6295, 6363, 6409 Perth Street

Transportation Impact Assessment

Step 1 Screening Report

Step 2 Scoping Report

Step 3 Forecasting Report

Step 4 Strategy Report (revision 7)

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August 2022

PN: 2019-64

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1 Screening

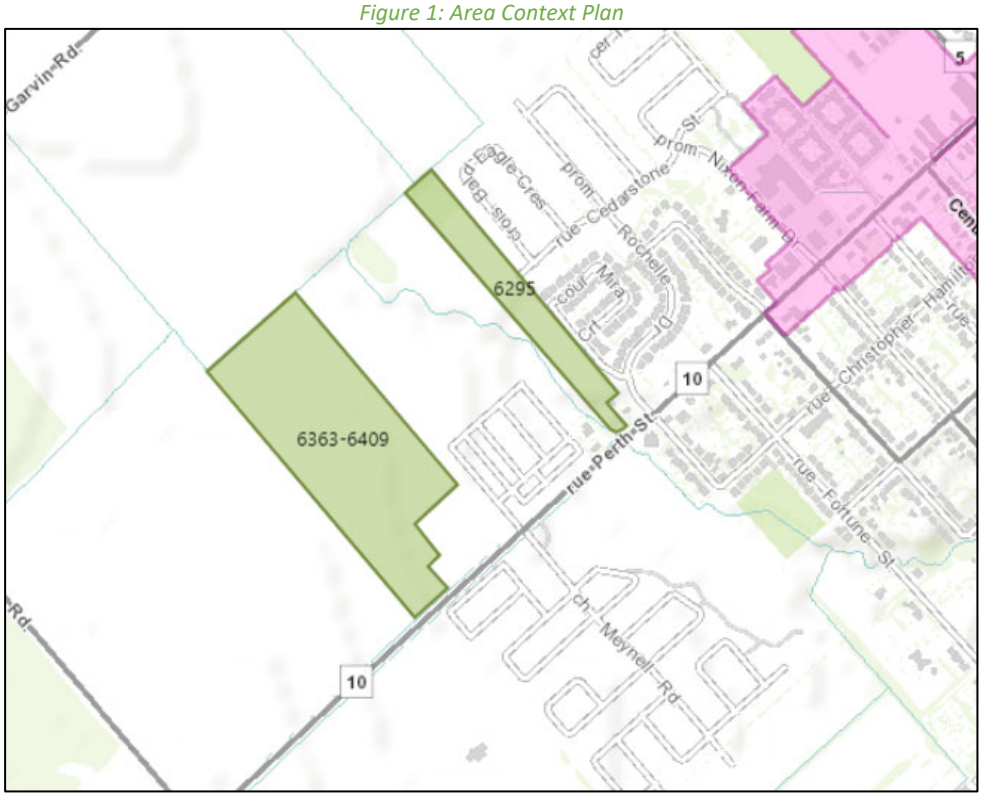
This study has been prepared according to the City of Ottawa's 2017 Transportation Impact Assessment (TIA) Guidelines. Accordingly, a Step 1 Screening Form has been prepared and is included as Appendix A, along with the Certification Form for TIA Study PM. As shown in the Screening Form, a TIA is required through the trip generation and safety triggers. This TIA has been provided to support the zoning bylaw amendment and draft plan of subdivision and the Design Review will be provided for high level context only.

2 Existing and Planned Conditions

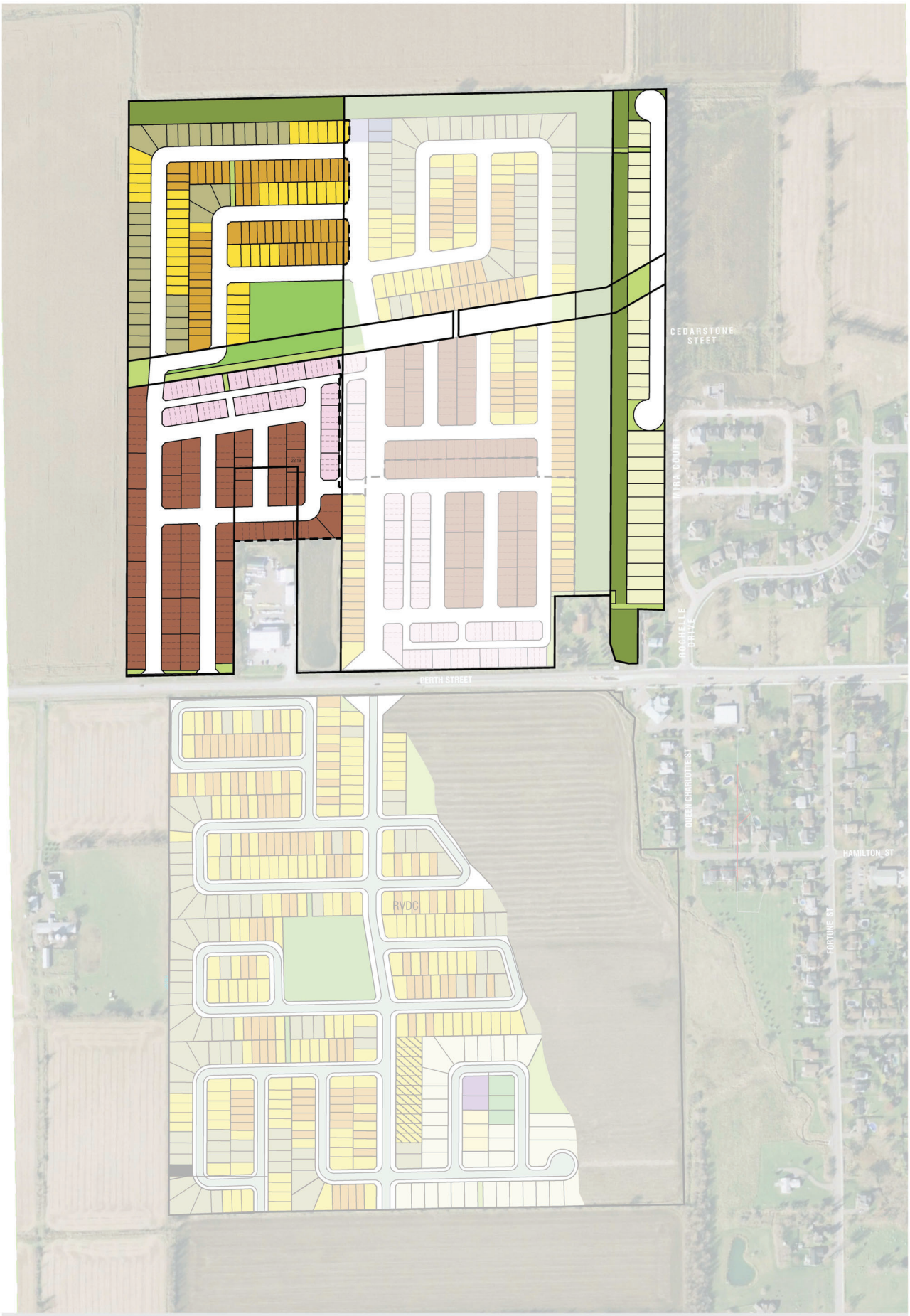
2.1 Proposed Development

The proposed development, located at 6295, 6363 and 6409 Perth Street, is currently greenfield property designated as Development Reserve (DR1) and is included within the Richmond CDP. The proposed development would include 402 residential units, with 139 detached homes and 233 townhomes at 6363-6409 Perth Street, and 30 detached homes at 6295 Perth Street. Access will be provided through Oldenburg Street, a local road connection to Perth Street (west of roundabout) and a local connection to Cedarstone Street. This study will support the zoning bylaw amendment and draft plan of subdivision applications. Figure 1 illustrates the Study Area Context, and Figure 2 illustrates the proposed draft plan for the development lands.

Figure 1: Area Context Plan



Source: http://maps.ottawa.ca/geoOttawabeta/ Accessed: December 14, 2021



- All Units In Metric Unless Otherwise Noted.
- Base Information Obtained From Various Sources And Is Approximate.
- Schedule / Plan Information Is Conceptual And Requires Verification by Appropriate Agency.
- Park and Open Space areas are artist concept only

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2.2 Existing Conditions

2.2.1 Area Road Network

Perth Street: Perth Street is a City of Ottawa arterial road with a divided four-lane urban cross-section east of Rochelle Drive/Queen Charlotte Street and transitions to a two-lane rural cross-section to the west. Sidewalks are provided on both sides of the road and the posted speed limit is 50 km/h within the Village Boundary and 80 km/h to the west. The Ottawa Official Plan reserves a 30.0 metre right of way within the Village Boundary. Perth Street is a truck route.

Meynell Road: Meynell Road, while currently classified as a local road, is to be a City of Ottawa collector road with a two-lane urban cross-section. Sidewalks are provided on both sides of the road and on-street parking is permitted. The unposted speed limit is 50 km/h and the existing right-of-way is 22.0 metres.

Rochelle Drive: Rochelle Drive is a City of Ottawa local road with a two-lane urban cross-section including a sidewalk on the east side. The unposted speed limit is 50 km/h and the existing right-of-way is 20 metres.

Queen Charlotte Street: Queen Charlotte Street is a City of Ottawa local road with a cross-section that is urbanized on the west side on the section north of Christopher Hamilton Street, and fully rural south of Burke Street. The unposted speed limit is 50 km/h, no sidewalks are provided, and the existing right-of-way is 20.0 metres.

Nixon Farm Drive: Nixon Farm Drive is a City of Ottawa local road with a two-lane urban cross-section. The unposted speed limit is 50 km/h, no sidewalks are provided, and the existing right-of-way is 20.0 metres.

Fowler Street: Fowler Avenue is a City of Ottawa local road with a two-lane rural cross-section. The unposted speed limit is 50 km/h, no sidewalks are provided, and the existing right-of-way is 20.0 metres.

Mira Court: Mira Court is a City of Ottawa local road with a two-lane urban cross-section. The unposted speed limit is 50 km/h, no sidewalks are provided, and the existing right-of-way is 20.0 metres.

Cedarstone Street: Cedarstone Street is a City of Ottawa local road with a two-lane urban cross-section. The unposted speed limit is 50 km/h, a sidewalk is provided on the south side of the roadway, and the existing right-of-way is 20.0 metres.

2.2.2 Existing Intersections

The existing signalized area intersections within one kilometre of the site have been summarized below:

Perth Street & Meynell Street	The intersection of Perth Street and Meynell Street is an unsignalized intersection with stop-control located on the minor approach of Meynell Street. All approaches currently consist of single lane shared movements. No turn restrictions are noted.
Perth Street & Rochelle Drive/Queen Charlotte Street	The intersection of Perth Street and Rochelle Drive/Queen Charlotte Street is an unsignalized intersection with stop-control located on the minor approaches. The north and south bound approaches consist of a shared all movement lane, the westbound approach consists of a left-turn lane and shared through/right-turn lane, and the eastbound approach consists of a shared left-turn/though lane and shared through/right-turn lane. No turn restrictions are noted.
Perth Street & Nixon Farm Drive/Fowler Street	The intersection of Perth Street and Nixon Farm Drive/Fowler Street is a signalized intersection. The northbound approach consists of a shared all movement lane, and the southbound approach consists of a left-turn

	lane and shared through/right-turn lane. The westbound and eastbound approaches each consist of a shared left-turn/though lane and shared through/right-turn lane. No turn restrictions are noted.
Cedarstone Street & Rochelle Drive	The intersection of Cedarstone Street and Rochelle Drive is an unsignalized intersection with stop-control located on the minor approaches of Cedarstone Street. All approaches currently consist of single lane shared movements. No turn restrictions are noted.
Mira Court & Rochelle Drive	The intersection of Mira Court and Rochelle Drive is an unsignalized intersection with stop-control located on the minor approach of Mira Court. All approaches currently consist of single lane shared movements. No turn restrictions are noted.

2.2.3 Existing Driveways

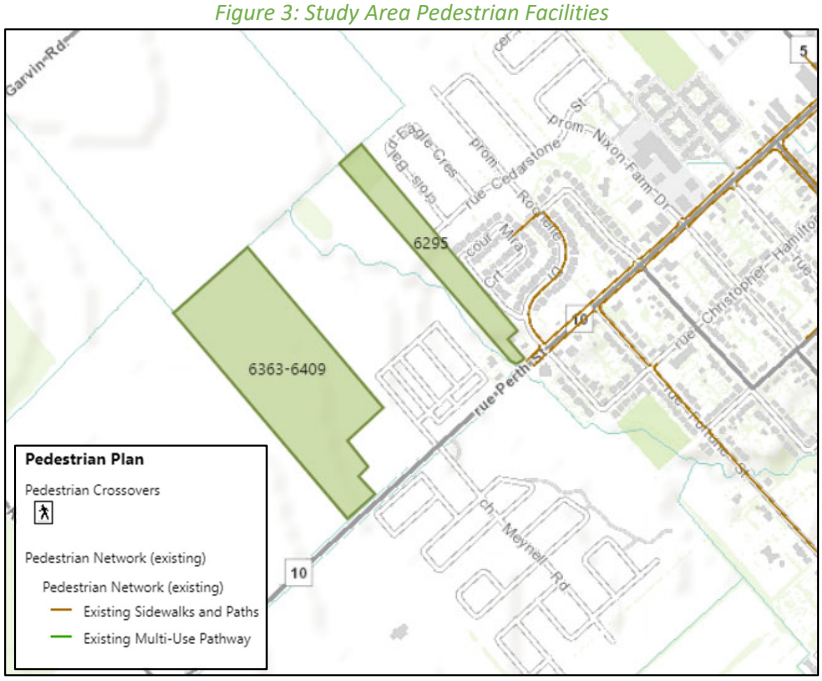
Private residential driveways exist within 200 metres of proposed local road extensions. Adjacent to the Mira Court extension, there are approximately 32 private residential driveways on both sides of Mira Court and Rochelle Drive. Adjacent to the Cedarstone Street extension, there are approximately 40 private residential driveways on both sides of Cedarstone Street and Bald Eagle Crescent. The extension of Trammel Road and Oldenburg Avenue is estimated to include approximately 96 private residential driveways, excluding rear-lane units, based on the Fox Run Phase 2 approved plans.

2.2.4 Cycling and Pedestrian Facilities

Figure 3 illustrates the pedestrian facilities in the study area and Figure 4 illustrates the cycling facilities.

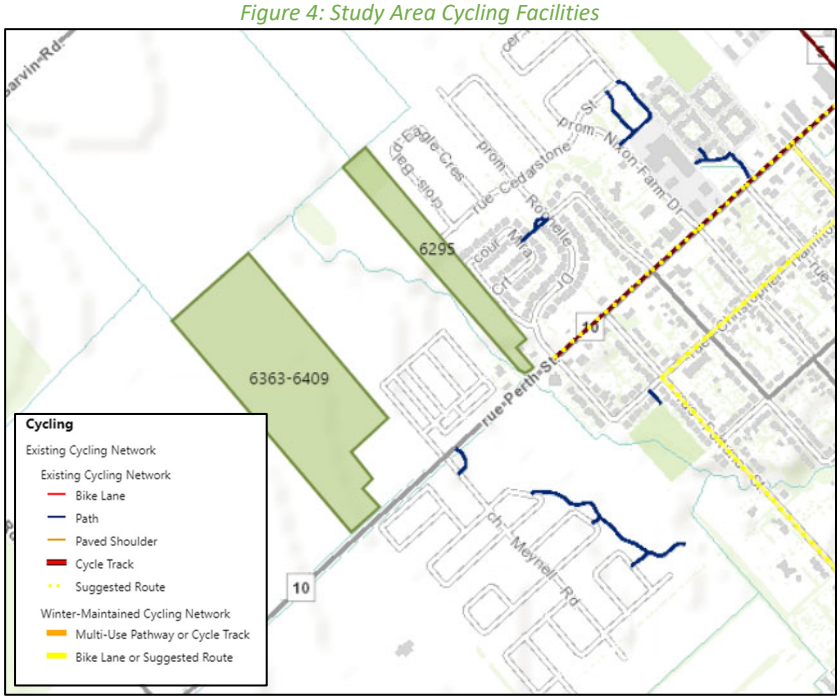
Sidewalks are provided along both sides of Perth Street to the east of Rochelle Drive/Queen Charlotte Drive and a sidewalk is provided on Fortune Street. While not illustrated below, Queen Charlotte Drive also has a sidewalk on the west side between Perth Street and Christopher Hamilton Street, and Cedarstone Street has a sidewalk west of Rochelle Drive. No dedicated cycling facilities are provided in the study area. Perth Street is designated as a cycling spine route to the east of Rochelle Drive/Queen Charlotte Street, and Fortune Street (between Burke Street to Christopher Hamilton Street), and Christopher Hamilton Street (east of Fortune Street) are designated as local routes.

Figure 3: Study Area Pedestrian Facilities



Source: http://maps.ottawa.ca/geoOttawabeta/ Accessed: December 14, 2021

Figure 4: Study Area Cycling Facilities



Source: http://maps.ottawa.ca/geoOttawabeta/ Accessed: December 14, 2021

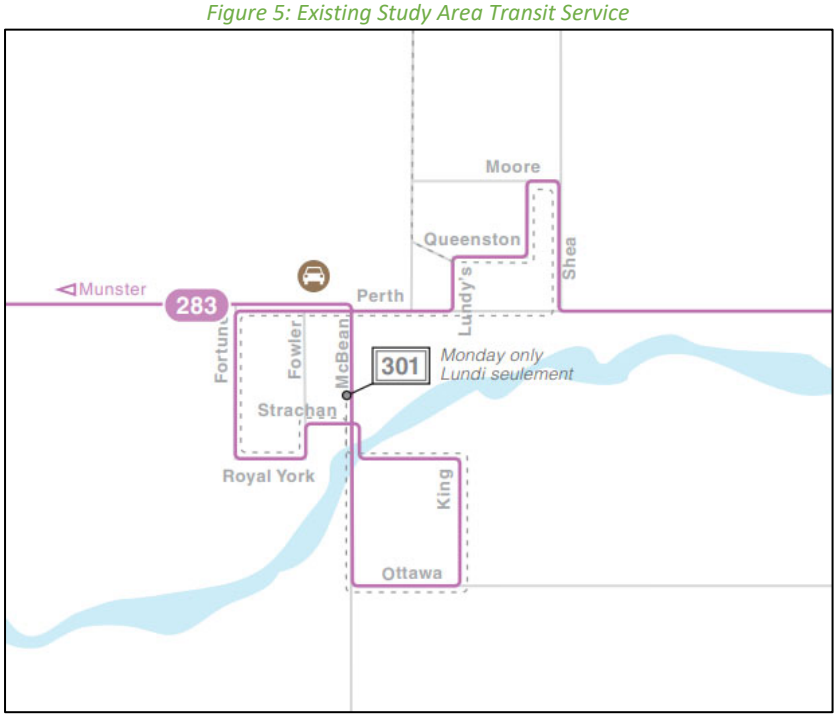
2.2.5 Existing Transit

Within the study area, the routes #283 and 301 provide service to Richmond Village. In the vicinity of the proposed site, stops are located on Fortune Street at Royal York Street, Martin Street, and Christopher Hamilton Street and at Perth Street at Joys Road. The frequency of these routes within proximity of the proposed site currently are (prior to pandemic reduced service changes):

- Route #283 – 30-minute service during the peak hours, with a total of four trips during each peak, and three AM trips traveling from Munster and two PM trips ending in Munster
- Route #301 – Monday only service, with a single AM trip departing at 8:50 AM, and a single trip returning at 3:40 PM

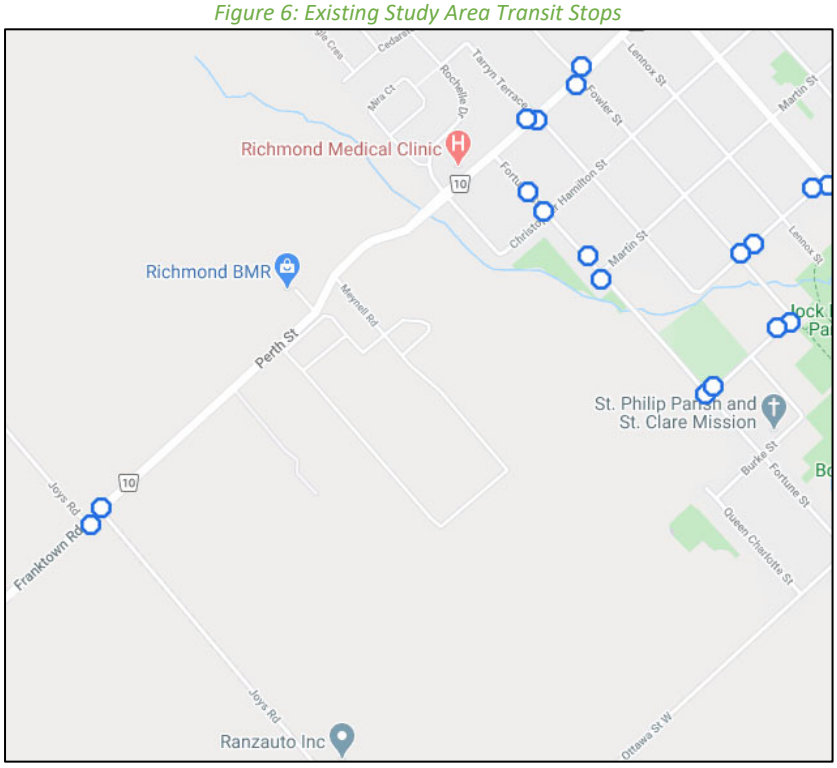
Figure 5 illustrates the transit system map in the study area and Figure 6 illustrates nearby transit stops.

Figure 5: Existing Study Area Transit Service



Source: http://www.octranspo.com/ Accessed: May 28, 2020

Figure 6: Existing Study Area Transit Stops



Source: http://www.octranspo.com/ Accessed: May 28, 2020

2.2.6 Existing Area Traffic Management Measures

There are no existing area traffic management measures within the study area.

2.2.7 Existing Peak Hour Travel Demand

Existing turning movement counts were acquired from adjacent development studies for the existing study area intersections. Table 1 summarizes the intersection count dates.

Table 1: Intersection Count Date

Intersection	Count Date	Source
Perth Street & Meynell Road	-	Trip Generation of Phase 1
Perth Street & Rochelle Drive/Queen Charlotte Street	May 18, 2016	Transportation Brief, Richmond Oaks Health Centre (6265 Perth Street), June 2016, D.J. Halpenny & Associates Ltd.
Perth Street & Nixon Farm Drive/Fowler Street	August 12, 2015	Transportation Brief, Samara Square (6143 Perth Street), June 2017, D.J. Halpenny & Associates Ltd.

Figure 7 illustrates the existing traffic volumes and Table 2 summarizes the existing intersection operations. The level of service for signalized intersections is based on v/c calculations for individual lane movements and HCM 2000 v/c calculations for the overall intersection and HCM 2010 average delay for unsignalized intersections. Synchro 11 has been used to model the unsignalized and signalized intersections. Detailed turning movement count data is included in Appendix B and the synchro worksheets are provided in Appendix C.

Figure 7: Existing Intersection Volumes

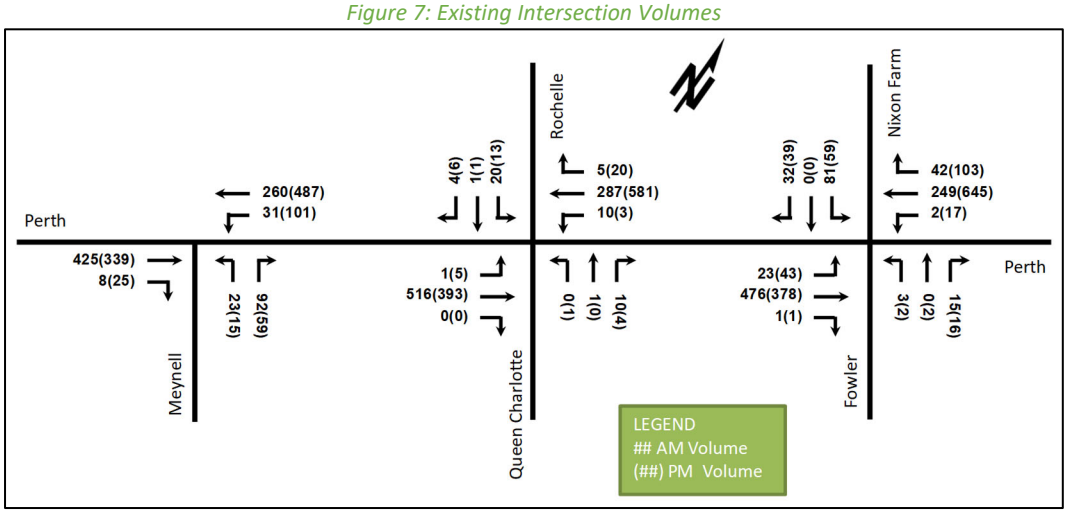


Table 2: Existing Intersection Operations

Intersection	Lane	AM Peak Hour				PM Peak Hour			
		LOS	V/C	Delay	Q (95th)	LOS	V/C	Delay	Q (95th)
Perth Street & Meynell Road *Unsignalized*	EBT/R	-	-	-	-	-	-	-	-
	WBL/T	A	0.03	8.4	0.8	A	0.10	8.5	2.3
	NB	B	0.25	14.5	7.5	C	0.19	15.2	5.3
	Overall	**A**	**-**	**2.3**	**-**	**A**	**-**	**2.0**	**-**
Perth Street & Rochelle Drive/Queen Charlotte Street *Unsignalized*	EBL/T	A	0.00	7.9	0.0	A	0.01	8.9	0.0
	EBT/R	-	-	-	-	-	-	-	-
	WBL	A	0.01	8.6	0.0	A	0.00	8.2	0.0
	WBT/R	-	-	-	-	-	-	-	-
	NB	B	0.02	11.0	0.8	B	0.01	13.0	0.0
	SB	B	0.07	14.9	1.5	C	0.08	18.8	2.3
	Overall	**A**	**-**	**0.7**	**-**	**A**	**-**	**0.5**	**-**
Perth Street & Nixon Farm Drive/Fowler Street *Signalized*	EB	A	0.24	4.5	22.5	A	0.23	4.1	17.6
	WB	A	0.14	3.7	12.1	A	0.37	4.6	33.0
	NB	A	0.08	6.6	3.8	A	0.09	14.2	6.0
	SBL	A	0.44	34.0	23.7	A	0.34	31.9	18.6
	SBT/R	A	0.05	0.2	0.0	A	0.12	0.7	0.0
	Overall	**A**	**0.30**	**6.7**	**-**	**A**	**0.39**	**5.7**	**-**

Notes: Saturation flow rate of 1800 veh/h/lane
PHF = 0.90

During both the AM and PM peak hours, the study area intersections operate well. No capacity issues are noted.

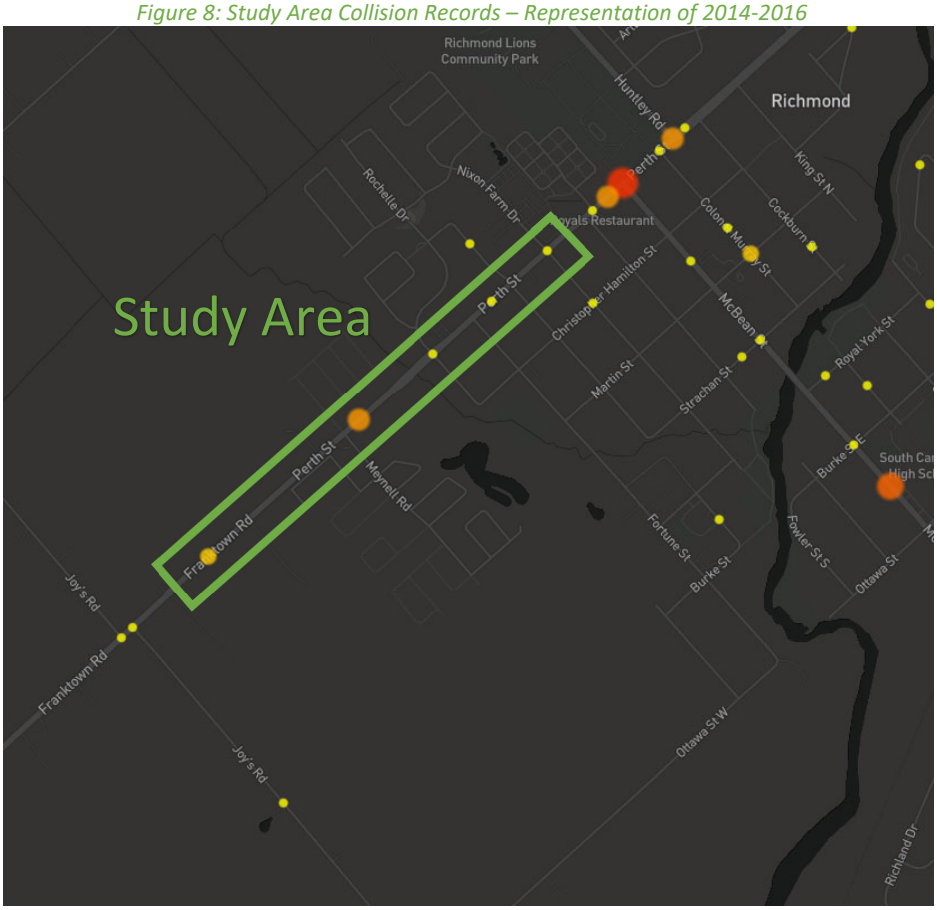
2.2.8 Collision Analysis

Collision data have been acquired from the City of Ottawa open data website (data.ottawa.ca) for five years prior to the commencement of this TIA for the surrounding study are road network. Table 3 summarizes the collisions types and conditions in the study area, Figure 8 illustrates the intersections and segments analyzed, and Table 4 summarizes the total collisions for each of these locations. Collision data are included in Appendix D.

Table 3: Study Area Collision Summary, 2014-2018

		Number	%
Total Collisions		3	**100%**
Classification	**Fatality**	0	0%
	Non-Fatal Injury	2	25%
	Property Damage Only	11	75%
Initial Impact Type	**Rear end**	2	15%
	Sideswipe	1	8%
	Turning Movement	3	23%
	SMV Other	7	54%
Road Surface Condition	**Dry**	8	62%
	Wet	2	16%
	Ice	3	23%
Pedestrian Involved		2	15%
Cyclists Involved		0	0%

Figure 8: Study Area Collision Records – Representation of 2014-2016



Source: https://maps.bikeottawa.ca/collisions/ Accessed: May 28, 2020

Table 4: Summary of Collision Locations, 2014-2018

	Number	%
Intersections / Segments	**13**	**100%**
Perth St @ Queen Charlotte St/Rochelle Dr	4	31%
Franktown Rd btwn Joy's Rd & Perth St	2	14%
Perth St btwn Franktown Rd & Rochelle Dr	4	31%

	Number	%
Intersections / Segments	**13**	**100%**
Perth St btwn Fortune St & Tarryn Ter	1	8%
Perth St btwn Tarryn Ter & Nixon Farm Dr	1	8%
Perth St btwn Nixon Farm Dr & Lennox St	1	8%

Within the study area, no specific localities are noted to have collisions frequencies of concern. Generally, the trend of the study area is having high representation of single motor vehicle (other) collisions, which are typical of rural roads with higher speed limits than their urban counterparts. Specifically, this collision type is the highest represented at both locations with four collisions.

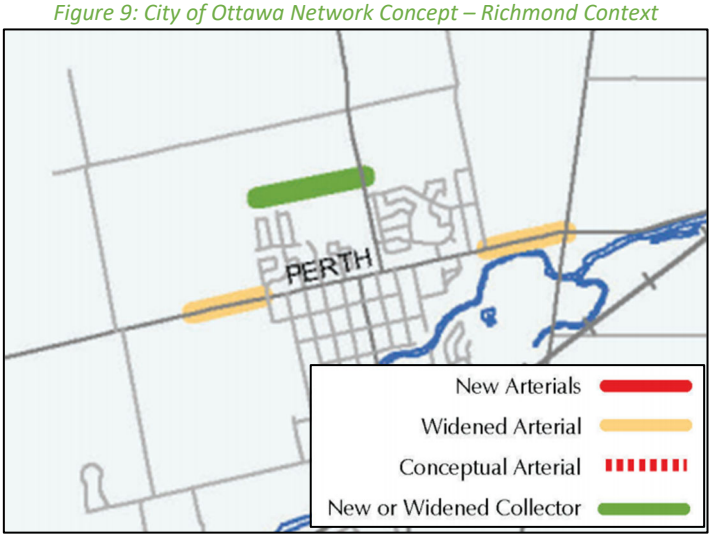
2.3 Planned Conditions

2.3.1 Changes to the Area Transportation Network

The subject development is within the Richmond Village Secondary Plan/Community Design Plan. No improvements are included within the 2031 Affordable Network of the Ottawa TMP. The following projects are currently identified beyond the 2031 horizon in the Network Concept and are illustrated in Figure 9:

- Richmond Village By-Pass: Construct a new two-lane road between Huntley Road and Eagleson Road
- Perth Street Widening: Widen Perth Street to four lanes between Village Boundary and Rochelle Drive/Queen Charlotte Street
- Perth Street Widening: Widen Perth Street to four lanes between Shea Road and Eagleson Road

Figure 9: City of Ottawa Network Concept – Richmond Context



The RMA and detailed design for the new intersection at Perth Street and Meynell Road and the urbanization of Perth Street between Meynell Road and Rochelle Drive/Queen Charlotte Street are included within DC funded project list and are expected to be constructed by 2024/25. The new intersection's ultimate condition will include a roundabout and cycle track that continues to the intersection of Perth Street and Rochelle Drive/Queen Charlotte Street, and the intersection's interim condition will be stop-controlled on the minor approaches.

While not identified in planning documents, a sidewalk will be constructed (by others) on the west side of Nixon Farm Drive from Perth Street to 235 m north of Perth Street in 2020.

2.3.2 Other Study Area Developments

Fox Run Phase 1 - Caivan

The first Phase of the Fox Run development is currently under construction. In total, the subdivision will include a total of 214 single family homes. A new intersection on Perth Street will be provided at Meynell Road.

Fox Run Phase 2 - Caivan

The second Phases of Fox Run have been termed Phase 2 North and South and include 386 residential units split on the north side of Perth Street and on the west side of the Phase 1 lands. Servicing is underway and it is expected that this phase will be completed by 2024.

Fox Run Phase 3 - Caivan

The final phase of the Fox Run development are currently planned to begin in 2025. It is envisioned that a total of 87 townhomes and 163 single family homes is planned to be constructed during 2025-2026.

6305 Ottawa Street – Caivan Laffin Lands

A zoning amendment and draft plan of subdivision is currently underway for a new residential subdivision west of Queen Charlotte Street and north of Ottawa Street. The development is planned to include 177 residential units, with 63 detached homes and 114 townhomes.

6240-6431 Ottawa Street – Mattamy Richmond Subdivision

A plan of subdivision application has been submitted for a new residential subdivision along Ottawa Street with 848 single family homes and 252 townhomes estimated to be built-out by 2029 with approximately 100-150 units per year. The proposed site will extend Meynell Road, connect to Ottawa Street, and include additional future connections to Royal York Street and Burke Street.

6265 Perth street – Richmond Oaks Health Centre

The proposed medical centre will be developed in two phases, with Phase 1 completed including a medical clinic and pharmacy, and Phase 2 will include 31 senior apartment units and 10,182 sq. ft. of commercial/retail space. Phase 2 is anticipated to be completed by 2022.

Samara Square

Phase 2 of the Hyde Park Senior Development will include two buildings with 35 rental apartments, 124 senior retirement apartments, and supporting commercial/retail. While not currently included in the development planning, Phase 3 will include an additional 122 apartment units in eight buildings.

471 Sangeet Place

An extension of the existing Jock River Estates development includes an additional 10 homes.

3 Study Area and Time Periods

3.1 Study Area

The TIA guidelines recommend a study area that includes all signalized and roundabout intersections within 1.0 km of the subject lands. Due to the current pandemic conditions, and past construction/closures along Eagleson Road and McBean Street in the last three years, limited data is available and verifiable in the area. It is therefore recommended that the following intersections be included in this study, based on available counts and adjacent area studies:

- Perth Street at Meynell Road/Oldenburg Street
- Perth Street at Rochelle Drive/Queen Charlotte Street

- Perth Street at Nixon Farm Drive/Fowler Street

The many local road intersections will not be able to have data collection completed at this time, as the rate at which to scale these volumes is unknown. A review of the generated volumes can be completed with the inclusion of the Neighbourhood Traffic Management module to the scope of work to gauge the relative impact the specific developments would have on the area road thresholds.

No TRANS screenlines are present in the area, therefore no screenlines will be reviewed as part of this study.

3.2 Time Periods

As the proposed development is composed entirely of residential units the AM and PM peak hours will be examined.

3.3 Horizon Years

The anticipated build-out year of 2025 is assumed for the subject site. As a result, the full build-out plus five years horizon year is 2030.

4 Exemption Review

Table 5 summarizes the exemptions for this TIA.

Table 5: Exemption Review

Module	Element	Explanation	Exempt/Required
Design Review Component			
4.1 Development Design	4.1.2 Circulation and Access	Only required for site plans	Exempt
	4.2.3 New Street Networks	Only required for plans of subdivision	Required
4.2 Parking	4.2.1 Parking Supply	Only required for site plans	Exempt
	4.2.2 Spillover Parking	Only required for site plans where parking supply is 15% below unconstrained demand	Exempt
Network Impact Component			
4.5 Transportation Demand Management	All Elements	Not required for site plans expected to have fewer than 60 employees and/or students on location at any given time	Required
4.6 Neighbourhood Traffic Management	4.6.1 Adjacent Neighbourhoods	Only required when the development relies on local or collector streets for access and total volumes exceed ATM capacity thresholds	Required
4.8 Network Concept		Only required when proposed development generates more than 200 person-trips during the peak hour in excess of equivalent volume permitted by established zoning	Exempt (Currently Development Reserve, therefore zoning changes are “worst case”)

5 Development-Generated Travel Demand

5.1 Mode Shares

Examining the mode shares recommended in the TRANS Trip Generation Manual (2020) for the subject district, derived from the most recent National Capital Region Origin-Destination survey (OD Survey), the existing average district mode shares by land use for Other Rural Districts have been summarized in Table 6Table 7.

Table 6: TRANS Trip Generation Manual Mode Shares – Other Rural Districts

Travel Mode	Single Detached (High-Rise)		Multi-Unit (Low-Rise)	
	AM	PM	AM	PM
Auto Driver	60%	67%	66%	62%
Auto Passenger	14%	17%	13%	19%
Transit	24%	14%	21%	16%
Cycling	2%	2%	1%	3%
Walking	0%	0%	0%	0%
Total	**100%**	**100%**	**100%**	**100%**

Direction from City Staff was provided on the transit service provisions in the Village of Richmond being restricted to outbound during the AM and inbound during the PM peak, and should be limited to 5% in the peak directions. Therefore, the recommended mode shares are summarized in Table 7.

Table 7: Recommended Mode Shares

Travel Mode	Single Detached (High-Rise)		Multi-Unit (Low-Rise)	
	AM	PM	AM	PM
Auto Driver	84%/79%	76%/81%	86%/82%	73%/78%
Auto Passenger	14%	17%	13%	19%
Transit	5% (out only)	5% (in only)	5% (out only)	5% (in only)
Cycling	2%	2%	1%	3%
Walking	0%	0%	0%	0%
Total	**100%**	**100%**	**100%**	**100%**

5.2 Trip Generation

This TIA has been prepared using the vehicle and person trip rates for the residential dwellings from the TRANS Trip Generation Manual (2020). Table 8 summarizes the peak period person trip rates for the proposed residential land use for each peak period.

Table 8: Trip Generation Person Trip Rates by Peak Period

Dwelling Type	Land Use Code	Peak Period	Person Trip Rates
Single-Detached Dwelling	210	AM	2.05
		PM	2.48
Multi-Unit (Low Rise)	220	AM	1.35
		PM	1.58

Using the above person trip rates, the total person trip generation has been estimated. Table 9 summarizes the total person trip generation for the residential land use.

Table 9: Total Residential Person Trip Generation by Peak Period

Land Use	Units	AM Peak Period			PM Peak Period		
		In	Out	Total	In	Out	Total
Single Detached 6363-6409 Perth Street	139	42	97	139	95	58	153
Multi-Unit (Low Rise) 6363-6409 Perth Street	233	47	108	155	91	72	163
Single Detached 6295 Perth Street	30	10	22	32	20	11	32

Using the site-specific mode share targets and the person trip rates, the person trips by mode have been projected. Trip generation by peak hour has been forecasted using the prescribed peak period conversion factors presented in the TRANS Trip Generation Manual (2020). Table 10 summarizes the residential trip generation and by mode and peak hour.

Table 10: Trip Generation by Mode

Phase	Travel Mode	In	Out	Total	In	Out	Total
6363-6409 Perth Street	Auto Driver	75	163	238	138	103	241
	Auto Passenger	12	27	39	33	24	57
	Transit	0	12	12	10	0	10
	Bicycle	2	3	5	5	3	8
	Walk	0	0	0	0	0	0
	Total	**89**	**205**	**294**	**186**	**130**	**316**
6295 Perth Street	Auto Driver	9	16	25	15	9	24
	Auto Passenger	1	3	4	4	2	6
	Transit	0	1	1	1	0	1
	Bicycle	0	1	1	0	0	0
	Walk	0	0	0	0	0	0
	Total	**10**	**21**	**31**	**20**	**11**	**31**

As shown above, a total of 263 AM and 265 PM new peak hour two-way vehicle trips are projected as a result of the proposed development.

5.3 Trip Distribution

To understand the travel patterns of the subject development the OD Survey has been reviewed to determine the existing travel patterns. Table 11 below summarizes the distribution.

Table 11: OD Survey Existing Distribution – Rural Southwest

To/From	Percent of Trips	Via
North	55%	Perth St - 45% east, 10% west
South	5%	Perth St/Martin St - 5% east
East	25%	Perth St east
West	15%	Perth St west
Total	100%	

5.4 Trip Assignment

Using the distribution outlined above, turning movement splits, and access to major transportation infrastructure, the trips generated by the site have been assigned to the Study Area road network. The new site volumes for 6363-6409 Perth Street and 6295 Perth Street are illustrated in Figure 10 and Figure 11.

Figure 10: New Site Generation Auto Volumes – 6363-6409 Perth Street

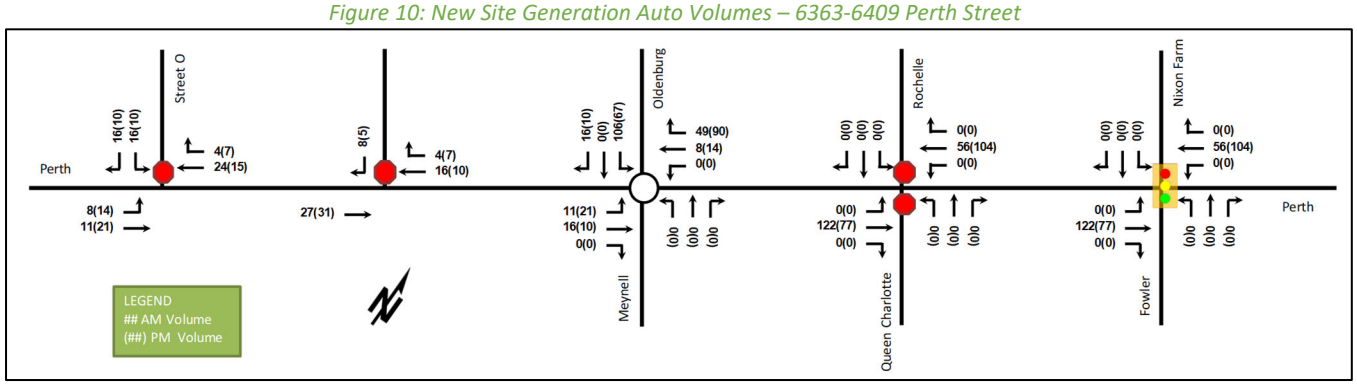
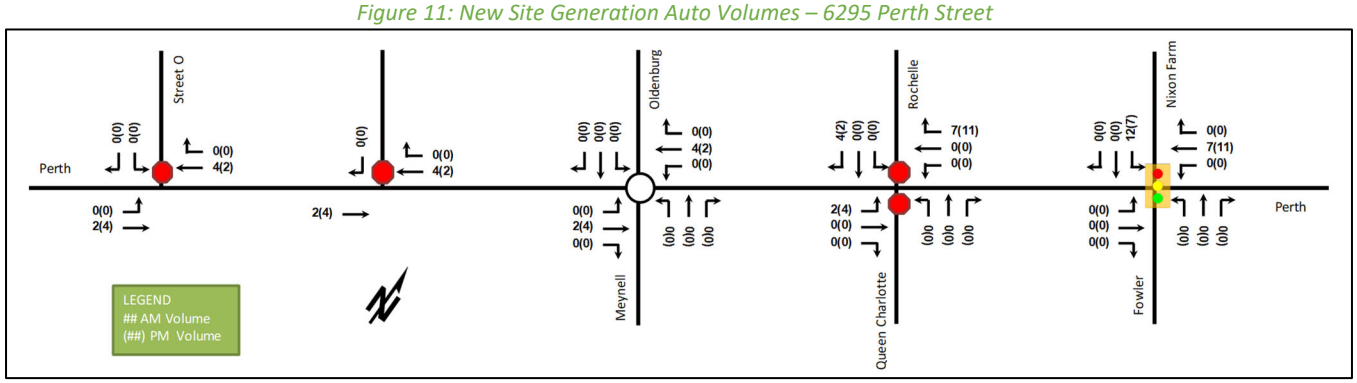


Figure 11: New Site Generation Auto Volumes – 6295 Perth Street



6 Background Network Travel Demand

6.1 Transportation Network Plans

The transportation network plans were discussed in Section 2.3.

6.2 Background Growth

The background growth identified in adjacent developments ranges from 1.5% to 2.0% along Perth Street. A significant amount of the development within the Village of Richmond has been explicitly accounted for in Section 6.3. Therefore, a background growth rate along Perth Street has been assumed as 1.5% in the peak direction for development beyond the Village of Richmond. The TRANS background projection plots are provided in Appendix E.

6.3 Other Developments

The background developments explicitly considered in the background conditions (Section 2.3) include:

- Fox Run Phase 1 - Caivan
- Fox Run Phase 2 - Caivan
- Fox Run Phase 3 – Caivan
- 6305 Ottawa Street – Caivan
- 6240-6431 Ottawa Street – Mattamy Richmond Subdivision
- 6265 Perth street – Richmond Oaks Health Centre
- Samara Square
- 471 Sangeet Place

Based on the assumed build-out rates of the adjacent developments, the total background development volumes for the 2025 and 2030 horizons are illustrated in Figure 12 and Figure 13.

Figure 12: 2025 Background Development Total Volumes

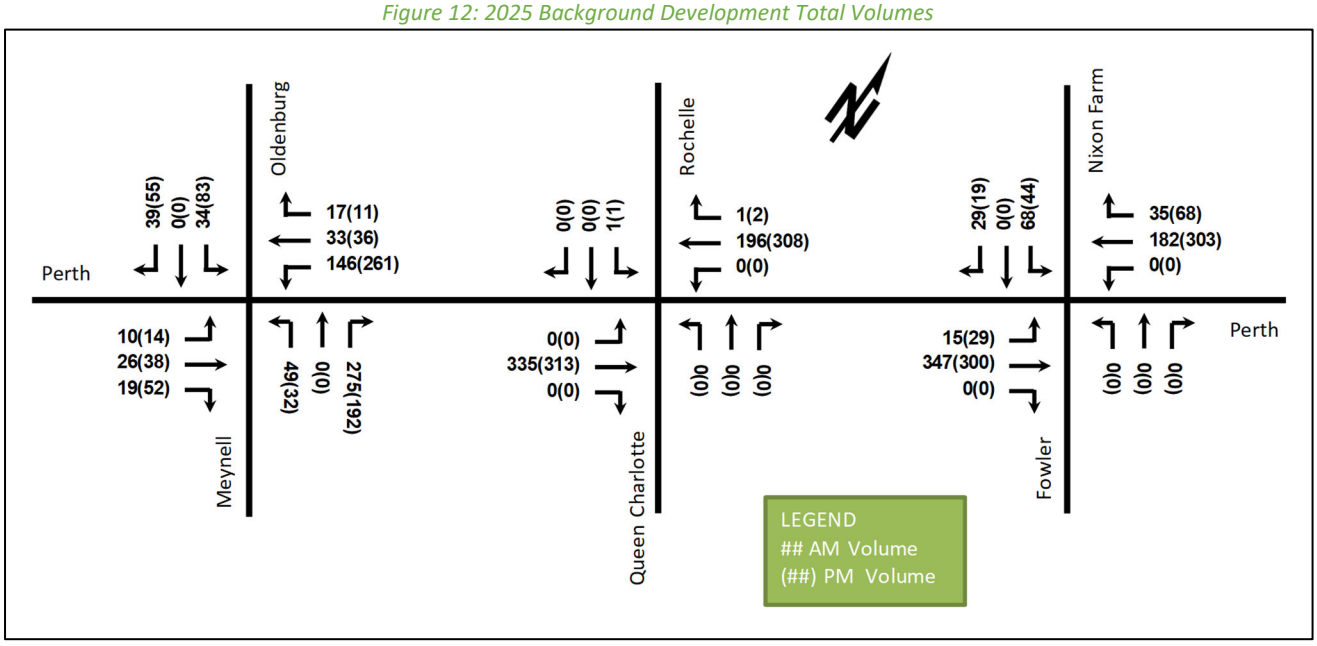
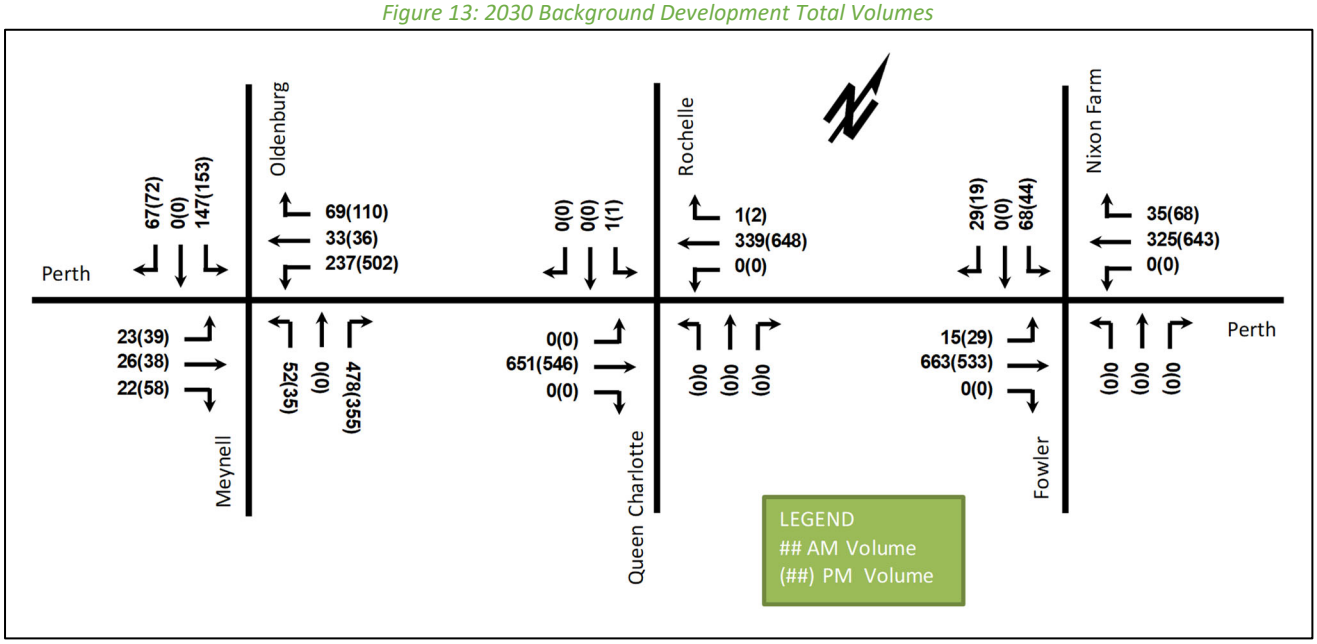


Figure 13: 2030 Background Development Total Volumes



The background development traffic was generated through TIA studies using the TRANS 2009 and ITE Trip Generation Manual methodologies and mode share splits and overestimates the anticipated auto volumes from these developments. Within the Richmond Village context, it is estimated that the auto trips have been forecast 28-37% higher than auto trips forecasted through the TRANS 2020 methodology. Given the background traffic would require re-assessing eight site plan and plan of subdivision applications, the background volumes have been carried forward from the previous studies and can be considered to conservatively estimate the road network operations. The actual volumes are expected to be lowered and road network operations to be better than forecasted in this report.

7 Demand Rationalization

7.1 2025 Future Background Conditions

Figure 14 illustrates the 2025 background volumes and Table 12 summarizes the 2025 background intersection operations. The level of service for signalized intersections is based on v/c calculations for individual lane movements and HCM 2000 v/c calculations for the overall intersection and HCM 2010 average delay for unsignalized intersections. Synchro 11 has been used to model the unsignalized and signalized intersections, and Sidra 8 to model the study area roundabouts. The synchro and sidra worksheets are provided in Appendix F.

Figure 14: 2025 Future Background Traffic Volumes

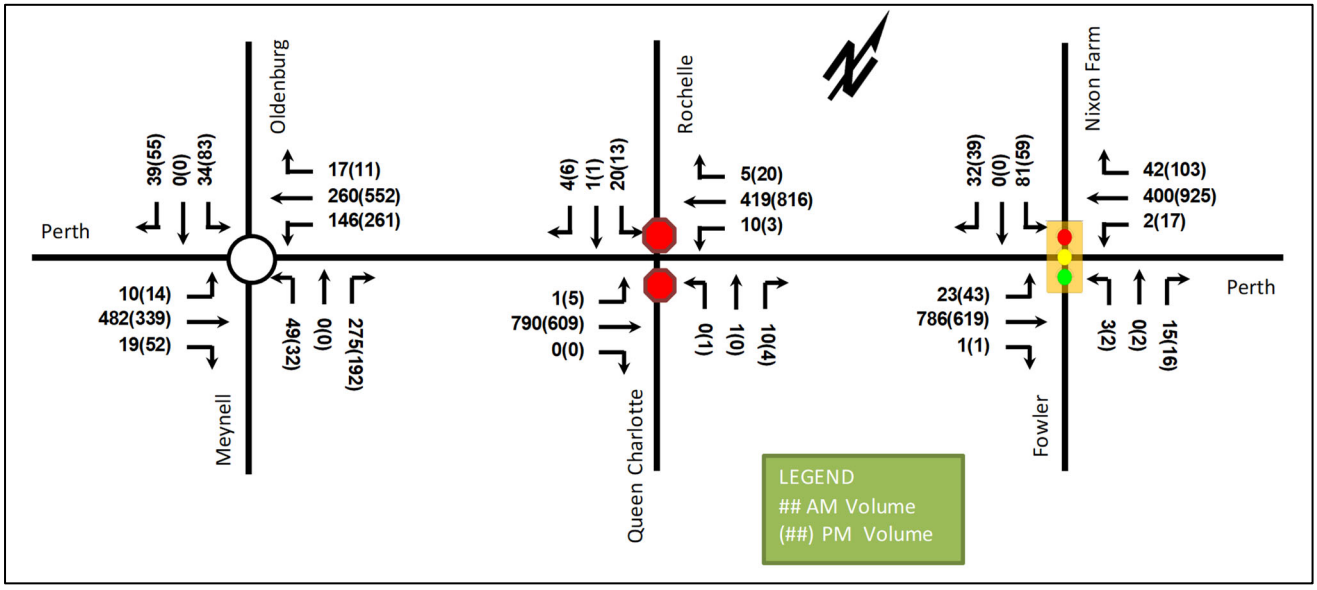


Table 12: 2025 Future Background Intersection Operations

Intersection	Lane	AM Peak Hour				PM Peak Hour			
		LOS	V/C	Delay	Q (95th)	LOS	V/C	Delay	Q (95th)
Perth Street & Meynell Road *Roundabout*	EB	A	0.41	5.4	20.1	A	0.38	6.6	17.6
	WB	A	0.30	6.0	14.7	A	0.54	5.9	35.7
	NB	A	0.37	8.0	17.4	A	0.24	7.1	10.3
	SB	A	0.08	8.4	2.9	A	0.20	12.7	9.2
	Overall	**A**	**0.41**	**6.4**	-	**A**	**0.54**	**6.8**	-
Perth Street & Rochelle Drive/Queen Charlotte Street *Unsignalized*	EBL/T	A	0.00	8.2	0.0	A	0.01	9.6	0.0
	EBT/R	-	-	-	-	-	-	-	-
	WBL	A	0.01	9.4	0.0	A	0.00	8.7	0.0
	WBT/R	-	-	-	-	-	-	-	-
	NB	B	0.02	12.5	0.8	C	0.02	16.8	0.0
	SB	C	0.09	18.9	2.3	D	0.10	25.8	2.3
	Overall	**A**	**-**	**0.6**	-	**A**	**-**	**0.4**	-
Perth Street & Nixon Farm Drive/Fowler Street *Signalized*	EB	A	0.35	4.9	31.5	A	0.31	4.4	23.6
	WB	A	0.19	3.9	15.4	A	0.45	5.2	40.4
	NB	A	0.07	5.7	3.0	A	0.09	14.9	5.6
	SBL	A	0.41	33.4	20.2	A	0.31	31.6	16.0
	SBT/R	A	0.06	0.2	0.0	A	0.13	1.7	1.4
	Overall	**A**	**0.38**	**6.1**	-	**A**	**0.46**	**5.8**	-

Notes: Saturation flow rate of 1800 veh/h/lane
PHF = 1.00
m = metered queue
# = volume for the 95th %ile cycle exceeds capacity

Overall, the study area intersections will operate like the existing conditions during the 2025 future background horizon. No improvements or mitigation is required.

7.2 2030 Future Background Conditions

Figure 15 illustrates the 2030 future background volumes and Table 13 summarizes the intersection operations. The level of service for signalized intersections is based on v/c calculations for individual lane movements and HCM 2000 v/c calculations for the overall intersection and HCM 2010 average delay for unsignalized intersections. Synchro 11 has been used to model the unsignalized and signalized intersections, and Sidra 8 to model the study area roundabouts. The synchro and sidra worksheets are provided in Appendix G.

Figure 15: 2030 Future Background Traffic Volumes

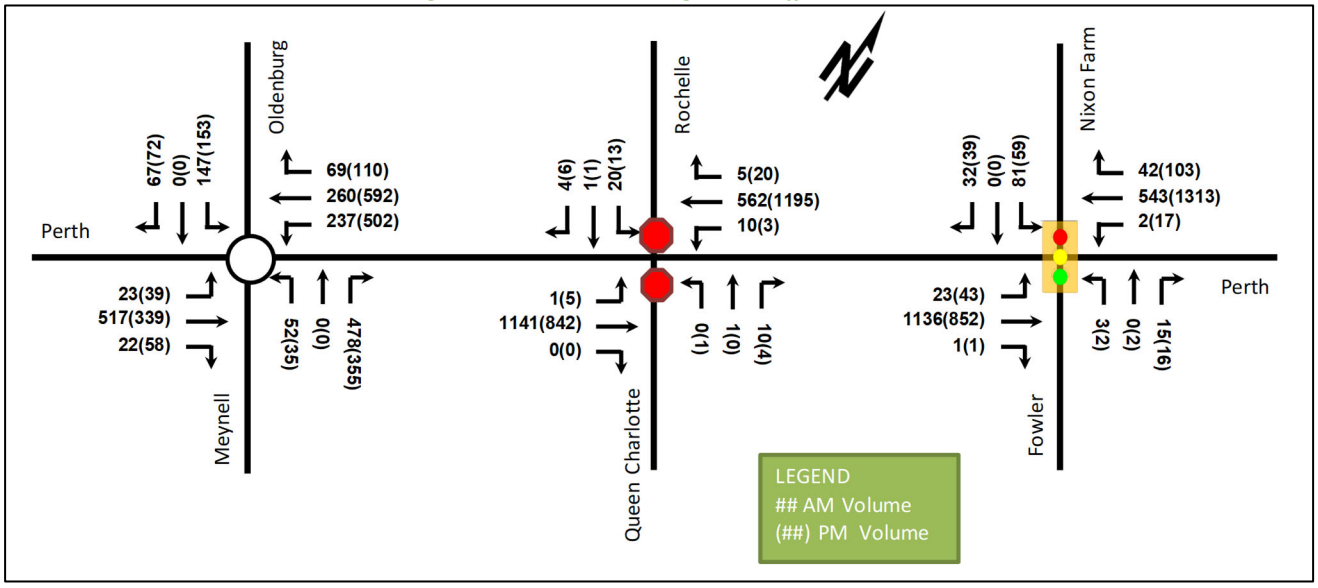


Table 13: 2030 Future Background Intersection Operations

Intersection	Lane	AM Peak Hour				PM Peak Hour			
		LOS	V/C	Delay	Q (95th)	LOS	V/C	Delay	Q (95th)
Perth Street & Meynell Road *Roundabout*	EB	A	0.55	7.8	32.4	A	0.57	11.7	37.1
	WB	A	0.40	6.5	22.9	D	0.81	7.1	99.1
	NB	C	0.72	16.0	62.9	A	0.46	8.2	24.6
	SB	A	0.24	10.5	10.4	A	0.55	26.5	37.7
	Overall	**C**	**0.72**	**10.0**	**-**	**D**	**0.81**	**10.1**	**-**
Perth Street & Rochelle Drive/Queen Charlotte Street *Unsignalized*	EBL/T	A	0.00	8.6	0.0	B	0.01	11.3	0.0
	EBT/R	-	-	-	-	-	-	-	-
	WBL	B	0.02	11.0	0.8	A	0.004	9.6	0.0
	WBT/R	-	-	-	-	-	-	-	-
	NB	C	0.03	16.2	0.8	D	0.04	32.9	0.8
	SB	D	0.15	30.0	3.8	**F**	**0.23**	**58.3**	**6.0**
	Overall	**A**	**-**	**0.6**	**-**	**A**	**-**	**0.7**	**-**

Intersection	Lane	AM Peak Hour				PM Peak Hour			
		LOS	V/C	Delay	Q (95th)	LOS	V/C	Delay	Q (95th)
Perth Street & Nixon Farm Drive/Fowler Street ***Signalized***	EB	A	0.50	6.0	52.6	A	0.43	5.3	35.8
	WB	A	0.25	4.2	21.1	B	0.61	7.0	69.3
	NB	A	0.07	5.7	3.0	A	0.09	14.9	5.6
	SBL	A	0.41	33.4	20.2	A	0.31	31.6	16.0
	SBT/R	A	0.07	0.3	0.0	A	0.16	12.9	7.7
	Overall	**A**	**0.52**	**6.6**	**-**	**B**	**0.60**	**7.1**	**-**

Notes: Saturation flow rate of 1800 veh/h/lane
PHF = 1.00
m = metered queue
# = volume for the 95th %ile cycle exceeds capacity

Overall, the study area intersections at the 2030 future background horizon will operate similarly to the existing and 2025 future background conditions. The southbound left-turn at the Perth Street and Rochelle Drive/Queen Charlotte Street intersection will experience delays approaching one minute during the PM peak. It is anticipated that turning vehicles will shift to the Nixon Farm Drive/Fowler Street intersection. No improvements or mitigation is required.

7.3 Modal Share Sensitivity

Capacity constraints have been noted at the Rochelle Drive/Queen Charlotte Street intersection for the northbound and southbound movements. As this is a function of the left-turns, the left-turns will likely move to the Nixon Farm Drive/Fowler Street signalized intersection. This will be modified in the future total conditions.

No additional capacity constraints are noted in the background horizons.

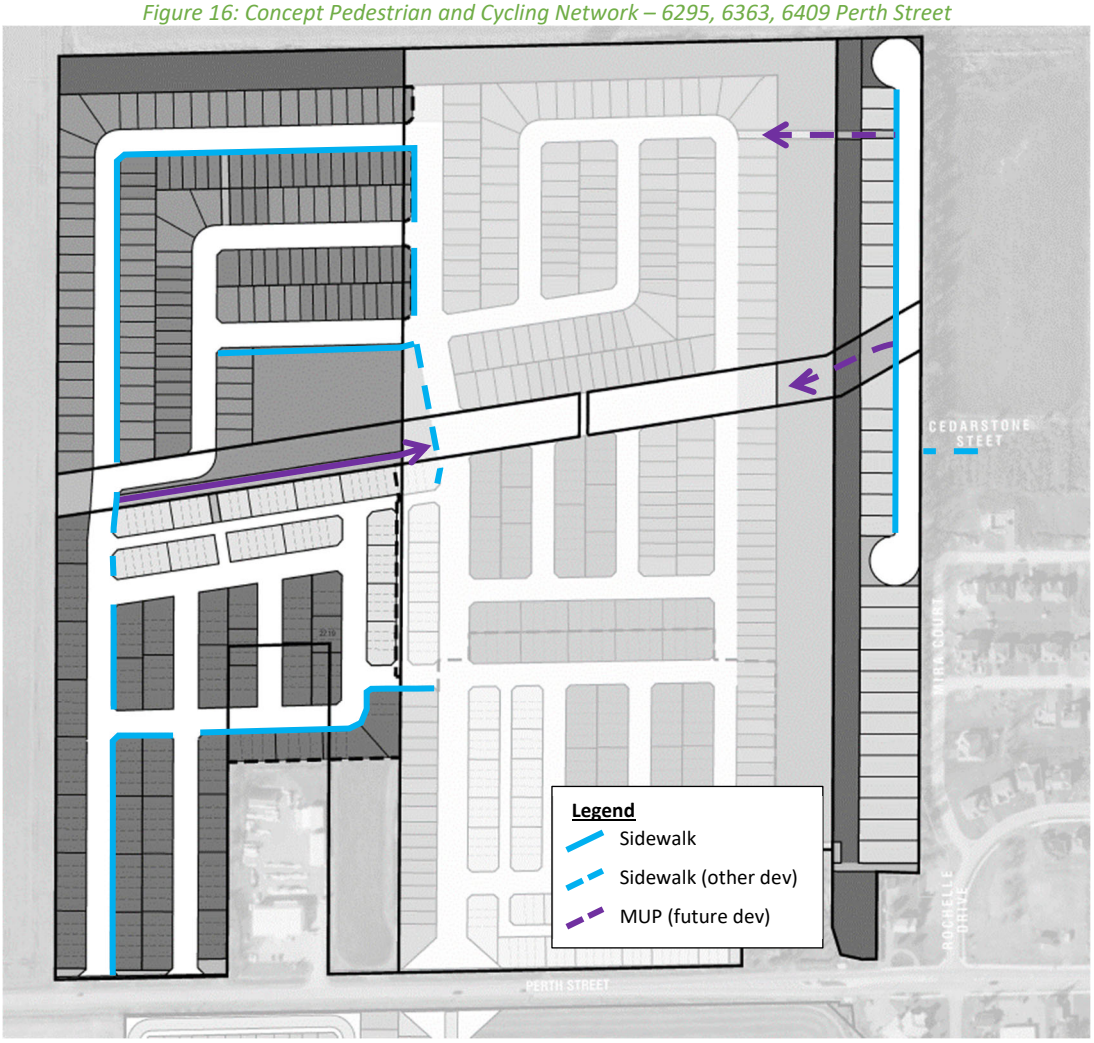
The transit service is at an achievable level and any improvement may also increase service within the Richmond Village as a whole and considered a net benefit for the City.

8 Development Design

8.1 Design for Sustainable Modes

The proposed development is a residential subdivision where each dwelling will include a driveway and garage. Bicycle parking is assumed to be within the individual units. Figure 16 illustrates the pedestrian concept network with connections to adjacent pedestrian facilities and both collector and arterial roadways. These are conceptual only and meant as guidance once the subdivision proceeds to future approvals beyond the rezoning.

Figure 16: Concept Pedestrian and Cycling Network – 6295, 6363, 6409 Perth Street

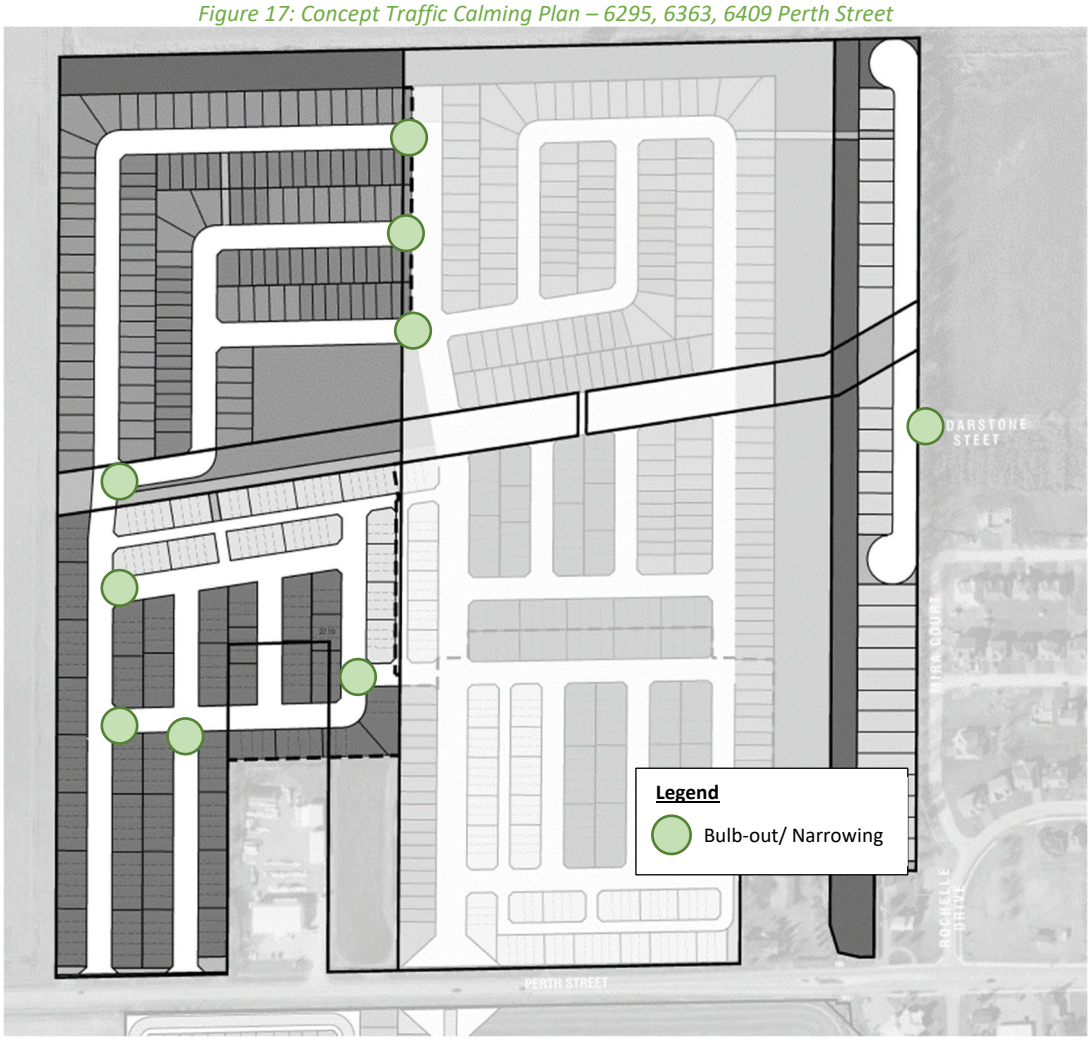


8.2 New Street Networks

The planned street network will be predominantly 18.0 metre local roadways with an 8.5 metre lane way, immediately south of the hydro corridor. The local roads will provide the opportunity for parking on one side of the roadway. The subdivision is considered to be designed for 30 km/h roadways.

Traffic calming elements are recommended at the internal intersections, including bulb-outs to narrow each approach to the intersection (e.g., reduced crossing distance). On-street parking is undefined within these concepts. Once the road network pattern and lotting concepts are confirmed, the on-street parking can be outlined in the geometric roadway design. Figure 17 illustrates the proposed locations. These are conceptual only and meant as guidance once the subdivision proceeds to future approvals beyond the rezoning.

Figure 17: Concept Traffic Calming Plan – 6295, 6363, 6409 Perth Street



9 Boundary Street Design

Table 14 summarizes the MMLOS analysis for the boundary street network. Perth Street and Ottawa Street are noted for future improvement and thus the existing and future conditions have been assessed in separate rows where the remaining roadways' existing and future conditions are considered in the same row. The analysis is based on the policy area of Village. The MMLOS worksheets has been provided in Appendix H.

Table 14: Boundary Street MMLOS Analysis

Segment	Pedestrian LOS		Bicycle LOS		Transit LOS		Truck LOS	
	PLOS	Target	BLOS	Target	TLOS	Target	TrLOS	Target
Perth (existing)	F	C	F	C	D	D	C	D
Perth (interim)	C	C	A/C	B	D	D	C	D
Perth (ultimate)	C	C	A	B	D	D	C	D
Oldenburg	C	C	A	D	N/A	N/A	N/A	N/A
Mira	-	C	A	D	N/A	N/A	N/A	N/A
Cedarstone	E	C	A	D	N/A	N/A	N/A	N/A

Cedarstone Street and Perth Street do not meet the pedestrian LOS targets for Richmond Village. The existing Perth Street does not have any pedestrian facilities. Cedarstone Street would require a wider sidewalk (1.8 metres)

or a boulevard of 0.5 metres or greater to meet the area targets. No mitigation is recommended for Perth Street as it is a rural arterial roadway and connections can be provided through the subdivision or, on Cedarstone Street due to limited space for shifting the existing sidewalks.

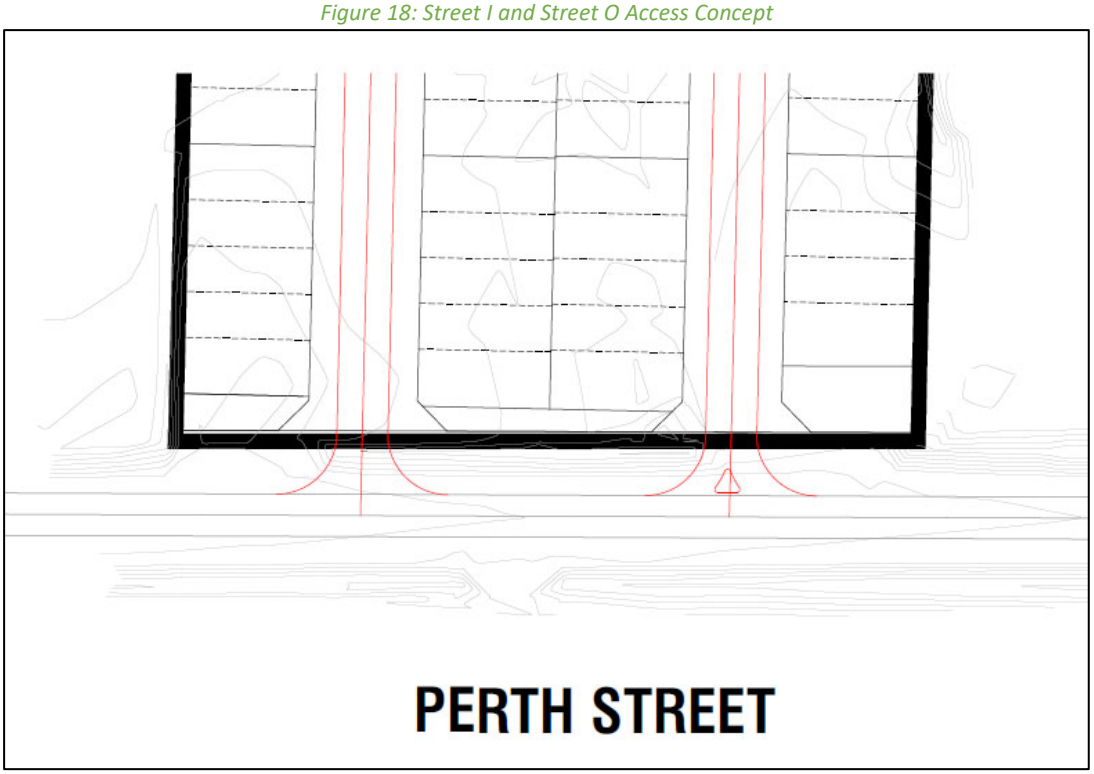
Similar to the pedestrian conditions, existing Perth Street does not have any dedicated cycling facilities and fail to meet the bicycle LOS. The interim south side of Perth Street will have a shoulder facility but still not meet the BLOS target.

10 Access Intersections Design

10.1 Location and Design of Access

The residential accesses will connect to the adjacent road network via local roads and adjacent collector roads of Oldenburg Avenue, and a local road connection to Perth Street. Within the subdivision, no turn lanes are proposed for the internal intersections which will be controlled by minor stop control. The new intersection of Street O is proposed as an all-movement intersection and Street I as a right-in/right-out. The access concept is illustrated in Figure 18.

Figure 18: Street I and Street O Access Concept



10.2 Intersection Control

The intersections of Street O and Street I at Perth Street are considered as a minor stop control and left-turn warrants are met for the eastbound approach at Street O. The warrants at the Street O and Perth Street intersection for the existing 90km/h design speed and a future 60km/h design speed, once the City implements the previously recommended speed limit change of 50 km/h to the Village boundary, have been provided for reference in Appendix I.

The warrants are met due to the east-west volumes along Perth Street, and not due to the volume of left-turns. If warrants were conducted for the two Joys Road intersections or the numerous residential driveways to the west

of the proposed subdivisions intersection, they would also all require left-turn lanes. As the eastbound left-turn volumes are below 15 vehicles in either AM or PM peak hour, it is recommended that no left-turn lanes are required along Perth Street.

10.3 Access Intersection Design

10.3.1 2025 Future Total Access Intersection Operations

The 2025 future total access intersection volumes are illustrated above in Figure 19 and intersection operations are summarized below in Table 15. The level of service for unsignalized intersections is based on HCM 2010 average delay. Synchro 11 has been used to model the unsignalized intersections and Sidra 8 to model the study area roundabouts. The synchro and sidra worksheets are provided in Appendix J.

Figure 19: 2025 Future Total Volumes

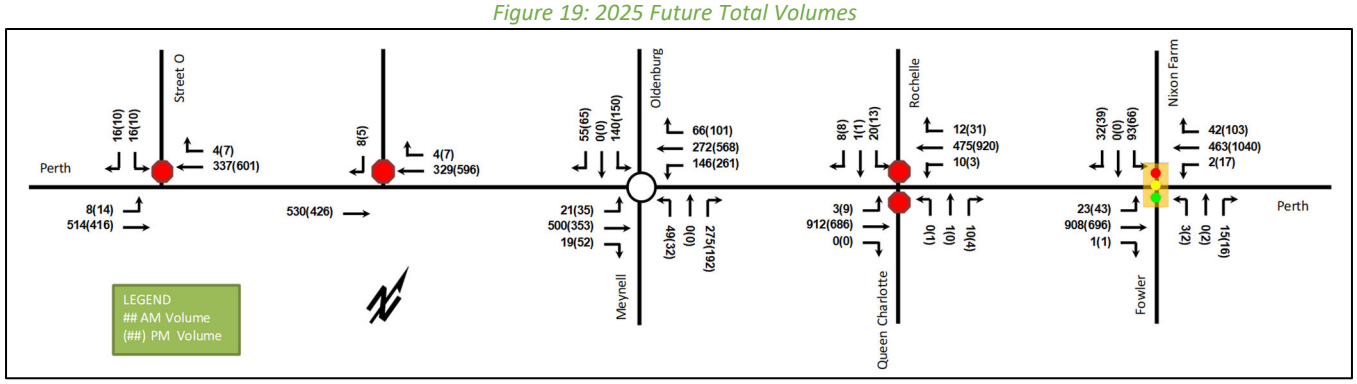


Table 15: 2025 Future Total Access Intersection Operations

Intersection	Lane	AM Peak Hour				PM Peak Hour			
		LOS	V/C	Delay	Q (95th)	LOS	V/C	Delay	Q (95th)
Perth Street & Street O *Unsignalized*	EB	A	0.01	8.0	0.0	A	0.01	8.8	0.0
	WB	-	-	-	-	-	-	-	-
	SB	B	0.07	13.8	1.5	C	0.05	16.6	1.5
	Overall	**A**	**-**	**0.6**	**-**	**A**	**-**	**0.4**	**-**
Perth Street & Street I *Unsignalized*	EBT/R	-	-	-	-	-	-	-	-
	WB	-	-	-	-	-	-	-	-
	SBR	B	0.01	10.1	0.0	B	0.01	12.3	0.0
	Overall	**A**	**-**	**0.2**	**-**	**A**	**-**	**0.1**	**-**

Notes: Saturation flow rate of 1800 veh/h/lane
PHF = 1.00
m = metered queue
# = volume for the 95th %ile cycle exceeds capacity

Overall, the access intersection will operate well during the 2025 future total horizon. No improvements or mitigation are required.

10.3.2 2030 Future Total Access Intersection Operations

The 2030 future total access intersection volumes are illustrated above in Figure 20 and intersection operations are summarized below in Table 16. The level of service for unsignalized intersections is based on HCM 2010 average delay. Synchro 11 has been used to model the unsignalized intersections and Sidra 8 to model the study area roundabouts. The synchro and sidra worksheets are provided in Appendix K.

Figure 20: 2030 Future Total Volumes

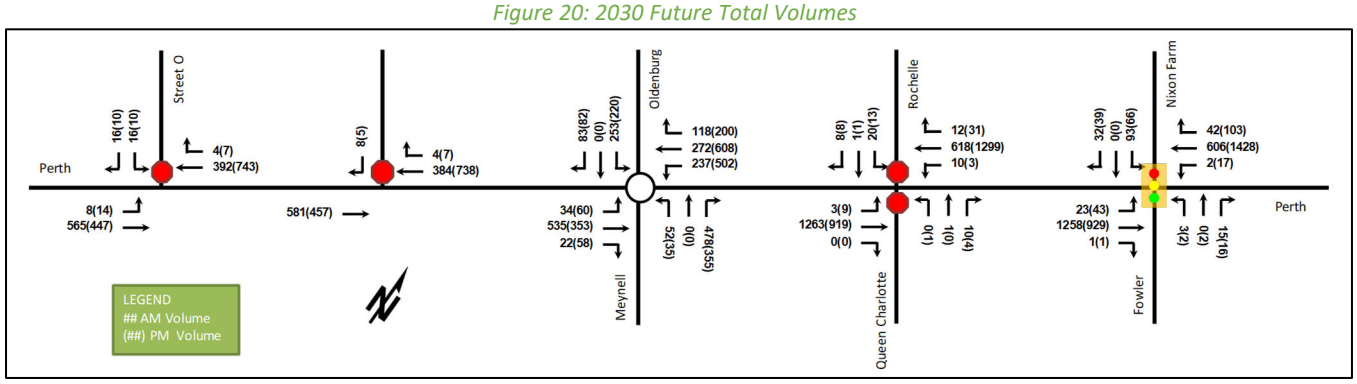


Table 16: 2030 Future Total Access Intersection Operations

Intersection	Lane	AM Peak Hour				PM Peak Hour			
		LOS	V/C	Delay	Q (95th)	LOS	V/C	Delay	Q (95th)
Perth Street & Street O *Unsignalized*	EB	A	0.01	8.1	0.0	A	0.02	9.3	0.8
	WB	-	-	-	-	-	-	-	-
	SB	C	0.08	15.1	2.3	C	0.08	19.8	1.5
	Overall	**A**	**-**	**0.5**	**-**	**A**	**-**	**0.4**	**-**
Perth Street & Street I *Unsignalized*	EBT/R	-	-	-	-	-	-	-	-
	WB	-	-	-	-	-	-	-	-
	SBR	B	0.01	10.5	0.0	B	0.01	13.8	0.0
	Overall	**A**	**-**	**0.1**	**-**	**A**	**-**	**0.1**	**-**

Notes: Saturation flow rate of 1800 veh/h/lane
PHF = 1.00
m = metered queue
# = volume for the 95th %ile cycle exceeds capacity

Overall, the access intersection will operate well during the 2030 future total horizon. No improvements or mitigation are required.

11 Transportation Demand Management

11.1 Context for TDM

The mode shares used within the TIA are representative of the area and no major improvements are anticipated to shift these modes.

The subject site is not within a design priority area.

Total bedrooms within the development are subject to the final unit count and layout selections by purchasers. No age restrictions are noted.

11.2 Need and Opportunity

The subject site has been assumed to rely predominantly on auto travel. The study area intersections are anticipated to have residual capacity and if transit service is increased in the area, there may be a shift from auto that is possible.

11.3 TDM Program

The "suite of post occupancy TDM measures" has been summarized in the TDM checklists for the residential land uses. The checklist is provided in Appendix L. The key TDM measures recommended include:

- Provide a multimodal travel option information package to new residents

OC Transpo has noted no changes to the existing AM service and therefore not further TDM is achievable.

12 Neighbourhood Traffic Management

The proposed development will connect to the arterial road network through the adjacent local and collector road network which requires a review of the traffic thresholds for the roadways, as stipulated within the TIA guidelines. In general, the TIA thresholds are too low for local and collector roadways when considered as two-way volumes. The thresholds may be more applicable as one-way volumes, although they will still be too low for application when considering areas with limited collector road connectivity to arterial roads or where a single collector is accessed by multiple local roadways.

Given the two-way volume definitions, Oldenburg Avenue will be approaching capacity in 2025 background conditions and is forecasted to exceed the TIA threshold prior to 2030 background conditions. Once 6363-6409 Perth Street is built-out, Oldenburg Avenue will increase to over double the threshold by 2030. Operationally, see Section 15.2, the roundabout may experience some constraints on the Oldenburg Avenue leg given the increase of volumes along Perth Street. This is quirk of the roundabout capacity and Perth Street volumes more than an indication that Oldenburg Avenue is suffering due to exceeding the TIA thresholds for a collector road.

For 6295 Perth Street, Rochelle Drive will be under the local road thresholds. Nixon Farm Drive is currently over the local road thresholds and operates more closely as a collector roadway for all the residential area north of Perth Street west of Huntley Road. Nixon Farm Drive is below the collector road thresholds.

Stepping back from the specific roadway thresholds and volumes, the rural nature within Richmond Village limits the ability to feasibly provide solutions beyond the proposed subdivision and boundary roads. Additionally, the under classification of roadways (e.g., Nixon Farm Street) will increase the perceived impacts of the volumes on adjacent roadways and contribute to the thresholds being met, currently or in the future. Overall, the development of the Richmond Village West Development Lands is going to have a relative impact on the local and collector road volumes. The increase in traffic from the subject lands at 6295, 6363, 6409 Perth Street, while exceeding the TIA Guidelines two-way volume thresholds, is not anticipated to have undue impacts on the roads and can be supported.

13 Transit

13.1 Route Capacity

In Section 5.2 the trip generation by mode was estimated, including an estimate of the number of transit trips that will be generated by the proposed development. Table 17 summarizes the transit trip generation.

Table 17: Trip Generation by Transit Mode

Travel Mode	Mode Share	AM Peak Period			PM Peak Period		
		In	Out	Total	In	Out	Total
Transit	5%	0	13	13	11	0	11

The proposed development is anticipated to generate an additional 13 AM peak hour and 11 PM peak hour transit trips. Given the routes along Perth Street, it is likely majority of these trips will be to and from the east. It is unlikely any trips will be west to Munster.

Overall, the forecasted new transit trips would likely be accommodated on the existing service for the peak hour services.

13.2 Transit Priority

No transit priority is required explicitly for this study.

14 Network Concept

The background and forecasted site trips do not exceed the anticipated lane capacities on the boundary road network. The development aligns with the development concepts contemplated in the Richmond CDP and planned infrastructure noted therein.

15 Network Intersection Design

15.1 Network Intersection Control

No change to the existing signalized control is recommended for the network intersections.

15.2 Network Intersection Design

15.2.1 2025 Future Total Network Intersection Operations

The 2025 future total intersection operations are summarized below in Table 18. The level of service for signalized intersections is based on v/c calculations for individual lane movements and HCM 2000 v/c calculations for the overall intersection and HCM 2010 average delay for unsignalized intersections. Synchro 11 has been used to model the unsignalized and signalized intersections, and Sidra 8 to model the study area roundabouts. The synchro and sidra worksheets are provided in Appendix J.

Table 18: 2025 Future Total Network Intersection Operations

Intersection	Lane	AM Peak Hour				PM Peak Hour			
		LOS	V/C	Delay	Q (95th)	LOS	V/C	Delay	Q (95th)
Perth Street & Meynell Road *Roundabout*	EB	A	0.49	7.3	25.4	A	0.44	7.4	21.7
	WB	A	0.34	5.9	17.7	B	0.62	5.9	46.0
	NB	A	0.42	9.5	21.5	A	0.26	7.8	11.6
	SB	A	0.20	10.0	8.4	A	0.33	13.8	16.2
	Overall	**A**	**0.49**	**7.3**	**-**	**B**	**0.62**	**7.4**	**-**
Perth Street & Rochelle Drive/Queen Charlotte Street *Unsignalized*	EBL/T	A	0.00	8.4	0.0	A	0.01	10.1	0.0
	EBT/R	-	-	-	-	-	-	-	-
	WBL	A	0.01	9.9	0.0	A	0.00	9.0	0.0
	WBT/R	-	-	-	-	-	-	-	-
	NB	B	0.03	13.6	0.8	C	0.02	20.3	0.8
	SB	C	0.12	21.1	3.0	D	0.14	31.6	3.8
	Overall	**A**	**-**	**0.6**	**-**	**A**	**-**	**0.6**	**-**
Perth Street & Nixon Farm Drive/Fowler Street *Signalized*	EB	A	0.40	5.5	40.3	A	0.35	4.8	28.2
	WB	A	0.22	4.3	18.8	A	0.50	5.7	49.2
	NB	A	0.07	5.6	3.0	A	0.09	14.7	5.4
	SBL	A	0.45	34.2	22.7	A	0.35	32.1	17.4
	SBT/R	A	0.06	0.2	0.0	A	0.14	4.6	4.0
	Overall	**A**	**0.44**	**6.7**	**-**	**A**	**0.51**	**6.3**	**-**

Notes: Saturation flow rate of 1800 veh/h/lane
PHF = 1.00
m = metered queue
# = volume for the 95th %ile cycle exceeds capacity

The network intersection operations for the 2025 future total horizon operate similar to the 2025 future background conditions. No improvements or mitigation is required.

15.2.2 2030 Future Total Network Intersection Operations

The 2030 future total intersection operations are summarized below in Table 19. The level of service for signalized intersections is based on v/c calculations for individual lane movements and HCM 2000 v/c calculations for the overall intersection and HCM 2010 average delay for unsignalized intersections. Synchro 11 has been used to

model the unsignalized and signalized intersections, and Sidra 8 to model the study area roundabouts. The synchro and sidra worksheets are provided in Appendix K.

Table 19: 2030 Future Total Network Intersection Operations

Intersection	Lane	AM Peak Hour				PM Peak Hour			
		LOS	V/C	Delay	Q (95th)	LOS	V/C	Delay	Q (95th)
Perth Street & Meynell Road/Oldenburg Avenue *Roundabout*	EB	B	0.65	10.7	48.4	B	0.69	16.3	57.4
	WB	A	0.45	6.4	26.4	E	0.91	7.9	163.2
	NB	D	0.84	27.9	98.6	A	0.51	10.2	31.0
	SB	A	0.39	11.3	18.2	E	0.97	80.4	126.2
	Overall	**D**	**0.84**	**13.9**	**-**	**E**	**0.97**	**18.7**	**-**
Perth Street & Rochelle Drive/Queen Charlotte Street *Unsignalized*	EBL/T	A	0.00	8.8	0.0	B	0.02	12.1	0.8
	EBT/R	-	-	-	-	-	-	-	-
	WBL	B	0.02	11.8	0.8	A	0.00	9.9	0.0
	WBT/R	-	-	-	-	-	-	-	-
	NB	C	0.04	18.3	0.8	E	0.05	43.7	1.5
	SB	D	0.19	34.4	5.3	**F**	**0.30**	**77.0**	**1.8**
	Overall	**A**	**-**	**0.7**	**-**	**A**	**-**	**1.0**	**-**
Perth Street & Nixon Farm Drive/Fowler Street *Signalized*	EB	A	0.55	6.9	65.5	A	0.48	5.8	42.3
	WB	A	0.28	4.6	25.1	B	0.66	7.9	84.0
	NB	A	0.07	5.6	3.0	A	0.09	14.7	5.4
	SBL	A	0.45	34.2	22.7	A	0.35	32.1	17.4
	SBT/R	A	0.08	0.3	0.0	A	0.16	12.7	7.6
	Overall	**A**	**0.57**	**7.3**	**-**	**B**	**0.65**	**7.9**	**-**

Notes: Saturation flow rate of 1800 veh/h/lane
PHF = 1.00
m = metered queue
# = volume for the 95th %ile cycle exceeds capacity

The network intersection operations for the 2030 future total horizon will see a degradation of the southbound approaches along Perth Street at Rochelle Drive. Perth Street at Rochelle Drive/Queen Charlotte Street does not meet signal warrants and the warrant is provided in Appendix M.

The increased volumes along Perth Street limit the ability of the southbound left-turn movement at the Perth Street and Rochelle Drive/Queen Charlotte Street intersection. The Nixon Farm Drive/Fowler Street signalized intersection has residual capacity and can accommodate these additional left-turns. The City may investigate the need to implement signage limiting southbound left-turns during the PM peak hours to encourage the use of Nixon Farm Drive and act as an enforcement tool to avoid this constrained movement. As the northbound left-turn movement is a single vehicle, it is anticipated that there will be a vehicle that will attempt to make this movement but does not require any mitigation.

As a sensitivity, Table 20 summarizes the intersection operations if the 13 total southbound left-turns are shifted to the Perth Street and Nixon Farm Drive/Fowler Street intersection, illustrating the road network has residual capacity to accommodate all the development lands in west Richmond Village. The westbound queuing is not anticipated to reach the previous intersection at Lennox Street. The synchro worksheet are provided in Appendix N.

Table 20: 2030 Future Total Network Intersection Operations – PM Peak Diverted Volumes

Intersection	Lane	PM Peak Hour			
		LOS	V/C	Delay	Q (95th)
Perth Street & Nixon Farm Drive/Fowler Street *Signalized*	EB	A	0.49	6.7	49.7
	WB	B	0.68	9.2	98.9
	NB	A	0.08	13.8	5.3
	SBL	A	0.49	34.8	25.3
	SBT/R	A	0.14	11.8	7.5
	Overall	**B**	**0.69**	**9.4**	**-**

Notes: Saturation flow rate of 1800 veh/h/lane
PHF = 1.00
m = metered queue
# = volume for the 95th %ile cycle exceeds capacity

15.2.3 Network Intersection MMLOS

Table 21 summarizes the MMLOS analysis for the network intersections of Perth Street at Nixon Farm Drive/Fowler Street. The existing and future conditions will be the same and are considered in one row. The intersection analysis is based on the policy area of village arterial. The MMLOS worksheets has been provided in Appendix H.

Table 21: Study Area Intersection MMLOS Analysis

Intersection	Pedestrian LOS		Bicycle LOS		Transit LOS		Truck LOS		Auto LOS	
	PLOS	Target	BLOS	Target	TLOS	Target	TrLOS	Target	ALOS	Target
Perth Street & Nixon Farm Drive/Fowler Street	**D**	C	**E**	C	N/A	N/A	N/A	N/A	A/B	D

The MMLOS targets will not be met for the pedestrian and bicycle. The pedestrian level of service would require a maximum of three lanes at a crossing to meet a LOS C. The mixed traffic approaches for cyclists govern the bicycle LOS and require improvements on the approach geometry to meet the target LOS.

No mitigation is recommended as part of this study. The City may investigate the complete reconstruction of the intersection to improve BLOS and the feasibility of lane reductions along Perth Street to improve the PLOS.

While no target is designated for transit in the Village setting, a transit route does travel along Perth Street and would receive a TLOS B.

15.2.4 Recommended Design Elements

No study area intersection design elements are proposed as part of this study.

16 Summary of Improvements Indicated and Modifications Options

The following summarizes the analysis and results presented in this TIA report:

Proposed Site and Screening

- The proposed site includes 139 detached homes and 233 townhomes at 6363-6409 Perth Street, 30 detached homes at 6295 Perth Street
- Accesses will be provided through new local road connections to Perth Street, Cedarstone Street and Oldenburg Avenue/Trammel Road, and have frontage along Mira Court
- The development is proposed to be completed as separate phases
- The trip generation and safety triggers were met for the TIA Screening, and the Design Review modules will be provided for high level context only

Existing Conditions

- Perth Street is an arterial road, and Meynell Road are collector roads in the study area
- Future roadways include local roads and the extensions of the existing local roads
- Sidewalks are provided on Rochelle Drive, Cedarstone Street and both sides of Perth Street
- A low number of collisions were noted on the road network and no patterns were noted
- The existing network intersections operate well during both peaks

Development Generated Travel Demand

- The proposed development is forecasted produce 294 two-way people trips during the AM peak hour and 319 two-way people trips during the PM peak hour from 6363-6409 Perth Street, and 31 two-way people trips during the AM peak hour and 31 two-way people trips during the PM peak hour from 6295 Perth Street
- Of the forecasted people trips, 238 two-way trips will be vehicle trips during the AM peak hour and 241 two-way trips will be vehicle trips during the PM peak hour based on the rural modal shares adjusted for limited transit service
- Of the forecasted trips, 55% are anticipated to travel north, 25% to the east, 15% to the west, and 5% to the south

Background Conditions

- The background developments were explicitly included in the background conditions, along with a total background growth of 1.5% per annum along the peak direction mainline volumes
- The study area intersections will operate similar to the existing conditions with the increased volumes along Perth Street limiting the southbound left-turn from Rochelle Drive during the PM peak

Development Design

- The bike and auto parking areas are to be located at each dwelling unit
- Pedestrian connections will be made to Oldenburg Avenue, Perth Street and Cedarstone Street
- The conceptual traffic calming elements are recommended at the future internal road intersections including bulb-outs to narrow each approach to the intersection and reduce pedestrian crossing distances and on-street parking ultimately alternative sides to the north of the existing phases

Boundary Street Design

- The boundary streets of Perth Street (existing) and Cedarstone Street will not meet pedestrian MMLOS targets, due to boulevard spacing and auto volumes and/or posted speed limits
- The bicycle LOS targets will not be met on Perth Street (existing and south side interim) due to lack of facilities and require the implementation of separated facilities
- No improvements are recommended as part of the proposed subdivisions

Access Intersections Design

- The accesses are proposed as extensions of adjacent local roads and two local road connections to Perth Street
- The accesses along Perth Street will function as a full movement access on Street O and a right-in/right-out access on Street I

- The Street O connection to Perth Street meets the warrants for an eastbound left-turn lane due to the volumes along Perth Street
- While the warrant is met, this would be the case regardless of the volume making the eastbound left-turn movement
- Due to the low volume anticipated to make this movement, less than 25 vehicles in the peak hours, it is recommended that no left-turn lane be constructed along Perth Street, similar to the Joys Road intersections
- Internally and for connections to adjacent development lands, no specific recommendations or design elements are required outside of typical plan of subdivision requirements and City standards

TDM

- Supportive TDM measures to be included within the proposed development should include:
  - Provide a multimodal travel option information package to new residents
- The City has noted no transit service will be provided beyond the existing AM travel and therefore no further TDM is achievable

Neighbourhood Traffic Management

- In general, the TIA thresholds are too low for local and collector roadways when considered as two-way volumes and may be more applicable as one-way volumes, although they will still be too low for applications when considering areas with limited collector road connectivity to arterial roads or where a single collector is accessed by multiple local roadways
- While forecasted volumes will exceed the TIA Guidelines two-way volume thresholds, is not anticipated to have undue impacts on the roads and can be supported.

Transit

- Transit service is currently provided along Perth Street in the peak directions
- To meet forecasted transit use, less than a half a single bus, or equivalent capacity, would be required for peak hour service on local routes
- No specific transit priority measures were considered as part of this development

Network Concept

- The background and forecasted site trips do not exceed the anticipated lane capacities on the boundary road network
- The development aligns with the development concepts contemplated in the Richmond CDP and planned infrastructure noted therein

Network Intersection Design

- Generally, the network intersections will operate well during the future total conditions
- A sensitivity of 13 trips diverting to Nixon Farm Drive from Rochelle Drive can be accommodated at the signalized intersection, should the Rochelle Drive southbound left-turn be restricted by the City
- The MMLOS targets will not be met for the pedestrian and bicycle at Perth Street & Nixon Farm Drive/Fowler Street

- No mitigation is recommended as part of this study, as the City would be required to reduce Perth Street to a maximum of a three-lane cross section to meet the PLOS, require separated bike facilities for the BLOS

17 Conclusion

It is recommended that, from a transportation perspective, the proposed development application proceed.

Prepared By:	Reviewed By:
Andrew Harte, P.Eng. Senior Transportation Engineer	Christopher Gordon, P.Eng. Senior Transportation Engineer

Appendix A

TIA Screening Form and PM Certification Form

13 Markham Avenue
Ottawa ON K2G 3Z1

City of Ottawa 2017 TIA Guidelines
Step 1 - Screening Form

Date: 14-Dec-21
Project Number: 2019-64
Project Reference: 6295, 6363, 6409 Perth St

1.1 Description of Proposed Development	
Municipal Address	6409, 6363, 6295 Perth Street
Description of Location	Existing farm land within the Village of Richmond
Land Use Classification	Development Reserve (DR1)
Approximate Development Size	6406 & 6363 Perth St: 160 singles, 175 towns 6295 Perth St: 33 singles
Accesses	6406 & 6363 Perth St: Connectivity through Fox Run North and Perth Street 6295 Perth St: New connection to Mira Court and Cedarstone Road
Phase of Development	6406 & 6363 Perth St: One or two phases 6295 Perth St: Single phase
Buildout Year	2027
TIA Requirement	Full TIA Required

1.2 Trip Generation Trigger		
Land Use Type	Single-family homes	
Development Size	193	Units
Trip Generation Trigger	Yes	(Approx. 175 townhomes, 193 singles)

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

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

TIA Plan Reports

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

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

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

CERTIFICATION

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

[1,2] License of registration body that oversees the profession is required to have a code of conduct and ethics guidelines that will ensure appropriate conduct and representation for transportation planning and/or transportation engineering works.

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Infrastructure Services and Community Sustainability
Planning and Growth Management
110 Laurier Avenue West, 4th fl.
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Urbanisme et Gestion de la croissance
110, avenue Laurier Ouest
Ottawa (Ontario) K1P 1J1
Tél. : 613-580-2424
Télécopieur: 613-560-6006

Dated at ___Ottawa_____ this __20__ day of _____September_____, 2018.
(City)

Name: _____Andrew Harte_____
(Please Print)

Professional Title: _____Professional Engineer_____

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

Office Contact Information (Please Print)
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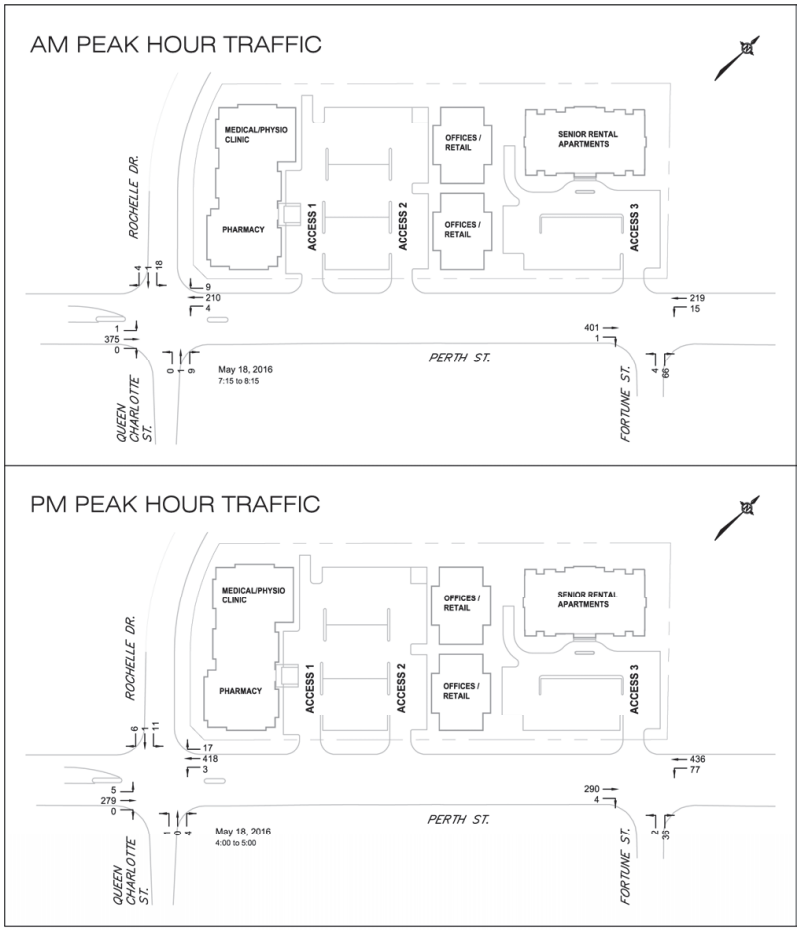
City / Postal Code: Ottawa / K2G 3Z1
Telephone / Extension: (613) 697-3797
E-Mail Address: Andrew.Harte@CGHTransportation.com

Appendix B

Turning Movement Counts

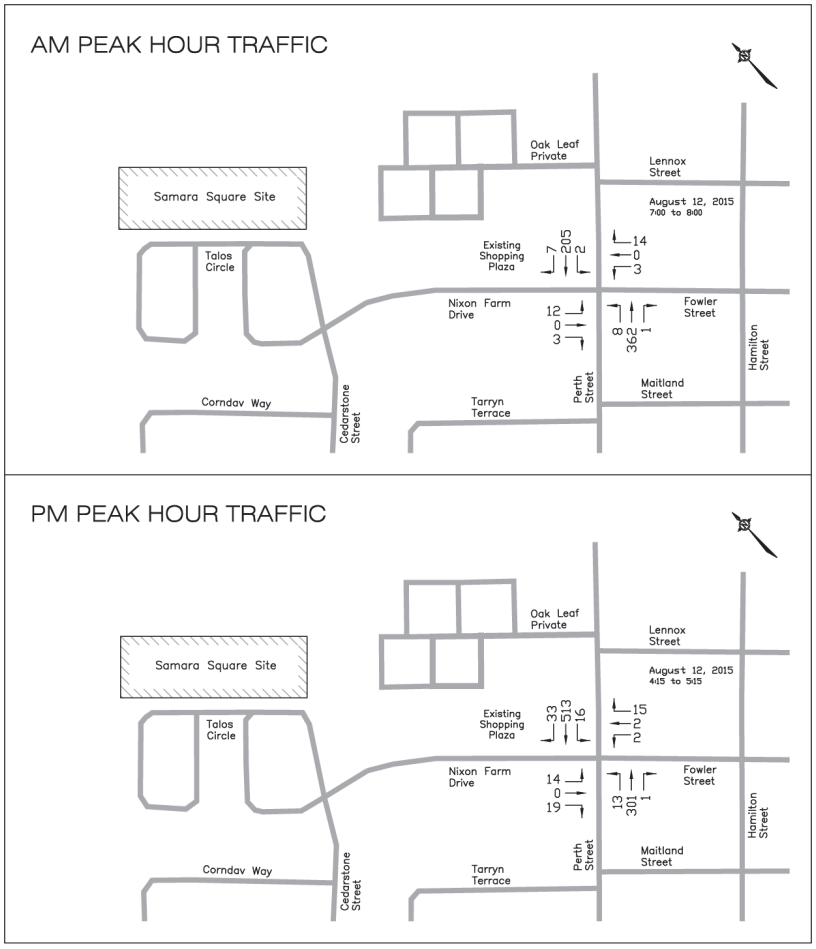
CGH TRANSPORTATION

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



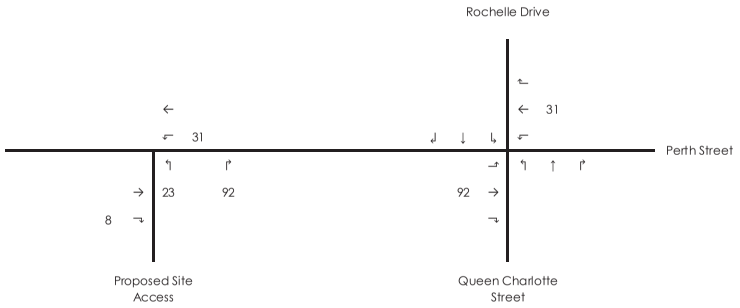
NOT TO SCALE

FIGURE 2.1
YEAR 2015 WEEKDAY PEAK AM AND PM HOUR TRAFFIC COUNTS

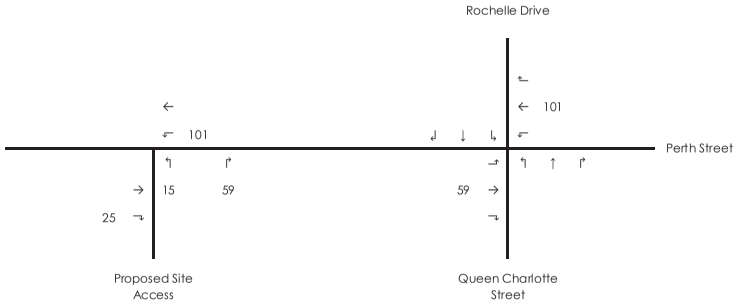


NOT TO SCALE

AM Peak Hour



PM Peak Hour



Stantec

Richmond Village Development Corporation
Richmond Village - Phase 1
Figure 7
Site Traffic

Appendix C

Synchro Intersection Worksheets – Existing Conditions

Intersection	
Int Delay, s/veh	0.7

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	1	516	0	10	287	5	0	1	10	20	1	4
Future Vol, veh/h	1	516	0	10	287	5	0	1	10	20	1	4
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	350	-	-	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	1	573	0	11	319	6	0	1	11	22	1	4

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	325	0	0	573	0	0	922	922	287	633	919	322
Stage 1	-	-	-	-	-	-	575	575	-	344	344	-
Stage 2	-	-	-	-	-	-	347	347	-	289	575	-
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	1233	-	-	998	-	-	238	269	710	378	270	718
Stage 1	-	-	-	-	-	-	471	502	-	671	636	-
Stage 2	-	-	-	-	-	-	668	634	-	695	502	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1233	-	-	998	-	-	234	266	710	367	267	718
Mov Cap-2 Maneuver	-	-	-	-	-	-	234	266	-	367	267	-
Stage 1	-	-	-	-	-	-	471	501	-	670	629	-
Stage 2	-	-	-	-	-	-	655	627	-	682	501	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0	0.3	11	14.9
HCM LOS			B	B

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	616	1233	-	-	998	-	-	392
HCM Lane V/C Ratio	0.02	0.001	-	-	0.011	-	-	0.071
HCM Control Delay (s)	11	7.9	0	-	8.6	-	-	14.9
HCM Lane LOS	B	A	A	-	A	-	-	B
HCM 95th %tile Q(veh)	0.1	0	-	-	0	-	-	0.2

Intersection	
Int Delay, s/veh	2.3

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	425	8	31	260	23	92
Future Vol, veh/h	425	8	31	260	23	92
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	90	90	90	90	90	90
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	472	9	34	289	26	102

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	481	0	834	477
Stage 1	-	-	-	-	477	-
Stage 2	-	-	-	-	357	-
Critical Hdwy	-	-	4.12	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	-	-	2.218	-	3.518	3.318
Pot Cap-1 Maneuver	-	-	1082	-	338	588
Stage 1	-	-	-	-	624	-
Stage 2	-	-	-	-	708	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1082	-	325	588
Mov Cap-2 Maneuver	-	-	-	-	325	-
Stage 1	-	-	-	-	624	-
Stage 2	-	-	-	-	682	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0.9	14.5
HCM LOS			B

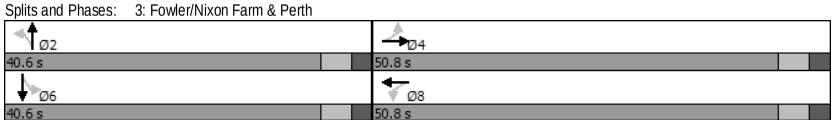
Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	506	-	-	1082	-
HCM Lane V/C Ratio	0.253	-	-	0.032	-
HCM Control Delay (s)	14.5	-	-	8.4	0
HCM Lane LOS	B	-	-	A	A
HCM 95th %tile Q(veh)	1	-	-	0.1	-

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	23	476	1	2	249	42	3	0	15	81	0	32
Future Volume (vph)	23	476	1	2	249	42	3	0	15	81	0	32
Satd. Flow (prot)	0	3309	0	0	3243	0	0	1534	0	1658	1483	0
Flt Permitted		0.930			0.953			0.955		0.744		
Satd. Flow (perm)	0	3084	0	0	3090	0	0	1475	0	1298	1483	0
Satd. Flow (RTOR)					29			33			530	
Lane Group Flow (vph)	0	556	0	0	326	0	0	20	0	90	36	0
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2			6		
Detector Phase	4	4		8	8		2	2		6	6	
Switch Phase												
Minimum Initial (s)	10.0	10.0		10.0	10.0		10.0	10.0		10.0	10.0	
Minimum Split (s)	50.8	50.8		50.8	50.8		25.6	25.6		25.6	25.6	
Total Split (s)	50.8	50.8		50.8	50.8		40.6	40.6		40.6	40.6	
Total Split (%)	55.6%	55.6%		55.6%	55.6%		44.4%	44.4%		44.4%	44.4%	
Yellow Time (s)	3.3	3.3		3.3	3.3		3.3	3.3		3.3	3.3	
All-Red Time (s)	2.5	2.5		2.5	2.5		2.3	2.3		2.3	2.3	
Lost Time Adjust (s)		0.0			0.0			0.0		0.0	0.0	
Total Lost Time (s)		5.8			5.8			5.6		5.6	5.6	
Lead/Lag												
Lead-Lag Optimize?												
Recall Mode	Max	Max		Max	Max		None	None		None	None	
Act Effct Green (s)		53.2			53.2			11.2		11.2	11.2	
Actuated g/C Ratio		0.75			0.75			0.16		0.16	0.16	
v/c Ratio		0.24			0.14			0.08		0.44	0.05	
Control Delay		4.5			3.7			6.6		34.0	0.2	
Queue Delay		0.0			0.0			0.0		0.0	0.0	
Total Delay		4.5			3.7			6.6		34.0	0.2	
LOS		A			A			A		C	A	
Approach Delay		4.5			3.7			6.6			24.4	
Approach LOS		A			A			A			C	
Queue Length 50th (m)		12.3			5.9			0.0		11.7	0.0	
Queue Length 95th (m)		22.5			12.1			3.8		23.7	0.0	
Internal Link Dist (m)		414.4			185.4			258.4			148.6	
Turn Bay Length (m)										15.0		
Base Capacity (vph)		2302			2314			745		641	1000	
Starvation Cap Reductn		0			0			0		0	0	
Spillback Cap Reductn		0			0			0		0	0	
Storage Cap Reductn		0			0			0		0	0	
Reduced v/c Ratio		0.24			0.14			0.03		0.14	0.04	

Intersection Summary
Cycle Length: 91.4
Actuated Cycle Length: 71.2
Natural Cycle: 80
Control Type: Semi Act-Uncoord
Maximum v/c Ratio: 0.44

Intersection Signal Delay: 6.7 Intersection LOS: A
Intersection Capacity Utilization 49.1% ICU Level of Service A
Analysis Period (min) 15

Splits and Phases: 3: Fowler/Nixon Farm & Perth



Intersection	
Int Delay, s/veh	0.5

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	5	393	0	3	581	20	1	0	4	13	1	6
Future Vol, veh/h	5	393	0	3	581	20	1	0	4	13	1	6
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	350	-	-	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	437	0	3	646	22	1	0	4	14	1	7

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	668	0	0	437	0	0	1116	1123	219	894	1112	657
Stage 1	-	-	-	-	-	-	449	449	-	663	663	-
Stage 2	-	-	-	-	-	-	667	674	-	231	449	-
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	920	-	-	1121	-	-	173	205	786	249	208	464
Stage 1	-	-	-	-	-	-	560	571	-	450	458	-
Stage 2	-	-	-	-	-	-	447	453	-	752	571	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	920	-	-	1121	-	-	168	203	786	246	206	464
Mov Cap-2 Maneuver	-	-	-	-	-	-	168	203	-	246	206	-
Stage 1	-	-	-	-	-	-	555	566	-	446	457	-
Stage 2	-	-	-	-	-	-	438	452	-	741	566	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0.1	0	13	18.8
HCM LOS			B	C

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	453	920	-	-	1121	-	-	283
HCM Lane V/C Ratio	0.012	0.006	-	-	0.003	-	-	0.079
HCM Control Delay (s)	13	8.9	0	-	8.2	-	-	18.8
HCM Lane LOS	B	A	A	-	A	-	-	C
HCM 95th %tile Q(veh)	0	0	-	-	0	-	-	0.3

Intersection	
Int Delay, s/veh	2

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	339	25	101	487	15	59
Future Vol, veh/h	339	25	101	487	15	59
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	90	90	90	90	90	90
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	377	28	112	541	17	66

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	405	0	1156	391
Stage 1	-	-	-	-	391	-
Stage 2	-	-	-	-	765	-
Critical Hdwy	-	-	4.12	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	-	-	2.218	-	3.518	3.318
Pot Cap-1 Maneuver	-	-	1154	-	217	658
Stage 1	-	-	-	-	683	-
Stage 2	-	-	-	-	459	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1154	-	187	658
Mov Cap-2 Maneuver	-	-	-	-	187	-
Stage 1	-	-	-	-	683	-
Stage 2	-	-	-	-	395	-

Approach	EB	WB	NB
HCM Control Delay, s	0	1.5	15.2
HCM LOS			C

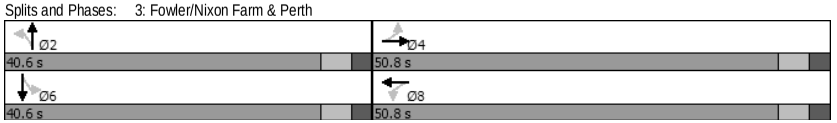
Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	436	-	-	1154	-
HCM Lane V/C Ratio	0.189	-	-	0.097	-
HCM Control Delay (s)	15.2	-	-	8.5	0
HCM Lane LOS	C	-	-	A	A
HCM 95th %tile Q(veh)	0.7	-	-	0.3	-

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	43	378	1	17	645	103	2	2	16	59	0	39
Future Volume (vph)	43	378	1	17	645	103	2	2	16	59	0	39
Satd. Flow (prot)	0	3299	0	0	3246	0	0	1545	0	1658	1483	0
Flt Permitted		0.820			0.941			0.970		0.743		
Satd. Flow (perm)	0	2719	0	0	3058	0	0	1507	0	1297	1483	0
Satd. Flow (RTOR)					27			18			161	
Lane Group Flow (vph)	0	469	0	0	850	0	0	22	0	66	43	0
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2			6		
Detector Phase	4	4		8	8		2	2		6	6	
Switch Phase												
Minimum Initial (s)	10.0	10.0		10.0	10.0		10.0	10.0		10.0	10.0	
Minimum Split (s)	24.8	24.8		24.8	24.8		40.6	40.6		40.6	40.6	
Total Split (s)	50.8	50.8		50.8	50.8		40.6	40.6		40.6	40.6	
Total Split (%)	55.6%	55.6%		55.6%	55.6%		44.4%	44.4%		44.4%	44.4%	
Yellow Time (s)	3.3	3.3		3.3	3.3		3.3	3.3		3.3	3.3	
All-Red Time (s)	2.5	2.5		2.5	2.5		2.3	2.3		2.3	2.3	
Lost Time Adjust (s)		0.0			0.0			0.0		0.0	0.0	
Total Lost Time (s)		5.8			5.8			5.6		5.6	5.6	
Lead/Lag												
Lead-Lag Optimize?												
Recall Mode	Max	Max		Max	Max		None	None		None	None	
Act Effct Green (s)		53.5			53.5			10.5		10.5	10.5	
Actuated g/C Ratio		0.75			0.75			0.15		0.15	0.15	
v/c Ratio		0.23			0.37			0.09		0.34	0.12	
Control Delay		4.1			4.6			14.2		31.9	0.7	
Queue Delay		0.0			0.0			0.0		0.0	0.0	
Total Delay		4.1			4.6			14.2		31.9	0.7	
LOS		A			A			B		C	A	
Approach Delay		4.1			4.6			14.2			19.6	
Approach LOS		A			A			B			B	
Queue Length 50th (m)		10.2			20.2			0.5		8.7	0.0	
Queue Length 95th (m)		17.6			33.0			6.0		18.6	0.0	
Internal Link Dist (m)		414.4			185.4			258.4			148.6	
Turn Bay Length (m)										15.0		
Base Capacity (vph)		2053			2316			757		644	817	
Starvation Cap Reductn		0			0			0		0	0	
Spillback Cap Reductn		0			0			0		0	0	
Storage Cap Reductn		0			0			0		0	0	
Reduced v/c Ratio		0.23			0.37			0.03		0.10	0.05	

Intersection Summary
Cycle Length: 91.4
Actuated Cycle Length: 70.9
Natural Cycle: 70
Control Type: Semi Act-Uncoord
Maximum v/c Ratio: 0.37

Intersection Signal Delay: 5.7 Intersection LOS: A
Intersection Capacity Utilization 59.6% ICU Level of Service B
Analysis Period (min) 15

Splits and Phases: 3: Fowler/Nixon Farm & Perth



Appendix D

Collision Data

Record	LOCATION	X	Y	DATE	TIME	ENVIRONMENT	ROAD_SURFACE_C	TRAFFIC_CONTROL	ACCIDENT_LOCATION	LIGHT	CLASS_OF_ACCIDENT	IMPACT_TYPE
3334	PERTH ST btwn NIXONFARM DR & LENNOX ST (__3ZA42Z)	356559.19470	5006085.72856	2018-03-31	13:31	01 - Clear	01 - Dry	10 - No control	04 - At/near private drive	01 - Daylight	03 - P.D. only	05 - Turning movement
3837	PERTH ST btwn TARRYN TER & NIXONFARM DR (__3ZA42Y)	356484.21252	5006015.87197	2018-04-19	16:01	01 - Clear	01 - Dry	10 - No control	01 - Non intersection	01 - Daylight	03 - P.D. only	03 - Rear end
9192	PERTH ST @ QUEEN CHARLOTTE ST/ROCHELLE DR (0009772)	356182.52500	5005741.36838	2018-10-09	17:20	01 - Clear	01 - Dry	02 - Stop sign	03 - At intersection	01 - Daylight	03 - P.D. only	05 - Turning movement
11342	PERTH ST @ QUEEN CHARLOTTE ST/ROCHELLE DR	356183.55325	5005740.16067	2017-12-11	8:49	01 - Clear	01 - Dry	02 - Stop sign	02 - Intersection related	01 - Daylight	03 - P.D. only	04 - Sideswipe
11343	PERTH ST @ QUEEN CHARLOTTE ST/ROCHELLE DR	356182.83002	5005742.23955	2017-02-20	1:58	01 - Clear	06 - Ice	02 - Stop sign	02 - Intersection related	07 - Dark	02 - Non-fatal injury	07 - SMV other
11344	PERTH ST btwn FRANKTOWN RD & ROCHELLE DR	356143.47607	5005709.23708	2017-06-17	4:28	01 - Clear	01 - Dry	10 - No control	01 - Non intersection	07 - Dark	03 - P.D. only	07 - SMV other
5199	FRANKTOWN RD btwn JOY'S RD & PERTH ST	355445.4472	5005062.869	2016-09-28	3:00	01 - Clear	01 - Dry	10 - No control	01 - Non intersection	07 - Dark	03 - P.D. only	07 - SMV other
2515	PERTH ST btwn FRANKTOWN RD & ROCHELLE DR	356071.2583	5005641.877	2015-12-20	5:41	03 - Snow	06 - Ice	10 - No control	01 - Non intersection	07 - Dark	02 - Non-fatal injury	07 - SMV other
4122	PERTH ST @ QUEEN CHARLOTTE ST/ROCHELLE DR	356182.6065	5005738.934	2015-02-07	4:38	01 - Clear	02 - Wet	02 - Stop sign	02 - Intersection related	07 - Dark	03 - P.D. only	07 - SMV other
7062	PERTH ST btwn FORTUNE ST & TARRYN TER	356366.6312	5005910.146	2015-08-23	5:05	01 - Clear	01 - Dry	10 - No control	01 - Non intersection	07 - Dark	03 - P.D. only	07 - SMV other
7408	PERTH ST btwn FRANKTOWN RD & ROCHELLE DR	356047.4412	5005619.3	2015-03-02	19:05	03 - Snow	06 - Ice	10 - No control	01 - Non intersection	07 - Dark	03 - P.D. only	07 - SMV other
9925	PERTH ST btwn FRANKTOWN RD & ROCHELLE DR	355971.5209	5005549.124	2014-10-13	19:27	02 - Rain	02 - Wet	10 - No control	04 - At/near private drive	07 - Dark	03 - P.D. only	05 - Turning movement
11658	FRANKTOWN RD btwn JOY'S RD & PERTH ST	355306.1519	5004931.19	2014-09-18	7:59	01 - Clear	01 - Dry	10 - No control	01 - Non intersection	01 - Daylight	03 - P.D. only	03 - Rear end

Appendix E

TRANS Background Projection Plots

TRANS Regional Model

Version 2.13 - Assigned December 11, 2019

AM Peak Hour Total Traffic Volume

Richmond Area

2011 Model - Base Scenario

No Modifications from Base Version

User Initials: MM
Plot Prepared: April 21, 2020
EMME Scenario: 21311

Legend

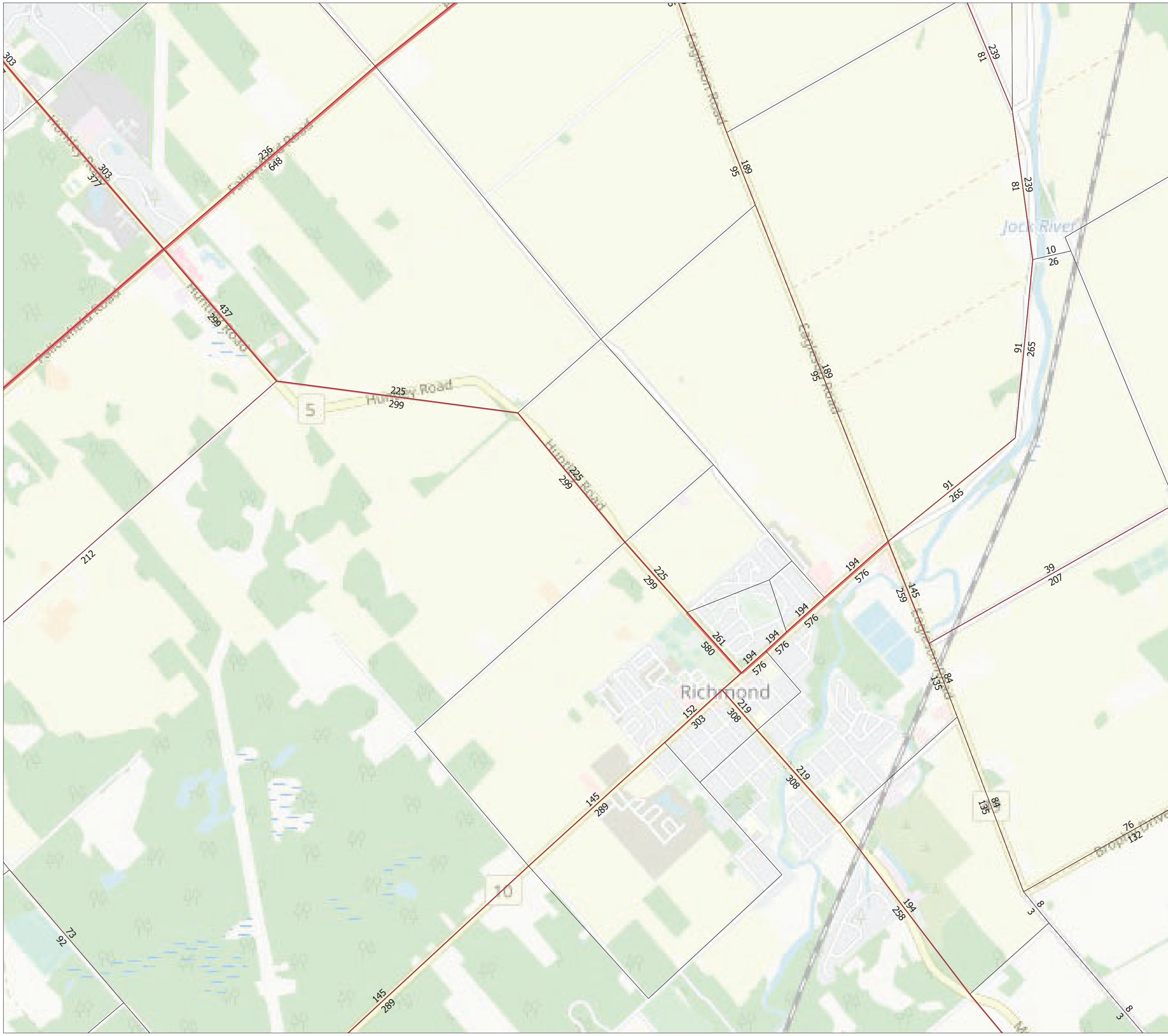
AM Peak Hour Total Traffic Volume

2000 4000 6000 8000 10000

N

Distance (m)

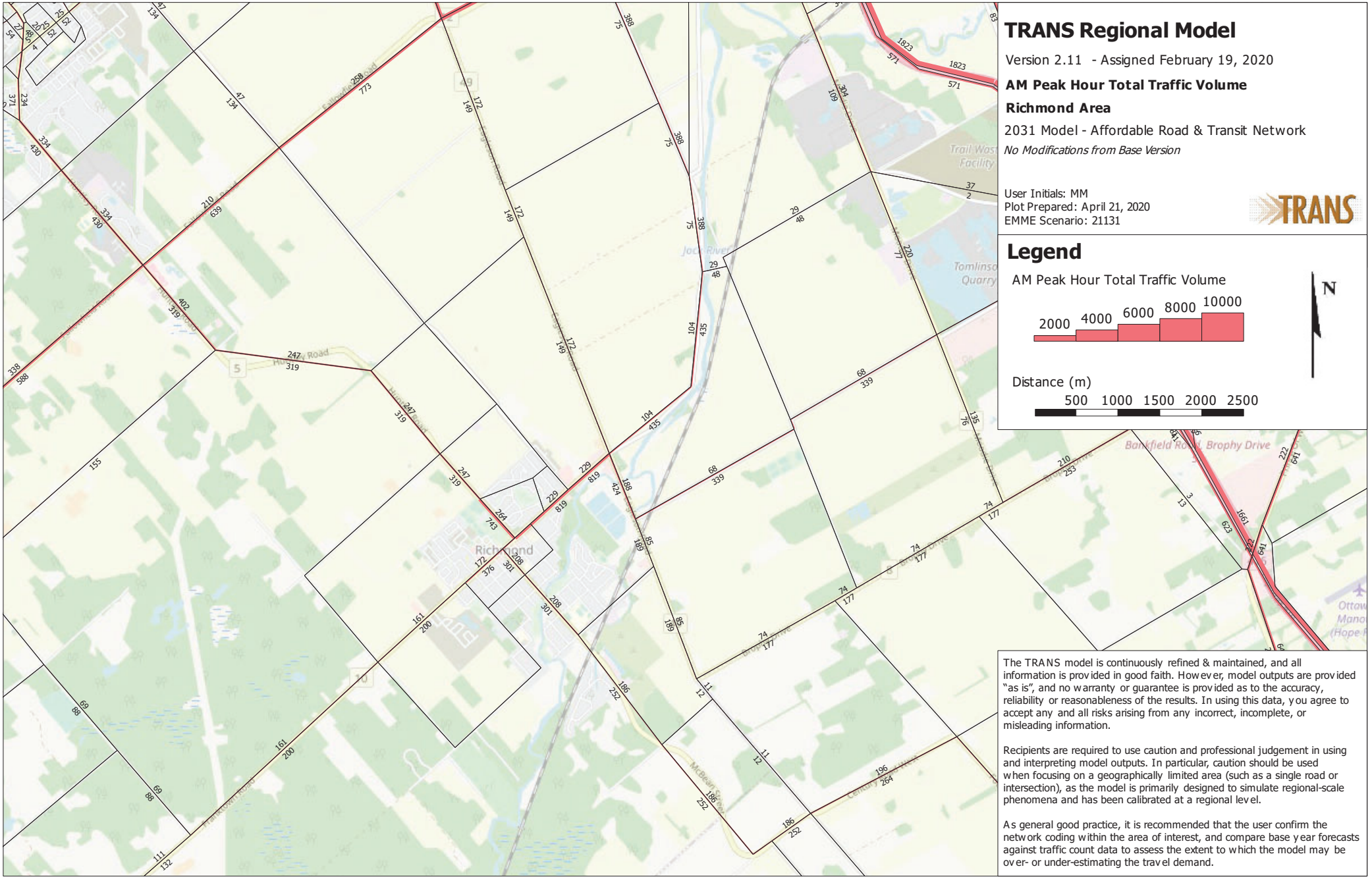
500 1000 1500 2000



The TRANS model is continuously refined & maintained, and all information is provided in good faith. However, model outputs are provided "as is", and no warranty or guarantee is provided as to the accuracy, reliability or reasonableness of the results. In using this data, you agree to accept any and all risks arising from any incorrect, incomplete, or misleading information.

Recipients are required to use caution and professional judgement in using and interpreting model outputs. In particular, caution should be used when focusing on a geographically limited area (such as a single road or intersection), as the model is primarily designed to simulate regional-scale phenomena and has been calibrated at a regional level.

As general good practice, it is recommended that the user confirm the network coding within the area of interest, and compare base year forecasts against traffic count data to assess the extent to which the model may be over- or under-estimating the travel demand.



TRANS Regional Model

Version 2.11 - Assigned February 19, 2020

AM Peak Hour Total Traffic Volume

Richmond Area

2031 Model - Affordable Road & Transit Network

No Modifications from Base Version

User Initials: MM
Plot Prepared: April 21, 2020
EMME Scenario: 21131

Legend

AM Peak Hour Total Traffic Volume

2000 4000 6000 8000 10000

N

Distance (m)

500 1000 1500 2000 2500

The TRANS model is continuously refined & maintained, and all information is provided in good faith. However, model outputs are provided "as is", and no warranty or guarantee is provided as to the accuracy, reliability or reasonableness of the results. In using this data, you agree to accept any and all risks arising from any incorrect, incomplete, or misleading information.

Recipients are required to use caution and professional judgement in using and interpreting model outputs. In particular, caution should be used when focusing on a geographically limited area (such as a single road or intersection), as the model is primarily designed to simulate regional-scale phenomena and has been calibrated at a regional level.

As general good practice, it is recommended that the user confirm the network coding within the area of interest, and compare base year forecasts against traffic count data to assess the extent to which the model may be over- or under-estimating the travel demand.

Appendix F

Synchro Intersection Worksheets – 2025 Future Background Conditions

Intersection	
Int Delay, s/veh	0.6

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	1	790	0	10	419	5	0	1	10	20	1	4
Future Vol, veh/h	1	790	0	10	419	5	0	1	10	20	1	4
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	35	-	-	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	1	790	0	10	419	5	0	1	10	20	1	4

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	424	0	0	790	0	0	1236	1236	395	840	1234	422
Stage 1	-	-	-	-	-	-	792	792	-	442	442	-
Stage 2	-	-	-	-	-	-	444	444	-	398	792	-
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	1133	-	-	828	-	-	142	175	605	271	176	631
Stage 1	-	-	-	-	-	-	349	400	-	594	576	-
Stage 2	-	-	-	-	-	-	592	574	-	600	400	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1133	-	-	828	-	-	139	173	605	263	174	631
Mov Cap-2 Maneuver	-	-	-	-	-	-	139	173	-	263	174	-
Stage 1	-	-	-	-	-	-	348	399	-	593	569	-
Stage 2	-	-	-	-	-	-	580	567	-	587	399	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0	0.2	12.5	18.9
HCM LOS			B	C

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	493	1133	-	-	828	-	-	284
HCM Lane V/C Ratio	0.022	0.001	-	-	0.012	-	-	0.088
HCM Control Delay (s)	12.5	8.2	0	-	9.4	-	-	18.9
HCM Lane LOS	B	A	A	-	A	-	-	C
HCM 95th %tile Q(veh)	0.1	0	-	-	0	-	-	0.3

MOVEMENT SUMMARY

Site: 101 [Perth-Meynell AM FB2025 Green (Site Folder: General)]

6295, 6363, 6409 Perth St
Site Category: (None)
Roundabout

Vehicle Movement Performance														
Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] %	DEMAND FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: Meynell														
1	L2	49	1.0	49	1.0	0.365	12.2	LOS B	2.5	17.4	0.72	0.77	0.72	53.6
2	T1	1	1.0	1	1.0	0.365	7.5	LOS A	2.5	17.4	0.72	0.77	0.72	53.6
3	R2	275	1.0	275	1.0	0.365	7.3	LOS A	2.5	17.4	0.72	0.77	0.72	52.3
Approach		325	1.0	325	1.0	0.365	8.0	LOS A	2.5	17.4	0.72	0.77	0.72	52.5
East: Perth														
4	L2	146	1.0	146	1.0	0.295	9.0	LOS A	2.1	14.7	0.25	0.50	0.25	54.5
5	T1	260	2.0	260	2.0	0.295	4.4	LOS A	2.1	14.7	0.25	0.50	0.25	54.6
6	R2	17	1.0	17	1.0	0.295	4.2	LOS A	2.1	14.7	0.25	0.50	0.25	53.3
Approach		423	1.6	423	1.6	0.295	6.0	LOS A	2.1	14.7	0.25	0.50	0.25	54.5
North: Meynell														
7	L2	34	1.0	34	1.0	0.077	11.0	LOS B	0.4	2.9	0.54	0.65	0.54	53.4
8	T1	1	1.0	1	1.0	0.077	6.4	LOS A	0.4	2.9	0.54	0.65	0.54	53.4
9	R2	39	1.0	39	1.0	0.077	6.1	LOS A	0.4	2.9	0.54	0.65	0.54	52.2
Approach		74	1.0	74	1.0	0.077	8.4	LOS A	0.4	2.9	0.54	0.65	0.54	52.7
West: Perth														
10	L2	10	1.0	10	1.0	0.411	9.9	LOS A	2.8	20.1	0.45	0.52	0.45	54.6
11	T1	482	2.0	482	2.0	0.411	5.3	LOS A	2.8	20.1	0.45	0.52	0.45	54.6
12	R2	19	1.0	19	1.0	0.411	5.0	LOS A	2.8	20.1	0.45	0.52	0.45	53.3
Approach		511	1.9	511	1.9	0.411	5.4	LOS A	2.8	20.1	0.45	0.52	0.45	54.6
All Vehicles		1333	1.6	1333	1.6	0.411	6.4	LOS A	2.8	20.1	0.46	0.58	0.46	53.9

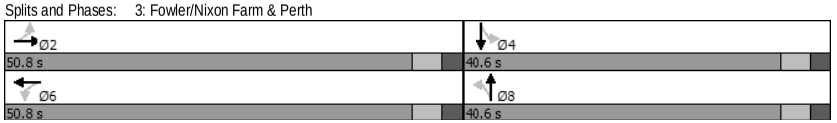
Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Roundabout LOS Method: SIDRA Roundabout LOS.
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
Roundabout Capacity Model: SIDRA Standard.
Delay Model: SIDRA Standard (Geometric Delay is included).
Queue Model: SIDRA Standard.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	23	786	1	2	400	42	3	0	15	81	0	32
Future Volume (vph)	23	786	1	2	400	42	3	0	15	81	0	32
Satd. Flow (prot)	0	3312	0	0	3269	0	0	1536	0	1658	1483	0
Flt Permitted		0.937			0.953			0.949		0.746		
Satd. Flow (perm)	0	3107	0	0	3116	0	0	1469	0	1302	1483	0
Satd. Flow (RTOR)					17			33			382	
Lane Group Flow (vph)	0	810	0	0	444	0	0	18	0	81	32	0
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		2			6			8			4	
Permitted Phases	2			6			8			4		
Detector Phase	2	2		6	6		8	8		4	4	
Switch Phase												
Minimum Initial (s)	10.0	10.0		10.0	10.0		10.0	10.0		10.0	10.0	
Minimum Split (s)	50.8	50.8		50.8	50.8		25.6	25.6		25.6	25.6	
Total Split (s)	50.8	50.8		50.8	50.8		40.6	40.6		40.6	40.6	
Total Split (%)	55.6%	55.6%		55.6%	55.6%		44.4%	44.4%		44.4%	44.4%	
Yellow Time (s)	3.3	3.3		3.3	3.3		3.3	3.3		3.3	3.3	
All-Red Time (s)	2.5	2.5		2.5	2.5		2.3	2.3		2.3	2.3	
Lost Time Adjust (s)		0.0			0.0			0.0		0.0	0.0	
Total Lost Time (s)		5.8			5.8			5.6		5.6	5.6	
Lead/Lag												
Lead-Lag Optimize?												
Recall Mode	Max	Max		Max	Max		None	None		None	None	
Act Effct Green (s)		53.6			53.6			10.9		10.9	10.9	
Actuated g/C Ratio		0.75			0.75			0.15		0.15	0.15	
v/c Ratio		0.35			0.19			0.07		0.41	0.06	
Control Delay		4.9			3.9			5.7		33.4	0.2	
Queue Delay		0.0			0.0			0.0		0.0	0.0	
Total Delay		4.9			3.9			5.7		33.4	0.2	
LOS		A			A			A		C	A	
Approach Delay		4.9			3.9			5.7			24.0	
Approach LOS		A			A			A			C	
Queue Length 50th (m)		18.5			8.3			0.0		10.2	0.0	
Queue Length 95th (m)		31.5			15.4			3.0		20.2	0.0	
Internal Link Dist (m)		414.4			185.4			258.4			148.6	
Turn Bay Length (m)										15.0		
Base Capacity (vph)		2333			2344			741		642	925	
Starvation Cap Reductn		0			0			0		0	0	
Spillback Cap Reductn		0			0			0		0	0	
Storage Cap Reductn		0			0			0		0	0	
Reduced v/c Ratio		0.35			0.19			0.02		0.13	0.03	

Intersection Summary
Cycle Length: 91.4
Actuated Cycle Length: 71.3
Natural Cycle: 80
Control Type: Semi Act-Uncoord
Maximum v/c Ratio: 0.41

Intersection Signal Delay: 6.1 — Intersection LOS: A
Intersection Capacity Utilization 61.4% — ICU Level of Service B
Analysis Period (min) 15

Splits and Phases: 3: Fowler/Nixon Farm & Perth



Intersection	
Int Delay, s/veh	0.4

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	5	609	0	3	816	20	1	0	4	13	1	6
Future Vol, veh/h	5	609	0	3	816	20	1	0	4	13	1	6
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	35	-	-	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	609	0	3	816	20	1	0	4	13	1	6

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	836	0	0	609	0	0	1455	1461	305	1147	1451	826
Stage 1	-	-	-	-	-	-	619	619	-	832	832	-
Stage 2	-	-	-	-	-	-	836	842	-	315	619	-
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	796	-	-	968	-	-	99	128	692	165	130	371
Stage 1	-	-	-	-	-	-	444	479	-	363	383	-
Stage 2	-	-	-	-	-	-	361	379	-	671	479	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	796	-	-	968	-	-	96	126	692	163	128	371
Mov Cap-2 Maneuver	-	-	-	-	-	-	96	126	-	163	128	-
Stage 1	-	-	-	-	-	-	440	475	-	360	382	-
Stage 2	-	-	-	-	-	-	353	378	-	661	475	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0.1	0	16.8	25.8
HCM LOS			C	D

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	309	796	-	-	968	-	-	193
HCM Lane V/C Ratio	0.016	0.006	-	-	0.003	-	-	0.104
HCM Control Delay (s)	16.8	9.6	0	-	8.7	-	-	25.8
HCM Lane LOS	C	A	A	-	A	-	-	D
HCM 95th %tile Q(veh)	0	0	-	-	0	-	-	0.3

MOVEMENT SUMMARY

Site: 101 [Perth-Meynell PM FB2025 Green (Site Folder: General)]

6295, 6363, 6409 Perth St
Site Category: (None)
Roundabout

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] %	DEMAND FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: Meynell														
1	L2	32	1.0	32	1.0	0.237	11.2	LOS B	1.5	10.3	0.62	0.68	0.62	54.4
2	T1	1	1.0	1	1.0	0.237	6.5	LOS A	1.5	10.3	0.62	0.68	0.62	54.4
3	R2	192	1.0	192	1.0	0.237	6.4	LOS A	1.5	10.3	0.62	0.68	0.62	53.0
Approach		225	1.0	225	1.0	0.237	7.1	LOS A	1.5	10.3	0.62	0.68	0.62	53.2
East: Perth														
4	L2	261	1.0	261	1.0	0.535	9.1	LOS A	5.0	35.7	0.28	0.48	0.28	54.6
5	T1	552	2.0	552	2.0	0.535	4.4	LOS A	5.0	35.7	0.28	0.48	0.28	54.7
6	R2	11	1.0	11	1.0	0.535	4.1	LOS A	5.0	35.7	0.28	0.48	0.28	53.4
Approach		824	1.7	824	1.7	0.535	5.9	LOS A	5.0	35.7	0.28	0.48	0.28	54.6
North: Meynell														
7	L2	83	1.0	83	1.0	0.203	14.7	LOS B	1.3	9.2	0.79	0.84	0.79	50.3
8	T1	1	1.0	1	1.0	0.203	10.1	LOS B	1.3	9.2	0.79	0.84	0.79	50.3
9	R2	55	1.0	55	1.0	0.203	9.8	LOS A	1.3	9.2	0.79	0.84	0.79	49.2
Approach		139	1.0	139	1.0	0.203	12.7	LOS B	1.3	9.2	0.79	0.84	0.79	49.9
West: Perth														
10	L2	14	1.0	14	1.0	0.382	10.9	LOS B	2.5	17.6	0.59	0.64	0.59	54.0
11	T1	339	2.0	339	2.0	0.382	6.4	LOS A	2.5	17.6	0.59	0.64	0.59	54.0
12	R2	52	1.0	52	1.0	0.382	6.2	LOS A	2.5	17.6	0.59	0.64	0.59	52.7
Approach		405	1.8	405	1.8	0.382	6.6	LOS A	2.5	17.6	0.59	0.64	0.59	53.8
All Vehicles		1593	1.6	1593	1.6	0.535	6.8	LOS A	5.0	35.7	0.45	0.58	0.45	53.8

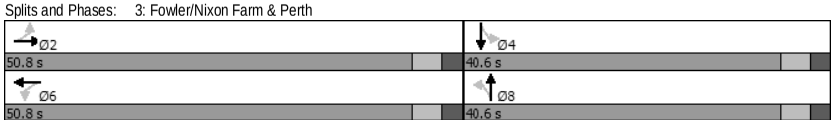
Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Roundabout LOS Method: SIDRA Roundabout LOS.
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
Roundabout Capacity Model: SIDRA Standard.
Delay Model: SIDRA Standard (Geometric Delay is included).
Queue Model: SIDRA Standard.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	43	619	1	17	925	103	2	2	16	59	0	39
Future Volume (vph)	43	619	1	17	925	103	2	2	16	59	0	39
Satd. Flow (prot)	0	3306	0	0	3263	0	0	1549	0	1658	1483	0
Flt Permitted		0.839			0.941			0.967		0.744		
Satd. Flow (perm)	0	2782	0	0	3073	0	0	1505	0	1298	1483	0
Satd. Flow (RTOR)					18			16			90	
Lane Group Flow (vph)	0	663	0	0	1045	0	0	20	0	59	39	0
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		2			6			8			4	
Permitted Phases	2			6			8			4		
Detector Phase	2	2		6	6		8	8		4	4	
Switch Phase												
Minimum Initial (s)	10.0	10.0		10.0	10.0		10.0	10.0		10.0	10.0	
Minimum Split (s)	24.8	24.8		24.8	24.8		40.6	40.6		40.6	40.6	
Total Split (s)	50.8	50.8		50.8	50.8		40.6	40.6		40.6	40.6	
Total Split (%)	55.6%	55.6%		55.6%	55.6%		44.4%	44.4%		44.4%	44.4%	
Yellow Time (s)	3.3	3.3		3.3	3.3		3.3	3.3		3.3	3.3	
All-Red Time (s)	2.5	2.5		2.5	2.5		2.3	2.3		2.3	2.3	
Lost Time Adjust (s)		0.0			0.0			0.0		0.0	0.0	
Total Lost Time (s)		5.8			5.8			5.6		5.6	5.6	
Lead/Lag												
Lead-Lag Optimize?												
Recall Mode	Max	Max		Max	Max		None	None		None	None	
Act Effct Green (s)		54.1			54.1			10.4		10.4	10.4	
Actuated g/C Ratio		0.76			0.76			0.15		0.15	0.15	
v/c Ratio		0.31			0.45			0.09		0.31	0.13	
Control Delay		4.4			5.2			14.9		31.6	1.7	
Queue Delay		0.0			0.0			0.0		0.0	0.0	
Total Delay		4.4			5.2			14.9		31.6	1.7	
LOS		A			A			B		C	A	
Approach Delay		4.4			5.2			14.9			19.7	
Approach LOS		A			A			B			B	
Queue Length 50th (m)		14.7			26.1			0.5		7.5	0.0	
Queue Length 95th (m)		23.6			40.4			5.6		16.0	1.4	
Internal Link Dist (m)		414.4			185.4			258.4			148.6	
Turn Bay Length (m)										15.0		
Base Capacity (vph)		2110			2336			751		641	777	
Starvation Cap Reductn		0			0			0		0	0	
Spillback Cap Reductn		0			0			0		0	0	
Storage Cap Reductn		0			0			0		0	0	
Reduced v/c Ratio		0.31			0.45			0.03		0.09	0.05	

Intersection Summary
Cycle Length: 91.4
Actuated Cycle Length: 71.3
Natural Cycle: 75
Control Type: Semi Act-Uncoord
Maximum v/c Ratio: 0.45

Intersection Signal Delay: 5.8 — Intersection LOS: A
Intersection Capacity Utilization 72.0% — ICU Level of Service C
Analysis Period (min) 15

Splits and Phases: 3: Fowler/Nixon Farm & Perth



Appendix G

Synchro Intersection Worksheets – 2030 Future Background Conditions

CGH TRANSPORTATION

Intersection	
Int Delay, s/veh	0.6

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	1	1141	0	10	562	5	0	1	10	20	1	4
Future Vol, veh/h	1	1141	0	10	562	5	0	1	10	20	1	4
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	35	-	-	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	1	1141	0	10	562	5	0	1	10	20	1	4

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	567	0	0	1141	0	0	1730	1730	571	1158	1728	565
Stage 1	-	-	-	-	-	-	1143	1143	-	585	585	-
Stage 2	-	-	-	-	-	-	587	587	-	573	1143	-
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	1003	-	-	610	-	-	63	88	465	162	88	523
Stage 1	-	-	-	-	-	-	214	274	-	496	497	-
Stage 2	-	-	-	-	-	-	495	496	-	473	274	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1003	-	-	610	-	-	61	86	465	155	86	523
Mov Cap-2 Maneuver	-	-	-	-	-	-	61	86	-	155	86	-
Stage 1	-	-	-	-	-	-	213	273	-	495	489	-
Stage 2	-	-	-	-	-	-	482	488	-	460	273	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0	0.2	16.2	30
HCM LOS			C	D

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	332	1003	-	-	610	-	-	169
HCM Lane V/C Ratio	0.033	0.001	-	-	0.016	-	-	0.148
HCM Control Delay (s)	16.2	8.6	0	-	11	-	-	30
HCM Lane LOS	C	A	A	-	B	-	-	D
HCM 95th %tile Q(veh)	0.1	0	-	-	0.1	-	-	0.5

MOVEMENT SUMMARY

Site: 101 [Perth-Meynell AM FB2030 Green (Site Folder: General)]

6295, 6363, 6409 Perth St
Site Category: (None)
Roundabout

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] %	DEMAND FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: Meynell														
1	L2	52	1.0	52	1.0	0.716	20.4	LOS C	8.9	62.9	0.99	1.16	1.44	48.0
2	T1	1	1.0	1	1.0	0.716	15.7	LOS B	8.9	62.9	0.99	1.16	1.44	48.0
3	R2	478	1.0	478	1.0	0.716	15.5	LOS B	8.9	62.9	0.99	1.16	1.44	47.0
Approach		531	1.0	531	1.0	0.716	16.0	LOS B	8.9	62.9	0.99	1.16	1.44	47.1
East: Perth														
4	L2	237	1.0	237	1.0	0.400	9.2	LOS A	3.2	22.9	0.33	0.52	0.33	54.1
5	T1	260	2.0	260	2.0	0.400	4.6	LOS A	3.2	22.9	0.33	0.52	0.33	54.1
6	R2	69	1.0	69	1.0	0.400	4.3	LOS A	3.2	22.9	0.33	0.52	0.33	52.9
Approach		566	1.5	566	1.5	0.400	6.5	LOS A	3.2	22.9	0.33	0.52	0.33	53.9
North: Meynell														
7	L2	147	1.0	147	1.0	0.242	12.0	LOS B	1.5	10.4	0.66	0.76	0.66	51.9
8	T1	1	1.0	1	1.0	0.242	7.4	LOS A	1.5	10.4	0.66	0.76	0.66	51.9
9	R2	67	1.0	67	1.0	0.242	7.1	LOS A	1.5	10.4	0.66	0.76	0.66	50.8
Approach		215	1.0	215	1.0	0.242	10.5	LOS B	1.5	10.4	0.66	0.76	0.66	51.5
West: Perth														
10	L2	23	1.0	23	1.0	0.552	12.2	LOS B	4.5	32.4	0.71	0.74	0.76	53.3
11	T1	517	2.0	517	2.0	0.552	7.6	LOS A	4.5	32.4	0.71	0.74	0.76	53.3
12	R2	22	1.0	22	1.0	0.552	7.3	LOS A	4.5	32.4	0.71	0.74	0.76	52.1
Approach		562	1.9	562	1.9	0.552	7.8	LOS A	4.5	32.4	0.71	0.74	0.76	53.3
All Vehicles		1874	1.4	1874	1.4	0.716	10.0	LOS B	8.9	62.9	0.67	0.79	0.81	51.4

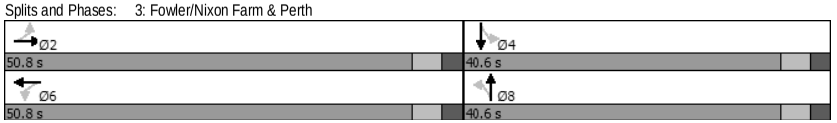
Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Roundabout LOS Method: SIDRA Roundabout LOS.
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
Roundabout Capacity Model: SIDRA Standard.
Delay Model: SIDRA Standard (Geometric Delay is included).
Queue Model: SIDRA Standard.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	23	1136	1	2	543	42	3	0	15	81	0	32
Future Volume (vph)	23	1136	1	2	543	42	3	0	15	81	0	32
Satd. Flow (prot)	0	3312	0	0	3279	0	0	1536	0	1658	1483	0
Flt Permitted		0.938			0.953			0.949		0.746		
Satd. Flow (perm)	0	3110	0	0	3125	0	0	1469	0	1302	1483	0
Satd. Flow (RTOR)					12			33			259	
Lane Group Flow (vph)	0	1160	0	0	587	0	0	18	0	81	32	0
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		2			6			8			4	
Permitted Phases	2			6			8			4		
Detector Phase	2	2		6	6		8	8		4	4	
Switch Phase												
Minimum Initial (s)	10.0	10.0		10.0	10.0		10.0	10.0		10.0	10.0	
Minimum Split (s)	50.8	50.8		50.8	50.8		25.6	25.6		25.6	25.6	
Total Split (s)	50.8	50.8		50.8	50.8		40.6	40.6		40.6	40.6	
Total Split (%)	55.6%	55.6%		55.6%	55.6%		44.4%	44.4%		44.4%	44.4%	
Yellow Time (s)	3.3	3.3		3.3	3.3		3.3	3.3		3.3	3.3	
All-Red Time (s)	2.5	2.5		2.5	2.5		2.3	2.3		2.3	2.3	
Lost Time Adjust (s)		0.0			0.0			0.0		0.0	0.0	
Total Lost Time (s)		5.8			5.8			5.6		5.6	5.6	
Lead/Lag												
Lead-Lag Optimize?												
Recall Mode	Max	Max		Max	Max		None	None		None	None	
Act Effct Green (s)		53.6			53.6			10.9		10.9	10.9	
Actuated g/C Ratio		0.75			0.75			0.15		0.15	0.15	
v/c Ratio		0.50			0.25			0.07		0.41	0.07	
Control Delay		6.0			4.2			5.7		33.4	0.3	
Queue Delay		0.0			0.0			0.0		0.0	0.0	
Total Delay		6.0			4.2			5.7		33.4	0.3	
LOS		A			A			A		C	A	
Approach Delay		6.0			4.2			5.7			24.1	
Approach LOS		A			A			A			C	
Queue Length 50th (m)		31.3			11.9			0.0		10.2	0.0	
Queue Length 95th (m)		52.6			21.1			3.0		20.2	0.0	
Internal Link Dist (m)		414.4			185.4			258.4			148.6	
Turn Bay Length (m)										15.0		
Base Capacity (vph)		2336			2350			741		642	863	
Starvation Cap Reductn		0			0			0		0	0	
Spillback Cap Reductn		0			0			0		0	0	
Storage Cap Reductn		0			0			0		0	0	
Reduced v/c Ratio		0.50			0.25			0.02		0.13	0.04	

Intersection Summary
Cycle Length: 91.4
Actuated Cycle Length: 71.3
Natural Cycle: 80
Control Type: Semi Act-Uncoord
Maximum v/c Ratio: 0.50

Intersection Signal Delay: 6.6	Intersection LOS: A
Intersection Capacity Utilization 71.4%	ICU Level of Service C
Analysis Period (min) 15	

Splits and Phases: 3: Fowler/Nixon Farm & Perth



Intersection	
Int Delay, s/veh	0.7

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↳			↕			↕	
Traffic Vol, veh/h	5	842	0	3	1195	20	1	0	4	13	1	6
Future Vol, veh/h	5	842	0	3	1195	20	1	0	4	13	1	6
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	35	-	-	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	842	0	3	1195	20	1	0	4	13	1	6

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	1215	0	0	842	0	0	2067	2073	421	1642	2063	1205
Stage 1	-	-	-	-	-	-	852	852	-	1211	1211	-
Stage 2	-	-	-	-	-	-	1215	1221	-	431	852	-
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	572	-	-	792	-	-	35	54	582	73	54	223
Stage 1	-	-	-	-	-	-	321	375	-	222	254	-
Stage 2	-	-	-	-	-	-	221	251	-	574	375	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	572	-	-	792	-	-	33	53	582	71	53	223
Mov Cap-2 Maneuver	-	-	-	-	-	-	33	53	-	71	53	-
Stage 1	-	-	-	-	-	-	316	369	-	218	253	-
Stage 2	-	-	-	-	-	-	213	250	-	561	369	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0.2	0	32.9	58.3
HCM LOS			D	F

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	134	572	-	-	792	-	-	87
HCM Lane V/C Ratio	0.037	0.009	-	-	0.004	-	-	0.23
HCM Control Delay (s)	32.9	11.3	0.1	-	9.6	-	-	58.3
HCM Lane LOS	D	B	A	-	A	-	-	F
HCM 95th %tile Q(veh)	0.1	0	-	-	0	-	-	0.8

MOVEMENT SUMMARY

Site: 101 [Perth-Meynell PM FB2030 Green (Site Folder: General)]

6295, 6363, 6409 Perth St
Site Category: (None)
Roundabout

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] %	DEMAND FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: Meynell														
1	L2	35	1.0	35	1.0	0.459	12.7	LOS B	3.5	24.6	0.79	0.82	0.82	53.4
2	T1	1	1.0	1	1.0	0.459	8.0	LOS A	3.5	24.6	0.79	0.82	0.82	53.4
3	R2	355	1.0	355	1.0	0.459	7.8	LOS A	3.5	24.6	0.79	0.82	0.82	52.2
Approach		391	1.0	391	1.0	0.459	8.2	LOS A	3.5	24.6	0.79	0.82	0.82	52.3
East: Perth														
4	L2	502	1.0	502	1.0	0.813	9.8	LOS A	14.0	99.1	0.63	0.51	0.63	53.0
5	T1	592	2.0	592	2.0	0.813	5.2	LOS A	14.0	99.1	0.63	0.51	0.63	53.0
6	R2	110	1.0	110	1.0	0.813	5.0	LOS A	14.0	99.1	0.63	0.51	0.63	51.8
Approach		1204	1.5	1204	1.5	0.813	7.1	LOS A	14.0	99.1	0.63	0.51	0.63	52.9
North: Meynell														
7	L2	153	1.0	153	1.0	0.554	28.1	LOS C	5.3	37.7	1.00	1.13	1.36	42.4
8	T1	1	1.0	1	1.0	0.554	23.4	LOS C	5.3	37.7	1.00	1.13	1.36	42.5
9	R2	72	1.0	72	1.0	0.554	23.2	LOS C	5.3	37.7	1.00	1.13	1.36	41.7
Approach		226	1.0	226	1.0	0.554	26.5	LOS C	5.3	37.7	1.00	1.13	1.36	42.2
West: Perth														
10	L2	39	1.0	39	1.0	0.565	15.9	LOS B	5.2	37.1	0.88	0.97	1.08	51.0
11	T1	339	2.0	339	2.0	0.565	11.3	LOS B	5.2	37.1	0.88	0.97	1.08	51.0
12	R2	58	1.0	58	1.0	0.565	11.0	LOS B	5.2	37.1	0.88	0.97	1.08	49.9
Approach		436	1.8	436	1.8	0.565	11.7	LOS B	5.2	37.1	0.88	0.97	1.08	50.9
All Vehicles		2257	1.4	2257	1.4	0.813	10.1	LOS B	14.0	99.1	0.75	0.71	0.82	51.1

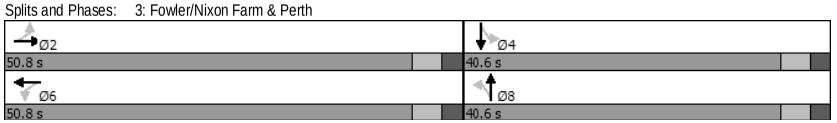
Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Roundabout LOS Method: SIDRA Roundabout LOS.
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
Roundabout Capacity Model: SIDRA Standard.
Delay Model: SIDRA Standard (Geometric Delay is included).
Queue Model: SIDRA Standard.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	43	852	1	17	1313	103	2	2	16	59	0	39
Future Volume (vph)	43	852	1	17	1313	103	2	2	16	59	0	39
Satd. Flow (prot)	0	3309	0	0	3276	0	0	1549	0	1658	1483	0
Flt Permitted		0.820			0.941			0.967		0.744		
Satd. Flow (perm)	0	2719	0	0	3086	0	0	1505	0	1298	1483	0
Satd. Flow (RTOR)					12			16			33	
Lane Group Flow (vph)	0	896	0	0	1433	0	0	20	0	59	39	0
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		2			6			8			4	
Permitted Phases	2			6			8			4		
Detector Phase	2	2		6	6		8	8		4	4	
Switch Phase												
Minimum Initial (s)	10.0	10.0		10.0	10.0		10.0	10.0		10.0	10.0	
Minimum Split (s)	24.8	24.8		24.8	24.8		40.6	40.6		40.6	40.6	
Total Split (s)	50.8	50.8		50.8	50.8		40.6	40.6		40.6	40.6	
Total Split (%)	55.6%	55.6%		55.6%	55.6%		44.4%	44.4%		44.4%	44.4%	
Yellow Time (s)	3.3	3.3		3.3	3.3		3.3	3.3		3.3	3.3	
All-Red Time (s)	2.5	2.5		2.5	2.5		2.3	2.3		2.3	2.3	
Lost Time Adjust (s)		0.0			0.0			0.0		0.0	0.0	
Total Lost Time (s)		5.8			5.8			5.6		5.6	5.6	
Lead/Lag												
Lead-Lag Optimize?												
Recall Mode	Max	Max		Max	Max		None	None		None	None	
Act Effct Green (s)		54.1			54.1			10.4		10.4	10.4	
Actuated g/C Ratio		0.76			0.76			0.15		0.15	0.15	
v/c Ratio		0.43			0.61			0.09		0.31	0.16	
Control Delay		5.3			7.0			14.9		31.6	12.9	
Queue Delay		0.0			0.0			0.0		0.0	0.0	
Total Delay		5.3			7.0			14.9		31.6	12.9	
LOS		A			A			B		C	B	
Approach Delay		5.3			7.0			14.9			24.1	
Approach LOS		A			A			B			C	
Queue Length 50th (m)		22.6			44.7			0.5		7.5	0.7	
Queue Length 95th (m)		35.8			69.3			5.6		16.0	7.7	
Internal Link Dist (m)		414.4			185.4			258.4			148.6	
Turn Bay Length (m)										15.0		
Base Capacity (vph)		2063			2344			751		641	749	
Starvation Cap Reductn		0			0			0		0	0	
Spillback Cap Reductn		0			0			0		0	0	
Storage Cap Reductn		0			0			0		0	0	
Reduced v/c Ratio		0.43			0.61			0.03		0.09	0.05	

Intersection Summary
Cycle Length: 91.4
Actuated Cycle Length: 71.3
Natural Cycle: 90
Control Type: Semi Act-Uncoord
Maximum v/c Ratio: 0.61

Intersection Signal Delay: 7.1 — Intersection LOS: A
Intersection Capacity Utilization 78.1% — ICU Level of Service D
Analysis Period (min) 15

Splits and Phases: 3: Fowler/Nixon Farm & Perth



Appendix H

MMLOS Analysis

CGH TRANSPORTATION

Multi-Modal Level of Service - Intersections Form

Consultant	CGH Transportation	**Project**	6295, 6363, 6409 Perth,
Scenario	Existing and Future		6305 Ottawa
Comments		**Date**	14-Dec-21

INTERSECTIONS		**Perth & Nixon Farm/Fowler**			
	Crossing Side	**NORTH**	**SOUTH**	**EAST**	**WEST**
Pedestrian	Lanes	3	0 - 2	4	4
	Median	No Median - 2.4 m	No Median - 2.4 m	No Median - 2.4 m	No Median - 2.4 m
	Conflicting Left Turns	Permissive	Permissive	Permissive	Permissive
	Conflicting Right Turns	Permissive or yield control	Permissive or yield control	Permissive or yield control	Permissive or yield control
	Right Turns on Red (RToR) ?	RTOR allowed	RTOR allowed	RTOR allowed	RTOR allowed
	Ped Signal Leading Interval?	No	No	No	No
	Right Turn Channel	No Channel	No Channel	No Channel	No Channel
	Corner Radius	5-10m	5-10m	5-10m	5-10m
	Crosswalk Type	Std transverse markings	Std transverse markings	Std transverse markings	Std transverse markings
	PETSI Score	**71**	**86**	**54**	**54**
	Ped. Exposure to Traffic LoS	**C**	**B**	**D**	**D**
	Cycle Length	50	50	40	40
	Effective Walk Time	19	19	20	20
	Average Pedestrian Delay	**10**	**10**	**5**	**5**
	Pedestrian Delay LoS	**B**	**B**	**A**	**A**
	Level of Service	**C**	**B**	**D**	**D**
		D			
	Approach From	**NORTH**	**SOUTH**	**EAST**	**WEST**
Bicycle	Bicycle Lane Arrangement on Approach				
	Right Turn Lane Configuration				
	Right Turning Speed				
	Cyclist relative to RT motorists	-	-	-	-
	Separated or Mixed Traffic	-	-	-	-
	Left Turn Approach	One lane crossed	One lane crossed	One lane crossed	One lane crossed
	Operating Speed	> 40 to ≤ 50 km/h	> 40 to ≤ 50 km/h	> 50 to < 60 km/h	> 50 to < 60 km/h
	Left Turning Cyclist	**D**	**D**	**E**	**E**
	Level of Service	-	-	-	-
		-			
Transit	Average Signal Delay			≤ 10 sec	≤ 10 sec
	Level of Service	-	-	**B**	**B**
		B			
Truck	Effective Corner Radius				
	Number of Receiving Lanes on Departure from Intersection				
	Level of Service	-	-	-	-
		-			
Auto	Volume to Capacity Ratio	0.61 - 0.70			
	Level of Service	**B**			

Multi-Modal Level of Service - Segments Form

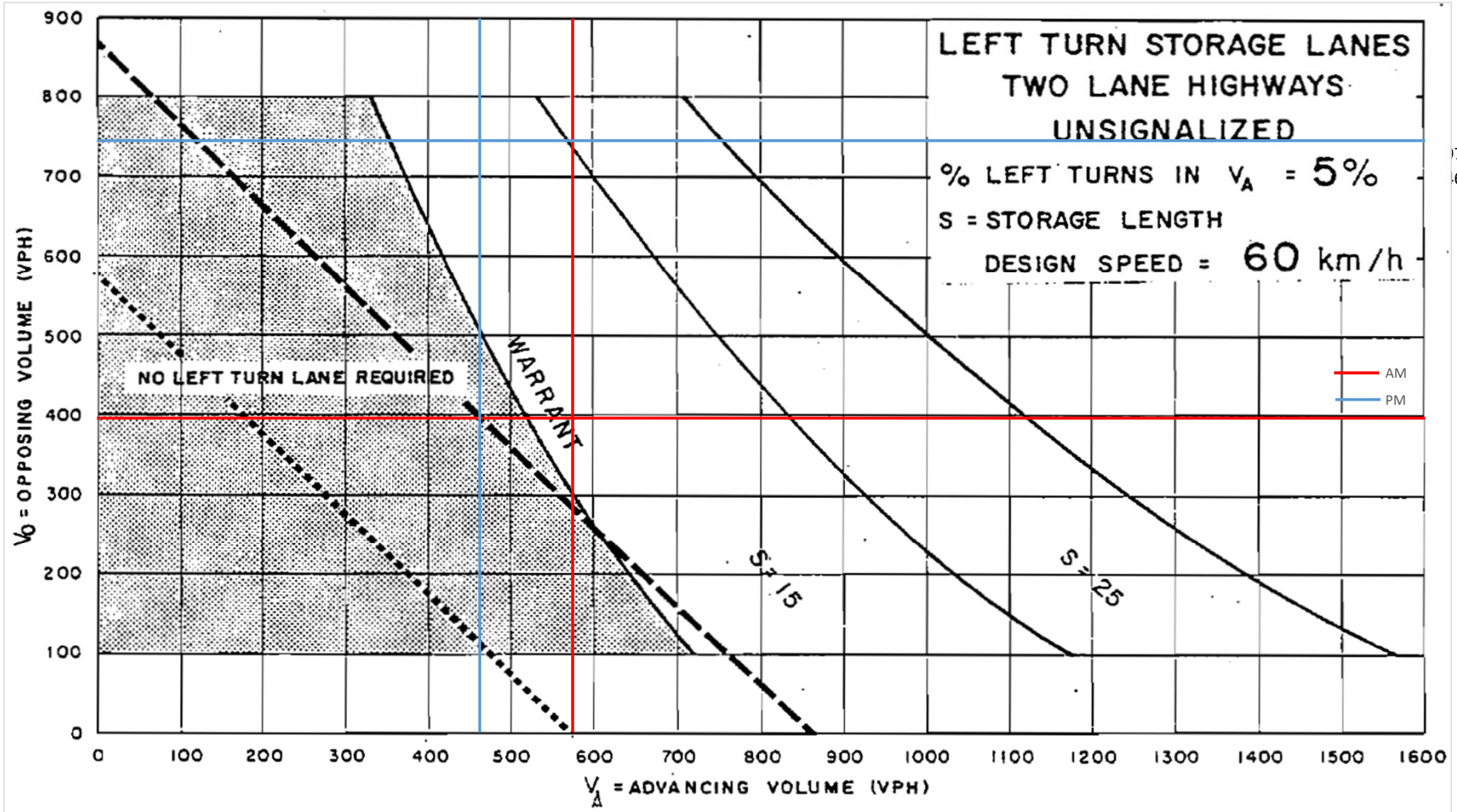
Consultant	CGH Transportation	**Project**	6295, 6363, 6409 Perth
Scenario	Existing and Future		
Comments		**Date**	14-Dec-21

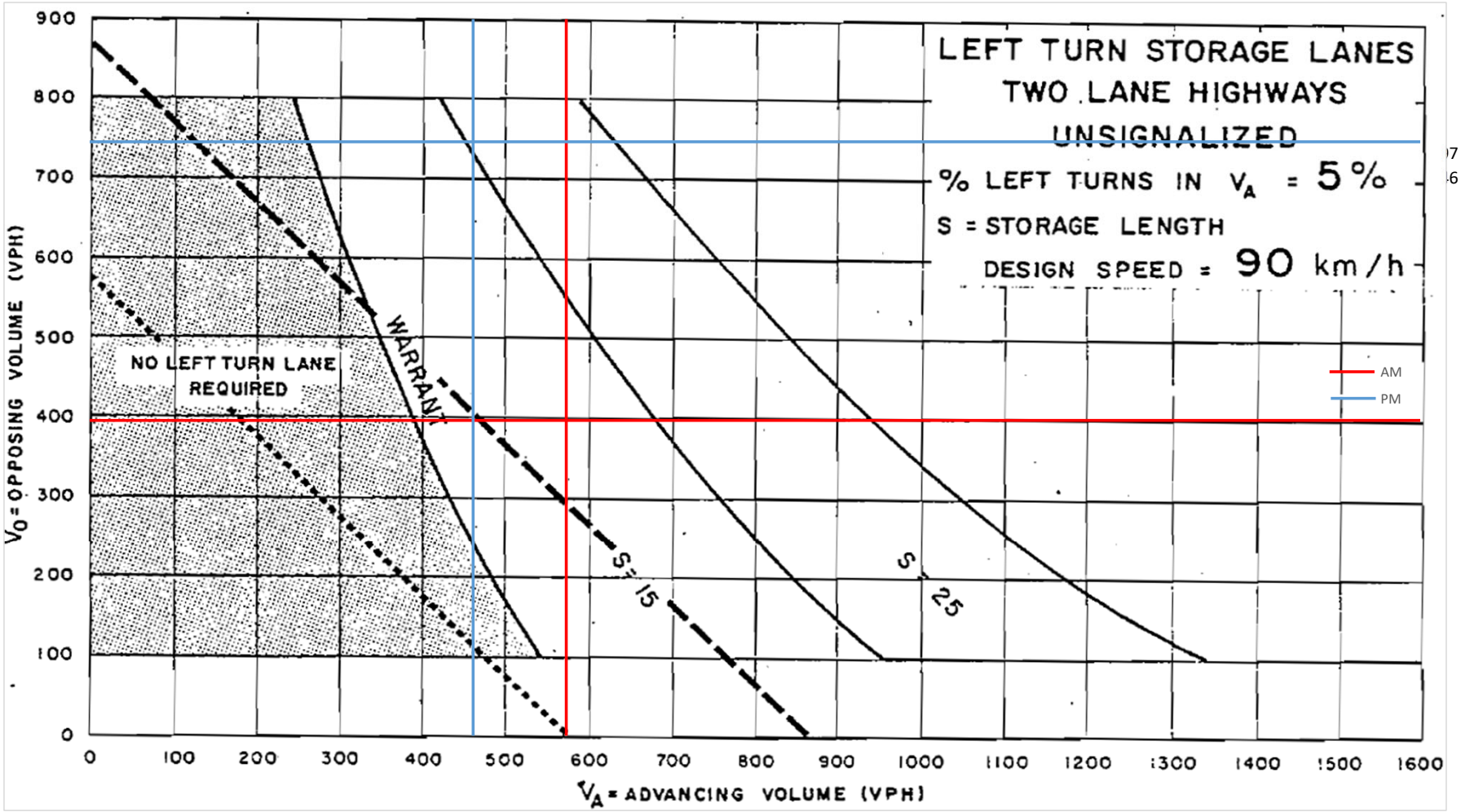
SEGMENTS		Street A	Oldenburg	Ex. Perth	Mira	Cedarstone	Int. Perth N	Int. Perth S	Fut. Perth
			1	2	3	4	5	6	7
Pedestrian	Sidewalk Width Boulevard Width	E	1.8 m < 0.5 m	no sidewalk n/a	no sidewalk n/a	1.5 m < 0.5 m	≥ 2 m > 2 m	no sidewalk n/a	≥ 2 m > 2 m
	Avg Daily Curb Lane Traffic Volume		> 3000	> 3000	≤ 3000	≤ 3000	> 3000	> 3000	> 3000
	Operating Speed On-Street Parking		> 30 to 50 km/h yes	> 60 km/h no	> 30 to 50 km/h yes	> 30 to 50 km/h yes	> 50 to 60 km/h no	> 50 to 60 km/h no	> 50 to 60 km/h no
	Exposure to Traffic PLoS		**C**	**F**	**F**	**E**	**C**	**F**	**C**
	Effective Sidewalk Width		1.5 m			1.5 m	2.0 m		2.0 m
	Pedestrian Volume		250 ped/hr			250 ped/hr	250 ped/hr		250 ped/hr
	Crowding PLoS		**B**	-	-	**B**	**B**	-	**B**
	Level of Service		**C**	**-**	**-**	**E**	**C**	**-**	**C**
Bicycle	Type of Cycling Facility	F	Mixed Traffic	Mixed Traffic	Mixed Traffic	Mixed Traffic	Physically Separated	Curbside Bike Lane	Physically Separated
	Number of Travel Lanes		≤ 2 (no centreline)	2-3 lanes total	≤ 2 (no centreline)	≤ 2 (no centreline)		≤ 1 each direction	
	Operating Speed		≤ 40 km/h	≥ 60 km/h	≤ 40 km/h	≤ 40 km/h		>50 to 70 km/h	
	# of Lanes & Operating Speed LoS		**A**	**F**	**A**	**A**	-	**C**	-
	Bike Lane (+ Parking Lane) Width							≥1.5 to <1.8 m	
	Bike Lane Width LoS		-	-	-	-	-	**B**	-
	Bike Lane Blockages							Rare	
	Blockage LoS		-	-	-	-	-	**A**	-
	Median Refuge Width (no median = < 1.8 m)		< 1.8 m refuge	< 1.8 m refuge	< 1.8 m refuge	< 1.8 m refuge		< 1.8 m refuge	
	No. of Lanes at Unsignalized Crossing		≤ 3 lanes	≤ 3 lanes	≤ 3 lanes	≤ 3 lanes		≤ 3 lanes	
	Sidestreet Operating Speed		≤ 40 km/h	>40 to 50 km/h	≤ 40 km/h	≤ 40 km/h		>40 to 50 km/h	
	Unsignalized Crossing - Lowest LoS		**A**	**A**	**A**	**A**	**A**	**A**	**A**
	Level of Service		**A**	**F**	**A**	**A**	**A**	**C**	**A**
Transit	Facility Type	D		Mixed Traffic			Mixed Traffic	Mixed Traffic	Mixed Traffic
	Friction or Ratio Transit:Posted Speed			Vt/Vp ≥ 0.8			Vt/Vp ≥ 0.8	Vt/Vp ≥ 0.8	Vt/Vp ≥ 0.8
	Level of Service		**-**	**D**	**-**	**-**	**D**	**D**	**D**
Truck	Truck Lane Width	C		≤ 3.5 m			≤ 3.5 m	≤ 3.5 m	≤ 3.5 m
	Travel Lanes per Direction			1			1	1	1
	Level of Service		**-**	**C**	**-**	**-**	**C**	**C**	**C**
Auto	**Level of Service**	**Not Applicable**							

Appendix I

Left-Turn Warrant

Design Speed	Eastbound Left	Yes																
90 km/h		EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	%Left Turn	Volume Advancing	Volume Opposing		
or		AM	8	565	0	0	392	4	0	0	0	16	0	16	1.4%	573	396	
60		PM	14	447	0	0	738	8	0	0	0	10	0	10	3.0%	461	746	


LEFT TURN STORAGE LANES
TWO LANE HIGHWAYS
UNSIGNALIZED
% LEFT TURNS IN V_A = 5%
S = STORAGE LENGTH
DESIGN SPEED = 60 km/h
NO LEFT TURN LANE REQUIRED
WARRANT
S = 15
S = 25
AM
PM
V_O = OPPOSING VOLUME (VPH)
V_A = ADVANCING VOLUME (VPH)
0
100
200
300
400
500
600
700
800
900
1000
1100
1200
1300
1400
1500
1600


LEFT TURN STORAGE LANES
TWO LANE HIGHWAYS
UNSIGNALIZED
% LEFT TURNS IN V_A = 5 %
S = STORAGE LENGTH
DESIGN SPEED = 90 km/h
NO LEFT TURN LANE REQUIRED
WARRANT
S = 15
S = 25
AM
PM
V_O = OPPOSING VOLUME (VPH)
V_A = ADVANCING VOLUME (VPH)
0
100
200
300
400
500
600
700
800
900
1000
1100
1200
1300
1400
1500
1600

Appendix J

Synchro Intersection Worksheets – 2025 Future Total Conditions

Intersection	
Int Delay, s/veh	0.6

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↱			↕			↕	
Traffic Vol, veh/h	3	912	0	10	475	12	0	1	10	20	1	8
Future Vol, veh/h	3	912	0	10	475	12	0	1	10	20	1	8
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	35	-	-	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	3	912	0	10	475	12	0	1	10	20	1	8

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	487	0	0	912	0	0	1424	1425	456	964	1419	481
Stage 1	-	-	-	-	-	-	918	918	-	501	501	-
Stage 2	-	-	-	-	-	-	506	507	-	463	918	-
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	1074	-	-	745	-	-	104	135	552	222	136	584
Stage 1	-	-	-	-	-	-	293	350	-	551	542	-
Stage 2	-	-	-	-	-	-	548	538	-	549	350	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1074	-	-	745	-	-	100	132	552	214	133	584
Mov Cap-2 Maneuver	-	-	-	-	-	-	100	132	-	214	133	-
Stage 1	-	-	-	-	-	-	291	348	-	548	535	-
Stage 2	-	-	-	-	-	-	532	531	-	534	348	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0	0.2	13.6	21.1
HCM LOS			B	C

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	428	1074	-	-	745	-	-	253
HCM Lane V/C Ratio	0.026	0.003	-	-	0.013	-	-	0.115
HCM Control Delay (s)	13.6	8.4	0	-	9.9	-	-	21.1
HCM Lane LOS	B	A	A	-	A	-	-	C
HCM 95th %tile Q(veh)	0.1	0	-	-	0	-	-	0.4

MOVEMENT SUMMARY

Site: 101 [Perth-Meynell AM FT2025 (Site Folder: General)]

6295, 6363, 6409 Perth St & 6305 Ottawa St
Site Category: (None)
Roundabout

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] %	DEMAND FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: Meynell														
1	L2	49	1.0	49	1.0	0.419	13.6	LOS B	3.0	21.5	0.82	0.86	0.84	52.5
2	T1	1	1.0	1	1.0	0.419	9.0	LOS A	3.0	21.5	0.82	0.86	0.84	52.5
3	R2	275	1.0	275	1.0	0.419	8.7	LOS A	3.0	21.5	0.82	0.86	0.84	51.3
Approach		325	1.0	325	1.0	0.419	9.5	LOS A	3.0	21.5	0.82	0.86	0.84	51.5
East: Perth														
4	L2	146	1.0	146	1.0	0.341	9.1	LOS A	2.5	17.7	0.29	0.50	0.29	54.6
5	T1	272	2.0	272	2.0	0.341	4.5	LOS A	2.5	17.7	0.29	0.50	0.29	54.6
6	R2	66	1.0	66	1.0	0.341	4.3	LOS A	2.5	17.7	0.29	0.50	0.29	53.3
Approach		484	1.6	484	1.6	0.341	5.9	LOS A	2.5	17.7	0.29	0.50	0.29	54.4
North: Meynell														
7	L2	140	1.0	140	1.0	0.206	11.3	LOS B	1.2	8.4	0.60	0.73	0.60	52.2
8	T1	1	1.0	1	1.0	0.206	6.7	LOS A	1.2	8.4	0.60	0.73	0.60	52.3
9	R2	55	1.0	55	1.0	0.206	6.5	LOS A	1.2	8.4	0.60	0.73	0.60	51.1
Approach		196	1.0	196	1.0	0.206	10.0	LOS A	1.2	8.4	0.60	0.73	0.60	51.9
West: Perth														
10	L2	21	1.0	21	1.0	0.486	10.8	LOS B	3.6	25.4	0.61	0.62	0.61	53.8
11	T1	500	2.0	500	2.0	0.486	6.2	LOS A	3.6	25.4	0.61	0.62	0.61	53.8
12	R2	19	1.0	19	1.0	0.486	5.9	LOS A	3.6	25.4	0.61	0.62	0.61	52.6
Approach		540	1.9	540	1.9	0.486	6.3	LOS A	3.6	25.4	0.61	0.62	0.61	53.8
All Vehicles		1545	1.5	1545	1.5	0.486	7.3	LOS A	3.6	25.4	0.55	0.64	0.55	53.2

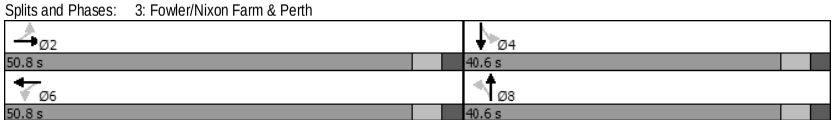
Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Roundabout LOS Method: SIDRA Roundabout LOS.
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
Roundabout Capacity Model: SIDRA Standard.
Delay Model: SIDRA Standard (Geometric Delay is included).
Queue Model: SIDRA Standard.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	23	908	1	2	463	42	3	0	15	93	0	32
Future Volume (vph)	23	908	1	2	463	42	3	0	15	93	0	32
Satd. Flow (prot)	0	3312	0	0	3276	0	0	1536	0	1658	1483	0
Flt Permitted		0.937			0.953			0.951		0.746		
Satd. Flow (perm)	0	3107	0	0	3122	0	0	1472	0	1302	1483	0
Satd. Flow (RTOR)					14			33			322	
Lane Group Flow (vph)	0	932	0	0	507	0	0	18	0	93	32	0
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		2			6			8			4	
Permitted Phases	2			6			8			4		
Detector Phase	2	2		6	6		8	8		4	4	
Switch Phase												
Minimum Initial (s)	10.0	10.0		10.0	10.0		10.0	10.0		10.0	10.0	
Minimum Split (s)	24.8	24.8		24.8	24.8		40.6	40.6		40.6	40.6	
Total Split (s)	50.8	50.8		50.8	50.8		40.6	40.6		40.6	40.6	
Total Split (%)	55.6%	55.6%		55.6%	55.6%		44.4%	44.4%		44.4%	44.4%	
Yellow Time (s)	3.3	3.3		3.3	3.3		3.3	3.3		3.3	3.3	
All-Red Time (s)	2.5	2.5		2.5	2.5		2.3	2.3		2.3	2.3	
Lost Time Adjust (s)		0.0			0.0			0.0		0.0	0.0	
Total Lost Time (s)		5.8			5.8			5.6		5.6	5.6	
Lead/Lag												
Lead-Lag Optimize?												
Recall Mode	Max	Max		Max	Max		None	None		None	None	
Act Effct Green (s)		53.2			53.2			11.4		11.4	11.4	
Actuated g/C Ratio		0.75			0.75			0.16		0.16	0.16	
v/c Ratio		0.40			0.22			0.07		0.45	0.06	
Control Delay		5.5			4.3			5.6		34.2	0.2	
Queue Delay		0.0			0.0			0.0		0.0	0.0	
Total Delay		5.5			4.3			5.6		34.2	0.2	
LOS		A			A			A		C	A	
Approach Delay		5.5			4.3			5.6			25.5	
Approach LOS		A			A			A			C	
Queue Length 50th (m)		22.9			10.1			0.0		11.4	0.0	
Queue Length 95th (m)		40.3			18.8			3.0		22.7	0.0	
Internal Link Dist (m)		414.4			185.4			258.4			148.6	
Turn Bay Length (m)										15.0		
Base Capacity (vph)		2316			2331			741		641	893	
Starvation Cap Reductn		0			0			0		0	0	
Spillback Cap Reductn		0			0			0		0	0	
Storage Cap Reductn		0			0			0		0	0	
Reduced v/c Ratio		0.40			0.22			0.02		0.15	0.04	

Intersection Summary
Cycle Length: 91.4
Actuated Cycle Length: 71.4
Natural Cycle: 70
Control Type: Semi Act-Uncoord
Maximum v/c Ratio: 0.45

Intersection Signal Delay: 6.7 — Intersection LOS: A
Intersection Capacity Utilization 65.6% — ICU Level of Service C
Analysis Period (min) 15

Splits and Phases: 3: Fowler/Nixon Farm & Perth



Intersection	
Int Delay, s/veh	0.6

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	8	514	337	4	16	16
Future Vol, veh/h	8	514	337	4	16	16
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	100	100	100	100	100	100
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	8	514	337	4	16	16

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	341	0	-	0	869	339
Stage 1	-	-	-	-	339	-
Stage 2	-	-	-	-	530	-
Critical Hdwy	4.12	-	-	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	2.218	-	-	-	3.518	3.318
Pot Cap-1 Maneuver	1218	-	-	-	322	703
Stage 1	-	-	-	-	722	-
Stage 2	-	-	-	-	590	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1218	-	-	-	319	703
Mov Cap-2 Maneuver	-	-	-	-	319	-
Stage 1	-	-	-	-	716	-
Stage 2	-	-	-	-	590	-

Approach	EB	WB	SB
HCM Control Delay, s	0.1	0	13.8
HCM LOS			B

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1218	-	-	-	439
HCM Lane V/C Ratio	0.007	-	-	-	0.073
HCM Control Delay (s)	8	0	-	-	13.8
HCM Lane LOS	A	A	-	-	B
HCM 95th %tile Q(veh)	0	-	-	-	0.2

Intersection	
Int Delay, s/veh	0.2

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	0	530	329	4	8	6
Future Vol, veh/h	0	530	329	4	8	6
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	-	0
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	100	100	100	100	100	100
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	0	530	329	4	8	6

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	-	0	-	0	861	331
Stage 1	-	-	-	-	331	-
Stage 2	-	-	-	-	530	-
Critical Hdwy	-	-	-	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	-	-	-	-	3.518	3.318
Pot Cap-1 Maneuver	0	-	-	-	326	711
Stage 1	0	-	-	-	728	-
Stage 2	0	-	-	-	590	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	-	-	-	-	326	711
Mov Cap-2 Maneuver	-	-	-	-	326	-
Stage 1	-	-	-	-	728	-
Stage 2	-	-	-	-	590	-

Approach	EB	WB	SB
HCM Control Delay, s	0	0	10.1
HCM LOS			B

Minor Lane/Major Mvmt	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	-	-	-	711
HCM Lane V/C Ratio	-	-	-	0.008
HCM Control Delay (s)	-	-	-	10.1
HCM Lane LOS	-	-	-	B
HCM 95th %tile Q(veh)	-	-	-	0

Intersection	
Int Delay, s/veh	0.6

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	9	686	0	3	920	31	1	0	4	13	1	8
Future Vol, veh/h	9	686	0	3	920	31	1	0	4	13	1	8
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	35	-	-	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	9	686	0	3	920	31	1	0	4	13	1	8

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	951	0	0	686	0	0	1650	1661	343	1303	1646	936
Stage 1	-	-	-	-	-	-	704	704	-	942	942	-
Stage 2	-	-	-	-	-	-	946	957	-	361	704	-
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	720	-	-	906	-	-	72	97	654	127	99	320
Stage 1	-	-	-	-	-	-	395	439	-	315	341	-
Stage 2	-	-	-	-	-	-	313	335	-	631	439	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	720	-	-	906	-	-	68	95	654	124	97	320
Mov Cap-2 Maneuver	-	-	-	-	-	-	68	95	-	124	97	-
Stage 1	-	-	-	-	-	-	387	430	-	309	340	-
Stage 2	-	-	-	-	-	-	303	334	-	615	430	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0.2	0	20.3	31.6
HCM LOS			C	D

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	240	720	-	-	906	-	-	157
HCM Lane V/C Ratio	0.021	0.013	-	-	0.003	-	-	0.14
HCM Control Delay (s)	20.3	10.1	0.1	-	9	-	-	31.6
HCM Lane LOS	C	B	A	-	A	-	-	D
HCM 95th %tile Q(veh)	0.1	0	-	-	0	-	-	0.5

MOVEMENT SUMMARY

Site: 101 [Perth-Meynell PM FT2025 (Site Folder: General)]

6295, 6363, 6409 Perth St & 6305 Ottawa St
Site Category: (None)
Roundabout

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] %	DEMAND FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: Meynell														
1	L2	32	1.0	32	1.0	0.259	12.0	LOS B	1.6	11.6	0.69	0.74	0.69	53.8
2	T1	1	1.0	1	1.0	0.259	7.3	LOS A	1.6	11.6	0.69	0.74	0.69	53.9
3	R2	192	1.0	192	1.0	0.259	7.1	LOS A	1.6	11.6	0.69	0.74	0.69	52.5
Approach		225	1.0	225	1.0	0.259	7.8	LOS A	1.6	11.6	0.69	0.74	0.69	52.7
East: Perth														
4	L2	261	1.0	261	1.0	0.623	9.3	LOS A	6.5	46.0	0.38	0.49	0.38	54.4
5	T1	568	2.0	568	2.0	0.623	4.6	LOS A	6.5	46.0	0.38	0.49	0.38	54.4
6	R2	101	1.0	101	1.0	0.623	4.4	LOS A	6.5	46.0	0.38	0.49	0.38	53.2
Approach		930	1.6	930	1.6	0.623	5.9	LOS A	6.5	46.0	0.38	0.49	0.38	54.3
North: Meynell														
7	L2	150	1.0	150	1.0	0.331	15.3	LOS B	2.3	16.2	0.86	0.90	0.86	49.6
8	T1	1	1.0	1	1.0	0.331	10.8	LOS B	2.3	16.2	0.86	0.90	0.86	49.6
9	R2	65	1.0	65	1.0	0.331	10.5	LOS B	2.3	16.2	0.86	0.90	0.86	48.6
Approach		216	1.0	216	1.0	0.331	13.8	LOS B	2.3	16.2	0.86	0.90	0.86	49.2
West: Perth														
10	L2	35	1.0	35	1.0	0.441	11.5	LOS B	3.1	21.7	0.67	0.70	0.67	53.5
11	T1	353	2.0	353	2.0	0.441	7.0	LOS A	3.1	21.7	0.67	0.70	0.67	53.5
12	R2	52	1.0	52	1.0	0.441	6.8	LOS A	3.1	21.7	0.67	0.70	0.67	52.2
Approach		440	1.8	440	1.8	0.441	7.4	LOS A	3.1	21.7	0.67	0.70	0.67	53.3
All Vehicles		1811	1.5	1811	1.5	0.623	7.4	LOS A	6.5	46.0	0.55	0.62	0.55	53.2

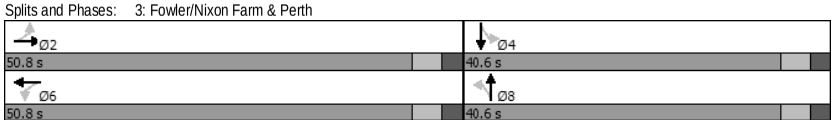
Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Roundabout LOS Method: SIDRA Roundabout LOS.
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
Roundabout Capacity Model: SIDRA Standard.
Delay Model: SIDRA Standard (Geometric Delay is included).
Queue Model: SIDRA Standard.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	43	696	1	17	1040	103	2	2	16	66	0	39
Future Volume (vph)	43	696	1	17	1040	103	2	2	16	66	0	39
Satd. Flow (prot)	0	3306	0	0	3269	0	0	1549	0	1658	1483	0
Flt Permitted		0.834			0.941			0.967		0.744		
Satd. Flow (perm)	0	2765	0	0	3079	0	0	1505	0	1298	1483	0
Satd. Flow (RTOR)					16			16			65	
Lane Group Flow (vph)	0	740	0	0	1160	0	0	20	0	66	39	0
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		2			6			8			4	
Permitted Phases	2			6			8			4		
Detector Phase	2	2		6	6		8	8		4	4	
Switch Phase												
Minimum Initial (s)	10.0	10.0		10.0	10.0		10.0	10.0		10.0	10.0	
Minimum Split (s)	24.8	24.8		24.8	24.8		40.6	40.6		40.6	40.6	
Total Split (s)	50.8	50.8		50.8	50.8		40.6	40.6		40.6	40.6	
Total Split (%)	55.6%	55.6%		55.6%	55.6%		44.4%	44.4%		44.4%	44.4%	
Yellow Time (s)	3.3	3.3		3.3	3.3		3.3	3.3		3.3	3.3	
All-Red Time (s)	2.5	2.5		2.5	2.5		2.3	2.3		2.3	2.3	
Lost Time Adjust (s)		0.0			0.0			0.0		0.0	0.0	
Total Lost Time (s)		5.8			5.8			5.6		5.6	5.6	
Lead/Lag												
Lead-Lag Optimize?												
Recall Mode	Max	Max		Max	Max		None	None		None	None	
Act Effct Green (s)		53.8			53.8			10.5		10.5	10.5	
Actuated g/C Ratio		0.76			0.76			0.15		0.15	0.15	
v/c Ratio		0.35			0.50			0.09		0.35	0.14	
Control Delay		4.8			5.7			14.7		32.1	4.6	
Queue Delay		0.0			0.0			0.0		0.0	0.0	
Total Delay		4.8			5.7			14.7		32.1	4.6	
LOS		A			A			B		C	A	
Approach Delay		4.8			5.7			14.7			21.9	
Approach LOS		A			A			B			C	
Queue Length 50th (m)		17.1			30.8			0.5		8.3	0.0	
Queue Length 95th (m)		28.2			49.2			5.4		17.4	4.0	
Internal Link Dist (m)		414.4			185.4			258.4			148.6	
Turn Bay Length (m)										15.0		
Base Capacity (vph)		2090			2331			753		643	767	
Starvation Cap Reductn		0			0			0		0	0	
Spillback Cap Reductn		0			0			0		0	0	
Storage Cap Reductn		0			0			0		0	0	
Reduced v/c Ratio		0.35			0.50			0.03		0.10	0.05	

Intersection Summary
Cycle Length: 91.4
Actuated Cycle Length: 71.1
Natural Cycle: 80
Control Type: Semi Act-Uncoord
Maximum v/c Ratio: 0.50

Intersection Signal Delay: 6.3 — Intersection LOS: A
Intersection Capacity Utilization 74.4% — ICU Level of Service D
Analysis Period (min) 15

Splits and Phases: 3: Fowler/Nixon Farm & Perth



Intersection	
Int Delay, s/veh	0.4

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	14	416	601	7	10	10
Future Vol, veh/h	14	416	601	7	10	10
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	100	100	100	100	100	100
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	14	416	601	7	10	10

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	608	0	-	0	1049	605
Stage 1	-	-	-	-	605	-
Stage 2	-	-	-	-	444	-
Critical Hdwy	4.12	-	-	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	2.218	-	-	-	3.518	3.318
Pot Cap-1 Maneuver	970	-	-	-	252	498
Stage 1	-	-	-	-	545	-
Stage 2	-	-	-	-	646	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	970	-	-	-	247	498
Mov Cap-2 Maneuver	-	-	-	-	247	-
Stage 1	-	-	-	-	535	-
Stage 2	-	-	-	-	646	-

Approach	EB	WB	SB
HCM Control Delay, s	0.3	0	16.6
HCM LOS			C

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	970	-	-	-	330
HCM Lane V/C Ratio	0.014	-	-	-	0.061
HCM Control Delay (s)	8.8	0	-	-	16.6
HCM Lane LOS	A	A	-	-	C
HCM 95th %tile Q(veh)	0	-	-	-	0.2

Intersection	
Int Delay, s/veh	0.1

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	0	426	596	7	0	5
Future Vol, veh/h	0	426	596	7	0	5
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	-	0
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	100	100	100	100	100	100
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	0	426	596	7	0	5

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	-	0	-	0	-	600
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-
Critical Hdwy	-	-	-	-	-	6.22
Critical Hdwy Stg 1	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-
Follow-up Hdwy	-	-	-	-	-	3.318
Pot Cap-1 Maneuver	0	-	-	-	0	501
Stage 1	0	-	-	-	0	-
Stage 2	0	-	-	-	0	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	-	-	-	-	-	501
Mov Cap-2 Maneuver	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-

Approach	EB	WB	SB
HCM Control Delay, s	0	0	12.3
HCM LOS			B

Minor Lane/Major Mvmt	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	-	-	-	501
HCM Lane V/C Ratio	-	-	-	0.01
HCM Control Delay (s)	-	-	-	12.3
HCM Lane LOS	-	-	-	B
HCM 95th %tile Q(veh)	-	-	-	0

Appendix K

Synchro Intersection Worksheets – 2030 Future Total Conditions

CGH TRANSPORTATION

Intersection	
Int Delay, s/veh	0.7

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	3	1263	0	10	618	12	0	1	10	20	1	8
Future Vol, veh/h	3	1263	0	10	618	12	0	1	10	20	1	8
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	35	-	-	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	3	1263	0	10	618	12	0	1	10	20	1	8

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	630	0	0	1263	0	0	1918	1919	632	1282	1913	624
Stage 1	-	-	-	-	-	-	1269	1269	-	644	644	-
Stage 2	-	-	-	-	-	-	649	650	-	638	1269	-
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	950	-	-	548	-	-	46	67	424	132	68	484
Stage 1	-	-	-	-	-	-	179	239	-	460	467	-
Stage 2	-	-	-	-	-	-	458	464	-	432	239	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	950	-	-	548	-	-	44	65	424	125	66	484
Mov Cap-2 Maneuver	-	-	-	-	-	-	44	65	-	125	66	-
Stage 1	-	-	-	-	-	-	177	236	-	455	459	-
Stage 2	-	-	-	-	-	-	441	456	-	415	236	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0	0.2	18.3	34.4
HCM LOS			C	D

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	282	950	-	-	548	-	-	151
HCM Lane V/C Ratio	0.039	0.003	-	-	0.018	-	-	0.192
HCM Control Delay (s)	18.3	8.8	0	-	11.7	-	-	34.4
HCM Lane LOS	C	A	A	-	B	-	-	D
HCM 95th %tile Q(veh)	0.1	0	-	-	0.1	-	-	0.7

MOVEMENT SUMMARY

Site: 101 [Perth-Meynell AM FT2030 (Site Folder: General)]

6295, 6363, 6409 Perth St & 6305 Ottawa St
Site Category: (None)
Roundabout

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] %	DEMAND FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: Meynell														
1	L2	52	1.0	52	1.0	0.844	32.3	LOS C	14.0	98.6	1.00	1.38	1.97	41.5
2	T1	1	1.0	1	1.0	0.844	27.6	LOS C	14.0	98.6	1.00	1.38	1.97	41.5
3	R2	478	1.0	478	1.0	0.844	27.4	LOS C	14.0	98.6	1.00	1.38	1.97	40.8
Approach		531	1.0	531	1.0	0.844	27.9	LOS C	14.0	98.6	1.00	1.38	1.97	40.8
East: Perth														
4	L2	237	1.0	237	1.0	0.448	9.3	LOS A	3.7	26.4	0.36	0.52	0.36	54.1
5	T1	272	2.0	272	2.0	0.448	4.7	LOS A	3.7	26.4	0.36	0.52	0.36	54.1
6	R2	118	1.0	118	1.0	0.448	4.4	LOS A	3.7	26.4	0.36	0.52	0.36	52.9
Approach		627	1.4	627	1.4	0.448	6.4	LOS A	3.7	26.4	0.36	0.52	0.36	53.9
North: Meynell														
7	L2	253	1.0	253	1.0	0.386	12.5	LOS B	2.6	18.2	0.73	0.81	0.73	51.3
8	T1	1	1.0	1	1.0	0.386	7.9	LOS A	2.6	18.2	0.73	0.81	0.73	51.3
9	R2	83	1.0	83	1.0	0.386	7.6	LOS A	2.6	18.2	0.73	0.81	0.73	50.2
Approach		337	1.0	337	1.0	0.386	11.3	LOS B	2.6	18.2	0.73	0.81	0.73	51.0
West: Perth														
10	L2	34	1.0	34	1.0	0.646	15.0	LOS B	6.8	48.4	0.85	0.92	1.05	51.7
11	T1	535	2.0	535	2.0	0.646	10.5	LOS B	6.8	48.4	0.85	0.92	1.05	51.7
12	R2	22	1.0	22	1.0	0.646	10.2	LOS B	6.8	48.4	0.85	0.92	1.05	50.6
Approach		591	1.9	591	1.9	0.646	10.7	LOS B	6.8	48.4	0.85	0.92	1.05	51.6
All Vehicles		2086	1.4	2086	1.4	0.844	13.9	LOS B	14.0	98.6	0.72	0.90	1.03	48.9

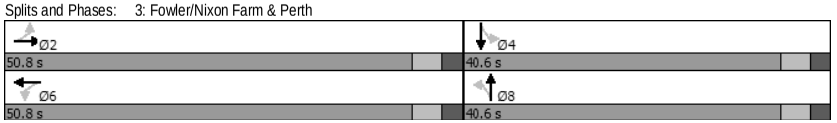
Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Roundabout LOS Method: SIDRA Roundabout LOS.
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
Roundabout Capacity Model: SIDRA Standard.
Delay Model: SIDRA Standard (Geometric Delay is included).
Queue Model: SIDRA Standard.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	23	1258	1	2	606	42	3	0	15	93	0	32
Future Volume (vph)	23	1258	1	2	606	42	3	0	15	93	0	32
Satd. Flow (prot)	0	3312	0	0	3283	0	0	1536	0	1658	1483	0
Flt Permitted		0.938			0.952			0.951		0.746		
Satd. Flow (perm)	0	3110	0	0	3125	0	0	1472	0	1302	1483	0
Satd. Flow (RTOR)					11			33			218	
Lane Group Flow (vph)	0	1282	0	0	650	0	0	18	0	93	32	0
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		2			6			8			4	
Permitted Phases	2			6			8			4		
Detector Phase	2	2		6	6		8	8		4	4	
Switch Phase												
Minimum Initial (s)	10.0	10.0		10.0	10.0		10.0	10.0		10.0	10.0	
Minimum Split (s)	24.8	24.8		24.8	24.8		40.6	40.6		40.6	40.6	
Total Split (s)	50.8	50.8		50.8	50.8		40.6	40.6		40.6	40.6	
Total Split (%)	55.6%	55.6%		55.6%	55.6%		44.4%	44.4%		44.4%	44.4%	
Yellow Time (s)	3.3	3.3		3.3	3.3		3.3	3.3		3.3	3.3	
All-Red Time (s)	2.5	2.5		2.5	2.5		2.3	2.3		2.3	2.3	
Lost Time Adjust (s)		0.0			0.0			0.0		0.0	0.0	
Total Lost Time (s)		5.8			5.8			5.6		5.6	5.6	
Lead/Lag												
Lead-Lag Optimize?												
Recall Mode	Max	Max		Max	Max		None	None		None	None	
Act Effct Green (s)		53.2			53.2			11.4		11.4	11.4	
Actuated g/C Ratio		0.75			0.75			0.16		0.16	0.16	
v/c Ratio		0.55			0.28			0.07		0.45	0.08	
Control Delay		6.9			4.6			5.6		34.2	0.3	
Queue Delay		0.0			0.0			0.0		0.0	0.0	
Total Delay		6.9			4.6			5.6		34.2	0.3	
LOS		A			A			A		C	A	
Approach Delay		6.9			4.6			5.6			25.6	
Approach LOS		A			A			A			C	
Queue Length 50th (m)		37.5			13.8			0.0		11.4	0.0	
Queue Length 95th (m)		65.5			25.1			3.0		22.7	0.0	
Internal Link Dist (m)		414.4			185.4			258.4			148.6	
Turn Bay Length (m)										15.0		
Base Capacity (vph)		2319			2333			741		641	840	
Starvation Cap Reductn		0			0			0		0	0	
Spillback Cap Reductn		0			0			0		0	0	
Storage Cap Reductn		0			0			0		0	0	
Reduced v/c Ratio		0.55			0.28			0.02		0.15	0.04	

Intersection Summary
Cycle Length: 91.4
Actuated Cycle Length: 71.4
Natural Cycle: 80
Control Type: Semi Act-Uncoord
Maximum v/c Ratio: 0.55

Intersection Signal Delay: 7.3 — Intersection LOS: A
Intersection Capacity Utilization 75.6% — ICU Level of Service D
Analysis Period (min) 15

Splits and Phases: 3: Fowler/Nixon Farm & Perth



Intersection	
Int Delay, s/veh	0.5

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	8	565	392	4	16	16
Future Vol, veh/h	8	565	392	4	16	16
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	100	100	100	100	100	100
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	8	565	392	4	16	16

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	396	0	-	0	975	394
Stage 1	-	-	-	-	394	-
Stage 2	-	-	-	-	581	-
Critical Hdwy	4.12	-	-	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	2.218	-	-	-	3.518	3.318
Pot Cap-1 Maneuver	1163	-	-	-	279	655
Stage 1	-	-	-	-	681	-
Stage 2	-	-	-	-	559	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1163	-	-	-	276	655
Mov Cap-2 Maneuver	-	-	-	-	276	-
Stage 1	-	-	-	-	674	-
Stage 2	-	-	-	-	559	-

Approach	EB	WB	SB
HCM Control Delay, s	0.1	0	15.1
HCM LOS			C

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1163	-	-	-	388
HCM Lane V/C Ratio	0.007	-	-	-	0.082
HCM Control Delay (s)	8.1	0	-	-	15.1
HCM Lane LOS	A	A	-	-	C
HCM 95th %tile Q(veh)	0	-	-	-	0.3

Intersection	
Int Delay, s/veh	0.1

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	0	581	384	4	0	8
Future Vol, veh/h	0	581	384	4	0	8
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	-	0
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	100	100	100	100	100	100
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	0	581	384	4	0	8

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	-	0	-	0	-	386
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-
Critical Hdwy	-	-	-	-	-	6.22
Critical Hdwy Stg 1	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-
Follow-up Hdwy	-	-	-	-	-	3.318
Pot Cap-1 Maneuver	0	-	-	-	0	662
Stage 1	0	-	-	-	0	-
Stage 2	0	-	-	-	0	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	-	-	-	-	-	662
Mov Cap-2 Maneuver	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-

Approach	EB	WB	SB
HCM Control Delay, s	0	0	10.5
HCM LOS			B

Minor Lane/Major Mvmt	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	-	-	-	662
HCM Lane V/C Ratio	-	-	-	0.012
HCM Control Delay (s)	-	-	-	10.5
HCM Lane LOS	-	-	-	B
HCM 95th %tile Q(veh)	-	-	-	0

Intersection	
Int Delay, s/veh	1

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	9	919	0	3	1299	31	1	0	4	13	1	8
Future Vol, veh/h	9	919	0	3	1299	31	1	0	4	13	1	8
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	35	-	-	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	9	919	0	3	1299	31	1	0	4	13	1	8

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	1330	0	0	919	0	0	2262	2273	460	1799	2258	1315
Stage 1	-	-	-	-	-	-	937	937	-	1321	1321	-
Stage 2	-	-	-	-	-	-	1325	1336	-	478	937	-
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	517	-	-	740	-	-	25	40	549	56	41	192
Stage 1	-	-	-	-	-	-	285	342	-	192	225	-
Stage 2	-	-	-	-	-	-	191	221	-	538	342	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	517	-	-	740	-	-	23	38	549	54	39	192
Mov Cap-2 Maneuver	-	-	-	-	-	-	23	38	-	54	39	-
Stage 1	-	-	-	-	-	-	275	330	-	185	224	-
Stage 2	-	-	-	-	-	-	181	220	-	515	330	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0.3	0	43.7	77
HCM LOS			E	F

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	98	517	-	-	740	-	-	71
HCM Lane V/C Ratio	0.051	0.017	-	-	0.004	-	-	0.31
HCM Control Delay (s)	43.7	12.1	0.2	-	9.9	-	-	77
HCM Lane LOS	E	B	A	-	A	-	-	F
HCM 95th %tile Q(veh)	0.2	0.1	-	-	0	-	-	1.1

MOVEMENT SUMMARY

Site: 101 [Perth-Meynell PM FT2030 (Site Folder: General)]

6295, 6363, 6409 Perth St & 6305 Ottawa St
Site Category: (None)
Roundabout

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] %	DEMAND FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: Meynell														
1	L2	35	1.0	35	1.0	0.512	14.6	LOS B	4.4	31.0	0.87	0.92	0.99	51.9
2	T1	1	1.0	1	1.0	0.512	10.0	LOS A	4.4	31.0	0.87	0.92	0.99	52.0
3	R2	355	1.0	355	1.0	0.512	9.7	LOS A	4.4	31.0	0.87	0.92	0.99	50.8
Approach		391	1.0	391	1.0	0.512	10.2	LOS B	4.4	31.0	0.87	0.92	0.99	50.9
East: Perth														
4	L2	502	1.0	502	1.0	0.914	10.7	LOS B	23.0	163.2	1.00	0.54	1.00	51.9
5	T1	608	2.0	608	2.0	0.914	6.1	LOS A	23.0	163.2	1.00	0.54	1.00	51.9
6	R2	200	1.0	200	1.0	0.914	5.9	LOS A	23.0	163.2	1.00	0.54	1.00	50.7
Approach		1310	1.5	1310	1.5	0.914	7.9	LOS A	23.0	163.2	1.00	0.54	1.00	51.7
North: Meynell														
7	L2	220	1.0	220	1.0	0.971	81.7	LOS F	17.9	126.2	1.00	1.57	2.55	26.4
8	T1	1	1.0	1	1.0	0.971	77.1	LOS F	17.9	126.2	1.00	1.57	2.55	26.4
9	R2	82	1.0	82	1.0	0.971	76.9	LOS F	17.9	126.2	1.00	1.57	2.55	26.1
Approach		303	1.0	303	1.0	0.971	80.4	LOS F	17.9	126.2	1.00	1.57	2.55	26.3
West: Perth														
10	L2	60	1.0	60	1.0	0.693	20.3	LOS C	8.1	57.4	1.00	1.15	1.41	48.0
11	T1	353	2.0	353	2.0	0.693	15.7	LOS B	8.1	57.4	1.00	1.15	1.41	48.0
12	R2	58	1.0	58	1.0	0.693	15.4	LOS B	8.1	57.4	1.00	1.15	1.41	47.0
Approach		471	1.7	471	1.7	0.693	16.3	LOS B	8.1	57.4	1.00	1.15	1.41	47.9
All Vehicles		2475	1.4	2475	1.4	0.971	18.7	LOS B	23.0	163.2	0.98	0.84	1.26	45.5

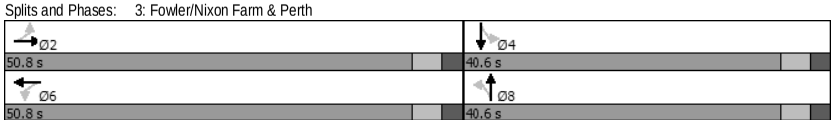
Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Roundabout LOS Method: SIDRA Roundabout LOS.
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
Roundabout Capacity Model: SIDRA Standard.
Delay Model: SIDRA Standard (Geometric Delay is included).
Queue Model: SIDRA Standard.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	43	929	1	17	1428	103	2	2	16	66	0	39
Future Volume (vph)	43	929	1	17	1428	103	2	2	16	66	0	39
Satd. Flow (prot)	0	3309	0	0	3279	0	0	1549	0	1658	1483	0
Flt Permitted		0.814			0.940			0.967		0.744		
Satd. Flow (perm)	0	2699	0	0	3086	0	0	1505	0	1298	1483	0
Satd. Flow (RTOR)					11			16			33	
Lane Group Flow (vph)	0	973	0	0	1548	0	0	20	0	66	39	0
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		2			6			8			4	
Permitted Phases	2			6			8			4		
Detector Phase	2	2		6	6		8	8		4	4	
Switch Phase												
Minimum Initial (s)	10.0	10.0		10.0	10.0		10.0	10.0		10.0	10.0	
Minimum Split (s)	24.8	24.8		24.8	24.8		40.6	40.6		40.6	40.6	
Total Split (s)	50.8	50.8		50.8	50.8		40.6	40.6		40.6	40.6	
Total Split (%)	55.6%	55.6%		55.6%	55.6%		44.4%	44.4%		44.4%	44.4%	
Yellow Time (s)	3.3	3.3		3.3	3.3		3.3	3.3		3.3	3.3	
All-Red Time (s)	2.5	2.5		2.5	2.5		2.3	2.3		2.3	2.3	
Lost Time Adjust (s)		0.0			0.0			0.0		0.0	0.0	
Total Lost Time (s)		5.8			5.8			5.6		5.6	5.6	
Lead/Lag												
Lead-Lag Optimize?												
Recall Mode	Max	Max		Max	Max		None	None		None	None	
Act Effct Green (s)		53.8			53.8			10.5		10.5	10.5	
Actuated g/C Ratio		0.76			0.76			0.15		0.15	0.15	
v/c Ratio		0.48			0.66			0.09		0.35	0.16	
Control Delay		5.8			7.9			14.7		32.1	12.7	
Queue Delay		0.0			0.0			0.0		0.0	0.0	
Total Delay		5.8			7.9			14.7		32.1	12.7	
LOS		A			A			B		C	B	
Approach Delay		5.8			7.9			14.7			24.9	
Approach LOS		A			A			B			C	
Queue Length 50th (m)		25.7			51.9			0.5		8.3	0.7	
Queue Length 95th (m)		42.3			84.0			5.4		17.4	7.6	
Internal Link Dist (m)		414.4			185.4			258.4			148.6	
Turn Bay Length (m)										15.0		
Base Capacity (vph)		2040			2336			753		643	751	
Starvation Cap Reductn		0			0			0		0	0	
Spillback Cap Reductn		0			0			0		0	0	
Storage Cap Reductn		0			0			0		0	0	
Reduced v/c Ratio		0.48			0.66			0.03		0.10	0.05	

Intersection Summary
Cycle Length: 91.4
Actuated Cycle Length: 71.1
Natural Cycle: 90
Control Type: Semi Act-Uncoord
Maximum v/c Ratio: 0.66

Intersection Signal Delay: 7.9 — Intersection LOS: A
Intersection Capacity Utilization 80.6% — ICU Level of Service D
Analysis Period (min) 15

Splits and Phases: 3: Fowler/Nixon Farm & Perth



Intersection	
Int Delay, s/veh	0.4

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	14	447	743	7	10	10
Future Vol, veh/h	14	447	743	7	10	10
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	100	100	100	100	100	100
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	14	447	743	7	10	10

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	750	0	-	0	1222	747
Stage 1	-	-	-	-	747	-
Stage 2	-	-	-	-	475	-
Critical Hdwy	4.12	-	-	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	2.218	-	-	-	3.518	3.318
Pot Cap-1 Maneuver	859	-	-	-	198	413
Stage 1	-	-	-	-	468	-
Stage 2	-	-	-	-	626	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	859	-	-	-	194	413
Mov Cap-2 Maneuver	-	-	-	-	194	-
Stage 1	-	-	-	-	458	-
Stage 2	-	-	-	-	626	-

Approach	EB	WB	SB
HCM Control Delay, s	0.3	0	19.8
HCM LOS			C

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	859	-	-	-	264
HCM Lane V/C Ratio	0.016	-	-	-	0.076
HCM Control Delay (s)	9.3	0	-	-	19.8
HCM Lane LOS	A	A	-	-	C
HCM 95th %tile Q(veh)	0.1	-	-	-	0.2

Intersection	
Int Delay, s/veh	0.1

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	0	457	738	7	0	5
Future Vol, veh/h	0	457	738	7	0	5
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	100	100	100	100	100	100
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	0	457	738	7	0	5

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	-	0	-	0	1199	742
Stage 1	-	-	-	-	742	-
Stage 2	-	-	-	-	457	-
Critical Hdwy	-	-	-	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	-	-	-	-	3.518	3.318
Pot Cap-1 Maneuver	0	-	-	-	205	416
Stage 1	0	-	-	-	471	-
Stage 2	0	-	-	-	638	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	-	-	-	-	205	416
Mov Cap-2 Maneuver	-	-	-	-	205	-
Stage 1	-	-	-	-	471	-
Stage 2	-	-	-	-	638	-

Approach	EB	WB	SB
HCM Control Delay, s	0	0	13.8
HCM LOS			B

Minor Lane/Major Mvmt	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	-	-	-	416
HCM Lane V/C Ratio	-	-	-	0.012
HCM Control Delay (s)	-	-	-	13.8
HCM Lane LOS	-	-	-	B
HCM 95th %tile Q(veh)	-	-	-	0

Appendix L

TDM Checklist

CGH TRANSPORTATION

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

Legend

BASIC — The measure is generally feasible and effective, and in most cases would benefit the development and its users

BETTER — The measure could maximize support for users of sustainable modes, and optimize development performance

★ — The measure is one of the most dependably effective tools to encourage the use of sustainable modes

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

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

			TDM measures: *Residential developments*	Check if proposed & add descriptions
		6.	**TDM MARKETING & COMMUNICATIONS**	
		6.1	**Multimodal travel information**	
BASIC	★	6.1.1	Provide a multimodal travel option information package to new residents	☑
		6.2	**Personalized trip planning**	
BETTER	★	6.2.1	Offer personalized trip planning to new residents	☐

Appendix M

Signal Warrants – Justification 7

CGH TRANSPORTATION

Perth St @ Rochelle Dr/Queen Charlotte St
2030 FT

Justification #7

Justification	Description	Minimum Requirement 1 Lane Highway		Minimum Requirement 2 or More Lanes		Compliance Sectional		Compliance Entire %	Signal
		Free Flow	Restr. Flow	Free Flow	Restr. Flow	Numerical	%		
1. Minimum Vehicular Volume	A. Vehicle volume, all approaches (average hour)	480	720	600	900	1059	118%	10%	No
	B. Vehicle volume, along minor streets (average hour)	120	170	120	170	17	10%		
2. Delay to Cross Traffic	A. Vehicle volumes, major street (average hour)	480	720	600	900	1042	116%	12%	No
	B. Combined vehicle and pedestrian volume crossing artery from minor streets (average hour)	50	75	50	75	9	12%		

Notes
1. Refer to OTM Book 12, pg 88, Nov 2007
2. Lowest section percentage governs justification
3. Average hourly volumes estimated from peak hour volumes, AHV = PM/2 or (AM + PM) / 4, including applicable amplification factors
4. T-intersection factor corrected, applies only to 1B
5. Correction to 2B, as per MTO and City of Ottawa, for '2 or More Lanes' has been applied

Appendix N

Synchro/Sidra Intersection Worksheets – 2030 Future Total Conditions PM Diverted Volumes

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	43	929	1	17	1428	103	2	2	16	106	0	39
Future Volume (vph)	43	929	1	17	1428	103	2	2	16	106	0	39
Satd. Flow (prot)	0	3309	0	0	3279	0	0	1549	0	1658	1483	0
Flt Permitted		0.814			0.940			0.972		0.744		
Satd. Flow (perm)	0	2699	0	0	3086	0	0	1513	0	1298	1483	0
Satd. Flow (RTOR)					11			16			33	
Lane Group Flow (vph)	0	973	0	0	1548	0	0	20	0	106	39	0
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		2			6			8			4	
Permitted Phases	2			6			8			4		
Detector Phase	2	2		6	6		8	8		4	4	
Switch Phase												
Minimum Initial (s)	10.0	10.0		10.0	10.0		10.0	10.0		10.0	10.0	
Minimum Split (s)	24.8	24.8		24.8	24.8		40.6	40.6		40.6	40.6	
Total Split (s)	50.8	50.8		50.8	50.8		40.6	40.6		40.6	40.6	
Total Split (%)	55.6%	55.6%		55.6%	55.6%		44.4%	44.4%		44.4%	44.4%	
Yellow Time (s)	3.3	3.3		3.3	3.3		3.3	3.3		3.3	3.3	
All-Red Time (s)	2.5	2.5		2.5	2.5		2.3	2.3		2.3	2.3	
Lost Time Adjust (s)		0.0			0.0			0.0		0.0	0.0	
Total Lost Time (s)		5.8			5.8			5.6		5.6	5.6	
Lead/Lag												
Lead-Lag Optimize?												
Recall Mode	Max	Max		Max	Max		None	None		None	None	
Act Effct Green (s)		52.5			52.5			11.9		11.9	11.9	
Actuated g/C Ratio		0.74			0.74			0.17		0.17	0.17	
v/c Ratio		0.49			0.68			0.08		0.49	0.14	
Control Delay		6.7			9.2			13.8		34.8	11.8	
Queue Delay		0.0			0.0			0.0		0.0	0.0	
Total Delay		6.7			9.2			13.8		34.8	11.8	
LOS		A			A			B		C	B	
Approach Delay		6.7			9.2			13.8			28.6	
Approach LOS		A			A			B			C	
Queue Length 50th (m)		27.2			55.0			0.4		12.6	0.7	
Queue Length 95th (m)		49.7			98.9			5.3		25.3	7.5	
Internal Link Dist (m)		414.4			185.4			258.4			148.6	
Turn Bay Length (m)										15.0		
Base Capacity (vph)		1991			2279			755		641	749	
Starvation Cap Reductn		0			0			0		0	0	
Spillback Cap Reductn		0			0			0		0	0	
Storage Cap Reductn		0			0			0		0	0	
Reduced v/c Ratio		0.49			0.68			0.03		0.17	0.05	

Intersection Summary
Cycle Length: 91.4
Actuated Cycle Length: 71.2
Natural Cycle: 90
Control Type: Semi Act-Uncoord
Maximum v/c Ratio: 0.68

Intersection Signal Delay: 9.4 — Intersection LOS: A
Intersection Capacity Utilization 83.0% — ICU Level of Service E
Analysis Period (min) 15

Splits and Phases: 3: Fowler/Nixon Farm & Perth