1987	0.204	100	3.2	LOS A	0.0	0.0	Full	500	0.0	0.0
Approach	445	2.0		0.204		3.8	LOS A	0.2	1.3				
East: Perth Street													
Lane 1	625	2.0	1420	0.440	100	9.4	LOS A	2.7	19.3	Full	500	0.0	0.0
Lane 2[d]	700	2.0	1657	0.423	100	3.5	LOS A	2.6	18.4	Full	500	0.0	0.0
Approach	1325	2.0		0.440		6.3	LOS A	2.7	19.3				
North: Meynell Road													
Lane 1[d]	105	2.0	770	0.136	100	10.3	LOS B	0.5	3.3	Full	500	0.0	0.0
Approach	105	2.0		0.136		10.3	LOS B	0.5	3.3				
West: Perth Street													
Lane 1[d]	475	2.0	811	0.586	100	9.6	LOS A	4.3	30.8	Full	500	0.0	0.0
Approach	475	2.0		0.586		9.6	LOS A	4.3	30.8				
Intersection	2350	2.0		0.586		6.7	LOS A	4.3	30.8				

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 ratio (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 for all lanes (v/c not used as specified in HCM 2010).
Roundabout Capacity Model: SIDRA Standard.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

d Dominant lane on roundabout approach

MOVEMENT SUMMARY

Site: 101 [2029 TF w/ WBL & NBR PM]

Perth Street and Meynell Road
Roundabout

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Meynell Road											
1	L2	35	2.0	0.033	10.4	LOS B	0.2	1.3	0.52	0.63	52.7
2	T1	5	2.0	0.033	4.5	LOS A	0.2	1.3	0.52	0.63	52.5
3	R2	405	2.0	0.204	3.2	LOS A	0.0	0.0	0.00	0.43	56.7
Approach		445	2.0	0.204	3.8	LOS A	0.2	1.3	0.05	0.44	56.3
East: Perth Street											
4	L2	625	2.0	0.440	9.4	LOS A	2.7	19.3	0.25	0.61	53.0
5	T1	565	2.0	0.423	3.4	LOS A	2.6	18.4	0.23	0.38	57.2
6	R2	135	2.0	0.423	4.0	LOS A	2.6	18.4	0.23	0.38	55.3
Approach		1325	2.0	0.440	6.3	LOS A	2.7	19.3	0.24	0.49	54.9
North: Meynell Road											
7	L2	80	2.0	0.136	11.7	LOS B	0.5	3.3	0.55	0.82	52.8
8	T1	5	2.0	0.136	5.8	LOS A	0.5	3.3	0.55	0.82	52.6
9	R2	20	2.0	0.136	6.1	LOS A	0.5	3.3	0.55	0.82	51.2
Approach		105	2.0	0.136	10.3	LOS B	0.5	3.3	0.55	0.82	52.5
West: Perth Street											
10	L2	35	2.0	0.586	15.0	LOS B	4.3	30.8	0.74	0.92	53.3
11	T1	385	2.0	0.586	9.1	LOS A	4.3	30.8	0.74	0.92	53.1
12	R2	55	2.0	0.586	9.4	LOS A	4.3	30.8	0.74	0.92	51.7
Approach		475	2.0	0.586	9.6	LOS A	4.3	30.8	0.74	0.92	53.0
All Vehicles		2350	2.0	0.586	6.7	LOS A	4.3	30.8	0.32	0.58	54.6

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.
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement.
LOS F will result if v/c > 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 (v/c not used as specified in HCM 2010).
Roundabout Capacity Model: SIDRA Standard.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

LANE LEVEL OF SERVICE

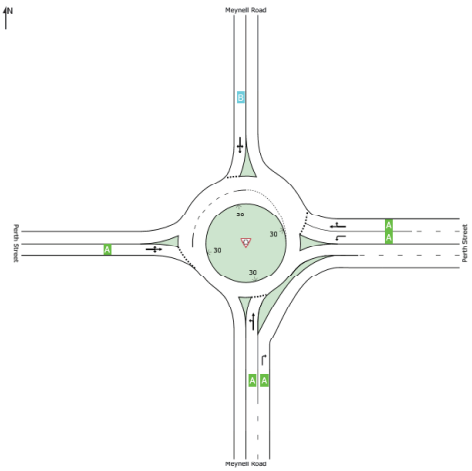
Lane Level of Service

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 ratio (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 for all lanes (v/c not used as specified in HCM 2010).
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.

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

Mattamy Richmond Village
2034 Ultimate AM

Intersection	
Int Delay, s/veh	1.2

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	5	1215	5	5	580	10	5	5	10	20	5	5
Future Vol, veh/h	5	1215	5	5	580	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	1215	5	5	580	10	5	5	10	20	5	5

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	590	0	0	1220	0	0	1531	1828	610	1215	1825	295
Stage 1	-	-	-	-	-	-	1228	1228	-	595	595	-
Stage 2	-	-	-	-	-	-	303	600	-	620	1230	-
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	982	-	-	567	-	-	80	76	437	137	76	701
Stage 1	-	-	-	-	-	-	189	249	-	458	491	-
Stage 2	-	-	-	-	-	-	681	488	-	442	248	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	982	-	-	567	-	-	74	74	437	124	74	701
Mov Cap-2 Maneuver	-	-	-	-	-	-	74	74	-	124	74	-
Stage 1	-	-	-	-	-	-	186	245	-	451	485	-
Stage 2	-	-	-	-	-	-	660	482	-	416	244	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0.1	0.2	38.6	41.9
HCM LOS			E	E

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	127	982	-	-	567	-	-	127
HCM Lane V/C Ratio	0.157	0.005	-	-	0.009	-	-	0.236
HCM Control Delay (s)	38.6	8.7	0.1	-	11.4	0.1	-	41.9
HCM Lane LOS	E	A	A	-	B	A	-	E
HCM 95th %tile Q(veh)	0.5	0	-	-	0	-	-	0.9

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

Mattamy Richmond Village
2034 Ultimate AM

Intersection	
Intersection Delay, s/veh	7.2
Intersection LOS	A

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	5	55	20	5	5	5
Future Vol, veh/h	5	55	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
Mvmt Flow	5	55	20	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	7.3	7	7
HCM LOS	A	A	A

Lane	EBLn1	WBLn1	SBLn1
Vol Left, %	8%	0%	50%
Vol Thru, %	92%	80%	0%
Vol Right, %	0%	20%	50%
Sign Control	Stop	Stop	Stop
Traffic Vol by Lane	60	25	10
LT Vol	5	0	5
Through Vol	55	20	0
RT Vol	0	5	5
Lane Flow Rate	60	25	10
Geometry Grp	1	1	1
Degree of Util (X)	0.066	0.027	0.011
Departure Headway (Hd)	3.987	3.876	3.879
Convergence, Y/N	Yes	Yes	Yes
Cap	902	926	920
Service Time	1.995	1.891	1.914
HCM Lane V/C Ratio	0.067	0.027	0.011
HCM Control Delay	7.3	7	7
HCM Lane LOS	A	A	A
HCM 95th-tile Q	0.2	0.1	0

HCM 2010 AWSC
3: Meynell Rd. & Ottawa St. W.

Mattamy Richmond Village
2034 Ultimate AM

Intersection	
Intersection Delay, s/veh	7.9
Intersection LOS	A

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	70	25	5	10	5	5	5	95	20	15	40	35
Future Vol, veh/h	70	25	5	10	5	5	5	95	20	15	40	35
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	70	25	5	10	5	5	5	95	20	15	40	35
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 Left	SB	NB	EB	WB
Conflicting Lanes Left	1	1	1	1
Conflicting Approach Right	NB	SB	WB	EB
Conflicting Lanes Right	1	1	1	1
HCM Control Delay	8.2	7.6	7.9	7.6
HCM LOS	A	A	A	A

Lane	NBLn1	EBLn1	WBLn1	SBLn1
Vol Left, %	4%	70%	50%	17%
Vol Thru, %	79%	25%	25%	44%
Vol Right, %	17%	5%	25%	39%
Sign Control	Stop	Stop	Stop	Stop
Traffic Vol by Lane	120	100	20	90
LT Vol	5	70	10	15
Through Vol	95	25	5	40
RT Vol	20	5	5	35
Lane Flow Rate	120	100	20	90
Geometry Grp	1	1	1	1
Degree of Util (X)	0.141	0.126	0.025	0.104
Departure Headway (Hd)	4.23	4.524	4.458	4.143
Convergence, Y/N	Yes	Yes	Yes	Yes
Cap	853	795	805	868
Service Time	2.23	2.539	2.474	2.154
HCM Lane V/C Ratio	0.141	0.126	0.025	0.104
HCM Control Delay	7.9	8.2	7.6	7.6
HCM Lane LOS	A	A	A	A
HCM 95th-tile Q	0.5	0.4	0.1	0.3

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

Mattamy Richmond Village
2034 Ultimate PM

Intersection	
Int Delay, s/veh	2.4

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	5	905	5	5	1380	20	5	5	5	15	5	5
Future Vol, veh/h	5	905	5	5	1380	20	5	5	5	15	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	905	5	5	1380	20	5	5	5	15	5	5

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	1400	0	0	910	0	0	1621	2328	455	1865	2320	700
Stage 1	-	-	-	-	-	-	918	918	-	1400	1400	-
Stage 2	-	-	-	-	-	-	703	1410	-	465	920	-
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	484	-	-	744	-	-	68	37	552	45	37	382
Stage 1	-	-	-	-	-	-	292	349	-	148	205	-
Stage 2	-	-	-	-	-	-	394	203	-	547	348	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	484	-	-	744	-	-	57	35	552	38	35	382
Mov Cap-2 Maneuver	-	-	-	-	-	-	57	35	-	38	35	-
Stage 1	-	-	-	-	-	-	286	342	-	145	199	-
Stage 2	-	-	-	-	-	-	367	197	-	523	341	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0.2	0.2	79.2	158.2
HCM LOS			F	F

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	63	484	-	-	744	-	-	45
HCM Lane V/C Ratio	0.238	0.01	-	-	0.007	-	-	0.556
HCM Control Delay (s)	79.2	12.5	0.1	-	9.9	0.2	-	158.2
HCM Lane LOS	F	B	A	-	A	A	-	F
HCM 95th %tile Q(veh)	0.8	0	-	-	0	-	-	2.1

Intersection	
Intersection Delay, s/veh	7.3
Intersection LOS	A

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
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	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	7.3	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
HCM Control Delay	7.3	7.3	7
HCM Lane LOS	A	A	A
HCM 95th-tile Q	0.2	0.2	0

Intersection	
Intersection Delay, s/veh	8.4
Intersection LOS	A

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	60	30	5	20	30	15	5	75	15	10	120	85
Future Vol, veh/h	60	30	5	20	30	15	5	75	15	10	120	85
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	30	5	20	30	15	5	75	15	10	120	85
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 Left	SB	NB	EB	WB
Conflicting Lanes Left	1	1	1	1
Conflicting Approach Right	NB	SB	WB	EB
Conflicting Lanes Right	1	1	1	1
HCM Control Delay	8.5	8.1	8.1	8.6
HCM LOS	A	A	A	A

Lane	NBLn1	EBLn1	WBLn1	SBLn1
Vol Left, %	5%	63%	31%	5%
Vol Thru, %	79%	32%	46%	56%
Vol Right, %	16%	5%	23%	40%
Sign Control	Stop	Stop	Stop	Stop
Traffic Vol by Lane	95	95	65	215
LT Vol	5	60	20	10
Through Vol	75	30	30	120
RT Vol	15	5	15	85
Lane Flow Rate	95	95	65	215
Geometry Grp	1	1	1	1
Degree of Util (X)	0.118	0.126	0.084	0.251
Departure Headway (Hd)	4.466	4.789	4.657	4.201
Convergence, Y/N	Yes	Yes	Yes	Yes
Cap	804	749	769	856
Service Time	2.488	2.818	2.688	2.22
HCM Lane V/C Ratio	0.118	0.127	0.085	0.251
HCM Control Delay	8.1	8.5	8.1	8.6
HCM Lane LOS	A	A	A	A
HCM 95th-tile Q	0.4	0.4	0.3	1

LANE SUMMARY

Site: 101 [2034 TF w/ WBL & NBR AM]

Perth Street and Meynell Road
Roundabout

Lane Use and Performance

	Demand Flows Total veh/h	HV %	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Average Delay sec	Level of Service	95% Back of Queue Veh	Dist m	Lane Config	Lane Length m	Cap. Adj. %	Prob. Block. %
South: Meynell Road													
Lane 1[d]	55	2.0	1092	0.050	100	10.7	LOS B	0.3	2.1	Full	500	0.0	0.0
Lane 2	555	2.0	1987	0.279	100	3.2	LOS A	0.0	0.0	Full	500	0.0	0.0
Approach	610	2.0		0.279		3.9	LOS A	0.3	2.1				
East: Perth Street													
Lane 1	230	2.0	1360	0.169	100	9.3	LOS A	0.8	5.8	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	590	2.0		0.220		5.7	LOS A	1.1	8.2				
North: Meynell Road													
Lane 1[d]	165	2.0	967	0.171	100	9.3	LOS A	0.5	3.8	Full	500	0.0	0.0
Approach	165	2.0		0.171		9.3	LOS A	0.5	3.8				
West: Perth Street													
Lane 1[d]	565	2.0	1039	0.544	100	5.4	LOS A	3.1	22.1	Full	500	0.0	0.0
Approach	565	2.0		0.544		5.4	LOS A	3.1	22.1				
Intersection	1930	2.0		0.544		5.4	LOS A	3.1	22.1				

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 ratio (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 for all lanes (v/c not used as specified in HCM 2010).
Roundabout Capacity Model: SIDRA Standard.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

d Dominant lane on roundabout approach

MOVEMENT SUMMARY

Site: 101 [2034 TF w/ WBL & NBR AM]

Perth Street and Meynell Road
Roundabout

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Meynell Road											
1	L2	50	2.0	0.050	11.3	LOS B	0.3	2.1	0.61	0.68	52.2
2	T1	5	2.0	0.050	5.3	LOS A	0.3	2.1	0.61	0.68	52.0
3	R2	555	2.0	0.279	3.2	LOS A	0.0	0.0	0.00	0.43	56.6
Approach		610	2.0	0.279	3.9	LOS A	0.3	2.1	0.06	0.45	56.2
East: Perth Street											
4	L2	230	2.0	0.169	9.3	LOS A	0.8	5.8	0.19	0.61	53.2
5	T1	320	2.0	0.220	3.3	LOS A	1.1	8.2	0.18	0.36	57.4
6	R2	40	2.0	0.220	3.9	LOS A	1.1	8.2	0.18	0.36	55.6
Approach		590	2.0	0.220	5.7	LOS A	1.1	8.2	0.19	0.46	55.6
North: Meynell Road											
7	L2	130	2.0	0.171	10.5	LOS B	0.5	3.8	0.40	0.73	53.4
8	T1	5	2.0	0.171	4.5	LOS A	0.5	3.8	0.40	0.73	53.2
9	R2	30	2.0	0.171	4.9	LOS A	0.5	3.8	0.40	0.73	51.8
Approach		165	2.0	0.171	9.3	LOS A	0.5	3.8	0.40	0.73	53.1
West: Perth Street											
10	L2	10	2.0	0.544	11.2	LOS B	3.1	22.1	0.52	0.60	55.9
11	T1	535	2.0	0.544	5.3	LOS A	3.1	22.1	0.52	0.60	55.7
12	R2	20	2.0	0.544	5.6	LOS A	3.1	22.1	0.52	0.60	54.0
Approach		565	2.0	0.544	5.4	LOS A	3.1	22.1	0.52	0.60	55.6
All Vehicles		1930	2.0	0.544	5.4	LOS A	3.1	22.1	0.26	0.52	55.5

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.
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement.
LOS F will result if v/c > 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 (v/c not used as specified in HCM 2010).
Roundabout Capacity Model: SIDRA Standard.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

LANE LEVEL OF SERVICE

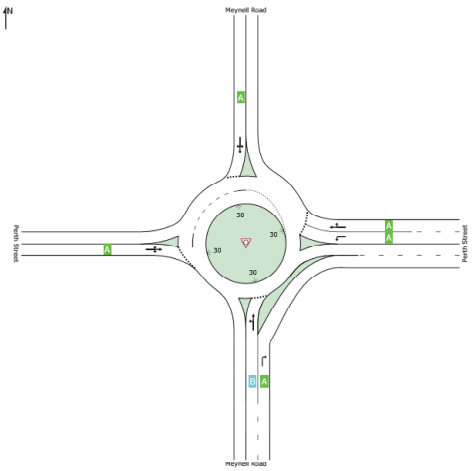
Lane Level of Service

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 ratio (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 for all lanes (v/c not used as specified in HCM 2010).
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.

LANE SUMMARY

Site: 101 [2034 TF w/ WBL & NBR PM]

Perth Street and Meynell Road
Roundabout

Lane Use and Performance

	Demand Flows Total veh/h	HV %	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Average Delay sec	Level of Service	95% Back of Queue Veh	Dist m	Lane Config	Lane Length m	Cap. Adj. %	Prob. Block. %
South: Meynell Road													
Lane 1[d]	40	2.0	1165	0.034	100	9.8	LOS A	0.2	1.4	Full	500	0.0	0.0
Lane 2	420	2.0	1987	0.211	100	3.2	LOS A	0.0	0.0	Full	500	0.0	0.0
Approach	460	2.0		0.211		3.8	LOS A	0.2	1.4				
East: Perth Street													
Lane 1	645	2.0	1416	0.455	100	9.4	LOS A	2.9	20.5	Full	500	0.0	0.0
Lane 2[d]	745	2.0	1659	0.449	100	3.5	LOS A	2.9	20.4	Full	500	0.0	0.0
Approach	1390	2.0		0.455		6.3	LOS A	2.9	20.5				
North: Meynell Road													
Lane 1[d]	105	2.0	751	0.140	100	10.5	LOS B	0.5	3.4	Full	500	0.0	0.0
Approach	105	2.0		0.140		10.5	LOS B	0.5	3.4				
West: Perth Street													
Lane 1[d]	505	2.0	797	0.633	100	10.5	LOS B	5.2	36.7	Full	500	0.0	0.0
Approach	505	2.0		0.633		10.5	LOS B	5.2	36.7				
Intersection	2460	2.0		0.633		6.9	LOS A	5.2	36.7				

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 ratio (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 for all lanes (v/c not used as specified in HCM 2010).
Roundabout Capacity Model: SIDRA Standard.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

d Dominant lane on roundabout approach

MOVEMENT SUMMARY

Site: 101 [2034 TF w/ WBL & NBR PM]

Perth Street and Meynell Road
Roundabout

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Meynell Road											
1	L2	35	2.0	0.034	10.5	LOS B	0.2	1.4	0.55	0.64	52.6
2	T1	5	2.0	0.034	4.6	LOS A	0.2	1.4	0.55	0.64	52.4
3	R2	420	2.0	0.211	3.2	LOS A	0.0	0.0	0.00	0.43	56.7
Approach		460	2.0	0.211	3.8	LOS A	0.2	1.4	0.05	0.44	56.3
East: Perth Street											
4	L2	645	2.0	0.455	9.4	LOS A	2.9	20.5	0.26	0.60	53.0
5	T1	610	2.0	0.449	3.4	LOS A	2.9	20.4	0.24	0.38	57.1
6	R2	135	2.0	0.449	4.0	LOS A	2.9	20.4	0.24	0.38	55.3
Approach		1390	2.0	0.455	6.3	LOS A	2.9	20.5	0.25	0.48	54.9
North: Meynell Road											
7	L2	80	2.0	0.140	11.8	LOS B	0.5	3.4	0.56	0.83	52.7
8	T1	5	2.0	0.140	5.9	LOS A	0.5	3.4	0.56	0.83	52.5
9	R2	20	2.0	0.140	6.2	LOS A	0.5	3.4	0.56	0.83	51.1
Approach		105	2.0	0.140	10.5	LOS B	0.5	3.4	0.56	0.83	52.4
West: Perth Street											
10	L2	35	2.0	0.633	16.0	LOS B	5.2	36.7	0.78	0.97	52.6
11	T1	415	2.0	0.633	10.1	LOS B	5.2	36.7	0.78	0.97	52.4
12	R2	55	2.0	0.633	10.4	LOS B	5.2	36.7	0.78	0.97	51.0
Approach		505	2.0	0.633	10.5	LOS B	5.2	36.7	0.78	0.97	52.3
All Vehicles		2460	2.0	0.633	6.9	LOS A	5.2	36.7	0.33	0.59	54.5

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.
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement.
LOS F will result if v/c > 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 (v/c not used as specified in HCM 2010).
Roundabout Capacity Model: SIDRA Standard.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

LANE LEVEL OF SERVICE

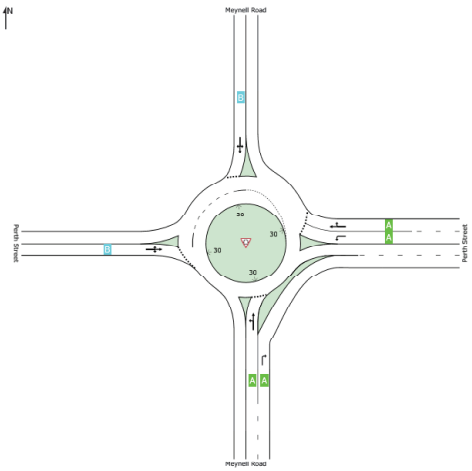
Lane Level of Service

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	B	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 ratio (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 for all lanes (v/c not used as specified in HCM 2010).
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.