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URBANDALE CONSTRUCTION LTD.

130 Huntmar Drive

Transportation Impact Assessment (TIA)

May 2021 – 19-1698

Certification

I have reviewed and have a sound understanding of the objectives, needs, and requirements of the City of Ottawa's Official Plan and the Transportation Impact Assessment (2017) Guidelines;

I have a sound knowledge of industry standard practice with respect to the presentation of transportation impact assessment reports, including multimodal level of service review;

I have substantial experience (more than 5 years) in undertaking and delivering transportation impact studies (analysis, reporting and geometric design) with strong background knowledge in transportation planning, engineering, or traffic operations; and,

I am either a licensed or registered professional in good standing, whose field of expertise is either transportation engineering or transportation planning.

Signature of individual certifier that s/he meets the above four criteria.

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Table of Contents

Figures

Tables

Appendices

1.0 Screening

1.1 Description of Proposed Development

Municipal Address	130 Huntmar Drive, located in the North-East quadrant of the Huntmar Drive / Maple Grove Road intersection in Kanata West.	
Description of Location	The proposed development will be a mixed-use concept, consistent with the Official Plan and the Kanata West Concept Plan. The site will include commercial lands adjacent to the planned Maple Grove Rapid Transit Station with low and medium density residential along the Rapid Transit corridor. There is a school planned at the corner of Huntmar Drive and Maple Grove Road.	
Ward	Ward 6 - Stittsville	
Land Use Classification	Residential (low and medium density) Commercial School Park	
Development Size	235,568 m^2 Total Size	
	30 000 ft^2 of retail (2,790 m^2) School – 23,941 m2 (2.4 Ha.) Park – 10,655 m2 (1.1 Ha.)	~79 Single family homes ~162 Townhomes ~512 Stacked townhomes
Number of accesses and locations	Huntmar Drive - 3 accesses Maple Grove Road - 3 accesses	
Phases of development	One phase	
Build-out year	2024	

1.2 Trip Generation Trigger

Land Use Type	Minimum Development Size	Yes	No
Single-family homes	40 units	x	
Townhomes or apartments	90 units	x	
Office	3,500 sq.m.		x
Industrial	5,000 sq.m.		x
Fast-food restaurant or coffee shop	100 sq.m.		x
Destination retail	1,000 sq.m.		x
Gas station or convenience market	75 sq.m.		x
Other	60 person trips or more during weekday peak hours	x	

1.3 Location Triggers

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

1.4 Safety Triggers

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

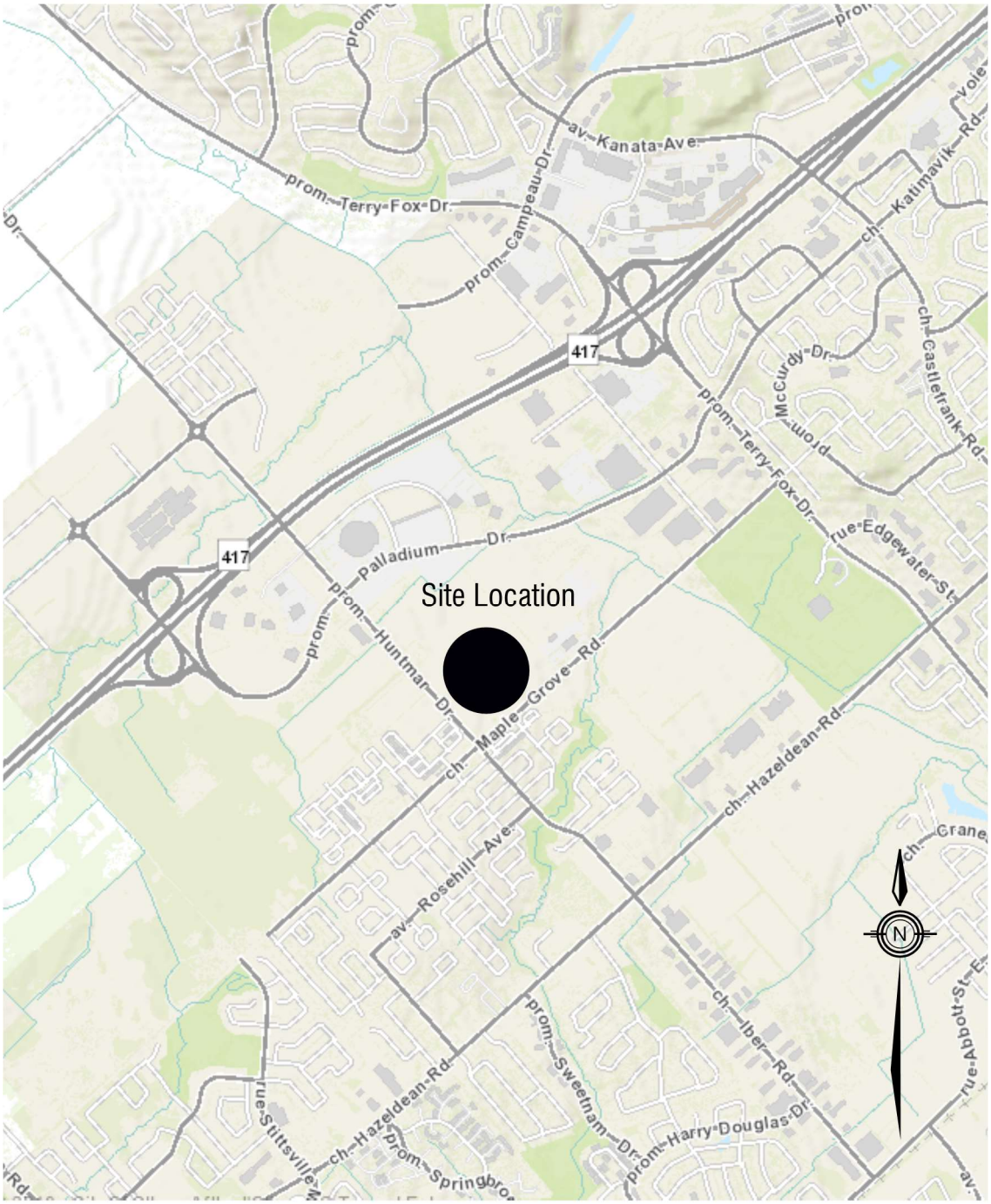
Note that it is unknown at this time where institutional land-use driveways will be located. The site is located in close proximity to the signalized intersection of Maple Grove Road and Huntmar Drive.

1.5 Summary

	Yes	No
Does the development satisfy the Trip Generation Trigger?	x	
Does the development satisfy the Location Trigger?	x	
Does the development satisfy the Safety Trigger?		x

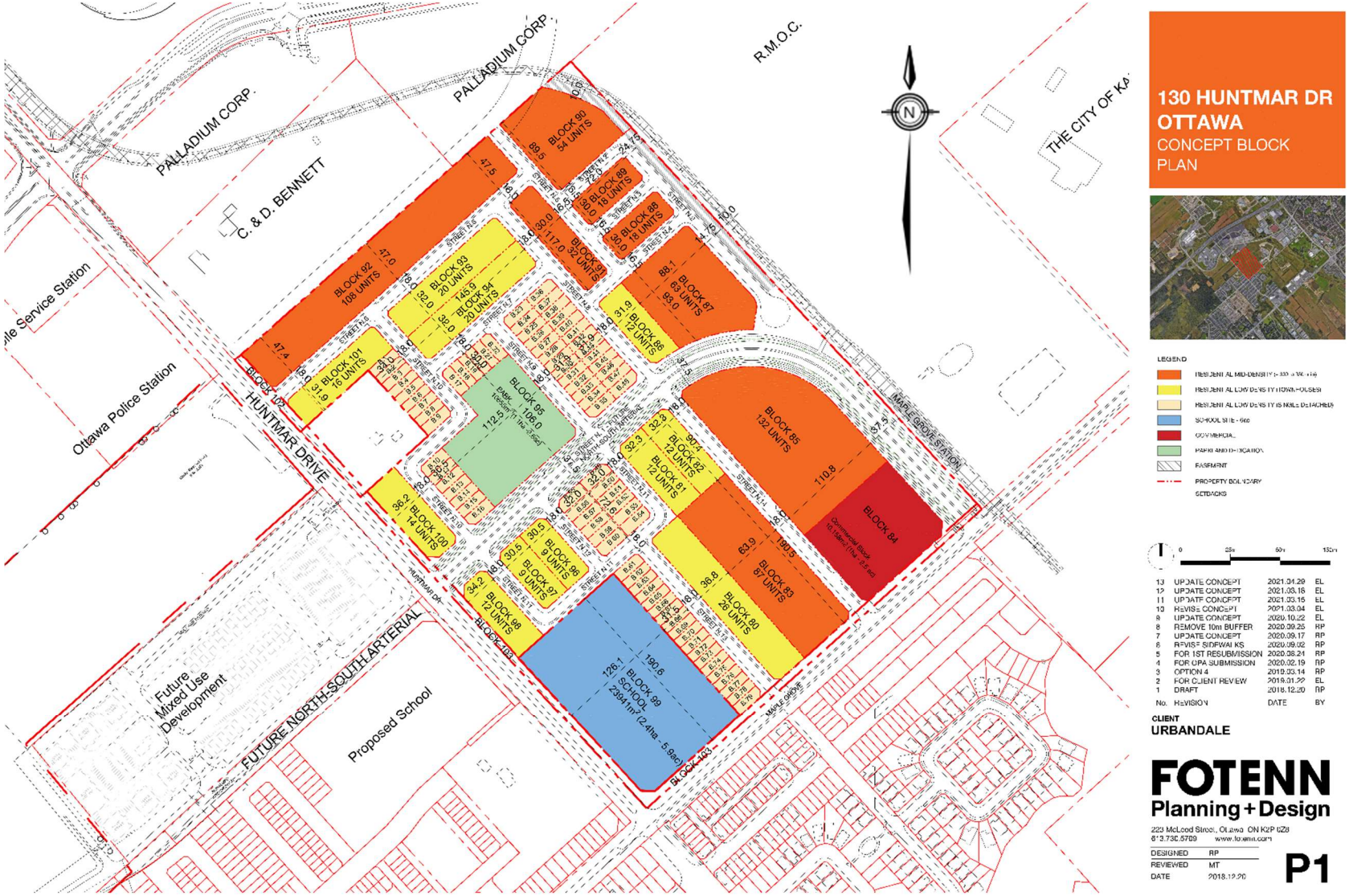
Since the development satisfies the Trip Generation and Location Triggers, the network impact component will be addressed in the TIA. **Figure 1** illustrates the site location, **Figure 2** shows the various land uses.

Figure 1: Site Location



Background image source: geoOttawa, accessed October 25, 2019

Figure 2: Land Use Plan (Fotenn, April 2021)



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2.0 Scoping

2.1 Existing and Planned Conditions

2.1.1 Proposed Development

The proposed development, 130 Huntmar Drive, is within the Kanata West Secondary Plan area, a Western suburb of Ottawa located approximately one kilometre South of Highway 417. The site is bound by Palladium Drive to the North, the planned LRT corridor to the east, Maple Grove Road to the South, and Huntmar Drive to the West.

The proposed development is to be constructed on vacant lands, and will include a mix of residential and commercial land uses as well as a school.

The right-of-way (ROW) protection for Huntmar Drive and Maple Grove Road is 37.5 metres. A future arterial roadway (called herein as the North-South Arterial) will travel through the site as Street 1, transitioning from a north-south alignment to an east-west alignment. The ultimate configuration includes two lanes per direction; however, this road will initially be built with one lane per direction until such time as capacity improvements are required (anticipated to be beyond planning horizon of this TIA). All other internal roadways will consist of local roads, mostly with a ROW protection of between 16.5 metres and 18 metres as per ROW protection requirements for the City of Ottawa.

It has been assumed that by 2029, the North-South Arterial will be extended west of 130 Huntmar Drive to serve adjacent developments, discussed in **Section 2.1.3.4**.

The proposed development was illustrated in **Figure 2**.

The ultimate plan for the North-South Arterial, beyond the planning horizon, includes:

- Four-lane roadway to support ultimate vehicle demand;
- Signalization of the intersection at Street 9 / 11 to facilitate pedestrian and cycling connectivity; and,
- Extensions of the North-South Arterial, south and west of the study area.

This TIA represents the development in 2024 and 2029 under the following conditions:

- Two-lane roadway to support projected vehicle demand up to 2029;
- All-way stop control at the intersection of Street 1 at Street 9 / 11 to facilitate pedestrian and cycling connectivity; and,
- Extensions of the North-South Arterial west of the study area.

2.1.2 Existing Conditions

2.1.2.1 Roads and Traffic Control

The roadways under consideration in the vicinity of the study area are described as follows:

Table 1: Existing Area Roads

Road	Description	Posted Speed
Huntmar Drive	Huntmar Drive Road is two-lane municipally-owned Arterial road running North-South, bordering the proposed development on the West side. Huntmar Drive connects to the Highway 417 via Palladium Drive.	50 km/h
Maple Grove Road	Maple Grove Road is a two-lane municipally-owned Major Arterial running East-West from Alon Street in Stittsville to Young's Farm Way with connections to Huntmar Drive and Terry Fox Drive. West of Huntmar Drive this road operates as a collector roadway.	50 km/h
Terry Fox Drive	Terry Fox Drive is a four-lane, divided, municipally-owned road running North-South from Herzberg Road to Eagleson Road, where it becomes Hope Side Road. It is classified as a Major Collector East of March Road and as an Arterial West to Hope Side Road.	70 km/h
Palladium Drive	Palladium Drive is a four-lane, divided, municipally-owned Arterial road running East-West from Campeau Drive to Terry Fox Drive.	70 km/h
Hazeldean Road	Hazeldean Road is a is a four-lane, divided, municipally-owned Arterial road running West to East from Spruce Ridge Road (West of Highway 417) Market to Eagleson Road. It is located South of the proposed development.	60 km/h

Figure 3 shows the road classification in the study area.

2.1.2.2 Walking and Cycling

Figure 4 illustrates the pedestrian and cycling facilities in the study area. Sidewalks exist along both sides of Palladium Drive, Huntmar Drive (South of Maple Grove Road), and Hazeldean Road. There are sidewalks on the South side of Maple Grove Road from Huntmar Drive to 90 metres east of Rosehill Avenue.

The City's 2013 Transportation Master Plan (TMP) identifies Terry Fox Drive, Hazeldean Road and Huntmar Drive as part of the Cycling Network as Spine Routes. Existing cycling facilities include a bike lane along the East side of Huntmar Drive between Maple Grove Road and Palladium Drive. The west side of Huntmar Drive has a paved shoulder. Other major pathways exist in the area connecting various roadways.

Figure 3: Urban Road Network

Background image source: geoOttawa, accessed October 25, 2019

Figure 4: Existing Walking and Cycling Facilities

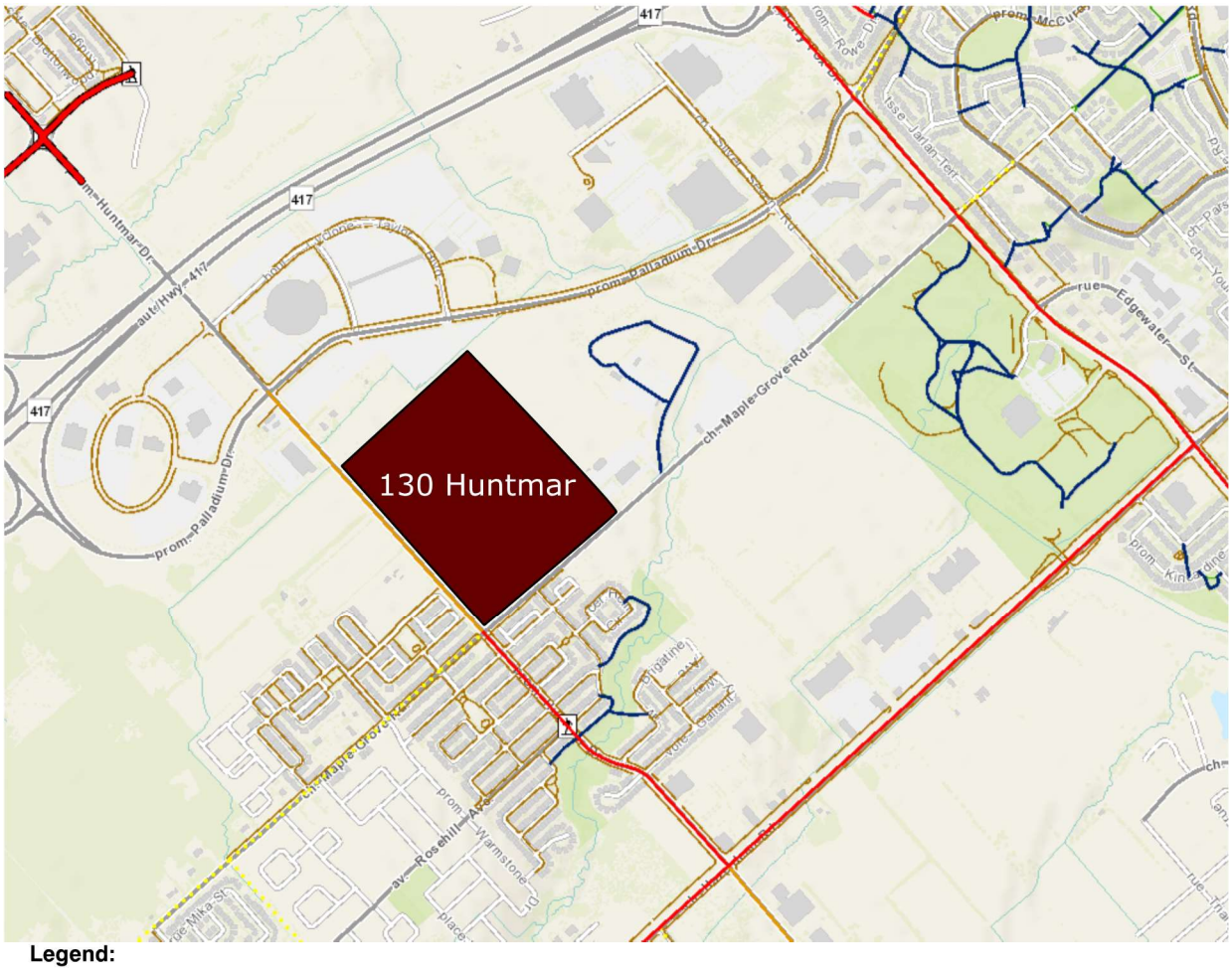


Image source: geoOttawa, accessed November 27, 2019

2.1.2.3 Transit

Figure 5 shows the existing transit service near the proposed development. Existing transit services operate 7 days / week in all time periods along Huntmar Drive and Palladium Drive with convenient access to the O-Train. Transit services operate at headways between 15 minutes and 60 minutes near the site location. Route numbers along with respective transit operation information can be found in **Table 2.**

The TRANS Committee's 2011 *NCR Household Origin-Destination Survey* (O-D Survey) indicates that within the Kanata/ Stittsville district, approximately 46% of residents make trips destined outside of the area during the AM peak period and 34% of trips originating elsewhere conclude within the Kanata / Stittsville district.

Furthermore, approximately 24% of residents originating from the Kanata / Stittsville district during the AM Peak Hour use transit as their primary mode of transportation, compared to 59% using a personal vehicle. Approximately 21% of residents destined to the Kanata / Stittsville district during the PM peak hour use transit, compared to 61% that use a personal vehicle. Roughly 4% of residents travelling within the Kanata / Stittsville district (internal trips) use transit as their primary travel mode during the AM peak period, compared to 2% during the PM peak period.

Table 2: Existing Transit Routes

Route	Stop Location	Destination	Service Hours	Headway (Minutes)
62	Huntmar / Maple Grove	Tunney's Pasture (O-Train Confederation Line)	07:00 - 23:59	30
261	Huntmar / Maple Grove	Tunney's Pasture (O-Train Confederation Line)	06:00 - 08:00	20
263	Huntmar / Maple Grove	Tunney's Pasture (O-Train Confederation Line)	06:00 - 08:00	20
162	Huntmar / Maple Grove	Tanger Outlets and Kanata Centrum	14:00 - 00:00	60
88	Terry Fox / Maple Grove	Hurdman Station	05:00 - 13:00	15

Figure 5: Existing Transit Service

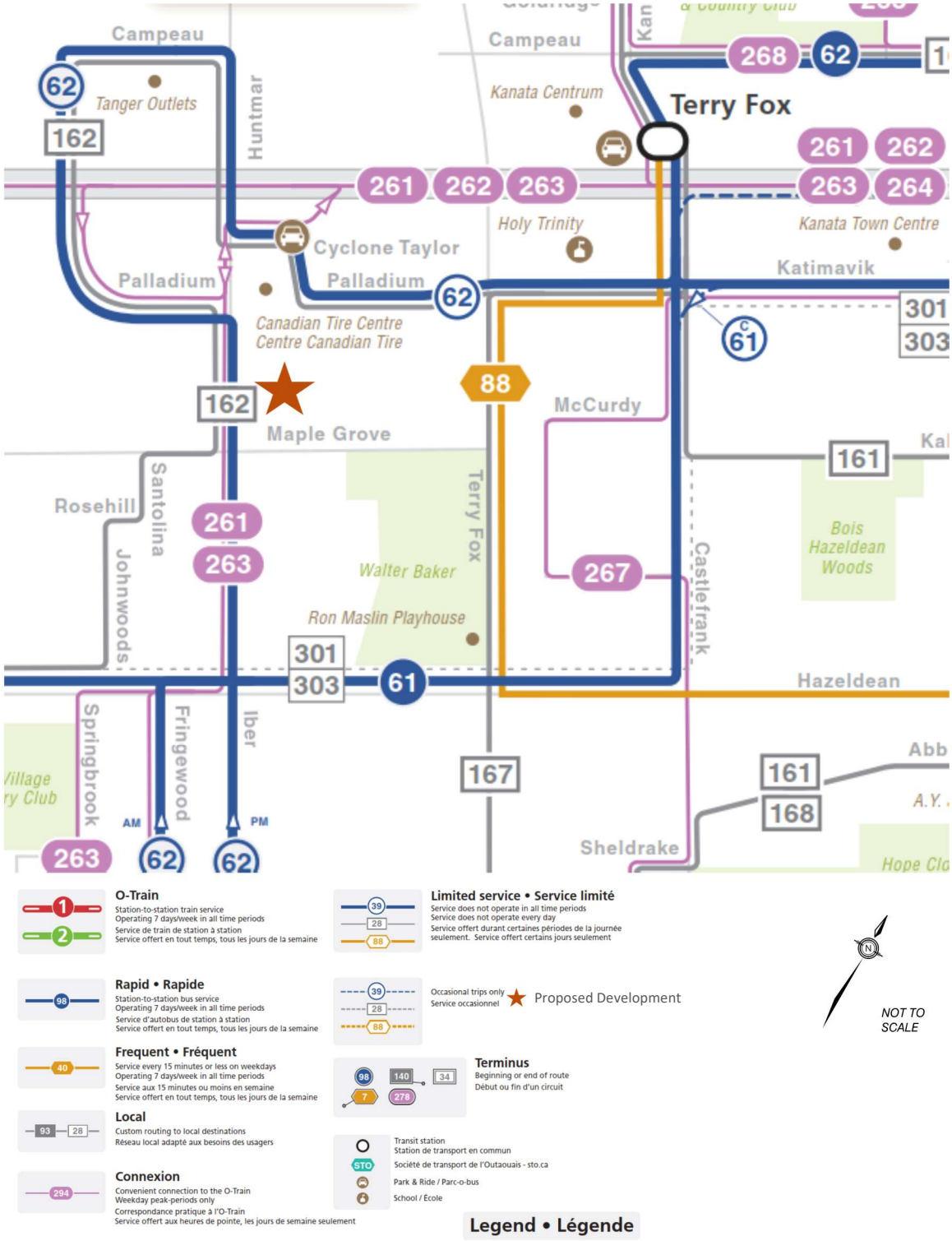


Image source: Except from OC Transpo, accessed November 27, 2019

2.1.2.4 Traffic Management Measures

There are no traffic management measures in the study area.

2.1.2.5 Traffic Volumes and Traffic Signal Timing Plans

Table 3 summarizes the traffic counts used for this study as well as date of the existing traffic signal timing plans obtained from the City, where applicable.

Table 3: Traffic Counts and Traffic Signal Timing Plans

Intersection	Date	Source	Timing Plan
Huntmar Drive & Hazeldean Road	July 2019	City of Ottawa	March 2021
Huntmar Drive & Rosehill Avenue	December 2016	City of Ottawa	N/A
Palladium Drive & Huntmar Drive	April 2019	City of Ottawa	March 2021
Palladium Drive & Terry Fox Drive	November 2017	City of Ottawa	March 2021
Terry Fox Drive & Maple Grove Road	March 2016	City of Ottawa	March 2021
Huntmar Drive & Maple Grove Road	November 2017	City of Ottawa	March 2021
Maple Grove Road & Rosehill Avenue	August 2020	City of Ottawa	N/A

A separate field investigation was also undertaken by Dillon at the intersection of Maple Grove Road and Huntmar Drive in October 2019. This intersection was chosen due to new development in the area and in order to confirm the general distribution of traffic through the intersection. This location also allowed confirmation of annual growth rates between 2017 traffic count and the 2019 existing conditions. An additional traffic count was obtained during the preparation of this TIA at the intersection of Maple Gove Road and Rosehill Avenue as the proposed site plan includes a new road aligned with Rosehill Ave. While the count was undertaken during the COVID-19 pandemic, it still provided a good indication of the existing AM and PM peak trip generation via this local roadway, with traffic volumes as expected.

The 2016 and 2017 traffic volumes were grown by 3% per year to simulate existing 2019 conditions. This growth rate was derived from population growth in the surrounding area and by comparing 2016 and 2019 traffic volumes at Huntmar Drive and Rosehill Avenue. The analysis confirmed that a 3% annual growth rate is reasonable for this location. This growth rate was applied to all intersections in the area to obtain a baseline 2019 network.

Figure 6 illustrates the existing 2019 study area traffic volumes and **Figure 7** illustrates the existing lane geometry and traffic control.

Figure 6: Existing Traffic Volumes (2019)

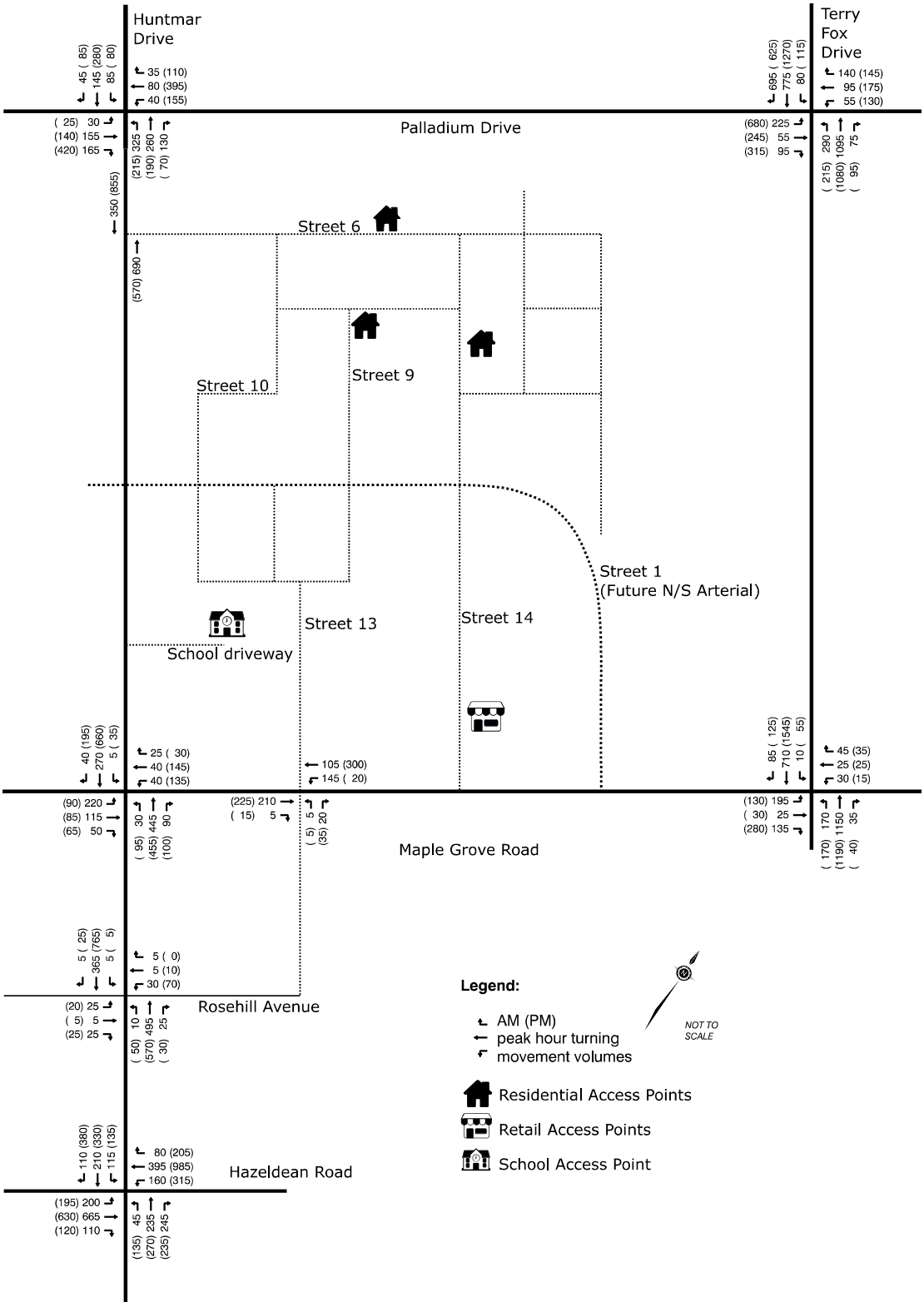
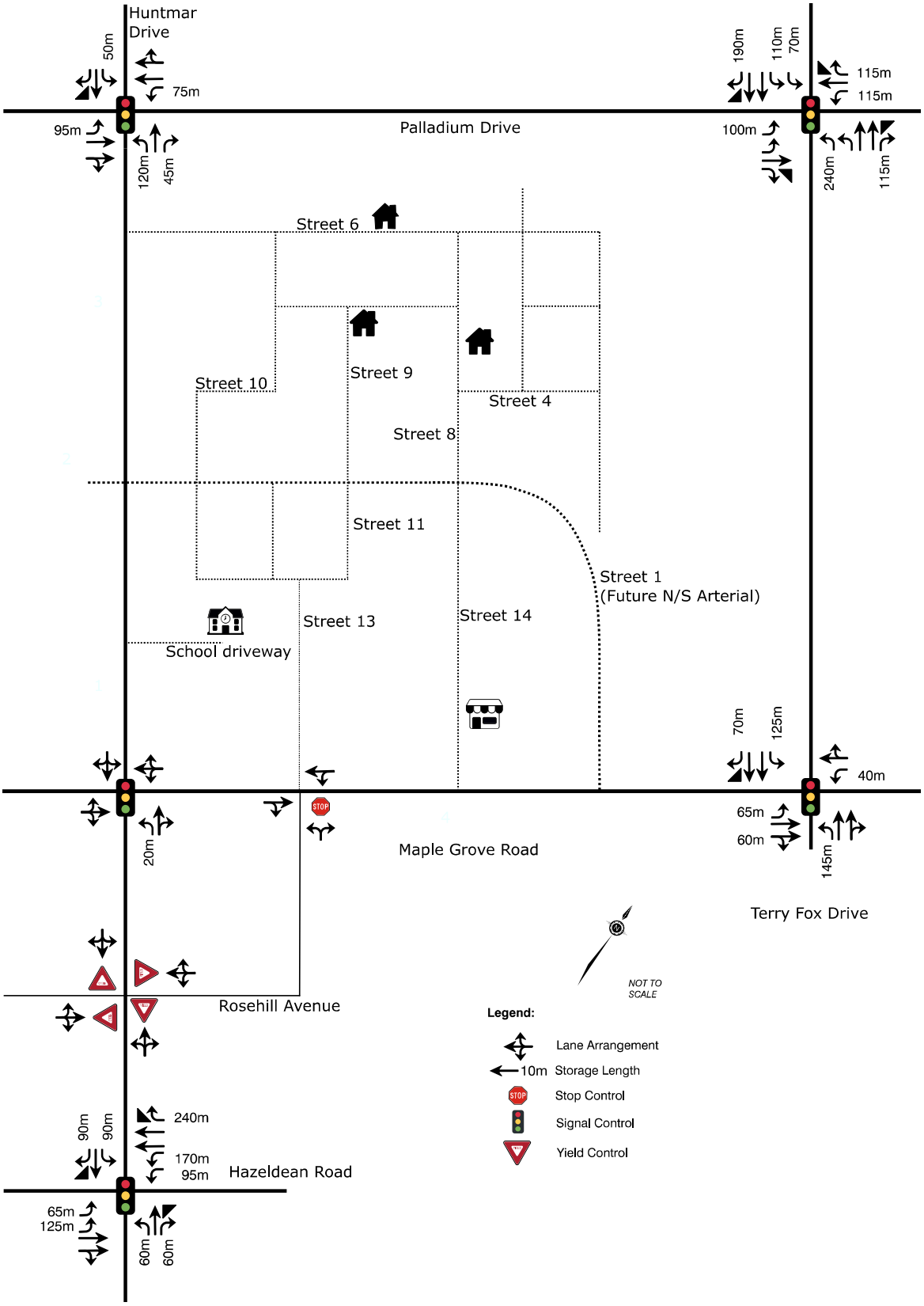


Figure 7: Existing Lane Geometry and Traffic Control



2.1.2.6 Collision History

Figure 8 illustrates the location and number of collisions in the study area between 2014 and 2018. The white number in the red circle indicates the number of total collisions at the location specified within this timeframe.

There are between five (5) and 30 collisions per year at major intersections. **Table 4** provides a breakdowns of collision types at three intersections from 2014 to 2018. The intersection of Huntmar Drive at Maple Grove Road was chosen based on its proximity to the proposed development, while Terry Fox Drive at Pallium Drive and Terry Fox Drive at Maple Grove Road were chosen based on having the highest collision rates of all the study intersections.

The majority of these collisions were rear-end and most resulted in property damage only. The accident rate for the intersection of Huntmar Drive and Maple Grove Road, including the North leg, is 2.9 accidents per million vehicle KMs, indicating low collision numbers in proximity to the development. None of the study area intersections are within the top 10 intersection collision areas within Ottawa based on the data from the 2016 City of Ottawa Road Safety Report.

Table 4: Collision Table

Intersection	Year	Rear End	Turning	Sideswipe	Angle	SMV	Approaching	Total
Huntmar Drive and Maple Grove Road	2014	1	-	-	1	1	-	3
	2015	7	-	-	2	2	-	11
	2016	5	2	1	-	3	-	11
	2017	-	-	1	-	-	1	2
	2018	5	-	-	-	2	-	7
	Total	**18**	**2**	**2**	**3**	**8**	**1**	**34**
Terry Fox Drive and Palladium Drive	2014	29	2	3	1	-	-	35
	2015	20	-	1	2	-	-	23
	2016	18	-	1	-	-	-	19
	2017	9	-	3	-	-	-	12
	2018	12	-	-	-	-	-	12
	Total	**88**	**2**	**8**	**3**	**0**	**0**	**101**
Terry Fox Drive and Maple Grove Road	2014	11	2	1	2	1	-	17
	2015	15	3	3	2	-	-	23
	2016	10	3	1	2	-	-	16
	2017	6	2	1	-	-	-	9
	2018	7	1	-	1	1	-	10
	Total	**49**	**11**	**6**	**7**	**2**	**0**	**75**

Figure 8: Collision Map (2013 to 2018)

Image source: City of Ottawa Open Data Portal, accessed November 28, 2019

2.1.3 Planned Conditions

2.1.3.1 Road Network

The 2013 TMP identified several road network improvements in the study area:

1. Huntmar Drive to be widened between Maple Grove Road and Campeau Drive;
2. A new E/W Arterial road is to be constructed connecting with Street 1 (Robert Grant Expansion); and,
3. A new North-South Arterial road is to be constructed.

Figure 9 shows the 2031 Affordable Network from the TMP. We understand that discussions are underway regarding the alignment of the new North-South Arterial and it may shift further east as a result.

At the time of the 2013 TMP, these projects were all planned for completion prior to the 2031 horizon. However, as of late 2019, City staff indicated that these projects are unlikely to be completed prior to the 2031 horizon.

This analysis has not included the impacts of these road projects. The analysis within this report represents a "worst case" scenario (most constrained transportation scenario). The inclusion of the identified road projects would increase area roadway capacity, alleviating potential vehicle impacts.

Intersection modifications have been included at the intersection of Huntmar Drive and Maple Grove Road. The existing intersection is reaching capacity, and a widened intersection has been designed which includes the following:

- Auxiliary left-turns on all approaches
- Auxiliary southbound right-turn lane
- Two through lanes on the northbound approach
- Single through lanes on southbound, westbound, and eastbound approaches

Figure 10 illustrates the proposed lane configuration of the development in 2024, while **Figure 11** illustrates the proposed lane configuration of the development in 2029. It is noted that a three-way stop is recommended at the intersection of Street 4 at Street 8. See **Figure 2** for all street name locations.

The extension of the North-South Arterial, west of Huntmar Drive is anticipated to occur within the planning horizon (by 2024); however, the roadway is expected to serve local development and is assumed to not extend north to Highway 417. See **Section 3.2.3** for further details.

Figure 9: 2031 Affordable Road Network

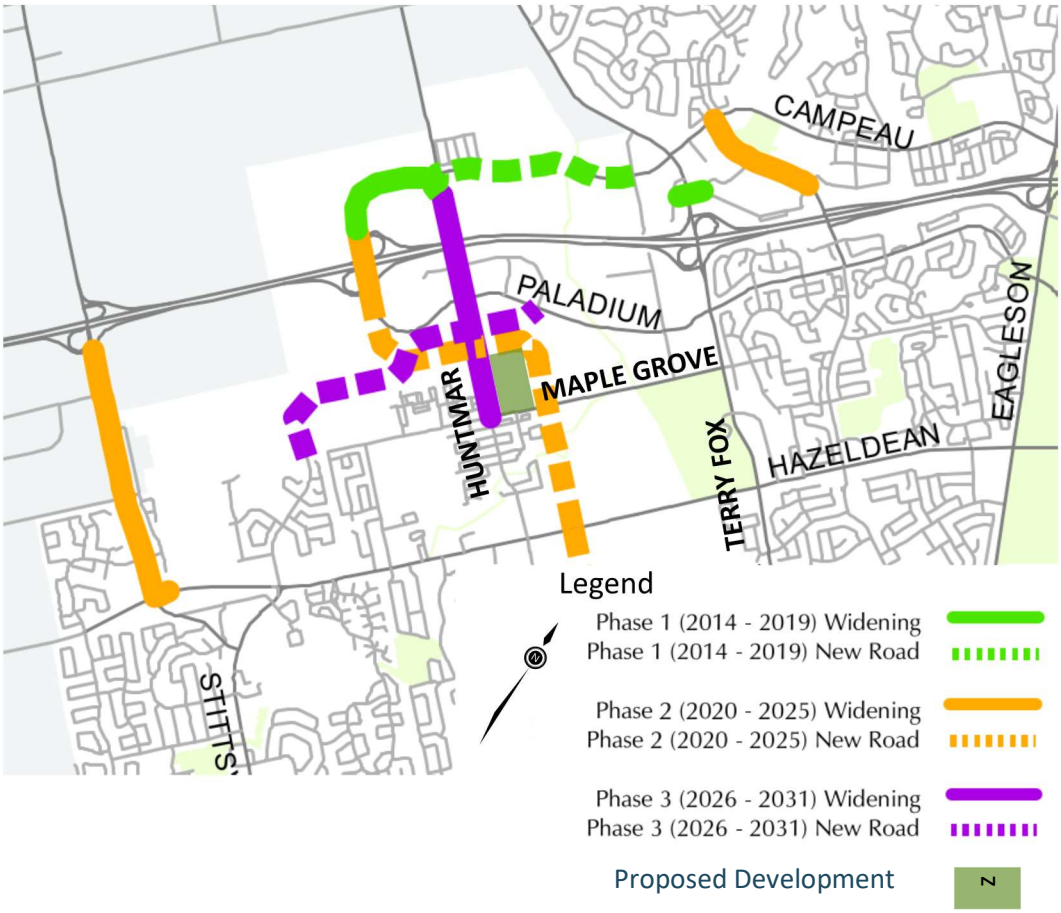


Image source: City of Ottawa 2013 TMP, 2031 Affordable Network, accessed November 28, 2019

Figure 10: 2024 Proposed Lane Configuration

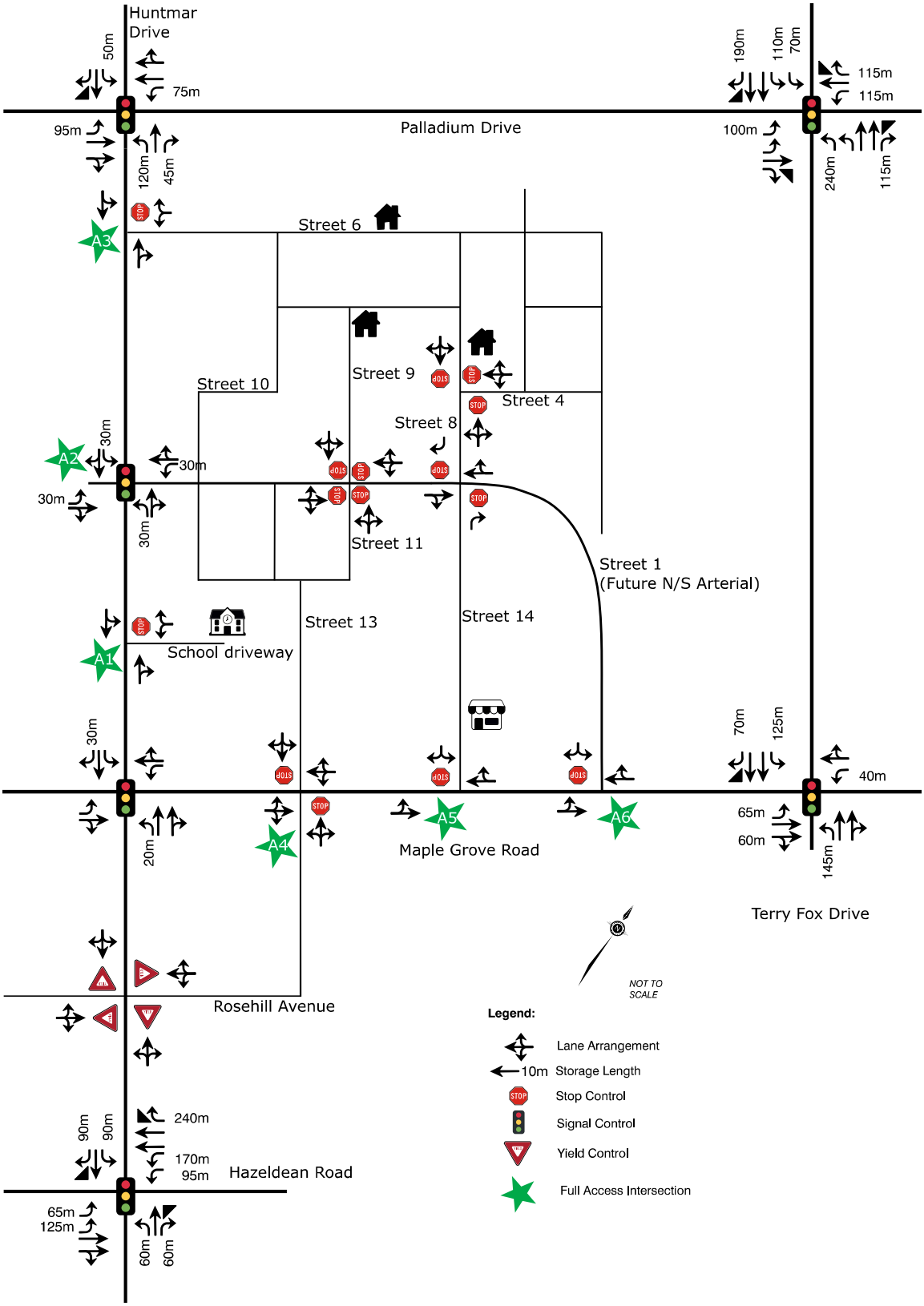
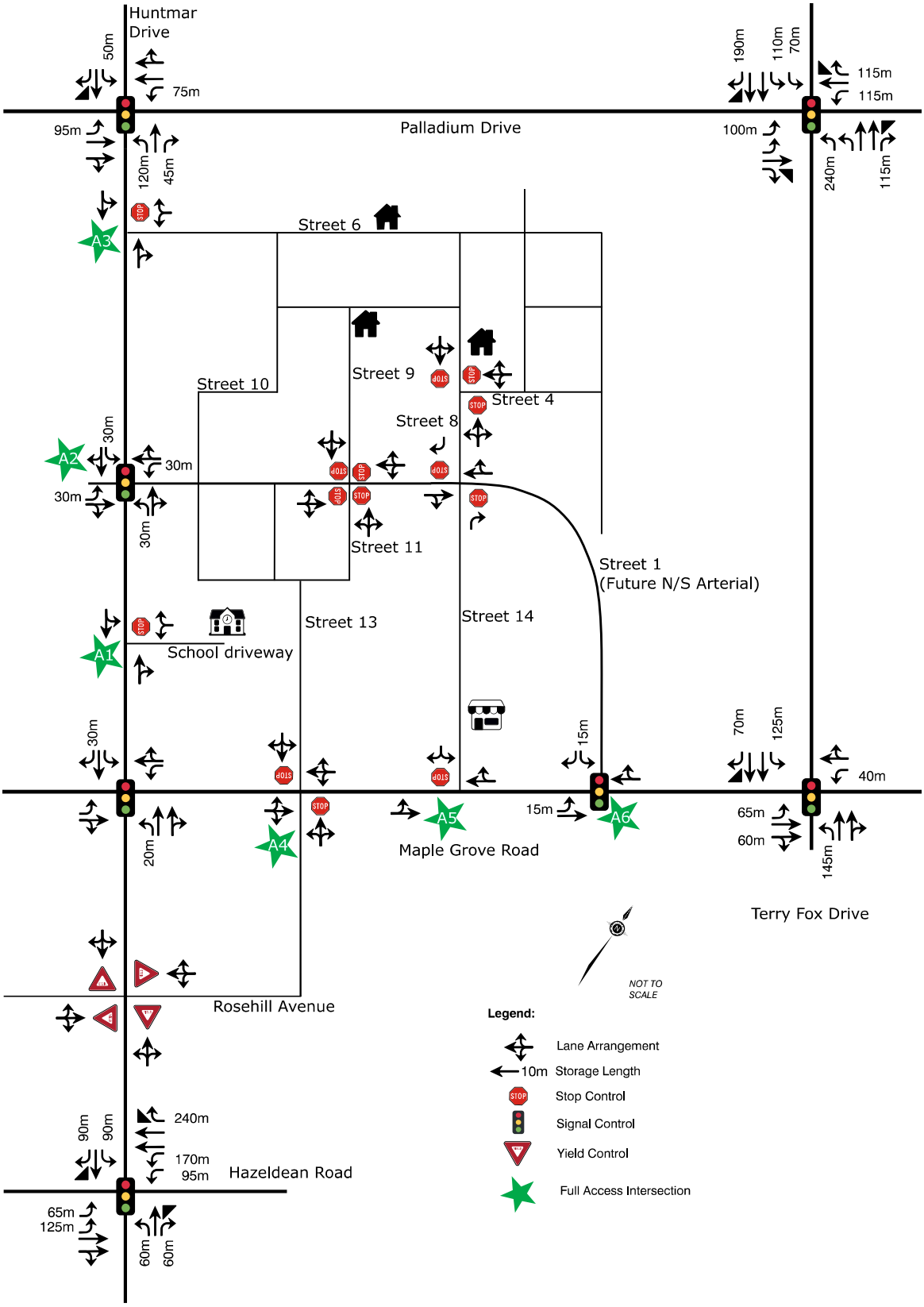


Figure 11: 2029 Proposed Lane Configuration



2.1.3.2 Walking and Cycling

The current plan in the 2031 Ottawa TMP includes a road expansion along Huntmar Drive between Maple Grove Road and Campeau Drive to increase the number of driving lanes from two to four by 2031, with sidewalks and facilities for pedestrians and cyclists. These lanes would be added following the completion of an EA, pending funding.

Maple Grove Road, as an Arterial Roadway, will also see improvements by 2031 through infrastructure such as sidewalks and bike lanes improving pedestrian connections to the future LRT station.

2.1.3.3 Transit

Figure 12 shows the 2031 Affordable Transit Network in the study area. This included isolated transit measures on Hazeldean Road and isolated transit measures on the new North-South Arterial roadway.

Figure 13 shows the Ultimate Transit Network in the study area. This included LRT service to the Canadian Tire Centre and then BRT with grade-separated crossings to Hazeldean Road and then BRT with at-grade crossings further south to Fernbank Road. The Ultimate Transit Network was amended following the *Kanata Light Rail Transit (LRT) Planning and Environmental Assessment Study (2017).*

Figure 14 shows the amended Ultimate Transit Network. This included LRT service to the intersection of Hazeldean Road and the new North-South Arterial with a park and ride lot located at said intersection. LRT to Hazeldean Road is part of LRT Stage 3 and at this time is not anticipated to occur until sometime after 2031, following completion of LRT Stage 2 in 2025.

City staff indicated that BRT, and LRT projects will **not** be completed by the 2024 or 2029 horizon years and therefore they will **not** be included in the analysis. The resulting analysis will be conservative since it assumes a constrained transportation scenario with higher vehicle mode shares.

The transit service will be greatly improved for the proposed development with the Ultimate transit network. With improved transit, the auto mode share will likely be reduced.

Figure 12: 2031 Affordable Transit Network

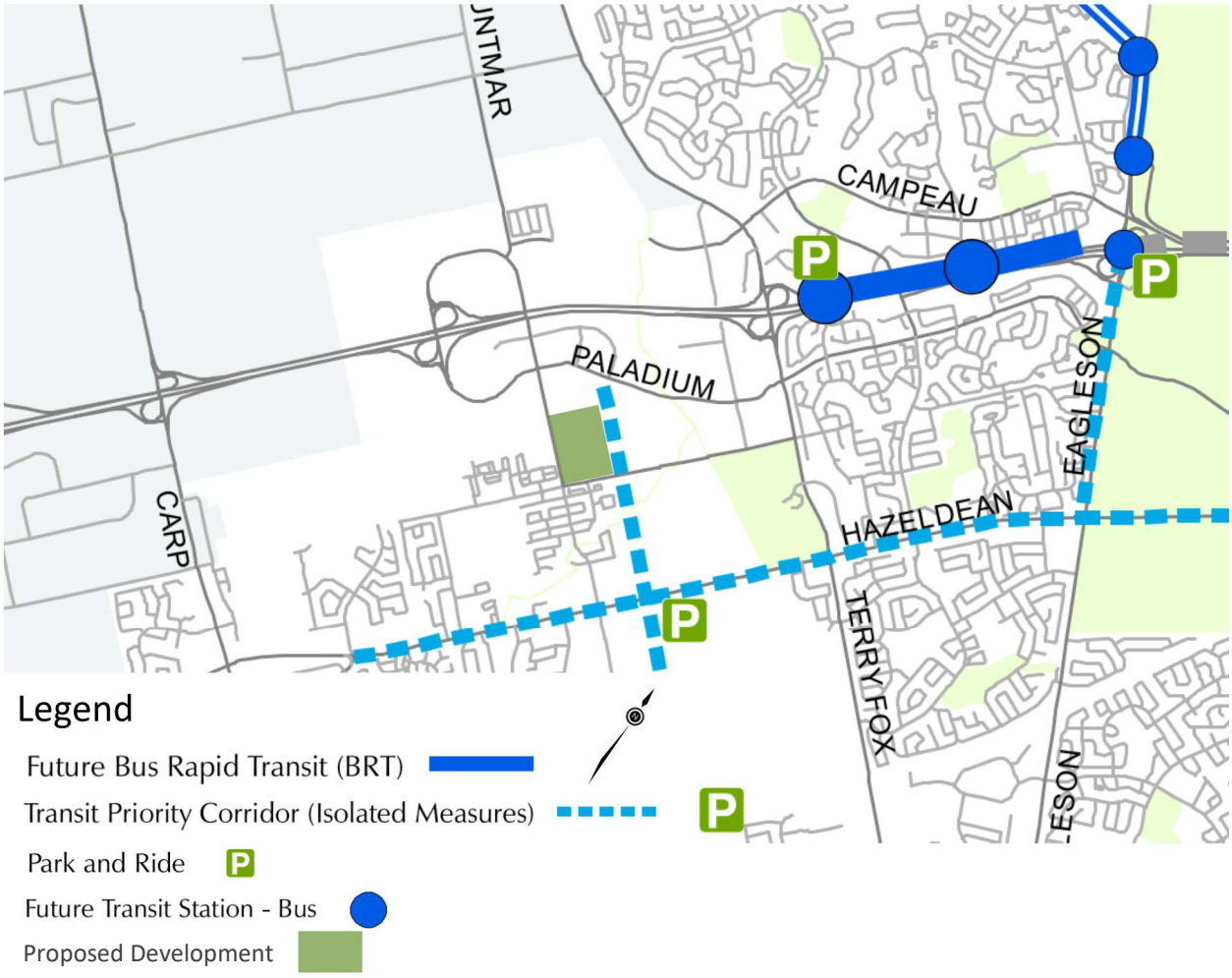


Image source: City of Ottawa 2013 TMP, 2031 Affordable Transit Network, accessed November 28, 2019

Figure 13: Ultimate Transit Network (2013 TMP)

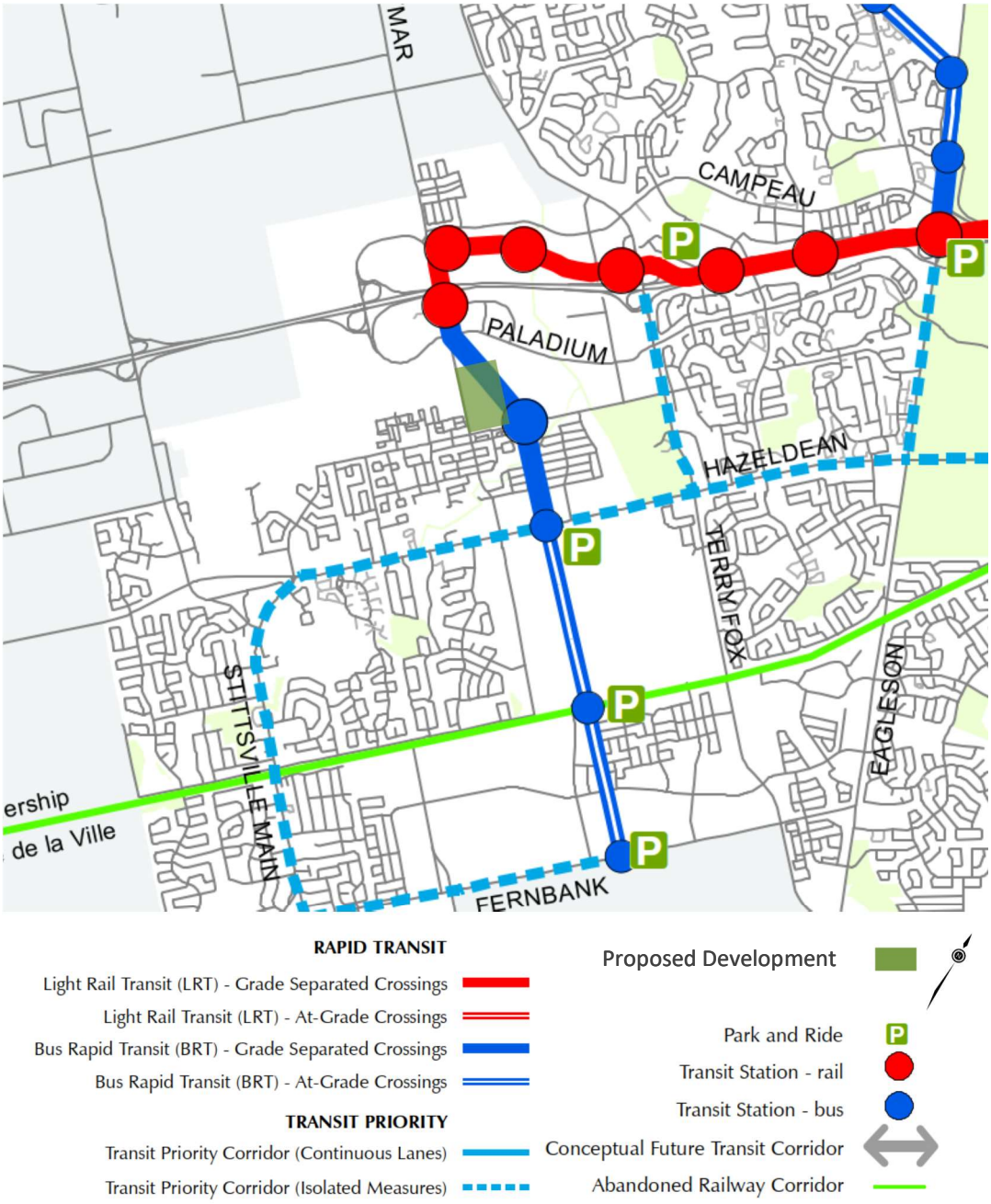


Image source: City of Ottawa 2013 TMP, Ultimate Network, accessed January 16, 2020

Figure 14: Ultimate Transit Network (2017 Kanata LRT EA)

Image source: City of Ottawa Kanata Light Rail Transit Planning and Environmental Assessment Study website, accessed January 16, 2020

2.1.3.4 Future Background Developments

The City of Ottawa's development applications search tool was used to identify other developments within the study area that could impact study area intersections.

Table 5 contains further detail regarding these developments. The application type is mostly Plan of Subdivision and Site Plan Control. Additional developments are also underway along Palladium Drive to the West of Huntmar Drive. **Figure 15** illustrates the surrounding developments. It is noted that trips from the development located at 173 Huntmar Drive were not included since the build-out year was deemed to be beyond the scope of this TIA. Trips were introduced to the network based on build-out year. Traffic volumes from developments in blue shading were assumed to be in place by 2024.

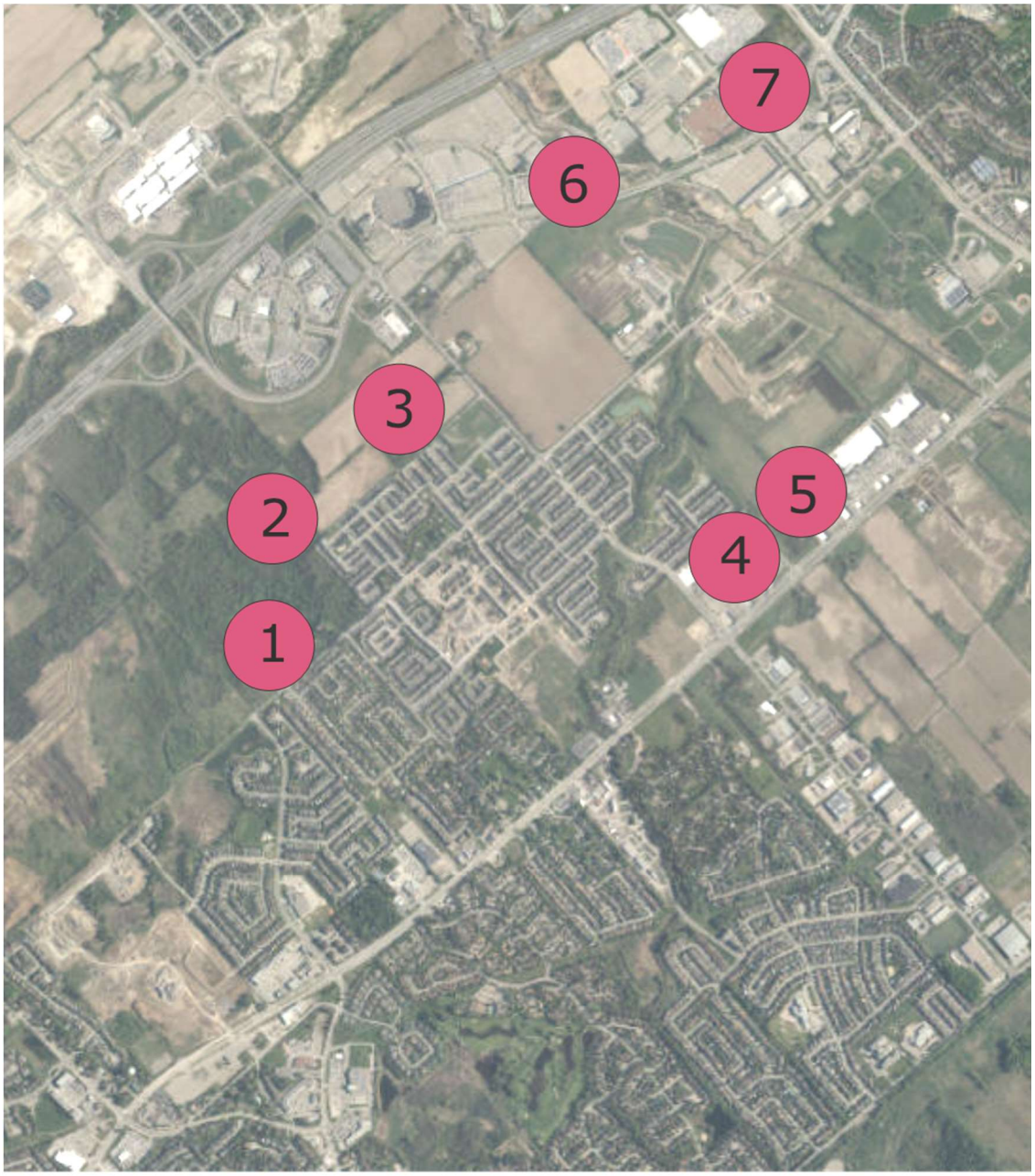
Appendix A contains the background development volumes used for this analysis.

Table 5: Background Development Information

Development Number	Application Type	Land Use	Address	Size	Percentage Developed by 2024	Percentage Developed by 2029
D07-16-14-0016	Plan of Subdivision	Mixed-use Development	173 Huntmar Drive	206 residential units 65 000 ft^2 of office / retail	0%	0%
D07-16-16-0011	Plan of Subdivision	Mixed-use Development	195 Huntmar Drive	691 residential units, a commercial block, and 5.98 ha district park	100%	100%
D07-16-18-0010	Plan of Subdivision	Residential Subdivision	1981 Maple Grove Road	196 residential units	100%	100%
D07-12-19-0168	Site Plan Control	Community Retail Development	5707 Hazeldean Road	47 710 ft^2 GFA retail	100%	100%
D07-12-16-0032	Site Plan Control	Commercial Retail Development	5649/5705 Hazeldean Road	15 750 ft^2 GFA retail	100%	100%

Development Number	Application Type	Land Use	Address	Size	Percentage Developed by 2024	Percentage Developed by 2029
D07-12-19-0045	Site Plan Control	Mixed-use Development	800 Palladium Drive	11 000 ft^2 GFA commercial 7 400 ft^2 GFA office 5 000 ft^2 GFA restaurant	100%	100%
D07-12-14-0147	Site Plan Control	Silver Seven Corporate Centre	777/737 Seven Silver Road	130 000 ft^2 GFA commercial	100%	100%

Figure 15: Background Developments



Legend

Development Area

1: D07-16-18-0010 - 1981 Maple Grove Road - Residential Subdivision
2: D07-16-14-0016 - 173 Huntmar Drive - Mixed Use Development
3: D07-16-16-0011 - 195 Huntmar Drive - Mixed Use Development
4: D07-12-19-0168 - 5707 Hazeldean Road - Community Retail Development
5: D07-12-16-0032 - 5649/5705 Hazeldean Road - Residential and Commercial
6: D07-12-19-0045 - 800 Palladium Drive - Mixed Use Development
7: D07-12-14-0147 - 777/737 Silver Seven Road - Silver Seven Corporate Centre

Background image source: geoOttawa, accessed December 4, 2019

2.2 Study Parameters

2.2.1 Study Area

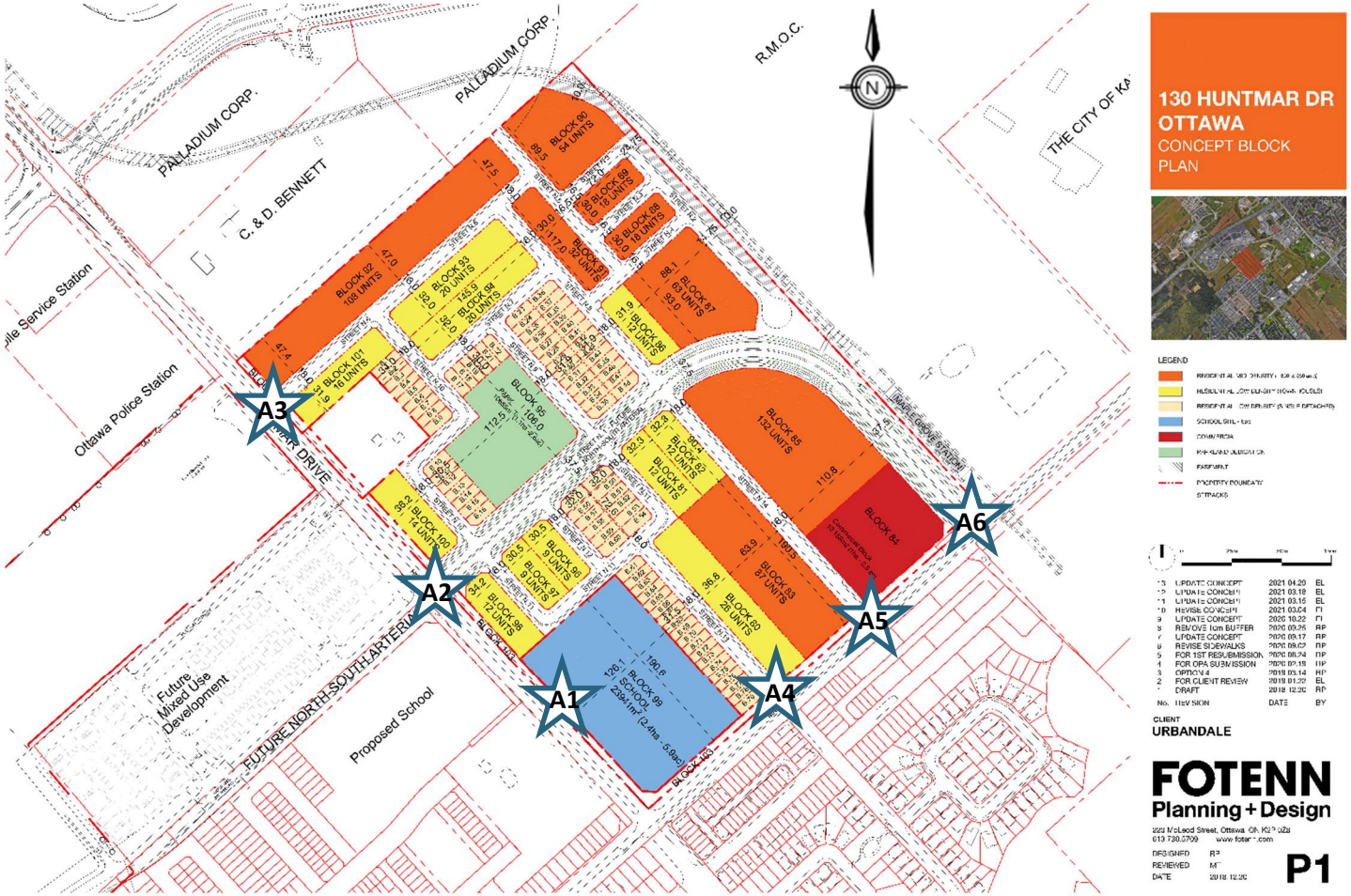
Figure 16 illustrates the Boundary Road intersections that will be assessed as part of the transportation analysis:

A1: Huntmar Drive and School Access
A2: Huntmar Drive and Street 1
A3: Huntmar Drive and Street 6
A4: Maple Grove Road and Street 13
A5: Maple Grove Road and Street 14
A6: Maple Grove Road and Street 1

Figure 17 illustrates the Network intersections that will be assessed as part of the transportation analysis:

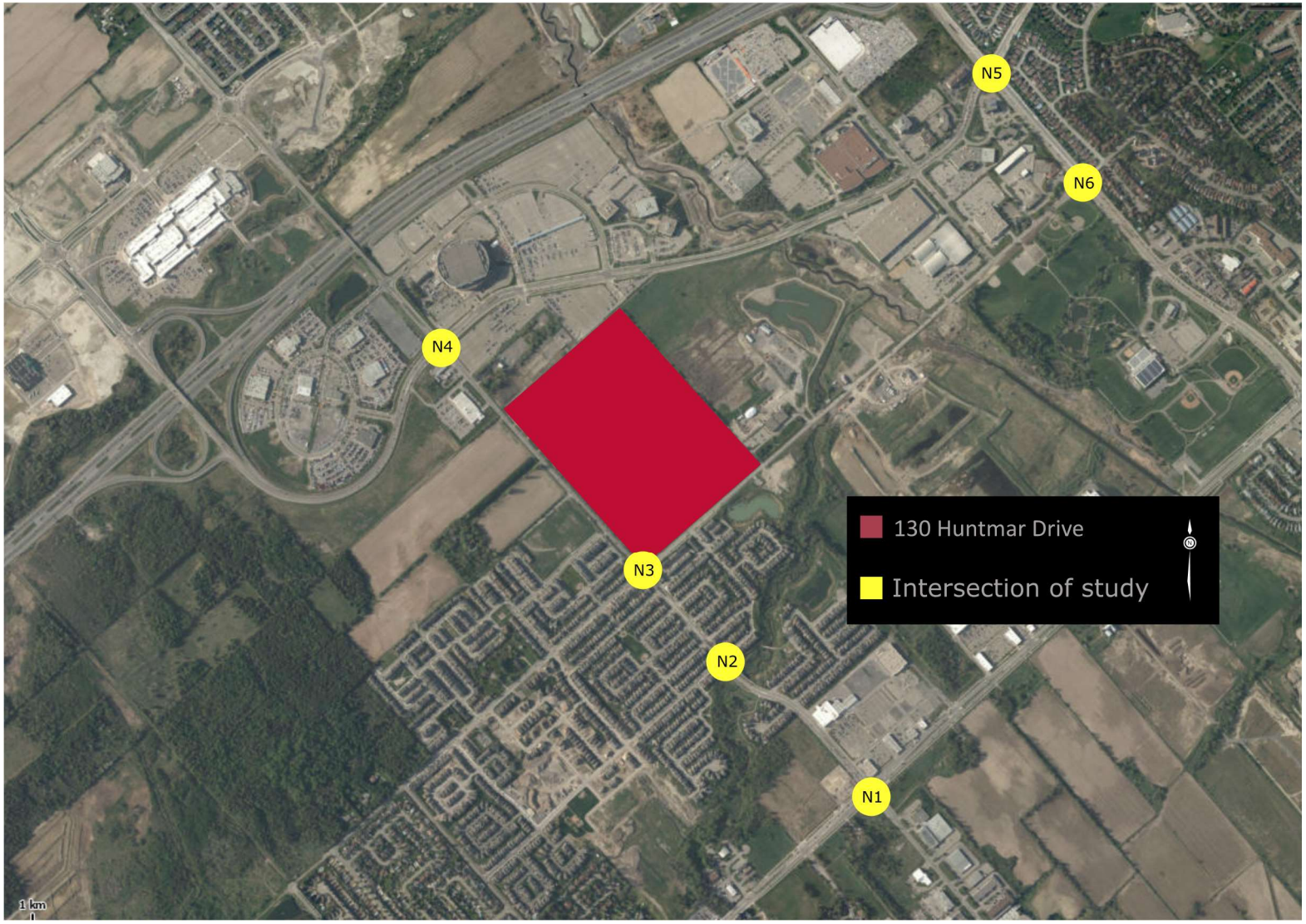
N1: Huntmar Drive & Hazeldean Road
N2: Huntmar Drive & Rosehill Avenue
N3: Huntmar Drive & Maple Grove Road
N4: Palladium Drive & Huntmar Drive
N5: Palladium Drive & Terry Fox Drive
N6: Terry Fox Drive & Maple Grove Road

Figure 16: Boundary Road Intersections



Proposed new full access intersections to be included in transportation assessment

Figure 17: Network Intersections and Study Area



Background image source: geoOttawa, accessed October 25, 2019

2.2.2 Time Periods

The development is primarily residential and therefore the weekday AM and PM peak hours will govern the analysis.

2.2.3 Horizon Years

Construction will commence in 2022 and is planned to be completed in 2024. The analysis will assess transportation for the 2024 horizon year, and in 2029, five years after build-out.

2.3 Exemptions Review

Table 6 presents the exemptions review table from the City of Ottawa's 2017 *Transportation Impact Assessment Guidelines*. The exemptions were rationalized as follows:

1. the TIA is not being submitted for a site plan and therefore elements 4.1.2, 4.2.1 and 4.2.2and are exempt; and,
2. the proposed development generates less than 200 person trips in excess of the equivalent volume permitted by established zoning.

Table 6: Exemptions Review

Module	Element	Exemption Consideration	Status
Design Review Component			
4.1 Development Design	4.1.2 Circulation and Access	Only required for site plans	Exempt
	4.1.3 New Street Networks	Only required for plans of subdivision	Included
4.2 Parking	4.2.1 Parking Supply	Only required for site plans	Exempt
	4.2.2 Spillover Parking	Only required for site plans where parking supply is 15% below unconstrained demand	Exempt
Network Impact Component			
4.5 Transportation Demand Management	All Elements	Not required for site plans expected to have fewer than 60 employees and/or students on location at any given time	Included
4.6 Neighbourhood Traffic Management	4.6.1 Adjacent Neighbourhoods	Only required when the development relies on Local or Collector streets for access and total volumes exceed ATM capacity thresholds	Exempt
4.8 Network Concept		Only required when proposed development generates more than 200 person trips during the peak hour in excess of the equivalent volume permitted by established zoning	Exempt
4.9 Intersection Design	All Elements	Not required if site generation trigger is not met	Included

3.0 Forecasting

3.1 Development-Generated Travel Demand

3.1.1 Trip Generation and Mode Shares

The proposed development includes residential, retail, recreation, and an elementary school. Several data sources were referenced to estimate the trip generation for the proposed development.

For residential and retail developments, the data sources are for vehicle trip generation. As per the TIA Guidelines, these vehicle trip rates were converted to person trip rates so that custom mode shares could be applied for the Kanata/Stittsville development context. The mode share for each land use was estimated using a combination of TRANS OD survey data, field observations, and professional judgement. It should be noted that travel patterns have been altered in recent years due the commencement of Ottawa's Stage 1 LRT, as well as Covid-19. It is unclear how demand will change in the future with potentially increased employees working-from-home, and other flexibility. The analysis however, assumed pre-Covid demand levels.

Residential Trips: The TRANS Trip Generation Study Report (2009) was used to estimate residential trip generation. The person trip rates were obtained by dividing the vehicle trip generation rates[1] by the auto vehicle mode share[2].

Retail Trips: The Institute of Transportation Engineers (ITE) Trip Generation Manual, 10th edition, was used to estimate the retail trip generation. ITE rates often correspond with data collected in the United States as far back as 1980; ITE rates typically represent a high auto driver mode share (assumed 90%). Average vehicle occupancy was assumed to be 1.15.

Recreation Trips: The planned park was not included in the trip generation calculation as it was assumed it will generate few trips during the peak hours and many of those trips would be local trips via walking or cycling and therefore there is minimal impact on the transportation network.

Elementary School Trips: The elementary school trip generation was estimated based on a trip generation study conducted in 2018 at the French catholic elementary school Bernard-Grandmaître, located in Riverside South. Bernard-Grandmaître has ~449 sq.m. of daycare, 765 students, 59 staff, and 11 school buses; this is more students, staff, and school buses than another French catholic elementary school in the area despite having a smaller footprint. The catchment areas of French catholic schools can be larger than English catholic or public schools, however, the vehicle trip generation is similar to the ITE

[1] TRANS Trip Generation Study Report (2009) Table 6.3
[2] TRANS Trip Generation Study Report (2009) Table 3.13

rates (for the lower end of the spectrum).Overall, the trip generation for Bernard-Grandmaître is a reasonable proxy for estimating trip generation for the proposed school in Stittsville.

Table 7 and **Table 8** trip generation rates and total trips generated by the residential and retail land uses. **Table 9** summarizes the forecasted elementary school trip generation which is the same as the observed trip generation at Bernard-Grandmaître.

Table 7: Person Trip Generation Rates – Residential and Commercial

Land Use Code / Land Use	Source	Auto Trip Gen Rate				Auto Mode Share		Avg. Vehicle Occupancy	Units	Person Trip Generation Rate	
		AM		PM							
		Rate	In %	Rate	In %	AM	PM			AM	PM
210: Single-detached homes	TRANS	0.7	29%	0.9	62%	55%	64%	1.00	Dwellings	1.27	1.41
224: Semi-detached, townhomes	TRANS	0.54	37%	0.71	53%	52%	62%	1.00	Dwellings	1.04	1.15
223: Mid-rise apartment 3-10 floors	TRANS	0.29	24%	0.37	62%	44%	44%	1.00	Dwellings	0.66	0.84
816: Hardware/Paint Store	ITE	1.08	54%	2.68	47%	90%	90%	1.15	1000 sq. ft. GFA	1.38	3.42
851: Convenience Market	ITE	62.5	50%	49.1	51%	90%	90%	1.15	1000 sq. ft. GFA	79.91	62.75
890: Furniture Store	ITE	0.26	71%	0.52	47%	90%	90%	1.15	1000 sq. ft. GFA	0.33	0.66
912: Drive-In Bank	ITE	9.5	58%	20.5	50%	90%	90%	1.15	1000 sq. ft. GFA	28.80	33.73
933: Fast-Food Restaurant w/o Drive-Thru	ITE	25.1	60%	28.3	50%	90%	90%	1.15	1000 sq. ft. GFA	32.07	36.21
936: Coffee/Donut Shop w/o Drive-Thru	ITE	101.1	51%	36.3	50%	90%	90%	1.15	1000 sq. ft. GFA	129.23	46.40

Table 8: Person Trips – Residential and Commercial

Land Use	Size	AM Peak Hour			PM Peak Hour		
		Total	In	Out	Total	In	Out
210: Single-detached homes	79	101	29	72	111	69	42
224: Semi-detached, townhomes	162	168	62	106	186	99	87
223: Mid-rise apartment 3-10 floors	512	337	81	256	431	267	164
816: Hardware/Paint Store	2.9 k sq.ft.	4	2	2	10	5	5
851: Convenience Market	1.4 k sq.ft.	111	56	55	87	44	43
890: Furniture Store	1.7 k sq.ft.	1	1	0	1	0	1
912: Drive-In Bank	1.0 k sq.ft.	29	15	14	34	17	17
933: Fast-Food Restaurant w/o drive-thru	1.2 k sq.ft.	37	22	15	42	21	21
936: Coffee/Donut Shop w/o drive-thru	1.0 k sq.ft.	126	64	62	45	23	22
Total		**914**	**332**	**582**	**947**	**545**	**402**

* *Does not include reductions due to internalization, or pass by*

Table 9: Elementary School Trip Generation

Location	Weekday AM Peak Hour of Roadway			Weekday PM Peak Hour of Roadway[3]		
	Total	In	Out	Total	In	Out
Staff parking lot vehicles	25	25	0	5	0	5
Student drop-offs / pick-up vehicles	94	47	47	0	0	0
Daycare drop-off / pick-up vehicles	74	37	37	30	15	15
School buses	22	11	11	0	0	0
Cycling (10% of students)	77	77	0	0	0	0
Walking (10% of students)	77	77	0	0	0	0
Total vehicle trips	**193**	**109**	**84**	**35**	**15**	**20**
Pass-by trips (student and daycare drop off)	94 + 74 / 193 = 87%			30 / 35 = 86%		
New trips (staff)	13%			14%		

For the retail and commercial land uses, the mode shares for the proposed development were determined using the TRANS O-D survey for the Kanata/Stittsville district:

- For residential mode shares, a blend of the 'from' and 'within' the district was used for the AM peak hour, and 'to' and 'within' the district was used for the PM peak hour.
- For retail mode shares, a blend of the 'to' and 'within' district was used for the AM peak hour and 'from' and 'within' the district was used for the PM peak hour.

[3] The Weekday PM pk hr was not observed at the French catholic elementary school Bernard-Grandmaître. The total vehicle trips were assumed to be 1/7th the AM pk hr trip generation. This assumption was based on the difference between the AM and PM pk hr average vehicle trip generation rates for an elementary school (LUC 520), ITE Trip Generation Manual, 10th edition.

Table 10 summarizes the trip generation by mode for the proposed residential and retail land uses.

Table 10: Trip Generation by Mode – Retail and Residential

Land Use	Travel Mode	Mode Share		AM Peak Hour			PM Peak Hour		
		AM	PM	Total	In	Out	Total	In	Out
Residential	Auto Driver	52%	59%	315	89	226	430	257	173
	Auto Pass.	13%	19%	79	22	56	138	83	56
	Transit	14%	12%	85	24	61	84	50	34
	Other	21%	11%	127	36	91	76	46	31
	Total	100%	100%	606	172	434	728	435	293
Retail	Auto Driver	60%	65%	174	90	84	135	68	67
	Auto Pass.	12%	20%	35	18	17	42	21	21
	Transit	6%	5%	18	9	8	9	5	5
	Other	23%	11%	66	34	32	22	11	11
	Total	100%	100%	293	152	141	208	105	104
Total	Auto Driver	54%	60%	489	179	310	565	325	240
	Auto Pass.	13%	19%	114	40	73	180	104	77
	Transit	11%	10%	103	33	69	93	55	39
	Other	21%	10%	193	70	123	98	57	42
	Total	100%	100%	899	324	575	936	540	397

* *includes reductions due to internalization, and pass by*

Overall, an 11% transit mode share is forecast for the AM peak period prior to construction of the future LRT station adjacent to the site representing a total of 69 outbound and 33 inbound transit passenger trips. In the PM the 10% transit mode share generates 55 inbound and 39 outbound transit trips.

The 'other' category includes walking, cycling, school bus, paratransit, motorcycle / scooter, and taxi, and accounts for up to 21% of AM Peak trips and 11% of PM peak trips.

This TIA assumes that 54% and 60% of AM and PM peak period residential and retail trips would result in additional vehicles to be accommodated by the area road network. This recognizes that there are trips internal within the site (discussed as Internal Capture below in **Section 3.1.1.1**) and that some trips may be trips that are already on the road network, and will generate a stop at the site along the way (discussed as Pass-By and Diverted Traffic in **Section 3.1.1.2**). This results in the difference in totals between **Table 8** and **Table 10.**

3.1.1.1 Internal Capture

This analysis includes the assignment and evaluation of internal roadways for the proposed development and therefore it is not appropriate to apply the principle of internal capture reduction for

trips **between** residential, retail, and school land uses. Instead, trips between these land uses were assigned explicitly.

The retail is concentrated in one area and therefore the principle of internal capture can be applied for retail-retail trips; it may reduce the impact of the proposed development on the study area road network, since some trips may visit multiple retail properties.

The magnitude of internal capture depends on the land uses and the likelihood of users to visit multiple properties. For this proposed development, the major retail trip generators were assumed to be a convenience market, fast-food restaurant (without drive through), and coffee/donut shop (without drive through). These are relatively similar land uses and therefore the internal capture rate is anticipated to be low (assumed to be 5%).

Table 11 summarizes the trip generation by mode after internal capture reductions.

Table 11: Trip Generation by Mode After Internal Capture

Land Use	Travel Mode	Internal Capture Rate		AM Peak Hour			PM Peak Hour		
		AM	PM	Total	In	Out	Total	In	Out
Retail	Auto Driver	5%	5%	174	90	84	135	68	67
	Auto Pass.	5%	5%	35	18	17	42	21	21
	Transit	5%	5%	18	9	8	9	5	5
	Other	5%	5%	66	34	32	22	11	11
	Total	5%	5%	**293**	**152**	**141**	**208**	**105**	**104**

3.1.1.2 Pass-By and Diverted Traffic

Fast-food restaurants, convenience markets, and elementary schools are rarely the primary trip purpose; they are usually the mid-point of a trip, called a 'pass-by' or 'diverted' trip.

Table 12 summarizes the breakdown of new trips, pass-by trips, and diverted trips. The assumed rates are based professional judgement, since there is limited ITE data for these land uses or the ITE data was collected in the United States in 1987. Retail pass-by rates were calculated based on blended rates from individual land uses, provided in the ITE Trip Generation Handbook, 3rd Edition.

Overall it is anticipated that there will be 695 vehicle trips generated during the AM peak hour and 609 vehicle trips generated during the PM peak hour. Of these vehicle trips, there will be 435 new vehicle trips during the AM peak hour and 507 new vehicle trips during the PM peak hour. These values can be seen in **Table 12**. The remainder of the vehicle trips are anticipated to be pass-by or diverted trips.

Table 12: Pass-By and Diverted Traffic (Auto Driver Trips)

Land Use	Trip Type	Percent		Auto Driver Trips					
		AM	PM	AM			PM		
				Total	In	Out	Total	In	Out
School	Total trips	100%		193	109	84	35	15	20
	New staff trips	from **Table 9**		25	25	0	5	0	5
	Drop-off / Pick-up	remainder		168	84	84	30	15	15
	from new residential	*33%*		*56*	*28*	*28*	*10*	*5*	*5*
	from existing residential	*67%*		*112*	*56*	*56*	*20*	*10*	*10*
Retail	Total trips	100%		174	90	84	135	68	67
	Pass-by trips	56%	54%	92	46	46	72	36	36
	New trips	44%	46%	82	44	38	63	32	31
Residential (new trips)	Total trips	100%		315	89	226	430	257	173
	Home-School-Work Trips	33% of drop-off/pick-up		56	28	28	10	5	5
	Home-Work Trips	Remainder		259	61	198	420	252	168
Total	Pass-by / diverted trips			260	130	130	102	51	51
	New trips			422	159	263	498	289	209
	Total			682	289	393	600	340	260

3.1.2 Trip Distribution

The trip distribution for new residential trips, pass-by school trips, and pass-by retail trips was specified separately than new retail trips and new school trips, since the former are likely home-work based and the latter are likely local only and therefore the distributions are different.

The TRANS O-D Survey indicated that 69% of all AM peak hour trips originating in the Kanata / Stittsville district are trips to work. Using this information it was determined that the majority of the origins (during PM peak period) and destinations (during AM peak period) are office and industry sectors located north and east of the study area. Traffic was assigned using three main points of destination to and from the area:

1. Ottawa Center (Destination for large majority of residents during peak hours);
2. Kanata North (Destination for residents during peak hours due to density of office spaces); and,
3. Nearby retail/schools (Destination within the district for smaller portion of residents during peak hours).

Table 13 summarizes the trip distribution used for this analysis.

Table 13: Trip Distribution

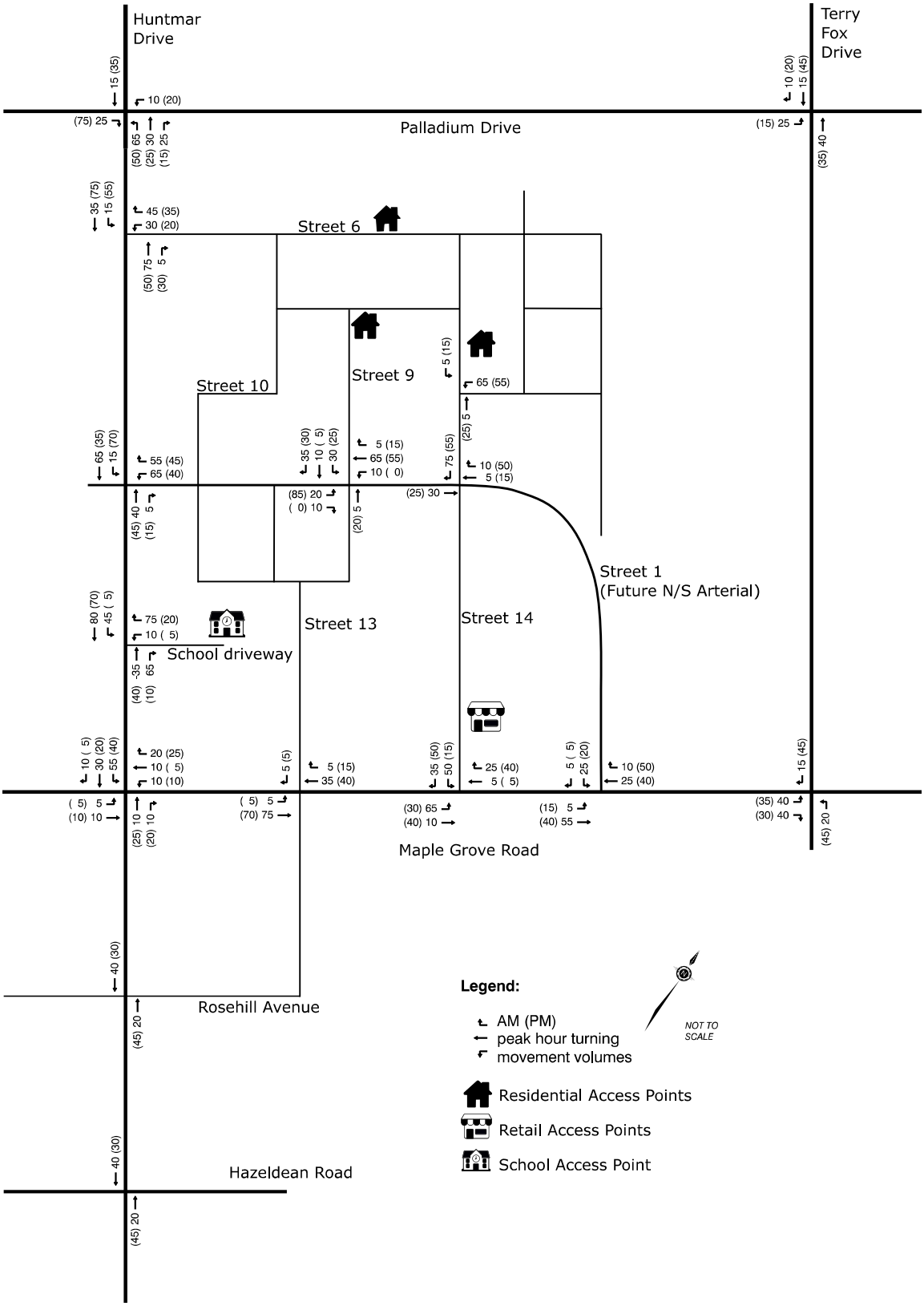
Cardinal Direction	New Residential New School (staff) Pass-by School Pass-by Retail	New Retail Trips New School (Home-School-Home drop-offs)
North	12%	25%
East	50%	25%
South	30%	25%
West	8%	25%
Total	**100%**	**100%**

It is noted that travel patterns have more recently been impacted by Covid-19, with increased working from home, and less travel to the downtown core area. This analysis assumes pre-Covid conditions.

3.1.3 Trip Assignment

Vehicle trips for new retail trips and new school trips were assigned to the local road network surrounding the proposed development. **Figure 18** illustrates the trip assignment to the study area road network.

Figure 18: Trip Assignment



3.2 Background Network Travel Demand

3.2.1 Transportation Network Plans

There are several road network projects identified in the Transportation Master Plan, however, City staff indicated that these projects are unlikely to be completed prior to 2031 and therefore the impact of these road network projects has not been included in this analysis.

The Affordable and Ultimate networks will have additional road and transit capacity. The transit service will also be greatly improved, particularly for the proposed development for the Ultimate transit network. With improved transit, the auto mode share will likely be reduced and the new Arterial roadways will provide additional capacity for the remaining auto vehicles. In other words, issues identified as part of this analysis may be short-term and remedied by already-planned improvements.

3.2.2 Background Growth

Table 14 summarizes the predicted growth rate for the Kanata / Stittsville district based on data from the TRANS O-D Surveys. The 2019 traffic counts were grown at a rate of 2.43% annually, non-compounding, to represent 2024 and 2029 background traffic volumes.

Table 14: TRANS O-D Survey Annual Growth Prediction for Kanata / Stittsville

Measurement	2011 Actual	2031 Predicted	Annual Growth
Population	105,215	156,396	2.43%
Auto trips	157,040	233,431	2.43%

A review of historic intersection volumes (3%) confirms that this level of growth is appropriate for reflecting background growth.

3.2.3 Other Developments

There are seven planned developments near the proposed development which will impact study area intersections. Details for each planned development were listed on the City of Ottawa's development applications tool and were outlined in **Section 2.1.3.4**. These development volumes have been included as part of the 2024 and 2029 background traffic analysis and applied to the future road networks separately. An annual compound growth rate of 2.43% (reflective of the study area) was applied to grow 2024 volumes to represent the 2029 time horizon.

It is noted that trips from the development located at 173 Huntmar Drive were not included since the build-out year was deemed to be beyond the scope of this TIA.

Figure 19 and **Figure 20** illustrate the forecasted 2024 and 2029 background traffic volumes, respectively.

Figure 19: Background Traffic Volumes - 2024

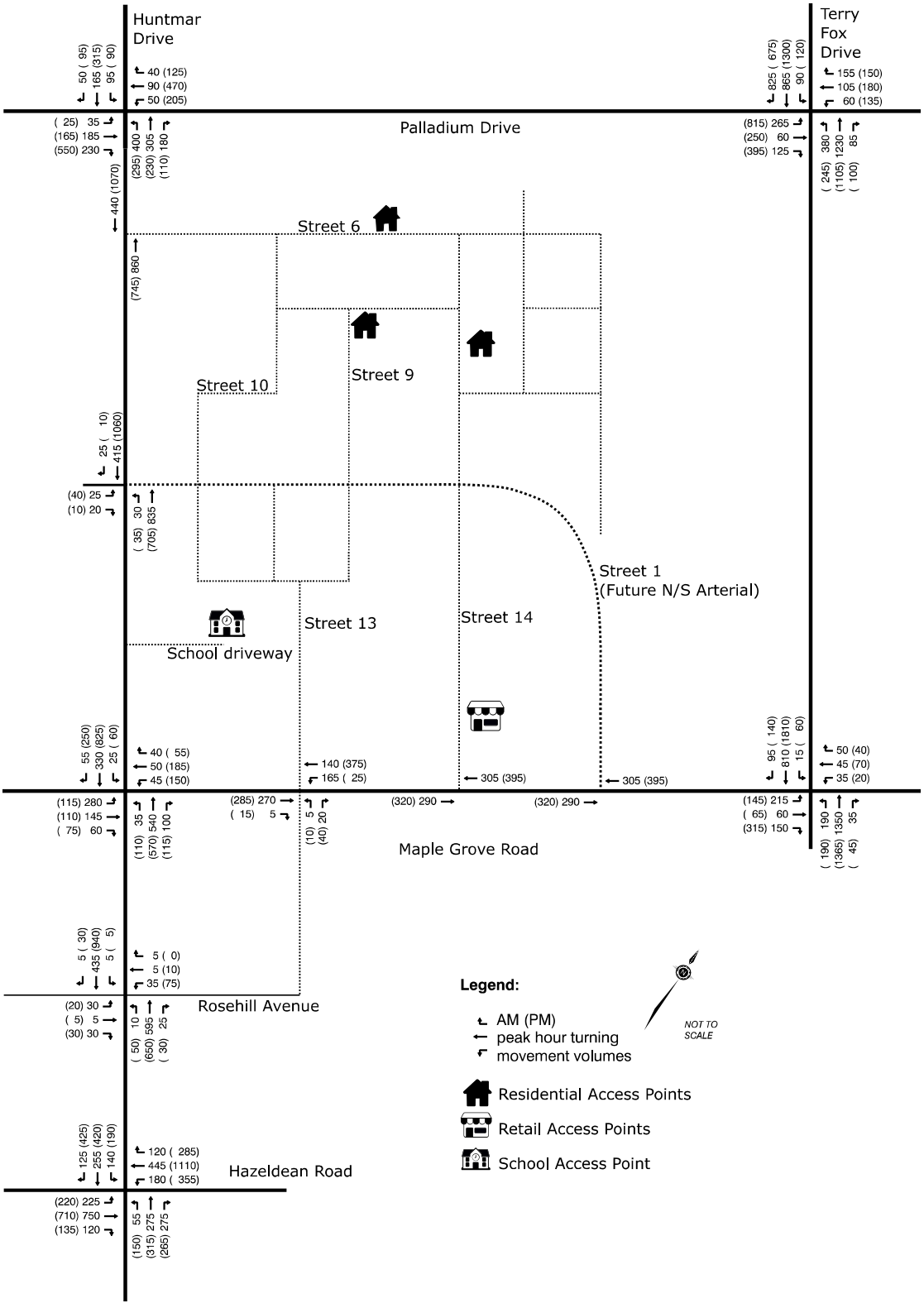
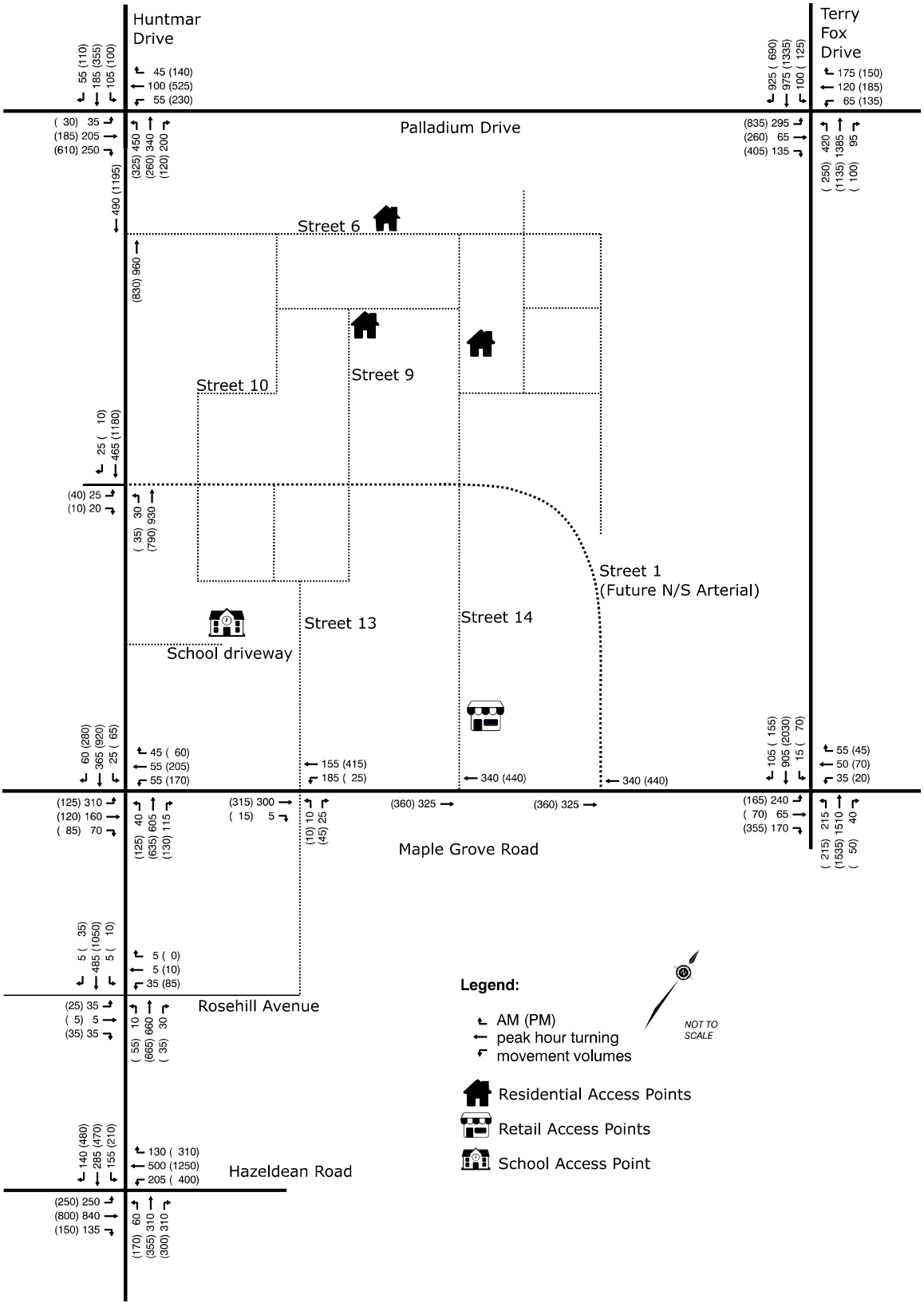


Figure 20: Background Traffic Volumes – 2029



3.3 Demand Rationalization

The proposed development is expected to generate additional vehicle trips that are to be accommodated by the roadway network. The analysis is based on application of transit mode shares representative of typical suburban areas. Future rapid transit would encourage increased shares of transit usage and would minimize the proposed vehicle network impacts. Without a full commitment that the widening of Huntmar Drive and/or construction of the new North-South Arterial would be complete by the 2029 planning horizon, the analysis is based on accommodating the forecast vehicle volumes via the existing road network with intersection improvements at the intersection of Maple Grove Road and Huntmar Drive. The analysis is therefore a conservative estimate of potential vehicle impacts. Future extension of the North-South Arterial will increase vehicle capacity and improve connectivity, but that is beyond the timeframe of this TIA.

3.3.1 Peak Period Ratio Analysis

Table 15 illustrates the distribution of vehicles across the peak period. A peak period ratio of 1.0 would indicate that peak hour volumes are maintained across the entire peak period. The table shows that with peak period ratios of between 0.81 and 0.91 in the AM and between 0.89 and 0.95 in the PM, there is the ability to accommodate further spreading of peak vehicles. This will likely be achieved in advance of widening Huntmar Drive.

Table 15: Peak Period Ratios

Intersection	Peak Period Volume* AM (PM)	Peak Hour Volume* AM (PM)	Peak Period Ratio
1. Huntmar & Hazeldean	444 (767)	542 (830)	0.82 (0.92)
2. Huntmar & Rosehill	161 (270)	186 (298)	0.86 (0.91)
3. Huntmar & Maple Grove	249 (374)	274 (416)	0.91 (0.9)
4. Huntmar & Palladium	260 (405)	315 (457)	0.83 (0.89)
5. Terry Fox & Palladium	589 (963)	728 (1012)	0.81 (0.95)
6. Terry Fox & Maple Grove	437 (649)	504 (704)	0.87 (0.92)

*Based of average of all movements

Covid-19 has result in increased flexibility in employment and travel patterns. It is recognized that in the future demand may further spread beyond the peak periods as employees adjust their working hours to suit their needs.

3.3.2 2024 and 2029 Vehicle Volumes

Figure 21 and **Figure 22** show the 2024 and 2029 AM and PM peak hour traffic volumes used in the analysis.

Figure 21: Total Traffic Volumes - 2024

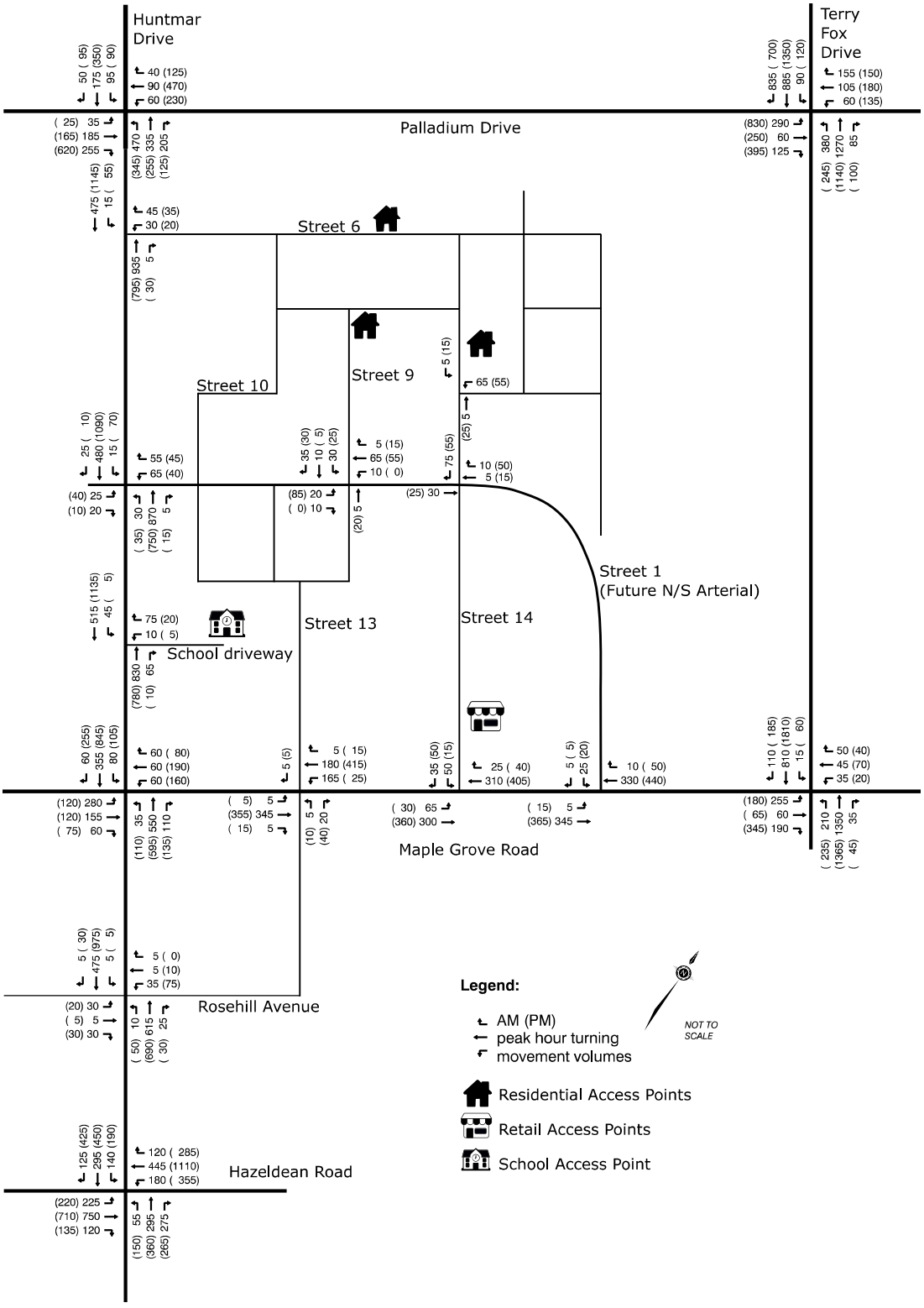
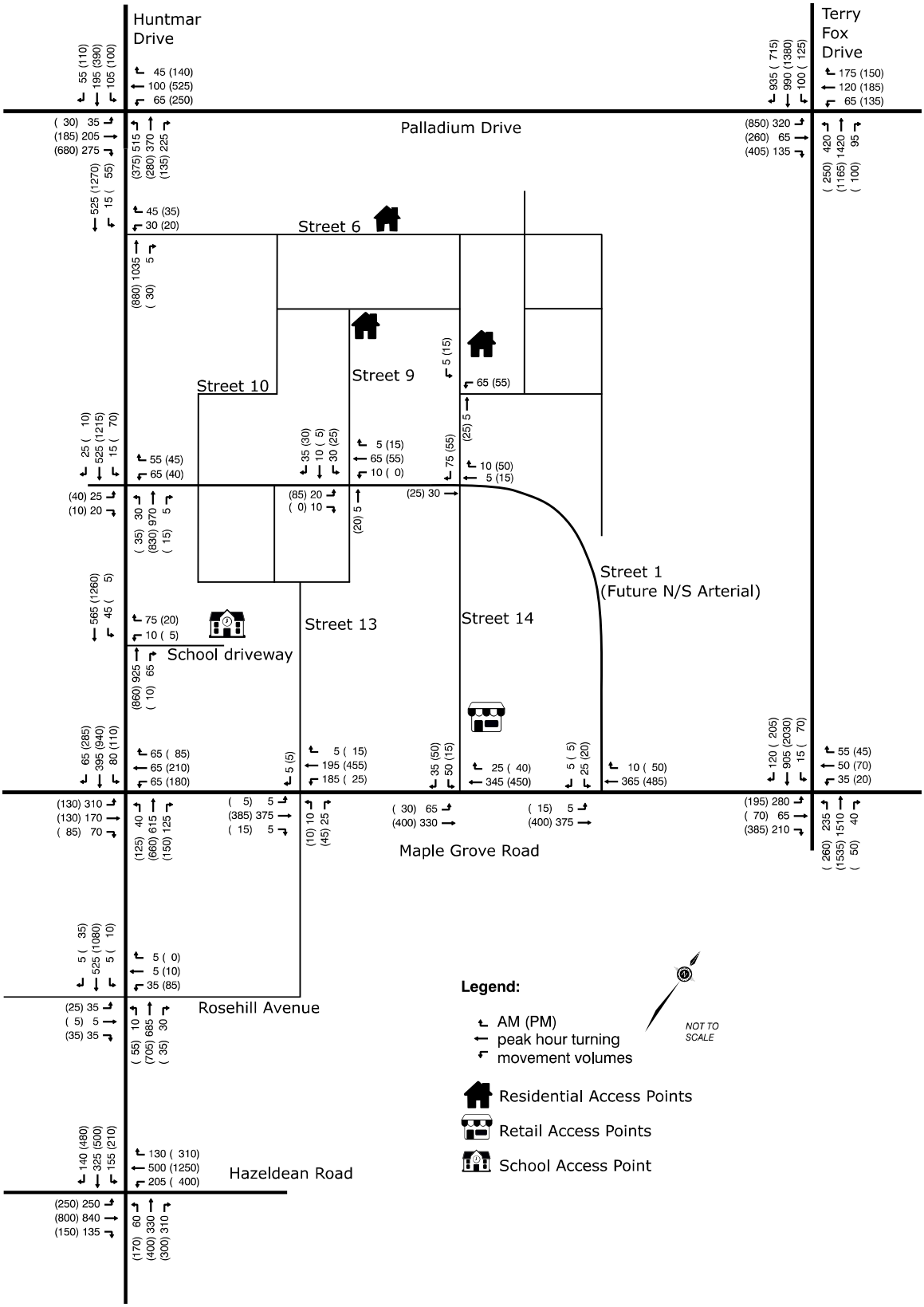


Figure 22: Total Traffic Volumes - 2029



4.0 Analysis

The transportation analysis that was undertaken was based on both Multi-Modal level of service as per the City of Ottawa MMLOS Guidelines, as well as Operational level of service (LOS) analysis using Trafficware's Synchro software version 10.0. This software package, which uses the methodologies of the Highway Capacity Manual (HCM), produces results in terms of level-of-service (LOS), volume to capacity ratio (V/C), vehicle delay, 50th percentile queues, and 95th percentile queues,.

The overall volume-to-capacity ratio (V/C) is a measure of the utilization of the capacity of the intersection using the intersection's critical movements and approaches. The worst movement listed denotes the highest V/C ratio of the critical movements at each intersection. **Appendix B** contains the Synchro performance worksheets.

4.1 Development Design

4.1.1 Design for Sustainable Modes

The community will be designed to match neighbourhood roadway designs. Pedestrian and cycling facilities of the surrounding area and the local streets of the proposed development can be found in **Table 16**.

On-street parking will be limited to collector and local roadways. An internal roadway connection is provided between the development and the elementary school, to provide local drop-off space, and to increase internal walkability and cycling connectivity for the school. ROW is protected for future connections to the North. The ROW dimensions for internal streets are provided in **Table 16**.

Table 16: Roadway Design for Sustainable Modes

Roadway	Cycling	Pedestrian	Parking	ROW (m)
Palladium Drive	Mixed Traffic	Sidewalk on both sides	None	-
Maple Grove Road	Mixed Traffic	Sidewalk on both sides	On-street parking on one side	-
Huntmar Drive	See on-going EA for future details	Sidewalk on both sides	None	-
Terry Fox Drive	Mixed Traffic	Sidewalk on both sides	None	-
Local Streets	Mixed Traffic	Sidewalk on one side	On-street parking on one side	16.5 - 18
Street 1 – West of Street 9 / 11	Cycle lanes	Sidewalk on both sides	None	37.5

Roadway	Cycling	Pedestrian	Parking	ROW (m)
Street 1 – East of Street 9 / 11	Cycle lane, MUP	Sidewalk on South side	None	37.5

4.1.1.1 Pedestrian Connectivity

Pedestrians should be provided with a high degree of priority within 600m of a future rapid transit station and therefore a sidewalk should be provided without the need for people to share the road with motorized vehicles. Internal streets will have sidewalks on one side of the street, but the North-South Arterial (Street 1) will have sidewalks on both sides.

Internally within the development area, no signalized intersections are currently planned. A 4-way stop control is provided along the North-South Arterial at Street 9/11 to facilitate pedestrian and cyclist crossing the corridor. Ultimately when the North-South Arterial is widened (beyond the 2029 horizon) a signalized intersection is proposed.

The extension of the North-South Arterial west across Huntmar Drive and south across Maple Grove Drive will ultimately require signalization of the two arterial road intersections. The intersection of Street 1 at Maple Grove Road can be constructed initially with a stop control (in 2024) but by 2029 would require signalization. The intersection of Street 1 at Huntmar Drive will require signalization by 2024. This will accommodate increasing traffic volumes and improve pedestrian connectivity.

Pedestrian connectivity will be further addressed at the site plan approval stage. While identified roadways or rights of way have not been provided along Street 14 between Maple Grove Road and the North-South Arterial, there are several large parcels being provided that will enable pedestrians to navigate through the sites.

4.1.1.2 Cycling Connectivity

An Environmental Assessment (EA) for the widening of Huntmar Drive is currently being undertaken by the City. The study is to assess multi-modal requirements of the corridor. It is unknown at his time what cycling infrastructure will be included in a widened Huntmar Drive.

Maple Grove is designated as a “Local Route” in the ultimate cycling network. It is important to maintain continuity beyond the study area boundary and cycling should be provided in conjunction with a larger network plan.

Huntmar Drive and Maple Grove Road are arterial roadways that are to be designed as per the City of Ottawa’s Arteria Roadway Cross-section Guidelines which include sidewalks on both sides of the road with segregated cycling facilities.

4.1.1.3 Transit Connectivity

Transit service is currently provided along Huntmar Drive. As service expands in the area, additional stops will be situated along Huntmar Drive and Maple Grove Road to ensure residents are within 400m of a stop. There will be direct and convenient sidewalks and paved surfaces between the residential developments and the transit stops.

The future North-South Arterial will be designed to accommodate transit design vehicles, and sidewalks will be provided to facilitate connections to the future Rapid Transit Station.

4.1.2 Circulation and Access

Not applicable; exempted during screening and scoping.

4.1.3 New Street Networks

The development plan includes several new roadways that will serve the development as well as future network connections. Arterials have been provided with a minimum 37.5 metre ROW while local roads include between 16.5 and 18 metres. **Figure 23** and **Figure 24** and illustrates representative cross-sections for the North-South Arterial (Street 1) within the study area.

A median is provided through the development along Street 1 between Maple Grove Road and Street 9/11 to enable right-in right-out movements only. Street 1 at Street 9 / 11 will have full access movements to accommodate cyclists and entry to the subdivision. The arterial road cross section west of Street 9/11 does not include a median as per the Arteria Roadway Cross-section Guidelines.

The proposed development will have a total of six (6) accesses: three on Huntmar Drive and three on Maple Grove Road. Internal roadways will be designed to accommodate transit vehicles, delivery trucks, and garbage trucks.

The proposed development will have eighteen interior intersections. However, only three intersections have been analyzed as representative worst case. All internal intersections that were not analyzed are anticipated to operate at a LOS ‘A’ under the site generated traffic conditions for both the AM and the PM peak hours.

The school is located adjacent to two arterial roadways where on-street parking and loading/unloading will be limited. As well, the school site is located in close proximity to the existing signalized intersection where drop-offs are further discouraged as they can impact network circulation. A local roadway is provided on the north side of the school to facilitate school bus and parent drop-offs. It is still suggested that on-site facilities be provided to accommodate additional vehicle circulation as well as required staff parking. On-site vehicle access is proposed via Huntmar Drive. New residential roads will be designed for 30 km/h posted speed limits. Monitoring of speeds is suggested if concerns are raised.

4.1.3.1 North-South Arterial Evaluation

The Future North-South Arterial is anticipated to travel through the development, transitioning from a South-North alignment to an East-West alignment. Typical arterial roadways in the City of Ottawa will ultimately accommodate between 800 and 1100 vehicles per hour per lane, based on the 2014 MMM TRANS Model Technical Report. The expected demand on the North-South Arterial will necessitate the signalization of Street 1 at Street 9 / Street 11. This will also facilitate pedestrian and cycling connectivity through the development. The North-South Arterial will be extended south and west of the study area.

To enable the transition of the arterial roadway from an east-west alignment to the north-south alignment several options were considered. It was initially envisioned that a roundabout could be used, but through an iterative assessment, it was identified that there were potential impacts that may better be managed with an alternate configuration. A qualitative evaluation of the North-South Arterial was therefore performed.

It was necessary for the roadway alignment to address the development surface drainage (overland flow to the east) as well as development and transportation design / operations, while being constrained by the Kanata LRT alignment, station and structure location. Three options were considered:

1. Use a roundabout and extend planned LRT structure North to accommodate overland flow crossing under LRT;
2. Use a roundabout that is shifted to the southwest to enable overland flow to cross under planned LRT structure; or
3. Replace planned roundabout with 130 metre radius bend in roadway

A multi-modal evaluation was undertake assessing criteria related to conflicts, design measures, and comfort for pedestrians, cyclists, and motor vehicles. The goal was to determine which alternative minimized conflicts, maximized travel mode efficiency, and provided comfort for all transportation modes through the development. **Table 17** and **Table 18** illustrate the comparison of alternatives analysis. **Figure 23** and **Figure 24** illustrate representative cross-sections of Street 1 (North-South Arterial). A PowerPoint presentation detailing the full qualitative analysis is found in **Appendix C**. **Figure 25** illustrates the preliminary plan view of the North-South Arterial through the development, and the transition from the MUP to the LRT.

Through the evaluation of three alternative options for the future North-South Arterial, it was determined that a 130 metre radius bend in the roadway is the recommended alternative. It was found that this option minimizes conflict points, provides optimal drainage and should result in minimal development impact. To ensure that pedestrian and cycling crossings are suitably accommodated, a protected signalized intersection is recommended ultimately at Street 9/11 to allow eastbound cyclists to access a bi-directional MUP on the north side of the arterial between Street 9/11 and the LRT corridor. A 4-way stop control would be suitable in the interim prior to signalization.

Table 17: Detailed Analysis

Criteria		Option 1/2 - Roundabout	Option 3 – Curve in Roadway
Pedestrian	**Conflicts**	• Pedestrian conflicts at exit lanes (vehicles yield to pedestrians)	• Barrier in median on bend to restrict pedestrian crossings
	Design Measures	• PXO can be included on intersection approaches and exits (impacts capacity)	• Controlled crossing (signal) would be required on roadway tangent upstream / downstream from "bend".
	Comfort	• Slightly longer distances to cross road compared to traditional signal	• Pedestrians crossing south leg are diverted
Cycling	**Conflicts**	• Cyclists should not travel within a 2-lane roundabout. • They should circulate around as if they are pedestrians.	• Barrier in median on bend to restrict crossing of arterial; • MUP on north side crossing Street 8 (vehicles look left at vehicle gaps and not at approaching eastbound cyclists)
	Design Measures	• No accommodation of cyclists, PXO's are for pedestrians and do not technically enable cross rides at this time	• Signalized intersection at Street 9/11 to enable cyclists to cross road
	Comfort	• Slightly longer distances to cross road compared to traditional signal, and cyclists dismount their bicycle to cross road	• Diversion of cyclists to bi-directional MUP on north side of road
Auto	**Conflicts**	• Potential site line issues at Street 8/14, Right-in Right Out provided	• Potential site line issues at Street 8/14, Right-in Right Out provided
	Design Measures	• Reduced to 40 km/h operating speeds	• Designed with 60 km/h operating speeds (4% super elevation)
	Comfort	• Continuous flow, easy to indicate North-South Arterial direction	• Continuous flow, obvious North-South Arterial direction • Consolidation of site vehicles at Street 8 & 9 requires signal

Table 18: Summary

Criteria		Option 1/2 – Roundabout	Option 3 – Curve in Roadway	Notes
Pedestrian	Conflicts	◒	◒	• Roundabout introduces conflicts at exit lanes; less conflicts with curve, but may result in uncontrolled crossings of the North-South Arterial
	Design Measures	●	●	• Conflicts can be mitigated through design
	Comfort	◒	◔	• Roundabout would result in shorter pedestrian crossing distances
Cycling	Conflicts	◔	◔	• Neither the roundabout of the curve would appropriately serve cyclists without specific design measures.
	Design Measures	◔	◒	• Curve in roadway can include a signal to enable cyclists to cross Arterial from south side to bi-directional MUP on north side between signal and LRT.
	Comfort	◒	◔	• Roundabout would not require diversion of cyclists
Auto	Conflicts	◒	◒	• Similar vehicle site-line conflicts
	Design Measures	◒	●	• Curve in roadway can maintain desired Arterial roadway design speed
	Comfort	●	◕	• Full access provided with roundabout while curve may limit connections to north of the development

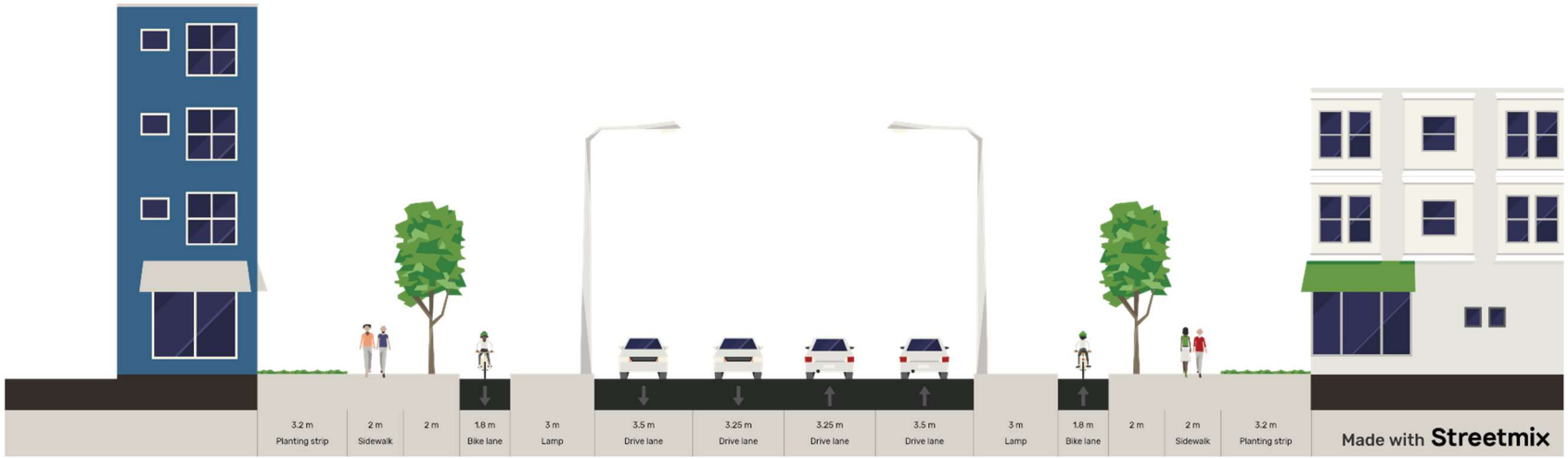


Figure 23: Cross-Section of Street 1 - West of Street 9 /11

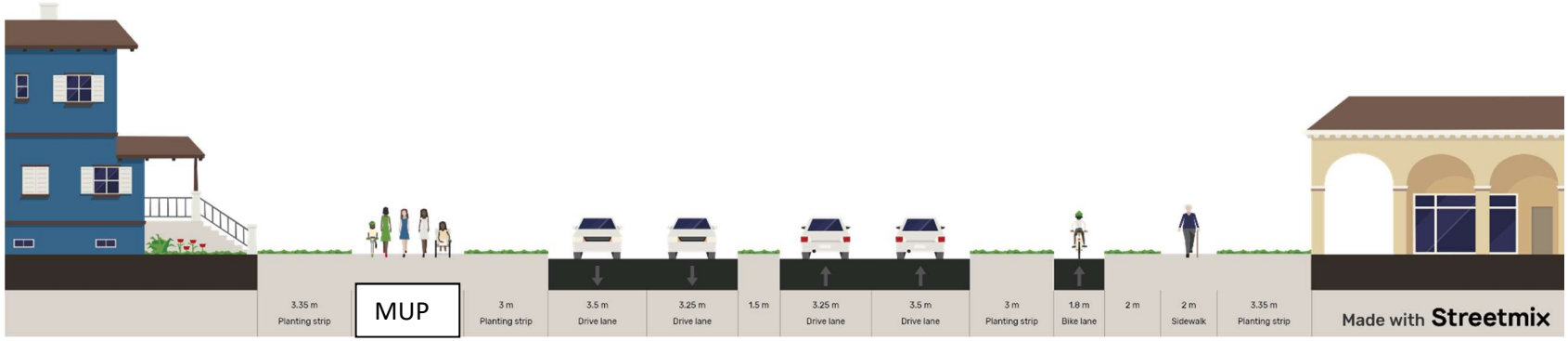


Figure 24: Cross-Section of Street 1 – East of Street 9 /11

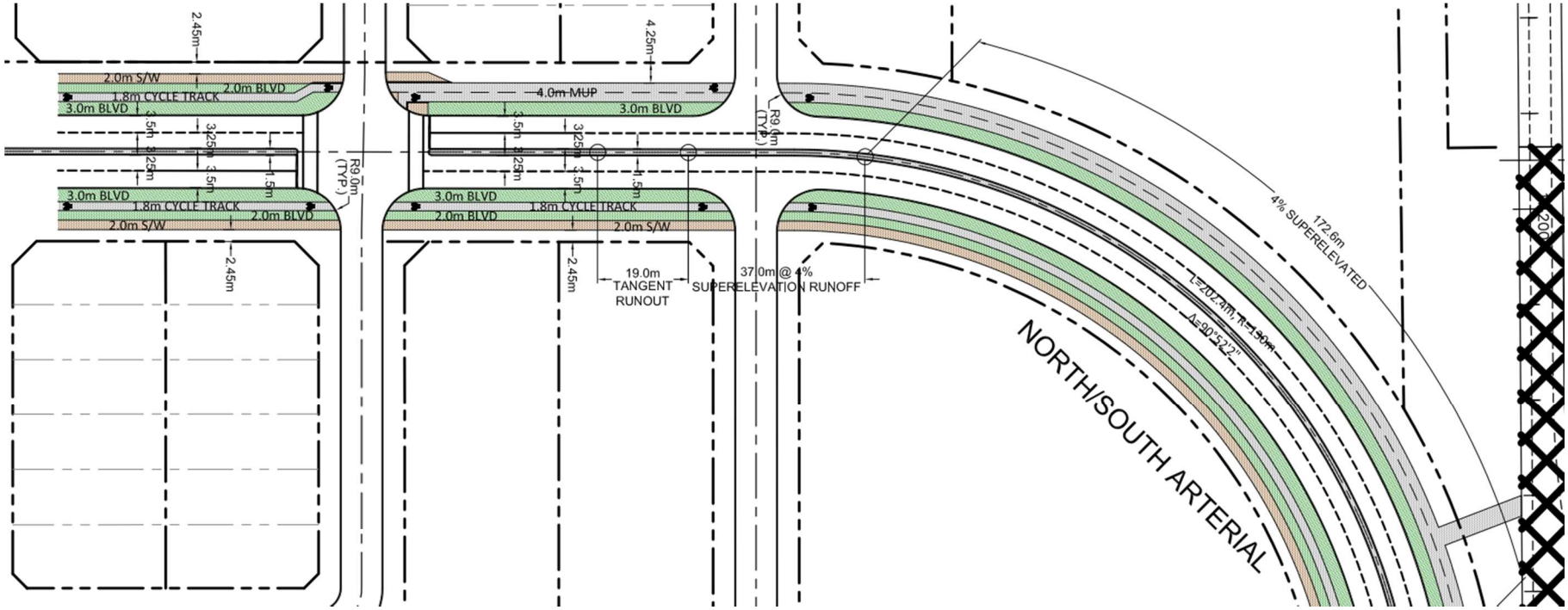


Figure 25: North-South Arterial – Plan View

4.2 Parking

Not applicable; exempted during screening and scoping.

4.3 Boundary Street Design

The planned development will be bound by the existing Huntmar Drive to the West, and Maple Grove Road to the South.

All new local residential roads will be designed to target an operating speed of 30 km/h per the Strategic Road Safety Action Plan. A 30 km/h design guideline is currently being developed by the City. The following measures are recommended as preliminary steps toward designing and building all new or reconstructed local residential streets with a target operating speed of 30 km/h:

- Provide bulb-outs that narrow the local road to 7 m target throat width at all local-local and local-collector road intersections. The bulb-outs would ideally be arranged to enclose on-street parking. Review turning templates using AutoTurn. Ensure that an HSU can make the turns using the entire road space of the local road.
- Periodic pinch points, if appropriate (can be combined with a mid-block vertical measure), per the Traffic Calming Design Guidelines.
- If vertical measures are required to achieve design speeds, consistent spacing of speed humps, tables, crossings or intersections in line with the constraints identified in the Traffic Calming Design Guidelines should be applied.

There are plans for the widening of Huntmar Drive to provide a four lane cross section with additional turning lanes and cycling and pedestrian facilities. The EA for widening of Huntmar drive will confirm the roadway elements and planned roadway design.

Maple Grove is currently a two-lane roadway. The roadway is not currently planned for widening, but upgrades may be required to improve pedestrian and cycling facilities.

4.3.1 Design Concept

4.3.1.1 Intersection MMLOS Analysis

Multi-Modal Level of Service (MMLOS) was evaluated for the intersection at Huntmar Drive and Maple Grove Road to assist with developing a design concept that maximizes the achievement of the MMLOS objectives. Huntmar Drive, and Maple Grove Road are subject to MMLOS targets of school policy areas as the development will be within 300 metres of a school in the future.

Table 19 presents the minimum desirable LOS targets for each mode considering the policy area and road classification for each of the roads under review.

Table 19: Minimum Desirable MMLOS Targets

Policy Area	Road Segment	Road Class	Pedestrian LOS (PLOS)	Bicycle LOS (BLOS)	Transit LOS (TLOS)	Truck LOS (TkLOS)	Vehicle LOS (VLOS)
Within 300m of a School	Huntmar Drive	Arterial	A	C	D	No Target	E
	Maple Grove Road	Arterial	A	B	D	No Target	E

Notes on the MMLOS analysis are as follows:

- The City's TMP identifies Huntmar Drive as a cycling Spine Route therefore it has a BLOS target of "C".
- The transit LOS target for both Huntmar Drive and Maple Grove Road is a "D" as neither is a planned transit priority corridor.
- Neither Huntmar Drive nor Maple Grove Road are designated truck routes therefore there is no Truck LOS target.

Table 20 provides a summary of the existing and planned MMLOS results for the intersection of Maple Grove Road and Huntmar Drive. The posted speeds were assumed to be 50 km/h on both roads. The full analysis can be found in **Appendix D**.

Table 20: MMLOS Summary: Intersection of Huntmar Drive at Maple Grove Road

Time Period	Pedestrian	Bicycle	Transit	Truck	Auto
Existing	E	D	F	F	B
Planned - 2029	E	B	F	E	C
LOS Target*	**A**	**B**	**D**	**N/A**	**E**

*Represents policy area targets within 300 metres of a school

The intersection does not achieve the pedestrian target 'A' for existing or planned conditions because the cycle length of the intersection and the effective walk time of the pedestrian provides a level of service 'E'. This may be remedied by reducing the cycle length of the intersection or by increasing the effective walk time available to pedestrian. This however may further impact vehicle operations.

The intersection does not currently achieve the bicycle target because the cyclists are accommodated in mixed traffic. This will remedied with the inclusion of cycle tracks, and cross-rides on all approaches in the planned intersection improvements, which would increase overall safety for bikers and increase the intersection LOS to 'B' for cyclists.

The intersection does not achieve the transit target 'D' for existing or planned conditions because of the average signal delay on the eastbound movement. This may be remedied by installing a left turn lane on

the eastbound movement, which would reduce the overall delay of the intersection. Note that the primary transit movement is via the North-South approaches. Also, the future Rapid Transit facility will significantly improve transit service with a station planned to accommodate the planned development.

It is noted that with the added capacity gained through the planned widening of Huntmar Drive, the future design will much better address MMLOS requirements.

4.3.1.2 Segment MMLOS Analysis

A segment MMLOS analysis for the two boundary streets was undertaken and is summarized below. The full analysis can be found in **Appendix D**.

Maple Grove Road

MMLOS analysis was undertaken for Maple Grove resulting in BLOS=D for the current roadway. As a Local Route within 600m of a Rapid Transit station and 300 m of a School a BLOS= B target should be adopted. To provide the target BLOS for a 50 km/h roadway, a minimum 1.5 m cycle lane should be provided, and should the roadway be widened to 2 travel lanes in each direction a raised median would be required (it is noted however that the updated City of Ottawa Arterial Road Cross-sections do not include medians). Intersections would achieve a BLOS=B for a 50 km/h roadway if no lanes were to be crossed to undertake a left turn which would not be the case if cycle tracks were provided with two-stage left turns on Maple Grove Road, or if the road is widened in the future. The intersections should therefore be designed with consideration for higher order cycling facilities.

The MMLOS analysis suggests that a 2 to 3-lane road would not require cycle facilities to achieve a BLOS B with posted speeds of 40 km/h or less. Maple Grove Road is envisioned as more than 1 lane per direction and likely to operate with 50 km/h vehicle speeds suggesting the need for Bike Lanes.

Huntmar Drive

MMLOS analysis was undertaken for Huntmar Drive resulting in BLOS=D for the current roadway. The TIA suggests a target BLOS=C, since it is a Spine Route Route within 600m of a Rapid Transit station and 300 m of a School. To provide the target BLOS for a 50 km/h roadway, a minimum 1.5 m cycle lane should be provided. The intersections should therefore be designed with consideration for higher order cycling facilities.

Refer to the ongoing Environmental Assessment for further details regarding the future MMLOS segment analysis for Huntmar Drive. The EA study will identify and protect the corridor for the widening of Huntmar Drive and will address the following key items:

- Confirmation of the future transportation demand in the study area;
- Development of corridor and design options to address the forecast travel demand;
- Application of the Complete Street framework and multimodal level of service analysis; and
- Assessment of walking and cycling infrastructure and connection requirements.

4.4 Access Intersection Design

There are six locations were the adjacent roadway network will be connected to the planned development:

- Three full access intersections on Huntmar Drive (at Street 1 and Street 6), plus the school driveway. To ensure the results of the traffic analysis capture potential impacts, no residential or retail site traffic was assigned to the school driveway. School trips were assigned to the intersection on Huntmar Drive (A1).
- Three full access intersections were assumed on Maple Grove Road (Street 13, Street 14 and Street 1).

4.4.1 Location and Design of Driveway

The roads that provide entry and the distance to boundary roads are presented in **Table 21**. Six full movement accesses were analyzed. It is not anticipated that they will be impacted by tapers. Street 13 is aligned with Rosehill Avenue on Maple Grove Road but is not signalized as part of this analysis.

To accommodate the school access, a driveway will be required approximately 160 metres from the intersection of Huntmar Drive and Maple Grove Road. School accesses are typically provided via the arterial and collector road network and do not rely on local roadways. School access is also controlled (particularly for elementary schools) limiting the number of locations for pedestrian site access. For the purposes of traffic analysis, this driveway was determined to be a full access configuration. There is limited ability to accommodate on-street school bus loading/ unloading and parent drop off on the adjacent arterial roads. On-site facilities would be required with appropriate sidewalks and accessible connections to the building. Internal local access will also be facilitated within the development to promote active transportation and safe pedestrian and cycling to school.

Table 21: Proximity to Adjacent Driveways

Access Road	Access Intersection	Boundary Road Distance (m)	Boundary Road
Huntmar Drive	A1: School Access	160	Maple Grove Road
	A2: Street 1	300	Maple Grove Road
	A3: Street 6	510	Maple Grove Road
Maple Grove Road	A4: Street 13	180	Huntmar Drive
	A5: Street 14	300	Huntmar Drive
	A6: Street 1	410	Huntmar Drive

Accesses on Huntmar Drive are all > 350 metres from Palladium Drive.
Accesses on Maple Grove Road are all > 1250 metres from Terry Fox Drive.

4.4.2 Intersection Control

Six full access intersections were analyzed along Huntmar Drive and Maple Grove Road. Street 1 (North-South Arterial) is to be extended West of Huntmar Drive and extended South of Maple Grove Road. The two access intersections along the North-South Arterial (A2 and A6) will require signalization.

It is not anticipated that signalization will be in place to accommodate 2024 vehicular traffic, except for the intersection of Street 1 at Huntmar Drive, which will be signalized. The analysis for initial build-out (2024) includes stop control only at all other intersections. Signalization has also been assumed to be in place for 2029 at the intersection of Street 1 at Maple Grove Road to accommodate additional development, pedestrian volumes and pedestrian/cycling connectivity. The remaining intersections will be two-way stop controlled:

- Street 6 at Huntmar Drive
- School Driveway
- Street 13 at Maple Grove
- Street 14 at Maple Grove Road

4.4.3 Intersection Design

The sections that follow present the analysis of access and internal intersection operations during the AM and PM peak hour for existing and future conditions.

4.4.3.1 Existing Access Intersection Operations

The proposed development is in a greenfield area and there are no existing access intersections.

4.4.3.2 Future Access Intersection Operations

Table 22 and **Table 23** summarizes the Synchro results for the access intersections during the weekday AM and PM peak hours for the 2024 and 2029 horizon years. **Appendix E** provides full analyses results by movement for signalized intersections.

The analysis confirms that vehicles will operate with satisfactory conditions in 2024 and 2029 at all access intersections with each movement operating at LOS D or better based on the volume to capacity ratio. It is noted that some intersections experience minor delays.

In 2024 the access at Huntmar Drive at Street 1 would operate with an unsatisfactory LOS during the PM peak hour with v/c of greater than 2.0 if it were to be unsignalized. It is recommended that this intersection be signalized shortly after development buildout, as shown in the analysis results.

Table 22: Access Intersections – 2024 AM (PM) Peak Hour Operations

Main Road	Side Road	Overall			Worst Movement			
		Volume	Delay (s)	V/C	Movement	(V/C)	LOS	Q95th (m)
Huntmar Drive	**Street 6** (unsignalized)	1500 (2080)	1.7 (4.8)	**0.37 (0.25)**	NBTR (WBLR)	**0.55 (0.73)**	A (C)	0.0 (27.5)
	Street 1 (signalized)	1585 (2100)	10.7 (11.7)	0.69 (0.79)	NBTR (SBTR)	0.69 (0.79)	B (C)	#160.2 (#271.4)
	School Access (unsignalized)	1540 (1950)	2.1 (0.5)	**0.35 (0.19)**	NBTR (NBTR)	**0.53 (0.46)**	A (A)	0.0 (0.0)
Maple Grove Road	**Rosehill Avenue / Street 13** (unsignalized)	735 (880)	2.8 (1.2)	**0.07 (0.02)**	WBLTR (NBLTR)	**0.14 (0.10)**	A (A)	3.7 (2.5)
	Street 14 (unsignalized)	785 (895)	2.5 (1.3)	**0.13 (0.15)**	WBTR (WBTR)	**0.20 (0.26)**	A (A)	0.0 (0.0)
	Street 1 (unsignalized)	720 (890)	0.6 (0.6)	**0.10 (0.16)**	WBTR (WBTR)	**0.20 (0.29)**	A (A)	0.0 (0.0)

represents 95th percentile queues that are continuously growing and are therefore measures after 2 signal cycles

Table 23: Access Intersections – 2029 AM (PM) Peak Hour Operations

Main Road	Side Road	Overall			Worst Movement			
		Volume	Delay (s)	V/C	Movement	(V/C)	LOS	Q95th (m)
Huntmar Drive	**Street 6** (unsignalized)	1650 (2285)	2.9 (3.3)	**0.42 (0.27)**	NBTR (NBTR)	**0.61 (0.54)**	B (A)	0.0 (0.0)
	Street 1 (signalized)	1735 (2305)	11.8 (14.1)	**0.75 (0.86)**	NBTR (SBTR)	**0.75 (0.86)**	C (D)	#210.7 (#321.9)
	School Access (unsignalized)	1680 (2160)	2.1 (0.6)	**0.39 (0.21)**	NBTR (NBTR)	**0.58 (0.51)**	A (A)	0.0 (0.0)
Maple Grove Road	**Rosehill Avenue / Street 13** (unsignalized)	805 (960)	3.1 (1.2)	**0.08 (0.02)**	WBLTR (NBLTR)	**0.16 (0.11)**	A (A)	4.4 (3.0)
	Street 14 (unsignalized)	850 (980)	2.4 (1.2)	**0.14 (0.16)**	WBTR (WBTR)	**0.22 (0.29)**	A (A)	0.0 (0.0)
	Street 1 (signalized)	785 (970)	12.6 (12.9)	**0.58 (0.71)**	EBT (WBTR)	**0.58 (0.71)**	A (C)	46.3 (69.2)

represents 95th percentile queues that are continuously growing and are therefore measures after 2 signal cycles

The extensive queueing anticipated at the intersection of Huntmar Drive and Street 1, will be mitigated with the widening of Huntmar Drive. A sensitivity analysis was performed and it was found that an additional southbound through lane would reduce the 95th percentile queue from 321.9 metres to 69.8 metres during the 2029 PM peak hour.

The Ontario Ministry of Transportation (MTO) left turn storage lane warrant procedure for at-grade intersections was applied to the access intersections to determine appropriate storage lengths for signalized access intersections. It was determined, based on design speed and vehicle volumes, that a storage length of 15 metres was appropriate for the left turn lanes at the newly signalized access intersection at Maple Grove Road / Street 1. This will typically accommodate 2 smaller vehicles or a larger commercial vehicle. The signalized intersection at Huntmar Drive / Street 1 was analyzed with left turn storage lanes of 30 metres in each direction.

Where anticipated vehicle queuing exceeds these values, the storage lane could be extended. The length of storage will be confirmed prior to design.

4.4.3.3 Internal Intersections

Table 24 provides internal intersection results for both 2024 and 2029. There is no difference in results anticipated between 2024 and 2029.

The internal intersections are forecast to operate well with LOS A at all movements, operating well below capacity with minimal queueing. It is noted that the analysis assumes no extension of the North-South Arterial other than directly serving adjacent development. It does not include diverted traffic due to future connections to Highway 417.

Table 24: AM (PM) Peak Hour Operations: Internal Intersections

Main Road	Side Road	Overall			Worst Movement			
		Volume	Delay (s)	V/C	Movement	(V/C)	LOS	Q95th (m)
Street 1	Street 9 / 11	185 (230)	7.4 (7.5)	**0.07 (0.08)**	WBLTR (EBLTR)	**0.09 (0.10)**	A (A)	0.0 (0.0)
	Street 8 / 14	120 (145)	5.4 (3.3)	**0.05 (0.04)**	SBR (SBR)	**0.07 (0.05**	A (A)	1.8 (1.3)
Street 8	Street 4	75 (95)	7.4 (7.4)	**0.06 (0.05)**	WBLR (WBLR)	**0.07 (0.06)**	A (A)	0.0 (0.0)

4.5 Transportation Demand Management

TDM program measures can be adopted to complement the development's proposed design. These measure encourage sustainable transportation choices, benefit occupants and visitors, and increase marketability.

Appendix F contains the complete TDM checklists which help identify relevant TDM measures to be adopted in the future.
From the TDM residential checklists, some recommendations are:

- Display local area maps with walking/cycling access routes and key destinations at major
- entrances;

- Display relevant transit schedules and route maps at residential building entrances;
- Contract with provider to install on-site bike share station;
- Contract with provider to install on-site car share vehicles and promote their use by residents;
- Unbundle parking costs - condominium purchase price / monthly rent;
- Provide a multimodal travel option information package to new residents.

From the TDM non-residential checklist, some recommendations are:

- Conduct periodic surveys to identify travel-related behaviours, attitudes, challenges and solutions, and to track progress
- Display local area maps with walking/cycling access routes and key destinations at major
- entrances;
- Display relevant transit schedules and route maps at entrances;
- Provide online links to OC Transpo and STO information;
- Subsidize or reimburse monthly transit pass purchases by employees;
- Contract with provider to install on-site bikeshare station for use by commuters and visitors;
- Provide employees with bikeshare memberships for local business travel;
- Unbundle parking cost from lease rates at multi-tenant sites;
- Provide a multimodal travel option information package to new/relocating employees and students;
- Encourage flexible work hours;
- Encourage compressed workweeks;
- Encourage telework;
- Provide on-site amenities/services to minimize mid-day or mid-commute errands.

TDM-supportive design & infrastructure measures:

- Locate buildings close to the street, and do not locate parking areas between the street and building entrances
- Locate building entrances in order to minimize walking distances to sidewalks and transit stops/stations
- Locate building doors and windows to ensure visibility of pedestrians from the building, for their security and comfort
- Provide shower and lockers for retail employees.

4.6 Neighbourhood Traffic Management

Not applicable; exempted during screening and scoping.

It is recognized that the development south of Maple Grove Road uses Rosehill Avenue as a secondary access, which is directly across from Street 13. A signal may be desirable due to the intersection's

proximity to the school; however, it is not over capacity based on vehicle demand. Pedestrian crossings can be accommodated at Maple Grove Road / Street 1 at Huntmar Drive at Maple Grove Road.

4.7 Transit

In order to achieve target transit shares, transit facilities will need to be provided along Maple Grove road in advance of the new development. Transit stops are recommended to be built at the access intersections Street 1 at Huntmar Drive (A2) and Street 14 at Maple Grove road (A5). Once these stops are built all residents will be within 400 metres of transit.

Ultimately, transit service will operate on Street 1 in order to better serve the new development. The arterial will include sidewalks and does not require specialized infrastructure for transit. Transit stops will be provided near the intersection of Street 1 and 9/11 where there is planned intersection control measures for pedestrians to cross the arterial roadway. A second set of stops will be shown near Maple Grove Station. The North-South Arterial will be designed to accommodate both standard and articulated transit vehicles in its ultimate configuration.

The existing transit services that run along Huntmar Drive will need to be improved in the future to accommodate the increased transit demand. Standard and articulated buses have seated capacities of 40 and 55 people respectively. In order to be conservative, the average seated capacity was approximated to be 45. To serve the additional passengers related to the 130 Huntmar Drive development, an additional 1-2 bus trips would be required during the peak hours (to serve the peak 60 passengers per hour in the peak direction).

4.8 Review of Network Concept

Not applicable; exempted during screening and scoping.

4.9 Intersection Design

This section addresses the potential impacts to area intersections beyond the immediate access intersections presented in **Section 4.4**. Six existing intersections were identified during the project Scoping that are to be assessed for impacts due to the additional site-generated vehicles as follows:

1. Huntmar Drive and Hazeldean Road
2. Huntmar Drive and Rosehill Avenue
3. Huntmar Drive and Maple Grove Road
4. Huntmar Drive and Palladium Drive
5. Terry Fox Drive and Palladium Drive
6. Terry Fox Drive and Maple Grove Road

Refer to **Figure 7** for lane configurations of the study area. **Appendix B** contains the intersection performance worksheets.

4.9.1 Intersection Control

See **Section 4.4.2**.

4.9.2 Intersection Design

The identified network intersections are all signal controlled. The analysis of area intersections includes the planned improvement at the intersection of Huntmar Drive and Maple Grove Road as follows:

- Auxiliary left-turns on all approaches
- Auxiliary southbound right-turn lane
- Two through lanes on the northbound approach
- Single through lanes on southbound, westbound, and eastbound approaches

The other area intersections were assumed to be maintained as is.

It is noted that lost time reduction was included in the PM peak hour analyses at select intersections. This lost time reduction is included to ensure that observed vehicles are being processed by the modelled network. It reflects vehicles using a portion of the amber phase for traversing the intersection. The same lost time reduction is applied to both existing and future forecasts as it is expected that drivers' behavior will not change. Los time represents vehicles making use of the All-red clearance interval when there are longer delays and queues.

4.9.2.1 Existing Network Intersection Operations

Table 25 summarizes the Synchro results for the existing network intersections during the AM and PM peak hours. All intersections are operating acceptably overall; however, the northbound left movement at the intersection of Huntmar Drive and Hazeldean Road currently operates with a LOS F and is over capacity during the PM peak hour. Existing signal timings were obtained directly from the City for this analysis. No adjustments were made to the existing signal timings other than accounting for lost time on specific movements exceeding capacity. **Appendix E** provides full analyses results by movement for signalized intersections.

The intersection of Huntmar Drive and Rosehill Avenue operates as a roundabout and therefore an overall V/C ratio is not listed.

Table 25: AM (PM) Peak Hour Operations – Existing (2019) Network Intersections

Main Road	Side Road	Overall			Worst Movement			
		Volume	Delay (s)	V/C	Movement	(V/C)	LOS	Q95th (m)
Huntmar Drive	Hazeldean Road**	2570 (3935)	34.0 (45.4)	0.77 (0.91)	SBL (NBL)	0.92 (1.17)	E (F)	#64.3 (#81.5)
	Rosehill Avenue	1000 (1575)	8.5 (16.1)	-	NB (SB)	0.51 (0.81)	A (D)	21 (63)*
	Palladium Drive**	1495 (2165)	29.6 (23.3)	0.75 (0.78)	NBL (NBL)	0.84 (0.78)	D (C)	77.2 (#53.2)
	Maple Grove Road	1370 (2090)	28.8 (35.8)	0.84 (0.87)	EBTLR (WBTLR)	0.84 (0.90)	D (D)	111.9 (#116.0)
Terry Fox Drive	Maple Grove Road	2615 (3640)	16.2 (30.5)	0.81 (0.82)	EBL (EBR)	0.81 (0.83)	D (D)	64.6 (m69.3)
	Palladium Drive**	3675 (5090)	27.8 (45.9)	0.71 (0.98)	SBR (EBL)	0.73 (1.00)	C (E)	81.3 (#128.6)

*Vehicle length for queue calculation has been assumed at 7 metres.

**Lost time applied to movements exceeding capacity

represents 95th percentile queues that are continuously growing and are therefore measures after 2 signal cycles

m denotes that upstream metering is in effect

4.9.2.2 2024 Network Intersection Operations

Table 26 summarizes the Synchro results for the 2024 forecast network intersections during the AM and PM peak hours. Adjustments were made to the existing signal timings obtained from the City for the 2024 time horizon. **Appendix E** provides full analyses results by movement for signalized intersections.

The majority of the intersections operate acceptably with each movement at LOS E or better and below capacity. The intersections at Huntmar Drive and Rosehill Avenue, and Palladium Drive, and at Terry Fox Drive and Palladium Drive are the most congested with a reported LOS F for at least one movement. The intersection of Terry Fox Drive and Palladium Drive is forecast to be over capacity with an overall V/C of 1.13.

Traffic congestion at the intersections may be mitigated through higher transit mode shares from implementing isolated transit measures or bus rapid transit through the area. It is also noted that peak spreading may occur throughout the peak period as shown in **Table 15**.

Table 26: AM (PM) Peak Hour Operations – 2024 Network Intersections

Main Road	Side Road	Overall			Worst Movement			
		Volume	Delay (s)	V/C	Movement	(V/C)	LOS	Q95th (m)
Huntmar Drive	Hazeldean Road	3025 (4655)	34.2 (43.5)	0.76 (0.86)	NBT (SBT)	0.76 (0.90)	C (D)	93.7 (#169.8)
	Rosehill Avenue	1245 (1915)	10.5 (36.7)	-	NB (SB)	0.63 (1.03)	B (F)	35 (147)*
	Palladium Drive**	1990 (2895)	34.9 (36.7)	1.01 (0.99)	NBL (NBL)	1.01 (0.99)	F (E)	#79.5 (m#111.9)
	Maple Grove Road	1865 (2790)	30.2 (32.9)	0.63 (0.86)	EBL (SBT)	0.64 (0.86)	B (D)	61.9 (#269.4)
Terry Fox Drive	Maple Grove Road**	3165 (4420)	29.1 (30.8)	0.68 (1.00)	EBL (SBT)	0.79 (1.00)	C (E)	74.1 (m73.3)
	Palladium Drive**	4335 (5590)	30.9 (65.3)	0.83 (1.13)	SBR (SBT)	0.83 (1.14)	D (F)	94.9 (#260.0)

*Vehicle length for queue calculation has been assumed at 7 metres.

**Lost time applied to movements exceeding capacity

represents 95th percentile queues that are continuously growing and are therefore measures after 2 signal cycles

m denotes that upstream metering is in effect

4.9.2.3 2029 Network Intersection Operations

Table 27 summarizes the Synchro results for the 2029 forecast network intersections during the AM and PM peak hours. Adjustments were made to the signal timings to balance the v/c between conflicting movements. **Appendix E** provides full analyses results by movement for signalized intersections.

The majority of the intersections operate acceptably with each movement at LOS E or better and below capacity. However, the following intersections experience at least one movement with a LOS F:

- Huntmar Drive and Rosehill Avenue: *not due to site generated trips however potential that vehicles may divert to Maple Grove Road and North-South Arterial*
- Huntmar Drive and Palladium Drive: *future Huntmar drive widening and future connections to Highway 417*
- Terry Fox Drive and Maple Grove Road: *not due to site generated trips; future LRT to encourage increase transit for Kanata West*
- Terry Fox Drive and Palladium Drive: *not due to site generated trips; future LRT to encourage increase transit for Kanata West*

Traffic congestion at the intersections may be mitigated through higher transit mode shares from implementing isolated transit measures or bus rapid transit through the area. It is also noted that peak spreading may occur throughout the peak period as shown in **Table 15**.

Table 27: AM (PM) Peak Hour Operations – 2029 Network Intersections

Main Road	Side Road	Overall			Worst Movement			
		Volume	Delay (s)	V/C	Movement	(V/C)	LOS	Q95th (m)
Huntmar Drive	Hazeldean Road	3380 (5215)	35.0 (50.0)	0.75 (0.94)	NBT (NBL)	0.79 (0.97)	C (E)	101.7 (#68.7)
	Rosehill Avenue	1380 (2080)	12.1 (64.2)	-	NB (SB)	0.70 (1.17)	B (F)	42 (231)*
	Palladium Drive**	2190 (3200)	46.8 (35.5)	1.15 (0.92)	NBL (NBL)	1.15 (0.92)	F (E)	#159.3 (#110.4)
	Maple Grove Road	2065 (3080)	29.8 (45.2)	0.56 (0.99)	EBL (SBT)	0.66 (0.99)	B (E)	63.8 (#320.3)
Terry Fox Drive	Maple Grove Road**	3520 (4925)	33.9 (52.7)	0.84 (1.12)	NBTR (SBT)	0.84 (1.12)	D (F)	#293.3 (m#262.8)
	Palladium Drive**	4840 (5720)	37.5 (82.1)	0.95 (1.22)	SBR (SBT)	0.95 (1.22)	E (F)	#190.0 (#265.9)

*Vehicle length for queue calculation has been assumed at 7 metres.

**Lost time applied to movements exceeding capacity

represents 95th percentile queues that are continuously growing and are therefore measures after 2 signal cycles

m denotes that upstream metering is in effect

5.0 Conclusions

This Transportation Impact Assessment for 130 Huntmar Drive was undertaken to identify potential pressures on the transportation network once the site is developed. The analysis addressed all modes of travel in and around the site with a MMLOS assessment of boundary roads and detailed intersection analysis at access intersections, network intersections beyond the immediate study area, as well as internal circulation on new streets within the site.

To accommodate the transportation demand for the site, the following measures have been identified:

- Increased Capacity at the intersection of Huntmar Drive and Maple Grove Road (by 2024)
- Signalization of access roads: Street 1 at Huntmar Drive, Street 1 at Maple Grove Road (by 2029)
- Provision of an additional unsignalized access roadway and a full access driveway for the identified school property on Huntmar Drive.
- Provision of two additional unsignalized access roadways via Maple Grove Road.
- Provision of sidewalks on all local roadways.
- Provision of additional active transportation facilities on Huntmar Drive via the planned roadway widening. Consider advancement of active transportation facilities in advance of roadway construction.
- Consider upgrading Maple Grove with increased cycling facilities, continuity with planned infrastructure east and west of the Study Area.

The analysis also indicates that several network intersections will operate at unsatisfactory levels. For these intersections, congestion may be mitigated through peak spreading, implementation of the North-South Arterial, the Huntmar Drive widening, and increasing transit mode share in the surrounding development. The study intersections which are forecasted to experience deficiencies by 2024 are listed below:

- Huntmar Drive and Rosehill Avenue
- Huntmar Drive and Palladium Drive
- Terry Fox Drive and Palladium Drive

By 2029 additional intersections are expected to operate at or exceed the capacity for at least one movement. Planned capacity improvements will be required such as the widening of Huntmar Drive and construction of the new North-South Arterial. Study intersections which are forecasted to experience deficiencies by 2029 are listed below:

- **Huntmar Drive and Rosehill Avenue**: This intersection operates at an unsatisfactory LOS along the southbound movement for the PM peak period. Traffic congestion at this intersection may be mitigated through higher transit mode shares from implementing isolated transit measures or bus rapid transit in the area, or from the Huntmar Drive road widening from two lanes to four lanes.

- **Huntmar Drive and Palladium Drive**: This intersection operates at an unsatisfactory LOS along the westbound left movement for the PM peak period. Traffic congestion at this intersection may be mitigated through higher transit mode shares from implementing isolated transit measures or bus rapid transit through the area.

- **Terry Fox Drive and Maple Grove Road**: This intersection operates at an unsatisfactory LOS along the southbound through movement for the PM peak period. The proposed site is not expected to produce traffic along southbound through movement at this intersection hence the failure LOS is a byproduct of emergent developments in the area.

- **Terry Fox Drive and Palladium Drive**: This intersection operates at an unsatisfactory LOS along the eastbound left movement for the PM peak period. This is a pre-existing condition of the intersection and the site generated traffic of the proposed development is anticipated to be only 2.4% of the total traffic travelling along the movements that fail. The failure LOS is a pre-existing condition and traffic congestion at this intersection may be mitigated through higher transit mode shares from implementing isolated transit measures or bus rapid transit in the area.

Appendix A

Background Development Analysis Volumes

Development Number	Distribution		AM		PM		Site Location	URL	Include?	Address
			IN	OUT	IN	OUT				
D07-16-18-0010	Trip Generation		18	71	72	39	Maple Grove west of Huntmar	http://webcast.ottawa.ca/plan/All_Image%20Referencing_Subdivision_Image%20Reference_2018-05-08%20Transportation%20Impact%20Assessment%20D07-16-18-0010.PDF	Yes	1981 Maple Grove Road
	North (Huntmar/Maple Grove)	40%	7.2	28.4	28.8	15.6				
	East (Huntmar/Maple Grove)	25%	4.5	17.75	18	9.75				
	South (Huntmar/Maple Grove)	5%	0.9	3.55	3.6	1.95				
D07-12-19-0168	Trip Generation		0	0	61	67	Hazeldean and Huntmar Intersection	http://webcast.ottawa.ca/plan/All_Image%20Referencing_Site%20Plan%20Application_Image%20Reference_2019-10-22%20-%20TIA%20Report%20-%20D07-12-19-0168.PDF	Yes	5707 Hazeldean Road
	North (Huntmar/Hazeldean)	30%	0	0	18.3	20.1				
D07-12-16-0032	Trip Generation		62	58	110	105	Hazeldean and Huntmar Intersection	http://webcast.ottawa.ca/plan/All_Image%20Referencing_Site%20Plan%20Application_Image%20Reference_D07-12-16-0032%20Traffic%20Impact%20Study%20Addendum.PDF	Yes	5649/5705 Hazeldean Road
	North (Huntmar/Hazeldean)	15%	9.3	8.7	16.5	15.75				
D07-12-19-0045	Trip Generation		124	38	43	113	Palladium east of Huntmar	http://webcast.ottawa.ca/plan/All_Image%20Referencing_Site%20Plan%20Application_Image%20Reference_2019-03-25%20-%20Transportation%20Impact%20Assessment%20-%20D07-12-19-0045.PDF	Yes	800 Palladium Drive
	East (Terry Fox/Palladium)	76%	94.24	28.88	32.68	85.88				
	West (Huntmar/Palladium)	22%	27.28	8.36	9.46	24.86				
D07-12-14-0147	Trip Generation		0	0	40	146	Palladium west of Terry Fox	http://webcast.ottawa.ca/plan/All_Image%20Referencing_Site%20Plan%20Application_Image%20Reference_D07-12-14-0147%20Transportation%20Impact%20Study.PDF	Yes	777/737 Seven Silver Road
	East (Terry Fox/Palladium)	70%	0	0	28	102.2				
	West (Huntmar/Palladium)	20%	0	0	8	29.2				
D07-16-14-0016	Trip Generation						West of Huntmar	pw:\\pwintsrv.dillon.ca:Projects_2019\Documents\Projects\191698 130 Huntmar Drive TIA\2. Work\Reports & Presentation\All_Image Referencing_Subdivision_Image Reference_D07-16-14-0016 Community Transportation Study.pdf	No	173 Huntmar Drive
D07-16-16-0011	Trip Generation						West of Huntmar	pw:\\pwintsrv.dillon.ca:Projects_2019\Documents\Projects\191698 130 Huntmar Drive TIA\2. Work\Reports & Presentation\All_Image Referencing_Subdivision_Image Reference_2019-10-04 Transportation Impact Assessment D07-16-16-0011.PDF	Yes	195 Huntmar Drive
	trips assigned directly to the network based on Figure 9									
	North		24	27	33	39				
	South		29	18	12	10				

Appendix B

Synchro Performance Worksheets

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	200	665	110	160	395	80	45	235	245	115	210	110
Future Volume (vph)	200	665	110	160	395	80	45	235	245	115	210	110
Confl. Peds. (#/hr)	5		5	5		5	5		5	5		5
Confl. Bikes (#/hr)												
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
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	3%	3%	14%	4%	5%	2%	4%	0%	5%	3%	3%	0%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%			0%	
Shared Lane Traffic (%)												
Lane Group Flow (vph)	200	775	0	160	395	80	45	235	245	115	210	110
Turn Type	Prot	NA		Prot	NA	Perm	Prot	NA	Perm	Prot	NA	Perm
Protected Phases	5 9	2		1	6		3	8		7	4	
Permitted Phases						6			8			4
Detector Phase	5 9	2		1	6	6	3	8	8	7	4	4
Switch Phase												
Minimum Initial (s)		10.0		5.0	10.0	10.0	5.0	10.0	10.0	5.0	10.0	10.0
Minimum Split (s)		36.3		11.5	36.3	36.3	11.3	39.6	39.6	11.3	39.6	39.6
Total Split (s)		49.0		14.0	37.0	37.0	12.0	40.0	40.0	12.0	40.0	40.0
Total Split (%)		42.6%		12.2%	32.2%	32.2%	10.4%	34.8%	34.8%	10.4%	34.8%	34.8%
Yellow Time (s)		3.7		3.7	3.7	3.7	3.7	3.7	3.7	3.7	3.7	3.7
All-Red Time (s)		2.6		2.8	2.6	2.6	2.6	2.9	2.9	2.6	2.9	2.9
Lost Time Adjust (s)		0.0		0.0	0.0	0.0	0.0	0.0	0.0	-3.0	0.0	0.0
Total Lost Time (s)		6.3		6.5	6.3	6.3	6.3	6.6	6.6	3.3	6.6	6.6
Lead/Lag		Lag		Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag	Lag
Lead-Lag Optimize?		Yes		Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Recall Mode		C-Max		None	C-Max	C-Max	None	None	None	None	None	None
Act Effct Green (s)	14.5	52.0		10.1	42.9	42.9	5.7	21.5	21.5	8.7	23.9	23.9
Actuated g/C Ratio	0.13	0.45		0.09	0.37	0.37	0.05	0.19	0.19	0.08	0.21	0.21
v/c Ratio	0.49	0.53		0.57	0.33	0.12	0.56	0.70	0.53	0.92	0.58	0.23
Control Delay	28.1	25.2		59.0	28.5	0.3	79.0	54.0	8.6	115.0	47.4	1.1
Queue Delay	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	28.1	25.2		59.0	28.5	0.3	79.0	54.0	8.6	115.0	47.4	1.1
LOS	C	C		E	C	A	E	D	A	F	D	A
Approach Delay		25.8			32.6			35.0			53.6	
Approach LOS		C			C			C			D	
Queue Length 50th (m)	12.1	66.6		18.8	34.3	0.0	10.6	53.3	0.0	27.6	47.0	0.0
Queue Length 95th (m)	19.2	99.3		#35.2	56.7	0.0	#27.3	70.3	19.2	#64.3	63.4	0.0
Internal Link Dist (m)		871.0			1427.4			1305.6			301.9	
Turn Bay Length (m)	50.0			90.0		225.0	30.0		60.0	50.0		275.0
Base Capacity (vph)	421	1454		280	1214	684	81	522	589	125	507	587
Starvation Cap Reductn	0	0		0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0		0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0		0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.48	0.53		0.57	0.33	0.12	0.56	0.45	0.42	0.92	0.41	0.19

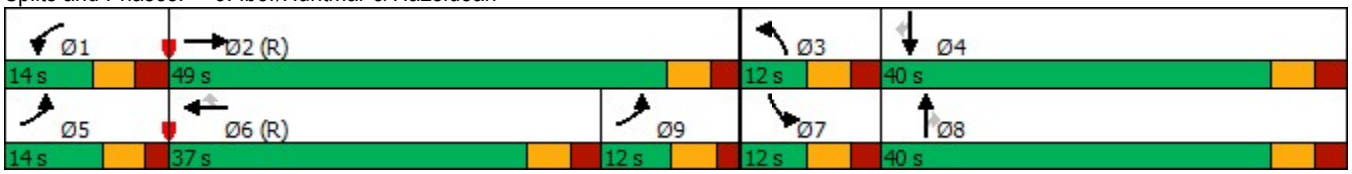
Intersection Summary

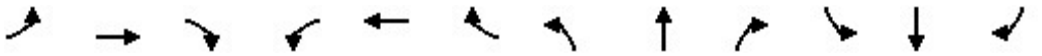
Lane Group	Ø5	Ø9
Lane Configurations		
Traffic Volume (vph)		
Future Volume (vph)		
Confl. Peds. (#/hr)		
Confl. Bikes (#/hr)		
Peak Hour Factor		
Growth Factor		
Heavy Vehicles (%)		
Bus Blockages (#/hr)		
Parking (#/hr)		
Mid-Block Traffic (%)		
Shared Lane Traffic (%)		
Lane Group Flow (vph)		
Turn Type		
Protected Phases	5	9
Permitted Phases		
Detector Phase		
Switch Phase		
Minimum Initial (s)	5.0	4.0
Minimum Split (s)	10.6	10.0
Total Split (s)	14.0	12.0
Total Split (%)	12%	10%
Yellow Time (s)	3.6	4.0
All-Red Time (s)	2.0	2.0
Lost Time Adjust (s)		
Total Lost Time (s)		
Lead/Lag	Lead	
Lead-Lag Optimize?	Yes	
Recall Mode	None	None
Act Effct Green (s)		
Actuated g/C Ratio		
v/c Ratio		
Control Delay		
Queue Delay		
Total Delay		
LOS		
Approach Delay		
Approach LOS		
Queue Length 50th (m)		
Queue Length 95th (m)		
Internal Link Dist (m)		
Turn Bay Length (m)		
Base Capacity (vph)		
Starvation Cap Reductn		
Spillback Cap Reductn		
Storage Cap Reductn		
Reduced v/c Ratio		

Intersection Summary

Cycle Length: 115
Actuated Cycle Length: 115
Offset: 62 (54%), Referenced to phase 2:EBT and 6:WBT, Start of Green
Natural Cycle: 110
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.92
Intersection Signal Delay: 34.0 Intersection LOS: C
Intersection Capacity Utilization 71.8% 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: 3: Iber/Huntmar & Hazeldean



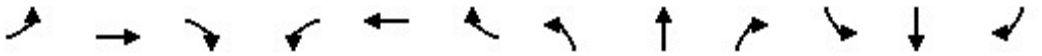


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	225	55	95	55	95	140	290	1095	75	80	775	695
Future Volume (vph)	225	55	95	55	95	140	290	1095	75	80	775	695
Confl. Peds. (#/hr)	5		5	5		5	5		5	5		5
Confl. Bikes (#/hr)												
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	6%	6%	3%	12%	6%	4%	0%	3%	13%	3%	5%	1%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%			0%	
Shared Lane Traffic (%)												
Lane Group Flow (vph)	225	55	95	55	95	140	290	1095	75	80	775	695
Turn Type	Prot	NA	Perm	Prot	NA	Perm	Prot	NA	Perm	Prot	NA	Perm
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases			4			8			2			6
Detector Phase	7	4	4	3	8	8	5	2	2	1	6	6
Switch Phase												
Minimum Initial (s)	5.0	10.0	10.0	5.0	10.0	10.0	5.0	10.0	10.0	5.0	10.0	10.0
Minimum Split (s)	11.4	30.4	30.4	11.4	30.4	30.4	11.4	30.4	30.4	11.4	30.4	30.4
Total Split (s)	20.0	31.0	31.0	20.0	31.0	31.0	20.0	39.0	39.0	20.0	39.0	39.0
Total Split (%)	18.2%	28.2%	28.2%	18.2%	28.2%	28.2%	18.2%	35.5%	35.5%	18.2%	35.5%	35.5%
Yellow Time (s)	3.7	3.7	3.7	3.7	3.7	3.7	4.2	4.2	4.2	4.2	4.2	4.2
All-Red Time (s)	2.7	2.7	2.7	2.7	2.7	2.7	2.2	2.2	2.2	2.2	2.2	2.2
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag	Lag
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Recall Mode	None	None	None	None	None	None	None	C-Max	C-Max	None	C-Max	C-Max
Act Effct Green (s)	12.3	19.1	19.1	9.3	13.8	13.8	13.9	52.7	52.7	8.1	44.5	44.5
Actuated g/C Ratio	0.11	0.17	0.17	0.08	0.13	0.13	0.13	0.48	0.48	0.07	0.40	0.40
v/c Ratio	0.65	0.19	0.25	0.43	0.45	0.44	0.69	0.69	0.10	0.34	0.59	0.73
Control Delay	55.7	40.9	1.9	56.9	49.9	8.5	68.1	21.5	0.3	51.8	29.6	11.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	55.7	40.9	1.9	56.9	49.9	8.5	68.1	21.5	0.3	51.8	29.6	11.1
LOS	E	D	A	E	D	A	E	C	A	D	C	B
Approach Delay		39.9			31.3			29.7			22.5	
Approach LOS		D			C			C			C	
Queue Length 50th (m)	25.2	11.2	0.0	12.0	20.7	0.0	36.0	98.2	0.0	9.0	70.1	16.2
Queue Length 95th (m)	38.0	21.4	1.3	24.7	33.1	12.1	47.0	#178.9	m0.2	16.6	109.1	81.3
Internal Link Dist (m)		1802.0			304.5			406.9			280.2	
Turn Bay Length (m)	100.0			115.0		115.0	240.0		115.0	70.0		190.0
Base Capacity (vph)	386	383	454	188	379	447	438	1591	720	398	1316	947
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.58	0.14	0.21	0.29	0.25	0.31	0.66	0.69	0.10	0.20	0.59	0.73

Intersection Summary

Cycle Length: 110
Actuated Cycle Length: 110
Offset: 85 (77%), Referenced to phase 2:NBT and 6:SBT, Start of Green
Natural Cycle: 85
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.73
Intersection Signal Delay: 27.8 Intersection LOS: C
Intersection Capacity Utilization 80.8% ICU Level of Service D
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: 6: Terry Fox & Palladium/Katimavik

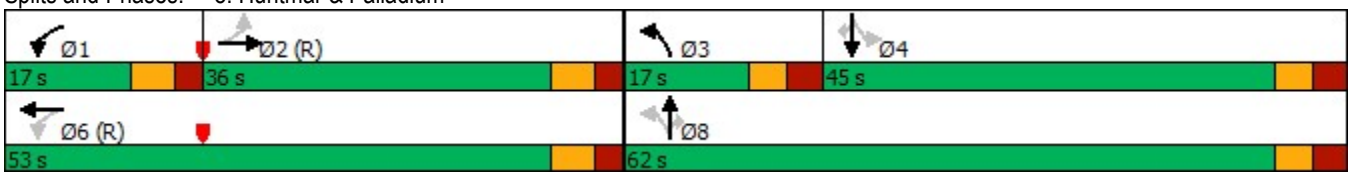


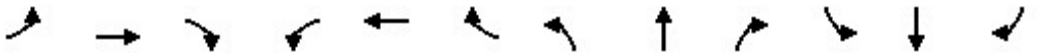
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	30	155	165	40	80	35	325	260	130	85	145	45
Future Volume (vph)	30	155	165	40	80	35	325	260	130	85	145	45
Confl. Peds. (#/hr)	5		5	5		5	5		5	5		5
Confl. Bikes (#/hr)												
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	0%	4%	2%	11%	1%	0%	1%	1%	1%	2%	4%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%			0%	
Shared Lane Traffic (%)												
Lane Group Flow (vph)	30	320	0	40	115	0	325	260	130	85	145	45
Turn Type	Perm	NA		pm+pt	NA		pm+pt	NA	Perm	Perm	NA	Perm
Protected Phases		2		1	6		3	8			4	
Permitted Phases	2			6			8		8	4		4
Detector Phase	2	2		1	6		3	8	8	4	4	4
Switch Phase												
Minimum Initial (s)	10.0	10.0		5.0	10.0		4.0	10.0	10.0	10.0	10.0	10.0
Minimum Split (s)	36.3	36.3		11.2	36.3		10.4	37.4	37.4	37.4	37.4	37.4
Total Split (s)	36.0	36.0		17.0	53.0		17.0	62.0	62.0	45.0	45.0	45.0
Total Split (%)	31.3%	31.3%		14.8%	46.1%		14.8%	53.9%	53.9%	39.1%	39.1%	39.1%
Yellow Time (s)	3.7	3.7		3.7	3.7		3.3	3.3	3.3	3.3	3.3	3.3
All-Red Time (s)	2.6	2.6		2.5	2.6		3.1	3.1	3.1	3.1	3.1	3.1
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		-3.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	6.3	6.3		6.2	6.3		3.4	6.4	6.4	6.4	6.4	6.4
Lead/Lag	Lag	Lag		Lead			Lead			Lag	Lag	Lag
Lead-Lag Optimize?	Yes	Yes		Yes			Yes			Yes	Yes	Yes
Recall Mode	C-Max	C-Max		None	C-Max		None	None	None	None	None	None
Act Effct Green (s)	59.7	59.7		68.1	68.0		37.3	34.3	34.3	17.3	17.3	17.3
Actuated g/C Ratio	0.52	0.52		0.59	0.59		0.32	0.30	0.30	0.15	0.15	0.15
v/c Ratio	0.05	0.19		0.08	0.06		0.84	0.49	0.24	0.54	0.56	0.13
Control Delay	20.0	9.5		12.7	8.6		52.3	35.3	5.2	55.6	52.0	0.8
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	20.0	9.5		12.7	8.6		52.3	35.3	5.2	55.6	52.0	0.8
LOS	B	A		B	A		D	D	A	E	D	A
Approach Delay		10.4			9.6			37.6			44.7	
Approach LOS		B			A			D			D	
Queue Length 50th (m)	3.5	9.8		3.5	3.6		66.2	52.1	0.0	19.3	33.1	0.0
Queue Length 95th (m)	11.9	24.6		11.3	10.6		77.2	62.7	11.8	31.0	46.0	0.0
Internal Link Dist (m)		535.2			1802.0			357.2			231.7	
Turn Bay Length (m)	95.0			75.0			120.0		45.0	50.0		
Base Capacity (vph)	631	1647		549	1920		386	861	786	353	581	595
Starvation Cap Reductn	0	0		0	0		0	0	0	0	0	0
Spillback Cap Reductn	0	0		0	0		0	0	0	0	0	0
Storage Cap Reductn	0	0		0	0		0	0	0	0	0	0
Reduced v/c Ratio	0.05	0.19		0.07	0.06		0.84	0.30	0.17	0.24	0.25	0.08

Intersection Summary

Cycle Length: 115	
Actuated Cycle Length: 115	
Offset: 0 (0%), Referenced to phase 2:EBTL and 6:WBTL, Start of Green	
Natural Cycle: 100	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.84	
Intersection Signal Delay: 29.6	Intersection LOS: C
Intersection Capacity Utilization 79.0%	ICU Level of Service D
Analysis Period (min) 15	

Splits and Phases: 8: Huntmar & Palladium



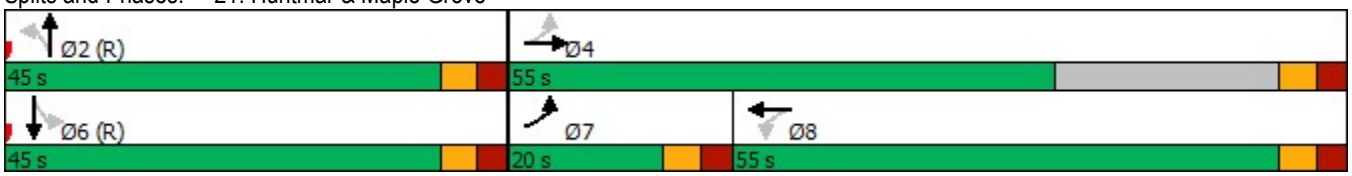


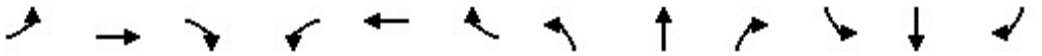
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	220	115	50	40	40	25	30	445	90	5	270	40
Future Volume (vph)	220	115	50	40	40	25	30	445	90	5	270	40
Confl. Peds. (#/hr)	5		5	5		5	5		5	5		5
Confl. Bikes (#/hr)												
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	1%	2%	6%	0%	10%	5%	23%	2%	4%	14%	3%	0%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%			0%	
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	385	0	0	105	0	30	535	0	0	315	0
Turn Type	pm+pt	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases	7	4			8			2			6	
Permitted Phases	4			8			2			6		
Detector Phase	7	4		8	8		2	2		6	6	
Switch Phase												
Minimum Initial (s)	4.0	10.0		10.0	10.0		10.0	10.0		10.0	10.0	
Minimum Split (s)	10.2	29.2		29.2	29.2		21.1	21.1		21.1	21.1	
Total Split (s)	20.0	55.0		55.0	55.0		45.0	45.0		45.0	45.0	
Total Split (%)	16.7%	45.8%		45.8%	45.8%		37.5%	37.5%		37.5%	37.5%	
Yellow Time (s)	3.3	3.3		3.3	3.3		3.3	3.3		3.3	3.3	
All-Red Time (s)	2.9	2.9		2.9	2.9		2.8	2.8		2.8	2.8	
Lost Time Adjust (s)		0.0			0.0		0.0	0.0			0.0	
Total Lost Time (s)		6.2			6.2		6.1	6.1			6.1	
Lead/Lag	Lead			Lag	Lag							
Lead-Lag Optimize?	Yes											
Recall Mode	None	None		None	None		C-Max	C-Max		C-Max	C-Max	
Act Effct Green (s)		40.8			40.8		66.9	66.9			66.9	
Actuated g/C Ratio		0.34			0.34		0.56	0.56			0.56	
v/c Ratio		0.84			0.23		0.07	0.56			0.33	
Control Delay		51.2			23.0		15.9	21.5			17.0	
Queue Delay		0.0			0.0		0.0	0.0			0.0	
Total Delay		51.2			23.0		15.9	21.5			17.0	
LOS		D			C		B	C			B	
Approach Delay		51.2			23.0			21.2			17.0	
Approach LOS		D			C			C			B	
Queue Length 50th (m)		84.6			15.4		3.3	81.6			40.4	
Queue Length 95th (m)		111.9			25.9		9.9	138.3			71.7	
Internal Link Dist (m)		630.5			86.3			293.1			175.1	
Turn Bay Length (m)							20.0					
Base Capacity (vph)		767			540		441	953			950	
Starvation Cap Reductn		0			0		0	0			0	
Spillback Cap Reductn		0			0		0	0			0	
Storage Cap Reductn		0			0		0	0			0	
Reduced v/c Ratio		0.50			0.19		0.07	0.56			0.33	

Intersection Summary

Cycle Length: 120	
Actuated Cycle Length: 120	
Offset: 0 (0%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green	
Natural Cycle: 70	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.84	
Intersection Signal Delay: 28.8	Intersection LOS: C
Intersection Capacity Utilization 70.0%	ICU Level of Service C
Analysis Period (min) 15	

Splits and Phases: 21: Huntmar & Maple Grove





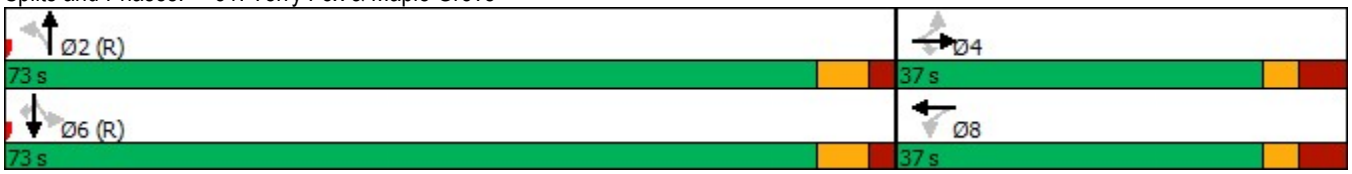
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	195	25	135	30	25	45	170	1150	35	10	710	85
Future Volume (vph)	195	25	135	30	25	45	170	1150	35	10	710	85
Confl. Peds. (#/hr)	5		5	5		5	5		5	5		5
Confl. Bikes (#/hr)												
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	10%	9%	12%	11%	9%	0%	8%	5%	7%	0%	8%	19%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%			0%	
Shared Lane Traffic (%)												
Lane Group Flow (vph)	195	25	135	30	70	0	170	1185	0	10	710	85
Turn Type	Perm	NA	Perm	Perm	NA		Perm	NA		Perm	NA	Perm
Protected Phases		4			8			2			6	
Permitted Phases	4		4	8			2			6		6
Detector Phase	4	4	4	8	8		2	2		6	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	10.0
Minimum Split (s)	37.1	37.1	37.1	37.1	37.1		36.5	36.5		36.5	36.5	36.5
Total Split (s)	37.0	37.0	37.0	37.0	37.0		73.0	73.0		73.0	73.0	73.0
Total Split (%)	33.6%	33.6%	33.6%	33.6%	33.6%		66.4%	66.4%		66.4%	66.4%	66.4%
Yellow Time (s)	3.0	3.0	3.0	3.0	3.0		4.2	4.2		4.2	4.2	4.2
All-Red Time (s)	4.1	4.1	4.1	4.1	4.1		2.3	2.3		2.3	2.3	2.3
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	0.0
Total Lost Time (s)	7.1	7.1	7.1	7.1	7.1		6.5	6.5		6.5	6.5	6.5
Lead/Lag												
Lead-Lag Optimize?												
Recall Mode	None	None	None	None	None		C-Max	C-Max		C-Max	C-Max	C-Max
Act Effct Green (s)	23.0	23.0	23.0	23.0	23.0		73.4	73.4		73.4	73.4	73.4
Actuated g/C Ratio	0.21	0.21	0.21	0.21	0.21		0.67	0.67		0.67	0.67	0.67
v/c Ratio	0.81	0.07	0.35	0.12	0.19		0.42	0.55		0.04	0.34	0.10
Control Delay	64.8	32.4	8.1	33.5	15.8		13.9	11.6		16.9	12.6	7.3
Queue Delay	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	0.0
Total Delay	64.8	32.4	8.1	33.5	15.8		13.9	11.6		16.9	12.6	7.3
LOS	E	C	A	C	B		B	B		B	B	A
Approach Delay		40.9			21.1			11.9			12.0	
Approach LOS		D			C			B			B	
Queue Length 50th (m)	41.8	4.5	0.0	5.5	4.5		16.4	68.2		0.6	23.5	0.0
Queue Length 95th (m)	64.6	11.2	15.0	13.0	15.6		38.9	102.1		m3.2	73.6	m16.2
Internal Link Dist (m)		1246.0			796.0			547.8			406.9	
Turn Bay Length (m)	65.0		60.0	40.0			145.0			125.0		70.0
Base Capacity (vph)	314	448	463	324	456		405	2163		234	2112	860
Starvation Cap Reductn	0	0	0	0	0		0	0		0	0	0
Spillback Cap Reductn	0	0	0	0	0		0	0		0	0	0
Storage Cap Reductn	0	0	0	0	0		0	0		0	0	0
Reduced v/c Ratio	0.62	0.06	0.29	0.09	0.15		0.42	0.55		0.04	0.34	0.10

Intersection Summary

Cycle Length: 110	
Actuated Cycle Length: 110	
Offset: 52 (47%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green	
Natural Cycle: 75	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.81	
Intersection Signal Delay: 16.2	Intersection LOS: B
Intersection Capacity Utilization 79.0%	ICU Level of Service D
Analysis Period (min) 15	

m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 31: Terry Fox & Maple Grove



Intersection	
Intersection Delay, s/veh	8.5
Intersection LOS	A

Approach	EB	WB	NB	SB
Entry Lanes	1	1	1	1
Conflicting Circle Lanes	1	1	1	1
Adj Approach Flow, veh/h	55	40	530	375
Demand Flow Rate, veh/h	61	43	557	393
Vehicles Circulating, veh/h	419	557	37	48
Vehicles Exiting, veh/h	22	37	443	552
Follow-Up Headway, s	3.186	3.186	3.186	3.186
Ped Vol Crossing Leg, #/h	5	5	5	5
Ped Cap Adj	0.999	0.999	0.999	0.999
Approach Delay, s/veh	6.3	6.7	9.6	7.3
Approach LOS	A	A	A	A

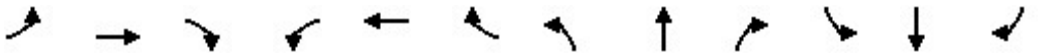
Lane	Left	Left	Left	Left
Designated Moves	LTR	LTR	LTR	LTR
Assumed Moves	LTR	LTR	LTR	LTR
RT Channelized				
Lane Util	1.000	1.000	1.000	1.000
Critical Headway, s	5.193	5.193	5.193	5.193
Entry Flow, veh/h	61	43	557	393
Cap Entry Lane, veh/h	743	647	1089	1077
Entry HV Adj Factor	0.902	0.936	0.952	0.954
Flow Entry, veh/h	55	40	530	375
Cap Entry, veh/h	670	606	1036	1026
V/C Ratio	0.082	0.066	0.512	0.365
Control Delay, s/veh	6.3	6.7	9.6	7.3
LOS	A	A	A	A
95th %tile Queue, veh	0	0	3	2

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	195	630	120	315	985	205	135	270	235	135	330	380
Future Volume (vph)	195	630	120	315	985	205	135	270	235	135	330	380
Confl. Peds. (#/hr)	5		5	5		5	5		5	5		5
Confl. Bikes (#/hr)												
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
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	0%	2%	3%	1%	1%	0%	7%	2%	1%	1%	2%	1%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%			0%	
Shared Lane Traffic (%)												
Lane Group Flow (vph)	195	750	0	315	985	205	135	270	235	135	330	380
Turn Type	Prot	NA		Prot	NA	Perm	Prot	NA	Perm	Prot	NA	Perm
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases						6			8			4
Detector Phase	5	2		1	6	6	3	8	8	7	4	4
Switch Phase												
Minimum Initial (s)	5.0	10.0		5.0	10.0	10.0	5.0	10.0	10.0	5.0	10.0	10.0
Minimum Split (s)	11.6	36.3		11.5	36.3	36.3	11.3	39.6	39.6	11.3	39.6	39.6
Total Split (s)	22.0	44.0		22.0	44.0	44.0	12.0	42.0	42.0	12.0	42.0	42.0
Total Split (%)	18.3%	36.7%		18.3%	36.7%	36.7%	10.0%	35.0%	35.0%	10.0%	35.0%	35.0%
Yellow Time (s)	3.7	3.7		3.7	3.7	3.7	3.7	3.7	3.7	3.7	3.7	3.7
All-Red Time (s)	2.9	2.6		2.8	2.6	2.6	2.6	2.9	2.9	2.6	2.9	2.9
Lost Time Adjust (s)	0.0	0.0		0.0	0.0	0.0	-3.0	0.0	0.0	-3.0	0.0	0.0
Total Lost Time (s)	6.6	6.3		6.5	6.3	6.3	3.3	6.6	6.6	3.3	6.6	6.6
Lead/Lag	Lead	Lag		Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag	Lag
Lead-Lag Optimize?	Yes	Yes		Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Recall Mode	None	C-Max		None	C-Max	C-Max	None	None	None	None	None	None
Act Effct Green (s)	12.3	45.1		15.7	48.4	48.4	8.7	27.8	27.8	8.7	27.8	27.8
Actuated g/C Ratio	0.10	0.38		0.13	0.40	0.40	0.07	0.23	0.23	0.07	0.23	0.23
v/c Ratio	0.58	0.61		0.74	0.72	0.28	1.17	0.66	0.45	1.11	0.81	0.66
Control Delay	58.0	33.5		61.0	35.5	5.0	186.2	49.0	7.0	163.9	58.4	14.6
Queue Delay	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	58.0	33.5		61.0	35.5	5.0	186.2	49.0	7.0	163.9	58.4	14.6
LOS	E	C		E	D	A	F	D	A	F	E	B
Approach Delay		38.6			36.7			62.5			55.5	
Approach LOS		D			D			E			E	
Queue Length 50th (m)	24.1	78.3		38.8	107.7	0.0	~39.8	60.6	0.0	~38.0	77.1	15.9
Queue Length 95th (m)	35.7	107.9		#56.0	#165.3	17.4	#81.5	83.5	18.9	#79.8	104.0	46.4
Internal Link Dist (m)		871.0			1427.4			1305.6			301.9	
Turn Bay Length (m)	50.0			90.0		225.0	30.0		60.0	50.0		275.0
Base Capacity (vph)	425	1236		448	1365	728	115	520	604	122	520	651
Starvation Cap Reductn	0	0		0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0		0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0		0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.46	0.61		0.70	0.72	0.28	1.17	0.52	0.39	1.11	0.63	0.58

Intersection Summary

Cycle Length: 120
Actuated Cycle Length: 120
Offset: 68 (57%), Referenced to phase 2:EBT and 6:WBT, Start of Green
Natural Cycle: 100
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 1.17
Intersection Signal Delay: 45.4 Intersection LOS: D
Intersection Capacity Utilization 81.8% ICU Level of Service D
Analysis Period (min) 15
~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 3: Iber/Huntmar & Hazeldean

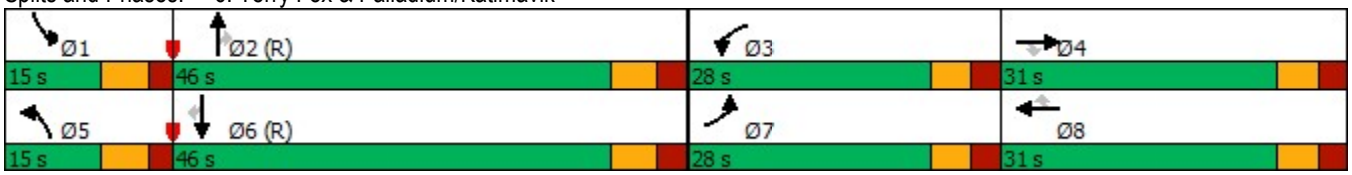


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	680	245	315	130	175	145	215	1080	95	115	1270	625
Future Volume (vph)	680	245	315	130	175	145	215	1080	95	115	1270	625
Confl. Peds. (#/hr)	5		5	5		5	5		5	5		5
Confl. Bikes (#/hr)												
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
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	0%	0%	1%	5%	2%	0%	0%	2%	4%	0%	1%	0%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%			0%	
Shared Lane Traffic (%)												
Lane Group Flow (vph)	680	245	315	130	175	145	215	1080	95	115	1270	625
Turn Type	Prot	NA	Perm	Prot	NA	Perm	Prot	NA	Perm	Prot	NA	Perm
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases			4			8			2			6
Detector Phase	7	4	4	3	8	8	5	2	2	1	6	6
Switch Phase												
Minimum Initial (s)	5.0	10.0	10.0	5.0	10.0	10.0	5.0	10.0	10.0	5.0	10.0	10.0
Minimum Split (s)	11.4	30.4	30.4	11.4	30.4	30.4	11.4	30.9	30.9	11.4	30.9	30.9
Total Split (s)	28.0	31.0	31.0	28.0	31.0	31.0	15.0	46.0	46.0	15.0	46.0	46.0
Total Split (%)	23.3%	25.8%	25.8%	23.3%	25.8%	25.8%	12.5%	38.3%	38.3%	12.5%	38.3%	38.3%
Yellow Time (s)	3.7	3.7	3.7	3.7	3.7	3.7	4.2	4.2	4.2	4.2	4.2	4.2
All-Red Time (s)	2.7	2.7	2.7	2.7	2.7	2.7	2.2	2.7	2.7	2.2	2.7	2.7
Lost Time Adjust (s)	-3.0	0.0	0.0	-2.0	0.0	0.0	0.0	0.0	0.0	0.0	-3.0	0.0
Total Lost Time (s)	3.4	6.4	6.4	4.4	6.4	6.4	6.4	6.9	6.9	6.4	3.9	6.9
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag	Lag
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Recall Mode	None	None	None	None	None	None	None	C-Max	C-Max	None	C-Max	C-Max
Act Effct Green (s)	24.6	24.2	24.2	16.8	17.4	17.4	12.0	46.1	46.1	8.8	45.9	42.9
Actuated g/C Ratio	0.20	0.20	0.20	0.14	0.14	0.14	0.10	0.38	0.38	0.07	0.38	0.36
v/c Ratio	1.00	0.68	0.61	0.57	0.68	0.42	0.65	0.84	0.15	0.47	0.98	0.69
Control Delay	82.8	54.5	13.2	57.3	61.7	9.6	49.9	39.4	7.1	59.9	58.4	8.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	82.8	54.5	13.2	57.3	61.7	9.6	49.9	39.4	7.1	59.9	58.4	8.2
LOS	F	D	B	E	E	A	D	D	A	E	E	A
Approach Delay		59.5			43.7			38.8			42.8	
Approach LOS		E			D			D			D	
Queue Length 50th (m)	~87.6	56.8	8.4	30.5	41.8	0.0	25.6	135.9	4.3	14.2	~176.2	6.9
Queue Length 95th (m)	#128.6	84.5	37.4	49.0	62.0	15.9	#50.3	#190.7	m15.6	24.4	#227.4	45.7
Internal Link Dist (m)		1802.0			304.5			406.9			280.2	
Turn Bay Length (m)	100.0			115.0		115.0	240.0		115.0	70.0		190.0
Base Capacity (vph)	679	372	524	320	361	428	331	1287	644	253	1294	911
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	1.00	0.66	0.60	0.41	0.48	0.34	0.65	0.84	0.15	0.45	0.98	0.69

Intersection Summary

Cycle Length: 120
Actuated Cycle Length: 120
Offset: 42 (35%), Referenced to phase 2:NBT and 6:SBT, Start of Green
Natural Cycle: 125
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 1.00
Intersection Signal Delay: 45.9 Intersection LOS: D
Intersection Capacity Utilization 92.6% ICU Level of Service F
Analysis Period (min) 15
~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.
m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 6: Terry Fox & Palladium/Katimavik



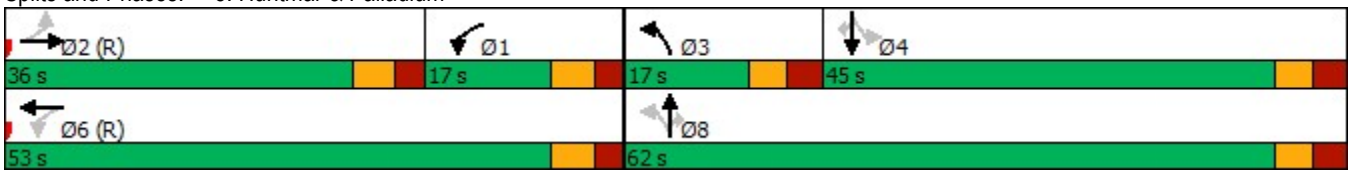
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	25	140	420	155	395	110	215	190	70	80	280	85
Future Volume (vph)	25	140	420	155	395	110	215	190	70	80	280	85
Confl. Peds. (#/hr)	5		5	5		5	5		5	5		5
Confl. Bikes (#/hr)												
Peak Hour 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
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	12%	0%	1%	1%	0%	0%	1%	1%	0%	1%	2%	1%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%			0%	
Shared Lane Traffic (%)												
Lane Group Flow (vph)	25	560	0	155	505	0	215	190	70	80	280	85
Turn Type	Perm	NA		pm+pt	NA		pm+pt	NA	Perm	Perm	NA	Perm
Protected Phases		2		1	6		3	8			4	
Permitted Phases	2			6			8		8	4		4
Detector Phase	2	2		1	6		3	8	8	4	4	4
Switch Phase												
Minimum Initial (s)	10.0	10.0		5.0	10.0		4.0	10.0	10.0	10.0	10.0	10.0
Minimum Split (s)	36.3	36.3		11.2	36.3		10.4	37.4	37.4	37.4	37.4	37.4
Total Split (s)	36.0	36.0		17.0	53.0		17.0	62.0	62.0	45.0	45.0	45.0
Total Split (%)	31.3%	31.3%		14.8%	46.1%		14.8%	53.9%	53.9%	39.1%	39.1%	39.1%
Yellow Time (s)	3.7	3.7		3.7	3.7		3.3	3.3	3.3	3.3	3.3	3.3
All-Red Time (s)	2.6	2.6		2.5	2.6		3.1	3.1	3.1	3.1	3.1	3.1
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	6.3	6.3		6.2	6.3		6.4	6.4	6.4	6.4	6.4	6.4
Lead/Lag	Lead	Lead		Lag			Lead			Lag	Lag	Lag
Lead-Lag Optimize?	Yes	Yes		Yes			Yes			Yes	Yes	Yes
Recall Mode	C-Max	C-Max		None	C-Max		None	None	None	None	None	None
Act Effct Green (s)	44.5	44.5		61.6	61.5		40.8	40.8	40.8	23.8	23.8	23.8
Actuated g/C Ratio	0.39	0.39		0.54	0.53		0.35	0.35	0.35	0.21	0.21	0.21
v/c Ratio	0.09	0.40		0.34	0.28		0.78	0.30	0.12	0.34	0.77	0.20
Control Delay	26.8	7.8		21.1	14.9		46.7	27.0	2.8	41.2	56.5	1.0
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	26.8	7.8		21.1	14.9		46.7	27.0	2.8	41.2	56.5	1.0
LOS	C	A		C	B		D	C	A	D	E	A
Approach Delay		8.6			16.4			32.4			43.2	
Approach LOS		A			B			C			D	
Queue Length 50th (m)	3.7	11.1		18.0	30.3		37.3	32.2	0.0	16.3	63.0	0.0
Queue Length 95th (m)	11.4	27.3		34.9	48.4		#53.2	45.5	5.7	28.8	86.2	0.2
Internal Link Dist (m)		535.2			1802.0			357.2			231.7	
Turn Bay Length (m)	95.0			75.0			120.0		45.0	50.0		
Base Capacity (vph)	269	1397		454	1779		277	861	773	379	592	600
Starvation Cap Reductn	0	0		0	0		0	0	0	0	0	0
Spillback Cap Reductn	0	0		0	0		0	0	0	0	0	0
Storage Cap Reductn	0	0		0	0		0	0	0	0	0	0
Reduced v/c Ratio	0.09	0.40		0.34	0.28		0.78	0.22	0.09	0.21	0.47	0.14

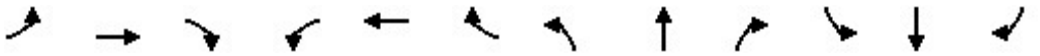
Intersection Summary

Cycle Length: 115	
Actuated Cycle Length: 115	
Offset: 0 (0%), Referenced to phase 2:EBTL and 6:WBTL, Start of Green	
Natural Cycle: 100	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.78	
Intersection Signal Delay: 23.3	Intersection LOS: C
Intersection Capacity Utilization 84.9%	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: 8: Huntmar & Palladium





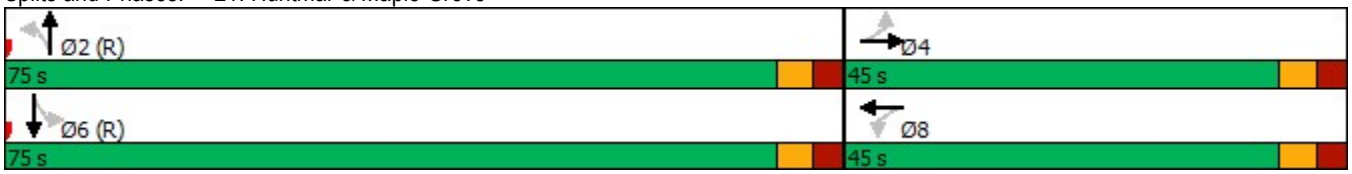
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	90	85	65	135	145	30	95	455	100	35	660	195
Future Volume (vph)	90	85	65	135	145	30	95	455	100	35	660	195
Confl. Peds. (#/hr)	5		5	5		5	5		5	5		5
Confl. Bikes (#/hr)												
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	0%	1%	0%	0%	0%	0%	2%	1%	0%	0%	1%	0%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%			0%	
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	240	0	0	310	0	95	555	0	0	890	0
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2			6		
Detector Phase	4	4		8	8		2	2		6	6	
Switch Phase												
Minimum Initial (s)	10.0	10.0		10.0	10.0		10.0	10.0		10.0	10.0	
Minimum Split (s)	29.2	29.2		29.2	29.2		21.1	21.1		21.1	21.1	
Total Split (s)	45.0	45.0		45.0	45.0		75.0	75.0		75.0	75.0	
Total Split (%)	37.5%	37.5%		37.5%	37.5%		62.5%	62.5%		62.5%	62.5%	
Yellow Time (s)	3.3	3.3		3.3	3.3		3.3	3.3		3.3	3.3	
All-Red Time (s)	2.9	2.9		2.9	2.9		2.8	2.8		2.8	2.8	
Lost Time Adjust (s)		0.0			0.0		0.0	0.0			0.0	
Total Lost Time (s)		6.2			6.2		6.1	6.1			6.1	
Lead/Lag												
Lead-Lag Optimize?												
Recall Mode	None	None		None	None		C-Max	C-Max		C-Max	C-Max	
Act Effct Green (s)		33.1			33.1		74.6	74.6			74.6	
Actuated g/C Ratio		0.28			0.28		0.62	0.62			0.62	
v/c Ratio		0.69			0.90		0.30	0.52			0.86	
Control Delay		45.9			87.4		15.5	15.5			29.9	
Queue Delay		0.0			0.0		0.0	0.0			0.0	
Total Delay		45.9			87.4		15.5	15.5			29.9	
LOS		D			F		B	B			C	
Approach Delay		45.9			87.4			15.5			29.9	
Approach LOS		D			F			B			C	
Queue Length 50th (m)		48.8			69.8		10.7	72.5			171.5	
Queue Length 95th (m)		75.3			#115.9		24.5	112.6			#289.2	
Internal Link Dist (m)		630.5			86.3			293.1			175.1	
Turn Bay Length (m)							20.0					
Base Capacity (vph)		406			404		315	1077			1035	
Starvation Cap Reductn		0			0		0	0			0	
Spillback Cap Reductn		0			0		0	0			0	
Storage Cap Reductn		0			0		0	0			0	
Reduced v/c Ratio		0.59			0.77		0.30	0.52			0.86	

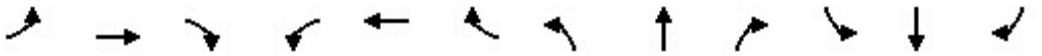
Intersection Summary

Cycle Length: 120	
Actuated Cycle Length: 120	
Offset: 0 (0%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green	
Natural Cycle: 90	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.90	
Intersection Signal Delay: 35.8	Intersection LOS: D
Intersection Capacity Utilization 115.2%	ICU Level of Service H
Analysis Period (min) 15	

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

Splits and Phases: 21: Huntmar & Maple Grove





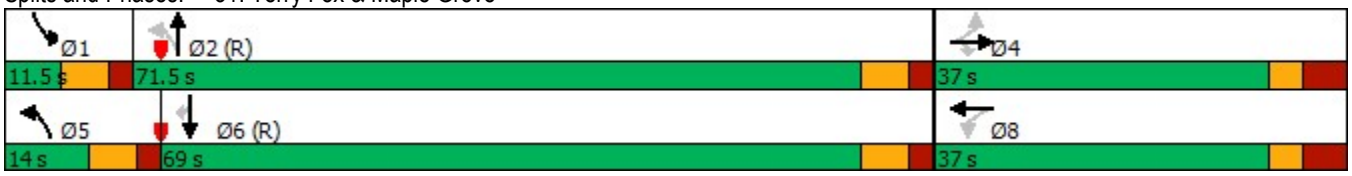
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	130	30	280	15	25	35	170	1190	40	55	1545	125
Future Volume (vph)	130	30	280	15	25	35	170	1190	40	55	1545	125
Confl. Peds. (#/hr)	5		5	5		5	5		5	5		5
Confl. Bikes (#/hr)												
Peak Hour 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
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	3%	0%	1%	0%	0%	0%	3%	2%	0%	0%	1%	4%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%			0%	
Shared Lane Traffic (%)												
Lane Group Flow (vph)	130	30	280	15	60	0	170	1230	0	55	1545	125
Turn Type	Perm	NA	Perm	Perm	NA		pm+pt	NA		Prot	NA	Perm
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4		4	8			2					6
Detector Phase	4	4	4	8	8		5	2		1	6	6
Switch Phase												
Minimum Initial (s)	10.0	10.0	10.0	10.0	10.0		5.0	10.0		5.0	10.0	10.0
Minimum Split (s)	37.1	37.1	37.1	37.1	37.1		11.5	36.5		11.5	36.5	36.5
Total Split (s)	37.0	37.0	37.0	37.0	37.0		14.0	71.5		11.5	69.0	69.0
Total Split (%)	30.8%	30.8%	30.8%	30.8%	30.8%		11.7%	59.6%		9.6%	57.5%	57.5%
Yellow Time (s)	3.0	3.0	3.0	3.0	3.0		4.2	4.2		4.2	4.2	4.2
All-Red Time (s)	4.1	4.1	4.1	4.1	4.1		2.3	2.3		2.3	2.3	2.3
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	0.0
Total Lost Time (s)	7.1	7.1	7.1	7.1	7.1		6.5	6.5		6.5	6.5	6.5
Lead/Lag							Lead	Lag		Lead	Lag	Lag
Lead-Lag Optimize?							Yes	Yes		Yes	Yes	Yes
Recall Mode	None	None	None	None	None		None	C-Max		None	C-Max	C-Max
Act Effct Green (s)	20.8	20.8	20.8	20.8	20.8		84.0	73.7		8.1	65.6	65.6
Actuated g/C Ratio	0.17	0.17	0.17	0.17	0.17		0.70	0.61		0.07	0.55	0.55
v/c Ratio	0.60	0.10	0.83	0.07	0.19		0.68	0.60		0.48	0.83	0.15
Control Delay	53.5	36.9	47.4	38.0	20.7		39.7	17.7		62.3	35.5	8.7
Queue Delay	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	0.0
Total Delay	53.5	36.9	47.4	38.0	20.7		39.7	17.7		62.3	35.5	8.7
LOS	D	D	D	D	C		D	B		E	D	A
Approach Delay		48.5			24.2			20.3			34.4	
Approach LOS		D			C			C			C	
Queue Length 50th (m)	30.6	6.1	46.0	3.1	5.3		22.4	102.8		11.1	211.9	12.8
Queue Length 95th (m)	m45.2	m11.5	m69.3	8.7	16.2		#75.9	136.3		m15.6	m216.0	m16.4
Internal Link Dist (m)		1246.0			796.0			547.8			406.9	
Turn Bay Length (m)	65.0		60.0	40.0			145.0			125.0		70.0
Base Capacity (vph)	310	448	444	329	430		251	2049		115	1851	823
Starvation Cap Reductn	0	0	0	0	0		0	0		0	0	0
Spillback Cap Reductn	0	0	0	0	0		0	0		0	0	0
Storage Cap Reductn	0	0	0	0	0		0	0		0	0	0
Reduced v/c Ratio	0.42	0.07	0.63	0.05	0.14		0.68	0.60		0.48	0.83	0.15

Intersection Summary

Cycle Length: 120	
Actuated Cycle Length: 120	
Offset: 97 (81%), Referenced to phase 2:NBTL and 6:SBT, Start of Green	
Natural Cycle: 100	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.83	
Intersection Signal Delay: 30.5	Intersection LOS: C
Intersection Capacity Utilization 90.4%	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.
m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 31: Terry Fox & Maple Grove



Intersection	
Intersection Delay, s/veh	16.1
Intersection LOS	C

Approach	EB	WB	NB	SB
Entry Lanes	1	1	1	1
Conflicting Circle Lanes	1	1	1	1
Adj Approach Flow, veh/h	50	80	650	795
Demand Flow Rate, veh/h	54	81	656	804
Vehicles Circulating, veh/h	849	646	32	131
Vehicles Exiting, veh/h	86	42	870	596
Follow-Up Headway, s	3.186	3.186	3.186	3.186
Ped Vol Crossing Leg, #/h	5	5	5	5
Ped Cap Adj	0.999	0.999	0.999	0.999
Approach Delay, s/veh	9.6	7.8	11.2	21.4
Approach LOS	A	A	B	C

Lane	Left	Left	Left	Left
Designated Moves	LTR	LTR	LTR	LTR
Assumed Moves	LTR	LTR	LTR	LTR
RT Channelized				
Lane Util	1.000	1.000	1.000	1.000
Critical Headway, s	5.193	5.193	5.193	5.193
Entry Flow, veh/h	54	81	656	804
Cap Entry Lane, veh/h	483	592	1094	991
Entry HV Adj Factor	0.932	0.988	0.991	0.989
Flow Entry, veh/h	50	80	650	795
Cap Entry, veh/h	450	585	1084	980
V/C Ratio	0.112	0.137	0.600	0.812
Control Delay, s/veh	9.6	7.8	11.2	21.4
LOS	A	A	B	C
95th %tile Queue, veh	0	0	4	9

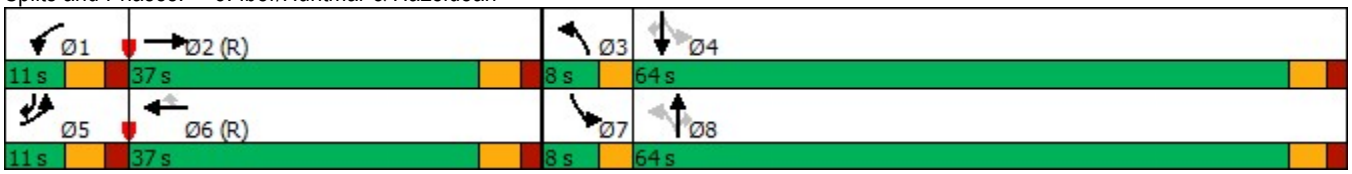
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	225	750	120	180	445	120	55	295	275	140	295	125
Future Volume (vph)	225	750	120	180	445	120	55	295	275	140	295	125
Confl. Peds. (#/hr)	5		5	5		5	5		5	5		5
Confl. Bikes (#/hr)												
Peak 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
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	2%	2%	13%	3%	4%	2%	4%	0%	5%	3%	2%	0%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%			0%	
Shared Lane Traffic (%)												
Lane Group Flow (vph)	225	870	0	180	445	120	55	295	275	140	295	125
Turn Type	Prot	NA		Prot	NA	Perm	pm+pt	NA	Perm	pm+pt	NA	pm+ov
Protected Phases	5	2		1	6		3	8		7	4	5
Permitted Phases						6	8		8	4		4
Detector Phase	5	2		1	6	6	3	8	8	7	4	5
Switch Phase												
Minimum Initial (s)	5.0	10.0		5.0	10.0	10.0	5.0	10.0	10.0	5.0	10.0	5.0
Minimum Split (s)	10.6	36.6		10.6	36.6	36.6	8.0	38.3	38.3	8.0	38.3	10.6
Total Split (s)	11.0	37.0		11.0	37.0	37.0	8.0	64.0	64.0	8.0	64.0	11.0
Total Split (%)	9.2%	30.8%		9.2%	30.8%	30.8%	6.7%	53.3%	53.3%	6.7%	53.3%	9.2%
Yellow Time (s)	3.6	3.6		3.6	3.6	3.6	3.0	3.3	3.3	3.0	3.3	3.6
All-Red Time (s)	2.0	2.0		2.0	2.0	2.0	0.0	2.0	2.0	0.0	2.0	2.0
Lost Time Adjust (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	5.6	5.6		5.6	5.6	5.6	3.0	5.3	5.3	3.0	5.3	5.6
Lead/Lag	Lead	Lag		Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag	Lead
Lead-Lag Optimize?	Yes	Yes		Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Recall Mode	None	C-Max		None	C-Max	C-Max	None	None	None	None	None	None
Act Effct Green (s)	19.1	54.2		15.4	50.5	50.5	33.2	25.9	25.9	33.8	27.5	46.3
Actuated g/C Ratio	0.16	0.45		0.13	0.42	0.42	0.28	0.22	0.22	0.28	0.23	0.39
v/c Ratio	0.44	0.59		0.44	0.32	0.17	0.28	0.76	0.60	0.74	0.73	0.19
Control Delay	49.4	27.3		52.3	24.7	4.9	31.7	56.3	17.7	58.0	53.6	4.0
Queue Delay	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	49.4	27.3		52.3	24.7	4.9	31.7	56.3	17.7	58.0	53.6	4.0
LOS	D	C		D	C	A	C	E	B	E	D	A
Approach Delay		31.8			28.2			37.1			43.6	
Approach LOS		C			C			D			D	
Queue Length 50th (m)	26.8	81.3		21.7	37.4	0.0	9.8	68.7	16.7	26.3	69.0	0.0
Queue Length 95th (m)	39.8	115.8		33.5	56.0	12.5	18.4	93.7	42.4	#41.7	94.1	10.6
Internal Link Dist (m)		871.0			1427.4			1305.6			301.9	
Turn Bay Length (m)	50.0			90.0		225.0	30.0		60.0	50.0		275.0
Base Capacity (vph)	517	1465		412	1382	689	198	880	799	188	863	661
Starvation Cap Reductn	0	0		0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0		0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0		0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.44	0.59		0.44	0.32	0.17	0.28	0.34	0.34	0.74	0.34	0.19

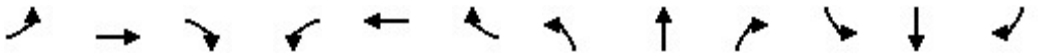
Intersection Summary

Cycle Length: 120	
Actuated Cycle Length: 120	
Offset: 0 (0%), Referenced to phase 2:EBT and 6:WBT, Start of Green	
Natural Cycle: 95	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.76	
Intersection Signal Delay: 34.2	Intersection LOS: C
Intersection Capacity Utilization 76.0%	ICU Level of Service D
Analysis Period (min) 15	

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

Splits and Phases: 3: Iber/Huntmar & Hazeldean



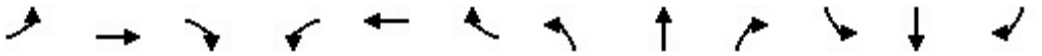


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	290	60	125	60	105	155	380	1265	85	90	885	835
Future Volume (vph)	290	60	125	60	105	155	380	1265	85	90	885	835
Confl. Peds. (#/hr)	5		5	5		5	5		5	5		5
Confl. Bikes (#/hr)												
Peak Hour 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
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	5%	5%	3%	11%	5%	3%	0%	2%	12%	2%	5%	1%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%			0%	
Shared Lane Traffic (%)												
Lane Group Flow (vph)	290	60	125	60	105	155	380	1265	85	90	885	835
Turn Type	Prot	NA	Perm	Prot	NA	Perm	Prot	NA	Perm	Prot	NA	Perm
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases			4			8			2			6
Detector Phase	7	4	4	3	8	8	5	2	2	1	6	6
Switch Phase												
Minimum Initial (s)	5.0	10.0	10.0	5.0	10.0	10.0	5.0	10.0	10.0	5.0	10.0	10.0
Minimum Split (s)	10.6	37.6	37.6	10.3	37.3	37.3	11.0	38.0	38.0	11.0	38.0	38.0
Total Split (s)	21.7	38.0	38.0	21.0	37.3	37.3	11.0	50.0	50.0	11.0	50.0	50.0
Total Split (%)	18.1%	31.7%	31.7%	17.5%	31.1%	31.1%	9.2%	41.7%	41.7%	9.2%	41.7%	41.7%
Yellow Time (s)	3.6	3.6	3.6	3.3	3.3	3.3	4.0	4.0	4.0	4.0	4.0	4.0
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	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	0.0	0.0	0.0	0.0
Total Lost Time (s)	5.6	5.6	5.6	5.3	5.3	5.3	6.0	6.0	6.0	6.0	6.0	6.0
Lead/Lag	Lead	Lead	Lead	Lag	Lag	Lag	Lead	Lag	Lag	Lead	Lag	Lag
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Recall Mode	None	None	None	None	None	None	None	C-Max	C-Max	None	C-Max	C-Max
Act Effct Green (s)	14.9	18.0	18.0	15.1	16.0	16.0	22.2	58.5	58.5	7.6	44.0	44.0
Actuated g/C Ratio	0.12	0.15	0.15	0.13	0.13	0.13	0.18	0.49	0.49	0.06	0.37	0.37
v/c Ratio	0.74	0.23	0.38	0.31	0.46	0.50	0.62	0.77	0.11	0.43	0.74	0.83
Control Delay	58.9	48.8	11.1	50.6	52.4	15.6	55.7	24.1	0.7	61.1	37.6	13.8
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	58.9	48.8	11.1	50.6	52.4	15.6	55.7	24.1	0.7	61.1	37.6	13.8
LOS	E	D	B	D	D	B	E	C	A	E	D	B
Approach Delay		45.0			34.3			29.9			27.8	
Approach LOS		D			C			C			C	
Queue Length 50th (m)	30.3	13.9	0.7	13.2	25.2	5.0	42.9	132.7	0.0	11.1	99.5	19.6
Queue Length 95th (m)	47.5	20.6	8.5	27.6	36.0	21.2	#118.4	#215.5	m1.3	#24.0	124.7	94.9
Internal Link Dist (m)		1802.0			304.5			406.9			280.2	
Turn Bay Length (m)	100.0			115.0		115.0	240.0		115.0	70.0		190.0
Base Capacity (vph)	423	462	488	220	457	486	613	1635	745	207	1194	1000
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.69	0.13	0.26	0.27	0.23	0.32	0.62	0.77	0.11	0.43	0.74	0.83

Intersection Summary

Cycle Length: 120
Actuated Cycle Length: 120
Offset: 0 (0%), Referenced to phase 2:NBT and 6:SBT, Start of Green, Master Intersection
Natural Cycle: 110
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.83
Intersection Signal Delay: 31.0 Intersection LOS: C
Intersection Capacity Utilization 92.1% ICU Level of Service F
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: 6: Terry Fox & Palladium/Katimavik



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	35	185	255	60	90	40	465	335	205	95	175	50
Future Volume (vph)	35	185	255	60	90	40	465	335	205	95	175	50
Confl. Peds. (#/hr)	5		5	5		5	5		5	5		5
Confl. Bikes (#/hr)												
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
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	0%	3%	2%	7%	1%	0%	0%	1%	0%	2%	3%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%			0%	
Shared Lane Traffic (%)												
Lane Group Flow (vph)	35	440	0	60	130	0	465	335	205	95	175	50
Turn Type	pm+pt	NA		pm+pt	NA		pm+pt	NA	Perm	Perm	NA	Perm
Protected Phases	5	2		1	6		3	8			4	
Permitted Phases	2			6			8		8	4		4
Detector Phase	5	2		1	6		3	8	8	4	4	4
Switch Phase												
Minimum Initial (s)	5.0	10.0		5.0	10.0		4.0	10.0	10.0	10.0	10.0	10.0
Minimum Split (s)	11.0	43.0		11.0	43.0		10.0	42.3	42.3	42.3	42.3	42.3
Total Split (s)	11.0	43.0		11.0	43.0		23.7	66.0	66.0	42.3	42.3	42.3
Total Split (%)	9.2%	35.8%		9.2%	35.8%		19.8%	55.0%	55.0%	35.3%	35.3%	35.3%
Yellow Time (s)	4.0	4.0		4.0	4.0		4.0	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	2.0	2.0	2.0	2.0
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		-3.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	6.0	6.0		6.0	6.0		3.0	5.3	5.3	5.3	5.3	5.3
Lead/Lag	Lead	Lag		Lead	Lag		Lead			Lag	Lag	Lag
Lead-Lag Optimize?	Yes	Yes		Yes	Yes		Yes			Yes	Yes	Yes
Recall Mode	None	C-Max		None	C-Max		None	None	None	None	None	None
Act Effct Green (s)	59.5	54.6		61.7	57.5		46.1	43.8	43.8	20.1	20.1	20.1
Actuated g/C Ratio	0.50	0.46		0.51	0.48		0.38	0.36	0.36	0.17	0.17	0.17
v/c Ratio	0.06	0.29		0.14	0.08		1.01	0.52	0.30	0.58	0.60	0.14
Control Delay	17.0	10.7		19.9	19.3		76.7	31.6	3.7	57.5	53.0	0.8
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	17.0	10.7		19.9	19.3		76.7	31.6	3.7	57.5	53.0	0.8
LOS	B	B		B	B		E	C	A	E	D	A
Approach Delay		11.1			19.5			46.8			46.2	
Approach LOS		B			B			D			D	
Queue Length 50th (m)	3.7	13.8		9.4	9.3		~107.6	66.8	0.0	22.6	41.8	0.0
Queue Length 95th (m)	12.1	32.3		m15.3	m15.3		#110.8	71.4	12.2	34.0	53.5	0.0
Internal Link Dist (m)		535.2			1802.0			357.2			231.7	
Turn Bay Length (m)	95.0			75.0			120.0		45.0	50.0		
Base Capacity (vph)	621	1502		431	1566		461	901	862	303	538	548
Starvation Cap Reductn	0	0		0	0		0	0	0	0	0	0
Spillback Cap Reductn	0	0		0	0		0	0	0	0	0	0
Storage Cap Reductn	0	0		0	0		0	0	0	0	0	0
Reduced v/c Ratio	0.06	0.29		0.14	0.08		1.01	0.37	0.24	0.31	0.33	0.09

Intersection Summary

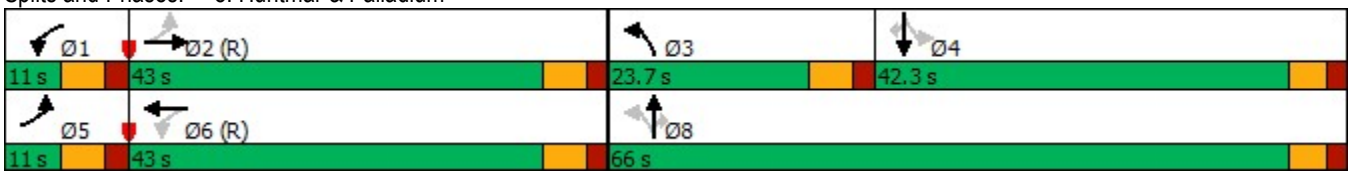
Cycle Length: 120	
Actuated Cycle Length: 120	
Offset: 0 (0%), Referenced to phase 2:EBTL and 6:WBTL, Start of Green	
Natural Cycle: 110	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 1.01	
Intersection Signal Delay: 35.6	Intersection LOS: D
Intersection Capacity Utilization 92.9%	ICU Level of Service F
Analysis Period (min) 15	

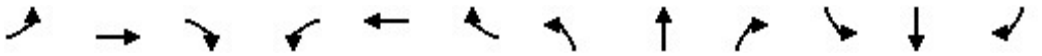
~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

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

m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 8: Huntmar & Palladium





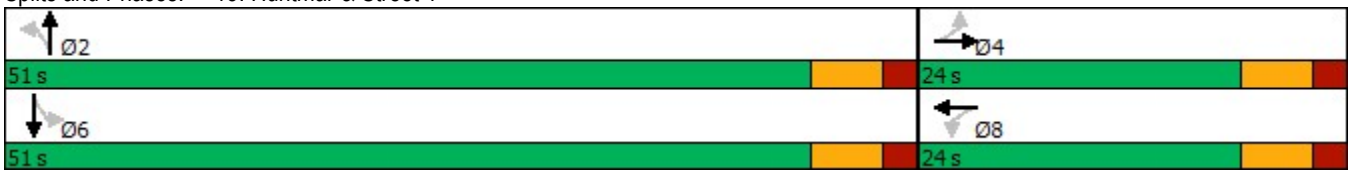
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	25	0	20	65	0	55	30	870	5	15	475	25
Future Volume (vph)	25	0	20	65	0	55	30	870	5	15	475	25
Confl. Peds. (#/hr)				5		5			5	5		
Confl. Bikes (#/hr)												
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%	0%	1%	0%	0%	3%	0%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%			0%	
Shared Lane Traffic (%)												
Lane Group Flow (vph)	25	20	0	65	55	0	30	875	0	15	500	0
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2			6		
Detector Phase	4	4		8	8		2	2		6	6	
Switch Phase												
Minimum Initial (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Minimum Split (s)	24.0	24.0		24.0	24.0		24.0	24.0		24.0	24.0	
Total Split (s)	24.0	24.0		24.0	24.0		51.0	51.0		51.0	51.0	
Total Split (%)	32.0%	32.0%		32.0%	32.0%		68.0%	68.0%		68.0%	68.0%	
Yellow Time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
All-Red Time (s)	2.0	2.0		2.0	2.0		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	6.0		6.0	6.0		6.0	6.0		6.0	6.0	
Lead/Lag												
Lead-Lag Optimize?												
Recall Mode	None	None		None	None		Min	Min		Min	Min	
Act Effct Green (s)	9.6	9.6		9.6	9.6		40.0	40.0		40.0	40.0	
Actuated g/C Ratio	0.17	0.17		0.17	0.17		0.71	0.71		0.71	0.71	
v/c Ratio	0.11	0.03		0.29	0.14		0.05	0.69		0.05	0.41	
Control Delay	23.2	0.1		26.3	0.8		5.4	12.5		5.9	7.1	
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay	23.2	0.1		26.3	0.8		5.4	12.5		5.9	7.1	
LOS	C	A		C	A		A	B		A	A	
Approach Delay		13.0			14.6			12.2			7.0	
Approach LOS		B			B			B			A	
Queue Length 50th (m)	2.3	0.0		6.2	0.0		1.0	55.5		0.5	22.2	
Queue Length 95th (m)	8.9	0.0		17.9	0.0		4.9	#160.2		3.3	59.1	
Internal Link Dist (m)		14.0			122.1			53.9			0.1	
Turn Bay Length (m)	30.0			30.0			30.0			30.0		
Base Capacity (vph)	447	784		456	615		649	1396		319	1362	
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	0.03		0.14	0.09		0.05	0.63		0.05	0.37	

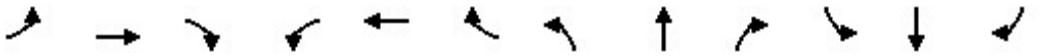
Intersection Summary

Cycle Length: 75	
Actuated Cycle Length: 56.5	
Natural Cycle: 65	
Control Type: Actuated-Uncoordinated	
Maximum v/c Ratio: 0.69	
Intersection Signal Delay: 10.7	Intersection LOS: B
Intersection Capacity Utilization 69.8%	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: 13: Huntmar & Street 1



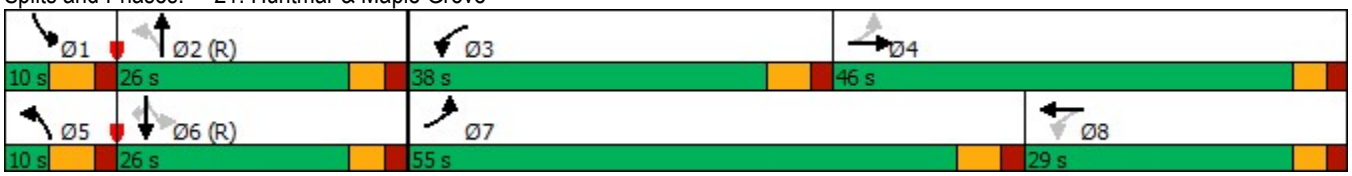


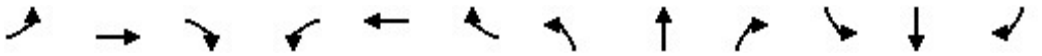
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	280	155	60	60	60	60	35	550	110	80	355	60
Future Volume (vph)	280	155	60	60	60	60	35	550	110	80	355	60
Confl. Peds. (#/hr)	5		5	5		5	5		5	5		5
Confl. Bikes (#/hr)												
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	1%	1%	5%	0%	7%	2%	21%	2%	3%	1%	2%	0%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%			0%	
Shared Lane Traffic (%)												
Lane Group Flow (vph)	280	215	0	60	120	0	35	660	0	80	355	60
Turn Type	pm+pt	NA		pm+pt	NA		pm+pt	NA		pm+pt	NA	Perm
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases	4			8			2			6		6
Detector Phase	7	4		3	8		5	2		1	6	6
Switch Phase												
Minimum Initial (s)	4.0	10.0		4.0	10.0		4.0	10.0		4.0	10.0	10.0
Minimum Split (s)	10.0	29.0		10.0	29.0		10.0	25.3		10.0	25.3	25.3
Total Split (s)	55.0	46.0		38.0	29.0		10.0	26.0		10.0	26.0	26.0
Total Split (%)	45.8%	38.3%		31.7%	24.2%		8.3%	21.7%		8.3%	21.7%	21.7%
Yellow Time (s)	4.0	3.0		4.0	3.0		4.0	3.3		4.0	3.3	3.3
All-Red Time (s)	2.0	2.0		2.0	2.0		2.0	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	0.0
Total Lost Time (s)	6.0	5.0		6.0	5.0		6.0	5.3		6.0	5.3	5.3
Lead/Lag	Lead	Lag		Lead	Lag		Lead	Lag		Lead	Lag	Lag
Lead-Lag Optimize?	Yes	Yes		Yes			Yes	Yes		Yes	Yes	Yes
Recall Mode	None	None		None	None		None	C-Max		None	C-Max	C-Max
Act Effct Green (s)	41.9	30.8		21.5	14.0		58.3	51.9		63.8	58.4	58.4
Actuated g/C Ratio	0.35	0.26		0.18	0.12		0.49	0.43		0.53	0.49	0.49
v/c Ratio	0.64	0.49		0.25	0.56		0.09	0.47		0.22	0.41	0.07
Control Delay	36.2	38.0		24.4	40.0		17.1	27.4		17.3	26.2	0.2
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	0.0
Total Delay	36.2	38.0		24.4	40.0		17.1	27.4		17.3	26.2	0.2
LOS	D	D		C	D		B	C		B	C	A
Approach Delay		36.9			34.8			26.9			21.6	
Approach LOS		D			C			C			C	
Queue Length 50th (m)	55.6	44.1		10.7	18.3		3.6	55.8		8.5	56.8	0.0
Queue Length 95th (m)	61.9	56.7		15.3	37.7		12.0	99.8		22.8	114.2	0.0
Internal Link Dist (m)		630.5			86.3			293.1			175.1	
Turn Bay Length (m)							20.0					30.0
Base Capacity (vph)	703	589		540	344		384	1412		359	859	812
Starvation Cap Reductn	0	0		0	0		0	0		0	0	0
Spillback Cap Reductn	0	0		0	0		0	0		0	0	0
Storage Cap Reductn	0	0		0	0		0	0		0	0	0
Reduced v/c Ratio	0.40	0.37		0.11	0.35		0.09	0.47		0.22	0.41	0.07

Intersection Summary

Cycle Length: 120	
Actuated Cycle Length: 120	
Offset: 0 (0%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green	
Natural Cycle: 75	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.64	
Intersection Signal Delay: 28.9	Intersection LOS: C
Intersection Capacity Utilization 69.3%	ICU Level of Service C
Analysis Period (min) 15	

Splits and Phases: 21: Huntmar & Maple Grove



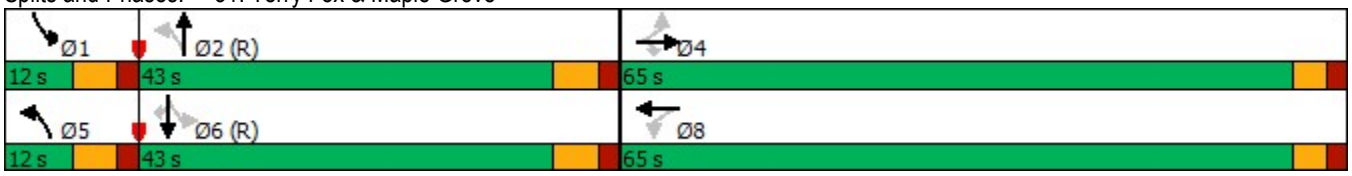


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	255	60	190	35	45	50	210	1350	35	15	810	110
Future Volume (vph)	255	60	190	35	45	50	210	1350	35	15	810	110
Confl. Peds. (#/hr)	5		5	5		5	5		5	5		5
Confl. Bikes (#/hr)												
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	7%	4%	9%	10%	5%	0%	7%	4%	6%	0%	7%	15%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%			0%	
Shared Lane Traffic (%)												
Lane Group Flow (vph)	255	60	190	35	95	0	210	1385	0	15	810	110
Turn Type	Perm	NA	Perm	Perm	NA		pm+pt	NA		pm+pt	NA	Perm
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4		4	8			2			6		6
Detector Phase	4	4	4	8	8		5	2		1	6	6
Switch Phase												
Minimum Initial (s)	10.0	10.0	10.0	10.0	10.0		5.0	10.0		5.0	10.0	10.0
Minimum Split (s)	42.0	42.0	42.0	42.0	42.0		12.0	43.0		12.0	43.0	43.0
Total Split (s)	65.0	65.0	65.0	65.0	65.0		12.0	43.0		12.0	43.0	43.0
Total Split (%)	54.2%	54.2%	54.2%	54.2%	54.2%		10.0%	35.8%		10.0%	35.8%	35.8%
Yellow Time (s)	3.0	3.0	3.0	3.0	3.0		4.0	4.0		4.0	4.0	4.0
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0		2.0	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	0.0	0.0
Total Lost Time (s)	5.0	5.0	5.0	5.0	5.0		6.0	6.0		6.0	6.0	6.0
Lead/Lag							Lead	Lag		Lead	Lag	Lag
Lead-Lag Optimize?							Yes	Yes		Yes	Yes	Yes
Recall Mode	None	None	None	None	None		None	C-Max		None	C-Max	C-Max
Act Effct Green (s)	33.3	33.3	33.3	33.3	33.3		75.7	70.7		53.6	47.6	47.6
Actuated g/C Ratio	0.28	0.28	0.28	0.28	0.28		0.63	0.59		0.45	0.40	0.40
v/c Ratio	0.79	0.12	0.37	0.11	0.20		0.47	0.72		0.08	0.64	0.19
Control Delay	60.3	33.5	10.1	29.0	15.6		15.0	23.7		23.1	39.7	15.6
Queue Delay	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	0.0
Total Delay	60.3	33.5	10.1	29.0	15.6		15.0	23.7		23.1	39.7	15.6
LOS	E	C	B	C	B		B	C		C	D	B
Approach Delay		38.2			19.2			22.6			36.6	
Approach LOS		D			B			C			D	
Queue Length 50th (m)	61.1	12.6	6.2	6.5	8.3		20.7	107.8		1.9	66.6	4.9
Queue Length 95th (m)	74.1	18.9	17.2	12.8	18.8		43.0	#234.6		m4.0	92.3	m15.2
Internal Link Dist (m)		1246.0			796.0			547.8			406.9	
Turn Bay Length (m)	65.0		60.0	40.0			145.0			125.0		70.0
Base Capacity (vph)	582	865	779	585	827		444	1926		196	1267	578
Starvation Cap Reductn	0	0	0	0	0		0	0		0	0	0
Spillback Cap Reductn	0	0	0	0	0		0	0		0	0	0
Storage Cap Reductn	0	0	0	0	0		0	0		0	0	0
Reduced v/c Ratio	0.44	0.07	0.24	0.06	0.11		0.47	0.72		0.08	0.64	0.19

Intersection Summary

Cycle Length: 120
Actuated Cycle Length: 120
Offset: 0 (0%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green
Natural Cycle: 100
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.79
Intersection Signal Delay: 29.1 Intersection LOS: C
Intersection Capacity Utilization 81.9% ICU Level of Service D
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: 31: Terry Fox & Maple Grove



Intersection	
Int Delay, s/veh	5.4

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	0	30	0	0	5	10	0	0	0	0	0	75
Future Vol, veh/h	0	30	0	0	5	10	0	0	0	0	0	75
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	0	-	-	0
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	100	100	100	100	100	100	100	100	100	100	100	100
Heavy Vehicles, %	0	0	0	0	0	0	0	0	0	0	0	0
Mvmt Flow	0	30	0	0	5	10	0	0	0	0	0	75

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	-	0	0	-	-	0	-	-	30	-	-	10
Stage 1	-	-	-	-	-	-	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-	-	-	-	-	-	-
Critical Hdwy	-	-	-	-	-	-	-	-	6.2	-	-	6.2
Critical Hdwy Stg 1	-	-	-	-	-	-	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-	-	-	-	-	-	-
Follow-up Hdwy	-	-	-	-	-	-	-	-	3.3	-	-	3.3
Pot Cap-1 Maneuver	0	-	-	0	-	-	0	0	1050	0	0	1077
Stage 1	0	-	-	0	-	-	0	0	-	0	0	-
Stage 2	0	-	-	0	-	-	0	0	-	0	0	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	-	-	-	-	-	-	-	-	1050	-	-	1077
Mov Cap-2 Maneuver	-	-	-	-	-	-	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0	0	0	8.6
HCM LOS			A	A

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBT	WBR	SBLn1
Capacity (veh/h)	-	-	-	-	-	1077
HCM Lane V/C Ratio	-	-	-	-	-	0.07
HCM Control Delay (s)	0	-	-	-	-	8.6
HCM Lane LOS	A	-	-	-	-	A
HCM 95th %tile Q(veh)	-	-	-	-	-	0.2

Intersection	
Int Delay, s/veh	1.6

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	30	40	935	5	15	475
Future Vol, veh/h	30	40	935	5	15	475
Conflicting Peds, #/hr	5	5	0	5	5	0
Sign Control	Stop	Stop	Free	Free	Free	Free
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, %	0	0	1	0	0	3
Mvmt Flow	30	40	935	5	15	475

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	1453	948	0	0	945	0
Stage 1	943	-	-	-	-	-
Stage 2	510	-	-	-	-	-
Critical Hdwy	6.4	6.2	-	-	4.1	-
Critical Hdwy Stg 1	5.4	-	-	-	-	-
Critical Hdwy Stg 2	5.4	-	-	-	-	-
Follow-up Hdwy	3.5	3.3	-	-	2.2	-
Pot Cap-1 Maneuver	145	319	-	-	734	-
Stage 1	382	-	-	-	-	-
Stage 2	607	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	140	316	-	-	731	-
Mov Cap-2 Maneuver	140	-	-	-	-	-
Stage 1	380	-	-	-	-	-
Stage 2	588	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	31.4	0	0.3
HCM LOS	D		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	205	731	-
HCM Lane V/C Ratio	-	-	0.341	0.021	-
HCM Control Delay (s)	-	-	31.4	10	0
HCM Lane LOS	-	-	D	B	A
HCM 95th %tile Q(veh)	-	-	1.4	0.1	-

Intersection	
Int Delay, s/veh	0.6

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	5	345	330	10	25	5
Future Vol, veh/h	5	345	330	10	25	5
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	100	100	100	100	100	100
Heavy Vehicles, %	0	2	2	0	0	0
Mvmt Flow	5	345	330	10	25	5

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	340	0	-	0	690	335
Stage 1	-	-	-	-	335	-
Stage 2	-	-	-	-	355	-
Critical Hdwy	4.1	-	-	-	6.4	6.2
Critical Hdwy Stg 1	-	-	-	-	5.4	-
Critical Hdwy Stg 2	-	-	-	-	5.4	-
Follow-up Hdwy	2.2	-	-	-	3.5	3.3
Pot Cap-1 Maneuver	1230	-	-	-	414	712
Stage 1	-	-	-	-	729	-
Stage 2	-	-	-	-	714	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1230	-	-	-	412	712
Mov Cap-2 Maneuver	-	-	-	-	412	-
Stage 1	-	-	-	-	725	-
Stage 2	-	-	-	-	714	-

Approach	EB	WB	SB
HCM Control Delay, s	0.1	0	13.7
HCM LOS			B

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1230	-	-	-	443
HCM Lane V/C Ratio	0.004	-	-	-	0.068
HCM Control Delay (s)	7.9	0	-	-	13.7
HCM Lane LOS	A	A	-	-	B
HCM 95th %tile Q(veh)	0	-	-	-	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	345	5	165	180	5	5	0	20	0	0	5
Future Vol, veh/h	5	345	5	165	180	5	5	0	20	0	0	5
Conflicting Peds, #/hr	5	0	0	0	0	5	0	0	0	5	0	5
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	100	100	100	100	100	100	100	100	100	100	100	100
Heavy Vehicles, %	0	2	0	0	3	0	0	0	0	0	0	0
Mvmt Flow	5	345	5	165	180	5	5	0	20	0	0	5

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	190	0	0	350	0	0	878	878	353	891	878	193
Stage 1	-	-	-	-	-	-	358	358	-	518	518	-
Stage 2	-	-	-	-	-	-	520	520	-	373	360	-
Critical Hdwy	4.1	-	-	4.1	-	-	7.1	6.5	6.2	7.1	6.5	6.2
Critical Hdwy Stg 1	-	-	-	-	-	-	6.1	5.5	-	6.1	5.5	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.1	5.5	-	6.1	5.5	-
Follow-up Hdwy	2.2	-	-	2.2	-	-	3.5	4	3.3	3.5	4	3.3
Pot Cap-1 Maneuver	1396	-	-	1220	-	-	271	289	695	265	289	854
Stage 1	-	-	-	-	-	-	664	631	-	544	536	-
Stage 2	-	-	-	-	-	-	543	535	-	652	630	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1390	-	-	1220	-	-	237	243	692	225	243	847
Mov Cap-2 Maneuver	-	-	-	-	-	-	237	243	-	225	243	-
Stage 1	-	-	-	-	-	-	661	628	-	540	453	-
Stage 2	-	-	-	-	-	-	456	453	-	628	627	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0.1	4	12.6	9.3
HCM LOS			B	A

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	500	1390	-	-	1220	-	-	847
HCM Lane V/C Ratio	0.05	0.004	-	-	0.135	-	-	0.006
HCM Control Delay (s)	12.6	7.6	0	-	8.4	0	-	9.3
HCM Lane LOS	B	A	A	-	A	A	-	A
HCM 95th %tile Q(veh)	0.2	0	-	-	0.5	-	-	0

Intersection	
Int Delay, s/veh	2.3

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	65	300	310	25	50	35
Future Vol, veh/h	65	300	310	25	50	35
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	100	100	100	100	100	100
Heavy Vehicles, %	0	2	2	0	0	0
Mvmt Flow	65	300	310	25	50	35

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	335	0	-	0	753	323
Stage 1	-	-	-	-	323	-
Stage 2	-	-	-	-	430	-
Critical Hdwy	4.1	-	-	-	6.4	6.2
Critical Hdwy Stg 1	-	-	-	-	5.4	-
Critical Hdwy Stg 2	-	-	-	-	5.4	-
Follow-up Hdwy	2.2	-	-	-	3.5	3.3
Pot Cap-1 Maneuver	1236	-	-	-	380	723
Stage 1	-	-	-	-	738	-
Stage 2	-	-	-	-	660	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1236	-	-	-	356	723
Mov Cap-2 Maneuver	-	-	-	-	356	-
Stage 1	-	-	-	-	692	-
Stage 2	-	-	-	-	660	-

Approach	EB	WB	SB
HCM Control Delay, s	1.4	0	14.9
HCM LOS			B

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1236	-	-	-	450
HCM Lane V/C Ratio	0.053	-	-	-	0.189
HCM Control Delay (s)	8.1	0	-	-	14.9
HCM Lane LOS	A	A	-	-	B
HCM 95th %tile Q(veh)	0.2	-	-	-	0.7

Intersection	
Int Delay, s/veh	1.5

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	10	75	830	65	45	515
Future Vol, veh/h	10	75	830	65	45	515
Conflicting Peds, #/hr	5	5	0	5	5	0
Sign Control	Stop	Stop	Free	Free	Free	Free
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, %	0	0	1	0	0	3
Mvmt Flow	10	75	830	65	45	515

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	1478	873	0	0	900	0
Stage 1	868	-	-	-	-	-
Stage 2	610	-	-	-	-	-
Critical Hdwy	6.4	6.2	-	-	4.1	-
Critical Hdwy Stg 1	5.4	-	-	-	-	-
Critical Hdwy Stg 2	5.4	-	-	-	-	-
Follow-up Hdwy	3.5	3.3	-	-	2.2	-
Pot Cap-1 Maneuver	140	352	-	-	763	-
Stage 1	414	-	-	-	-	-
Stage 2	546	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	127	349	-	-	760	-
Mov Cap-2 Maneuver	127	-	-	-	-	-
Stage 1	412	-	-	-	-	-
Stage 2	498	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	22.6	0	0.8
HCM LOS	C		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	289	760	-
HCM Lane V/C Ratio	-	-	0.294	0.059	-
HCM Control Delay (s)	-	-	22.6	10	0
HCM Lane LOS	-	-	C	B	A
HCM 95th %tile Q(veh)	-	-	1.2	0.2	-

Intersection	
Intersection Delay, s/veh	10.5
Intersection LOS	B

Approach	EB	WB	NB	SB
Entry Lanes	1	1	1	1
Conflicting Circle Lanes	1	1	1	1
Adj Approach Flow, veh/h	65	45	650	485
Demand Flow Rate, veh/h	71	48	677	504
Vehicles Circulating, veh/h	535	682	42	53
Vehicles Exiting, veh/h	22	37	565	677
Follow-Up Headway, s	3.186	3.186	3.186	3.186
Ped Vol Crossing Leg, #/h	5	5	5	5
Ped Cap Adj	0.999	0.999	0.999	0.999
Approach Delay, s/veh	7.2	7.7	12.2	8.9
Approach LOS	A	A	B	A

Lane	Left	Left	Left	Left
Designated Moves	LTR	LTR	LTR	LTR
Assumed Moves	LTR	LTR	LTR	LTR
RT Channelized				
Lane Util	1.000	1.000	1.000	1.000
Critical Headway, s	5.193	5.193	5.193	5.193
Entry Flow, veh/h	71	48	677	504
Cap Entry Lane, veh/h	662	571	1083	1072
Entry HV Adj Factor	0.915	0.945	0.961	0.962
Flow Entry, veh/h	65	45	650	485
Cap Entry, veh/h	605	539	1040	1031
V/C Ratio	0.107	0.084	0.625	0.471
Control Delay, s/veh	7.2	7.7	12.2	8.9
LOS	A	A	B	A
95th %tile Queue, veh	0	0	5	3

Intersection	
Intersection Delay, s/veh	7.5
Intersection LOS	A

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	65	0	5	0	5	0
Future Vol, veh/h	65	0	5	0	5	0
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Heavy Vehicles, %	0	0	0	0	0	0
Mvmt Flow	65	0	5	0	5	0
Number of Lanes	1	0	1	0	0	1

Approach	WB	NB	SB
Opposing Approach		SB	NB
Opposing Lanes	0	1	1
Conflicting Approach Left	NB		WB
Conflicting Lanes Left	1	0	1
Conflicting Approach Right	SB	WB	
Conflicting Lanes Right	1	1	0
HCM Control Delay	7.5	7.1	7.3
HCM LOS	A	A	A

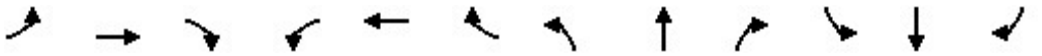
Lane	NBLn1	WBLn1	SBLn1
Vol Left, %	0%	100%	100%
Vol Thru, %	100%	0%	0%
Vol Right, %	0%	0%	0%
Sign Control	Stop	Stop	Stop
Traffic Vol by Lane	5	65	5
LT Vol	0	65	5
Through Vol	5	0	0
RT Vol	0	0	0
Lane Flow Rate	5	65	5
Geometry Grp	1	1	1
Degree of Util (X)	0.006	0.074	0.006
Departure Headway (Hd)	4.018	4.116	4.218
Convergence, Y/N	Yes	Yes	Yes
Cap	889	874	847
Service Time	2.051	2.123	2.251
HCM Lane V/C Ratio	0.006	0.074	0.006
HCM Control Delay	7.1	7.5	7.3
HCM Lane LOS	A	A	A
HCM 95th-tile Q	0	0.2	0

Intersection	
Intersection Delay, s/veh	7.4
Intersection LOS	A

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	20	0	10	10	65	5	0	5	0	30	10	30
Future Vol, veh/h	20	0	10	10	65	5	0	5	0	30	10	30
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Heavy Vehicles, %	0	0	0	0	0	0	0	0	0	0	0	0
Mvmt Flow	20	0	10	10	65	5	0	5	0	30	10	30
Number of Lanes	0	1	0	0	1	0	0	1	0	0	1	0

Approach	EB	WB	NB	SB
Opposing Approach	WB	EB	SB	NB
Opposing Lanes	1	1	1	1
Conflicting Approach 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	7.2	7.5	7.2	7.3
HCM LOS	A	A	A	A

Lane	NBLn1	EBLn1	WBLn1	SBLn1
Vol Left, %	0%	67%	12%	43%
Vol Thru, %	100%	0%	81%	14%
Vol Right, %	0%	33%	6%	43%
Sign Control	Stop	Stop	Stop	Stop
Traffic Vol by Lane	5	30	80	70
LT Vol	0	20	10	30
Through Vol	5	0	65	10
RT Vol	0	10	5	30
Lane Flow Rate	5	30	80	70
Geometry Grp	1	1	1	1
Degree of Util (X)	0.006	0.034	0.09	0.076
Departure Headway (Hd)	4.145	4.024	4.04	3.923
Convergence, Y/N	Yes	Yes	Yes	Yes
Cap	855	884	884	907
Service Time	2.209	2.072	2.077	1.974
HCM Lane V/C Ratio	0.006	0.034	0.09	0.077
HCM Control Delay	7.2	7.2	7.5	7.3
HCM Lane LOS	A	A	A	A
HCM 95th-tile Q	0	0.1	0.3	0.2

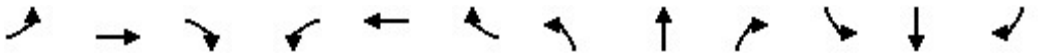


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	220	710	135	355	1110	285	150	360	265	190	450	425
Future Volume (vph)	220	710	135	355	1110	285	150	360	265	190	450	425
Confl. Peds. (#/hr)	5		5	5		5	5		5	5		5
Confl. Bikes (#/hr)												
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
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	0%	2%	2%	1%	1%	0%	6%	1%	1%	1%	2%	1%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%			0%	
Shared Lane Traffic (%)												
Lane Group Flow (vph)	220	845	0	355	1110	285	150	360	265	190	450	425
Turn Type	Prot	NA		Prot	NA	Perm	pm+pt	NA	Perm	pm+pt	NA	pm+ov
Protected Phases	5	2		1	6		3	8		7	4	5
Permitted Phases						6	8		8	4		4
Detector Phase	5	2		1	6	6	3	8	8	7	4	5
Switch Phase												
Minimum Initial (s)	5.0	10.0		5.0	10.0	10.0	5.0	10.0	10.0	5.0	10.0	5.0
Minimum Split (s)	10.6	36.6		10.6	36.6	36.6	8.0	38.3	38.3	8.0	38.3	10.6
Total Split (s)	11.0	44.0		18.0	51.0	51.0	19.0	39.0	39.0	19.0	39.0	11.0
Total Split (%)	9.2%	36.7%		15.0%	42.5%	42.5%	15.8%	32.5%	32.5%	15.8%	32.5%	9.2%
Yellow Time (s)	3.6	3.6		3.6	3.6	3.6	3.0	3.3	3.3	3.0	3.3	3.6
All-Red Time (s)	2.0	2.0		2.0	2.0	2.0	0.0	2.0	2.0	0.0	2.0	2.0
Lost Time Adjust (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	5.6	5.6		5.6	5.6	5.6	3.0	5.3	5.3	3.0	5.3	5.6
Lead/Lag	Lead	Lag		Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag	Lead
Lead-Lag Optimize?	Yes	Yes		Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Recall Mode	None	C-Max		None	C-Max	C-Max	None	None	None	None	None	None
Act Effct Green (s)	8.9	39.3		15.0	45.4	45.4	47.3	32.7	32.7	49.7	33.9	42.5
Actuated g/C Ratio	0.07	0.33		0.12	0.38	0.38	0.39	0.27	0.27	0.41	0.28	0.35
v/c Ratio	0.89	0.78		0.87	0.87	0.38	0.61	0.74	0.46	0.58	0.90	0.71
Control Delay	91.9	41.9		73.4	43.0	4.5	32.1	49.9	8.9	28.6	64.1	29.1
Queue Delay	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	91.9	41.9		73.4	43.0	4.5	32.1	49.9	8.9	28.6	64.1	29.1
LOS	F	D		E	D	A	C	D	A	C	E	C
Approach Delay		52.3			42.9			32.4			43.8	
Approach LOS		D			D			C			D	
Queue Length 50th (m)	~38.6	98.3		~49.2	132.4	0.0	21.7	78.2	5.0	28.1	102.6	61.5
Queue Length 95th (m)	#64.9	124.1		#80.6	163.0	17.8	35.9	116.6	27.7	44.6	#169.8	104.1
Internal Link Dist (m)		871.0			1427.4			1305.6			301.9	
Turn Bay Length (m)	50.0			90.0		225.0	30.0		60.0	50.0		275.0
Base Capacity (vph)	246	1081		410	1281	745	292	508	593	359	514	601
Starvation Cap Reductn	0	0		0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0		0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0		0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.89	0.78		0.87	0.87	0.38	0.51	0.71	0.45	0.53	0.88	0.71

Intersection Summary

Cycle Length: 120
Actuated Cycle Length: 120
Offset: 0 (0%), Referenced to phase 2:EBT and 6:WBT, Start of Green
Natural Cycle: 95
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.90
Intersection Signal Delay: 43.5 Intersection LOS: D
Intersection Capacity Utilization 90.3% ICU Level of Service E
Analysis Period (min) 15
~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 3: Iber/Huntmar & Hazeldean

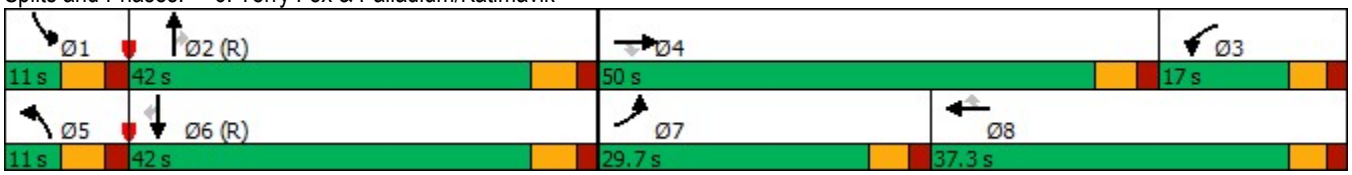


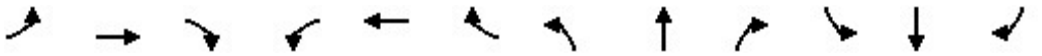
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	830	250	395	135	180	150	245	1140	100	120	1345	700
Future Volume (vph)	830	250	395	135	180	150	245	1140	100	120	1345	700
Confl. Peds. (#/hr)	5		5	5		5	5		5	5		5
Confl. Bikes (#/hr)												
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
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	0%	0%	1%	5%	2%	0%	0%	2%	4%	0%	1%	0%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%			0%	
Shared Lane Traffic (%)												
Lane Group Flow (vph)	830	250	395	135	180	150	245	1140	100	120	1345	700
Turn Type	Prot	NA	Perm	Prot	NA	Perm	Prot	NA	Perm	Prot	NA	Perm
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases			4			8			2			6
Detector Phase	7	4	4	3	8	8	5	2	2	1	6	6
Switch Phase												
Minimum Initial (s)	5.0	10.0	10.0	5.0	10.0	10.0	5.0	10.0	10.0	5.0	10.0	10.0
Minimum Split (s)	10.6	37.6	37.6	10.3	37.3	37.3	11.0	38.0	38.0	11.0	38.0	38.0
Total Split (s)	29.7	50.0	50.0	17.0	37.3	37.3	11.0	42.0	42.0	11.0	42.0	42.0
Total Split (%)	24.8%	41.7%	41.7%	14.2%	31.1%	31.1%	9.2%	35.0%	35.0%	9.2%	35.0%	35.0%
Yellow Time (s)	3.6	3.6	3.6	3.3	3.3	3.3	4.0	4.0	4.0	4.0	4.0	4.0
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Lost Time Adjust (s)	-3.0	0.0	0.0	0.0	0.0	0.0	-3.0	-3.0	0.0	0.0	-3.0	0.0
Total Lost Time (s)	2.6	5.6	5.6	5.3	5.3	5.3	3.0	3.0	6.0	6.0	3.0	6.0
Lead/Lag	Lead	Lead	Lead	Lag	Lag	Lag	Lead	Lag	Lag	Lead	Lag	Lag
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Recall Mode	None	None	None	None	None	None	None	C-Max	C-Max	None	C-Max	C-Max
Act Effct Green (s)	27.1	28.6	28.6	17.1	21.6	21.6	15.7	46.1	43.1	8.3	41.7	38.7
Actuated g/C Ratio	0.23	0.24	0.24	0.14	0.18	0.18	0.13	0.38	0.36	0.07	0.35	0.32
v/c Ratio	1.11	0.58	0.86	0.58	0.57	0.40	0.57	0.89	0.16	0.53	1.14	0.74
Control Delay	108.3	43.1	43.4	59.5	50.3	11.3	58.6	44.3	5.7	63.2	111.3	8.5
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	108.3	43.1	43.4	59.5	50.3	11.3	58.6	44.3	5.7	63.2	111.3	8.5
LOS	F	D	D	E	D	B	E	D	A	E	F	A
Approach Delay		79.9			40.4			44.1			75.4	
Approach LOS		E			D			D			E	
Queue Length 50th (m)	~121.5	52.5	57.8	31.8	41.4	3.6	32.0	92.2	0.6	14.7	~215.7	3.3
Queue Length 95th (m)	#161.1	68.3	88.6	#58.9	58.3	19.7	#64.4	#202.0	m6.7	#34.0	#260.0	43.8
Internal Link Dist (m)		1802.0			304.5			406.9			280.2	
Turn Bay Length (m)	100.0			115.0		115.0	240.0		115.0	70.0		190.0
Base Capacity (vph)	749	666	638	232	470	498	432	1288	632	228	1177	946
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	1.11	0.38	0.62	0.58	0.38	0.30	0.57	0.89	0.16	0.53	1.14	0.74

Intersection Summary

Cycle Length: 120
Actuated Cycle Length: 120
Offset: 0 (0%), Referenced to phase 2:NBT and 6:SBT, Start of Green, Master Intersection
Natural Cycle: 150
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 1.14
Intersection Signal Delay: 65.3 Intersection LOS: E
Intersection Capacity Utilization 98.6% ICU Level of Service F
Analysis Period (min) 15
~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.
m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 6: Terry Fox & Palladium/Katimavik



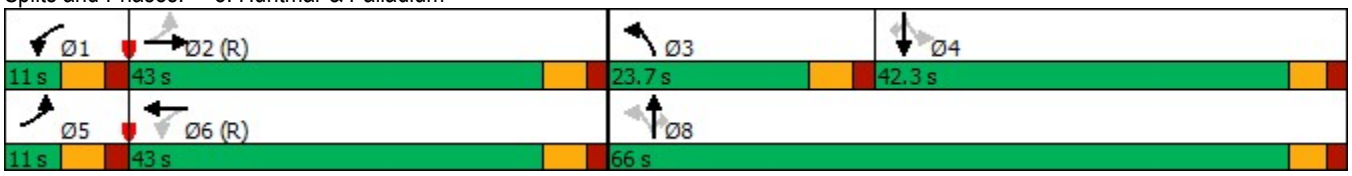


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	25	165	620	230	470	125	345	255	125	90	350	95
Future Volume (vph)	25	165	620	230	470	125	345	255	125	90	350	95
Confl. Peds. (#/hr)	5		5	5		5	5		5	5		5
Confl. Bikes (#/hr)												
Peak Hour 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
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	11%	0%	0%	0%	0%	0%	1%	1%	0%	1%	2%	1%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%			0%	
Shared Lane Traffic (%)												
Lane Group Flow (vph)	25	785	0	230	595	0	345	255	125	90	350	95
Turn Type	pm+pt	NA		pm+pt	NA		pm+pt	NA	Perm	Perm	NA	Perm
Protected Phases	5	2		1	6		3	8			4	
Permitted Phases	2			6			8		8	4		4
Detector Phase	5	2		1	6		3	8	8	4	4	4
Switch Phase												
Minimum Initial (s)	5.0	10.0		5.0	10.0		4.0	10.0	10.0	10.0	10.0	10.0
Minimum Split (s)	11.0	43.0		11.0	43.0		10.0	42.3	42.3	42.3	42.3	42.3
Total Split (s)	11.0	43.0		11.0	43.0		23.7	66.0	66.0	42.3	42.3	42.3
Total Split (%)	9.2%	35.8%		9.2%	35.8%		19.8%	55.0%	55.0%	35.3%	35.3%	35.3%
Yellow Time (s)	4.0	4.0		4.0	4.0		4.0	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	2.0	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	0.0	0.0
Total Lost Time (s)	6.0	6.0		6.0	6.0		6.0	5.3	5.3	5.3	5.3	5.3
Lead/Lag	Lead	Lag		Lead	Lag		Lead			Lag	Lag	Lag
Lead-Lag Optimize?	Yes	Yes		Yes	Yes		Yes			Yes	Yes	Yes
Recall Mode	None	C-Max		None	C-Max		None	None	None	None	None	None
Act Effct Green (s)	43.0	37.0		54.1	48.7		52.0	52.7	52.7	29.0	29.0	29.0
Actuated g/C Ratio	0.36	0.31		0.45	0.41		0.43	0.44	0.44	0.24	0.24	0.24
v/c Ratio	0.09	0.64		0.83	0.44		0.99	0.33	0.17	0.35	0.82	0.21
Control Delay	21.1	15.9		54.8	36.7		73.5	22.4	3.4	39.9	58.7	2.7
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	21.1	15.9		54.8	36.7		73.5	22.4	3.4	39.9	58.7	2.7
LOS	C	B		D	D		E	C	A	D	E	A
Approach Delay		16.1			41.8			43.4			45.6	
Approach LOS		B			D			D			D	
Queue Length 50th (m)	3.3	33.8		45.8	67.6		59.5	40.4	0.0	18.5	82.3	0.0
Queue Length 95th (m)	9.7	55.8		m#120.9	92.4		#110.4	53.3	9.8	31.8	108.7	5.1
Internal Link Dist (m)		535.2			1802.0			357.2			231.7	
Turn Bay Length (m)	95.0			75.0			120.0		45.0	50.0		
Base Capacity (vph)	289	1236		278	1356		348	901	822	328	544	553
Starvation Cap Reductn	0	0		0	0		0	0	0	0	0	0
Spillback Cap Reductn	0	0		0	0		0	0	0	0	0	0
Storage Cap Reductn	0	0		0	0		0	0	0	0	0	0
Reduced v/c Ratio	0.09	0.64		0.83	0.44		0.99	0.28	0.15	0.27	0.64	0.17

Intersection Summary

Cycle Length: 120
Actuated Cycle Length: 120
Offset: 0 (0%), Referenced to phase 2:EBTL and 6:WBTL, Start of Green
Natural Cycle: 110
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.99
Intersection Signal Delay: 35.7 Intersection LOS: D
Intersection Capacity Utilization 105.1% ICU Level of Service G
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: 8: Huntmar & Palladium



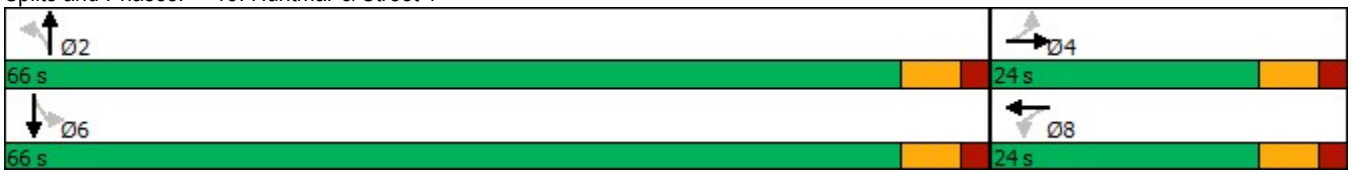
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	40	0	10	40	0	45	35	750	15	65	1090	10
Future Volume (vph)	40	0	10	40	0	45	35	750	15	65	1090	10
Confl. Peds. (#/hr)				5		5			5	5		
Confl. Bikes (#/hr)												
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%	0%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%			0%	
Shared Lane Traffic (%)												
Lane Group Flow (vph)	40	10	0	40	45	0	35	765	0	65	1100	0
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2			6		
Detector Phase	4	4		8	8		2	2		6	6	
Switch Phase												
Minimum Initial (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Minimum Split (s)	24.0	24.0		24.0	24.0		24.0	24.0		24.0	24.0	
Total Split (s)	24.0	24.0		24.0	24.0		66.0	66.0		66.0	66.0	
Total Split (%)	26.7%	26.7%		26.7%	26.7%		73.3%	73.3%		73.3%	73.3%	
Yellow Time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
All-Red Time (s)	2.0	2.0		2.0	2.0		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	6.0		6.0	6.0		6.0	6.0		6.0	6.0	
Lead/Lag												
Lead-Lag Optimize?												
Recall Mode	None	None		None	None		Min	Min		Min	Min	
Act Effct Green (s)	9.3	9.3		9.3	9.3		58.2	58.2		58.2	58.2	
Actuated g/C Ratio	0.13	0.13		0.13	0.13		0.78	0.78		0.78	0.78	
v/c Ratio	0.24	0.03		0.24	0.11		0.16	0.54		0.14	0.79	
Control Delay	36.1	0.2		35.9	0.6		6.5	7.2		5.0	14.1	
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay	36.1	0.2		35.9	0.6		6.5	7.2		5.0	14.1	
LOS	D	A		D	A		A	A		A	B	
Approach Delay		28.9			17.2			7.2			13.6	
Approach LOS		C			B			A			B	
Queue Length 50th (m)	6.2	0.0		6.2	0.0		1.3	41.5		2.3	89.8	
Queue Length 95th (m)	15.0	0.0		15.0	0.0		6.8	107.2		9.4	#271.4	
Internal Link Dist (m)		14.0			122.1			53.9			0.1	
Turn Bay Length (m)	30.0			30.0			30.0			30.0		
Base Capacity (vph)	341	492		348	568		219	1421		455	1411	
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	0.12	0.02		0.11	0.08		0.16	0.54		0.14	0.78	

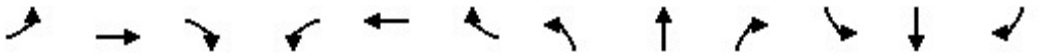
Intersection Summary

Cycle Length: 90	
Actuated Cycle Length: 74.3	
Natural Cycle: 90	
Control Type: Actuated-Uncoordinated	
Maximum v/c Ratio: 0.79	
Intersection Signal Delay: 11.7	Intersection LOS: B
Intersection Capacity Utilization 81.1%	ICU Level of Service D
Analysis Period (min) 15	

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

Splits and Phases: 13: Huntmar & Street 1



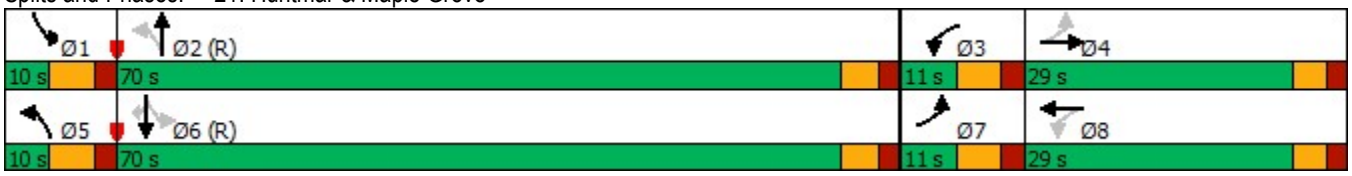


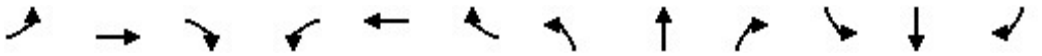
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	120	120	75	160	190	80	110	595	135	105	845	255
Future Volume (vph)	120	120	75	160	190	80	110	595	135	105	845	255
Confl. Peds. (#/hr)	5		5	5		5	5		5	5		5
Confl. Bikes (#/hr)												
Peak 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
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	0%	1%	0%	0%	0%	0%	2%	1%	0%	0%	1%	0%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%			0%	
Shared Lane Traffic (%)												
Lane Group Flow (vph)	120	195	0	160	270	0	110	730	0	105	845	255
Turn Type	pm+pt	NA		pm+pt	NA		pm+pt	NA		pm+pt	NA	Perm
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases	4			8			2			6		6
Detector Phase	7	4		3	8		5	2		1	6	6
Switch Phase												
Minimum Initial (s)	4.0	10.0		4.0	10.0		4.0	10.0		4.0	10.0	10.0
Minimum Split (s)	10.0	29.0		10.0	29.0		10.0	25.3		10.0	25.3	25.3
Total Split (s)	11.0	29.0		11.0	29.0		10.0	70.0		10.0	70.0	70.0
Total Split (%)	9.2%	24.2%		9.2%	24.2%		8.3%	58.3%		8.3%	58.3%	58.3%
Yellow Time (s)	4.0	3.0		4.0	3.0		4.0	3.3		4.0	3.3	3.3
All-Red Time (s)	2.0	2.0		2.0	2.0		2.0	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	0.0
Total Lost Time (s)	6.0	5.0		6.0	5.0		6.0	5.3		6.0	5.3	5.3
Lead/Lag	Lead	Lag		Lead	Lag		Lead	Lag		Lead	Lag	Lag
Lead-Lag Optimize?	Yes	Yes		Yes			Yes	Yes		Yes	Yes	Yes
Recall Mode	None	None		None	None		None	C-Max		None	C-Max	C-Max
Act Effct Green (s)	25.5	21.5		25.5	21.5		70.6	66.0		70.3	65.8	65.8
Actuated g/C Ratio	0.21	0.18		0.21	0.18		0.59	0.55		0.59	0.55	0.55
v/c Ratio	0.81	0.62		0.79	0.85		0.57	0.40		0.27	0.86	0.29
Control Delay	75.6	48.3		64.0	65.0		24.0	15.8		11.4	34.8	8.2
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	0.0
Total Delay	75.6	48.3		64.0	65.0		24.0	15.8		11.4	34.8	8.2
LOS	E	D		E	E		C	B		B	C	A
Approach Delay		58.7			64.6			16.9			27.1	
Approach LOS		E			E			B			C	
Queue Length 50th (m)	23.1	38.8		30.7	59.3		10.4	51.2		9.8	176.0	15.4
Queue Length 95th (m)	#50.6	64.0		m#46.5	m83.0		#21.6	65.8		17.6	#265.9	31.4
Internal Link Dist (m)		630.5			86.3			293.1			175.1	
Turn Bay Length (m)							20.0					30.0
Base Capacity (vph)	148	351		202	353		192	1816		387	977	867
Starvation Cap Reductn	0	0		0	0		0	0		0	0	0
Spillback Cap Reductn	0	0		0	0		0	0		0	0	0
Storage Cap Reductn	0	0		0	0		0	0		0	0	0
Reduced v/c Ratio	0.81	0.56		0.79	0.76		0.57	0.40		0.27	0.86	0.29

Intersection Summary

Cycle Length: 120
Actuated Cycle Length: 120
Offset: 0 (0%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green
Natural Cycle: 100
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.86
Intersection Signal Delay: 33.4 Intersection LOS: C
Intersection Capacity Utilization 95.5% ICU Level of Service F
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: 21: Huntmar & Maple Grove





Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	180	65	345	20	70	40	235	1365	45	60	1810	185
Future Volume (vph)	180	65	345	20	70	40	235	1365	45	60	1810	185
Confl. Peds. (#/hr)	5		5	5		5	5		5	5		5
Confl. Bikes (#/hr)												
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
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	2%	0%	1%	0%	0%	0%	2%	2%	0%	0%	1%	3%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%			0%	
Shared Lane Traffic (%)												
Lane Group Flow (vph)	180	65	345	20	110	0	235	1410	0	60	1810	185
Turn Type	Perm	NA	Perm	Perm	NA		pm+pt	NA		pm+pt	NA	Perm
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4		4	8			2			6		6
Detector Phase	4	4	4	8	8		5	2		1	6	6
Switch Phase												
Minimum Initial (s)	10.0	10.0	10.0	10.0	10.0		5.0	10.0		5.0	10.0	10.0
Minimum Split (s)	42.0	42.0	42.0	42.0	42.0		11.0	43.0		11.0	43.0	43.0
Total Split (s)	42.0	42.0	42.0	42.0	42.0		11.0	67.0		11.0	67.0	67.0
Total Split (%)	35.0%	35.0%	35.0%	35.0%	35.0%		9.2%	55.8%		9.2%	55.8%	55.8%
Yellow Time (s)	3.0	3.0	3.0	3.0	3.0		4.0	4.0		4.0	4.0	4.0
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0		2.0	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	-3.0	0.0
Total Lost Time (s)	5.0	5.0	5.0	5.0	5.0		6.0	6.0		6.0	3.0	6.0
Lead/Lag							Lead	Lag		Lead	Lag	Lag
Lead-Lag Optimize?							Yes	Yes		Yes	Yes	Yes
Recall Mode	None	None	None	None	None		None	C-Max		None	C-Max	C-Max
Act Effct Green (s)	27.0	27.0	27.0	27.0	27.0		80.0	72.1		67.2	64.0	61.0
Actuated g/C Ratio	0.22	0.22	0.22	0.22	0.22		0.67	0.60		0.56	0.53	0.51
v/c Ratio	0.69	0.16	0.85	0.07	0.28		0.88	0.70		0.29	1.00	0.23
Control Delay	56.9	36.9	52.2	33.0	28.9		65.9	21.4		7.0	30.8	1.5
Queue Delay	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	0.0
Total Delay	56.9	36.9	52.2	33.0	28.9		65.9	21.4		7.0	30.8	1.5
LOS	E	D	D	C	C		E	C		A	C	A
Approach Delay		52.0			29.6			27.8			27.4	
Approach LOS		D			C			C			C	
Queue Length 50th (m)	42.6	13.8	64.1	3.9	17.3		41.9	128.0		2.7	~88.3	1.2
Queue Length 95th (m)	64.4	m25.4	96.3	9.7	30.2		#128.9	184.1		m3.6	m73.2	m0.6
Internal Link Dist (m)		1246.0			796.0			547.8			406.9	
Turn Bay Length (m)	65.0		60.0	40.0			145.0			125.0		70.0
Base Capacity (vph)	357	555	522	394	538		267	2004		208	1805	790
Starvation Cap Reductn	0	0	0	0	0		0	0		0	0	0
Spillback Cap Reductn	0	0	0	0	0		0	0		0	0	0
Storage Cap Reductn	0	0	0	0	0		0	0		0	0	0
Reduced v/c Ratio	0.50	0.12	0.66	0.05	0.20		0.88	0.70		0.29	1.00	0.23

Intersection Summary

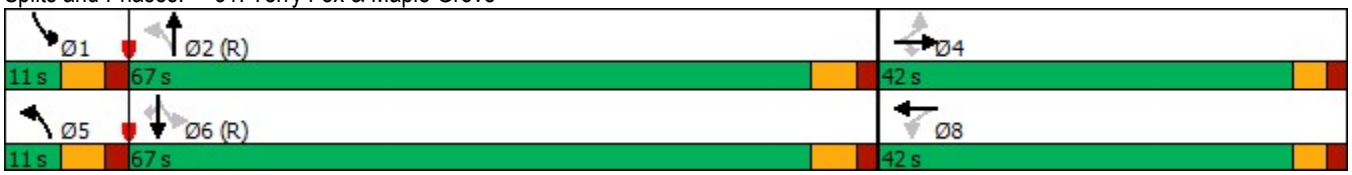
Cycle Length: 120	
Actuated Cycle Length: 120	
Offset: 0 (0%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green	
Natural Cycle: 140	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 1.00	
Intersection Signal Delay: 30.9	Intersection LOS: C
Intersection Capacity Utilization 98.3%	ICU Level of Service F
Analysis Period (min) 15	

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

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

m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 31: Terry Fox & Maple Grove



Intersection	
Int Delay, s/veh	3.3

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	0	25	0	0	15	50	0	0	0	0	0	55
Future Vol, veh/h	0	25	0	0	15	50	0	0	0	0	0	55
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	0	-	-	0
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	100	100	100	100	100	100	100	100	100	100	100	100
Heavy Vehicles, %	0	0	0	0	0	0	0	0	0	0	0	0
Mvmt Flow	0	25	0	0	15	50	0	0	0	0	0	55

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	-	0	0	-	-	0	-	-	25	-	-	40
Stage 1	-	-	-	-	-	-	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-	-	-	-	-	-	-
Critical Hdwy	-	-	-	-	-	-	-	-	6.2	-	-	6.2
Critical Hdwy Stg 1	-	-	-	-	-	-	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-	-	-	-	-	-	-
Follow-up Hdwy	-	-	-	-	-	-	-	-	3.3	-	-	3.3
Pot Cap-1 Maneuver	0	-	-	0	-	-	0	0	1057	0	0	1037
Stage 1	0	-	-	0	-	-	0	0	-	0	0	-
Stage 2	0	-	-	0	-	-	0	0	-	0	0	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	-	-	-	-	-	-	-	-	1057	-	-	1037
Mov Cap-2 Maneuver	-	-	-	-	-	-	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0	0	0	8.7
HCM LOS			A	A

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBT	WBR	SBLn1
Capacity (veh/h)	-	-	-	-	-	1037
HCM Lane V/C Ratio	-	-	-	-	-	0.053
HCM Control Delay (s)	0	-	-	-	-	8.7
HCM Lane LOS	A	-	-	-	-	A
HCM 95th %tile Q(veh)	-	-	-	-	-	0.2

Intersection	
Int Delay, s/veh	2

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	20	35	795	30	55	1145
Future Vol, veh/h	20	35	795	30	55	1145
Conflicting Peds, #/hr	5	5	0	5	5	0
Sign Control	Stop	Stop	Free	Free	Free	Free
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, %	0	0	0	0	0	1
Mvmt Flow	20	35	795	30	55	1145

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	2075	820	0	0	830	0
Stage 1	815	-	-	-	-	-
Stage 2	1260	-	-	-	-	-
Critical Hdwy	6.4	6.2	-	-	4.1	-
Critical Hdwy Stg 1	5.4	-	-	-	-	-
Critical Hdwy Stg 2	5.4	-	-	-	-	-
Follow-up Hdwy	3.5	3.3	-	-	2.2	-
Pot Cap-1 Maneuver	60	378	-	-	811	-
Stage 1	439	-	-	-	-	-
Stage 2	270	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	48	375	-	-	808	-
Mov Cap-2 Maneuver	48	-	-	-	-	-
Stage 1	437	-	-	-	-	-
Stage 2	219	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	68.7	0	0.4
HCM LOS	F		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	108	808	-
HCM Lane V/C Ratio	-	-	0.509	0.068	-
HCM Control Delay (s)	-	-	68.7	9.8	0
HCM Lane LOS	-	-	F	A	A
HCM 95th %tile Q(veh)	-	-	2.3	0.2	-

Intersection	
Int Delay, s/veh	0.6

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	15	365	435	50	20	5
Future Vol, veh/h	15	365	435	50	20	5
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	100	100	100	100	100	100
Heavy Vehicles, %	0	0	3	0	0	0
Mvmt Flow	15	365	435	50	20	5

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	485	0	-	0	855	460
Stage 1	-	-	-	-	460	-
Stage 2	-	-	-	-	395	-
Critical Hdwy	4.1	-	-	-	6.4	6.2
Critical Hdwy Stg 1	-	-	-	-	5.4	-
Critical Hdwy Stg 2	-	-	-	-	5.4	-
Follow-up Hdwy	2.2	-	-	-	3.5	3.3
Pot Cap-1 Maneuver	1088	-	-	-	331	605
Stage 1	-	-	-	-	640	-
Stage 2	-	-	-	-	685	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1088	-	-	-	325	605
Mov Cap-2 Maneuver	-	-	-	-	325	-
Stage 1	-	-	-	-	629	-
Stage 2	-	-	-	-	685	-

Approach	EB	WB	SB
HCM Control Delay, s	0.3	0	15.8
HCM LOS			C

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1088	-	-	-	358
HCM Lane V/C Ratio	0.014	-	-	-	0.07
HCM Control Delay (s)	8.4	0	-	-	15.8
HCM Lane LOS	A	A	-	-	C
HCM 95th %tile Q(veh)	0	-	-	-	0.2

Intersection	
Int Delay, s/veh	1

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		⇕			⇕			⇕			⇕	
Traffic Vol, veh/h	5	350	15	25	415	15	10	0	40	0	0	5
Future Vol, veh/h	5	350	15	25	415	15	10	0	40	0	0	5
Conflicting Peds, #/hr	5	0	0	0	0	5	0	0	0	5	0	5
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	100	100	100	100	100	100	100	100	100	100	100	100
Heavy Vehicles, %	0	0	7	4	3	0	0	0	3	0	0	0
Mvmt Flow	5	350	15	25	415	15	10	0	40	0	0	5

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	435	0	0	365	0	0	848	853	363	871	853	433
Stage 1	-	-	-	-	-	-	368	368	-	478	478	-
Stage 2	-	-	-	-	-	-	480	485	-	393	375	-
Critical Hdwy	4.1	-	-	4.14	-	-	7.1	6.5	6.23	7.1	6.5	6.2
Critical Hdwy Stg 1	-	-	-	-	-	-	6.1	5.5	-	6.1	5.5	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.1	5.5	-	6.1	5.5	-
Follow-up Hdwy	2.2	-	-	2.236	-	-	3.5	4	3.327	3.5	4	3.3
Pot Cap-1 Maneuver	1135	-	-	1183	-	-	284	299	680	274	299	627
Stage 1	-	-	-	-	-	-	656	625	-	572	559	-
Stage 2	-	-	-	-	-	-	571	555	-	636	621	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1130	-	-	1183	-	-	273	288	677	249	288	622
Mov Cap-2 Maneuver	-	-	-	-	-	-	273	288	-	249	288	-
Stage 1	-	-	-	-	-	-	652	621	-	566	541	-
Stage 2	-	-	-	-	-	-	548	537	-	592	617	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0.1	0.4	12.6	10.8
HCM LOS			B	B

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	522	1130	-	-	1183	-	-	622
HCM Lane V/C Ratio	0.096	0.004	-	-	0.021	-	-	0.008
HCM Control Delay (s)	12.6	8.2	0	-	8.1	0	-	10.8
HCM Lane LOS	B	A	A	-	A	A	-	B
HCM 95th %tile Q(veh)	0.3	0	-	-	0.1	-	-	0

Intersection	
Int Delay, s/veh	1.2

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	30	360	400	40	15	50
Future Vol, veh/h	30	360	400	40	15	50
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	100	100	100	100	100	100
Heavy Vehicles, %	0	0	3	0	0	0
Mvmt Flow	30	360	400	40	15	50

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	440	0	-	0	840	420
Stage 1	-	-	-	-	420	-
Stage 2	-	-	-	-	420	-
Critical Hdwy	4.1	-	-	-	6.4	6.2
Critical Hdwy Stg 1	-	-	-	-	5.4	-
Critical Hdwy Stg 2	-	-	-	-	5.4	-
Follow-up Hdwy	2.2	-	-	-	3.5	3.3
Pot Cap-1 Maneuver	1131	-	-	-	338	638
Stage 1	-	-	-	-	667	-
Stage 2	-	-	-	-	667	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1131	-	-	-	327	638
Mov Cap-2 Maneuver	-	-	-	-	327	-
Stage 1	-	-	-	-	645	-
Stage 2	-	-	-	-	667	-

Approach	EB	WB	SB
HCM Control Delay, s	0.6	0	12.9
HCM LOS			B

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1131	-	-	-	523
HCM Lane V/C Ratio	0.027	-	-	-	0.124
HCM Control Delay (s)	8.3	0	-	-	12.9
HCM Lane LOS	A	A	-	-	B
HCM 95th %tile Q(veh)	0.1	-	-	-	0.4

Intersection	
Int Delay, s/veh	0.3

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	5	20	775	10	5	1135
Future Vol, veh/h	5	20	775	10	5	1135
Conflicting Peds, #/hr	5	5	0	5	5	0
Sign Control	Stop	Stop	Free	Free	Free	Free
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, %	0	0	0	0	0	1
Mvmt Flow	5	20	775	10	5	1135

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	1935	790	0	0	790	0
Stage 1	785	-	-	-	-	-
Stage 2	1150	-	-	-	-	-
Critical Hdwy	6.4	6.2	-	-	4.1	-
Critical Hdwy Stg 1	5.4	-	-	-	-	-
Critical Hdwy Stg 2	5.4	-	-	-	-	-
Follow-up Hdwy	3.5	3.3	-	-	2.2	-
Pot Cap-1 Maneuver	73	393	-	-	839	-
Stage 1	453	-	-	-	-	-
Stage 2	304	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	71	390	-	-	835	-
Mov Cap-2 Maneuver	71	-	-	-	-	-
Stage 1	451	-	-	-	-	-
Stage 2	298	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	25	0	0
HCM LOS	D		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	205	835	-
HCM Lane V/C Ratio	-	-	0.122	0.006	-
HCM Control Delay (s)	-	-	25	9.3	0
HCM Lane LOS	-	-	D	A	A
HCM 95th %tile Q(veh)	-	-	0.4	0	-

Intersection	
Intersection Delay, s/veh	36.7
Intersection LOS	E

Approach	EB	WB	NB	SB
Entry Lanes	1	1	1	1
Conflicting Circle Lanes	1	1	1	1
Adj Approach Flow, veh/h	55	85	770	1005
Demand Flow Rate, veh/h	58	86	770	1016
Vehicles Circulating, veh/h	1061	760	32	136
Vehicles Exiting, veh/h	91	42	1087	710
Follow-Up Headway, s	3.186	3.186	3.186	3.186
Ped Vol Crossing Leg, #/h	5	5	5	5
Ped Cap Adj	1.000	0.999	0.999	0.999
Approach Delay, s/veh	12.2	9.0	14.2	57.6
Approach LOS	B	A	B	F

Lane	Left	Left	Left	Left
Designated Moves	LTR	LTR	LTR	LTR
Assumed Moves	LTR	LTR	LTR	LTR
RT Channelized				
Lane Util	1.000	1.000	1.000	1.000
Critical Headway, s	5.193	5.193	5.193	5.193
Entry Flow, veh/h	58	86	770	1016
Cap Entry Lane, veh/h	391	528	1094	986
Entry HV Adj Factor	0.944	0.988	1.000	0.989
Flow Entry, veh/h	55	85	770	1005
Cap Entry, veh/h	369	522	1094	975
V/C Ratio	0.148	0.163	0.704	1.031
Control Delay, s/veh	12.2	9.0	14.2	57.6
LOS	B	A	B	F
95th %tile Queue, veh	1	1	6	21

Intersection	
Intersection Delay, s/veh	7.4
Intersection LOS	A

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	55	0	25	0	15	0
Future Vol, veh/h	55	0	25	0	15	0
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Heavy Vehicles, %	0	0	0	0	0	0
Mvmt Flow	55	0	25	0	15	0
Number of Lanes	1	0	1	0	0	1

Approach	WB	NB	SB
Opposing Approach		SB	NB
Opposing Lanes	0	1	1
Conflicting Approach Left	NB		WB
Conflicting Lanes Left	1	0	1
Conflicting Approach Right	SB	WB	
Conflicting Lanes Right	1	1	0
HCM Control Delay	7.5	7.2	7.3
HCM LOS	A	A	A

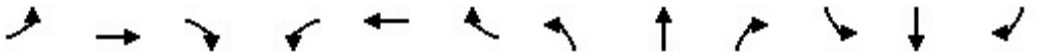
Lane	NBLn1	WBLn1	SBLn1
Vol Left, %	0%	100%	100%
Vol Thru, %	100%	0%	0%
Vol Right, %	0%	0%	0%
Sign Control	Stop	Stop	Stop
Traffic Vol by Lane	25	55	15
LT Vol	0	55	15
Through Vol	25	0	0
RT Vol	0	0	0
Lane Flow Rate	25	55	15
Geometry Grp	1	1	1
Degree of Util (X)	0.028	0.064	0.018
Departure Headway (Hd)	4.008	4.168	4.216
Convergence, Y/N	Yes	Yes	Yes
Cap	891	860	847
Service Time	2.042	2.19	2.251
HCM Lane V/C Ratio	0.028	0.064	0.018
HCM Control Delay	7.2	7.5	7.3
HCM Lane LOS	A	A	A
HCM 95th-tile Q	0.1	0.2	0.1

Intersection	
Intersection Delay, s/veh	7.5
Intersection LOS	A

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	80	0	0	0	55	15	0	20	0	25	5	30
Future Vol, veh/h	80	0	0	0	55	15	0	20	0	25	5	30
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Heavy Vehicles, %	0	0	0	0	0	0	0	0	0	0	0	0
Mvmt Flow	80	0	0	0	55	15	0	20	0	25	5	30
Number of Lanes	0	1	0	0	1	0	0	1	0	0	1	0

Approach	EB	WB	NB	SB
Opposing Approach	WB	EB	SB	NB
Opposing Lanes	1	1	1	1
Conflicting Approach 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	7.8	7.4	7.4	7.3
HCM LOS	A	A	A	A

Lane	NBLn1	EBLn1	WBLn1	SBLn1
Vol Left, %	0%	100%	0%	42%
Vol Thru, %	100%	0%	79%	8%
Vol Right, %	0%	0%	21%	50%
Sign Control	Stop	Stop	Stop	Stop
Traffic Vol by Lane	20	80	70	60
LT Vol	0	80	0	25
Through Vol	20	0	55	5
RT Vol	0	0	15	30
Lane Flow Rate	20	80	70	60
Geometry Grp	1	1	1	1
Degree of Util (X)	0.023	0.095	0.077	0.066
Departure Headway (Hd)	4.205	4.292	3.971	3.957
Convergence, Y/N	Yes	Yes	Yes	Yes
Cap	839	830	895	893
Service Time	2.292	2.341	2.027	2.036
HCM Lane V/C Ratio	0.024	0.096	0.078	0.067
HCM Control Delay	7.4	7.8	7.4	7.3
HCM Lane LOS	A	A	A	A
HCM 95th-tile Q	0.1	0.3	0.2	0.2

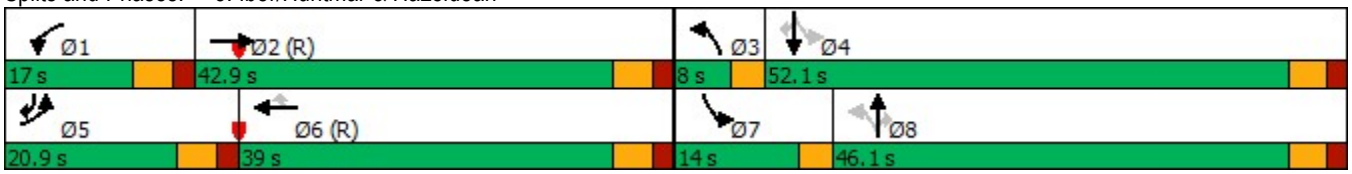


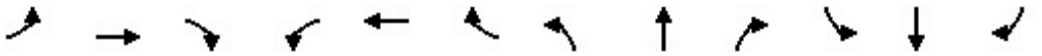
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	250	840	135	205	500	130	60	330	310	155	325	140
Future Volume (vph)	250	840	135	205	500	130	60	330	310	155	325	140
Confl. Peds. (#/hr)	5		5	5		5	5		5	5		5
Confl. Bikes (#/hr)												
Peak 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
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	2%	2%	12%	3%	4%	2%	4%	0%	4%	3%	2%	0%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%			0%	
Shared Lane Traffic (%)												
Lane Group Flow (vph)	250	975	0	205	500	130	60	330	310	155	325	140
Turn Type	Prot	NA		Prot	NA	Perm	pm+pt	NA	Perm	pm+pt	NA	pm+ov
Protected Phases	5	2		1	6		3	8		7	4	5
Permitted Phases						6	8		8	4		4
Detector Phase	5	2		1	6	6	3	8	8	7	4	5
Switch Phase												
Minimum Initial (s)	5.0	10.0		5.0	10.0	10.0	5.0	10.0	10.0	5.0	10.0	5.0
Minimum Split (s)	10.6	36.6		10.6	36.6	36.6	8.0	38.3	38.3	8.0	38.3	10.6
Total Split (s)	20.9	42.9		17.0	39.0	39.0	8.0	46.1	46.1	14.0	52.1	20.9
Total Split (%)	17.4%	35.8%		14.2%	32.5%	32.5%	6.7%	38.4%	38.4%	11.7%	43.4%	17.4%
Yellow Time (s)	3.6	3.6		3.6	3.6	3.6	3.0	3.3	3.3	3.0	3.3	3.6
All-Red Time (s)	2.0	2.0		2.0	2.0	2.0	0.0	2.0	2.0	0.0	2.0	2.0
Lost Time Adjust (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	5.6	5.6		5.6	5.6	5.6	3.0	5.3	5.3	3.0	5.3	5.6
Lead/Lag	Lead	Lag		Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag	Lead
Lead-Lag Optimize?	Yes	Yes		Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Recall Mode	None	C-Max		None	C-Max	C-Max	None	None	None	None	None	None
Act Effct Green (s)	14.5	49.3		12.7	47.5	47.5	35.1	27.8	27.8	43.8	35.1	49.3
Actuated g/C Ratio	0.12	0.41		0.11	0.40	0.40	0.29	0.23	0.23	0.36	0.29	0.41
v/c Ratio	0.64	0.73		0.60	0.38	0.20	0.24	0.79	0.55	0.59	0.63	0.20
Control Delay	57.6	35.1		58.6	29.0	6.0	25.4	56.8	8.1	35.0	42.1	2.9
Queue Delay	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	57.6	35.1		58.6	29.0	6.0	25.4	56.8	8.1	35.0	42.1	2.9
LOS	E	D		E	C	A	C	E	A	C	D	A
Approach Delay		39.7			32.7			32.5			31.5	
Approach LOS		D			C			C			C	
Queue Length 50th (m)	30.8	104.3		25.3	45.9	0.0	9.7	77.6	1.8	26.7	71.3	0.0
Queue Length 95th (m)	43.3	#167.9		37.4	72.6	15.0	17.1	101.7	23.8	38.1	92.4	9.2
Internal Link Dist (m)		871.0			1427.4			1305.6			301.9	
Turn Bay Length (m)	50.0			90.0		225.0	30.0		60.0	50.0		275.0
Base Capacity (vph)	435	1335		352	1301	661	254	612	690	264	688	721
Starvation Cap Reductn	0	0		0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0		0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0		0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.57	0.73		0.58	0.38	0.20	0.24	0.54	0.45	0.59	0.47	0.19

Intersection Summary

Cycle Length: 120
Actuated Cycle Length: 120
Offset: 0 (0%), Referenced to phase 2:EBT and 6:WBT, Start of Green
Natural Cycle: 95
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.79
Intersection Signal Delay: 35.0 Intersection LOS: C
Intersection Capacity Utilization 81.2% ICU Level of Service D
Analysis Period (min) 15
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 3: Iber/Huntmar & Hazeldean



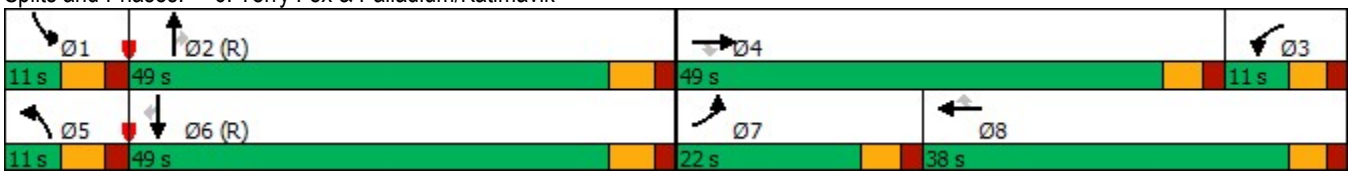


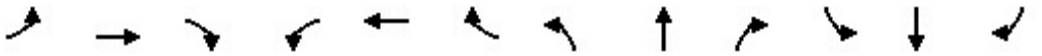
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	320	65	135	65	120	175	420	1420	95	100	990	935
Future Volume (vph)	320	65	135	65	120	175	420	1420	95	100	990	935
Confl. Peds. (#/hr)	5		5	5		5	5		5	5		5
Confl. Bikes (#/hr)												
Peak 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
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	5%	5%	2%	10%	5%	3%	0%	2%	11%	2%	4%	1%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%			0%	
Shared Lane Traffic (%)												
Lane Group Flow (vph)	320	65	135	65	120	175	420	1420	95	100	990	935
Turn Type	Prot	NA	Perm	Prot	NA	Perm	Prot	NA	Perm	Prot	NA	Perm
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases			4			8			2			6
Detector Phase	7	4	4	3	8	8	5	2	2	1	6	6
Switch Phase												
Minimum Initial (s)	5.0	10.0	10.0	5.0	10.0	10.0	5.0	10.0	10.0	5.0	10.0	10.0
Minimum Split (s)	10.6	37.6	37.6	10.3	37.3	37.3	11.0	38.0	38.0	11.0	38.0	38.0
Total Split (s)	22.0	49.0	49.0	11.0	38.0	38.0	11.0	49.0	49.0	11.0	49.0	49.0
Total Split (%)	18.3%	40.8%	40.8%	9.2%	31.7%	31.7%	9.2%	40.8%	40.8%	9.2%	40.8%	40.8%
Yellow Time (s)	3.6	3.6	3.6	3.3	3.3	3.3	4.0	4.0	4.0	4.0	4.0	4.0
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	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	0.0	0.0	0.0	0.0
Total Lost Time (s)	5.6	5.6	5.6	5.3	5.3	5.3	6.0	6.0	6.0	6.0	6.0	6.0
Lead/Lag	Lead	Lead	Lead	Lag	Lag	Lag	Lead	Lag	Lag	Lead	Lag	Lag
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Recall Mode	None	None	None	None	None	None	None	C-Max	C-Max	None	C-Max	C-Max
Act Effct Green (s)	15.5	14.7	14.7	17.5	16.7	16.7	21.9	56.8	56.8	8.2	43.0	43.0
Actuated g/C Ratio	0.13	0.12	0.12	0.15	0.14	0.14	0.18	0.47	0.47	0.07	0.36	0.36
v/c Ratio	0.78	0.31	0.45	0.29	0.50	0.55	0.69	0.90	0.13	0.45	0.84	0.95
Control Delay	61.9	51.6	13.4	48.9	53.4	19.3	58.0	30.1	1.2	60.8	43.1	29.4
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	61.9	51.6	13.4	48.9	53.4	19.3	58.0	30.1	1.2	60.8	43.1	29.4
LOS	E	D	B	D	D	B	E	C	A	E	D	C
Approach Delay		48.0			36.0			34.8			37.7	
Approach LOS		D			D			C			D	
Queue Length 50th (m)	34.6	15.3	1.6	14.1	28.7	9.6	50.8	144.4	0.0	12.3	117.5	74.8
Queue Length 95th (m)	#53.8	22.1	9.4	29.2	40.6	27.3	m#118.4	#261.3	m1.9	#24.9	146.0	#190.0
Internal Link Dist (m)		1802.0			304.5			406.9			280.2	
Turn Bay Length (m)	100.0			115.0		115.0	240.0		115.0	70.0		190.0
Base Capacity (vph)	431	619	619	226	467	494	605	1586	733	220	1178	982
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.74	0.11	0.22	0.29	0.26	0.35	0.69	0.90	0.13	0.45	0.84	0.95

Intersection Summary

Cycle Length: 120
Actuated Cycle Length: 120
Offset: 0 (0%), Referenced to phase 2:NBT and 6:SBT, Start of Green, Master Intersection
Natural Cycle: 150
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.95
Intersection Signal Delay: 37.5 Intersection LOS: D
Intersection Capacity Utilization 99.9% ICU Level of Service F
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: 6: Terry Fox & Palladium/Katimavik





Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	35	205	275	65	100	45	515	370	225	105	195	55
Future Volume (vph)	35	205	275	65	100	45	515	370	225	105	195	55
Confl. Peds. (#/hr)	5		5	5		5	5		5	5		5
Confl. Bikes (#/hr)												
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
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	0%	3%	2%	7%	1%	0%	0%	1%	0%	2%	3%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%			0%	
Shared Lane Traffic (%)												
Lane Group Flow (vph)	35	480	0	65	145	0	515	370	225	105	195	55
Turn Type	pm+pt	NA		pm+pt	NA		pm+pt	NA	Perm	Perm	NA	Perm
Protected Phases	5	2		1	6		3	8			4	
Permitted Phases	2			6			8		8	4		4
Detector Phase	5	2		1	6		3	8	8	4	4	4
Switch Phase												
Minimum Initial (s)	5.0	10.0		5.0	10.0		4.0	10.0	10.0	10.0	10.0	10.0
Minimum Split (s)	11.0	43.0		11.0	43.0		10.0	42.3	42.3	42.3	42.3	42.3
Total Split (s)	11.0	43.0		11.0	43.0		23.0	66.0	66.0	43.0	43.0	43.0
Total Split (%)	9.2%	35.8%		9.2%	35.8%		19.2%	55.0%	55.0%	35.8%	35.8%	35.8%
Yellow Time (s)	4.0	4.0		4.0	4.0		4.0	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	2.0	2.0	2.0	2.0
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		-3.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	6.0	6.0		6.0	6.0		3.0	5.3	5.3	5.3	5.3	5.3
Lead/Lag	Lead	Lag		Lead	Lag		Lead			Lag	Lag	Lag
Lead-Lag Optimize?	Yes	Yes		Yes	Yes		Yes			Yes	Yes	Yes
Recall Mode	None	C-Max		None	C-Max		None	None	None	None	None	None
Act Effct Green (s)	59.0	53.9		61.4	57.0		46.5	44.2	44.2	21.2	21.2	21.2
Actuated g/C Ratio	0.49	0.45		0.51	0.48		0.39	0.37	0.37	0.18	0.18	0.18
v/c Ratio	0.06	0.32		0.16	0.09		1.15	0.56	0.32	0.62	0.63	0.15
Control Delay	17.1	11.1		19.3	18.7		122.1	32.7	3.7	59.8	53.4	0.8
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	17.1	11.1		19.3	18.7		122.1	32.7	3.7	59.8	53.4	0.8
LOS	B	B		B	B		F	C	A	E	D	A
Approach Delay		11.5			18.9			68.3			47.2	
Approach LOS		B			B			E			D	
Queue Length 50th (m)	3.7	15.6		9.7	9.7		~115.1	75.0	0.0	25.0	46.5	0.0
Queue Length 95th (m)	12.0	35.3		m14.5	m14.8		#159.3	80.9	12.7	37.2	59.3	0.0
Internal Link Dist (m)		535.2			1802.0			357.2			231.7	
Turn Bay Length (m)	95.0			75.0			120.0		45.0	50.0		
Base Capacity (vph)	608	1499		410	1551		447	901	871	299	549	556
Starvation Cap Reductn	0	0		0	0		0	0	0	0	0	0
Spillback Cap Reductn	0	0		0	0		0	0	0	0	0	0
Storage Cap Reductn	0	0		0	0		0	0	0	0	0	0
Reduced v/c Ratio	0.06	0.32		0.16	0.09		1.15	0.41	0.26	0.35	0.36	0.10

Intersection Summary

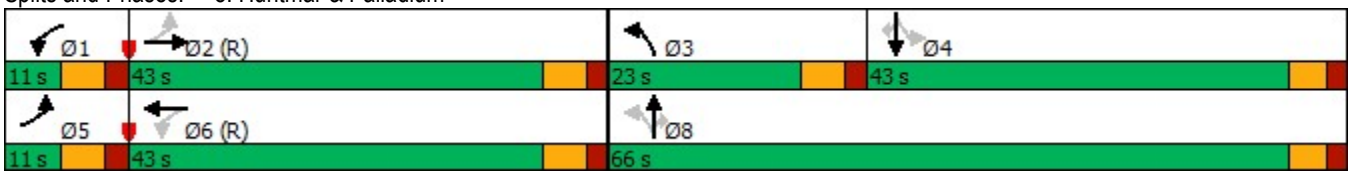
Cycle Length: 120	
Actuated Cycle Length: 120	
Offset: 0 (0%), Referenced to phase 2:EBTL and 6:WBTL, Start of Green	
Natural Cycle: 110	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 1.15	
Intersection Signal Delay: 46.8	Intersection LOS: D
Intersection Capacity Utilization 96.8%	ICU Level of Service F
Analysis Period (min) 15	

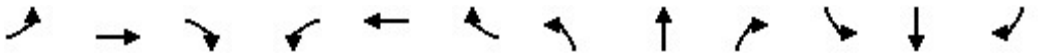
~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

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

m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 8: Huntmar & Palladium





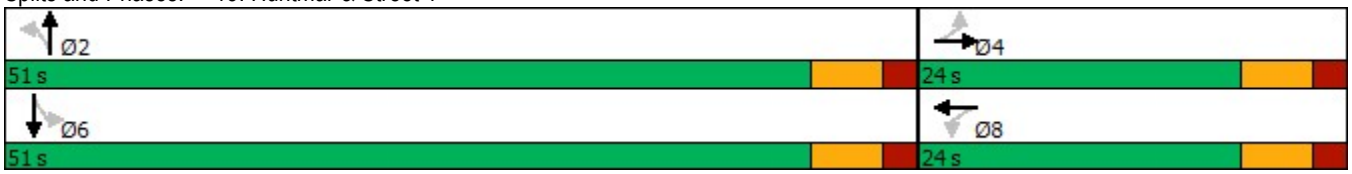
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	25	0	20	65	0	55	30	970	5	15	525	25
Future Volume (vph)	25	0	20	65	0	55	30	970	5	15	525	25
Confl. Peds. (#/hr)				5		5			5	5		
Confl. Bikes (#/hr)												
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%	0%	1%	0%	0%	3%	0%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%			0%	
Shared Lane Traffic (%)												
Lane Group Flow (vph)	25	20	0	65	55	0	30	975	0	15	550	0
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2			6		
Detector Phase	4	4		8	8		2	2		6	6	
Switch Phase												
Minimum Initial (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Minimum Split (s)	24.0	24.0		24.0	24.0		24.0	24.0		24.0	24.0	
Total Split (s)	24.0	24.0		24.0	24.0		51.0	51.0		51.0	51.0	
Total Split (%)	32.0%	32.0%		32.0%	32.0%		68.0%	68.0%		68.0%	68.0%	
Yellow Time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
All-Red Time (s)	2.0	2.0		2.0	2.0		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	6.0		6.0	6.0		6.0	6.0		6.0	6.0	
Lead/Lag												
Lead-Lag Optimize?												
Recall Mode	None	None		None	None		Min	Min		Min	Min	
Act Effct Green (s)	9.8	9.8		9.8	9.8		46.1	46.1		46.1	46.1	
Actuated g/C Ratio	0.16	0.16		0.16	0.16		0.73	0.73		0.73	0.73	
v/c Ratio	0.12	0.04		0.32	0.16		0.05	0.75		0.06	0.43	
Control Delay	25.5	0.1		29.5	1.0		5.2	14.2		5.9	7.0	
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay	25.5	0.1		29.5	1.0		5.2	14.2		5.9	7.0	
LOS	C	A		C	A		A	B		A	A	
Approach Delay		14.2			16.4			13.9			7.0	
Approach LOS		B			B			B			A	
Queue Length 50th (m)	3.0	0.0		8.0	0.0		1.0	70.9		0.5	26.1	
Queue Length 95th (m)	8.9	0.0		17.9	0.0		5.0	#210.7		3.4	67.3	
Internal Link Dist (m)		14.0			122.1			53.9			0.1	
Turn Bay Length (m)	30.0			30.0			30.0			30.0		
Base Capacity (vph)	393	708		402	537		566	1306		244	1277	
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	0.03		0.16	0.10		0.05	0.75		0.06	0.43	

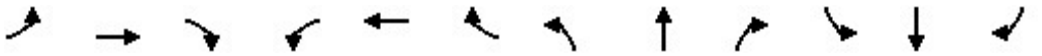
Intersection Summary

Cycle Length: 75	
Actuated Cycle Length: 62.8	
Natural Cycle: 75	
Control Type: Actuated-Uncoordinated	
Maximum v/c Ratio: 0.75	
Intersection Signal Delay: 11.8	Intersection LOS: B
Intersection Capacity Utilization 75.4%	ICU Level of Service D
Analysis Period (min) 15	

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

Splits and Phases: 13: Huntmar & Street 1



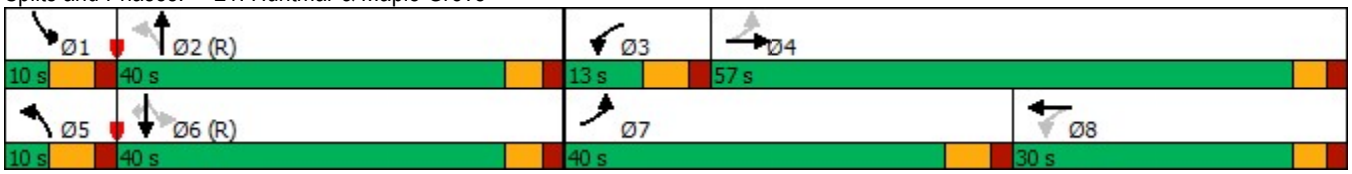


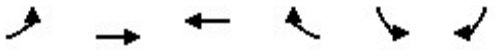
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	310	170	70	65	65	65	40	615	125	80	395	65
Future Volume (vph)	310	170	70	65	65	65	40	615	125	80	395	65
Confl. Peds. (#/hr)	5		5	5		5	5		5	5		5
Confl. Bikes (#/hr)												
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	1%	1%	5%	0%	7%	2%	20%	1%	3%	1%	2%	0%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%			0%	
Shared Lane Traffic (%)												
Lane Group Flow (vph)	310	240	0	65	130	0	40	740	0	80	395	65
Turn Type	pm+pt	NA		pm+pt	NA		pm+pt	NA		pm+pt	NA	Perm
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases	4			8			2			6		6
Detector Phase	7	4		3	8		5	2		1	6	6
Switch Phase												
Minimum Initial (s)	4.0	10.0		4.0	10.0		4.0	10.0		4.0	10.0	10.0
Minimum Split (s)	10.0	29.0		10.0	29.0		10.0	25.3		10.0	25.3	25.3
Total Split (s)	40.0	57.0		13.0	30.0		10.0	40.0		10.0	40.0	40.0
Total Split (%)	33.3%	47.5%		10.8%	25.0%		8.3%	33.3%		8.3%	33.3%	33.3%
Yellow Time (s)	4.0	3.0		4.0	3.0		4.0	3.3		4.0	3.3	3.3
All-Red Time (s)	2.0	2.0		2.0	2.0		2.0	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	0.0
Total Lost Time (s)	6.0	5.0		6.0	5.0		6.0	5.3		6.0	5.3	5.3
Lead/Lag	Lead	Lag		Lead	Lag		Lead	Lag		Lead	Lag	Lag
Lead-Lag Optimize?	Yes	Yes		Yes			Yes	Yes		Yes	Yes	Yes
Recall Mode	None	None		None	None		None	C-Max		None	C-Max	C-Max
Act Effct Green (s)	44.9	35.5		20.1	14.3		57.6	53.0		59.0	53.7	53.7
Actuated g/C Ratio	0.37	0.30		0.17	0.12		0.48	0.44		0.49	0.45	0.45
v/c Ratio	0.66	0.47		0.30	0.59		0.12	0.51		0.26	0.50	0.09
Control Delay	34.4	33.5		28.5	45.1		19.3	28.0		20.7	30.3	0.2
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	0.0
Total Delay	34.4	33.5		28.5	45.1		19.3	28.0		20.7	30.3	0.2
LOS	C	C		C	D		B	C		C	C	A
Approach Delay		34.0			39.5			27.6			25.2	
Approach LOS		C			D			C			C	
Queue Length 50th (m)	60.3	46.9		10.8	22.1		4.4	67.3		9.1	68.8	0.0
Queue Length 95th (m)	63.8	56.1		15.2	39.2		14.2	110.2		24.3	#131.3	0.0
Internal Link Dist (m)		630.5			86.3			293.1			175.1	
Turn Bay Length (m)							20.0					30.0
Base Capacity (vph)	542	735		220	356		323	1455		304	790	761
Starvation Cap Reductn	0	0		0	0		0	0		0	0	0
Spillback Cap Reductn	0	0		0	0		0	0		0	0	0
Storage Cap Reductn	0	0		0	0		0	0		0	0	0
Reduced v/c Ratio	0.57	0.33		0.30	0.37		0.12	0.51		0.26	0.50	0.09

Intersection Summary

Cycle Length: 120
Actuated Cycle Length: 120
Offset: 0 (0%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green
Natural Cycle: 75
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.66
Intersection Signal Delay: 29.8 Intersection LOS: C
Intersection Capacity Utilization 73.2% ICU Level of Service D
Analysis Period (min) 15
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 21: Huntmar & Maple Grove



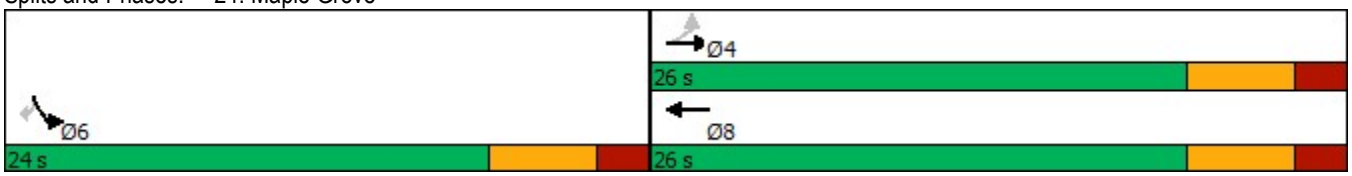


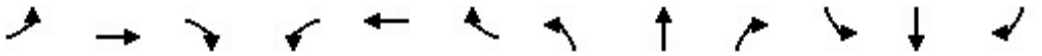
Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	5	375	365	10	25	5
Future Volume (vph)	5	375	365	10	25	5
Confl. Peds. (#/hr)						
Confl. Bikes (#/hr)						
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Growth Factor	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	0%	2%	2%	0%	0%	0%
Bus Blockages (#/hr)	0	0	0	0	0	0
Parking (#/hr)						
Mid-Block Traffic (%)		0%	0%		0%	
Shared Lane Traffic (%)						
Lane Group Flow (vph)	5	375	375	0	25	5
Turn Type	Perm	NA	NA		Prot	Perm
Protected Phases		4	8		6	
Permitted Phases	4					6
Detector Phase	4	4	8		6	6
Switch Phase						
Minimum Initial (s)	4.0	4.0	4.0		4.0	4.0
Minimum Split (s)	24.0	24.0	24.0		24.0	24.0
Total Split (s)	26.0	26.0	26.0		24.0	24.0
Total Split (%)	52.0%	52.0%	52.0%		48.0%	48.0%
Yellow Time (s)	4.0	4.0	4.0		4.0	4.0
All-Red Time (s)	2.0	2.0	2.0		2.0	2.0
Lost Time Adjust (s)	0.0	0.0	0.0		0.0	0.0
Total Lost Time (s)	6.0	6.0	6.0		6.0	6.0
Lead/Lag						
Lead-Lag Optimize?						
Recall Mode	None	None	None		Min	Min
Act Effct Green (s)	11.9	11.9	11.9		7.7	7.7
Actuated g/C Ratio	0.37	0.37	0.37		0.24	0.24
v/c Ratio	0.01	0.58	0.58		0.06	0.01
Control Delay	7.8	12.8	12.7		10.6	7.2
Queue Delay	0.0	0.0	0.0		0.0	0.0
Total Delay	7.8	12.8	12.7		10.6	7.2
LOS	A	B	B		B	A
Approach Delay		12.7	12.7		10.0	
Approach LOS		B	B		B	
Queue Length 50th (m)	0.2	12.6	12.5		1.0	0.0
Queue Length 95th (m)	1.8	46.3	46.1		5.2	1.6
Internal Link Dist (m)		80.8	1246.0		337.3	
Turn Bay Length (m)	15.0				15.0	
Base Capacity (vph)	636	1157	1154		1009	905
Starvation Cap Reductn	0	0	0		0	0
Spillback Cap Reductn	0	0	0		0	0
Storage Cap Reductn	0	0	0		0	0
Reduced v/c Ratio	0.01	0.32	0.32		0.02	0.01

Intersection Summary

Cycle Length: 50	
Actuated Cycle Length: 32.4	
Natural Cycle: 50	
Control Type: Actuated-Uncoordinated	
Maximum v/c Ratio: 0.58	
Intersection Signal Delay: 12.6	Intersection LOS: B
Intersection Capacity Utilization 34.3%	ICU Level of Service A
Analysis Period (min) 15	

Splits and Phases: 24: Maple Grove





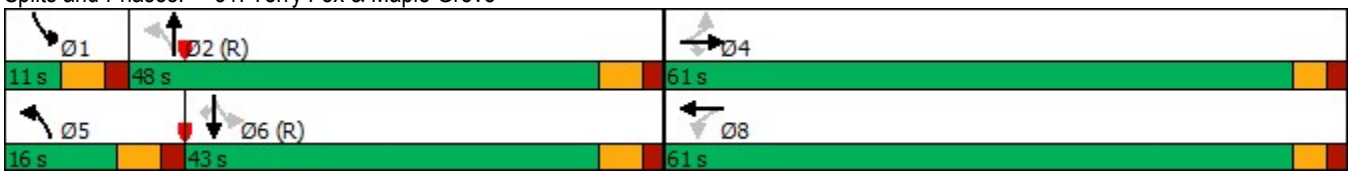
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	280	65	210	35	50	55	235	1510	40	15	905	120
Future Volume (vph)	280	65	210	35	50	55	235	1510	40	15	905	120
Confl. Peds. (#/hr)	5		5	5		5	5		5	5		5
Confl. Bikes (#/hr)												
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	7%	4%	8%	9%	5%	0%	6%	4%	6%	0%	7%	14%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%			0%	
Shared Lane Traffic (%)												
Lane Group Flow (vph)	280	65	210	35	105	0	235	1550	0	15	905	120
Turn Type	Perm	NA	Perm	Perm	NA		pm+pt	NA		pm+pt	NA	Perm
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4		4	8			2			6		6
Detector Phase	4	4	4	8	8		5	2		1	6	6
Switch Phase												
Minimum Initial (s)	10.0	10.0	10.0	10.0	10.0		5.0	10.0		5.0	10.0	10.0
Minimum Split (s)	42.0	42.0	42.0	42.0	42.0		11.0	43.0		11.0	43.0	43.0
Total Split (s)	61.0	61.0	61.0	61.0	61.0		16.0	48.0		11.0	43.0	43.0
Total Split (%)	50.8%	50.8%	50.8%	50.8%	50.8%		13.3%	40.0%		9.2%	35.8%	35.8%
Yellow Time (s)	3.0	3.0	3.0	3.0	3.0		4.0	4.0		4.0	4.0	4.0
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0		2.0	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	0.0	0.0
Total Lost Time (s)	5.0	5.0	5.0	5.0	5.0		6.0	6.0		6.0	6.0	6.0
Lead/Lag							Lead	Lag		Lead	Lag	Lag
Lead-Lag Optimize?							Yes	Yes		Yes	Yes	Yes
Recall Mode	None	None	None	None	None		None	C-Max		None	C-Max	C-Max
Act Effct Green (s)	36.1	36.1	36.1	36.1	36.1		72.9	67.8		49.3	43.2	43.2
Actuated g/C Ratio	0.30	0.30	0.30	0.30	0.30		0.61	0.56		0.41	0.36	0.36
v/c Ratio	0.81	0.12	0.40	0.10	0.20		0.57	0.84		0.10	0.79	0.22
Control Delay	55.9	27.6	11.4	26.8	14.4		22.9	29.8		26.1	47.5	18.9
Queue Delay	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	0.0
Total Delay	55.9	27.6	11.4	26.8	14.4		22.9	29.8		26.1	47.5	18.9
LOS	E	C	B	C	B		C	C		C	D	B
Approach Delay		35.7			17.5			28.8			43.9	
Approach LOS		D			B			C			D	
Queue Length 50th (m)	64.1	11.7	11.4	6.3	8.9		25.2	141.5		2.2	80.4	9.8
Queue Length 95th (m)	84.7	19.3	27.1	12.2	19.1		#70.2	#293.3		m3.6	#147.2	m15.9
Internal Link Dist (m)		1246.0			796.0			547.8			406.9	
Turn Bay Length (m)	65.0		60.0	40.0			145.0			125.0		70.0
Base Capacity (vph)	535	807	728	548	778		414	1849		145	1151	538
Starvation Cap Reductn	0	0	0	0	0		0	0		0	0	0
Spillback Cap Reductn	0	0	0	0	0		0	0		0	0	0
Storage Cap Reductn	0	0	0	0	0		0	0		0	0	0
Reduced v/c Ratio	0.52	0.08	0.29	0.06	0.13		0.57	0.84		0.10	0.79	0.22

Intersection Summary

Cycle Length: 120	
Actuated Cycle Length: 120	
Offset: 0 (0%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green	
Natural Cycle: 110	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.84	
Intersection Signal Delay: 33.9	Intersection LOS: C
Intersection Capacity Utilization 88.0%	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.
m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 31: Terry Fox & Maple Grove



Intersection	
Int Delay, s/veh	5.4

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	0	30	0	0	5	10	0	0	0	0	0	75
Future Vol, veh/h	0	30	0	0	5	10	0	0	0	0	0	75
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	0	-	-	0
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	100	100	100	100	100	100	100	100	100	100	100	100
Heavy Vehicles, %	0	0	0	0	0	0	0	0	0	0	0	0
Mvmt Flow	0	30	0	0	5	10	0	0	0	0	0	75

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	-	0	0	-	-	0	-	-	30	-	-	10
Stage 1	-	-	-	-	-	-	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-	-	-	-	-	-	-
Critical Hdwy	-	-	-	-	-	-	-	-	6.2	-	-	6.2
Critical Hdwy Stg 1	-	-	-	-	-	-	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-	-	-	-	-	-	-
Follow-up Hdwy	-	-	-	-	-	-	-	-	3.3	-	-	3.3
Pot Cap-1 Maneuver	0	-	-	0	-	-	0	0	1050	0	0	1077
Stage 1	0	-	-	0	-	-	0	0	-	0	0	-
Stage 2	0	-	-	0	-	-	0	0	-	0	0	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	-	-	-	-	-	-	-	-	1050	-	-	1077
Mov Cap-2 Maneuver	-	-	-	-	-	-	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0	0	0	8.6
HCM LOS			A	A

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBT	WBR	SBLn1
Capacity (veh/h)	-	-	-	-	-	1077
HCM Lane V/C Ratio	-	-	-	-	-	0.07
HCM Control Delay (s)	0	-	-	-	-	8.6
HCM Lane LOS	A	-	-	-	-	A
HCM 95th %tile Q(veh)	-	-	-	-	-	0.2

Intersection	
Int Delay, s/veh	1.8

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	30	40	1035	5	15	525
Future Vol, veh/h	30	40	1035	5	15	525
Conflicting Peds, #/hr	5	5	0	5	5	0
Sign Control	Stop	Stop	Free	Free	Free	Free
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, %	0	0	1	0	0	3
Mvmt Flow	30	40	1035	5	15	525

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	1603	1048	0	0	1045	0
Stage 1	1043	-	-	-	-	-
Stage 2	560	-	-	-	-	-
Critical Hdwy	6.4	6.2	-	-	4.1	-
Critical Hdwy Stg 1	5.4	-	-	-	-	-
Critical Hdwy Stg 2	5.4	-	-	-	-	-
Follow-up Hdwy	3.5	3.3	-	-	2.2	-
Pot Cap-1 Maneuver	117	279	-	-	673	-
Stage 1	342	-	-	-	-	-
Stage 2	576	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	112	277	-	-	670	-
Mov Cap-2 Maneuver	112	-	-	-	-	-
Stage 1	341	-	-	-	-	-
Stage 2	555	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	40.3	0	0.3
HCM LOS	E		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	170	670	-
HCM Lane V/C Ratio	-	-	0.412	0.022	-
HCM Control Delay (s)	-	-	40.3	10.5	0
HCM Lane LOS	-	-	E	B	A
HCM 95th %tile Q(veh)	-	-	1.8	0.1	-

Intersection	
Int Delay, s/veh	2.7

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		⇕			⇕			⇕			⇕	
Traffic Vol, veh/h	5	370	5	185	195	5	10	0	25	0	0	5
Future Vol, veh/h	5	370	5	185	195	5	10	0	25	0	0	5
Conflicting Peds, #/hr	5	0	0	0	0	5	0	0	0	5	0	5
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	100	100	100	100	100	100	100	100	100	100	100	100
Heavy Vehicles, %	0	2	0	0	3	0	0	0	0	0	0	0
Mvmt Flow	5	370	5	185	195	5	10	0	25	0	0	5

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	205	0	0	375	0	0	958	958	378	973	958	208
Stage 1	-	-	-	-	-	-	383	383	-	573	573	-
Stage 2	-	-	-	-	-	-	575	575	-	400	385	-
Critical Hdwy	4.1	-	-	4.1	-	-	7.1	6.5	6.2	7.1	6.5	6.2
Critical Hdwy Stg 1	-	-	-	-	-	-	6.1	5.5	-	6.1	5.5	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.1	5.5	-	6.1	5.5	-
Follow-up Hdwy	2.2	-	-	2.2	-	-	3.5	4	3.3	3.5	4	3.3
Pot Cap-1 Maneuver	1378	-	-	1195	-	-	239	259	673	233	259	837
Stage 1	-	-	-	-	-	-	644	616	-	508	507	-
Stage 2	-	-	-	-	-	-	507	506	-	630	614	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1372	-	-	1195	-	-	204	212	670	192	212	830
Mov Cap-2 Maneuver	-	-	-	-	-	-	204	212	-	192	212	-
Stage 1	-	-	-	-	-	-	641	613	-	503	417	-
Stage 2	-	-	-	-	-	-	414	416	-	601	611	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0.1	4.1	14.7	9.4
HCM LOS			B	A

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	405	1372	-	-	1195	-	-	830
HCM Lane V/C Ratio	0.086	0.004	-	-	0.155	-	-	0.006
HCM Control Delay (s)	14.7	7.6	0	-	8.6	0	-	9.4
HCM Lane LOS	B	A	A	-	A	A	-	A
HCM 95th %tile Q(veh)	0.3	0	-	-	0.5	-	-	0

Intersection	
Int Delay, s/veh	2.2

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	65	330	345	25	50	35
Future Vol, veh/h	65	330	345	25	50	35
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	100	100	100	100	100	100
Heavy Vehicles, %	0	2	2	0	0	0
Mvmt Flow	65	330	345	25	50	35

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	370	0	-	0	818	358
Stage 1	-	-	-	-	358	-
Stage 2	-	-	-	-	460	-
Critical Hdwy	4.1	-	-	-	6.4	6.2
Critical Hdwy Stg 1	-	-	-	-	5.4	-
Critical Hdwy Stg 2	-	-	-	-	5.4	-
Follow-up Hdwy	2.2	-	-	-	3.5	3.3
Pot Cap-1 Maneuver	1200	-	-	-	348	691
Stage 1	-	-	-	-	712	-
Stage 2	-	-	-	-	640	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1200	-	-	-	325	691
Mov Cap-2 Maneuver	-	-	-	-	325	-
Stage 1	-	-	-	-	665	-
Stage 2	-	-	-	-	640	-

Approach	EB	WB	SB
HCM Control Delay, s	1.3	0	15.9
HCM LOS			C

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1200	-	-	-	416
HCM Lane V/C Ratio	0.054	-	-	-	0.204
HCM Control Delay (s)	8.2	0	-	-	15.9
HCM Lane LOS	A	A	-	-	C
HCM 95th %tile Q(veh)	0.2	-	-	-	0.8

Intersection	
Int Delay, s/veh	1.6

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	10	75	925	65	45	560
Future Vol, veh/h	10	75	925	65	45	560
Conflicting Peds, #/hr	5	5	0	5	5	0
Sign Control	Stop	Stop	Free	Free	Free	Free
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, %	0	0	1	0	0	3
Mvmt Flow	10	75	925	65	45	560

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	1618	968	0	0	995	0
Stage 1	963	-	-	-	-	-
Stage 2	655	-	-	-	-	-
Critical Hdwy	6.4	6.2	-	-	4.1	-
Critical Hdwy Stg 1	5.4	-	-	-	-	-
Critical Hdwy Stg 2	5.4	-	-	-	-	-
Follow-up Hdwy	3.5	3.3	-	-	2.2	-
Pot Cap-1 Maneuver	115	311	-	-	703	-
Stage 1	374	-	-	-	-	-
Stage 2	521	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	104	308	-	-	700	-
Mov Cap-2 Maneuver	104	-	-	-	-	-
Stage 1	373	-	-	-	-	-
Stage 2	470	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	26.6	0	0.8
HCM LOS	D		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	250	700	-
HCM Lane V/C Ratio	-	-	0.34	0.064	-
HCM Control Delay (s)	-	-	26.6	10.5	0
HCM Lane LOS	-	-	D	B	A
HCM 95th %tile Q(veh)	-	-	1.4	0.2	-

Intersection	
Intersection Delay, s/veh	12.1
Intersection LOS	B

Approach	EB	WB	NB	SB
Entry Lanes	1	1	1	1
Conflicting Circle Lanes	1	1	1	1
Adj Approach Flow, veh/h	75	45	725	535
Demand Flow Rate, veh/h	82	47	754	551
Vehicles Circulating, veh/h	582	759	47	52
Vehicles Exiting, veh/h	21	42	617	754
Follow-Up Headway, s	3.186	3.186	3.186	3.186
Ped Vol Crossing Leg, #/h	5	5	5	5
Ped Cap Adj	0.999	0.999	0.999	0.999
Approach Delay, s/veh	7.8	8.3	14.6	9.6
Approach LOS	A	A	B	A

Lane	Left	Left	Left	Left
Designated Moves	LTR	LTR	LTR	LTR
Assumed Moves	LTR	LTR	LTR	LTR
RT Channelized				
Lane Util	1.000	1.000	1.000	1.000
Critical Headway, s	5.193	5.193	5.193	5.193
Entry Flow, veh/h	82	47	754	551
Cap Entry Lane, veh/h	631	529	1078	1073
Entry HV Adj Factor	0.915	0.950	0.961	0.971
Flow Entry, veh/h	75	45	725	535
Cap Entry, veh/h	577	502	1035	1041
V/C Ratio	0.130	0.089	0.700	0.514
Control Delay, s/veh	7.8	8.3	14.6	9.6
LOS	A	A	B	A
95th %tile Queue, veh	0	0	6	3

Intersection	
Intersection Delay, s/veh	7.5
Intersection LOS	A

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	65	0	5	0	5	0
Future Vol, veh/h	65	0	5	0	5	0
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Heavy Vehicles, %	0	0	0	0	0	0
Mvmt Flow	65	0	5	0	5	0
Number of Lanes	1	0	1	0	0	1

Approach	WB	NB	SB
Opposing Approach		SB	NB
Opposing Lanes	0	1	1
Conflicting Approach Left	NB		WB
Conflicting Lanes Left	1	0	1
Conflicting Approach Right	SB	WB	
Conflicting Lanes Right	1	1	0
HCM Control Delay	7.5	7.1	7.3
HCM LOS	A	A	A

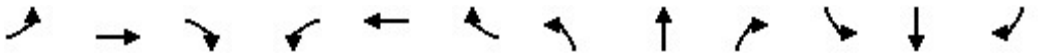
Lane	NBLn1	WBLn1	SBLn1
Vol Left, %	0%	100%	100%
Vol Thru, %	100%	0%	0%
Vol Right, %	0%	0%	0%
Sign Control	Stop	Stop	Stop
Traffic Vol by Lane	5	65	5
LT Vol	0	65	5
Through Vol	5	0	0
RT Vol	0	0	0
Lane Flow Rate	5	65	5
Geometry Grp	1	1	1
Degree of Util (X)	0.006	0.074	0.006
Departure Headway (Hd)	4.018	4.116	4.218
Convergence, Y/N	Yes	Yes	Yes
Cap	889	874	847
Service Time	2.051	2.123	2.251
HCM Lane V/C Ratio	0.006	0.074	0.006
HCM Control Delay	7.1	7.5	7.3
HCM Lane LOS	A	A	A
HCM 95th-tile Q	0	0.2	0

Intersection	
Intersection Delay, s/veh	7.4
Intersection LOS	A

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	20	0	10	10	65	5	0	5	0	30	10	30
Future Vol, veh/h	20	0	10	10	65	5	0	5	0	30	10	30
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Heavy Vehicles, %	0	0	0	0	0	0	0	0	0	0	0	0
Mvmt Flow	20	0	10	10	65	5	0	5	0	30	10	30
Number of Lanes	0	1	0	0	1	0	0	1	0	0	1	0

Approach	EB	WB	NB	SB
Opposing Approach	WB	EB	SB	NB
Opposing Lanes	1	1	1	1
Conflicting Approach 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	7.2	7.5	7.2	7.3
HCM LOS	A	A	A	A

Lane	NBLn1	EBLn1	WBLn1	SBLn1
Vol Left, %	0%	67%	12%	43%
Vol Thru, %	100%	0%	81%	14%
Vol Right, %	0%	33%	6%	43%
Sign Control	Stop	Stop	Stop	Stop
Traffic Vol by Lane	5	30	80	70
LT Vol	0	20	10	30
Through Vol	5	0	65	10
RT Vol	0	10	5	30
Lane Flow Rate	5	30	80	70
Geometry Grp	1	1	1	1
Degree of Util (X)	0.006	0.034	0.09	0.076
Departure Headway (Hd)	4.145	4.024	4.04	3.923
Convergence, Y/N	Yes	Yes	Yes	Yes
Cap	855	884	884	907
Service Time	2.209	2.072	2.077	1.974
HCM Lane V/C Ratio	0.006	0.034	0.09	0.077
HCM Control Delay	7.2	7.2	7.5	7.3
HCM Lane LOS	A	A	A	A
HCM 95th-tile Q	0	0.1	0.3	0.2



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	250	800	150	400	1250	310	170	395	300	210	500	480
Future Volume (vph)	250	800	150	400	1250	310	170	395	300	210	500	480
Confl. Peds. (#/hr)	5		5	5		5	5		5	5		5
Confl. Bikes (#/hr)												
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
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	0%	1%	2%	1%	1%	0%	6%	1%	1%	1%	2%	1%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%			0%	
Shared Lane Traffic (%)												
Lane Group Flow (vph)	250	950	0	400	1250	310	170	395	300	210	500	480
Turn Type	Prot	NA		Prot	NA	Perm	pm+pt	NA	Perm	pm+pt	NA	pm+ov
Protected Phases	5	2		1	6		3	8		7	4	5
Permitted Phases						6	8		8	4		4
Detector Phase	5	2		1	6	6	3	8	8	7	4	5
Switch Phase												
Minimum Initial (s)	5.0	10.0		5.0	10.0	10.0	5.0	10.0	10.0	5.0	10.0	5.0
Minimum Split (s)	10.6	36.6		10.6	36.6	36.6	8.0	38.3	38.3	8.0	38.3	10.6
Total Split (s)	14.0	44.0		22.0	52.0	52.0	11.0	40.0	40.0	14.0	43.0	14.0
Total Split (%)	11.7%	36.7%		18.3%	43.3%	43.3%	9.2%	33.3%	33.3%	11.7%	35.8%	11.7%
Yellow Time (s)	3.6	3.6		3.6	3.6	3.6	3.0	3.3	3.3	3.0	3.3	3.6
All-Red Time (s)	2.0	2.0		2.0	2.0	2.0	0.0	2.0	2.0	0.0	2.0	2.0
Lost Time Adjust (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	5.6	5.6		5.6	5.6	5.6	3.0	5.3	5.3	3.0	5.3	5.6
Lead/Lag	Lead	Lag		Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag	Lead
Lead-Lag Optimize?	Yes	Yes		Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Recall Mode	None	C-Max		None	C-Max	C-Max	None	None	None	None	None	None
Act Effct Green (s)	9.8	39.8		16.5	46.4	46.4	43.6	33.3	33.3	49.6	36.3	45.8
Actuated g/C Ratio	0.08	0.33		0.14	0.39	0.39	0.36	0.28	0.28	0.41	0.30	0.38
v/c Ratio	0.92	0.86		0.89	0.95	0.41	0.97	0.80	0.50	0.77	0.94	0.76
Control Delay	92.9	46.5		73.4	52.4	5.4	88.9	53.4	10.0	43.9	67.4	30.6
Queue Delay	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	92.9	46.5		73.4	52.4	5.4	88.9	53.4	10.0	43.9	67.4	30.6
LOS	F	D		E	D	A	F	D	B	D	E	C
Approach Delay		56.2			49.2			45.3			48.4	
Approach LOS		E			D			D			D	
Queue Length 50th (m)	~35.6	115.5		50.9	156.6	3.1	26.6	89.4	8.4	33.6	118.4	75.0
Queue Length 95th (m)	#62.9	#153.6		#79.1	#205.5	22.2	#68.7	#129.1	33.4	#61.3	#182.5	115.8
Internal Link Dist (m)		871.0			1427.4			1305.6			301.9	
Turn Bay Length (m)	50.0			90.0		225.0	30.0		60.0	50.0		275.0
Base Capacity (vph)	272	1103		452	1309	759	175	515	611	273	554	633
Starvation Cap Reductn	0	0		0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0		0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0		0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.92	0.86		0.88	0.95	0.41	0.97	0.77	0.49	0.77	0.90	0.76

Intersection Summary

Cycle Length: 120
Actuated Cycle Length: 120
Offset: 0 (0%), Referenced to phase 2:EBT and 6:WBT, Start of Green
Natural Cycle: 105
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.97
Intersection Signal Delay: 50.0 Intersection LOS: D
Intersection Capacity Utilization 98.8% ICU Level of Service F
Analysis Period (min) 15
~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

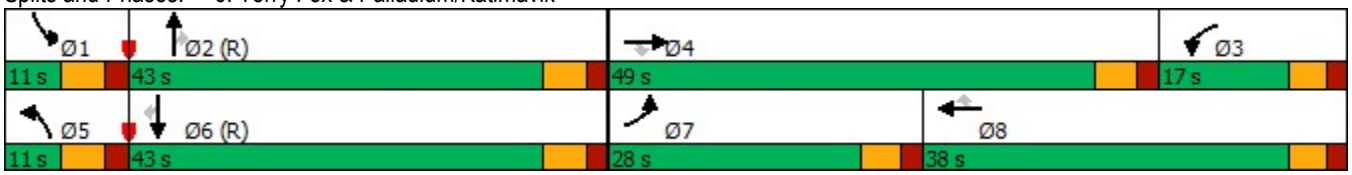
Splits and Phases: 3: Iber/Huntmar & Hazeldean

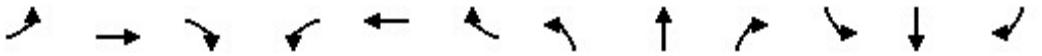
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	850	260	405	135	185	150	250	1165	100	125	1380	715
Future Volume (vph)	850	260	405	135	185	150	250	1165	100	125	1380	715
Confl. Peds. (#/hr)	5		5	5		5	5		5	5		5
Confl. Bikes (#/hr)												
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
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	0%	0%	1%	5%	2%	0%	0%	2%	4%	0%	1%	0%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%			0%	
Shared Lane Traffic (%)												
Lane Group Flow (vph)	850	260	405	135	185	150	250	1165	100	125	1380	715
Turn Type	Prot	NA	Perm	Prot	NA	Perm	Prot	NA	Perm	Prot	NA	Perm
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases			4			8			2			6
Detector Phase	7	4	4	3	8	8	5	2	2	1	6	6
Switch Phase												
Minimum Initial (s)	5.0	10.0	10.0	5.0	10.0	10.0	5.0	10.0	10.0	5.0	10.0	10.0
Minimum Split (s)	10.6	37.6	37.6	10.3	37.3	37.3	11.0	38.0	38.0	11.0	38.0	38.0
Total Split (s)	28.0	49.0	49.0	17.0	38.0	38.0	11.0	43.0	43.0	11.0	43.0	43.0
Total Split (%)	23.3%	40.8%	40.8%	14.2%	31.7%	31.7%	9.2%	35.8%	35.8%	9.2%	35.8%	35.8%
Yellow Time (s)	3.6	3.6	3.6	3.3	3.3	3.3	4.0	4.0	4.0	4.0	4.0	4.0
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Lost Time Adjust (s)	-3.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-3.0	0.0
Total Lost Time (s)	2.6	5.6	5.6	5.3	5.3	5.3	6.0	6.0	6.0	6.0	3.0	6.0
Lead/Lag	Lead	Lead	Lead	Lag	Lag	Lag	Lead	Lag	Lag	Lead	Lag	Lag
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Recall Mode	None	None	None	None	None	None	None	C-Max	C-Max	None	C-Max	C-Max
Act Effct Green (s)	25.4	29.6	29.6	16.0	23.2	23.2	14.5	43.4	43.4	8.1	40.0	37.0
Actuated g/C Ratio	0.21	0.25	0.25	0.13	0.19	0.19	0.12	0.36	0.36	0.07	0.33	0.31
v/c Ratio	1.21	0.59	0.86	0.62	0.54	0.38	0.62	0.96	0.16	0.56	1.22	0.78
Control Delay	147.4	42.2	43.9	62.9	47.9	10.7	58.3	57.3	5.3	64.9	144.3	10.7
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	147.4	42.2	43.9	62.9	47.9	10.7	58.3	57.3	5.3	64.9	144.3	10.7
LOS	F	D	D	E	D	B	E	E	A	E	F	B
Approach Delay		101.7			40.3			54.0			96.8	
Approach LOS		F			D			D			F	
Queue Length 50th (m)	~132.9	54.3	60.9	31.8	41.3	3.4	33.4	~161.4	0.4	15.3	~221.4	9.0
Queue Length 95th (m)	#173.1	70.4	91.7	#65.2	59.4	19.6	m#65.9	#217.3	m3.8	#35.6	#265.9	57.9
Internal Link Dist (m)		1802.0			304.5			406.9			280.2	
Turn Bay Length (m)	100.0			115.0		115.0	240.0		115.0	70.0		190.0
Base Capacity (vph)	702	651	625	217	480	506	401	1213	635	224	1128	922
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	1.21	0.40	0.65	0.62	0.39	0.30	0.62	0.96	0.16	0.56	1.22	0.78

Intersection Summary

Cycle Length: 120
Actuated Cycle Length: 120
Offset: 0 (0%), Referenced to phase 2:NBT and 6:SBT, Start of Green, Master Intersection
Natural Cycle: 150
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 1.22
Intersection Signal Delay: 82.1 Intersection LOS: F
Intersection Capacity Utilization 102.3% ICU Level of Service G
Analysis Period (min) 15
~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.
m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 6: Terry Fox & Palladium/Katimavik



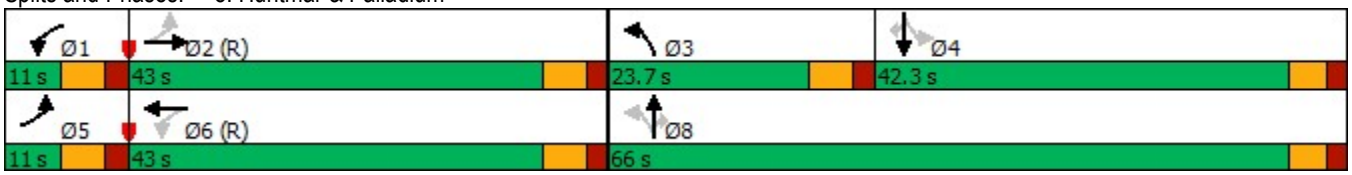


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	30	185	680	250	525	140	375	280	135	100	390	110
Future Volume (vph)	30	185	680	250	525	140	375	280	135	100	390	110
Confl. Peds. (#/hr)	5		5	5		5	5		5	5		5
Confl. Bikes (#/hr)												
Peak 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
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	11%	0%	0%	0%	0%	0%	1%	1%	0%	1%	2%	1%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%			0%	
Shared Lane Traffic (%)												
Lane Group Flow (vph)	30	865	0	250	665	0	375	280	135	100	390	110
Turn Type	pm+pt	NA		pm+pt	NA		pm+pt	NA	Perm	Perm	NA	Perm
Protected Phases	5	2		1	6		3	8			4	
Permitted Phases	2			6			8		8	4		4
Detector Phase	5	2		1	6		3	8	8	4	4	4
Switch Phase												
Minimum Initial (s)	5.0	10.0		5.0	10.0		4.0	10.0	10.0	10.0	10.0	10.0
Minimum Split (s)	11.0	43.0		11.0	43.0		10.0	42.3	42.3	42.3	42.3	42.3
Total Split (s)	11.0	43.0		11.0	43.0		23.7	66.0	66.0	42.3	42.3	42.3
Total Split (%)	9.2%	35.8%		9.2%	35.8%		19.8%	55.0%	55.0%	35.3%	35.3%	35.3%
Yellow Time (s)	4.0	4.0		4.0	4.0		4.0	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	2.0	2.0	2.0	2.0
Lost Time Adjust (s)	0.0	0.0		-3.0	0.0		-3.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	6.0	6.0		3.0	6.0		3.0	5.3	5.3	5.3	5.3	5.3
Lead/Lag	Lead	Lag		Lead	Lag		Lead			Lag	Lag	Lag
Lead-Lag Optimize?	Yes	Yes		Yes	Yes		Yes			Yes	Yes	Yes
Recall Mode	None	C-Max		None	C-Max		None	None	None	None	None	None
Act Effct Green (s)	42.9	37.0		55.7	46.8		57.1	54.8	54.8	31.1	31.1	31.1
Actuated g/C Ratio	0.36	0.31		0.46	0.39		0.48	0.46	0.46	0.26	0.26	0.26
v/c Ratio	0.12	0.88dr		0.88	0.51		0.92	0.34	0.18	0.37	0.85	0.23
Control Delay	22.4	20.4		59.8	39.3		53.3	21.6	3.2	39.1	59.9	3.9
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	22.4	20.4		59.8	39.3		53.3	21.6	3.2	39.1	59.9	3.9
LOS	C	C		E	D		D	C	A	D	E	A
Approach Delay		20.5			44.9			33.5			46.2	
Approach LOS		C			D			C			D	
Queue Length 50th (m)	4.1	48.3		50.6	79.0		60.1	43.2	0.0	20.2	91.5	0.0
Queue Length 95th (m)	10.9	73.1		m#102.0	103.6		#110.4	58.8	10.2	35.0	123.2	8.5
Internal Link Dist (m)		535.2			1802.0			357.2			231.7	
Turn Bay Length (m)	95.0			75.0			120.0		45.0	50.0		
Base Capacity (vph)	247	1221		283	1303		406	901	827	321	544	553
Starvation Cap Reductn	0	0		0	0		0	0	0	0	0	0
Spillback Cap Reductn	0	0		0	0		0	0	0	0	0	0
Storage Cap Reductn	0	0		0	0		0	0	0	0	0	0
Reduced v/c Ratio	0.12	0.71		0.88	0.51		0.92	0.31	0.16	0.31	0.72	0.20

Intersection Summary

Cycle Length: 120
Actuated Cycle Length: 120
Offset: 0 (0%), Referenced to phase 2:EBTL and 6:WBTL, Start of Green
Natural Cycle: 110
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.92
Intersection Signal Delay: 35.5 Intersection LOS: D
Intersection Capacity Utilization 106.5% ICU Level of Service G
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.
dr Defacto Right Lane. Recode with 1 though lane as a right lane.

Splits and Phases: 8: Huntmar & Palladium



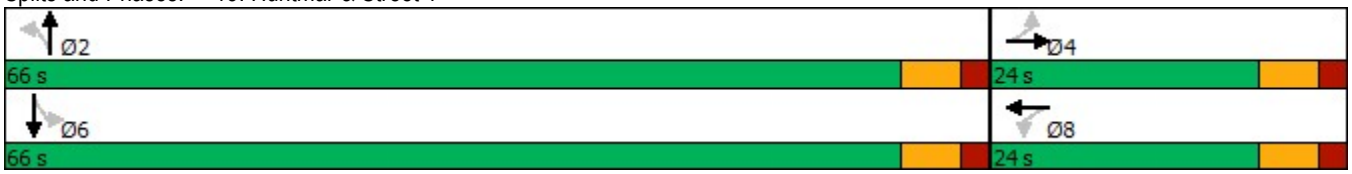
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	40	0	10	40	0	45	35	830	15	65	1215	10
Future Volume (vph)	40	0	10	40	0	45	35	830	15	65	1215	10
Confl. Peds. (#/hr)				5		5			5	5		
Confl. Bikes (#/hr)												
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%	0%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%			0%	
Shared Lane Traffic (%)												
Lane Group Flow (vph)	40	10	0	40	45	0	35	845	0	65	1225	0
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2			6		
Detector Phase	4	4		8	8		2	2		6	6	
Switch Phase												
Minimum Initial (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Minimum Split (s)	24.0	24.0		24.0	24.0		24.0	24.0		24.0	24.0	
Total Split (s)	24.0	24.0		24.0	24.0		66.0	66.0		66.0	66.0	
Total Split (%)	26.7%	26.7%		26.7%	26.7%		73.3%	73.3%		73.3%	73.3%	
Yellow Time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
All-Red Time (s)	2.0	2.0		2.0	2.0		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	6.0		6.0	6.0		6.0	6.0		6.0	6.0	
Lead/Lag												
Lead-Lag Optimize?												
Recall Mode	None	None		None	None		Min	Min		Min	Min	
Act Effct Green (s)	9.5	9.5		9.5	9.5		69.4	69.4		69.4	69.4	
Actuated g/C Ratio	0.11	0.11		0.11	0.11		0.80	0.80		0.80	0.80	
v/c Ratio	0.28	0.04		0.28	0.13		0.22	0.59		0.16	0.86	
Control Delay	39.0	0.3		38.7	0.8		8.8	7.7		5.2	18.1	
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay	39.0	0.3		38.7	0.8		8.8	7.7		5.2	18.1	
LOS	D	A		D	A		A	A		A	B	
Approach Delay		31.2			18.6			7.8			17.5	
Approach LOS		C			B			A			B	
Queue Length 50th (m)	6.8	0.0		6.8	0.0		1.3	49.6		2.3	122.3	
Queue Length 95th (m)	15.0	0.0		15.0	0.0		8.3	129.6		9.7	#321.9	
Internal Link Dist (m)		14.0			122.1			53.9			0.1	
Turn Bay Length (m)	30.0			30.0			30.0			30.0		
Base Capacity (vph)	271	393		276	473		158	1429		411	1418	
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	0.15	0.03		0.14	0.10		0.22	0.59		0.16	0.86	

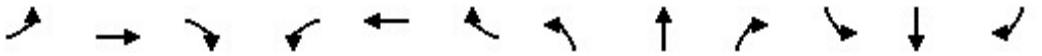
Intersection Summary

Cycle Length: 90	
Actuated Cycle Length: 87.1	
Natural Cycle: 90	
Control Type: Actuated-Uncoordinated	
Maximum v/c Ratio: 0.86	
Intersection Signal Delay: 14.1	Intersection LOS: B
Intersection Capacity Utilization 88.1%	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: 13: Huntmar & Street 1



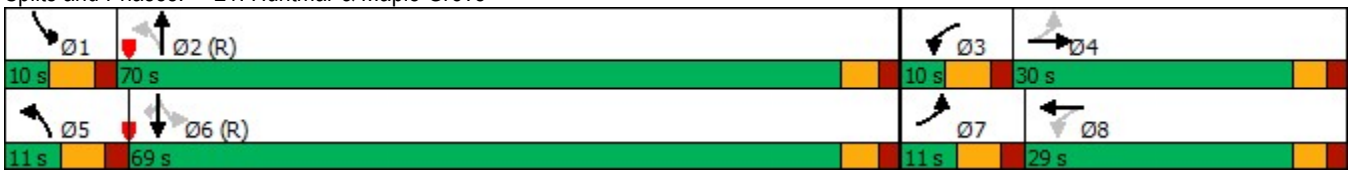


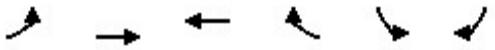
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	130	130	85	180	210	80	125	660	145	110	940	285
Future Volume (vph)	130	130	85	180	210	80	125	660	145	110	940	285
Confl. Peds. (#/hr)	5		5	5		5	5		5	5		5
Confl. Bikes (#/hr)												
Peak 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
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	0%	1%	0%	0%	0%	0%	2%	1%	0%	0%	1%	0%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%			0%	
Shared Lane Traffic (%)												
Lane Group Flow (vph)	130	215	0	180	290	0	125	805	0	110	940	285
Turn Type	pm+pt	NA		pm+pt	NA		pm+pt	NA		pm+pt	NA	Perm
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases	4			8			2			6		6
Detector Phase	7	4		3	8		5	2		1	6	6
Switch Phase												
Minimum Initial (s)	4.0	10.0		4.0	10.0		4.0	10.0		4.0	10.0	10.0
Minimum Split (s)	10.0	29.0		10.0	29.0		10.0	25.3		10.0	25.3	25.3
Total Split (s)	11.0	30.0		10.0	29.0		11.0	70.0		10.0	69.0	69.0
Total Split (%)	9.2%	25.0%		8.3%	24.2%		9.2%	58.3%		8.3%	57.5%	57.5%
Yellow Time (s)	4.0	3.0		4.0	3.0		4.0	3.3		4.0	3.3	3.3
All-Red Time (s)	2.0	2.0		2.0	2.0		2.0	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	0.0
Total Lost Time (s)	6.0	5.0		6.0	5.0		6.0	5.3		6.0	5.3	5.3
Lead/Lag	Lead	Lag		Lead	Lag		Lead	Lag		Lead	Lag	Lag
Lead-Lag Optimize?	Yes	Yes		Yes			Yes	Yes		Yes	Yes	Yes
Recall Mode	None	None		None	None		None	C-Max		None	C-Max	C-Max
Act Effct Green (s)	27.3	23.3		25.3	22.3		71.6	65.6		67.8	63.7	63.7
Actuated g/C Ratio	0.23	0.19		0.21	0.19		0.60	0.55		0.56	0.53	0.53
v/c Ratio	0.92	0.63		0.94	0.88		0.83	0.45		0.32	0.99	0.34
Control Delay	96.3	47.5		94.3	72.4		62.7	16.7		12.5	56.7	9.7
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	0.0
Total Delay	96.3	47.5		94.3	72.4		62.7	16.7		12.5	56.7	9.7
LOS	F	D		F	E		E	B		B	E	A
Approach Delay		65.9			80.8			22.8			43.0	
Approach LOS		E			F			C			D	
Queue Length 50th (m)	25.0	42.8		35.8	66.3		16.1	58.6		10.5	222.6	19.8
Queue Length 95th (m)	#60.3	69.4		#77.5	#112.1		#57.1	74.6		18.3	#320.3	38.2
Internal Link Dist (m)		630.5			86.3			293.1			175.1	
Turn Bay Length (m)							20.0					30.0
Base Capacity (vph)	142	366		191	353		151	1808		347	945	843
Starvation Cap Reductn	0	0		0	0		0	0		0	0	0
Spillback Cap Reductn	0	0		0	0		0	0		0	0	0
Storage Cap Reductn	0	0		0	0		0	0		0	0	0
Reduced v/c Ratio	0.92	0.59		0.94	0.82		0.83	0.45		0.32	0.99	0.34

Intersection Summary

Cycle Length: 120
Actuated Cycle Length: 120
Offset: 0 (0%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green
Natural Cycle: 120
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.99
Intersection Signal Delay: 45.2 Intersection LOS: D
Intersection Capacity Utilization 103.1% ICU Level of Service G
Analysis Period (min) 15
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 21: Huntmar & Maple Grove



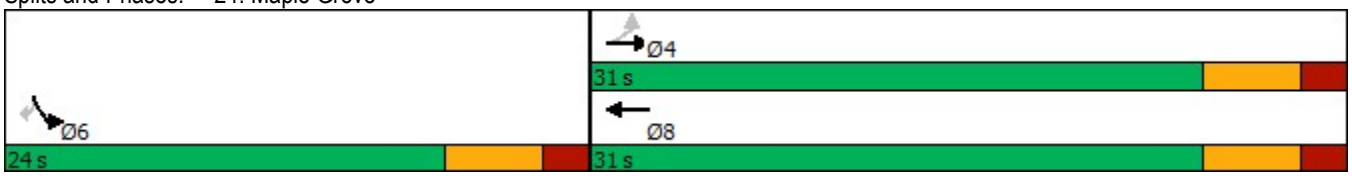


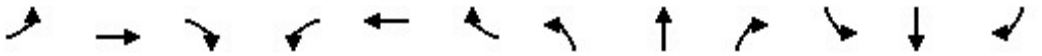
Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	15	400	480	50	20	5
Future Volume (vph)	15	400	480	50	20	5
Confl. Peds. (#/hr)						
Confl. Bikes (#/hr)						
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Growth Factor	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	0%	0%	2%	0%	0%	0%
Bus Blockages (#/hr)	0	0	0	0	0	0
Parking (#/hr)						
Mid-Block Traffic (%)		0%	0%		0%	
Shared Lane Traffic (%)						
Lane Group Flow (vph)	15	400	530	0	20	5
Turn Type	Perm	NA	NA		Prot	Perm
Protected Phases		4	8		6	
Permitted Phases	4					6
Detector Phase	4	4	8		6	6
Switch Phase						
Minimum Initial (s)	4.0	4.0	4.0		4.0	4.0
Minimum Split (s)	24.0	24.0	24.0		24.0	24.0
Total Split (s)	31.0	31.0	31.0		24.0	24.0
Total Split (%)	56.4%	56.4%	56.4%		43.6%	43.6%
Yellow Time (s)	4.0	4.0	4.0		4.0	4.0
All-Red Time (s)	2.0	2.0	2.0		2.0	2.0
Lost Time Adjust (s)	0.0	0.0	0.0		0.0	0.0
Total Lost Time (s)	6.0	6.0	6.0		6.0	6.0
Lead/Lag						
Lead-Lag Optimize?						
Recall Mode	None	None	None		Min	Min
Act Effct Green (s)	15.2	15.2	15.2		7.7	7.7
Actuated g/C Ratio	0.43	0.43	0.43		0.22	0.22
v/c Ratio	0.05	0.52	0.71		0.05	0.01
Control Delay	7.3	10.8	14.7		12.6	8.6
Queue Delay	0.0	0.0	0.0		0.0	0.0
Total Delay	7.3	10.8	14.7		12.6	8.6
LOS	A	B	B		B	A
Approach Delay		10.7	14.7		11.8	
Approach LOS		B	B		B	
Queue Length 50th (m)	0.4	13.6	19.5		0.9	0.0
Queue Length 95th (m)	3.5	47.9	69.2		5.2	1.9
Internal Link Dist (m)		80.8	1246.0		337.3	
Turn Bay Length (m)	15.0				15.0	
Base Capacity (vph)	535	1342	1304		918	824
Starvation Cap Reductn	0	0	0		0	0
Spillback Cap Reductn	0	0	0		0	0
Storage Cap Reductn	0	0	0		0	0
Reduced v/c Ratio	0.03	0.30	0.41		0.02	0.01

Intersection Summary

Cycle Length: 55	
Actuated Cycle Length: 35.7	
Natural Cycle: 50	
Control Type: Actuated-Uncoordinated	
Maximum v/c Ratio: 0.71	
Intersection Signal Delay: 12.9	Intersection LOS: B
Intersection Capacity Utilization 43.2%	ICU Level of Service A
Analysis Period (min) 15	

Splits and Phases: 24: Maple Grove



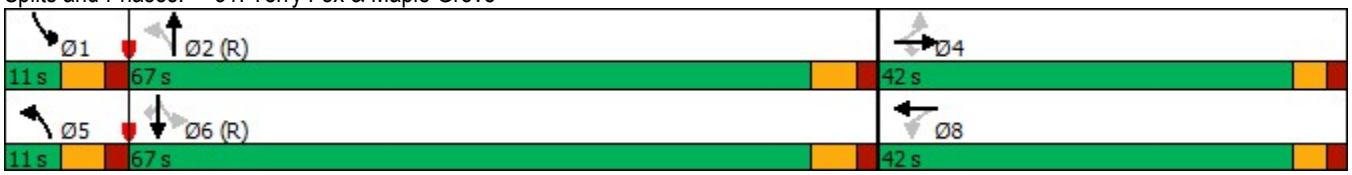


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	195	70	385	20	70	45	255	1535	50	70	2030	200
Future Volume (vph)	195	70	385	20	70	45	255	1535	50	70	2030	200
Confl. Peds. (#/hr)	5		5	5		5	5		5	5		5
Confl. Bikes (#/hr)												
Peak Hour 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
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	2%	0%	1%	0%	0%	0%	2%	2%	0%	0%	1%	3%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%			0%	
Shared Lane Traffic (%)												
Lane Group Flow (vph)	195	70	385	20	115	0	255	1585	0	70	2030	200
Turn Type	Perm	NA	Perm	Perm	NA		pm+pt	NA		pm+pt	NA	Perm
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4		4	8			2			6		6
Detector Phase	4	4	4	8	8		5	2		1	6	6
Switch Phase												
Minimum Initial (s)	10.0	10.0	10.0	10.0	10.0		5.0	10.0		5.0	10.0	10.0
Minimum Split (s)	42.0	42.0	42.0	42.0	42.0		11.0	43.0		11.0	43.0	43.0
Total Split (s)	42.0	42.0	42.0	42.0	42.0		11.0	67.0		11.0	67.0	67.0
Total Split (%)	35.0%	35.0%	35.0%	35.0%	35.0%		9.2%	55.8%		9.2%	55.8%	55.8%
Yellow Time (s)	3.0	3.0	3.0	3.0	3.0		4.0	4.0		4.0	4.0	4.0
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0		2.0	2.0		2.0	2.0	2.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0		-3.0	0.0		0.0	-3.0	0.0
Total Lost Time (s)	5.0	5.0	5.0	5.0	5.0		3.0	6.0		6.0	3.0	6.0
Lead/Lag							Lead	Lag		Lead	Lag	Lag
Lead-Lag Optimize?							Yes	Yes		Yes	Yes	Yes
Recall Mode	None	None	None	None	None		None	C-Max		None	C-Max	C-Max
Act Effct Green (s)	30.0	30.0	30.0	30.0	30.0		80.8	69.3		67.1	64.0	61.0
Actuated g/C Ratio	0.25	0.25	0.25	0.25	0.25		0.67	0.58		0.56	0.53	0.51
v/c Ratio	0.68	0.16	0.88	0.06	0.26		0.95	0.82		0.45	1.12	0.25
Control Delay	51.7	33.5	54.2	31.4	26.7		79.9	27.4		22.0	77.1	2.8
Queue Delay	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	0.0
Total Delay	51.7	33.5	54.2	31.4	26.7		79.9	27.4		22.0	77.1	2.8
LOS	D	C	D	C	C		E	C		C	E	A
Approach Delay		51.2			27.4			34.7			68.9	
Approach LOS		D			C			C			E	
Queue Length 50th (m)	43.0	13.3	71.8	3.7	16.8		~52.3	175.9		4.3	~305.3	2.2
Queue Length 95th (m)	65.9	24.2	106.5	9.7	31.0		#128.4	#244.6		m7.4	m#262.8	m2.2
Internal Link Dist (m)		1246.0			796.0			547.8			406.9	
Turn Bay Length (m)	65.0		60.0	40.0			145.0			125.0		70.0
Base Capacity (vph)	356	555	519	392	538		268	1926		156	1805	788
Starvation Cap Reductn	0	0	0	0	0		0	0		0	0	0
Spillback Cap Reductn	0	0	0	0	0		0	0		0	0	0
Storage Cap Reductn	0	0	0	0	0		0	0		0	0	0
Reduced v/c Ratio	0.55	0.13	0.74	0.05	0.21		0.95	0.82		0.45	1.12	0.25

Intersection Summary

Cycle Length: 120
Actuated Cycle Length: 120
Offset: 0 (0%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green
Natural Cycle: 150
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 1.12
Intersection Signal Delay: 52.7 Intersection LOS: D
Intersection Capacity Utilization 105.7% ICU Level of Service G
Analysis Period (min) 15
~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.
m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 31: Terry Fox & Maple Grove



Intersection	
Int Delay, s/veh	3.3

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	0	25	0	0	15	50	0	0	0	0	0	55
Future Vol, veh/h	0	25	0	0	15	50	0	0	0	0	0	55
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	0	-	-	0
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	100	100	100	100	100	100	100	100	100	100	100	100
Heavy Vehicles, %	0	0	0	0	0	0	0	0	0	0	0	0
Mvmt Flow	0	25	0	0	15	50	0	0	0	0	0	55

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	-	0	0	-	-	0	-	-	25	-	-	40
Stage 1	-	-	-	-	-	-	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-	-	-	-	-	-	-
Critical Hdwy	-	-	-	-	-	-	-	-	6.2	-	-	6.2
Critical Hdwy Stg 1	-	-	-	-	-	-	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-	-	-	-	-	-	-
Follow-up Hdwy	-	-	-	-	-	-	-	-	3.3	-	-	3.3
Pot Cap-1 Maneuver	0	-	-	0	-	-	0	0	1057	0	0	1037
Stage 1	0	-	-	0	-	-	0	0	-	0	0	-
Stage 2	0	-	-	0	-	-	0	0	-	0	0	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	-	-	-	-	-	-	-	-	1057	-	-	1037
Mov Cap-2 Maneuver	-	-	-	-	-	-	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0	0	0	8.7
HCM LOS			A	A

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBT	WBR	SBLn1
Capacity (veh/h)	-	-	-	-	-	1037
HCM Lane V/C Ratio	-	-	-	-	-	0.053
HCM Control Delay (s)	0	-	-	-	-	8.7
HCM Lane LOS	A	-	-	-	-	A
HCM 95th %tile Q(veh)	-	-	-	-	-	0.2

Intersection	
Int Delay, s/veh	3.3

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	20	35	880	30	55	1265
Future Vol, veh/h	20	35	880	30	55	1265
Conflicting Peds, #/hr	5	5	0	5	5	0
Sign Control	Stop	Stop	Free	Free	Free	Free
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, %	0	0	0	0	0	1
Mvmt Flow	20	35	880	30	55	1265

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	2280	905	0	0	915	0
Stage 1	900	-	-	-	-	-
Stage 2	1380	-	-	-	-	-
Critical Hdwy	6.4	6.2	-	-	4.1	-
Critical Hdwy Stg 1	5.4	-	-	-	-	-
Critical Hdwy Stg 2	5.4	-	-	-	-	-
Follow-up Hdwy	3.5	3.3	-	-	2.2	-
Pot Cap-1 Maneuver	44	338	-	-	754	-
Stage 1	400	-	-	-	-	-
Stage 2	236	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	33	335	-	-	751	-
Mov Cap-2 Maneuver	33	-	-	-	-	-
Stage 1	398	-	-	-	-	-
Stage 2	177	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	125.9	0	0.4
HCM LOS	F		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	77	751	-
HCM Lane V/C Ratio	-	-	0.714	0.073	-
HCM Control Delay (s)	-	-	125.9	10.2	0
HCM Lane LOS	-	-	F	B	A
HCM 95th %tile Q(veh)	-	-	3.4	0.2	-

Intersection	
Int Delay, s/veh	1.1

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		⇕			⇕			⇕			⇕	
Traffic Vol, veh/h	5	385	15	25	455	15	10	0	45	0	0	5
Future Vol, veh/h	5	385	15	25	455	15	10	0	45	0	0	5
Conflicting Peds, #/hr	5	0	0	0	0	5	0	0	0	5	0	5
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	100	100	100	100	100	100	100	100	100	100	100	100
Heavy Vehicles, %	0	0	6	4	3	0	0	0	2	0	0	0
Mvmt Flow	5	385	15	25	455	15	10	0	45	0	0	5

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	475	0	0	400	0	0	923	928	398	948	928	473
Stage 1	-	-	-	-	-	-	403	403	-	518	518	-
Stage 2	-	-	-	-	-	-	520	525	-	430	410	-
Critical Hdwy	4.1	-	-	4.14	-	-	7.1	6.5	6.22	7.1	6.5	6.2
Critical Hdwy Stg 1	-	-	-	-	-	-	6.1	5.5	-	6.1	5.5	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.1	5.5	-	6.1	5.5	-
Follow-up Hdwy	2.2	-	-	2.236	-	-	3.5	4	3.318	3.5	4	3.3
Pot Cap-1 Maneuver	1098	-	-	1148	-	-	252	270	652	243	270	595
Stage 1	-	-	-	-	-	-	628	603	-	544	536	-
Stage 2	-	-	-	-	-	-	543	533	-	607	599	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1093	-	-	1148	-	-	242	259	649	218	259	590
Mov Cap-2 Maneuver	-	-	-	-	-	-	242	259	-	218	259	-
Stage 1	-	-	-	-	-	-	624	599	-	539	518	-
Stage 2	-	-	-	-	-	-	520	515	-	559	595	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0.1	0.4	13.1	11.2
HCM LOS			B	B

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	497	1093	-	-	1148	-	-	590
HCM Lane V/C Ratio	0.111	0.005	-	-	0.022	-	-	0.008
HCM Control Delay (s)	13.1	8.3	0	-	8.2	0	-	11.2
HCM Lane LOS	B	A	A	-	A	A	-	B
HCM 95th %tile Q(veh)	0.4	0	-	-	0.1	-	-	0

Intersection	
Int Delay, s/veh	1.2

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	30	400	445	40	15	50
Future Vol, veh/h	30	400	445	40	15	50
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	100	100	100	100	100	100
Heavy Vehicles, %	0	0	3	0	0	0
Mvmt Flow	30	400	445	40	15	50

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	485	0	-	0	925	465
Stage 1	-	-	-	-	465	-
Stage 2	-	-	-	-	460	-
Critical Hdwy	4.1	-	-	-	6.4	6.2
Critical Hdwy Stg 1	-	-	-	-	5.4	-
Critical Hdwy Stg 2	-	-	-	-	5.4	-
Follow-up Hdwy	2.2	-	-	-	3.5	3.3
Pot Cap-1 Maneuver	1088	-	-	-	301	602
Stage 1	-	-	-	-	636	-
Stage 2	-	-	-	-	640	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1088	-	-	-	290	602
Mov Cap-2 Maneuver	-	-	-	-	290	-
Stage 1	-	-	-	-	614	-
Stage 2	-	-	-	-	640	-

Approach	EB	WB	SB
HCM Control Delay, s	0.6	0	13.6
HCM LOS			B

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1088	-	-	-	482
HCM Lane V/C Ratio	0.028	-	-	-	0.135
HCM Control Delay (s)	8.4	0	-	-	13.6
HCM Lane LOS	A	A	-	-	B
HCM 95th %tile Q(veh)	0.1	-	-	-	0.5

Intersection	
Int Delay, s/veh	0.4

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	5	20	860	10	5	1260
Future Vol, veh/h	5	20	860	10	5	1260
Conflicting Peds, #/hr	5	5	0	5	5	0
Sign Control	Stop	Stop	Free	Free	Free	Free
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, %	0	0	0	0	0	1
Mvmt Flow	5	20	860	10	5	1260

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	2145	875	0	0	875	0
Stage 1	870	-	-	-	-	-
Stage 2	1275	-	-	-	-	-
Critical Hdwy	6.4	6.2	-	-	4.1	-
Critical Hdwy Stg 1	5.4	-	-	-	-	-
Critical Hdwy Stg 2	5.4	-	-	-	-	-
Follow-up Hdwy	3.5	3.3	-	-	2.2	-
Pot Cap-1 Maneuver	54	351	-	-	780	-
Stage 1	413	-	-	-	-	-
Stage 2	265	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	52	348	-	-	777	-
Mov Cap-2 Maneuver	52	-	-	-	-	-
Stage 1	411	-	-	-	-	-
Stage 2	258	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	31	0	0
HCM LOS	D		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	163	777	-
HCM Lane V/C Ratio	-	-	0.153	0.006	-
HCM Control Delay (s)	-	-	31	9.7	0
HCM Lane LOS	-	-	D	A	A
HCM 95th %tile Q(veh)	-	-	0.5	0	-

Intersection	
Intersection Delay, s/veh	64.2
Intersection LOS	F

Approach	EB	WB	NB	SB
Entry Lanes	1	1	1	1
Conflicting Circle Lanes	1	1	1	1
Adj Approach Flow, veh/h	65	95	795	1125
Demand Flow Rate, veh/h	68	96	795	1137
Vehicles Circulating, veh/h	1187	785	42	151
Vehicles Exiting, veh/h	101	52	1213	730
Follow-Up Headway, s	3.186	3.186	3.186	3.186
Ped Vol Crossing Leg, #/h	5	5	5	5
Ped Cap Adj	1.000	0.999	0.999	0.999
Approach Delay, s/veh	14.6	9.6	15.6	106.0
Approach LOS	B	A	C	F

Lane	Left	Left	Left	Left
Designated Moves	LTR	LTR	LTR	LTR
Assumed Moves	LTR	LTR	LTR	LTR
RT Channelized				
Lane Util	1.000	1.000	1.000	1.000
Critical Headway, s	5.193	5.193	5.193	5.193
Entry Flow, veh/h	68	96	795	1137
Cap Entry Lane, veh/h	345	515	1083	972
Entry HV Adj Factor	0.953	0.990	1.000	0.990
Flow Entry, veh/h	65	95	795	1125
Cap Entry, veh/h	329	510	1083	961
V/C Ratio	0.197	0.186	0.734	1.171
Control Delay, s/veh	14.6	9.6	15.6	106.0
LOS	B	A	C	F
95th %tile Queue, veh	1	1	7	33

Intersection	
Intersection Delay, s/veh	7.4
Intersection LOS	A

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	55	0	25	0	15	0
Future Vol, veh/h	55	0	25	0	15	0
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Heavy Vehicles, %	0	0	0	0	0	0
Mvmt Flow	55	0	25	0	15	0
Number of Lanes	1	0	1	0	0	1

Approach	WB	NB	SB
Opposing Approach		SB	NB
Opposing Lanes	0	1	1
Conflicting Approach Left	NB		WB
Conflicting Lanes Left	1	0	1
Conflicting Approach Right	SB	WB	
Conflicting Lanes Right	1	1	0
HCM Control Delay	7.5	7.2	7.3
HCM LOS	A	A	A

Lane	NBLn1	WBLn1	SBLn1
Vol Left, %	0%	100%	100%
Vol Thru, %	100%	0%	0%
Vol Right, %	0%	0%	0%
Sign Control	Stop	Stop	Stop
Traffic Vol by Lane	25	55	15
LT Vol	0	55	15
Through Vol	25	0	0
RT Vol	0	0	0
Lane Flow Rate	25	55	15
Geometry Grp	1	1	1
Degree of Util (X)	0.028	0.064	0.018
Departure Headway (Hd)	4.008	4.168	4.216
Convergence, Y/N	Yes	Yes	Yes
Cap	891	860	847
Service Time	2.042	2.19	2.251
HCM Lane V/C Ratio	0.028	0.064	0.018
HCM Control Delay	7.2	7.5	7.3
HCM Lane LOS	A	A	A
HCM 95th-tile Q	0.1	0.2	0.1

Intersection	
Intersection Delay, s/veh	7.5
Intersection LOS	A

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	80	0	0	0	55	15	0	20	0	25	5	30
Future Vol, veh/h	80	0	0	0	55	15	0	20	0	25	5	30
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Heavy Vehicles, %	0	0	0	0	0	0	0	0	0	0	0	0
Mvmt Flow	80	0	0	0	55	15	0	20	0	25	5	30
Number of Lanes	0	1	0	0	1	0	0	1	0	0	1	0

Approach	EB	WB	NB	SB
Opposing Approach	WB	EB	SB	NB
Opposing Lanes	1	1	1	1
Conflicting Approach 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	7.8	7.4	7.4	7.3
HCM LOS	A	A	A	A

Lane	NBLn1	EBLn1	WBLn1	SBLn1
Vol Left, %	0%	100%	0%	42%
Vol Thru, %	100%	0%	79%	8%
Vol Right, %	0%	0%	21%	50%
Sign Control	Stop	Stop	Stop	Stop
Traffic Vol by Lane	20	80	70	60
LT Vol	0	80	0	25
Through Vol	20	0	55	5
RT Vol	0	0	15	30
Lane Flow Rate	20	80	70	60
Geometry Grp	1	1	1	1
Degree of Util (X)	0.023	0.095	0.077	0.066
Departure Headway (Hd)	4.205	4.292	3.971	3.957
Convergence, Y/N	Yes	Yes	Yes	Yes
Cap	839	830	895	893
Service Time	2.292	2.341	2.027	2.036
HCM Lane V/C Ratio	0.024	0.096	0.078	0.067
HCM Control Delay	7.4	7.8	7.4	7.3
HCM Lane LOS	A	A	A	A
HCM 95th-tile Q	0.1	0.3	0.2	0.2

Appendix C

North-South Arterial Evaluation

130 Huntmar

Evaluation of N/S Arterial Intersection Control

DRAFT - 18 December 2020

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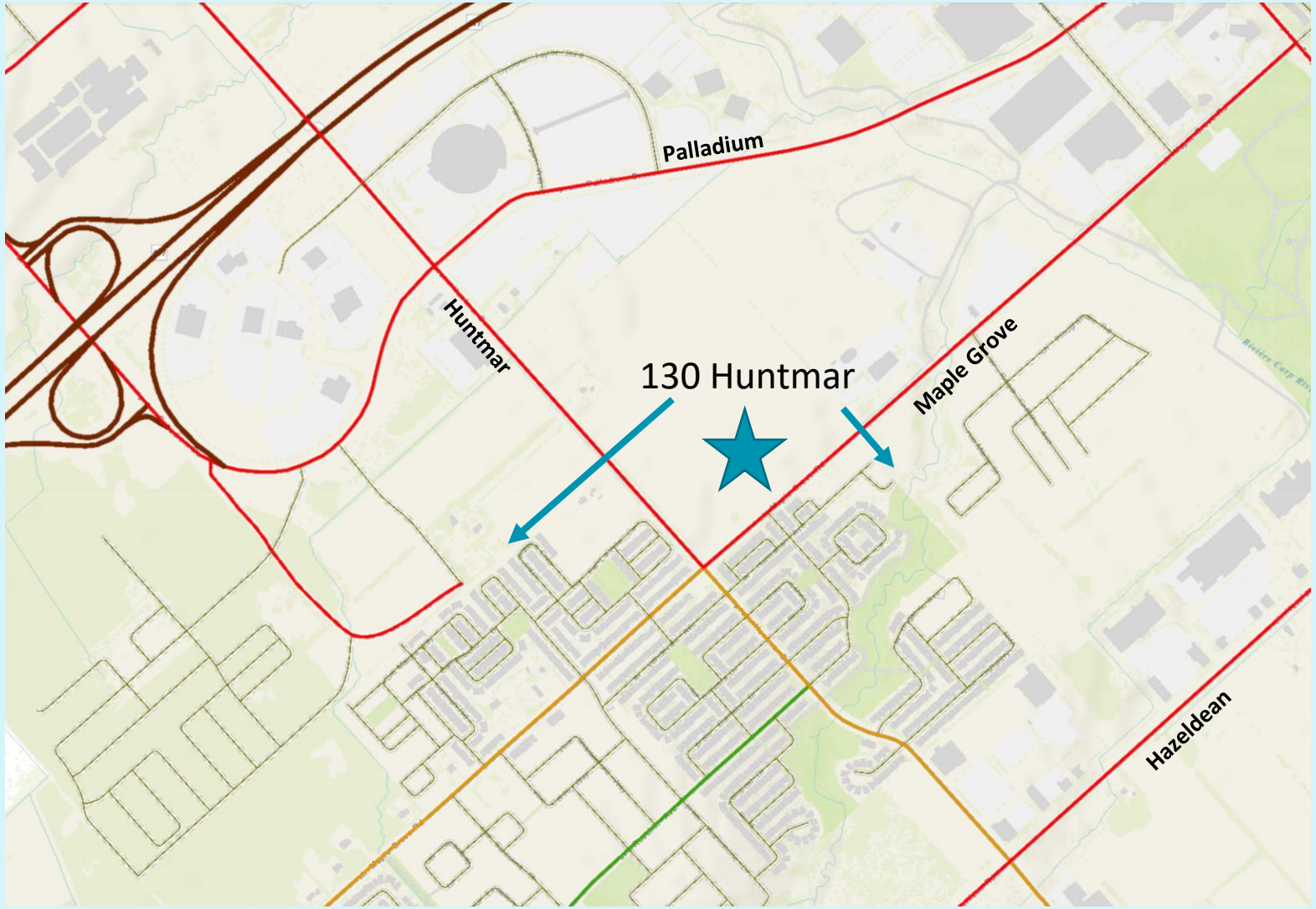
Objective



- Present Development Constraints (N/S Arterial)
- Show potentials options and trade-offs
- Evaluate transportation operations
- Recommend Roadway Alignment and Control for N/S Arterial

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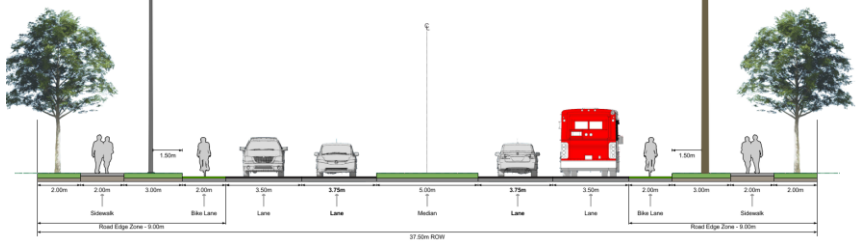
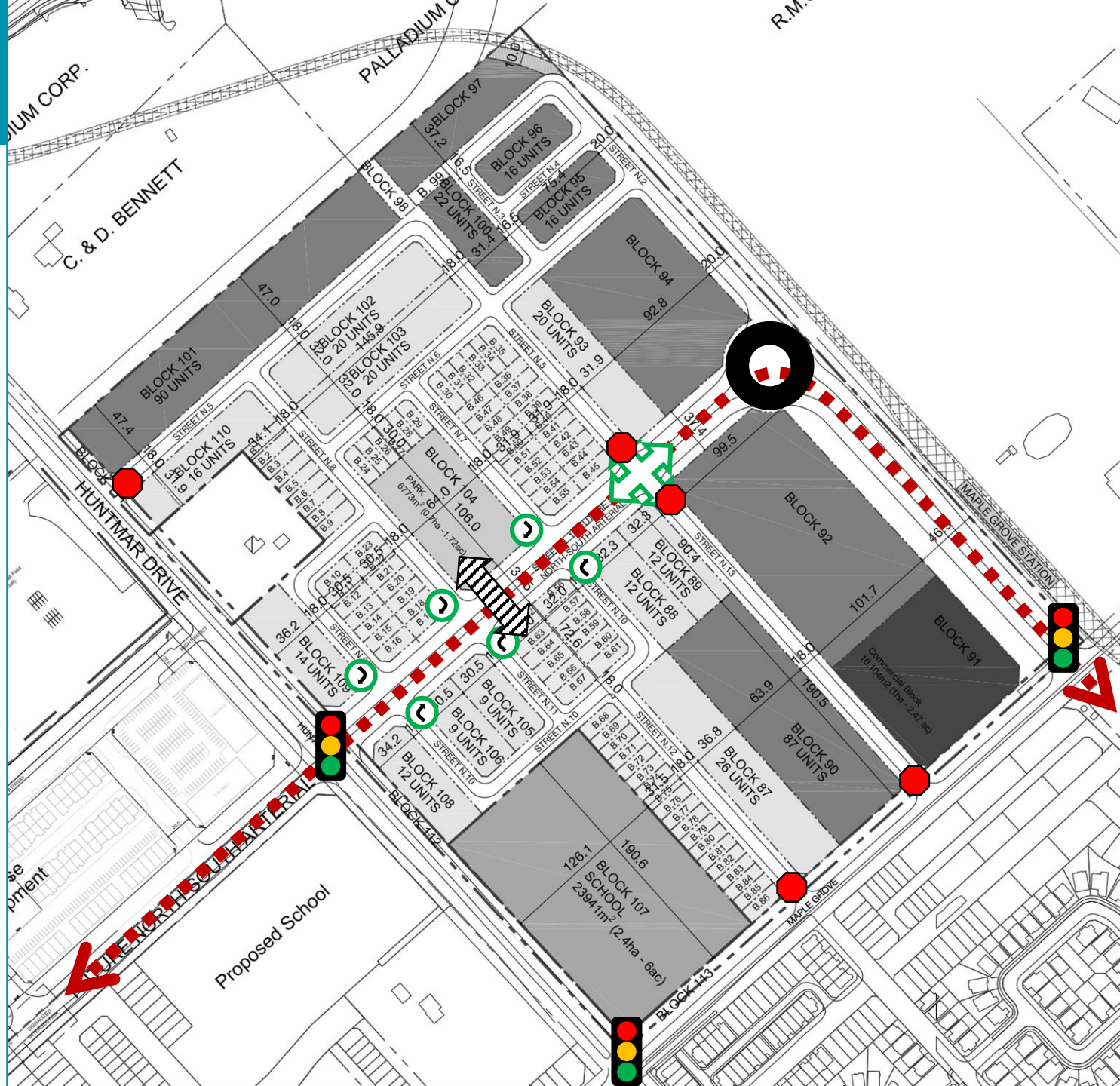
Current Site Plan

- N/S Arterial:
  - Signalized @ Maple-Grove
  - Signalized @ Huntmar
- Included within the Site:
  - Roundabout (N/S Arterial @ Street 2)
  - Two-way Stop (Street 5 / 13)
  - PXO Street 8 / 11

1 - Current Cross-Section Standard (Bike Lanes)



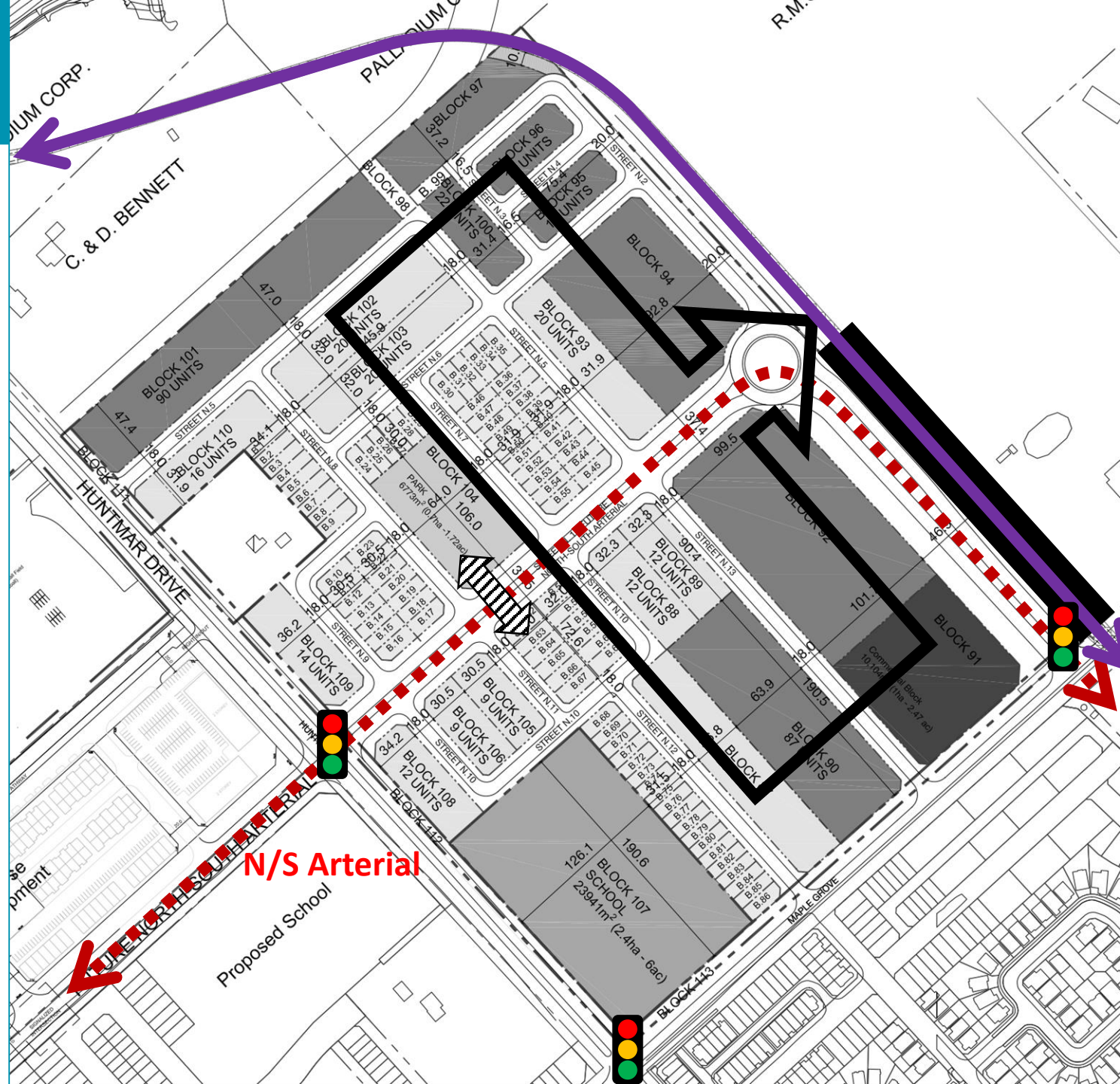


Constraints and Criteria

- Kanata LRT is constraint:
  - Alignment (east boundary of site)
  - Station (adjacent Maple Grove)
  - Structure (south of Street 1)

- Site to address:
  - Drainage = Overland Flow to east
  - Development = Developable Area
  - Transportation = Design / Operations

Drainage	Development	Transportation
✗	✓	✓

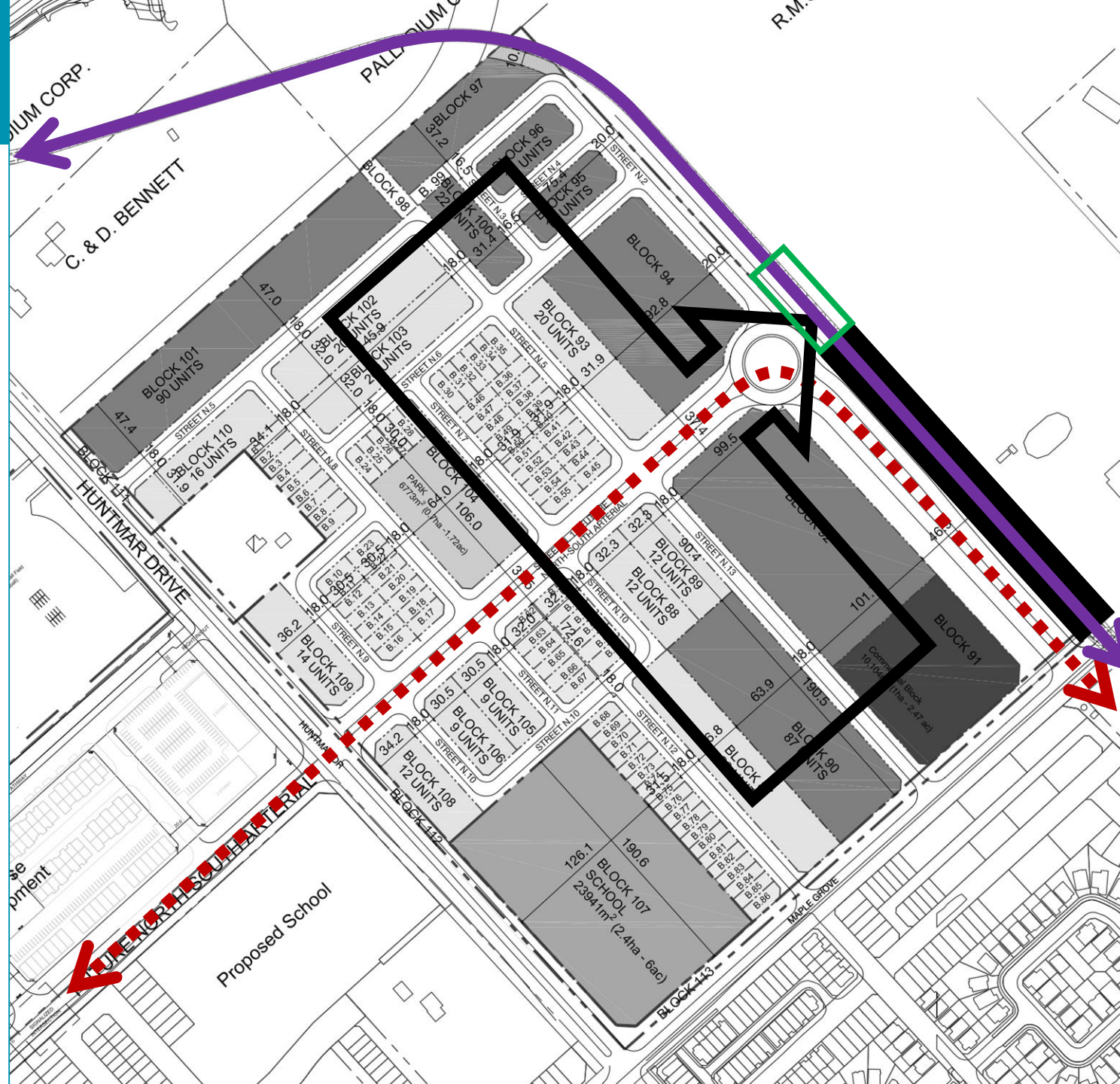


Options

- Option 1 – **Extend LRT Structure** to accommodate overland flow crossing under LRT

City has advised that LRT Structures are not to be modified

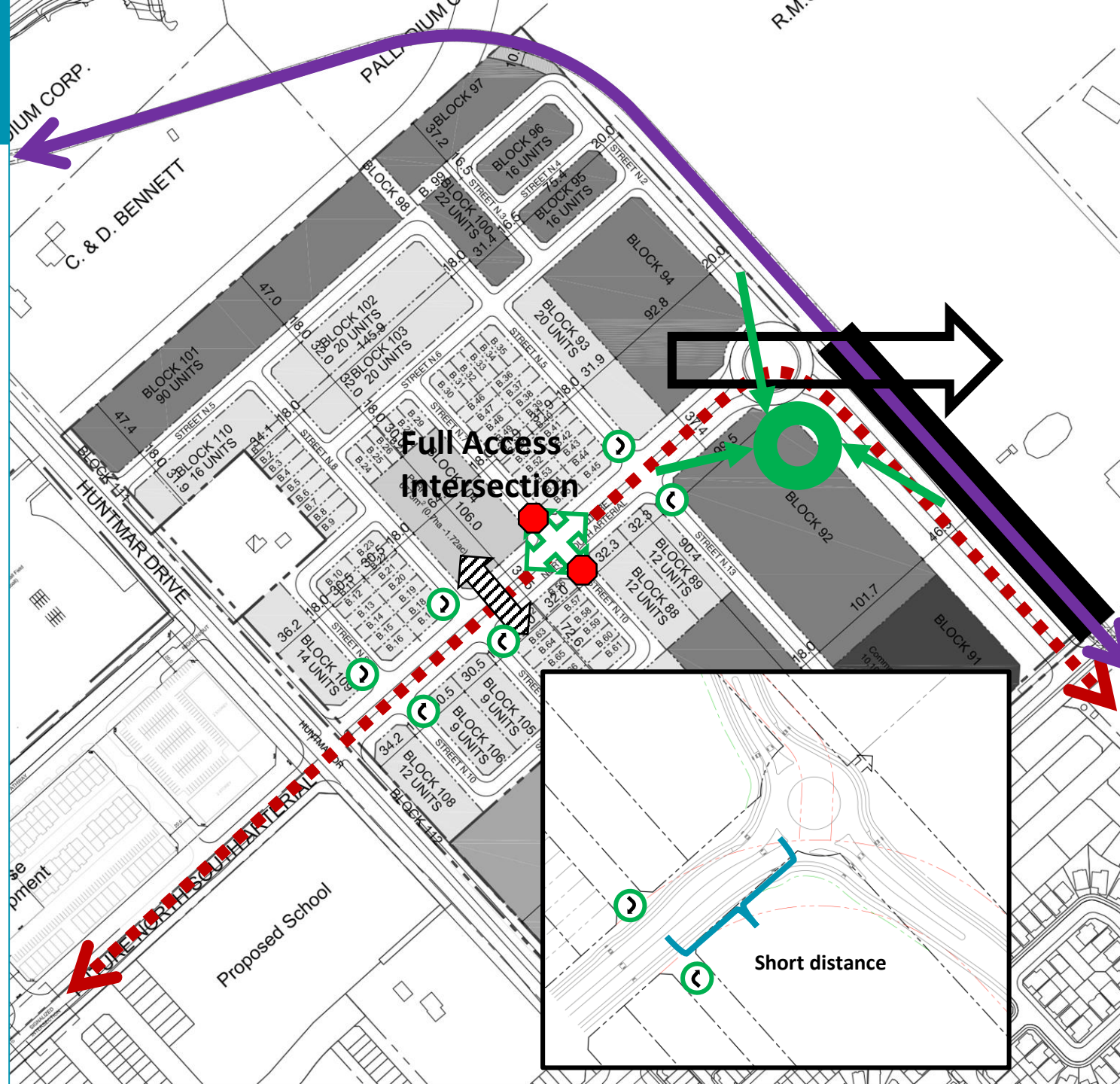
Drainage	Development	Transportation
✓	✓	✓



Options

- Option 2 – **Shift roundabout** to enable overland flow to cross under planned LRT structure
  - Large inner diameter for Arterial roads
  - Approach spirals to reduce vehicle entry speeds (<40 kph) for an arterial posted for 60 kph
  - Right-in Right-out at Street 5/13

Drainage	Development	Transportation
✓	Impact	Impact to be evaluated further

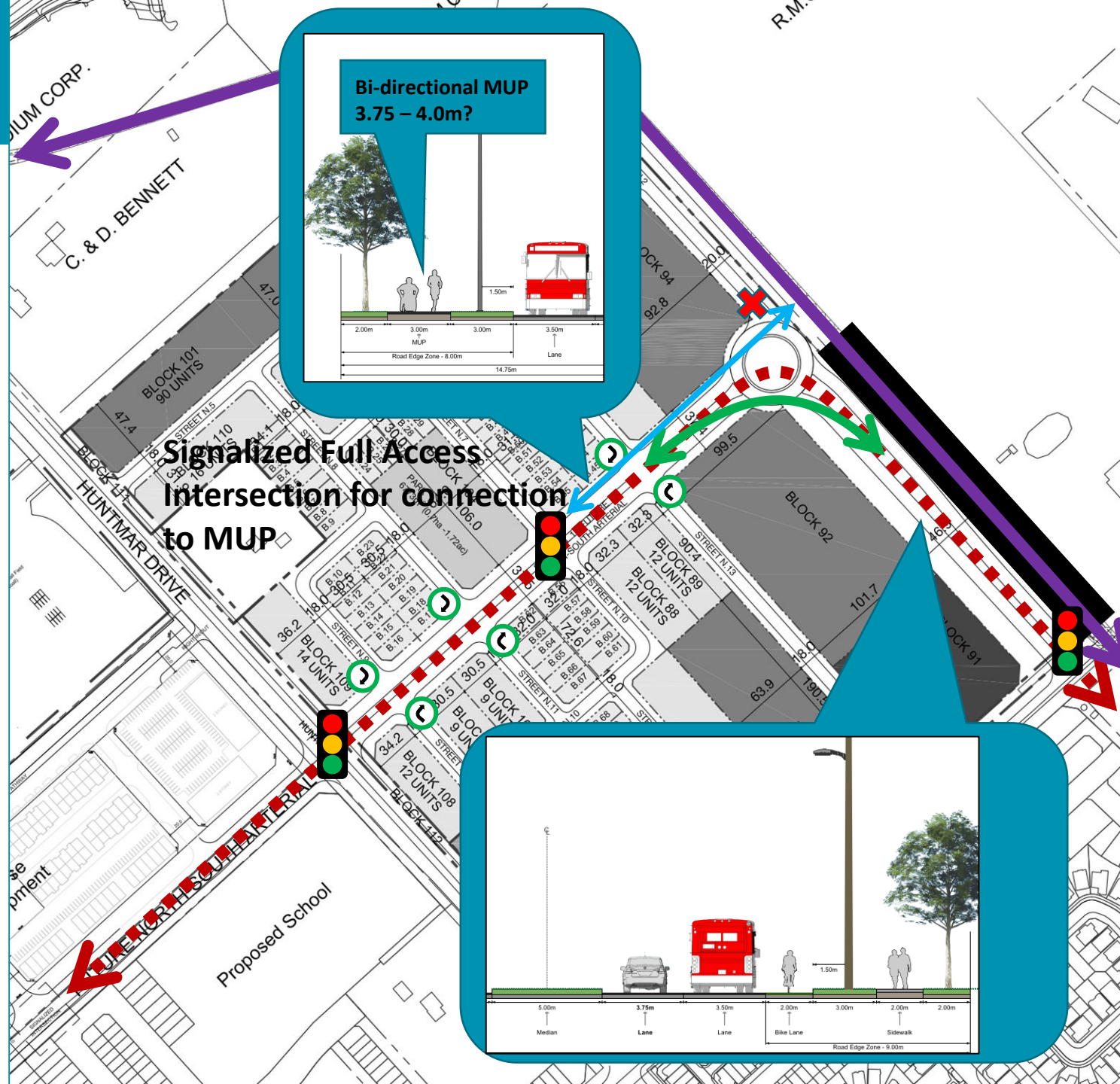


Options

- Option 3 – **Replace roundabout** with 130m radius bend in roadway

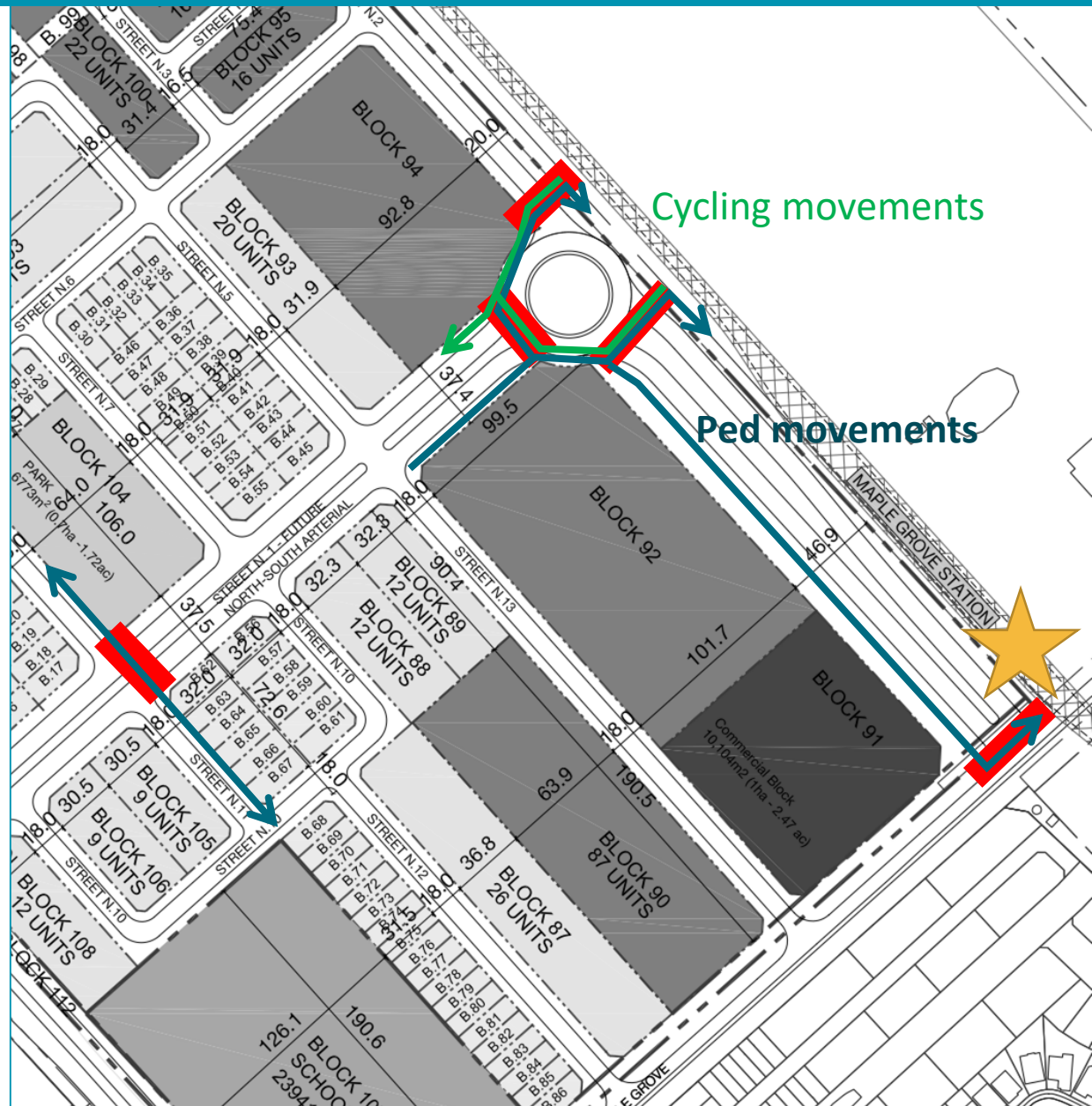
- 60kph roadway design speed
- 4% super elevation required
- Closure of N-leg (Street 2) → Signalized at Street 7/10
- Right-in Right-out at Street 5/13
- MUP on North Side

Drainage	Development	Transportation
✓	✓	Impact to be evaluated further



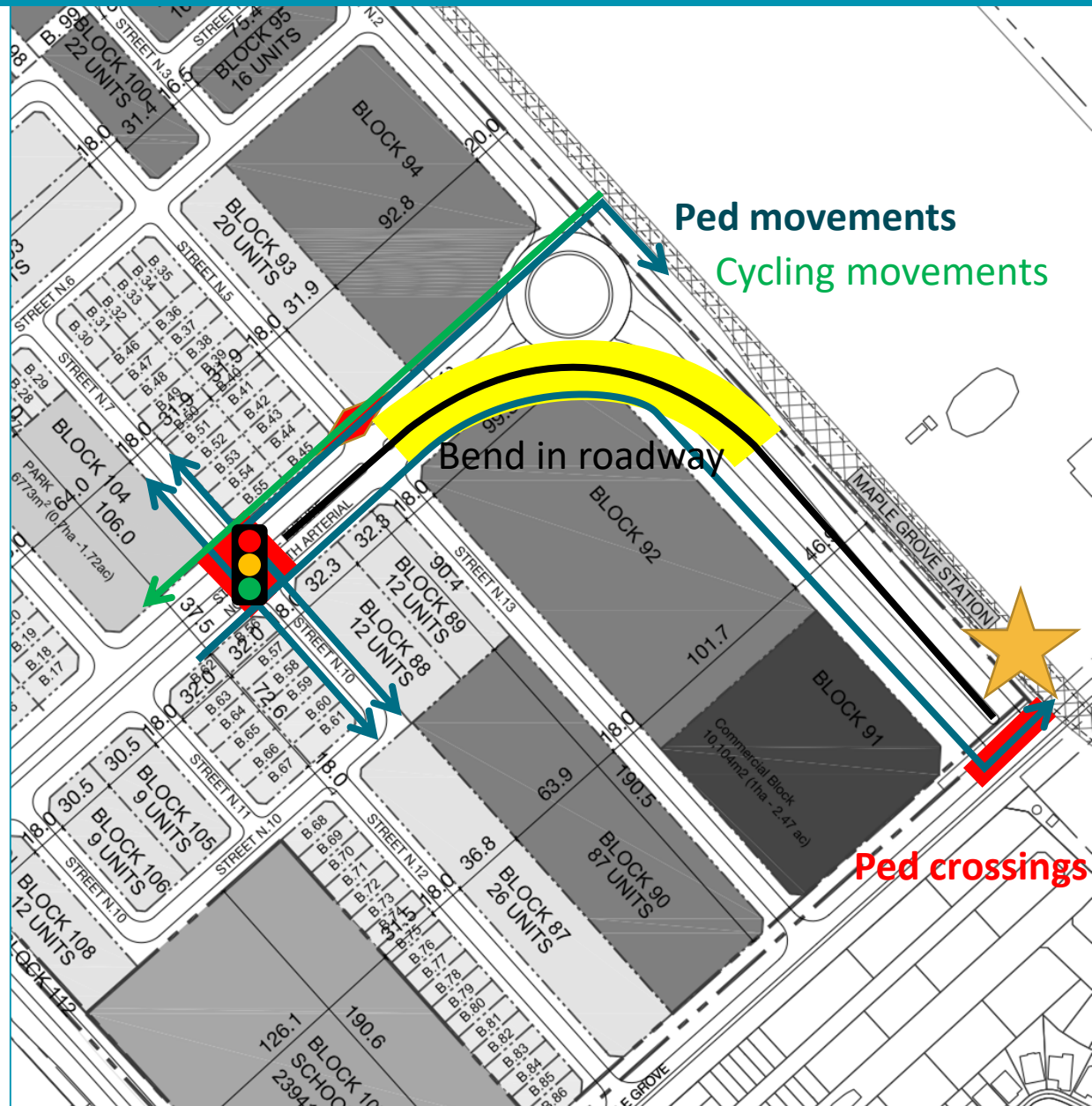
Option 1/2 - Roundabout

Criteria		Details	
Pedestrian	Conflicts	• Pedestrian conflicts at exit lanes (vehicles yield to pedestrians)	
	Design Measures	• PXO can be included on intersection approaches and exits (impacts capacity)	
	Comfort	• Slightly longer distances to cross road compared to traditional signal	
Cycling	Conflicts	• Cyclists should not travel within a 2-lane roundabout. • They should circulate around as if they are pedestrians.	
	Design Measures	• No accommodation of cyclists, PXO's are for pedestrians and do not technically enable cross rides at this time	
	Comfort	• Slightly longer distances to cross road compared to traditional signal, and cyclists dismount their bicycle to cross road	
Auto	Conflicts	• Potential site line issues at Street 5/13, Right-in Right Out provided	
	Design Measures	• Reduced to 40 kph operating speeds	
	Comfort	• Continuous flow, easy to indicate N/S Arterial direction	



Option 3 – Curve in Roadway

Crteria		Details	
Pedestrian	Conflicts	• Barrier in median on bend to restrict pedestrian crossings	
	Design Measures	• Controlled crossing (signal) would be required on roadway tangent upstream / downstream from "bend".	
	Comfort	• Pedestrians crossing S-leg are diverted	
Cycling	Conflicts	• Barrier in median on bend to restrict crossing of arterial; • MUP on north side crossing Street 5 (vehicles look left at vehicle gaps and not at approaching eastbound cyclists)	
	Design Measures	• Signalized intersection at Street 7/10 to enable cyclists to cross road	
	Comfort	• Diversion of cyclists to bi-directional MUP on north side of road	
Auto	Conflicts	• Potential site line issues at Street 5/13, Right-in Right Out provided	
	Design Measures	• Designed with 60 kph operating speeds (4% super elevation)	
	Comfort	• Continuous flow, obvious N/S Arterial direction • Consolidation of site vehicles at Street 5 & 7 requires signal	



Comparison of Options

Analysis shows that Curve is better for minimizing conflict points, Roundabout is better for “comfort”

Option 1/2 - Roundabout

Criteria		Details	
Pedestrian	Conflicts	• Pedestrian conflicts at exit lanes (vehicles yield to pedestrians)	
	Design Measures	• PXO can be included on intersection approaches and exits (impacts capacity)	
	Comfort	• Slightly longer distances to cross road compared to traditional signal	
Cycling	Conflicts	• Cyclists should not travel within a 2-lane roundabout. • They should circulate around as if they are pedestrians.	
	Design Measures	• No accommodation of cyclists, PXO's are for pedestrians and do not technically enable cross rides at this time	
	Comfort	• Slightly longer distances to cross road compared to traditional signal, and cyclists dismount their bicycle to cross road	
Auto	Conflicts	• Potential site line issues at Street 5/13, Right-in Right Out provided	
	Design Measures	• Reduced to 40 kph operating speeds	
	Comfort	• Continuous flow, easy to indicate N/S Arterial direction	

Option 3 – Curve in Roadway

Crteria		Details	
Pedestrian	Conflicts	• Barrier in median on bend to restrict pedestrian crossings	
	Design Measures	• Controlled crossing (signal) would be required on roadway tangent upstream / downstream from "bend".	
	Comfort	• Pedestrians crossing S-leg are diverted	
Cycling	Conflicts	• Barrier in median on bend to restrict crossing of arterial; • MUP on north side crossing Street 5 (vehicles look left at vehicle gaps and not at approaching eastbound cyclists)	
	Design Measures	• Signalized intersection at Street 7/10 to enable cyclists to cross road	
	Comfort	• Diversion of cyclists to bi-directional MUP on north side of road	
Auto	Conflicts	• Potential site line issues at Street 5/13, Right-in Right Out provided	
	Design Measures	• Designed with 60 kph operating speeds (4% super elevation)	
	Comfort	• Continuous flow, obvious N/S Arterial direction • Consolidation of site vehicles at Street 5 & 7 requires signal	

Summary

- Trade off's between options from a Transportation Perspective
- Both are reasonable solutions to serve the development and Arterial Road

	Drainage	Development	Transportation
Option 1 – adjust LRT	✓	✓	✓
Option 2 – shift Roundabout	✓	Impact	Improved comfort
Option 3 – replace with Bend	✓	✓	Minimized conflict points

- Recommend Option 3 with design measures to accommodate Pedestrians / Cyclists on North side of Street 1.

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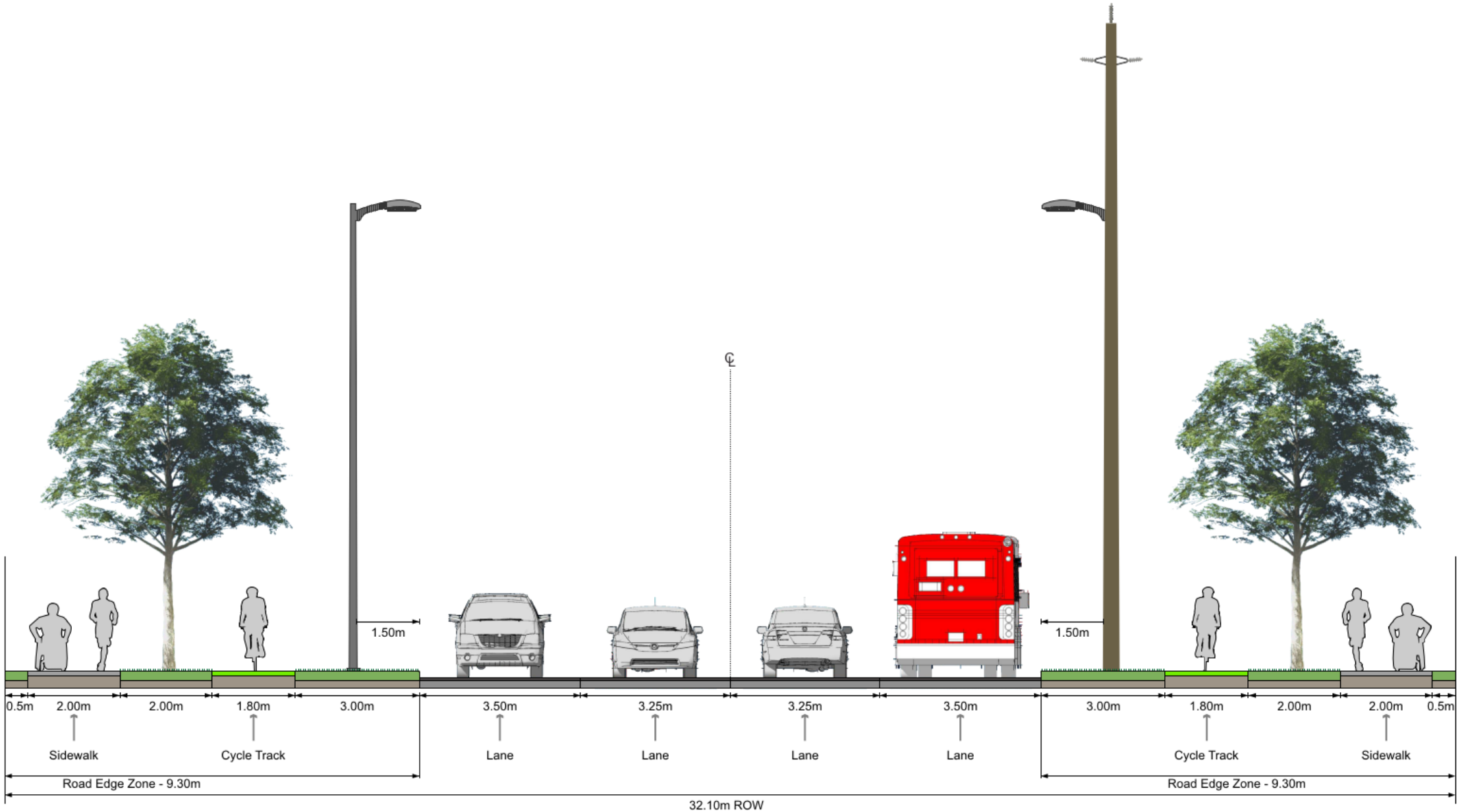
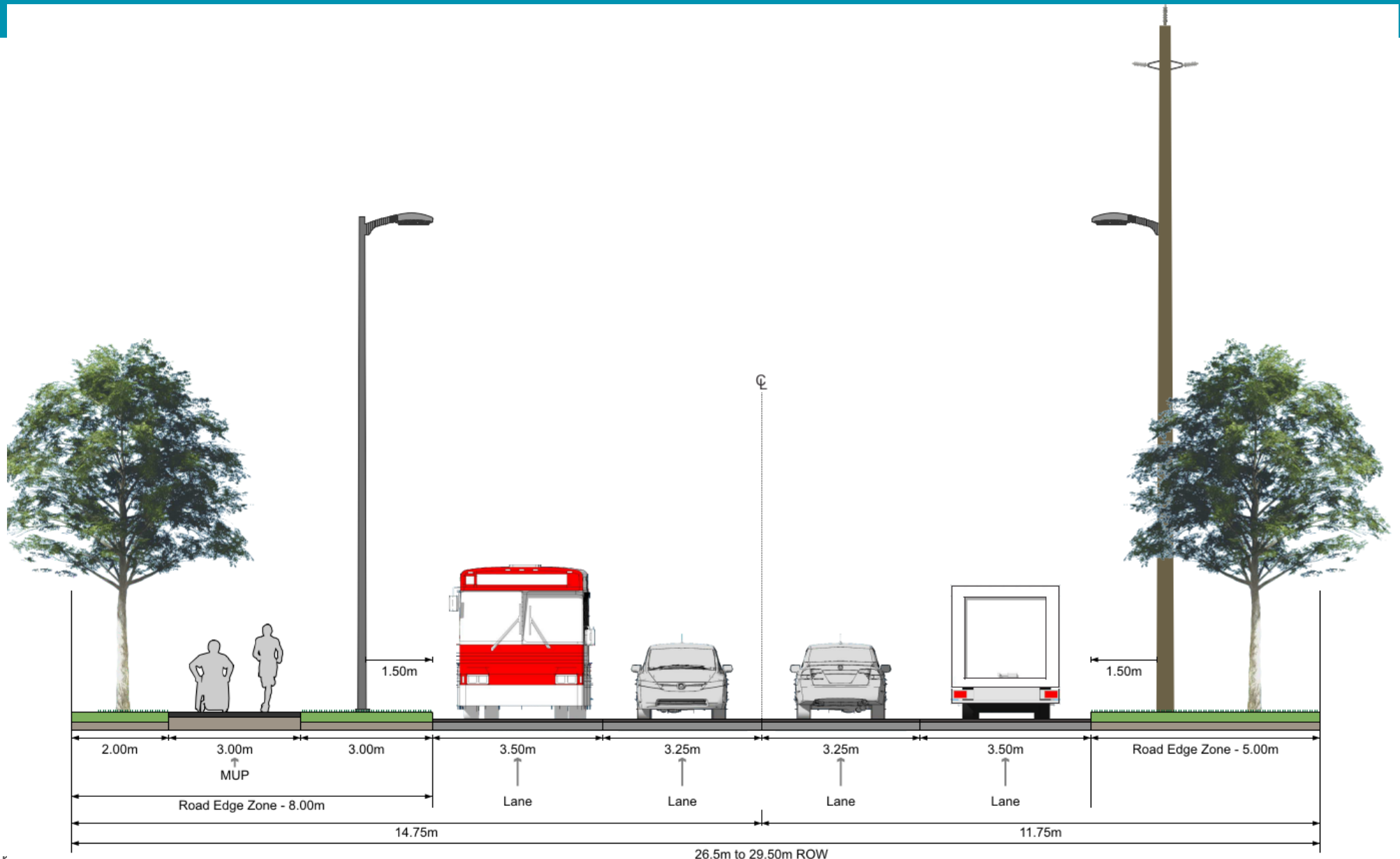

1.50m
1.50m
0.5m
2.00m
2.00m
1.80m
3.00m
3.50m
3.25m
3.25m
3.50m
3.00m
1.80m
2.00m
2.00m
0.5m
Sidewalk
Cycle Track
Lane
Lane
Lane
Lane
Cycle Track
Sidewalk
Road Edge Zone - 9.30m
Road Edge Zone - 9.30m
32.10m ROW

Pleas



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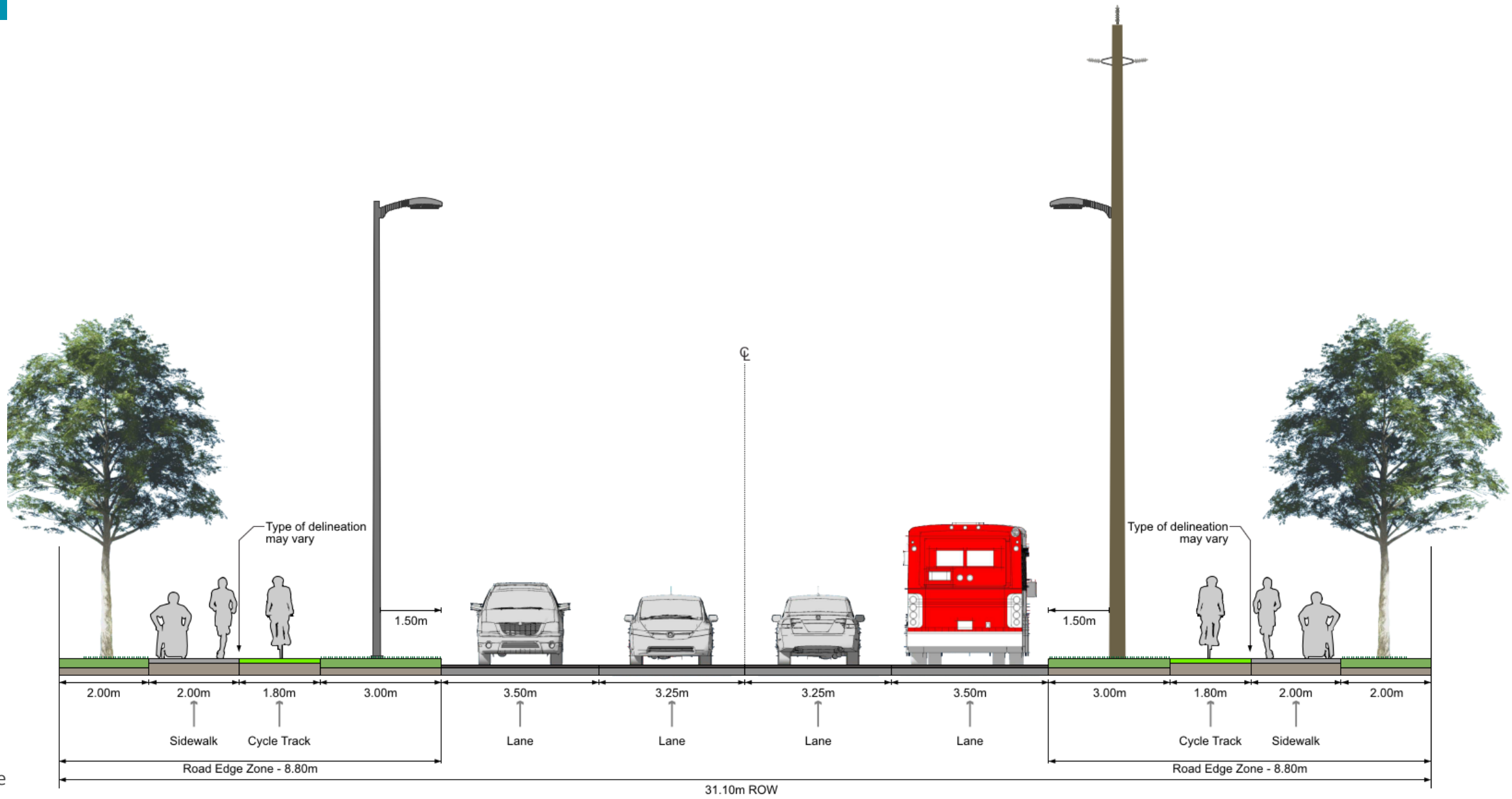
3 - Combined Cycle Tracks/Sidewalks



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Appendix D

MMLOS Analysis Tables

Existing - MMLOS Intersection Analysis

	Approach	Northbound	Southbound	Eastbound	Westbound
Pedestrian	Lanes to cross	3	2	2	2
	Median	No	No	No	No
	Island refuge	No	No	No	No
	Conflicting left turns	Perm	Perm	Prot+perm	Perm
	Conflicting right turns	Prot+perm	Prot+perm	Prot+perm	Prot+perm
	RTOR?	Always	Always	Always	Always
	Pedestrian leading interval?	Yes	No	No	No
	Corner radius (largest)	10-15m	5-10m	5-10m	10-15m
	Crosswalk type	Std. transverse	Std. transverse	Std. transverse	Std. transverse
	PETSI points	72	86	86	85
	Cycle length	120	120	120	120
	Effective walk time	22	22	27	27
	Calculated pedestrian delay	40	40	36	36
	Level of service (PETSI points)	C	B	B	B
	Level of service (ped. delay)	E	E	D	D
	Level of Service	**E**	**E**	**D**	**D**
	Level of Service	**E**			
Bicycle	Type of bikeway	Mixed Traffic	Mixed Traffic	Mixed Traffic	Mixed Traffic
	Bike lane shift	N/A	N/A	N/A	N/A
	Length of right-turn lane	N/A	N/A	N/A	N/A
	Right-turn vehicle turning speed (from int. geom.)	<=25 km/h	<=25 km/h	<=25 km/h	<=25 km/h
	Dual right-turn lane (shared or exclusive)	No	No	No	No
	Left-turn type / lanes crossed and turn speed	1 lane, 50km/h	None, <=50km/h	None, <=50km/h	None, <=50km/h
	Level of Service	**D**	**B**	**B**	**B**
	Level of Service	**D**			
Transit	Average signal delay	20	20	50	20
	Level of Service	**C**	**C**	**F**	**C**
	Level of Service	**F**			
Truck	Effective turning radius (smallest)	10 to 15m	<10m	<10m	10 to 15m
	Number of Receiving Lanes	1	1	1	1
	Level of Service	**E**	**F**	**F**	**E**
	Level of Service	**F**			
Auto	Volume to capacity ratio	0.56 (0.52)	0.33 (0.86)	0.84 (0.69)	0.23 (0.90)
	Level of Service	**A (A)**	**A (D)**	**D (B)**	**A (E)**

	Approach	Northbound	Southbound	Eastbound	Westbound
	Level of Service	**B**			

Planned 2029 - MMLOS Intersection Analysis

	Approach	Northbound	Southbound	Eastbound	Westbound
Pedestrian	Lanes to cross	4	4	3	3
	Median	No	No	No	No
	Island refuge	No	No	No	No
	Conflicting left turns	Prot+perm	Prot+perm	Prot+perm	Prot+perm
	Conflicting right turns	Prot+perm	Prot+perm	Prot+perm	Prot+perm
	RTOR?	Always	Always	Always	Always
	Pedestrian leading interval?	Yes	No	No	No
	Corner radius (largest)	15-25m	15-25m	15-25m	15-25m
	Crosswalk type	Std. transverse	Std. transverse	Std. transverse	Std. transverse
	PETSI points	53	51	68	68
	Cycle length	120	120	120	120
	Effective walk time	22	22	27	27
	Calculated pedestrian delay	40	40	36	36
	Level of service (PETSI points)	D	D	C	C
	Level of service (ped. delay)	E	E	D	D
	Level of Service	**E**	**E**	**D**	**D**
	Level of Service	**E**			
Bicycle	Type of bikeway	Bike Lanes	Bike Lanes	Bike Lanes	Bike Lanes
	Bike lane shift	N/A	N/A	N/A	N/A
	Length of right-turn lane	N/A	N/A	N/A	N/A
	Right-turn vehicle turning speed (from int. geom.)	<=25 km/h	<=25 km/h	<=25 km/h	<=25 km/h
	Dual right-turn lane (shared or exclusive)	No	No	No	No
	Left-turn type / lanes crossed and turn speed	None, <=50km/h	None, <=50km/h	None, <=50km/h	None, <=50km/h
	Level of Service	**B**	**B**	**B**	**B**
	Level of Service	**B**			
Transit	Average signal delay	20	20	50	40
	Level of Service	**C**	**C**	**F**	**E**
	Level of Service	**F**			
Truck	Effective turning radius (smallest)	10 to 15m	10 to 15m	10 to 15m	10 to 15m
	Number of Receiving Lanes	1	1	1	1
	Level of Service	**E**	**E**	**E**	**E**

	Approach	Northbound	Southbound	Eastbound	Westbound
	Level of Service	**E**			
Auto	Volume to capacity ratio	0.51 (0.83)	0.50 (0.99)	0.66 (0.92)	0.59 (0.94)
	Level of Service	**A (D)**	**A (E)**	**B (E)**	**A (E)**
	Level of Service	**C**			

Existing MMLOS Segment Analysis for Maple Grove Road

Maple Grove Road

Pedestrian	Sidewalk width	0m
	Boulevard width	0m
	AADT	>3000
	On-street parking	No
	Operating speed	30-50km/h
	Level of Service	**F**
Bicycle	Number of travel lanes (mixed traffic = total, bike lanes = one direction)	2
	Classified as residential or no marked centreline	No
	Type of bikeway	Mixed
	Bike lane width	N/A
	Bike lane + parking lane width (incl. marked buffer and paved gutter)	N/A
	Segment operating speed	50 km/h
	Frequency of bike lane blockages	N/A
	Unsignalized crossing - number lanes being crossed (no median)	2
	Unsignalized crossing - number lanes being crossed (median > 1.8m)	0
	Operating speed of road being crossed	50 km/h
	Level of Service	**D**
Transit - AM	Facility type	Mixed
	Length of segment (km)	0.85
	Number of driveways	3
	Volume crossing driveways	10
	Average transit travel speed	22
	Posted speed limit	50

Maple Grove Road

	Conflict factor, Cf	35
	Transit speed ratio, Vt / Vp	0.4
	Level of Service	**E**
Transit - PM	Facility type	Mixed
	Length of segment (km)	0.85
	Number of driveways	3
	Volume crossing driveways	10
	Average transit travel speed	22
	Posted speed limit	50
	Conflict factor, Cf	35
	Transit speed ratio, Vt / Vp	0.4
	Level of Service	**E**
Truck	Curb lane width (meters)	<=3.5m
	Travel Lanes per Direction	1 lane/dir
	Level of Service	**C**

Existing MMLOS Segment Analysis for Huntmar Drive

Huntmar Drive

Pedestrian	Sidewalk width	0m
	Boulevard width	0m
	AADT	>3000
	On-street parking	No
	Operating speed	30-50km/h
	Level of Service	**F**
Bicycle	Number of travel lanes (mixed traffic = total, bike lanes = one direction)	2
	Classified as residential or no marked centreline	No
	Type of bikeway	Mixed
	Bike lane width	N/A
	Bike lane + parking lane width (incl. marked buffer and paved gutter)	N/A
	Segment operating speed	50 km/h

Huntmar Drive

	Frequency of bike lane blockages	N/A
	Unsignalized crossing - number lanes being crossed (no median)	4
	Unsignalized crossing - number lanes being crossed (median > 1.8m)	0
	Operating speed of road being crossed	N/A
	Level of Service	**D**
Transit - AM	Facility type	Mixed
	Length of segment (km)	0.85
	Number of driveways	3
	Volume crossing driveways	0
	Average transit travel speed	22
	Posted speed limit	50
	Conflict factor, Cf	0
	Transit speed ratio, Vt / Vp	0.4
	Level of Service	**E**
Transit - PM	Facility type	Mixed
	Length of segment (km)	0.85
	Number of driveways	3
	Volume crossing driveways	10
	Average transit travel speed	22
	Posted speed limit	50
	Conflict factor, Cf	35
	Transit speed ratio, Vt / Vp	0.4
	Level of Service	**E**
Truck	Curb lane width (meters)	<=3.5m
	Travel Lanes per Direction	1 lane/dir
	Level of Service	**C**

Appendix E

Signalized Intersection Traffic Operations Results

2019 Signalized Intersections

Notes:

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

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

m Volume for 95th percentile queue is metered by upstream signal.

N1: 2019 Existing Huntmar Drive at Hazeldean Road Traffic Operations

Movement	Volume	Delay (s)	LOS	V/C	Q50th	Q95th
EBL	200 (195)	28.1 (58)	A (A)	0.49 (0.58)	12.1 (24.1)	19.2 (35.7)
EBTR	775 (750)	25.2 (33.5)	A (B)	0.53 (0.61)	66.6 (78.3)	99.3 (107.9)
WBL	160 (315)	59 (61)	A (C)	0.57 (0.74)	18.8 (38.8)	#35.2 (#56.0)
WBT	395 (985)	28.5 (35.5)	A (C)	0.33 (0.72)	34.3 (107.7)	56.7 (#165.3)
WBR	80 (205)	0.3 (5)	A (A)	0.12 (0.28)	0 (0)	0 (17.4)
NBL	45 (135)	79 (186.2)	A **(F)**	0.56 (1.17)	10.6 (~39.8)	#27.3 (#81.5)
NBT	235 (270)	54 (49)	C (B)	0.7 (0.66)	53.3 (60.6)	70.3 (83.5)
NBR	245 (235)	8.6 (7)	A (A)	0.53 (0.45)	0 (0)	19.2 (18.9)
SBL	115 (135)	115 (163.9)	E **(F)**	0.92 (1.11)	27.6 (~38.0)	#64.3 (#79.8)
SBT	210 (330)	47.4 (58.4)	A (D)	0.58 (0.81)	47 (77.1)	63.4 (104)
SBR	110 (380)	1.1 (14.6)	A (B)	0.23 (0.66)	0 (15.9)	0 (46.4)
OVERALL	**2570 (3935)**	**34.0 (45.4)**	**C (E)**	**0.77 (0.91)**	-	-
WORST MOVEMENT		**SBL (NBL)**	**E (F)**	**0.92 (1.17)**	-	-

N3: 2019 Existing Huntmar Drive at Maple Grove Road Traffic Operations

Movement	Volume	Delay (s)	LOS	V/C	Q50th	Q95th
EBTLR	385 (240)	51.2 (45.9)	D (B)	0.84 (0.69)	84.6 (48.8)	111.9 (75.3)
WBTLR	105 (310)	23 (87.4)	A (E)	0.23 (0.9)	15.4 (69.6)	25.9 (#116.0)
NBL	30 (95)	15.9 (15.5)	A (A)	0.07 (0.3)	3.3 (10.7)	9.9 (24.5)
NBTR	535 (555)	21.5 (15.5)	A (A)	0.56 (0.52)	81.6 (72.5)	138.3 (112.6)
SBTLR	315 (890)	17 (29.9)	A (D)	0.33 (0.86)	40.4 (171.5)	71.7 (#289.2)
OVERALL	**1370 (2090)**	**28.8 (35.8)**	**D (D)**	**0.84 (0.87)**	-	-
WORST MOVEMENT		**EBTLR (WBTLR)**	**D (D)**	**0.84 (0.9)**	-	-

N4: 2019 Existing Huntmar Drive at Palladium Drive Traffic Operations

Movement	Volume	Delay (s)	LOS	V/C	Q50th	Q95th
EBL	30 (25)	20 (26.8)	A (A)	0.05 (0.09)	3.5 (3.7)	11.9 (11.4)
EBTR	320 (560)	9.5 (7.8)	A (A)	0.19 (0.4)	9.8 (11.1)	24.6 (27.3)
WBL	40 (155)	12.7 (21.1)	A (A)	0.08 (0.34)	3.5 (18)	11.3 (34.9)
WBTR	115 (505)	8.6 (14.9)	A (A)	0.06 (0.28)	3.6 (30.3)	10.6 (48.4)
NBL	325 (215)	52.3 (46.7)	D (C)	0.84 (0.78)	66.2 (37.3)	77.2 (#53.2)
NBT	260 (190)	35.3 (27)	A (A)	0.49 (0.3)	52.1 (32.2)	62.7 (45.5)
NBR	130 (70)	5.2 (2.8)	A (A)	0.24 (0.12)	0 (0)	11.8 (5.7)
SBL	85 (80)	55.6 (41.2)	A (A)	0.54 (0.34)	19.3 (16.3)	31 (28.8)
SBT	145 (280)	52 (56.5)	A (C)	0.56 (0.77)	33.1 (63)	46 (86.2)
SBR	45 (85)	0.8 (1)	A (A)	0.13 (0.2)	0 (0)	0 (0.2)
OVERALL	**1495 (2165)**	**29.6 (23.3)**	**C (C)**	**0.75 (0.78)**	-	-
WORST MOVEMENT		**NBL (NBL)**	**D (C)**	**0.84 (0.78)**	-	-

N5: 2019 Existing Terry Fox Drive at Palladium Drive Traffic Operations

Movement	Volume	Delay (s)	LOS	V/C	Q50th	Q95th
EBL	225 (680)	55.7 (82.8)	B (E)	0.65 (1)	25.2 (~87.6)	38 (#128.6)
EBT	55 (245)	40.9 (54.5)	A (B)	0.19 (0.68)	11.2 (56.8)	21.4 (84.5)
EBR	95 (315)	1.9 (13.2)	A (B)	0.25 (0.61)	0 (8.4)	1.3 (37.4)
WBL	55 (130)	56.9 (57.3)	A (A)	0.43 (0.57)	12 (30.5)	24.7 (49)
WBT	95 (175)	49.9 (61.7)	A (B)	0.45 (0.68)	20.7 (41.8)	33.1 (62)
WBR	140 (145)	8.5 (9.6)	A (A)	0.44 (0.42)	0 (0)	12.1 (15.9)
NBL	290 (215)	68.1 (49.9)	B (B)	0.69 (0.65)	36 (25.6)	47 (#50.3)
NBT	1095 (1080)	21.5 (39.4)	B (D)	0.69 (0.84)	98.2 (135.9)	#178.9 (#190.7)
NBR	75 (95)	0.3 (7.1)	A (A)	0.1 (0.15)	0 (4.3)	m0.2 (m15.6)
SBL	80 (115)	51.8 (59.9)	A (A)	0.34 (0.47)	9 (14.2)	16.6 (24.4)
SBT	775 (1270)	29.6 (58.4)	A (E)	0.59 (0.98)	70.1 (~176.2)	109.1 (#227.4)
SBR	695 (625)	11.1 (8.2)	C (B)	0.73 (0.69)	16.2 (6.9)	81.3 (45.7)
OVERALL	**3675 (5090)**	**27.8 (45.9)**	**A (A)**	**27.8 (45.9)**	-	-
WORST MOVEMENT		**SBR (EBL)**	**C (E)**	**0.73 (1)**	-	-

N6: 2019 Existing Terry Fox Drive at Maple Grove Traffic Operations

Movement	Volume	Delay (s)	LOS	V/C	Q50th	Q95th
EBL	195 (130)	64.8 (53.5)	D (B)	0.81 (0.6)	41.8 (30.6)	64.6 (m45.2)
EBT	25 (30)	32.4 (36.9)	A (A)	0.07 (0.1)	4.5 (6.1)	11.2 (m11.5)
EBR	135 (280)	8.1 (47.4)	A (D)	0.35 (0.83)	0 (46)	15 (m69.3)
WBL	30 (15)	33.5 (38)	A (A)	0.12 (0.07)	5.5 (3.1)	13 (8.7)
WBTR	70 (60)	15.8 (20.7)	A (A)	0.19 (0.19)	4.5 (5.3)	15.6 (16.2)
NBL	170 (170)	13.9 (39.7)	A (B)	0.42 (0.68)	16.4 (22.4)	38.9 (#75.9)
NBTR	1185 (1230)	11.6 (17.7)	A (B)	0.55 (0.6)	68.2 (102.8)	102.1 (136.3)
SBL	10 (55)	16.9 (62.3)	A (A)	0.04 (0.48)	0.6 (11.1)	m3.2 (m15.6)
SBT	710 (1545)	12.6 (35.5)	A (D)	0.34 (0.83)	23.5 (211.9)	73.6 (m216.0)
SBR	85 (125)	7.3 (8.7)	A (A)	0.1 (0.15)	0 (12.8)	m16.2 (m16.4)
OVERALL	**2615 (3640)**	**16.2 (30.5)**	**A (A)**	**16.2 (30.5)**	-	-
WORST MOVEMENT		**EBL (EBR)**	**D (D)**	**0.81 (0.83)**	-	-

2024 Signalized Intersections

N1: 2024 Future Huntmar Drive at Hazeldean Road Traffic Operations

Movement	Volume	Delay (s)	LOS	V/C	Q50th	Q95th
EBL	225 (220)	49.4 (91.9)	A (D)	0.44 (0.89)	26.8 (~38.6)	39.8 (#64.9)
EBTR	870 (845)	27.3 (41.9)	A (C)	0.59 (0.78)	81.3 (98.3)	115.8 (124.1)
WBL	180 (355)	52.3 (73.4)	A (D)	0.44 (0.87)	21.7 (~49.2)	33.5 (#80.6)
WBT	445 (1110)	24.7 (43)	A (D)	0.32 (0.87)	37.4 (132.4)	56 (163)
WBR	120 (285)	4.9 (4.5)	A (A)	0.17 (0.38)	0 (0)	12.5 (17.8)
NBL	55 (150)	31.7 (32.1)	A (B)	0.28 (0.61)	9.8 (21.7)	18.4 (35.9)
NBT	295 (360)	56.3 (49.9)	C (C)	0.76 (0.74)	68.7 (78.2)	93.7 (116.6)
NBR	275 (265)	17.7 (8.9)	B (A)	0.6 (0.46)	16.7 (5)	42.4 (27.7)
SBL	140 (190)	58 (28.6)	C (A)	0.74 (0.58)	26.3 (28.1)	#41.7 (44.6)
SBT	295 (450)	53.6 (64.1)	C (E)	0.73 (0.9)	69 (102.6)	94.1 (#169.8)
SBR	125 (425)	4 (29.1)	A (C)	0.19 (0.71)	0 (61.5)	10.6 (104.1)
OVERALL	**3025 (4655)**	**34.2 (43.5)**	**C (D)**	**0.76 (0.86)**	-	-
WORST MOVEMENT		**NBT (SBT)**	**C (D)**	**0.76 (0.9)**	-	-

N3: 2024 Future Huntmar Drive at Maple Grove Road Traffic Operations

Movement	Volume	Delay (s)	LOS	V/C	Q50th	Q95th
EBL	280 (120)	36.2 (75.6)	B (D)	0.64 (0.81)	55.6 (23.1)	61.9 (#50.6)
EBTR	215 (195)	38 (48.3)	A (B)	0.49 (0.62)	44.1 (38.8)	56.7 (64)
WBL	60 (160)	24.4 (63.9)	A (C)	0.25 (0.79)	10.7 (30.6)	15.3 (m#46.5)
WBTR	120 (270)	40 (65)	A (D)	0.56 (0.85)	18.2 (59.2)	37.7 (m83.0)
NBL	35 (110)	17.1 (24)	A (A)	0.09 (0.57)	3.6 (10.4)	12 (#21.6)
NBTR	660 (730)	27.4 (15.8)	A (A)	0.47 (0.4)	55.8 (51.2)	99.8 (65.8)
SBL	80 (105)	22.7 (13.4)	A (A)	0.22 (0.27)	11.3 (9.9)	28.2 (m19.4)
SBT	355 (845)	31.5 (32.5)	A (D)	0.41 (0.86)	61.9 (172.2)	108.5 (#269.4)
SBR	60 (255)	0.8 (10)	A (A)	0.07 (0.29)	0.1 (12)	1.9 (m30.8)
OVERALL	**1865 (2790)**	**30.2 (32.9)**	**B (D)**	**0.63 (0.86)**	-	-
WORST MOVEMENT		**EBL (SBT)**	**B (D)**	**0.64 (0.86)**	-	-

N4: 2024 Future Huntmar Drive at Palladium Drive Traffic Operations

Movement	Volume	Delay (s)	LOS	V/C	Q50th	Q95th
EBL	35 (25)	17 (21.1)	A (A)	0.06 (0.09)	3.7 (3.3)	12.1 (9.7)
EBTR	440 (785)	10.7 (15.9)	A (B)	0.29 (0.64)	13.8 (33.8)	32.3 (55.8)
WBL	60 (230)	19.9 (54.9)	A (D)	0.14 (0.83)	9.4 (45.7)	m15.3 (m#120.9)
WBTR	130 (595)	19.3 (36.7)	A (A)	0.08 (0.44)	9.3 (67.5)	m15.3 (92.4)
NBL	465 (345)	75.6 (85.7)	F (E)	1.01 (0.99)	~116.3 (69)	#79.5 (m#111.9)
NBT	335 (255)	29.1 (17.6)	A (A)	0.52 (0.33)	74.3 (33.2)	39 (m39.4)
NBR	205 (125)	3.7 (1.5)	A (A)	0.3 (0.17)	3.7 (0.3)	1.5 (m2.3)
SBL	95 (90)	57.5 (39.9)	A (A)	0.58 (0.35)	22.6 (18.5)	34 (31.8)
SBT	175 (350)	53 (58.7)	B (D)	0.6 (0.82)	41.8 (82.3)	53.5 (108.7)
SBR	50 (95)	0.8 (2.7)	A (A)	0.14 (0.21)	0 (0)	0 (5.1)
OVERALL	**1990 (2895)**	**34.9 (36.7)**	**F (E)**	**1.01 (0.99)**	-	-
WORST MOVEMENT		**NBL (NBL)**	**F (E)**	**1.01 (0.99)**	-	-

N5: 2024 Future Terry Fox Drive at Palladium Drive Traffic Operations

Movement	Volume	Delay (s)	LOS	V/C	Q50th	Q95th
EBL	290 (830)	57.9 (108)	C (F)	0.74 (1.11)	30.8 (~121.0)	45 (#160.4)
EBT	60 (250)	46.7 (42.7)	A (A)	0.23 (0.58)	14 (51.5)	17.7 (66.4)
EBR	125 (395)	9.6 (42.9)	A (D)	0.38 (0.86)	0.6 (55.7)	8.5 (84.8)
WBL	60 (135)	50.6 (59.5)	A (A)	0.31 (0.58)	13.2 (31.8)	27.6 (#58.9)
WBT	105 (180)	52.4 (50.3)	A (A)	0.46 (0.57)	25.2 (41.4)	36 (58.3)
WBR	155 (150)	15.6 (11.3)	A (A)	0.5 (0.4)	5 (3.6)	21.2 (19.7)
NBL	380 (245)	55.7 (58.7)	B (A)	0.62 (0.57)	42.9 (32)	#118.4 (#64.5)
NBT	1265 (1140)	24.1 (44.3)	C (D)	0.77 (0.89)	132.7 (92.2)	#215.5 (#202.0)
NBR	85 (100)	0.7 (5.7)	A (A)	0.11 (0.16)	0 (0.6)	m1.3 (m6.7)
SBL	90 (120)	61.1 (63.2)	A (A)	0.43 (0.53)	11.1 (14.7)	#24.0 (#34.0)
SBT	885 (1345)	37.6 (111.3)	C (F)	0.74 (1.14)	99.5 (~215.7)	124.7 (#260.0)
SBR	835 (700)	13.8 (8.5)	D (C)	0.83 (0.74)	19.6 (3.3)	94.9 (43.8)
OVERALL	**4335 (5590)**	**30.9 (65.3)**	**D (F)**	**0.83 (1.13)**	-	-
WORST MOVEMENT		**SBR (SBT)**	**D (F)**	**0.83 (1.14)**	-	-

N6: 2024 Future Terry Fox Drive at Maple Grove Traffic Operations

Movement	Volume	Delay (s)	LOS	V/C	Q50th	Q95th
EBL	255 (180)	60.2 (56.3)	C (B)	0.79 (0.69)	61.1 (42.2)	74.1 (64.2)
EBT	60 (65)	33.6 (36.3)	A (A)	0.12 (0.16)	12.4 (13.7)	18.8 (m25.3)
EBR	190 (345)	10.2 (51.6)	A (D)	0.37 (0.85)	6.2 (62.9)	16.7 (95.3)
WBL	35 (20)	29 (33)	A (A)	0.11 (0.07)	6.5 (3.9)	12.8 (9.7)
WBTR	95 (110)	15.6 (28.9)	A (A)	0.2 (0.28)	8.3 (17.3)	18.8 (30.2)
NBL	210 (235)	15 (65.9)	A (D)	0.47 (0.88)	20.7 (41.9)	43 (#128.9)
NBTR	1385 (1410)	23.7 (21.4)	C (C)	0.72 (0.7)	107.8 (128)	#234.6 (184.1)
SBL	15 (60)	23 (7)	A (A)	0.08 (0.29)	1.9 (2.7)	m4.0 (m3.5)
SBT	810 (1810)	39.7 (30.8)	B (E)	0.64 (1)	67 (~88.4)	92.2 (m73.3)
SBR	110 (185)	15.6 (1.5)	A (A)	0.19 (0.23)	4.8 (1.2)	m15.1 (m0.7)
OVERALL	**3165 (4420)**	**29.1 (30.8)**	**B (E)**	**0.68 (1.00)**	-	-
WORST MOVEMENT		**EBL (SBT)**	**C (E)**	**0.79 (1.00)**	-	-

A2: 2024 Future Huntmar Drive at Street 1 Traffic Operations

Movement	Volume	Delay (s)	LOS	V/C	Q50th	Q95th
EBL	25 (40)	23.2 (36.1)	A (A)	0.11 (0.24)	2.3 (6.2)	8.9 (15)
EBTR	20 (10)	0.1 (0.2)	A (A)	0.03 (0.03)	0 (0)	0 (0)
WBL	65 (40)	26.3 (35.9)	A (A)	0.29 (0.24)	6.2 (6.2)	17.9 (15)
WBTR	55 (45)	0.8 (0.6)	A (A)	0.14 (0.11)	0 (0)	0 (0)
NBL	30 (35)	5.4 (6.5)	A (A)	0.05 (0.16)	1 (1.3)	4.9 (6.8)
NBTR	975 (845)	12.5 (7.2)	B (A)	0.69 (0.54)	55.5 (41.5)	#160.2 (107.2)
SBL	15 (65)	5.9 (5)	A (A)	0.05 (0.14)	0.5 (2.3)	3.3 (9.4)
SBTR	550 (1225)	7.1 (14.1)	A (C)	0.41 (0.79)	22.2 (89.8)	59.1 (#271.4)
OVERALL	**1735 (2305)**	**10.7 (11.7)**	**B (C)**	**0.69 (0.79)**	-	-
WORST MOVEMENT		**NBTR (SBTR)**	**B (C)**	**0.69 (0.79)**	-	-

2029 Signalized Intersections

N1: 2029 Future Huntmar Drive at Hazeldean Road Traffic Operations

Movement	Volume	Delay (s)	LOS	V/C	Q50th	Q95th
EBL	250 (250)	57.6 (92.9)	B (E)	0.64 (0.92)	30.8 (~35.6)	43.3 (#62.9)
EBTR	975 (950)	35.1 (46.5)	C (D)	0.73 (0.86)	104.3 (115.5)	#167.9 (#153.6)
WBL	205 (400)	58.6 (73.4)	B (D)	0.6 (0.89)	25.3 (50.9)	37.4 (#79.1)
WBT	500 (1250)	29 (52.4)	A (E)	0.38 (0.95)	45.9 (156.6)	72.6 (#205.5)
WBR	130 (310)	6 (5.4)	A (A)	0.2 (0.41)	0 (3.1)	15 (22.2)
NBL	60 (170)	25.4 (88.9)	A (E)	0.24 (0.97)	9.7 (26.6)	17.1 (#68.7)
NBT	330 (395)	56.8 (53.4)	C (D)	0.79 (0.8)	77.6 (89.4)	101.7 (#129.1)
NBR	310 (300)	8.1 (10)	A (A)	0.55 (0.5)	1.8 (8.4)	23.8 (33.4)
SBL	155 (210)	35 (43.9)	A (C)	0.59 (0.77)	26.7 (33.6)	38.1 (#61.3)
SBT	325 (500)	42.1 (67.4)	B (E)	0.63 (0.94)	71.3 (118.4)	92.4 (#182.5)
SBR	140 (480)	2.9 (30.6)	A (C)	0.2 (0.76)	0 (75)	9.2 (115.8)
OVERALL	**3380 (5215)**	**35.0 (50.0)**	**C (E)**	**0.75 (0.94)**	-	-
WORST MOVEMENT		**NBT (NBL)**	**C (E)**	**0.79 (0.97)**	-	-

N3: 2029 Future Huntmar Drive at Maple Grove Road Traffic Operations

Movement	Volume	Delay (s)	LOS	V/C	Q50th	Q95th
EBL	310 (130)	34.4 (96.3)	B (E)	0.66 (0.92)	60.3 (25)	63.8 (#60.3)
EBTR	240 (215)	33.5 (47.5)	A (B)	0.47 (0.63)	46.9 (42.8)	56.1 (69.4)
WBL	65 (180)	28.5 (94.3)	A (E)	0.3 (0.94)	10.8 (35.8)	15.2 (#77.5)
WBTR	130 (290)	45.1 (72.4)	A (D)	0.59 (0.88)	22.1 (66.3)	39.2 (#112.1)
NBL	40 (125)	19.3 (62.7)	A (D)	0.12 (0.83)	4.4 (16.1)	14.2 (#57.1)
NBTR	740 (805)	28 (16.7)	A (A)	0.51 (0.45)	67.3 (58.6)	110.2 (74.6)
SBL	80 (110)	20.7 (12.5)	A (A)	0.26 (0.32)	9.1 (10.5)	24.3 (18.3)
SBT	395 (940)	30.3 (56.7)	A (E)	0.5 (0.99)	68.8 (222.6)	#131.3 (#320.3)
SBR	65 (285)	0.2 (9.7)	A (A)	0.09 (0.34)	0 (19.8)	0 (38.2)
OVERALL	**2065 (3080)**	**29.8 (45.2)**	**A (E)**	**0.56 (0.99)**	-	-
WORST MOVEMENT		**EBL (SBT)**	**B (E)**	**0.66 (0.99)**	-	-

N4: 2029 Future Huntmar Drive at Palladium Drive Traffic Operations

Movement	Volume	Delay (s)	LOS	V/C	Q50th	Q95th
EBL	35 (30)	17.1 (22.4)	A (A)	0.06 (0.12)	3.7 (4.1)	12 (10.9)
EBTR	480 (865)	11.1 (20.4)	A (D)	0.32 (0.88dr)	15.6 (48.3)	35.3 (73.1)
WBL	65 (250)	19.3 (59.8)	A (D)	0.16 (0.88)	9.7 (50.6)	m14.5 (m#102.0)
WBTR	145 (665)	18.7 (39.3)	A (A)	0.09 (0.51)	9.7 (79)	m14.8 (103.6)
NBL	515 (375)	122.1 (53.3)	F (E)	1.15 (0.92)	~115.1 (60.1)	#159.3 (#110.4)
NBT	370 (280)	32.7 (21.6)	A (A)	0.56 (0.34)	75 (43.2)	80.9 (58.8)
NBR	225 (135)	3.7 (3.2)	A (A)	0.32 (0.18)	0 (0)	12.7 (10.2)
SBL	105 (100)	59.8 (39.1)	B (A)	0.62 (0.37)	25 (20.2)	37.2 (35)
SBT	195 (390)	53.4 (59.9)	B (D)	0.63 (0.85)	46.5 (91.5)	59.3 (123.2)
SBR	55 (110)	0.8 (3.9)	A (A)	0.15 (0.23)	0 (0)	0 (8.5)
OVERALL	**2190 (3200)**	**46.8 (35.5)**	**F (E)**	**1.15 (0.92)**	-	-
WORST MOVEMENT		**NBL (NBL)**	**F (E)**	**1.15 (0.92)**	-	-

N5: 2029 Future Terry Fox Drive at Palladium Drive Traffic Operations

Movement	Volume	Delay (s)	LOS	V/C	Q50th	Q95th
EBL	320 (850)	61.9 (147.4)	C (F)	0.78 (1.21)	34.6 (~132.9)	#53.8 (#173.1)
EBT	65 (260)	51.6 (42.2)	A (A)	0.31 (0.59)	15.3 (54.3)	22.1 (70.4)
EBR	135 (405)	13.4 (43.9)	A (D)	0.45 (0.86)	1.6 (60.9)	9.4 (91.7)
WBL	65 (135)	48.9 (62.9)	A (B)	0.29 (0.62)	14.1 (31.8)	29.2 (#65.2)
WBT	120 (185)	53.4 (47.9)	A (A)	0.5 (0.54)	28.7 (41.3)	40.6 (59.4)
WBR	175 (150)	19.3 (10.7)	A (A)	0.55 (0.38)	9.6 (3.4)	27.3 (19.6)
NBL	420 (250)	58 (58.3)	B (B)	0.69 (0.62)	50.8 (33.4)	m#118.4 (m#65.9)
NBT	1420 (1165)	30.1 (57.3)	E (E)	0.9 (0.96)	144.4 (~161.4)	#261.3 (#217.3)
NBR	95 (100)	1.2 (5.3)	A (A)	0.13 (0.16)	0 (0.4)	m1.9 (m3.8)
SBL	100 (125)	60.8 (64.9)	A (A)	0.45 (0.56)	12.3 (15.3)	#24.9 (#35.6)
SBT	990 (1380)	43.1 (144.3)	D (F)	0.84 (1.22)	117.5 (~221.4)	146 (#265.9)
SBR	935 (715)	29.4 (10.7)	E (C)	0.95 (0.78)	74.8 (9)	#190.0 (57.9)
OVERALL	**4840 (5720)**	**37.5 (82.1)**	**E (F)**	**0.95 (1.22)**	-	-
WORST MOVEMENT		**SBR (SBT)**	**E (F)**	**0.95 (1.22)**	-	-

N6: 2029 Future Terry Fox Drive at Maple Grove Traffic Operations

Movement	Volume	Delay (s)	LOS	V/C	Q50th	Q95th
EBL	280 (195)	55.9 (51.7)	D (B)	0.81 (0.68)	64.1 (43)	84.7 (65.9)
EBT	65 (70)	27.6 (33.5)	A (A)	0.12 (0.16)	11.7 (13.3)	19.3 (24.2)
EBR	210 (385)	11.4 (54.2)	A (D)	0.4 (0.88)	11.4 (71.8)	27.1 (106.5)
WBL	35 (20)	26.8 (31.4)	A (A)	0.1 (0.06)	6.3 (3.7)	12.2 (9.7)
WBTR	105 (115)	14.4 (26.7)	A (A)	0.2 (0.26)	8.9 (16.8)	19.1 (31)
NBL	235 (255)	22.9 (79.9)	A (E)	0.57 (0.95)	25.2 (~52.3)	#70.2 (#128.4)
NBTR	1550 (1585)	29.8 (27.4)	D (D)	0.84 (0.82)	141.5 (175.9)	#293.3 (#244.6)
SBL	15 (70)	26.1 (22)	A (A)	0.1 (0.45)	2.2 (4.3)	m3.6 (m7.4)
SBT	905 (2030)	47.5 (77.1)	C **(F)**	0.79 (1.12)	80.4 (~305.3)	#147.2 (m#262.8)
SBR	120 (200)	18.9 (2.8)	A (A)	0.22 (0.25)	9.8 (2.2)	m15.9 (m2.2)
OVERALL	**3520 (4925)**	**33.9 (52.7)**	**D (F)**	**0.84 (1.12)**	-	-
WORST MOVEMENT		**NBTR (SBT)**	**D (F)**	**0.84 (1.12)**	-	-

A2: 2029 Future Huntmar Drive at Street 1 Traffic Operations

Movement	Volume	Delay (s)	LOS	V/C	Q50th	Q95th
EBL	25 (40)	25.5 (39)	A (A)	0.12 (0.28)	3 (6.8)	8.9 (15)
EBTR	20 (10)	0.1 (0.3)	A (A)	0.04 (0.04)	0 (0)	0 (0)
WBL	65 (40)	29.5 (38.7)	A (A)	0.32 (0.28)	8 (6.8)	17.9 (15)
WBTR	55 (45)	1 (0.8)	A (A)	0.16 (0.13)	0 (0)	0 (0)
NBL	30 (35)	5.2 (8.8)	A (A)	0.05 (0.22)	1 (1.3)	5 (8.3)
NBTR	975 (845)	14.2 (7.7)	C (A)	0.75 (0.59)	70.9 (49.6)	#210.7 (129.6)
SBL	15 (65)	5.9 (5.2)	A (A)	0.06 (0.16)	0.5 (2.3)	3.4 (9.7)
SBTR	550 (1225)	7 (18.1)	A (D)	0.43 (0.86)	26.1 (122.3)	67.3 (#321.9)
OVERALL	**1735 (2305)**	**11.8 (14.1)**	**C (D)**	**0.75 (0.86)**	-	-
WORST MOVEMENT		**NBTR (SBTR)**	**C (D)**	**0.75 (0.86)**	-	-

A6: 2029 Future Maple Grove Road at Street 1 Traffic Operations

Movement	Volume	Delay (s)	LOS	V/C	Q50th	Q95th
EBL	5 (15)	7.8 (7.3)	A (A)	0.01 (0.05)	0.2 (0.4)	1.8 (3.5)
EBT	375 (400)	12.8 (10.8)	A (A)	0.58 (0.52)	12.6 (13.6)	46.3 (47.9)
WBTR	375 (530)	12.7 (14.7)	A (C)	0.58 (0.71)	12.5 (19.5)	46.1 (69.2)
SBL	25 (20)	10.6 (12.6)	A (A)	0.06 (0.05)	1 (0.9)	5.2 (5.2)
SBR	5 (5)	7.2 (8.6)	A (A)	0.01 (0.01)	0 (0)	1.6 (1.9)
OVERALL	**785 (970)**	**12.6 (12.9)**	**A (C)**	**0.58 (0.71)**	-	-
WORST MOVEMENT		**EBT (WBTR)**	**A (C)**	**0.58 (0.71)**	-	-

Appendix F

TDM Checklists

Introduction

The City of Ottawa's *Transportation Impact Assessment (TIA) Guidelines* (specifically Module 4.3—Transportation Demand Management) requires proponents of qualifying developments to assess the context, need and opportunity for transportation demand management (TDM) measures at their development. The guidelines require that proponents complete the City's **TDM Measures Checklist**, at a minimum, to identify any TDM measures being proposed.

The remaining sections of this document are:

- Using the Checklist
- Glossary
- TDM Measures Checklist: Non-Residential Developments
- TDM Measures Checklist: Residential developments

Readers are encouraged to contact the City of Ottawa's TDM Officer for any guidance and assistance they require to complete this checklist.

Using the Checklist

The City's *TIA Guidelines* are designed so that *Module 3.1—Development-Generated Travel Demand*, *Module 4.1—Development Design*, and *Module 4.2—Parking* are complete before a proponent begins *Module 4.3—Transportation Demand Management*.

Within Module 4.3, *Element 4.3.1—Context for TDM* and *Element 4.3.2—Need and Opportunity* are intended to create an understanding of the need for any TDM measures, and of the results they are expected to achieve or support. Once those two elements are complete, proponents begin *Element 4.3.3—TDM Program* that requires proponents to identify proposed TDM measures using the **TDM Measures Checklist**, at a minimum. The *TIA Guidelines* note that the City may require additional analysis for large or complex development proposals, or those that represent a higher degree of performance risk; as well, proponents proposing TDM measures for a new development must also propose an implementation plan that addresses planning and coordination, funding and human resources, timelines for action, performance targets and monitoring requirements.

This **TDM Measures Checklist** document includes two actual checklists, one for non-residential developments (office, institutional, retail or industrial) and one for residential developments (multi-family, condominium or subdivision). Readers may download the applicable checklist in electronic format and complete it electronically, or print it out and complete it by hand. As an alternative, they may create a freestanding document that lists the TDM measures being proposed and provides additional detail on them, including an implementation plan as required by the City's *TIA Guidelines*.

Each measure in the checklist is numbered for easy reference. Each measure is also flagged as:

- BASIC —The measure is generally feasible and effective, and in most cases would benefit the development and its users.
- BETTER —The measure could maximize support for users of sustainable modes, and optimize development performance.
- ★ —The measure is one of the most dependably effective tools to encourage the use of sustainable modes.

Glossary

This glossary defines and describes the following measures that are identified in the **TDM Measures Checklist**:

TDM program management
- Program coordinator
- Travel surveys

Parking
- Priced parking

Walking & cycling
- Information on walking/cycling routes & destinations
- Bicycle skills training
- Valet bike parking

Transit
- Transit information
- Transit fare incentives
- Enhanced public transit service
- Private transit service

Ridesharing
- Ridematching service
- Carpool parking price incentives
- Vanpool service

Carsharing & bikesharing
- Bikeshare stations & memberships
- Carshare vehicles & memberships

TDM marketing & communications
- Multimodal travel information
- Personalized trip planning
- Promotions

Other incentives & amenities
- Emergency ride home
- Alternative work arrangements
- Local business travel options
- Commuter incentives
- On-site amenities

For further information on selecting and implementing TDM measures (particularly as they apply to non-residential developments, with a focus on workplaces), readers may find it helpful to consult Transport Canada's *Workplace Travel Plans: Guidance for Canadian Employers*, which can be downloaded in English and French from the ACT Canada website at www.actcanada.com/resources/act-resources.

▶ *TDM program management*

While some TDM measures can be implemented with a minimum of effort through routine channels (e.g. parking or human resources), more complex measures or a larger development site may warrant assigning responsibility for TDM program coordination to a designated person either inside or outside the implementing organization. Similarly, some TDM measures are more effective if they are targeted or customized for specific audiences, and would benefit from the collection of related information.

Program coordinator. This person is charged with day-to-day TDM program development and implementation. Only in very large employers with thousands of workers is this likely to be a full-time, dedicated position. Usually, it is added to an existing role in parking, real estate, human resources or environmental management. In practice, this role may be called TDM coordinator, commute trip reduction coordinator or employee transportation coordinator. The City of Ottawa can identify external resources (e.g. non-profit organizations or consultants) that could provide these services.

Travel surveys. Travel surveys are most commonly conducted at workplaces, but can be helpful in other settings. They identify how and why people travel the way they do, and what barriers and opportunities exist for different behaviours. They usually capture the following information:

- *Personal data* including home address or postal code, destination, job type or function, employment status (full-time, part-time and/or teleworker), gender, age and hours of work
- *Commute information* including distance or time for the trip between home and work, usual methods of commuting, and reasons for choosing them
- *Barriers and opportunities* including why other commuting methods are unattractive, willingness to consider other options, and what improvements to other options could make them more attractive

▶ *Parking*

Priced parking. Charging for parking is typically among the most effective ways of getting drivers to consider other travel options. While drivers may not support parking fees, they can be more accepting if the revenues are used to improve other travel options (e.g. new showers and change rooms, improved bicycle parking or subsidized transit passes). At workplaces or daytime destinations, parking discounts (e.g. early bird specials, daily passes that cost significantly less than the equivalent hourly charge, monthly passes that cost significantly less than the equivalent daily charge) encourage long-term parking and discourage the use of other travel options. For residential uses, unbundling parking costs from dwelling purchase, lease or rental costs provides an incentive for residents to own fewer cars, and can reduce car use and the costs of parking provision.

▶ *Walking & cycling*

Active transportation options like cycling and walking are particularly attractive for short trips (typically up to 5 km and 2 km, respectively). Other supportive factors include an active, health-conscious audience, and development proximity to high-quality walking and cycling networks. Common challenges to active transportation include rain, darkness, snowy or icy conditions, personal safety concerns, the potential for bicycle theft, and a lack of shower and change facilities for those making longer trips.

Information on walking/cycling routes & destinations. Ottawa, Gatineau and the National Capital Commission all publish maps to help people identify the most convenient and comfortable walking or cycling routes.

Bicycle skills training. Potential cyclists can be intimidated by the need to ride on roads shared with motor vehicles. This barrier can be reduced or eliminated by offering cycling skills training to interested cyclists (e.g. CAN-BIKE certification courses).

Valet bike parking. For large events, temporary “valet parking” areas can be easily set up to maximize convenience and security for cyclists. Experienced local non-profit groups can help.

▶ *Transit*

Transit information. Difficulty in finding or understanding basic information on transit fares, routes and schedules can prevent people from trying transit. Employers can help by providing online links to OC Transpo and STO websites. Transit users also appreciate visible maps and schedules of transit routes that serve the site; even better, a screen that shows real-time transit arrival information is particularly useful at sites with many transit users and an adjacent transit stop or station.

Transit fare incentives. Free or subsidized transit fares are an attractive incentive for non-transit riders to try transit. Many non-users are unsure of how to pay a fare, and providing tickets or a preloaded PRESTO card (or, for special events, pre-arranging with OC Transpo that transit fares are included with event tickets) overcome that barrier.

Enhanced public transit service. OC Transpo may adjust transit routes, stop locations, service hours or frequencies for an agreed fee under contract, or at no cost where warranted by the potential ridership increase. Information provided by a survey of people who travel to a given development can support these decisions.

Private transit service. At remote suburban or rural workplaces, a poor transit connection to the nearest rapid transit station can be an obstacle for potential transit users, and an employer in this situation could initiate a private shuttle service to make transit use more feasible or attractive. Other circumstances where a shuttle makes sense include large special events, or a residential development for people with limited independent mobility who still require regular access to shops and services.

▶ *Ridesharing*

Ridesharing's potential is greatest in situations where transit ridership is low, where parking costs are high, and/or where large numbers of car commuters (e.g. employees or full-time students) live reasonably far from the workplace.

Ridematching service. Potential carpoolers in Ottawa are served by www.OttawaRideMatch.com, an online service to help people find carpool partners. Employers can arrange for a dedicated portal where their employees can search for potential carpool partners only among their colleagues, if they desire. Some very large employers may establish internal ridematching services, to maximize employee uptake and corporate control. Ridematching service providers typically include a waiver to relieve employers of liability when their employees start carpooling through a ridematching service. Ridesharing with co-workers also tends to eliminate security concerns.

Carpool parking price incentives. Discounted parking fees for carpools can be an extra incentive to rideshare.

Vanpool service. Vanpools operate in the Toronto and Vancouver metropolitan areas, where vans that carry up to about ten occupants are driven by one of the vanpool members. Vanpools tend to operate on a cost-recovery basis, and are most practical for long-distance commutes where transit is not an option. Current legislation in Ontario does not permit third-party (i.e. private or non-profit) vanpool services, but does permit employers to operate internal vanpools.

▶ *Carsharing & bikesharing*

Bikeshare station & memberships. VeloGO Bike Share and Right Bike both operate bikesharing services in Ottawa. Developments that would benefit from having a bikeshare station installed at or near their development may negotiate directly with either service provider.

Carshare vehicles & memberships. VRTUCAR and Zipcar both operate carsharing services in Ottawa, for use by the general public or by businesses as an alternative to corporate fleets. Carsharing services offer 24-hour access, self-serve reservation systems, itemized monthly billings, and outsourcing of all financing, insurance, maintenance and administrative responsibilities.

▶ *TDM marketing & communications*

Multimodal travel information. Aside from mode-specific information discussed elsewhere in this document, multimodal information that identifies and explains the full range of travel options available to people can be very influential—especially when provided at times and locations where individuals are actively choosing among those options. Examples include: employees when their employer is relocating, or when they are joining a new employer; students when they are starting a program at a new institution; visitors or customers travelling to an unfamiliar destination, or when faced with new options (e.g. shuttle services or parking restrictions); and residents when they purchase or occupy a residence that is new to them.

Personalized trip planning. As an extension to the simple provision of information, this technique (also known as *individualized marketing*) is effective in helping people make more sustainable travel choices. The approach involves identifying who is most likely to change their travel choices (notably relocating employees, students or residents) giving them customized information, training and incentives to support them in making that change. It may be conducted with assistance from an external service provider with the necessary skills, and delivered in a variety of settings including workplaces and homes.

Promotions. Special events and incentives can raise awareness and encourage individuals to examine and try new travel options.

- *Special events* can help attract attention, build participation and celebrate successes. Events that have been held in Ottawa include Earth Day (in April) Bike to Work Month (in May), Environment Week (early June), International Car Free Day (September 22), and Canadian Ridesharing Week (October). At workplaces or educational institutions, similarly effective internal events could include workshops, lunch-and-learns, inter-departmental challenges, pancake breakfasts, and so on.
- *Incentives* can encourage trial of sustainable modes, and might include loyalty rewards for duration or consistency of activity (e.g. 1,000 km commuted by bicycle), participation prizes (e.g. for completing a survey or joining a special event), or personal recognition that highlights individual accomplishments.

▶ *Other incentives & amenities*

Emergency ride home. This measure assures non-driving commuters that they will be able to get home quickly and conveniently in case of family emergency (or in some workplaces, in case of unexpected overtime, severe weather conditions, or the early departure of a carpool driver) by offering a chit or reimbursement for taxi, carshare or rental car usage. Limits on annual usage or cost per employee may be set, although across North America the actual rates of usage are typically very low.

Alternative work arrangements. A number of alternatives to the standard 9-to-5, Monday-to-Friday workweek can support sustainable commuting (and work-life balance) at workplaces:

- *Flexible working hours* allow transit commuters to take advantage of the fastest and most convenient transit services, and allow potential carpoolers to include people who work slightly different schedules in their search for carpool partners. They also allow active commuters to travel at least one direction in daylight, either in the morning or the afternoon, during the winter.
- *Compressed workweeks* allow employees to work their required hours over fewer days (e.g. five days in four, or ten days in nine), eliminating the need to commute on certain days. For employees, this can promote work-life balance and gives flexibility for appointments. For employers, this can permit extended service hours as well as reduced parking demands if employees stagger their days off.
- *Telework* is a normal part of many workplaces. It helps reduce commuting activity, and can lead to significant cost savings through workspace sharing. Telework initiatives involve many stakeholders, and may face as much resistance as support within an organization. Consultation, education and training are helpful.

Local business travel options. A common obstacle for people who might prefer to not drive to work is that their employer requires them to bring a car to work so they can make business trips during the day. Giving employees convenient alternatives to private cars for local business travel during the workday makes walking, cycling, transit or carpooling in someone else's car more practical.

- *Walking and cycling*—Active transportation can be a convenient and enjoyable way to make short business trips. They can also reduce employer expenses, although they may require extra travel time. Providing a fleet of shared bikes, or reimbursing cyclists for the kilometres they ride, are inexpensive ways to validate their choice.
- *Public transit*—Transit can be convenient and inexpensive compared to driving. OC Transpo's PRESTO cards are transferable among employees and automatically reloadable, making them the perfect tool for enabling transit use during the day.
- *Ridesharin*g—When multiple employees attend the same off-site meeting or event, they can be reminded to carpool whenever possible.
- *Taxis or ride-hailing*—Taxis and ride-hailing can eliminate parking costs, save time and eliminate collision liability concerns. Taxi chits eliminate cash transactions and minimize paperwork.
    - *Fleet vehicles or carsharing*—Fleet vehicles can be cost-effective for high travel volumes, while carsharing is a great option for less frequent trips.
    - *Interoffice shuttles*—Employers with multiple worksites in the region could use a shuttle service to move people as well as mail or supplies.
    - *Videoconferencing*—New technologies mean that staying in the office to hold meetings electronically is more viable, affordable and productive than ever.

Commuter incentives. Financial incentives can help create a level playing field and support commuting by sustainable modes. A "commuting allowance" given to all employees as a taxable benefit is one such incentive; employees who choose to drive could then be charged for parking, while other employees could use the allowance for transit fares or cycling equipment, or for spending or saving. (Note that in the United States this practice is known as "parking cash-out," and is popular because commuting allowances are not taxable up to a certain limit). Alternatively, a monthly commuting allowance for non-driving employees would give drivers an incentive to choose a different commuting mode. Another practical incentive for active commuters or transit users is to offer them discounted "rainy day" parking passes for a small number of days each month.

On-site amenities. Developments that offer services to limit employees' need for a car during their commute (e.g. to drop off clothing at the dry cleaners) or during their workday (e.g. to buy lunch) can free employees to make the commuting decision that otherwise works best for them.

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

		TDM measures: *Residential developments*	Check if proposed & add descriptions
	1.	**TDM PROGRAM MANAGEMENT**	
	1.1	**Program coordinator**	
BASIC ★	1.1.1	Designate an internal coordinator, or contract with an external coordinator	☐
	1.2	**Travel surveys**	
BETTER	1.2.1	Conduct periodic surveys to identify travel-related behaviours, attitudes, challenges and solutions, and to track progress	☐
	2.	**WALKING AND CYCLING**	
	2.1	**Information on walking/cycling routes & destinations**	
BASIC	2.1.1	Display local area maps with walking/cycling access routes and key destinations at major entrances *(multi-family, condominium)*	☒ Routes and maps will be displayed inside apartment buildings.
	2.2	**Bicycle skills training**	
BETTER	2.2.1	Offer on-site cycling courses for residents, or subsidize off-site courses	☐
	3.	**TRANSIT**	
	3.1	**Transit information**	
BASIC	3.1.1	Display relevant transit schedules and route maps at entrances *(multi-family, condominium)*	☒ Routes and maps will be displayed inside apartment buildings.
BETTER	3.1.2	Provide real-time arrival information display at entrances *(multi-family, condominium)*	☐
	3.2	**Transit fare incentives**	
BASIC ★	3.2.1	Offer PRESTO cards preloaded with one monthly transit pass on residence purchase/move-in, to encourage residents to use transit	☐
BETTER	3.2.2	Offer at least one year of free monthly transit passes on residence purchase/move-in	☐
	3.3	**Enhanced public transit service**	
BETTER ★	3.3.1	Contract with OC Transpo to provide early transit services until regular services are warranted by occupancy levels *(subdivision)*	☒ OC Transpo already has plans to run a route through the subdivision.
	3.4	**Private transit service**	
BETTER	3.4.1	Provide shuttle service for seniors homes or lifestyle communities (e.g. scheduled mall or supermarket runs)	☐

	4.	**CARSHARING & BIKESHARING**	
	4.1	**Bikeshare stations & memberships**	
BETTER	4.1.1	Contract with provider to install on-site bikeshare station (*multi-family)*	☒ Client will contract with provider to install on-site bike share vehicles.
BETTER	4.1.2	Provide residents with bikeshare memberships, either free or subsidized *(multi-family)*	☐
	4.2	**Carshare vehicles & memberships**	
BETTER	4.2.1	Contract with provider to install on-site carshare vehicles and promote their use by residents	☒ Client will contract with provider to install on-site car share vehicles.
BETTER	4.2.2	Provide residents with carshare memberships, either free or subsidized	☐
	5.	**PARKING**	
	5.1	**Priced parking**	
BASIC ★	5.1.1	Unbundle parking cost from purchase price *(condominium)*	☒ Parking cost will not be bundled.
BASIC ★	5.1.2	Unbundle parking cost from monthly rent *(multi-family)*	☒ Parking cost will not be bundled.
	6.	**TDM MARKETING & COMMUNICATIONS**	
	6.1	**Multimodal travel information**	
BASIC ★	6.1.1	Provide a multimodal travel option information package to new residents	☒ Information package will be provided to new residents.
	6.2	**Personalized trip planning**	
BETTER ★	6.2.1	Offer personalized trip planning to new residents	☐

TDM Measures Checklist:
Non-Residential Developments (office, institutional, retail or industrial)

Legend

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

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

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

		TDM measures: *Non-residential developments*	Check if proposed & add descriptions
	1.	**TDM PROGRAM MANAGEMENT**	
	1.1	**Program coordinator**	
BASIC ★	1.1.1	Designate an internal coordinator, or contract with an external coordinator	☐
	1.2	**Travel surveys**	
BETTER	1.2.1	Conduct periodic surveys to identify travel-related behaviours, attitudes, challenges and solutions, and to track progress	☒ Travel surveys will be undertaken annually.
	2.	**WALKING AND CYCLING**	
	2.1	**Information on walking/cycling routes & destinations**	
BASIC	2.1.1	Display local area maps with walking/cycling access routes and key destinations at major entrances	☒ Routes and maps will be displayed in workplaces
	2.2	**Bicycle skills training**	
		Commuter travel	
BETTER ★	2.2.1	Offer on-site cycling courses for commuters, or subsidize off-site courses	☐
	2.3	**Valet bike parking**	
		Visitor travel	
BETTER	2.3.1	Offer secure valet bike parking during public events when demand exceeds fixed supply (e.g. for festivals, concerts, games)	☐

			TDM measures: *Non-residential developments*	Check if proposed & add descriptions
		3.	**TRANSIT**	
		3.1	**Transit information**	
BASIC		3.1.1	Display relevant transit schedules and route maps at entrances	☒ Schedules will be displayed inside workplaces.
BASIC		3.1.2	Provide online links to OC Transpo and STO information	☒ Flyers will be available, pointing employees to links.
BETTER		3.1.3	Provide real-time arrival information display at entrances	☐
		3.2	**Transit fare incentives**	
			Commuter travel	
BETTER		3.2.1	Offer preloaded PRESTO cards to encourage commuters to use transit	☐
BETTER	★	3.2.2	Subsidize or reimburse monthly transit pass purchases by employees	☒ Transit ridership will be encouraged through subsidies.
			Visitor travel	
BETTER		3.2.3	Arrange inclusion of same-day transit fare in price of tickets (e.g. for festivals, concerts, games)	☐
		3.3	**Enhanced public transit service**	
			Commuter travel	
BETTER		3.3.1	Contract with OC Transpo to provide enhanced transit services (e.g. for shift changes, weekends)	☐
			Visitor travel	
BETTER		3.3.2	Contract with OC Transpo to provide enhanced transit services (e.g. for festivals, concerts, games)	☐
		3.4	**Private transit service**	
			Commuter travel	
BETTER		3.4.1	Provide shuttle service when OC Transpo cannot offer sufficient quality or capacity to serve demand (e.g. for shift changes, weekends)	☐
			Visitor travel	
BETTER		3.4.2	Provide shuttle service when OC Transpo cannot offer sufficient quality or capacity to serve demand (e.g. for festivals, concerts, games)	☐

		TDM measures: *Non-residential developments*	Check if proposed & add descriptions
	4.	**RIDESHARING**	
	4.1	**Ridematching service**	
		Commuter travel	
BASIC ★	4.1.1	Provide a dedicated ridematching portal at OttawaRideMatch.com	☐
	4.2	**Carpool parking price incentives**	
		Commuter travel	
BETTER	4.2.1	Provide discounts on parking costs for registered carpools	☐
	4.3	**Vanpool service**	
		Commuter travel	
BETTER	4.3.1	Provide a vanpooling service for long-distance commuters	☐
	5.	**CARSHARING & BIKESHARING**	
	5.1	**Bikeshare stations & memberships**	
BETTER	5.1.1	Contract with provider to install on-site bikeshare station for use by commuters and visitors	☒ Cycling mode share will be increased by providing a bikeshare station on-site
		Commuter travel	
BETTER	5.1.2	Provide employees with bikeshare memberships for local business travel	☒ Businesses can provide employees with memberships at a subsidized cost.
	5.2	**Carshare vehicles & memberships**	
		Commuter travel	
BETTER	5.2.1	Contract with provider to install on-site carshare vehicles and promote their use by tenants	☐
BETTER	5.2.2	Provide employees with carshare memberships for local business travel	☐
	6.	**PARKING**	
	6.1	**Priced parking**	
		Commuter travel	
BASIC ★	6.1.1	Charge for long-term parking (daily, weekly, monthly)	☐
BASIC	6.1.2	Unbundle parking cost from lease rates at multi-tenant sites	☒ This will encourage lower car ownership while not discouraging visitors.
		Visitor travel	
BETTER	6.1.3	Charge for short-term parking (hourly)	☐

			TDM measures: *Non-residential developments*	Check if proposed & add descriptions
		7.	**TDM MARKETING & COMMUNICATIONS**	
		7.1	**Multimodal travel information**	
			Commuter travel	
BASIC	★	7.1.1	Provide a multimodal travel option information package to new/relocating employees and students	☒ Package to be provided to new employees.
			Visitor travel	
BETTER	★	7.1.2	Include multimodal travel option information in invitations or advertising that attract visitors or customers (e.g. for festivals, concerts, games)	☐
		7.2	**Personalized trip planning**	
			Commuter travel	
BETTER	★	7.2.1	Offer personalized trip planning to new/relocating employees	☐
		7.3	**Promotions**	
			Commuter travel	
BETTER		7.3.1	Deliver promotions and incentives to maintain awareness, build understanding, and encourage trial of sustainable modes	☐
		8.	**OTHER INCENTIVES & AMENITIES**	
		8.1	**Emergency ride home**	
			Commuter travel	
BETTER	★	8.1.1	Provide emergency ride home service to non-driving commuters	☐
		8.2	**Alternative work arrangements**	
			Commuter travel	
BASIC	★	8.2.1	Encourage flexible work hours	☒ Will assist with reducing vehicle trips.
BETTER		8.2.2	Encourage compressed workweeks	☒ Will assist with reducing vehicle trips.
BETTER	★	8.2.3	Encourage telework	☒ Will assist with reducing vehicle trips.
		8.3	**Local business travel options**	
			Commuter travel	
BASIC	★	8.3.1	Provide local business travel options that minimize the need for employees to bring a personal car to work	☐
		8.4	**Commuter incentives**	
			Commuter travel	
BETTER		8.4.1	Offer employees a taxable, mode-neutral commuting allowance	☐
		8.5	**On-site amenities**	
			Commuter travel	
BETTER		8.5.1	Provide on-site amenities/services to minimize mid-day or mid-commute errands	☒ On-site commercial facilities will be provided.