Western Annex Lands – 141 Peter Street

Transportation Impact Study

Prepared for:

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PN: 2021-117

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1 Study Context

This Transportation Impact Study (TIS) has been prepared for the Golf Course Lands of the Town of Perth's Western Annex Lands, located at 141 Peter Street. It supports both the development's Plan of Subdivision application and the Municipal Class Environmental Assessment process.

1.1 Background

Subsequent to the addition of the Western Annex Lands to the Town of Perth's Urban Settlement Boundary, an Infrastructure Master Plan (IMP) was commissioned by the Town and prepared by Jp2g Consultants Inc. in 2019, in part to develop a transportation framework for the area, identifying high-level opportunities and constraints. This Infrastructure Master Plan has formed the foundation for future planning work to develop these lands.

A Transportation Review was conducted for the Golf Course Lands by CGH in 2022, which evaluated newly proposed changes from the high-level IMP plan as the design became more detailed. The Transportation Review concluded that the refined concept at full build-out and at the development's first phases were supportable from a transportation network perspective.

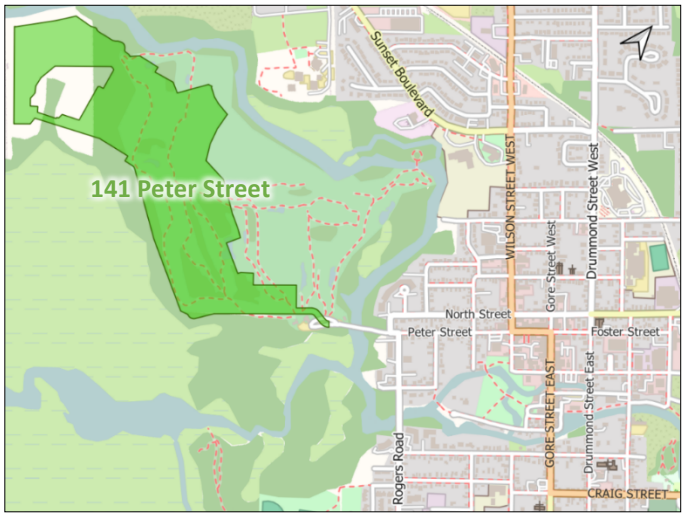
As planning work has continued for the new community, options for subdivision access across the Tay River have been explored, which are the subject of the Perth Golf Course Access Options Memo prepared by CGH in 2022. This Access Options Memo, provided in Appendix A, supersedes the recommendations from the IMP with respect to crossing options, and the Sunset Boulevard crossing is no longer recommended for the transportation servicing of the new community.

Given the new community has already been found to be supportable from a transportation perspective through the IMP and the subsequent Transportation Review, this TIS has been prepared to evaluate and understand the local impacts of the newly proposed crossing configuration.

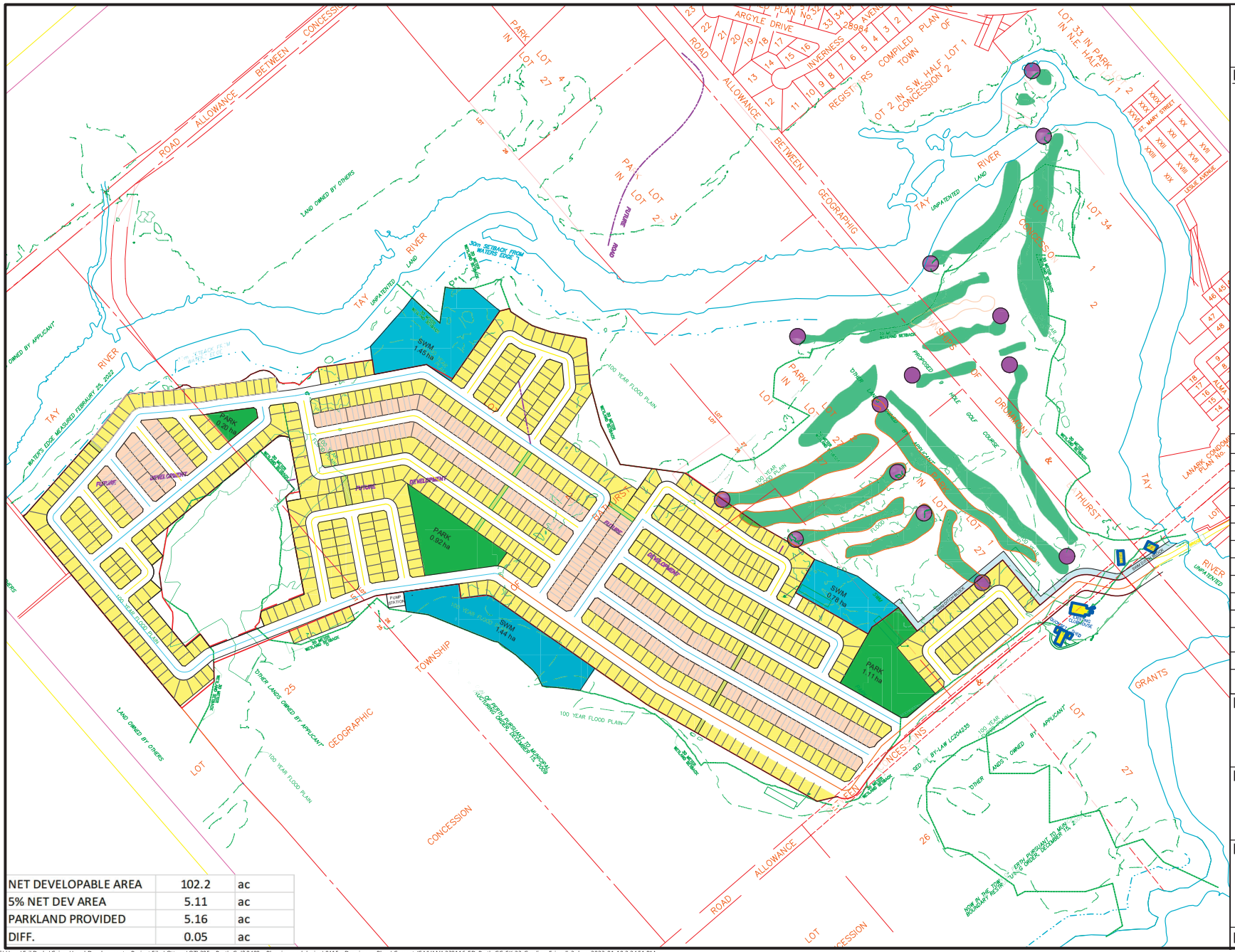
1.2 Proposed Development

The proposed subdivision concept includes 640 detached single-family dwellings, and 299 townhouse dwellings. Access is proposed via the existing Peter Street Bridge and a new crossing adjacent to this existing bridge. The assumed full-buildout horizon is 2041, in line with the existing traffic planning for the Town. Figure 1 illustrates the study area context. Figure 2 illustrates the proposed concept plan.

Figure 1: Area Context Plan



Source: https://www.openstreetmap.org/ Accessed: December 20, 2021



NET DEVELOPABLE AREA	102.2	ac
5% NET DEV AREA	5.11	ac
PARKLAND PROVIDED	5.16	ac
DIFF.	0.05	ac

CAIVAN

LEGEND:

- 24' STANDARD TOWNHOUSE
- DETACHED HOME
- 23m ROW
- 18.5m ROW
- 16.75m ROW
- PATHWAY
- 100 YEAR FLOOD PLAIN
- 30m WETLAND SETBACK

LOT COUNT

UNIT TYPE	# UNITS	%
RLTH	0	0
B2B	0	0
24' STND TH	299	32
35' SINGLE	116	12
37' SINGLE	65	7
42' SINGLE	231	25
50' SINGLE	228	24
TOTAL	939	100

REV #	DESCRIPTION	DATE
03		
02		
01		

PROJECT NAME:

PERTH GOLF

DRAWING NAME:

SECOND SUBMISSION DRAFT

DATE:	DRAWING NO:
13/01/2023	SK-23
DRAWN BY: CH/ED	OTL305

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2 Existing and Planned Conditions

2.1 Area Road Network

Wilson Street: Wilson Street is an arterial road to the north of Foster Street and a collector road to the south. Between the Perth Mews access and Sunset Boulevard, Wilson Street has a three-lane urban cross-section with two southbound lanes, and it has a two-lane urban cross-section to the south. Sidewalks are provided on both sides of the road and bike lanes are provided on both sides of the road between Sunset Boulevard and Leslie Street. Street parking is permitted on both sides of the road between Leslie Street and the Best Western, and on the east side of the road to the south. The posted speed limit is 50 km/h, and the existing right-of-way is typically 20 metres.

Gore Street: Gore Street is a local road north of Foster Street and an arterial Road to the south with a two-lane urban cross-section and with sidewalks on both sides of the road. Street parking is permitted on both sides of the road south of D'Arcy Street and on the east side to the north. The unposted speed limit is assumed to be 50 km/h and the existing right-of-way is 20 metres.

Foster Street: Foster Street is an arterial road between Wilson Street and Gore Street, a collector road between Gore Street and Drummond Street, and a local road east of Drummond Street. Sidewalks are provided on both sides of the road west of Beckwith Street. Street parking is permitted on both sides of the road west of Drummond Street and on the north side of the road to the east. The unposted speed limit is assumed to be 50 km/h, and the existing right-of-way is 20 metres.

Peter Street: Peter Street is a collector road with a two-lane urban cross-section east of Lustre Lane, and transitions to a rural cross-section to the west. Sidewalks are provided on the north side of the road between Rogers Road and Lustre Lane, and both sides east of Rogers Road. The posted speed limit is 40 km/h east of Lustre Lane and 30km/h to the west. The existing right-of-way is 12 metres.

Rogers Road: Rogers Road is a collector road with a two-lane urban cross-section with a sidewalk on the west side of the road north of John Street and south of Harvey Street, and sidewalks on both sides of the road between these locations. Street parking is permitted on the west side of the road north of John Street and south of Harvey Street. The posted speed limit is 50 km/h and the existing right-of-way varies between 15.5 and 18 metres in the study area.

North Street: North Street is an arterial road east of Wilson Street West, and a local road to the west, each with a two-lane urban cross-section. West of Sinclair Street, a sidewalk is present on the north side of the road, and sidewalks are present on both sides of the road to the east. West of Lewis Street, street parking is permitted on the north side of the road and overnight parking is permitted on the south side of the road. Between Lewis Street and Wilson Street West, street parking is permitted on both sides of the road. Between Wilson Street West and Gore Street West, layby parking is on the north side of the road. East of Gore Street West, street parking is permitted on the south side of the road. The posted speed limit is 50 km/h and the existing right-of-way varies between 19 and 20 metres in the study area.

Lustre Lane: Lustre Lane is a local road with a two-lane urban cross-section. The unposted speed limit is assumed to be 50 km/h and the existing right-of-way is 16 metres.

2.2 Existing Intersections

The key signalized area intersections have been summarized below:

Wilson Street W at North Street	The intersection of Wilson Street West at North Street is an unsignalized intersection, stop-controlled on the minor approaches of North Street. The northbound approach consists of shared all-movements lane and southbound approach consists of a left-turn lane (that operates as a shared left-turn/through lane) and an auxiliary through/right-turn lane. The eastbound approach consists of a shared all-movements lane (that operates as a shared left-turn/through lane and a short auxiliary right-turn lane), and the westbound approach consists of shared all-movement lane (that operates as a right-turn lane and a shared left-turn/through lane). No turn restrictions were noted.
Gore Street W at North Street	The intersection of Gore Street West at North Street is an unsignalized intersection stop controlled on the minor approaches of North Street. The northbound, southbound, and westbound approaches each consist of a shared all-movement lane (where the southbound approach operates as a shared left-turn/through lane and an auxiliary right-turn lane). The eastbound approach consists of an auxiliary shared left-turn/through lane and a right-turn lane. No turn restrictions were noted.
Peter Street at Rogers Road	The intersection of Peter Street and Rogers Road is an unsignalized T-intersection, stop-controlled on Rogers Road. The northbound approach consists of a shared left-turn/right-turn lane. The eastbound approach consists of a shared through/right-turn lane and the westbound approach consists of a shared left-turn/through lane. No turn restrictions were noted.
Wilson Street W / Wilson Street E at Peter Street / Foster Street	The intersection of Wilson Street West/Wilson Street East at Peter Street/Foster Street is a signalized intersection. The northbound and eastbound approaches each consist of a shared all-movement lane. The southbound approach consists of a left-turn lane and a shared through/right-turn lane, and the westbound approach consists of a shared left-turn/through lane and an auxiliary right-turn lane. No turn restrictions were noted.
Gore Street W / Gore Street E at Foster Street	The intersection of Gore Street West/Gore Street East at Foster is a signalized intersection. The northbound approach consists of a left-turn lane and an auxiliary shared through/right-turn lane, and the southbound approach consists of a shared all-movement lane (with enough pavement width to operate as a shared left-turn/through lane and a short auxiliary right-turn lane). The eastbound approach consists of a shared left-turn/through lane and an auxiliary right-turn lane, and the westbound approach consists of a shared all-movement lane (with enough pavement width to operate as a shared left-turn/through lane and a short auxiliary right-turn lane). No turn restrictions were noted.

2.3 Cycling and Pedestrian Facilities

Sidewalks are provided on both sides of Wilson Street, Foster Street, North Street, Peter Street east of Rogers Road, on the north side of Peter Street between Rogers Road and Lustre, on the west side of Rogers Road. An existing trail is located along the Tay River that uses Rogers Road and John Street south of Peter Street.

Bike lanes are provided on both sides of Wilson Street West between Sunset Boulevard and Leslie Street.

Figure 3 illustrates the candidate pedestrian network routes, and Figure 4 illustrates the candidate bicycle network routes, each including existing facilities, from the 2017 Town of Perth Municipal Transportation Master Plan (TMP) prepared by Stantec Consulting Ltd.

Figure 3: TMP Pedestrian Network Candidate Routes

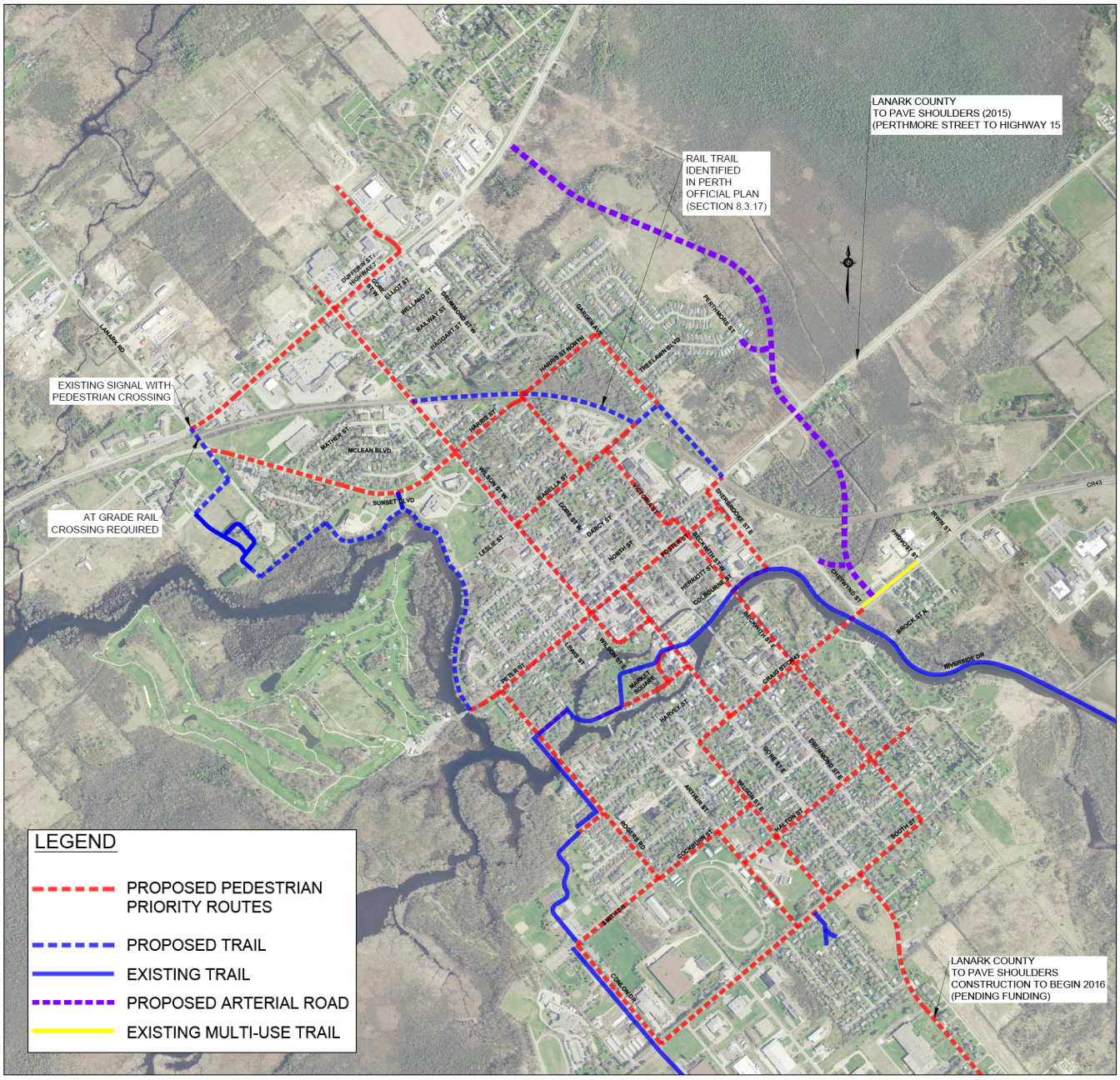
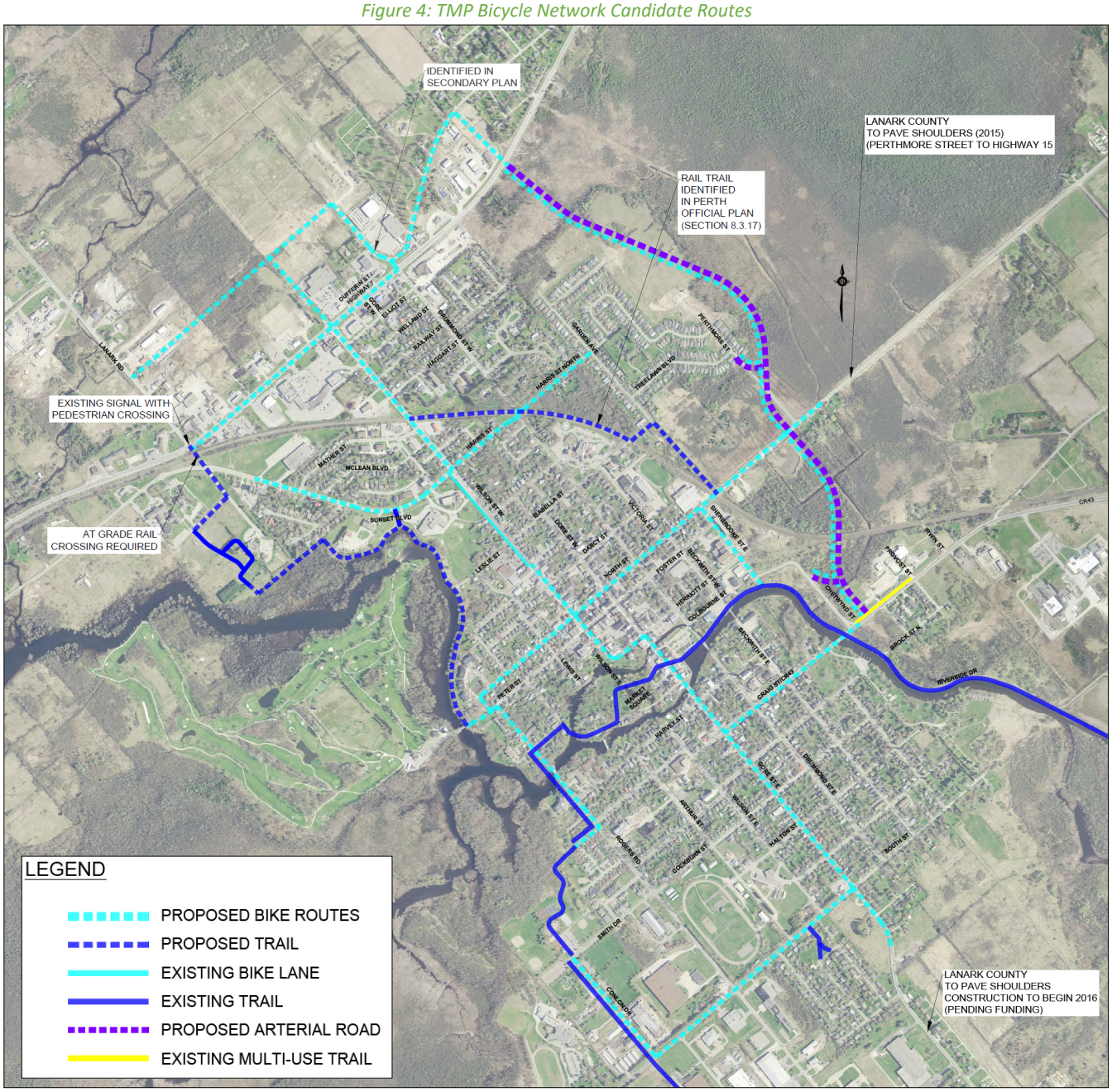


Figure 4: TMP Bicycle Network Candidate Routes



2.4 Changes to the Area Transportation Network

From the Town's TMP, Wilson Street, Peter Street/Foster Street, Rogers Road, and Gore Street East are proposed pedestrian priority routes. Wilson Street, Gore Street East south of Herriot Street, Rogers Road, Peter Street west of Rogers Road, Lustre Lane, and North Street are proposed bike routes.

A trail along the Tay River north of Peter Street connecting to the existing trails near the Lanark County Administration Building is proposed. A portion of this project within the study area is presently planned from the County building, however this project's scope sees the trail's southern section terminate at Leslie Street.

3 Updated Subdivision Review

3.1 Site Design

3.1.1 New Streets

The proposed subdivision concept generally follows the one presented within the 2022 Transportation Review of a modified grid that is responsive to the environmental constraints. A collector road with a 23.0-metre-wide right-of-way is proposed between the central park within the new community and the Tay River crossing at Peter Street. The cross-section of this portion of the collector road is to include a parking lane, a bike lane, two travel lanes, a bike lane, and a sidewalk.

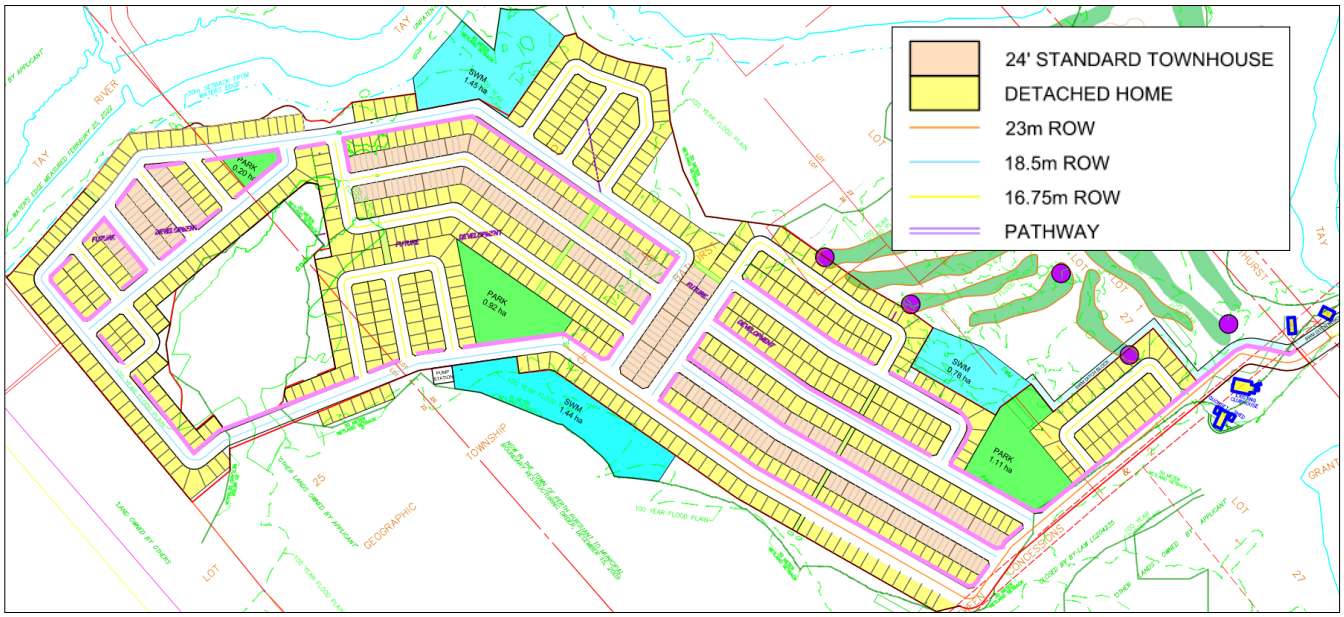
Typical local roads that permit access to other roads within the subdivision are proposed as having 18.5-metre rights-of-way including a sidewalk, two travel lanes, and a parking lane. Additional internal local roads oriented towards land access only are proposed as having 16.75-metre rights-of-way, including two travel lanes and a parking lane.

3.1.2 Design for Active Modes

Consistent with the Town Transportation Master Plan, whose vision is of "a safe, sustainable, and multi-modal transportation system," active transportation connections will be provided from the subject lands to the surrounding town and downtown. These connections will have the goal of increasing the recreational opportunities for the residents, and, importantly, ultimately enabling the reduction in auto traffic by providing opportunity for a higher proportion of trips to be walking and cycling.

The active transportation facilities planned include bike lanes along the collector road, connecting the central park and the existing surrounding community and proposed future trails and future bike routes within the TMP. Active transportation facilities are proposed across each bridge. Figure 5 illustrates the proposed rights-of-way, and sidewalk and internal crossing block locations (in light green) within the new community.

Figure 5: Sidewalks and Rights-of-Way



3.2 Internal Subdivision Traffic Calming

Within the new community, traffic calming elements are proposed throughout via several types of measures.

Horizontal deflection measured including bulb-outs are proposed to narrow roadways and intersections at strategic locations. Mid-block narrowings are proposed at key crossing locations, and intersection narrowing is proposed periodically along roadways to reduce vehicle speeds on straight stretches. Abrupt bends in the roadway also serve this function and will have the effect of calming traffic.

On-street parking will also be a key traffic calming feature of the new community and is generally included as part of all typical roadway cross-sections.

A geometric drawing of the new community's transportation elements detailing these recommendations will be submitted to the Town for review in future. Figure 6 illustrates the proposed locations of narrowings within the new community.

Figure 6: Proposed Traffic Calming Measures

3.3 Subdivision Access and Network Traffic Calming

The proposed access and river crossing configurations result in the new community's traffic ingress and egress occurring exclusively on the east side of the development. Various treatments may be considered to reduce potential future impacts from new traffic on the existing local community.

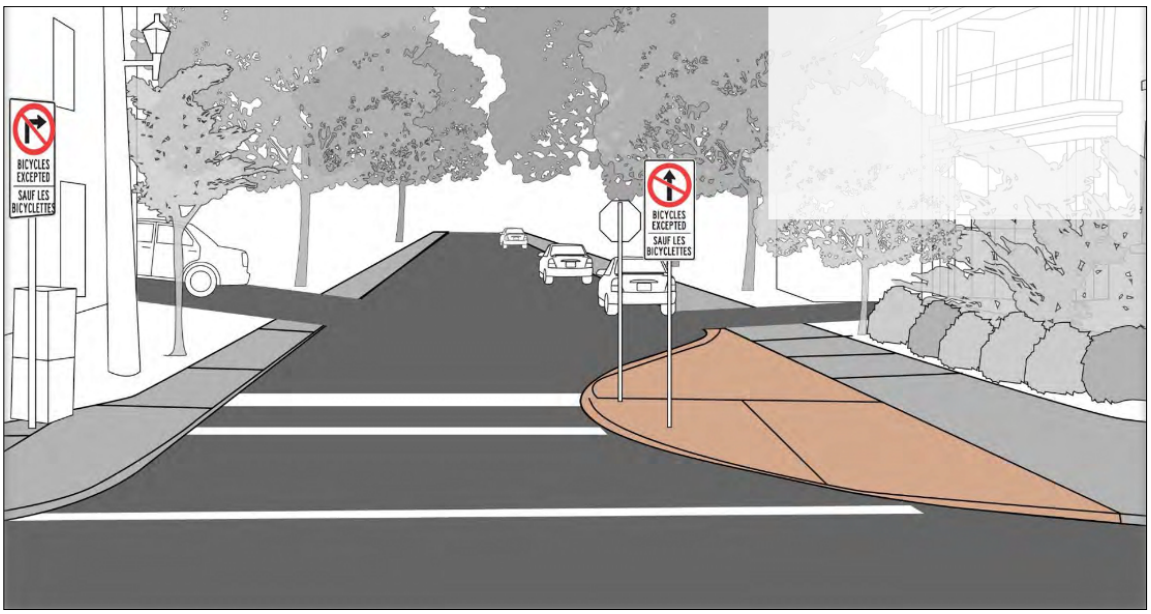
3.3.1 Directional Restriction

To manage volumes within the local neighbourhood context, the introduction of a directional restriction via the installation of a bulb-out on Peter Street between Lustre Lane and Rogers Road is proposed. This concept is different from the IMP treatment of creating a one-way couplet of Peter Street and North Street for the subject development's traffic. While this restriction would ensure all inbound traffic uses North Street, outbound traffic may use North Street or Peter Street as is convenient to reach their ultimate destination. The location of this directional restriction would still permit two-way traffic on both Peter Street and North Street for the existing neighbourhood's traffic. The intended effect of this treatment would be to reduce traffic on Peter Street which has a narrow right-of-way and generally includes narrow building setbacks.

The IMP stated that creation of a couplet of North Street and Peter Steet would require investigation into the signalization of the intersection of North Street at Wilson Street West. Additionally, inbound traffic that would otherwise use Rogers Road would need to divert to arrive at North Street through the downtown area. A conceptual plan for the implementation in the neighbourhood context is illustrated in Figure 7. An example at street-level of a typical implementation of this type of treatment is illustrated in Figure 8, where applied to the proposed context, the image would, in effect, be looking west on Peter Street from the intersection.

Figure 7: Directional Closure Concept Plan

Figure 8: Directional Closure Treatment



Source: Traffic Calming Design Guidelines (City of Ottawa, 2018)

3.3.2 Peter Street Speed Treatments

Various options for reducing speeds on Peter Street may be employed to limit the impacts of potential traffic increases. While the existing narrow pavement width will limit the opportunity for speeding, flexible post centreline treatments may further augment this effect. Speed humps may also be explored, and provide calming effect year-round, unlike the seasonal flexible post installation. Bulb-outs at Thom Street, and/or Lewis Street may additionally be included to narrow the pavement width to 7.0 metres to reduce speeds. In accordance with the recommendations from the 2022 Traffic Review by CGH, it is recommended that any such measures be explored on an as-needed basis through monitoring of the conditions as the subject development builds out.

3.3.3 North Street Speed Treatments

Similarly to Peter Street, speed treatments may be explored for North Street in the presence of a couplet. Given the North Street roadway is wider than that of Peter Street, the same tools may be considered to reduce speeds. Flex posts and speed humps may be explored, bulb-outs at Alma Street, Sinclair Street, and/or Lewis Street may additionally be included to narrow the pavement width to 7.0 metres to reduce speeds. As with the potential Peter Street treatments, need, timing, and selection of North Street treatments would be subject to monitoring.

3.3.4 Rogers Road Speed Treatments

As discussed within the TMP, speeding on Rogers Road has been noted in the past. The pavement width of the road averages approximately 9.0 metres, and especially when on-street parking is not utilized, this width and the straightness of the travelled path are suspected to contribute to higher operating speeds.

Rogers Road is a direct path to/from the site from/to South Street and Scotch Line Road to the south, which a portion of outbound development traffic may use thereby bypassing the downtown core. As such, it is anticipated that speeding concerns will be applicable to site traffic, and therefore speeding treatments may be accordingly investigated. Recommended treatments for the Town to address this existing issue include electronic driver feedback speed display signs (“Your Speed” signs), or the installation of an automated speed enforcement device (speed trap). This latter treatment, however, is noted to impact existing area residents and should be considered through consultation with the potentially impacted communities. As with the potential Peter Street and North Street speed treatments, need, timing, and selection of Rogers Road treatments would be subject to monitoring.

4 Development Traffic Demand

4.1 Trip Generation

Traffic generation for the full subdivision build-out has been prepared using the vehicle trip rates for each residential dwelling type using the fitted curve equation rates from the ITE Trip Generation Manual 11th Edition (2021). Table 1 summarizes the vehicle trip rates for the proposed land uses.

Table 1: Trip Generation Vehicle Trip Rates

Dwelling Type	ITE Land Use Code	Peak Hour	Vehicle Trip Rate
Single Family Detached	210	AM	0.72
		PM	0.91
Multi-Family Low Rise	220	AM	0.44
		PM	0.54

Using the above vehicle trip rates and the new community’s unit counts, the total vehicle trip generation for the new community by peak hour has been estimated. The vehicle trip generation for the new community is summarized in Table 2.

Table 2: Vehicle Trip Generation

Land Use	Units / GFA	AM Peak Hour			PM Peak Hour		
		In	Out	Total	In	Out	Total
Single Family Detached	640	120	341	461	372	210	582
Multi-Family Low Rise	299	32	100	132	100	61	161
Total	**939**	**152**	**441**	**593**	**472**	**271**	**743**

As shown above, the new community is anticipated to generate 593 new AM and 743 new PM peak hour two-way auto trips.

4.2 Trip Distribution

The distribution of trips will be consistent with the Transportation Review, the Infrastructure Master Plan, and the Perth Transportation Master Plan Future Traffic Forecasting Memo (Stantec, 2016). This methodology, based upon the existing turning movement splits, and access to major infrastructure, is considered valid. Table 3 below summarizes the ultimate distribution of traffic, imported from the Future Traffic Forecasting Memo.

Table 3: Trip Distribution

To/From	Residential % of Trips
North	5%
South	50%
East	25%
West	20%
Total	**100%**

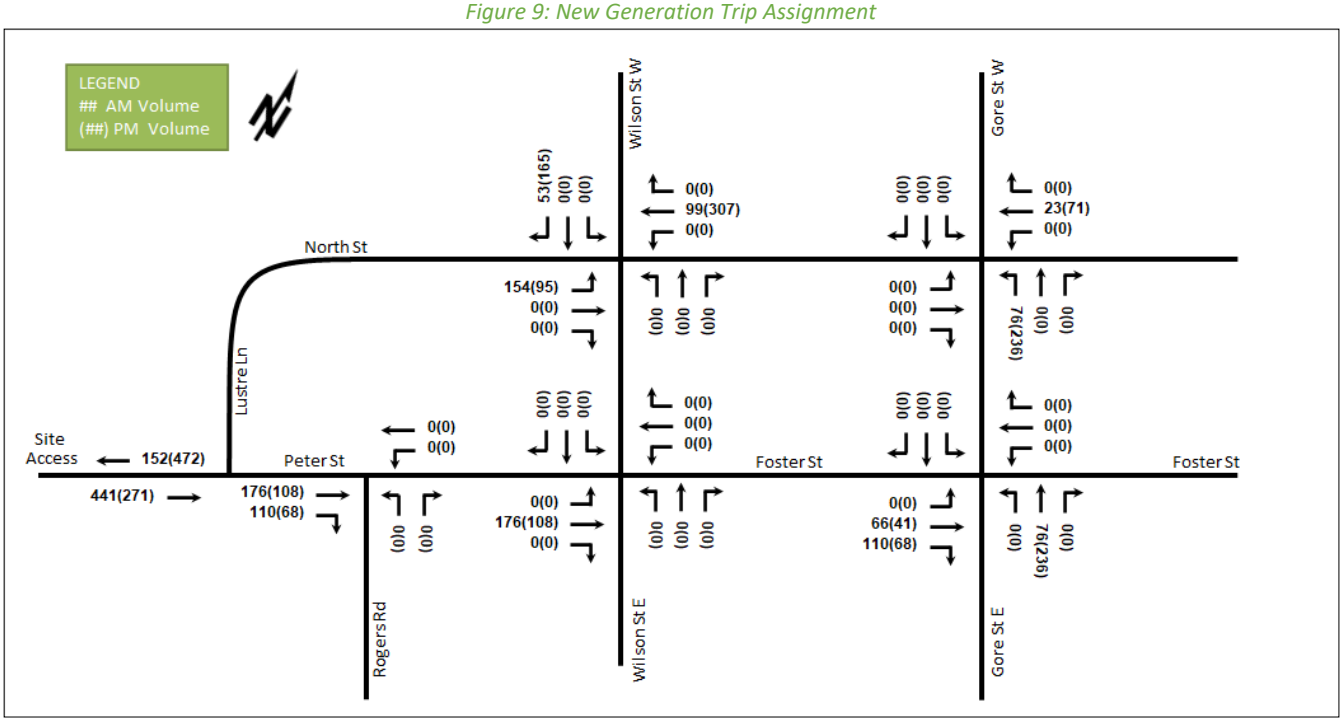
4.3 Trip Assignment

From the distribution summarized in Table 3, the new community's traffic has been assigned to the local study area road network. The directional assignment is summarized in Table 4 and the resultant new community-generated auto traffic volumes are illustrated in Figure 9.

Table 4: Trip Assignment

To/From	Inbound	Outbound
North	Wilson St W	Wilson St W
South	Gore St E	25% Gore St E, 25% Rogers Rd
East	10% Wilson St W (N), 15% North St	10% Wilson St W (N), 15% Foster St
West	Wilson St W (N)	Wilson St W (N)
Total	**100%**	**100%**

Figure 9: New Generation Trip Assignment



5 Traffic Analysis

Traffic operations will be analyzed for the study area intersections in the existing conditions, the future background conditions without the development traffic, and the future total conditions with the development traffic. The level of service (LOS) for signalized intersections will be based on Highway Capacity Manual (HCM) scoring of the percentile delay for the individual lane movements and overall intersection, and will be based on HCM 6th Edition delay for unsignalized intersections. Synchro version 11 will be used to model the forecasted study area traffic operations.

HCM LOS scoring for signalized intersections is summarized in Table 5 and for unsignalized intersections is summarized in Table 6.

Table 5: HCM LOS Scoring at Signalized Intersections

Level of Service (LOS)	Delay (seconds/vehicle)
A	0 – 10 seconds
B	> 10 – 20 seconds
C	> 20 – 35 seconds
D	> 35 – 55 seconds
E	> 55 – 80 seconds
F	> 80 seconds

Table 6: HCM LOS Scoring at Unsignalized Intersections

Level of Service (LOS)	Delay (seconds/vehicle)
A	0 – 10 seconds
B	> 10 – 15 seconds
C	> 15 – 25 seconds
D	> 25 – 35 seconds
E	> 35 – 50 seconds
F	> 50 seconds

5.1 Existing Peak Hour Travel Demand

5.1.1 Intersection Operations

Traffic volumes were observed in the field at the study area intersections on Tuesday, January 24, 2023, and these data, collected by Ontario Traffic Incorporated, are provided in Appendix B. The counted traffic volumes are illustrated in Figure 10. Signal timing for the study area signalized intersections was provided by the Town, in plans dated February 2, 2022. The forecasted study area traffic operations are summarized in Table 7. The Synchro worksheets are provided in Appendix C.

Figure 10: Existing Traffic Counts

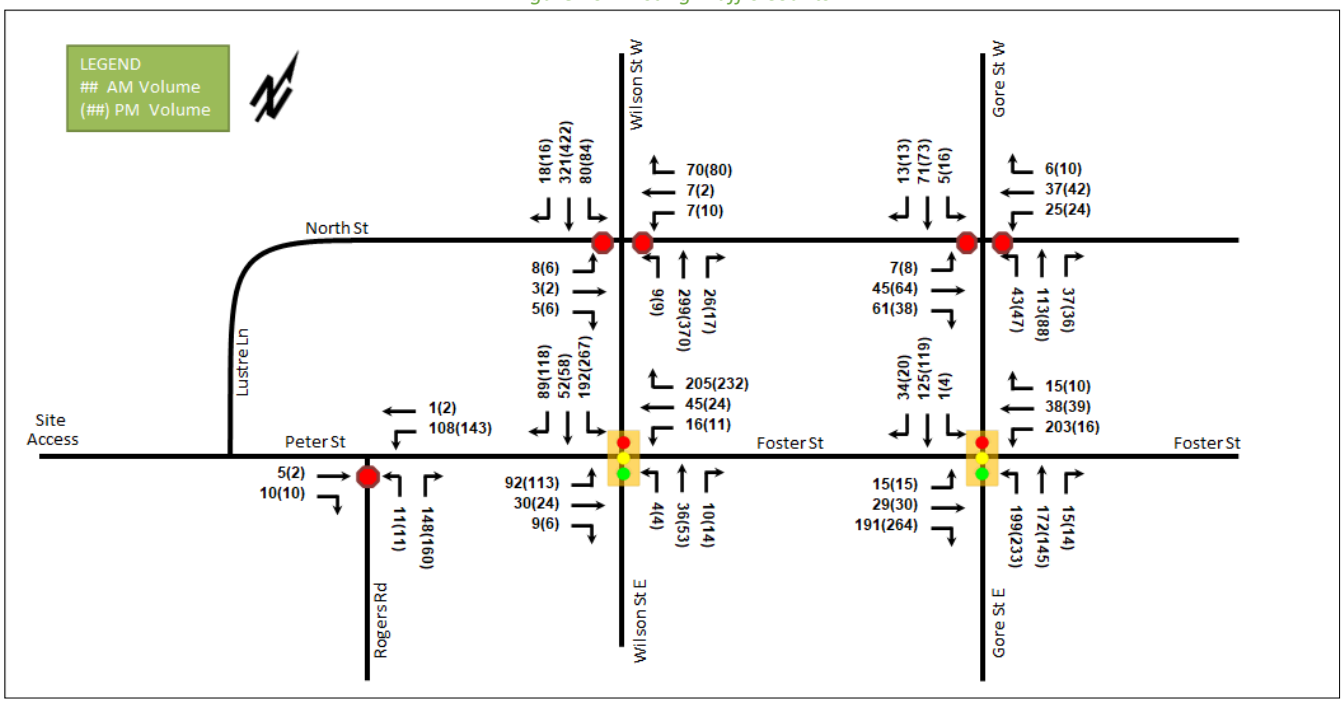


Table 7: Existing Intersection Operations

Intersection	Lane	AM Peak Hour				PM Peak Hour			
		LOS	V/C	Delay (s)	Q (95th)	LOS	V/C	Delay (s)	Q (95th)
Wilson St W & North St ***Unsignalized***	EBL/T	A	0.01	7.4	0.0	A	0.00	7.4	0.0
	EBR	-	-	-	-	-	-	-	-
	WBL/T	A	0.01	7.3	0.0	A	0.01	7.3	0.0
	WBR	-	-	-	-	-	-	-	-
	NB	B	0.50	14.5	21.0	C	0.60	17.2	30.8
	SBL/T	C	0.43	15.1	16.5	C	0.55	18.0	24.8
	SBT/R	B	0.24	10.7	6.8	B	0.30	11.1	9.8
	Overall	**B**	**-**	**12.3**	**-**	**B**	**-**	**14.4**	**-**

Intersection	Lane	AM Peak Hour				PM Peak Hour			
		LOS	V/C	Delay (s)	Q (95th)	LOS	V/C	Delay (s)	Q (95th)
Wilson St E/Wilson St W & Peter St/Foster St *Signalized*	EB	B	0.44	19.9	26.5	C	0.47	21.2	31.7
	WBL/T	B	0.16	15.2	13.5	B	0.09	15.4	9.7
	WBR	A	0.27	1.8	6.7	A	0.29	1.7	6.6
	NB	B	0.13	13.6	10.6	B	0.18	15.9	15.8
	SBL	A	0.23	5.8	19.3	A	0.32	6.6	28.8
	SBT/R	A	0.17	3.7	10.4	A	0.20	3.5	12.0
	Overall	**A**	**-**	**8.0**	**-**	**A**	**-**	**8.1**	**-**
Gore St W & North St *Unsignalized*	EBL/T	B	0.12	13.2	3.0	B	0.16	13.5	4.5
	EBR	A	0.08	9.3	1.5	A	0.05	9.2	0.8
	WB	B	0.15	13.6	3.8	B	0.17	13.7	4.5
	NBL	A	0.04	7.8	0.8	A	0.04	7.7	0.8
	NBT/R	-	-	-	-	-	-	-	-
	SBL/T	A	0.00	7.6	0.0	A	0.01	7.6	0.0
	SBR	-	-	-	-	-	-	-	-
	Overall	**A**	**-**	**5.5**	**-**	**A**	**-**	**6.2**	**-**
Gore St E/Gore St W & Foster St *Signalized*	EBL/T	B	0.11	15.7	11.4	B	0.14	17.1	15.4
	EBR	A	0.23	1.3	5.3	A	0.27	1.3	5.5
	WBL/T	C	0.70	29.4	**#61.2**	D	0.84	44.7	**#88.4**
	WBR	A	0.04	0.1	0.0	A	0.04	0.1	0.0
	NBL	A	0.35	9.9	24.9	B	0.43	11.7	29.4
	NBT/R	A	0.27	9.9	24.7	A	0.22	9.6	18.6
	SBL/T	C	0.44	27.1	31.5	C	0.46	30.0	32.3
	SBR	A	0.11	2.5	2.4	A	0.13	3.2	2.9
	Overall	**B**	**-**	**14.8**	**-**	**B**	**-**	**19.2**	**-**
Rogers Rd & Peter St *Unsignalized*	EB	-	-	-	-	-	-	-	-
	WB	A	0.08	7.5	1.5	A	0.10	7.5	2.3
	NB	A	0.18	9.4	4.5	A	0.19	9.3	5.3
	Overall	**A**	**-**	**8.1**	**-**	**A**	**-**	**8.1**	**-**

Notes: Saturation flow rate of 1800 veh/h/lane
Queue is measured in metres
Peak Hour Factor = 0.90
v/c = volume-to-capacity ratio
m = metered queue
# = volume for the 95th %ile cycle exceeds capacity

The study area intersections operate well in the existing conditions. No capacity or delay issues are present. Extended queues which may not clear the intersection in a single cycle for some number of cycles is noted on the westbound left-turn/through movement at the intersection of Gore Street East/Gore Street West at Foster Street during both peak hours.

5.1.2 Queueing Analysis

A detailed queueing analysis was performed to better understand queueing in the existing conditions. Microsimulation was conducted using SimTraffic 11 with a 30-minute seed time and a 60-minute run time across three separate runs to obtain 95th percentile queue lengths, which are summarized along with the available storage distance for all movements in Table 8. SimTraffic worksheets are provided in Appendix C.

Table 8: Existing Intersection Queue Lengths

Intersection	Lane	Storage Dist. (m)	AM Q (95th)	PM Q (95th)
Wilson St W & North St *Unsignalized*	EBL/T	125*	4.6	2.9
	EBR	8	3.7	3.8
	WBL/T	15	1.6	4.8
	WBR	125	7.2	0.0
	NB	50	34.4	38.9
	SBL/T	125*	27.5	28.1
	SBT/R	55	19.4	18.0
Wilson St E/Wilson St W & Peter St/Foster St *Signalized*	EB	125*	34.8	33.8
	WBL/T	125	20.3	17.6
	WBR	15	25.5	26.1
	NB	270	17.6	20.4
	SBL	50*	30.1	40.6
	SBT/R	50*	20.3	20.4
Gore St W & North St *Unsignalized*	EBL/T	10	16.7	15.4
	EBR	125	16.8	13.3
	WB	125	20.9	18.7
	NB	50	9.6	7.3
	SBL/T	125*	3.5	4.0
	SBR	8	1.1	0.0
Gore St E/Gore St W & Foster St *Signalized*	EBL/T	125	12.1	15.7
	EBR	25	22.6	25.9
	WBL/T	125	51.7	106.4
	WBR	8	17.3	18.0
	NBL	135	37.4	44.9
	NBT/R	20	32.3	28.5
	SBL/T	50	33.2	32.9
	SBR	10	16.8	17.8
Rogers Rd & Peter St *Unsignalized*	EB	-	0.0	0.0
	WB	-	7.3	4.0
	NB	200	20.3	16.1

Notes: *Distance to the nearest upstream road intersection with minor stop control, actual storage capacity is higher but will cause blockage of intersecting roadways

Examining queuing throughout the study area, all approaches have the required storage distances for the combined queues in each lane in the existing conditions. Minor blockage of adjacent lanes is noted but would typically be expected and is not considered to materially impact operations.

Examining the queueing on the westbound left-turn/through movement at the intersection of Gore Street East/Gore Street West at Foster Street, the queue lengths from SimTraffic are longer than those noted in the Synchro analysis during the PM peak hour, but do not extend past the block length. No queuing issues are noted.

5.2 2041 Future Background Peak Hour Traffic Demand

5.2.1 Intersection Operations

The forecasted 2041 future traffic volumes were obtained from the Perth Transportation Master Plan Future Traffic Forecasting Memo (Stantec, 2016) which are provided in Appendix D. The volumes included those forecasted for subject development using various, outdated assumptions which were required to be removed to

generate the future background conditions without site traffic. The existing volumes were used as a basis of comparison to remove the subject development traffic under the old set of assumptions which are detailed in the Future Traffic Forecasting Memo. The resultant 2041 future background volumes are illustrated in Figure 11 and the forecasted traffic operations are summarized in Table 9. The Synchro worksheets are provided in Appendix E.

Figure 11: 2041 Future Background Traffic Volumes

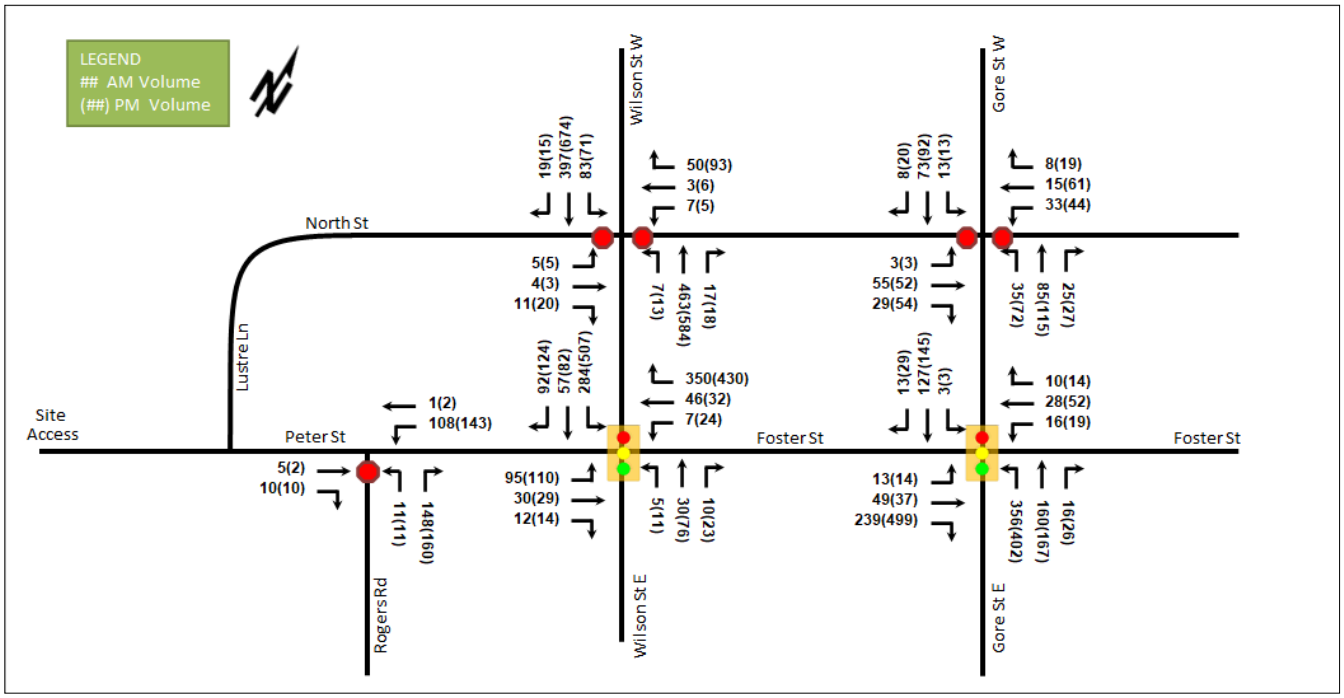


Table 9: 2041 Future Background Intersection Operations

Intersection	Lane	AM Peak Hour				PM Peak Hour			
		LOS	V/C	Delay (s)	Q (95th)	LOS	V/C	Delay (s)	Q (95th)
Wilson St W & North St ***Unsignalized***	EBL/T	D	0.06	31.1	1.5	**F**	**0.11**	**61.2**	**3.0**
	EBR	B	0.02	10.1	0.0	B	0.03	10.9	0.8
	WBL/T	C	0.05	24.0	1.5	E	0.09	38.3	2.3
	WBR	B	0.10	12.5	2.3	B	0.20	14.6	5.3
	NB	A	0.01	8.3	0.0	A	0.02	9.1	0.0
	SBL/T	A	0.09	9.2	2.3	A	0.08	9.5	2.3
	SBT/R	-	-	-	-	-	-	-	-
	Overall	**A**	**-**	**2.1**	**-**	**A**	**-**	**2.4**	**-**
Wilson St E/Wilson St W & Peter St/Foster St ***Signalized***	EB	C	0.42	20.1	26.7	C	0.47	23.6	32.3
	WBL/T	B	0.12	15.6	11.8	B	0.14	18.4	13.7
	WBR	A	0.38	2.0	7.8	A	0.43	2.0	8.1
	NB	B	0.11	14.1	9.7	B	0.28	19.6	22.3
	SBL	A	0.31	6.1	25.6	A	0.52	8.0	53.1
	SBT/R	A	0.16	3.6	9.9	A	0.20	3.5	12.8
	Overall	**A**	**-**	**7.0**	**-**	**A**	**-**	**8.5**	**-**

Intersection	Lane	AM Peak Hour				PM Peak Hour			
		LOS	V/C	Delay (s)	Q (95th)	LOS	V/C	Delay (s)	Q (95th)
Gore St W & North St ***Unsignalized***	EBL/T	B	0.11	12.3	3.0	B	0.12	13.8	3.0
	EBR	A	0.03	9.1	0.8	A	0.06	9.3	1.5
	WB	B	0.10	12.0	2.3	C	0.27	15.6	8.3
	NBL	A	0.03	7.7	0.8	A	0.05	7.8	1.5
	NBT/R	-	-	-	-	-	-	-	-
	SBL/T	A	0.01	7.5	0.0	A	0.01	7.6	0.0
	SBR	-	-	-	-	-	-	-	-
	Overall	**A**	**-**	**5.3**	**-**	**A**	**-**	**6.7**	**-**
Gore St E/Gore St W & Foster St ***Signalized***	EBL/T	B	0.15	19.6	14.7	C	0.14	20.7	13.0
	EBR	A	0.29	1.7	5.6	A	0.52	2.9	10.0
	WBL/T	C	0.15	20.2	11.4	C	0.25	22.2	16.7
	WBR	A	0.03	0.2	0.0	A	0.04	0.3	0.0
	NBL	A	0.39	5.2	28.0	A	0.43	5.4	32.3
	NBT/R	A	0.15	4.5	14.5	A	0.16	4.3	15.5
	SBL/T	C	0.30	20.7	26.9	C	0.34	21.8	29.6
	SBR	A	0.03	0.2	0.0	A	0.07	0.7	0.9
	Overall	**A**	**-**	**7.6**	**-**	**A**	**-**	**7.4**	**-**
Rogers Rd & Peter St ***Unsignalized***	EB	-	-	-	-	-	-	-	-
	WB	A	0.07	7.4	1.5	A	0.09	7.5	2.3
	NB	A	0.16	9.3	4.5	A	0.17	9.2	4.5
	Overall	**A**	**-**	**8.1**	**-**	**A**	**-**	**8.1**	**-**

Notes: Saturation flow rate of 1800 veh/h/lane
Queue is measured in metres
Peak Hour Factor = 1.00
v/c = volume-to-capacity ratio
m = metered queue
# = volume for the 95th %ile cycle exceeds capacity

The study area intersections in the 2041 future background conditions generally operate well during both peak hours and similarly to the existing conditions with increases in delays and queueing noted throughout.

The minor approaches of North Street at the intersection of Wilson Street West at North Street are forecast to experience a higher increase in delays than typically noted in the study area during both peak hours, and with failing or near-failing levels of service during the PM peak hour. This effect is due to the limited availability of gaps in the traffic stream with the addition of the forecasted north-south through background volumes, and through and left-turning vehicles may detour to other intersections to avoid these approaches as delays become intolerable.

5.2.2 Queueing Analysis

A detailed queueing analysis using the methods and parameters described in Section 5.1 at the 2041 future background horizon. The results of this analysis are summarized in Table 10. SimTraffic worksheets are provided in Appendix E.

Table 10: 2041 Future Background Intersection Queue Lengths

Intersection	Lane	Storage Dist. (m)	AM Q (95th)	PM Q (95th)
Wilson St W & North St *Unsignalized*	EBL/T	125*	9.4	8.7
	EBR	8	12.9	13.8
	WBL/T	15	8.4	9.8
	WBR	125	21.7	23.3
	NB	50	11.4	21.6
	SBL/T	125*	30.6	55.1
	SBT/R	55	2.3	14.3
Wilson St E/Wilson St W & Peter St/Foster St *Signalized*	EB	125*	37.4	43.7
	WBL/T	125	29.5	35.7
	WBR	15	31.2	32.8
	NB	270	16.2	32.7
	SBL	50*	42.7	61.9
	SBT/R	50*	20.6	26.8
Gore St W & North St *Unsignalized*	EBL/T	10	17.7	14.1
	EBR	125	16.5	15.4
	WB	125	16.7	22.5
	NB	50	5.9	20.4
	SBL/T	125*	4.1	5.5
	SBR	8	0.0	0.0
Gore St E/Gore St W & Foster St *Signalized*	EBL/T	125	20.5	54.3
	EBR	25	25.5	44.8
	WBL/T	125	17.4	26.0
	WBR	8	10.5	12.0
	NBL	135	43.3	56.9
	NBT/R	20	31.8	36.2
	SBL/T	50	33.4	38.9
	SBR	10	13.4	19.1
Rogers Rd & Peter St *Unsignalized*	EB	-	0.0	0.0
	WB	-	6.2	6.3
	NB	200	25.9	16.5

Notes: *Distance to the nearest upstream road intersection with minor stop control, actual storage capacity is higher but will cause blockage of intersecting roadways

As discussed in the existing conditions queueing analysis, minor blockage of adjacent lanes is forecast to occur at the 2041 future background horizon. The southbound left-turn movement at the intersection of Wilson St East/Wilson St West at Peter St/Foster St is forecast to spill back along the arterial corridor to halfway between the intersections of Wilson Street West at North Street and Wilson Street West at Glascott Street/D'Arcy Street. Queueing to or beyond adjacent intersection is a typical feature in urban conditions where short block lengths are present. Gaps in the traffic stream to permit conflicting movements will be limited to courtesy gaps at the intersection of Wilson Street West at North Street at those times during a peak hour where queues back up and cause blockages.

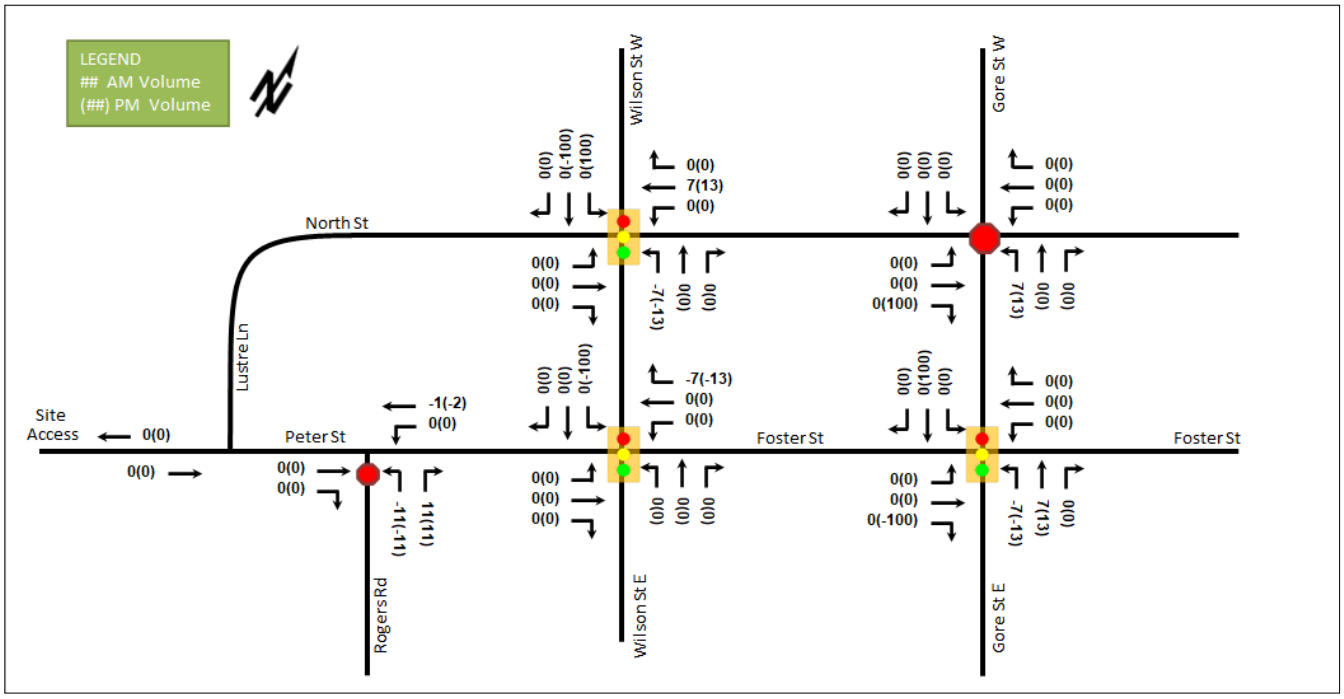
5.3 2041 Future Total Peak Hour Traffic Demand

5.3.1 Changes to Network Conditions

As discussed previously in this study and as stated in the Infrastructure Master Plan, the use of Peter Street and North Street as a couplet for access was understood to require the signalization of the intersection of Wilson Street West at North Street. All-way stop control will also be assumed for the intersection of Gore Street West at North Street to facilitate the change in traffic at this intersection as a result of the signalization of the intersection to the west. A number of other network changes will be assumed as part of the future total conditions to facilitate site access, and these modifications include turn restrictions, lane configuration adjustments, and storage lane extension. The full list of modifications, including forecasted design values based on best practices and operational needs are detailed in Section 5.4.2.5.

As a result of these changes, it is acknowledged that background traffic patterns will adjust to the new conditions. These changes are forecast to include additional use of the southbound left-turn lane at the intersection of North Street at Wilson Street West during the PM peak hour with the signalization of the intersection. Changes associated with the existing vehicles making movements that are to be restricted will also be resultant. The assumed changes in traffic patterns applied at the 2041 future total horizon are illustrated in Figure 12.

Figure 12: Changes to Background Traffic



5.3.2 Intersection Operations

Superimposing the forecasted subject development traffic volumes, illustrated in Figure 9, onto the future background traffic volumes illustrated in Figure 11, with the background changes illustrated in Figure 12, the forecasted 2041 future total traffic volumes have been projected. These volumes are illustrated in Figure 13 and the forecasted traffic operations are summarized in Table 11. Signal timing has been optimized at this horizon. The Synchro worksheets are provided in Appendix F.

Figure 13: 2041 Future Total Traffic Volumes

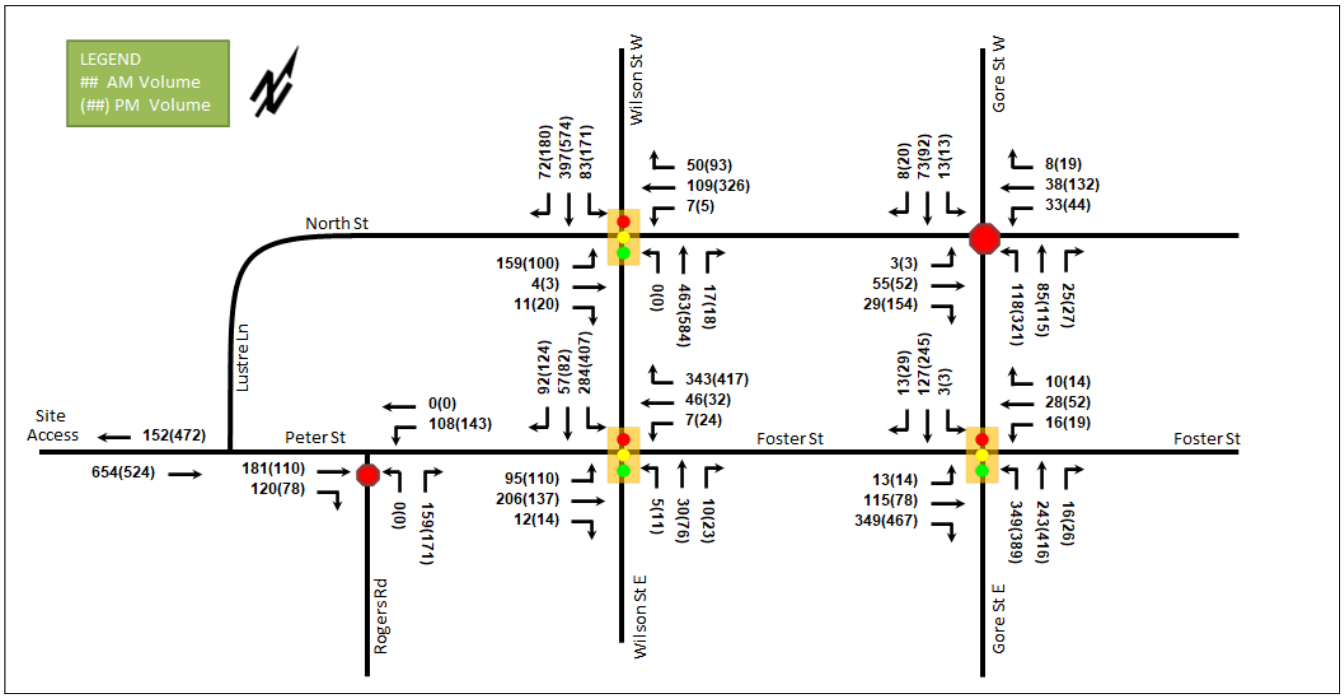


Table 11: 2041 Future Total Intersection Operations

Intersection	Lane	AM Peak Hour				PM Peak Hour			
		LOS	V/C	Delay (s)	Q (95th)	LOS	V/C	Delay (s)	Q (95th)
Wilson St W & North St *Signalized*	EBL/T	C	0.65	33.0	30.2	E	0.79	64.3	**#35.7**
	EBR	A	0.04	3.5	1.6	A	0.05	4.0	2.8
	WBL/T	C	0.39	22.4	20.8	D	0.79	39.7	**#72.2**
	WBR	A	0.16	6.9	6.2	A	0.24	6.8	9.6
	NB	A	0.56	7.7	41.0	B	0.59	14.1	84.8
	SBL	A	0.24	8.9	12.4	B	0.53	16.7	32.6
	SBT/R	A	0.42	7.8	48.6	B	0.76	16.6	**#119.0**
	Overall	**B**	-	**11.5**	-	**C**	-	**21.4**	-
Wilson St E/Wilson St W & Peter St/Foster St *Signalized*	EB	C	0.77	33.6	**#60.9**	D	0.77	40.5	**#58.7**
	WBL/T	B	0.12	12.0	6.0	C	0.16	24.7	14.2
	WBR	A	0.32	1.0	0.0	A	0.37	1.6	2.5
	NB	B	0.15	16.7	8.8	C	0.39	25.3	21.5
	SBL	B	0.32	14.5	49.7	A	0.43	3.2	m3.2
	SBT/R	B	0.17	10.1	25.2	A	0.21	1.1	m0.2
	Overall	**B**	-	**15.0**	-	**B**	-	**11.6**	-
Gore St W & North St *Unsignalized*	EB	B	0.31	10.2	9.8	C	0.74	23.4	48.0
	WB	A	0.11	8.3	3.0	B	0.33	11.4	10.5
	NB	A	0.11	8.5	3.0	B	0.34	12.3	11.3
	SB	A	0.12	8.3	3.0	B	0.21	10.6	6.0
	Overall	**A**	-	**9.2**	-	**C**	-	**17.1**	-

Intersection	Lane	AM Peak Hour				PM Peak Hour			
		LOS	V/C	Delay (s)	Q (95th)	LOS	V/C	Delay (s)	Q (95th)
Gore St E/Gore St W & Foster St *Signalized*	EBL/T	C	0.42	20.3	m18.3	C	0.35	24.3	m18.7
	EBR	A	0.33	2.2	m12.0	A	0.46	5.8	31.0
	WBL/T	C	0.18	21.8	10.7	C	0.32	29.1	18.1
	WBR	A	0.03	0.2	0.0	A	0.05	0.4	0.0
	NBL	A	0.35	5.4	27.8	A	0.41	5.4	30.4
	NBT/R	A	0.23	5.4	22.1	A	0.37	5.9	39.6
	SBL/T	C	0.45	26.5	25.0	D	0.69	35.5	48.7
	SBR	A	0.04	0.2	0.0	A	0.08	0.4	0.0
	Overall	**A**	**-**	**8.6**	**-**	**B**	**-**	**11.7**	**-**
Rogers Rd & Peter St *Unsignalized*	EB	-	-	-	-	-	-	-	-
	WB	-	-	-	-	-	-	-	-
	NB	B	0.21	10.9	6.0	B	0.19	10.0	5.3
	Overall	**A**	**-**	**3.8**	**-**	**A**	**-**	**4.8**	**-**

Notes: Saturation flow rate of 1800 veh/h/lane
Queue is measured in metres
Peak Hour Factor = 1.00
v/c = volume-to-capacity ratio
m = metered queue
# = volume for the 95th %ile cycle exceeds capacity

During both peak hours, the study area intersections are forecast to operate well in the 2041 future total conditions.

It is notable that delays on the arterial corridor of Wilson Street West, Foster Street, and Gore Street East are all comparable to the background conditions and in some cases even showing an improvement. This condition is due to priority being given to these arterial movements which is a typical practice consistent with the existing timing plans.

Moderate delays were forecast to be present on the conflicting movements to this corridor in the background conditions and where site vehicles are forecast to contribute to these movements, these delays are forecast to increase. This effect is mostly confined to the eastbound approach of the intersection of Peter Street/Foster Street at Wilson Street East/Wilson Street West, however these delays are forecast to remain at acceptable levels. In the case of Wilson Street West at North Street, during the PM peak hour, where the delays on the North Street approaches were high and contributing to low and failing level of service, the signalization of this intersection has improved the previously noted condition despite the increase in volumes.

While delays throughout the study area are not forecast to substantially increase, an increase in queueing is anticipated on several movements where stored queues may not clear the intersection in a single cycle for some number of cycles during a peak hour. This effect is forecast on the eastbound approach at the intersection of Peter Street/Foster Street at Wilson Street East/Wilson Street West during both peak hours, and on the eastbound left/through, westbound left/through, and southbound left/through movements of the intersection of Wilson Street West at North Street during the PM peak hour.

5.3.3 Queueing Analysis

As with the other horizons, a detailed queueing analysis has been performed using SimTraffic with the previously noted parameters to better understand the forecasted queueing within the study area at the 2041 future total conditions. The storage distances, and the forecasted 95th percentile queue lengths during each peak hour are summarized in Table 12. SimTraffic worksheets are provided in Appendix F.

Table 12: 2041 Future Total Intersection Queue Lengths

Intersection	Lane	Storage Dist. (m)	AM Q (95th) (m)	PM Q (95th) (m)
Wilson St W & North St ***Signalized***	EBL	125*	45.5	50.0
	EBT/R	8	15.3	23.5
	WBL/T	15	29.4	33.4
	WBR	125	38.4	74.2
	NB	50	61.1	63.2
	SBL	100†	38.4	64.5
	SBT/R	125*	56.4	113.0
Wilson St E/Wilson St W & Peter St/Foster St ***Signalized***	EB	125*	97.1	102.7
	WBL/T	125	17.6	32.4
	WBR	15	25.4	31.0
	NB	270	20.9	31.2
	SBL	50	52.7	40.3
	SBT/R	50	30.4	13.9
Gore St W & North St ***Unsignalized***	EB	125	22.9	34.4
	WB	125	20.6	28.8
	NB	50	37.5	57.0
	SB	125*	17.5	21.3
Gore St E/Gore St W & Foster St ***Signalized***	EBL/T	125	37.2	45.1
	EBR	25	37.1	43.4
	WBL/T	125	19.6	39.6
	WBR	8	13.2	14.8
	NBL	135	47.5	102.5
	NBT/R	20	37.2	42.9
	SBL/T	50	37.9	61.1
	SBR	10	10.7	22.8
Rogers Rd & Peter St ***Unsignalized***	EB	-	5.0	1.2
	WB	-	16.2	16.1
	NB	200	24.0	18.3

Notes: *Distance to the nearest upstream road intersection with minor stop control, actual storage capacity is higher
†Distance assumed for the purposes of the analysis, design values are subject to further study

At the study area intersections, queueing is noted to increase generally—a trend that is consistent with the results from the Synchro analysis.

With the signalization of Wilson Street West at North Street and the remediation of delays on the eastbound and westbound approaches at this intersection, the previously noted southbound queuing from the downstream intersection of Wilson Street East/Wilson Street West at Peter Street/Foster Street will be interrupted by the signal control and pushed further upstream beyond North Street. This effect will be partly due to the elimination of queueing space within the intersection as was present in the background conditions where blockage of the intersection was noted.

Also, typical of urban conditions, queuing on the northbound approach at the intersection of Wilson Street West at North Street during both peak hours is anticipated to spill back to the westbound approach of the intersection of Wilson Street East/Wilson Street West at Peter Street/Foster Street, along the arterial corridor. This spillback

is limited in scale however, and the upstream queueing on the westbound approach at the intersection of Wilson Street East/Wilson Street West at Peter Street/Foster Street is not anticipated to reach Gore Street.

Ninety-fifth percentile queues on the eastbound approaches of Peter Street and on North Street at Wilson Street West are anticipated to be contained within the block and are typically double the values of the average queues.

During the PM peak hour, queueing at the proposed all-way stop controlled intersection of Gore Street West at North Street is anticipated to spill back into the intersection of Gore Street West/Gore Street East at Foster Street by one vehicle due to the short block length. Similarly during the PM peak hour, the southbound left-turn/through movement queue at the intersection of Gore Street West/Gore Street East at Foster Street is anticipated to spill back to the all-way stop-controlled intersection of Gore Street West at North Street. These operations are considered acceptable.

5.4 Analysis and Discussion

The traffic analysis for the subject development is considered to be conservative due to a number of factors which will be discussed herein. The selection of a conservative analysis is appropriate as part of a long-term planning exercise to identify maximum anticipated impacts and required mitigations. It is noted that even under the conservative analysis constituting the foregoing work, the network intersections are forecast to operate well and queues within the study area are acceptable and no mitigation for these conditions is required beyond those elements required to facilitate access assumed in Section 5.3.1 and later refined in Section 5.4.2.

Traffic calming, as discussed above, should be employed. However, the extent to which it will be required may be based upon how development traffic ultimately gets realized as compared to forecasts within this study. Given the large proportion of forecasted traffic versus counted traffic from both the background conditions and from the subject development, the traffic on the Town's road network that is ultimately realized at the 2041 horizon will be highly contingent on mitigating factors.

5.4.1 Mitigating Factors

A number of factors will affect how much traffic the subject development will ultimately generate, and how much the background developments will also contribute to the network, however two of the most salient ones can be categorized as active mode trips and emerging trends.

5.4.1.1 Active Mode Trips

The trip generation employed within subject TIS and the Future Traffic Forecasting Memo represents industry-standard methods for directly forecasting auto trips based upon land use types. It is noteworthy that these rates for residential land uses have trended downward as subsequent versions have been published. What is not captured at this level of analysis, however, is the site-specific potential for auto trips to be converted to walking or cycling trips based upon access to active mode infrastructure.

The development concept includes high quality active mode connections to the surrounding network across the two bridges. Many employment and commercial destinations in town, including the downtown, are within walking distance of the new community. Where these trips in other community contexts would be made via personal auto, the subject community may meet a higher active mode share than would otherwise be assumed by the typical values.

5.4.1.2 Emerging Trends

Another series of factors which would reduce the background and site trip generation from the values forecasted, are emerging social and technological trends such as virtual travel.

Virtual travel describes all of the trips that were previously made by auto travel and other modes being captured by internet and telecommunication technologies. These trips include those reduced by work from home, either full-time or part-time, online services such as fitness, banking, medical, or consultation appointments, and e-commerce which converts retail trips during the peak hours into off-peak deliveries.

5.4.1.3 Enabling the Mitigating Factors

The updated subdivision concept already includes robust active mode connectivity, and thus further mitigation to shift travel towards walking and cycling is not required.

To take advantage of the shift from auto travel towards virtual travel, infrastructure connectivity solutions should be explored. The Town of Perth has high quality fibre-optic internet infrastructure whose extension to the subject community could increase the new community's potential for remote activities to supplant physical ones. Not only would such connectivity serve to shift subject development traffic towards virtual travel, but as adoption of virtual travel increases regionally, and as further employment and commercial activities go online, some proportion of background traffic may shift towards this emerging "mode" as well.

5.4.2 Network Design Elements

Various transportation network design elements were assumed in Section 5.3.1 for the facilitation of vehicular access to the new community whose design values were based upon operational suitability as determined by the modeled traffic conditions. These assumed configurations and design values will be examined within this section through a theoretical framework employing industry standard practices for determining design values to supplement the operational analysis.

Recommendations made herein are contingent on the ultimate network traffic reflecting those volumes forecast within the subject study and the Future Forecasting Memo. As such, verification of realized traffic volumes will need to be conducted as part of the future design of any proposed facility or modification.

5.4.2.1 Signalization

The signalization of the intersection of Wilson Street West at North Street was proposed as part of the IMP in the event that a couplet between North Street and Peter Street was contemplated for the new community's access. This conclusion is supported by the subject TIS and its analyses. It is noteworthy that coordination between the Wilson Street West at North Street and Wilson Street West/Wilson Street East at Peter Street/Foster Street will be required due to the proximity of the intersections, and this coordination has been assumed as part of the 2041 future total operational analysis' signal timing optimization.

While signalization has recommended based on operational need, signal warrants have also been evaluated. The results from the Ministry of Transportation of Ontario's (MTO) Ontario Traffic Manual (OTM) Book 12 – Traffic Signals' Justification 7 for projected volumes have been evaluated for the two North Street intersections at each study horizon, and the results are summarized in Table 13. Signal warrants are provided in Appendix G.

Table 13: Signalization Warrant Summary

Intersection	Horizon	Warranted?
Wilson St W & North St	Existing	No
	2041 Future Background	No
	2041 Future Total	Yes/No
Gore St W & North St	Existing	No
	2041 Future Background	No
	2041 Future Total	No

As shown above, the intersection of Gore Street West at North Street does not meet OTM signal justifications. Warrants at the intersection of Wilson Street West at North Street are not met at the existing and future background horizons, however, are on the cusp of being met in the future total conditions where an additional eight vehicles on any approach during either peak hour would meet warrants. If the warrant is met, however, it is in part due to the assumption of signalization and the shift in travel patterns anticipated from this change which are discussed in Section 5.3.1. While the warrant may or may not be met, signalization of Wilson Street West at North Street is proposed on the basis of operational need where in the future background conditions, low and failing levels of service were noted on the minor approaches, and in the future total conditions, signalization was required to facilitate access to the new community.

5.4.2.2 Approach Configurations and Turn-Lanes

At the intersection of Wilson Street West at North Street, the southbound left-turn lane in the existing and background conditions will operate as a shared left-turn/through lane. While the existing pavement markings nominally indicate that this lane is a left-turn lane at the minor stop-controlled intersection, the majority of traffic utilizes it as a through lane to eventually make the southbound left at the downstream intersection. Under the proposed signalization, the lane configuration will be formalized.

The MTO Design Supplement to Section 9.17 of the Geometric Design Guide for Canadian Roads manual (Transportation Association of Canada (TAC), 2017) prescribes warrants for when to include left-turn lanes. Using this framework, the results of the warrant analysis by study horizon are summarized in Table 14 and left-turn warrants are provided in Appendix H.

Table 14: Left-Turn Lane Warrant Summary

Intersection	Horizon	Approach	Peak Hour	Warranted?
Wilson St W & North St	Existing	Southbound	AM	Yes
			PM	Yes
	2041 Future Background	Southbound	AM	Yes
			PM	Yes
	2041 Future Total	Southbound	AM	Yes
			PM	Yes

As shown above, the southbound left-turn lane is warranted at all study horizons. As such, this approach is proposed to have an auxiliary southbound left-turn lane. This condition is different from the existing line painting, where an auxiliary through/right-turn lane develops to the west of de facto left-turn/through lane. It is recommended that the line painting be modified to have the shared through/right-turn lane shift west of the newly designated auxiliary left-turn lane.

Left turns on the northbound approach of this intersection are proposed as being restricted to ensure site traffic arriving from the south and east make the westbound through movement on North Street which will not disrupt the function of Wilson Street West by introducing a new turn lane on the northbound approach or impacting the southbound operations by allocating split to a turning movement in the signal timing.

No changes are proposed for the westbound approach at this intersection due to the requirement for trucks to make the westbound right turn from the shared movements lane, and no changes are proposed to the eastbound approach.

The approach configurations at the intersection of Gore Street West at North Street are proposed to be converted to shared all-movements lanes on each approach. This modification would be to reduce potential safety issues where drivers have to track the arrival of multiple conflicting vehicles to determine which has the right-of-way.

The pavement width is not recommended to be changed, where right-turning vehicles may slip past a left-turning or through vehicle waiting for other vehicles to clear the intersection when judged safe to do so.

5.4.2.3 Storage Lane Lengths

The recommended methodology for the calculation of storage length from the Geometric Design Guide for Canadian Roads (Transportation Association of Canada (TAC), 2017) is from equation 9.14.1. This value may be contextualized with the forecasted queue lengths from the traffic models, as where the storage lane is full, it will block the adjacent through lane. In the case of this intersection, however, the auxiliary left-turn is forecast to be used to the extent that it is available, given drivers are anticipated to turn opportunistically given availability and signal phase, and are able to continue south to complete the left turn at the downstream intersection. It is noted that the traffic model assumed a storage length of 100 metres to remove this length constraint for queueing.

The existing storage length values, the calculated values from TAC, the 95th percentile values from the SimTraffic queueing analysis, and preliminary recommended design values, along with the number of impacted on-street parking spaces on the roadway are summarized in Table 15.

Table 15: 2041 Future Total Intersection Storage Lengths

Intersection	Lane	Existing Storage Dist. (m)	Calculated Value from TAC (m)	SimTraffic Q (95th) (m)	Rec. Storage Dist. (m)	Impacted Parking Spaces
Wilson St W & North St	SBL	55‡	39.9	64.5	70	3-4

Notes: ‡Distance of the adjacent auxiliary lane based on the existing approach configuration

The southbound left-turn movement at the intersection of Wilson Street West at North Street is recommended at this time to include a storage length of 70 metres to meet forecasted queues and, with the taper, this length may impact three-to-four on-street parking spaces on Wilson Street West by the extension of the adjacent through lane around it.

5.4.2.4 Network Classifications

Peter Street is classified as a collector road. It is noted that the projected future total volumes are below typical maximum values for collector roads from Chapter 2 of the TAC manual. As such, the volumes are considered appropriate from the perspective of the network function and road classification. Notwithstanding the network considerations, the character of Peter Street is of a slow residential road where houses fronting onto it include narrow setbacks and all private driveways to these dwellings access the roadway.

The designations of North Street west of Wilson Street West (where it is a local road) and Lustre Lane would require upgrade to a collector road under the proposed access plan, which would be in line with their function under the future total conditions. In addition to the functional aspect, the projected volumes are within the envelope of typical volumes on a collector road from Chapter 2 of the TAC manual. The rights-of-way of North Street and Lustre Lane and their building setbacks are wider than the collector road of Peter Street, and this upgrade is considered appropriate, as is the shift of volumes from Peter Street to North Street as achieved by the directional restriction on Peter Street.

5.4.2.5 List of Network Modifications

The following is a list of modifications to the study area transportation network as documented through this TIS to support site access:

- North Street at Wilson Street West
    - Signalization of the intersection

    - Shifting the auxiliary lane designation from the southbound through movement to the southbound left turn
    - Extending the auxiliary storage length to 70 metres
    - Restriction of the northbound left-turn movement
- North Street at Gore Street West
    - Instituting all-way stop control
    - Repainting all approaches to comprise shared all-movements lanes
- Peter Street at Rogers Road
    - Restriction of the northbound left-turn and westbound through movements through the introduction of a directional restriction on Peter Street

6 Summary of Improvements Indicated and Modifications Options

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

Proposed Development and Background

- This study has been prepared in support of a Plan of Subdivision application and a Municipal Class EA process
- An Infrastructure Master Plan was commissioned by the Town, partly to study the Golf Course Lands, which was the subject of a 2022 Transportation Review by CGH
- A new access solution for the community has been recommended since this transportation review and superseding this previous work, which comprises the construction of a new bridge adjacent to the Peter Street Bridge presently serving the development area
- The subject TIS has been prepared to evaluate the impacts of the new access solution for the new community where the resultant changes in traffic patterns are forecast to impact the network
- The proposed development includes 640 single detached dwellings and 299 townhome units assumed to be built out by 2041

Existing and Planned Conditions

- Wilson Street, Gore Street, and Foster Street are arterial roads, and Peter Street and Rogers Road are collector roads within the study area
- The study area comprises the intersections of:
    - Wilson Street W at North Street
    - Wilson Street W / Wilson Street E at Peter Street / Foster Street
    - Gore Street W at North Street
    - Gore Street W / Gore Street E at Foster Street
    - Rogers Road at Peter Street
- Sidewalks are provided on both sides of Wilson Street, Foster Street, North Street, Peter Street east of Rogers Road, on the north side of Peter Street between Rogers Road and Lustre Lane, on the west side of Rogers Road
- An existing trail is located along the Tay River that uses Rogers Road and John Street south of Peter Street
- Bike lanes are provided on both sides of Wilson Street W between Sunset Boulevard and Leslie Street
- The TMP proposes Wilson Street, Peter Street/Foster Street, Rogers Road, and Gore Street East as pedestrian priority routes and Wilson Street, Gore Street East south of Herriot Street, Rogers Road, Peter Street west of Rogers Road, Lustre Lane, and North Street as bike routes

- The TMP proposes a trail along the Tay River north of Peter Street connecting to the existing trails near the Lanark County Administration Building, of which the section north of Leslie Street is currently planned

Updated Subdivision Review

- The proposed subdivision concept generally follows the one presented within the 2022 Transportation Review of a modified grid that is responsive to environmental constraints
- Typical cross-sections for the new community are proposed as being:
    - 23.0-metre collector road with two parking lanes, two bike lanes, two travel lanes and a sidewalk
    - 18.0-metre local roads facilitating network access with a parking lane, two travel lanes, and a sidewalk
    - 16.75-metre local roads facilitating land access only with a parking lane and two travel lanes
- Bike lanes and a sidewalk are proposed along the collector road and a sidewalk is proposed along key local roads with internal crossing blocks at key locations
- Traffic calming within the new community is focused on on-street parking and horizontal deflection measures including bulb-outs applied at strategic intersections and crossing blocks and abrupt roadway bends
- The major traffic calming measure in the existing neighbourhood to the east is proposed to be the directional restriction of westbound vehicles on Peter Street west of Rogers Road
- This treatment will greatly reduce the volumes anticipated on Peter Street where the right-of-way and setbacks are narrow and push all inbound traffic to North Street where these aspects are more generous
- Traffic calming in the existing neighbourhood to the east may also include centreline treatments like flex posts, vertical deflection measures like speed humps, and horizontal deflection measures like bulb-outs on Peter Street and/or North Street, and speed monitoring treatments on Rogers Road
- The need, timing, and selection of measures should be based on monitoring traffic volumes as the subdivision builds out

Development Traffic Demand

- The updated subdivision concept is forecasted to generate 593 total AM and 743 total PM peak hour two-way auto trips
- The site-generated vehicles are forecast to travel 5% north, 50% south, 25% east, and 20% west

Traffic Analysis

- Existing traffic data were collected in the field in January of 2023, the 2041 future background traffic was determined by subtracting the previously assumed subject development from the Future Traffic Forecasting Memo of the TMP by using the existing volumes as a basis, and the 2041 future total horizon traffic was determined by applying the forecasted development volumes along with any traffic reassignment from network modifications to the 2041 future background conditions
- The existing traffic conditions operate well with minor queueing on the westbound left-through movement at the intersection of Gore Street East/Gore Street West at Foster Street, where a detailed queueing analysis determined that while some blockage of adjacent lanes occurs, no issues are noted
- Delays and queueing were noted to increase from the existing conditions at the 2041 future background horizon where high mainline arterial volumes impact the function of the minor stop-controlled approaches of North Street at its intersection with Wilson Street West

- Queueing along the arterial corridor is forecast to increase in the 2041 future background horizon from the existing conditions
- In line with an analogous option within the IMP, the signalization of Wilson Street West at North Street is proposed for the conversion of North Street and Peter Street into a couplet for site access, and the conversion to all-way stop control for the intersection of North Street and Gore Street West is proposed as a result of the signalization to the west
- These modifications, along with additional lane restrictions and approach configuration changes are anticipated to result in a change in background traffic patterns
- The study are intersections at the 2041 future total horizon are forecast to operate well, with additional queueing on several movements throughout the study area and operational improvements on the minor approaches at the intersection of Wilson Street West at North Street with the signalization
- Queueing within the study area at the 2041 future total conditions has increased along the arterial corridor with longer queues on the eastbound approaches of North Street and Peter Street each at Wilson Street, and minor spillback to adjacent intersections with the short block lengths, but overall, no concern with queueing is noted

Traffic Analysis Discussion

- No mitigation for forecasted conditions is required beyond those modifications proposed to facilitate site access, and the analysis is considered conservative
- Mitigating social and geographical factors are anticipated to reduce the site and background trip generation from that modeled within this study, including proximity to downtown and the shift to virtual travel anticipated by 2041
- The development should capitalize on these opportunities by provided high quality active transportation connections across the site access bridges to facilitate higher active mode uptake, and the provision of high quality communications infrastructure supporting virtual activities

Network Design Elements

- The intersection of Wilson Street West at North Street may meet signalization warrants at the 2041 future total horizon, and will be provided to facilitate the proposed access solution for the new community
- This intersection at the remaining horizons and the intersection of Gore Street West at North Street at all horizons are not forecast to meet signal warrants
- The southbound approach at the intersection of Wilson Street West at North Street meets left-turn lane warrants at all study horizons, and an auxiliary left-turn is proposed to be included in the lane configuration by shifting the through/right lane to the west of the developing auxiliary lane at the 2041 future total horizon, the northbound right turn is proposed to be restricted at this intersection at this horizon, and no changes are proposed for the remaining approaches
- The intersection of Gore Street West at North Street is proposed to include all-way stop control with the repainting of all approaches to be shared all-movement lanes in support of the new control
- The storage lane for the redesignated auxiliary left-turn lane on the southbound approach of the intersection of Wilson Street west at North Street is recommended to be 70 metres based on traffic models and despite the calculated theoretical length of 40 metres, where three to four parking spaces may be impacted by this storage length

- North Street west of Wilson Street West and Lustre Lane are recommended to be redesignated to collector roads, in line with their function at the 2041 future total horizon, and this designation is supported by the projected volumes and its planning and physical characteristics
- The list of proposed changes to support site access for the new community are:
    - North Street at Wilson Street West
        - Signalization of the intersection
        - Shifting the auxiliary lane designation from the southbound through movement to the southbound left turn
        - Extending the auxiliary storage length to 70 metres
        - Restriction of the northbound left-turn movement
    - North Street at Gore Street West
        - Instituting all-way stop control
        - Repainting all approaches to comprise shared all-movements lanes
    - Peter Street at Rogers Road
        - Restriction of the northbound left-turn and westbound through movements through the introduction of a directional restriction on Peter Street

7 Conclusion

The full development is to planned to comprise 640 single detached dwellings and 299 townhouse units and is to be served by the existing Peter Street Bridge, and a new bridge adjacent to it, forming a one-way couplet. The development will be constructed in multiple phases, of which the first phase is currently planned to comprise fewer than 40 single detached dwellings to be accessed by the existing Peter Street Bridge. As development continues, the EA process for the second crossing will be completed and the appropriate timing for its construction will be determined.

As discussed throughout this TIS, traffic forecasts presented in the report are considered conservative, and the recommended design elements and timing of recommended improvements will be subject to future monitoring.

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

Prepared By:

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Reviewed By:

Christopher Gordon, P.Eng.
Senior Transportation Engineer

Appendix A

Perth Golf Course Access Options Memo

CGH TRANSPORTATION

Technical Memorandum

To:	Colin Haskin, Hugo Lalonde – Caivan	Date:	2022-11-24
Cc:			
From:	John Kingsley, Christopher Gordon – CGH	Project Number:	2021-117

Re: Perth Golf Course Access Options

1 Context

The Infrastructure Master Plan (IMP) for the Western Annexed Lands of the Town of Perth, prepared by JP2G Consultants Inc (2019) outlined options and selected a preferred alternative among them for access to the planned Golf Course Community which is separated from the town by the Tay River, all of which included the use of the existing Peter Street Bridge.

For community access, the IMP considered three scenarios.

- The first was that all traffic use the Peter Street Bridge, which was deemed not acceptable due to emergency access requirements, without examining the suitability of the existing bridge for the purpose of conveying traffic
- The second was the construction of a second bridge to the County Office, providing a second site access to Christie Lake Road/Sunset Boulevard
- The third scenario was the creation of a one-way couplet with Peter Street and North Street, by constructing a second bridge as an extension of North Street, and was not preferred partly due to the fact that a high traffic volume would be using North Street which is classified as a local road, and that a signal would need to be installed at the intersection of North Street at Wilson Street West

The IMP's recommendation was somewhat unclear about how much traffic could be accommodated on the Peter Street bridge before a second crossing is constructed. As such, further examination of the Peter Street Bridge options is warranted and documented herein.

The memo additionally discusses traffic impacts and traffic calming options for the surrounding neighbourhoods to the east of the planned development, both in the context of the proposed access options and for general consideration for the proposed development. As well, the second crossing preliminary concept is also developed in order to compare it to the preferred Peter Street Bridge alternative.

1.1 Tying Into the Existing Network

An area context map east of the Peter Street Bridge and noting approximate property parcels is illustrated in Figure 1. A description of the potentially implicated network elements for access and a discussion on the use of each follows.

Figure 1: Peter Street Bridge Area Context and Property Map

1.1.1 Lanark County Administration Building Access

In addition to requiring a second bridge, access to the Lanark County Administration Building driveway would require County agreement, road upgrades to bring the driveway to public road standards, and coordination between Tay Valley Township, Drummond Township, Lanark County, and the Town of Perth, given the property impacts, as stated by Julie Stewart representing Lanark County at a meeting with the development team on September 16, 2022.

Alternative crossing locations to this access on the north of the planned Golf Course Community may be considered, including to the planned Tayview community to the northwest, however for the purposes of this memo, all alternative crossing locations beyond those hereafter explicitly discussed will be treated equally.

1.1.2 Peter Street

All access arrangements within this memo and the IMP consider the use of Peter Street via the existing bridge connection. This bridge has a narrow deck which, while comprising two travel lanes, will not permit collector road traffic, or local road traffic in excess of approximately 300 vehicles per peak hour. The shoulder-less rural cross-section of Peter Street pinches down to 5.5 metres of pavement width, and transitions to an urban cross-section of 7.5 metres pavement at Lustre Lane with a sidewalk on the north side of the road, and sidewalks are present on both sides of the road east of Rogers Road. In addition to the narrow right of way and narrow pavement width, building setbacks are unusually narrow on Peter Street as well, and this sensitive context contributes to the concerns for the increase of traffic of the roadway from the proposed development.

Immediately west of Lustre Lane, the roadway departs the protected right of way for the alignment across the Tay River, as illustrated in Figure 1. The right of way is still reserved south of this departure, however.

1.1.3 Lustre Lane

North Street terminates at a 90-degree bend and becomes Lustre Lane, which spans only between North Street and Peter Street. Lustre Lane's intersection with Peter Street is offset approximately 30 metres from roadway crown to roadway crown, which is considered too close for safe operations beyond minor traffic volumes. This offset distance may require mitigation generally, but especially in the event that additional volumes be added to Lustre Lane. Lustre Lane has an urban cross-section including 8.0 metres of pavement width.

1.1.4 North Street

All access arrangements can make use of North Street via Lustre Lane, but the one-way couplet option per the IMP proposes the extension of the road across the river to meet the unopened allowance of its extension west of the river. The Carolina Suites retirement complex property includes a parking lot west of the current terminus of North Street at the 90-degree bend to Lustre Lane. These features are illustrated in Figure 1.

1.2 Traffic Calming for the Existing Neighbourhood

Multiple options were explored for traffic calming within the neighbourhood surrounding the Peter Street bridge. The following elements were those with the most applicability to the context, and have implications for the crossing alternatives.

1.2.1 Mini Roundabout

A mini roundabout at the intersection of Lustre Lane and Peter Street was considered but discounted partly due to the footprint of such a treatment, especially in the context of limited property (parcel 0285). Compliance issues with control measures at a mini roundabout and appropriate configurations for active modes are also difficulties inherent to this type of treatment. However, if property constraints were alleviated, the treatment would improve the conditions for the Peter Street, Lustre Lane, and North Street interface, and provide traffic calming for Peter Street and is deserving of consideration should conditions change.

1.2.2 Peter Street Speed Treatments

Various options for reducing speeds on Peter Street may be employed. While the existing narrow pavement width will reduce the opportunity for speeding, flexible post centreline treatments may further augment this effect. Speed humps may also be explored, and provide calming effect year-round, unlike the seasonal flexible post installation. Bulb-outs at Rogers Road, Thom Street, and/or Lewis Street may additionally be included to narrow the pavement width to 7.0 metres to reduce speeds at these locations. In accordance with the recommendations from the Golf Course community Traffic Review by CGH, it is recommended that any such measures be explored on an as-needed basis through monitoring of the conditions as the subject development builds out.

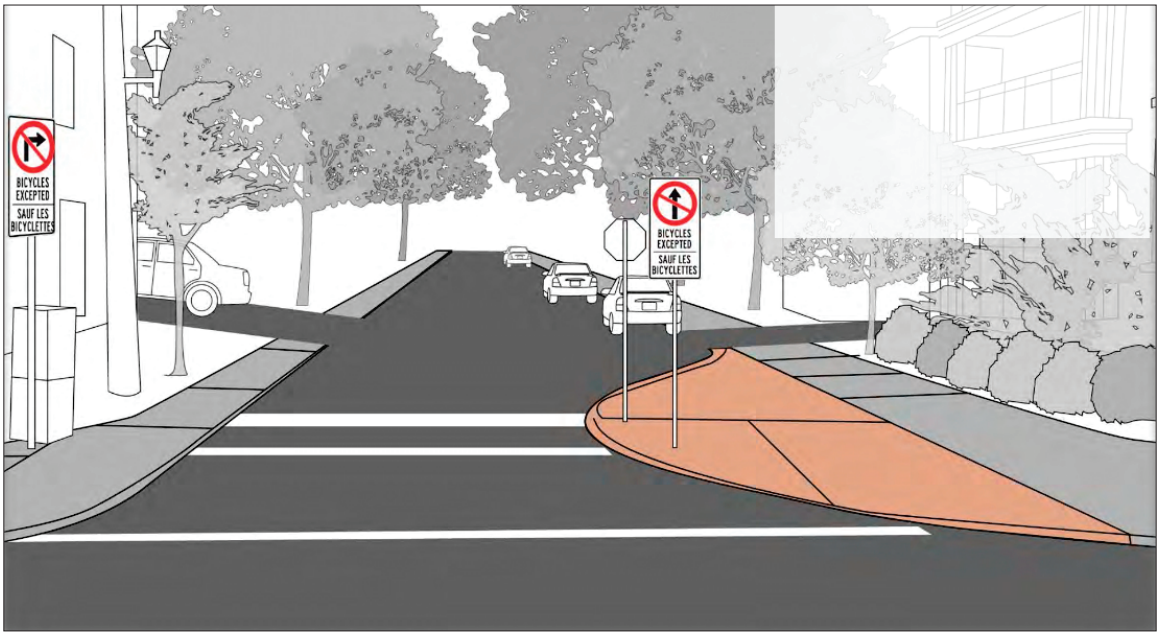
1.2.3 Directional Restriction and Functional One-Way Couplet

All alternatives for access may include the introduction of a directional restriction via the installation of a bulb-out on Peter Street between Lustre Lane and Rogers Road. This treatment would functionally create a one-way couplet of Peter Street and North Street for site traffic, permitting two-way traffic for most of the existing neighbourhood. The majority of outbound site traffic would be anticipated use Peter Street, and all inbound site traffic would be required to use North Street. As with the one-way couplet scenario from the IMP, the signalization of the intersection of North Street and Wilson Street West would need to be investigated for this treatment. Additionally, inbound traffic that would otherwise use Rogers Road would either divert east on Peter Street, north on Lewis Street, and then west on North Street, or divert through the downtown area.

Conceptually, at the end of the first phase of development during the PM peak hour, this treatment would reduce site-generated traffic on Peter Street from an average of approximately six two-way vehicles per minute to

approximately two, by shifting the balance to North Street. During the AM peak hour, this reduction would be from approximately ten two-way vehicles every two minutes on Peter Street to approximately seven every two minutes. A conceptual implementation of this treatment is illustrated in Figure 2.

Figure 2: Directional Closure Treatment



1.2.4 Rogers Road Speed Treatments

As discussed within the TMP, speeding on Rogers Road is a consistent phenomenon. The pavement width of the road averages approximately 9.0 metres, and especially when on-street parking is not utilized, this width and the straightness of the travelled path are suspected to contribute to the high operating speeds, which may be a concern for residents.

Rogers Road is a direct path to/from the site from/to South Street/Scotch Line Road to the south, which a portion of site traffic may use, bypassing the downtown by using Rogers Road to do so. As such, it is anticipated that speeding concerns will be applicable to site traffic, and therefore speeding treatments may be accordingly investigated. Recommended treatments include electronic driver feedback speed display signs ("Your Speed" signs), or the installation of an automated speed enforcement device (speed trap). This latter treatment, however, is noted to impact area residents most frequently and should be considered through consultation with the potentially impacted communities.

2 Peter Street Bridge Alternatives

2.1 List of Access Alternatives

The following layouts present the conceptual alternatives explored through this memo, including a description of features, elements, costs, and phasing considerations.

Notes:

LEGEND

- MULTI USE PATHWAY
- SIDEWALK
- ROAD WIDENING/NEW ROAD
- BRIDGE WIDENING / NEW BRIDGE

REV:	DESCRIPTION:	BY:	DATE:
02	Issued for Review	BB	2022-11-21
01	Issued for Review	BB	2022-11-03

STATUS:

CGH Transportation
6 Plaza Court
Ottawa, ON
K2H 7W1
(343) 999-9117

CLIENT: Caivan Communitites
2934 Baseline Road, Suite 302
Ottawa, ON
K2H 1B2

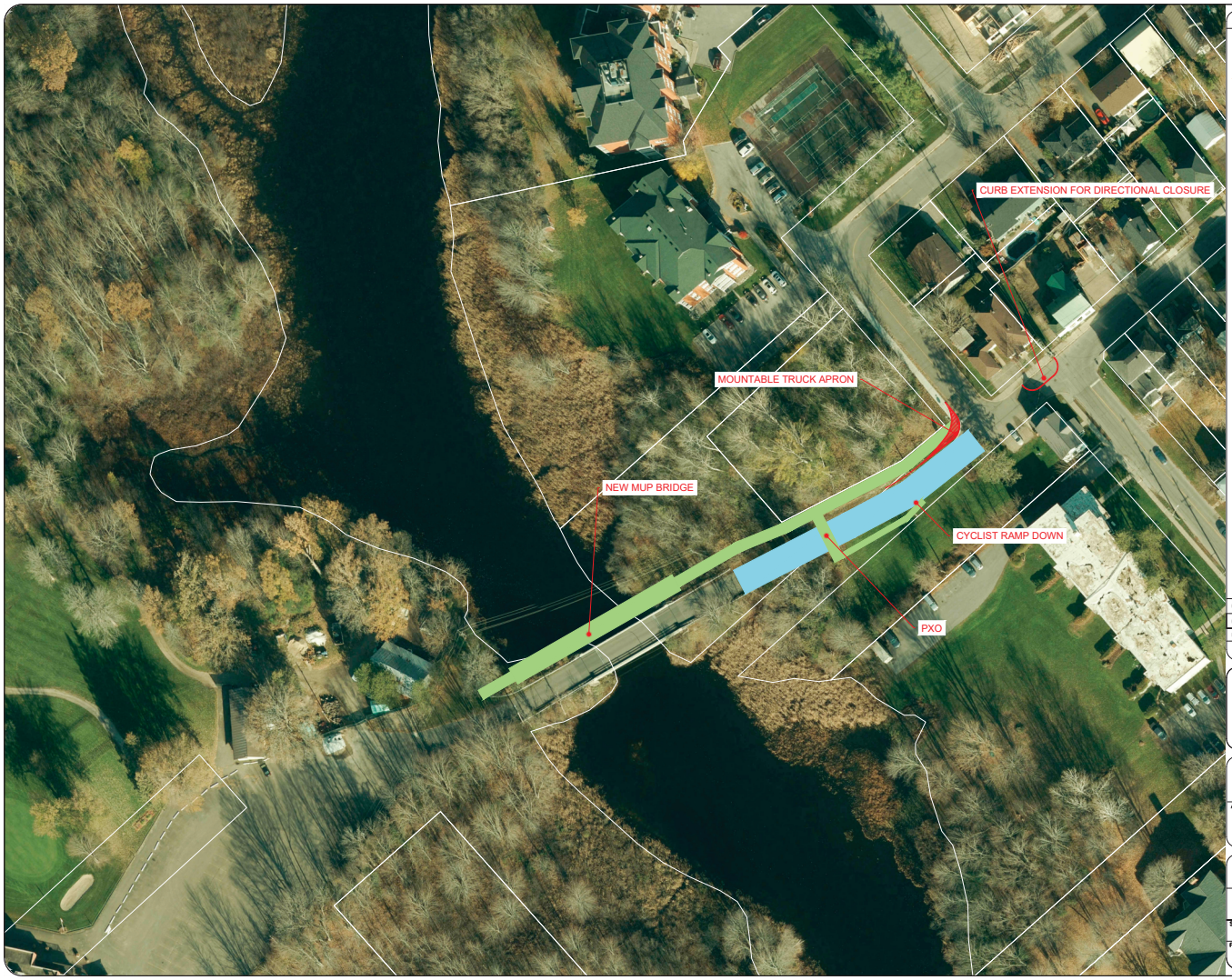
ARCHITECT:

SITE: Caivan Perth

TITLE: Option 1

SCALE AT A3:	DATE:	DRAWN:	CHECKED:
NTS	2022-11-21	BB	CG

PROJECT NO:	DRAWING NO:	REVISION:
2021-117	000	02



Notes:

LEGEND

- MULTI USE PATHWAY
- SIDEWALK
- ROAD WIDENING/NEW ROAD
- BRIDGE WIDENING / NEW BRIDGE

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CLIENT: Caivan Communitites
2934 Baseline Road, Suite 302
Ottawa, ON
K2H 182

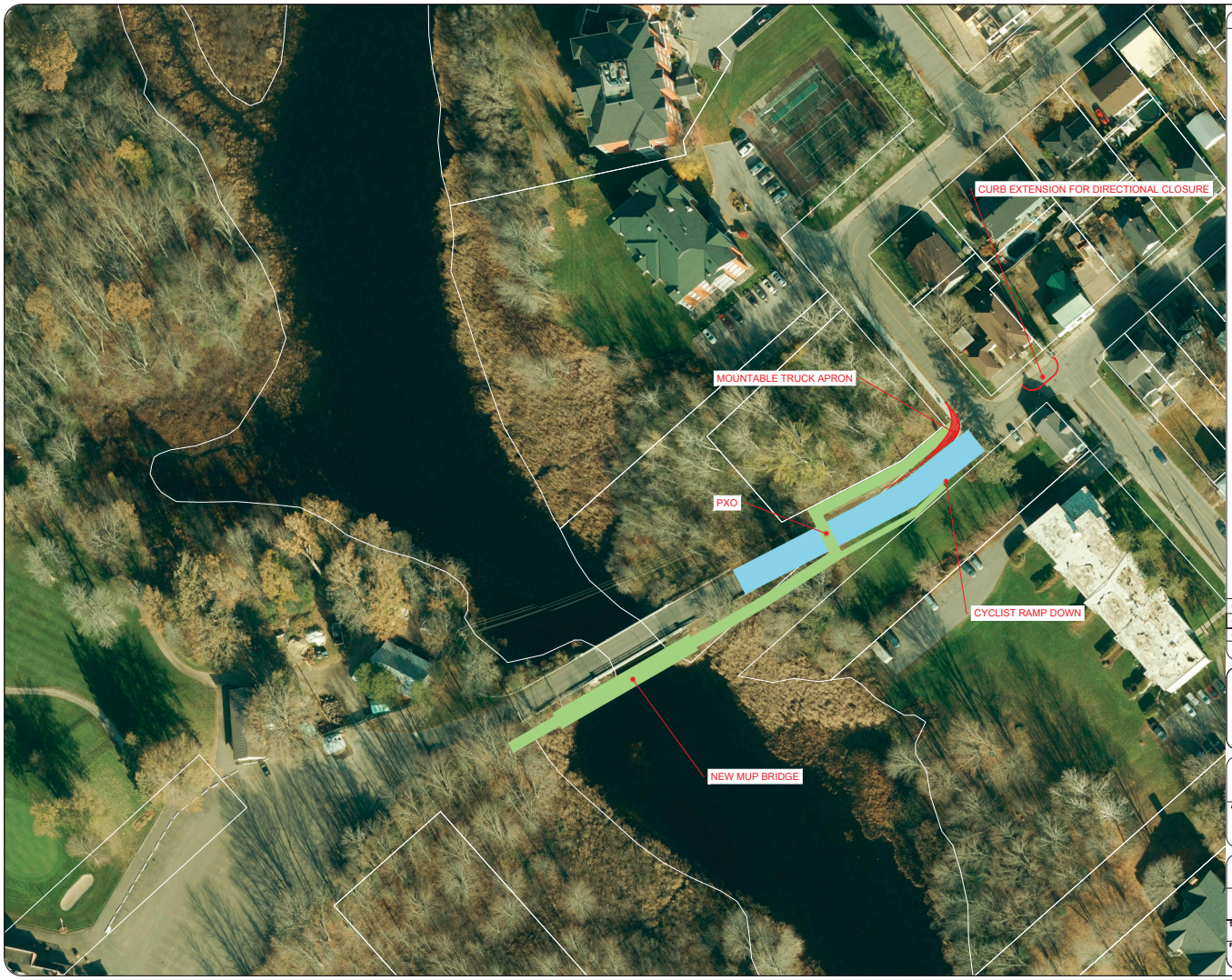
ARCHITECT:

SITE: Caivan Perth

TITLE: Option 2A

SCALE AT A3:	DATE:	DRAWN:	CHECKED:
NTS	2022-11-21	BB	CG

PROJECT NO:	DRAWING NO:	REVISION:
2021-117	001	02



Notes:

LEGEND

- MULTI USE PATHWAY
- SIDEWALK
- ROAD WIDENING/NEW ROAD
- BRIDGE WIDENING / NEW BRIDGE

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CLIENT: Caivan Communitites
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K2H 1B2

ARCHITECT:

SITE: Caivan Perth

TITLE: Option 2B

SCALE AT A3:	DATE:	DRAWN:	CHECKED:
NTS	2022-11-21	BB	CG

PROJECT NO:	DRAWING NO:	REVISION:
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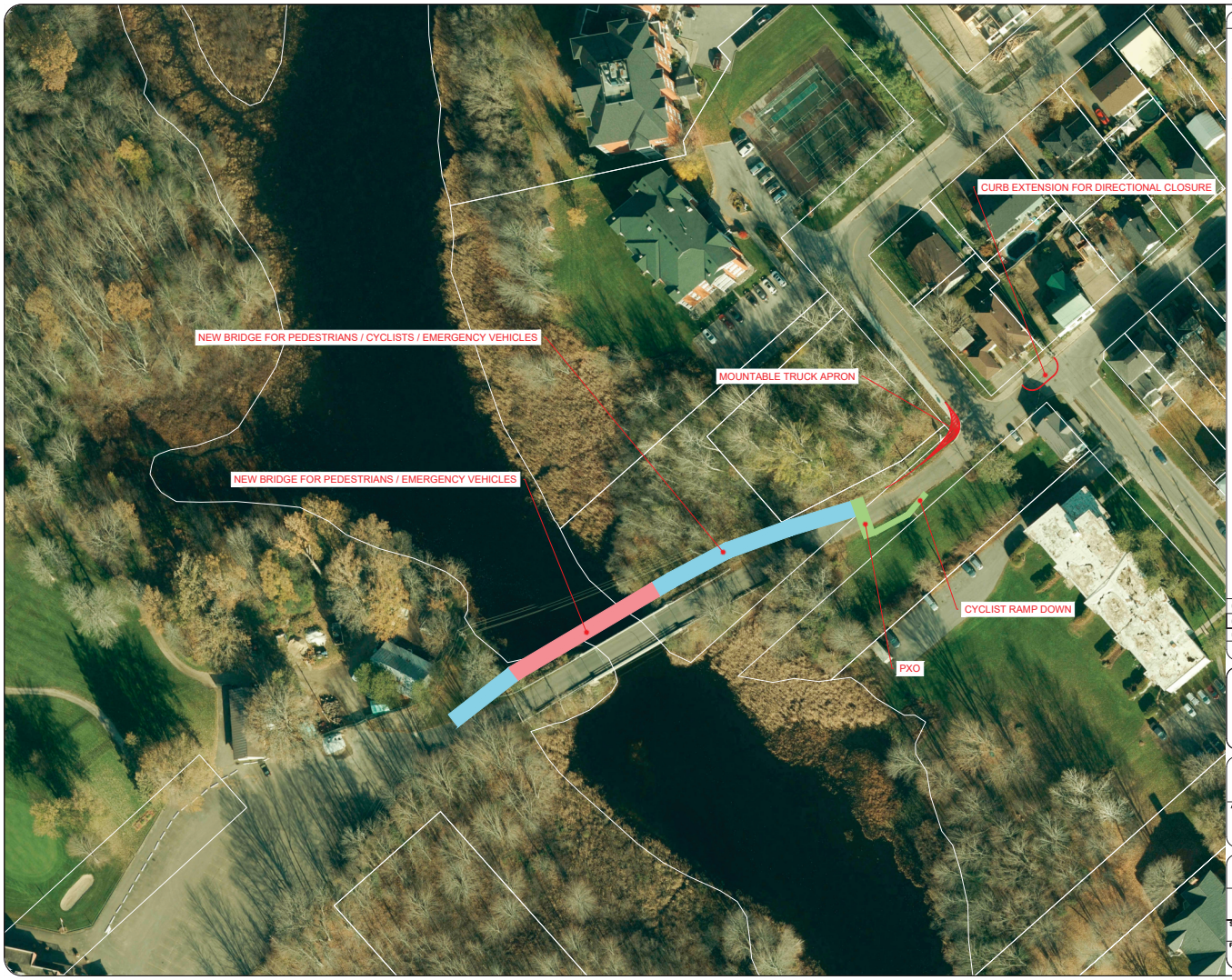

Notes:

LEGEND

- MULTI USE PATHWAY
- SIDEWALK
- ROAD WIDENING/NEW ROAD
- BRIDGE WIDENING / NEW BRIDGE

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CLIENT: Caivan Communitites
2934 Baseline Road, Suite 302
Ottawa, ON
K2H 1B2

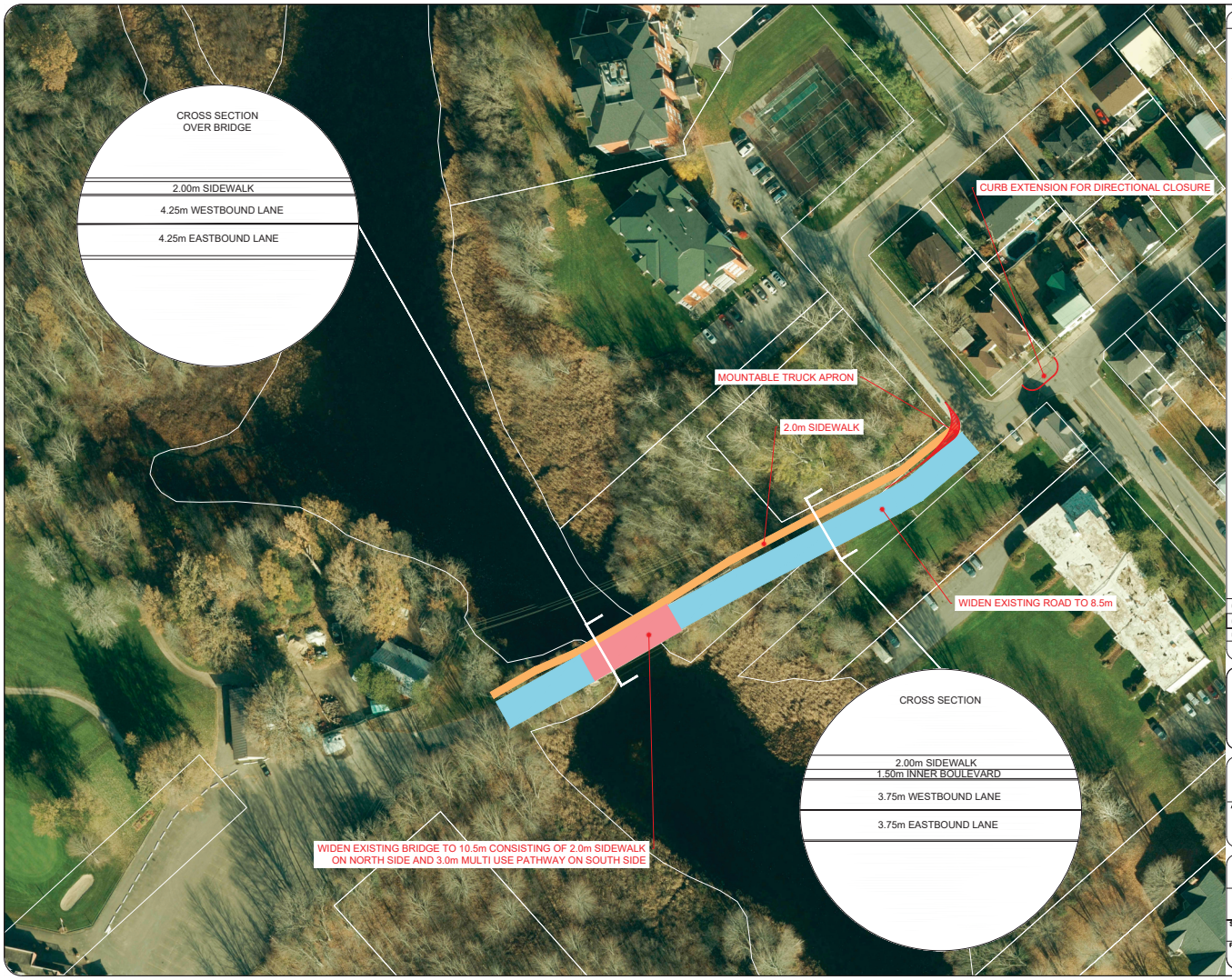
ARCHITECT:

SITE: Caivan Perth

TITLE: Option 3

SCALE AT A3:	DATE:	DRAWN:	CHECKED:
NTS	2022-11-21	BB	CG

PROJECT NO:	DRAWING NO:	REVISION:
2021-117	003	02



Notes:

LEGEND

- MULTI USE PATHWAY
- SIDEWALK
- ROAD WIDENING/NEW ROAD
- BRIDGE WIDENING / NEW BRIDGE

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K2H 7W1
(343) 999-9117

CLIENT: Caivan Communitites
2934 Baseline Road, Suite 302
Ottawa, ON
K2H 1B2

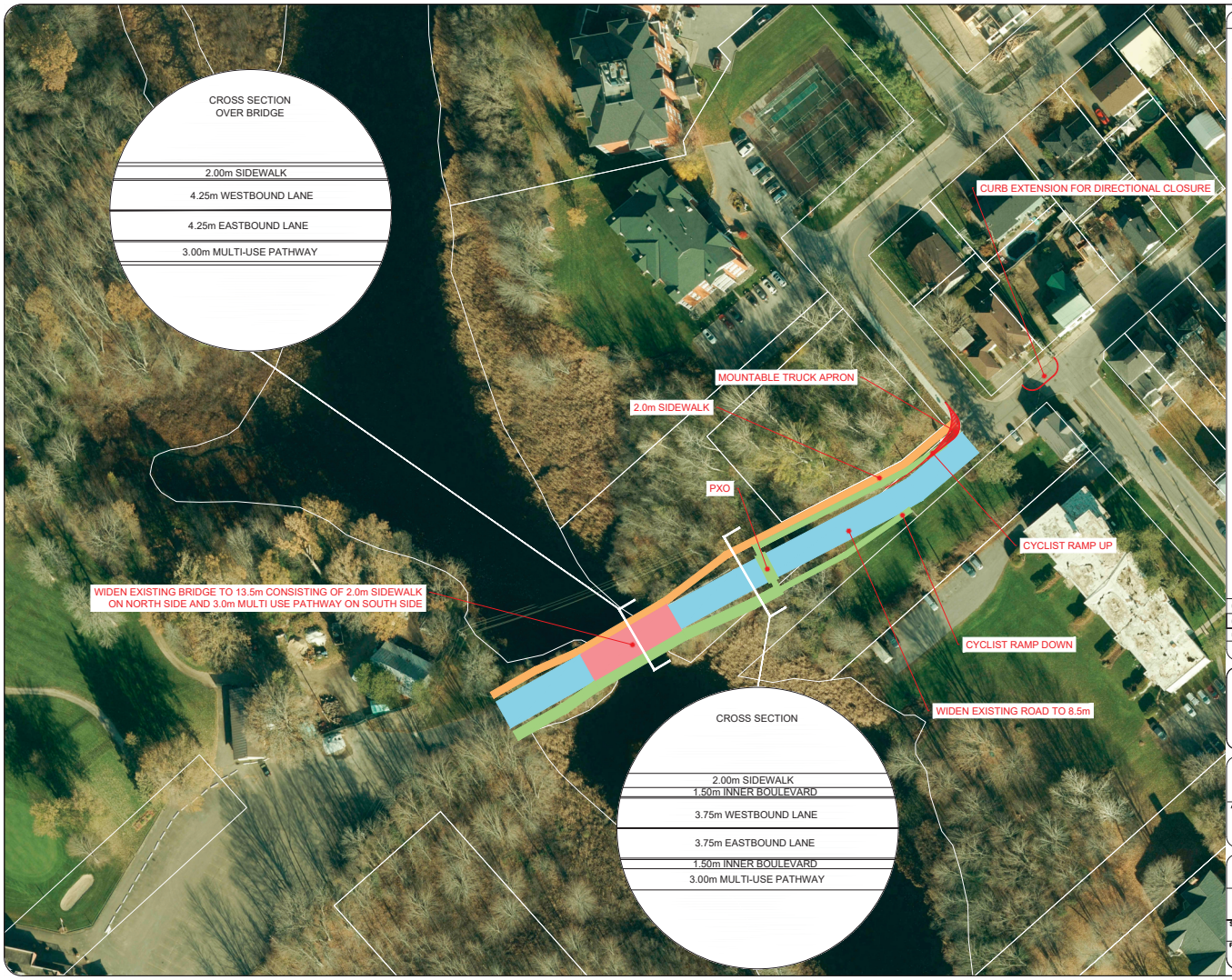
ARCHITECT:

SITE: Caivan Perth

TITLE: Option 4

SCALE AT A3:	DATE:	DRAWN:	CHECKED:
NTS	2022-11-21	BB	CG

PROJECT NO:	DRAWING NO:	REVISION:
2021-117	004	02



Notes:

LEGEND

- MULTI USE PATHWAY
- SIDEWALK
- ROAD WIDENING/NEW ROAD
- BRIDGE WIDENING / NEW BRIDGE

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01	Issued for Review	BB	2022-11-03

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Ottawa, ON
K2H 7W1
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CLIENT: Caivan Communitites
2934 Baseline Road, Suite 302
Ottawa, ON
K2H 182

ARCHITECT:

SITE: Caivan Perth

TITLE: Option 5

SCALE AT A3:	DATE:	DRAWN:	CHECKED:
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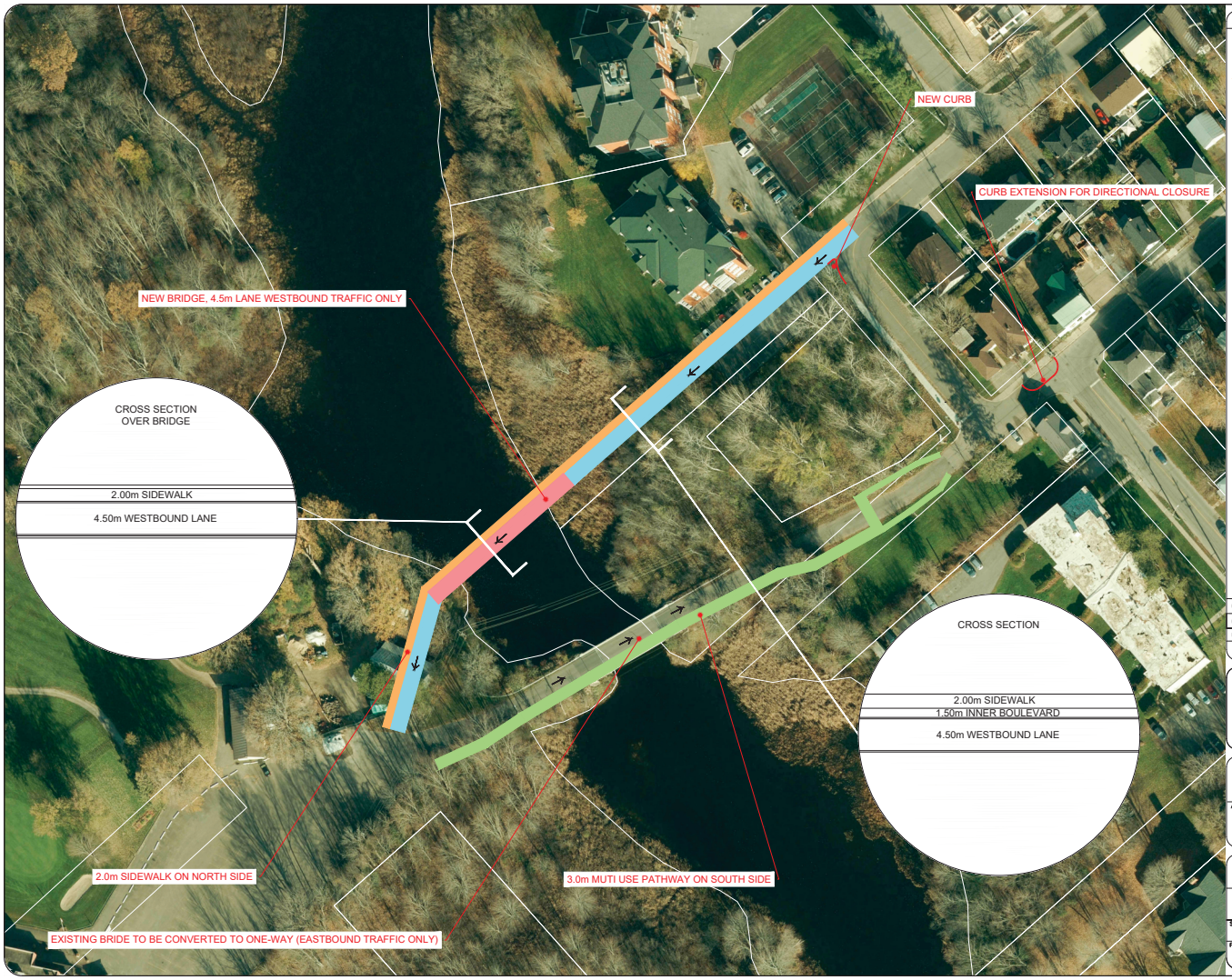
PROJECT NO:	DRAWING NO:	REVISION:
2021-117	005	02



Notes:

LEGEND

- MULTI USE PATHWAY
- SIDEWALK
- ROAD WIDENING/NEW ROAD
- BRIDGE WIDENING / NEW BRIDGE

REV:	DESCRIPTION:	BY:	DATE:
02	Issued for Review	BB	2022-11-21
01	Issued for Review	BB	2022-11-03

STATUS:

CGH Transportation
6 Plaza Court
Ottawa, ON
K2H 7W1
(343) 999-9117

CLIENT: Caivan Communitites
2934 Baseline Road, Suite 302
Ottawa, ON
K2H 182

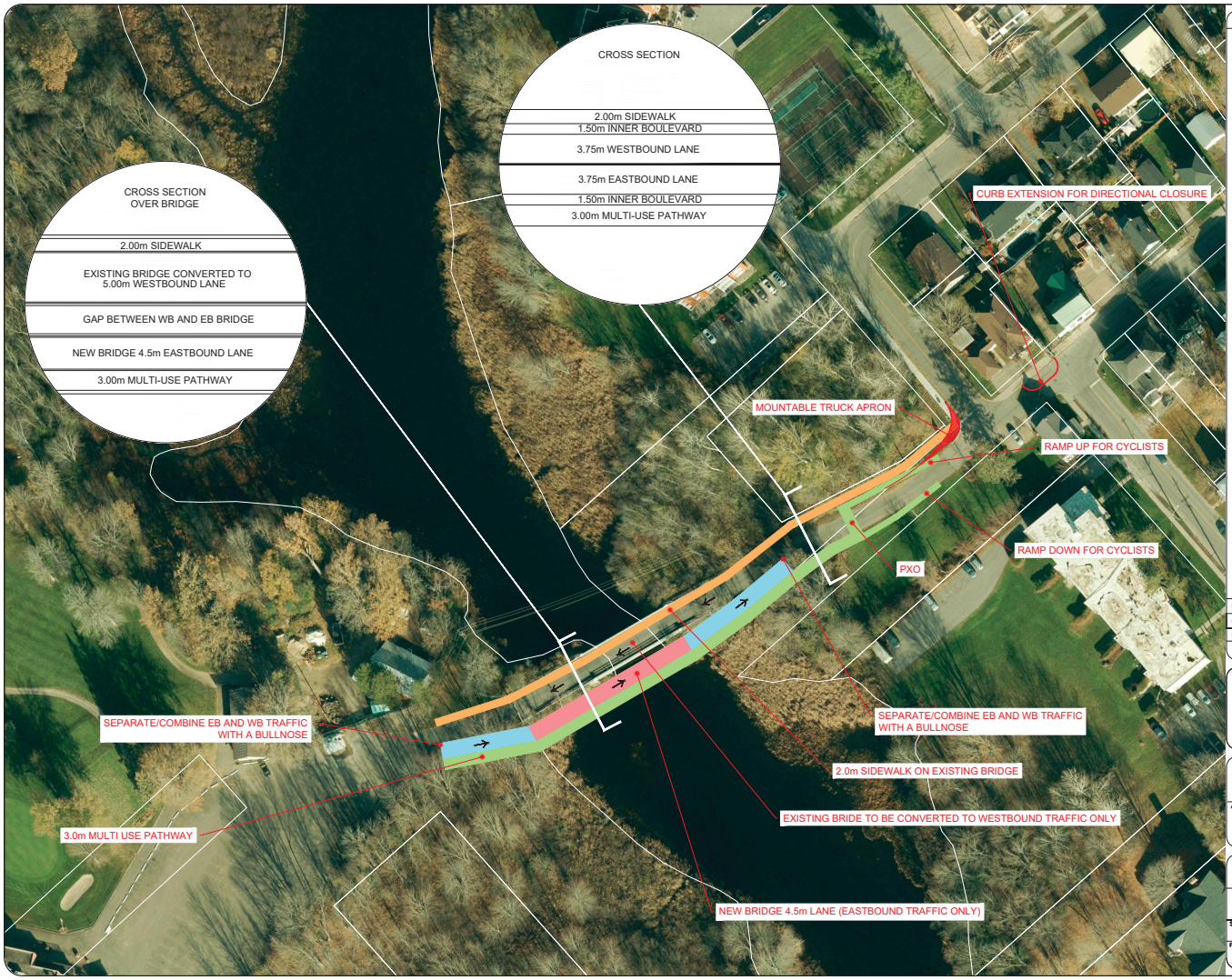
ARCHITECT:

SITE: Caivan Perth

TITLE: Option 6

SCALE AT A3:	DATE:	DRAWN:	CHECKED:
NTS	2022-11-21	BB	CG

PROJECT NO:	DRAWING NO:	REVISION:
2021-117	006	02



Notes:

LEGEND

- MULTI USE PATHWAY
- SIDEWALK
- ROAD WIDENING/NEW ROAD
- BRIDGE WIDENING / NEW BRIDGE

REV:	DESCRIPTION:	BY:	DATE:
02	Issued for Review	BB	2022-11-21
01	Issued for Review	BB	2022-11-03

STATUS:

CGH Transportation
6 Plaza Court
Ottawa, ON
K2H 7W1
(343) 999-9117

CLIENT: Caivan Communitites
2934 Baseline Road, Suite 302
Ottawa, ON
K2H 182

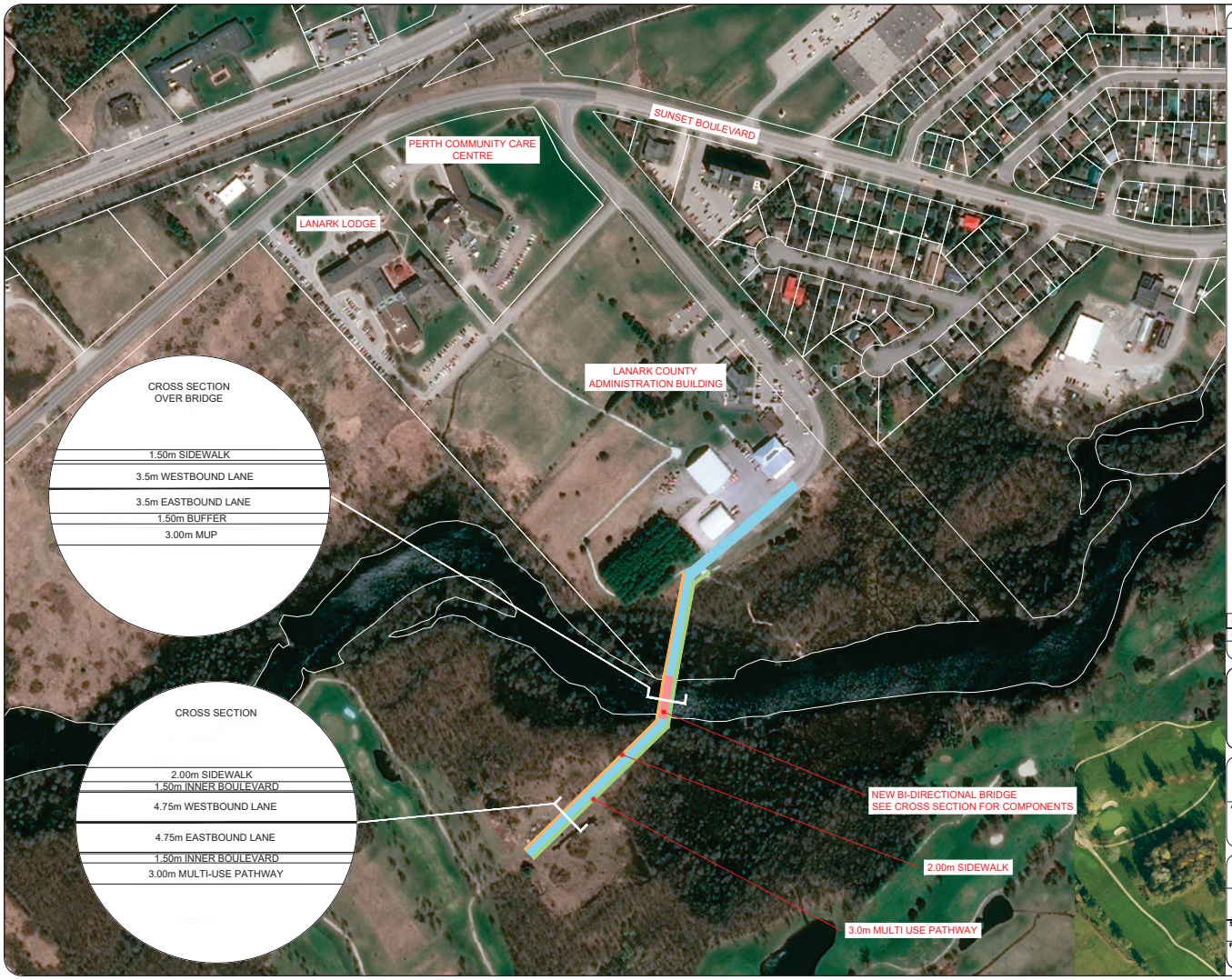
ARCHITECT:

SITE: Caivan Perth

TITLE: Option 7

SCALE AT A3:	DATE:	DRAWN:	CHECKED:
NTS	2022-11-21	BB	CG

PROJECT NO:	DRAWING NO:	REVISION:
2021-117	007	02



Notes:

LEGEND

- MULTI USE PATHWAY
- SIDEWALK
- ROAD WIDENING/NEW ROAD
- BRIDGE WIDENING / NEW BRIDGE

REV:	DESCRIPTION:	BY:	DATE:
02	Issued for Review	BB	2022-11-21

STATUS:

CGH Transportation
6 Plaza Court
Ottawa, ON
K2H 7W1
(343) 999-9117

CLIENT: Caivan Communitites
2934 Baseline Road, Suite 302
Ottawa, ON
K2H 1B2

ARCHITECT:

SITE: Caivan Perth

TITLE: Option 8

SCALE AT A3:	DATE:	DRAWN:	CHECKED:
NTS	2022-11-21	BB	CG

PROJECT NO:	DRAWING NO:	REVISION:
2021-117	008	02

3 Evaluation

The evaluation will score the alternatives as either having relatively positive outcomes, relatively negative outcomes, or as having relatively neutral outcomes.

3.1 Criteria Definitions

The following definitions provide the methodology of ranking various bridge alternatives using multiple transportation and structural criteria presented below.

3.1.1 Pedestrian Needs

- Facilities with separated pedestrian infrastructure within the cross-section will result in a high Pedestrian Level of Service (PLOS) as people who are walking will experience a higher degree of comfort and safety
- In cases where the pedestrian facility is not physically separated from other traffic lanes but delineated (with painted lane markings/crosswalks) pedestrians will experience a moderate level of safety
- Where there are no pedestrian facilities whatsoever in the cross-section, pedestrians will experience a lower/moderate/higher degree of comfort and safety

3.1.2 Cyclist Needs

- Facilities with separated cyclist infrastructure within the cross-section will result in a high Bicycle Level of Service (BLOS) as people who are walking will experience a higher degree of comfort and safety
- In cases where the cyclist facility is not physically separated from other traffic lanes but delineated (with painted lane markings/crosswalks) cyclist will experience a moderate level of safety
- Where there are no cyclist facilities whatsoever in the cross-section, cyclist will experience a lower/moderate/higher degree of comfort and safety

3.1.3 Auto Needs

- Alternatives that provide a high degree of capacity across the river, using industry standard lane widths will be ranked higher
- Alternatives where the cross-sections will not provide adequate capacity will be ranked low

3.1.4 Emergency Vehicles

- Alternatives with secondary emergency vehicle access using roadway infrastructure will be ranked high
- Alternatives where emergency vehicles can cross the river using active mode infrastructure will be ranked moderate
- Alternatives that do not provide a secondary emergency access will be ranked low

3.1.5 Peter Street Traffic

Peter Street connects the new subdivision to the village of Perth's historic downtown area. Recognising this local street will experience additional golf course subdivision traffic. Traffic calming features will be implemented to mitigate the impact. All bridge options can accommodate the preferred Peter/Rodger traffic calming improvement.

3.1.6 Phasing

- Alternatives that enable full buildout of the subdivision are ranked high.
- Alternatives that accommodate phase one of the subdivision are ranked moderate.
- Alternatives that are unable to accommodate traffic are ranked low.

3.1.7 Structural Costs

The structural costs include various bridge and abutment elements required to span the Tay River. Additional costs associated with the complete access solution beyond the Peter Street area will require further study would be required to properly quantify them.

3.1.8 Transportation Costs

The transportation costs include elements within the cross-section that connect the various bridge scenarios to the Peter Street at Lustre Lane intersection and between the community and the Lanark County Administration Building drive aisle.

3.1.9 Land Requirements

- Alternatives that require no additional private land are ranked high.
- Alternatives that require coordination between multiple jurisdictions to secure access are ranked moderate.
- Alternatives that require private land at unknown cost and availability are ranked low.

3.2 Evaluation Scoring

The results of the evaluation are summarized in Table 1 on the following page.

Table 1: Evaluation Matrix

Criterion	Option 1 Do Nothing	Option 2 Construct a Separate MUP Bridge (3m)	Option 3 Construct a Separate MUP Bridge (4.5m)	Option 4 Widen Deck for Collector Traffic, Sidewalk (One Side)	Option 5 Widen Deck for Collector Traffic, Sidewalk, MUP	Option 6 Construct New Bridge North of Existing, Sidewalk, Westbound Travel Lane	Option 7 Construct New Bridge South of Existing, MUP, Eastbound Travel Lane	Option 8 Construct New Bridge at the North End of the Community
Pedestrian Needs	Does not provide a separated pedestrian connection to the downtown	Will provide separated pedestrian connection to the downtown	Will provide separated pedestrian connection to the downtown	Will provide separated pedestrian connection to the downtown	Will provide separated pedestrian connection to the downtown	Will provide separated pedestrian connection to the downtown	Will provide separated pedestrian connection to the downtown	Does not provide a separated pedestrian connection to the downtown
Cyclist Needs	Shared use lanes on a narrow bridge deck will reduce cycling trips	Adding a separated connection will encourage cycling trips	Adding a separated connection will encourage cycling trips	Absence of a separated connection will limit cycling trips	Adding a separated connection will encourage cycling trips	Adding a separated connection will encourage cycling trips	Adding a separated connection will encourage cycling trips	Shared use lanes on a narrow bridge deck will reduce cycling trips
Auto Needs	Auto connectivity is adequate, but capacity is low and will be limited to first phase traffic	Auto connectivity is adequate, but capacity is low and will be limited to first phase traffic	Auto connectivity is adequate, but capacity is low and will be limited to first phase traffic	Supports increased auto capacity and connectivity past Phase 1	Supports increased auto capacity and connectivity past Phase 1	Supports increased auto capacity and connectivity past Phase 1	Supports increased auto capacity and connectivity past Phase 1	Supports increased auto capacity and connectivity past Phase 1
Emergency Vehicles	No secondary access for emergency vehicles typically caps development at 200 units	MUP bridge will not function as emergency access capping development at 200 units	MUP bridge may function as a secondary emergency access	No secondary access for emergency vehicles typically caps development at 200 units	No secondary access for emergency vehicles typically caps development at 200 units	New bridge will provide a full secondary emergency access	New bridge will provide a full secondary emergency access	New bridge will provide a full secondary emergency access
Peter Street Traffic	Permits directional diverter on Peter Street	Permits directional diverter on Peter Street	Permits directional diverter on Peter Street	Permits directional diverter on Peter Street	Permits directional diverter on Peter Street	Permits directional diverter on Peter Street but allows for exploration of alternative treatments	Permits directional diverter on Peter Street	Permits directional diverter on Peter Street
Schedule and Phasing	Development limited to 200 units	Development limited to 200 units	Development limited to Phase 1	Development limited to 200 units	Development limited to 200 units	May permit all phases of development	May permit all phases of development	May permit all phases of development
Structural Costs	No costs at present; future rehabilitation cost schedule applies, future costs for additional crossing(s)	An estimated construction cost of **$500,000** for the MUP bridge, and **$4,900,000-$9,800,000** for the future crossing for full development traffic	An estimated construction cost of **$950,000** and **$4,900,000-$9,800,000** for the future crossing for full development traffic	An estimated construction cost of **$750,000** and **$4,900,000-$9,800,000** for the future crossing for full development traffic	An estimated construction cost of **$1,200,000** and **$4,900,000-$9,800,000** for the future crossing for full development traffic	An estimated construction cost of **$2,100,000** which includes modifications to the existing bridge to convert to one-way with MUP	An estimated construction cost of **$2,700,000** which include modifications to the existing bridge to convert to one-way with sidewalk	An estimated construction cost of **$4,900,000-$9,800,000**
Transportation Costs	An estimated construction cost of **$995,000**	An estimated construction cost of **$1,100,000** at the east river crossing, **$2,380,000** for the north river crossing	An estimated construction cost of **$1,140,000** at the east river crossing, **$2,380,000** for the north river crossing	An estimated construction cost of **$1,125,000** at the east river crossing, **$2,380,000** for the north river crossing	An estimated construction cost of **$1,190,000** at the east river crossing, **$2,380,000** for the north river crossing	An estimated construction cost of **$1,300,000**	An estimated construction cost of **$1,245,000**	An estimated construction cost of **$2,380,000**
Land Requirements	No additional land required	Multi-jurisdictional coordination required	Multi-jurisdictional coordination required	Multi-jurisdictional coordination required	Multi-jurisdictional coordination required	Private land required	No additional land required	Multi-jurisdictional coordination required

Notes: ○ Relatively Positive ◇ Relatively Neutral □ Relatively Negative

4 Recommendations

It is recommended that Options 6 and 7 be explored in parallel. Given the potential for these options to constitute the full community access solution, and having a more constrained and known overall cost, it is recommended that these options be provisionally selected as the preferred options.

Additionally, given the magnitude difference in cost, process challenges and constructability, it is recommended that the second crossing to the County Administration Building access be screened out and the accessibility requirements for these lands be accommodated using the Perth Street/North Street corridor and the Option 6 or 7 structure alternative.

5 Next Steps

Following the review of the findings of this memo, further work to properly quantify options will be required. As part of this work, an EA will need to be undertaken to determine costs and details associated with community access.

Appendix B

Existing Turning Movement Counts

CGH TRANSPORTATION

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Peak Hour Diagram

Specified Period		One Hour Peak	
From:	07:00:00	From:	09:00:00
To:	10:00:00	To:	10:00:00

Intersection: Wilson St W & North St
Site Code: 2301600001
Count Date: Jan 24, 2023

Weather conditions: Clear

**** Unsignalized Intersection ****

Major Road: Wilson St W runs N/S

North Approach

	Out	In	Total
Cars	384	342	726
Trucks	35	35	70
Bicycles	0	0	0
	419	377	796

Wilson St W

Bicycles	0	0	0	0
Trucks	4	13	18	0
Cars	14	308	62	0
Totals	18	321	80	0

East Approach

	Out	In	Total
Cars	66	88	154
Trucks	18	21	39
Bicycles	0	0	0
	84	109	193

North St

Bicycles	Trucks	Cars	Totals	
0	0	0	0	
0	0	8	8	
0	1	2	3	
0	1	4	5	

Peds: 16

Peds: 0

Peds: 9

Peds: 4

North St

	Totals	Cars	Trucks	Bicycles
	0	0	0	0
	70	54	16	0
	7	5	2	0
	7	7	0	0

West Approach

	Out	In	Total
Cars	14	28	42
Trucks	2	6	8
Bicycles	0	0	0
	16	34	50

Wilson St W

Totals	9	299	26	0
Cars	9	280	24	0
Trucks	0	19	2	0
Bicycles	0	0	0	0

South Approach

	Out	In	Total
Cars	313	319	632
Trucks	21	14	35
Bicycles	0	0	0
	334	333	667

Cars - Trucks - Bicycles

Comments

Ontario Traffic Inc.
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Peak Hour Diagram

Specified Period		One Hour Peak	
From:	15:00:00	From:	15:45:00
To:	18:00:00	To:	16:45:00

Intersection: Wilson St W & North St
Site Code: 2301600001
Count Date: Jan 24, 2023

Weather conditions: Clear

**** Unsignalized Intersection ****

Major Road: Wilson St W runs N/S

North Approach

	Out	In	Total
Cars	500	429	929
Trucks	22	27	49
Bicycles	0	0	0
	522	456	978

Wilson St W

Bicycles	0	0	0	0
Trucks	2	6	14	0
Cars	14	416	70	0
Totals	16	422	84	0

East Approach

	Out	In	Total
Cars	82	88	170
Trucks	10	15	25
Bicycles	0	0	0
	92	103	195

North St

Bicycles	Trucks	Cars	Totals	
0	0	0	0	
0	0	6	6	
0	0	2	2	
0	0	6	6	

Peds: 15

Peds: 0

Peds: 12

Peds: 3

North St

	Totals	Cars	Trucks	Bicycles
	0	0	0	0
	80	70	10	0
	2	2	0	0
	10	10	0	0

West Approach

	Out	In	Total
Cars	14	25	39
Trucks	0	2	2
Bicycles	0	0	0
	14	27	41

Wilson St W

Totals	9	370	17	0
Cars	9	353	16	0
Trucks	0	17	1	0
Bicycles	0	0	0	0

South Approach

	Out	In	Total
Cars	378	432	810
Trucks	18	6	24
Bicycles	0	0	0
	396	438	834

Cars - Trucks - Bicycles

Comments

Ontario Traffic Inc.
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Peak Hour Diagram

Specified Period		One Hour Peak	
From:	07:00:00	From:	09:00:00
To:	10:00:00	To:	10:00:00

Intersection: Wilson St & Peter St-Foster St
Site Code: 2301600002
Count Date: Jan 24, 2023

Weather conditions: Clear

**** Signalized Intersection ****

Major Road: Wilson St W runs N/S

North Approach

	Out	In	Total
Cars	318	312	630
Trucks	15	21	36
Bicycles	0	0	0
	333	333	666

Wilson St W

Bicycles	0	0	0	0
Trucks	6	1	8	0
Cars	83	51	184	0
Totals	89	52	192	0

Peds: 16

East Approach

	Out	In	Total
Cars	262	224	486
Trucks	4	8	12
Bicycles	0	0	0
	266	232	498

Peter St

Bicycles	Trucks	Cars	Totals
0	0	0	0
0	15	77	92
0	0	30	30
0	1	8	9

Peds: 13

Peds: 14

Foster St

Totals	Cars	Trucks	Bicycles
0	0	0	0
205	201	4	0
45	45	0	0
16	16	0	0

Peds: 5

West Approach

	Out	In	Total
Cars	115	132	247
Trucks	16	6	22
Bicycles	0	0	0
	131	138	269

Wilson St E

Totals	4	36	10	0
Cars	4	34	10	0
Trucks	0	2	0	0
Bicycles	0	0	0	0

South Approach

	Out	In	Total
Cars	48	75	123
Trucks	2	2	4
Bicycles	0	0	0
	50	77	127

Cars - Trucks - Bicycles

Comments

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Peak Hour Diagram

Specified Period		One Hour Peak	
From:	15:00:00	From:	15:45:00
To:	18:00:00	To:	16:45:00

Intersection: Wilson St & Peter St-Foster St
Site Code: 2301600002
Count Date: Jan 24, 2023

Weather conditions: Clear

**** Signalized Intersection ****

Major Road: Wilson St W runs N/S

North Approach

	Out	In	Total
Cars	438	382	820
Trucks	5	16	21
Bicycles	0	0	0
	443	398	841

Wilson St W

Bicycles	0	0	0	0
Trucks	3	1	1	0
Cars	115	57	266	0
Totals	118	58	267	0

Peds: 13

East Approach

	Out	In	Total
Cars	263	303	566
Trucks	4	2	6
Bicycles	0	0	0
	267	305	572

Peter St

Bicycles	Trucks	Cars	Totals
0	0	0	0
0	11	102	113
0	0	24	24
0	1	5	6

Peds: 9

Peds: 14

Foster St

Totals	Cars	Trucks	Bicycles
0	0	0	0
232	228	4	0
24	24	0	0
11	11	0	0

Peds: 11

West Approach

	Out	In	Total
Cars	131	143	274
Trucks	12	3	15
Bicycles	0	0	0
	143	146	289

Wilson St E

Totals	4	53	14	0
Cars	4	52	13	0
Trucks	0	1	1	0
Bicycles	0	0	0	0

South Approach

	Out	In	Total
Cars	69	73	142
Trucks	2	2	4
Bicycles	0	0	0
	71	75	146

Cars - Trucks - Bicycles

Comments

Ontario Traffic Inc.
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Peak Hour Diagram

Specified Period		One Hour Peak	
From:	07:00:00	From:	09:00:00
To:	10:00:00	To:	10:00:00

Intersection: Gore St W & North St
Site Code: 2301600003
Count Date: Jan 24, 2023

Weather conditions: Clear

**** Unsignalized Intersection ****

Major Road: Gore St W runs N/S

North Approach

	Out	In	Total
Cars	85	123	208
Trucks	4	3	7
Bicycles	0	0	0
	89	126	215

Gore St W

Bicycles	0	0	0	0
Trucks	0	4	0	0
Cars	13	67	5	0
Totals	13	71	5	0

Peds: 5

East Approach

	Out	In	Total
Cars	61	75	136
Trucks	7	12	19
Bicycles	0	0	0
	68	87	155

North St

Bicycles	Trucks	Cars	Totals
0	0	0	0
0	0	7	7
0	9	36	45
0	12	49	61

Peds: 9

Peds: 17

North St

Totals	Cars	Trucks	Bicycles
0	0	0	0
6	6	0	0
37	31	6	0
25	24	1	0

Peds: 6

West Approach

	Out	In	Total
Cars	92	75	167
Trucks	21	18	39
Bicycles	0	0	0
	113	93	206

Gore St W

Totals	43	113	37	0
Cars	31	110	34	0
Trucks	12	3	3	0
Bicycles	0	0	0	0

South Approach

	Out	In	Total
Cars	175	140	315
Trucks	18	17	35
Bicycles	0	0	0
	193	157	350

Cars - Trucks - Bicycles

Comments

Ontario Traffic Inc.
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Peak Hour Diagram

Specified Period		One Hour Peak	
From:	15:00:00	From:	15:30:00
To:	18:00:00	To:	16:30:00

Intersection: Gore St W & North St
Site Code: 2301600003
Count Date: Jan 24, 2023

Weather conditions: Clear

**** Unsignalized Intersection ****

Major Road: Gore St W runs N/S

North Approach

	Out	In	Total
Cars	101	102	203
Trucks	1	4	5
Bicycles	0	0	0
	102	106	208

Gore St W

Bicycles	0	0	0	0
Trucks	0	0	1	0
Cars	13	73	15	0
Totals	13	73	16	0

Peds: 10

East Approach

	Out	In	Total
Cars	69	110	179
Trucks	7	6	13
Bicycles	0	0	0
	76	116	192

North St

Bicycles	Trucks	Cars	Totals
0	0	0	0
0	0	8	8
0	5	59	64
0	6	32	38

Peds: 10

Peds: 14

North St

Totals	Cars	Trucks	Bicycles
0	0	0	0
10	10	0	0
42	37	5	0
24	22	2	0

Peds: 13

West Approach

	Out	In	Total
Cars	99	88	187
Trucks	11	14	25
Bicycles	0	0	0
	110	102	212

Gore St W

Totals	47	88	36	0
Cars	38	84	36	0
Trucks	9	4	0	0
Bicycles	0	0	0	0

South Approach

	Out	In	Total
Cars	158	127	285
Trucks	13	8	21
Bicycles	0	0	0
	171	135	306

Cars - Trucks - Bicycles

Comments

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Peak Hour Diagram

Specified Period		One Hour Peak	
From:	07:00:00	From:	09:00:00
To:	10:00:00	To:	10:00:00

Intersection: Gore St E & Foster St
Site Code: 2301600004
Count Date: Jan 24, 2023

Weather conditions: Clear

**** Signalized Intersection ****

Major Road: Gore St E runs N/S

North Approach

	Out	In	Total
Cars	142	182	324
Trucks	18	20	38
Bicycles	0	0	0
	160	**202**	**362**

Gore St E

Bicycles	0	0	0	0
Trucks	0	18	0	0
Cars	34	107	1	0
Totals	**34**	**125**	**1**	**0**

East Approach

	Out	In	Total
Cars	249	44	293
Trucks	7	1	8
Bicycles	0	0	0
	256	**45**	**301**

Peds: 28

Foster St

Bicycles	Trucks	Cars	Totals
0	0	0	**0**
0	1	14	**15**
0	0	29	**29**
0	5	186	**191**

Peds: 15

N
W E
S

Peds: 14

Foster St

Totals	Cars	Trucks	Bicycles
0	0	0	0
15	14	1	0
38	36	2	0
203	199	4	0

Peds: 14

West Approach

	Out	In	Total
Cars	229	266	495
Trucks	6	5	11
Bicycles	0	0	0
	235	**271**	**506**

Totals	199	172	15	0
Cars	196	154	14	0
Trucks	3	18	1	0
Bicycles	0	0	0	0

Gore St E

South Approach

	Out	In	Total
Cars	364	492	856
Trucks	22	27	49
Bicycles	0	0	0
	386	**519**	**905**

Cars - Trucks - Bicycles

Comments

Ontario Traffic Inc.
Traffic Monitoring • Services & Products

Peak Hour Diagram

Specified Period		One Hour Peak	
From:	15:00:00	From:	15:30:00
To:	18:00:00	To:	16:30:00

Intersection: Gore St E & Foster St
Site Code: 2301600004
Count Date: Jan 24, 2023

Weather conditions: Clear

**** Signalized Intersection ****

Major Road: Gore St E runs N/S

North Approach

	Out	In	Total
Cars	133	160	293
Trucks	10	10	20
Bicycles	0	0	0
	143	**170**	**313**

Gore St E

Bicycles	0	0	0	0
Trucks	0	9	1	0
Cars	20	110	3	0
Totals	**20**	**119**	**4**	**0**

East Approach

	Out	In	Total
Cars	64	46	110
Trucks	1	2	3
Bicycles	0	0	0
	65	**48**	**113**

Peds: 26

Foster St

Bicycles	Trucks	Cars	Totals
0	0	0	**0**
0	0	15	**15**
0	0	30	**30**
0	2	262	**264**

Peds: 31

N
W E
S

Peds: 26

Foster St

Totals	Cars	Trucks	Bicycles
0	0	0	0
10	10	0	0
39	38	1	0
16	16	0	0

Peds: 1

West Approach

	Out	In	Total
Cars	307	288	595
Trucks	2	4	6
Bicycles	0	0	0
	309	**292**	**601**

Totals	233	145	14	0
Cars	230	135	13	0
Trucks	3	10	1	0
Bicycles	0	0	0	0

Gore St E

South Approach

	Out	In	Total
Cars	378	388	766
Trucks	14	11	25
Bicycles	0	0	0
	392	**399**	**791**

Cars - Trucks - Bicycles

Comments

Ontario Traffic Inc.
Traffic Monitoring • Services & Products

Peak Hour Diagram

Specified Period		One Hour Peak	
From:	07:00:00	From:	08:45:00
To:	10:00:00	To:	09:45:00

Intersection: Peter St & Rogers Rd
Site Code: 2301600005
Count Date: Jan 24, 2023

Weather conditions: Clear

**** Unsignalized Intersection ****

Major Road: Peter St runs E/W

East Approach

	Out	In	Total
Cars	105	135	240
Trucks	4	18	22
Bicycles	0	0	0
	109	**153**	**262**

Peter St

			Totals
			0
0	0	5	**5**
0	3	7	**10**

Peds: 4

Peds: 0

Peter St

	Totals			
	0	0	0	0
	1	1	0	0
	108	104	4	0

Peds: 0

Peds: 4

West Approach

	Out	In	Total
Cars	12	11	23
Trucks	3	1	4
Bicycles	0	0	0
	15	**12**	**27**

Totals	11	148	0
Cars	10	130	0
Trucks	1	18	0
Bicycles	0	0	0

Rogers Rd

South Approach

	Out	In	Total
Cars	140	111	251
Trucks	19	7	26
Bicycles	0	0	0
	159	**118**	**277**

Cars - Trucks - Bicycles

Comments

Ontario Traffic Inc.
Traffic Monitoring • Services & Products

Peak Hour Diagram

Specified Period		One Hour Peak	
From:	15:00:00	From:	15:30:00
To:	18:00:00	To:	16:30:00

Intersection: Peter St & Rogers Rd
Site Code: 2301600005
Count Date: Jan 24, 2023

Weather conditions: Clear

**** Unsignalized Intersection ****

Major Road: Peter St runs E/W

East Approach

	Out	In	Total
Cars	143	148	291
Trucks	2	14	16
Bicycles	0	0	0
	145	**162**	**307**

Peter St

			Totals
			0
0	0	2	**2**
0	0	10	**10**

Peds: 4

Peds: 0

Peter St

	Totals			
	0	0	0	0
	2	2	0	0
	143	141	2	0

Peds: 0

Peds: 1

West Approach

	Out	In	Total
Cars	12	13	25
Trucks	0	0	0
Bicycles	0	0	0
	12	**13**	**25**

Totals	11	160	0
Cars	11	146	0
Trucks	0	14	0
Bicycles	0	0	0

Rogers Rd

South Approach

	Out	In	Total
Cars	157	151	308
Trucks	14	2	16
Bicycles	0	0	0
	171	**153**	**324**

Cars - Trucks - Bicycles

Comments

Appendix C

Synchro and SimTraffic Intersection Worksheets – Existing Conditions

CGH TRANSPORTATION

Summary of All Intervals

Run Number	1	2	3	Avg
Start Time	6:30	6:30	6:30	6:30
End Time	8:00	8:00	8:00	8:00
Total Time (min)	90	90	90	90
Time Recorded (min)	60	60	60	60
# of Intervals	2	2	2	2
# of Recorded Intervals	1	1	1	1
Vehs Entered	1486	1487	1469	1481
Vehs Exited	1493	1483	1472	1485
Starting Vehs	36	34	41	33
Ending Vehs	29	38	38	29
Travel Distance (km)	1230	1233	1210	1224
Travel Time (hr)	36.9	37.0	36.8	36.9
Total Delay (hr)	9.4	9.5	9.6	9.5
Total Stops	2249	2288	2267	2265
Fuel Used (l)	113.4	112.7	111.5	112.6

Interval #0 Information Seeding

Start Time	6:30
End Time	7:00
Total Time (min)	30
Volumes adjusted by Growth Factors.	
No data recorded this interval.	

Interval #1 Information Recording

Start Time	7:00
End Time	8:00
Total Time (min)	60
Volumes adjusted by Growth Factors.	

Run Number	1	2	3	Avg
Vehs Entered	1486	1487	1469	1481
Vehs Exited	1493	1483	1472	1485
Starting Vehs	36	34	41	33
Ending Vehs	29	38	38	29
Travel Distance (km)	1230	1233	1210	1224
Travel Time (hr)	36.9	37.0	36.8	36.9
Total Delay (hr)	9.4	9.5	9.6	9.5
Total Stops	2249	2288	2267	2265
Fuel Used (l)	113.4	112.7	111.5	112.6

Intersection: 3: Wilson St W & North St

Movement	EB	EB	WB	WB	NB	SB	SB
Directions Served	LT	R	LT	R	LTR	LT	TR
Maximum Queue (m)	9.0	8.6	2.9	16.8	44.5	33.7	22.1
Average Queue (m)	0.7	0.4	0.1	1.2	19.8	16.8	11.1
95th Queue (m)	4.6	3.7	1.6	7.2	34.4	27.5	19.4
Link Distance (m)	430.4			116.4	52.1	658.3	
Upstream Blk Time (%)					0		
Queuing Penalty (veh)					0		
Storage Bay Dist (m)		5.0	15.0				65.0
Storage Blk Time (%)	0	0		0			
Queuing Penalty (veh)	0	0		0			

Intersection: 4: Wilson St E/Wilson St W & Peter St/Foster St

Movement	EB	WB	WB	NB	SB	SB
Directions Served	LTR	LT	R	LTR	L	TR
Maximum Queue (m)	43.8	26.2	28.3	19.5	43.4	29.9
Average Queue (m)	19.4	9.1	14.6	7.3	16.2	9.0
95th Queue (m)	34.8	20.3	25.5	17.6	30.1	20.3
Link Distance (m)	316.3	114.5		134.6	52.1	52.1
Upstream Blk Time (%)					0	
Queuing Penalty (veh)					0	
Storage Bay Dist (m)			15.0			
Storage Blk Time (%)		3	3			
Queuing Penalty (veh)		7	2			

Intersection: 5: Gore St W & North St

Movement	EB	EB	WB	NB	SB	SB
Directions Served	LT	R	LTR	LTR	LT	R
Maximum Queue (m)	19.3	20.7	29.8	19.9	8.6	2.1
Average Queue (m)	8.6	8.4	10.3	1.9	0.4	0.1
95th Queue (m)	16.7	16.8	20.9	9.6	3.5	1.1
Link Distance (m)		116.4	140.5	52.4	108.1	
Upstream Blk Time (%)						
Queuing Penalty (veh)						
Storage Bay Dist (m)	9.5					5.0
Storage Blk Time (%)	4	3			0	0
Queuing Penalty (veh)	2	1			0	0

Queuing and Blocking Report
Existing
02-10-2023

Intersection: 6: Gore St E/Gore St W & Foster St

Movement	EB	EB	WB	WB	NB	NB	SB	SB
Directions Served	LT	R	LT	R	L	TR	LT	R
Maximum Queue (m)	15.8	30.2	60.2	22.3	52.1	34.4	37.9	24.9
Average Queue (m)	4.5	12.2	31.5	5.2	18.9	15.9	16.9	6.0
95th Queue (m)	12.1	22.6	51.7	17.3	37.4	32.3	33.2	16.8
Link Distance (m)	114.5		134.8		284.1		52.4	
Upstream Blk Time (%)								
Queuing Penalty (veh)								
Storage Bay Dist (m)		25.0		8.0		20.0		10.0
Storage Blk Time (%)	0	1	51	2	4	4	16	1
Queuing Penalty (veh)	0	0	8	5	7	8	5	1

Intersection: 10: Rogers Rd & Peter St

Movement	WB	NB
Directions Served	LT	LR
Maximum Queue (m)	12.9	22.4
Average Queue (m)	1.2	13.2
95th Queue (m)	7.3	20.3
Link Distance (m)	316.3	114.8
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (m)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Network Summary

Network wide Queuing Penalty: 48

SimTraffic Simulation Summary
Existing
02-10-2023

Summary of All Intervals

Run Number	1	2	3	Avg
Start Time	3:15	3:15	3:15	3:15
End Time	4:45	4:45	4:45	4:45
Total Time (min)	90	90	90	90
Time Recorded (min)	60	60	60	60
# of Intervals	2	2	2	2
# of Recorded Intervals	1	1	1	1
Vehs Entered	1685	1768	1731	1728
Vehs Exited	1686	1776	1702	1722
Starting Vehs	46	43	28	33
Ending Vehs	45	35	57	42
Travel Distance (km)	1386	1466	1417	1423
Travel Time (hr)	43.2	46.9	45.1	45.1
Total Delay (hr)	12.3	14.0	13.4	13.2
Total Stops	2568	2708	2592	2626
Fuel Used (l)	127.5	135.5	129.8	130.9

Interval #0 Information Seeding

Start Time	3:15
End Time	3:45
Total Time (min)	30

Volumes adjusted by Growth Factors.
No data recorded this interval.

Interval #1 Information Recording

Start Time	3:45
End Time	4:45
Total Time (min)	60

Volumes adjusted by Growth Factors.

Run Number	1	2	3	Avg
Vehs Entered	1685	1768	1731	1728
Vehs Exited	1686	1776	1702	1722
Starting Vehs	46	43	28	33
Ending Vehs	45	35	57	42
Travel Distance (km)	1386	1466	1417	1423
Travel Time (hr)	43.2	46.9	45.1	45.1
Total Delay (hr)	12.3	14.0	13.4	13.2
Total Stops	2568	2708	2592	2626
Fuel Used (l)	127.5	135.5	129.8	130.9

Intersection: 3: Wilson St W & North St

Movement	EB	WB	WB	NB	SB	SB
Directions Served	LT	LT	R	LTR	LT	TR
Maximum Queue (m)	5.8	5.8	7.0	49.9	33.9	22.0
Average Queue (m)	0.3	0.5	1.0	23.1	17.8	10.6
95th Queue (m)	2.9	3.8	4.8	38.9	28.1	18.0
Link Distance (m)	430.4		116.4	52.1	658.3	
Upstream Blk Time (%)				0		
Queuing Penalty (veh)				0		
Storage Bay Dist (m)		15.0				65.0
Storage Blk Time (%)	0					
Queuing Penalty (veh)	0					

Intersection: 4: Wilson St E/Wilson St W & Peter St/Foster St

Movement	EB	WB	WB	NB	SB	SB
Directions Served	LTR	LT	R	LTR	L	TR
Maximum Queue (m)	43.6	25.4	28.0	23.8	49.4	27.7
Average Queue (m)	19.1	5.3	15.3	10.5	23.3	10.2
95th Queue (m)	33.8	17.6	26.1	20.4	40.6	20.4
Link Distance (m)	316.3	114.5		134.6	52.1	52.1
Upstream Blk Time (%)					0	
Queuing Penalty (veh)					0	
Storage Bay Dist (m)			15.0			
Storage Blk Time (%)		1	4			
Queuing Penalty (veh)		2	1			

Intersection: 5: Gore St W & North St

Movement	EB	EB	WB	NB	SB
Directions Served	LT	R	LTR	LTR	LT
Maximum Queue (m)	20.4	15.9	21.6	13.5	8.6
Average Queue (m)	8.5	5.6	10.5	1.4	0.6
95th Queue (m)	15.4	13.3	18.7	7.3	4.0
Link Distance (m)		116.4	140.5	52.4	108.1
Upstream Blk Time (%)					
Queuing Penalty (veh)					
Storage Bay Dist (m)	9.5				
Storage Blk Time (%)	4	1			0
Queuing Penalty (veh)	1	1			0

Intersection: 6: Gore St E/Gore St W & Foster St

Movement	EB	EB	WB	WB	NB	NB	SB	SB
Directions Served	LT	R	LT	R	L	TR	LT	R
Maximum Queue (m)	16.2	35.5	122.8	23.0	68.0	33.8	47.8	24.1
Average Queue (m)	7.2	12.7	56.8	4.9	22.3	12.6	16.3	6.1
95th Queue (m)	15.7	25.9	106.4	18.0	44.9	28.5	32.9	17.8
Link Distance (m)	114.5		134.8		284.1		52.4	
Upstream Blk Time (%)			1				0	
Queuing Penalty (veh)			0				0	
Storage Bay Dist (m)		25.0		8.0		20.0		10.0
Storage Blk Time (%)	0	1	63	1	9	2	16	1
Queuing Penalty (veh)	0	0	11	4	13	5	6	1

Intersection: 10: Peter St

Movement	WB	NB
Directions Served	LT	LR
Maximum Queue (m)	9.2	19.8
Average Queue (m)	0.5	10.7
95th Queue (m)	4.0	16.1
Link Distance (m)	316.3	114.8
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (m)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Network Summary

Network wide Queuing Penalty: 47

Intersection	
Int Delay, s/veh	12.3

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	8	3	5	7	7	70	9	299	26	80	321	18
Future Vol, veh/h	8	3	5	7	7	70	9	299	26	80	321	18
Conflicting Peds, #/hr	0	0	4	4	0	0	15	0	12	12	0	15
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	5	15	-	0	-	-	-	-	-	65
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	33	20	2	29	23	2	6	8	23	4	22
Mvmt Flow	9	3	6	8	8	78	10	332	29	89	357	20

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	86	0	0	13	0	0	292	127	19	241	55	23
Stage 1	-	-	-	-	-	-	25	25	-	24	24	-
Stage 2	-	-	-	-	-	-	267	102	-	217	31	-
Critical Hdwy	4.12	-	-	4.12	-	-	7.12	6.56	6.28	7.33	6.54	6.42
Critical Hdwy Stg 1	-	-	-	-	-	-	6.12	5.56	-	6.33	5.54	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.12	5.56	-	6.33	5.54	-
Follow-up Hdwy	2.218	-	-	2.218	-	-	3.518	4.054	3.372	3.707	4.036	3.498
Pot Cap-1 Maneuver	1510	-	-	1606	-	-	660	756	1042	671	832	999
Stage 1	-	-	-	-	-	-	993	866	-	943	871	-
Stage 2	-	-	-	-	-	-	738	803	-	740	865	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1510	-	-	1601	-	-	417	745	1029	417	820	987
Mov Cap-2 Maneuver	-	-	-	-	-	-	417	745	-	417	820	-
Stage 1	-	-	-	-	-	-	984	858	-	937	867	-
Stage 2	-	-	-	-	-	-	419	799	-	434	857	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	3.7	0.6	14.5	13.2
HCM LOS			B	B

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1	SBLn2
Capacity (veh/h)	745	1510	-	-	1601	-	-	621	834
HCM Lane V/C Ratio	0.498	0.006	-	-	0.005	-	-	0.43	0.238
HCM Control Delay (s)	14.5	7.4	0	-	7.3	0	-	15.1	10.7
HCM Lane LOS	B	A	A	-	A	A	-	C	B
HCM 95th %tile Q(veh)	2.8	0	-	-	0	-	-	2.2	0.9

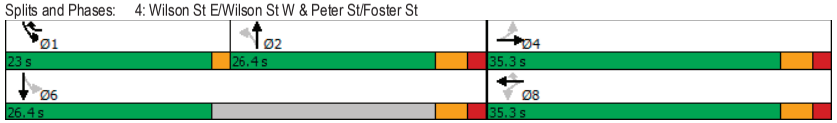
Lane Group	EBL	EBT	WBL	WBT	WBR	NBL	NBT	SBL	SBT
Lane Configurations									
Traffic Volume (vph)	92	30	16	45	205	4	36	192	52
Future Volume (vph)	92	30	16	45	205	4	36	192	52
Lane Group Flow (vph)	0	145	0	68	228	0	55	213	157
Turn Type	Perm	NA	Perm	NA	pm+ov	Perm	NA	pm+pt	NA
Protected Phases		4		8	1		2	1	6
Permitted Phases	4		8		8	2		6	
Detector Phase	4	4	8	8	1	2	2	1	6
Switch Phase									
Minimum Initial (s)	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0
Minimum Split (s)	24.0	24.0	24.0	24.0	12.0	23.1	23.1	12.0	23.1
Total Split (s)	35.3	35.3	35.3	35.3	23.0	26.4	26.4	23.0	26.4
Total Split (%)	41.7%	41.7%	41.7%	41.7%	27.2%	31.2%	31.2%	27.2%	31.2%
Maximum Green (s)	30.0	30.0	30.0	30.0	21.0	21.0	21.0	21.0	21.0
Yellow Time (s)	3.3	3.3	3.3	3.3	2.0	3.3	3.3	2.0	3.3
All-Red Time (s)	2.0	2.0	2.0	2.0	0.0	2.1	2.1	0.0	2.1
Lost Time Adjust (s)		0.0		0.0	0.0		0.0	0.0	0.0
Total Lost Time (s)		5.3		5.3	2.0		5.4	2.0	5.4
Lead/Lag					Lead	Lag	Lag	Lead	
Lead-Lag Optimize?					Yes	Yes	Yes	Yes	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Recall Mode	None	None	None	None	None	Min	Min	None	Min
Walk Time (s)	12.0	12.0	12.0	12.0		12.0	12.0		12.0
Flash Dont Walk (s)	6.7	6.7	6.7	6.7		5.7	5.7		5.7
Pedestrian Calls (#/hr)	5	5	16	16		14	14		13
Act Effct Green (s)		12.5		12.5	22.8		11.8	28.6	26.7
Actuated g/C Ratio		0.28		0.28	0.52		0.27	0.65	0.61
v/c Ratio		0.44		0.16	0.27		0.13	0.23	0.17
Control Delay		19.9		15.2	1.8		13.6	5.8	3.7
Queue Delay		0.0		0.0	0.0		0.0	0.0	0.0
Total Delay		19.9		15.2	1.8		13.6	5.8	3.7
LOS		B		B	A		B	A	A
Approach Delay		19.9		4.9			13.6		4.9
Approach LOS		B		A			B		A
Queue Length 50th (m)		9.0		4.0	0.0		2.6	6.1	1.9
Queue Length 95th (m)		26.5		13.5	6.7		10.6	19.3	10.4
Internal Link Dist (m)		305.8		110.6			117.1		48.0
Turn Bay Length (m)					15.0				
Base Capacity (vph)		813		1090	1181		816	1007	1397
Starvation Cap Reductn		0		0	0		0	0	0
Spillback Cap Reductn		0		0	0		0	0	0
Storage Cap Reductn		0		0	0		0	0	0
Reduced v/c Ratio		0.18		0.06	0.19		0.07	0.21	0.11

Intersection Summary
Cycle Length: 84.7
Actuated Cycle Length: 44
Natural Cycle: 60
Control Type: Actuated-Uncoordinated

Maximum v/c Ratio: 0.44

Intersection Signal Delay: 8.0	Intersection LOS: A
Intersection Capacity Utilization 47.4%	ICU Level of Service A
Analysis Period (min) 15	

Splits and Phases: 4: Wilson St E/Wilson St W & Peter St/Foster St



Intersection	
Int Delay, s/veh	5.5

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	7	45	61	25	37	6	43	113	37	5	71	13
Future Vol, veh/h	7	45	61	25	37	6	43	113	37	5	71	13
Conflicting Peds, #/hr	5	0	6	6	0	5	9	0	17	17	0	9
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	9.5	-	0	-	-	-	-	-	-	-	-	5
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	20	20	4	16	2	28	3	8	2	6	2
Mvmt Flow	8	50	68	28	41	7	48	126	41	6	79	14

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	372	380	94	423	374	169	102	0	0	184	0	0
Stage 1	100	100	-	260	260	-	-	-	-	-	-	-
Stage 2	272	280	-	163	114	-	-	-	-	-	-	-
Critical Hdwy	7.12	6.7	6.4	7.14	6.66	6.22	4.38	-	-	4.12	-	-
Critical Hdwy Stg 1	6.12	5.7	-	6.14	5.66	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.12	5.7	-	6.14	5.66	-	-	-	-	-	-	-
Follow-up Hdwy	3.518	4.18	3.48	3.536	4.144	3.318	2.452	-	-	2.218	-	-
Pot Cap-1 Maneuver	585	525	916	538	535	875	1342	-	-	1391	-	-
Stage 1	906	779	-	740	668	-	-	-	-	-	-	-
Stage 2	734	648	-	834	775	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	520	491	905	436	501	860	1333	-	-	1373	-	-
Mov Cap-2 Maneuver	520	491	-	436	501	-	-	-	-	-	-	-
Stage 1	863	770	-	701	633	-	-	-	-	-	-	-
Stage 2	651	614	-	714	766	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	11.1	13.6	1.7	0.4
HCM LOS	B	B		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	EBLn2	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1333	-	-	495	905	492	1373	-	-
HCM Lane V/C Ratio	0.036	-	-	0.117	0.075	0.154	0.004	-	-
HCM Control Delay (s)	7.8	0	-	13.2	9.3	13.6	7.6	0	-
HCM Lane LOS	A	A	-	B	A	B	A	A	-
HCM 95th %tile Q(veh)	0.1	-	-	0.4	0.2	0.5	0	-	-

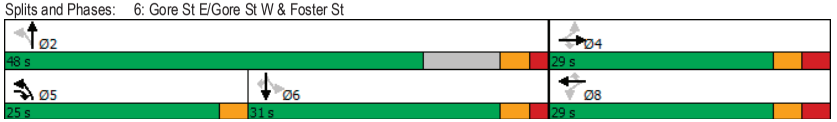
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	SBL	SBT	SBR
Lane Configurations											
Traffic Volume (vph)	15	29	191	203	38	15	199	172	1	125	34
Future Volume (vph)	15	29	191	203	38	15	199	172	1	125	34
Lane Group Flow (vph)	0	49	212	0	268	17	221	208	0	140	38
Turn Type	Perm	NA	pm+ov	Perm	NA	Perm	pm+pt	NA	Perm	NA	Perm
Protected Phases		4	5		8		5	2		6	
Permitted Phases	4		4	8		8	2		6		6
Detector Phase	4	4	5	8	8	8	5	2	6	6	6
Switch Phase											
Minimum Initial (s)	10.0	10.0	4.0	4.0	4.0	4.0	4.0	10.0	10.0	10.0	10.0
Minimum Split (s)	20.0	20.0	9.0	20.0	20.0	20.0	9.0	15.0	19.0	19.0	19.0
Total Split (s)	29.0	29.0	25.0	29.0	29.0	29.0	25.0	48.0	31.0	31.0	31.0
Total Split (%)	34.1%	34.1%	29.4%	34.1%	34.1%	34.1%	29.4%	56.5%	36.5%	36.5%	36.5%
Maximum Green (s)	23.0	23.0	22.0	23.0	23.0	23.0	22.0	43.0	26.0	26.0	26.0
Yellow Time (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
All-Red Time (s)	3.0	3.0	0.0	3.0	3.0	3.0	0.0	2.0	2.0	2.0	2.0
Lost Time Adjust (s)		0.0	0.0		0.0	0.0	0.0	0.0		0.0	0.0
Total Lost Time (s)		6.0	3.0		6.0	6.0	3.0	5.0		5.0	5.0
Lead/Lag			Lead				Lead		Lag	Lag	Lag
Lead-Lag Optimize?											
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Recall Mode	None	None	None	None	None	None	None	Min	Min	Min	Min
Walk Time (s)	11.0	11.0		11.0	11.0	11.0		7.0	11.0	11.0	11.0
Flash Dont Walk (s)	3.0	3.0		3.0	3.0	3.0		3.0	3.0	3.0	3.0
Pedestrian Calls (#/hr)	14	14		28	28	28		14	15	15	15
Act Effct Green (s)		17.8	33.5		17.8	17.8	29.3	27.2		11.6	11.6
Actuated g/C Ratio		0.32	0.59		0.32	0.32	0.52	0.48		0.21	0.21
v/c Ratio		0.11	0.23		0.70	0.04	0.35	0.27		0.44	0.11
Control Delay		15.7	1.3		29.4	0.1	9.9	9.9		27.1	2.5
Queue Delay		0.0	0.0		0.0	0.0	0.0	0.0		0.0	0.0
Total Delay		15.7	1.3		29.4	0.1	9.9	9.9		27.1	2.5
LOS		B	A		C	A	A	A		C	A
Approach Delay		4.0			27.6			9.9		21.9	
Approach LOS		A			C			A		C	
Queue Length 50th (m)		3.3	0.0		22.5	0.0	11.6	11.2		12.7	0.0
Queue Length 95th (m)		11.4	5.3		#61.2	0.0	24.9	24.7		31.5	2.4
Internal Link Dist (m)		110.6			119.1			270.3		48.4	
Turn Bay Length (m)			25.0			8.0					10.0
Base Capacity (vph)		606	1150		511	570	771	1416		741	700
Starvation Cap Reductn		0	0		0	0	0	0		0	0
Spillback Cap Reductn		0	0		0	0	0	0		0	0
Storage Cap Reductn		0	0		0	0	0	0		0	0
Reduced v/c Ratio		0.08	0.18		0.52	0.03	0.29	0.15		0.19	0.05

Intersection Summary

Cycle Length: 85
Actuated Cycle Length: 56.4
Natural Cycle: 50
Control Type: Semi Act-Uncoord

Maximum v/c Ratio: 0.70
Intersection Signal Delay: 14.8 — Intersection LOS: B
Intersection Capacity Utilization 55.3% — ICU Level of Service B
Analysis Period (min) 15
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 6: Gore St E/Gore St W & Foster St



Intersection	
Int Delay, s/veh	8.1

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	5	10	108	1	11	148
Future Vol, veh/h	5	10	108	1	11	148
Conflicting Peds, #/hr	0	4	4	0	4	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	30	4	2	9	12
Mvmt Flow	6	11	120	1	12	164

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	21	0	261	16
Stage 1	-	-	-	-	16	-
Stage 2	-	-	-	-	245	-
Critical Hdwy	-	-	4.14	-	6.49	6.32
Critical Hdwy Stg 1	-	-	-	-	5.49	-
Critical Hdwy Stg 2	-	-	-	-	5.49	-
Follow-up Hdwy	-	-	2.236	-	3.581	3.408
Pot Cap-1 Maneuver	-	-	1582	-	713	1035
Stage 1	-	-	-	-	989	-
Stage 2	-	-	-	-	780	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1577	-	655	1032
Mov Cap-2 Maneuver	-	-	-	-	655	-
Stage 1	-	-	-	-	986	-
Stage 2	-	-	-	-	718	-

Approach	EB	WB	NB
HCM Control Delay, s	0	7.4	9.4
HCM LOS			A

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	992	-	-	1577	-
HCM Lane V/C Ratio	0.178	-	-	0.076	-
HCM Control Delay (s)	9.4	-	-	7.5	0
HCM Lane LOS	A	-	-	A	A
HCM 95th %tile Q(veh)	0.6	-	-	0.2	-

Intersection	
Int Delay, s/veh	14.4

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	6	2	6	10	2	80	9	370	17	84	422	16
Future Vol, veh/h	6	2	6	10	2	80	9	370	17	84	422	16
Conflicting Peds, #/hr	0	0	3	3	0	0	15	0	12	12	0	15
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	5	15	-	0	-	-	-	-	-	65
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	13	2	5	6	17	2	13
Mvmt Flow	7	2	7	11	2	89	10	411	19	93	469	18

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	91	0	0	12	0	0	346	132	17	271	50	17
Stage 1	-	-	-	-	-	-	19	19	-	24	24	-
Stage 2	-	-	-	-	-	-	327	113	-	247	26	-
Critical Hdwy	4.12	-	-	4.12	-	-	7.12	6.55	6.26	7.27	6.52	6.33
Critical Hdwy Stg 1	-	-	-	-	-	-	6.12	5.55	-	6.27	5.52	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.12	5.55	-	6.27	5.52	-
Follow-up Hdwy	2.218	-	-	2.218	-	-	3.518	4.045	3.354	3.653	4.018	3.417
Pot Cap-1 Maneuver	1504	-	-	1607	-	-	608	753	1050	652	841	1031
Stage 1	-	-	-	-	-	-	1000	874	-	957	875	-
Stage 2	-	-	-	-	-	-	686	796	-	725	874	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1504	-	-	1603	-	-	322	742	1038	353	829	1019
Mov Cap-2 Maneuver	-	-	-	-	-	-	322	742	-	353	829	-
Stage 1	-	-	-	-	-	-	993	868	-	952	869	-
Stage 2	-	-	-	-	-	-	305	790	-	369	868	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	3.2	0.8	17.2	15
HCM LOS			C	C

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1	SBLn2
Capacity (veh/h)	729	1504	-	-	1603	-	-	599	840
HCM Lane V/C Ratio	0.604	0.004	-	-	0.007	-	-	0.547	0.3
HCM Control Delay (s)	17.2	7.4	0	-	7.3	0	-	18	11.1
HCM Lane LOS	C	A	A	-	A	A	-	C	B
HCM 95th %tile Q(veh)	4.1	0	-	-	0	-	-	3.3	1.3

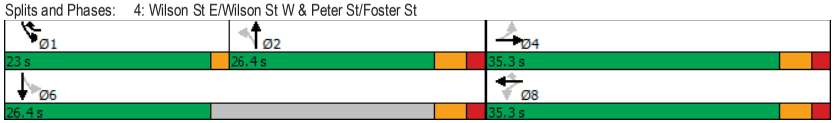
Lane Group	EBL	EBT	WBL	WBT	WBR	NBL	NBT	SBL	SBT
Lane Configurations									
Traffic Volume (vph)	113	24	11	24	232	4	53	267	58
Future Volume (vph)	113	24	11	24	232	4	53	267	58
Lane Group Flow (vph)	0	160	0	39	258	0	79	297	195
Turn Type	Perm	NA	Perm	NA	pm+ov	Perm	NA	pm+pt	NA
Protected Phases		4		8	1		2	1	6
Permitted Phases	4		8		8	2		6	
Detector Phase	4	4	8	8	1	2	2	1	6
Switch Phase									
Minimum Initial (s)	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0
Minimum Split (s)	24.0	24.0	24.0	24.0	12.0	23.1	23.1	12.0	23.1
Total Split (s)	35.3	35.3	35.3	35.3	23.0	26.4	26.4	23.0	26.4
Total Split (%)	41.7%	41.7%	41.7%	41.7%	27.2%	31.2%	31.2%	27.2%	31.2%
Maximum Green (s)	30.0	30.0	30.0	30.0	21.0	21.0	21.0	21.0	21.0
Yellow Time (s)	3.3	3.3	3.3	3.3	2.0	3.3	3.3	2.0	3.3
All-Red Time (s)	2.0	2.0	2.0	2.0	0.0	2.1	2.1	0.0	2.1
Lost Time Adjust (s)		0.0		0.0	0.0		0.0	0.0	0.0
Total Lost Time (s)		5.3		5.3	2.0		5.4	2.0	5.4
Lead/Lag					Lead	Lag	Lag	Lead	
Lead-Lag Optimize?					Yes	Yes	Yes	Yes	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Recall Mode	None	None	None	None	None	Min	Min	None	Min
Walk Time (s)	12.0	12.0	12.0	12.0		12.0	12.0		12.0
Flash Dont Walk (s)	6.7	6.7	6.7	6.7		5.7	5.7		5.7
Pedestrian Calls (#/hr)	11	11	13	13		14	14		9
Act Effct Green (s)		13.3		13.3	24.7		11.9	30.1	28.2
Actuated g/C Ratio		0.29		0.29	0.53		0.26	0.65	0.61
v/c Ratio		0.47		0.09	0.29		0.18	0.32	0.20
Control Delay		21.2		15.4	1.7		15.9	6.6	3.5
Queue Delay		0.0		0.0	0.0		0.0	0.0	0.0
Total Delay		21.2		15.4	1.7		15.9	6.6	3.5
LOS		C		B	A		B	A	A
Approach Delay		21.2		3.5			15.9		5.4
Approach LOS		C		A			B		A
Queue Length 50th (m)		10.3		2.3	0.0		4.0	9.7	2.3
Queue Length 95th (m)		31.7		9.7	6.6		15.8	28.8	12.0
Internal Link Dist (m)		305.8		110.6			117.1		48.0
Turn Bay Length (m)					15.0				
Base Capacity (vph)		813		1045	1174		813	1017	1390
Starvation Cap Reductn		0		0	0		0	0	0
Spillback Cap Reductn		0		0	0		0	0	0
Storage Cap Reductn		0		0	0		0	0	0
Reduced v/c Ratio		0.20		0.04	0.22		0.10	0.29	0.14

Intersection Summary
Cycle Length: 84.7
Actuated Cycle Length: 46.2
Natural Cycle: 60
Control Type: Actuated-Uncoordinated

Maximum v/c Ratio: 0.47

Intersection Signal Delay: 8.1	Intersection LOS: A
Intersection Capacity Utilization 50.0%	ICU Level of Service A
Analysis Period (min) 15	

Splits and Phases: 4: Wilson St E/Wilson St W & Peter St/Foster St



Intersection	
Int Delay, s/veh	6.2

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	8	64	38	24	42	10	47	88	36	16	73	13
Future Vol, veh/h	8	64	38	24	42	10	47	88	36	16	73	13
Conflicting Peds, #/hr	10	0	13	13	0	10	10	0	14	14	0	10
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	9.5	-	0	-	-	-	-	-	-	-	-	5
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	8	16	8	12	2	19	5	2	6	2	2
Mvmt Flow	9	71	42	27	47	11	52	98	40	18	81	14

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	388	383	104	430	377	142	105	0	0	152	0	0
Stage 1	127	127	-	236	236	-	-	-	-	-	-	-
Stage 2	261	256	-	194	141	-	-	-	-	-	-	-
Critical Hdwy	7.12	6.58	6.36	7.18	6.62	6.22	4.29	-	-	4.16	-	-
Critical Hdwy Stg 1	6.12	5.58	-	6.18	5.62	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.12	5.58	-	6.18	5.62	-	-	-	-	-	-	-
Follow-up Hdwy	3.518	4.072	3.444	3.572	4.108	3.318	2.371	-	-	2.254	-	-
Pot Cap-1 Maneuver	571	541	914	525	539	906	1387	-	-	1405	-	-
Stage 1	877	780	-	754	692	-	-	-	-	-	-	-
Stage 2	744	685	-	794	761	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	494	502	898	419	500	889	1376	-	-	1390	-	-
Mov Cap-2 Maneuver	494	502	-	419	500	-	-	-	-	-	-	-
Stage 1	835	763	-	716	656	-	-	-	-	-	-	-
Stage 2	649	649	-	670	744	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	12	13.7	2.1	1.2
HCM LOS	B	B		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	EBLn2	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1376	-	-	501	898	498	1390	-	-
HCM Lane V/C Ratio	0.038	-	-	0.16	0.047	0.17	0.013	-	-
HCM Control Delay (s)	7.7	0	-	13.5	9.2	13.7	7.6	0	-
HCM Lane LOS	A	A	-	B	A	B	A	A	-
HCM 95th %tile Q(veh)	0.1	-	-	0.6	0.1	0.6	0	-	-

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	SBL	SBT	SBR
Lane Configurations											
Traffic Volume (vph)	26	34	236	238	39	17	237	128	6	117	36
Future Volume (vph)	26	34	236	238	39	17	237	128	6	117	36
Lane Group Flow (vph)	0	67	262	0	307	19	263	161	0	137	40
Turn Type	Perm	NA	pm+ov	Perm	NA	Perm	pm+pt	NA	Perm	NA	Perm
Protected Phases		4	5		8		5	2		6	
Permitted Phases	4		4	8		8	2		6		6
Detector Phase	4	4	5	8	8	8	5	2	6	6	6
Switch Phase											
Minimum Initial (s)	10.0	10.0	4.0	4.0	4.0	4.0	4.0	10.0	10.0	10.0	10.0
Minimum Split (s)	20.0	20.0	9.0	20.0	20.0	20.0	9.0	15.0	19.0	19.0	19.0
Total Split (s)	29.0	29.0	25.0	29.0	29.0	29.0	25.0	48.0	31.0	31.0	31.0
Total Split (%)	34.1%	34.1%	29.4%	34.1%	34.1%	34.1%	29.4%	56.5%	36.5%	36.5%	36.5%
Maximum Green (s)	23.0	23.0	22.0	23.0	23.0	23.0	22.0	43.0	26.0	26.0	26.0
Yellow Time (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
All-Red Time (s)	3.0	3.0	0.0	3.0	3.0	3.0	0.0	2.0	2.0	2.0	2.0
Lost Time Adjust (s)		0.0	0.0		0.0	0.0	0.0	0.0		0.0	0.0
Total Lost Time (s)		6.0	3.0		6.0	6.0	3.0	5.0		5.0	5.0
Lead/Lag			Lead				Lead		Lag	Lag	Lag
Lead-Lag Optimize?											
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Recall Mode	None	None	None	None	None	None	None	Min	Min	Min	Min
Walk Time (s)	11.0	11.0		11.0	11.0	11.0		7.0	11.0	11.0	11.0
Flash Dont Walk (s)	3.0	3.0		3.0	3.0	3.0		3.0	3.0	3.0	3.0
Pedestrian Calls (#/hr)	1	1		26	26	26		26	31	31	31
Act Effct Green (s)		23.2	41.0		23.2	23.2	31.5	29.4		11.7	11.7
Actuated g/C Ratio		0.36	0.64		0.36	0.36	0.49	0.46		0.18	0.18
v/c Ratio		0.14	0.27		0.84	0.04	0.43	0.22		0.46	0.13
Control Delay		17.1	1.3		44.7	0.1	11.7	9.6		30.0	3.2
Queue Delay		0.0	0.0		0.0	0.0	0.0	0.0		0.0	0.0
Total Delay		17.1	1.3		44.7	0.1	11.7	9.6		30.0	3.2
LOS		B	A		D	A	B	A		C	A
Approach Delay		4.5			42.1			10.9		23.9	
Approach LOS		A			D			B		C	
Queue Length 50th (m)		4.9	0.0		30.4	0.0	17.2	9.6		14.4	0.0
Queue Length 95th (m)		15.4	5.5		#88.4	0.0	29.4	18.6		32.3	2.9
Internal Link Dist (m)		110.6			119.1			270.3		48.4	
Turn Bay Length (m)			25.0			8.0					10.0
Base Capacity (vph)		480	1123		366	521	703	1296		669	573
Starvation Cap Reductn		0	0		0	0	0	0		0	0
Spillback Cap Reductn		0	0		0	0	0	0		0	0
Storage Cap Reductn		0	0		0	0	0	0		0	0
Reduced v/c Ratio		0.14	0.23		0.84	0.04	0.37	0.12		0.20	0.07

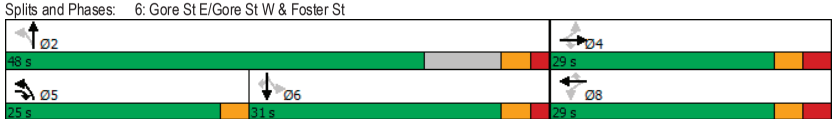
Intersection Summary
Cycle Length: 85
Actuated Cycle Length: 63.8
Natural Cycle: 60
Control Type: Semi Act-Uncoord

Maximum v/c Ratio: 0.84

Intersection Signal Delay: 19.2	Intersection LOS: B
Intersection Capacity Utilization 57.2%	ICU Level of Service B
Analysis Period (min) 15	

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

Splits and Phases: 6: Gore St E/Gore St W & Foster St



Intersection						
Int Delay, s/veh	8.1					

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	2	10	143	2	11	160
Future Vol, veh/h	2	10	143	2	11	160
Conflicting Peds, #/hr	0	1	1	0	4	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	2	11	159	2	12	178

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	14	0	333	9
Stage 1	-	-	-	-	9	-
Stage 2	-	-	-	-	324	-
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	-	-	1604	-	662	1073
Stage 1	-	-	-	-	1014	-
Stage 2	-	-	-	-	733	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1603	-	594	1072
Mov Cap-2 Maneuver	-	-	-	-	594	-
Stage 1	-	-	-	-	1013	-
Stage 2	-	-	-	-	658	-

Approach	EB	WB	NB
HCM Control Delay, s	0	7.4	9.3
HCM LOS			A

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	1019	-	-	1603	-
HCM Lane V/C Ratio	0.186	-	-	0.099	-
HCM Control Delay (s)	9.3	-	-	7.5	0
HCM Lane LOS	A	-	-	A	A
HCM 95th %tile Q(veh)	0.7	-	-	0.3	-

Appendix D

Future Traffic Forecasting Memo Traffic Volumes

CGH TRANSPORTATION

Figure 2
Future Traffic Forecasts

Appendix E

Synchro and SimTraffic Intersection Worksheets – 2041 Future Background Conditions

Summary of All Intervals

Run Number	1	2	3	Avg
Start Time	6:30	6:30	6:30	6:30
End Time	8:00	8:00	8:00	8:00
Total Time (min)	90	90	90	90
Time Recorded (min)	60	60	60	60
# of Intervals	2	2	2	2
# of Recorded Intervals	1	1	1	1
Vehs Entered	1423	1547	1503	1491
Vehs Exited	1437	1532	1512	1493
Starting Vehs	51	27	42	38
Ending Vehs	37	42	33	36
Travel Distance (km)	1289	1381	1363	1344
Travel Time (hr)	36.0	39.2	38.4	37.9
Total Delay (hr)	7.2	8.5	8.0	7.9
Total Stops	1445	1586	1584	1537
Fuel Used (l)	111.1	119.8	118.1	116.3

Interval #0 Information Seeding

Start Time	6:30
End Time	7:00
Total Time (min)	30

Volumes adjusted by Growth Factors.
No data recorded this interval.

Interval #1 Information Recording

Start Time	7:00
End Time	8:00
Total Time (min)	60

Volumes adjusted by Growth Factors.

Run Number	1	2	3	Avg
Vehs Entered	1423	1547	1503	1491
Vehs Exited	1437	1532	1512	1493
Starting Vehs	51	27	42	38
Ending Vehs	37	42	33	36
Travel Distance (km)	1289	1381	1363	1344
Travel Time (hr)	36.0	39.2	38.4	37.9
Total Delay (hr)	7.2	8.5	8.0	7.9
Total Stops	1445	1586	1584	1537
Fuel Used (l)	111.1	119.8	118.1	116.3

Intersection: 3: Wilson St W & North St

Movement	EB	EB	WB	WB	NB	SB	SB
Directions Served	LT	R	LT	R	LTR	LT	TR
Maximum Queue (m)	16.2	18.1	8.8	25.2	24.4	43.8	6.1
Average Queue (m)	2.2	3.9	2.2	10.8	2.2	12.6	0.3
95th Queue (m)	9.4	12.9	8.4	21.7	11.4	30.6	2.3
Link Distance (m)	430.4			116.4	52.1	658.3	
Upstream Blk Time (%)							
Queuing Penalty (veh)							
Storage Bay Dist (m)		5.0	15.0				65.0
Storage Blk Time (%)	2	2		2			
Queuing Penalty (veh)	0	0		0			

Intersection: 4: Wilson St E/Wilson St W & Peter St/Foster St

Movement	EB	WB	WB	NB	SB	SB
Directions Served	LTR	LT	R	LTR	L	TR
Maximum Queue (m)	49.4	48.4	30.0	19.7	50.5	27.0
Average Queue (m)	20.9	10.5	18.8	6.4	22.7	9.4
95th Queue (m)	37.4	29.5	31.2	16.2	42.7	20.6
Link Distance (m)	316.3	114.5		134.6	52.1	52.1
Upstream Blk Time (%)					0	
Queuing Penalty (veh)					1	
Storage Bay Dist (m)			15.0			
Storage Blk Time (%)		4	8			
Queuing Penalty (veh)		13	4			

Intersection: 5: Gore St W & North St

Movement	EB	EB	WB	NB	SB
Directions Served	LT	R	LTR	LTR	LT
Maximum Queue (m)	18.4	19.7	22.1	15.0	5.9
Average Queue (m)	8.8	6.3	8.6	0.6	0.6
95th Queue (m)	17.7	16.5	16.7	5.9	4.1
Link Distance (m)		116.4	140.5	52.4	108.1
Upstream Blk Time (%)					
Queuing Penalty (veh)					
Storage Bay Dist (m)	9.5				
Storage Blk Time (%)	3	1			0
Queuing Penalty (veh)	1	1			0

Queuing and Blocking Report
Future Background 2041
02-10-2023

Intersection: 6: Gore St E/Gore St W & Foster St

Movement	EB	EB	WB	WB	NB	NB	SB	SB
Directions Served	LT	R	LT	R	L	TR	LT	R
Maximum Queue (m)	26.3	34.2	22.1	16.1	54.4	35.0	46.5	24.9
Average Queue (m)	8.8	12.6	8.1	2.7	25.2	13.5	15.3	3.4
95th Queue (m)	20.5	25.5	17.4	10.5	43.3	31.8	33.4	13.4
Link Distance (m)	114.5		134.8		284.1		52.4	
Upstream Blk Time (%)							0	
Queuing Penalty (veh)							0	
Storage Bay Dist (m)		25.0		8.0		20.0		10.0
Storage Blk Time (%)	1	1	16	1	10	2	14	0
Queuing Penalty (veh)	1	0	2	0	18	5	2	1

Intersection: 10: Rogers Rd & Peter St

Movement	WB	NB
Directions Served	LT	LR
Maximum Queue (m)	6.2	25.9
Average Queue (m)	0.6	13.5
95th Queue (m)	4.4	22.2
Link Distance (m)	316.3	114.8
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (m)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Network Summary

Network wide Queuing Penalty: 50

SimTraffic Simulation Summary
Future Total 2041
02-10-2023

Summary of All Intervals

Run Number	1	2	3	Avg
Start Time	3:15	3:15	3:15	3:15
End Time	4:45	4:45	4:45	4:45
Total Time (min)	90	90	90	90
Time Recorded (min)	60	60	60	60
# of Intervals	2	2	2	2
# of Recorded Intervals	1	1	1	1
Vehs Entered	2078	2114	2104	2102
Vehs Exited	2086	2118	2100	2103
Starting Vehs	56	62	54	56
Ending Vehs	48	58	58	49
Travel Distance (km)	1917	1937	1917	1924
Travel Time (hr)	57.6	59.0	58.4	58.4
Total Delay (hr)	14.7	15.5	15.7	15.3
Total Stops	2358	2566	2452	2458
Fuel Used (l)	167.8	171.2	168.5	169.2

Interval #0 Information Seeding

Start Time	3:15
End Time	3:45
Total Time (min)	30

Volumes adjusted by Growth Factors.
No data recorded this interval.

Interval #1 Information Recording

Start Time	3:45
End Time	4:45
Total Time (min)	60

Volumes adjusted by Growth Factors.

Run Number	1	2	3	Avg
Vehs Entered	2078	2114	2104	2102
Vehs Exited	2086	2118	2100	2103
Starting Vehs	56	62	54	56
Ending Vehs	48	58	58	49
Travel Distance (km)	1917	1937	1917	1924
Travel Time (hr)	57.6	59.0	58.4	58.4
Total Delay (hr)	14.7	15.5	15.7	15.3
Total Stops	2358	2566	2452	2458
Fuel Used (l)	167.8	171.2	168.5	169.2

Intersection: 3: Wilson St W & North St

Movement	EB	EB	WB	WB	NB	SB	SB
Directions Served	LT	R	LT	R	LTR	LT	TR
Maximum Queue (m)	9.2	16.6	14.4	34.7	43.6	85.0	27.7
Average Queue (m)	2.3	5.2	2.7	13.0	4.6	22.3	0.9
95th Queue (m)	8.7	13.8	9.8	23.3	21.6	55.1	14.3
Link Distance (m)	430.4			116.4	52.1	658.3	
Upstream Blk Time (%)					0		
Queuing Penalty (veh)					0		
Storage Bay Dist (m)		5.0	15.0				65.0
Storage Blk Time (%)	4	6	0	4		1	
Queuing Penalty (veh)	1	0	0	0		2	

Intersection: 4: Wilson St E/Wilson St W & Peter St/Foster St

Movement	EB	WB	WB	NB	SB	SB
Directions Served	LTR	LT	R	LTR	L	TR
Maximum Queue (m)	55.4	51.3	30.0	40.6	57.6	31.9
Average Queue (m)	24.1	13.2	21.5	16.2	42.1	13.4
95th Queue (m)	43.7	35.7	32.8	32.7	61.9	26.8
Link Distance (m)	316.3	114.5		134.6	52.1	52.1
Upstream Blk Time (%)					6	
Queuing Penalty (veh)					21	
Storage Bay Dist (m)			15.0			
Storage Blk Time (%)		4	11			
Queuing Penalty (veh)		18	6			

Intersection: 5: Gore St W & North St

Movement	EB	EB	WB	NB	SB
Directions Served	LT	R	LTR	LTR	LT
Maximum Queue (m)	19.2	17.4	29.8	34.8	11.0
Average Queue (m)	7.4	7.8	13.1	5.8	0.9
95th Queue (m)	14.1	15.4	22.5	20.4	5.5
Link Distance (m)		116.4	140.5	52.4	108.1
Upstream Blk Time (%)					
Queuing Penalty (veh)					
Storage Bay Dist (m)	9.5				
Storage Blk Time (%)	3	2			0
Queuing Penalty (veh)	2	1			0

Intersection: 6: Gore St E/Gore St W & Foster St

Movement	EB	EB	WB	WB	NB	NB	SB	SB
Directions Served	LT	R	LT	R	L	TR	LT	R
Maximum Queue (m)	87.2	40.0	36.4	17.3	65.1	35.0	48.8	24.9
Average Queue (m)	18.3	27.4	13.0	3.5	32.9	16.5	20.9	5.8
95th Queue (m)	54.3	44.8	26.0	12.0	56.9	36.2	38.9	19.1
Link Distance (m)	114.5		134.8		284.1		52.4	
Upstream Blk Time (%)							0	
Queuing Penalty (veh)							0	
Storage Bay Dist (m)		25.0		8.0		20.0		10.0
Storage Blk Time (%)	0	10	33	2	14	2	24	1
Queuing Penalty (veh)	0	5	5	1	27	9	7	2

Intersection: 10: Peter St

Movement	WB	NB
Directions Served	LT	LR
Maximum Queue (m)	11.3	18.7
Average Queue (m)	0.9	11.0
95th Queue (m)	6.3	16.5
Link Distance (m)	316.3	114.8
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (m)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Network Summary

Network wide Queuing Penalty: 110

Intersection	
Int Delay, s/veh	2.1

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	5	4	11	7	3	50	7	463	17	83	397	19
Future Vol, veh/h	5	4	11	7	3	50	7	463	17	83	397	19
Conflicting Peds, #/hr	0	0	4	4	0	0	15	0	12	12	0	15
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	5	15	-	0	-	-	-	-	-	65
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	33	20	2	29	23	2	6	8	23	4	22
Mvmt Flow	5	4	11	7	3	50	7	463	17	83	397	19

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	1100	1094	227	869	1095	484	431	0	0	492	0	0
Stage 1	588	588	-	498	498	-	-	-	-	-	-	-
Stage 2	512	506	-	371	597	-	-	-	-	-	-	-
Critical Hdwy	7.33	6.995	7.2	7.33	6.935	6.545	4.13	-	-	4.445	-	-
Critical Hdwy Stg 1	6.53	5.995	-	6.13	5.935	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.13	5.995	-	6.53	5.935	-	-	-	-	-	-	-
Follow-up Hdwy	3.519	4.3135	3.49	3.519	4.2755	3.5185	2.219	-	-	2.4185	-	-
Pot Cap-1 Maneuver	178	179	730	259	183	533	1127	-	-	952	-	-
Stage 1	463	437	-	553	491	-	-	-	-	-	-	-
Stage 2	544	479	-	622	439	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	142	154	719	224	157	528	1114	-	-	943	-	-
Mov Cap-2 Maneuver	142	154	-	224	157	-	-	-	-	-	-	-
Stage 1	453	382	-	543	482	-	-	-	-	-	-	-
Stage 2	485	470	-	535	384	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	19.6	14.4	0.1	1.8
HCM LOS	C	B		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	EBLn2	WBLn1	WBLn2	SBL	SBT	SBR
Capacity (veh/h)	1114	-	-	147	719	199	528	943	-	-
HCM Lane V/C Ratio	0.006	-	-	0.061	0.015	0.05	0.095	0.088	-	-
HCM Control Delay (s)	8.3	0	-	31.1	10.1	24	12.5	9.2	0.4	-
HCM Lane LOS	A	A	-	D	B	C	B	A	A	-
HCM 95th %tile Q(veh)	0	-	-	0.2	0	0.2	0.3	0.3	-	-

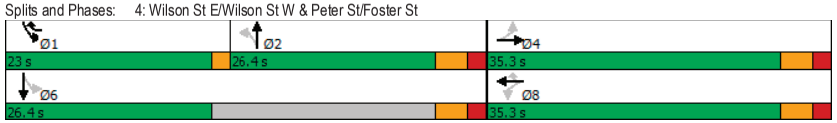
Lane Group	EBL	EBT	WBL	WBT	WBR	NBL	NBT	SBL	SBT
Lane Configurations									
Traffic Volume (vph)	95	30	7	46	350	5	30	284	57
Future Volume (vph)	95	30	7	46	350	5	30	284	57
Lane Group Flow (vph)	0	137	0	53	350	0	45	284	149
Turn Type	Perm	NA	Perm	NA	pm+ov	Perm	NA	pm+pt	NA
Protected Phases		4		8	1		2	1	6
Permitted Phases	4		8		8	2		6	
Detector Phase	4	4	8	8	1	2	2	1	6
Switch Phase									
Minimum Initial (s)	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0
Minimum Split (s)	24.0	24.0	24.0	24.0	12.0	23.1	23.1	12.0	23.1
Total Split (s)	35.3	35.3	35.3	35.3	23.0	26.4	26.4	23.0	26.4
Total Split (%)	41.7%	41.7%	41.7%	41.7%	27.2%	31.2%	31.2%	27.2%	31.2%
Maximum Green (s)	30.0	30.0	30.0	30.0	21.0	21.0	21.0	21.0	21.0
Yellow Time (s)	3.3	3.3	3.3	3.3	2.0	3.3	3.3	2.0	3.3
All-Red Time (s)	2.0	2.0	2.0	2.0	0.0	2.1	2.1	0.0	2.1
Lost Time Adjust (s)		0.0		0.0	0.0		0.0	0.0	0.0
Total Lost Time (s)		5.3		5.3	2.0		5.4	2.0	5.4
Lead/Lag					Lead	Lag	Lag	Lead	
Lead-Lag Optimize?					Yes	Yes	Yes	Yes	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Recall Mode	None	None	None	None	None	Min	Min	None	Min
Walk Time (s)	12.0	12.0	12.0	12.0		12.0	12.0		12.0
Flash Dont Walk (s)	6.7	6.7	6.7	6.7		5.7	5.7		5.7
Pedestrian Calls (#/hr)	5	5	16	16		14	14		13
Act Effct Green (s)		12.5		12.5	23.6		11.8	29.5	27.6
Actuated g/C Ratio		0.28		0.28	0.53		0.26	0.66	0.61
v/c Ratio		0.42		0.12	0.38		0.11	0.31	0.16
Control Delay		20.1		15.6	2.0		14.1	6.1	3.6
Queue Delay		0.0		0.0	0.0		0.0	0.0	0.0
Total Delay		20.1		15.6	2.0		14.1	6.1	3.6
LOS		C		B	A		B	A	A
Approach Delay		20.1		3.8			14.1		5.2
Approach LOS		C		A			B		A
Queue Length 50th (m)		8.3		3.1	0.0		2.1	8.4	1.9
Queue Length 95th (m)		26.7		11.8	7.8		9.7	25.6	9.9
Internal Link Dist (m)		305.8		110.6			117.1		48.0
Turn Bay Length (m)					15.0				
Base Capacity (vph)		813		1156	1195		793	1015	1382
Starvation Cap Reductn		0		0	0		0	0	0
Spillback Cap Reductn		0		0	0		0	0	0
Storage Cap Reductn		0		0	0		0	0	0
Reduced v/c Ratio		0.17		0.05	0.29		0.06	0.28	0.11

Intersection Summary
Cycle Length: 84.7
Actuated Cycle Length: 44.9
Natural Cycle: 60
Control Type: Actuated-Uncoordinated

Maximum v/c Ratio: 0.42

Intersection Signal Delay: 7.0	Intersection LOS: A
Intersection Capacity Utilization 56.9%	ICU Level of Service B
Analysis Period (min) 15	

Splits and Phases: 4: Wilson St E/Wilson St W & Peter St/Foster St



Intersection												
Int Delay, s/veh	5.3											

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	3	55	29	33	15	8	35	85	25	13	73	8
Future Vol, veh/h	3	55	29	33	15	8	35	85	25	13	73	8
Conflicting Peds, #/hr	5	0	6	6	0	5	9	0	17	17	0	9
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	9.5	-	0	-	-	-	-	-	-	-	-	5
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	20	20	4	16	2	28	3	8	2	6	2
Mvmt Flow	3	55	29	33	15	8	35	85	25	13	73	8

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	292	305	88	336	301	120	90	0	0	127	0	0
Stage 1	108	108	-	185	185	-	-	-	-	-	-	-
Stage 2	184	197	-	151	116	-	-	-	-	-	-	-
Critical Hdwy	7.12	6.7	6.4	7.14	6.66	6.22	4.38	-	-	4.12	-	-
Critical Hdwy Stg 1	6.12	5.7	-	6.14	5.66	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.12	5.7	-	6.14	5.66	-	-	-	-	-	-	-
Follow-up Hdwy	3.518	4.18	3.48	3.536	4.144	3.318	2.452	-	-	2.218	-	-
Pot Cap-1 Maneuver	660	580	923	614	589	931	1357	-	-	1459	-	-
Stage 1	897	772	-	812	721	-	-	-	-	-	-	-
Stage 2	818	705	-	847	773	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	616	548	912	524	556	915	1348	-	-	1440	-	-
Mov Cap-2 Maneuver	616	548	-	524	556	-	-	-	-	-	-	-
Stage 1	866	760	-	779	691	-	-	-	-	-	-	-
Stage 2	768	676	-	750	761	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	11.2	12	1.9	1
HCM LOS	B	B		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	EBLn2	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1348	-	-	551	912	567	1440	-	-
HCM Lane V/C Ratio	0.026	-	-	0.105	0.032	0.099	0.009	-	-
HCM Control Delay (s)	7.7	0	-	12.3	9.1	12	7.5	0	-
HCM Lane LOS	A	A	-	B	A	B	A	A	-
HCM 95th %tile Q(veh)	0.1	-	-	0.4	0.1	0.3	0	-	-

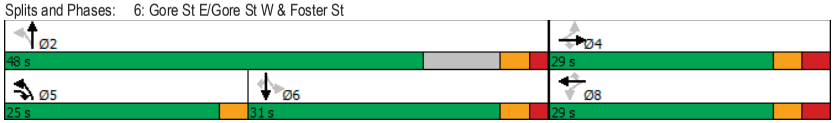
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	SBL	SBT	SBR
Lane Configurations											
Traffic Volume (vph)	13	49	239	16	28	10	356	160	3	127	13
Future Volume (vph)	13	49	239	16	28	10	356	160	3	127	13
Lane Group Flow (vph)	0	62	239	0	44	10	356	176	0	130	13
Turn Type	Perm	NA	pm+ov	Perm	NA	Perm	pm+pt	NA	Perm	NA	Perm
Protected Phases		4	5		8		5	2		6	
Permitted Phases	4		4	8		8	2		6		6
Detector Phase	4	4	5	8	8	8	5	2	6	6	6
Switch Phase											
Minimum Initial (s)	10.0	10.0	4.0	4.0	4.0	4.0	4.0	10.0	10.0	10.0	10.0
Minimum Split (s)	20.0	20.0	9.0	20.0	20.0	20.0	9.0	15.0	19.0	19.0	19.0
Total Split (s)	29.0	29.0	25.0	29.0	29.0	29.0	25.0	48.0	31.0	31.0	31.0
Total Split (%)	34.1%	34.1%	29.4%	34.1%	34.1%	34.1%	29.4%	56.5%	36.5%	36.5%	36.5%
Maximum Green (s)	23.0	23.0	22.0	23.0	23.0	23.0	22.0	43.0	26.0	26.0	26.0
Yellow Time (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
All-Red Time (s)	3.0	3.0	0.0	3.0	3.0	3.0	0.0	2.0	2.0	2.0	2.0
Lost Time Adjust (s)		0.0	0.0		0.0	0.0	0.0	0.0		0.0	0.0
Total Lost Time (s)		6.0	3.0		6.0	6.0	3.0	5.0		5.0	5.0
Lead/Lag			Lead				Lead		Lag	Lag	Lag
Lead-Lag Optimize?											
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Recall Mode	None	None	None	None	None	None	None	Min	Min	Min	Min
Walk Time (s)	11.0	11.0		11.0	11.0	11.0		7.0	11.0	11.0	11.0
Flash Dont Walk (s)	3.0	3.0		3.0	3.0	3.0		3.0	3.0	3.0	3.0
Pedestrian Calls (#/hr)	14	14		28	28	28		14	15	15	15
Act Effct Green (s)		12.0	21.5		9.1	9.1	32.8	33.8		12.2	12.2
Actuated g/C Ratio		0.27	0.48		0.20	0.20	0.74	0.76		0.27	0.27
v/c Ratio		0.15	0.29		0.15	0.03	0.39	0.15		0.30	0.03
Control Delay		19.6	1.7		20.2	0.2	5.2	4.5		20.7	0.2
Queue Delay		0.0	0.0		0.0	0.0	0.0	0.0		0.0	0.0
Total Delay		19.6	1.7		20.2	0.2	5.2	4.5		20.7	0.2
LOS		B	A		C	A	A	A		C	A
Approach Delay		5.4			16.5			5.0		18.9	
Approach LOS		A			B			A		B	
Queue Length 50th (m)		4.6	0.0		3.2	0.0	12.5	5.8		10.1	0.0
Queue Length 95th (m)		14.7	5.6		11.4	0.0	28.0	14.5		26.9	0.0
Internal Link Dist (m)		110.6			119.1			270.3		48.4	
Turn Bay Length (m)			25.0			8.0					10.0
Base Capacity (vph)		924	1112		858	780	1098	1498		1039	954
Starvation Cap Reductn		0	0		0	0	0	0		0	0
Spillback Cap Reductn		0	0		0	0	0	0		0	0
Storage Cap Reductn		0	0		0	0	0	0		0	0
Reduced v/c Ratio		0.07	0.21		0.05	0.01	0.32	0.12		0.13	0.01

Intersection Summary
Cycle Length: 85
Actuated Cycle Length: 44.4
Natural Cycle: 50
Control Type: Semi Act-Uncoord

Maximum v/c Ratio: 0.39

Intersection Signal Delay: 7.6	Intersection LOS: A
Intersection Capacity Utilization 54.5%	ICU Level of Service A
Analysis Period (min) 15	

Splits and Phases: 6: Gore St E/Gore St W & Foster St



Intersection	
Int Delay, s/veh	8.1

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	5	10	108	1	11	148
Future Vol, veh/h	5	10	108	1	11	148
Conflicting Peds, #/hr	0	4	4	0	4	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	30	4	2	9	12
Mvmt Flow	5	10	108	1	11	148

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	19	0	235	14
Stage 1	-	-	-	-	14	-
Stage 2	-	-	-	-	221	-
Critical Hdwy	-	-	4.14	-	6.49	6.32
Critical Hdwy Stg 1	-	-	-	-	5.49	-
Critical Hdwy Stg 2	-	-	-	-	5.49	-
Follow-up Hdwy	-	-	2.236	-	3.581	3.408
Pot Cap-1 Maneuver	-	-	1585	-	738	1038
Stage 1	-	-	-	-	991	-
Stage 2	-	-	-	-	799	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1580	-	683	1035
Mov Cap-2 Maneuver	-	-	-	-	683	-
Stage 1	-	-	-	-	988	-
Stage 2	-	-	-	-	742	-

Approach	EB	WB	NB
HCM Control Delay, s	0	7.4	9.3
HCM LOS			A

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	999	-	-	1580	-
HCM Lane V/C Ratio	0.159	-	-	0.068	-
HCM Control Delay (s)	9.3	-	-	7.4	0
HCM Lane LOS	A	-	-	A	A
HCM 95th %tile Q(veh)	0.6	-	-	0.2	-

Intersection	
Int Delay, s/veh	2.4

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	5	3	20	5	6	93	13	584	18	71	674	15
Future Vol, veh/h	5	3	20	5	6	93	13	584	18	71	674	15
Conflicting Peds, #/hr	0	0	3	3	0	0	15	0	12	12	0	15
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	5	15	-	0	-	-	-	-	-	65
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	13	2	5	6	17	2	13
Mvmt Flow	5	3	20	5	6	93	13	584	18	71	674	15

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	1508	1479	363	1115	1477	605	704	0	0	614	0	0
Stage 1	839	839	-	631	631	-	-	-	-	-	-	-
Stage 2	669	640	-	484	846	-	-	-	-	-	-	-
Critical Hdwy	7.33	6.53	6.93	7.33	6.53	6.395	4.13	-	-	4.355	-	-
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	3.519	4.019	3.319	3.519	4.019	3.4235	2.219	-	-	2.3615	-	-
Pot Cap-1 Maneuver	91	125	635	174	125	472	892	-	-	881	-	-
Stage 1	327	380	-	468	473	-	-	-	-	-	-	-
Stage 2	446	469	-	534	377	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	61	104	626	144	104	468	882	-	-	873	-	-
Mov Cap-2 Maneuver	61	104	-	144	104	-	-	-	-	-	-	-
Stage 1	316	326	-	453	458	-	-	-	-	-	-	-
Stage 2	345	454	-	444	323	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	25.3	17.1	0.2	1.3
HCM LOS	D	C		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	EBLn2	WBLn1	WBLn2	SBL	SBT	SBR
Capacity (veh/h)	882	-	-	72	626	119	468	873	-	-
HCM Lane V/C Ratio	0.015	-	-	0.111	0.032	0.092	0.199	0.081	-	-
HCM Control Delay (s)	9.1	0	-	61.2	10.9	38.3	14.6	9.5	0.5	-
HCM Lane LOS	A	A	-	F	B	E	B	A	A	-
HCM 95th %tile Q(veh)	0	-	-	0.4	0.1	0.3	0.7	0.3	-	-

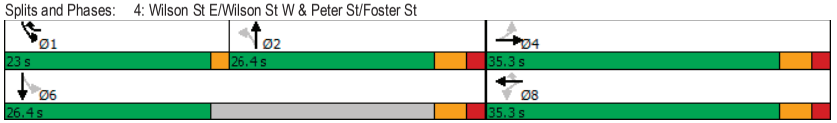
Lane Group	EBL	EBT	WBL	WBT	WBR	NBL	NBT	SBL	SBT
Lane Configurations									
Traffic Volume (vph)	110	29	24	32	430	11	76	507	82
Future Volume (vph)	110	29	24	32	430	11	76	507	82
Lane Group Flow (vph)	0	153	0	56	430	0	110	507	206
Turn Type	Perm	NA	Perm	NA	pm+ov	Perm	NA	pm+pt	NA
Protected Phases		4		8	1		2	1	6
Permitted Phases	4		8		8	2		6	
Detector Phase	4	4	8	8	1	2	2	1	6
Switch Phase									
Minimum Initial (s)	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0
Minimum Split (s)	24.0	24.0	24.0	24.0	12.0	23.1	23.1	12.0	23.1
Total Split (s)	35.3	35.3	35.3	35.3	23.0	26.4	26.4	23.0	26.4
Total Split (%)	41.7%	41.7%	41.7%	41.7%	27.2%	31.2%	31.2%	27.2%	31.2%
Maximum Green (s)	30.0	30.0	30.0	30.0	21.0	21.0	21.0	21.0	21.0
Yellow Time (s)	3.3	3.3	3.3	3.3	2.0	3.3	3.3	2.0	3.3
All-Red Time (s)	2.0	2.0	2.0	2.0	0.0	2.1	2.1	0.0	2.1
Lost Time Adjust (s)		0.0		0.0	0.0		0.0	0.0	0.0
Total Lost Time (s)		5.3		5.3	2.0		5.4	2.0	5.4
Lead/Lag					Lead	Lag	Lag	Lead	
Lead-Lag Optimize?					Yes	Yes	Yes	Yes	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Recall Mode	None	None	None	None	None	Min	Min	None	Min
Walk Time (s)	12.0	12.0	12.0	12.0		12.0	12.0		12.0
Flash Dont Walk (s)	6.7	6.7	6.7	6.7		5.7	5.7		5.7
Pedestrian Calls (#/hr)	11	11	13	13		14	14		9
Act Effct Green (s)		13.6		13.6	28.1		12.2	33.9	32.1
Actuated g/C Ratio		0.27		0.27	0.56		0.24	0.68	0.64
v/c Ratio		0.47		0.14	0.43		0.28	0.52	0.20
Control Delay		23.6		18.4	2.0		19.6	8.0	3.5
Queue Delay		0.0		0.0	0.0		0.0	0.0	0.0
Total Delay		23.6		18.4	2.0		19.6	8.0	3.5
LOS		C		B	A		B	A	A
Approach Delay		23.6		3.9			19.6		6.7
Approach LOS		C		A			B		A
Queue Length 50th (m)		11.4		4.0	0.0		7.3	20.4	3.0
Queue Length 95th (m)		32.3		13.7	8.1		22.3	53.1	12.8
Internal Link Dist (m)		305.8		110.6			117.1		48.0
Turn Bay Length (m)					15.0				
Base Capacity (vph)		764		945	1162		744	1035	1331
Starvation Cap Reductn		0		0	0		0	0	0
Spillback Cap Reductn		0		0	0		0	0	0
Storage Cap Reductn		0		0	0		0	0	0
Reduced v/c Ratio		0.20		0.06	0.37		0.15	0.49	0.15

Intersection Summary

Cycle Length: 84.7
Actuated Cycle Length: 49.9
Natural Cycle: 60
Control Type: Actuated-Uncoordinated

Maximum v/c Ratio: 0.52
Intersection Signal Delay: 8.5 — Intersection LOS: A
Intersection Capacity Utilization 63.4% — ICU Level of Service B
Analysis Period (min) 15

Splits and Phases: 4: Wilson St E/Wilson St W & Peter St/Foster St



Intersection	
Int Delay, s/veh	6.7

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	3	52	54	44	61	19	72	115	27	13	92	20
Future Vol, veh/h	3	52	54	44	61	19	72	115	27	13	92	20
Conflicting Peds, #/hr	10	0	13	13	0	10	10	0	14	14	0	10
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	9.5	-	0	-	-	-	-	-	-	-	-	5
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	8	16	8	12	2	19	5	2	6	2	2
Mvmt Flow	3	52	54	44	61	19	72	115	27	13	92	20

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	451	428	115	481	435	153	122	0	0	156	0	0
Stage 1	128	128	-	287	287	-	-	-	-	-	-	-
Stage 2	323	300	-	194	148	-	-	-	-	-	-	-
Critical Hdwy	7.12	6.58	6.36	7.18	6.62	6.22	4.29	-	-	4.16	-	-
Critical Hdwy Stg 1	6.12	5.58	-	6.18	5.62	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.12	5.58	-	6.18	5.62	-	-	-	-	-	-	-
Follow-up Hdwy	3.518	4.072	3.444	3.572	4.108	3.318	2.371	-	-	2.254	-	-
Pot Cap-1 Maneuver	519	510	901	486	500	893	1366	-	-	1400	-	-
Stage 1	876	779	-	708	657	-	-	-	-	-	-	-
Stage 2	689	655	-	794	756	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	426	467	885	388	458	876	1355	-	-	1385	-	-
Mov Cap-2 Maneuver	426	467	-	388	458	-	-	-	-	-	-	-
Stage 1	819	765	-	660	612	-	-	-	-	-	-	-
Stage 2	567	610	-	681	742	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	11.6	15.6	2.6	0.8
HCM LOS	B	C		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	EBLn2	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1355	-	-	465	885	462	1385	-	-
HCM Lane V/C Ratio	0.053	-	-	0.118	0.061	0.268	0.009	-	-
HCM Control Delay (s)	7.8	0	-	13.8	9.3	15.6	7.6	0	-
HCM Lane LOS	A	A	-	B	A	C	A	A	-
HCM 95th %tile Q(veh)	0.2	-	-	0.4	0.2	1.1	0	-	-

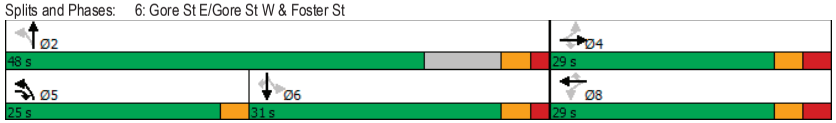
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	SBL	SBT	SBR
Lane Configurations											
Traffic Volume (vph)	14	37	499	19	52	14	402	167	3	145	29
Future Volume (vph)	14	37	499	19	52	14	402	167	3	145	29
Lane Group Flow (vph)	0	51	499	0	71	14	402	193	0	148	29
Turn Type	Perm	NA	pm+ov	Perm	NA	Perm	pm+pt	NA	Perm	NA	Perm
Protected Phases		4	5		8		5	2		6	
Permitted Phases	4		4	8		8	2		6		6
Detector Phase	4	4	5	8	8	8	5	2	6	6	6
Switch Phase											
Minimum Initial (s)	10.0	10.0	4.0	4.0	4.0	4.0	4.0	10.0	10.0	10.0	10.0
Minimum Split (s)	20.0	20.0	9.0	20.0	20.0	20.0	9.0	15.0	19.0	19.0	19.0
Total Split (s)	29.0	29.0	25.0	29.0	29.0	29.0	25.0	48.0	31.0	31.0	31.0
Total Split (%)	34.1%	34.1%	29.4%	34.1%	34.1%	34.1%	29.4%	56.5%	36.5%	36.5%	36.5%
Maximum Green (s)	23.0	23.0	22.0	23.0	23.0	23.0	22.0	43.0	26.0	26.0	26.0
Yellow Time (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
All-Red Time (s)	3.0	3.0	0.0	3.0	3.0	3.0	0.0	2.0	2.0	2.0	2.0
Lost Time Adjust (s)		0.0	0.0		0.0	0.0	0.0	0.0		0.0	0.0
Total Lost Time (s)		6.0	3.0		6.0	6.0	3.0	5.0		5.0	5.0
Lead/Lag			Lead				Lead		Lag	Lag	Lag
Lead-Lag Optimize?											
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Recall Mode	None	None	None	None	None	None	None	Min	Min	Min	Min
Walk Time (s)	11.0	11.0		11.0	11.0	11.0		7.0	11.0	11.0	11.0
Flash Dont Walk (s)	3.0	3.0		3.0	3.0	3.0		3.0	3.0	3.0	3.0
Pedestrian Calls (#/hr)	1	1		26	26	26		26	31	31	31
Act Effct Green (s)		11.9	24.0		9.3	9.3	35.1	36.1		12.3	12.3
Actuated g/C Ratio		0.25	0.51		0.20	0.20	0.75	0.77		0.26	0.26
v/c Ratio		0.14	0.52		0.25	0.04	0.43	0.16		0.34	0.07
Control Delay		20.7	2.9		22.2	0.3	5.4	4.3		21.8	0.7
Queue Delay		0.0	0.0		0.0	0.0	0.0	0.0		0.0	0.0
Total Delay		20.7	2.9		22.2	0.3	5.4	4.3		21.8	0.7
LOS		C	A		C	A	A	A		C	A
Approach Delay		4.5			18.6			5.1		18.3	
Approach LOS		A			B			A		B	
Queue Length 50th (m)		4.1	1.0		5.8	0.0	14.6	6.3		12.6	0.0
Queue Length 95th (m)		13.0	10.0		16.7	0.0	32.3	15.5		29.6	0.9
Internal Link Dist (m)		110.6			119.1			270.3		48.4	
Turn Bay Length (m)			25.0			8.0					10.0
Base Capacity (vph)		812	1130		808	762	1071	1481		1036	834
Starvation Cap Reductn		0	0		0	0	0	0		0	0
Spillback Cap Reductn		0	0		0	0	0	0		0	0
Storage Cap Reductn		0	0		0	0	0	0		0	0
Reduced v/c Ratio		0.06	0.44		0.09	0.02	0.38	0.13		0.14	0.03

Intersection Summary
Cycle Length: 85
Actuated Cycle Length: 46.8
Natural Cycle: 50
Control Type: Semi Act-Uncoord

Maximum v/c Ratio: 0.52

Intersection Signal Delay: 7.4	Intersection LOS: A
Intersection Capacity Utilization 67.1%	ICU Level of Service C
Analysis Period (min) 15	

Splits and Phases: 6: Gore St E/Gore St W & Foster St



Intersection	
Int Delay, s/veh	8.1

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	2	10	143	2	11	160
Future Vol, veh/h	2	10	143	2	11	160
Conflicting Peds, #/hr	0	1	1	0	4	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	2	10	143	2	11	160

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	13	0	300	8
Stage 1	-	-	-	-	8	-
Stage 2	-	-	-	-	292	-
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	-	-	1606	-	691	1074
Stage 1	-	-	-	-	1015	-
Stage 2	-	-	-	-	758	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1605	-	627	1073
Mov Cap-2 Maneuver	-	-	-	-	627	-
Stage 1	-	-	-	-	1014	-
Stage 2	-	-	-	-	688	-

Approach	EB	WB	NB
HCM Control Delay, s	0	7.4	9.2
HCM LOS			A

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	1026	-	-	1605	-
HCM Lane V/C Ratio	0.167	-	-	0.089	-
HCM Control Delay (s)	9.2	-	-	7.5	0
HCM Lane LOS	A	-	-	A	A
HCM 95th %tile Q(veh)	0.6	-	-	0.3	-

Appendix F

Synchro and SimTraffic Intersection Worksheets – 2041 Future Total Conditions

CGH TRANSPORTATION

Summary of All Intervals

Run Number	1	2	3	Avg
Start Time	6:30	6:30	6:30	6:30
End Time	8:00	8:00	8:00	8:00
Total Time (min)	90	90	90	90
Time Recorded (min)	60	60	60	60
# of Intervals	2	2	2	2
# of Recorded Intervals	1	1	1	1
Vehs Entered	2254	2303	2325	2294
Vehs Exited	2279	2318	2311	2305
Starting Vehs	79	68	70	71
Ending Vehs	54	53	84	63
Travel Distance (km)	2004	2071	2083	2052
Travel Time (hr)	63.5	66.1	66.3	65.3
Total Delay (hr)	19.6	20.6	20.6	20.2
Total Stops	2876	2980	3048	2967
Fuel Used (l)	181.5	185.0	187.7	184.8

Interval #0 Information Seeding

Start Time	6:30
End Time	7:00
Total Time (min)	30

Volumes adjusted by Growth Factors.
No data recorded this interval.

Interval #1 Information Recording

Start Time	7:00
End Time	8:00
Total Time (min)	60

Volumes adjusted by Growth Factors.

Run Number	1	2	3	Avg
Vehs Entered	2254	2303	2325	2294
Vehs Exited	2279	2318	2311	2305
Starting Vehs	79	68	70	71
Ending Vehs	54	53	84	63
Travel Distance (km)	2004	2071	2083	2052
Travel Time (hr)	63.5	66.1	66.3	65.3
Total Delay (hr)	19.6	20.6	20.6	20.2
Total Stops	2876	2980	3048	2967
Fuel Used (l)	181.5	185.0	187.7	184.8

Intersection: 3: Wilson St W & North St

Movement	EB	EB	WB	WB	NB	SB	SB
Directions Served	LT	R	LT	R	TR	L	TR
Maximum Queue (m)	49.8	22.8	29.6	55.3	57.5	62.7	78.1
Average Queue (m)	24.3	4.2	17.2	14.1	41.1	16.5	28.9
95th Queue (m)	45.5	15.3	29.4	38.4	61.1	38.4	56.4
Link Distance (m)	428.9			118.7	52.2		658.3
Upstream Blk Time (%)					3		
Queuing Penalty (veh)					14		
Storage Bay Dist (m)		8.0	15.0			100.0	
Storage Blk Time (%)	49	3	17	5			0
Queuing Penalty (veh)	5	4	9	5			0

Intersection: 4: Wilson St E/Wilson St W & Peter St/Foster St

Movement	EB	WB	WB	NB	SB	SB
Directions Served	LTR	LT	R	LTR	L	TR
Maximum Queue (m)	122.2	20.8	27.9	28.7	55.7	38.7
Average Queue (m)	55.1	6.8	14.1	8.9	31.6	14.7
95th Queue (m)	97.1	17.6	25.4	20.9	52.7	30.4
Link Distance (m)	437.3	114.5		134.6	52.2	52.2
Upstream Blk Time (%)					1	
Queuing Penalty (veh)					2	
Storage Bay Dist (m)			15.0			
Storage Blk Time (%)		2	4			
Queuing Penalty (veh)		8	2			

Intersection: 5: Gore St W & North St

Movement	EB	WB	NB	SB
Directions Served	LTR	LTR	LTR	LTR
Maximum Queue (m)	25.1	27.6	49.0	20.8
Average Queue (m)	14.2	10.5	21.1	10.8
95th Queue (m)	22.9	20.6	37.5	17.5
Link Distance (m)	118.7	140.6	54.0	106.5
Upstream Blk Time (%)			0	
Queuing Penalty (veh)			0	
Storage Bay Dist (m)				
Storage Blk Time (%)				
Queuing Penalty (veh)				

Queuing and Blocking Report
Future Total 2041
02-15-2023

Intersection: 6: Gore St E/Gore St W & Foster St

Movement	EB	EB	WB	WB	NB	NB	SB	SB
Directions Served	LT	R	LT	R	L	TR	LT	R
Maximum Queue (m)	57.8	39.6	30.0	22.6	64.4	35.0	45.9	18.8
Average Queue (m)	18.9	19.8	9.1	3.5	22.9	17.9	20.0	2.6
95th Queue (m)	37.2	37.1	19.6	13.2	47.5	37.2	37.9	10.7
Link Distance (m)	114.5		134.8		284.1		54.0	
Upstream Blk Time (%)							0	
Queuing Penalty (veh)							0	
Storage Bay Dist (m)		25.0		8.0		20.0		10.0
Storage Blk Time (%)	4	2	24	2	8	3	24	0
Queuing Penalty (veh)	13	2	2	1	21	11	3	0

Intersection: 10: Rogers Rd & Peter St

Movement	EB	WB	NB
Directions Served	TR	L	R
Maximum Queue (m)	10.8	20.3	30.0
Average Queue (m)	0.6	7.4	15.2
95th Queue (m)	5.0	16.2	24.0
Link Distance (m)	182.0	437.3	113.2
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (m)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Network Summary

Network wide Queuing Penalty: 104

SimTraffic Simulation Summary
Future Total 2041
02-15-2023

Summary of All Intervals

Run Number	1	2	3	Avg
Start Time	3:15	3:15	3:15	3:15
End Time	4:45	4:45	4:45	4:45
Total Time (min)	90	90	90	90
Time Recorded (min)	60	60	60	60
# of Intervals	2	2	2	2
# of Recorded Intervals	1	1	1	1
Vehs Entered	2892	2898	2760	2848
Vehs Exited	2913	2902	2750	2854
Starting Vehs	103	98	96	98
Ending Vehs	82	94	106	95
Travel Distance (km)	2685	2670	2538	2631
Travel Time (hr)	93.6	96.9	86.1	92.2
Total Delay (hr)	34.4	38.2	30.4	34.4
Total Stops	4501	4601	4095	4398
Fuel Used (l)	246.0	248.4	231.5	242.0

Interval #0 Information Seeding

Start Time	3:15
End Time	3:45
Total Time (min)	30

Volumes adjusted by Growth Factors.
No data recorded this interval.

Interval #1 Information Recording

Start Time	3:45
End Time	4:45
Total Time (min)	60

Volumes adjusted by Growth Factors.

Run Number	1	2	3	Avg
Vehs Entered	2892	2898	2760	2848
Vehs Exited	2913	2902	2750	2854
Starting Vehs	103	98	96	98
Ending Vehs	82	94	106	95
Travel Distance (km)	2685	2670	2538	2631
Travel Time (hr)	93.6	96.9	86.1	92.2
Total Delay (hr)	34.4	38.2	30.4	34.4
Total Stops	4501	4601	4095	4398
Fuel Used (l)	246.0	248.4	231.5	242.0

Intersection: 3: Wilson St W & North St

Movement	EB	EB	WB	WB	NB	SB	SB
Directions Served	LT	R	LT	R	TR	L	TR
Maximum Queue (m)	57.9	23.0	29.9	73.8	57.6	93.2	156.0
Average Queue (m)	26.4	7.9	28.0	43.5	42.9	32.0	59.0
95th Queue (m)	50.0	23.5	33.4	74.2	63.2	64.5	113.0
Link Distance (m)	428.9			118.7	52.2		658.3
Upstream Blk Time (%)					3		
Queuing Penalty (veh)					15		
Storage Bay Dist (m)		8.0	15.0			100.0	
Storage Blk Time (%)	65	4	46	8			2
Queuing Penalty (veh)	13	4	42	25			4

Intersection: 4: Wilson St E/Wilson St W & Peter St/Foster St

Movement	EB	WB	WB	NB	SB	SB
Directions Served	LTR	LT	R	LTR	L	TR
Maximum Queue (m)	122.3	56.8	30.0	37.4	48.0	14.2
Average Queue (m)	57.5	13.2	19.1	16.8	21.8	5.9
95th Queue (m)	102.7	32.4	31.0	31.2	40.3	13.9
Link Distance (m)	437.3	114.5		134.6	52.2	52.2
Upstream Blk Time (%)					0	
Queuing Penalty (veh)					0	
Storage Bay Dist (m)			15.0			
Storage Blk Time (%)		7	8			
Queuing Penalty (veh)		30	5			

Intersection: 5: Gore St W & North St

Movement	EB	WB	NB	SB
Directions Served	LTR	LTR	LTR	LTR
Maximum Queue (m)	45.2	31.0	59.3	30.6
Average Queue (m)	20.7	16.9	37.4	11.9
95th Queue (m)	34.4	28.8	57.0	21.3
Link Distance (m)	118.7	140.6	54.0	106.5
Upstream Blk Time (%)			1	
Queuing Penalty (veh)			4	
Storage Bay Dist (m)				
Storage Blk Time (%)				
Queuing Penalty (veh)				

Intersection: 6: Gore St E/Gore St W & Foster St

Movement	EB	EB	WB	WB	NB	NB	SB	SB
Directions Served	LT	R	LT	R	L	TR	LT	R
Maximum Queue (m)	66.8	40.0	53.0	23.0	135.3	35.0	58.7	25.0
Average Queue (m)	17.5	25.8	19.0	3.7	51.2	28.7	39.1	7.8
95th Queue (m)	45.1	43.4	39.6	14.8	102.5	42.9	61.1	22.8
Link Distance (m)	114.5		134.8		284.1		54.0	
Upstream Blk Time (%)							2	
Queuing Penalty (veh)							7	
Storage Bay Dist (m)		25.0		8.0		20.0		10.0
Storage Blk Time (%)	1	8	47	2	16	13	42	1
Queuing Penalty (veh)	4	8	7	1	72	51	12	2

Intersection: 10: Peter St

Movement	EB	WB	NB
Directions Served	TR	L	R
Maximum Queue (m)	2.3	20.3	21.0
Average Queue (m)	0.1	6.3	11.9
95th Queue (m)	1.2	16.1	18.3
Link Distance (m)	230.8	437.3	113.2
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (m)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Network Summary

Network wide Queuing Penalty: 306

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBT	SBL	SBT
Lane Configurations									
Traffic Volume (vph)	159	4	11	7	109	50	617	83	397
Future Volume (vph)	159	4	11	7	109	50	617	83	397
Lane Group Flow (vph)	0	163	11	0	116	50	634	83	469
Turn Type	Perm	NA	Perm	Perm	NA	Perm	NA	Perm	NA
Protected Phases		4			8		2		6
Permitted Phases	4		4	8		8		6	
Detector Phase	4	4	4	8	8	8	2	6	6
Switch Phase									
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Minimum Split (s)	22.5	22.5	22.5	22.5	22.5	22.5	22.5	22.5	22.5
Total Split (s)	22.5	22.5	22.5	22.5	22.5	22.5	37.5	37.5	37.5
Total Split (%)	37.5%	37.5%	37.5%	37.5%	37.5%	37.5%	62.5%	62.5%	62.5%
Maximum Green (s)	18.0	18.0	18.0	18.0	18.0	18.0	33.0	33.0	33.0
Yellow Time (s)	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Lost Time Adjust (s)		0.0	0.0		0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)		4.5	4.5		4.5	4.5	4.5	4.5	4.5
Lead/Lag									
Lead-Lag Optimize?									
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Recall Mode	None	None	None	None	None	None	C-Min	C-Min	C-Min
Walk Time (s)	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0
Flash Dont Walk (s)	11.0	11.0	11.0	11.0	11.0	11.0	11.0	11.0	11.0
Pedestrian Calls (#/hr)	0	0	0	0	0	0	0	0	0
Act Effct Green (s)		13.4	13.4		13.1	13.1	40.9	40.9	40.9
Actuated g/C Ratio		0.22	0.22		0.22	0.22	0.68	0.68	0.68
v/c Ratio		0.65	0.04		0.39	0.16	0.56	0.24	0.42
Control Delay		33.0	3.5		22.3	6.9	7.2	8.9	7.8
Queue Delay		0.0	0.0		0.0	0.0	0.5	0.0	0.0
Total Delay		33.0	3.5		22.4	6.9	7.7	8.9	7.8
LOS		C	A		C	A	A	A	A
Approach Delay		31.1			17.7		7.7		7.9
Approach LOS		C			B		A		A
Queue Length 50th (m)		16.2	0.0		10.8	0.0	26.2	3.6	22.0
Queue Length 95th (m)		30.2	1.6		20.8	6.2	41.0	12.4	48.6
Internal Link Dist (m)		416.4			109.6		48.0		644.4
Turn Bay Length (m)			8.0					100.0	
Base Capacity (vph)		336	391		410	404	1139	342	1110
Starvation Cap Reductn		0	0		0	0	176	0	0
Spillback Cap Reductn		0	13		13	0	0	0	19
Storage Cap Reductn		0	0		0	0	0	0	0
Reduced v/c Ratio		0.49	0.03		0.29	0.12	0.66	0.24	0.43

Intersection Summary

Cycle Length: 60
Actuated Cycle Length: 60
Offset: 27 (45%), Referenced to phase 2:NBT and 6:SBTL, Start of Green
Natural Cycle: 60

Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.65
Intersection Signal Delay: 11.5 — Intersection LOS: B
Intersection Capacity Utilization 67.7% — ICU Level of Service C
Analysis Period (min) 15

Splits and Phases: 3: Wilson St W & North St

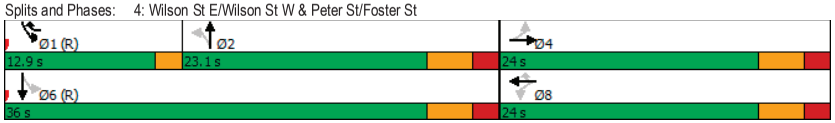
Lane Group	EBL	EBT	WBL	WBT	WBR	NBL	NBT	SBL	SBT
Lane Configurations									
Traffic Volume (vph)	95	206	7	46	343	5	30	284	57
Future Volume (vph)	95	206	7	46	343	5	30	284	57
Lane Group Flow (vph)	0	313	0	53	343	0	45	284	149
Turn Type	Perm	NA	Perm	NA	pm+ov	Perm	NA	pm+pt	NA
Protected Phases		4		8	1		2	1	6
Permitted Phases	4		8		8	2		6	
Detector Phase	4	4	8	8	1	2	2	1	6
Switch Phase									
Minimum Initial (s)	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0
Minimum Split (s)	24.0	24.0	24.0	24.0	12.0	23.1	23.1	12.0	23.1
Total Split (s)	24.0	24.0	24.0	24.0	12.9	23.1	23.1	12.9	36.0
Total Split (%)	40.0%	40.0%	40.0%	40.0%	21.5%	38.5%	38.5%	21.5%	60.0%
Maximum Green (s)	18.7	18.7	18.7	18.7	10.9	17.7	17.7	10.9	30.6
Yellow Time (s)	3.3	3.3	3.3	3.3	2.0	3.3	3.3	2.0	3.3
All-Red Time (s)	2.0	2.0	2.0	2.0	0.0	2.1	2.1	0.0	2.1
Lost Time Adjust (s)		0.0		0.0	0.0		0.0	0.0	0.0
Total Lost Time (s)		5.3		5.3	2.0		5.4	2.0	5.4
Lead/Lag					Lead	Lag	Lag	Lead	
Lead-Lag Optimize?									
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Recall Mode	None	None	None	None	C-Max	Min	Min	C-Max	C-Min
Walk Time (s)	12.0	12.0	12.0	12.0		12.0	12.0		12.0
Flash Dont Walk (s)	6.7	6.7	6.7	6.7		5.7	5.7		5.7
Pedestrian Calls (#/hr)	5	5	16	16		14	14		13
Act Effct Green (s)		16.7		16.7	39.1		11.5	36.0	32.6
Actuated g/C Ratio		0.28		0.28	0.65		0.19	0.60	0.54
v/c Ratio		0.77		0.12	0.32		0.15	0.32	0.17
Control Delay		33.6		12.0	1.0		16.7	13.6	10.1
Queue Delay		0.0		0.0	0.0		0.0	0.9	0.0
Total Delay		33.6		12.0	1.0		16.7	14.5	10.1
LOS		C		B	A		B	B	B
Approach Delay		33.6		2.5			16.7		13.0
Approach LOS		C		A			B		B
Queue Length 50th (m)		30.0		3.0	0.0		3.3	13.7	3.7
Queue Length 95th (m)		#60.9		6.0	0.0		8.8	49.7	25.2
Internal Link Dist (m)		428.5		110.6			117.1		48.0
Turn Bay Length (m)					15.0				
Base Capacity (vph)		462		523	1062		468	879	863
Starvation Cap Reductn		0		0	0		0	347	0
Spillback Cap Reductn		0		0	2		0	0	0
Storage Cap Reductn		0		0	0		0	0	0
Reduced v/c Ratio		0.68		0.10	0.32		0.10	0.53	0.17

Intersection Summary

Cycle Length: 60
Actuated Cycle Length: 60
Offset: 0 (0%), Referenced to phase 1:SBL and 6:SBTL, Start of Green, Master Intersection
Natural Cycle: 60

Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.77
Intersection Signal Delay: 15.0 Intersection LOS: B
Intersection Capacity Utilization 64.8% ICU Level of Service C
Analysis Period (min) 15
\# 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 4: Wilson St E/Wilson St W & Peter St/Foster St



Intersection	
Intersection Delay, s/veh	9.2
Intersection LOS	A

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	3	55	29	33	38	8	118	85	25	13	73	8
Future Vol, veh/h	3	55	29	33	38	8	118	85	25	13	73	8
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Heavy Vehicles, %	2	20	20	4	16	2	28	3	8	2	6	2
Mvmt Flow	3	55	29	33	38	8	118	85	25	13	73	8
Number of Lanes	0	1	0	0	1	0	0	1	0	0	1	0

Approach	EB	WB	NB	SB
Opposing Approach	WB	EB	SB	NB
Opposing Lanes	1	1	1	1
Conflicting Approach Left	SB	NB	EB	WB
Conflicting Lanes Left	1	1	1	1
Conflicting Approach Right	NB	SB	WB	EB
Conflicting Lanes Right	1	1	1	1
HCM Control Delay	8.3	8.5	10.2	8.3
HCM LOS	A	A	B	A

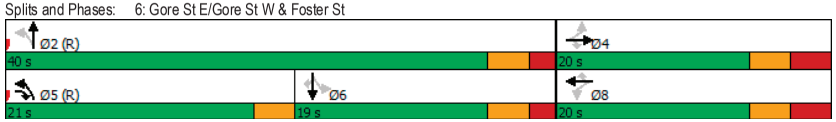
Lane	NBLn1	EBLn1	WBLn1	SBLn1
Vol Left, %	52%	3%	42%	14%
Vol Thru, %	37%	63%	48%	78%
Vol Right, %	11%	33%	10%	9%
Sign Control	Stop	Stop	Stop	Stop
Traffic Vol by Lane	228	87	79	94
LT Vol	118	3	33	13
Through Vol	85	55	38	73
RT Vol	25	29	8	8
Lane Flow Rate	228	87	79	94
Geometry Grp	1	1	1	1
Degree of Util (X)	0.312	0.112	0.107	0.12
Departure Headway (Hd)	4.919	4.637	4.893	4.589
Convergence, Y/N	Yes	Yes	Yes	Yes
Cap	730	772	732	780
Service Time	2.95	2.673	2.931	2.625
HCM Lane V/C Ratio	0.312	0.113	0.108	0.121
HCM Control Delay	10.2	8.3	8.5	8.3
HCM Lane LOS	B	A	A	A
HCM 95th-tile Q	1.3	0.4	0.4	0.4

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	SBL	SBT	SBR
Lane Configurations											
Traffic Volume (vph)	13	115	349	16	28	10	349	243	3	127	13
Future Volume (vph)	13	115	349	16	28	10	349	243	3	127	13
Lane Group Flow (vph)	0	128	349	0	44	10	349	259	0	130	13
Turn Type	Perm	NA	pm+ov	Perm	NA	Perm	pm+pt	NA	Perm	NA	Perm
Protected Phases		4	5		8		5	2		6	
Permitted Phases	4		4	8		8	2		6		6
Detector Phase	4	4	5	8	8	8	5	2	6	6	6
Switch Phase											
Minimum Initial (s)	10.0	10.0	4.0	4.0	4.0	4.0	4.0	10.0	10.0	10.0	10.0
Minimum Split (s)	20.0	20.0	9.0	20.0	20.0	20.0	9.0	15.0	19.0	19.0	19.0
Total Split (s)	20.0	20.0	21.0	20.0	20.0	20.0	21.0	40.0	19.0	19.0	19.0
Total Split (%)	33.3%	33.3%	35.0%	33.3%	33.3%	33.3%	35.0%	66.7%	31.7%	31.7%	31.7%
Maximum Green (s)	14.0	14.0	18.0	14.0	14.0	14.0	18.0	35.0	14.0	14.0	14.0
Yellow Time (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
All-Red Time (s)	3.0	3.0	0.0	3.0	3.0	3.0	0.0	2.0	2.0	2.0	2.0
Lost Time Adjust (s)		0.0	0.0		0.0	0.0	0.0	0.0		0.0	0.0
Total Lost Time (s)		6.0	3.0		6.0	6.0	3.0	5.0		5.0	5.0
Lead/Lag			Lead				Lead		Lag	Lag	Lag
Lead-Lag Optimize?											
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Recall Mode	None	None	C-Max	None	None	None	C-Max	C-Min	Min	Min	Min
Walk Time (s)	11.0	11.0		11.0	11.0	11.0		7.0	11.0	11.0	11.0
Flash Dont Walk (s)	3.0	3.0		3.0	3.0	3.0		3.0	3.0	3.0	3.0
Pedestrian Calls (#/hr)	14	14		28	28	28		14	15	15	15
Act Effct Green (s)		11.1	38.3		10.2	10.2	43.1	42.1		11.3	11.3
Actuated g/C Ratio		0.18	0.64		0.17	0.17	0.72	0.70		0.19	0.19
v/c Ratio		0.42	0.33		0.18	0.03	0.35	0.23		0.45	0.04
Control Delay		20.3	2.2		21.8	0.2	5.4	5.4		26.5	0.2
Queue Delay		0.0	0.0		0.0	0.0	0.0	0.0		0.0	0.0
Total Delay		20.3	2.2		21.8	0.2	5.4	5.4		26.5	0.2
LOS		C	A		C	A	A	A		C	A
Approach Delay		7.0			17.8			5.4		24.1	
Approach LOS		A			B			A		C	
Queue Length 50th (m)		12.1	0.0		4.2	0.0	12.1	9.4		13.1	0.0
Queue Length 95th (m)		m18.3	m12.0		10.7	0.0	27.8	22.1		25.0	0.0
Internal Link Dist (m)		110.6			119.1			270.3		48.4	
Turn Bay Length (m)			25.0			8.0					10.0
Base Capacity (vph)		386	1050		329	373	987	1126		361	411
Starvation Cap Reductn		0	0		0	0	0	0		0	0
Spillback Cap Reductn		0	0		0	0	0	0		0	0
Storage Cap Reductn		0	0		0	0	0	0		0	0
Reduced v/c Ratio		0.33	0.33		0.13	0.03	0.35	0.23		0.36	0.03

Intersection Summary
Cycle Length: 60
Actuated Cycle Length: 60
Offset: 26 (43%), Referenced to phase 2:NBTL and 5:NBL, Start of Green
Natural Cycle: 50

Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.45
Intersection Signal Delay: 8.6 Intersection LOS: A
Intersection Capacity Utilization 57.2% ICU Level of Service B
Analysis Period (min) 15
m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 6: Gore St E/Gore St W & Foster St



Intersection						
Int Delay, s/veh	3.8					

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	181	120	108	0	0	159
Future Vol, veh/h	181	120	108	0	0	159
Conflicting Peds, #/hr	0	4	4	0	4	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	0	-	-	0
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	100	100	100	100	100	100
Heavy Vehicles, %	2	30	4	2	9	12
Mvmt Flow	181	120	108	0	0	159

Major/Minor	Major1			Minor1	
Conflicting Flow All	0	0		-	245
Stage 1	-	-		-	-
Stage 2	-	-		-	-
Critical Hdwy	-	-		-	6.32
Critical Hdwy Stg 1	-	-		-	-
Critical Hdwy Stg 2	-	-		-	-
Follow-up Hdwy	-	-		-	3.408
Pot Cap-1 Maneuver	-	-		0	770
Stage 1	-	-		0	-
Stage 2	-	-		0	-
Platoon blocked, %	-	-			
Mov Cap-1 Maneuver	-	-		-	768
Mov Cap-2 Maneuver	-	-		-	-
Stage 1	-	-		-	-
Stage 2	-	-		-	-

Approach	EB	NB
HCM Control Delay, s	0	10.9
HCM LOS		B

Minor Lane/Major Mvmt	NBLn1	EBT	EBR
Capacity (veh/h)	768	-	-
HCM Lane V/C Ratio	0.207	-	-
HCM Control Delay (s)	10.9	-	-
HCM Lane LOS	B	-	-
HCM 95th %tile Q(veh)	0.8	-	-

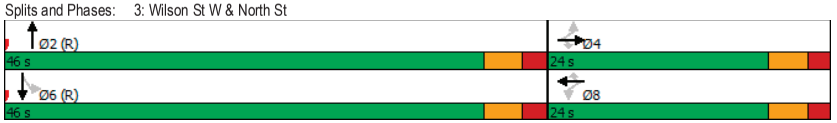
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBT	SBL	SBT
Lane Configurations									
Traffic Volume (vph)	100	3	20	5	326	93	584	171	574
Future Volume (vph)	100	3	20	5	326	93	584	171	574
Lane Group Flow (vph)	0	103	20	0	331	93	602	171	754
Turn Type	Perm	NA	Perm	Perm	NA	Perm	NA	Perm	NA
Protected Phases		4			8		2		6
Permitted Phases	4		4	8		8		6	
Detector Phase	4	4	4	8	8	8	2	6	6
Switch Phase									
Minimum Initial (s)	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0
Minimum Split (s)	24.0	24.0	24.0	24.0	24.0	24.0	23.1	23.1	23.1
Total Split (s)	24.0	24.0	24.0	24.0	24.0	24.0	46.0	46.0	46.0
Total Split (%)	34.3%	34.3%	34.3%	34.3%	34.3%	34.3%	65.7%	65.7%	65.7%
Maximum Green (s)	18.7	18.7	18.7	18.7	18.7	18.7	40.6	40.6	40.6
Yellow Time (s)	3.3	3.3	3.3	3.3	3.3	3.3	3.3	3.3	3.3
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0	2.0	2.1	2.1	2.1
Lost Time Adjust (s)		0.0	0.0		0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)		5.3	5.3		5.3	5.3	5.4	5.4	5.4
Lead/Lag									
Lead-Lag Optimize?									
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Recall Mode	None	None	None	None	None	None	C-Max	C-Max	C-Max
Walk Time (s)	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0
Flash Dont Walk (s)	6.7	6.7	6.7	6.7	6.7	6.7	5.7	5.7	5.7
Pedestrian Calls (#/hr)	3	3	3	0	0	0	12	15	15
Act Effct Green (s)		16.8	16.8		16.8	16.8	42.5	42.5	42.5
Actuated g/C Ratio		0.24	0.24		0.24	0.24	0.61	0.61	0.61
v/c Ratio		0.79	0.05		0.79	0.24	0.59	0.53	0.76
Control Delay		64.3	4.0		39.7	6.8	12.3	16.7	16.6
Queue Delay		0.0	0.0		0.0	0.0	1.8	0.0	0.0
Total Delay		64.3	4.0		39.7	6.8	14.1	16.7	16.6
LOS		E	A		D	A	B	B	B
Approach Delay		54.5			32.5		14.1		16.6
Approach LOS		D			C		B		B
Queue Length 50th (m)		12.2	0.0		39.2	0.0	54.0	12.5	64.9
Queue Length 95th (m)		#35.7	2.8		#72.2	9.6	84.8	32.6	#119.0
Internal Link Dist (m)		416.4			109.6		48.0		644.4
Turn Bay Length (m)			8.0					100.0	
Base Capacity (vph)		146	417		464	425	1024	320	998
Starvation Cap Reductn		0	0		0	0	257	0	0
Spillback Cap Reductn		0	0		0	0	0	0	0
Storage Cap Reductn		0	0		0	0	0	0	0
Reduced v/c Ratio		0.71	0.05		0.71	0.22	0.78	0.53	0.76

Intersection Summary

Cycle Length: 70
Actuated Cycle Length: 70
Offset: 65 (93%), Referenced to phase 2:NBT and 6:SBTL, Start of Green
Natural Cycle: 60

Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.79
Intersection Signal Delay: 21.4 Intersection LOS: C
Intersection Capacity Utilization 88.9% ICU Level of Service E
Analysis Period (min) 15
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 3: Wilson St W & North St



Lane Group	EBL	EBT	WBL	WBT	WBR	NBL	NBT	SBL	SBT
Lane Configurations									
Traffic Volume (vph)	110	137	24	32	417	11	76	407	82
Future Volume (vph)	110	137	24	32	417	11	76	407	82
Lane Group Flow (vph)	0	261	0	56	417	0	110	407	206
Turn Type	Perm	NA	Perm	NA	pm+ov	Perm	NA	pm+pt	NA
Protected Phases		4		8	1		2	1	6
Permitted Phases	4		8		8	2		6	
Detector Phase	4	4	8	8	1	2	2	1	6
Switch Phase									
Minimum Initial (s)	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0
Minimum Split (s)	24.0	24.0	24.0	24.0	12.0	23.1	23.1	12.0	23.1
Total Split (s)	25.0	25.0	25.0	25.0	21.9	23.1	23.1	21.9	45.0
Total Split (%)	35.7%	35.7%	35.7%	35.7%	31.3%	33.0%	33.0%	31.3%	64.3%
Maximum Green (s)	19.7	19.7	19.7	19.7	19.9	17.7	17.7	19.9	39.6
Yellow Time (s)	3.3	3.3	3.3	3.3	2.0	3.3	3.3	2.0	3.3
All-Red Time (s)	2.0	2.0	2.0	2.0	0.0	2.1	2.1	0.0	2.1
Lost Time Adjust (s)		0.0		0.0	0.0		0.0	0.0	0.0
Total Lost Time (s)		5.3		5.3	2.0		5.4	2.0	5.4
Lead/Lag					Lead	Lag	Lag	Lead	
Lead-Lag Optimize?									
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Recall Mode	None	None	None	None	C-Max	Min	Min	C-Max	C-Min
Walk Time (s)	12.0	12.0	12.0	12.0		12.0	12.0		12.0
Flash Dont Walk (s)	6.7	6.7	6.7	6.7		5.7	5.7		5.7
Pedestrian Calls (#/hr)	11	11	13	13		14	14		9
Act Effct Green (s)		17.1		17.1	48.8		11.8	45.6	42.2
Actuated g/C Ratio		0.24		0.24	0.70		0.17	0.65	0.60
v/c Ratio		0.77		0.16	0.37		0.39	0.43	0.21
Control Delay		39.7		24.7	1.3		25.2	2.6	0.6
Queue Delay		0.8		0.0	0.3		0.0	0.5	0.5
Total Delay		40.5		24.7	1.6		25.3	3.2	1.1
LOS		D		C	A		C	A	A
Approach Delay		40.5		4.3			25.3		2.5
Approach LOS		D		A			C		A
Queue Length 50th (m)		30.5		5.3	0.0		11.1	6.3	0.5
Queue Length 95th (m)		#58.7		14.2	2.5		21.5	m3.2	m0.2
Internal Link Dist (m)		428.5		110.6			117.1		48.0
Turn Bay Length (m)					15.0				
Base Capacity (vph)		396		416	1141		412	944	985
Starvation Cap Reductn		0		0	0		0	220	438
Spillback Cap Reductn		25		0	245		3	0	0
Storage Cap Reductn		0		0	0		0	0	0
Reduced v/c Ratio		0.70		0.13	0.47		0.27	0.56	0.38

Intersection Summary

Cycle Length: 70
Actuated Cycle Length: 70
Offset: 0 (0%), Referenced to phase 1:SBL and 6:SBTL, Start of Green, Master Intersection
Natural Cycle: 60

Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.77
Intersection Signal Delay: 11.6 Intersection LOS: B
Intersection Capacity Utilization 66.7% ICU Level of Service C
Analysis Period (min) 15
\# 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.
m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 4: Wilson St E/Wilson St W & Peter St/Foster St

Intersection	
Intersection Delay, s/veh	17.1
Intersection LOS	C

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	3	52	154	44	132	19	321	115	27	13	92	20
Future Vol, veh/h	3	52	154	44	132	19	321	115	27	13	92	20
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Heavy Vehicles, %	2	8	16	8	12	2	19	5	2	6	2	2
Mvmt Flow	3	52	154	44	132	19	321	115	27	13	92	20
Number of Lanes	0	1	0	0	1	0	0	1	0	0	1	0

Approach	EB	WB	NB	SB
Opposing Approach	WB	EB	SB	NB
Opposing Lanes	1	1	1	1
Conflicting Approach Left	SB	NB	EB	WB
Conflicting Lanes Left	1	1	1	1
Conflicting Approach Right	NB	SB	WB	EB
Conflicting Lanes Right	1	1	1	1
HCM Control Delay	11.4	12.3	23.4	10.6
HCM LOS	B	B	C	B

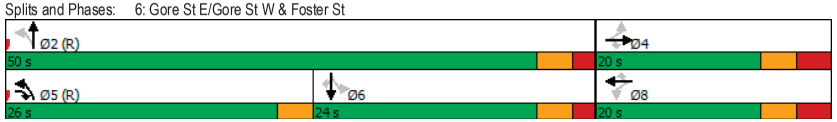
Lane	NBLn1	EBLn1	WBLn1	SBLn1
Vol Left, %	69%	1%	23%	10%
Vol Thru, %	25%	25%	68%	74%
Vol Right, %	6%	74%	10%	16%
Sign Control	Stop	Stop	Stop	Stop
Traffic Vol by Lane	463	209	195	125
LT Vol	321	3	44	13
Through Vol	115	52	132	92
RT Vol	27	154	19	20
Lane Flow Rate	463	209	195	125
Geometry Grp	1	1	1	1
Degree of Util (X)	0.739	0.326	0.333	0.207
Departure Headway (Hd)	5.747	5.621	6.15	5.966
Convergence, Y/N	Yes	Yes	Yes	Yes
Cap	625	635	581	598
Service Time	3.803	3.699	4.228	4.049
HCM Lane V/C Ratio	0.741	0.329	0.336	0.209
HCM Control Delay	23.4	11.4	12.3	10.6
HCM Lane LOS	C	B	B	B
HCM 95th-tile Q	6.4	1.4	1.5	0.8

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	SBL	SBT	SBR
Lane Configurations											
Traffic Volume (vph)	14	78	467	19	52	14	389	416	3	245	29
Future Volume (vph)	14	78	467	19	52	14	389	416	3	245	29
Lane Group Flow (vph)	0	92	467	0	71	14	389	442	0	248	29
Turn Type	Perm	NA	pm+ov	Perm	NA	Perm	pm+pt	NA	Perm	NA	Perm
Protected Phases		4	5		8		5	2		6	
Permitted Phases	4		4	8		8	2		6		6
Detector Phase	4	4	5	8	8	8	5	2	6	6	6
Switch Phase											
Minimum Initial (s)	10.0	10.0	4.0	4.0	4.0	4.0	4.0	10.0	10.0	10.0	10.0
Minimum Split (s)	20.0	20.0	9.0	20.0	20.0	20.0	9.0	15.0	19.0	19.0	19.0
Total Split (s)	20.0	20.0	26.0	20.0	20.0	20.0	26.0	50.0	24.0	24.0	24.0
Total Split (%)	28.6%	28.6%	37.1%	28.6%	28.6%	28.6%	37.1%	71.4%	34.3%	34.3%	34.3%
Maximum Green (s)	14.0	14.0	23.0	14.0	14.0	14.0	23.0	45.0	19.0	19.0	19.0
Yellow Time (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
All-Red Time (s)	3.0	3.0	0.0	3.0	3.0	3.0	0.0	2.0	2.0	2.0	2.0
Lost Time Adjust (s)		0.0	0.0		0.0	0.0	0.0	0.0		0.0	0.0
Total Lost Time (s)		6.0	3.0		6.0	6.0	3.0	5.0		5.0	5.0
Lead/Lag			Lead				Lead		Lag	Lag	Lag
Lead-Lag Optimize?											
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Recall Mode	None	None	C-Max	None	None	None	C-Max	C-Min	Min	Min	Min
Walk Time (s)	11.0	11.0		11.0	11.0	11.0		7.0	11.0	11.0	11.0
Flash Dont Walk (s)	3.0	3.0		3.0	3.0	3.0		3.0	3.0	3.0	3.0
Pedestrian Calls (#/hr)	1	1		26	26	26		26	31	31	31
Act Effct Green (s)		11.6	44.5		10.7	10.7	52.6	51.6		15.1	15.1
Actuated g/C Ratio		0.17	0.64		0.15	0.15	0.75	0.74		0.22	0.22
v/c Ratio		0.35	0.46		0.32	0.05	0.41	0.37		0.69	0.08
Control Delay		24.3	5.8		29.1	0.4	5.4	5.9		35.5	0.4
Queue Delay		0.0	0.0		0.0	0.0	0.0	0.0		0.0	0.0
Total Delay		24.3	5.8		29.1	0.4	5.4	5.9		35.5	0.4
LOS		C	A		C	A	A	A		D	A
Approach Delay		8.8			24.4			5.7		31.8	
Approach LOS		A			C			A		C	
Queue Length 50th (m)		9.6	13.5		8.5	0.0	14.0	18.7		29.9	0.0
Queue Length 95th (m)		m18.7	31.0		18.1	0.0	30.4	39.6		48.7	0.0
Internal Link Dist (m)		110.6			119.1			270.3		48.4	
Turn Bay Length (m)			25.0			8.0					10.0
Base Capacity (vph)		318	1010		288	331	951	1201		448	422
Starvation Cap Reductn		0	0		0	0	0	0		0	0
Spillback Cap Reductn		0	0		0	0	0	0		0	0
Storage Cap Reductn		0	0		0	0	0	0		0	0
Reduced v/c Ratio		0.29	0.46		0.25	0.04	0.41	0.37		0.55	0.07

Intersection Summary
Cycle Length: 70
Actuated Cycle Length: 70
Offset: 49 (70%), Referenced to phase 2:NBTL and 5:NBL, Start of Green
Natural Cycle: 55

Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.69
Intersection Signal Delay: 11.7 Intersection LOS: B
Intersection Capacity Utilization 68.4% ICU Level of Service C
Analysis Period (min) 15
m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 6: Gore St E/Gore St W & Foster St



Intersection						
Int Delay, s/veh	4.8					

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	110	78	143	0	0	171
Future Vol, veh/h	110	78	143	0	0	171
Conflicting Peds, #/hr	0	1	1	0	4	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	0	-	-	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	110	78	143	0	0	171

Major/Minor	Major1			Minor1	
Conflicting Flow All	0	0		-	150
Stage 1	-	-		-	-
Stage 2	-	-		-	-
Critical Hdwy	-	-		-	6.22
Critical Hdwy Stg 1	-	-		-	-
Critical Hdwy Stg 2	-	-		-	-
Follow-up Hdwy	-	-		-	3.318
Pot Cap-1 Maneuver	-	-		0	896
Stage 1	-	-		0	-
Stage 2	-	-		0	-
Platoon blocked, %	-	-			
Mov Cap-1 Maneuver	-	-		-	895
Mov Cap-2 Maneuver	-	-		-	-
Stage 1	-	-		-	-
Stage 2	-	-		-	-

Approach	EB	NB
HCM Control Delay, s	0	10
HCM LOS		B

Minor Lane/Major Mvmt	NBLn1	EBT	EBR
Capacity (veh/h)	895	-	-
HCM Lane V/C Ratio	0.191	-	-
HCM Control Delay (s)	10	-	-
HCM Lane LOS	B	-	-
HCM 95th %tile Q(veh)	0.7	-	-

Appendix G

Traffic Signal Warrants

CGH TRANSPORTATION

Gore Street W & North Street
Existing

Justification #7

Justification	Description	Minimum Requirement 1 Lane Highway		Minimum Requirement 2 or More Lanes		Compliance Sectional		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	231	32%	32%	No
	B. Vehicle volume, along minor streets (average hour)	120	170	120	170	92	54%		
2. Delay to Cross Traffic	A. Vehicle volumes, major street (average hour)	480	720	600	900	139	19%	19%	No
	B. Combined vehicle and pedestrian volume crossing artery from minor streets (average hour)	50	75	50	75	43	58%		

Notes
1. Refer to OTM Book 12, pg 92, Mar 2012
2. Lowest section percentage governs justification
3. Average hourly volumes estimated from peak hour volumes, AHV = PM/2 or (AM + PM) / 4, including amplifcation factors
4. T-intersection factor corrected, applies only to 1B

Gore Street W & North Street
2041 Future Background

Justification #7

Justification	Description	Minimum Requirement 1 Lane Highway		Minimum Requirement 2 or More Lanes		Compliance Sectional		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	239	33%	33%	No
	B. Vehicle volume, along minor streets (average hour)	120	170	120	170	94	55%		
2. Delay to Cross Traffic	A. Vehicle volumes, major street (average hour)	480	720	600	900	145	20%	20%	No
	B. Combined vehicle and pedestrian volume crossing artery from minor streets (average hour)	50	75	50	75	48	63%		

Notes
1. Refer to OTM Book 12, pg 92, Mar 2012
2. Lowest section percentage governs justification
3. Average hourly volumes estimated from peak hour volumes, AHV = PM/2 or (AM + PM) / 4, including amplifcation factors
4. T-intersection factor corrected, applies only to 1B

Gore Street W & North Street
2041 Future Total

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	370	51%	51%	No
	B. Vehicle volume, along minor streets (average hour)	120	170	120	170	143	84%		
2. Delay to Cross Traffic	A. Vehicle volumes, major street (average hour)	480	720	600	900	228	32%	32%	No
	B. Combined vehicle and pedestrian volume crossing artery from minor streets (average hour)	50	75	50	75	63	84%		

Notes
1. Refer to OTM Book 12, pg 92, Mar 2012
2. Lowest section percentage governs justification
3. Average hourly volumes estimated from peak hour volumes, AHV = PM/2 or (AM + PM) / 4, including amplifcation factors
4. T-intersection factor corrected, applies only to 1B

Wilson St W & North St
Existing

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	469	52%	30%	No
	B. Vehicle volume, along minor streets (average hour)	120	170	120	170	52	30%		
2. Delay to Cross Traffic	A. Vehicle volumes, major street (average hour)	480	720	600	900	418	46%	13%	No
	B. Combined vehicle and pedestrian volume crossing artery from minor streets (average hour)	50	75	50	75	10	13%		

Notes
1. Refer to OTM Book 12, pg 92, Mar 2012
2. Lowest section percentage governs justification
3. Average hourly volumes estimated from peak hour volumes, AHV = PM/2 or (AM + PM) / 4, including amplifcation factors
4. T-intersection factor corrected, applies only to 1B

Wilson St W & North St
Future Background 2041

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	643	71%	31%	No
	B. Vehicle volume, along minor streets (average hour)	120	170	120	170	53	31%		
2. Delay to Cross Traffic	A. Vehicle volumes, major street (average hour)	480	720	600	900	590	66%	10%	No
	B. Combined vehicle and pedestrian volume crossing artery from minor streets (average hour)	50	75	50	75	8	10%		

Notes
1. Refer to OTM Book 12, pg 92, Mar 2012
2. Lowest section percentage governs justification
3. Average hourly volumes estimated from peak hour volumes, AHV = PM/2 or (AM + PM) / 4, including amplifcation factors
4. T-intersection factor corrected, applies only to 1B

Wilson St W & North St
Future Total 2041

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	862	120%	120%	No
	B. Vehicle volume, along minor streets (average hour)	120	170	120	170	222	130%		
2. Delay to Cross Traffic	A. Vehicle volumes, major street (average hour)	480	720	600	900	640	89%	89%	No
	B. Combined vehicle and pedestrian volume crossing artery from minor streets (average hour)	50	75	50	75	177	235%		

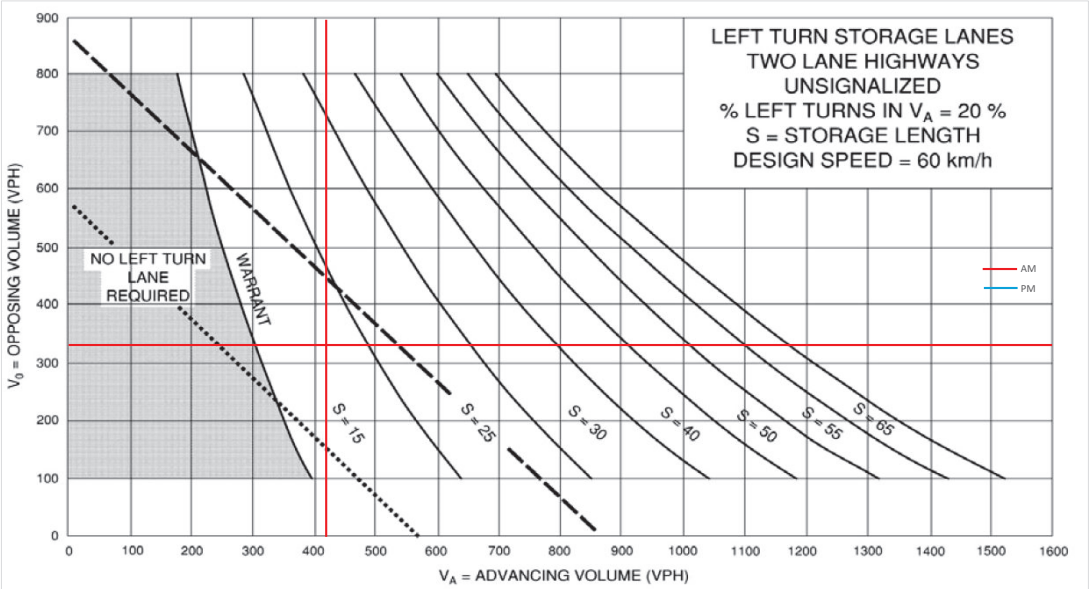
Notes
1. Refer to OTM Book 12, pg 92, Mar 2012
2. Lowest section percentage governs justification
3. Average hourly volumes estimated from peak hour volumes, AHV = PM/2 or (AM + PM) / 4, including amplifcation factors
4. T-intersection factor corrected, applies only to 1B

Appendix H

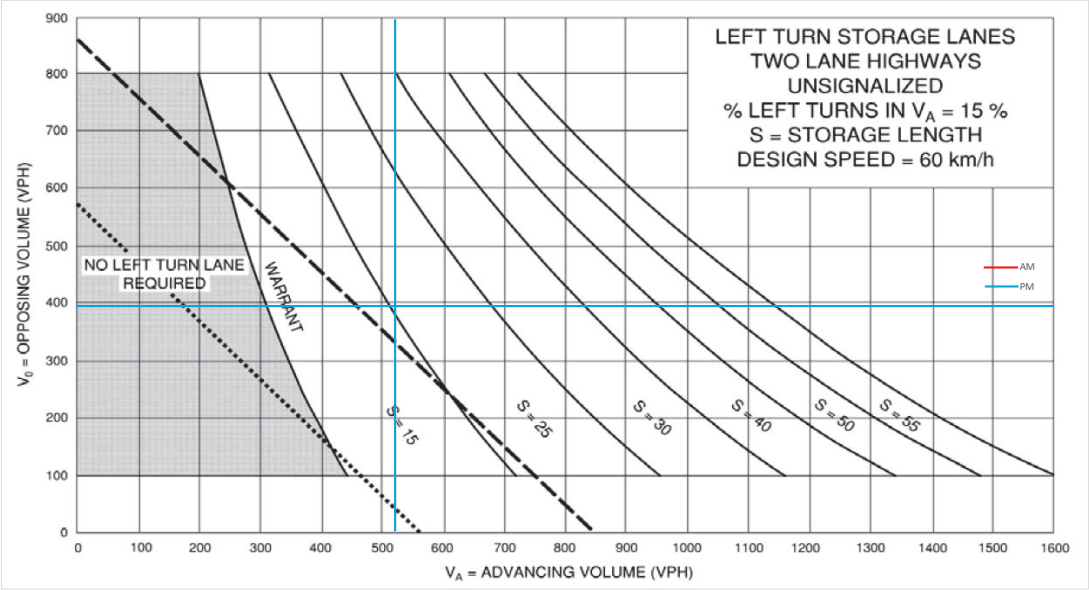
Left-turn Lane Warrants

CGH TRANSPORTATION

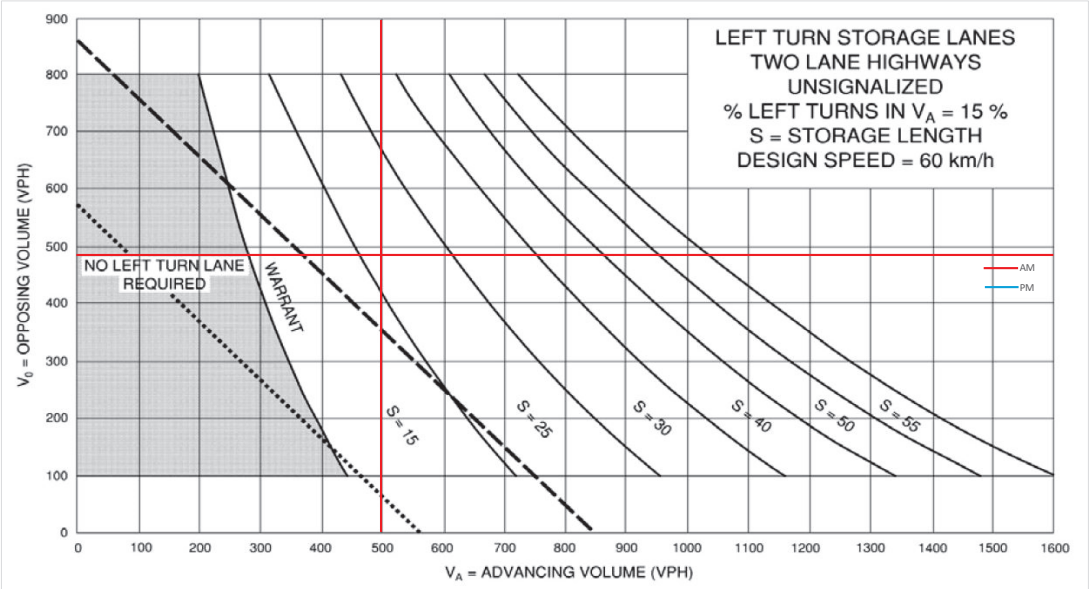
Existing - Southbound Left



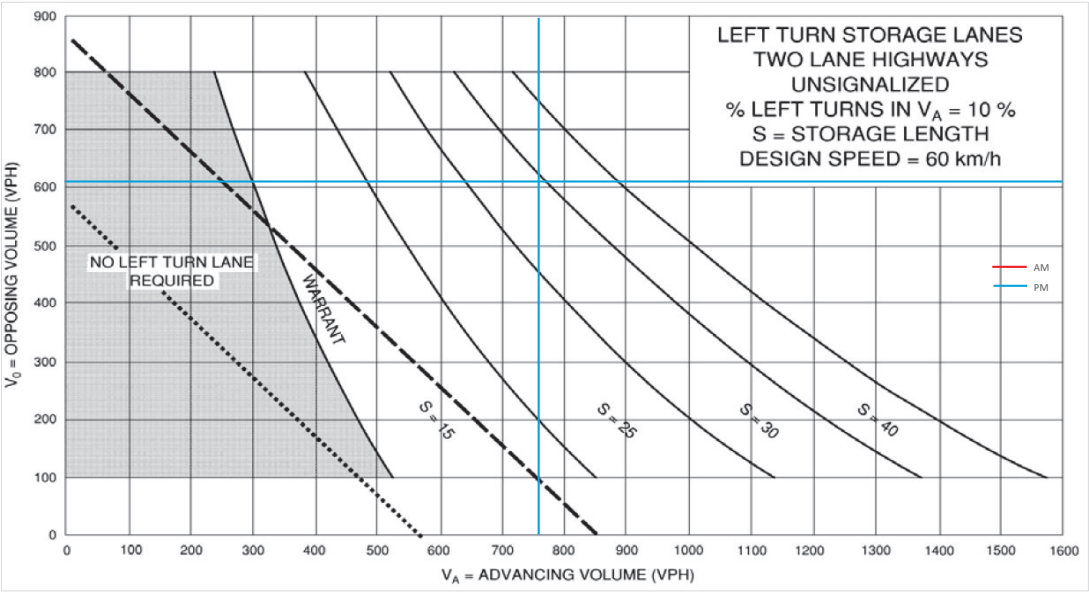
Existing - Southbound Left



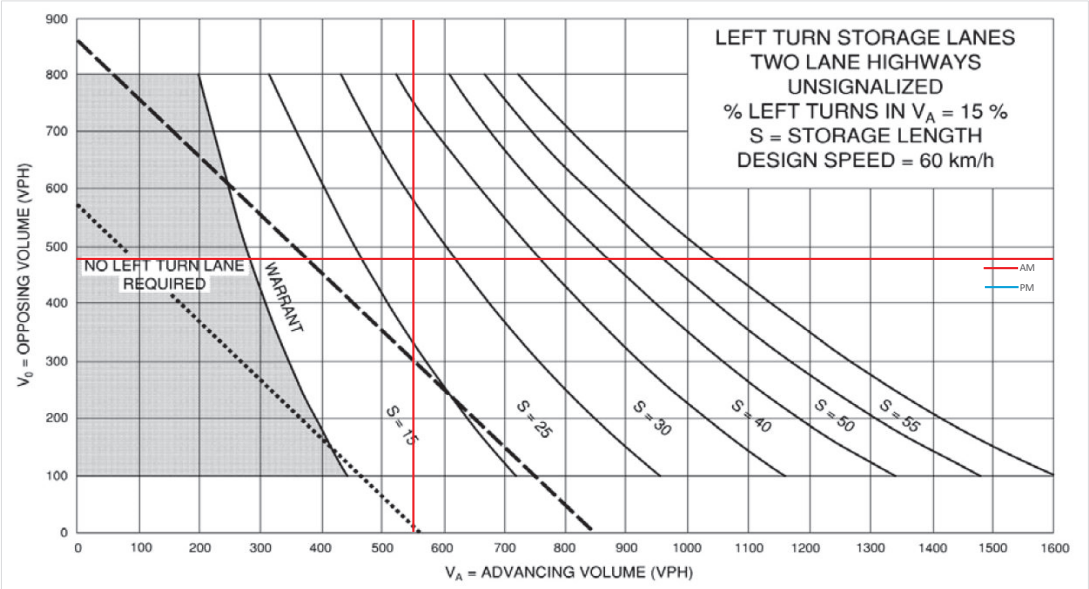
Future Background 2041 - Southbound Left



Future Background 2041 - Southbound Left



Future Total 2041 - Southbound Left



Future Total 2041 - Southbound Left