6295, 6363, 6409 Perth Street, 6305 Ottawa Street West

Transportation Impact Assessment

Step 1 Screening Report

Step 2 Scoping Report

Step 3 Forecasting Report

Step 4 Strategy Report (revision 4)

Prepared for:

Richmond North Ltd
2934 Baseline Road, Suite 302
Ottawa, Ontario, K2H 1B2

Prepared by:

CGH TRANSPORTATION
13 Markham Avenue
Ottawa, ON K2G 3Z1

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PN: 2019-64

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1 Screening

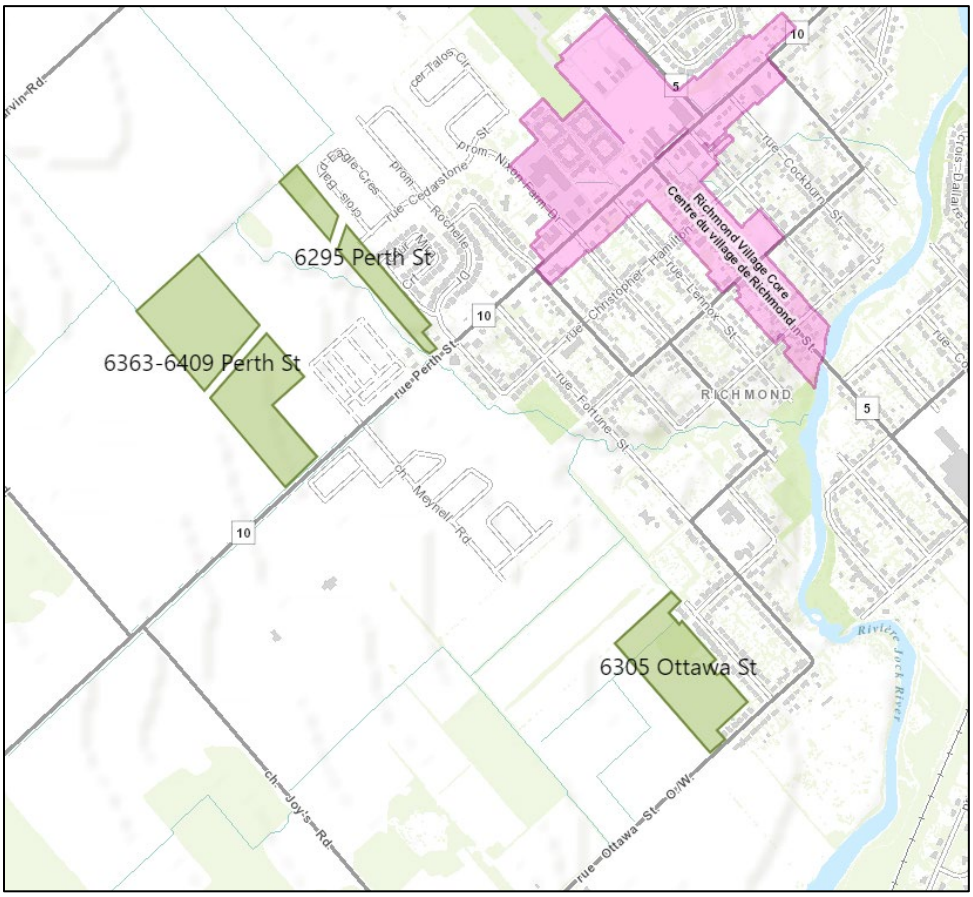
This study has been prepared according to the City of Ottawa's 2017 Transportation Impact Assessment (TIA) Guidelines. Accordingly, a Step 1 Screening Form has been prepared and is included as Appendix A, along with the Certification Form for TIA Study PM. As shown in the Screening Form, a TIA is required 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 and 6305 Ottawa Street, is currently greenfield property designated as Development Reserve (DR1) and is included within the Richmond CDP. The proposed development would include 580 residential units, with 162 detached homes and 175 townhomes at 6363-6409 Perth Street, 32 detached homes at 6295 Perth Street, and 42 detached homes and 169 townhomes at 6305 Ottawa Street. Access will be provided through Oldenburg Street, a local road connection to Perth Street (west of roundabout) and local connections to Cedarstone Street, Burke Street, with future connections to future development lands on the north side of Ottawa 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 and Figure 3 illustrates the proposed draft plan for the north and south development lands.

Figure 1: Area Context Plan



Source: http://maps.ottawa.ca/geoOttawabeta/ Accessed: May 28, 2020

- 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

FOX RUN NORTH/GREEN LANDS | Ottawa, Ontario

CAIVAN (RICHMOND NORTH) LIMITED

AUG 18, 2021
PROJECT 1221
SCALE 1:3000

SK-46

- 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.
- Aerial Photo: Google Earth, Approx. Spring 2018

GERRARD DESIGN

CAVIAN RICHMOND LAFFIN | Ottawa (Richmond), Ontario

PRELIMINARY DEVELOPMENT CONCEPT

AUG 17, 2021
PROJECT 1937
SCALE 1:2000

SK-12

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.

Ottawa Street: Ottawa Street is a City of Ottawa collector road between Joys Road and Fortune Street with a two-lane rural cross-section with gravel shoulders. The posted speed limit changes between 50 km/h and 70 km/h approximately 400 metres west of Queen Charlotte Street. The existing right-of-way is 20.0 metres.

Fortune Street: Fortune Street is a City of Ottawa collector road with a semi-urban cross-section with no curbs on the west side and a sidewalk on the east side. The posted speed limit is 50 km/h, and a school zone is located from north of Royal York Street to south of Burke Street. The existing right-of-way is 20.0 metres.

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.

Burke Street: Burke Street 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 16.0 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 & Fortune Street	The intersection of Perth Street and Fortune Street is an unsignalized intersection with stop-control located on the minor approaches of Fortune Street. The northbound approach consists of a shared all movement lane, the eastbound approach consists of a through lane and a shared through/right-turn lane, and the westbound approach consists of a shared left-turn/though lane and a through 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.
Burke Street & Fortune Street	The intersection of Burke Street and Fortune Street is an unsignalized intersection with stop-control located on the minor approaches of Burke Street. All approaches currently consist of single lane shared movements. No turn restrictions are noted.
Ottawa Street & Queen Charlotte Street	The intersection of Ottawa Street and Queen Charlotte Street is an unsignalized intersection with all-way stop-control. All approaches currently consist of single lane shared movements. No turn restrictions are noted.

2.2.3 Existing Driveways

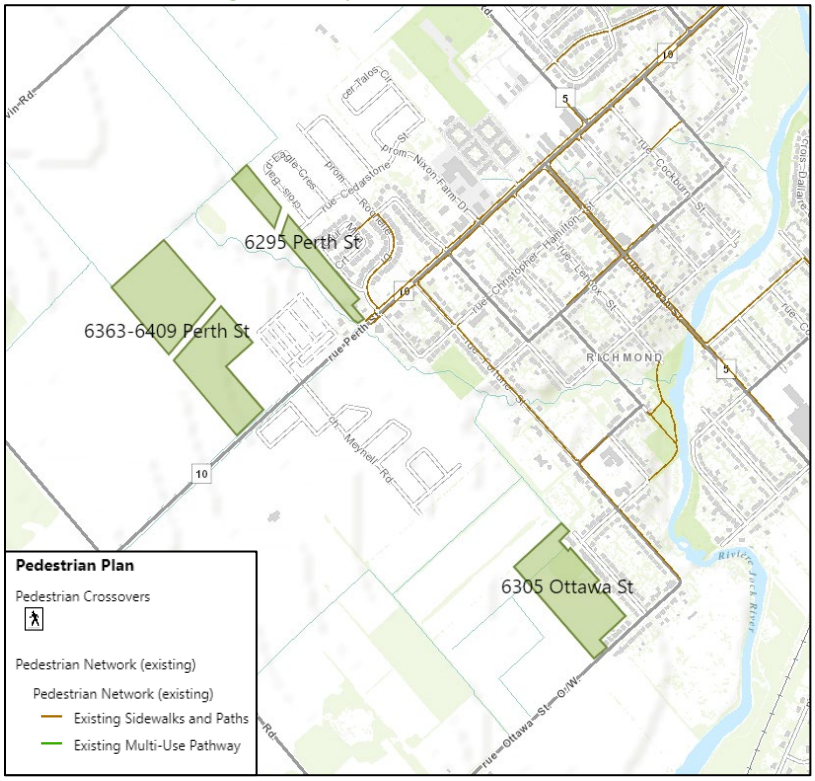
Private residential driveways exist within 200 metres of proposed local road extensions. Adjacent to the Burke Street extension, there are approximately 30 private residential driveways on both sides of Queen Charlotte Street and Burke Street. Adjacent to the Mira Court extension, there are approximately 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 4 illustrates the pedestrian facilities in the study area and Figure 5 illustrates the cycling facilities.

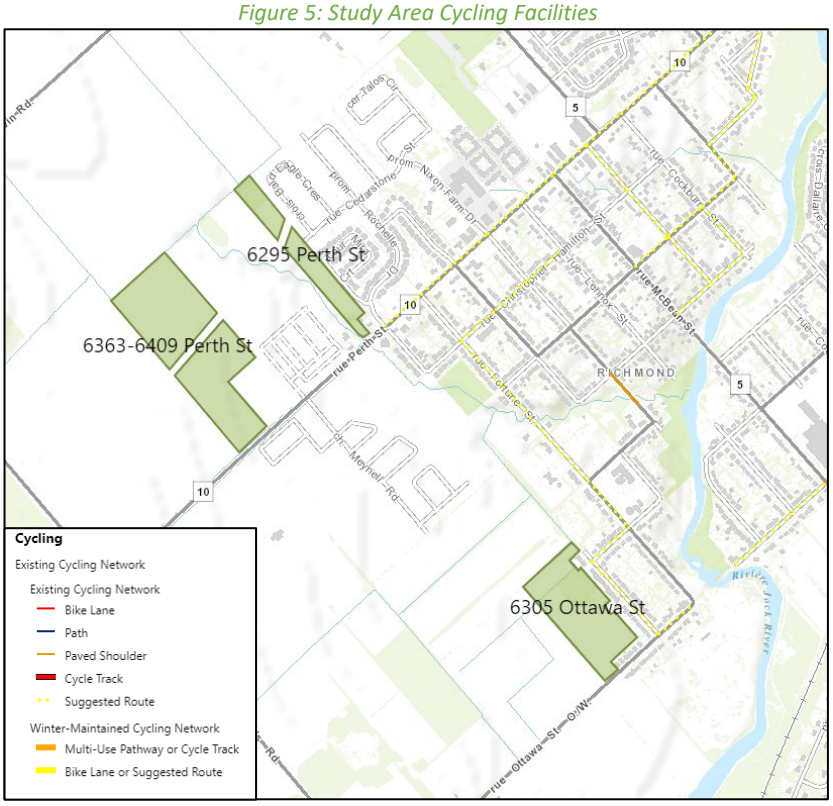
Sidewalks are provided along both sides of Perth Street to the east of Rochelle Drive/Queen Charlotte Drive and a sidewalk is provided on Fortune Street. While not illustrated below, Queen Charlotte Drive also has a sidewalk on the west side between Perth Street and Christopher Hamilton Street, and Cedarstone 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 Ottawa Street, Queen Charlotte Street (between Ottawa Street and Burke Street), Burke Street (between Queen Charlotte Street and Fortune Street), Fortune Street (between Burke Street to Christopher Hamilton Street), and Christopher Hamilton Street (east of Fortune Street) are designated as local routes.

Figure 4: Study Area Pedestrian Facilities



Source: http://maps.ottawa.ca/geoOttawabeta/ Accessed: May 28, 2020

Figure 5: Study Area Cycling Facilities



Source: http://maps.ottawa.ca/geoOttawabeta/ Accessed: May 28, 2020

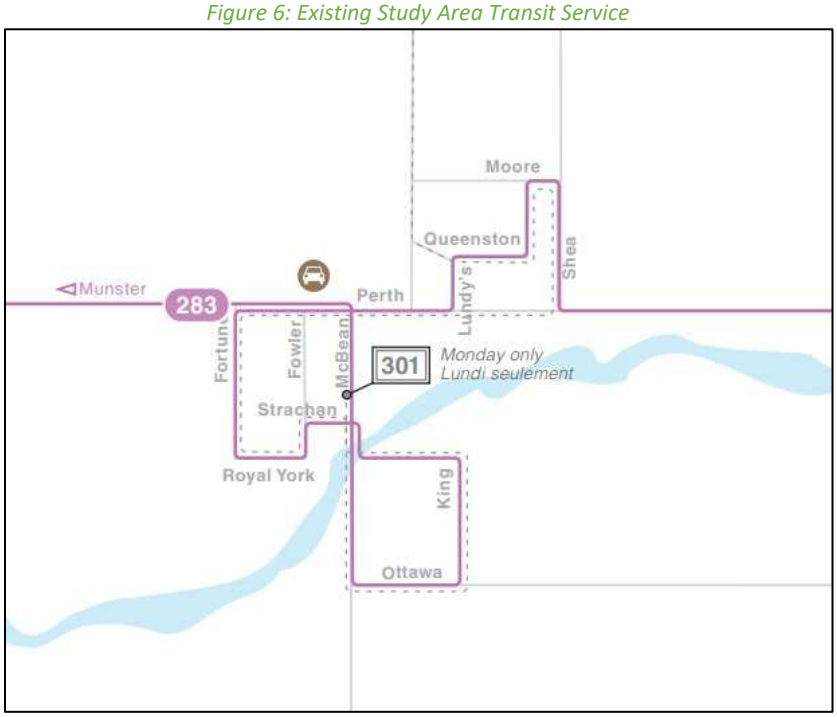
2.2.5 Existing Transit

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

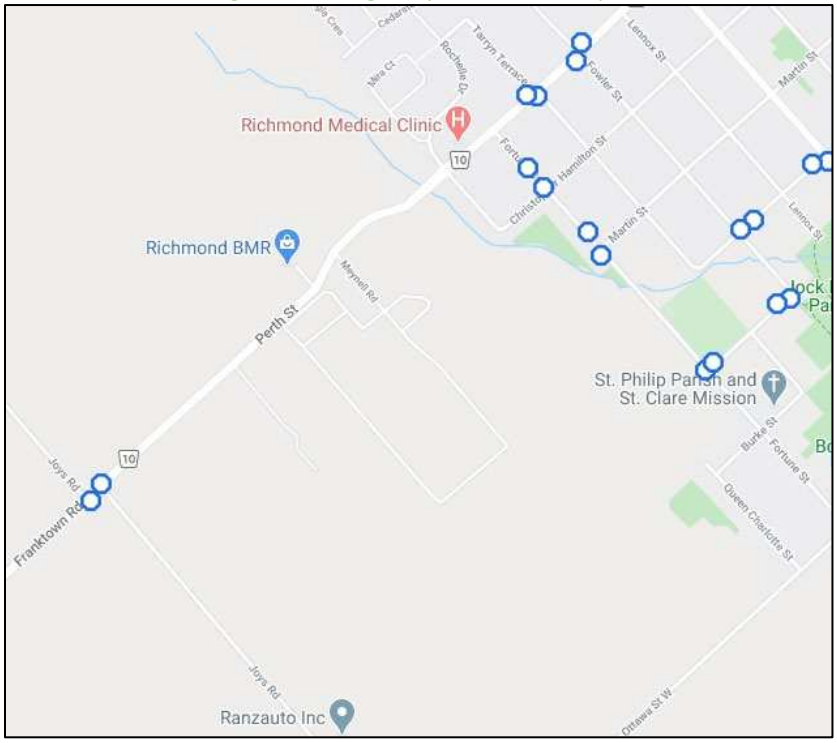
Figure 6 illustrates the transit system map in the study area and Figure 7 illustrates nearby transit stops.

Figure 6: Existing Study Area Transit Service



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

Figure 7: 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 8 illustrates the existing traffic volumes and Table 2 summarizes the existing intersection operations. The level of service for signalized intersections is based on the TIA Guidelines for the lane movements and HCM average delay for the overall intersection. Detailed turning movement count data is included in Appendix B and the synchro worksheets are provided in Appendix C.

Figure 8: Existing Intersection Volumes

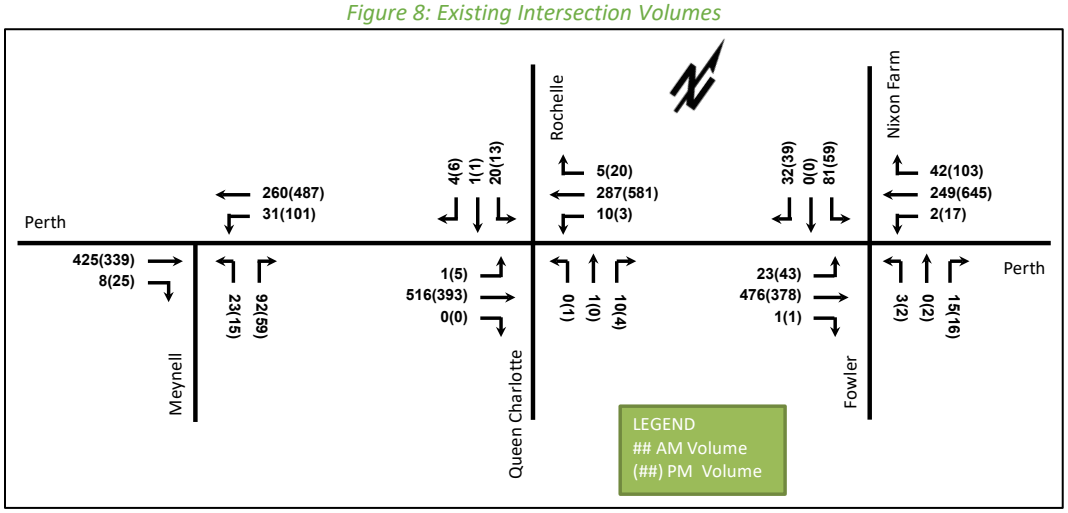


Table 2: Existing Intersection Operations

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**	**-**

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	0.24	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.

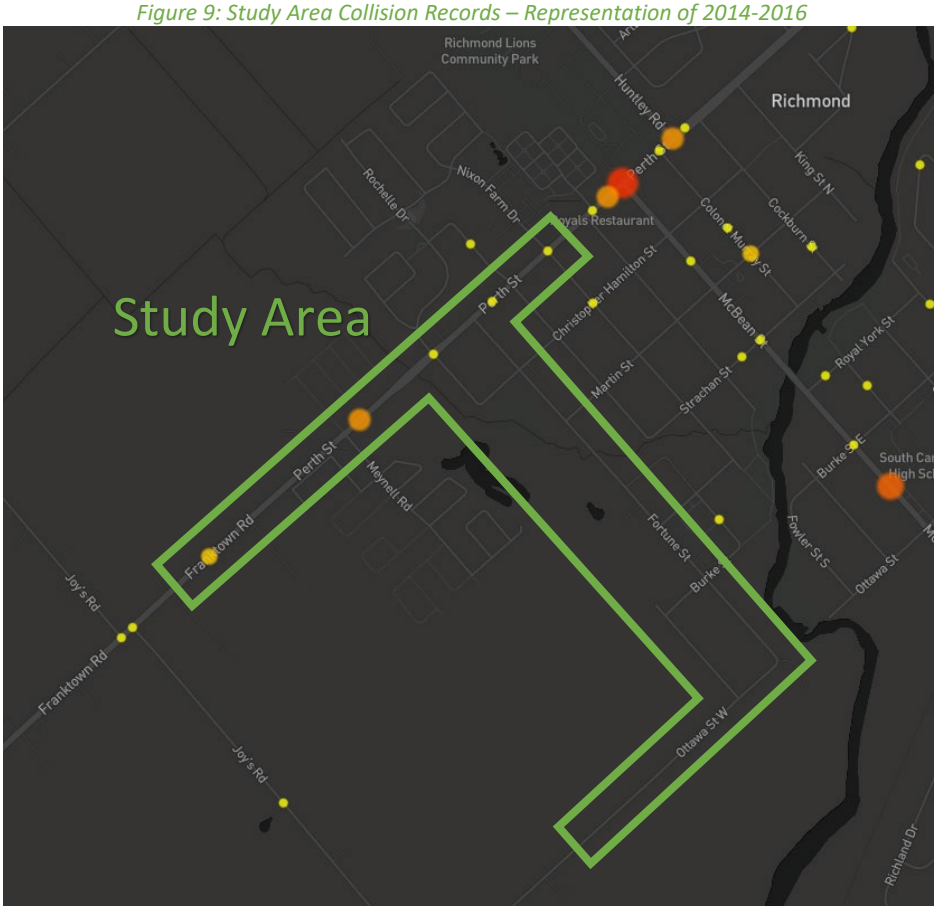
2.2.8 Collision Analysis

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 9 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		16	**100%**
Classification	**Fatality**	0	0%
	Non-Fatal Injury	4	25%
	Property Damage Only	12	75%
Initial Impact Type	**Angle**	1	6%
	Rear end	2	13%
	Sideswipe	1	6%
	Turning Movement	3	19%
	SMV Other	9	56%
Road Surface Condition	**Dry**	11	69%
	Wet	2	13%
	Ice	3	19%
Pedestrian Involved		2	13%
Cyclists Involved		0	0%

Figure 9: 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	**16**	**100%**
Perth St @ Queen Charlotte St/Rochelle Dr	4	25%
Fowler St/Nixon Farm Dr @ Perth St	1	6%
Fortune St @ Martin St	1	6%
Franktown Rd btwn Joy's Rd & Perth St	2	13%
Perth St btwn Franktown Rd & Rochelle Dr	4	25%
Perth St btwn Fortune St & Tarryn Ter	1	6%
Perth St btwn Tarryn Ter & Nixon Farm Dr	1	6%
Perth St btwn Nixon Farm Dr & Lennox St	1	6%
Fortune St btwn Perth St & Hamilton St	1	6%

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.

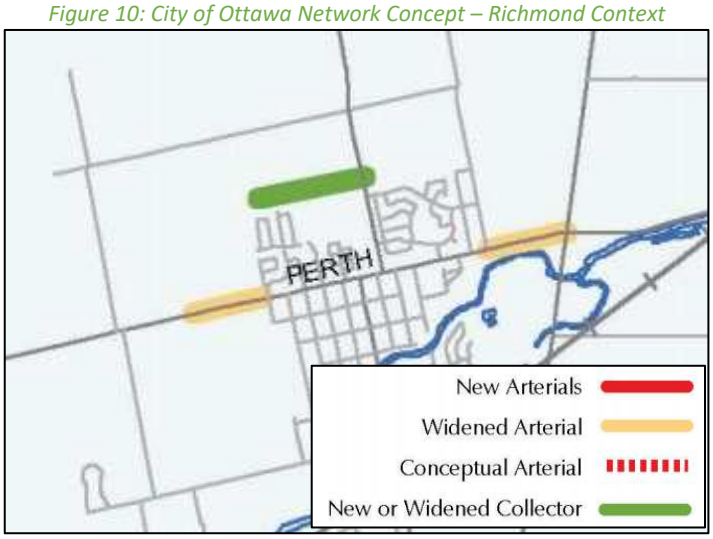
2.3 Planned Conditions

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 10:

- 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 10: 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.

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 Trip Generation and Mode Shares

This TIA has been prepared using the vehicle and person trip rates for the residential components using the TRANS Trip Generation Study Report (2009) for rural areas. Table 6 summarizes the person trip rates for the proposed land uses.

Table 6: Trip Generation Person Trip Rates

Dwelling Type	Land Use Code	Peak Hour	Vehicle Trip Rate	Person Trip Rates
Single-Detached Dwelling	221	AM	0.62	1.03
		PM	0.92	1.23
Townhomes/Rowhouses	223	AM	0.62	0.85
		PM	0.67	0.91

Using the above Person Trip rates, the total person trip generation has been estimated. Table 7 summarizes the total person trip generation by phase and dwelling type. The unit totals are considered a maximum unit count for

the subdivision and it is recognized that the ultimate unit count may be reduced through layout changes to address technical comments from other disciplines.

Table 7: Total Person Trip Generation

Site	Land Use	Units	AM Peak Hour			PM Peak Hour		
			In	Out	Total	In	Out	Total
6363-6409 Perth St.	Single-Detached	162	48	119	167	121	78	199
	Townhomes	175	55	94	149	84	75	159
6295 Perth St.	Single-Detached	32	10	23	33	24	15	39
6305 Ottawa St.	Single-Detached	42	12	31	43	32	20	52
	Townhomes	169	53	91	144	82	72	154
Total Person Trips			**178**	**358**	**536**	**343**	**260**	**603**

Using the most recent National Capital Region Origin-Destination survey (OD Survey), the existing mode shares for Rural Southwest have been determined and compared to various modes share breakdowns identified by City Staff as potential interpretations of the data. Table 8 summarizes these modal shares.

Table 8: Rural Southwest Mode Share

Travel Mode	Rural Southwest	AM From/Within	PM To/Within
Auto Driver	75%	85%	75%
Auto Passenger	15%	10%	15%
Transit	5%	5% (out only)	5% (in only)
Bicycle	1%	0%	0%
Walk	4%	0%	5%
Total	100%	100%	100%

Per City of Ottawa staff, the AM and PM mode shares and person trip rates have been projected and summarized in Table 9.

Table 9: Trip Generation by Mode

Phase	Travel Mode	Mode Share	In	Out	Total	Mode Share	In	Out	Total
6363-6409 Perth Street	Auto Driver	85%	88	181	269	75%	154	115	268
	Auto Passenger	10%	16	21	37	15%	31	31	62
	Transit	5%	0	11	11	5%	10	0	10
	Bicycle	0%	0	0	0	0%	0	0	0
	Walk	0%	0	0	0	5%	10	8	18
	Total	**100%**	**103**	**213**	**316**	**100%**	**205**	**153**	**358**
6295 Perth Street	Auto Driver	85%	9	20	28	75%	18	11	29
	Auto Passenger	10%	2	2	4	15%	4	3	7
	Transit	5%	0	1	1	5%	1	0	1
	Bicycle	0%	0	0	0	0%	0	0	0
	Walk	0%	0	0	0	5%	1	1	2
	Total	**100%**	**10**	**23**	**33**	**100%**	**24**	**15**	**39**
6305 Ottawa Street	Auto Driver	85%	55	103	159	75%	86	69	155
	Auto Passenger	10%	10	12	22	15%	17	19	36
	Transit	5%	0	7	7	5%	6	0	6
	Bicycle	0%	0	0	0	0%	0	0	0
	Walk	0%	0	0	0	5%	6	5	11
	Total	**100%**	**65**	**122**	**187**	**100%**	**114**	**92**	**206**

As shown above, 456 AM and 452 PM peak hour two-way vehicle trips are projected as a result of the proposed development.

No trip reductions factors (i.e., synergy, pass-by, etc.) have been applied as the subject development is residential.

5.2 Trip Distribution

To understand the travel patterns of the subject development the OD Survey has been reviewed to determine the existing travel patterns. Table 10 below summarizes the distribution.

Table 10: 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%	

5.3 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, 6295 Perth Street, and 6305 Ottawa Street are illustrated in Figure 11, Figure 12, and Figure 13. Of note for 6305 Ottawa Street, left turns onto Perth Street will be avoided due to the difficulty of making these movements, especially during the peak hours. In a general sense, it is easier to exit Perth Street than it is to enter during the peak hours at non-signalized locations.

Figure 11: New Site Generation Auto Volumes – 6363-6409 Perth Street

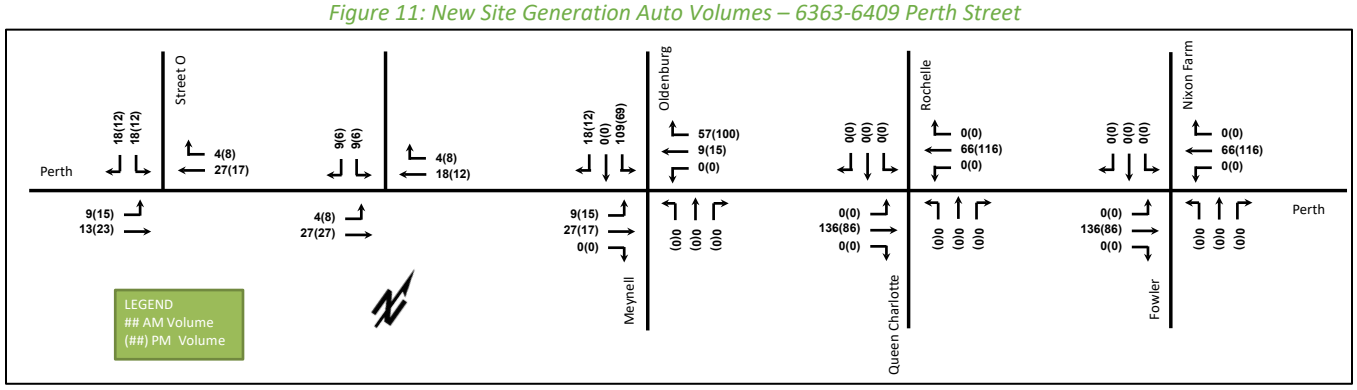


Figure 12: New Site Generation Auto Volumes – 6295 Perth Street

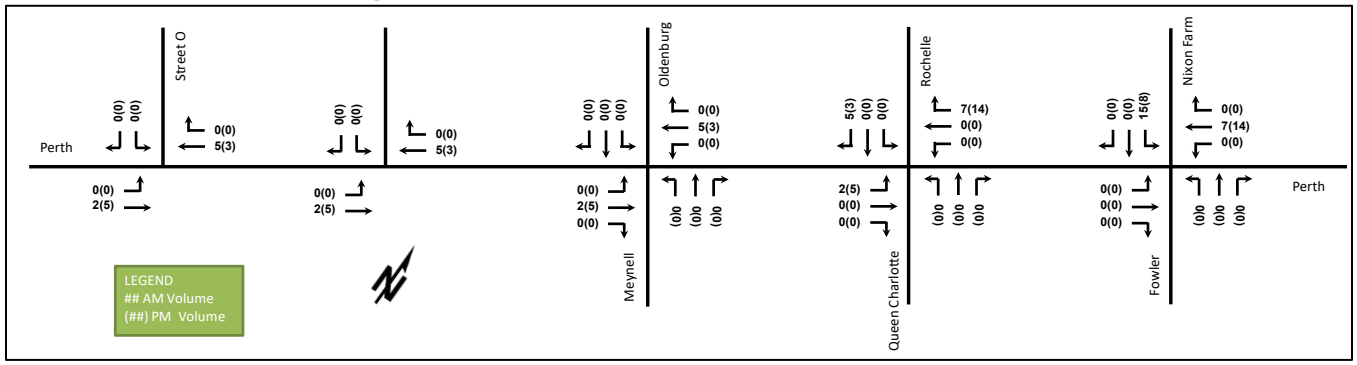
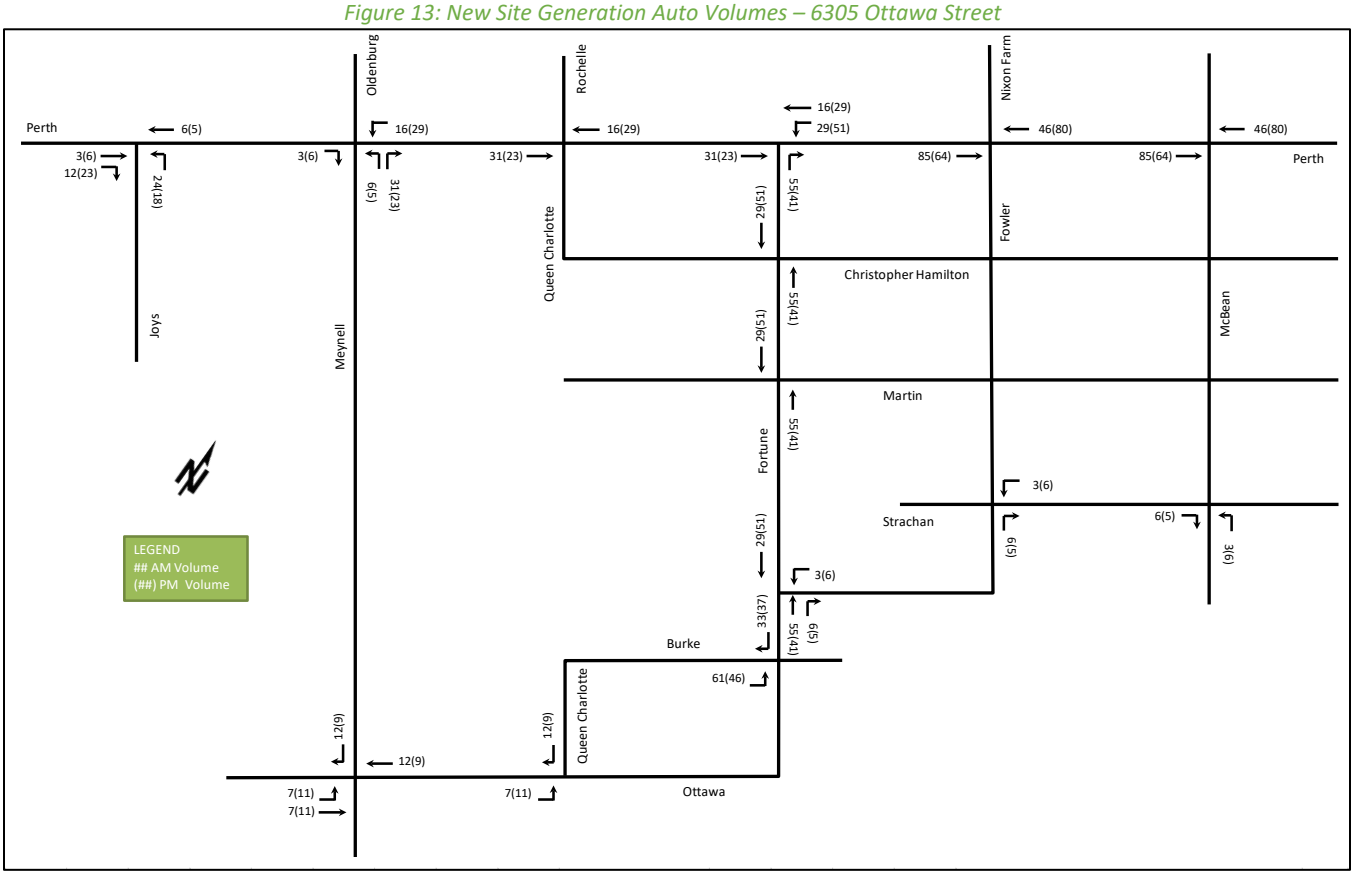


Figure 13: New Site Generation Auto Volumes – 6305 Ottawa Street



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
- 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 14 and Figure 15.

Figure 14: 2025 Background Development Total Volumes

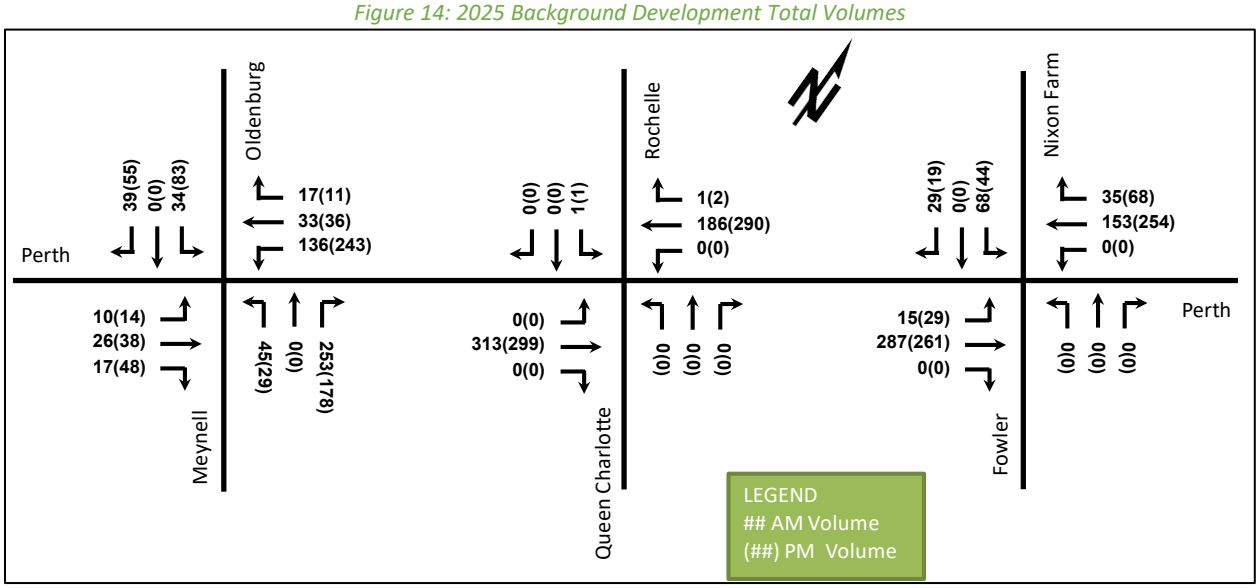
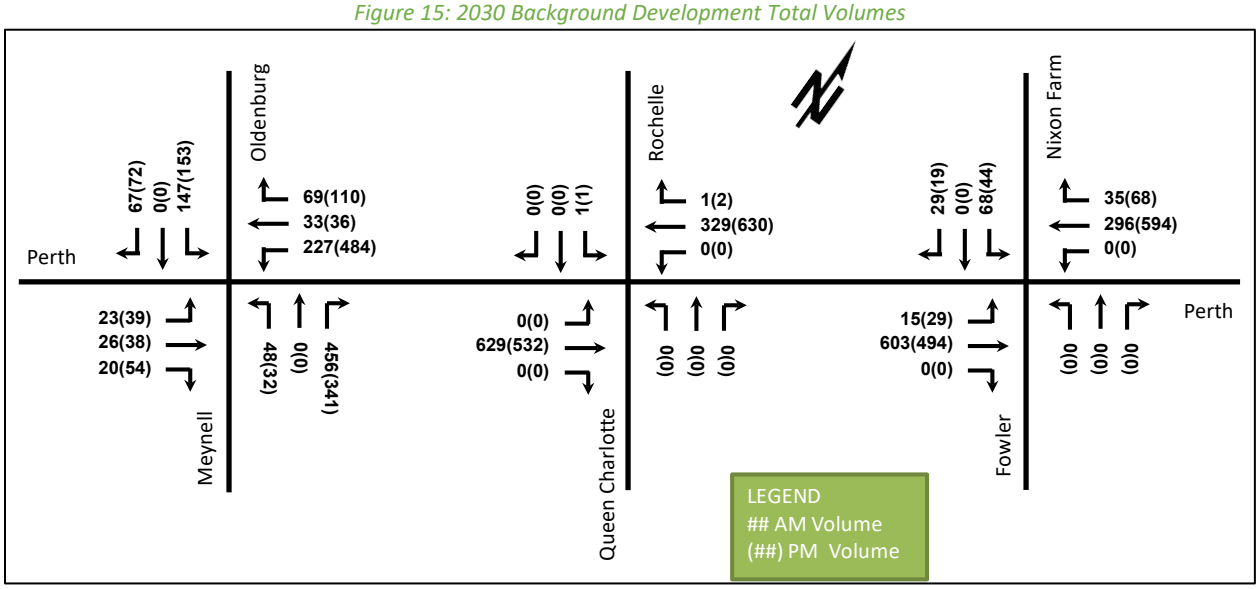


Figure 15: 2030 Background Development Total Volumes



7 Demand Rationalization

7.1 2025 Future Background Conditions

Figure 16 illustrates the 2025 future background volumes and Table 11 summarizes the intersection operations. The level of service for signalized intersections is based on the TIA Guidelines for volume to capacity ratio of the lane movements and HCM average delay for the overall intersection, and HCM average delay for unsignalized intersections. The synchro and sidra worksheets are provided in Appendix F.

Figure 16: 2025 Future Background Traffic Volumes

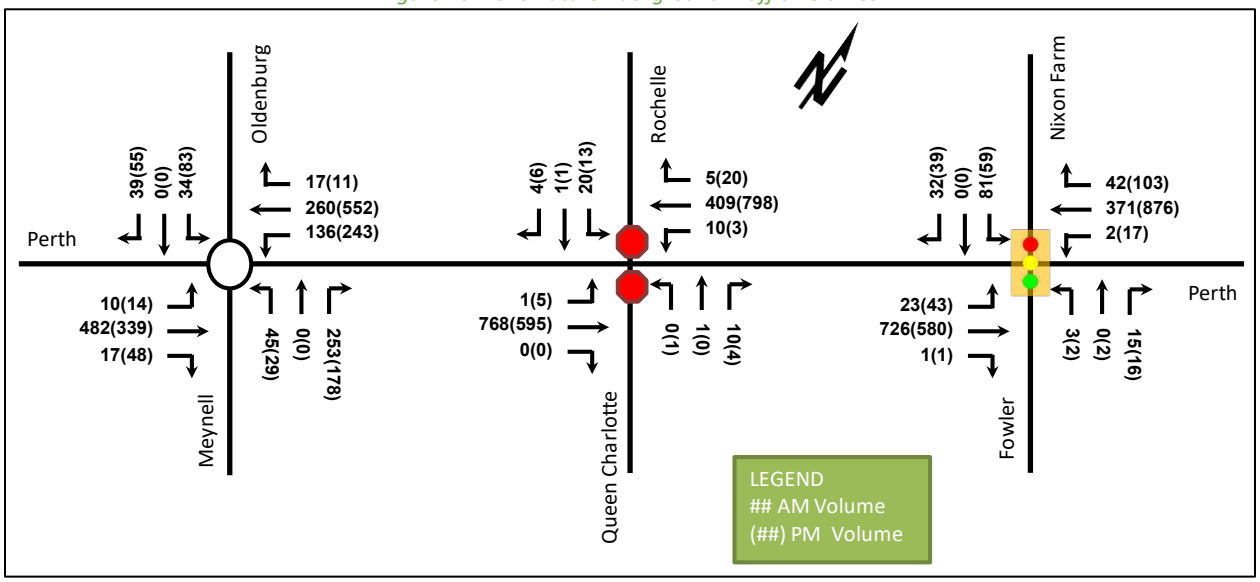


Table 11: 2025 Future Background Intersection Operations

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	0.43	6.4	21.4	A	3.40	6.8	37.5
	WB	A	0.30	5.9	15.2	A	0.55	5.8	37.5
	NB	A	0.36	8.2	17.3	A	0.24	7.2	10.2
	SB	A	0.08	8.4	3.1	A	0.22	13.0	10.0
	Overall	**A**	**0.43**	**6.4**	**-**	**A**	**0.55**	**6.8**	**-**
Perth Street & Rochelle Drive/Queen Charlotte Street *Unsignalized*	EBL/T	A	0.00	8.2	0.0		A	0.01	9.5
	EBT/R	-	-	-	-	-	-	-	-
	WBL	A	0.01	9.3	0.0	A	0.00	8.7	0.0
	WBT/R	-	-	-	-	-	-	-	-
	NB	B	0.02	12.3	0.8	C	0.02	16.4	0.0
	SB	C	0.09	18.4	2.3	D	0.10	25.0	2.3
	Overall	**A**	**-**	**0.6**	**-**	**A**	**-**	**0.4**	**-**
Perth Street & Nixon Farm Drive/Fowler Street *Signalized*	EB	A	0.32	4.7	28.7	A	0.30	4.3	22.0
	WB	A	0.18	3.9	14.3	A	0.43	5.0	37.7
	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	0.9	0.0
	Overall	**A**	**0.36**	**6.1**	**-**	**A**	**0.44**	**5.7**	**-**

Notes: Saturation flow rate of 1800 veh/h/lane
PHF = 1.00

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 17 illustrates the 2030 future background volumes and Table 12 summarizes the intersection operations. The level of service for signalized intersections is based on the TIA Guidelines for volume to capacity ratio of the lane movements and HCM average delay for the overall intersection, and HCM average delay for unsignalized intersections. The synchro and sidra worksheets are provided in Appendix G.

Figure 17: 2030 Future Background Traffic Volumes

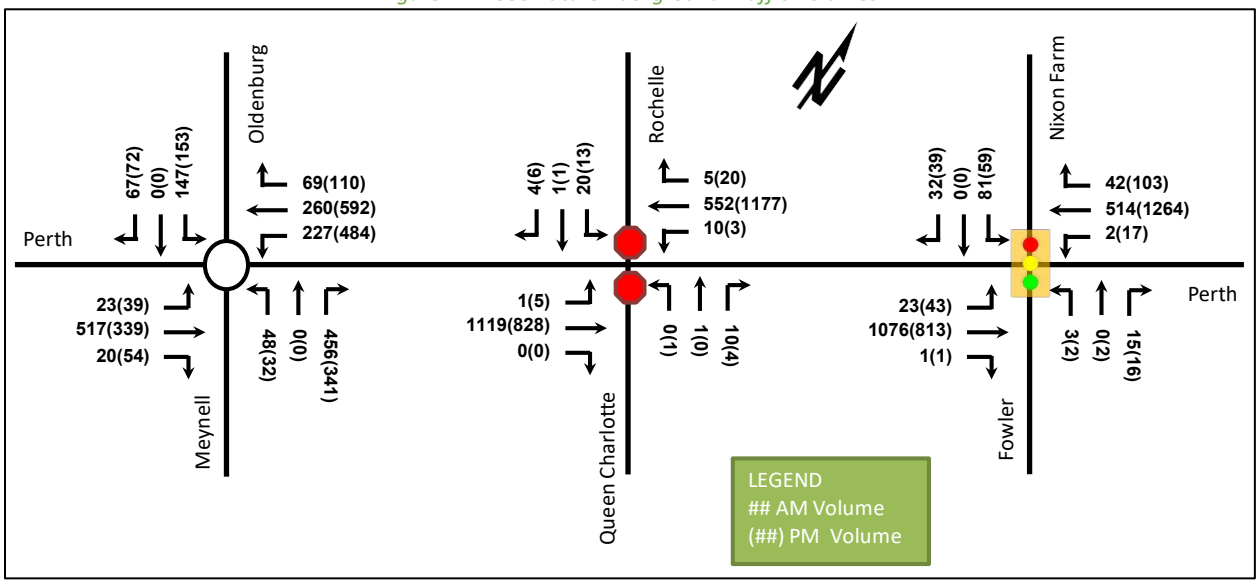


Table 12: 2030 Future Background Intersection Operations

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	0.58	8.3	37.0	B	0.61	12.7	43.0
	WB	A	0.41	6.4	23.9	D	0.84	7.2	116.6
	NB	B	0.75	18.6	71.8	A	0.48	8.8	26.8
	SB	A	0.26	10.6	11.2	B	0.65	34.7	49.5
	Overall	**C**	**0.75**	**10.8**	**-**	**D**	**0.84**	**11.3**	**-**
Perth Street & Rochelle Drive/Queen Charlotte Street *Unsignalized*	EBL/T	A	0.00	8.6	0.0	B	0.01	11.2	0.0
	EBT/R	-	-	-	-	-	-	-	-
	WBL	B	0.02	10.9	0.0	A	0.00	9.5	0.0
	WBT/R	-	-	-	-	-	-	-	-
	NB	C	0.03	15.9	0.8	D	0.04	31.5	0.8
	SB	D	0.14	29.1	3.8	**F**	**0.22**	**55.4**	**6.0**
	Overall	**A**	**-**	**0.6**	**-**	**A**	**-**	**0.7**	**-**
Perth Street & Nixon Farm Drive/Fowler Street *Signalized*	EB	A	0.47	5.8	48.5	A	0.42	5.1	33.5
	WB	A	0.24	4.2	19.9	A	0.59	6.7	64.9
	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	12.5	7.6
	Overall	**A**	**0.49**	**6.4**	**-**	**A**	**0.58**	**6.9**	**-**

Notes: Saturation flow rate of 1800 veh/h/lane
PHF = 1.00

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 the 13 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 18 and Figure 19 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 18: Concept Pedestrian and Cycling Network – 6295, 6363, 6409 Perth Street

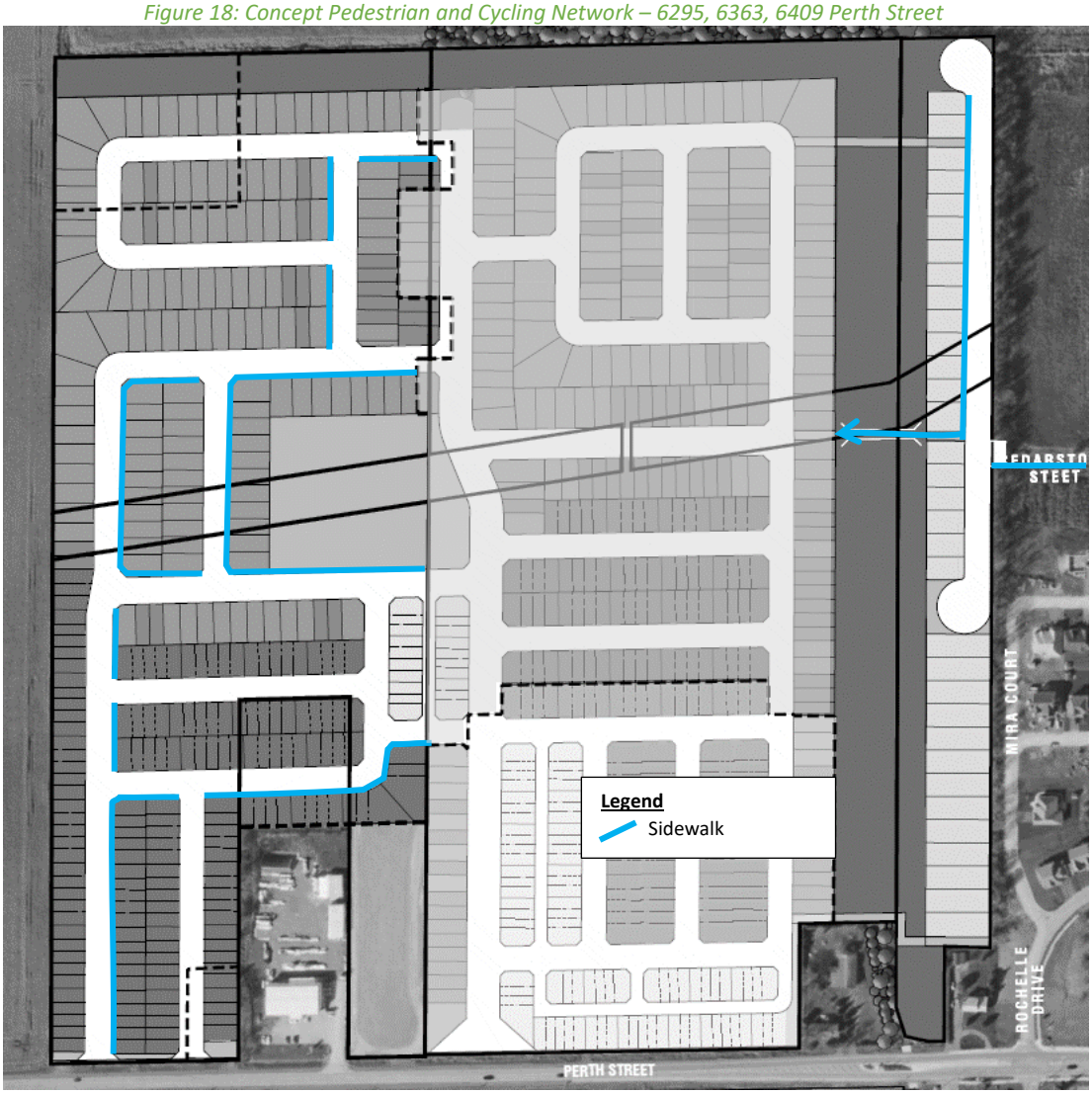


Figure 19: Concept Pedestrian and Cycling Network – 6305 Ottawa Street West

8.2 New Street Networks

The planned street network will include a mix of 16.5 and 18.0 metre local roadways, and 20.0 metre local road connections to adjacent local roadways. 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 20 illustrates the proposed locations. These are conceptual only and meant as guidance once the subdivision proceeds to future approvals beyond the rezoning.

Figure 20: Concept Traffic Calming Plan – 6295, 6363, 6409 Perth Street

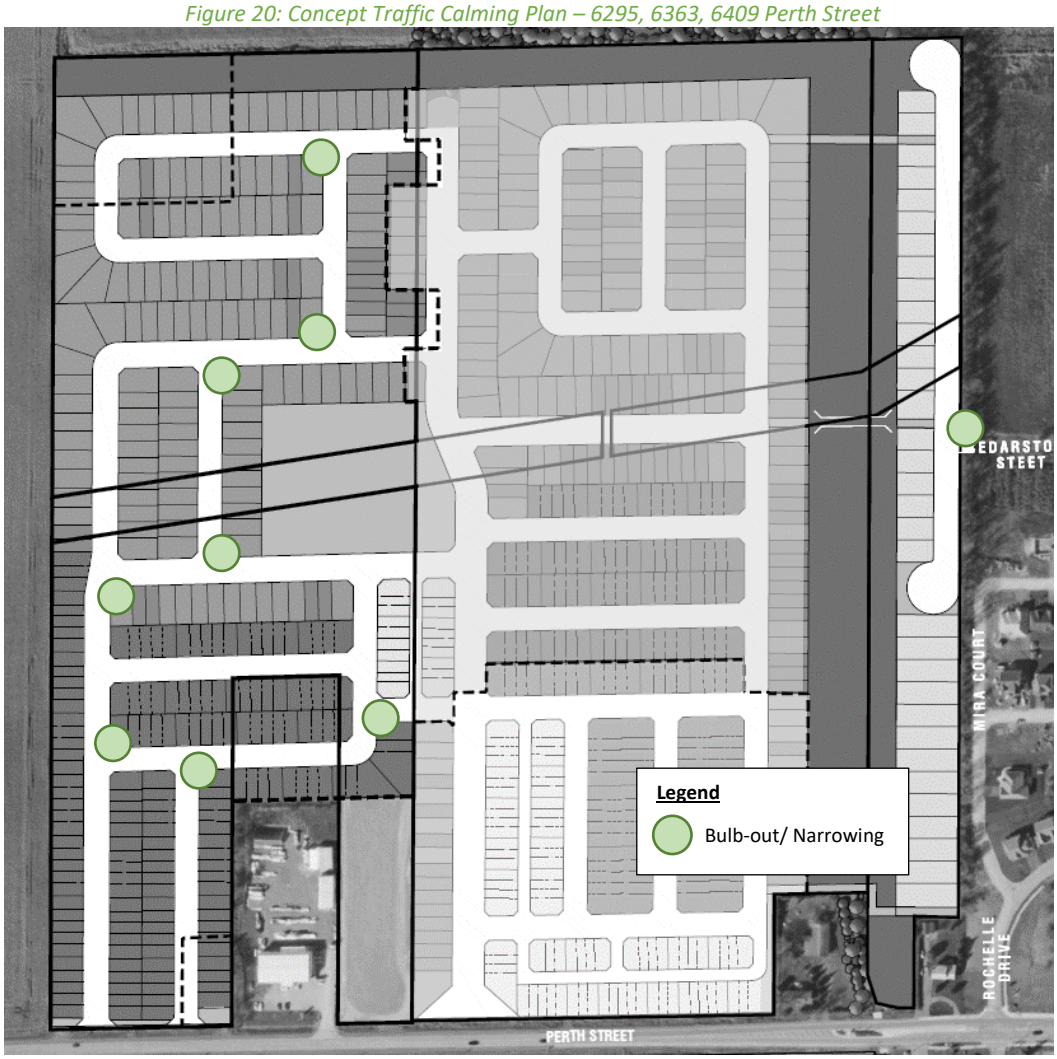


Figure 21: Concept Traffic Calming Plan – 6305 Ottawa Street West

9 Boundary Street Design

Table 13 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 13: 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
Ottawa (existing)	F	C	F	B	N/A	N/A	N/A	N/A
Ottawa (future)	E	C	D	B	N/A	N/A	N/A	N/A
Meynell	C	C	A	D	N/A	N/A	N/A	N/A
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
Burke	-	C	A	B	N/A	N/A	N/A	N/A

Cedarstone Street, Perth Street and Ottawa Street do not meet the pedestrian LOS targets for Richmond Village. The existing Perth Street and Ottawa Street do 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. In the future, Ottawa Street is assumed to include a sidewalk and is limited by the traffic volumes and speeds anticipated along the roadway. No mitigation is recommended for: Perth Street as it is a rural arterial roadway and connections can be provided through the subdivision; for Ottawa Street as the road design is subject to the subdivision work included in 6240-6431 Ottawa Street or, on Cedarstone Street due to limited space for shifting the existing sidewalks.

Similar to the pedestrian conditions, existing Perth Street and Ottawa Street do 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. The future Ottawa Street remains undefined, but the assumption of mixed traffic will not meet the area targets. Along Ottawa Street, it is recommended that the City investigate the ability to place separated facilities for cyclists during the approvals of 6240-6431 Ottawa Street. This is the direction the MMLOS analysis dictates for the roadway, even if it is not ultimately required given the location at the limits of the Village.

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, Fortune Street and Ottawa Street, 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.

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. The warrants at the Street 0 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 22 and intersection operations are summarized below in Table 14. The level of service for signalized intersections is based on the TIA Guidelines for volume to capacity ratio of the lane movements and HCM average delay for the overall intersection, and HCM average delay for unsignalized intersections. The synchro and sidra worksheets have been provided in Appendix J.

Figure 22: 2025 Future Total Volumes

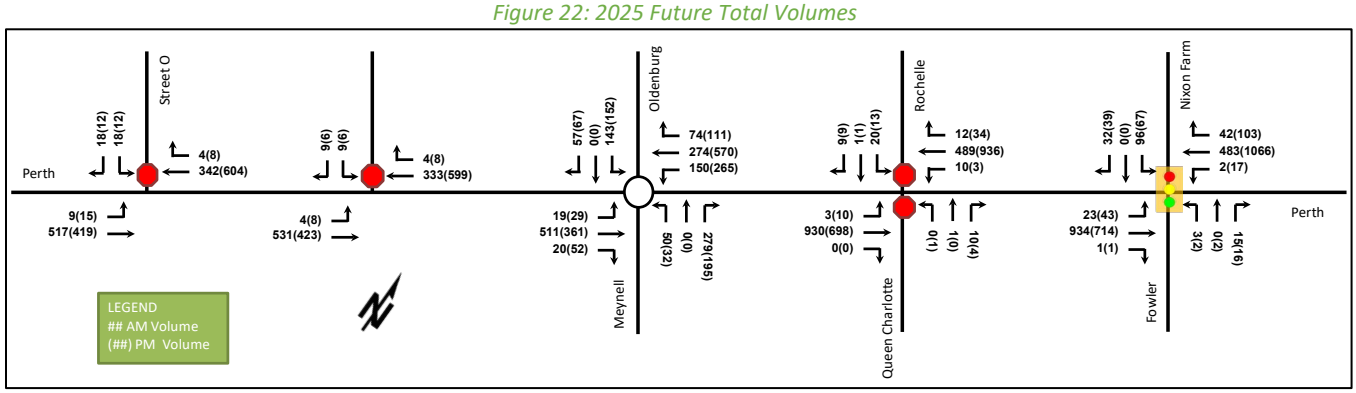


Table 14: 2025 Future Total Access Intersection Operations

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	0.02	8.8	0.0
	WB	-	-	-	-	-	-	-	-
	SB	B	0.08	14.0	2.3	C	0.07	16.9	1.5
	Overall	**A**	**-**	**0.6**	**-**	**A**	**-**	**0.5**	**-**
Perth Street & Street I *Unsignalized*	EB	A	0.00	8.0	0.0	A	0.01	8.7	0.0
	WB	-	-	-	-	-	-	-	-
	SB	B	0.04	13.6	0.8	C	0.04	16.2	0.8
	Overall	**A**	**-**	**0.3**	**-**	**A**	**-**	**0.3**	**-**

Notes: Saturation flow rate of 1800 veh/h/lane
PHF = 1.00

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 23 and intersection operations are summarized below in Table 15. The level of service for signalized intersections is based on the TIA Guidelines for volume to capacity ratio of the lane movements and HCM average delay for the overall intersection, and HCM average delay for unsignalized intersections. The synchro and sidra worksheets have been provided in Appendix K.

Figure 23: 2030 Future Total Volumes

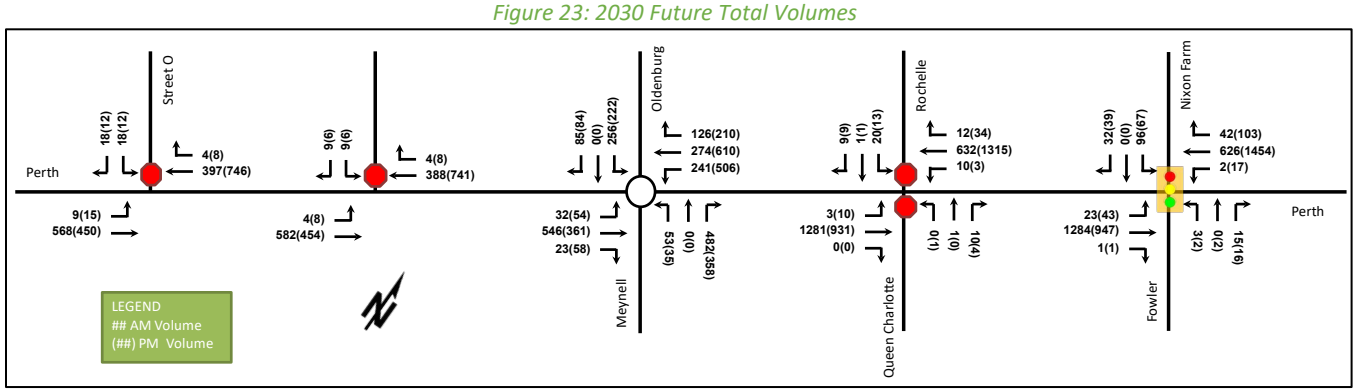


Table 15: 2030 Future Total Access Intersection Operations

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	0.09	15.3	2.3	C	0.09	20.2	2.3
	Overall	**A**	**-**	**0.6**	**-**	**A**	**-**	**0.5**	**-**
Perth Street & Street O *Unsignalized*	EB	A	0.00	8.1	0.0	A	0.01	9.2	0.0
	WB	-	-	-	-	-	-	-	-
	SB	B	0.05	14.7	0.8	C	0.05	19.1	0.8
	Overall	**A**	**-**	**0.3**	**-**	**A**	**-**	**0.3**	**-**

Notes: Saturation flow rate of 1800 veh/h/lane
PHF = 1.00

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.

For 6305 Ottawa Street, the forecasted trips would theoretically exceed a single local road threshold. Given the access configuration (Street B, Street E to Burke Street and Street F) these impacts are distributed across multiple roads. Due to the recent pandemic, data collection was limited, and the City has not been able to provide Streetlight data to approximate the area volumes and validate the impact of 6305 Ottawa Street on Burke Street, Fortune Street and Ottawa Street.

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) or convoluted routing of the available collector (e.g., Fortune-Royal York-Fowler) will increase the perceived impacts of the volumes on adjacent roadways and contribute to the thresholds being met, currently or in the future. The roadways likely to be impacts are the aforementioned Fortune to Royal York to Fowler route to Perth Street, and two routes to McBean Street via Fortune to Martin or Royal York to Fowler to Strachan. 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 and 6305 Ottawa Street West, 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 5.1 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 16 summarizes the transit trip generation.

Table 16: Trip Generation by Transit Mode

Travel Mode	Mode Share	AM Peak Period			PM Peak Period		
		In	Out	Total	In	Out	Total
Transit	5%	0	11	1	10	0	10

The proposed development is anticipated to generate an additional 11 AM peak hour and 10 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, and in the worst-case scenario result in an additional single bus (55-person capacity) 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 17. The level of service for signalized intersections is based on the TIA Guidelines for volume to capacity ratio of the lane movements and HCM average delay for the overall intersection, and HCM average delay for unsignalized intersections. The synchro and sidra worksheets have been provided in Appendix J.

Table 17: 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	0.53	6.6	28.9	A	0.48	7.7	53.6
	WB	A	0.37	5.9	20.2	B	0.66	5.9	53.6
	NB	A	0.47	10.9	27.2	A	0.29	8.1	13.2
	SB	A	0.29	10.2	9.6	A	0.38	14.9	19.4
	Overall	**A**	**0.53**	**7.7**	**-**	**B**	**0.66**	**7.7**	**-**
Perth Street & Rochelle Drive/Queen Charlotte Street *Unsignalized*	EBL/T	A	0.00	8.4	0.0	B	0.01	10.2	0.0
	EBT/R	-	-	-	-	-	-	-	-
	WBL	A	0.01	10.0	0.0	A	0.00	9.0	0.0
	WBT/R	-	-	-	-	-	-	-	-
	NB	B	0.03	13.8	0.8	C	0.02	21.1	0.8
	SB	C	0.12	21.4	3.0	D	0.15	32.2	3.8
	Overall	**A**	**-**	**0.6**	**-**	**A**	**-**	**0.6**	**-**
Perth Street & Nixon Farm Drive/Fowler Street *Signalized*	EB	A	0.41	5.6	42.3	A	0.36	4.9	29.2
	WB	A	0.23	4.4	19.8	A	0.51	5.9	51.3
	NB	A	0.07	5.6	3.0	A	0.08	14.7	5.4
	SBL	A	0.46	34.4	23.4	A	0.35	32.1	17.7
	SBT/R	A	0.06	0.2	0.0	A	0.14	5.5	4.6
	Overall	**A**	**0.45**	**6.8**	**-**	**A**	**0.52**	**6.4**	**-**

Notes: Saturation flow rate of 1800 veh/h/lane
PHF = 1.00
$: Delay exceeds 300s

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 18. The level of service for signalized intersections is based on the TIA Guidelines for volume to capacity ratio of the lane movements and HCM average delay for the overall intersection, and HCM average delay for unsignalized intersections. The synchro and sidra worksheets have been provided in Appendix K.

Table 18: 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	0.71	12.8	62.5	C	0.75	19.1	70.1
	WB	A	0.48	6.4	30.0	E	0.97	9.5	256.1
	NB	E	0.98	65.0	207.8	A	0.55	10.9	35.6
	SB	A	0.43	11.8	21.2	**F**	**1.18**	**240.9**	**339.6**
	Overall	**E**	**0.98**	**23.9**	**-**	**F**	**1.18**	**40.0**	**-**
Perth Street & Rochelle Drive/Queen Charlotte Street *Unsignalized*	EBL/T	A	0.00	8.8	0.0	B	0.02	12.2	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	18.6	0.8	E	0.05	45.0	1.5
	SB	E	0.20	35.2	5.3	**F**	**0.33**	**79.8**	**9.0**
	Overall	**A**	**-**	**0.7**	**-**	**A**	**-**	**1.0**	**-**
Perth Street & Nixon Farm Drive/Fowler Street *Signalized*	EB	A	0.57	7.2	68.6	A	0.49	5.9	43.5
	WB	A	0.29	4.7	26.2	B	0.67	8.2	87.8
	NB	A	0.07	5.6	3.0	A	0.08	14.7	5.4
	SBL	A	0.46	34.4	23.4	A	0.35	32.1	17.7
	SBT/R	A	0.08	0.4	0.0	A	0.16	12.7	7.6
	Overall	**A**	**0.59**	**7.5**	**-**	**B**	**0.67**	**8.0**	**-**

Notes: Saturation flow rate of 1800 veh/h/lane
PHF = 1.00

The network intersection operations for the 2030 future total horizon will see a degradation of the southbound approaches along Perth Street at Oldenburg Avenue and 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 decrease in the PM peak operations on Oldenburg Avenue to a v/c of 1.18 is due to the increase in traffic along Perth Street to the westbound left-turn movement. The continued build-out of 6240-6431 Ottawa Street is the primary reason for the increase in westbound left-turn volumes which reduce potential gaps for the southbound traffic to access the roundabout. The traffic projections assumed within this TIA did not alter the 2019 TIA (Stantec) for 6240-6431 Ottawa Street which applied over 75% of all development traffic to Meynell Road. A greater utilization of Ottawa Street is anticipated and will need to be reassessed by those development lands once they proceed. As an example, if the westbound through and left-turn volumes were decreased by 125 vehicles would improve to 0.85. Therefore, the development traffic associated with 6295, 6363, 6409 Perth Street and 6305 Ottawa Street West can be accommodated by the road network in the 2030 horizon and no mitigation is recommended as part of this study.

The southbound approach at the Perth Street and Rochelle Drive/Queen Charlotte Street intersection is also subject to the increased volumes along Perth Street, limiting the ability for southbound left-turns to be completed. 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 19 summarizes the intersection operations if 125 westbound left-turns and 12 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 and sidra worksheets are provided in Appendix N.

Table 19: 2030 Future Total Network Intersection Operations – PM Peak Diverted Volumes

Intersection	Lane	PM Peak Hour			
		LOS	V/C	Delay	Q (95th)
Perth Street & Meynell Road *Roundabout*	EB	B	0.64	13.1	48.5
	WB	D	0.88	7.3	133.4
	NB	A	0.56	11.5	36.6
	SB	D	0.85	51.9	91.7
	Overall	**D**	**0.88**	**14.9**	**--**
Perth Street & Rochelle Drive/Queen Charlotte Street *Unsignalized*	EBL/T	B	0.02	12.2	0.0
	EBT/R	-	-	-	-
	WBL	A	0.00	9.9	0.1
	WBT/R	-	-	-	-
	NB	E	0.05	45	0.2
	SB	E	0.10	39.3	0.3
	Overall	**A**	**-**	**0.4**	**-**
Perth Street & Nixon Farm Drive/Fowler Street *Signalized*	EB	A	0.50	6.2	46.6
	WB	E	0.94	25.2	**#173.3**
	NB	A	0.08	14.3	5.4
	SBL	A	0.40	33.1	20.0
	SBT/R	A	0.15	12.4	7.6
	Overall	**E**	**0.91**	**18.5**	**-**

Notes: Saturation flow rate of 1800 veh/h/lane
PHF = 1.00

15.2.3 Network Intersection MMLOS

Table 20 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 20: 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 162 detached homes and 175 townhomes at 6363-6409 Perth Street, 32 detached homes at 6295 Perth Street, and 42 detached homes and 169 townhomes at 6305 Ottawa Street
- Accesses will be provided through the extension of existing local roads of Burke 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 Ottawa Street, Fortune Street 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, Fortune 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 316 two-way people trips during the AM peak hour and 358 two-way people trips during the PM peak hour from 6363-6409 Perth Street, 33 two-way people trips during the AM peak hour and 39 two-way people trips during the PM peak hour from 6295 Perth Street, and 187 two-way people trips during the AM peak hour and 206 two-way people trips during the PM peak hour from 6305 Ottawa Street
- Of the forecasted people trips, 456 two-way trips will be vehicle trips during the AM peak hour and 452 two-way trips will be vehicle trips during the PM peak hour based on an 85% modal share target
- 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

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, with future connections to the adjacent Mattamy development along Ottawa 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), Ottawa Street 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) and Ottawa Street 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 a local road connection to Perth Street
- The new street connection to Perth Street, west of the future Meynell Road roundabout, 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 AM peak direction
- To meet forecasted transit use, 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 2025 future total conditions and the Perth Street at Meynell Road roundabout will reach capacity by 2030
- This capacity analysis assumes a significant percentage of the future Mattamy lands utilizing the roundabout to access Meynell Road, while it is likely this volume will divert to Ottawa Street
- A sensitivity of 125 trips diverting to Ottawa Street would result in the roundabout operating within capacity thresholds
- It is also noted that the southbound left-turn from Rochelle Drive will ultimately divert to Nixon Farm Drive and the signal has residual capacity to facilitate an additional 12 southbound left-turn movements
- 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 applications proceed.

Prepared By:

Andrew Harte, P.Eng.
Senior Transportation Engineer

Reviewed By:

Christopher Gordon, P.Eng.
Senior Transportation Engineer

Appendix A

TIA Screening Form and PM Certification Form

CGH TRANSPORTATION

13 Markham Avenue
Ottawa ON K2G 3Z1

City of Ottawa 2017 TIA Guidelines
Step 1 - Screening Form

Date: 04-Jun-20
Project Number: 2019-64
Project Reference: Green & Laffin Lands

1.1 Description of Proposed Development	
Municipal Address	6409, 6363, 6295 Perth Street, 6305 Ottawa Street West
Description of Location	Existing farm land within the Village of Richmond
Land Use Classification	Development Reserve (DR1)
Approximate Development Size	6406 & 6363 Perth St: 162 singles, 175 towns 6 295 Perth St: 32 singles 6305 Ottawa St W: 42 singles, 169 Townhomes
Accesses	6406 & 6363 Perth St: Connectivity through Fox Run North 6295 Perth St: New connection to Mira Court 6305 Ottawa St W: New connection to Queen Charlotte Street at Burke Street
Phase of Development	6406 & 6363 Perth St: One or two phases 6295 Perth St: Single phase 6305 Ottawa St W: Single phase
Buildout Year	2025
TIA Requirement	Full TIA Required

1.2 Trip Generation Trigger		
Land Use Type	Single-family homes	
Development Size	580	Units
Trip Generation Trigger	Yes	(Approx. 344 townhomes, 236 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.**

City Of Ottawa
Infrastructure Services and Community Sustainability
Planning and Growth Management
110 Laurier Avenue West, 4th fl.
Ottawa, ON K1P 1J1
Tel. : 613-580-2424
Fax: 613-560-6006

Ville d'Ottawa
Services d 'infrastructure et Viabilité des collectivités
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_____

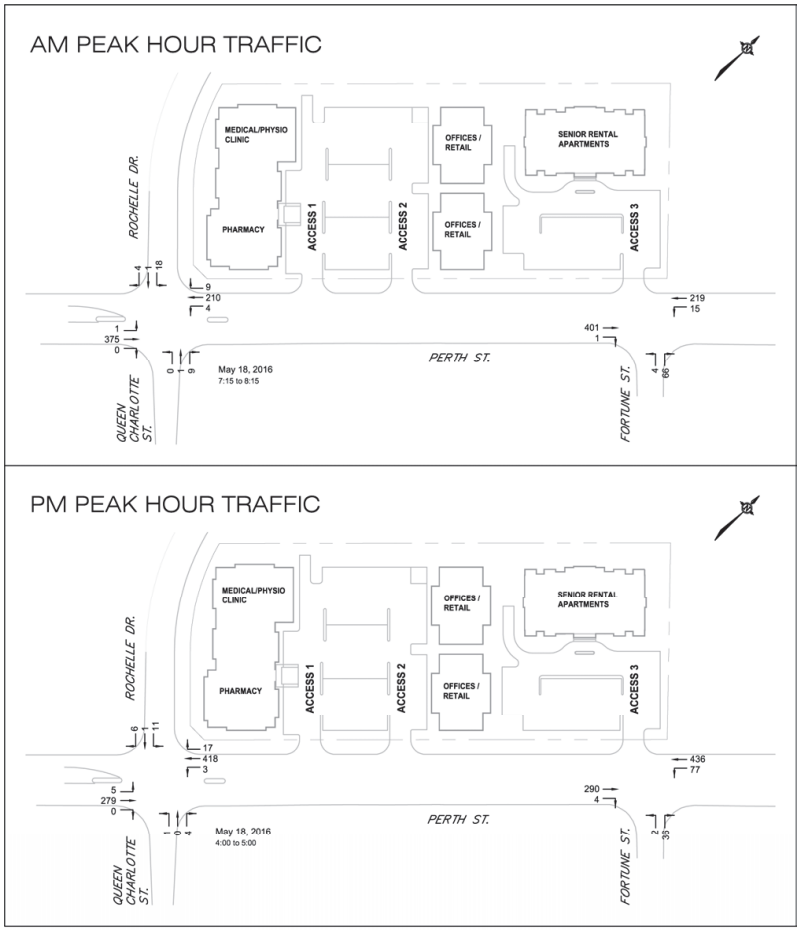
_____
Signature of Individual certifier that s/he meets the above four criteria

Office Contact Information (Please Print)
Address: 13 Markham Avenue
City / Postal Code: Ottawa / K2G 3Z1
Telephone / Extension: (613) 697-3797
E-Mail Address: Andrew.Harte@CGHTransportation.com

Appendix B

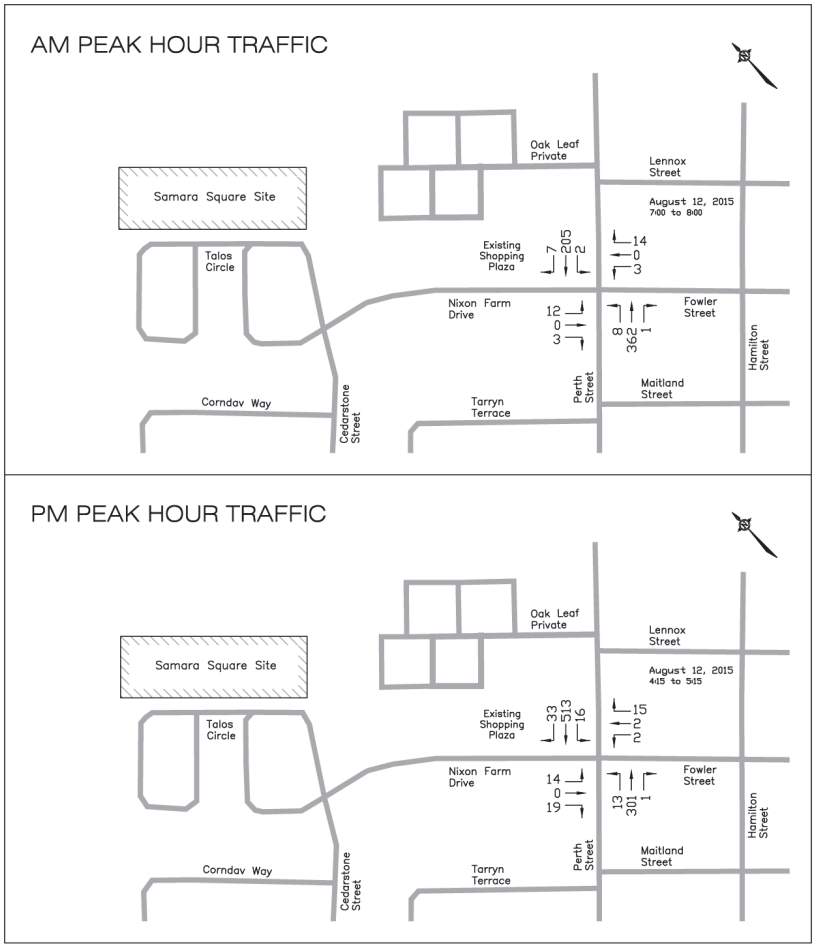
Turning Movement Counts

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



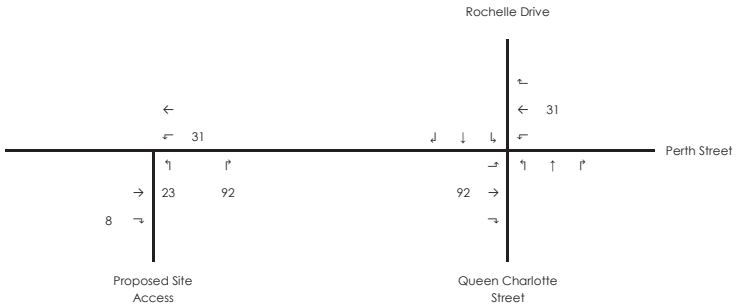
NOT TO SCALE

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

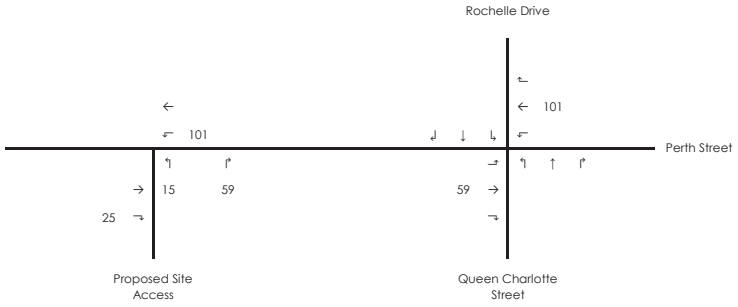


NOT TO SCALE

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

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	1	516	0	10	287	5	0	1	10	20	1	4
Future Volume (vph)	1	516	0	10	287	5	0	1	10	20	1	4
Satd. Flow (prot)	0	3316	0	1658	1740	0	0	1529	0	0	1643	0
Flt Permitted				0.950							0.961	
Satd. Flow (perm)	0	3316	0	1658	1740	0	0	1529	0	0	1643	0
Lane Group Flow (vph)	0	574	0	11	325	0	0	12	0	0	27	0
Sign Control		Free			Free			Stop			Stop	

Intersection Summary			
Control Type: Unsignalized			
Intersection Capacity Utilization 31.1%		ICU Level of Service A	
Analysis Period (min) 15			

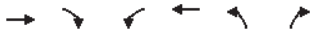
Intersection	
Int Delay, s/veh	0.7

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



Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (vph)	425	8	31	260	23	92
Future Volume (vph)	425	8	31	260	23	92
Satd. Flow (prot)	1740	0	0	1736	1541	0
Flt Permitted				0.995	0.990	
Satd. Flow (perm)	1740	0	0	1736	1541	0
Lane Group Flow (vph)	481	0	0	323	128	0
Sign Control	Free			Free	Stop	

Intersection Summary			
Control Type: Unsignalized			
Intersection Capacity Utilization 55.8%		ICU Level of Service B	
Analysis Period (min) 15			

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

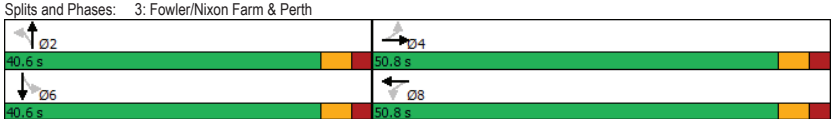
Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	506	-	-	1082	-
HCM Lane V/C Ratio	0.253	-	-	0.032	-
HCM Control Delay (s)	14.5	-	-	8.4	0
HCM Lane LOS	B	-	-	A	A
HCM 95th %tile Q(veh)	1	-	-	0.1	-

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



Lanes, Volumes, Timings
1: Queen Charlotte/Rochelle & Perth 05-30-2020

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	5	393	0	3	581	20	1	0	4	13	1	6
Future Volume (vph)	5	393	0	3	581	20	1	0	4	13	1	6
Satd. Flow (prot)	0	3312	0	1658	1736	0	0	1541	0	0	1618	0
Flt Permitted		0.999		0.950				0.990			0.969	
Satd. Flow (perm)	0	3312	0	1658	1736	0	0	1541	0	0	1618	0
Lane Group Flow (vph)	0	443	0	3	668	0	0	5	0	0	22	0
Sign Control		Free			Free			Stop			Stop	

Intersection Summary	
Control Type: Unsignalized	
Intersection Capacity Utilization 43.6%	ICU Level of Service A
Analysis Period (min) 15	

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

Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (vph)	339	25	101	487	15	59
Future Volume (vph)	339	25	101	487	15	59
Satd. Flow (prot)	1729	0	0	1729	1543	0
Flt Permitted				0.991	0.990	
Satd. Flow (perm)	1729	0	0	1729	1543	0
Lane Group Flow (vph)	405	0	0	653	83	0
Sign Control	Free			Free	Stop	

Intersection Summary		
Control Type: Unsignalized		
Intersection Capacity Utilization	68.1%	ICU Level of Service C
Analysis Period (min)	15	

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

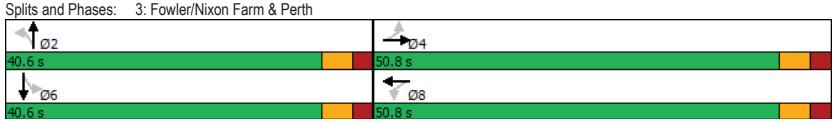
Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	436	-	-	1154	-
HCM Lane V/C Ratio	0.189	-	-	0.097	-
HCM Control Delay (s)	15.2	-	-	8.5	0
HCM Lane LOS	C	-	-	A	A
HCM 95th %tile Q(veh)	0.7	-	-	0.3	-

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



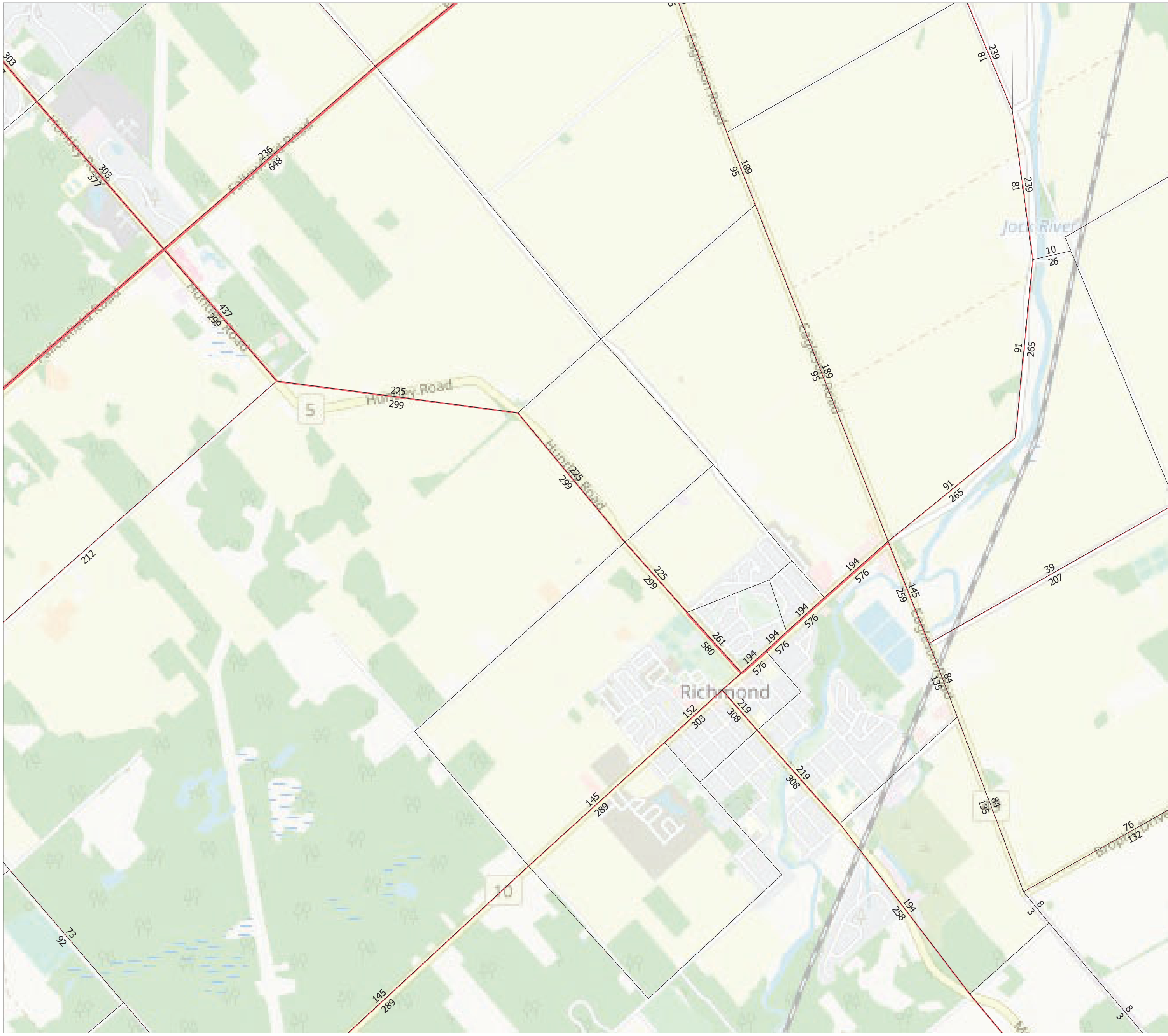
Appendix D

Collision Data

Accident Date	Accident Year	Accident Time	Location	Environment Condition	Light	Traffic Control	Traffic Control Condition	Classification Of Accident	Initial Impact Type	Road Surface Condition
2018-03-04	2018	11:49	FORTUNE ST @ MARTIN ST (0000443)	01 - Clear	01 - Daylight	02 - Stop sign		03 - P.D. only	02 - Angle	01 - Dry
2018-04-06	2018	9:15	FORTUNE ST btwn PERTH ST & HAMILTON ST (__3ZBNC5)	01 - Clear	01 - Daylight	10 - No control		02 - Non-fatal injury	07 - SMV other	01 - Dry
2015-06-30	2015	12:28	FOWLER ST/NIXON FARM DR @ PERTH ST	01 - Clear	01 - Daylight	01 - Traffic signal		02 - Non-fatal injury	07 - SMV other	01 - Dry
2014-09-18	2014	7:59	FRANKTOWN RD btwn JOY'S RD & PERTH ST	01 - Clear	01 - Daylight	10 - No control		03 - P.D. only	03 - Rear end	01 - Dry
2016-09-28	2016	3:00	FRANKTOWN RD btwn JOY'S RD & PERTH ST	01 - Clear	07 - Dark	10 - No control		03 - P.D. only	07 - SMV other	01 - Dry
2017-12-11	2017	8:49	PERTH ST @ QUEEN CHARLOTTE ST/ROCHELLE DR	01 - Clear	01 - Daylight	02 - Stop sign		03 - P.D. only	04 - Sideswipe	01 - Dry
2015-02-07	2015	4:38	PERTH ST @ QUEEN CHARLOTTE ST/ROCHELLE DR	01 - Clear	07 - Dark	02 - Stop sign		03 - P.D. only	07 - SMV other	02 - Wet
2017-02-20	2017	1:58	PERTH ST @ QUEEN CHARLOTTE ST/ROCHELLE DR	01 - Clear	07 - Dark	02 - Stop sign		02 - Non-fatal injury	07 - SMV other	06 - Ice
2018-10-09	2018	17:20	PERTH ST @ QUEEN CHARLOTTE ST/ROCHELLE DR (0009772)	01 - Clear	01 - Daylight	02 - Stop sign		03 - P.D. only	05 - Turning movement	01 - Dry
2015-08-23	2015	5:05	PERTH ST btwn FORTUNE ST & TARRYN TER	01 - Clear	07 - Dark	10 - No control		03 - P.D. only	07 - SMV other	01 - Dry
2014-10-13	2014	19:27	PERTH ST btwn FRANKTOWN RD & ROCHELLE DR	02 - Rain	07 - Dark	10 - No control		03 - P.D. only	05 - Turning movement	02 - Wet
2015-03-02	2015	19:05	PERTH ST btwn FRANKTOWN RD & ROCHELLE DR	03 - Snow	07 - Dark	10 - No control		03 - P.D. only	07 - SMV other	06 - Ice
2015-12-20	2015	5:41	PERTH ST btwn FRANKTOWN RD & ROCHELLE DR	03 - Snow	07 - Dark	10 - No control		02 - Non-fatal injury	07 - SMV other	06 - Ice
2017-06-17	2017	4:28	PERTH ST btwn FRANKTOWN RD & ROCHELLE DR	01 - Clear	07 - Dark	10 - No control		03 - P.D. only	07 - SMV other	01 - Dry
2018-03-31	2018	13:31	PERTH ST btwn NIXONFARM DR & LENNOX ST (__3ZA42Z)	01 - Clear	01 - Daylight	10 - No control		03 - P.D. only	05 - Turning movement	01 - Dry
2018-04-19	2018	16:01	PERTH ST btwn TARRYN TER & NIXONFARM DR (__3ZA42Y)	01 - Clear	01 - Daylight	10 - No control		03 - P.D. only	03 - Rear end	01 - Dry

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

TRANS

Legend

AM Peak Hour Total Traffic Volume

2000 4000 6000 8000 10000

N

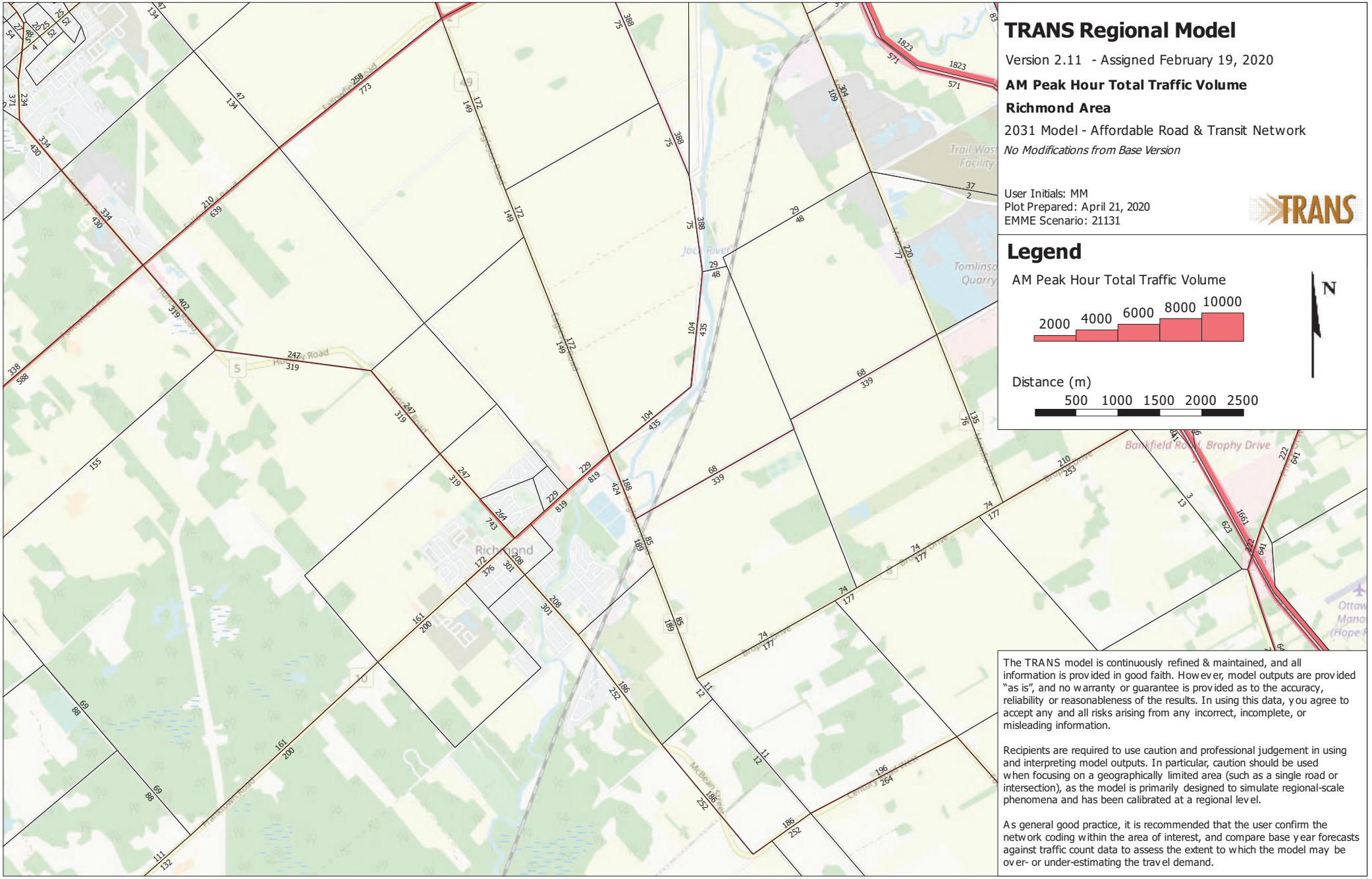
Distance (m)

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

TRANS

Legend

AM Peak Hour Total Traffic Volume

2000 4000 6000 8000 10000

N

Distance (m)

500 1000 1500 2000 2500

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	768	0	10	409	5	0	1	10	20	1	4
Future Vol, veh/h	1	768	0	10	409	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	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	768	0	10	409	5	0	1	10	20	1	4

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	414	0	0	768	0	0	1204	1204	384	819	1202	412
Stage 1	-	-	-	-	-	-	770	770	-	432	432	-
Stage 2	-	-	-	-	-	-	434	434	-	387	770	-
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	1143	-	-	844	-	-	150	183	615	281	184	639
Stage 1	-	-	-	-	-	-	360	409	-	601	581	-
Stage 2	-	-	-	-	-	-	600	580	-	609	409	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1143	-	-	844	-	-	147	180	615	272	181	639
Mov Cap-2 Maneuver	-	-	-	-	-	-	147	180	-	272	181	-
Stage 1	-	-	-	-	-	-	359	408	-	600	574	-
Stage 2	-	-	-	-	-	-	568	573	-	596	406	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0	0.2	12.3	18.4
HCM LOS			B	C

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	504	1143	-	-	844	-	-	293
HCM Lane V/C Ratio	0.022	0.001	-	-	0.012	-	-	0.085
HCM Control Delay (s)	12.3	8.2	0	-	9.3	-	-	18.4
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]

Fox Run Phase 2
Site Category: (None)
Roundabout

Movement Performance - Vehicles

Mov ID	Turn	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
South: Meynell												
1	L2	47	1.0	0.362	12.4	LOS B	2.5	17.3	0.73	0.78	0.73	53.4
2	T1	1	1.0	0.362	7.7	LOS A	2.5	17.3	0.73	0.78	0.73	53.4
3	R2	266	1.0	0.362	7.5	LOS A	2.5	17.3	0.73	0.78	0.73	52.2
Approach		315	1.0	0.362	8.2	LOS A	2.5	17.3	0.73	0.78	0.73	52.4
East: Perth												
4	L2	143	1.0	0.302	9.0	LOS A	2.1	15.2	0.25	0.49	0.25	54.6
5	T1	274	2.0	0.302	4.4	LOS A	2.1	15.2	0.25	0.49	0.25	54.6
6	R2	18	1.0	0.302	4.2	LOS A	2.1	15.2	0.25	0.49	0.25	53.4
Approach		435	1.6	0.302	5.9	LOS A	2.1	15.2	0.25	0.49	0.25	54.6
North: Meynell												
7	L2	36	1.0	0.081	11.0	LOS B	0.4	3.1	0.55	0.66	0.55	53.3
8	T1	1	1.0	0.081	6.4	LOS A	0.4	3.1	0.55	0.66	0.55	53.4
9	R2	41	1.0	0.081	6.2	LOS A	0.4	3.1	0.55	0.66	0.55	52.1
Approach		78	1.0	0.081	8.4	LOS A	0.4	3.1	0.55	0.66	0.55	52.7
West: Perth												
10	L2	11	1.0	0.430	9.9	LOS A	3.0	21.4	0.46	0.52	0.46	54.5
11	T1	507	2.0	0.430	5.3	LOS A	3.0	21.4	0.46	0.52	0.46	54.6
12	R2	18	1.0	0.430	5.1	LOS A	3.0	21.4	0.46	0.52	0.46	53.3
Approach		536	1.9	0.430	5.4	LOS A	3.0	21.4	0.46	0.52	0.46	54.5
All Vehicles		1363	1.6	0.430	6.4	LOS A	3.0	21.4	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.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

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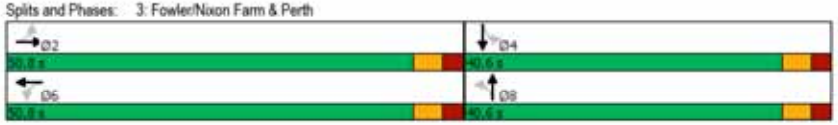
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	23	726	1	2	371	42	3	0	15	81	0	32
Future Volume (vph)	23	726	1	2	371	42	3	0	15	81	0	32
Satd. Flow (prot)	0	3309	0	0	3266	0	0	1536	0	1658	1483	0
Flt Permitted		0.936			0.953			0.949		0.746		
Satd. Flow (perm)	0	3103	0	0	3112	0	0	1469	0	1302	1483	0
Satd. Flow (RTOR)					19			33			412	
Lane Group Flow (vph)	0	750	0	0	415	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		0.32			0.18			0.07		0.41	0.06	
Control Delay		4.7			3.9			5.7		33.4	0.2	
Queue Delay		0.0			0.0			0.0		0.0	0.0	
Total Delay		4.7			3.9			5.7		33.4	0.2	
LOS		A			A			A		C	A	
Approach Delay		4.7			3.9			5.7			24.0	
Approach LOS		A			A			A			C	
Queue Length 50th (m)		16.7			7.6			0.0		10.2	0.0	
Queue Length 95th (m)		28.7			14.3			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)		2330			2342			741		642	940	
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		0.32			0.18			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 59.7% — 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	595	0	3	798	20	1	0	4	13	1	6
Future Vol, veh/h	5	595	0	3	798	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	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	595	0	3	798	20	1	0	4	13	1	6

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	818	0	0	595	0	0	1423	1429	298	1122	1419	808
Stage 1	-	-	-	-	-	-	605	605	-	814	814	-
Stage 2	-	-	-	-	-	-	818	824	-	308	605	-
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	808	-	-	979	-	-	105	134	699	172	136	380
Stage 1	-	-	-	-	-	-	452	486	-	371	391	-
Stage 2	-	-	-	-	-	-	369	386	-	678	486	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	808	-	-	979	-	-	102	132	699	169	134	380
Mov Cap-2 Maneuver	-	-	-	-	-	-	102	132	-	169	134	-
Stage 1	-	-	-	-	-	-	448	482	-	368	390	-
Stage 2	-	-	-	-	-	-	361	385	-	668	482	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0.1	0	16.4	25
HCM LOS			C	D

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	322	808	-	-	979	-	-	200
HCM Lane V/C Ratio	0.016	0.006	-	-	0.003	-	-	0.1
HCM Control Delay (s)	16.4	9.5	0	-	8.7	-	-	25
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]

Fox Run Phase 2
Site Category: (None)
Roundabout

Movement Performance - Vehicles

Mov ID	Turn	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
South: Meynell												
1	L2	31	1.0	0.235	11.4	LOS B	1.4	10.2	0.63	0.69	0.63	54.3
2	T1	1	1.0	0.235	6.7	LOS A	1.4	10.2	0.63	0.69	0.63	54.4
3	R2	187	1.0	0.235	6.5	LOS A	1.4	10.2	0.63	0.69	0.63	53.0
Approach		219	1.0	0.235	7.2	LOS A	1.4	10.2	0.63	0.69	0.63	53.2
East: Perth												
4	L2	256	1.0	0.550	9.1	LOS A	5.3	37.5	0.28	0.47	0.28	54.6
5	T1	581	2.0	0.550	4.4	LOS A	5.3	37.5	0.28	0.47	0.28	54.7
6	R2	12	1.0	0.550	4.1	LOS A	5.3	37.5	0.28	0.47	0.28	53.4
Approach		848	1.7	0.550	5.8	LOS A	5.3	37.5	0.28	0.47	0.28	54.7
North: Meynell												
7	L2	87	1.0	0.219	15.0	LOS B	1.4	10.0	0.81	0.85	0.81	50.0
8	T1	1	1.0	0.219	10.5	LOS B	1.4	10.0	0.81	0.85	0.81	50.1
9	R2	58	1.0	0.219	10.1	LOS B	1.4	10.0	0.81	0.85	0.81	49.0
Approach		146	1.0	0.219	13.0	LOS B	1.4	10.0	0.81	0.85	0.81	49.6
West: Perth												
10	L2	15	1.0	0.397	11.0	LOS B	2.6	18.6	0.59	0.64	0.59	54.0
11	T1	357	2.0	0.397	6.5	LOS A	2.6	18.6	0.59	0.64	0.59	53.9
12	R2	51	1.0	0.397	6.2	LOS A	2.6	18.6	0.59	0.64	0.59	52.7
Approach		422	1.8	0.397	6.6	LOS A	2.6	18.6	0.59	0.64	0.59	53.8
All Vehicles		1636	1.6	0.550	6.8	LOS A	5.3	37.5	0.46	0.58	0.46	53.7

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.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

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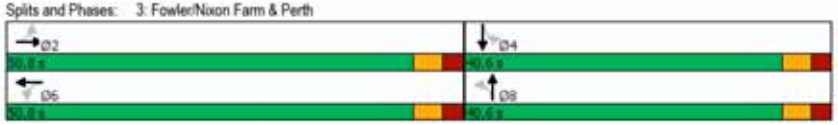
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	43	580	1	17	876	103	2	2	16	59	0	39
Future Volume (vph)	43	580	1	17	876	103	2	2	16	59	0	39
Satd. Flow (prot)	0	3306	0	0	3259	0	0	1549	0	1658	1483	0
Flt Permitted		0.840			0.941			0.967		0.744		
Satd. Flow (perm)	0	2785	0	0	3070	0	0	1505	0	1298	1483	0
Satd. Flow (RTOR)					19			16			103	
Lane Group Flow (vph)	0	624	0	0	996	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		0.30			0.43			0.09		0.31	0.13	
Control Delay		4.3			5.0			14.9		31.6	0.9	
Queue Delay		0.0			0.0			0.0		0.0	0.0	
Total Delay		4.3			5.0			14.9		31.6	0.9	
LOS		A			A			B		C	A	
Approach Delay		4.3			5.0			14.9			19.4	
Approach LOS		A			A			B			B	
Queue Length 50th (m)		13.5			24.2			0.5		7.5	0.0	
Queue Length 95th (m)		22.0			37.7			5.6		16.0	0.0	
Internal Link Dist (m)		414.4			185.4			258.4			148.6	
Turn Bay Length (m)										15.0		
Base Capacity (vph)		2113			2334			751		641	784	
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		0.30			0.43			0.03		0.09	0.05	

Intersection Summary
Cycle Length: 91.4
Actuated Cycle Length: 71.3
Natural Cycle: 70
Control Type: Semi Act-Uncoord
Maximum v/c Ratio: 0.43

Intersection Signal Delay: 5.7 — Intersection LOS: A
Intersection Capacity Utilization 71.0% — 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

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	1119	0	10	552	5	0	1	10	20	1	4
Future Vol, veh/h	1	1119	0	10	552	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	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	1119	0	10	552	5	0	1	10	20	1	4

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	557	0	0	1119	0	0	1698	1698	560	1137	1696	555
Stage 1	-	-	-	-	-	-	1121	1121	-	575	575	-
Stage 2	-	-	-	-	-	-	577	577	-	562	1121	-
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	1012	-	-	622	-	-	66	92	473	167	92	530
Stage 1	-	-	-	-	-	-	220	281	-	502	502	-
Stage 2	-	-	-	-	-	-	501	501	-	480	281	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1012	-	-	622	-	-	64	90	473	160	90	530
Mov Cap-2 Maneuver	-	-	-	-	-	-	64	90	-	160	90	-
Stage 1	-	-	-	-	-	-	219	280	-	500	494	-
Stage 2	-	-	-	-	-	-	488	493	-	467	280	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0	0.2	15.9	29.1
HCM LOS			C	D

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	341	1012	-	-	622	-	-	174
HCM Lane V/C Ratio	0.032	0.001	-	-	0.016	-	-	0.144
HCM Control Delay (s)	15.9	8.6	0	-	10.9	-	-	29.1
HCM Lane LOS	C	A	A	-	B	-	-	D
HCM 95th %tile Q(veh)	0.1	0	-	-	0	-	-	0.5

MOVEMENT SUMMARY

Site: 101 [Perth-Meynell AM FB2030]

Fox Run Phase 2
Site Category: (None)
Roundabout

Movement Performance - Vehicles

Mov ID	Turn	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
South: Meynell												
1	L2	51	1.0	0.753	23.0	LOS C	10.2	71.8	1.00	1.22	1.58	46.4
2	T1	1	1.0	0.753	18.4	LOS B	10.2	71.8	1.00	1.22	1.58	46.4
3	R2	480	1.0	0.753	18.1	LOS B	10.2	71.8	1.00	1.22	1.58	45.5
Approach		532	1.0	0.753	18.6	LOS B	10.2	71.8	1.00	1.22	1.58	45.6
East: Perth												
4	L2	239	1.0	0.413	9.2	LOS A	3.4	23.9	0.33	0.52	0.33	54.1
5	T1	274	2.0	0.413	4.6	LOS A	3.4	23.9	0.33	0.52	0.33	54.1
6	R2	73	1.0	0.413	4.3	LOS A	3.4	23.9	0.33	0.52	0.33	52.9
Approach		585	1.5	0.413	6.4	LOS A	3.4	23.9	0.33	0.52	0.33	53.9
North: Meynell												
7	L2	155	1.0	0.259	12.1	LOS B	1.6	11.2	0.67	0.77	0.67	51.8
8	T1	1	1.0	0.259	7.5	LOS A	1.6	11.2	0.67	0.77	0.67	51.6
9	R2	71	1.0	0.259	7.3	LOS A	1.6	11.2	0.67	0.77	0.67	50.7
Approach		226	1.0	0.259	10.6	LOS B	1.6	11.2	0.67	0.77	0.67	51.4
West: Perth												
10	L2	24	1.0	0.584	12.7	LOS B	5.2	37.0	0.74	0.77	0.82	53.1
11	T1	544	2.0	0.584	8.1	LOS A	5.2	37.0	0.74	0.77	0.82	53.2
12	R2	21	1.0	0.584	7.8	LOS A	5.2	37.0	0.74	0.77	0.82	52.0
Approach		589	1.9	0.584	8.3	LOS A	5.2	37.0	0.74	0.77	0.82	53.1
All Vehicles		1933	1.4	0.753	10.8	LOS B	10.2	71.8	0.68	0.82	0.86	50.9

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.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

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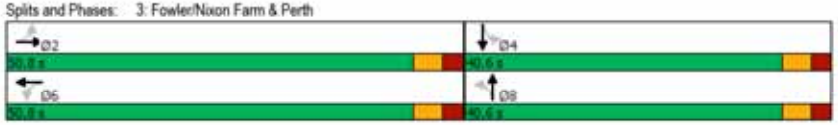
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	23	1076	1	2	514	42	3	0	15	81	0	32
Future Volume (vph)	23	1076	1	2	514	42	3	0	15	81	0	32
Satd. Flow (prot)	0	3312	0	0	3279	0	0	1536	0	1658	1483	0
Flt Permitted		0.938			0.953			0.949		0.746		
Satd. Flow (perm)	0	3110	0	0	3125	0	0	1469	0	1302	1483	0
Satd. Flow (RTOR)					13			33			281	
Lane Group Flow (vph)	0	1100	0	0	558	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		0.47			0.24			0.07		0.41	0.07	
Control Delay		5.8			4.2			5.7		33.4	0.3	
Queue Delay		0.0			0.0			0.0		0.0	0.0	
Total Delay		5.8			4.2			5.7		33.4	0.3	
LOS		A			A			A		C	A	
Approach Delay		5.8			4.2			5.7			24.1	
Approach LOS		A			A			A			C	
Queue Length 50th (m)		28.8			11.1			0.0		10.2	0.0	
Queue Length 95th (m)		48.5			19.9			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	874	
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		0.47			0.24			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: 0.47

Intersection Signal Delay: 6.4 — Intersection LOS: A
Intersection Capacity Utilization 69.7% — 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	828	0	3	1177	20	1	0	4	13	1	6
Future Vol, veh/h	5	828	0	3	1177	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	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	828	0	3	1177	20	1	0	4	13	1	6

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	1197	0	0	828	0	0	2035	2041	414	1617	2031	1187
Stage 1	-	-	-	-	-	-	838	838	-	1193	1193	-
Stage 2	-	-	-	-	-	-	1197	1203	-	424	838	-
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	581	-	-	801	-	-	37	56	588	76	57	229
Stage 1	-	-	-	-	-	-	328	381	-	227	259	-
Stage 2	-	-	-	-	-	-	226	257	-	579	381	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	581	-	-	801	-	-	35	55	588	74	56	229
Mov Cap-2 Maneuver	-	-	-	-	-	-	35	55	-	74	56	-
Stage 1	-	-	-	-	-	-	323	375	-	223	258	-
Stage 2	-	-	-	-	-	-	218	256	-	566	375	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0.2	0	31.5	55.4
HCM LOS			D	F

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	141	581	-	-	801	-	-	91
HCM Lane V/C Ratio	0.035	0.009	-	-	0.004	-	-	0.22
HCM Control Delay (s)	31.5	11.2	0.1	-	9.5	-	-	55.4
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]

Fox Run Phase 2
Site Category: (None)
Roundabout

Movement Performance - Vehicles

Mov ID	Turn	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
South: Meynell												
1	L2	34	1.0	0.477	13.2	LOS B	3.8	26.8	0.82	0.85	0.87	53.0
2	T1	1	1.0	0.477	8.6	LOS A	3.8	26.8	0.82	0.85	0.87	53.0
3	R2	359	1.0	0.477	8.3	LOS A	3.8	26.8	0.82	0.85	0.87	51.8
Approach		394	1.0	0.477	8.8	LOS A	3.8	26.8	0.82	0.85	0.87	51.9
East: Perth												
4	L2	509	1.0	0.843	10.0	LOS A	16.4	116.6	0.71	0.50	0.71	52.7
5	T1	623	2.0	0.843	5.4	LOS A	16.4	116.6	0.71	0.50	0.71	52.8
6	R2	116	1.0	0.843	5.1	LOS A	16.4	116.6	0.71	0.50	0.71	51.6
Approach		1248	1.5	0.843	7.2	LOS A	16.4	116.6	0.71	0.50	0.71	52.6
North: Meynell												
7	L2	161	1.0	0.647	36.3	LOS D	7.0	49.5	1.00	1.21	1.56	38.8
8	T1	1	1.0	0.647	31.6	LOS C	7.0	49.5	1.00	1.21	1.56	38.9
9	R2	76	1.0	0.647	31.4	LOS C	7.0	49.5	1.00	1.21	1.56	38.2
Approach		238	1.0	0.647	34.7	LOS C	7.0	49.5	1.00	1.21	1.56	38.6
West: Perth												
10	L2	41	1.0	0.605	16.9	LOS B	6.0	43.0	0.92	1.02	1.17	50.2
11	T1	357	2.0	0.605	12.4	LOS B	6.0	43.0	0.92	1.02	1.17	50.2
12	R2	57	1.0	0.605	12.1	LOS B	6.0	43.0	0.92	1.02	1.17	49.2
Approach		455	1.8	0.605	12.7	LOS B	6.0	43.0	0.92	1.02	1.17	50.1
All Vehicles		2335	1.4	0.843	11.3	LOS B	16.4	116.6	0.80	0.73	0.91	50.2

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.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

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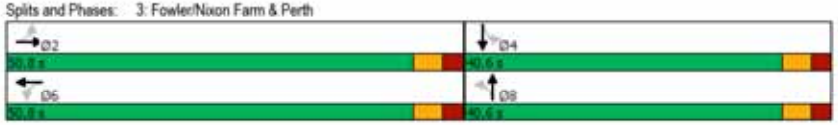
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	43	813	1	17	1264	103	2	2	16	59	0	39
Future Volume (vph)	43	813	1	17	1264	103	2	2	16	59	0	39
Satd. Flow (prot)	0	3306	0	0	3276	0	0	1549	0	1658	1483	0
Flt Permitted		0.821			0.941			0.967		0.744		
Satd. Flow (perm)	0	2722	0	0	3086	0	0	1505	0	1298	1483	0
Satd. Flow (RTOR)					13			16			34	
Lane Group Flow (vph)	0	857	0	0	1384	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		0.42			0.59			0.09		0.31	0.16	
Control Delay		5.1			6.7			14.9		31.6	12.5	
Queue Delay		0.0			0.0			0.0		0.0	0.0	
Total Delay		5.1			6.7			14.9		31.6	12.5	
LOS		A			A			B		C	B	
Approach Delay		5.1			6.7			14.9			24.0	
Approach LOS		A			A			B			C	
Queue Length 50th (m)		21.2			41.7			0.5		7.5	0.6	
Queue Length 95th (m)		33.5			64.9			5.6		16.0	7.6	
Internal Link Dist (m)		414.4			185.4			258.4			148.6	
Turn Bay Length (m)										15.0		
Base Capacity (vph)		2065			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		0.42			0.59			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: 0.59

Intersection Signal Delay: 6.9 — Intersection LOS: A
Intersection Capacity Utilization 77.1% — 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**	2019-64 - 6295, 6363, 6409
Scenario	Existing and Future		Perth, 6305 Ottawa
Comments		**Date**	09-Jul-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

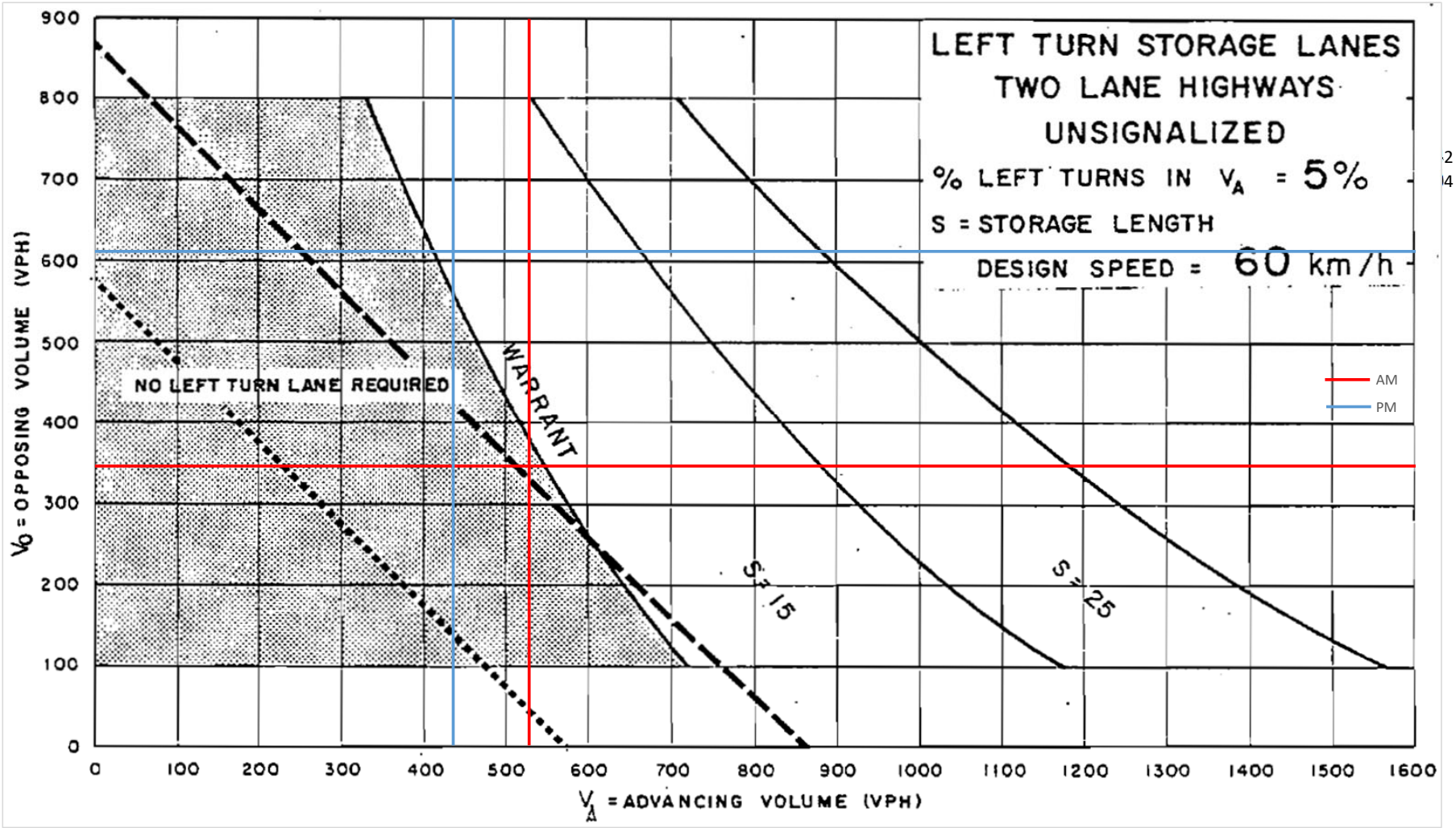
Consultant	CGH Transportation	**Project**	2019-64 - 6295, 6363, 6409
Scenario	Existing and Future		Perth, 6305 Ottawa
Comments		**Date**	09-Jul-21

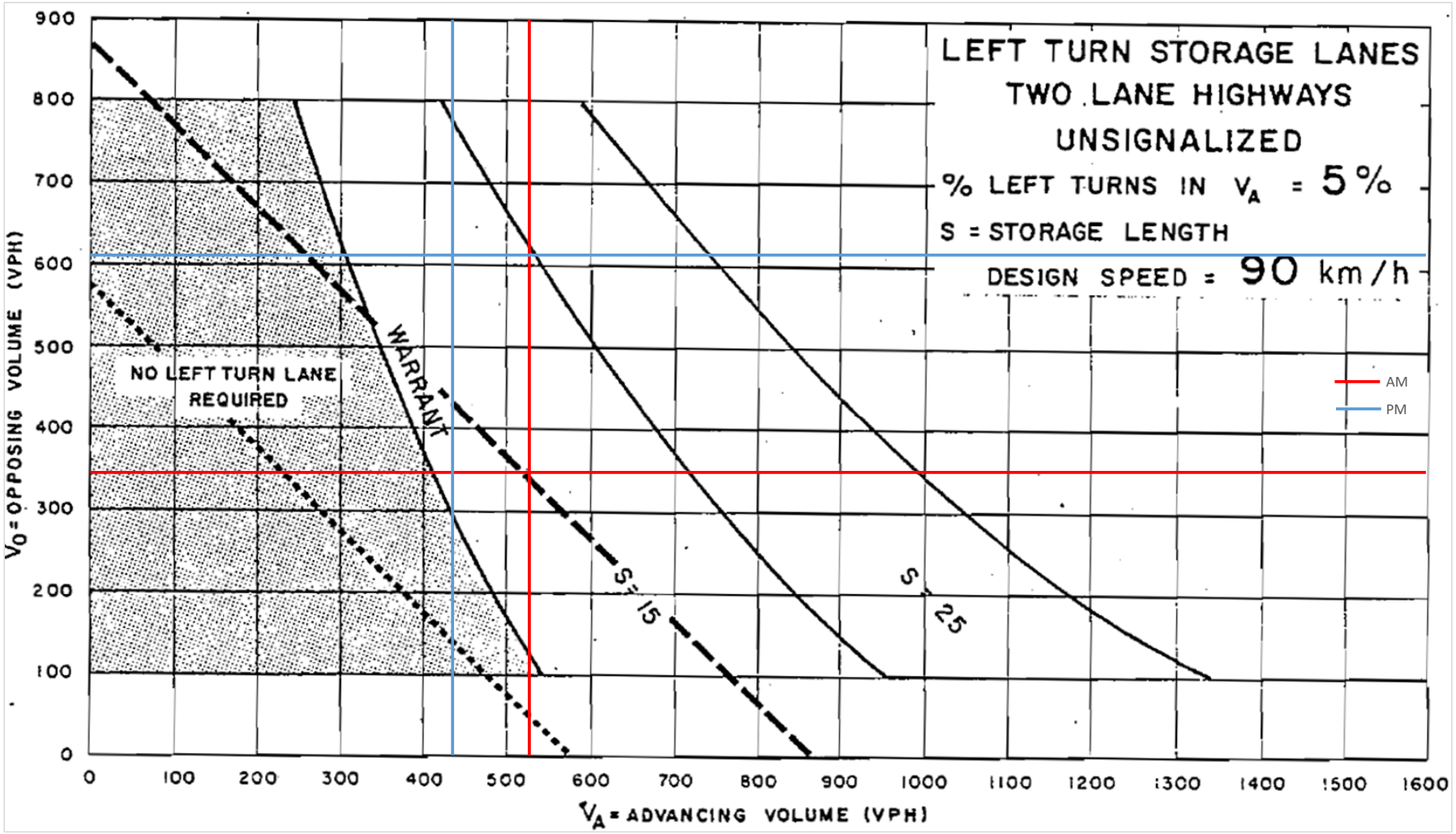
SEGMENTS		Street A	Meynell	Oldenburg	Ex. Perth	Mira	Cedarstone	Burke	Ex. Ottawa	Fut. Ottawa	Int. Perth N	Int. Perth S	Fut. Perth
			1	2	3	4	5	6	7	9	11	12	13
Pedestrian	Sidewalk Width Boulevard Width		1.8 m 0.5 - 2 m	1.8 m < 0.5 m	no sidewalk n/a	no sidewalk n/a	1.5 m < 0.5 m	no sidewalk n/a	no sidewalk n/a	≥ 2 m < 0.5	≥ 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	> 3000	> 3000	> 3000	> 3000
	Operating Speed On-Street Parking		> 30 to 50 km/h yes	> 30 to 50 km/h yes	> 60 km/h no	> 30 to 50 km/h yes	> 30 to 50 km/h yes	≤ 30 km/h yes	> 60 km/h no	> 50 to 60 km/h no	> 50 to 60 km/h no	> 50 to 60 km/h no	> 50 to 60 km/h no
	Exposure to Traffic PLoS	**E**	**C**	**C**	**F**	**F**	**E**	**C**	**F**	**E**	**C**	**F**	**C**
	Effective Sidewalk Width		2.0 m	1.5 m			1.5 m			2.0 m	2.0 m		2.0 m
	Pedestrian Volume		250 ped/hr	250 ped/hr			250 ped/hr			250 ped/hr	250 ped/hr		250 ped/hr
	Crowding PLoS		**B**	**B**	**-**	**-**	**B**	**-**	**-**	**B**	**B**	**-**	**B**
	Level of Service		**C**	**C**	**-**	**-**	**E**	**-**	**-**	**E**	**C**	**-**	**C**
Bicycle	Type of Cycling Facility		Mixed Traffic	Mixed Traffic	Mixed Traffic	Mixed Traffic	Mixed Traffic	Mixed Traffic	Mixed Traffic	Mixed Traffic	Physically Separated	Curbside Bike Lane	Physically Separated
	Number of Travel Lanes		≤ 2 (no centreline)	≤ 2 (no centreline)	2-3 lanes total	≤ 2 (no centreline)	≤ 2 (no centreline)	≤ 2 (no centreline)	≤ 2 (no centreline)	≤ 2 (no centreline)		≤ 1 each direction	
	Operating Speed		≤ 40 km/h	≤ 40 km/h	≥ 60 km/h	≤ 40 km/h	≤ 40 km/h	≤ 40 km/h	≥ 60 km/h	≥ 50 to 60 km/h		>50 to 70 km/h	
	# of Lanes & Operating Speed LoS	**F**	**A**	**A**	**F**	**A**	**A**	**A**	**F**	**D**	**-**	**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	< 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	≤ 3 lanes	≤ 3 lanes	≤ 3 lanes		≤ 3 lanes	
	Sidestreet Operating Speed		≤ 40 km/h	≤ 40 km/h	>40 to 50 km/h	≤ 40 km/h	≤ 40 km/h	≤ 40 km/h	≥ 65 km/h	>50 to 60 km/h		>40 to 50 km/h	
	Unsignalized Crossing - Lowest LoS		**A**	**A**	**A**	**A**	**A**	**A**	**D**	**B**	**A**	**A**	**A**
	Level of Service		**A**	**A**	**F**	**A**	**A**	**A**	**F**	**D**	**A**	**C**	**A**
Transit	Facility Type		Mixed Traffic		Mixed Traffic					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	Vt/Vp ≥ 0.8	Vt/Vp ≥ 0.8
	Level of Service	**D**	**D**	**-**	**D**	**-**	**-**	**-**	**-**	**D**	**D**	**D**	**D**
Truck	Truck Lane Width				≤ 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**	**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	9	517	0	0	342	4	0	0	0	18	0	18	1.7%	526	346	
60	PM	15	419	0	0	604	8	0	0	0	12	0	12	3.5%	434	612	


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	930	0	10	489	12	0	1	10	20	1	9
Future Vol, veh/h	3	930	0	10	489	12	0	1	10	20	1	9
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	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	930	0	10	489	12	0	1	10	20	1	9

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	501	0	0	930	0	0	1456	1457	465	987	1451	495
Stage 1	-	-	-	-	-	-	936	936	-	515	515	-
Stage 2	-	-	-	-	-	-	520	521	-	472	936	-
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	1061	-	-	733	-	-	99	129	545	214	130	574
Stage 1	-	-	-	-	-	-	286	343	-	542	534	-
Stage 2	-	-	-	-	-	-	538	531	-	543	343	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1061	-	-	733	-	-	95	126	545	206	127	574
Mov Cap-2 Maneuver	-	-	-	-	-	-	95	126	-	206	127	-
Stage 1	-	-	-	-	-	-	284	341	-	539	527	-
Stage 2	-	-	-	-	-	-	521	524	-	528	341	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0	0.2	13.8	21.4
HCM LOS			B	C

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	418	1061	-	-	733	-	-	249
HCM Lane V/C Ratio	0.026	0.003	-	-	0.014	-	-	0.12
HCM Control Delay (s)	13.8	8.4	0	-	10	-	-	21.4
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]

Fox Run Phase 2
Site Category: (None)
Roundabout

Movement Performance - Vehicles

Mov ID	Turn	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
South: Meynell												
1	L2	53	1.0	0.474	15.0	LOS B	3.9	27.2	0.87	0.93	0.97	51.4
2	T1	1	1.0	0.474	10.4	LOS B	3.9	27.2	0.87	0.93	0.97	51.5
3	R2	294	1.0	0.474	10.2	LOS B	3.9	27.2	0.87	0.93	0.97	50.3
Approach		347	1.0	0.474	10.9	LOS B	3.9	27.2	0.87	0.93	0.97	50.5
East: Perth												
4	L2	158	1.0	0.370	9.2	LOS A	2.8	20.2	0.31	0.50	0.31	54.5
5	T1	288	2.0	0.370	4.5	LOS A	2.8	20.2	0.31	0.50	0.31	54.5
6	R2	78	1.0	0.370	4.3	LOS A	2.8	20.2	0.31	0.50	0.31	53.3
Approach		524	1.6	0.370	5.9	LOS A	2.8	20.2	0.31	0.50	0.31	54.3
North: Meynell												
7	L2	151	1.0	0.228	11.6	LOS B	1.4	9.6	0.62	0.74	0.62	52.1
8	T1	1	1.0	0.228	7.0	LOS A	1.4	9.6	0.62	0.74	0.62	52.1
9	R2	60	1.0	0.228	6.8	LOS A	1.4	9.6	0.62	0.74	0.62	50.9
Approach		212	1.0	0.228	10.2	LOS B	1.4	9.6	0.62	0.74	0.62	51.7
West: Perth												
10	L2	20	1.0	0.531	11.0	LOS B	4.1	28.9	0.65	0.64	0.65	53.6
11	T1	538	2.0	0.531	6.5	LOS A	4.1	28.9	0.65	0.64	0.65	53.6
12	R2	21	1.0	0.531	6.2	LOS A	4.1	28.9	0.65	0.64	0.65	52.4
Approach		579	1.9	0.531	6.6	LOS A	4.1	28.9	0.65	0.64	0.65	53.6
All Vehicles		1662	1.5	0.531	7.7	LOS A	4.1	28.9	0.59	0.67	0.61	52.9

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.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Organisation: CGH TRANSPORTATION | Processed: August 23, 2021 12:22:30 PM
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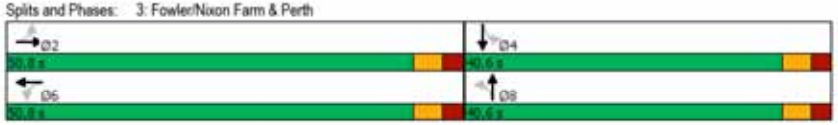
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	23	934	1	2	483	42	3	0	15	96	0	32
Future Volume (vph)	23	934	1	2	483	42	3	0	15	96	0	32
Satd. Flow (prot)	0	3312	0	0	3276	0	0	1536	0	1658	1483	0
Flt Permitted		0.937			0.953			0.951		0.746		
Satd. Flow (perm)	0	3107	0	0	3122	0	0	1472	0	1302	1483	0
Satd. Flow (RTOR)					14			33			305	
Lane Group Flow (vph)	0	958	0	0	527	0	0	18	0	96	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			11.5		11.5	11.5	
Actuated g/C Ratio		0.74			0.74			0.16		0.16	0.16	
v/c Ratio		0.41			0.23			0.07		0.46	0.06	
Control Delay		5.6			4.4			5.6		34.4	0.2	
Queue Delay		0.0			0.0			0.0		0.0	0.0	
Total Delay		5.6			4.4			5.6		34.4	0.2	
LOS		A			A			A		C	A	
Approach Delay		5.6			4.4			5.6			25.9	
Approach LOS		A			A			A			C	
Queue Length 50th (m)		24.2			10.7			0.0		11.8	0.0	
Queue Length 95th (m)		42.3			19.8			3.0		23.4	0.0	
Internal Link Dist (m)		414.4			185.4			258.4			148.6	
Turn Bay Length (m)										15.0		
Base Capacity (vph)		2312			2327			741		640	884	
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		0.41			0.23			0.02		0.15	0.04	

Intersection Summary
Cycle Length: 91.4
Actuated Cycle Length: 71.5
Natural Cycle: 70
Control Type: Semi Act-Uncoord
Maximum v/c Ratio: 0.46

Intersection Signal Delay: 6.8 — Intersection LOS: A
Intersection Capacity Utilization 66.5% — 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	9	517	342	4	18	18
Future Vol, veh/h	9	517	342	4	18	18
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	9	517	342	4	18	18

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	346	0	-	0	679	344
Stage 1	-	-	-	-	344	-
Stage 2	-	-	-	-	335	-
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	1213	-	-	-	318	699
Stage 1	-	-	-	-	718	-
Stage 2	-	-	-	-	587	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1213	-	-	-	315	699
Mov Cap-2 Maneuver	-	-	-	-	315	-
Stage 1	-	-	-	-	711	-
Stage 2	-	-	-	-	587	-

Approach	EB	WB	SB
HCM Control Delay, s	0.1	0	14
HCM LOS			B

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1213	-	-	-	434
HCM Lane V/C Ratio	0.007	-	-	-	0.083
HCM Control Delay (s)	8	0	-	-	14
HCM Lane LOS	A	A	-	-	B
HCM 95th %tile Q(veh)	0	-	-	-	0.3

Intersection	
Int Delay, s/veh	0.3

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	4	531	333	4	9	9
Future Vol, veh/h	4	531	333	4	9	9
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	4	531	333	4	9	9

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	337	0	-	0	874	335
Stage 1	-	-	-	-	335	-
Stage 2	-	-	-	-	539	-
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	1222	-	-	-	320	707
Stage 1	-	-	-	-	725	-
Stage 2	-	-	-	-	585	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1222	-	-	-	318	707
Mov Cap-2 Maneuver	-	-	-	-	318	-
Stage 1	-	-	-	-	721	-
Stage 2	-	-	-	-	585	-

Approach	EB	WB	SB
HCM Control Delay, s	0.1	0	13.6
HCM LOS			B

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1222	-	-	-	439
HCM Lane V/C Ratio	0.003	-	-	-	0.041
HCM Control Delay (s)	8	0	-	-	13.6
HCM Lane LOS	A	A	-	-	B
HCM 95th %tile Q(veh)	0	-	-	-	0.1

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	10	698	0	3	936	34	1	0	4	13	1	9
Future Vol, veh/h	10	698	0	3	936	34	1	0	4	13	1	9
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	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	10	698	0	3	936	34	1	0	4	13	1	9

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	970	0	0	698	0	0	1682	1694	349	1328	1677	953
Stage 1	-	-	-	-	-	-	718	718	-	959	959	-
Stage 2	-	-	-	-	-	-	964	976	-	369	718	-
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	708	-	-	896	-	-	68	92	648	122	95	313
Stage 1	-	-	-	-	-	-	387	432	-	308	334	-
Stage 2	-	-	-	-	-	-	306	328	-	624	432	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	708	-	-	896	-	-	64	90	648	119	93	313
Mov Cap-2 Maneuver	-	-	-	-	-	-	64	90	-	119	93	-
Stage 1	-	-	-	-	-	-	378	422	-	301	333	-
Stage 2	-	-	-	-	-	-	295	327	-	606	422	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0.2	0	21.1	32.2
HCM LOS			C	D

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	229	708	-	-	896	-	-	155
HCM Lane V/C Ratio	0.022	0.014	-	-	0.003	-	-	0.148
HCM Control Delay (s)	21.1	10.2	0.1	-	9	-	-	32.2
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]

Fox Run Phase 2
Site Category: (None)
Roundabout

Movement Performance - Vehicles

Mov ID	Turn	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
South: Meynell												
1	L2	34	1.0	0.286	12.3	LOS B	1.9	13.2	0.72	0.76	0.72	53.6
2	T1	1	1.0	0.286	7.6	LOS A	1.9	13.2	0.72	0.76	0.72	53.7
3	R2	205	1.0	0.286	7.4	LOS A	1.9	13.2	0.72	0.76	0.72	52.3
Approach		240	1.0	0.286	8.1	LOS A	1.9	13.2	0.72	0.76	0.72	52.5
East: Perth												
4	L2	279	1.0	0.662	9.4	LOS A	7.5	53.6	0.41	0.48	0.41	54.3
5	T1	600	2.0	0.662	4.7	LOS A	7.5	53.6	0.41	0.48	0.41	54.3
6	R2	117	1.0	0.662	4.4	LOS A	7.5	53.6	0.41	0.48	0.41	53.1
Approach		996	1.6	0.662	5.9	LOS A	7.5	53.6	0.41	0.48	0.41	54.2
North: Meynell												
7	L2	160	1.0	0.381	16.4	LOS B	2.8	19.4	0.90	0.94	0.92	48.9
8	T1	1	1.0	0.381	11.9	LOS B	2.8	19.4	0.90	0.94	0.92	48.9
9	R2	71	1.0	0.381	11.5	LOS B	2.8	19.4	0.90	0.94	0.92	47.9
Approach		232	1.0	0.381	14.9	LOS B	2.8	19.4	0.90	0.94	0.92	48.6
West: Perth												
10	L2	31	1.0	0.478	11.9	LOS B	3.5	24.6	0.71	0.73	0.72	53.3
11	T1	380	2.0	0.478	7.4	LOS A	3.5	24.6	0.71	0.73	0.72	53.3
12	R2	55	1.0	0.478	7.2	LOS A	3.5	24.6	0.71	0.73	0.72	52.1
Approach		465	1.8	0.478	7.7	LOS A	3.5	24.6	0.71	0.73	0.72	53.2
All Vehicles		1933	1.5	0.662	7.7	LOS A	7.5	53.6	0.58	0.63	0.58	53.0

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.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

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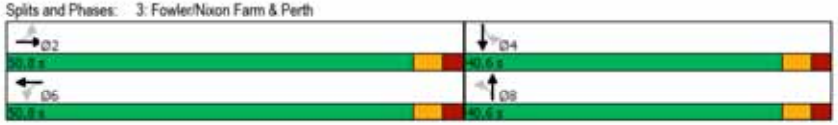
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	43	714	1	17	1066	103	2	2	16	67	0	39
Future Volume (vph)	43	714	1	17	1066	103	2	2	16	67	0	39
Satd. Flow (prot)	0	3306	0	0	3269	0	0	1549	0	1658	1483	0
Flt Permitted		0.833			0.941			0.968		0.744		
Satd. Flow (perm)	0	2762	0	0	3079	0	0	1507	0	1298	1483	0
Satd. Flow (RTOR)					15			16			60	
Lane Group Flow (vph)	0	758	0	0	1186	0	0	20	0	67	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)		53.7			53.7			10.5		10.5	10.5	
Actuated g/C Ratio		0.76			0.76			0.15		0.15	0.15	
v/c Ratio		0.36			0.51			0.08		0.35	0.14	
Control Delay		4.9			5.9			14.7		32.1	5.5	
Queue Delay		0.0			0.0			0.0		0.0	0.0	
Total Delay		4.9			5.9			14.7		32.1	5.5	
LOS		A			A			B		C	A	
Approach Delay		4.9			5.9			14.7			22.4	
Approach LOS		A			A			B			C	
Queue Length 50th (m)		17.6			32.1			0.5		8.4	0.0	
Queue Length 95th (m)		29.2			51.3			5.4		17.7	4.6	
Internal Link Dist (m)		414.4			185.4			258.4			148.6	
Turn Bay Length (m)										15.0		
Base Capacity (vph)		2086			2329			754		643	764	
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		0.36			0.51			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: 0.51

Intersection Signal Delay: 6.4 — Intersection LOS: A
Intersection Capacity Utilization 74.9% — 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	15	419	604	8	12	12
Future Vol, veh/h	15	419	604	8	12	12
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	15	419	604	8	12	12

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	612	0	-	0	1057	608
Stage 1	-	-	-	-	608	-
Stage 2	-	-	-	-	449	-
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	967	-	-	-	249	496
Stage 1	-	-	-	-	543	-
Stage 2	-	-	-	-	643	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	967	-	-	-	244	496
Mov Cap-2 Maneuver	-	-	-	-	244	-
Stage 1	-	-	-	-	532	-
Stage 2	-	-	-	-	643	-

Approach	EB	WB	SB
HCM Control Delay, s	0.3	0	16.9
HCM LOS			C

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	967	-	-	-	327
HCM Lane V/C Ratio	0.016	-	-	-	0.073
HCM Control Delay (s)	8.8	0	-	-	16.9
HCM Lane LOS	A	A	-	-	C
HCM 95th %tile Q(veh)	0	-	-	-	0.2

Intersection	
Int Delay, s/veh	0.3

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	8	423	599	8	6	6
Future Vol, veh/h	8	423	599	8	6	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	8	423	599	8	6	6

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	607	0	-	0	1042	603
Stage 1	-	-	-	-	603	-
Stage 2	-	-	-	-	439	-
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	971	-	-	-	254	499
Stage 1	-	-	-	-	546	-
Stage 2	-	-	-	-	650	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	971	-	-	-	251	499
Mov Cap-2 Maneuver	-	-	-	-	251	-
Stage 1	-	-	-	-	540	-
Stage 2	-	-	-	-	650	-

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

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	971	-	-	-	334
HCM Lane V/C Ratio	0.008	-	-	-	0.036
HCM Control Delay (s)	8.7	0	-	-	16.2
HCM Lane LOS	A	A	-	-	C
HCM 95th %tile Q(veh)	0	-	-	-	0.1

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	1281	0	10	632	12	0	1	10	20	1	9
Future Vol, veh/h	3	1281	0	10	632	12	0	1	10	20	1	9
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	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	1281	0	10	632	12	0	1	10	20	1	9

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	644	0	0	1281	0	0	1950	1951	641	1305	1945	638
Stage 1	-	-	-	-	-	-	1287	1287	-	658	658	-
Stage 2	-	-	-	-	-	-	663	664	-	647	1287	-
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	939	-	-	540	-	-	43	64	418	127	64	476
Stage 1	-	-	-	-	-	-	174	234	-	452	460	-
Stage 2	-	-	-	-	-	-	450	457	-	427	234	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	939	-	-	540	-	-	41	62	418	120	62	476
Mov Cap-2 Maneuver	-	-	-	-	-	-	41	62	-	120	62	-
Stage 1	-	-	-	-	-	-	172	231	-	447	451	-
Stage 2	-	-	-	-	-	-	432	448	-	410	231	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0	0.2	18.6	35.2
HCM LOS			C	E

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	275	939	-	-	540	-	-	149
HCM Lane V/C Ratio	0.04	0.003	-	-	0.019	-	-	0.201
HCM Control Delay (s)	18.6	8.8	0	-	11.8	-	-	35.2
HCM Lane LOS	C	A	A	-	B	-	-	E
HCM 95th %tile Q(veh)	0.1	0	-	-	0.1	-	-	0.7

MOVEMENT SUMMARY

Site: 101 [Perth-Meynell AM FT2030]

Fox Run Phase 2
Site Category: (None)
Roundabout

Movement Performance - Vehicles

Mov ID	Turn	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
South: Meynell												
1	L2	56	1.0	0.978	69.3	LOS E	29.4	207.8	1.00	2.01	3.60	29.2
2	T1	1	1.0	0.978	64.7	LOS E	29.4	207.8	1.00	2.01	3.60	29.2
3	R2	507	1.0	0.978	64.5	LOS E	29.4	207.8	1.00	2.01	3.60	28.9
Approach		564	1.0	0.978	65.0	LOS E	29.4	207.8	1.00	2.01	3.60	28.9
East: Perth												
4	L2	254	1.0	0.483	9.3	LOS A	4.2	30.0	0.39	0.53	0.39	54.0
5	T1	288	2.0	0.483	4.7	LOS A	4.2	30.0	0.39	0.53	0.39	54.0
6	R2	133	1.0	0.483	4.5	LOS A	4.2	30.0	0.39	0.53	0.39	52.8
Approach		675	1.4	0.483	6.4	LOS A	4.2	30.0	0.39	0.53	0.39	53.8
North: Meynell												
7	L2	269	1.0	0.428	13.0	LOS B	3.0	21.2	0.77	0.85	0.78	50.9
8	T1	1	1.0	0.428	8.4	LOS A	3.0	21.2	0.77	0.85	0.78	51.0
9	R2	89	1.0	0.428	8.2	LOS A	3.0	21.2	0.77	0.85	0.78	49.9
Approach		360	1.0	0.428	11.8	LOS B	3.0	21.2	0.77	0.85	0.78	50.7
West: Perth												
10	L2	34	1.0	0.714	17.2	LOS B	8.8	62.5	0.91	1.02	1.25	50.2
11	T1	575	2.0	0.714	12.6	LOS B	8.8	62.5	0.91	1.02	1.25	50.2
12	R2	24	1.0	0.714	12.3	LOS B	8.8	62.5	0.91	1.02	1.25	49.1
Approach		633	1.9	0.714	12.8	LOS B	8.8	62.5	0.91	1.02	1.25	50.2
All Vehicles		2232	1.4	0.978	23.9	LOS C	29.4	207.8	0.75	1.09	1.51	43.2

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.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

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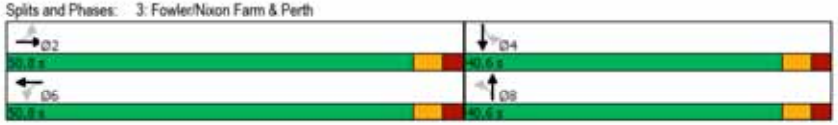
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	23	1284	1	2	626	42	3	0	15	96	0	32
Future Volume (vph)	23	1284	1	2	626	42	3	0	15	96	0	32
Satd. Flow (prot)	0	3312	0	0	3286	0	0	1536	0	1658	1483	0
Flt Permitted		0.937			0.952			0.951		0.746		
Satd. Flow (perm)	0	3107	0	0	3128	0	0	1472	0	1302	1483	0
Satd. Flow (RTOR)					10			33			207	
Lane Group Flow (vph)	0	1308	0	0	670	0	0	18	0	96	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			11.5		11.5	11.5	
Actuated g/C Ratio		0.74			0.74			0.16		0.16	0.16	
v/c Ratio		0.57			0.29			0.07		0.46	0.08	
Control Delay		7.2			4.7			5.6		34.4	0.4	
Queue Delay		0.0			0.0			0.0		0.0	0.0	
Total Delay		7.2			4.7			5.6		34.4	0.4	
LOS		A			A			A		C	A	
Approach Delay		7.2			4.7			5.6			25.9	
Approach LOS		A			A			A			C	
Queue Length 50th (m)		39.5			14.5			0.0		11.8	0.0	
Queue Length 95th (m)		68.6			26.2			3.0		23.4	0.0	
Internal Link Dist (m)		414.4			185.4			258.4			148.6	
Turn Bay Length (m)										15.0		
Base Capacity (vph)		2312			2330			741		640	834	
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		0.57			0.29			0.02		0.15	0.04	

Intersection Summary
Cycle Length: 91.4
Actuated Cycle Length: 71.5
Natural Cycle: 80
Control Type: Semi Act-Uncoord
Maximum v/c Ratio: 0.57

Intersection Signal Delay: 7.5 — Intersection LOS: A
Intersection Capacity Utilization 76.5% — ICU Level of Service D
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	9	568	397	4	18	18
Future Vol, veh/h	9	568	397	4	18	18
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	9	568	397	4	18	18

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	401	0	-	0	985	399
Stage 1	-	-	-	-	399	-
Stage 2	-	-	-	-	586	-
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	1158	-	-	-	275	651
Stage 1	-	-	-	-	678	-
Stage 2	-	-	-	-	556	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1158	-	-	-	272	651
Mov Cap-2 Maneuver	-	-	-	-	272	-
Stage 1	-	-	-	-	671	-
Stage 2	-	-	-	-	556	-

Approach	EB	WB	SB
HCM Control Delay, s	0.1	0	15.3
HCM LOS			C

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1158	-	-	-	384
HCM Lane V/C Ratio	0.008	-	-	-	0.094
HCM Control Delay (s)	8.1	0	-	-	15.3
HCM Lane LOS	A	A	-	-	C
HCM 95th %tile Q(veh)	0	-	-	-	0.3

Intersection	
Int Delay, s/veh	0.3

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	4	582	388	4	9	9
Future Vol, veh/h	4	582	388	4	9	9
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	4	582	388	4	9	9

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	392	0	-	0	980	390
Stage 1	-	-	-	-	390	-
Stage 2	-	-	-	-	590	-
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	1167	-	-	-	277	658
Stage 1	-	-	-	-	684	-
Stage 2	-	-	-	-	554	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1167	-	-	-	276	658
Mov Cap-2 Maneuver	-	-	-	-	276	-
Stage 1	-	-	-	-	681	-
Stage 2	-	-	-	-	554	-

Approach	EB	WB	SB
HCM Control Delay, s	0.1	0	14.7
HCM LOS			B

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1167	-	-	-	389
HCM Lane V/C Ratio	0.003	-	-	-	0.046
HCM Control Delay (s)	8.1	0	-	-	14.7
HCM Lane LOS	A	A	-	-	B
HCM 95th %tile Q(veh)	0	-	-	-	0.1

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	10	931	0	3	1315	34	1	0	4	13	1	9
Future Vol, veh/h	10	931	0	3	1315	34	1	0	4	13	1	9
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	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	10	931	0	3	1315	34	1	0	4	13	1	9

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	1349	0	0	931	0	0	2294	2306	466	1824	2289	1332
Stage 1	-	-	-	-	-	-	951	951	-	1338	1338	-
Stage 2	-	-	-	-	-	-	1343	1355	-	486	951	-
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	508	-	-	733	-	-	24	38	544	53	39	188
Stage 1	-	-	-	-	-	-	280	337	-	188	221	-
Stage 2	-	-	-	-	-	-	187	217	-	532	337	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	508	-	-	733	-	-	22	36	544	51	37	188
Mov Cap-2 Maneuver	-	-	-	-	-	-	22	36	-	51	37	-
Stage 1	-	-	-	-	-	-	269	323	-	180	220	-
Stage 2	-	-	-	-	-	-	177	216	-	506	323	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0.3	0	45	79.8
HCM LOS			E	F

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	95	508	-	-	733	-	-	70
HCM Lane V/C Ratio	0.053	0.02	-	-	0.004	-	-	0.329
HCM Control Delay (s)	45	12.2	0.2	-	9.9	-	-	79.8
HCM Lane LOS	E	B	A	-	A	-	-	F
HCM 95th %tile Q(veh)	0.2	0.1	-	-	0	-	-	1.2

MOVEMENT SUMMARY

Site: 101 [Perth-Meynell PM FT2030]

Fox Run Phase 2
Site Category: (None)
Roundabout

Movement Performance - Vehicles

Mov ID	Turn	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
South: Meynell												
1	L2	37	1.0	0.552	15.3	LOS B	5.0	35.6	0.89	0.96	1.06	51.4
2	T1	1	1.0	0.552	10.7	LOS B	5.0	35.6	0.89	0.96	1.06	51.5
3	R2	377	1.0	0.552	10.4	LOS B	5.0	35.6	0.89	0.96	1.06	50.3
Approach		415	1.0	0.552	10.9	LOS B	5.0	35.6	0.89	0.96	1.06	50.4
East: Perth												
4	L2	533	1.0	0.968	12.4	LOS B	36.1	256.1	1.00	0.55	1.03	51.7
5	T1	642	2.0	0.968	7.8	LOS A	36.1	256.1	1.00	0.55	1.03	51.7
6	R2	221	1.0	0.968	7.5	LOS A	36.1	256.1	1.00	0.55	1.03	50.6
Approach		1396	1.5	0.968	9.5	LOS A	36.1	256.1	1.00	0.55	1.03	51.6
North: Meynell												
7	L2	234	1.0	1.179	242.2	LOS F	48.1	339.6	1.00	2.67	5.53	12.3
8	T1	1	1.0	1.179	237.6	LOS F	48.1	339.6	1.00	2.67	5.53	12.3
9	R2	88	1.0	1.179	237.4	LOS F	48.1	339.6	1.00	2.67	5.53	12.2
Approach		323	1.0	1.179	240.9	LOS F	48.1	339.6	1.00	2.67	5.53	12.3
West: Perth												
10	L2	57	1.0	0.752	23.1	LOS C	9.9	70.1	1.00	1.22	1.56	46.3
11	T1	380	2.0	0.752	18.6	LOS B	9.9	70.1	1.00	1.22	1.56	46.3
12	R2	61	1.0	0.752	18.3	LOS B	9.9	70.1	1.00	1.22	1.56	45.4
Approach		498	1.8	0.752	19.1	LOS B	9.9	70.1	1.00	1.22	1.56	46.2
All Vehicles		2632	1.4	1.179	40.0	LOS D	48.1	339.6	0.98	1.00	1.68	36.3

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.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Organisation: CGH TRANSPORTATION | Processed: August 23, 2021 12:22:31 PM
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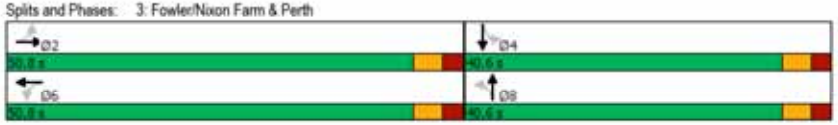
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	43	947	1	17	1454	103	2	2	16	67	0	39
Future Volume (vph)	43	947	1	17	1454	103	2	2	16	67	0	39
Satd. Flow (prot)	0	3309	0	0	3279	0	0	1549	0	1658	1483	0
Flt Permitted		0.813			0.940			0.968		0.744		
Satd. Flow (perm)	0	2696	0	0	3086	0	0	1507	0	1298	1483	0
Satd. Flow (RTOR)					11			16			33	
Lane Group Flow (vph)	0	991	0	0	1574	0	0	20	0	67	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)		53.7			53.7			10.5		10.5	10.5	
Actuated g/C Ratio		0.76			0.76			0.15		0.15	0.15	
v/c Ratio		0.49			0.67			0.08		0.35	0.16	
Control Delay		5.9			8.2			14.7		32.1	12.7	
Queue Delay		0.0			0.0			0.0		0.0	0.0	
Total Delay		5.9			8.2			14.7		32.1	12.7	
LOS		A			A			B		C	B	
Approach Delay		5.9			8.2			14.7			25.0	
Approach LOS		A			A			B			C	
Queue Length 50th (m)		26.5			53.8			0.5		8.4	0.7	
Queue Length 95th (m)		43.5			87.8			5.4		17.7	7.6	
Internal Link Dist (m)		414.4			185.4			258.4			148.6	
Turn Bay Length (m)										15.0		
Base Capacity (vph)		2036			2334			754		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		0.49			0.67			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: 0.67

Intersection Signal Delay: 8.0 — Intersection LOS: A
Intersection Capacity Utilization 81.2% — 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	15	450	746	8	12	12
Future Vol, veh/h	15	450	746	8	12	12
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	15	450	746	8	12	12

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	754	0	-	0	1230	750
Stage 1	-	-	-	-	750	-
Stage 2	-	-	-	-	480	-
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	856	-	-	-	196	411
Stage 1	-	-	-	-	467	-
Stage 2	-	-	-	-	622	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	856	-	-	-	191	411
Mov Cap-2 Maneuver	-	-	-	-	191	-
Stage 1	-	-	-	-	456	-
Stage 2	-	-	-	-	622	-

Approach	EB	WB	SB
HCM Control Delay, s	0.3	0	20.2
HCM LOS			C

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	856	-	-	-	261
HCM Lane V/C Ratio	0.018	-	-	-	0.092
HCM Control Delay (s)	9.3	0	-	-	20.2
HCM Lane LOS	A	A	-	-	C
HCM 95th %tile Q(veh)	0.1	-	-	-	0.3

Intersection	
Int Delay, s/veh	0.3

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	8	454	741	8	6	6
Future Vol, veh/h	8	454	741	8	6	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	8	454	741	8	6	6

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	749	0	-	0	1215	745
Stage 1	-	-	-	-	745	-
Stage 2	-	-	-	-	470	-
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	860	-	-	-	200	414
Stage 1	-	-	-	-	469	-
Stage 2	-	-	-	-	629	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	860	-	-	-	198	414
Mov Cap-2 Maneuver	-	-	-	-	198	-
Stage 1	-	-	-	-	463	-
Stage 2	-	-	-	-	629	-

Approach	EB	WB	SB
HCM Control Delay, s	0.2	0	19.1
HCM LOS			C

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	860	-	-	-	268
HCM Lane V/C Ratio	0.009	-	-	-	0.045
HCM Control Delay (s)	9.2	0	-	-	19.1
HCM Lane LOS	A	A	-	-	C
HCM 95th %tile Q(veh)	0	-	-	-	0.1

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	1075	119%	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	1058	118%	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

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	10	931	0	3	1315	34	1	0	4	1	1	9
Future Vol, veh/h	10	931	0	3	1315	34	1	0	4	1	1	9
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	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	10	931	0	3	1315	34	1	0	4	1	1	9

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	1349	0	0	931	0	0	2294	2306	466	1824	2289	1332
Stage 1	-	-	-	-	-	-	951	951	-	1338	1338	-
Stage 2	-	-	-	-	-	-	1343	1355	-	486	951	-
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	508	-	-	733	-	-	24	38	544	53	39	188
Stage 1	-	-	-	-	-	-	280	337	-	188	221	-
Stage 2	-	-	-	-	-	-	187	217	-	532	337	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	508	-	-	733	-	-	22	36	544	51	37	188
Mov Cap-2 Maneuver	-	-	-	-	-	-	22	36	-	51	37	-
Stage 1	-	-	-	-	-	-	269	323	-	180	220	-
Stage 2	-	-	-	-	-	-	177	216	-	506	323	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0.3	0	45	39.3
HCM LOS			E	E

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	95	508	-	-	733	-	-	116
HCM Lane V/C Ratio	0.053	0.02	-	-	0.004	-	-	0.095
HCM Control Delay (s)	45	12.2	0.2	-	9.9	-	-	39.3
HCM Lane LOS	E	B	A	-	A	-	-	E
HCM 95th %tile Q(veh)	0.2	0.1	-	-	0	-	-	0.3

MOVEMENT SUMMARY

Site: 101 [Perth-Meynell PM FT2030 - 125 veh reduction]

Fox Run Phase 2
Site Category: (None)
Roundabout

Movement Performance - Vehicles

Mov ID	Turn	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
South: Meynell												
1	L2	37	1.0	0.559	16.0	LOS B	5.2	36.6	0.90	0.98	1.09	50.9
2	T1	1	1.0	0.559	11.3	LOS B	5.2	36.6	0.90	0.98	1.09	51.0
3	R2	377	1.0	0.559	11.1	LOS B	5.2	36.6	0.90	0.98	1.09	49.8
Approach		415	1.0	0.559	11.5	LOS B	5.2	36.6	0.90	0.98	1.09	49.9
East: Perth												
4	L2	401	1.0	0.880	10.4	LOS B	18.8	133.4	0.87	0.53	0.87	52.4
5	T1	642	2.0	0.880	5.8	LOS A	18.8	133.4	0.87	0.53	0.87	52.5
6	R2	221	1.0	0.880	5.6	LOS A	18.8	133.4	0.87	0.53	0.87	51.3
Approach		1264	1.5	0.880	7.3	LOS A	18.8	133.4	0.87	0.53	0.87	52.2
North: Meynell												
7	L2	234	1.0	0.847	53.3	LOS E	13.0	91.7	1.00	1.44	2.17	33.0
8	T1	1	1.0	0.847	40.7	LOS D	13.0	91.7	1.00	1.44	2.17	33.0
9	R2	88	1.0	0.847	48.4	LOS D	13.0	91.7	1.00	1.44	2.17	32.5
Approach		323	1.0	0.847	51.9	LOS E	13.0	91.7	1.00	1.44	2.17	32.8
West: Perth												
10	L2	57	1.0	0.642	17.2	LOS B	6.8	48.5	0.92	1.03	1.21	50.0
11	T1	380	2.0	0.642	12.6	LOS B	6.8	48.5	0.92	1.03	1.21	50.0
12	R2	61	1.0	0.642	12.3	LOS B	6.8	48.5	0.92	1.03	1.21	49.0
Approach		498	1.8	0.642	13.1	LOS B	6.8	48.5	0.92	1.03	1.21	49.9
All Vehicles		2500	1.4	0.880	14.9	LOS B	18.8	133.4	0.91	0.82	1.14	47.8

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.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Organisation: CGH TRANSPORTATION | Processed: August 23, 2021 12:26:34 PM
Project: C:\Users\AndrewHarte\CGH TRANSPORTATION\CGH Working - Documents\Projects\2019-64 Caivan 6295, 6363, 6409 Perth St\DATA \sidra\2019-64 Green-Laffin.sip8

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	43	947	1	142	1454	103	2	2	16	79	0	39
Future Volume (vph)	43	947	1	142	1454	103	2	2	16	79	0	39
Satd. Flow (prot)	0	3309	0	0	3273	0	0	1549	0	1658	1483	0
Flt Permitted		0.800			0.728			0.969		0.744		
Satd. Flow (perm)	0	2653	0	0	2392	0	0	1508	0	1298	1483	0
Satd. Flow (RTOR)					10			16			33	
Lane Group Flow (vph)	0	991	0	0	1699	0	0	20	0	79	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)		53.4			53.4			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			0.94			0.08		0.40	0.15	
Control Delay		6.2			25.2			14.3		33.1	12.4	
Queue Delay		0.0			0.0			0.0		0.0	0.0	
Total Delay		6.2			25.2			14.3		33.1	12.4	
LOS		A			C			B		C	B	
Approach Delay		6.2			25.2			14.3			26.2	
Approach LOS		A			C			B			C	
Queue Length 50th (m)		26.7			~104.1			0.5		9.7	0.7	
Queue Length 95th (m)		46.6			#173.3			5.4		20.0	7.6	
Internal Link Dist (m)		414.4			185.4			258.4			148.6	
Turn Bay Length (m)										15.0		
Base Capacity (vph)		1991			1798			754		642	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		0.50			0.94			0.03		0.12	0.05	

Intersection Summary
Cycle Length: 91.4
Actuated Cycle Length: 71.1
Natural Cycle: 150
Control Type: Semi Act-Uncoord
Maximum v/c Ratio: 0.94

Intersection Signal Delay: 18.5 — Intersection LOS: B
Intersection Capacity Utilization 104.8% — ICU Level of Service G
Analysis Period (min) 15

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

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