927 March Road

Transportation Impact Assessment

Strategy Report

11 November 2020

Prepared for:

Brigil

Prepared by:

Stantec Consulting Ltd.

Certification

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

2. I have a sound knowledge of industry standard practice with respect to the preparation of transportation impact assessment reports, including multi modal level of service review;

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

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

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1.0 SCREENING

1.1 SUMMARY OF DEVELOPMENT

Municipal Address	**927 March Road**
Description of Location	Kanata North Urban Expansion Area – Southwest Quadrant
Land Use Classification	Residential, Commercial, Institutional
Development Size (units)	35 Single Family Homes, 78 townhomes, and 1,838 Apartment Units
Development Size (m^2)	Commercial: 6,100m^2
Number of Accesses and Locations	3 Access points: Street A to March Road, Street A to Halton Terrace, and Street D to March Road
Phase of Development	7 Phases Total
Buildout Year	2034

If available, please attach a sketch of the development or site plan to this form.

1.2 TRIP GENERATION TRIGGER

Considering the development's land use type and size (as filled out in the previous section), please refer to the Trip Generation Trigger checks below.

Land Use Type	Minimum Development Size	Triggered
Single-family homes	40 units	✘
Townhomes or apartments	90 units	✓
Office	3,500 m^2	✘
Industrial	5,000 m^2	✘
Fast-food restaurant or coffee shop	100 m^2	✘
Destination retail	1,000 m^2	✓
Gas station or convenience market	75 m^2	✘

** If the development has a land use type other than what is presented in the table above, estimates of person-trip generation may be made based on average trip generation characteristics represented in the current edition of the Institute of Transportation Engineers (ITE) Trip Generation Manual.*

If the proposed development size is greater than the sizes identified above, the Trip Generation Trigger is satisfied.

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?	✓	
Is the development in a Design Priority Area (DPA) or Transit-oriented Development (TOD) zone? *		✗

**DPA and TOD are identified in the City of Ottawa Official Plan (DPA in Section 2.5.1 and Schedules A and B; TOD in Annex 6). See Chapter 4 for a list of City of Ottawa Planning and Engineering documents that support the completion of TIA).*

If any of the above questions were answered with 'Yes,' the Location Trigger is satisfied.

1.4 SAFETY TRIGGERS

	Yes	No
Are posted speed limits on a boundary street 80 km/hr or greater?	✓	
Are there any horizontal/vertical curvatures on a boundary street limits sight lines at a proposed driveway?		✗
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)?		✗
Is the proposed driveway within auxiliary lanes of an intersection?		✗
Does the proposed driveway make use of an existing median break that serves an existing site?		✗
Is there a documented history of traffic operations or safety concerns on the boundary streets within 500 m of the development?		✗
Does the development include a drive-thru facility?		✗

If any of the above questions were answered with 'Yes,' the Safety Trigger is satisfied.

1.5 SUMMARY

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

If none of the triggers are satisfied, the TIA Study is complete. If one or more of the triggers is satisfied, the TIA Study must continue into the next stage (Screening and Scoping).

2.0 SCOPING

2.1 EXISTING AND PLANNED CONDITIONS

2.1.1 Proposed Development

Brigil is proceeding with an application for Plan of Subdivision and Zoning By-Law Amendment for their proposed development located at 927 March Road in the City of Ottawa's Kanata North community. The subject development encompasses the southwest quadrant of the Kanata North Urban Expansion Area (KNUEA). It is bound by existing residential dwellings to the west, undeveloped land to the north (future Claridge residential development), March Road to the east, and undeveloped land / Old Carp Road to the south.

Figure 1 illustrates the location the subject development in relation to the KNUEA boundary.

The subject site is currently zoned as Rural Countryside (RU) Zone; the purpose of the RU Zone, according to the City of Ottawa Official Plan, is to:

- "Accommodate agricultural, forestry, country residential lots created by severance and other land use characteristics of Ottawa's countryside, in areas designated as General Rural Area, Rural Natural Features and Greenbelt Rural in the Official Plan;
- Recognize and permit this range of rural-based land uses which often have large lot or distance separation requirements; and
- Regulate various types of development in manners that ensure compatibility with adjacent land uses and respect the rural context."

As part of the Zoning By-Law Amendment, the subject lands are proposed to be rezoned to permit the proposed land uses illustrated in the concept plan in **Figure 2** below.

The subdivision is proposed to include 35 single family homes, 78 townhomes, 1,838 apartment units, and 6,100m^2 of commercial space. The development is currently planned to be constructed in seven phases, starting with the mixed-use component along March Road. The proposed phasing plan can be seen in **Figure 3** below.

Figure 1 - Site Location

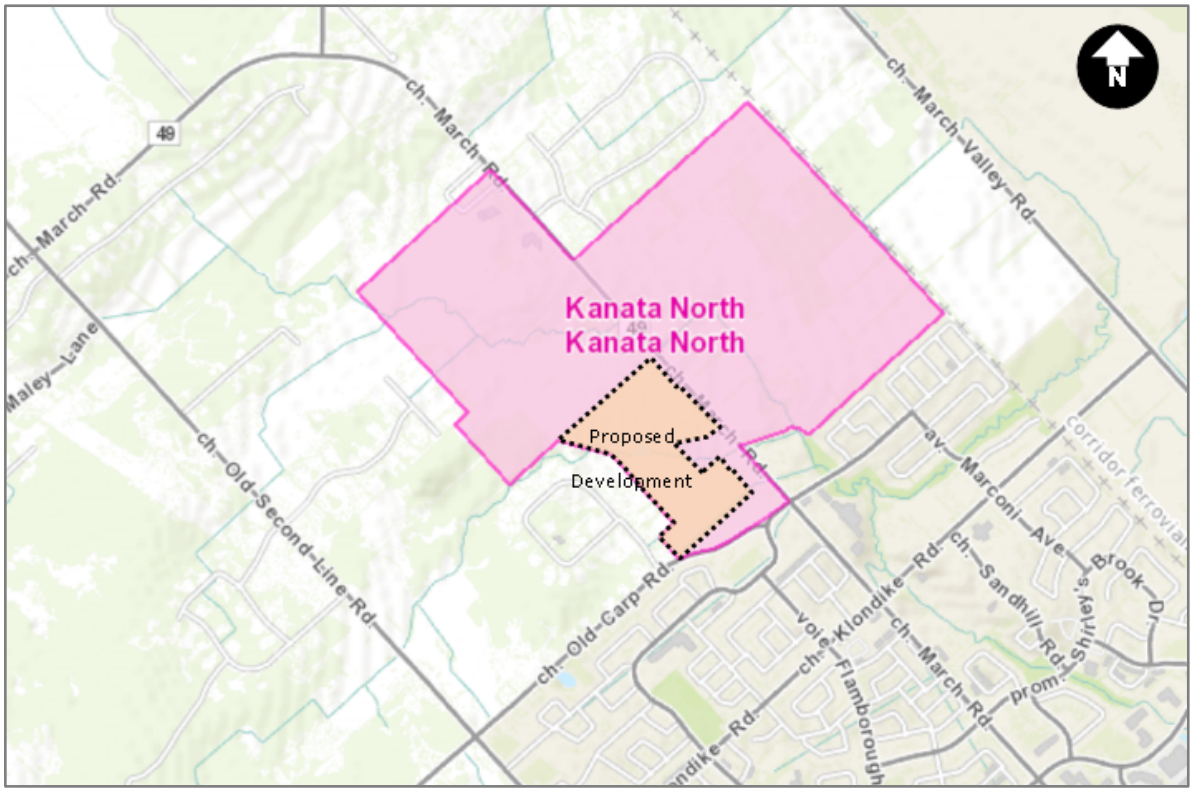


Figure 2 - Proposed Concept Plan

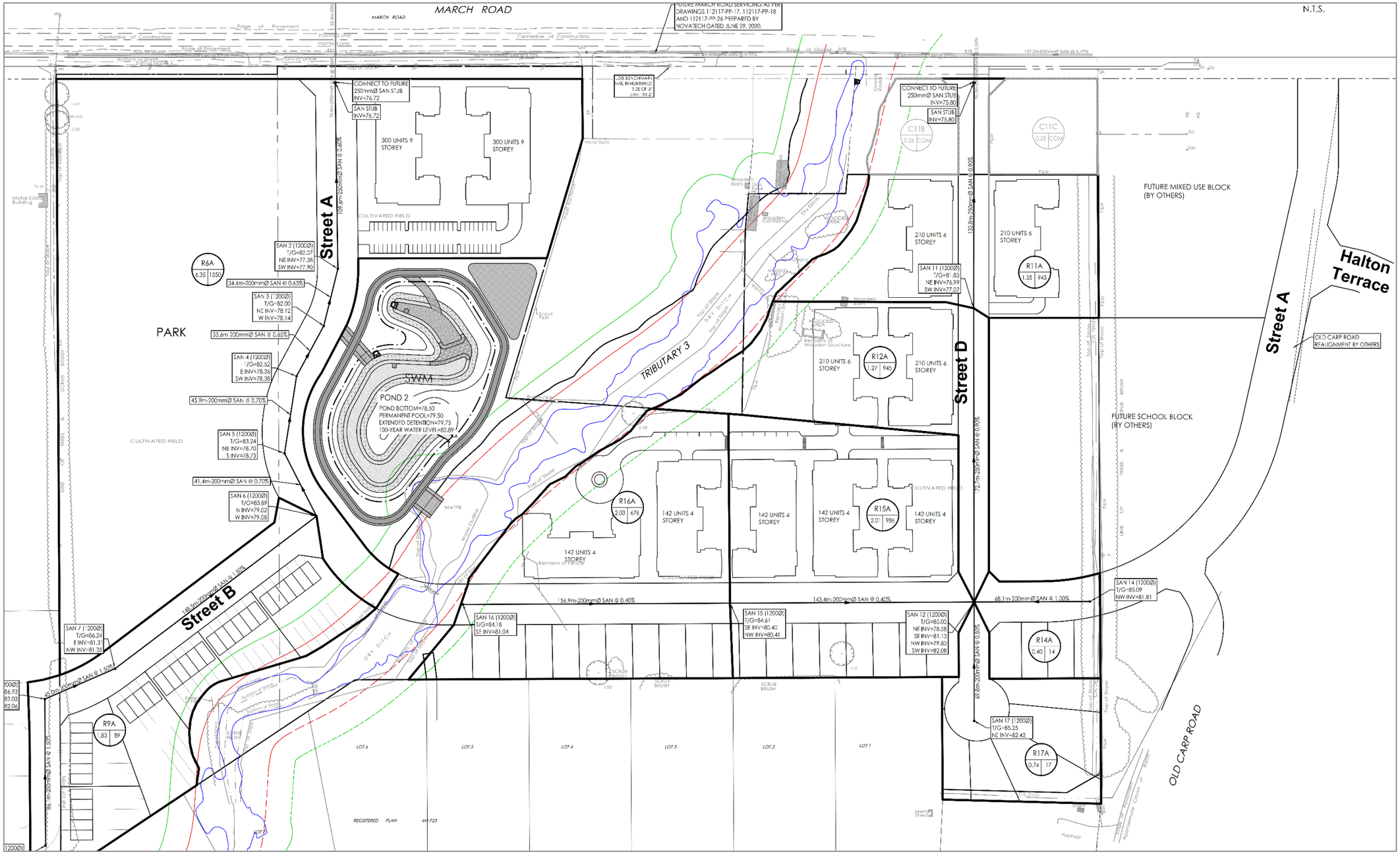
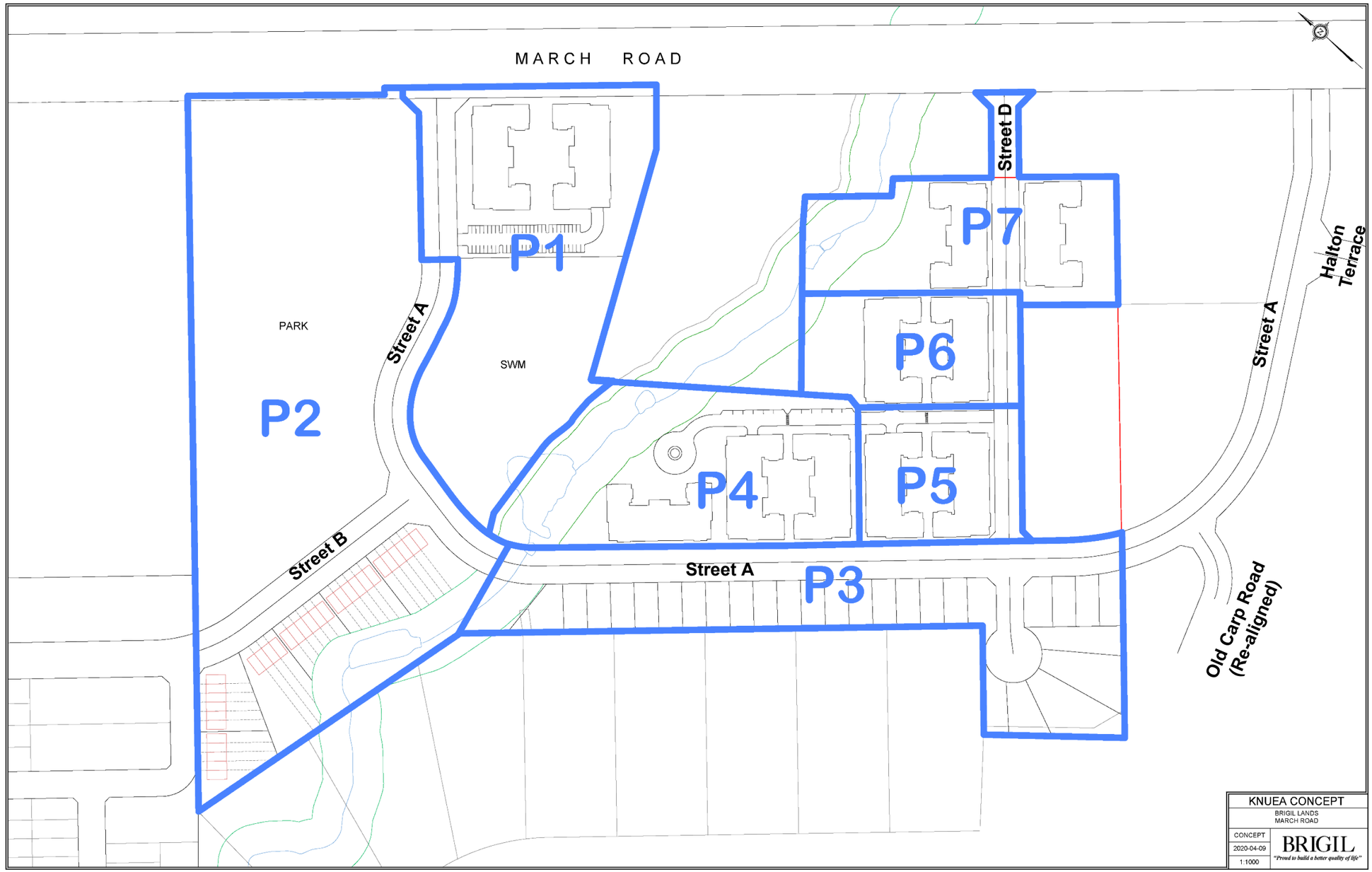


Figure 3 - Proposed Phasing Plan



The build-out years for each phase is outlined in **Table 1** below. The entire development is anticipated to be fully built and occupied by 2034. It is noted that in addition to the units specified in the **Table 1** below, the phasing details for additional units (7 single homes, 45 townhomes, and 38 apartment units) are still unknown and have been considered to be part of the last development phase by 2034.

Table 1 - Build-Out Per Phase

Phase	Size	Build-Out Year
1	Mixed-Use Block (2 mid-rise residential buildings, 600 units, SWM Pond Block)	2022
2	Park Block, Townhouses (33 units)	2024
3	Singles Block (28 units)	2026
4	Condo Block Part 1 (3 low-rise residential apartments, 336 units)	2028
5	Condo Block Part 2 (2 low-rise residential apartments, 224 units)	2030
6	Condo Block Part 3 (2 low-rise residential apartments, 320 units)	2032
7	Condo Block Part 4 (2 low-rise residential apartments, 320 units)	2034

Table 2 outlines the proposed land uses assumed for the analysis to forecast the trips generated by the proposed development which were obtained from the *Institute of Transportation Engineers Trip Generation Manual, 9th Edition*. These land use codes are consistent with those used in the approved *Kanata North Community Design Plan Transportation Master Plan* (Novatech, June 2016).

Table 2 - Proposed Land Uses / Land Use Codes

Land Use	Size	Land Use Code (LUC)
LUC 210	35 units	Single-Family Detached
LUC 230	78 units	Townhomes
LUC 220	1,838 Units	Mid-Rise Apartments
LUC 826	6,100 m^2 (~65,600 ft^2)	Specialty Retail

Primary access to the proposed development will be achieved via three new connections. Street A will connect to both March Road and Halton Terrace and Street D will connect to March Road. These new connections are illustrated in **Figure 2** above.

As illustrated in the *Kanata North Community Design Plan Transportation Master Plan* (Novatech 2016), the intersection of March Road at Street A will be signalized and the intersection with March Road at Street D will operate as a right-in / right-out only intersection and will be stop-controlled along the Street D approach.

No turning restrictions are proposed at any of the access locations and the type of traffic control at intersections will be determined during subsequent steps of the TIA process.

2.1.2 Existing Conditions

2.1.2.1 Roads and Traffic Control

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

March Road — Across the frontage of the subject development, March Road is a municipal two-lane arterial road that transitions from an urban cross-section south of the development to a rural cross-section heading north. Gravel shoulders are provided along both sides of the road. For the most part, March Road across the frontage of the proposed development has a posted speed limit of 80 km/h, however, in front of St. Isidore School, just north of the proposed development, the speed limit drops to 60km/h when the flashing lights are on, likely during school drop off and pick up.

Dunrobin Road — Dunrobin Road is a municipal two-lane arterial road with a rural cross-section and a posted speed limit of 60 km/h. Paved shoulders are provided along both sides of the road. The intersection with March Road is signalized and auxiliary turning lanes are provided in all directions.

Maxwell Bridge Road — Maxwell Bridge Road is a municipal two-lane collector road with an urban cross-section. In the absence of a posted speed limit, the default speed limit along this road is 50 km/h. Sidewalks and boulevards are provided along both sides of the Road. Maxwell Bridge Road makes up the east leg of the March Road at Maxwell Bridge Road / Halton Terrace intersection. The intersection with March Road is signalized. Left turn auxiliary lanes are provided in all directions and right turn auxiliary lanes are provided along March Road.

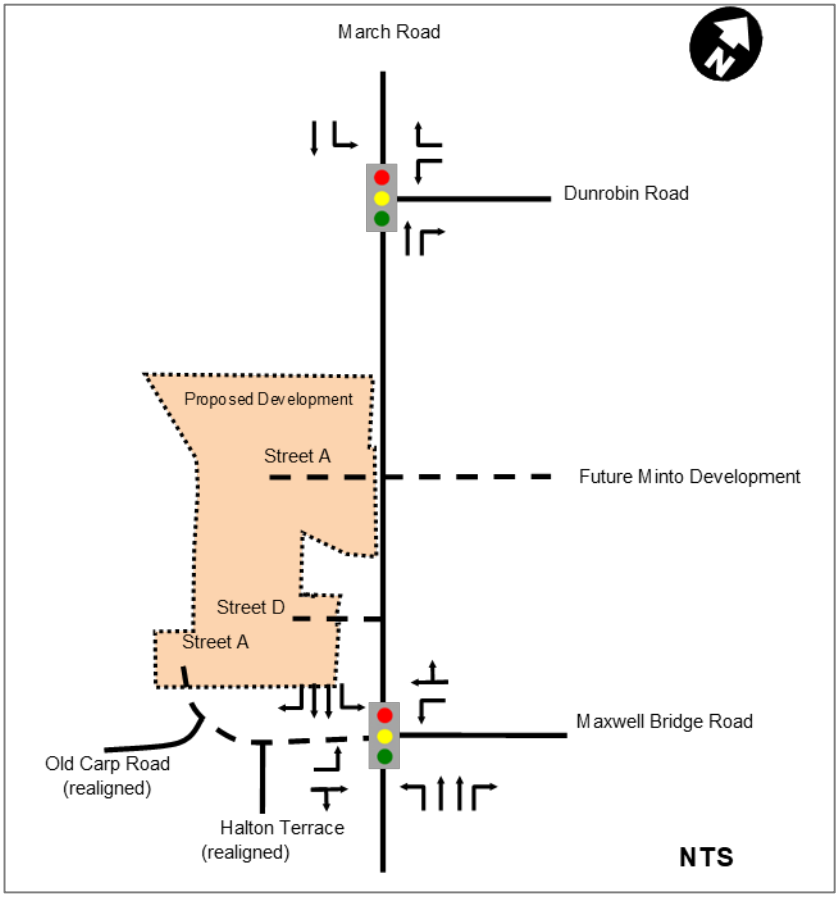
Halton Terrace — Halton Terrace is a municipal two-lane collector road with an urban cross-section and a posted speed limit of 40 km/h. Sidewalks are provided along both sides of the road. Halton Terrace makes up the west leg of the March Road at Maxwell Bridge Road / Halton Terrace intersection.

Old Carp Road — Old Carp Road is a two-lane collector road with a rural cross-section and a posted speed limit of 40 km/h. Gravel shoulders are provided along both sides of the road. The intersection with Halton Terrace is stop-controlled along the Old Carp Road approach.

There are a few existing residential and commercial driveways along March Road within 200m of the proposed site accesses. Just south of the intersection with Halton Terrace, March Road connects to commercial driveways on the east side of the roadway. North of the intersection, there are numerous commercial and residential driveways on the east and west sides of the roadway.

Figure 4 illustrates the existing lane configuration and traffic control.

Figure 4 - Existing Lane Configuration and Traffic Control



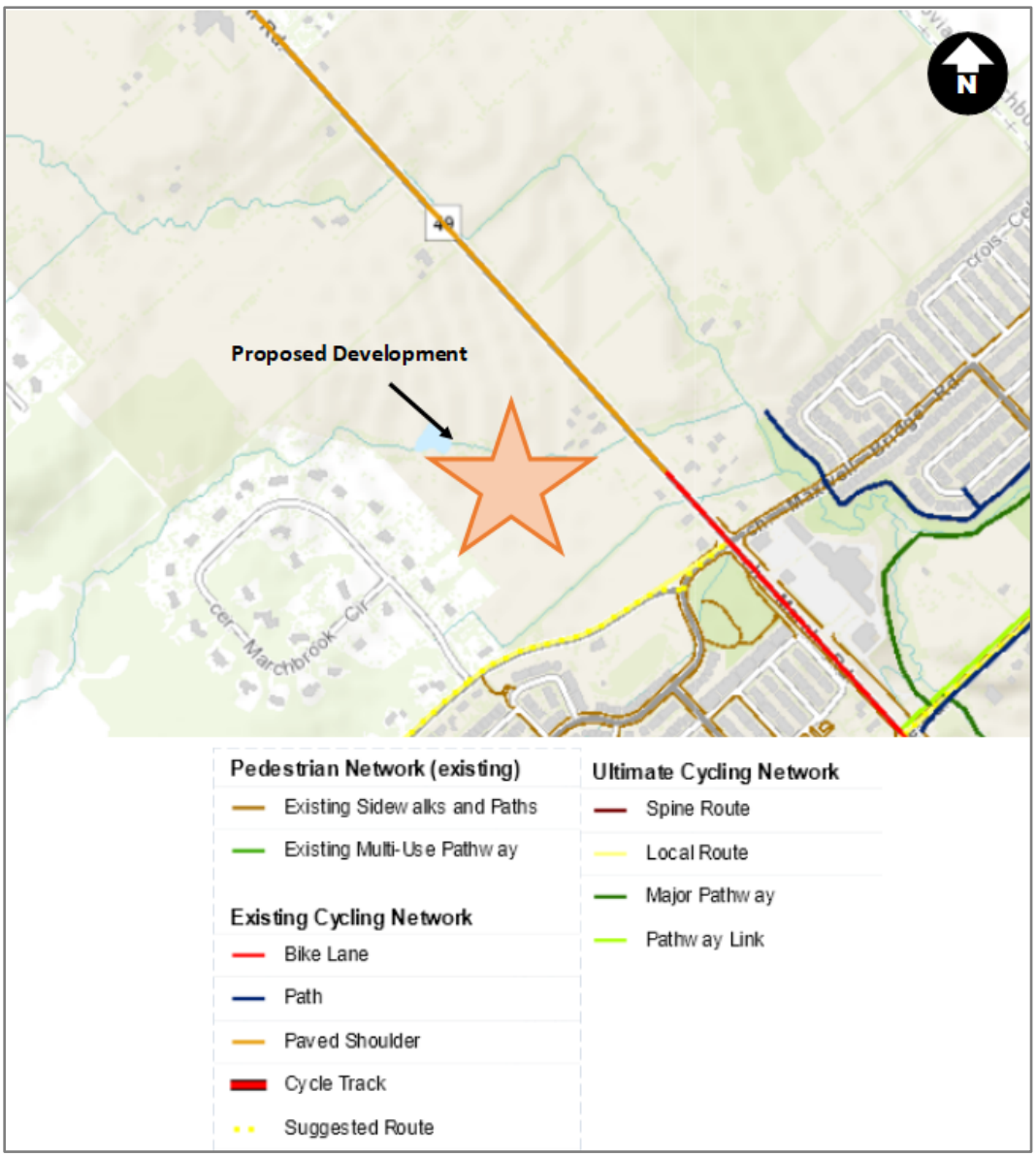
2.1.2.2 Walking and Cycling

March Road currently includes sidewalks along both sides of the road, starting approximately 100m north of the Halton Terrace intersection extending south. Halton Terrace currently includes sidewalks along both sides of the road in the vicinity of the subject development.

In terms of cycling facilities, March Road currently includes on-street bicycle lanes along both sides of the road starting approximately 100m north of the Halton Terrace intersection extending south. At the termination of the bicycle lanes, the cycling facilities transition to paved shoulders. Old Carp Road/Halton Terrace are suggested cycling routes and are also identified in the Ultimate Cycling Plan as local cycling routes. There are no existing dedicated cycling facilities along either roadway.

Figure 5 illustrates the existing cycling infrastructure within the vicinity of the study area.

Figure 5 – Existing Cycling Infrastructure



Source: Geo Ottawa Maps, accessed April 2020

2.1.2.3 Transit

The northern limit of the current transit system currently terminates at the March Road at Halton Terrace / Maxwell Bridge Road intersection, which is approximately 350m away from the subject development. Transit routes 63, 64, and 266 are currently serviced at this intersection.

Route 63 is a Rapid route that runs seven days per week between Kanata North and Tunney's Pasture Station. During the peak hours, it runs with approximate 30-minute headways.

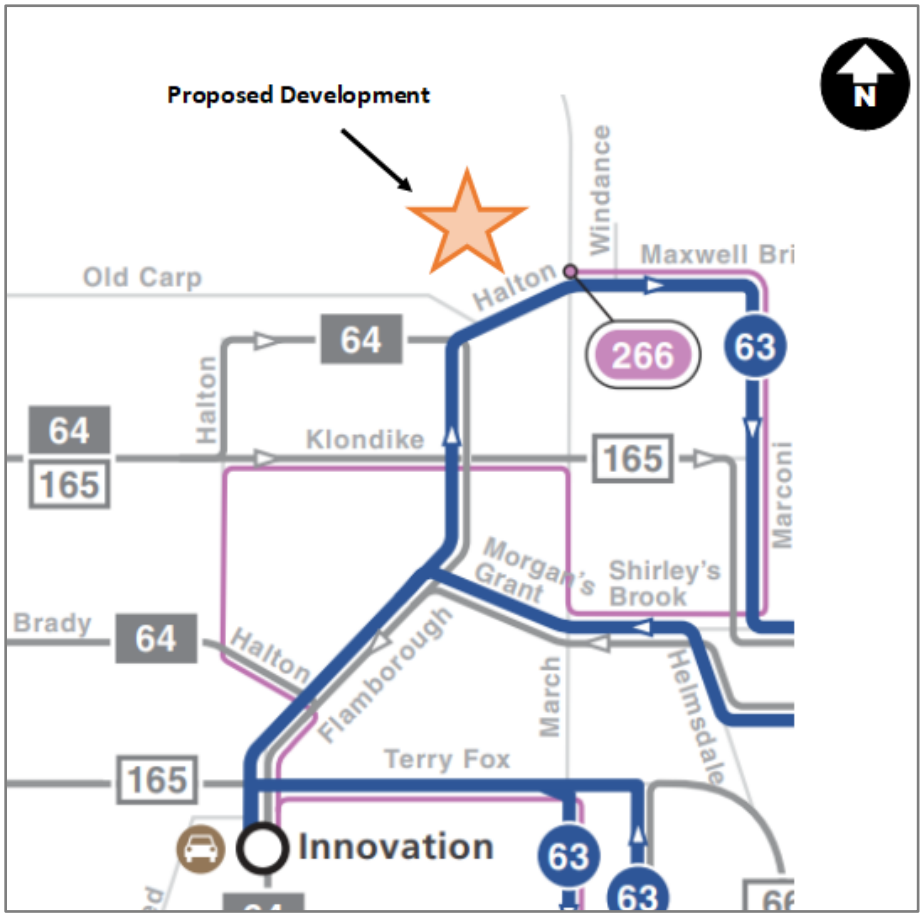
Route 64 is a Local route that runs from Monday to Friday between Morgan's Grant and Tunney's Pasture Station. During the peak hours, it runs with approximate 30-minute headways.

Route 266 is a Connexion route that runs between Kanata North and Tunney's Pasture Station during the weekday peak periods only.

It is noted that the aforementioned headways are atypical as a result of the service levels due to the COVID-19 pandemic at the time of this report. Service is expected to improve after the current state of emergency is lifted.

Figure 6 illustrates nearby transit routes and closest transit stops.

Figure 6 - Study Area Transit Routes and Stops



Source: OC Transpo System Map, accessed April 2020

2.1.2.4 Traffic Management Measures

There are flex stakes in the median along Halton Terrace and Maxwell Bridge Road intended as traffic calming measures.

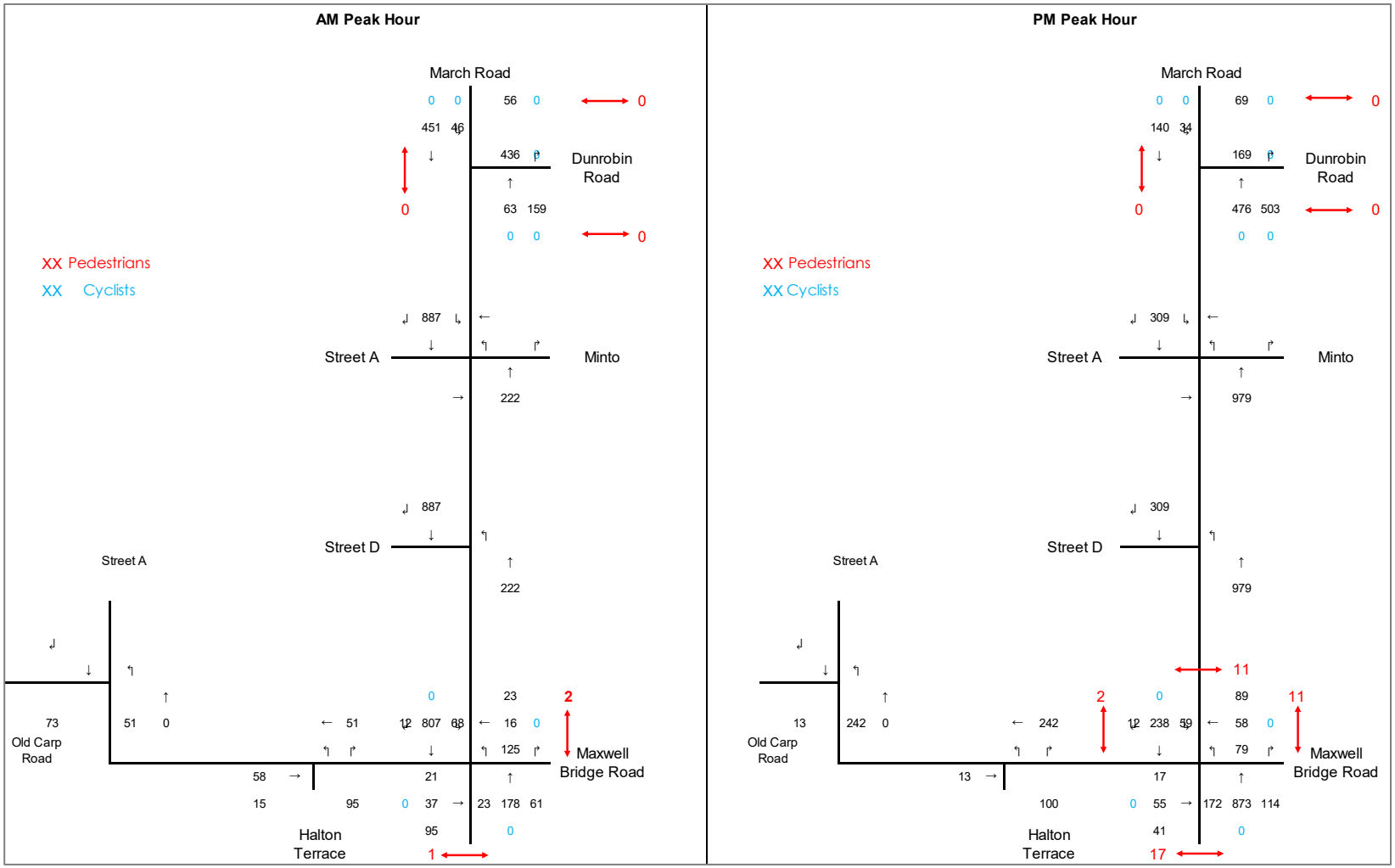
2.1.2.5 Traffic Volumes

Turning movement counts at the March Road at Dunrobin Road and March Road at Maxwell Bridge Road / Halton Terrace intersections were obtained from the City of Ottawa. These traffic counts were collected in January and March 2020, respectively. A count collected in 2019 was also obtained at the Halton Terrance and Flamborough Way intersection. The 2019 count was adjusted to 2020 volumes using a background growth rate of 0.5%. This background growth rate was obtained from the recently approved *Kanata North Community Design Plan Transportation Master Plan* (Novatech, June 2016).

Figure 7 illustrates the existing 2020 traffic volumes during the AM and PM peak hours.

Appendix A contains the traffic data and is provided for reference.

Figure 7 - 2020 Existing Traffic Volumes



2.1.2.6 Collision History

Collision data was provided by the City of Ottawa for the period January 2014 to December 2018 in the vicinity of the subject site. The data was reviewed to determine if any intersections or road segments exhibited an identifiable collision pattern during the five (5) year period.

Table 3 summarizes the collision class and impact types for each road segment and intersection within the study area.

Table 3 – Collision Summary

		Dunrobin at March	March at Maxwell Bridge / Halton	March at Maxwell	March between Dunrobin and Murphy	March between Murphy and Maxwell	March between Maxwell and Maxwell Bridge / Halton
Classification	Property Damage Only	16	7	1	21	3	18
	Non-Fatal Injury	2	3	1	5	2	4
Collision Type	Sideswipe	3	3	0	0	0	3
	Angle / Turning	9	6	1	2	1	1
	Rear End	4	0	1	1	1	5
	Single Motor Vehicle	2	1	0	21	2	13
	Other	0	0	0	2	1	0
Event	Other Motor Vehicle	16	9	2	4	2	9
	Ran off Road	2	0	0	1	0	2
	Pedestrian	0	0	0	0	0	0
	Skidding	0	1	0	2	1	0
	Wild Animal	0	0	0	18	2	9
	Physical (culvert, pole, barrier)	0	0	0	1	0	2
	Other	0	0	0	0	0	0

Based on the collision data summarized in **Table 3** above, it was found that the majority of the collisions resulted in property damage only (80%), which suggests that the collisions were low enough speeds to not cause injury to people. At the three intersections with March Road, the leading collision type was found to be turning / angle collisions (53%), which is a common finding at intersections. It is observed that at the three intersections, 90% of collisions involved another motor vehicle. On the other hand, along roadway segments, the most common event in reported collisions were involved animals (55%), followed by another motor vehicle (28%).

2.1.3 Planned Conditions

2.1.3.1 Road Network Modifications

Table 4 identifies the City of Ottawa Transportation Master Plan (TMP) projects located in the vicinity of the study area.

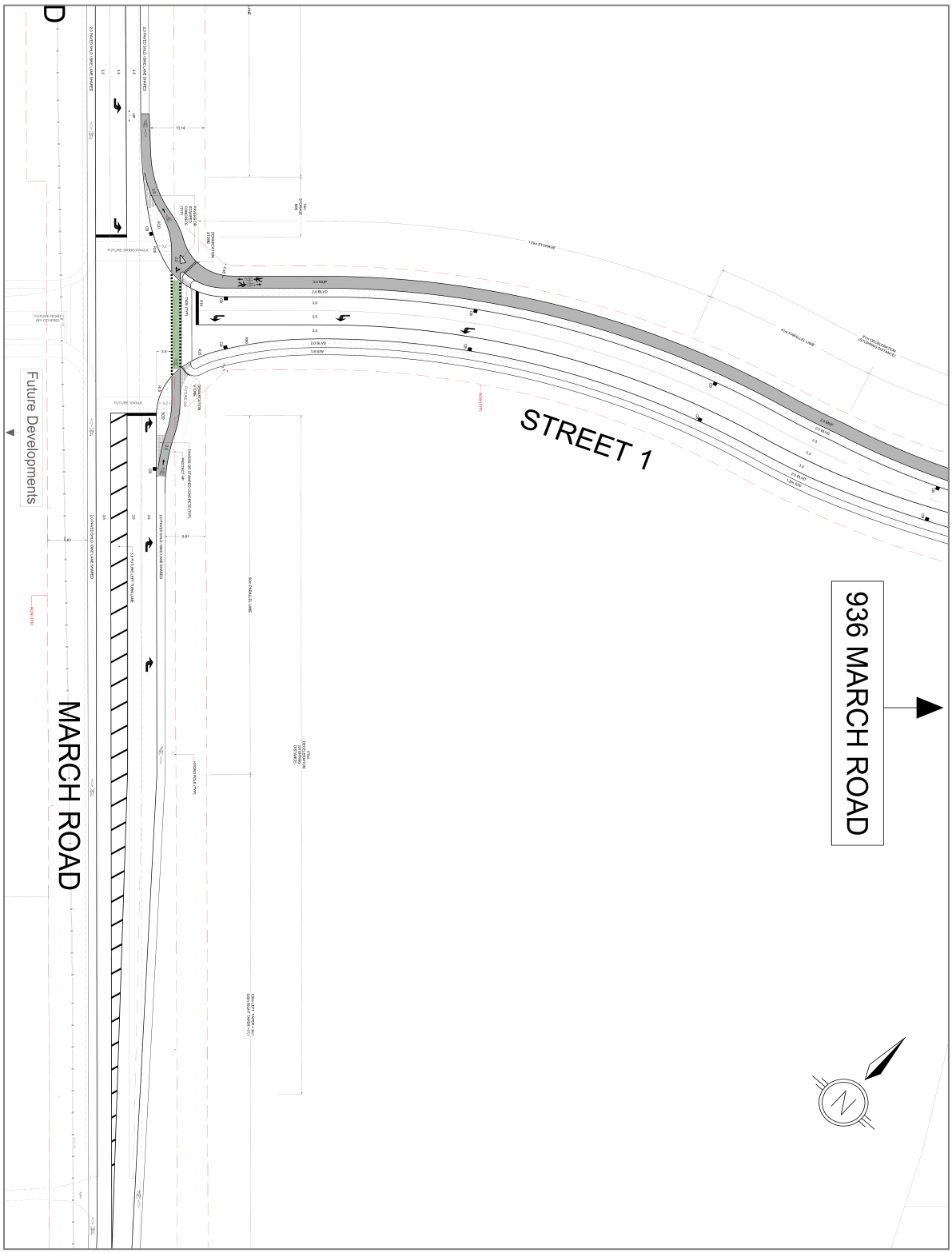
Table 4 - City of Ottawa Transportation Master Plan Projects

Project	Description	TMP Phase
March Road Widening	Widen from two to four lanes between Old Carp Road (Halton Terrace) and Dunrobin Road.	Network Concept (i.e. beyond 2031) (assumed implementation by the 2039 ultimate horizon year)
March Road Transit	Transit signal priority and queue jump lanes between Maxwell Bridge Road and Carling Avenue. Allows for future conversion to BRT at a later time to connect with planned BRT south of Carling Avenue.	Affordable Network (assumed implementation by the 2034 buildout horizon year)
	At-grade BRT between Maxwell Bridge Road and Highway 417 with a potential northward expansion to Dunrobin Road.	Network Concept (i.e beyond 2031) (assumed implementation after the 2039 ultimate horizon year)

Two transportation projects listed in **Table 4** above have undefined timelines, the widening of March Road between Halton Terrace (future Street A) and Dunrobin Road as well as an at-grade BRT system between Maxwell Bridge/Halton Terrace (future Street A) and Highway 417 to the south, with the potential for a northward expansion to Dunrobin Road. For the purpose of analysis, and per communications with the City of Ottawa, the at-grade BRT system was not assumed to be in place for the subject transportation impact study (i.e., it is assumed it will not be in place by the 2039 horizon time period). It was assumed that the transit signal priority lanes between Maxwell Bridge Road (future Street A) and Carling Avenue to the south would be in place by 2034, while the widening of March Road between Halton Terrace/Maxwell Bridge Road (future Street A) and Dunrobin Road was assumed to be in place by the 2039 ultimate horizon year (per communications with the City of Ottawa). These works were assumed to be necessitated by the increasing population in the area synonymous with the construction of all four KNUEA quadrants. The transit priority lanes and road widening projects are thought to complement the future Park and Ride lot in the northwest quadrant of the KNUEA lands by providing extended and more reliable transit service in the area.

For the intersection of March Road with Street A (north), the preliminary geometry was discerned using the RMA provided by the City of Ottawa (as shown in **Figure 8**) for the intersection of March Road with Street A.

Figure 8 - March Road at Street A / Street 1 (north) RMA



2.1.3.2 Future Background Developments

The Kanata North community has experienced substantial growth over the past few years and that growth is anticipated to continue well into the future. There are numerous developments scheduled to occur near the subject site, as illustrated in **Figure 9** and outlined in **Table 5** below.

Figure 9 - Background Developments

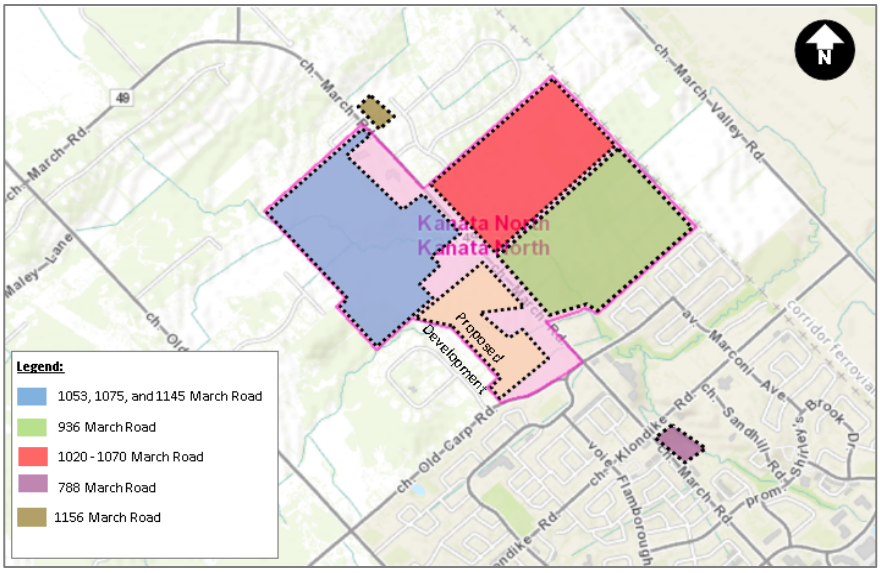


Table 5 - Background Developments

Development	Location	Size	Build-Out
1053, 1075, and 1145 March Road	Northwestern quadrant of the Kanata North Urban Expansion Area	825 residential units	2026
936 March Road TIA	Southeastern quadrant of the Kanata North Urban Expansion Area	856 residential units	2023
1020 and 1070 March Road	Northeastern quadrant of the Kanata North Urban Expansion Area	730 residential units	2031
788 March Road	Southeastern quadrant of the March Road at Klondike Road intersection	196 residential units	2023
1156 March Road	East side of March Road between the intersections with Murphy Court	Gasoline service center with 8 fueling positions	2021

2.2 STUDY AREA AND TIME PERIODS

2.2.1 Study Area

The proposed study area is limited to the following intersections:

- March Road at Dunrobin Road;
- March Road at Street A;
- March Road at Street D;
- March Road at Halton Terrace / Maxwell Bridge Road;
- Street A at Old Carp Road; and
- Street A at Halton Terrace.

2.2.2 Time Periods

The proposed scope of the transportation assessment includes the following analysis time periods:

- Weekday AM peak hour of roadway; and
- Weekday PM peak hour of roadway.

2.2.3 Horizon Years

The scope of the transportation assessment proposes the following horizon years:

- 2020 existing conditions;
- 2034 future background conditions;
- 2034 total future conditions (build-out);
- 2039 total future conditions (5 years beyond build-out); and
- The required development intensity to trigger intersection improvements, prior to full buildout

2.3 EXEMPTIONS REVIEW

Table 6 summarizes the Exemptions Review table from the City of Ottawa's *2017 Transportation Impact Assessment Guidelines*.

Table 6 - Exemptions Review

Module	Element	Exemption Considerations	Exempted?
Design Review Component			
4.1 Development Design	4.1.2 Circulation and Access	Only required for site plans	Yes
	4.1.3 New Street Networks	Only required for plans of subdivision	No
4.2 Parking	4.2.1 Parking Supply	Only required for site plans	Yes
	4.2.2 Spillover Parking	Only required for site plans where parking supply is 15% below unconstrained demand	Yes
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	No
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	No
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	Yes
4.9 Intersection Design	All Elements	Not required if site generation trigger is not met.	No

3.0 FORECASTING

3.1 DEVELOPMENT GENERATED TRAVEL DEMAND

3.1.1 Trip Generation and Mode Shares

Consistent with the previously approved *Kanata North Community Design Plan Transportation Master Plan* (Novatech, June 2016), the *Institute of Transportation (ITE) Trip Generation Manual* (9th Edition) was used to forecast auto trip generation for the proposed development. Land use codes 210 – Single-Family Detached, 230 – Townhomes, 223 – Mid-Rise Apartments, 826 – Specialty Retail, were thought to be the most representative of the proposed land uses. It is noted that the ITE 9th edition would result in a higher trip generation when compared to the ITE 10th edition, thus yielding more conservative results.

Table 7 outlines the assumed land uses and the trip generation rates for each land use.

Table 7 - Land Uses and Trip Generation Rates

LUC	Land Use	Size	Weekday AM Peak Hour			Weekday PM Peak Hour		
			In	Out	Total	In	Out	Total
210	Single Detached Houses	35 units	25%	75%	0.98	63%	37%	1.17
230	Townhomes	78 units	17%	83%	0.54	67%	33%	0.63
220	Apartments	1,838 units	31%	69%	0.30	58%	42%	0.39
826	Specialty Retail[1]	65,600 ft^2 GFA	0	0	0	44%	56%	2.73

Notes: 1. The ITE Trip Generation Manual does not have any information for this land use during the AM peak, therefore, it is assumed that it generates a negligible amount during the AM roadway peak.

To remain consistent with the KNUEA TMP, the auto trip generation rates of the proposed land uses were converted to person trips using a conversion factor of 1.42.

Table 8 outlines development-generated person trips for each land use.

Table 8 - Person Trips Generated by Land Use

LUC	Land Use	Trip Conversion	Weekday AM Peak Hour			Weekday PM Peak Hour		
			In	Out	Total	In	Out	Total
210	Single Detached Houses	Auto Trips	9	26	35	26	15	41
		Person Trip Factor	1.42	1.42	1.42	1.42	1.42	1.42
		Person Trips	13	37	50	37	21	58
230	Townhomes	Auto Trips	7	35	42	33	16	49
		Person Trip Factor	1.42	1.42	1.42	1.42	1.42	1.42
		Person Trips	10	50	60	47	23	70
223	Mid-Rise Apartments	Auto Trips	171	380	551	416	301	717
		Person Trip Factor	1.42	1.42	1.42	1.42	1.42	1.42
		Person Trips	243	540	783	591	427	1018
826	Specialty Retail	Auto Trips	0	0	0	79	100	179
		Person Trip Factor	1.42	1.42	1.42	1.42	1.42	1.42
		Person Trips	0	0	0	112	142	254
Total Development		**Auto Trips**	**187**	**441**	**628**	**554**	**432**	**986**
		Person Trip Factor	**1.42**	**1.42**	**1.42**	**1.42**	**1.42**	**1.42**
		Person Trips	**266**	**627**	**893**	**787**	**613**	**1400**

The modal shares outlined in the approved *Kanata North Community Design Plan Transportation Master Plan* (Novatech, June 2016) were used for the subject development and the modal shares for each land use (residential and commercial) are outlined in **Table 9** below. The KNUEA TMP assumed a 20% transit mode share due to the implementation of transit facilities outlined in the Affordable Network of the City of Ottawa TMP. It is anticipated that the transit modal share of 20% will be met by the 2034 buildout year due to the assumed implementation of the transit signal priority lanes and the construction of the park-and-ride lot in the northwest quadrant of the KNUEA lands to cater to the growing population and provide adequate transit connectivity to the area. Realistically, the transit modal share in the area is not assumed to exceed 20% prior to the construction of the median BRT system along March Road.

Table 9 – Trip Generation by Mode

LUC	Land Use	Trip Conversion		Weekday AM Peak Hour			Weekday PM Peak Hour		
				In	Out	Total	In	Out	Total
210	Single Detached Houses	Auto	60%	8	22	30	22	13	35
		Passenger	15%	2	6	8	6	3	9
		Walk / Bike	5%	1	2	3	2	1	3
		Transit	20%	3	7	10	7	4	11
230	Townhomes	Auto	60%	6	30	36	28	14	42
		Passenger	15%	2	8	10	7	3	10
		Walk / Bike	5%	1	3	4	2	1	3
		Transit	20%	2	10	12	9	5	14
223	Mid-Rise Apartments	Auto	60%	146	324	470	355	256	611
		Passenger	15%	36	81	117	89	64	153
		Walk / Bike	5%	12	27	39	30	21	51
		Transit	20%	49	108	157	118	85	203
826	Specialty Retail	Auto	60%	0	0	0	67	85	152
		Passenger	15%	0	0	0	17	21	38
		Walk / Bike	5%	0	0	0	6	7	13
		Transit	20%	0	0	0	22	28	50
Total Development		**Auto Trips**		**160**	**376**	**536**	**472**	**368**	**840**
		Passenger		**40**	**95**	**135**	**119**	**91**	**210**
		Walk / Bike		**14**	**32**	**46**	**40**	**30**	**70**

		Transit	**54**	**125**	**179**	**156**	**122**	**278**

3.1.2 Internal Capture and Pass-By

When predicting trips that are associated with different land use types, the interaction between those land use types must be accounted for by applying the principals of internal capture adjustments. Internal capture trips are trips which are shared between two or more uses on the same site. A portion of the generated trips for each individual land use is therefore drawn from the adjacent land uses. Internal capture adjustments were made to account for vehicles that visit more than one land use within the subject development. Since these trips are contained within the subject site, accounting for each trip separately on the roadway network would result in "double-counting". For this reason, land uses that may have associated internal capture trips between one another ultimately had their net new trips adjusted consistent with typical industry standards. In the subject development, the land uses that are subject to internal capture reductions are the commercial land uses. It is safe to assume that there will be a percentage of trips destined to the subject commercial parcels that will originate from the subject residential land uses.

In addition, a portion of the auto trips generated by the proposed commercial land uses will be 'pass-by' in nature. Pass-by trips are considered intermediate stops between an origin and a destination. They are site trips that are drawn from existing traffic volumes on the road network that are "passing-by" the site. While the total number of trips generated by a given development remains the same, the turning movements at study area intersections and site accesses require adjustments to reflect pass-by traffic. The rate of pass-by traffic is based on the specific land use which was obtained from the *ITE Trip Generation Manual*. A pass-by rate of 34% was used for the commercial land use. As the commercial land use generates negligible trips during the AM peak hour, the pass-by rate was applied to the PM peak hour only.

Table 10 outlines the pass-by, internal capture, and net new trips anticipated for the proposed development.

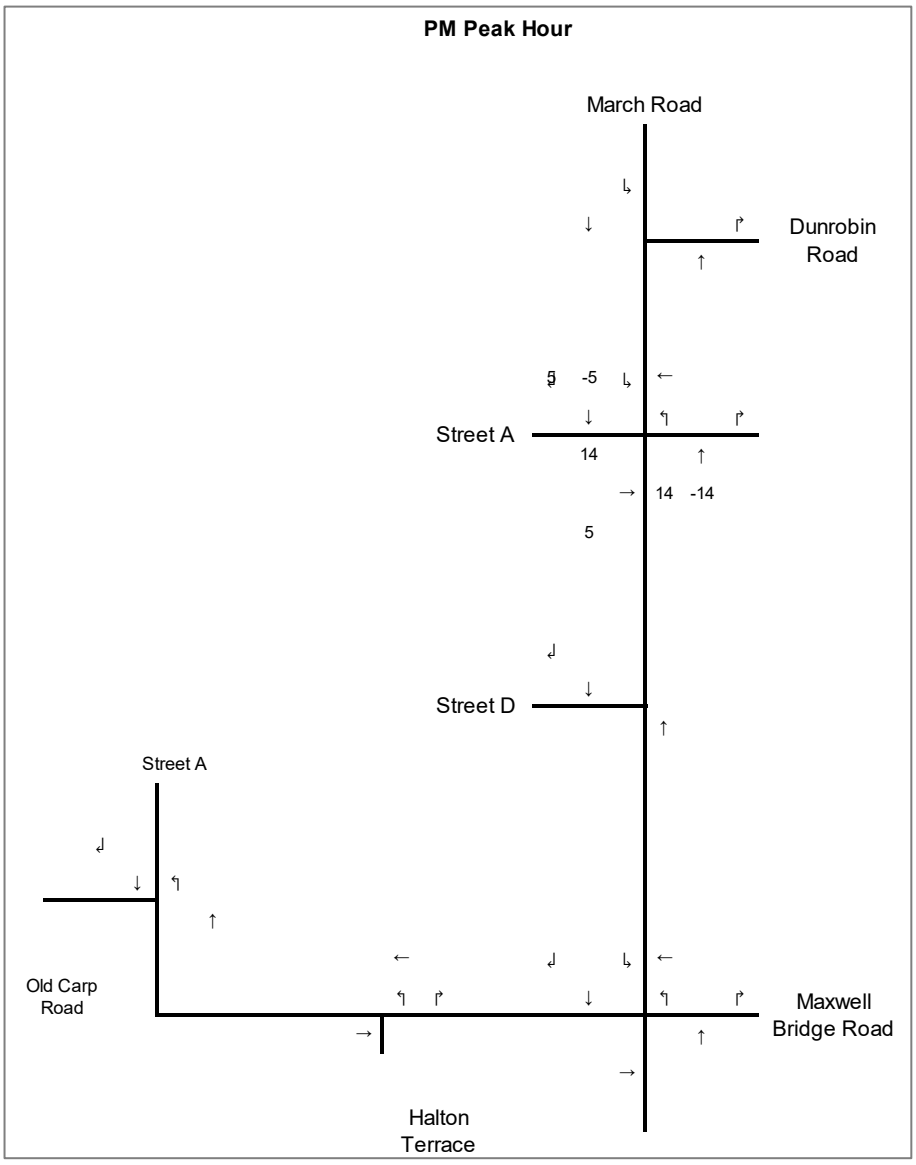
Figure 10 illustrates the pass-by trips the proposed development is anticipated to generate in the PM peak hour.

Table 10 - Pass-By and Internal Capture Trips

LUC	Land Use	Trip Conversion		Weekday AM Peak Hour			Weekday PM Peak Hour		
				In	Out	Total	In	Out	Total
210	Single Detached Houses	Auto Trips		8	22	30	22	13	35
		Internal Capture	0%	0	0	0	0	0	0
		Net Auto Trips		8	22	30	22	13	35
		Pass-By	0%	0	0	0	0	0	0
		Net New Auto Trips		8	22	30	22	13	35
230	Townhomes	Auto Trips		6	30	36	28	14	42
		Internal Capture	0%	0	0	0	0	0	0
		Net Auto Trips		6	30	36	28	14	42
		Pass-By	0%	0	0	0	0	0	0
		Net New Auto Trips		6	30	36	28	14	42
223	Mid-Rise Apartments	Auto Trips		146	324	470	355	256	611
		Internal Capture	0%	0	0	0	0	0	0
		Net Auto Trips		146	324	470	355	256	611
		Pass-By	0%	0	0	0	0	0	0
		Net New Auto Trips		146	324	470	355	256	611
826	Specialty Retail	Auto Trips		0	0	0	67	85	152
		Internal Capture	20%	0	0	0	13	17	30
		Net Auto Trips		0	0	0	54	68	122
		Pass-By	34%	0	0	0	21	21	42

		Net New Auto Trips	0	0	0	33	47	80
Total Development		**Auto Trips**	**160**	**376**	**536**	**472**	**368**	**840**
		Internal Capture	**0**	**0**	**0**	**13**	**17**	**30**
		Net Auto Trips	**160**	**376**	**536**	**459**	**351**	**810**
		Pass-By	**0**	**0**	**0**	**21**	**21**	**42**
		Net New Auto Trips	**160**	**376**	**536**	**438**	**330**	**768**

Figure 10 - Pass-By Volumes (PM Peak Hour)



3.1.3 Trip Distribution

The distribution of traffic to/from the proposed development follows the distribution outlined in the approved *Kanata North Community Design Plan Transportation Master Plan* (Novatech, June 2016). It is noteworthy that for residential land uses within the subject development, a total of 5% trips to/from the north during peak periods was assumed given the surrounding employment environment and the trip summary for the Kanata / Stittsville TAZ in the 2011 Trans O-D Survey. It is likely that 5% of the subject development's residents or less would be destined to Dunrobin during the AM and PM peak periods to/from their respective employers. However, for the commercial / specialty retail component of the development, it was assumed that 15% of the trips would be destined to/from the north (Dunrobin communities) on the basis that a specialty retail store in the subject development would likely attract some customers from Dunrobin during the peak periods. Given the number of generated trips associated with each land use, the weighted site trips to/from the north was found to be **6%**.

Table 11 summarizes the assumed trip distribution for the proposed development.

Table 11 - Trip Distribution

Direction		Via (to / from)	
		March Road (North)	**March Road (South)**
North	6%	6%	-
East	39%	-	39%
South	5%	-	5%
West	0%	-	-
Internal [1]	50%		50%
Total	**100%**	**6%**	**94%**

Notes:
1. Refers to trip origins/destinations within the same O-D Ward.

3.1.4 Trip Assignment

Site generated trips were assigned to the study area road network based on the trip distribution assumptions outlined above in **Table 11.**

Figure 11 illustrates the site traffic assignment.

Figure 12 illustrates new site generated trips during the AM and PM peak hours.

Figure 11 - Site Traffic Assignment

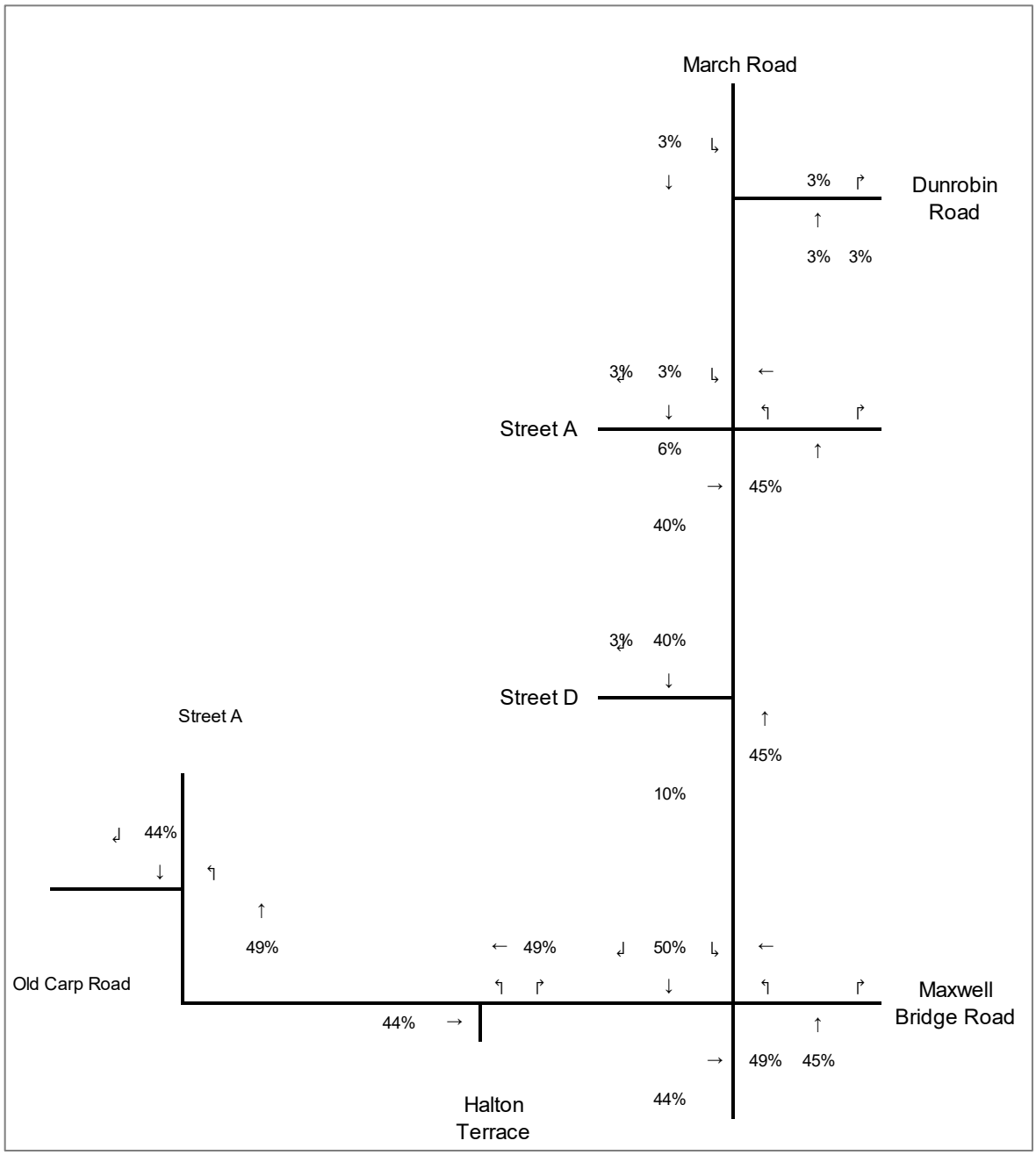
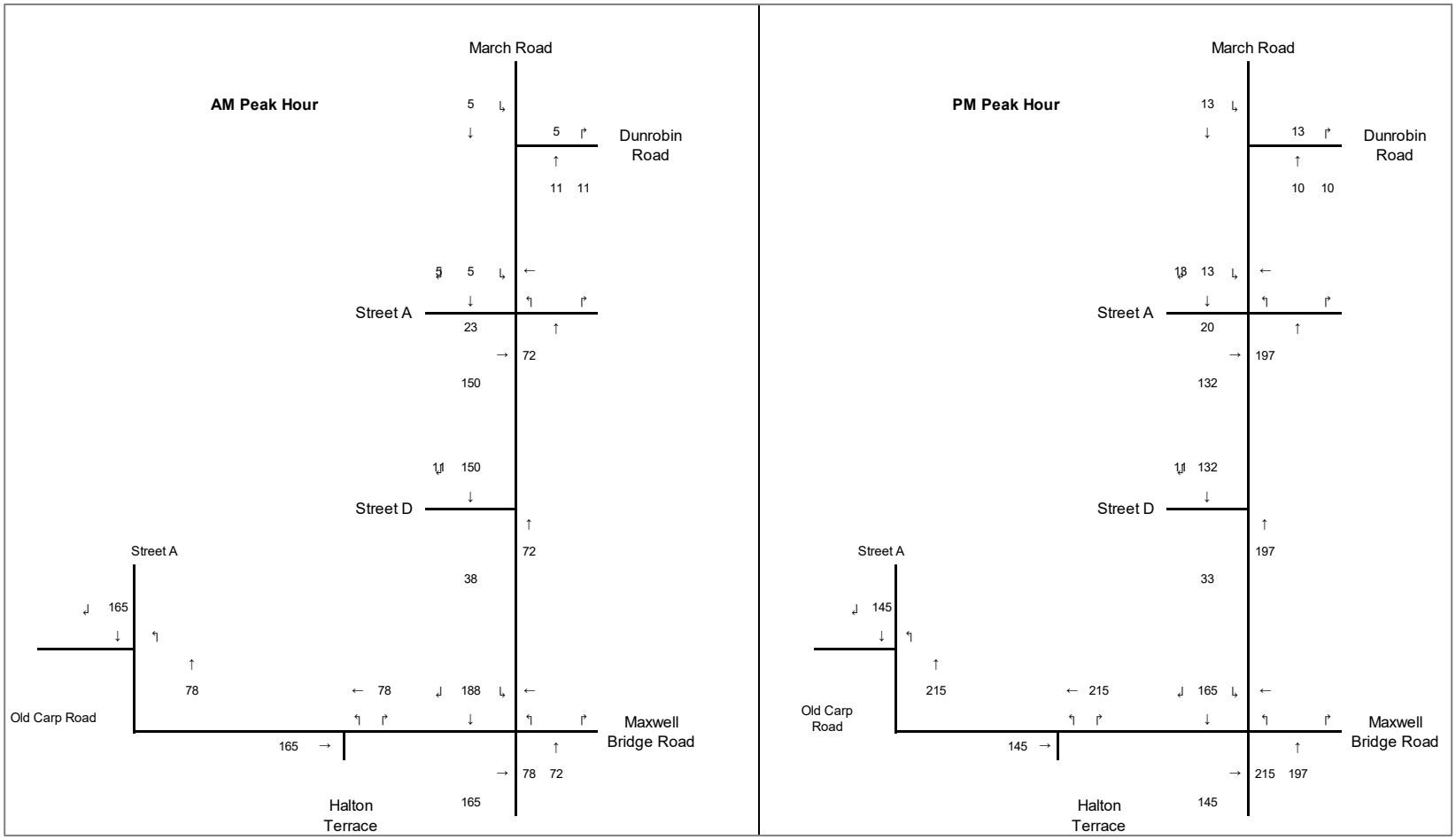


Figure 12 - Site Traffic Volumes



3.2 BACKGROUND NETWORK TRAVEL DEMAND

3.2.1 Transportation Network Plans

As outlined in **Table 4** in **Section 2.1.3.1**, the Transit Signal Priority measures along March Road are anticipated to be in place by the 2034 buildout horizon year, and the widening of March Road to Dunrobin Road is anticipated to occur within the study area by the 2039 ultimate horizon year.

3.2.2 Background Growth

Existing traffic volumes were grown at a rate of 0.5% annually, non-compounding, to represent 2034 and 2039 background traffic volumes. This rate of growth is consistent with the approved *Kanata North Community Design Plan Transportation Master Plan* (Novatech, June 2016).

3.2.3 Other Developments

As outlined in **Table 5** in **Section 2.1.3.2**, the remaining portion of the Kanata North Urban Expansion Area lands and the proposed developments at 788 March Road and 1156 March Road are planned to be fully built and occupied by the buildout year of the subject development (2034). The traffic volumes that these lands will generate were obtained from the approved *Kanata North Community Design Plan Transportation Master Plan* (Novatech, June 2016), the 1053 March Road TIA report (by Novatech), the 936 March Road TIA Report (by CGCH), the 1020 March Road TIA (by Stantec), the *788 March Road TIA Strategy Report* (Parsons, August 2018), and the 1156 March Road Transportation Brief (D.J Halpenny & Associates). These were added to the transportation network as background traffic. For the KNUEA TIA studies, due to the inconsistencies observed in the trip generation methodology, the person trip conversion factor, and the modal splits, the forecasting was redone using the ITE Trip Generation Manual (9th edition), a person trip conversion factor of 1.42, and consistent modal shares.

3.3 DEMAND RATIONALIZATION

The traffic forecasts indicate that the under the existing conditions and intersection geometry, the demand along March Road is anticipated to exceed the available capacity. This will be the case until March Road is widened and additional capacity is added to the network. As indicated earlier, March Road is assumed to be widened by the 2039 horizon year due to background growth in the study area. Maintaining the storage lanes shown in the RMA in **Figure 8**, analysis was performed assuming a widened March Road (4 lanes) between Maxwell Bridge and Dunrobin Road. In tandem with signal timing plan improvements at the intersection of March Road and Maxwell Bridge Road, the operations anticipated at the study area intersections are shown in **Table 12**, with the critical movements highlighted.

At the intersection of March Road and Maxwell Bridge Road, the westbound left movement is anticipated to operate with a v/c ratio of 1.0 and a delay of 2 minutes during the AM peak, which is acceptable for minor movements. The northbound through movement is anticipated to operate with a v/c ratio of 0.92 and a delay of 34s during the PM peak. Overall, the intersection operates with a v/c ratio of 0.96 and 0.92 during the AM and PM peak hours, respectively.

At the intersection of March Road and Street A, the westbound left movement is anticipated to operate with a v/c ratio of 0.93 and a delay of 74s in the AM peak.

The results indicate that the future widened cross section along March Road is sufficient in accommodating the traffic demands at the year 2039 as the LOS for all movements is E or better, which falls within the vehicular LOS targets set out by the City of Ottawa for an arterial road in close proximity to a school. As such, the traffic demand was not rationalized. Traffic at all other study area intersections operates with acceptable levels of service. It is also noted that the implementation of a median BRT system along March Road beyond the 2039 horizon year would result in increased transit modal shares, thus improving the operations below.

Additional horizon years analysis are discussed in detail in **Section 4.9.2**. The detailed analysis reports are shown in **Appendix C**.

Table 12 - Ultimate Horizon Year (2039) Traffic Operations - Widened March Road

Intersection	Intersection Control	Approach / Movement		LOS	V/C	Delay (s)	Queue 95th (veh)
March Road at Maxwell Bridge Road / Halton Terrace	Traffic Signals	EB	Left	A (A)	0.07 (0.11)	38.7 (49.2)	11.9 (10.9)
			Through / Right	B (C)	0.59 (0.71)	46.7 (63.7)	74.3 (59.4)
		WB	Left	E (C)	1.0 (0.71)	126.5 (62.0)	#74.9 (29.6)
			Through / Right	A (A)	0.06 (0.32)	38.6 (43.8)	13.1 (38.4)
		NB	Left	B (C)	0.0 (0.78)	43.7 (28.0)	#38.7 (#129.0)
			Through	A (E)	0.36 (0.92)	16.5 (33.6)	61.3 (#325.8)
			Right	A (A)	0.05 (0.08)	13.2 (12.2)	3.9 (9.5)
		SB	Left	A (A)	0.16 (0.46)	8.7 (37.1)	m7.3 (m20.4)
			Through	E (B)	0.97 (0.62)	28.1 (34.7)	#289.6 (135.2)
			Right	A (A)	0.01 (0.01)	13.6 (22.0)	0 (0.0)
		Overall Intersection		**E (E)**	**0.96 (0.92)**	**31.8 (35.7)**	**-- (--)**
March Road at Street A	Traffic Signals	EB	Left	A (A)	0.06 (0.13)	33.6 (43.0)	10.9 (15.4)
			Through / Right	A (A)	0.19 (0.17)	35.0 (43.4)	26.2 (21.3)
		WB	Left	E (D)	0.93 (0.87)	76.7 (80.3)	#123.3 (65.7)
			Through / Right	A (A)	0.04 (0.04)	33.4 (42.1)	9.6 (8.9)
		NB	Left	A (A)	0.55 (0.41)	65.9 (1.4)	29.4 (m2.9)
			Through	A (A)	0.27 (0.60)	11.3 (1.5)	36.1 (m10.2)
			Right	A (A)	0.06 (0.20)	8.4 (0.2)	5.2 (0)
		SB	Left	A (A)	0.01 (0.09)	15.2 (1434)	2.9 (7.2)
			Through / Right	C (A)	0.79 (0.34)	29.4 (16.3)	191.6 (71.2)
		Overall Intersection		**D (B)**	**0.83 (0.70)**	**32.1 (12.2)**	**-- (--)**

Notes:
1. Table format: AM (PM)
2. v/c – represents the anticipated volume divided by the predicted capacity

Figure 13, Figure 14, and **Figure 15** illustrate the future traffic volumes under the 2034 and 2039 horizon years.

Figure 13 - 2034 Future Background Traffic Volumes

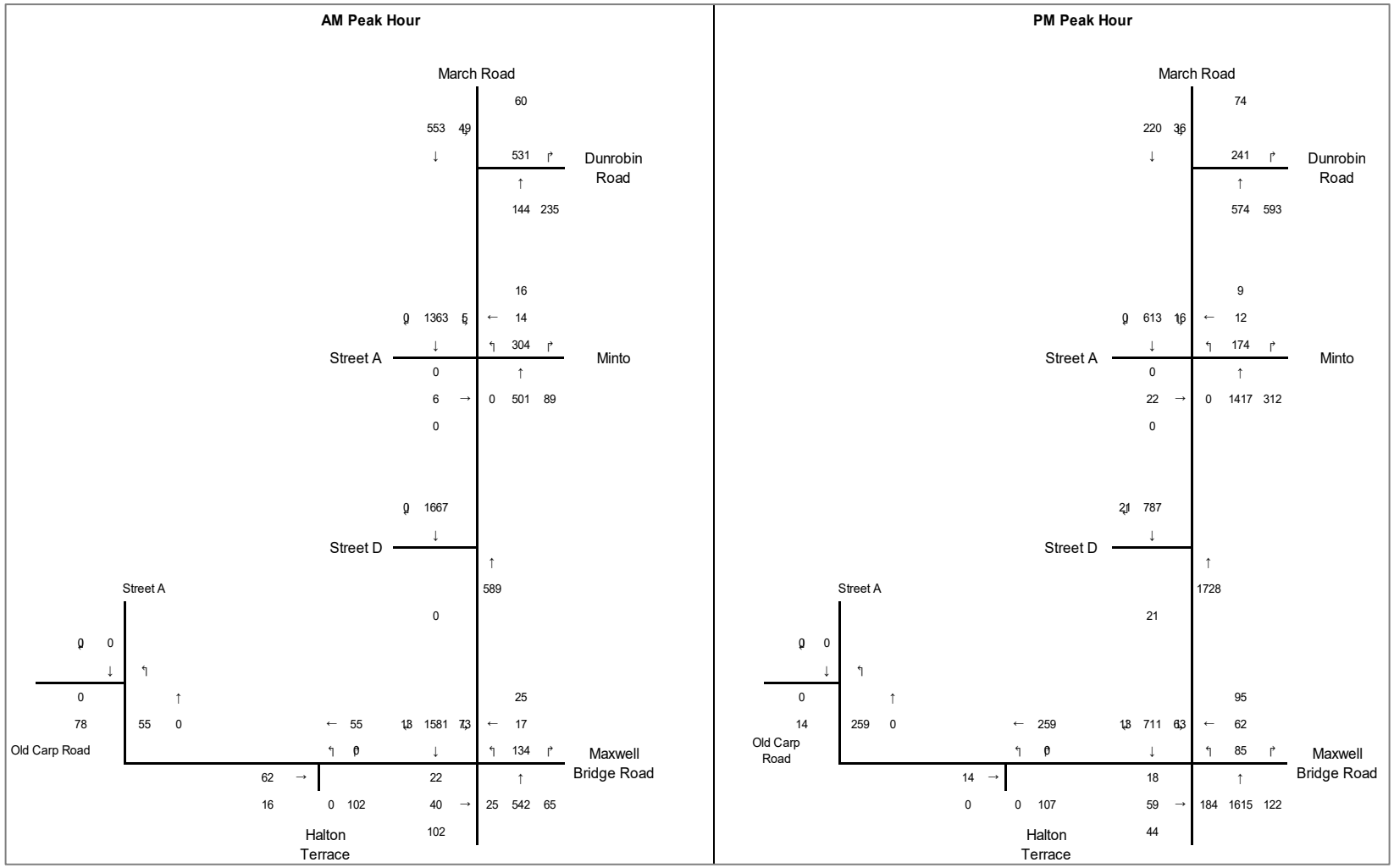


Figure 14 - 2034 Total Future Traffic Volumes

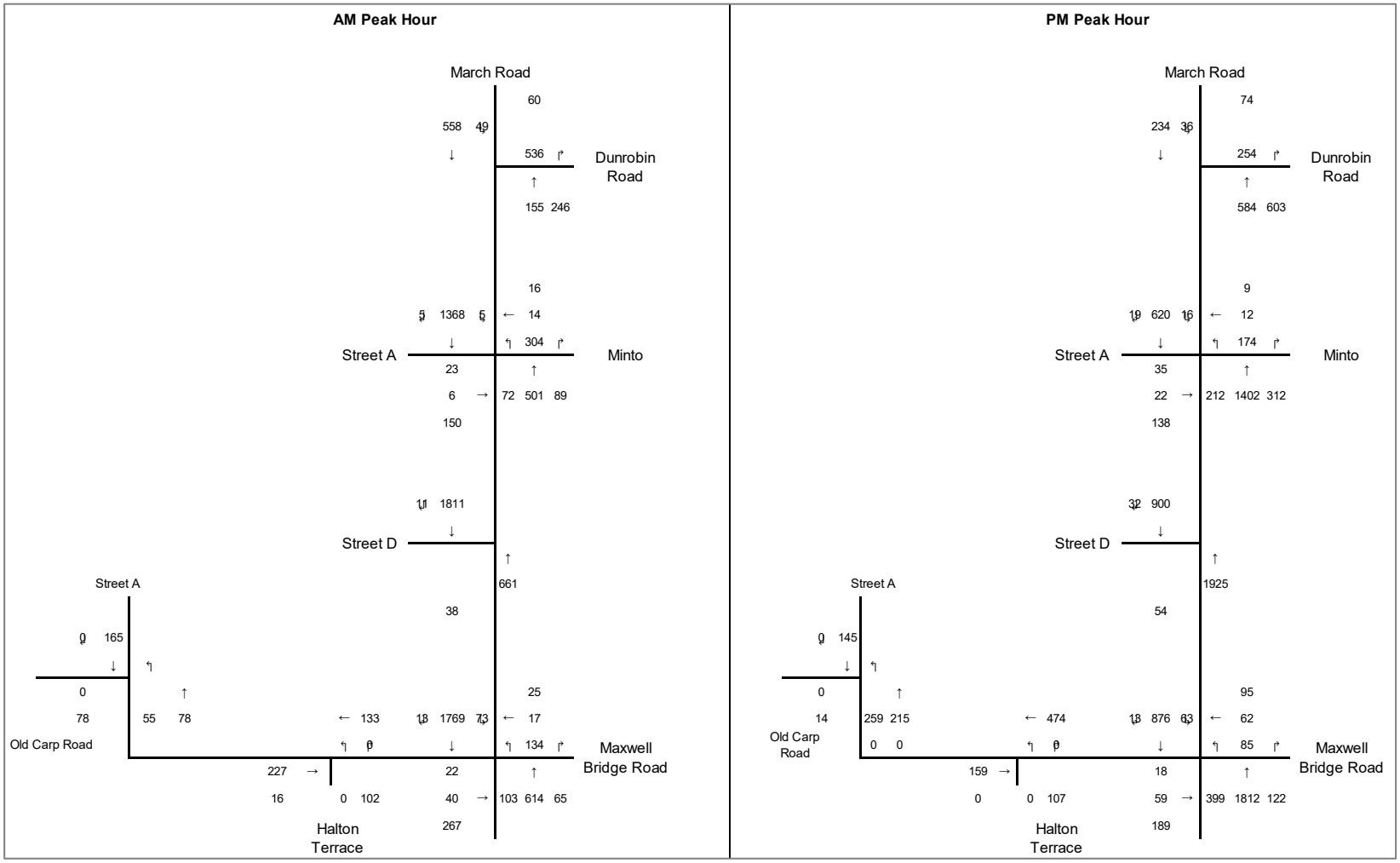
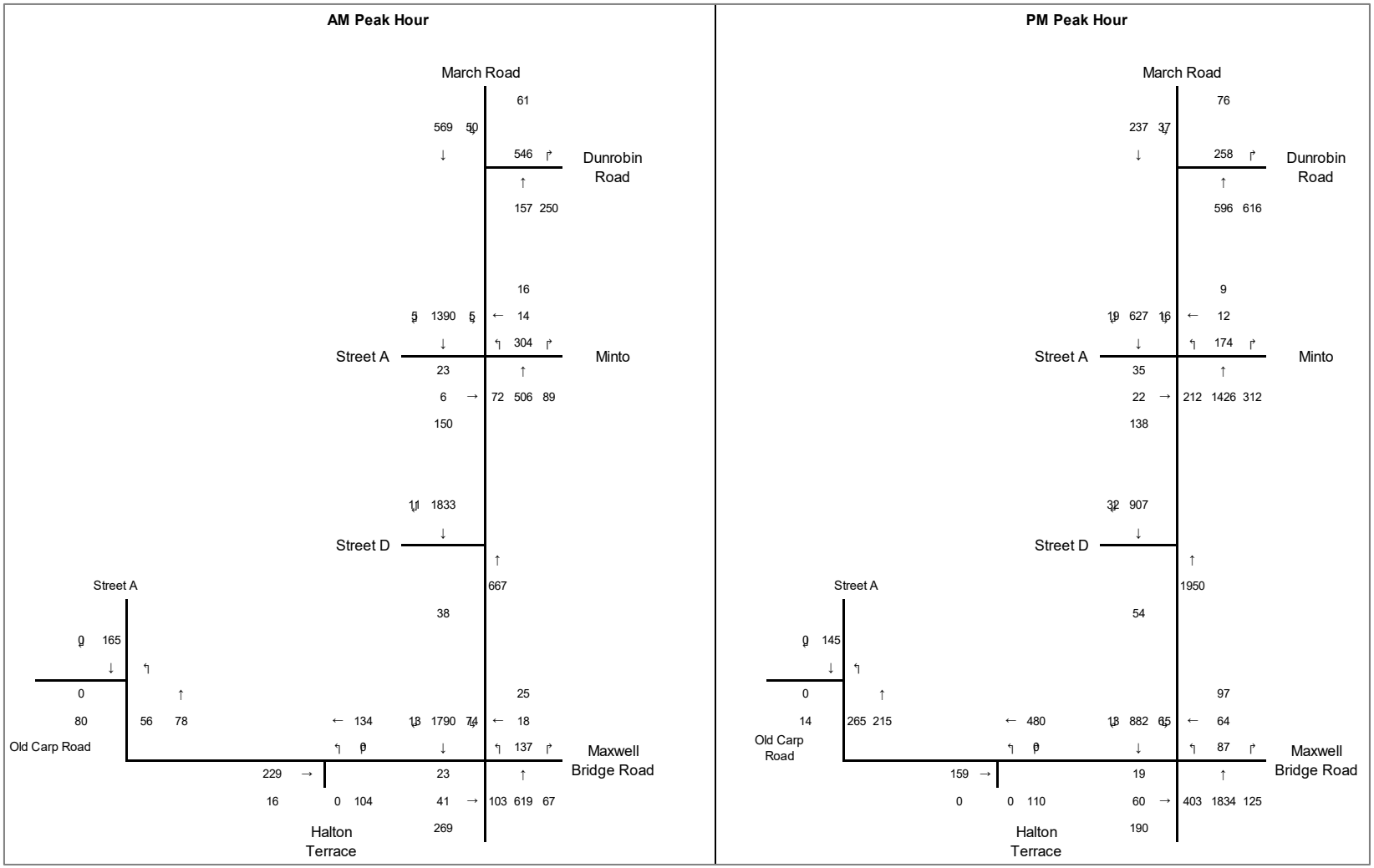


Figure 15 - 2039 Ultimate Traffic Volumes



4.0 STRATEGY REPORT

4.1 DEVELOPMENT DESIGN

4.1.1 Design for Sustainable Modes

Several features have been included within the subject development that help promote non-auto modes within the community. In reference to the Designing Neighborhood Collector Streets Guidelines published in December 2019, all collector roads within the subject development are planned to feature continuous uni-directional cycling areas adjacent to walking areas that are separated from the roadway by inner boulevards on both sides to improve circulation and safety for all road users. The neighborhood collector roads will feature periodic bulb-outs that are conducive to meeting the operating speed target of 40 km/h. The guidelines are applicable to Street A, which runs across the entire development and forms the E-W roadway at the new northern intersection (March Road and Street A) as shown in the site plan.

The development also encompasses one local collector road (Street D) which forms a right-in-right-out access configuration with the southern movement along March Road and is situated just north of the intersection of March Road and Maxwell Bridge Road. Street D is planned to connect to Street A approximately midway through the development to provide direct access. As a local road, the City of Ottawa operating speed target is 30 km/h. The roadway is planned to feature a sidewalk on the south side of the road as per excerpts from the KNUEA TMP.

4.1.2 Circulation and Access

Not applicable; exempted during screening and scoping.

4.1.3 New Street Networks

There are two new proposed roadways within the subject development, Streets A and D. Street A is a collector road that is in the shape of a crescent and intersects March Road at two locations. Street A will replace the existing Halton Terrace Roadway and intersect with March Road, forming the southern access of the development. Street A is planned to continue through the development and intersect with March Road again, forming the northern access of the development. The intersection of Street A at March Road is anticipated to be signalized. Street D is a local roadway envisioned to intersect March Road on the eastern end and with Street A on the western end. Street D is envisioned to feature a right-in-right out island and will be stop controlled along the minor approach.

As per the neighborhood collector roads guidelines, traffic calming measures are required to be included as a means to proactively calm traffic that is anticipated to travel along the Street A collector. Measures include but are not limited to periodic bulb-outs or intersection narrowings to help reduce the crossing distances for pedestrians as well as slow vehicular traffic down as motorists are traveling through the community and achieve an operating speed of 40 km/h.

4.2 PARKING

4.2.1 Parking Supply

Not applicable; exempted during screening and scoping.

4.2.2 Spillover Parking

Not applicable; exempted during screening and scoping.

4.3 BOUNDARY STREET DESIGN

4.3.1 Multi Modal Level of Service

The multi-modal level of service (MMLOS) was evaluated for the roadway segments of March Road, Street A, and Street D to assist with developing a design concept that maximizes the achievement of the MMLOS objectives. Based on the proximity of these three roads to the surrounding community, it was determined that:

- For existing 2020 conditions, March Road across the frontage of the subject development is an arterial roadway that falls under the "General Urban Area" policy. It is a designated spine route under the City of Ottawa's Ultimate Cycling Plan, assumed to support transit service as the City of Ottawa will likely extend the bus service to the area to accommodate the new developments, and is also a designated truck route.
- At the 2034 buildout year, March Road across the frontage of the subject development falls under the 'within 300m of a school' Policy Area due to a school located within the planned development.
- The existing road geometry and configuration of Old Carp Road will be considered under the analysis of existing conditions as the development's southern boundary and falls under the "General Urban Area" policy as a collector road. Old Carp road is currently a suggested cycling route without facilities and will be evaluated as a local route as per the City of Ottawa's Ultimate Cycling Plan.
- At the buildout year, the new re-aligned Street A will replace Old Carp Road as the development's southern boundary and will be classified as a collector road and is anticipated to support transit service. The cross section is extrapolated from the new neighborhood collector road guidelines published in 2019 and is not assumed to be designated as a local cycling route (assumed to be for Old Carp Road only) nor a truck route.
- At the buildout year, Street D will fall under the "within 300m of a school" policy and is classified as a local road. The cross section will be extrapolated form the KNUEA TMP. The roadway is not anticipated to support transit service, cycling, nor trucks.

The aforementioned land-use designation and policy areas dictate the MMLOS targets that will be applied to the three roadways.

For the existing conditions analysis, segments along March Road have a Pedestrian Level of Service (PLOS) target of C, a Bicycle Level of Service (BLOS) target of C (Spine Route under the City of Ottawa's Cycling Plan), a Transit Level of Service (TLOS) target of D as it is assumed that OC Transpo will be extending their bus service to the subject

development to accommodate the projected number of transit users, and a Truck Level of Service (TkLOS) target of D as March Road is designated as a full truck route. Segments along Old Carp Road and Halton Terrace will have a PLOS target of C, a BLOS target of B (local route cycling designation), a TLOS target of D, and no TkLOS target as Old Carp Road is not classified as a truck route.

For the buildout year (2034) analysis, segments along March Road have a PLOS target of A, a BLOS target of C, a TLOS target of D, and a TkLOS target of D. Street A has a PLOS target of A, a BLOS target of D (no formal cycling designation), and a TLOS target of D (assuming OC Transpo bus service will be extended to the subject development). There is no defined TkLOS target as Street A is not classified as truck routes. Street D will have a PLOS target of A, a BLOS target of D, and no TLOS or TkLOS targets as the roadway is not assumed to support transit service of full-size trucks.

Table 13 and **Table 14** located at the end of this section showcase the segment MMLOS for Arterials and Collector / Local roads, respectively.

Appendix D contains detailed segment MMLOS evaluation results for all evaluated roadway segments and intersections.

Existing Conditions (2020)

March Road Southbound (between Maxwell Bridge Road and Street D)

March Road currently does not meet the PLOS target of C as it operates with PLOS D. For a best-case scenario, the segment just south of the intersection was considered as the curbside lane (right turn storage lane) does not see a vehicular flow exceeding 3,000 veh/day. This operation is attributed to the high operating speed (>60 km/h) and the lack of boulevards to provide a greater buffer between pedestrians and road users. Measures to meet the PLOS target would be to lower the posted speed limit to 50 km/h or to provide a 0.5m or greater boulevard to increase the buffer zone between pedestrians and the curbside lane traffic. However, lowering the speed to 50 km/h may be challenging due to the functional classification of March Road.

The roadway segment does not meet the BLOS target of C as it operates with BLOS E due to the high posted speed limit (> 70 km/h). For a curbside bike lane, lowering the speed limit to 60 km/h would allow the BLOS target to be met. An alternative measure would be to upgrade cycling facilities to physically separated infrastructure, which may pose right-of-way constraints.

The road segment currently meets the TLOS and TkLOS targets of D.

March Road Southbound (Between Street A and Street D)

The road segment does not meet the PLOS target of C as it operates with PLOS F. This is attributed to the lack of sidewalks (only paved shoulders provided as indicated in the RMA shown in **Figure 8**), high vehicular volumes, and high operating speeds (80 km/h). Given the posted speed limit and vehicular volumes, the roadway segment would operate with PLOS D if the maximum effective sidewalk/boulevard width is provided (2m sidewalk and 2m boulevard). Furthermore, the speed limit would have to be lowered to under 60 km/h to meet the PLOS target of C. It is noted that reducing the curbside lane traffic volumes is not a feasible measure, especially for a high-speed arterial roadway like March Road.

The roadway segment does not meet the BLOS target of C as it operates with BLOS F due to the lack of cycling facilities as there are currently only paved shoulders for cyclists. To meet the BLOS target of C, a curbside bike lane would have to be provided and the speed limit would have to be lowered to less than 70 km/h. Alternatively, physically separated cycling infrastructure such as a multi-use pathway could be provided, although that may pose right-of-way constraints.

The road segment currently meets the TLOS and TkLOS targets of D.

Halton Terrace (between March Road and Old Carp Road)

The roadway segment meets the PLOS target of C as it operates with PLOS B. This is attributed to the low posted speed limit (40 km/hr) and moderate curbside lane vehicular volumes along the roadway along with the presence of a 1.8m wide sidewalk.

Despite mixed traffic operations, the segment meets the BLOS target of B given the low posted speed of 40 km/h.

The road segment meets the TLOS target of D. The TkLOS evaluation is not required as Halton Terrace is not classified as a truck route by the City of Ottawa.

Old Carp Road (between Halton Terrace and east of Marchbrook Circle)

The roadway segment does not meet the PLOS target of C as it operates with PLOS F. This is attributed to the lack of pedestrian facilities along the segment as there are only paved shoulders on the sides of the roadway. One measure to meet the PLOS target would be to install a 1.5m sidewalk with a 0.5m boulevard to provide a total buffer of 2m between pedestrians and vehicles.

Despite mixed traffic operations, the segment meets the BLOS target of B given the low posted speed limit of 40 km/h.

The road segment meets the TLOS target of D. Old Carp is not classified as a truck route and the TkLOS evaluation is not required.

Buildout Year (2034)

March Road Southbound (between Maxwell Bridge Road and Street D)

There are no anticipated geometry changes along this segment of March Road for the buildout year horizon. However, due to the construction of a school, the roadway will be designated as “within 300m of a school”. As such, the new PLOS target is A.

At the year 2034, the segment of March Road (just south of the intersection with Maxwell Bridge Road) is anticipated to operate with PLOS D, akin to the existing 2020 operation, which does not meet the desired PLOS target of A. To meet the PLOS target, a 2m wide boulevard is necessitated along March Road, which, in tandem with the existing 2m sidewalk, would provide the maximum effective buffer (4m) between pedestrians and road users, allowing for a PLOS of B. Furthermore, as the curbside lane (right turn storage lane) vehicular traffic is forecast to be under 3,000 veh/day, the speed limit would have to be lowered to under 60 km/h to meet the PLOS target of A. However, lowering the speed limit is not feasible due to the functional classification of March Road. The implementation of sidewalks and boulevards is also subject to the availability of Right of Way (ROW).

BLOS, TLOS, and TkLOS operations and targets have not change from the existing 2020 analysis.

March Road Southbound (between Street A and Street D)

In reference to the RMA in **Figure 8** provided by the City of Ottawa, the southbound segment of March Road in the vicinity of the intersection with Street A is not anticipated to feature pedestrian infrastructure. Since this segment is also anticipated to be within 300m of a school, the PLOS target is A. The PLOS target is not expected to be met as the segment will operate with PLOS F due to the lack of sidewalks (no change from existing conditions). To meet the PLOS target of A, a 2m sidewalk and a 2m boulevard are necessitated to provide a buffer between pedestrians and vehicular traffic, which would allow for PLOS D operations. This is attributed to the high curbside lane traffic (southbound through lane) exceeding 3,000 veh/day. Accordingly, and in combination with a 4m buffer, the posted speed would have to be lowered to under 30 km/h to achieve a PLOS target of A, which is not a feasible measure given the functional classification of March Road. A PLOS target of A is unattainable for this segment.

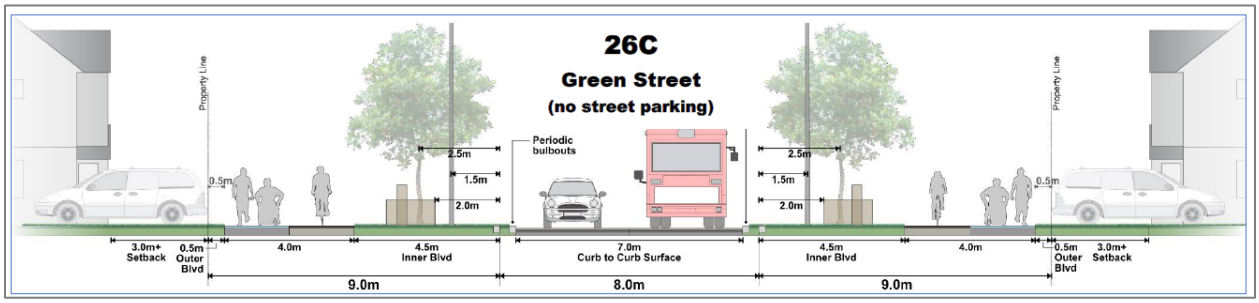
The RMA is indicative of curbside cycling lanes along the target segment in the future. With these facilities, the segment is expected to operate with BLOS E, which does not meet the target BLOS of C. To meet the aforementioned target, the speed limit would have to be lowered to under 70 km/h. Alternatively, cycling facilities can be upgraded to physically separated multi-use pathways to achieve the BLOS target.

For TLOS operations, it is anticipated that the delays to transit would result in a transit operating to posted speed ratio of 0.6 or less, thus translating to a reduced TLOS of E, which does not meet the target of D. The delays are attributed to the high north-south traffic with only one available through lane in each direction. The TkLOS operations and target are not expected to change from the 2020 analysis.

Street A (between Old Carp Road and March Road Intersection)

In reference to the new neighborhood collector streets design guidelines published in 2019, new collector roads are expected to have a similar layout to **Figure 16** below.

Figure 16 - Typical Neighborhood Collector Road Cross Section (Source: City of Ottawa Neighborhood Collector Roads Design Guidelines)



Street A is anticipated to operate with PLOS A and thus meet the target of PLOS A. The operation is the result of the reduced operating speed (retained at 40 km/h using traffic calming measures such as periodic bulb-outs) and vehicular volumes as well as the installation of a 2m sidewalk and a >2m boulevard resulting in a wide buffer between pedestrians and road users.

The BLOS target of D is anticipated to be met as the segment is found to operate with BLOS A given the physically separated cycling facilities.

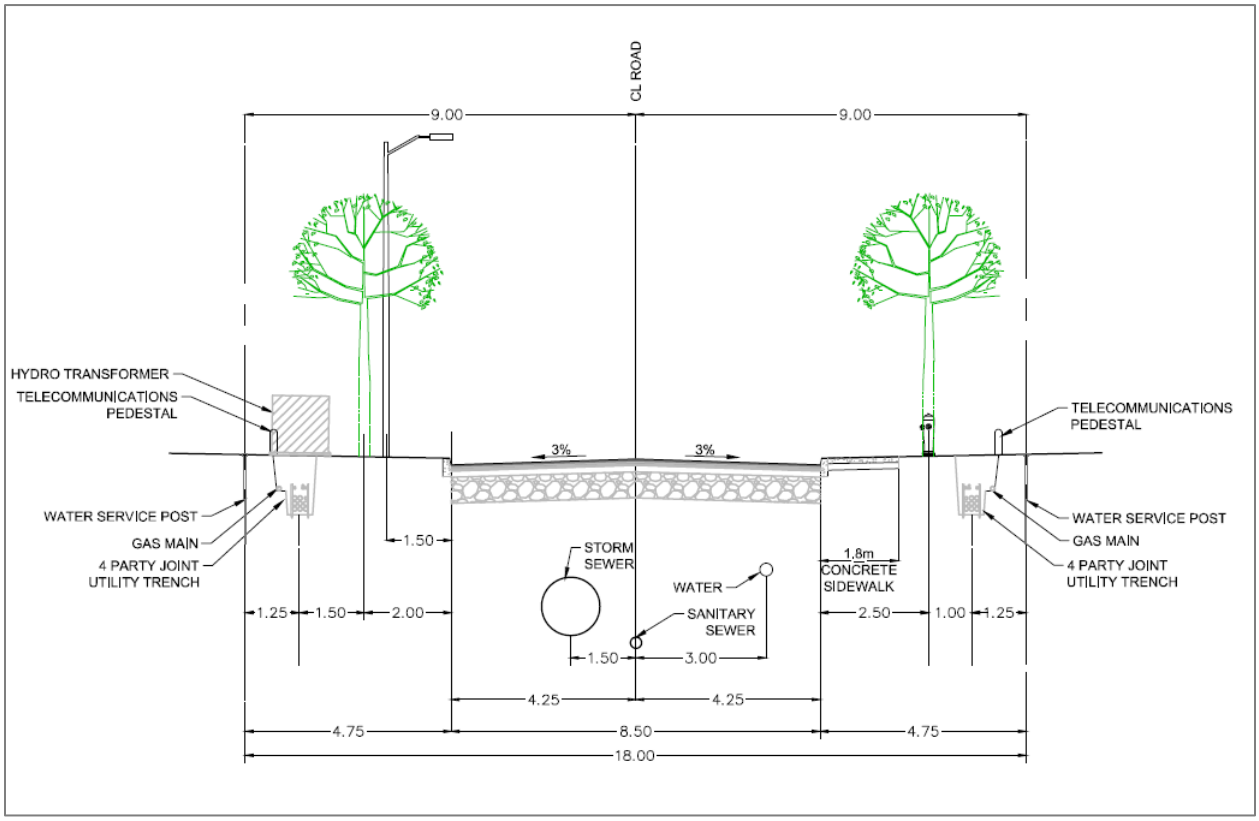
The TLOS target of D is also anticipated to be met as the roadway was found to operate with TLOS D. There is no TkLOS target as the segment is not a truck route.

Appendix D contains detailed segment MMLOS evaluation results.

Street D (between March Road and Street A)

The proposed local road cross section as detailed in the *Kanata North Community Design Plan* is shown in **Figure 17** below.

Figure 17 - Typical Local Road Cross Section (Source: KNUEA TMP)



Street D is anticipated to operate with PLOS A thereby achieving the PLOS target of A. The typical cross section in the CDP alludes to a 1.8m sidewalk, which, in combination with the low operating speed (30 km/h) and traffic volumes, provides ample separation between pedestrians and vehicles.

The BLOS target of D (assumed no cycling designation) is anticipated to be met as the segment is expected to operate with BLOS A. Despite mixed traffic operations, the high BLOS is attributed to the low operating speeds. Street D is not planned as a transit or truck route, and, as such, the TLOS and TkLOS evaluations are not required.

Ultimate Horizon Year (2039)

The operations described at the buildout year are anticipated to carry over to the ultimate horizon year (2039) as no changes to the facilities are anticipated to take place after the development's buildout. However, it is noted that the transit operations along the segment of March Road just south of the intersection with Street A is expected to improve given a widened March Road to 4-lanes.

Appendix D contains detailed segment MMLOS evaluation results.

Table 13 - Segment MMLOS Operations – Arterials (March Road)

Road Segment / Level of Service	March Road (between Maxwell Bridge and Street D				March Road (Between Street A and Street D)			
	2020 Existing	2034 Build-Out	2039 Ultimate	Target	2020 Existing	2034 Build-Out	2039 Ultimate	Target
PLOS	D	**	**	A (Future) (C Existing)	F	**	**	A (Future) (C Existing)
BLOS	E	**	**	C	F	E	**	C
TLOS	D	**	**	D	D	E	D	D
TkLOS	A	**	**	D	B	**	**	D

Note: ** indicates no change in operations

Table 14 - Segment MMLOS Operations - Collector / Local Roadways

Road Segment / Level of Service	Halton Terrace (btwn March Road and Old Carp Road)				Old Carp Road (btwn Halton Terrace and future Street A)				Street A (btwn Old Carp Road and March Road intersection)				Street D			
	2020	2034	2039	Target	2020	2034	2039	Target	2020	2034	2039	Target	2020	2034	2039	Target
PLOS	B	--	--	C	F	--	--	C	--	A	A	A	--	A	A	A
BLOS	B	--	--	B	B	--	--	B	--	A	A	D	--	A	A	D
TLOS	D	--	--	D	D	--	--	D	--	D	D	D	--	N/A	N/A	D
TkLOS	N/A	--	--	N/A	N/A	--	--	N/A	--	N/A	N/A	N/A	--	N/A	N/A	D

Note: -- indicates that the operation is no longer evaluated due to the road re-alignments in the area

4.4 ACCESS INTERSECTION DESIGN

4.4.1 Access Location

The proposed development will be accessed from municipal roads and intersections and not from private driveways or private accesses given that it is a plan of subdivision. **Module 4.4.1** is, therefore, not applicable and all the study area intersections will be assessed in **Section 4.9.2.**

4.4.2 Intersection Control

March Road at Street A

The intersection of March Road at Street A is one of the main access point for not only the subject Brigil development, but also the future Minto development on the east side of March Road. As outlined in the RMA shown in **Figure 8**, the intersection is signalized with auxiliary right and left turn lanes on the northbound approach, an auxiliary left lane on the southbound approach, and auxiliary left turn lanes on the east and west approaches. The north-south approaches are assumed to be widened by the year 2039 to include 4 lanes for the purpose of this analysis.

March Road at Maxwell Bridge / Street A

No changes are planned for this existing signalized intersection which features auxiliary right and left turn lanes on the north and south approaches and auxiliary left turn lanes on the east and west approaches.

March Road at Dunrobin Road

No changes are planned for this existing signalized intersection which features an auxiliary right turn lane on the west approach and an auxiliary right turn lane on the east approach. The assumed widening of March Road in 2039 would see an additional through lane on the westbound approach.

March Road at Street D

This new intersection would feature a right-in-right-out island and is planned to be stop controlled along the minor approach.

Street A at Old Carp Road

This new intersection would see a stop controlled and re-aligned Old Carp Road intersecting with the new collector road designated as Street A.

Street A at Halton Terrace

This new intersection would see a stop controlled and re-aligned Halton Terrace intersecting with the new collector road designated as Street A.

4.5 TRANSPORTATION DEMAND MANGEMENT

The proposed development is not located in a Design Priority Area (DPA) or Transit-oriented Development (TOD) zone. City of Ottawa TDM Checklists were used to determine what TDM measures could be implemented based on the available information.

It is anticipated for the transit mode share to increase with the implementation of the proposed median BRT system along March Road. The BRT system is envisioned to complement the nearby proposed Park and Ride facility (in the northwest quadrant of the KNUEA lands) to bolster ridership figures. Moreover, the new neighborhood collector roads design guidelines are designed with space allocated for segregated cycling facilities and walking areas separated form the roadway by grass boulevards, which is anticipated to encourage commuters to use active transportation.

The TDM checklists are contained in **Appendix E**.

4.6 NEIGHBHOURHOOD TRAFFIC MANAGEMENT

Not applicable; exempted during screening and scoping.

4.7 TRANSIT

4.7.1 Route Capacity

In light of the assumption that the March Road Bus Rapid Transit will take place beyond the ultimate horizon year, the transit modal share for the subject development is assumed to be 20%, which is consistent with the *Kanata North Community Design Plan Transportation Master Plan* (Novatech, June 2016). Based on this transit modal share, the subject development is anticipated to generate 179 and 278 total transit trips during the AM and PM peak hours, respectively. Articulated buses and double-decker buses have seated capacities of 70 and 90 passengers; respectively. If OC Transpo provides one bus to subject development operating at a 15-minute headway during the morning and afternoon peak hours, the hourly transit capacity will be 280 – 360 people per hour, which is sufficient to absorb the increased number of passengers generated by the subject development. Post the 2039 horizon year, if BRT is introduced at peak frequency of 10-minute headways, the transit capacity would be forecasted between 420 and 540 person trips per hour during the peak.

It is noted that future transit service frequency and routing will be decided by OC Transpo in coordination with the developer as well as the surrounding KNUEA developments.

4.8 REVIEW OF NETWORK CONCEPT

This was addressed as part of the approved *Kanata North Community Design Plan Transportation Master Plan* (Novatech, June 2016).

4.9 INTERSECTION DESIGN

4.9.1 Intersection Control

The intersection controls for the three study area intersections were discussed in **Section 4.4.2** and the analysis of the intersections can be seen in **Section 4.9.2**.

4.9.2 Intersection Design

An assessment of the study area intersections was undertaken to determine the operational characteristics under the various horizons identified in the Screening and Scoping report as well as the road improvement timelines. Intersection operational analysis was facilitated with Synchro 10.0™ software package (HCM 2000 method to remain consistent with other KNUEA TIA's and the TMP) and the MMLOS analysis was completed for all modes and compared against the City of Ottawa's MMLOS targets.

4.9.2.1 2020 Existing Conditions

Figure 7 illustrates 2020 existing traffic volumes at the study area intersection during the AM and PM peak hours, respectively.

Intersection Capacity Analysis

Table 15 summarizes the results of the Synchro analysis for 2020 existing intersection operations.

All existing study area intersections are currently operating satisfactorily, and as such, no improvements are required to supplement existing conditions.

Appendix C contains detailed intersection performance worksheets.

Table 15 – 2020 Existing Traffic Conditions –Intersection Operations

Intersection	Intersection Control	Approach / Movement		LOS	V/C	Delay (s)	Queue 95th (veh)
March Road at Maxwell Bridge Road / Halton Terrace	Traffic Signals	EB	Left	A (A)	0.11 (0.17)	46.6 (47.9)	12.3 (10.8)
			Through / Right	A (A)	0.27 (0.41)	48.2 (50.1)	29.1 (32.6)
		WB	Left	D (A)	0.81 (0.60)	76.0 (56.7)	54.2 (35.3)
			Through / Right	A (A)	0.09 (0.53)	46.4 (52.2)	13.5 (42.3)
		NB	Left	A (A)	0.07 (0.24)	7.8 (5.0)	5.3 (20.7)
			Through	A (A)	0.10 (0.43)	9.5 (10.4)	18.9 (81.1)
			Right	A (A)	0.05 (0.08)	9.2 (7.6)	3.8 (7.7)
		SB	Left	A (A)	0.10 (0.17)	6.4 (6.9)	11.8 (8.2)
			Through	A (A)	0.41 (0.12)	11.6 (9.1)	86.2 (22.0)
			Right	A (A)	0.01 (0.01)	8.2 (8.3)	0.0 (0.0)
		Overall Intersection		**A (A)**	**0.48 (0.45)**	**21.1 (17.3)**	**-- (--)**
March Road at Dunrobin Road	Traffic Signals	EB	Left	A (A)	0.08 (0.07)	6.6 (4.3)	8.4 (4.4)
			Through	A (A)	0.45 (0.12)	9.8 (3.6)	69.7 (13.8)
		WB	Through	A (A)	0.06 (0.45)	6.4 (10.0)	10.2 (81.9)
			Right	A (A)	0.12 (0.37)	6.8 (9.1)	7.7 (12.9)
		SB	Left	C (A)	0.74 (0.56)	33.0 (42.9)	55.6 (31.2)
		Overall Intersection		**A (A)**	**0.53 (0.46)**	**18.5 (14.5)**	**-- (--)**

Street A at Halton Terrace	Minor Stop Control	EB	Through / Right	A (A)	0.05 (0.01)	0.0 (0.0)	0.0 (0.0)
		WB	Left / Through	A (A)	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)
		NB	Left / Right	A (A)	0.11 (0.10)	9.1 (8.8)	2.7 (2.6)
		Overall Intersection		**A** (A)	**0.17** (**0.26**)	**3.9** (2.5)	**-- (--)**
Street A at Old Carp Road	Minor Stop Control	EB	Left / Right	A (A)	0.07 (0.01)	8.6 (8.4)	1.8 (0.3)
		NB	Left / Through	A (A)	0.04 (0.17)	7.3 (7.7)	0.8 (4.5)
		SB	Through / Right	A (A)	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)
		Overall Intersection		**A (A)**	**0.14 (0.23)**	**5.0 (2.5)**	**-- (--)**

Notes:
1. **Table format: AM (PM)**
2. **v/c – represents the anticipated volume divided by the predicted capacity**

Multi-Modal Level of Service Assessment

March Road at Maxwell Bridge Road / Street A

Based on the 'General Urban Area' land-use designation for the March Road at Maxwell Bridge Road intersection, the Pedestrian Level of Service (PLOS) target is C. The Ultimate Cycling Network from the City of Ottawa's *Cycling Plan* (2013) designates March Road as a spine cycling route and Halton Terrace as a local cycling route. The intersection is therefore subject to a Bicycle Level of Service (BLOS) target of C. The transit (TLOS) and truck (TkLOS) level of service targets for this intersection are both D.

The intersection of March Road at Maxwell Bridge Road / Halton Terrace currently operates with a PLOS of F, which does not meet the target of C. Reducing the cycle length and the number of lanes on March Road, protecting left and right turn phases, and incorporating raised crosswalks at this intersection would improve the PLOS based on the PETSI score. To improve the PLOS based on the pedestrian delay, the cycle length would need to be greatly reduced. Although these methods would improve the PLOS at this intersection, they are not feasible options as they would have significant impacts to vehicular and transit operations.

The Bicycle Level of Service at the intersection of March Road at Maxwell Bridge Road / Halton Terrace currently operates with a BLOS of F due to the number of lanes crossed for making left turns along and north-south approaches and the high operating speed, and therefore does not meet the BLOS target of C. Methods for improving the BLOS at this intersection include reducing the speed limit and number of lanes along March Road in addition to introducing the northbound right turn lane to the right of the northbound bike lane. Although these methods would improve the BLOS at this intersection, they are not feasible options as they would be to the detriment of the vehicles and transit. An alternative measure would be to upgrade the cycling facilities to feature segregated multi-use pathways and provide left turn treatments including 2-stage bike-boxes at the intersection. This improvement is subject to ROW availability.

The Transit Level of Service at the intersection of March Road at Maxwell Bridge Road / Halton Terrace currently operates with a TLOS of F. Based on the MMLOS guidelines, intersection TLOS is governed by the delay at the intersection. Most measures which are aimed towards reducing transit delay would come at the expense of the LOS for pedestrians and / or cyclists. For example, while adding additional northbound and southbound through lanes would improve the TLOS, it would increase the crossing distance for pedestrians and the number of lanes cyclists must cross to make a left turn, and therefore, reduce the PLOS and BLOS. Therefore, no mitigation measures are proposed to improve TLOS.

The Truck Level of Service at the intersection of March Road at Maxwell Bridge Road / Halton Terrace currently operates with a TkLOS of E, which is due to the side streets only having one receiving lane. As Maxwell Bridge Road and Halton Terrace are not designated truck routes, trucks will likely proceed along March Road in the northbound and southbound directions and will not likely turn onto the side streets. A TkLOS of E is therefore acceptable at this intersection.

Once March Road is widened with the Bus Rapid Transit in place, the operations at this intersection will change substantially. It is therefore not recommended to address the MMLOS at this time. Consideration should be given to incorporating multi-modal aspects into the design of March Road to achieve the MMLOS targets.

Appendix D contains detailed intersection MMLOS evaluation results.

March Road at Dunrobin Road

Based on the 'General Rural Area' land-use designation for the March Road at Dunrobin Road intersection, there is no Pedestrian Level of Service (PLOS) nor Transit Level of Service (TLOS) targets. The Ultimate Cycling Network from the City of Ottawa's *Cycling Plan* (2013) designates both March Road and Dunrobin Road as spine cycling routes, and as such, the intersection is subject to a Bicycle Level of Service (BLOS) target of D. Both March Road and Dunrobin Road are designated truck routes, therefore, the Truck Level of Service (TkLOS) target for this intersection is C.

The Bicycle Level of Service at the intersection of March Road at Dunrobin Road currently operates with a BLOS of F. Methods for improving the BLOS at this intersection include reducing the speed limit along March Road and reducing the length of the northbound right turn lane. Although these methods would improve the BLOS at this intersection, they are not feasible options as they would be to the detriment of the vehicles. An alternative measure is to upgrade the cycling facilities to feature multi-use pathways with left turn treatments at the intersection.

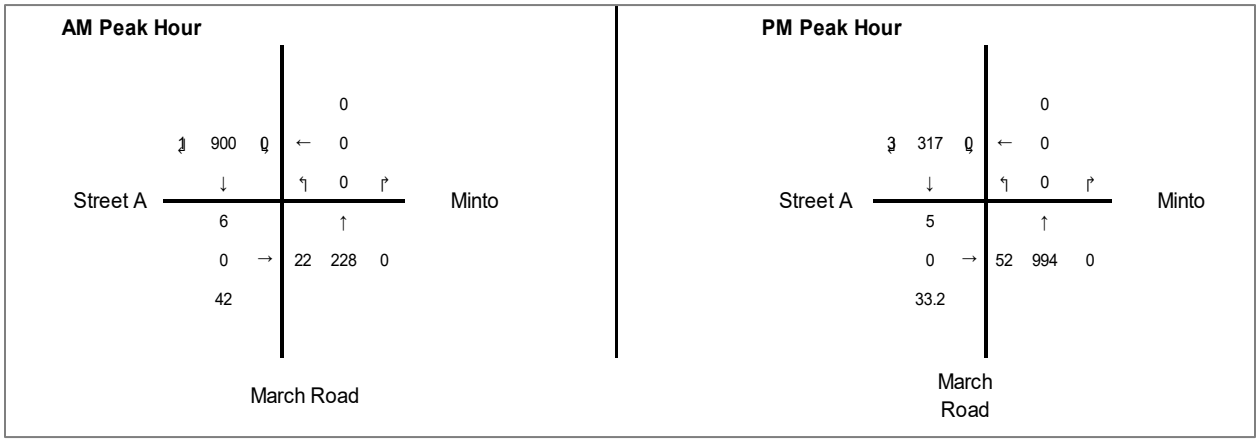
The Truck Level of Service at the intersection of March Road at Dunrobin Road currently operates with a TkLOS of E, which is attributed to only having one receiving lane on all legs of the intersection with the exception of the eastbound direction. Increasing the number of lanes along both March Road and Dunrobin Road or increasing the corner radii on all quadrants would improve the TkLOS at this intersection.

Appendix D contains detailed intersection MMLOS evaluation results.

4.9.2.2 2022 - First Phase Buildout – March Road at Street A intersection

The first phase of the development is planned to be constructed by the year 2022 and includes 600 mid-rise apartments. Within the proposed development, the first phase mid-rise apartments will be situated in the southwest quadrant of the intersection of March Road and Street A. As per **Figure 11**, 45% of entering traffic is anticipated to utilize the northbound left turn at the intersection to access the development during both peak periods. **Figure 18** showcases the total traffic volumes at the intersection of March Road and Street A in the year 2022, inclusive of phase 1 traffic.

Figure 18 - 2022 Total Traffic - March Road @ Street A Intersection



Intersection Capacity Analysis

For analysis purposes, a shorter 100s timing plan was adopted for the intersection of March Road at Street A for this scenario, while the northbound left turn lane was removed as it is assumed to not be in place by 2022. As the Minto development on the east side of March Road across from the subject development is not assumed to be constructed by 2022, traffic to/from the intersection's east leg is forecast to be negligible. In 2022, it is assumed that the eastbound left storage lane and the eastbound through / right lane would be in place as phase 1 of the subject development would have been completed. **Table 16** showcases the traffic operations.

Table 16 - 2022 Total Traffic Conditions –March Road @ Street A Intersection Operations

Intersection	Intersection Control	Approach / Movement		LOS	V/C	Delay (s)	Queue 95th (veh)
March Road at Street A	Traffic Signals	EB	Left	A (A)	0.09 (0.07)	46.9 (46.8)	5.0 (4.5)
			Through / Right	A (A)	0.03 (0.02)	46.4 (46.3)	0 (0)
		WB	Left	A (A)	0 (0)	0 (0)	0 (0)
			Through / Right	A (A)	0 (0)	0 (0)	0 (0)
		NB	Left / Through	A (C)	0.21 (0.73)	2.3 (3.9)	15.5 (131.2)
			Right	A (A)	0 (0)	0 (0)	0 (0)
		SB	Left	A (A)	0 (0)	0 (0)	0 (0)
			Through / Right	B (A)	0.61 (0.22)	5.1 (1.9)	86.8 (18.7)
		Overall Intersection		**A (B)**	**0.59 (0.70)**	**6.2 (7.1)**	**-- (--)**

Notes:
1. **Table format: AM (PM)**
2. **v/c – represents the anticipated volume divided by the predicted capacity**

Albeit the northbound movement operates acceptably, it is recommended for the implementation of the northbound left turn lane at the intersection of March Road and Street A as shown in the RMA in **Figure 8** to be synonymous with the buildout of the first phase of the subject development due to the high posted speed limit (80 km/h) on March Road. With a posted speed of 80 km/h, safety would be enhanced by providing a storage area for left turning vehicles to prevent the potential rapid deceleration of northbound through vehicles when following a northbound left turning vehicle in close proximity to the intersection. Moreover, with a shared left / through lane, northbound through vehicles (994 vph during the PM peak) would have to wait for a left turning vehicle to perform the maneuver before proceeding through the intersection.

Appendix C contains detailed intersection performance worksheets.

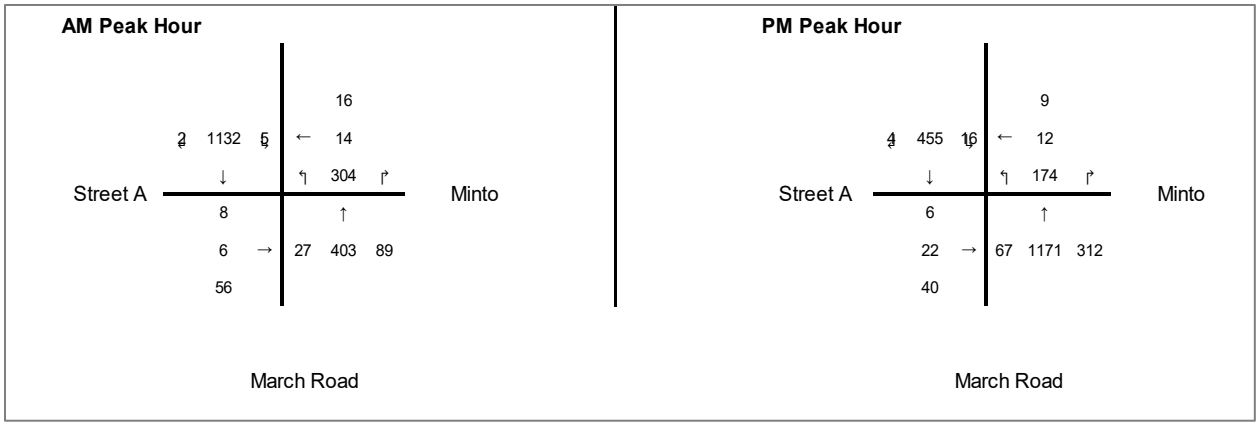
4.9.2.3 2026 – Claridge Site Buildout

By the year 2026, it is anticipated that all the background developments considered in this study (with the exception of the northeast quadrant of the KNUEA lands – Valecraft Homes) would be completed. Furthermore, the subject development is expected to have its 3rd phase completed as shown in Table 1. This entails 600 mid-rise apartment units, 28 single family homes, and 33 townhomes. Utilizing the trip distribution shown in **Figure 11**, the total traffic in the year 2026 at the intersection of March Road and Street A is shown in **Figure 19**. This horizon year was analyzed to further investigate the improvements required on March Road (i.e widening).

For analysis purposes, the following was assumed at the intersection of March Road and Street A:

- The eastbound left and eastbound through/right lanes are in place;
- The westbound left and westbound through/right lanes are in place;
- The northbound left and northbound right turn lanes are in place;
- Single northbound and southbound through lanes on March Road
- A 130s cycle length with permissive phasing due to the moderate northbound left turn volumes and low southbound left volumes.

Figure 19 - 2026 Total Traffic Volumes



The analysis results are shown in **Table 17** below and are indicative of March Road operating near its theoretical capacity. During the AM peak period, the southbound through movement is anticipated to operate with a v/c ratio of 0.98 and a delay of 44s, which is close to the road's full capacity. Southbound vehicles were also found to generate a 95th queue totaling approximately 375m upstream, which is anticipated to impact the Claridge development's planned Street D access as shown in the KNUEA TMP. Based on the traffic operations findings, it is concluded that the traffic along March Road would trigger road improvements in the form of widening shortly after the year 2026. The increase in southbound through traffic (just north of the March Road and Street A intersection) in the year 2026 is mainly attributed to the background traffic growth.

Appendix C contains detailed intersection performance worksheets.

Table 17 - 2026 Total Traffic Conditions –March Road @ Street A Intersection Operations

Intersection	Intersection Control	Approach / Movement		LOS	V/C	Delay (s)	Queue 95th (veh)
March Road at Street A	Traffic Signals	EB	Left	A (A)	0.02 (0.02)	37.5 (44.0)	5.8 (4.8)
			Through / Right	A (A)	0.05 (0.11)	37.8 (44.8)	12.3 (15.8)
		WB	Left	E (C)	0.97 (0.78)	91.6 (67.3)	#133.6 (63.5)
			Through / Right	A (A)	0.04 (0.05)	37.7 (44.2)	10.6 (9.2)
		NB	Left	A (A)	0.53 (0.11)	46.3 (6.1)	#21.2 (12.2)
			Through	A (E)	0.38 (0.91)	11.6 (26.4)	64.3 (#392.3)
			Right	A (A)	0.06 (0.21)	8.4 (6.7)	5.7 (14.1)
		SB	Left	A (A)	0.01 (0.15)	8.0 (8.9)	1.9 (5.6)
			Through / Right	E (A)	0.98 (0.36)	43.6 (8.0)	#375.7 (72.)
		Overall Intersection		**E (D)**	**0.98 (0.88)**	**42.6 (23.1)**	**-- (--)**

Notes:
1. **Table format: AM (PM)**
2. **v/c – represents the anticipated volume divided by the predicted capacity**

4.9.2.4 2034 Future Background Conditions

The future background traffic coinciding with the Brigil development's buildout year was analyzed to determine traffic operations at the study area intersections. In line with FBG conditions, no traffic to/from the Brigil development was added to the study area intersections although multiple phases of the development are anticipated to be completed at the time. The eastbound and westbound through traffic at the intersection of March Road and Street A is generated by the Minto development utilizing the Park and Ride lot. At the intersection of March Road and Street A, the same assumptions from the 2026 total traffic scenario were carried over. As such, all auxiliary lanes were assumed to be in place and a 130s signal timing plan with permissive phasing was utilized due to the low northbound left and southbound left turning volumes. For analysis purposes, it was assumed that March Road had not yet been widened to four lanes. The volumes are shown in **Figure 13**. The results are shown in **Table 18**.

At the intersection of March Road and Street A, the analysis found that during the AM peak hour, the southbound through movement is anticipated to operate with a v/c ratio of 1.17 and a delay of 110s. The 95th queue length is found to be approximately 500m upstream of the intersection, which is anticipated to affect operations at the Claridge (Street D) site access and at the shared Claridge/Valecraft (Street G) access as shown on the KNUEA TMP. As such, March Road is forecast to operate above capacity in the year 2034 even while excluding the traffic generated by the subject development, thereby triggering road improvements (i.e the widening of March Road to 4 lanes between Maxwell Bridge and Dunrobin Road). During the PM peak hour, the northbound through movement is anticipated to operate with a v/c ratio of 1.10 and generate a 95th queue of 520m upstream of the intersection, which could potentially spill back and affect lead to deteriorated operations at the intersection of March Road and Maxwell Bridge Road. It is also noted that the traffic signal at March Road and Street A is operating under a 130s timing plan (maximum recommended cycle for planning applications as per the City of Ottawa TIA guidelines).

All other study area intersections are anticipated to operate with acceptable levels of service.

Appendix C contains detailed intersection performance worksheets.

Table 18 - 2034 Future Background Traffic Conditions - Intersection Operations

Intersection	Intersection Control	Approach / Movement		LOS	V/C	Delay (s)	Queue 95th (veh)
March Road at Maxwell Bridge Road / Halton Terrace	Traffic Signals	EB	Left	A (A)	0.11 (0.16)	47.3 (48.0)	12.0 (10.4)
			Through / Right	A (A)	0.26 (0.40)	48.8 (50.2)	28.4 (31.6)
		WB	Left	C (A)	0.80 (0.59)	75.4 (56.5)	52.8 (34.2)
			Through / Right	A (A)	0.09 (0.52)	47.1 (51.9)	13.2 (40.9)
		NB	Left	A (A)	0.16 (0.34)	11.5 (5.5)	4.9 (19.7)
			Through	A (C)	0.27 (0.72)	10.7 (15.3)	49.8 (182.3)
			Right	A (A)	0.04 (0.09)	8.8 (7.6)	3.4 (10.0)
		SB	Left	A (A)	0.13 (0.31)	3.3 (11.1)	m3.2 (7.9)
			Through	C (A)	0.71 (0.33)	8.0 (10.7)	m97.3 (59.9)
			Right	A (A)	0.01 (0.01)	7.9 (8.2)	0 (0)
		Overall Intersection		**C (B)**	**0.71 (0.69)**	**15.1 (17.6)**	**-- (--)**
March Road at Street A	Traffic Signals	EB	Left	A (A)	0 (0)	0 (0)	0 (0)
			Through / Right	A (A)	0.02 (0.08)	37.6 (44.9)	4.7 (11.5)
		WB	Left	E (C)	0.93 (0.77)	81.1 (66.3)	#127.3 (63.3)
			Through / Right	A (A)	0.05 (0.04)	37.9 (44.6)	10.6 (8.2)
		NB	Left	A (A)	0 (0)	0 (0)	0 (0)
			Through	A (F)	0.47 (1.10)	18.1 (55.5)	117.9 (#523)
			Right	A (A)	0.06 (0.23)	10.3 (0.5)	6.9 (22.0)
		SB	Left	A (A)	0.01 (0.29)	7.9 (12.9)	2 (9.3)
			Through / Right	F (A)	1.17 (0.48)	109.4 (1.3)	#501.8 (106.1)
		Overall Intersection		**F (F)**	**1.11 (1.03)**	**80.6 (49.0)**	**-- (--)**
March Road at Dunrobin Road	Traffic Signals	EB	Left	A (A)	0.08 (0.07)	7.0 (5.2)	8.8 (4.8)
			Through	A (A)	0.51 (0.17)	11.0 (4.3)	85.0 (21.4)
		WB	Through	A (A)	0.14 (0.50)	7.3 (11.4)	20.1 (99.1)
			Right	A (A)	0.17 (0.39)	7.6 (10.1)	9.5 (14.0)
		SB	Left	C (B)	0.75 (0.66)	32.9 (44.7)	60.0 (39.5)
		Overall Intersection		**A (A)**	**0.57 (0.52)**	**18.3 (16.0)**	**-- (--)**
Street A at Halton Terrace	Minor Stop Control	EB	Through / Right	A (A)	0.05 (0.01)	0 (0)	0.0 (0)
		WB	Left / Through	A (A)	0.0 (0)	0 (0)	0.0 (0)
		NB	Left / Right	A (A)	0.10 (0.10)	9.0 (8.8)	9.0 (2.5)
		Overall Intersection		**A (A)**	**0.17 (0.28)**	**3.9 (2.5)**	**-- (--)**
Street A at Old Carp Road	Minor Stop Control	EB	Left / Right	A (A)	0.07 (0.01)	8.6 (8.4)	1.8 (0.3)
		NB	Left / Through	A (A)	0.03 (0.16)	7.3 (7.6)	0.8 (4.3)
		SB	Through / Right	A (A)	0.0 (0)	0 (0)	0 (0)
		Overall Intersection		**A (A)**	**0.15 (0.25)**	**8.0 (7.7)**	**-- (--)**
March Road at Street D	Minor Stop Control (RIRO)	EB	Right	--	--	--	--
		Overall Intersection		**--**	**--**	**--**	**--**

Notes:
1. **Table format: AM (PM)**
2. **v/c – represents the anticipated volume divided by the predicted capacity**

Multi-Modal Level of Service Assessment

March Road at Maxwell Bridge Road / Street A

No changes from the 2020 existing intersection MMLOS operations. In 2034, it is noted that a school is expected to be constructed in the southwest quadrant of the KNUEA lands. As such, March Road's designation will change to "within 300m of a school", and the PLOS target will shift to A. It is noted that the location of the school in the vicinity of this intersection has established unreasonably high PLOS targets for the area considering March Road is an arterial

roadway with high speeds and high volumes. The PLOS target of A is unattainable at the intersection of March Road at Maxwell Bridge Road / Street A.

Appendix D contains detailed intersection MMLOS evaluation results.

March Road at Dunrobin Road

No changes from the 2020 existing intersection MMLOS operations.

Appendix D contains detailed intersection MMLOS evaluation results.

March Road at Street A

Due to the school construction in the southwest quadrant of the KNUEA lands, the Policy Area for the March Road at Street A intersection can be classified as 'within 300m of a school'. Based on this classification, the Pedestrian Level of Service (PLOS) target is A. The Ultimate Cycling Network from the City of Ottawa's *Cycling Plan* (2013) designates March Road as a spine cycling route, therefore it is subject to a Bicycle Level of Service (BLOS) target of C. The transit (TLOS) and truck (TkLOS) level of service targets for this intersection are both D.

The design of the March Road at Street A intersection was taken from the RMA provided by the City of Ottawa as shown in **Figure 8**.

The Pedestrian Level of Service at the intersection of March Road at Street A is projected to operate with a PLOS of E, which does not meet the target of A. Reducing the cycle length, protecting left and right turn phases, and incorporating raised crosswalks at this intersection would allow the PLOS target of A to be met based on the PETSI score. To achieve the desired PLOS based on the pedestrian delay, the cycle length would need to be greatly reduced. Although these methods would improve the PLOS at the intersection, they are not feasible as they would be to the detriment of the vehicular and transit operations. It is noted that the location of the school in the vicinity of this intersection has established unachievable PLOS targets for the area considering March Road is an arterial roadway with high speeds and high volumes.

The Bicycle Level of Service at the intersection of March Road at Street A is projected to operate with a BLOS of C, thereby meeting the desired target of C. This is attributed to the planned presence of curbside bicycle lanes with transitions along the north-south approaches as illustrated in the RMA provided by the City of Ottawa. In addition, the presence of segregated cycling facilities along the east and west approaches of the intersection (as per the neighborhood collector road design guidelines) will likely encourage cyclists to make left turns by using designated crosswalks and/or cross-rides. As such, it is not anticipated for cyclists to cross any lanes performing left turns, thus improving the overall BLOS operations. It is noted that for this intersection, north-south cycle cross-rides will be provided by the build-out year 2034, while the east-west cycle cross-rides will be completed with the widening of March Road. Under the 2034 configuration, cyclists will not cross any lanes to make left turns. Once all cross rides are provided by 2039 (when March Road is assumed to be widened), the left turns can be treated as 2-stage with bike boxes.

The Transit Level of Service at the intersection of March Road at Street A is projected to operate with a TLOS of F, which does not meet the desired target of D. Based on the MMLOS guidelines, intersection TLOS is governed by the delay at the intersection. Most measures which are aimed towards reducing transit delay would come at the expense of the LOS for pedestrians and / or cyclists. For example, while adding additional northbound and southbound through

lanes would reduce overall intersection delay, it would increase the crossing distance for pedestrians and the number of lanes cyclists must cross to make a left turn, and therefore, reduce the PLOS and BLOS.

The Truck Level of Service at the intersection of March Road at Street 1 is projected to operate with a TkLOS of E, which does not meet the desired target of D. This is due to the three legs of the intersection only having one receiving lane. As Street A will likely not be a designated truck route, trucks will likely proceed along March Road in the northbound and southbound directions and will not likely turn onto Street A. A TkLOS of E is therefore acceptable at this intersection.

Once March Road is widened with the Bus Rapid Transit in place, the operations at this intersection will change substantially. It is therefore not recommended to address the MMLOS at this time. Consideration should be given to incorporating multi-modal aspects into the design of March Road to achieve the MMLOS targets.

Appendix D contains detailed intersection MMLOS evaluation results.

4.9.2.5 2034 Total Future Conditions

The traffic conditions at the total buildout year (2034) was analyzed to determine the impact of the subject development's traffic on the study area intersections. The geometric assumptions from the 2034 future background conditions scenario are carried over. For the intersection of March Road and Street A, the 130s timing plan from the future background scenario was adjusted to accommodate traffic to/from the proposed development by adding a protected portion to the northbound left movement while balance the overall delays between major and minor movements. The traffic volumes are shown in **Figure 14**. The analysis results are shown in **Table 19**.

At the intersection of March Road and Maxwell Bridge Road, the analysis found that during the AM peak hour, the westbound left movement is anticipated to operate with a v/c ratio of 1.02 and a delay of 132s due to the increase in eastbound conflicting traffic resulting from the Brigil development. The southbound through movement is found to operate near capacity at a v/c ratio of 0.95 and a moderate delay of 22s. During the PM peak, the westbound left movement is anticipated to operate with a v/c ratio of 1.1 and a delay of 184.7s due to the increase in eastbound conflicting traffic.

During the AM peak hour, and for the westbound left traffic, a v/c ratio of 1.02 with a delay of 132s is assumed to be acceptable for minor roads, given a 130s City of Ottawa timing plan prioritizing the north-south corridor. It is noted that during the PM peak hour, the intersection of March Road at Maxwell Bridge Road operates under a 120s timing plan. To improve the traffic operations for the critical movements during the 2034 horizon year, the PM peak hour cycle length was increased to 130s and the westbound left movement was assigned a protected portion to dissipate traffic more efficiently. As a result of the proposed 130s timing plan, the westbound left movement is anticipated to operate with a v/c ratio of 0.7 and a significantly reduced delay of 62s. Due to the increase in cycle length and more specifically, the additional timing assigned to accommodate the protected portion of the westbound left turn, the northbound through movement is anticipated to experience 10s of additional delay (31.5s) and is expected to operate with a v/c ratio of 0.91.

At the intersection of March Road and Street A, during the AM peak hour, the southbound through movement is anticipated to operate with a v/c ratio of 1.37 and a delay of exceeding 200s. The generated 95th queue length is approximately 550m upstream of the intersection, which could affect the traffic operations at the upstream intersections,

namely Street D (Claridge) and Street G (shared Claridge and Valecraft) as labelled in the KNUEA TMP. The deteriorated operations can be attributed to the protected portion of the northbound left movement which results in a shorter overall green time assigned for the southbound movement in addition to the high traffic volumes with only one through travel lane. Moreover, the westbound left movement is anticipated to operate with a v/c ratio of 1.09 and a delay of 127s, which is attributed to the inclusion of the conflicting eastbound traffic generated by the proposed development. The operations for the westbound movement are found to be acceptable, considering it is a minor movement.

During the PM peak hour, the northbound through movement is anticipated to operate with a v/c ratio of 1.12 and a delay of 84s, which is also attributed to the high traffic volumes with only one through travel lane. The generated 95th queue is calculated to be approximately 520m, which may potentially spill back and deteriorate the operations at the intersection of March Road and Maxwell Bridge Road.

All other study area intersections are anticipated to operate with acceptable levels of service.

Appendix C contains detailed intersection performance worksheets.

Table 19 - 2034 Total Traffic Conditions - Intersection Operations

Intersection	Intersection Control	Approach / Movement		LOS	V/C	Delay (s)	Queue 95th (veh)
March Road at Maxwell Bridge Road / Halton Terrace	Traffic Signals	EB	Left	A (A)	0.07 (0.12)	39.3 (44.6)	11.5 (9.7)
			Through / Right	A (A)	0.59 (0.60)	47.3 (52.1)	73.1 (50.2)
		WB	Left	F (F)	1.02 (1.10)	132.5 (184.7)	#73.8 (#45.5)
			Through / Right	A (A)	0.06 (0.43)	39.2 (47.6)	12.7 (38.0)
		NB	Left	B (C)	0.70 (0.77)	43.3 (17.6)	#38.7 (#84.4)
			Through	A (D)	0.35 (0.84)	16.0 (21.8)	60.7 (#276.6)
			Right	A (A)	0.04 (0.09)	12.8 (8.9)	3.6 (11.5)
		SB	Left	A (A)	0.15 (0.43)	8.1 (18.8)	m4.7 (13.7)
			Through	E (A)	0.95 (0.50)	21.7 (19.6)	m156.6 (91.3)
			Right	A (A)	0.01 (0.01)	13.2 (13.9)	0 (0)
		Overall Intersection		**E (E)**	**0.95 (0.92)**	**28.3 (27.2)**	**-- (--)**
March Road at Maxwell Bridge Road / Halton Terrace	Traffic Signals	**Increase in cycle length to 130s and adding a protected portion to the westbound left movement**					
		EB	Left	A (A)	0.07 (0.11)	39.3 (49.5)	11.5 (10.7)
			Through / Right	B (C)	0.59 (0.71)	47.3 (64.1)	73.1 (58.6)
		WB	Left	F (B)	1.02 (0.70)	132.5 (62.0)	#73.8 (29.3)
			Through / Right	A (A)	0.06 (0.31)	39.2 (44.0)	12.7 (37.3)
		NB	Left	B (C)	0.70 (0.76)	43.3 (26.2)	#38.7 (#124.4)
			Through	A (E)	0.35 (0.91)	16.0 (31.5)	60.7 (#317.2)

Intersection	Intersection Control	Approach / Movement		LOS	V/C	Delay (s)	Queue 95th (veh)
			Right	A (A)	0.04 (0.08)	12.8 (12.0)	3.6 (8.9)
		SB	Left	A (A)	0.15 (0.45)	8.1 (25.8)	m4.7 (m13.3)
			Through	E (B)	0.95 (0.62)	21.7 (29.9)	m156.6 (140.5)
			Right	A (A)	0.01 (0.01)	13.2 (22.0)	0 (0)
		Overall Intersection		**E (D)**	**0.95 (0.90)**	**28.3 (33.2)**	**-- (--)**
March Road at Street A	Traffic Signals	EB	Left	A (A)	0.07 (0.13)	37.1 (43.2)	1.9 (15.7)
			Through / Right	A (A)	0.14 (0.17)	37.9 (43.6)	20.8 (21.9)
		WB	Left	F (D)	1.09 (0.88)	127.2 (83.3)	#143.6 (#70.3)
			Through / Right	A (A)	0.04 (0.04)	36.9 (42.3)	10.6 (8.1)
		NB	Left	A (A)	0.59 (0.47)	26.5 (11.9)	21.3 (29.9)
			Through	A (F)	0.48 (1.12)	20.9 (84.1)	148.4 (#518.9)
			Right	A (A)	0.06 (0.23)	31.9 (7.6)	21.3 (19.5)
		SB	Left	A (A)	0.01 (0.29)	12.6 (26.9)	2.5 (11.3)
			Through / Right	F (B)	1.37 (0.62)	202.1 (21.1)	#551.2 (173.2)
		Overall Intersection		**F (F)**	**1.25 (1.11)**	**132.9 (54.1)**	**-- (--)**
March Road at Dunrobin Road	Traffic Signals	EB	Left	A (A)	0.08 (0.08)	7.1 (5.5)	8.9 (4.9)
			Through	A (A)	0.51 (0.18)	11.1 (44.5)	86.6 (23.4)
		WB	Through	A (A)	0.15 (0.51)	7.4 (11.9)	21.7 (103.6)
			Right	A (A)	0.18 (0.39)	7.7 (10.4)	9.6 (14.2)
		SB	Left	C (B)	0.75 (0.67)	33.0 (44.8)	60.5 (41.6)
		Overall Intersection		**A (A)**	**0.58 (0.53)**	**18.2 (16.3)**	**-- (--)**
Street A at Halton Terrace	Minor Stop Control	EB	Through / Right	A (A)	0.14 (0.09)	0 (0)	0 (0)
		WB	Left / Through	A (A)	0 (0)	0 (0)	0 (0)
		NB	Left / Right	B (A)	0.13 (0.12)	10.1 (9.6)	3.3 (3.1)
		Overall Intersection		**A (A)**	**0.27 (0.40)**	**2.2 (1.4)**	**-- (--)**
Street A at Old Carp Road	Minor Stop Control	EB	Left / Right	A (A)	0.09 (0.02)	9.5 (9.1)	2.2 (0.4)
		NB	Left / Through	A (A)	0.04 (0.18)	3.3 (5.2)	0.9 (5.0)
		SB	Through / Right	A (A)	0.10 (0.09)	0 (0)	0 (0)
		Overall Intersection		**A (A)**	**0.31 (0.48)**	**3.2 (4.1)**	**-- (--)**
March Road at Street D	Minor Stop Control (RIRO)	EB	Right	C (B)	0.14 (0.1)	20.1 (12.4)	3.6 (2.5)
		Overall Intersection		**A (A)**	**0.63 (0.59)**	**0.3 (0.2)**	**-- (--)**
Notes:							

Intersection	Intersection Control	Approach / Movement	LOS	V/C	Delay (s)	Queue 95th (veh)

1. **Table format: AM (PM)**
2. **v/c – represents the anticipated volume divided by the predicted capacity**

Consistent with the previous horizon, the intersection of March Road at Maxwell Bridge Road / Halton Terrace is projected to operate at or above capacity during the AM peak hour (i.e. v/c ratio ≥ 0.90). In addition, the projected volumes along March Road are significant (i.e. in excess of 1,000 vehicles per hour per direction). The widening of March Road will help to alleviate the projected capacity concerns along March Road; however, it is not within the Affordable Network as per the City of Ottawa's 2013 Transportation Master Plan. The City should consider advancing the timing of the March Road widening to accommodate these future traffic volumes.

All remaining study area intersections are projected to operate satisfactorily under 2034 Total Future conditions.

Appendix C contains detailed intersection performance worksheets.

Multi-Modal Level of Service Assessment

March Road at Maxwell Bridge Road / Street A

No changes anticipated from the 2034 FBG intersection MMLOS analysis above. **Appendix D** contains detailed intersection MMLOS evaluation results.

March Road at Dunrobin Road

No changes anticipated from the 2034 FBG intersection MMLOS analysis above. **Appendix D** contains detailed intersection MMLOS evaluation results.

March Road at Street A

No changes anticipated from the 2034 FBG intersection MMLOS analysis above. **Appendix D** contains detailed intersection MMLOS evaluation results.

4.9.2.6 2039 Ultimate Conditions

For the 2039 ultimate horizon year, and as per communication with the City of Ottawa, it is assumed that March Road would be widened from 2 lanes to 4 lanes between Maxwell Bridge Road and Dunrobin Road. This improvement is expected to have a profound impact on the traffic operations along March Road, especially at the intersection with Street A. The timing plan improvements during the PM peak hour at the intersection of March Road and Maxwell Bridge Road are retained for the purpose of the analysis. The traffic volumes are shown in Figure 15

Figure 15. The analysis results are shown in **Table 20**.

The analysis found that the intersection of March Road and Maxwell Bridge Road sees similar operations to the 2034 total traffic conditions. As such, the critical movements remain largely the same. It is noted that the westbound left

movement is anticipated to operate with a v/c ratio of 1.0 compared to a ratio of 1.02 in the 2034 total future conditions as a result of overall network offset optimization with the intersection of March Road and Street A, which is assumed to be widened. Overall, the intersection operates with a v/c ratio of 0.96 and a delay of 32s during the AM peak hour, and a v/c ratio of 0.92 and a delay of 36s during the PM peak hour. It is assumed that all highlighted critical movements have acceptable levels of service and delays. Further improvements are not thought to be warranted as the construction of the median BRT system along March Road is expected to bolster transit ridership figures and reduce vehicular use in the area, which will is anticipated to improve the operations summarized in **Table 20**.

As a result of the additional provided capacity through roadway twinning, the northbound and southbound through movements no longer operate above the theoretical capacity during the AM and PM peak hours at the intersection of March Road at Street A. During the AM peak hour, the southbound through movement operates with a v/c ratio of 0.79 and a delay of 29s, a significant improvement as compared to the 2034 total future conditions where a 2-lane March Road's southbound through movement is anticipated to operate with a v/c ratio of 1.37 and a delay of 202s. Similarly, during the PM peak, the northbound through movement is anticipated to operate with a v/c ratio of 0.60 and a delay of 1.5s compared to a v/c ratio of 1.12 and a delay of 84s for a non-widened March Road. It is noted that the queues for the northbound and southbound through movements during both peak periods have been substantially reduced from the upwards of 500m in the peak direction to approximately up to 190m in the peak direction due widening impacts. The queues are no longer anticipated to deteriorate traffic conditions at upstream intersections. The only noted critical movement is the westbound left during the AM peak hour, which is anticipated to operate with a v/c ratio of 0.93 and a delay of 77s, which is acceptable.

All other study area intersections are found to operate satisfactorily.

Appendix C contains detailed intersection performance worksheets.

Table 20 - 2039 Total Traffic Conditions - Intersection Analysis Results

Intersection	Intersection Control	Approach / Movement		LOS	V/C	Delay (s)	Queue 95th (veh)
March Road at Maxwell Bridge Road / Halton Terrace	Traffic Signals	EB	Left	A (A)	0.07 (0.11)	38.7 (49.2)	11.9 (10.9)
			Through / Right	A (C)	0.59 (0.71)	46.7 (63.7)	74.3 (59.4)
		WB	Left	E (C)	1.0 (0.71)	126.5 (62.0)	#74.9 (29.6)
			Through / Right	A (A)	0.06 (0.32)	38.6 43.8()	13.1 (38.4)
		NB	Left	B (C)	0.70 (0.78)	43.7 (28.0)	#38.7 (#129.0)
			Through	A (E)	0.36 (0.92)	16.5 (33.6)	61.3 (#325.8)
			Right	A (A)	0.05 (0.08)	13.2 (12.2)	3.9 (9.5)
		SB	Left	A (A)	0.16 (0.46)	8.7 (37.1)	m7.3 (m20.4)
			Through	E (B)	0.97 (0.62)	28.1 (34.7)	#289.6 (135.2)
			Right	A (A)	0.01 (0.01)	13.6 (22.0)	0 (0)
		Overall Intersection		**E (E)**	**0.96 (0.92)**	**31.8 (35.7)**	**-- (--)**
March Road at Street A	Traffic Signals	EB	Left	A (A)	0.06 (0.13)	33.6 (43.0)	10.9 (15.4)
			Through / Right	A (A)	0.19 (0.17)	35.0 (43.4)	26.2 (21.3)
		WB	Left	E (D)	0.93 (0.87)	76.7 (80.3)	#123.3 (65.7)
			Through / Right	A (A)	0.04 (0.04)	33.4 (42.1)	9.6 (8.9)
		NB	Left	A (A)	0.55 (0.41)	65.9 (1.4)	29.4 (m2.9)
			Through	A (A)	0.27 (0.60)	11.3 (1.5)	36.1 (m10.2)
			Right	A (A)	0.06 (0.20)	8.4 (0.2)	5.2 (0)

Intersection	Intersection Control	Approach / Movement		LOS	V/C	Delay (s)	Queue 95th (veh)
		SB	Left	A (A)	0.01 (0.09)	15.2 (14.4)	2.9 (7.2)
			Through / Right	C (A)	0.79 (0.34)	29.4 (16.3)	191.6 (71.2)
		Overall Intersection		**D (B)**	**0.83 (0.70)**	**32.1 (12.2)**	**-- (--)**
March Road at Dunrobin Road	Traffic Signals	EB	Left	A (A)	0.08 (0.07)	7.1 (4.1)	9.1 (5.0)
			Through	A (A)	0.52 (0.18)	11.3 (4.5)	89.5 (23.6)
		WB	Through	A (A)	0.08 (0.28)	6.9 (8.6)	10.6 (41.9)
			Right	A (A)	0.18 (0.40)	7.8 (10.5)	9.7 (14.3)
		SB	Left	C (B)	0.75 (0.67)	33.0 (44.9)	61.5 (42.0)
		Overall Intersection		**A** (A)	**0.59** (0.45)	**18.3** (15.3)	**-- (--)**
Street A at Halton Terrace	Minor Stop Control	EB	Through / Right	A (A)	0.14 (0.09)	0 (0)	0 (0)
		WB	Left / Through	A (A)	0 (0)	0 (0)	0 (0)
		NB	Left / Right	B (A)	0.13 (0.12)	10.2 (9.6)	3.4 (3.2)
		Overall Intersection		**A (A)**	**0.27 (0.40)**	**2.2 (1.4)**	**-- (--)**
Street A at Old Carp Road	Minor Stop Control	EB	Left / Right	A (A)	0.09 (0.02)	9.5 (9.1)	2.3 (0.4)
		NB	Left / Through	A (A)	0.04 (0.05)	3.4 (1.5)	0.9 (1.2)
		SB	Through / Right	A (A)	0.10 (0.09)	0 (0)	0 (0)
		Overall Intersection		**A ()**	**0.32 (0.48)**	**3.2 (1.3)**	**-- (--)**
March Road at Street D	Minor Stop Control (RIRO)	EB	Right	C (B)	0.14 (0.10)	20.4 (12.4)	3.6 (2.5)
		Overall Intersection		**A (A)**	**0.63 (60)**	**0.3 (0.2)**	**-- (--)**

Notes:
1. **Table format: AM (PM)**
2. **v/c – represents the anticipated volume divided by the predicted capacity**

Multi-Modal Level of Service Assessment

March Road at Maxwell Bridge Road / Street A

No changes anticipated from the 2034 TF intersection MMLOS analysis above. **Appendix D** contains detailed intersection MMLOS evaluation results.

March Road at Dunrobin Road

No changes anticipated from the 2034 TF intersection MMLOS analysis above. The widening of March road to 4 lanes is not anticipated to have an impact on the PLOS operations at this intersection because there is no pedestrian crossing perpendicular to the westbound movement**. Appendix D** contains detailed intersection MMLOS evaluation results.

March Road at Street A

With March Road assumed to be widened to 4-lanes from Maxwell Bridge Road to Dunrobin Road, the intersection's PLOS level is anticipated to deteriorate from E to F. The PLOS operations are expected to be similar to the operations observed at the intersection of March Road and Maxwell Bridge Road / Street A. It is noted that the location of the school in the vicinity of this intersection has established unreasonably high PLOS targets for the area considering March Road is an arterial roadway with high speeds and high volumes. The PLOS target of A is unattainable at the intersection of March Road at Street A.

The Bicycle Level of Service at the intersection of March Road at Street A is projected to operate with a BLOS of A, which exceeds the desired target of C. With the widening of March Road to 4-lanes, cross-rides will be provided in all directions, significantly improving BLOS operations. All left turns are anticipated to feature a 2-stage treatment with bike boxes.

The Transit Level of Service at the intersection of March Road at Street A is projected to operate with a TLOS of F, which does not meet the desired target of D. Given the widening of March Road, the transit delays in the north and south approaches will significantly improve and operate with TLOS D or better. However, due to a 130s cycle length, the east and west approaches experience average delays exceeding 40s, thereby deteriorating the overall TLOS to F. Since the east-west movement is minor, the TLOS operations are assumed to be acceptable for this intersection.

The Truck Level of Service at the intersection of March Road at Street A is projected to operate with a TkLOS of E, which does not meet the desired target of D. This is due to the east and west legs of the intersection only having one receiving lane. As Street A will likely not be a designated truck route, trucks will likely proceed along March Road in the northbound and southbound directions and will not likely turn onto the Street A. A TkLOS of E is therefore acceptable at this intersection.

Once March Road is widened with the Bus Rapid Transit in place, the operations at this intersection will change substantially. It is therefore not recommended to address the MMLOS at this time. Consideration should be given to incorporating multi-modal aspects into the design of March Road to achieve the MMLOS targets.

4.9.3 Summary of Required Road Improvements

Table 21 provides a summary of the road improvements required in each horizon to accommodate the proposed development.

Table 21 - Summary of Required Road Improvements

Intersection / Road Segment	2020 Existing	2022	2026	2034 Future Background	2034 Total Future	2039 Ultimate
March Road at Dunrobin Road	Traffic Signals	--	--	--	--	--
March Road at Maxwell Bridge Road / Halton Terrace	Traffic Signals	--	--	--	Signal Timing Improvements – PM Peak. Increase cycle to 130s + a protected/permissive westbound left phase.	Signal Timing Improvements – both peaks: Optimize Coordination Offsets.
March Road at Street A	-	Northbound left turn lane – minimum 30m storage. Eastbound left turn lane – minimum 30m storage.	Increase signal cycle length to 130s.	-	Introduce protected/permissive phasing for the NBL movement.	Signal Timing Improvements – both peaks: Optimize Coordination Offsets.
March Road	Two-Lane Roadway	--	--	Consider early road widening	Consider early road widening	Widened Four-Lane Roadway

It is noted that the proposed northbound left turn storage length of 90m at the intersection of March Road and Street A as shown in the RMA in **Figure 8** is sufficient to accommodate the traffic generated by the subject development under the ultimate traffic conditions scenario. It is also noted that a dedicated southbound right storage lane at the intersection

of March Road and Street A is not required due to the minimal southbound right turning traffic into the proposed development, which equates to less than 10% of the total southbound approach volume.

5.0 SUMMARY AND CONCLUSIONS

This Transportation Impact Assessment (TIA) was prepared in support of a Draft Plan of Subdivision and Zoning By-Law Amendment application for the proposed Brigil Development. The subject development is located at 927 March Road in the City of Ottawa's Kanata North community. The site is located in the southwest quadrant of the Kanata North Urban Expansion Area Lands. It is bound by March Road to the east, future developments to the north, existing developments to the south, and largely undeveloped land in the west.

The subdivision is proposed to include 35 single family homes, 78 townhomes, 1,838 apartment units, and a retail store. Build-out and occupancy is anticipated to occur by 2034.

Primary access to the proposed development will be achieved via a new Street A connection to March Road at two locations. The north access will be a shared access with the proposed future Minto development on the east side of March Road. The south access is located at the existing intersection of March Road and Maxwell Bridge Road, whereby a redesigned crescent shaped Street A is envisioned to extend to March Road and replace Maxwell Bridge Road. As a result of this, Old Carp Road and Halton Terrace are envisioned to be realigned as per the KNUEA TMP. A secondary access to will also be provided via Street D into the proposed development from the southbound direction along March Road under a right-in-right-out configuration. The proposed development is anticipated to generate 536 and 768 net new auto trips (two-way) during the AM and PM peak hours, respectively.

As per the recommended cross-section in the recently published neighborhood collector roads design guidelines, Street A (collector road) is envisioned to feature dedicated cycling and walking areas along both travel directions that are separated from the roadway by boulevards to improve the connectivity for pedestrians as they navigate through the community. Furthermore, road cross sectional narrowings are planned along Street A in an effort to maintain a 40 km/h operating speed by slowing vehicular traffic as well as to shorten crossing distances for pedestrians. With the aforementioned facilities in place, Street A is expected to meet the Pedestrian, Cycling, and Transit Level of Service targets. As neither street will be designated truck routes, the Truck Level of Service does not apply. Street D (local) is anticipated to feature a similar cross section to the one proposed in the KNUEA TMP, which envisions a sidewalk on one side of the roadway only. Given the City's target operating speed of 30 km/h and the short segment length, Street D is also expected to meet the Pedestrian and Cycling Level of Service Targets. Street D is not expected to support transit nor trucks.

The study area signalized intersections do not meet the MMLOS targets due to the high speed on March Road and the unrealistically high PLOS target of A due to the presence of a school in the vicinity of the intersections (to be built out in 2034). Overall, it is not recommended to implement road modifications due to MMLOS levels as the cross section along March Road will see significant changes in the future. More details can be found in **Appendix D**.

For traffic operations during the existing year (2020), all study area intersections are projected to operate acceptably.

During the year 2022, the first phase of the subject development (600 mid-rise apartments) is expected to be built-out in the southwest quadrant of the intersection of March Road with Street A. Subsequently, it is recommended for the proposed northbound left turn storage lane (as shown in the City of Ottawa's draft RMA) to be installed during the same year to maintain consistency along the high speed March Road by providing a storage area for the decelerating left turning vehicles, thus allowing less restricted flow for the northbound through movement that is utilizing only one

travel lane on March Road. A 100s timing plan was developed and adopted at the intersection of March Road and Street A for the purpose of analysis. All study area intersections are projected to operate acceptably.

During the year 2026, the Minto and Claridge developments in the northwest and southeast quadrants of the KNUEA lands are expected to be built-out. It was found that during the AM peak, the southbound through movement at the intersection of March Road and Street A will operate near capacity with a v/c ratio of 0.98. This is attributed to the increase in the southbound through traffic generated by the Claridge development, totaling 213 vph. The net southbound through traffic was calculated to be 1,132 vph at the intersection, which exceeds the theoretical capacity for a two-lane roadway. It was found that roadway improvements along March Road will theoretically be triggered in 2026 or shortly after. A 130s timing plan with permissive phasing was developed and adopted at the subject intersection for analysis purposes.

During the buildout year (2034), and under background traffic conditions, the intersection of March Road and Street A is projected to operate above capacity. During the AM peak, the southbound through movement was found to operate with a v/c ratio of 1.17, and during the PM peak, the northbound through movement was found to operate with a v/c ratio of 1.10. Both movements are projected to have 95th queues exceeding 500m upstream of the intersection, with the potential to impact traffic operations at other intersections in close proximity.

During the buildout year (2034), and under total future traffic conditions, the intersection of March Road and Street A is projected to see deteriorated traffic operations with the addition of the site generated traffic. To curtail congestion at the intersection, a protected portion was added to the northbound left turn movement under a modified version of the 130s timing plan that was utilized under the future background conditions. During the PM peak, the northbound through movement was found to operate with a v/c ratio of 1.12, and during the AM peak, the southbound through movement was found to operate with a v/c ratio of 1.37 and a delay exceeding 200s. At the intersection of March Road and Maxwell Bridge Road, the westbound left movement was found to deteriorate from a traffic operations standpoint, more notably during the PM peak, due to the conflicting eastbound right turning traffic generated by the subject development. The westbound left movement was found to operate with a v/c ratio of 1.02 during the AM peak with a delay of 133s, which is considered acceptable for minor movements. During the PM peak, the westbound left movement was found to operate with a v/c ratio of 1.10 and a delay exceeding 3 minutes. To curtail the delays, the cycle length was increased from 120s to 130s. As a result, the westbound left movement was found to operate acceptably with a v/c ratio of 0.7 and a delay of 62s during the PM peak.

During the ultimate horizon year (2039), and with an envisioned 4-lane cross section on March Road, all study area intersections were found to operate acceptably. At the intersection of March Road and Street A, the timing plan and offsets were optimized to improve traffic flow, resulting in an overall intersection v/c ratio of 0.83 and 0.7 during the AM and PM peaks, respectively. The queueing was substantially reduced to under 200m in the north and south travel directions. Under the PM peak timing plan improvement that was derived under the 2034 total future conditions, the intersection of March Road and Maxwell Bridge Road was found to operate acceptably with an overall intersection v/c ratio of 0.96 and 0.92 during the AM and PM peak hours, respectively.

It is noted that the envisioned median BRT system on March Road will bolster ridership figures and directly contribute to vehicular traffic reductions in the study area, thereby resulting in improved traffic operations at both intersections with March Road.

In conclusion, the development on 927 March Road is can be supported from a transportation perspective. It is noted that the following improvements are recommended:

- By the year 2022, introduce northbound and eastbound left turn storage lanes with a minimum storage length of 30m.
- By the year 2026, increase the cycle length at the intersection of March Road at Street A to 130s and consider early twinning of March Road.
- By the year 2034, and if March Road is not yet twinned, introduce signal timing plan improvements at the intersections of March Road at Maxwell Bridge and Street A. Increase the cycle length of March Road at Maxwell Bridge Road to 130s during the PM peak and introduce protected/permissive phasing for the westbound left movement. Introduce protected/permissive phasing for the northbound left movement at the intersection of March Road and Street A. If March Road is not yet widened, consider twinning to alleviate congestion.
- By the year 2039, March Road is planned to be widened; the signalized intersections of Street A and Maxwell Bridge would require minor signal timing coordination improvements.

Appendix A TRAFFIC DATA

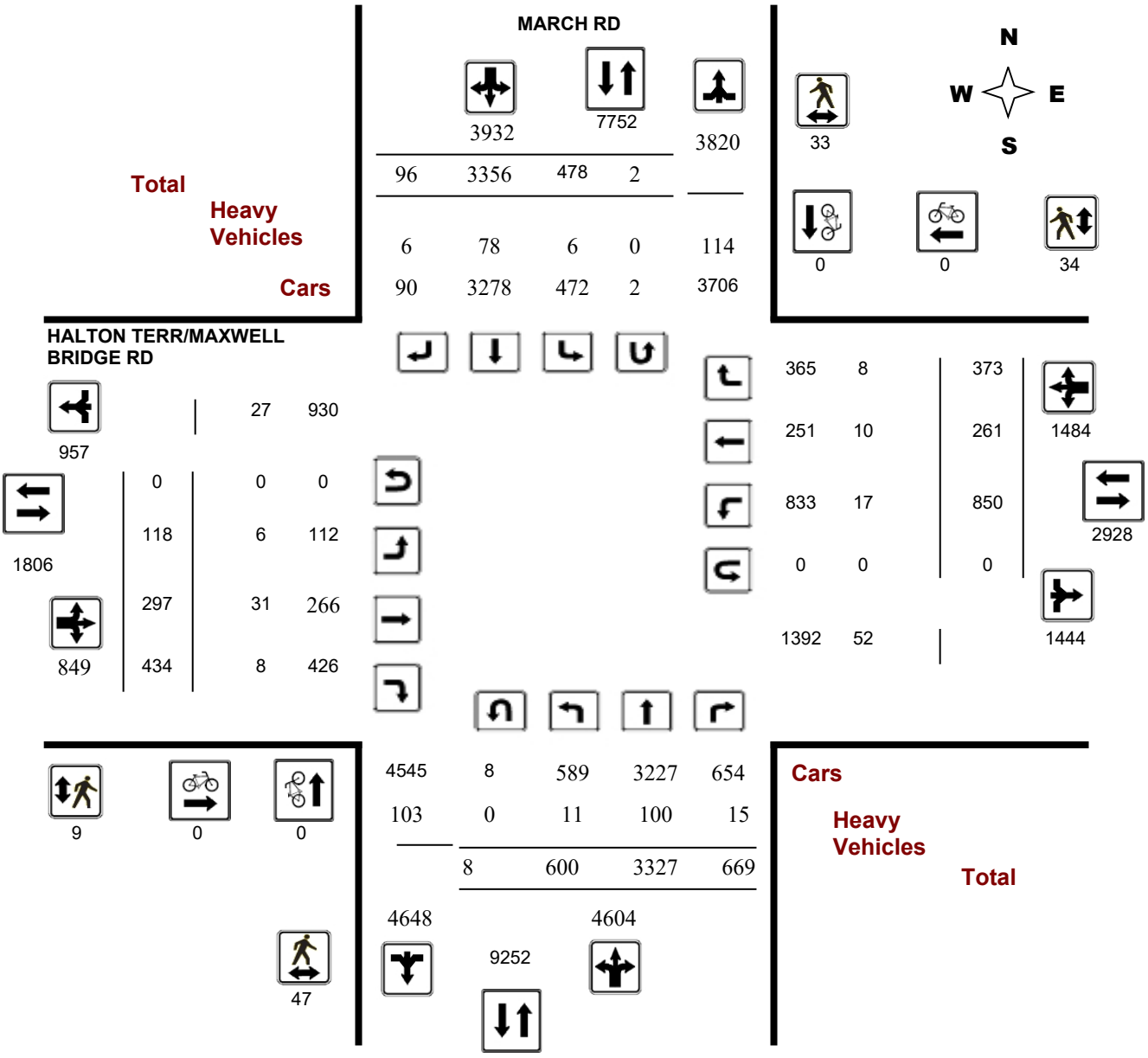
Transportation Services - Traffic Services

Turning Movement Count - Study Results

HALTON TERR/MAXWELL BRIDGE RD @ MARCH RD

Survey Date: Wednesday, March 04, 2020
Start Time: 07:00
WO No: 39372
Device: Miovision

Full Study Diagram



5472187 - WED JAN 22, 2020 - 8HRS - LORETTA

Transportation Services - Traffic Services

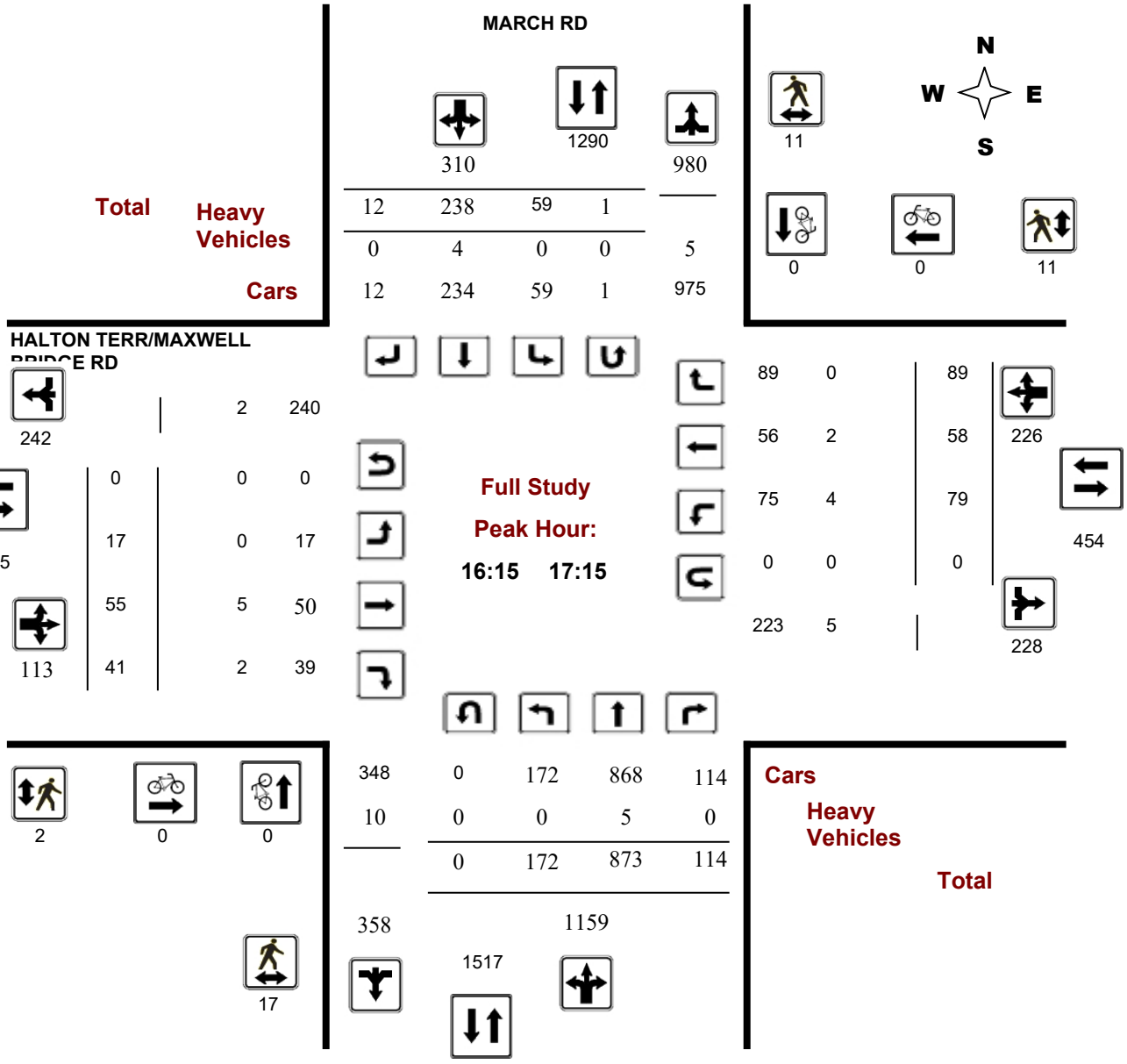
Turning Movement Count - Study Results

HALTON TERR/MAXWELL BRIDGE RD @ MARCH RD

Survey Date: Wednesday, March 04, 2020 **WO No:** 39372

Start Time: 07:00 **Device:** Miovision

Full Study Peak Hour Diagram



5472187 - WED JAN 22, 2020 - 8HRS - LORETTA

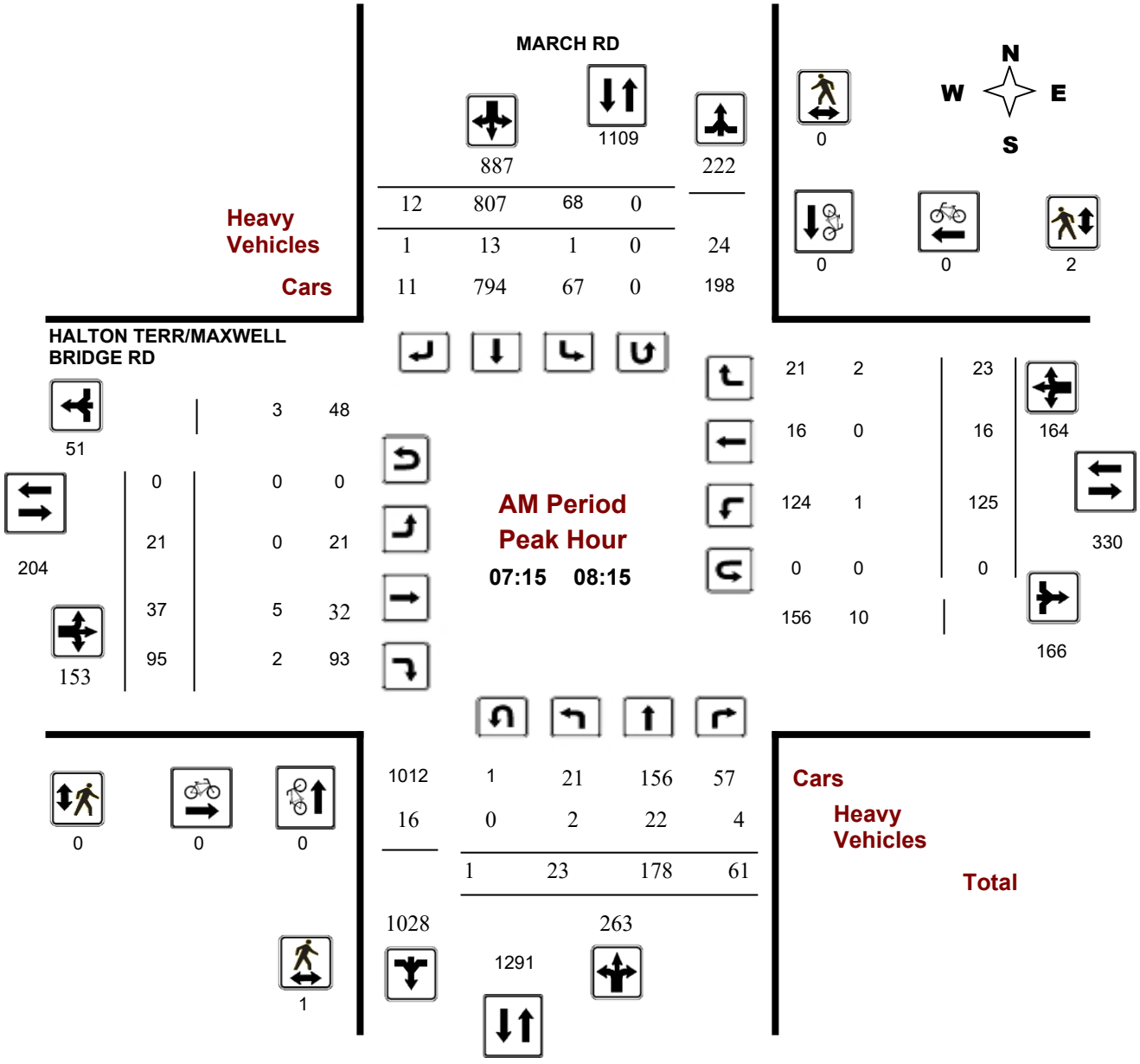
Transportation Services - Traffic Services

Turning Movement Count - Peak Hour Diagram

HALTON TERR/MAXWELL BRIDGE RD @ MARCH RD

Survey Date: Wednesday, March 04, 2020 **WO No:** 39372

Start Time: 07:00 **Device:** Miovision



Comments 5472187 - WED JAN 22, 2020 - 8HRS - LORETTA

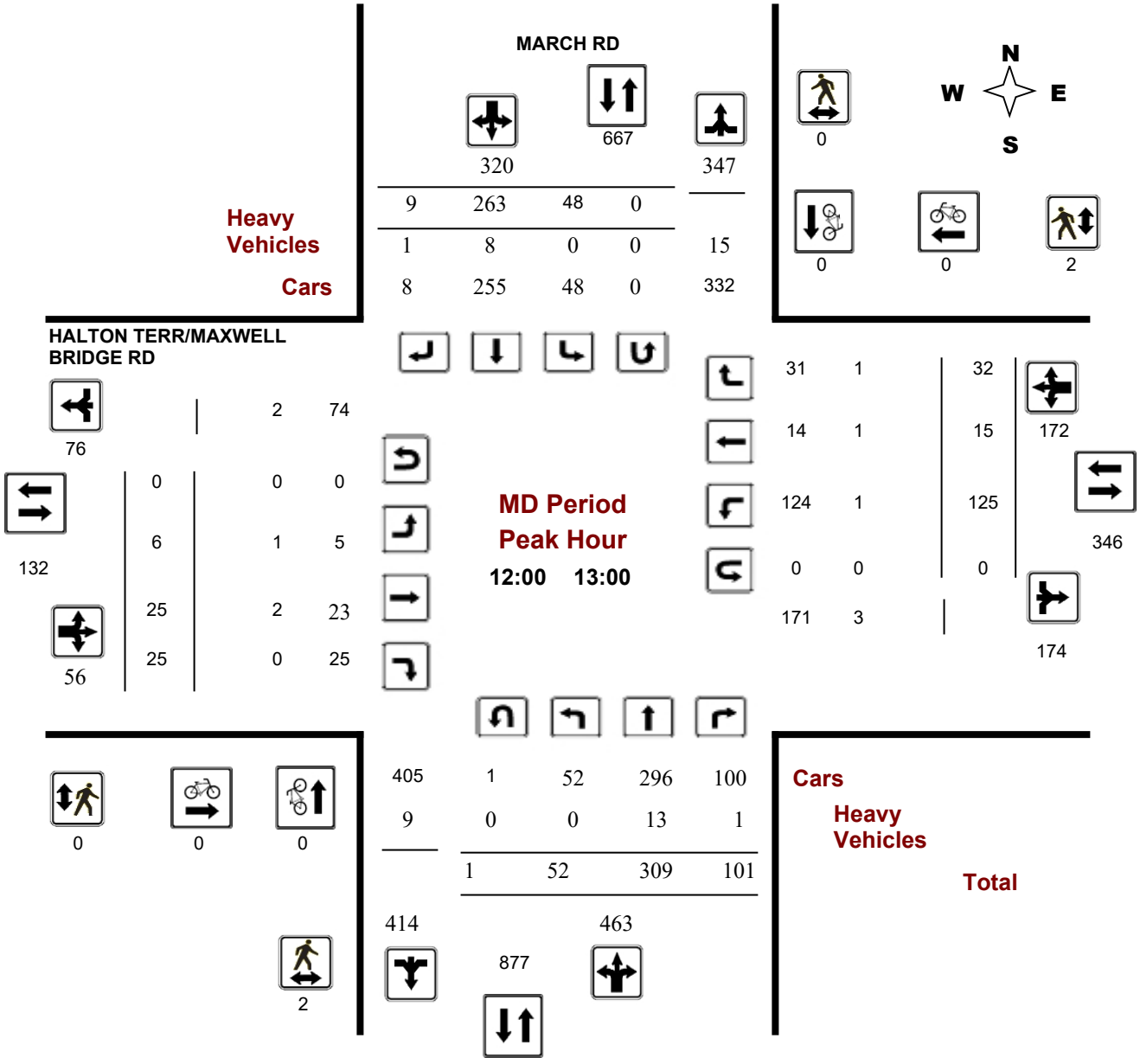
Transportation Services - Traffic Services

Turning Movement Count - Peak Hour Diagram

HALTON TERR/MAXWELL BRIDGE RD @ MARCH RD

Survey Date: Wednesday, March 04, 2020 **WO No:** 39372

Start Time: 07:00 **Device:** Miovision



Comments 5472187 - WED JAN 22, 2020 - 8HRS - LORETTA

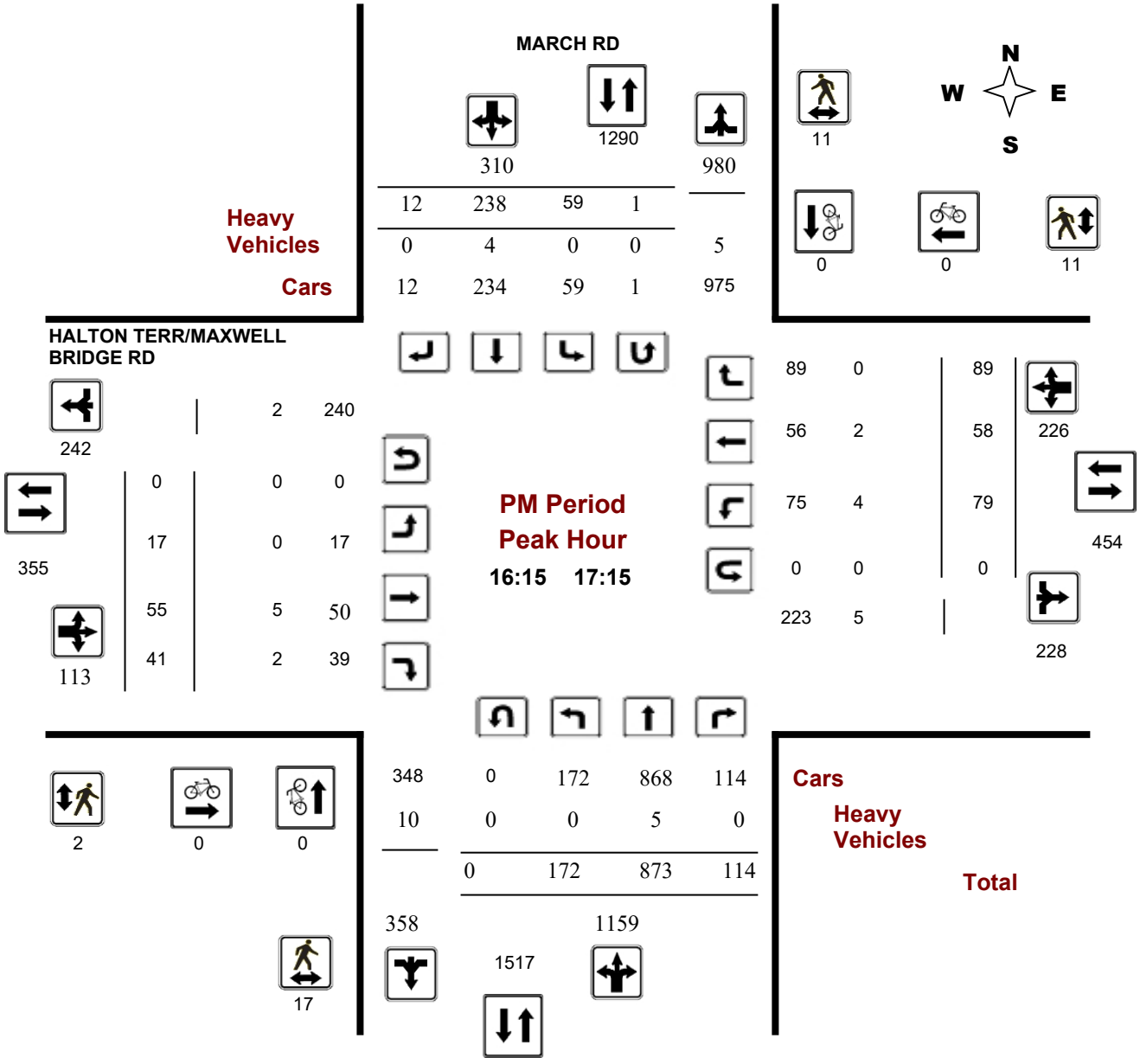
Transportation Services - Traffic Services

Turning Movement Count - Peak Hour Diagram

HALTON TERR/MAXWELL BRIDGE RD @ MARCH RD

Survey Date: Wednesday, March 04, 2020 **WO No:** 39372

Start Time: 07:00 **Device:** Miovision



Comments 5472187 - WED JAN 22, 2020 - 8HRS - LORETTA

Transportation Services - Traffic Services

Turning Movement Count - Study Results

HALTON TERR/MAXWELL BRIDGE RD @ MARCH RD

Survey Date: Wednesday, March 04, 2020 **WO No:** 39372

Start Time: 07:00 **Device:** Miovision

Full Study Summary (8 HR Standard)

Survey Date: Wednesday, March 04, 2020

Total Observed U-Turns

Northbound: 8 Southbound: 2

Eastbound: 0 Westbound: 0

AADT Factor

1.00

	MARCH RD								HALTON TERR/MAXWELL BRIDGE RD									
	Northbound				Southbound				Eastbound				Westbound					
Period	LT	ST	RT	NB TOT	LT	ST	RT	SB TOT	STR TOT	LT	ST	RT	EB TOT	LT	ST	RT	WB TOT	STR TOT	Grand Total
07:00 08:00	21	180	50	**251**	56	785	10	**851**	**1102**	18	36	90	**144**	122	16	23	**161**	**305**	**1407**
08:00 09:00	35	152	76	**263**	78	758	10	**846**	**1109**	21	32	83	**136**	141	24	19	**184**	**320**	**1429**
09:00 10:00	28	208	62	**298**	69	517	13	**599**	**897**	21	42	87	**150**	120	28	29	**177**	**327**	**1224**
11:30 12:30	58	268	85	**411**	52	283	9	**344**	**755**	3	24	28	**55**	115	18	27	**160**	**215**	**970**
12:30 13:30	47	287	86	**420**	43	266	7	**316**	**736**	8	21	34	**63**	109	15	28	**152**	**215**	**951**
15:00 16:00	96	608	104	**808**	58	265	19	**342**	**1150**	18	41	36	**95**	59	50	73	**182**	**277**	**1427**
16:00 17:00	156	867	101	**1124**	63	246	11	**320**	**1444**	18	51	39	**108**	70	52	88	**210**	**318**	**1762**
17:00 18:00	159	757	105	**1021**	59	236	17	**312**	**1333**	11	50	37	**98**	114	58	86	**258**	**356**	**1689**
Sub Total	600	3327	669	**4596**	478	3356	96	**3930**	**8526**	118	297	434	**849**	850	261	373	**1484**	**2333**	**10859**
U Turns				**8**				**2**	**10**				**0**				**0**	**0**	**10**
Total	600	3327	669	**4604**	478	3356	96	**3932**	**8536**	118	297	434	**849**	850	261	373	**1484**	**2333**	**10869**
EQ 12Hr	834	4625	930	**6400**	664	4665	133	**5465**	**11865**	164	413	603	**1180**	1182	363	518	**2063**	**3243**	**15108**
Note: These values are calculated by multiplying the totals by the appropriate expansion factor.														**1.39**					
AVG 12Hr	786	4358	876	**6031**	626	4396	126	**5151**	**11865**	155	389	569	**1112**	1114	342	489	**1944**	**3243**	**15108**
Note: These volumes are calculated by multiplying the Equivalent 12 hr. totals by the AADT factor.														**1**					
AVG 24Hr	1030	5709	1148	**7901**	820	5759	165	**6748**	**14649**	202	510	745	**1457**	1459	448	640	**2547**	**4004**	**18653**
Note: These volumes are calculated by multiplying the Average Daily 12 hr. totals by 12 to 24 expansion factor.														**1.31**					

Note: U-Turns provided for approach totals. Refer to 'U-Turn' Report for specific breakdown.

Transportation Services - Traffic Services

Turning Movement Count - Study Results

HALTON TERR/MAXWELL BRIDGE RD @ MARCH RD

Survey Date: Wednesday, March 04, 2020 **WO No:** 39372

Start Time: 07:00 **Device:** Miovision

Full Study 15 Minute Increments

		MARCH RD									HALTON TERR/MAXWELL BRIDGE RD									
		Northbound				Southbound					Eastbound				Westbound					
Time Period		LT	ST	RT	N TOT	LT	ST	RT	S TOT	STR TOT	LT	ST	RT	E TOT	LT	ST	RT	W TOT	STR TOT	Grand Total
07:00	07:15	6	45	14	65	9	179	0	188	15	2	8	19	29	36	4	6	46	15	328
07:15	07:30	8	54	12	74	14	224	1	239	17	5	6	27	38	29	4	3	36	17	387
07:30	07:45	4	54	16	75	12	183	5	200	7	8	10	25	43	25	3	4	32	7	350
07:45	08:00	3	27	8	38	21	199	4	224	7	3	12	19	34	32	5	10	47	7	343
08:00	08:15	8	43	25	76	21	201	2	224	12	5	9	24	38	39	4	6	49	12	387
08:15	08:30	6	32	18	56	20	182	1	203	5	5	8	18	31	37	3	5	45	5	335
08:30	08:45	11	42	22	76	15	189	3	207	9	7	7	27	41	26	6	5	37	9	361
08:45	09:00	10	35	11	56	22	186	4	212	6	4	8	14	26	39	11	3	53	6	347
09:00	09:15	7	52	23	82	23	166	8	197	16	8	18	37	63	40	10	9	59	16	401
09:15	09:30	8	54	17	79	17	126	1	144	10	7	9	33	49	30	10	10	50	10	322
09:30	09:45	7	55	11	74	17	125	2	144	5	4	6	13	23	27	3	4	34	5	275
09:45	10:00	6	47	11	65	12	100	2	114	4	2	9	4	15	23	5	6	34	4	228
11:30	11:45	17	55	19	92	14	77	4	95	5	1	6	10	17	35	5	8	48	5	252
11:45	12:00	15	57	20	94	10	70	1	81	10	2	6	10	18	25	6	3	34	10	227
12:00	12:15	16	84	26	126	12	70	3	85	3	0	4	3	7	30	2	8	40	3	258
12:15	12:30	10	72	20	103	16	66	1	83	3	0	8	5	13	25	5	8	38	3	237
12:30	12:45	15	79	28	122	8	56	2	66	7	3	6	8	17	37	5	9	51	7	256
12:45	13:00	11	74	27	112	12	71	3	86	10	3	7	9	19	33	3	7	43	10	260
13:00	13:15	11	83	10	104	8	71	1	80	4	1	6	13	20	18	2	6	26	4	230
13:15	13:30	10	51	21	82	15	68	1	85	6	1	2	4	7	21	5	6	32	6	206
15:00	15:15	13	130	25	168	10	63	4	77	1	2	5	7	14	15	9	19	43	1	302
15:15	15:30	29	129	33	191	13	56	6	75	9	2	11	8	21	16	15	15	46	9	333
15:30	15:45	24	163	16	203	13	65	4	82	10	7	9	5	21	13	16	23	52	10	358
15:45	16:00	30	186	30	246	22	81	5	108	9	7	16	16	39	15	10	16	41	9	434
16:00	16:15	27	202	22	251	17	62	3	82	7	4	12	11	27	17	9	25	51	7	411
16:15	16:30	40	251	17	308	16	64	1	81	3	6	13	11	30	14	11	18	43	3	462
16:30	16:45	43	214	32	289	10	50	4	65	1	2	11	8	21	20	14	27	61	1	436
16:45	17:00	46	200	30	276	20	70	3	93	3	6	15	9	30	19	18	18	55	3	454
17:00	17:15	43	208	35	286	13	54	4	71	2	3	16	13	32	26	15	26	67	2	456
17:15	17:30	32	217	18	267	17	65	1	83	1	3	10	5	18	30	14	21	65	1	433
17:30	17:45	37	173	26	236	21	50	3	74	9	5	15	7	27	37	11	27	75	9	412
17:45	18:00	47	159	26	232	8	67	9	84	0	0	9	12	21	21	18	12	51	0	388
Total:		600	3327	669	4604	478	3356	96	3932	216	118	297	434	849	850	261	373	1484	216	10,869

Note: U-Turns are included in Totals.

Transportation Services - Traffic Services

Turning Movement Count - Study Results

HALTON TERR/MAXWELL BRIDGE RD @ MARCH RD

Survey Date: Wednesday, March 04, 2020 **WO No:** 39372

Start Time: 07:00 **Device:** Miovision

Full Study Cyclist Volume

Time Period		MARCH RD			HALTON TERR/MAXWELL BRIDGE RD			
		Northbound	Southbound	Street Total	Eastbound	Westbound	Street Total	Grand Total
07:00	07:15	0	0	0	0	0	0	0
07:15	07:30	0	0	0	0	0	0	0
07:30	07:45	0	0	0	0	0	0	0
07:45	08:00	0	0	0	0	0	0	0
08:00	08:15	0	0	0	0	0	0	0
08:15	08:30	0	0	0	0	0	0	0
08:30	08:45	0	0	0	0	0	0	0
08:45	09:00	0	0	0	0	0	0	0
09:00	09:15	0	0	0	0	0	0	0
09:15	09:30	0	0	0	0	0	0	0
09:30	09:45	0	0	0	0	0	0	0
09:45	10:00	0	0	0	0	0	0	0
11:30	11:45	0	0	0	0	0	0	0
11:45	12:00	0	0	0	0	0	0	0
12:00	12:15	0	0	0	0	0	0	0
12:15	12:30	0	0	0	0	0	0	0
12:30	12:45	0	0	0	0	0	0	0
12:45	13:00	0	0	0	0	0	0	0
13:00	13:15	0	0	0	0	0	0	0
13:15	13:30	0	0	0	0	0	0	0
15:00	15:15	0	0	0	0	0	0	0
15:15	15:30	0	0	0	0	0	0	0
15:30	15:45	0	0	0	0	0	0	0
15:45	16:00	0	0	0	0	0	0	0
16:00	16:15	0	0	0	0	0	0	0
16:15	16:30	0	0	0	0	0	0	0
16:30	16:45	0	0	0	0	0	0	0
16:45	17:00	0	0	0	0	0	0	0
17:00	17:15	0	0	0	0	0	0	0
17:15	17:30	0	0	0	0	0	0	0
17:30	17:45	0	0	0	0	0	0	0
17:45	18:00	0	0	0	0	0	0	0
Total		0	0	**0**	0	0	0	0

Transportation Services - Traffic Services

Turning Movement Count - Study Results

HALTON TERR/MAXWELL BRIDGE RD @ MARCH RD

Survey Date: Wednesday, March 04, 2020 **WO No:** 39372

Start Time: 07:00 **Device:** Miovision

Full Study Pedestrian Volume

	MARCH RD			HALTON TERR/MAXWELL BRIDGE RD			
Time Period	NB Approach (E or W Crossing)	SB Approach (E or W Crossing)	Total	EB Approach (N or S Crossing)	WB Approach (N or S Crossing)	Total	Grand Total
07:00 07:15	0	1	**1**	0	0	**0**	**1**
07:15 07:30	0	0	**0**	0	1	**1**	**1**
07:30 07:45	0	0	**0**	0	0	**0**	**0**
07:45 08:00	1	0	**1**	0	1	**1**	**2**
08:00 08:15	0	0	**0**	0	0	**0**	**0**
08:15 08:30	0	0	**0**	0	0	**0**	**0**
08:30 08:45	0	0	**0**	0	1	**1**	**1**
08:45 09:00	1	2	**3**	0	1	**1**	**4**
09:00 09:15	1	0	**1**	0	0	**0**	**1**
09:15 09:30	0	1	**1**	1	1	**2**	**3**
09:30 09:45	0	0	**0**	0	0	**0**	**0**
09:45 10:00	0	0	**0**	1	0	**1**	**1**
11:30 11:45	2	0	**2**	0	1	**1**	**3**
11:45 12:00	2	0	**2**	0	0	**0**	**2**
12:00 12:15	0	0	**0**	0	2	**2**	**2**
12:15 12:30	1	0	**1**	0	0	**0**	**1**
12:30 12:45	1	0	**1**	0	0	**0**	**1**
12:45 13:00	0	0	**0**	0	0	**0**	**0**
13:00 13:15	2	0	**2**	0	0	**0**	**2**
13:15 13:30	2	0	**2**	0	0	**0**	**2**
15:00 15:15	0	5	**5**	0	4	**4**	**9**
15:15 15:30	4	2	**6**	0	6	**6**	**12**
15:30 15:45	1	0	**1**	0	0	**0**	**1**
15:45 16:00	0	1	**1**	1	0	**1**	**2**
16:00 16:15	3	5	**8**	1	1	**2**	**10**
16:15 16:30	6	0	**6**	1	6	**7**	**13**
16:30 16:45	4	8	**12**	0	1	**1**	**13**
16:45 17:00	6	2	**8**	1	2	**3**	**11**
17:00 17:15	1	1	**2**	0	2	**2**	**4**
17:15 17:30	3	1	**4**	0	1	**1**	**5**
17:30 17:45	3	4	**7**	0	3	**3**	**10**
17:45 18:00	3	0	**3**	3	0	**3**	**6**
Total	47	33	**80**	9	34	**43**	**123**

5472187 - WED JAN 22, 2020 - 8HRS - LORETTA

Transportation Services - Traffic Services

Turning Movement Count - Study Results

HALTON TERR/MAXWELL BRIDGE RD @ MARCH RD

Survey Date: Wednesday, March 04, 2020 **WO No:** 39372

Start Time: 07:00 **Device:** Miovision

Full Study Heavy Vehicles

		MARCH RD									HALTON TERR/MAXWELL BRIDGE RD									
		Northbound				Southbound					Eastbound				Westbound					
Time Period		LT	ST	RT	N TOT	LT	ST	RT	S TOT	STR TOT	LT	ST	RT	E TOT	LT	ST	RT	W TOT	STR TOT	Grand Total
07:00	07:15	1	5	3	**9**	0	6	0	**6**	**15**	0	2	0	**2**	0	0	0	**0**	**2**	**17**
07:15	07:30	2	9	2	**13**	1	3	0	**4**	**17**	0	1	2	**3**	0	0	2	**2**	**5**	**22**
07:30	07:45	0	3	1	**4**	0	3	0	**3**	**7**	0	1	0	**1**	0	0	0	**0**	**1**	**8**
07:45	08:00	0	2	0	**2**	0	4	1	**5**	**7**	0	1	0	**1**	1	0	0	**1**	**2**	**9**
08:00	08:15	0	8	1	**9**	0	3	0	**3**	**12**	0	2	0	**2**	0	0	0	**0**	**2**	**14**
08:15	08:30	0	2	0	**2**	1	2	0	**3**	**5**	0	1	0	**1**	0	0	0	**0**	**1**	**6**
08:30	08:45	0	5	1	**6**	0	3	0	**3**	**9**	0	0	0	**0**	0	1	0	**1**	**1**	**10**
08:45	09:00	0	2	0	**2**	1	3	0	**4**	**6**	0	1	0	**1**	1	1	0	**2**	**3**	**9**
09:00	09:15	2	6	0	**8**	0	7	1	**8**	**16**	1	2	2	**5**	0	1	1	**2**	**7**	**23**
09:15	09:30	1	6	1	**8**	0	2	0	**2**	**10**	1	2	2	**5**	0	0	1	**1**	**6**	**16**
09:30	09:45	0	2	0	**2**	0	3	0	**3**	**5**	0	0	0	**0**	0	0	0	**0**	**0**	**5**
09:45	10:00	0	2	0	**2**	0	2	0	**2**	**4**	0	2	0	**2**	0	0	0	**0**	**2**	**6**
11:30	11:45	0	2	0	**2**	2	1	0	**3**	**5**	0	1	0	**1**	0	1	1	**2**	**3**	**8**
11:45	12:00	0	7	1	**8**	0	2	0	**2**	**10**	0	0	0	**0**	1	0	0	**1**	**1**	**11**
12:00	12:15	0	0	0	**0**	0	3	0	**3**	**3**	0	0	0	**0**	0	0	0	**0**	**0**	**3**
12:15	12:30	0	2	0	**2**	0	1	0	**1**	**3**	0	1	0	**1**	1	0	0	**1**	**2**	**5**
12:30	12:45	0	4	1	**5**	0	2	0	**2**	**7**	0	1	0	**1**	0	1	1	**2**	**3**	**10**
12:45	13:00	0	7	0	**7**	0	2	1	**3**	**10**	1	0	0	**1**	0	0	0	**0**	**1**	**11**
13:00	13:15	1	1	0	**2**	0	2	0	**2**	**4**	1	1	0	**2**	0	0	0	**0**	**2**	**6**
13:15	13:30	1	2	0	**3**	0	2	1	**3**	**6**	0	1	0	**1**	0	0	0	**0**	**1**	**7**
15:00	15:15	0	0	0	**0**	0	1	0	**1**	**1**	0	0	0	**0**	2	0	0	**2**	**2**	**3**
15:15	15:30	0	3	1	**4**	0	5	0	**5**	**9**	0	1	0	**1**	0	1	0	**1**	**2**	**11**
15:30	15:45	1	5	1	**7**	0	3	0	**3**	**10**	1	1	0	**2**	1	1	0	**2**	**4**	**14**
15:45	16:00	1	2	1	**4**	1	2	2	**5**	**9**	0	1	0	**1**	0	0	0	**0**	**1**	**10**
16:00	16:15	1	3	0	**4**	0	3	0	**3**	**7**	1	1	0	**2**	1	1	2	**4**	**6**	**13**
16:15	16:30	0	3	0	**3**	0	0	0	**0**	**3**	0	1	0	**1**	2	2	0	**4**	**5**	**8**
16:30	16:45	0	0	0	**0**	0	1	0	**1**	**1**	0	2	1	**3**	0	0	0	**0**	**3**	**4**
16:45	17:00	0	0	0	**0**	0	3	0	**3**	**3**	0	1	0	**1**	1	0	0	**1**	**2**	**5**
17:00	17:15	0	2	0	**2**	0	0	0	**0**	**2**	0	1	1	**2**	1	0	0	**1**	**3**	**5**
17:15	17:30	0	1	0	**1**	0	0	0	**0**	**1**	0	1	0	**1**	1	0	0	**1**	**2**	**3**
17:30	17:45	0	4	1	**5**	0	4	0	**4**	**9**	0	0	0	**0**	3	0	0	**3**	**3**	**12**
17:45	18:00	0	0	0	**0**	0	0	0	**0**	**0**	0	1	0	**1**	1	0	0	**1**	**2**	**2**
Total:	None	11	100	15	**126**	6	78	6	**90**	**216**	6	31	8	**45**	17	10	8	**35**	**80**	**296**

Transportation Services - Traffic Services

Turning Movement Count - Study Results

HALTON TERR/MAXWELL BRIDGE RD @ MARCH RD

Survey Date: Wednesday, March 04, 2020 **WO No:** 39372

Start Time: 07:00 **Device:** Miovision

Full Study 15 Minute U-Turn Total

Time Period		MARCH RD		HALTON TERR/MAXWELL BRIDGE RD		Total
		Northbound U-Turn Total	Southbound U-Turn Total	Eastbound U-Turn Total	Westbound U-Turn Total	
07:00	07:15	0	0	0	0	0
07:15	07:30	0	0	0	0	0
07:30	07:45	1	0	0	0	1
07:45	08:00	0	0	0	0	0
08:00	08:15	0	0	0	0	0
08:15	08:30	0	0	0	0	0
08:30	08:45	1	0	0	0	1
08:45	09:00	0	0	0	0	0
09:00	09:15	0	0	0	0	0
09:15	09:30	0	0	0	0	0
09:30	09:45	1	0	0	0	1
09:45	10:00	1	0	0	0	1
11:30	11:45	1	0	0	0	1
11:45	12:00	2	0	0	0	2
12:00	12:15	0	0	0	0	0
12:15	12:30	1	0	0	0	1
12:30	12:45	0	0	0	0	0
12:45	13:00	0	0	0	0	0
13:00	13:15	0	0	0	0	0
13:15	13:30	0	1	0	0	1
15:00	15:15	0	0	0	0	0
15:15	15:30	0	0	0	0	0
15:30	15:45	0	0	0	0	0
15:45	16:00	0	0	0	0	0
16:00	16:15	0	0	0	0	0
16:15	16:30	0	0	0	0	0
16:30	16:45	0	1	0	0	1
16:45	17:00	0	0	0	0	0
17:00	17:15	0	0	0	0	0
17:15	17:30	0	0	0	0	0
17:30	17:45	0	0	0	0	0
17:45	18:00	0	0	0	0	0
Total		8	2	0	0	10

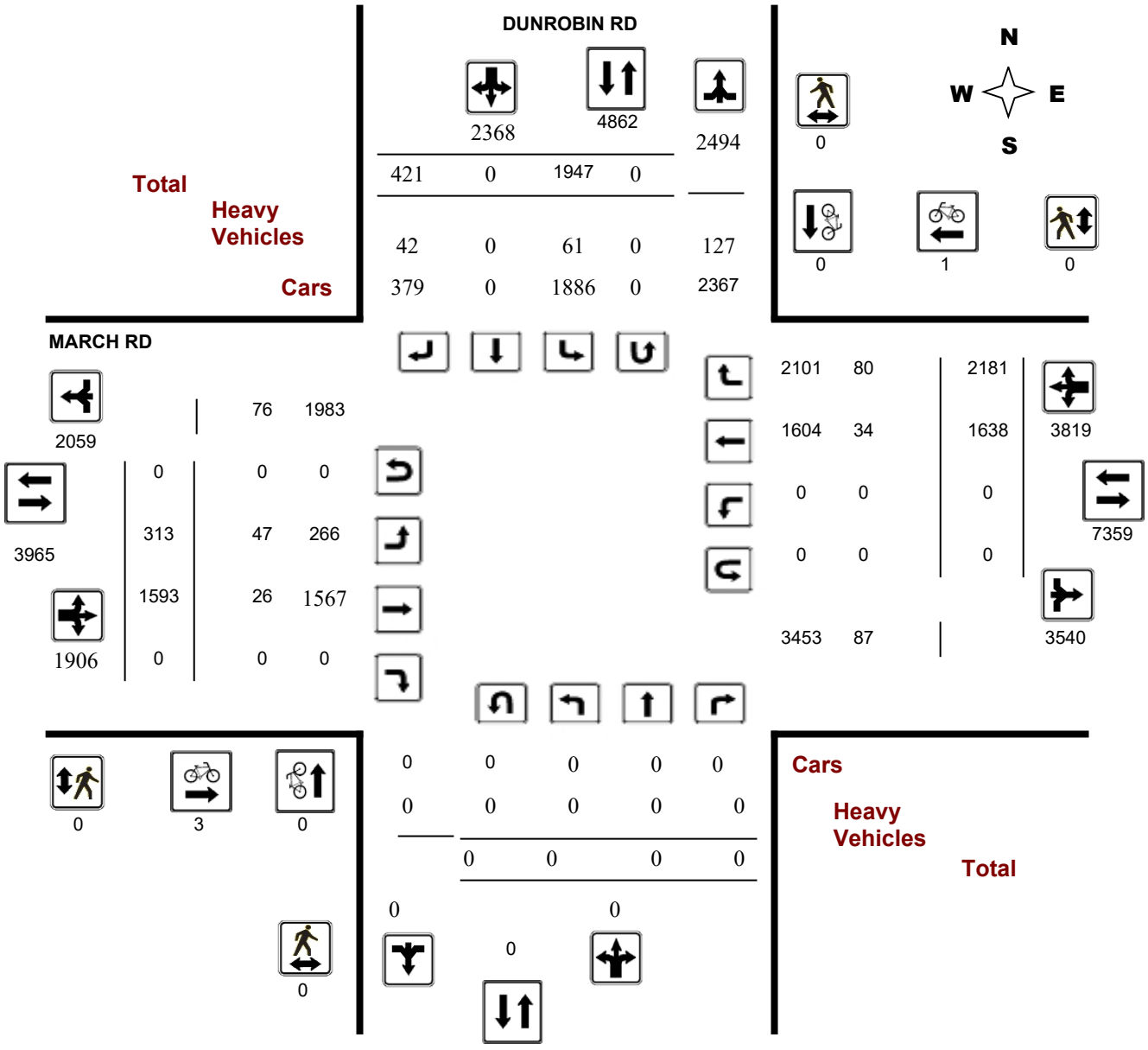
Transportation Services - Traffic Services

Turning Movement Count - Study Results

DUNROBIN RD @ MARCH RD

Survey Date: Wednesday, January 22, 2020
Start Time: 07:00
WO No: 39373
Device: Miovision

Full Study Diagram



5472188 - WED JAN 22, 2020 - 8HRS - LORETTA

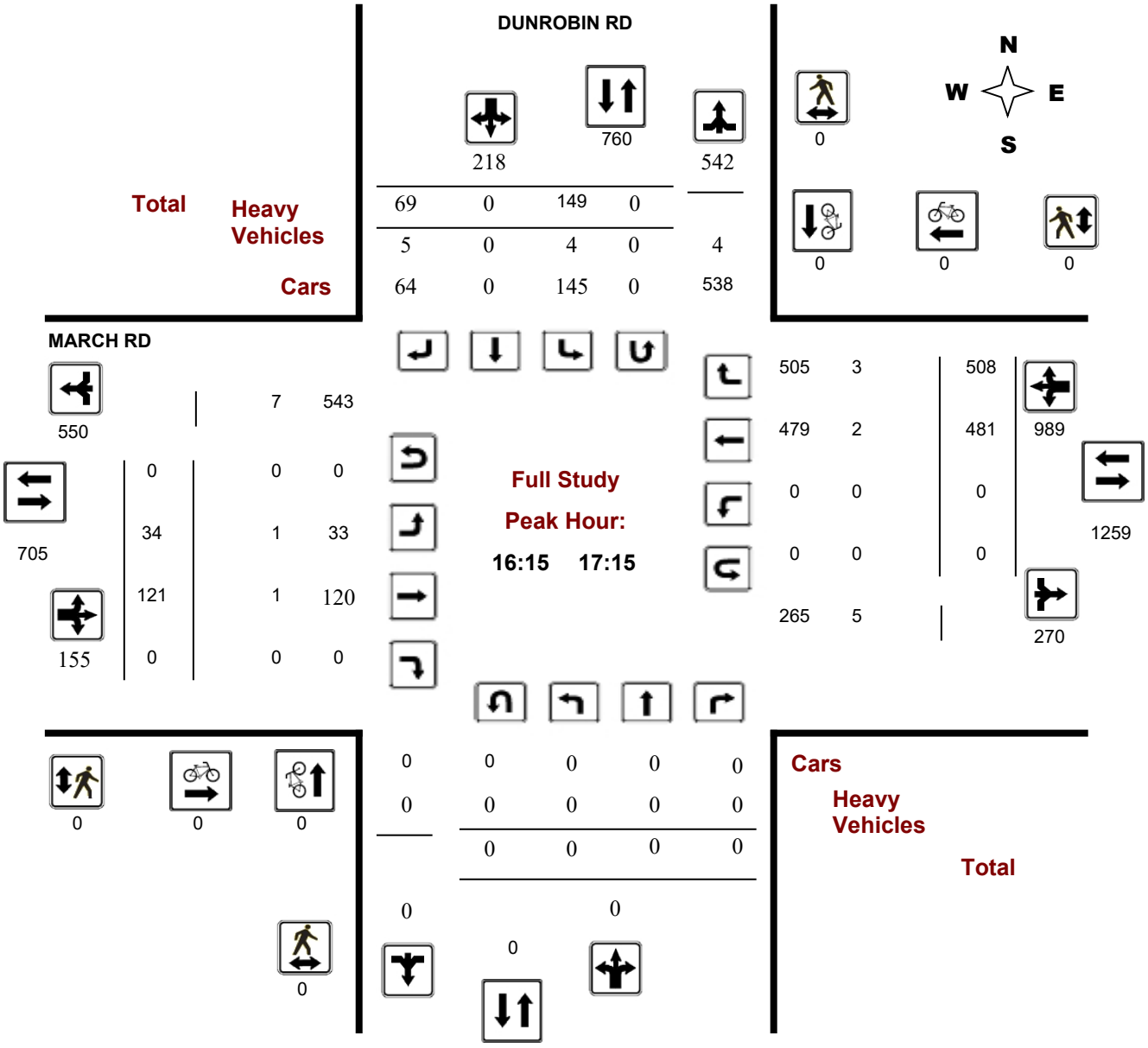
Transportation Services - Traffic Services

Turning Movement Count - Study Results

DUNROBIN RD @ MARCH RD

Survey Date: Wednesday, January 22, 2020
Start Time: 07:00
WO No: 39373
Device: Miovision

Full Study Peak Hour Diagram



5472188 - WED JAN 22, 2020 - 8HRS - LORETTA

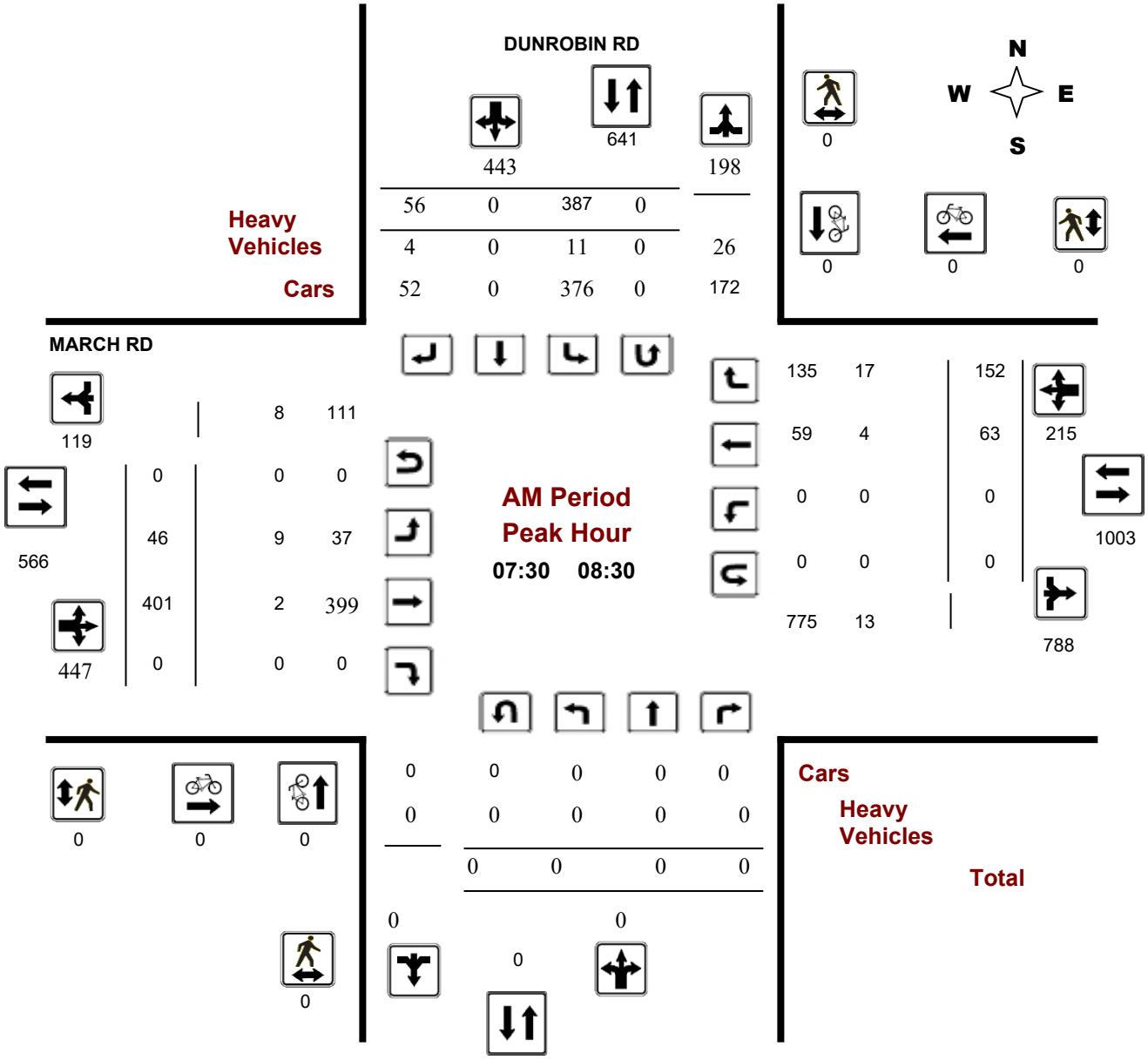
Transportation Services - Traffic Services

Turning Movement Count - Peak Hour Diagram

DUNROBIN RD @ MARCH RD

Survey Date: Wednesday, January 22, 2020 **WO No:** 39373

Start Time: 07:00 **Device:** Miovision



Comments 5472188 - WED JAN 22, 2020 - 8HRS - LORETTA

AM Period
Peak Hour
07:30 08:30

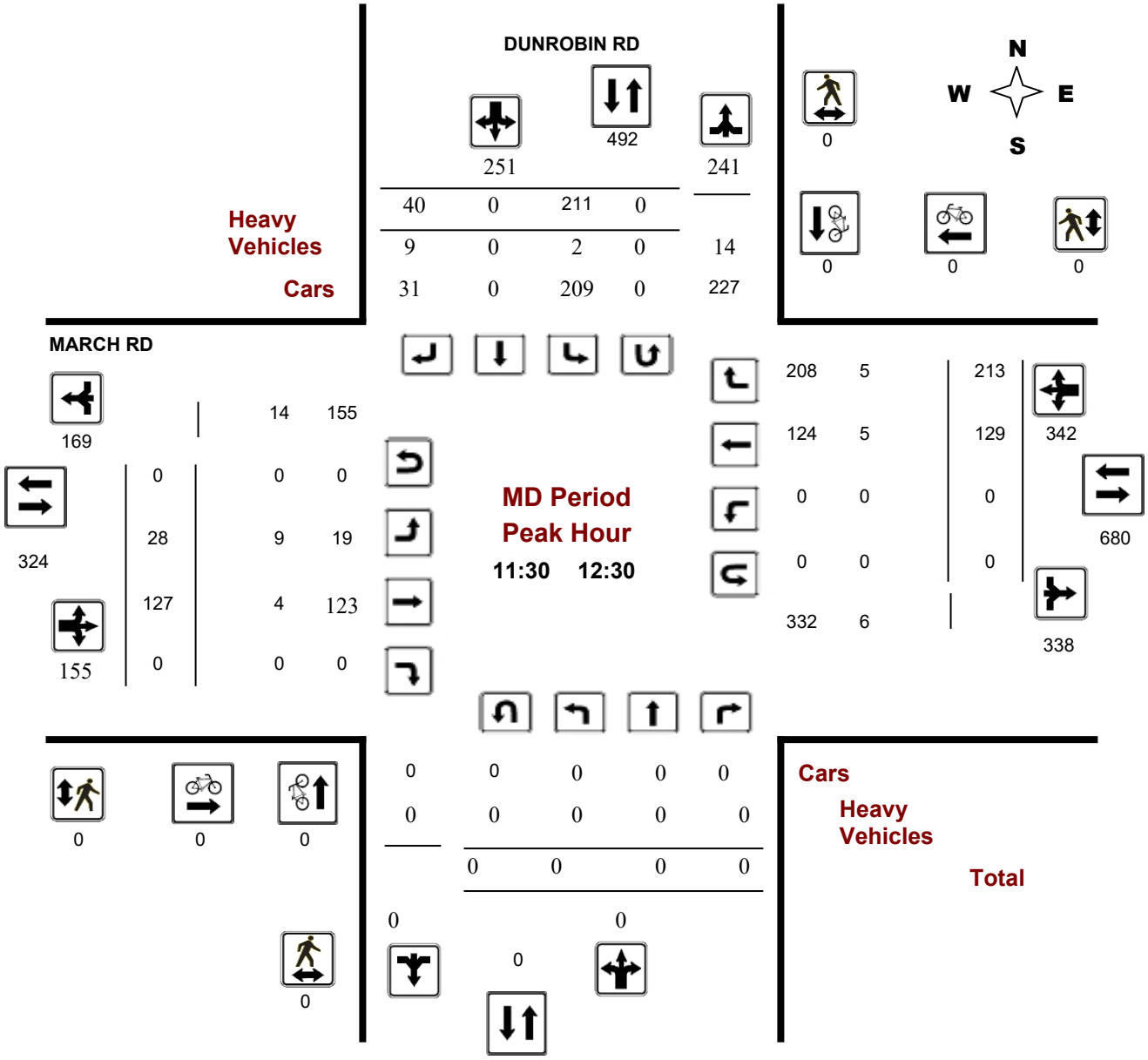
Transportation Services - Traffic Services

Turning Movement Count - Peak Hour Diagram

DUNROBIN RD @ MARCH RD

Survey Date: Wednesday, January 22, 2020 **WO No:** 39373

Start Time: 07:00 **Device:** Miovision



Comments 5472188 - WED JAN 22, 2020 - 8HRS - LORETTA

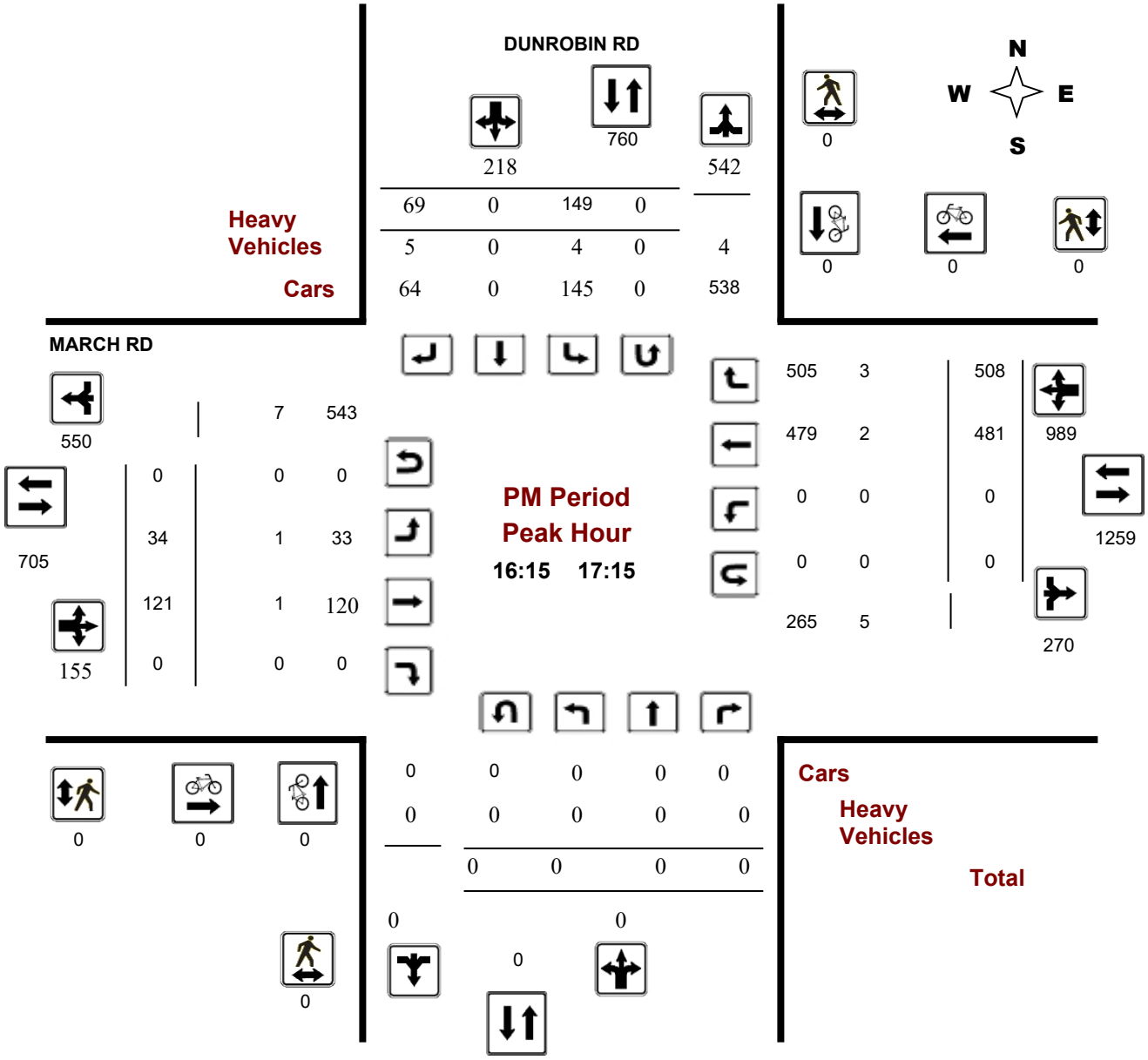
Transportation Services - Traffic Services

Turning Movement Count - Peak Hour Diagram

DUNROBIN RD @ MARCH RD

Survey Date: Wednesday, January 22, 2020 **WO No:** 39373

Start Time: 07:00 **Device:** Miovision



Comments 5472188 - WED JAN 22, 2020 - 8HRS - LORETTA

Transportation Services - Traffic Services

Turning Movement Count - Study Results

DUNROBIN RD @ MARCH RD

Survey Date: Wednesday, January 22, 2020 **WO No:** 39373

Start Time: 07:00 **Device:** Miovision

Full Study Summary (8 HR Standard)

Survey Date: Wednesday, January 22, 202

Total Observed U-Turns

Northbound: 0 Southbound: 0

Eastbound: 0 Westbound: 0

AADT Factor

1.00

	DUNROBIN RD									MARCH RD									
	Northbound				Southbound					Eastbound				Westbound					
Period	LT	ST	RT	NB TOT	LT	ST	RT	SB TOT	STR TOT	LT	ST	RT	EB TOT	LT	ST	RT	WB TOT	STR TOT	Grand Total
07:00 08:00	0	0	0	**0**	405	0	51	**456**	**456**	41	364	0	**405**	0	47	173	**220**	**625**	**1081**
08:00 09:00	0	0	0	**0**	369	0	62	**431**	**431**	35	422	0	**457**	0	72	116	**188**	**645**	**1076**
09:00 10:00	0	0	0	**0**	292	0	49	**341**	**341**	39	243	0	**282**	0	94	144	**238**	**520**	**861**
11:30 12:30	0	0	0	**0**	211	0	40	**251**	**251**	28	127	0	**155**	0	129	213	**342**	**497**	**748**
12:30 13:30	0	0	0	**0**	180	0	55	**235**	**235**	33	112	0	**145**	0	121	173	**294**	**439**	**674**
15:00 16:00	0	0	0	**0**	180	0	55	**235**	**235**	56	113	0	**169**	0	303	402	**705**	**874**	**1109**
16:00 17:00	0	0	0	**0**	156	0	69	**225**	**225**	38	107	0	**145**	0	473	508	**981**	**1126**	**1351**
17:00 18:00	0	0	0	**0**	154	0	40	**194**	**194**	43	105	0	**148**	0	399	452	**851**	**999**	**1193**
Sub Total	0	0	0	**0**	1947	0	421	**2368**	**2368**	313	1593	0	**1906**	0	1638	2181	**3819**	**5725**	**8093**
U Turns				**0**				**0**	**0**				**0**				**0**	**0**	**0**
Total	0	0	0	**0**	1947	0	421	**2368**	**2368**	313	1593	0	**1906**	0	1638	2181	**3819**	**5725**	**8093**
EQ 12Hr	0	0	0	**0**	2706	0	585	**3292**	**3292**	435	2214	0	**2649**	0	2277	3032	**5308**	**7958**	**11249**

Note: These values are calculated by multiplying the totals by the appropriate expansion factor. **1.39**

AVG 12Hr	0	0	0	**0**	2551	0	552	**3102**	**3292**	410	2087	0	**2497**	0	2146	2857	**5003**	**7958**	**11249**

Note: These volumes are calculated by multiplying the Equivalent 12 hr. totals by the AADT factor. **1**

AVG 24Hr	0	0	0	**0**	3341	0	722	**4064**	**4064**	537	2734	0	**3271**	0	2811	3743	**6554**	**9825**	**13889**

Note: These volumes are calculated by multiplying the Average Daily 12 hr. totals by 12 to 24 expansion factor. **1.31**

Note: U-Turns provided for approach totals. Refer to 'U-Turn' Report for specific breakdown.

Transportation Services - Traffic Services

Turning Movement Count - Study Results

DUNROBIN RD @ MARCH RD

Survey Date: Wednesday, January 22, 2020 **WO No:** 39373

Start Time: 07:00 **Device:** Miovision

Full Study 15 Minute Increments

		DUNROBIN RD									MARCH RD									
		Northbound				Southbound					Eastbound				Westbound					
Time Period		LT	ST	RT	N TOT	LT	ST	RT	S TOT	STR TOT	LT	ST	RT	E TOT	LT	ST	RT	W TOT	STR TOT	Grand Total
07:00	07:15	0	0	0	0	106	0	11	117	8	8	99	0	107	0	12	30	42	8	266
07:15	07:30	0	0	0	0	96	0	12	108	1	7	76	0	83	0	16	55	71	1	262
07:30	07:45	0	0	0	0	106	0	10	116	5	10	76	0	86	0	14	45	59	5	261
07:45	08:00	0	0	0	0	97	0	18	115	7	16	113	0	129	0	5	43	48	7	292
08:00	08:15	0	0	0	0	101	0	13	114	1	8	93	0	101	0	22	30	52	1	267
08:15	08:30	0	0	0	0	83	0	15	98	2	12	119	0	131	0	22	34	56	2	285
08:30	08:45	0	0	0	0	93	0	18	111	5	4	100	0	104	0	15	30	45	5	260
08:45	09:00	0	0	0	0	92	0	16	108	10	11	110	0	121	0	13	22	35	10	264
09:00	09:15	0	0	0	0	91	0	10	101	6	7	99	0	106	0	17	25	42	6	249
09:15	09:30	0	0	0	0	78	0	14	92	2	8	55	0	63	0	26	54	80	2	235
09:30	09:45	0	0	0	0	71	0	14	85	2	13	54	0	67	0	30	35	65	2	217
09:45	10:00	0	0	0	0	52	0	11	63	1	11	35	0	46	0	21	30	51	1	160
11:30	11:45	0	0	0	0	62	0	14	76	3	9	33	0	42	0	33	48	81	3	199
11:45	12:00	0	0	0	0	52	0	9	61	3	6	33	0	39	0	26	58	84	3	184
12:00	12:15	0	0	0	0	38	0	9	47	1	6	31	0	37	0	33	59	92	1	176
12:15	12:30	0	0	0	0	59	0	8	67	4	7	30	0	37	0	37	48	85	4	189
12:30	12:45	0	0	0	0	40	0	11	51	3	6	33	0	39	0	29	41	70	3	160
12:45	13:00	0	0	0	0	57	0	14	71	4	12	30	0	42	0	34	41	75	4	188
13:15	13:30	0	0	0	0	40	0	18	58	2	11	23	0	34	0	30	42	72	2	164
15:00	15:15	0	0	0	0	50	0	9	59	2	10	31	0	41	0	64	80	144	2	244
15:15	15:30	0	0	0	0	37	0	20	57	5	12	32	0	44	0	74	110	184	5	285
15:30	15:45	0	0	0	0	48	0	9	57	4	14	26	0	40	0	78	103	181	4	278
15:45	16:00	0	0	0	0	45	0	17	62	3	20	24	0	44	0	87	109	196	3	302
16:00	16:15	0	0	0	0	41	0	10	51	4	10	20	0	30	0	99	118	217	4	298
16:15	16:30	0	0	0	0	36	0	20	56	1	10	17	0	27	0	140	142	282	1	365
16:30	16:45	0	0	0	0	36	0	21	57	3	9	41	0	50	0	139	123	262	3	369
16:45	17:00	0	0	0	0	43	0	18	61	4	9	29	0	38	0	95	125	220	4	319
17:00	17:15	0	0	0	0	34	0	10	44	1	6	34	0	40	0	107	118	225	1	309
17:15	17:30	0	0	0	0	36	0	6	42	0	8	22	0	30	0	109	111	220	0	292
17:30	17:45	0	0	0	0	50	0	13	63	1	15	26	0	41	0	77	113	190	1	294
17:45	18:00	0	0	0	0	34	0	11	45	1	14	23	0	37	0	106	110	216	1	298
13:00	13:15	0	0	0	0	43	0	12	55	4	4	26	0	30	0	28	49	77	4	162
Total:		0	0	0	0	1947	0	421	2368	103	313	1593	0	1906	0	1638	2181	3819	103	8,093

Note: U-Turns are included in Totals.

Transportation Services - Traffic Services

Turning Movement Count - Study Results

DUNROBIN RD @ MARCH RD

Survey Date: Wednesday, January 22, 2020 **WO No:** 39373

Start Time: 07:00 **Device:** Miovision

Full Study Cyclist Volume

Time Period		DUNROBIN RD			MARCH RD			
		Northbound	Southbound	Street Total	Eastbound	Westbound	Street Total	Grand Total
07:00	07:15	0	0	0	0	0	0	0
07:15	07:30	0	0	0	0	0	0	0
07:30	07:45	0	0	0	0	0	0	0
07:45	08:00	0	0	0	0	0	0	0
08:00	08:15	0	0	0	0	0	0	0
08:15	08:30	0	0	0	0	0	0	0
08:30	08:45	0	0	0	0	0	0	0
08:45	09:00	0	0	0	0	0	0	0
09:00	09:15	0	0	0	0	0	0	0
09:15	09:30	0	0	0	0	0	0	0
09:30	09:45	0	0	0	0	0	0	0
09:45	10:00	0	0	0	0	0	0	0
11:30	11:45	0	0	0	0	0	0	0
11:45	12:00	0	0	0	0	0	0	0
12:00	12:15	0	0	0	0	0	0	0
12:15	12:30	0	0	0	0	0	0	0
12:30	12:45	0	0	0	0	0	0	0
12:45	13:00	0	0	0	0	0	0	0
13:15	13:30	0	0	0	0	0	0	0
15:00	15:15	0	0	0	0	0	0	0
15:15	15:30	0	0	0	0	0	0	0
15:30	15:45	0	0	0	3	1	4	4
15:45	16:00	0	0	0	0	0	0	0
16:00	16:15	0	0	0	0	0	0	0
16:15	16:30	0	0	0	0	0	0	0
16:30	16:45	0	0	0	0	0	0	0
16:45	17:00	0	0	0	0	0	0	0
17:00	17:15	0	0	0	0	0	0	0
17:15	17:30	0	0	0	0	0	0	0
17:30	17:45	0	0	0	0	0	0	0
17:45	18:00	0	0	0	0	0	0	0
13:00	13:15	0	0	0	0	0	0	0
Total		0	0	**0**	3	1	4	4

Transportation Services - Traffic Services

Turning Movement Count - Study Results

DUNROBIN RD @ MARCH RD

Survey Date: Wednesday, January 22, 2020 **WO No:** 39373

Start Time: 07:00 **Device:** Miovision

Full Study Pedestrian Volume

	DUNROBIN RD			MARCH RD			
Time Period	NB Approach (E or W Crossing)	SB Approach (E or W Crossing)	**Total**	EB Approach (N or S Crossing)	WB Approach (N or S Crossing)	**Total**	**Grand Total**
07:00 07:15	0	0	**0**	0	0	**0**	**0**
07:15 07:30	0	0	**0**	0	0	**0**	**0**
07:30 07:45	0	0	**0**	0	0	**0**	**0**
07:45 08:00	0	0	**0**	0	0	**0**	**0**
08:00 08:15	0	0	**0**	0	0	**0**	**0**
08:15 08:30	0	0	**0**	0	0	**0**	**0**
08:30 08:45	0	0	**0**	0	0	**0**	**0**
08:45 09:00	0	0	**0**	0	0	**0**	**0**
09:00 09:15	0	0	**0**	0	0	**0**	**0**
09:15 09:30	0	0	**0**	0	0	**0**	**0**
09:30 09:45	0	0	**0**	0	0	**0**	**0**
09:45 10:00	0	0	**0**	0	0	**0**	**0**
11:30 11:45	0	0	**0**	0	0	**0**	**0**
11:45 12:00	0	0	**0**	0	0	**0**	**0**
12:00 12:15	0	0	**0**	0	0	**0**	**0**
12:15 12:30	0	0	**0**	0	0	**0**	**0**
12:30 12:45	0	0	**0**	0	0	**0**	**0**
12:45 13:00	0	0	**0**	0	0	**0**	**0**
13:15 13:30	0	0	**0**	0	0	**0**	**0**
15:00 15:15	0	0	**0**	0	0	**0**	**0**
15:15 15:30	0	0	**0**	0	0	**0**	**0**
15:30 15:45	0	0	**0**	0	0	**0**	**0**
15:45 16:00	0	0	**0**	0	0	**0**	**0**
16:00 16:15	0	0	**0**	0	0	**0**	**0**
16:15 16:30	0	0	**0**	0	0	**0**	**0**
16:30 16:45	0	0	**0**	0	0	**0**	**0**
16:45 17:00	0	0	**0**	0	0	**0**	**0**
17:00 17:15	0	0	**0**	0	0	**0**	**0**
17:15 17:30	0	0	**0**	0	0	**0**	**0**
17:30 17:45	0	0	**0**	0	0	**0**	**0**
17:45 18:00	0	0	**0**	0	0	**0**	**0**
13:00 13:15	0	0	**0**	0	0	**0**	**0**
Total	0	0	**0**	0	0	**0**	**0**

5472188 - WED JAN 22, 2020 - 8HRS - LORETTA

Transportation Services - Traffic Services

Turning Movement Count - Study Results

DUNROBIN RD @ MARCH RD

Survey Date: Wednesday, January 22, 2020 **WO No:** 39373

Start Time: 07:00 **Device:** Miovision

Full Study Heavy Vehicles

		DUNROBIN RD									MARCH RD									
		Northbound				Southbound					Eastbound				Westbound					
Time Period		LT	ST	RT	N TOT	LT	ST	RT	S TOT	STR TOT	LT	ST	RT	E TOT	LT	ST	RT	W TOT	STR TOT	Grand Total
07:00	07:15	0	0	0	**0**	8	0	0	**8**	**8**	0	2	0	**2**	0	0	1	**1**	**3**	**11**
07:15	07:30	0	0	0	**0**	1	0	0	**1**	**1**	2	0	0	**2**	0	1	10	**11**	**13**	**14**
07:30	07:45	0	0	0	**0**	3	0	2	**5**	**5**	2	0	0	**2**	0	1	4	**5**	**7**	**12**
07:45	08:00	0	0	0	**0**	6	0	1	**7**	**7**	2	0	0	**2**	0	1	7	**8**	**10**	**17**
08:00	08:15	0	0	0	**0**	1	0	0	**1**	**1**	0	1	0	**1**	0	0	3	**3**	**4**	**5**
08:15	08:30	0	0	0	**0**	1	0	1	**2**	**2**	5	1	0	**6**	0	2	3	**5**	**11**	**13**
08:30	08:45	0	0	0	**0**	3	0	2	**5**	**5**	0	0	0	**0**	0	1	3	**4**	**4**	**9**
08:45	09:00	0	0	0	**0**	5	0	5	**10**	**10**	2	3	0	**5**	0	0	1	**1**	**6**	**16**
09:00	09:15	0	0	0	**0**	4	0	2	**6**	**6**	2	1	0	**3**	0	1	5	**6**	**9**	**15**
09:15	09:30	0	0	0	**0**	2	0	0	**2**	**2**	2	1	0	**3**	0	6	4	**10**	**13**	**15**
09:30	09:45	0	0	0	**0**	1	0	1	**2**	**2**	3	1	0	**4**	0	2	2	**4**	**8**	**10**
09:45	10:00	0	0	0	**0**	0	0	1	**1**	**1**	1	1	0	**2**	0	2	2	**4**	**6**	**7**
11:30	11:45	0	0	0	**0**	0	0	3	**3**	**3**	3	0	0	**3**	0	1	0	**1**	**4**	**7**
11:45	12:00	0	0	0	**0**	0	0	3	**3**	**3**	1	3	0	**4**	0	0	2	**2**	**6**	**9**
12:00	12:15	0	0	0	**0**	0	0	1	**1**	**1**	4	1	0	**5**	0	3	2	**5**	**10**	**11**
12:15	12:30	0	0	0	**0**	2	0	2	**4**	**4**	1	0	0	**1**	0	1	1	**2**	**3**	**7**
12:30	12:45	0	0	0	**0**	1	0	2	**3**	**3**	1	0	0	**1**	0	0	2	**2**	**3**	**6**
12:45	13:00	0	0	0	**0**	2	0	2	**4**	**4**	3	1	0	**4**	0	1	2	**3**	**7**	**11**
13:15	13:30	0	0	0	**0**	1	0	1	**2**	**2**	5	2	0	**7**	0	0	0	**0**	**7**	**9**
15:00	15:15	0	0	0	**0**	1	0	1	**2**	**2**	2	0	0	**2**	0	1	2	**3**	**5**	**7**
15:15	15:30	0	0	0	**0**	4	0	1	**5**	**5**	2	3	0	**5**	0	2	2	**4**	**9**	**14**
15:30	15:45	0	0	0	**0**	2	0	2	**4**	**4**	1	2	0	**3**	0	1	2	**3**	**6**	**10**
15:45	16:00	0	0	0	**0**	1	0	2	**3**	**3**	1	1	0	**2**	0	1	7	**8**	**10**	**13**
16:00	16:15	0	0	0	**0**	3	0	1	**4**	**4**	0	0	0	**0**	0	2	7	**9**	**9**	**13**
16:15	16:30	0	0	0	**0**	0	0	1	**1**	**1**	0	0	0	**0**	0	2	1	**3**	**3**	**4**
16:30	16:45	0	0	0	**0**	0	0	3	**3**	**3**	1	1	0	**2**	0	0	0	**0**	**2**	**5**
16:45	17:00	0	0	0	**0**	3	0	1	**4**	**4**	0	0	0	**0**	0	0	0	**0**	**0**	**4**
17:00	17:15	0	0	0	**0**	1	0	0	**1**	**1**	0	0	0	**0**	0	0	2	**2**	**2**	**3**
17:15	17:30	0	0	0	**0**	0	0	0	**0**	**0**	0	0	0	**0**	0	0	0	**0**	**0**	**0**
17:30	17:45	0	0	0	**0**	1	0	0	**1**	**1**	0	0	0	**0**	0	0	0	**0**	**0**	**1**
17:45	18:00	0	0	0	**0**	1	0	0	**1**	**1**	0	0	0	**0**	0	0	0	**0**	**0**	**1**
13:00	13:15	0	0	0	**0**	3	0	1	**4**	**4**	1	1	0	**2**	0	2	3	**5**	**7**	**11**
Total:	None	0	0	0	**0**	61	0	42	**103**	**103**	47	26	0	**73**	0	34	80	**114**	**187**	**290**

Transportation Services - Traffic Services

Turning Movement Count - Study Results

DUNROBIN RD @ MARCH RD

Survey Date: Wednesday, January 22, 2020 **WO No:** 39373

Start Time: 07:00 **Device:** Miovision

Full Study 15 Minute U-Turn Total

		DUNROBIN RD		MARCH RD		
Time Period		Northbound U-Turn Total	Southbound U-Turn Total	Eastbound U-Turn Total	Westbound U-Turn Total	Total
07:00	07:15	0	0	0	0	0
07:15	07:30	0	0	0	0	0
07:30	07:45	0	0	0	0	0
07:45	08:00	0	0	0	0	0
08:00	08:15	0	0	0	0	0
08:15	08:30	0	0	0	0	0
08:30	08:45	0	0	0	0	0
08:45	09:00	0	0	0	0	0
09:00	09:15	0	0	0	0	0
09:15	09:30	0	0	0	0	0
09:30	09:45	0	0	0	0	0
09:45	10:00	0	0	0	0	0
11:30	11:45	0	0	0	0	0
11:45	12:00	0	0	0	0	0
12:00	12:15	0	0	0	0	0
12:15	12:30	0	0	0	0	0
12:30	12:45	0	0	0	0	0
12:45	13:00	0	0	0	0	0
13:15	13:30	0	0	0	0	0
15:00	15:15	0	0	0	0	0
15:15	15:30	0	0	0	0	0
15:30	15:45	0	0	0	0	0
15:45	16:00	0	0	0	0	0
16:00	16:15	0	0	0	0	0
16:15	16:30	0	0	0	0	0
16:30	16:45	0	0	0	0	0
16:45	17:00	0	0	0	0	0
17:00	17:15	0	0	0	0	0
17:15	17:30	0	0	0	0	0
17:30	17:45	0	0	0	0	0
17:45	18:00	0	0	0	0	0
13:00	13:15	0	0	0	0	0
Total		0	0	0	0	0

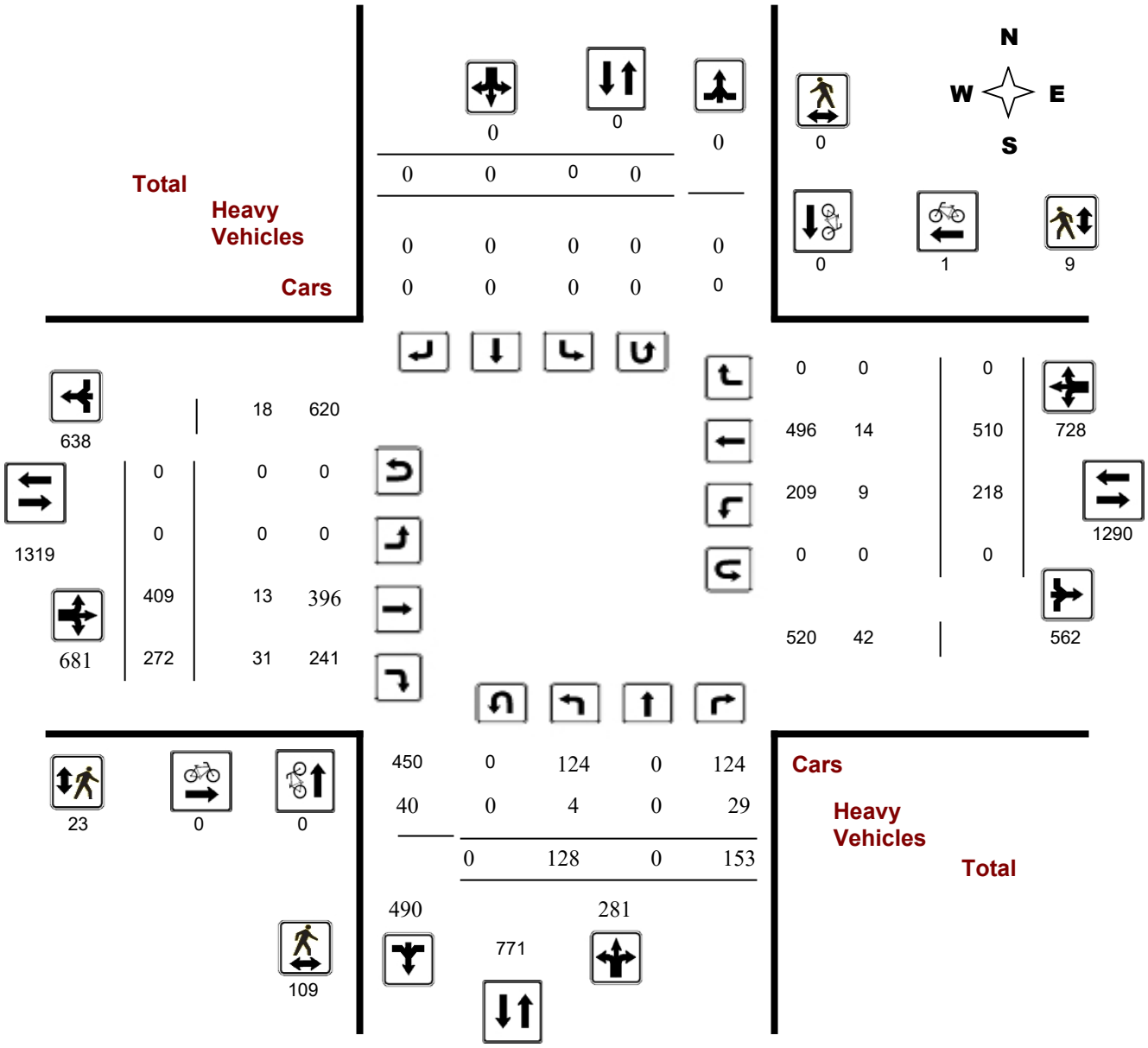
Transportation Services - Traffic Services

Turning Movement Count - Study Results

FLAMBOROUGH WAY @ HALTON TER

Survey Date: Wednesday, November 13, 2019
Start Time: 07:00
WO No: 38974
Device: Miovision

Full Study Diagram



Transportation Services - Traffic Services

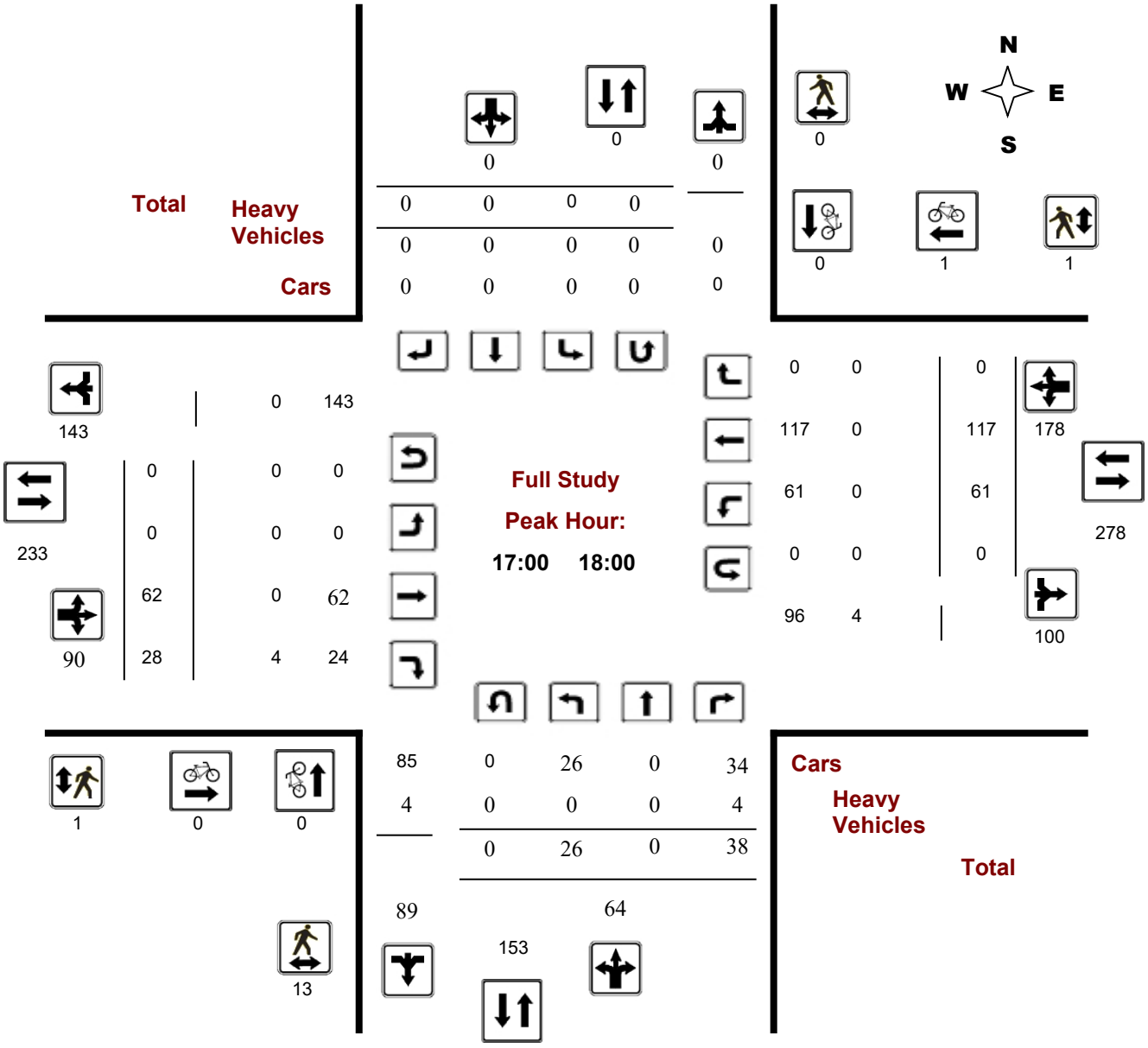
Turning Movement Count - Study Results

FLAMBOROUGH WAY @ HALTON TER

Survey Date: Wednesday, November 13, 2019 **WO No:** 38974

Start Time: 07:00 **Device:** Miovision

Full Study Peak Hour Diagram



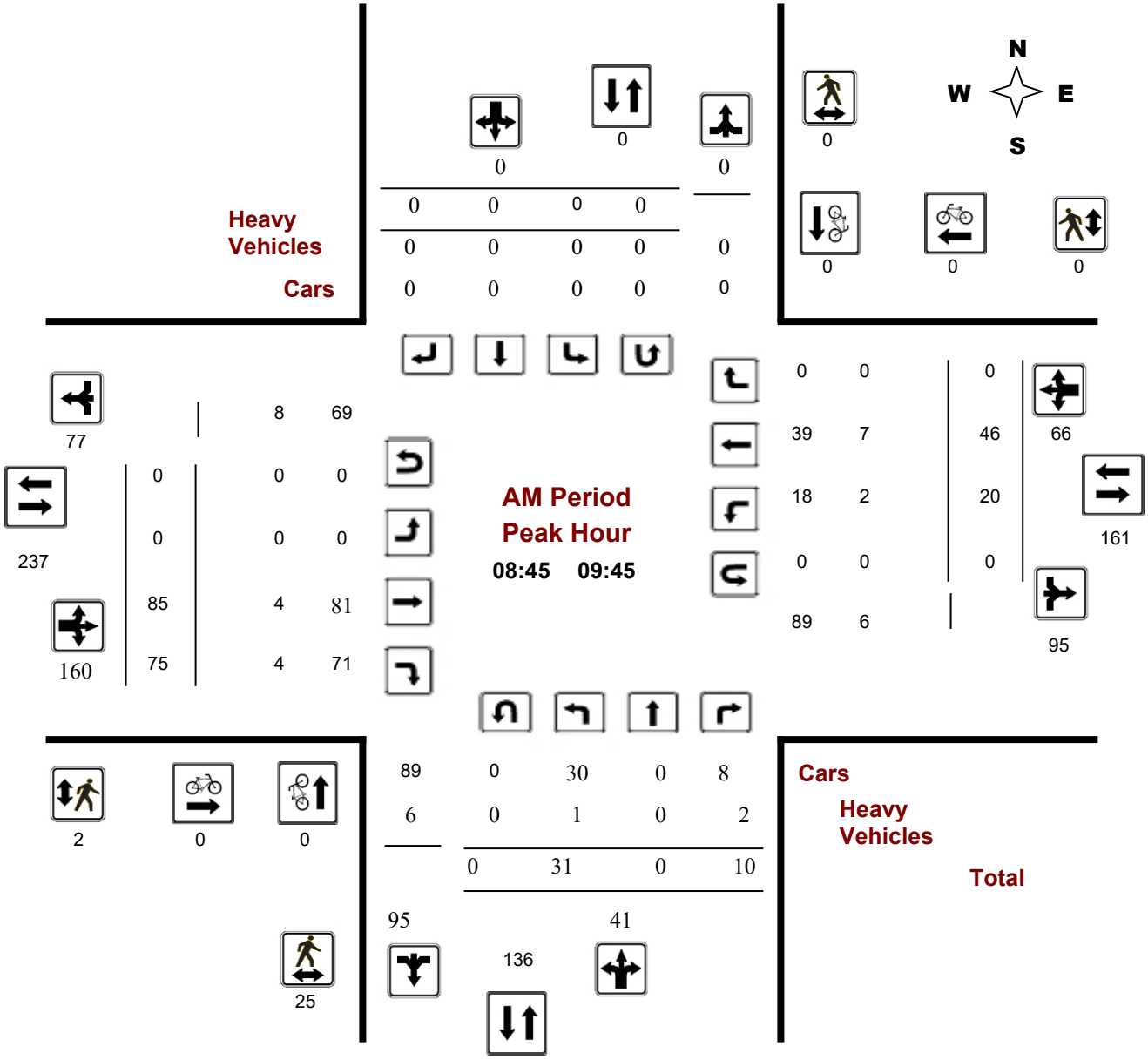
Transportation Services - Traffic Services

Turning Movement Count - Peak Hour Diagram

FLAMBOROUGH WAY @ HALTON TER

Survey Date: Wednesday, November 13, 2019 **WO No:** 38974

Start Time: 07:00 **Device:** Miovision



Comments

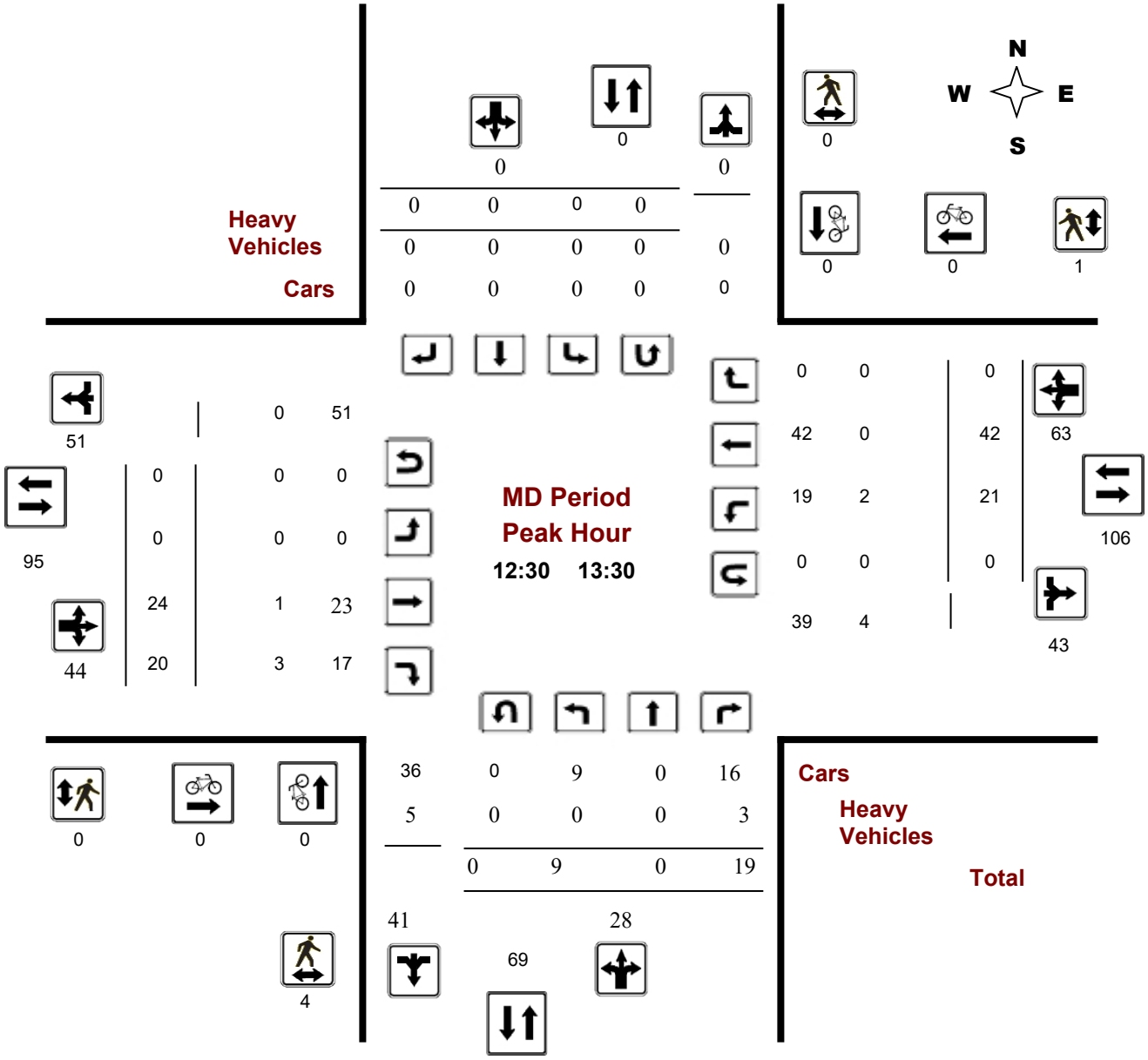
Transportation Services - Traffic Services

Turning Movement Count - Peak Hour Diagram

FLAMBOROUGH WAY @ HALTON TER

Survey Date: Wednesday, November 13, 2019 **WO No:** 38974

Start Time: 07:00 **Device:** Miovision



Comments

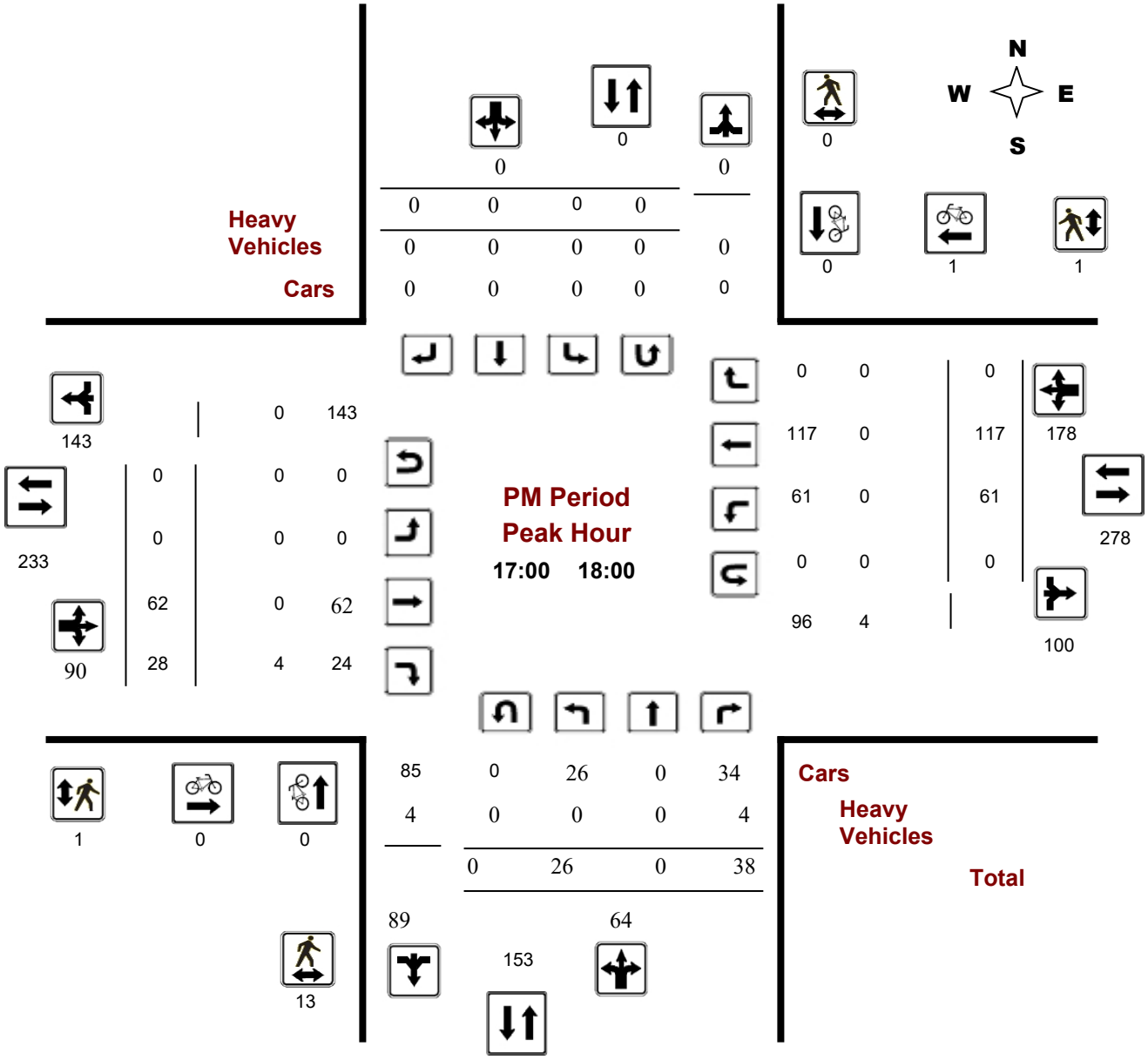
Transportation Services - Traffic Services

Turning Movement Count - Peak Hour Diagram

FLAMBOROUGH WAY @ HALTON TER

Survey Date: Wednesday, November 13, 2019 **WO No:** 38974

Start Time: 07:00 **Device:** Miovision



Comments

Transportation Services - Traffic Services

Turning Movement Count - Study Results

FLAMBOROUGH WAY @ HALTON TER

Survey Date: Wednesday, November 13, 2019 **WO No:** 38974

Start Time: 07:00 **Device:** Miovision

Full Study Summary (8 HR Standard)

Survey Date: Wednesday, November 13, 2019

Total Observed U-Turns

Northbound: 0 Southbound: 0

Eastbound: 0 Westbound: 0

AADT Factor

.90

	Northbound				Southbound					Eastbound				Westbound					
Period	LT	ST	RT	**NB TOT**	LT	ST	RT	**SB TOT**	**STR TOT**	LT	ST	RT	**EB TOT**	LT	ST	RT	**WB TOT**	**STR TOT**	**Grand Total**
07:00 08:00	7	0	15	**22**	0	0	0	**0**	**22**	0	65	53	**118**	7	29	0	**36**	**154**	**176**
08:00 09:00	14	0	18	**32**	0	0	0	**0**	**32**	0	56	23	**79**	15	38	0	**53**	**132**	**164**
09:00 10:00	21	0	7	**28**	0	0	0	**0**	**28**	0	78	72	**150**	19	39	0	**58**	**208**	**236**
11:30 12:30	9	0	13	**22**	0	0	0	**0**	**22**	0	20	15	**35**	20	29	0	**49**	**84**	**106**
12:30 13:30	9	0	19	**28**	0	0	0	**0**	**28**	0	24	20	**44**	21	42	0	**63**	**107**	**135**
15:00 16:00	25	0	15	**40**	0	0	0	**0**	**40**	0	46	33	**79**	28	86	0	**114**	**193**	**233**
16:00 17:00	17	0	28	**45**	0	0	0	**0**	**45**	0	58	28	**86**	47	130	0	**177**	**263**	**308**
17:00 18:00	26	0	38	**64**	0	0	0	**0**	**64**	0	62	28	**90**	61	117	0	**178**	**268**	**332**
Sub Total	128	0	153	**281**	0	0	0	**0**	**281**	0	409	272	**681**	218	510	0	**728**	**1409**	**1690**
U Turns				**0**				**0**	**0**				**0**				**0**	**0**	**0**
Total	128	0	153	**281**	0	0	0	**0**	**281**	0	409	272	**681**	218	510	0	**728**	**1409**	**1690**
EQ 12Hr	178	0	213	**391**	0	0	0	**0**	**391**	0	569	378	**947**	303	709	0	**1012**	**1959**	**2349**
Note: These values are calculated by multiplying the totals by the appropriate expansion factor.														**1.39**					
AVG 12Hr	151	0	180	**331**	0	0	0	**0**	**352**	0	482	321	**803**	257	601	0	**858**	**1763**	**2114**
Note: These volumes are calculated by multiplying the Equivalent 12 hr. totals by the AADT factor.														**0.9**					
AVG 24Hr	198	0	236	**434**	0	0	0	**0**	**434**	0	632	420	**1052**	337	788	0	**1124**	**2176**	**2610**
Note: These volumes are calculated by multiplying the Average Daily 12 hr. totals by 12 to 24 expansion factor.														**1.31**					

Note: U-Turns provided for approach totals. Refer to 'U-Turn' Report for specific breakdown.

Transportation Services - Traffic Services

Turning Movement Count - Study Results

FLAMBOROUGH WAY @ HALTON TER

Survey Date: Wednesday, November 13, 2019 **WO No:** 38974

Start Time: 07:00 **Device:** Miovision

Full Study 15 Minute Increments

Time Period		Northbound				Southbound					Eastbound				Westbound					
		LT	ST	RT	N TOT	LT	ST	RT	S TOT	STR TOT	LT	ST	RT	E TOT	LT	ST	RT	W TOT	STR TOT	Grand Total
07:00	07:15	2	0	2	4	0	0	0	0	1	0	12	12	24	0	4	0	4	1	32
07:15	07:30	2	0	4	6	0	0	0	0	2	0	15	15	30	2	7	0	9	2	45
07:30	07:45	1	0	2	3	0	0	0	0	1	0	25	13	38	4	8	0	12	1	53
07:45	08:00	2	0	7	9	0	0	0	0	2	0	13	13	26	1	10	0	11	2	46
08:00	08:15	3	0	6	9	0	0	0	0	1	0	16	5	21	5	6	0	11	1	41
08:15	08:30	0	0	3	3	0	0	0	0	0	0	18	5	23	2	9	0	11	0	37
08:30	08:45	1	0	5	6	0	0	0	0	3	0	7	4	11	3	9	0	12	3	29
08:45	09:00	10	0	4	14	0	0	0	0	1	0	15	9	24	5	14	0	19	1	57
09:00	09:15	15	0	2	17	0	0	0	0	1	0	38	44	82	1	20	0	21	1	120
09:15	09:30	4	0	1	5	0	0	0	0	0	0	25	17	42	7	5	0	12	0	59
09:30	09:45	2	0	3	5	0	0	0	0	1	0	7	5	12	7	7	0	14	1	31
09:45	10:00	0	0	1	1	0	0	0	0	0	0	8	6	14	4	7	0	11	0	26
11:30	11:45	4	0	3	7	0	0	0	0	1	0	3	4	7	5	5	0	10	1	24
11:45	12:00	5	0	2	7	0	0	0	0	1	0	3	4	7	10	5	0	15	1	29
12:00	12:15	0	0	3	3	0	0	0	0	1	0	6	2	8	5	9	0	14	1	25
12:15	12:30	0	0	5	5	0	0	0	0	0	0	8	5	13	0	10	0	10	0	28
12:30	12:45	5	0	4	9	0	0	0	0	1	0	8	6	14	5	9	0	14	1	37
12:45	13:00	1	0	8	9	0	0	0	0	1	0	2	3	5	6	13	0	19	1	33
13:00	13:15	2	0	4	6	0	0	0	0	1	0	8	4	12	6	13	0	19	1	37
13:15	13:30	1	0	3	4	0	0	0	0	0	0	6	7	13	4	7	0	11	0	28
15:00	15:15	0	0	3	3	0	0	0	0	0	0	7	2	9	2	19	0	21	0	33
15:15	15:30	5	0	4	9	0	0	0	0	0	0	8	4	12	12	21	0	33	0	54
15:30	15:45	11	0	2	13	0	0	0	0	2	0	9	3	12	9	27	0	36	2	61
15:45	16:00	9	0	6	15	0	0	0	0	3	0	22	24	46	5	19	0	24	3	85
16:00	16:15	4	0	6	10	0	0	0	0	1	0	19	10	29	15	29	0	44	1	83
16:15	16:30	3	0	6	9	0	0	0	0	3	0	15	5	20	7	23	0	30	3	59
16:30	16:45	4	0	8	12	0	0	0	0	0	0	10	4	14	11	49	0	60	0	86
16:45	17:00	6	0	8	14	0	0	0	0	1	0	14	9	23	14	29	0	43	1	80
17:00	17:15	8	0	11	19	0	0	0	0	0	0	17	5	22	13	28	0	41	0	82
17:15	17:30	3	0	10	13	0	0	0	0	3	0	11	9	20	18	29	0	47	3	80
17:30	17:45	7	0	7	14	0	0	0	0	0	0	20	8	28	14	33	0	47	0	89
17:45	18:00	8	0	10	18	0	0	0	0	1	0	14	6	20	16	27	0	43	1	81
Total:		128	0	153	281	0	0	0	0	33	0	409	272	681	218	510	0	728	33	1,690

Note: U-Turns are included in Totals.

Transportation Services - Traffic Services

Turning Movement Count - Study Results

FLAMBOROUGH WAY @ HALTON TER

Survey Date: Wednesday, November 13, 2019 **WO No:** 38974

Start Time: 07:00 **Device:** Miovision

Full Study Cyclist Volume

Time Period		Northbound	Southbound	Street Total	Eastbound	Westbound	Street Total	Grand Total
07:00	07:15	0	0	0	0	0	0	0
07:15	07:30	0	0	0	0	0	0	0
07:30	07:45	0	0	0	0	0	0	0
07:45	08:00	0	0	0	0	0	0	0
08:00	08:15	0	0	0	0	0	0	0
08:15	08:30	0	0	0	0	0	0	0
08:30	08:45	0	0	0	0	0	0	0
08:45	09:00	0	0	0	0	0	0	0
09:00	09:15	0	0	0	0	0	0	0
09:15	09:30	0	0	0	0	0	0	0
09:30	09:45	0	0	0	0	0	0	0
09:45	10:00	0	0	0	0	0	0	0
11:30	11:45	0	0	0	0	0	0	0
11:45	12:00	0	0	0	0	0	0	0
12:00	12:15	0	0	0	0	0	0	0
12:15	12:30	0	0	0	0	0	0	0
12:30	12:45	0	0	0	0	0	0	0
12:45	13:00	0	0	0	0	0	0	0
13:00	13:15	0	0	0	0	0	0	0
13:15	13:30	0	0	0	0	0	0	0
15:00	15:15	0	0	0	0	0	0	0
15:15	15:30	0	0	0	0	0	0	0
15:30	15:45	0	0	0	0	0	0	0
15:45	16:00	0	0	0	0	0	0	0
16:00	16:15	0	0	0	0	0	0	0
16:15	16:30	0	0	0	0	0	0	0
16:30	16:45	0	0	0	0	0	0	0
16:45	17:00	0	0	0	0	0	0	0
17:00	17:15	0	0	0	0	0	0	0
17:15	17:30	0	0	0	0	1	1	1
17:30	17:45	0	0	0	0	0	0	0
17:45	18:00	0	0	0	0	0	0	0
Total		0	0	**0**	0	1	1	1

Transportation Services - Traffic Services

Turning Movement Count - Study Results

FLAMBOROUGH WAY @ HALTON TER

Survey Date: Wednesday, November 13, 2019 **WO No:** 38974

Start Time: 07:00 **Device:** Miovision

Full Study Pedestrian Volume

Time Period	NB Approach (E or W Crossing)	SB Approach (E or W Crossing)	Total	EB Approach (N or S Crossing)	WB Approach (N or S Crossing)	Total	Grand Total
07:00 07:15	2	0	**2**	2	0	**2**	**4**
07:15 07:30	1	0	**1**	4	0	**4**	**5**
07:30 07:45	3	0	**3**	1	0	**1**	**4**
07:45 08:00	0	0	**0**	0	0	**0**	**0**
08:00 08:15	1	0	**1**	1	0	**1**	**2**
08:15 08:30	2	0	**2**	0	0	**0**	**2**
08:30 08:45	1	0	**1**	6	0	**6**	**7**
08:45 09:00	8	0	**8**	2	0	**2**	**10**
09:00 09:15	14	0	**14**	0	0	**0**	**14**
09:15 09:30	3	0	**3**	0	0	**0**	**3**
09:30 09:45	0	0	**0**	0	0	**0**	**0**
09:45 10:00	1	0	**1**	0	0	**0**	**1**
11:30 11:45	0	0	**0**	0	0	**0**	**0**
11:45 12:00	0	0	**0**	0	0	**0**	**0**
12:00 12:15	2	0	**2**	0	0	**0**	**2**
12:15 12:30	0	0	**0**	0	0	**0**	**0**
12:30 12:45	1	0	**1**	0	1	**1**	**2**
12:45 13:00	1	0	**1**	0	0	**0**	**1**
13:00 13:15	2	0	**2**	0	0	**0**	**2**
13:15 13:30	0	0	**0**	0	0	**0**	**0**
15:00 15:15	2	0	**2**	0	0	**0**	**2**
15:15 15:30	4	0	**4**	0	0	**0**	**4**
15:30 15:45	7	0	**7**	1	0	**1**	**8**
15:45 16:00	12	0	**12**	1	0	**1**	**13**
16:00 16:15	14	0	**14**	3	2	**5**	**19**
16:15 16:30	7	0	**7**	0	2	**2**	**9**
16:30 16:45	5	0	**5**	0	3	**3**	**8**
16:45 17:00	3	0	**3**	1	0	**1**	**4**
17:00 17:15	1	0	**1**	0	1	**1**	**2**
17:15 17:30	6	0	**6**	0	0	**0**	**6**
17:30 17:45	1	0	**1**	1	0	**1**	**2**
17:45 18:00	5	0	**5**	0	0	**0**	**5**
Total	109	0	**109**	23	9	**32**	**141**

Transportation Services - Traffic Services

Turning Movement Count - Study Results

FLAMBOROUGH WAY @ HALTON TER

Survey Date: Wednesday, November 13, 2019 **WO No:** 38974

Start Time: 07:00 **Device:** Miovision

Full Study Heavy Vehicles

Time Period		Northbound				Southbound					Eastbound				Westbound					
		LT	ST	RT	N TOT	LT	ST	RT	S TOT	STR TOT	LT	ST	RT	E TOT	LT	ST	RT	W TOT	STR TOT	Grand Total
07:00	07:15	0	0	1	**1**	0	0	0	**0**	**1**	0	0	2	**2**	0	0	0	**0**	**2**	**3**
07:15	07:30	1	0	1	**2**	0	0	0	**0**	**2**	0	0	1	**1**	1	1	0	**2**	**3**	**5**
07:30	07:45	0	0	1	**1**	0	0	0	**0**	**1**	0	0	2	**2**	0	1	0	**1**	**3**	**4**
07:45	08:00	0	0	2	**2**	0	0	0	**0**	**2**	0	0	0	**0**	0	0	0	**0**	**0**	**2**
08:00	08:15	0	0	1	**1**	0	0	0	**0**	**1**	0	1	1	**2**	0	0	0	**0**	**2**	**3**
08:15	08:30	0	0	0	**0**	0	0	0	**0**	**0**	0	0	1	**1**	0	0	0	**0**	**1**	**1**
08:30	08:45	0	0	3	**3**	0	0	0	**0**	**3**	0	0	2	**2**	0	1	0	**1**	**3**	**6**
08:45	09:00	1	0	0	**1**	0	0	0	**0**	**1**	0	0	0	**0**	2	1	0	**3**	**3**	**4**
09:00	09:15	0	0	1	**1**	0	0	0	**0**	**1**	0	3	2	**5**	0	5	0	**5**	**10**	**11**
09:15	09:30	0	0	0	**0**	0	0	0	**0**	**0**	0	1	1	**2**	0	0	0	**0**	**2**	**2**
09:30	09:45	0	0	1	**1**	0	0	0	**0**	**1**	0	0	1	**1**	0	1	0	**1**	**2**	**3**
09:45	10:00	0	0	0	**0**	0	0	0	**0**	**0**	0	0	0	**0**	0	1	0	**1**	**1**	**1**
11:30	11:45	0	0	1	**1**	0	0	0	**0**	**1**	0	0	1	**1**	0	0	0	**0**	**1**	**2**
11:45	12:00	1	0	0	**1**	0	0	0	**0**	**1**	0	0	2	**2**	0	0	0	**0**	**2**	**3**
12:00	12:15	0	0	1	**1**	0	0	0	**0**	**1**	0	0	0	**0**	0	0	0	**0**	**0**	**1**
12:15	12:30	0	0	0	**0**	0	0	0	**0**	**0**	0	0	0	**0**	0	1	0	**1**	**1**	**1**
12:30	12:45	0	0	1	**1**	0	0	0	**0**	**1**	0	0	1	**1**	1	0	0	**1**	**2**	**3**
12:45	13:00	0	0	1	**1**	0	0	0	**0**	**1**	0	1	0	**1**	0	0	0	**0**	**1**	**2**
13:00	13:15	0	0	1	**1**	0	0	0	**0**	**1**	0	0	0	**0**	1	0	0	**1**	**1**	**2**
13:15	13:30	0	0	0	**0**	0	0	0	**0**	**0**	0	0	2	**2**	0	0	0	**0**	**2**	**2**
15:00	15:15	0	0	0	**0**	0	0	0	**0**	**0**	0	1	2	**3**	0	0	0	**0**	**3**	**3**
15:15	15:30	0	0	0	**0**	0	0	0	**0**	**0**	0	0	1	**1**	2	0	0	**2**	**3**	**3**
15:30	15:45	0	0	2	**2**	0	0	0	**0**	**2**	0	1	0	**1**	0	0	0	**0**	**1**	**3**
15:45	16:00	1	0	2	**3**	0	0	0	**0**	**3**	0	2	1	**3**	0	1	0	**1**	**4**	**7**
16:00	16:15	0	0	1	**1**	0	0	0	**0**	**1**	0	1	0	**1**	0	1	0	**1**	**2**	**3**
16:15	16:30	0	0	3	**3**	0	0	0	**0**	**3**	0	1	2	**3**	1	0	0	**1**	**4**	**7**
16:30	16:45	0	0	0	**0**	0	0	0	**0**	**0**	0	0	1	**1**	1	0	0	**1**	**2**	**2**
16:45	17:00	0	0	1	**1**	0	0	0	**0**	**1**	0	1	1	**2**	0	0	0	**0**	**2**	**3**
17:00	17:15	0	0	0	**0**	0	0	0	**0**	**0**	0	0	0	**0**	0	0	0	**0**	**0**	**0**
17:15	17:30	0	0	3	**3**	0	0	0	**0**	**3**	0	0	2	**2**	0	0	0	**0**	**2**	**5**
17:30	17:45	0	0	0	**0**	0	0	0	**0**	**0**	0	0	1	**1**	0	0	0	**0**	**1**	**1**
17:45	18:00	0	0	1	**1**	0	0	0	**0**	**1**	0	0	1	**1**	0	0	0	**0**	**1**	**2**
Total:	None	4	0	29	**33**	0	0	0	**0**	**33**	0	13	31	**44**	9	14	0	**23**	**67**	**100**

Transportation Services - Traffic Services

Turning Movement Count - Study Results

FLAMBOROUGH WAY @ HALTON TER

Survey Date: Wednesday, November 13, 2019 **WO No:** 38974

Start Time: 07:00 **Device:** Miovision

Full Study 15 Minute U-Turn Total

Time Period		Northbound U-Turn Total	Southbound U-Turn Total	Eastbound U-Turn Total	Westbound U-Turn Total	Total
07:00	07:15	0	0	0	0	0
07:15	07:30	0	0	0	0	0
07:30	07:45	0	0	0	0	0
07:45	08:00	0	0	0	0	0
08:00	08:15	0	0	0	0	0
08:15	08:30	0	0	0	0	0
08:30	08:45	0	0	0	0	0
08:45	09:00	0	0	0	0	0
09:00	09:15	0	0	0	0	0
09:15	09:30	0	0	0	0	0
09:30	09:45	0	0	0	0	0
09:45	10:00	0	0	0	0	0
11:30	11:45	0	0	0	0	0
11:45	12:00	0	0	0	0	0
12:00	12:15	0	0	0	0	0
12:15	12:30	0	0	0	0	0
12:30	12:45	0	0	0	0	0
12:45	13:00	0	0	0	0	0
13:00	13:15	0	0	0	0	0
13:15	13:30	0	0	0	0	0
15:00	15:15	0	0	0	0	0
15:15	15:30	0	0	0	0	0
15:30	15:45	0	0	0	0	0
15:45	16:00	0	0	0	0	0
16:00	16:15	0	0	0	0	0
16:15	16:30	0	0	0	0	0
16:30	16:45	0	0	0	0	0
16:45	17:00	0	0	0	0	0
17:00	17:15	0	0	0	0	0
17:15	17:30	0	0	0	0	0
17:30	17:45	0	0	0	0	0
17:45	18:00	0	0	0	0	0
Total		0	0	0	0	0

City Operations - Transportation Services

Collision Details Report - Public Version

From: January 1, 2014 **To:** December 31, 2018

Location: DUNROBIN RD @ MARCH RD

Traffic Control: Traffic signal

Total Collisions: 18

Date/Day/Time	Environment	Impact Type	Classification	Surface Cond'n	Veh. Dir	Vehicle Manoeuver	Vehicle type	First Event	No. Ped
2014-Jan-12, Sun,13:30	Clear	Rear end	P.D. only	Wet	South	Going ahead	Truck-other	Other motor vehicle	
					South	Stopped	Passenger van	Other motor vehicle	
2014-Nov-09, Sun,23:53	Clear	SMV other	P.D. only	Wet	West	Going ahead	Passenger van	Ran off road	
2014-Feb-06, Thu,18:20	Clear	Turning movement	Non-fatal injury	Wet	West	Going ahead	Automobile, station wagon	Other motor vehicle	
					East	Turning left	Automobile, station wagon	Other motor vehicle	
2014-Dec-17, Wed,17:30	Snow	Turning movement	Non-fatal injury	Wet	East	Turning left	Pick-up truck	Other motor vehicle	
					West	Going ahead	Automobile, station wagon	Other motor vehicle	
2015-Mar-29, Sun,18:00	Clear	Rear end	P.D. only	Dry	West	Going ahead	Automobile, station wagon	Other motor vehicle	
					West	Going ahead	Passenger van	Other motor vehicle	
2015-Jul-07, Tue,16:20	Clear	Rear end	P.D. only	Dry	South	Turning left	Automobile, station wagon	Other motor vehicle	
					South	Turning left	Passenger van	Other motor vehicle	

					South	Turning left	Automobile, station wagon	Other motor vehicle
2015-Nov-12, Thu,11:33	Rain	Angle	P.D. only	Wet	West	Turning right	Automobile, station wagon	Other motor vehicle
					South	Stopped	Pick-up truck	Other motor vehicle
2015-Nov-26, Thu,07:45	Clear	Sideswipe	P.D. only	Wet	South	Turning left	Automobile, station wagon	Other motor vehicle
					South	Turning left	School bus	Other motor vehicle
2015-Dec-20, Sun,02:41	Clear	SMV other	P.D. only	Ice	West	Going ahead	Automobile, station wagon	Ran off road
2016-May-05, Thu,19:29	Clear	Turning movement	P.D. only	Dry	South	Turning left	Automobile, station wagon	Other motor vehicle
					North	Going ahead	Automobile, station wagon	Other motor vehicle
2016-Mar-29, Tue,17:17	Clear	Rear end	P.D. only	Dry	West	Going ahead	Automobile, station wagon	Other motor vehicle
					West	Stopped	Pick-up truck	Other motor vehicle
2016-Jul-02, Sat,00:45	Rain	Sideswipe	P.D. only	Wet	South	Overtaking	Unknown	Other motor vehicle
					South	Going ahead	Automobile, station wagon	Other motor vehicle
2017-Jun-08, Thu,17:57	Clear	Turning movement	P.D. only	Dry	East	Turning left	Pick-up truck	Other motor vehicle
					West	Going ahead	Pick-up truck	Other motor vehicle

2017-Apr-11, Tue,18:59	Clear	Turning movement	P.D. only	Dry	East	Turning left	Pick-up truck	Other motor vehicle
					West	Going ahead	Automobile, station wagon	Other motor vehicle
2017-Oct-11, Wed,19:21	Clear	Turning movement	P.D. only	Dry	East	Turning left	Automobile, station wagon	Other motor vehicle
					West	Going ahead	Truck - open	Other motor vehicle
2017-Dec-15, Fri,16:50	Snow	Turning movement	P.D. only	Loose snow	East	Turning left	Automobile, station wagon	Other motor vehicle
					West	Going ahead	Automobile, station wagon	Skidding/sliding
2018-Jun-23, Sat,11:41	Clear	Turning movement	P.D. only	Dry	East	Turning left	Automobile, station wagon	Other motor vehicle
					West	Going ahead	Automobile, station wagon	Other motor vehicle
					West	Going ahead	Automobile, station wagon	Other motor vehicle
2018-Nov-01, Thu,06:30	Clear	Sideswipe	P.D. only	Dry	East	Merging	Unknown	Other motor vehicle
					East	Going ahead	Automobile, station wagon	Other motor vehicle

Location: HALTON TERR/MAXWELL BRIDGE RD @ MARCH RD

Traffic Control: Traffic signal **Total Collisions:** 12

Date/Day/Time	Environment	Impact Type	Classification	Surface Cond'n	Veh. Dir	Vehicle Manoeuver	Vehicle type	First Event	No. Ped
2014-Jul-29, Tue,19:40	Clear	SMV other	P.D. only	Dry	South	Going ahead	Automobile, station wagon	Skidding/sliding	
2016-Feb-28, Sun,19:57	Freezing Rain	Turning movement	P.D. only	Ice	West	Turning left	Pick-up truck	Other motor vehicle	

					East	Going ahead	Automobile, station wagon	Other motor vehicle
2015-Dec-13, Sun,17:23	Clear	Sideswipe	P.D. only	Dry	North	Changing lanes	Passenger van	Other motor vehicle
					North	Going ahead	Passenger van	Other motor vehicle
2016-Sep-30, Fri,19:32	Clear	Turning movement	Non-fatal injury	Dry	South	Turning left	Automobile, station wagon	Other motor vehicle
					North	Going ahead	Pick-up truck	Other motor vehicle
2016-Dec-23, Fri,10:59	Clear	Turning movement	P.D. only	Wet	South	Turning left	Automobile, station wagon	Other motor vehicle
					North	Going ahead	Pick-up truck	Other motor vehicle
2016-Nov-24, Thu,06:47	Snow	Turning movement	Non-fatal injury	Ice	South	Turning left	Pick-up truck	Other motor vehicle
					North	Going ahead	Automobile, station wagon	Other motor vehicle
2016-Dec-05, Mon,08:23	Snow	Sideswipe	P.D. only	Loose snow	West	Changing lanes	Pick-up truck	Other motor vehicle
					West	Going ahead	Automobile, station wagon	Other motor vehicle
2017-Apr-19, Wed,14:14	Rain	Angle	Non-fatal injury	Wet	North	Going ahead	Automobile, station wagon	Other motor vehicle
					West	Stopped	Pick-up truck	Other motor vehicle
2017-Jun-22, Thu,10:59	Clear	Other	P.D. only	Dry	West	Reversing	Automobile, station wagon	Other motor vehicle

					East	Stopped	Automobile, station wagon	Other motor vehicle	
2017-Nov-28, Tue,22:03	Rain	SMV other	Non-fatal injury	Wet	South	Turning left	Automobile, station wagon	Pedestrian	1
2018-Dec-05, Wed,18:26	Snow	Turning movement	P.D. only	Loose snow	West	Turning left	Automobile, station wagon	Other motor vehicle	
					East	Going ahead	Automobile, station wagon	Other motor vehicle	
2018-Nov-15, Thu,17:20	Clear	Sideswipe	P.D. only	Dry	North	Changing lanes	Automobile, station wagon	Other motor vehicle	
					North	Going ahead	Automobile, station wagon	Other motor vehicle	

Location: MARCH RD @ MAXWELL RD

Traffic Control: Stop sign **Total Collisions:** 2

Date/Day/Time	Environment	Impact Type	Classification	Surface Cond'n	Veh. Dir	Vehicle Manoeuver	Vehicle type	First Event	No. Ped
2014-Oct-24, Fri,09:54	Clear	Angle	Non-fatal injury	Dry	West	Turning left	Automobile, station wagon	Other motor vehicle	
					North	Going ahead	Automobile, station wagon	Other motor vehicle	
2017-Feb-14, Tue,16:55	Snow	Rear end	P.D. only	Loose snow	South	Going ahead	Automobile, station wagon	Other motor vehicle	
					South	Stopped	Pick-up truck	Other motor vehicle	

Location: MARCH RD btwn DUNROBIN RD & MURPHY CRT

Traffic Control: No control **Total Collisions:** 26

Date/Day/Time	Environment	Impact Type	Classification	Surface Cond'n	Veh. Dir	Vehicle Manoeuver	Vehicle type	First Event	No. Ped
2014-Apr-20, Sun,21:05	Clear	SMV other	P.D. only	Dry	South	Going ahead	Pick-up truck	Animal - wild	

2014-Sep-27, Sat,04:51	Clear	SMV other	P.D. only	Dry	North	Going ahead	Automobile, station wagon	Steel guide rail
2014-Nov-19, Wed,17:35	Clear	Other	P.D. only	Dry	North	Going ahead	Unknown	Animal - wild
					South	Going ahead	Automobile, station wagon	Animal - wild
2014-Nov-19, Wed,17:35	Clear	SMV other	Non-fatal injury	Dry	North	Going ahead	Automobile, station wagon	Animal - wild
2015-Sep-24, Thu,07:01	Clear	SMV other	P.D. only	Dry	North	Going ahead	Pick-up truck	Animal - wild
2015-Apr-18, Sat,07:17	Clear	SMV other	P.D. only	Dry	South	Going ahead	Automobile, station wagon	Animal - wild
2016-Aug-04, Thu,09:45	Clear	SMV other	P.D. only	Dry	South	Going ahead	Automobile, station wagon	Animal - wild
2016-Jan-09, Sat,07:00	Rain	SMV other	Non-fatal injury	Slush	South	Going ahead	Automobile, station wagon	Skidding/sliding
2015-Nov-06, Fri,18:08	Clear	SMV other	P.D. only	Dry	South	Going ahead	Passenger van	Animal - wild
2015-Dec-03, Thu,17:00	Clear	Approaching	Non-fatal injury	Dry	North	Going ahead	Passenger van	Other motor vehicle
					South	Going ahead	Pick-up truck	Other motor vehicle
					South	Going ahead	Automobile, station wagon	Other motor vehicle
					South	Going ahead	Pick-up truck	Other motor vehicle
					North	Stopped	Automobile, station wagon	Other motor vehicle

					North	Stopped	Automobile, station wagon	Other motor vehicle
					North	Stopped	Automobile, station wagon	Other motor vehicle
2016-Jan-14, Thu,08:13	Snow	SMV other	Non-fatal injury	Slush	North	Going ahead	Passenger van	Skidding/sliding
2015-Dec-28, Mon,18:54	Clear	SMV other	P.D. only	Dry	North	Going ahead	Pick-up truck	Animal - wild
2016-Apr-17, Sun,17:15	Clear	Turning movement	Non-fatal injury	Dry	South	Turning left	Passenger van	Other motor vehicle
					North	Going ahead	Automobile, station wagon	Other motor vehicle
2016-Jun-11, Sat,17:12	Rain	Turning movement	P.D. only	Wet	North	Making "U" turn	Automobile, station wagon	Other motor vehicle
					North	Going ahead	Automobile, station wagon	Other motor vehicle
2016-Dec-21, Wed,17:53	Clear	SMV other	P.D. only	Dry	West	Going ahead	Automobile, station wagon	Animal - wild
2016-Dec-25, Sun,21:46	Clear	SMV other	P.D. only	Dry	North	Going ahead	Passenger van	Animal - wild
2017-Mar-25, Sat,14:46	Clear	Rear end	P.D. only	Wet	South	Slowing or stopping	Automobile, station wagon	Other motor vehicle
					South	Slowing or stopping	Automobile, station wagon	Other motor vehicle
2017-Jun-01, Thu,21:10	Clear	SMV other	P.D. only	Dry	West	Going ahead	Automobile, station wagon	Animal - wild
2017-Dec-14, Thu,21:05	Clear	SMV other	P.D. only	Wet	South	Going ahead	Pick-up truck	Ran off road

2018-Jan-14, Sun,11:45	Clear	SMV other	P.D. only	Dry	North	Going ahead	Pick-up truck	Animal - wild
2018-Jun-21, Thu,04:55	Clear	SMV other	P.D. only	Dry	South	Going ahead	Delivery van	Animal - wild
2018-Dec-06, Thu,19:08	Clear	SMV other	P.D. only	Dry	North	Going ahead	Automobile, station wagon	Animal - wild
2018-Dec-03, Mon,17:33	Clear	SMV other	P.D. only	Wet	South	Going ahead	Automobile, station wagon	Animal - wild
2018-Dec-13, Thu,20:46	Clear	SMV other	P.D. only	Dry	South	Going ahead	Automobile, station wagon	Animal - wild
2018-Nov-14, Wed,17:35	Clear	SMV other	P.D. only	Dry	North	Going ahead	Automobile, station wagon	Animal - domestic
2018-Dec-20, Thu,20:46	Clear	SMV other	P.D. only	Dry	North	Going ahead	Automobile, station wagon	Animal - wild

Location: MARCH RD btwn HALTON TERR/MAXWELL BRIDGE RD & MAXWELL RD

Traffic Control: No control **Total Collisions:** 22

Date/Day/Time	Environment	Impact Type	Classification	Surface Cond'n	Veh. Dir	Vehicle Manoeuver	Vehicle type	First Event	No. Ped
2014-May-01, Thu,20:55	Clear	SMV other	P.D. only	Dry	South	Going ahead	Automobile, station wagon	Animal - wild	
2014-May-20, Tue,01:30	Clear	SMV other	P.D. only	Dry	North	Going ahead	Pick-up truck	Animal - wild	
2014-Jun-23, Mon,00:02	Clear	SMV other	P.D. only	Dry	North	Going ahead	Automobile, station wagon	Animal - wild	
2014-Nov-11, Tue,17:44	Clear	SMV other	P.D. only	Dry	North	Going ahead	Automobile, station wagon	Animal - wild	

2015-Jun-20, Sat,03:14	Clear	SMV other	Non-fatal injury	Dry	South	Overtaking	Automobile, station wagon	Ran off road
2014-Dec-18, Thu,21:15	Clear	SMV other	P.D. only	Dry	North	Going ahead	Automobile, station wagon	Animal - wild
2015-Jan-20, Tue,09:37	Clear	Rear end	Non-fatal injury	Dry	North	Going ahead	Automobile, station wagon	Other motor vehicle
					North	Turning left	Automobile, station wagon	Other motor vehicle
2015-Sep-04, Fri,21:33	Clear	SMV other	P.D. only	Dry	South	Going ahead	Pick-up truck	Animal - wild
2015-Jun-17, Wed,13:38	Clear	Sideswipe	P.D. only	Dry	North	Changing lanes	Automobile, station wagon	Other motor vehicle
					North	Going ahead	Automobile, station wagon	Other motor vehicle
2015-Sep-02, Wed,09:15	Clear	Rear end	P.D. only	Dry	South	Slowing or stopping	Automobile, station wagon	Other motor vehicle
					South	Slowing or stopping	Pick-up truck	Other motor vehicle
2016-Oct-19, Wed,09:08	Clear	Rear end	P.D. only	Dry	North	Going ahead	Automobile, station wagon	Other motor vehicle
					North	Turning left	Automobile, station wagon	Other motor vehicle
2016-May-06, Fri,06:56	Clear	SMV other	P.D. only	Dry	South	Going ahead	Automobile, station wagon	Animal - wild
2016-Apr-22, Fri,13:53	Clear	SMV other	P.D. only	Wet	North	Unknown	Unknown	Animal - domestic

2016-Apr-24, Sun,11:02	Clear	Turning movement	P.D. only	Dry	North	Making "U" turn	Automobile, station wagon	Other motor vehicle
					North	Going ahead	Pick-up truck	Other motor vehicle
2017-Feb-08, Wed,04:35	Freezing Rain	SMV other	P.D. only	Slush	West	Reversing	Construction equipment	Pole (sign, parking meter)
2017-Feb-21, Tue,11:58	Clear	Sideswipe	Non-fatal injury	Dry	North	Merging	Pick-up truck	Other motor vehicle
					North	Going ahead	Automobile, station wagon	Other motor vehicle
2016-Dec-11, Sun,21:53	Snow	SMV other	P.D. only	Loose snow	South	Going ahead	Passenger van	Pole (utility, power)
2017-Jun-06, Tue,14:15	Clear	Sideswipe	P.D. only	Wet	North	Changing lanes	Unknown	Other motor vehicle
					North	Going ahead	Automobile, station wagon	Other motor vehicle
2017-Apr-06, Thu,21:59	Rain	Rear end	P.D. only	Wet	North	Changing lanes	Automobile, station wagon	Other motor vehicle
					North	Going ahead	Passenger van	Other motor vehicle
2017-Nov-27, Mon,17:36	Clear	SMV other	Non-fatal injury	Wet	South	Going ahead	Automobile, station wagon	Ran off road
2018-Feb-01, Thu,17:05	Snow	Rear end	P.D. only	Loose snow	South	Slowing or stopping	Automobile, station wagon	Other motor vehicle
					South	Slowing or stopping	Automobile, station wagon	Other motor vehicle
					North	Making "U" turn	Snow plow	Other

2018-Dec-05, Wed,16:50	Snow	SMV other	P.D. only	Loose snow	West	Going ahead	Automobile, station wagon	Animal - wild	

Location: MARCH RD btwn MURPHY CRT & MAXWELL RD

Traffic Control: No control

Total Collisions: 5

Date/Day/Time	Environment	Impact Type	Classification	Surface Cond'n	Veh. Dir	Vehicle Manoeuver	Vehicle type	First Event	No. Ped
2014-Jun-23, Mon,05:55	Clear	SMV other	P.D. only	Dry	South	Going ahead	Passenger van	Animal - wild	
2015-Jan-04, Sun,13:31	Clear	Approaching	Non-fatal injury	Wet	North	Going ahead	Pick-up truck	Skidding/sliding	
					South	Going ahead	Automobile, station wagon	Other motor vehicle	
2017-Sep-17, Sun,11:02	Clear	Turning movement	Non-fatal injury	Dry	North	Turning left	Automobile, station wagon	Other motor vehicle	
					South	Going ahead	Automobile, station wagon	Other motor vehicle	
2018-Oct-01, Mon,19:31	Clear	Rear end	P.D. only	Dry	North	Going ahead	Automobile, station wagon	Other motor vehicle	
					North	Slowing or stopping	Pick-up truck	Other motor vehicle	
2018-Dec-11, Tue,18:30	Snow	SMV other	P.D. only	Loose snow	North	Going ahead	Automobile, station wagon	Animal - wild	

Location: MAXWELL BRIDGE RD btwn CELTIC RIDGE CRES & BRAECREEK AVE

Traffic Control: No control

Total Collisions: 1

Date/Day/Time	Environment	Impact Type	Classification	Surface Cond'n	Veh. Dir	Vehicle Manoeuver	Vehicle type	First Event	No. Ped
2016-Dec-22, Thu,12:45	Clear	Turning movement	P.D. only	Packed snow	North	Going ahead	Pick-up truck	Other motor vehicle	
					North	Turning right	Automobile, station wagon	Other motor vehicle	

Location: MAXWELL BRIDGE RD btwn FORDELL AVE & ARNCLIFFE AVE

Traffic Control: No control **Total Collisions:** 1

Date/Day/Time	Environment	Impact Type	Classification	Surface Cond'n	Veh. Dir	Vehicle Manoeuver	Vehicle type	First Event	No. Ped
2014-Apr-11, Fri,07:30	Clear	SMV unattended vehicle	P.D. only	Wet	North	Reversing	Pick-up truck	Unattended vehicle	

Location: MAXWELL BRIDGE RD btwn MARCH RD & WINDANCE CRES

Traffic Control: No control **Total Collisions:** 1

Date/Day/Time	Environment	Impact Type	Classification	Surface Cond'n	Veh. Dir	Vehicle Manoeuver	Vehicle type	First Event	No. Ped
2014-May-13, Tue,09:44	Clear	SMV unattended vehicle	P.D. only	Dry	East	Going ahead	Passenger van	Unattended vehicle	

Location: MAXWELL BRIDGE RD btwn WINDANCE CRES & PENDRA WAY

Traffic Control: No control **Total Collisions:** 1

Date/Day/Time	Environment	Impact Type	Classification	Surface Cond'n	Veh. Dir	Vehicle Manoeuver	Vehicle type	First Event	No. Ped
2014-Jul-27, Sun,16:52	Clear	SMV unattended vehicle	P.D. only	Dry	North	Reversing	Pick-up truck	Unattended vehicle	

Appendix B CORRESPONDENCE

Al Hasoo, Mohammed

From: Gervais, Josiane <josiane.gervais@ottawa.ca>
Sent: Tuesday, October 27, 2020 10:23 AM
To: Al Hasoo, Mohammed
Cc: Abdelnaby, Ahmed
Subject: RE: 927 March Road - Widening/BRT Timeline

Hi Mohammed,

As I indicated in our call yesterday, the TMP is currently under review and I may only confirm that the timelines for March Road widening and BRT are post-2031.

However, since your two horizon years are beyond 2031, please assume the following:

- 2034, March Road remains at 2-lanes, BRT is not in place;
- 2039, March Road is widened to 4-lanes, BRT is not in place.

Once again, these are only assumptions at this time to be used for the purposes of this study, because the actual horizon years for the infrastructure have not yet been identified.

Regards,

Josiane Gervais, P.Eng.
Project Manager, Infrastructure Approvals | GPRJ Approbation des demandes d'infrastructure
Development Review Branch | Dir Examen des projets d'aménagement
City of Ottawa | Ville d'Ottawa
Tel |Tél. : 613-580- 2424 ext. | poste 21765
web | Site Web : www.ottawa.ca

Please note that I am currently working from home. E-mail is the preferred method to communicate with me. Thank you for your patience and understanding.

From: Al Hasoo, Mohammed <Mohammed.AlHasoo@stantec.com>
Sent: October 26, 2020 2:53 PM
To: Gervais, Josiane <josiane.gervais@ottawa.ca>
Subject: 927 March Road - Widening/BRT Timeline

Good Afternoon Josiane,

Thank you very much for the chat this morning and for shedding light on some of the grey areas. All the elements from our discussion today will be addressed in the Strategy Report submission.

As we alluded to during the meeting, the final item to verify would be the approximate implementation year for the widening of March Road / the median BRT system (if they go hand in hand). If that widened cross section can support the ultimate horizon (2039) traffic, there shouldn't be a need for demand rationalization assumptions.

Hopefully we can get confirmation at your earliest convenience! I will hold off on the analysis for now as demand rationalization is the first step in the analysis.

Thank you again for your kind help!

Regards,

Mohammed Al Hasoo, M.Eng, P.Eng
Intern, Transportation Planning

Direct: 613-725-5566
Fax: 613-722-2799
Mohammed.AlHasoo@stantec.com

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400 - 1331 Clyde Avenue
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Al Hasoo, Mohammed

From: Gervais, Josiane <josiane.gervais@ottawa.ca>
Sent: Friday, October 23, 2020 10:09 AM
To: Al Hasoo, Mohammed
Cc: Abdelnaby, Ahmed
Subject: RE: 927 March Road TIA - Forecasting Report Resubmission
Attachments: image006.wmz; 936 March Rd FD -AUG 10 ROLL PLAN.pdf

Importance: High

Follow Up Flag: Follow up
Flag Status: Flagged

Hi Mohammed,

Thank your for your patience on this! Please find below my responses to your questions for the 927 March Road file in blue.

If you require further clarification, please do not hesitate to contact me and we can set up a Teams call.

Regards,

Josiane Gervais, P.Eng.
Project Manager, Infrastructure Approvals | GPRJ Approbation des demandes d'infrastructure
Development Review Branch | Dir Examen des projets d'aménagement
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Please note that I am currently working from home. E-mail is the preferred method to communicate with me. Thank you for your patience and understanding.

From: Al Hasoo, Mohammed <Mohammed.AlHasoo@stantec.com>
Sent: October 15, 2020 2:34 PM
To: Gervais, Josiane <josiane.gervais@ottawa.ca>
Cc: Abdelnaby, Ahmed <Ahmed.Abdelnaby@stantec.com>
Subject: RE: 927 March Road TIA - Forecasting Report Resubmission

Hi Josiane,

Thank you very much for your comments. They have been noted and will be addressed in the Strategy Report submission.

I would like to enquire further about the enclosed Street 1 RMA that was provided earlier. I don't think the area of road modifications corresponds to the 927 March (Brigil) or 936 March (Minto) developments. Looking at the key plan and north direction, it seems that the area of road modifications is on the west side of March Road and it appears to correspond to the Claridge development (1053 March) that is situated just north of our Brigil development. **If you agree with this, I wonder if there is an existing RMA for March Road and Street A/Street 1?** The design for this intersection is underway, I've attached a DRAFT functional plan that you can use to create your synchro network. Please note that changes to the design are possible, as this is still a draft.

Searching through the 936 March (Minto) TIA report, I found that the recommended roadway modifications at the intersection of March Road with Street A/Street 1 were: a 115m WBL storage lane + a 10m SBL storage lane + a NBR turn lane. If no RMA currently exists, these dimensions will be carried over into the analysis of March Road @ Street A/Street 1. See attached functional plan for storage length dimensions.

For the bi-directional cross-rides, and in reference to the KNUEA TMP (excerpt below), the planned MUP appears only on the north side of the collector road that is Street A/Street 1, which is consistent with the "Typical Collector Road" cross sections from the TMP that feature a MUP on one side and a sidewalk on the other. Note that the MUP will be present on the north side of the east leg of the Street A/Street 1/March Road intersection, as this was decided upon earlier in the planning process for the Minto development. However, this cross-section does not fall within the new vetted cross-sections outlined within the 2019 Designing Neighborhood Collector Streets document. As noted in comment 7, the 927 March Road development should follow these new guidelines (i.e. provide cycle tracks instead of a MUP).

In addition, as this is a temporary intersection, until such time as March Road is widened, east-west cross-rides are not required and only cross-walks will be provided. The north-south cross rides/cross walks to remain as shown in the attached plan to facilitate cycling along March. With this change, please disregard the previous comment #6 (sent October 14th 2020 via e-mail).

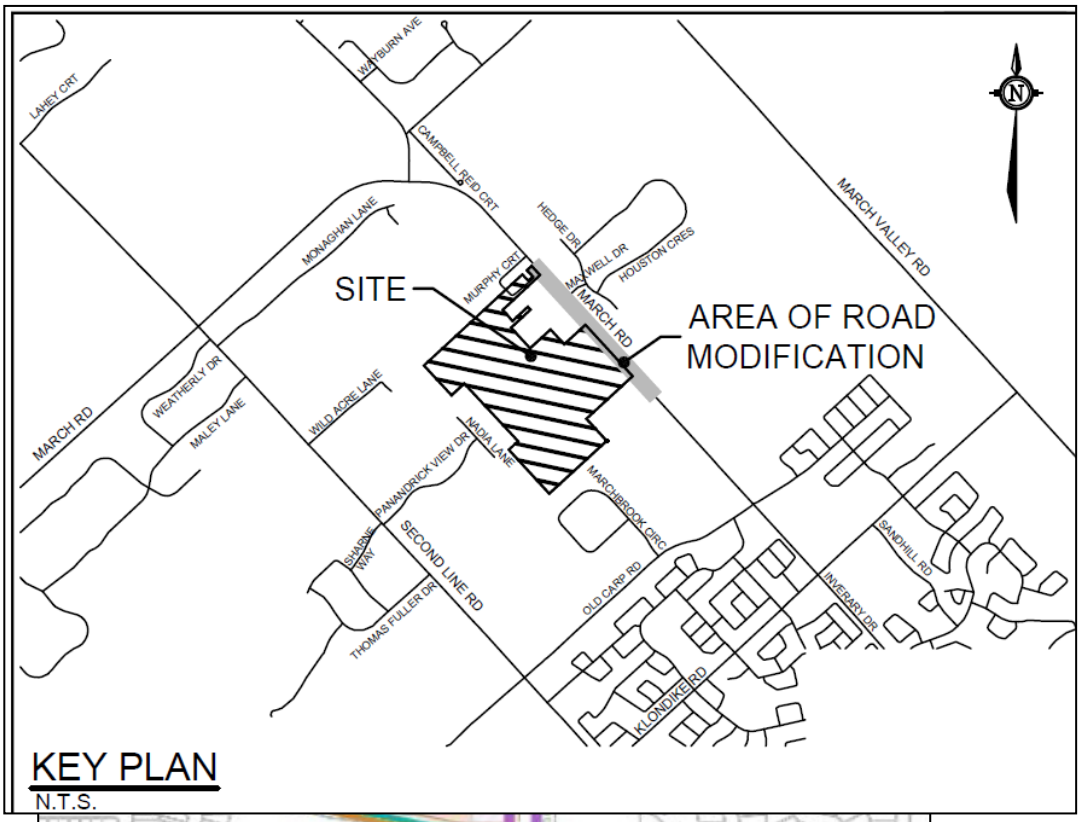
You are correct in that the eastbound left movement will have to be protected. A cross-ride will not be provided for the east-west movement, see comment above. We will confirm the location of the planned MUP with the developer and adjust the signal accordingly. The 936 March TIA report did not explicitly mention the location of the planned MUP. I can confirm that, for the east leg, the MUP is along the north side of the roadway.

You also pointed out below that **local** roadways will have a target operating speed of 30 km/h. May I please ask what the City of Ottawa's operating speed target is for future **collector** roadways? I would like to confirm that with you for the MMLOS analysis. The target operating speed for residential collector roadways is 40 km/hr.

Thank you very much for your help and direction. If you would like to have a chat about this, please let me know and we can schedule a Teams meeting.

Regards,

Mohammed Al Hasoo



Mohammed Al Hasoo, M.Eng, P.Eng
Intern, Transportation Planning

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Fax: 613-722-2799
Mohammed.AlHasoo@stantec.com

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Ottawa ON K2C 3G4

From: Gervais, Josiane <josiane.gervais@ottawa.ca>
Sent: Wednesday, October 14, 2020 2:11 PM
To: Al Hasoo, Mohammed <Mohammed.AlHasoo@stantec.com>
Cc: Abdelnaby, Ahmed <Ahmed.Abdelnaby@stantec.com>
Subject: RE: 927 March Road TIA - Forecasting Report Resubmission

Hello Mohammed,

My apologies for the delay in getting these comments to you, and thank you for your patience!

Please find comments below regarding the Forecasting Report for 927 March Rd.

Transportation Engineering Services

1. *Section 2.1.1 - Proposed Development:* Figure 2 does not correspond with the unit types described in this section of the report. The figure still shows the 2150 apartment units. Revise the report accordingly.
2. *Section 3.1.1 Development Generated Travel Demand*:
    a. With regard to the comment response #8 in the memo dated September 21, 2020: To remain conservative and consistent with the KNUEA TMP, use the 1.42 conversion factor if TRANS rates are not being used. Typically, a conversion factor of 1.28 is better suited when using the ITE rates, however, the 1.42 factor used in the KNUEA TMP is more conservative. Also note that the ITE version 9 combined with a 1.28 factor versus using TRANS trip generation projections, would yield 658 and 823 fewer trips for the residential component for the AM and PM Peaks respectively.
    b. Given that this development exceeds the unit count identified in the KNUEA TMP report, it is essential that the strategy report provides guidance as to when March Road will exceed capacity and what solutions are feasible to address the impacts.
3. All other comments on the comment response sheet are accepted.

Traffic Signal Operations

4. Please resubmit synchro analysis. Among other outputs, the synchro report MUST show v/c, queues, and a visual picture of the cycle length and splits.
5. Contrary to the statement on page 26 that "road widening is required prior to the complete buildout of the 927 March Road development", Synchro models must maintain March Road as two lanes (not widened) since widening will not occur prior to the 2034 horizon year:
6. ~~With implementation of a MUP on Street 1 in the 936 March Road development, the March Road and Street 1 intersection requires a bidirectional cross ride on the north side of the intersection. With this bidirectional cross ride, the eastbound left-turn and the westbound left-turn would need to be fully protected movements.~~
   ~~If the 927 March Road development implements cycle tracks on both sides of Street A (applying the newly approved collector road guidelines) a standard protected intersection design with unidirectional cross rides can be applied at the March Road/Street A/Street 1 intersection with no requirement for fully protected left turns. Only permitted protected left turns would be required to facilitate the heavy morning WB LT volumes.~~
   ~~Review the impact on the level of service on March Road at the Street A/Street 1 intersection during the AM peak between the two scenarios. While maintaining the same queue lengths for the~~

~~westbound left turns, compare the LOS and queueing on March Road with fully protected left turns at the intersection versus permitted protected left turns for the EB and WB LT's on Street A and Street 1.~~

Development Review – Transportation

7. While preparing the Draft Plan and TIA Strategy Report, note that:
   - all new collector streets within the subdivision should be designed following the City's Collector Guidelines; and
   - all new local residential streets should be designed with a target operating speed of 30km/h per the new Strategic Road Safety Action Plan Update. A 30 km/h Design Guideline with further guidance on how to achieve a 30km/h target for new roadways is being developed. TES may be contacted for interim guidance on how to achieve a 30km/h design speed on local streets.

If the above comments can be incorporated within the next submission, please proceed to Step 4: Strategy. Please submit Strategy Report and digital files of ICA outputs (Synchro/Sidra/Rodel, if applicable) for circulation.

Regards,

Josiane Gervais, P.Eng.
Project Manager, Infrastructure Approvals | GPRJ Approbation des demandes d'infrastructure
Development Review Branch | Dir Examen des projets d'aménagement
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Please note that I am currently working from home. E-mail is the preferred method to communicate with me. Thank you for your patience and understanding.

From: Al Hasoo, Mohammed <Mohammed.AlHasoo@stantec.com>
Sent: September 21, 2020 6:48 PM
To: Gervais, Josiane <josiane.gervais@ottawa.ca>
Cc: Abdelnaby, Ahmed <Ahmed.Abdelnaby@stantec.com>
Subject: 927 March Road TIA - Forecasting Report Resubmission

Hello Josiane,

Hope all is well.

Enclosed is the revised forecasting report for the development at 927 March Road along with a separate comment response table summarizing our assumptions in relation to your previous comments.

Please reach out to myself or Ahmed if you have any questions.

Thank you very much.

Regards,

Mohammed Al Hasoo
Transportation Planning EIT

Direct: 613-725-5566
Fax: 613-722-2799
Mohammed.AlHasoo@stantec.com

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'

Al Hasoo, Mohammed

From: Gervais, Josiane <josiane.gervais@ottawa.ca>
Sent: Wednesday, October 14, 2020 2:11 PM
To: Al Hasoo, Mohammed
Cc: Abdelnaby, Ahmed
Subject: RE: 927 March Road TIA - Forecasting Report Resubmission

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    a. With regard to the comment response #8 in the memo dated September 21, 2020: To remain conservative and consistent with the KNUEA TMP, use the 1.42 conversion factor if TRANS rates are not being used. Typically, a conversion factor of 1.28 is better suited when using the ITE rates, however, the 1.42 factor used in the KNUEA TMP is more conservative. Also note that the ITE version 9 combined with a 1.28 factor versus using TRANS trip generation projections, would yield 658 and 823 fewer trips for the residential component for the AM and PM Peaks respectively.
    b. Given that this development exceeds the unit count identified in the KNUEA TMP report, it is essential that the strategy report provides guidance as to when March Road will exceed capacity and what solutions are feasible to address the impacts.
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5. Contrary to the statement on page 26 that "road widening is required prior to the complete buildout of the 927 March Road development", Synchro models must maintain March Road as two lanes (<u>not</u> widened) since widening will <u>not</u> occur prior to the 2034 horizon year:
6. With implementation of a MUP on Street 1 in the 936 March Road development, the March Road and Street 1 intersection requires a bidirectional cross ride on the north side of the intersection. With this bidirectional cross ride, the eastbound left-turn and the westbound left-turn would need to be fully protected movements.
   If the 927 March Road development implements cycle tracks on both sides of Street A (applying the newly approved collector road guidelines) a standard protected intersection design with unidirectional cross rides can be applied at the March Road/Street A/Street 1 intersection with no requirement for

fully protected left turns. Only permitted protected left turns would be required to facilitate the heavy morning WB LT volumes.
Review the impact on the level of service on March Road at the Street A/Street 1 intersection during the AM peak between the two scenarios. While maintaining the same queue lengths for the westbound left turns, compare the LOS and queueing on March Road with fully protected left turns at the intersection versus permitted protected left turns for the EB and WB LT's on Street A and Street 1.

Development Review – Transportation

7. While preparing the Draft Plan and TIA Strategy Report, note that:
   - all new collector streets within the subdivision should be designed following the City's Collector Guidelines; and
   - all new local residential streets should be designed with a target operating speed of 30km/h per the new Strategic Road Safety Action Plan Update. A 30 km/h Design Guideline with further guidance on how to achieve a 30km/h target for new roadways is being developed. TES may be contacted for interim guidance on how to achieve a 30km/h design speed on local streets.

If the above comments can be incorporated within the next submission, please proceed to Step 4: Strategy. Please submit Strategy Report and digital files of ICA outputs (Synchro/Sidra/Rodel, if applicable) for circulation.

Regards,

Josiane Gervais, P.Eng.
Project Manager, Infrastructure Approvals | GPRJ Approbation des demandes d'infrastructure
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From: Al Hasoo, Mohammed <Mohammed.AlHasoo@stantec.com>
Sent: September 21, 2020 6:48 PM
To: Gervais, Josiane <josiane.gervais@ottawa.ca>
Cc: Abdelnaby, Ahmed <Ahmed.Abdelnaby@stantec.com>
Subject: 927 March Road TIA - Forecasting Report Resubmission

Hello Josiane,

Hope all is well.

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Please reach out to myself or Ahmed if you have any questions.

Thank you very much.

Regards,

Mohammed Al Hasoo
Transportation Planning EIT

Direct: 613-725-5566
Fax: 613-722-2799
Mohammed.AlHasoo@stantec.com

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400 - 1331 Clyde Avenue
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Al Hasoo, Mohammed

From: Gervais, Josiane <josiane.gervais@ottawa.ca>
Sent: Monday, August 10, 2020 10:42 AM
To: Abdelnaby, Ahmed
Cc: Al Hasoo, Mohammed
Subject: RE: 927 March Road - Step 3 TIA (way forward)

Good morning Ahmed,

My apologies for not getting back to you last week. I had issues with my internet connectivity.

As the comments on the forecasting report have come from numerous members of City Staff, it would be preferred if you could please re-submit the forecasting report including your assumptions and justifications below. I can then circulate this to the appropriate people and get comments back for you.

Regarding comment 9, my understanding of the comment was to justify the number of units being proposed and why it's resulting in a change in number of dwellings units in comparison to the original TMP. Consider… Were these unit numbers assumed within the KNUEA TMP for these parcels of land and the increase in overall units is because other properties within the area have increased their development numbers? Are there changes in the housing market that would have resulted in the need for additional apartments and less singles or townhomes than what was originally envisioned?

I'll send a copy of the RMA drawing for 936 March Road in a separate e-mail as soon as possible. Please note that this is still considered a draft and as such is subject to change.

Regards,

Josiane Gervais, P.Eng.
Project Manager, Infrastructure Approvals | GPRJ Approbation des demandes d'infrastructure
Development Review Branch | Dir Examen des projets d'aménagement
City of Ottawa | Ville d'Ottawa
Tel |Tél. : 613-580- 2424 ext. | poste 21765
web | Site Web : www.ottawa.ca

Please note that I am currently working from home. E-mail is the preferred method to communicate with me. Thank you for your patience and understanding.

From: Abdelnaby, Ahmed <Ahmed.Abdelnaby@stantec.com>
Sent: August 06, 2020 6:55 AM
To: Gervais, Josiane <josiane.gervais@ottawa.ca>
Cc: Al Hasoo, Mohammed <Mohammed.AlHasoo@stantec.com>
Subject: RE: 927 March Road - Step 3 TIA (way forward)

Good Morning Josiane,

Apologies for the delay getting to this file; as a follow up to Step 3 comments, we have listed all major comments for discussion below, the rest of the comments is noted and will be addressed.

It will be great to have your thoughts; I will be more than happy to discuss over a Teams meeting if needed.

8- Note that the use of the old trip generation rates vs the currently required TRANS person trip rates yields 65 and 272 fewer trips in the AM and PM Peak periods, respectively. To remain consistent with the KNUEA TMP, a conversion factor of 1.42 should be applied, yielding a closer approximation to the TRANS rates. AND
9- Justify the unit count proposed in this development. The KNUEA projected 975 single family homes, 970 townhomes and 1090 apartment residential units. As of this writing, 1,047 single family units, 1,030 townhomes and 216 apartments have been approved in the three other quadrants of the KNUEA. With the 2,150 apartment units shown, the residential trip generation will be significantly higher than what was approved in the KNUEA TMP.

We have looked into the available background studies and have identified an inconsistent use of assumptions related to the person conversion factors and the use of ITE rates. Below is a summary of our findings:

Study	Trip Gen. Assumptions	Notes
1. 788 March Rd – Parsons Aug 2018	• Trans rates and modal splits used for 195 units	• Assumed BRT and TSP along March Rd + P&R • Assumed twinning along March • Assignment 5% North • Assumed Transit share 10% for existing and 25% for future (2028)
2. 936 March Rd – GCGH Dec 2018	• ITE 10th rates for 800 Units + conversion to person trips using a factor of 1.28	• No BRT or TSP assumed • Assumed Twinning along March • Assignment 5% North • Used 10% Transit
3. 1020/1070 March Rd – Stantec July 2019	• ITE 9th rates for ○ 297 Single Family Units ○ 315 Townhomes ○ 116 Apt. Units ○ School with 580 students ○ 80,000 sqft retail • conversion to person trips using a factor of 1.28	• No BRT or TSP assumed • Assignment 15% North except for commercial (0% to North) • No Twinning was assumed • Used 20% for all land uses except school (0%)
4. 1053/1075/1145 March Rd – Novatech October 2018	• ITE 10th rates for ○ 296 Single Family Units ○ 530 Townhomes • conversion to person trips using a factor of 1.28	• Assumed BRT and TSP along March Rd + P&R • Assignment 15% North • Assumed twinning March Rd • Used 21%
5. 1156 March Rd (Gas Station) March 2016	• ITE 9th edition	• Transportation Brief • NA
6. CDP TMP	• ITE 9th edition with a conversion rate of 1.42	• Assumed BRT and TSP along March Rd + P&R • Assignment 15% North • Assumed twinning March Rd • Assumed 21% through implementation of transit projects

Originally, we were using ITE 9th edition which result in higher trip generation compared to ITE 10th (ITE 10th is lower than the 9th edition by 165 trips in the AM and 159 in the PM for our development). relatively, Trans rates are higher than both. As our development is coming in last, we would like to ensure consistency and capturing all the previous studies. I would propose maintaining ITE 9th edition use with a conversion factor of 1.28. It will be great if we can discuss this in greater details.

I am not sure if due to the use of a lower conversion rate coupled with occasional use of ITE 10th rates may have encouraged higher unit counts as compared to the overall TMP; but would like to discuss this point further to get better feedback from the developer.

10. Justify the transit mode share used in this report. The KNUEA TMP assumes a 20% transit mode share due to the implementation of transit facilities outlined in the Affordable Network of the City's TMP. If these are not expected by the ultimate study horizon, this mode share will be difficult to achieve.

The TRANS manual table (3.6) shows that the modal share is 23% for AM and 11% for the PM; the 20% was assumed to be consistent with the TMP; It is assumed that the transit signal priority lanes will be in place by the 2039 horizon year. We propose using 15% transit modal split to represent existing conditions for the purpose of the analysis while increasing this ratio to 20% for the 2039 horizon year analysis (build out +5). The demand rationalization will be performed by analyzing the 2039 horizon year first, then we will work our way backwards.

12. The KNUEA TMP showed a 15% to/from north for the combination of residential and institutional land uses. However, since this development is in the southwestern quadrant of the KNUEA confirm that 15% is appropriate.

The TMP has assumed that 15% of traffic will be heading north; however, reviewing the recently approved TIAs, there is a mixture of 5% versus 15% for Northbound traffic. To reflect accurate assumptions, we will be using 5% to the north for the residential component (closer to existing splits). On the other hand, the commercial component will reflect 15% to account for potential traffic from residences in the north to the commercial component of our site.

14. Note that the intersection of March Road and Street A is the subject of an RMA. This work proposes: one southbound left-turn lane, one northbound right-turn lane, paved shoulders on the northbound and southbound approaches. Additionally, on the east side of the intersection: cycle tracks immediately north and south of the intersection with cross ride, a boulevard -separated sidewalk along the south side of Street A, a boulevard-separated multi-use pathway on the north side of Street. The RMA also shows a future northbound left-turn lane. Since these road modifications are DC-eligible, coordination between the 927 and 936 March Road for road works is strongly encouraged.

Noted, would you be able to provide the latest drawings, if available? In the absence of a drawing, we will consider the turn lanes as listed in the 936 March Rd TIA

16. For future submissions, please perform a sensitivity analysis showing at what percent build out area intersections will fail.
Noted and will be considered in the analysis

17. Include additional horizon years analyzed as required to address when specific phases will trigger road works.
We propose addressing this point through the suggestion above, performing sensitivity analysis to identify the number of trips/units required for improvements to kick in.

Ahmed Abdelnaby M.Sc., P.Eng, RSP1.
Project Engineer, Transportation

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ahmed.abdelnaby@stantec.com

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From: Gervais, Josiane <josiane.gervais@ottawa.ca>
Sent: Tuesday, August 4, 2020 7:14 AM
To: Abdelnaby, Ahmed <Ahmed.Abdelnaby@stantec.com>; Al Hasoo, Mohammed <Mohammed.AlHasoo@stantec.com>
Subject: RE: 927 March Road - Step 3 TIA

Hi Ahmed,

Thanks for confirming the intention is still to maintain the local classification.

Regards,

Josiane Gervais, P.Eng.
Project Manager, Infrastructure Approvals | GPRJ Approbation des demandes d'infrastructure
Development Review Branch | Dir Examen des projets d'aménagement
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web | Site Web : www.ottawa.ca

From: Abdelnaby, Ahmed <Ahmed.Abdelnaby@stantec.com>
Sent: July 31, 2020 10:33 AM
To: Gervais, Josiane <josiane.gervais@ottawa.ca>; Al Hasoo, Mohammed <Mohammed.AlHasoo@stantec.com>
Subject: RE: 927 March Road - Step 3 TIA

Hi Josiane,

Looking at the TMP, our street D is classified as Local. I have attached the relevant Figure from the TMP for your reference.

Let me know if you have any questions, we are going through the Step 3 comments and will follow up with a couple of clarifications shortly.

Thanks!

Ahmed Abdelnaby M.Sc., P.Eng, RSP1.
Project Engineer, Transportation

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From: Gervais, Josiane <josiane.gervais@ottawa.ca>
Sent: Tuesday, July 28, 2020 2:48 PM
To: Al Hasoo, Mohammed <Mohammed.AlHasoo@stantec.com>
Cc: Abdelnaby, Ahmed <Ahmed.Abdelnaby@stantec.com>
Subject: RE: 927 March Road - Step 3 TIA

Hi Mohammed,

Can you please let me know if Street D is proposed as a local or collector designation?

Thank you.

Josiane Gervais, P.Eng.
Project Manager, Infrastructure Approvals | GPRJ Approbation des demandes d'infrastructure
Development Review Branch | Dir Examen des projets d'aménagement
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From: Gervais, Josiane
Sent: June 16, 2020 9:35 AM
To: Al Hasoo, Mohammed <Mohammed.AlHasoo@stantec.com>
Cc: Abdelnaby, Ahmed <Ahmed.Abdelnaby@stantec.com>
Subject: RE: 927 March Road - Step 3 TIA

Hello,

Please find comments below regarding the Forecasting Report for 927 March Rd.

Transportation Engineering Services

1. Correct section 2.1.2.1, Old Carp Road is classified as a collector road.
2. Confirm the proposed network layout in Figures 3 and 4. Figure 3, as shown in the KNUEA TMP, depicts a realignment of Halton Terrace, while Figure 4 seems to show Street A connecting to Halton Terrace in the same space as the existing Old Carp Road.
3. Note that the headways described in Section 2.1.2.3 are atypically low due to reduced service levels associated with COVID-19.

4. Correct Section 2.1.2.4, there are flex stakes in the median along Halton Terrace and Maxwell Bridge Road.
5. Correct Section 2.1.2.5 The report states that the 2016 volumes from the March Road at Halton Terrace/Maxwell Bridge intersection were adjusted for 2020 by applying a 0.5% growth rate, but the numbers shown reflect the March 4, 2020 count.
6. Use the 1053, 1075 and 1145 March Road TIA, 1020/1070 March Road TIA and the 936 March Road TIA to account for the other development trips in the remaining three quadrants of the KNUEA.
7. While there is no timeline for implementation, as stated in the report, it should be assumed that the transit priority lanes will be in place by the 2039 ultimate horizon year since they are on the City's Affordable network.
8. Note that the use of the old trip generation rates vs the currently required TRANS person trip rates yields 65 and 272 fewer trips in the AM and PM Peak periods, respectively. To remain consistent with the KNUEA TMP, a conversion factor of 1.42 should be applied, yielding a closer approximation to the TRANS rates.
9. Justify the unit count proposed in this development. The KNUEA projected 975 single family homes, 970 townhomes and 1090 apartment residential units. As of this writing, 1,047 single family units, 1,030 townhomes and 216 apartments have been approved in the three other quadrants of the KNUEA. With the 2,150 apartment units shown, the residential trip generation will be significantly higher than what was approved in the KNUEA TMP.
10. Justify the transit mode share used in this report. The KNUEA TMP assumes a 20% transit mode share due to the implementation of transit facilities outlined in the Affordable Network of the City's TMP. If these are not expected by the ultimate study horizon, this mode share will be difficult to achieve.
11. Applying 20% of all vehicle trips destined to the park and ride as transit trips results in an overall 32% transit modal share of all person trips. Adjust the number of trips to reflect the 20% transit modal share more accurately.
12. The KNUEA TMP showed a 15% to/from north for the combination of residential and institutional land uses. However, since this development is in the southwestern quadrant of the KNUEA confirm that 15% is appropriate.
13. The demand rationalization module requires the inclusion how much traffic volume requires rationalization to reach acceptable VLOS measurements.
14. Note that the intersection of March Road and Street A is the subject of an RMA. This work proposes: one southbound left-turn lane, one northbound right-turn lane, paved shoulders on the northbound and southbound approaches. Additionally, on the east side of the intersection: cycle tracks immediately north and south of the intersection with cross ride, a boulevard -separated sidewalk along the south side of Street A, a boulevard-separated multi-use pathway on the north side of Street. The RMA also shows a future northbound left-turn lane. Since these road modifications are DC-eligible, coordination between the 927 and 936 March Road for road works is strongly encouraged.

Traffic Signal Operations

15. Please be aware of other developments and take these volumes into account.
16. For future submissions, please perform a sensitivity analysis showing at what percent build out area intersections will fail.

Development Review – Transportation

17. Include additional horizon years analyzed as required to address when specific phases will trigger road works.
18. Include Appendix material.
19. Re-submit the forecasting report to address the above comments.

Regards,

Josiane Gervais, P.Eng.
Project Manager, Infrastructure Approvals | GPRJ Approbation des demandes d'infrastructure
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From: Al Hasoo, Mohammed <Mohammed.AlHasoo@stantec.com>
Sent: June 01, 2020 9:31 AM
To: Gervais, Josiane <josiane.gervais@ottawa.ca>
Cc: O'Grady, Lauren <Lauren.OGrady@stantec.com>; Abdelnaby, Ahmed <Ahmed.Abdelnaby@stantec.com>
Subject: 927 March Road - Step 3 TIA

Good Morning Josiane,

Trust all is well.

Enclosed is step 3 of the TIA for 927 March Road (Kanata North Urban Expansion Area) for your review.

Kindly inform us if we can proceed to step 4 of the TIA or if you have any questions, comments, or concerns.

Thank you and regards,

Mohammed Al Hasoo
Transportation Planning EIT

Direct: 613-725-5566
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'

Al Hasoo, Mohammed

From: Gervais, Josiane <josiane.gervais@ottawa.ca>
Sent: Tuesday, June 16, 2020 9:35 AM
To: Al Hasoo, Mohammed
Cc: Abdelnaby, Ahmed
Subject: RE: 927 March Road - Step 3 TIA

Hello,

Please find comments below regarding the Forecasting Report for 927 March Rd.

Transportation Engineering Services

1. Correct section 2.1.2.1, Old Carp Road is classified as a collector road.
2. Confirm the proposed network layout in Figures 3 and 4. Figure 3, as shown in the KNUEA TMP, depicts a realignment of Halton Terrace, while Figure 4 seems to show Street A connecting to Halton Terrace in the same space as the existing Old Carp Road.
3. Note that the headways described in Section 2.1.2.3 are atypically low due to reduced service levels associated with COVID-19.
4. Correct Section 2.1.2.4, there are flex stakes in the median along Halton Terrace and Maxwell Bridge Road.
5. Correct Section 2.1.2.5 The report states that the 2016 volumes from the March Road at Halton Terrace/Maxwell Bridge intersection were adjusted for 2020 by applying a 0.5% growth rate, but the numbers shown reflect the March 4, 2020 count.
6. Use the 1053, 1075 and 1145 March Road TIA, 1020/1070 March Road TIA and the 936 March Road TIA to account for the other development trips in the remaining three quadrants of the KNUEA.
7. While there is no timeline for implementation, as stated in the report, it should be assumed that the transit priority lanes will be in place by the 2039 ultimate horizon year since they are on the City's Affordable network.
8. Note that the use of the old trip generation rates vs the currently required TRANS person trip rates yields 65 and 272 fewer trips in the AM and PM Peak periods, respectively. To remain consistent with the KNUEA TMP, a conversion factor of 1.42 should be applied, yielding a closer approximation to the TRANS rates.
9. Justify the unit count proposed in this development. The KNUEA projected 975 single family homes, 970 townhomes and 1090 apartment residential units. As of this writing, 1,047 single family units, 1,030 townhomes and 216 apartments have been approved in the three other quadrants of the KNUEA. With the 2,150 apartment units shown, the residential trip generation will be significantly higher than what was approved in the KNUEA TMP.
10. Justify the transit mode share used in this report. The KNUEA TMP assumes a 20% transit mode share due to the implementation of transit facilities outlined in the Affordable Network of the City's TMP. If these are not expected by the ultimate study horizon, this mode share will be difficult to achieve.
11. Applying 20% of all vehicle trips destined to the park and ride as transit trips results in an overall 32% transit modal share of all person trips. Adjust the number of trips to reflect the 20% transit modal share more accurately.

12. The KNUEA TMP showed a 15% to/from north for the combination of residential and institutional land uses. However, since this development is in the southwestern quadrant of the KNUEA confirm that 15% is appropriate.
13. The demand rationalization module requires the inclusion how much traffic volume requires rationalization to reach acceptable VLOS measurements.
14. Note that the intersection of March Road and Street A is the subject of an RMA. This work proposes: one southbound left-turn lane, one northbound right-turn lane, paved shoulders on the northbound and southbound approaches. Additionally, on the east side of the intersection: cycle tracks immediately north and south of the intersection with cross ride, a boulevard -separated sidewalk along the south side of Street A, a boulevard-separated multi-use pathway on the north side of Street. The RMA also shows a future northbound left-turn lane. Since these road modifications are DC-eligible, coordination between the 927 and 936 March Road for road works is strongly encouraged.

Traffic Signal Operations

15. Please be aware of other developments and take these volumes into account.
16. For future submissions, please perform a sensitivity analysis showing at what percent build out area intersections will fail.

Development Review – Transportation

17. Include additional horizon years analyzed as required to address when specific phases will trigger road works.
18. Include Appendix material.
19. Re-submit the forecasting report to address the above comments.

Regards,

Josiane Gervais, P.Eng.
Project Manager, Infrastructure Approvals | GPRJ Approbation des demandes d'infrastructure
Development Review Branch | Dir Examen des projets d'aménagement
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web | Site Web : www.ottawa.ca

From: Al Hasoo, Mohammed <Mohammed.AlHasoo@stantec.com>
Sent: June 01, 2020 9:31 AM
To: Gervais, Josiane <josiane.gervais@ottawa.ca>
Cc: O'Grady, Lauren <Lauren.OGrady@stantec.com>; Abdelnaby, Ahmed <Ahmed.Abdelnaby@stantec.com>
Subject: 927 March Road - Step 3 TIA

Good Morning Josiane,

Trust all is well.

Enclosed is step 3 of the TIA for 927 March Road (Kanata North Urban Expansion Area) for your review.

Kindly inform us if we can proceed to step 4 of the TIA or if you have any questions, comments, or concerns.

Thank you and regards,

Mohammed Al Hasoo
Transportation Planning EIT

Direct: 613-725-5566
Fax: 613-722-2799
Mohammed.AlHasoo@stantec.com

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Al Hasoo, Mohammed

From: O'Grady, Lauren
Sent: Thursday, May 7, 2020 10:24 AM
To: Al Hasoo, Mohammed
Subject: FW: 927 March Road - Step 1 and 2 TIA

FYI – see below

Lauren O'Grady P.Eng.
Transportation Planning and Traffic Engineering Lead

Direct: 613-784-2264
lauren.o'grady@stantec.com

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From: Gervais, Josiane <josiane.gervais@ottawa.ca>
Sent: Thursday, April 30, 2020 1:01 PM
To: O'Grady, Lauren <Lauren.OGrady@stantec.com>
Cc: Philip Thibert <pthibert@brigil.com>
Subject: RE: 927 March Road - Step 1 and 2 TIA

Hi Lauren,

Please find comments below regarding the Scoping Report for 927 March Rd.

- Element 2.1.1 - Proposed Development – Include number of parking spaces, if available.
- Element 2.1.2 - Existing Conditions:
    - Define driveways and uses along March Road.
    - Also include volumes of pedestrians and cyclists, as per TIA guideline "Existing peak hour travel demands by mode". Include traffic volumes within Appendix of document.
    - Define peak hours in Figure 7, it is assumed that the figure to the left is AM and the figure to the right is PM.
- Element 2.1.3 - Planned Conditions: Other developments within the study area – Include gas service station at 1156/1170 March Rd.
- Element 2.2.1 - Study Area: Include Street A/Old Carp Road and Street A/Halton Terrace.
- Module 4.6 Neighbourhood Traffic Management - This module is not exempt, since Street A connects to Halton Terrace/Old Carp Rd, which are collector roadways.

If the above comments can be incorporated within the next submission, please proceed to Step 3: Forecasting.

Regards,

Josiane Gervais, P.Eng.
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From: O'Grady, Lauren <Lauren.OGrady@stantec.com>
Sent: April 24, 2020 2:02 PM
To: Gervais, Josiane <josiane.gervais@ottawa.ca>
Cc: Philip Thibert <pthibert@brigil.com>
Subject: 927 March Road - Step 1 and 2 TIA

Hi Josiane,

I hope you're doing well.

Please see attached the Step 1 and 2 TIA to support Brigil's development at 927 March Road in Kanata North. Please let me know if you have any questions or comments.

Have a great weekend,

Lauren O'Grady P.Eng.
Transportation Planning and Traffic Engineering Lead

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lauren.o'grady@stantec.com

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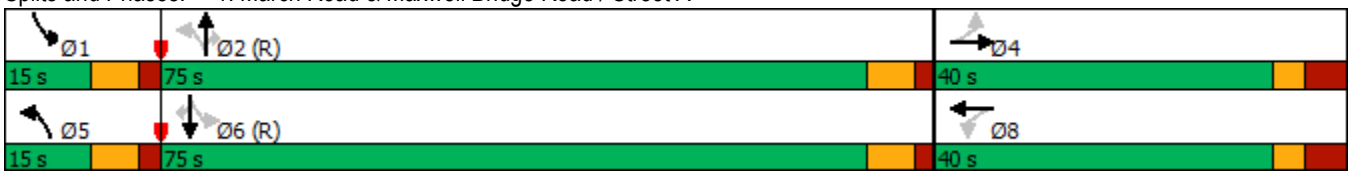
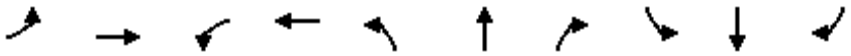
Appendix C INTERSECTION PERFORMANCE WORKSHEETS

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations										
Traffic Volume (vph)	21	37	125	16	23	178	61	68	807	12
Future Volume (vph)	21	37	125	16	23	178	61	68	807	12
Turn Type	Perm	NA	Perm	NA	pm+pt	NA	Perm	pm+pt	NA	Perm
Protected Phases		4		8	5	2		1	6	
Permitted Phases	4		8		2		2	6		6
Detector Phase	4	4	8	8	5	2	2	1	6	6
Switch Phase										
Minimum Initial (s)	10.0	10.0	10.0	10.0	7.0	10.0	10.0	7.0	10.0	10.0
Minimum Split (s)	39.3	39.3	39.3	39.3	13.7	34.6	34.6	13.7	34.6	34.6
Total Split (s)	40.0	40.0	40.0	40.0	15.0	75.0	75.0	15.0	75.0	75.0
Total Split (%)	30.8%	30.8%	30.8%	30.8%	11.5%	57.7%	57.7%	11.5%	57.7%	57.7%
Yellow Time (s)	3.0	3.0	3.0	3.0	4.6	4.6	4.6	4.6	4.6	4.6
All-Red Time (s)	4.3	4.3	4.3	4.3	2.1	2.0	2.0	2.1	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)	7.3	7.3	7.3	7.3	6.7	6.6	6.6	6.7	6.6	6.6
Lead/Lag					Lead	Lag	Lag	Lead	Lag	Lag
Lead-Lag Optimize?					Yes	Yes	Yes	Yes	Yes	Yes
Recall Mode	None	None	None	None	None	C-Max	C-Max	None	C-Max	C-Max
Act Effct Green (s)	21.1	21.1	21.1	21.1	89.0	83.4	83.4	91.5	86.8	86.8
Actuated g/C Ratio	0.16	0.16	0.16	0.16	0.68	0.64	0.64	0.70	0.67	0.67
v/c Ratio	0.11	0.45	0.81	0.16	0.07	0.10	0.07	0.09	0.40	0.01
Control Delay	44.1	21.7	84.2	23.5	6.9	11.0	1.5	6.5	12.3	0.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	44.1	21.7	84.2	23.5	6.9	11.0	1.5	6.5	12.3	0.0
LOS	D	C	F	C	A	B	A	A	B	A
Approach Delay		24.7		69.6		8.4			11.7	
Approach LOS		C		E		A			B	

Intersection Summary	
Cycle Length: 130	
Actuated Cycle Length: 130	
Offset: 69 (53%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green	
Natural Cycle: 90	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.81	
Intersection Signal Delay: 18.9	Intersection LOS: B
Intersection Capacity Utilization 69.3%	ICU Level of Service C
Analysis Period (min) 15	

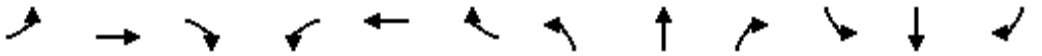
Splits and Phases: 1: March Road & Maxwell Bridge Road / Street A





Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	23	147	139	44	26	198	68	76	897	13
v/c Ratio	0.11	0.45	0.81	0.16	0.07	0.10	0.07	0.09	0.40	0.01
Control Delay	44.1	21.7	84.2	23.5	6.9	11.0	1.5	6.5	12.3	0.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	44.1	21.7	84.2	23.5	6.9	11.0	1.5	6.5	12.3	0.0
Queue Length 50th (m)	5.1	11.5	34.8	4.0	1.6	10.0	0.0	4.9	57.9	0.0
Queue Length 95th (m)	12.3	29.1	54.2	13.5	5.3	18.9	3.8	11.8	86.2	0.0
Internal Link Dist (m)		119.5		192.3		117.5			169.9	
Turn Bay Length (m)	68.0		76.0		91.0			120.0		
Base Capacity (vph)	333	459	266	415	403	1981	969	818	2263	986
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	0.07	0.32	0.52	0.11	0.06	0.10	0.07	0.09	0.40	0.01

Intersection Summary



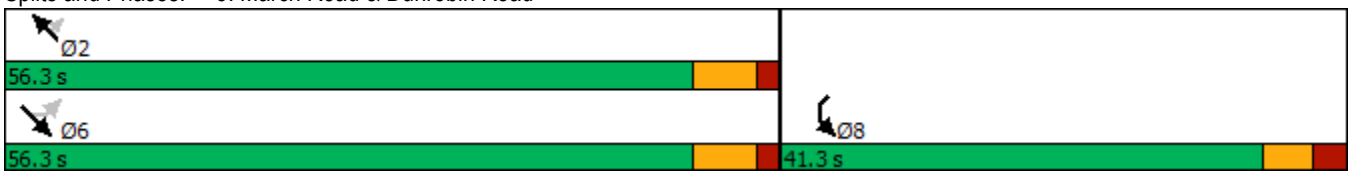
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	21	37	95	125	16	23	23	178	61	68	807	12
Future Volume (vph)	21	37	95	125	16	23	23	178	61	68	807	12
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Total Lost time (s)	7.3	7.3		7.3	7.3		6.7	6.6	6.6	6.7	6.6	6.6
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	0.95	1.00	1.00	0.95	1.00
Frt	1.00	0.89		1.00	0.91		1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1729	1541		1712	1575		1586	3088	1459	1712	3390	1432
Flt Permitted	0.73	1.00		0.59	1.00		0.29	1.00	1.00	0.61	1.00	1.00
Satd. Flow (perm)	1326	1541		1060	1575		480	3088	1459	1104	3390	1432
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	23	41	106	139	18	26	26	198	68	76	897	13
RTOR Reduction (vph)	0	80	0	0	22	0	0	0	25	0	0	5
Lane Group Flow (vph)	23	67	0	139	22	0	26	198	43	76	897	8
Heavy Vehicles (%)	0%	14%	2%	1%	0%	9%	9%	12%	6%	1%	2%	8%
Turn Type	Perm	NA		Perm	NA		pm+pt	NA	Perm	pm+pt	NA	Perm
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4			8			2		2	6		6
Actuated Green, G (s)	21.1	21.1		21.1	21.1		86.3	82.1	82.1	90.3	84.1	84.1
Effective Green, g (s)	21.1	21.1		21.1	21.1		86.3	82.1	82.1	90.3	84.1	84.1
Actuated g/C Ratio	0.16	0.16		0.16	0.16		0.66	0.63	0.63	0.69	0.65	0.65
Clearance Time (s)	7.3	7.3		7.3	7.3		6.7	6.6	6.6	6.7	6.6	6.6
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	215	250		172	255		354	1950	921	795	2193	926
v/s Ratio Prot		0.04			0.01		0.00	0.06		c0.00	c0.26	
v/s Ratio Perm	0.02			c0.13			0.05		0.03	0.06		0.01
v/c Ratio	0.11	0.27		0.81	0.09		0.07	0.10	0.05	0.10	0.41	0.01
Uniform Delay, d1	46.4	47.7		52.5	46.3		7.7	9.4	9.1	6.4	11.0	8.2
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	0.2	0.6		23.6	0.1		0.1	0.1	0.1	0.1	0.6	0.0
Delay (s)	46.6	48.2		76.0	46.4		7.8	9.5	9.2	6.4	11.6	8.2
Level of Service	D	D		E	D		A	A	A	A	B	A
Approach Delay (s)		48.0			68.9			9.3			11.1	
Approach LOS		D			E			A			B	

Intersection Summary			
HCM 2000 Control Delay	21.1	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.48		
Actuated Cycle Length (s)	130.0	Sum of lost time (s)	20.6
Intersection Capacity Utilization	69.3%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

Lane Group	SEL	SET	NWT	NWR	SWL
Lane Configurations					
Traffic Volume (vph)	46	451	63	159	436
Future Volume (vph)	46	451	63	159	436
Turn Type	Perm	NA	NA	Perm	Prot
Protected Phases		6	2		8
Permitted Phases	6			2	
Detector Phase	6	6	2	2	8
Switch Phase					
Minimum Initial (s)	50.0	50.0	50.0	50.0	10.0
Minimum Split (s)	56.3	56.3	56.3	56.3	27.3
Total Split (s)	56.3	56.3	56.3	56.3	41.3
Total Split (%)	57.7%	57.7%	57.7%	57.7%	42.3%
Yellow Time (s)	4.6	4.6	4.6	4.6	3.7
All-Red Time (s)	1.7	1.7	1.7	1.7	2.6
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	6.3	6.3	6.3	6.3	6.3
Lead/Lag					
Lead-Lag Optimize?					
Recall Mode	Max	Max	Max	Max	None
Act Effct Green (s)	50.1	50.1	50.1	50.1	18.9
Actuated g/C Ratio	0.61	0.61	0.61	0.61	0.23
v/c Ratio	0.08	0.45	0.06	0.18	0.74
Control Delay	7.8	10.8	7.5	1.8	34.9
Queue Delay	0.0	0.0	0.0	0.0	0.0
Total Delay	7.8	10.8	7.5	1.8	34.9
LOS	A	B	A	A	C
Approach Delay		10.5	3.5		34.9
Approach LOS		B	A		C

Intersection Summary	
Cycle Length: 97.6	
Actuated Cycle Length: 81.6	
Natural Cycle: 85	
Control Type: Actuated-Uncoordinated	
Maximum v/c Ratio: 0.74	
Intersection Signal Delay: 19.1	Intersection LOS: B
Intersection Capacity Utilization 93.8%	ICU Level of Service F
Analysis Period (min) 15	

Splits and Phases: 3: March Road & Dunrobin Road



Lane Group	SEL	SET	NWT	NWR	SWL
Lane Group Flow (vph)	51	501	70	177	546
v/c Ratio	0.08	0.45	0.06	0.18	0.74
Control Delay	7.8	10.8	7.5	1.8	34.9
Queue Delay	0.0	0.0	0.0	0.0	0.0
Total Delay	7.8	10.8	7.5	1.8	34.9
Queue Length 50th (m)	2.9	37.2	3.9	0.0	39.4
Queue Length 95th (m)	8.4	69.7	10.2	7.7	55.6
Internal Link Dist (m)		170.7	206.3		228.2
Turn Bay Length (m)	145.0			140.0	120.0
Base Capacity (vph)	661	1106	1095	999	1350
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	0.08	0.45	0.06	0.18	0.40

Intersection Summary

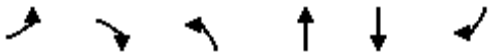
Movement	SEL	SET	NWT	NWR	SWL	SWR
Lane Configurations						
Traffic Volume (vph)	46	451	63	159	436	56
Future Volume (vph)	46	451	63	159	436	56
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800
Total Lost time (s)	6.3	6.3	6.3	6.3	6.3	
Lane Util. Factor	1.00	1.00	1.00	1.00	0.97	
Frt	1.00	1.00	1.00	0.85	0.98	
Flt Protected	0.95	1.00	1.00	1.00	0.96	
Satd. Flow (prot)	1441	1802	1784	1517	3119	
Flt Permitted	0.71	1.00	1.00	1.00	0.96	
Satd. Flow (perm)	1079	1802	1784	1517	3119	
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	51	501	70	177	484	62
RTOR Reduction (vph)	0	0	0	68	12	0
Lane Group Flow (vph)	51	501	70	109	534	0
Heavy Vehicles (%)	20%	1%	2%	2%	7%	3%
Turn Type	Perm	NA	NA	Perm	Prot	
Protected Phases		6	2		8	
Permitted Phases	6			2		
Actuated Green, G (s)	50.1	50.1	50.1	50.1	18.9	
Effective Green, g (s)	50.1	50.1	50.1	50.1	18.9	
Actuated g/C Ratio	0.61	0.61	0.61	0.61	0.23	
Clearance Time (s)	6.3	6.3	6.3	6.3	6.3	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	662	1106	1095	931	722	
v/s Ratio Prot		c0.28	0.04		c0.17	
v/s Ratio Perm	0.05			0.07		
v/c Ratio	0.08	0.45	0.06	0.12	0.74	
Uniform Delay, d1	6.4	8.4	6.3	6.5	29.1	
Progression Factor	1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	0.2	1.3	0.1	0.3	4.0	
Delay (s)	6.6	9.8	6.4	6.8	33.0	
Level of Service	A	A	A	A	C	
Approach Delay (s)		9.5	6.7		33.0	
Approach LOS		A	A		C	

Intersection Summary			
HCM 2000 Control Delay	18.5	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.53		
Actuated Cycle Length (s)	81.6	Sum of lost time (s)	12.6
Intersection Capacity Utilization	93.8%	ICU Level of Service	F
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	58	15	0	51	0	95
Future Volume (Veh/h)	58	15	0	51	0	95
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	64	17	0	57	0	106
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage veh)						
Upstream signal (m)				144		
pX, platoon unblocked						
vC, conflicting volume			81		130	72
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			81		130	72
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			100		100	89
cM capacity (veh/h)			1517		865	990

Direction, Lane #	EB 1	WB 1	NB 1
Volume Total	81	57	106
Volume Left	0	0	0
Volume Right	17	0	106
cSH	1700	1517	990
Volume to Capacity	0.05	0.00	0.11
Queue Length 95th (m)	0.0	0.0	2.7
Control Delay (s)	0.0	0.0	9.1
Lane LOS			A
Approach Delay (s)	0.0	0.0	9.1
Approach LOS			A

Intersection Summary			
Average Delay	3.9		
Intersection Capacity Utilization	17.1%	ICU Level of Service	A
Analysis Period (min)	15		



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	0	73	51	0	0	0
Future Volume (Veh/h)	0	73	51	0	0	0
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	0	81	57	0	0	0
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	114	0	0			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	114	0	0			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	100	93	96			
cM capacity (veh/h)	851	1085	1623			

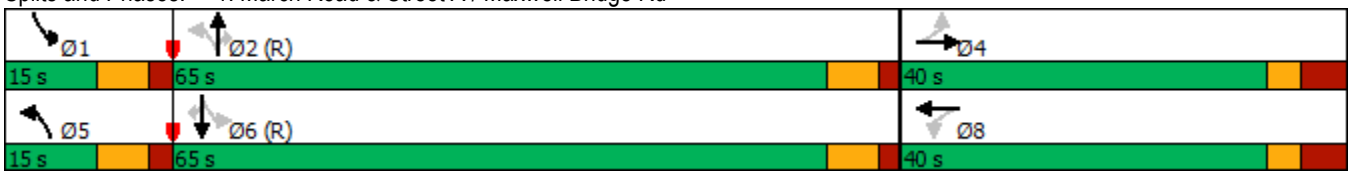
Direction, Lane #	EB 1	NB 1	SB 1
Volume Total	81	57	0
Volume Left	0	57	0
Volume Right	81	0	0
cSH	1085	1623	1700
Volume to Capacity	0.07	0.04	0.00
Queue Length 95th (m)	1.8	0.8	0.0
Control Delay (s)	8.6	7.3	0.0
Lane LOS	A	A	
Approach Delay (s)	8.6	7.3	0.0
Approach LOS	A		

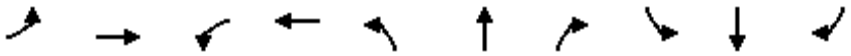
Intersection Summary			
Average Delay	8.1		
Intersection Capacity Utilization	14.8%	ICU Level of Service	A
Analysis Period (min)	15		

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations										
Traffic Volume (vph)	17	55	79	58	172	873	114	59	238	12
Future Volume (vph)	17	55	79	58	172	873	114	59	238	12
Turn Type	Perm	NA	Perm	NA	pm+pt	NA	Perm	pm+pt	NA	Perm
Protected Phases		4		8	5	2		1	6	
Permitted Phases	4		8		2		2	6		6
Detector Phase	4	4	8	8	5	2	2	1	6	6
Switch Phase										
Minimum Initial (s)	10.0	10.0	10.0	10.0	7.0	10.0	10.0	7.0	10.0	10.0
Minimum Split (s)	39.3	39.3	39.3	39.3	13.7	34.6	34.6	13.7	34.6	34.6
Total Split (s)	40.0	40.0	40.0	40.0	15.0	65.0	65.0	15.0	65.0	65.0
Total Split (%)	33.3%	33.3%	33.3%	33.3%	12.5%	54.2%	54.2%	12.5%	54.2%	54.2%
Yellow Time (s)	3.0	3.0	3.0	3.0	4.6	4.6	4.6	4.6	4.6	4.6
All-Red Time (s)	4.3	4.3	4.3	4.3	2.1	2.0	2.0	2.1	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)	7.3	7.3	7.3	7.3	6.7	6.6	6.6	6.7	6.6	6.6
Lead/Lag					Lead	Lag	Lag	Lead	Lag	Lag
Lead-Lag Optimize?					Yes	Yes	Yes	Yes	Yes	Yes
Recall Mode	None	None	None	None	None	C-Max	C-Max	None	C-Max	C-Max
Act Effct Green (s)	14.7	14.7	14.7	14.7	88.0	80.2	80.2	82.6	75.4	75.4
Actuated g/C Ratio	0.12	0.12	0.12	0.12	0.73	0.67	0.67	0.69	0.63	0.63
v/c Ratio	0.17	0.49	0.60	0.64	0.24	0.42	0.12	0.16	0.12	0.01
Control Delay	48.4	41.1	66.3	41.0	5.2	11.1	2.0	5.6	10.1	0.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	48.4	41.1	66.3	41.0	5.2	11.1	2.0	5.6	10.1	0.0
LOS	D	D	E	D	A	B	A	A	B	A
Approach Delay		42.2		49.8		9.3			8.8	
Approach LOS		D		D		A			A	

Intersection Summary	
Cycle Length: 120	
Actuated Cycle Length: 120	
Offset: 18 (15%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green	
Natural Cycle: 90	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.64	
Intersection Signal Delay: 16.4	Intersection LOS: B
Intersection Capacity Utilization 63.4%	ICU Level of Service B
Analysis Period (min) 15	

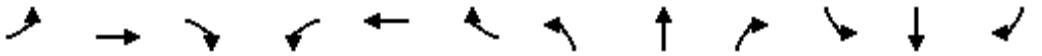
Splits and Phases: 1: March Road & Street A / Maxwell Bridge Rd





Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	19	107	88	163	191	970	127	66	264	13
v/c Ratio	0.17	0.49	0.60	0.64	0.24	0.42	0.12	0.16	0.12	0.01
Control Delay	48.4	41.1	66.3	41.0	5.2	11.1	2.0	5.6	10.1	0.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	48.4	41.1	66.3	41.0	5.2	11.1	2.0	5.6	10.1	0.0
Queue Length 50th (m)	4.1	16.8	20.0	22.3	10.1	53.9	0.0	3.2	12.0	0.0
Queue Length 95th (m)	10.8	32.6	35.3	42.3	20.7	81.1	7.7	8.2	22.0	0.0
Internal Link Dist (m)		119.5		192.3		117.5			169.9	
Turn Bay Length (m)	68.0		76.0		91.0			120.0		
Base Capacity (vph)	253	453	325	492	808	2289	1076	429	2130	1009
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	0.08	0.24	0.27	0.33	0.24	0.42	0.12	0.15	0.12	0.01

Intersection Summary



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	17	55	41	79	58	89	172	873	114	59	238	12
Future Volume (vph)	17	55	41	79	58	89	172	873	114	59	238	12
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Total Lost time (s)	7.3	7.3		7.3	7.3		6.7	6.6	6.6	6.7	6.6	6.6
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	0.95	1.00	1.00	0.95	1.00
Frt	1.00	0.94		1.00	0.91		1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1729	1579		1647	1635		1729	3424	1547	1729	3390	1547
Flt Permitted	0.51	1.00		0.69	1.00		0.56	1.00	1.00	0.27	1.00	1.00
Satd. Flow (perm)	932	1579		1192	1635		1024	3424	1547	493	3390	1547
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	19	61	46	88	64	99	191	970	127	66	264	13
RTOR Reduction (vph)	0	27	0	0	56	0	0	0	43	0	0	5
Lane Group Flow (vph)	19	80	0	88	107	0	191	970	84	66	264	8
Heavy Vehicles (%)	0%	10%	5%	5%	3%	0%	0%	1%	0%	0%	2%	0%
Turn Type	Perm	NA		Perm	NA		pm+pt	NA	Perm	pm+pt	NA	Perm
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4			8			2		2	6		6
Actuated Green, G (s)	14.7	14.7		14.7	14.7		88.2	78.9	78.9	81.2	75.4	75.4
Effective Green, g (s)	14.7	14.7		14.7	14.7		88.2	78.9	78.9	81.2	75.4	75.4
Actuated g/C Ratio	0.12	0.12		0.12	0.12		0.74	0.66	0.66	0.68	0.63	0.63
Clearance Time (s)	7.3	7.3		7.3	7.3		6.7	6.6	6.6	6.7	6.6	6.6
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	114	193		146	200		807	2251	1017	393	2130	972
v/s Ratio Prot		0.05			0.07		c0.02	c0.28		0.01	0.08	
v/s Ratio Perm	0.02			c0.07			0.16		0.05	0.11		0.01
v/c Ratio	0.17	0.41		0.60	0.53		0.24	0.43	0.08	0.17	0.12	0.01
Uniform Delay, d1	47.2	48.7		49.9	49.4		4.8	9.8	7.4	6.7	9.0	8.3
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	0.7	1.4		6.8	2.7		0.2	0.6	0.2	0.2	0.1	0.0
Delay (s)	47.9	50.1		56.7	52.2		5.0	10.4	7.6	6.9	9.1	8.3
Level of Service	D	D		E	D		A	B	A	A	A	A
Approach Delay (s)		49.8			53.8			9.3			8.7	
Approach LOS		D			D			A			A	

Intersection Summary			
HCM 2000 Control Delay	17.3	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.45		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	20.6
Intersection Capacity Utilization	63.4%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

Lane Group	SEL	SET	NWT	NWR	SWL
Lane Configurations					
Traffic Volume (vph)	34	140	476	503	169
Future Volume (vph)	34	140	476	503	169
Turn Type	pm+pt	NA	NA	Perm	Prot
Protected Phases	1	6	2		8
Permitted Phases	6			2	
Detector Phase	1	6	2	2	8
Switch Phase					
Minimum Initial (s)	5.0	50.0	50.0	50.0	10.0
Minimum Split (s)	11.3	56.3	56.3	56.3	27.3
Total Split (s)	21.3	77.6	56.3	56.3	36.3
Total Split (%)	18.7%	68.1%	49.4%	49.4%	31.9%
Yellow Time (s)	4.6	4.6	4.6	4.6	3.7
All-Red Time (s)	1.7	1.7	1.7	1.7	2.6
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	6.3	6.3	6.3	6.3	6.3
Lead/Lag	Lead		Lag	Lag	
Lead-Lag Optimize?	Yes		Yes	Yes	
Recall Mode	None	Max	Max	Max	None
Act Effct Green (s)	72.0	72.0	64.4	64.4	12.2
Actuated g/C Ratio	0.74	0.74	0.67	0.67	0.13
v/c Ratio	0.07	0.12	0.44	0.46	0.60
Control Delay	4.0	4.0	10.7	2.2	37.2
Queue Delay	0.0	0.0	0.0	0.0	0.0
Total Delay	4.0	4.0	10.7	2.2	37.2
LOS	A	A	B	A	D
Approach Delay		4.0	6.3		37.2
Approach LOS		A	A		D

Intersection Summary	
Cycle Length: 113.9	
Actuated Cycle Length: 96.8	
Natural Cycle: 95	
Control Type: Actuated-Uncoordinated	
Maximum v/c Ratio: 0.60	
Intersection Signal Delay: 11.3	Intersection LOS: B
Intersection Capacity Utilization 60.5%	ICU Level of Service B
Analysis Period (min) 15	

Splits and Phases: 3: March Road & Dunrobin Road

Lane Group	SEL	SET	NWT	NWR	SWL
Lane Group Flow (vph)	38	156	529	559	265
v/c Ratio	0.07	0.12	0.44	0.46	0.60
Control Delay	4.0	4.0	10.7	2.2	37.2
Queue Delay	0.0	0.0	0.0	0.0	0.0
Total Delay	4.0	4.0	10.7	2.2	37.2
Queue Length 50th (m)	1.5	6.6	48.5	0.0	19.1
Queue Length 95th (m)	4.4	13.8	81.9	12.9	31.2
Internal Link Dist (m)		170.7	206.3		228.2
Turn Bay Length (m)	145.0			140.0	120.0
Base Capacity (vph)	646	1339	1199	1206	1008
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	0.06	0.12	0.44	0.46	0.26

Intersection Summary

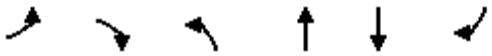
Movement	SEL	SET	NWT	NWR	SWL	SWR
Lane Configurations						
Traffic Volume (vph)	34	140	476	503	169	69
Future Volume (vph)	34	140	476	503	169	69
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800
Total Lost time (s)	6.3	6.3	6.3	6.3	6.3	
Lane Util. Factor	1.00	1.00	1.00	1.00	0.97	
Frt	1.00	1.00	1.00	0.85	0.96	
Flt Protected	0.95	1.00	1.00	1.00	0.97	
Satd. Flow (prot)	1679	1802	1802	1532	3131	
Flt Permitted	0.37	1.00	1.00	1.00	0.97	
Satd. Flow (perm)	656	1802	1802	1532	3131	
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	38	156	529	559	188	77
RTOR Reduction (vph)	0	0	0	196	48	0
Lane Group Flow (vph)	38	156	529	363	217	0
Heavy Vehicles (%)	3%	1%	1%	1%	3%	7%
Turn Type	pm+pt	NA	NA	Perm	Prot	
Protected Phases	1	6	2		8	
Permitted Phases	6			2		
Actuated Green, G (s)	74.5	74.5	64.4	64.4	12.2	
Effective Green, g (s)	74.5	74.5	64.4	64.4	12.2	
Actuated g/C Ratio	0.75	0.75	0.65	0.65	0.12	
Clearance Time (s)	6.3	6.3	6.3	6.3	6.3	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	531	1351	1168	993	384	
v/s Ratio Prot	0.00	c0.09	c0.29		c0.07	
v/s Ratio Perm	0.05			0.24		
v/c Ratio	0.07	0.12	0.45	0.37	0.56	
Uniform Delay, d1	4.3	3.4	8.7	8.0	41.0	
Progression Factor	1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	0.1	0.2	1.3	1.0	1.9	
Delay (s)	4.3	3.6	10.0	9.1	42.9	
Level of Service	A	A	A	A	D	
Approach Delay (s)		3.7	9.5		42.9	
Approach LOS		A	A		D	

Intersection Summary			
HCM 2000 Control Delay	14.5	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.46		
Actuated Cycle Length (s)	99.3	Sum of lost time (s)	18.9
Intersection Capacity Utilization	60.5%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	13	0	0	242	0	100
Future Volume (Veh/h)	13	0	0	242	0	100
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	14	0	0	269	0	111
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage veh)						
Upstream signal (m)				144		
pX, platoon unblocked					0.98	
vC, conflicting volume			14		283	14
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			14		257	14
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			100		100	90
cM capacity (veh/h)			1604		716	1066

Direction, Lane #	EB 1	WB 1	NB 1
Volume Total	14	269	111
Volume Left	0	0	0
Volume Right	0	0	111
cSH	1700	1604	1066
Volume to Capacity	0.01	0.00	0.10
Queue Length 95th (m)	0.0	0.0	2.6
Control Delay (s)	0.0	0.0	8.8
Lane LOS			A
Approach Delay (s)	0.0	0.0	8.8
Approach LOS			A

Intersection Summary			
Average Delay	2.5		
Intersection Capacity Utilization	26.6%	ICU Level of Service	A
Analysis Period (min)	15		



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	0	13	242	0	0	0
Future Volume (Veh/h)	0	13	242	0	0	0
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	0	14	269	0	0	0
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	538	0	0			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	538	0	0			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	100	99	83			
cM capacity (veh/h)	421	1085	1623			

Direction, Lane #	EB 1	NB 1	SB 1
Volume Total	14	269	0
Volume Left	0	269	0
Volume Right	14	0	0
cSH	1085	1623	1700
Volume to Capacity	0.01	0.17	0.00
Queue Length 95th (m)	0.3	4.5	0.0
Control Delay (s)	8.4	7.7	0.0
Lane LOS	A	A	
Approach Delay (s)	8.4	7.7	0.0
Approach LOS	A		

Intersection Summary			
Average Delay	7.7		
Intersection Capacity Utilization	24.2%	ICU Level of Service	A
Analysis Period (min)	15		

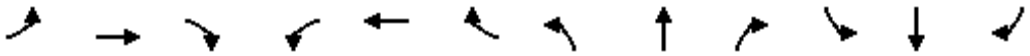
Lane Group	EBL	EBT	NBL	NBT	SBT	Ø8
Lane Configurations						
Traffic Volume (vph)	6	0	22	228	900	
Future Volume (vph)	6	0	22	228	900	
Turn Type	Perm	NA	Perm	NA	NA	
Protected Phases		4		2	6	8
Permitted Phases	4		2			
Detector Phase	4	4	2	2	6	
Switch Phase						
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0	5.0
Minimum Split (s)	39.3	39.3	35.9	35.9	38.6	25.3
Total Split (s)	39.4	39.4	60.6	60.6	60.6	39.4
Total Split (%)	39.4%	39.4%	60.6%	60.6%	60.6%	39%
Yellow Time (s)	3.0	3.0	4.6	4.6	4.6	3.0
All-Red Time (s)	4.3	4.3	2.0	2.0	2.0	4.3
Lost Time Adjust (s)	0.0	0.0		0.0	0.0	
Total Lost Time (s)	7.3	7.3		6.6	6.6	
Lead/Lag						
Lead-Lag Optimize?						
Recall Mode	None	None	C-Max	C-Max	C-Max	None
Act Effct Green (s)	6.1	6.1		87.8	87.8	
Actuated g/C Ratio	0.06	0.06		0.88	0.88	
v/c Ratio	0.05	0.20		0.19	0.58	
Control Delay	44.8	2.2		2.3	4.9	
Queue Delay	0.0	0.0		0.0	0.0	
Total Delay	44.8	2.2		2.3	4.9	
LOS	D	A		A	A	
Approach Delay		7.6		2.3	4.9	
Approach LOS		A		A	A	

Intersection Summary	
Cycle Length: 100	
Actuated Cycle Length: 100	
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: 0.58	
Intersection Signal Delay: 4.5	Intersection LOS: A
Intersection Capacity Utilization 65.8%	ICU Level of Service C
Analysis Period (min) 15	

Splits and Phases: 2: Street A & March Road

Lane Group	EBL	EBT	NBT	SBT
Lane Group Flow (vph)	6	42	250	901
v/c Ratio	0.05	0.20	0.19	0.58
Control Delay	44.8	2.2	2.3	4.9
Queue Delay	0.0	0.0	0.0	0.0
Total Delay	44.8	2.2	2.3	4.9
Queue Length 50th (m)	1.1	0.0	8.8	53.2
Queue Length 95th (m)	5.0	0.0	15.5	86.8
Internal Link Dist (m)		124.2	196.3	287.3
Turn Bay Length (m)	37.5			
Base Capacity (vph)	584	569	1293	1565
Starvation Cap Reductn	0	0	0	0
Spillback Cap Reductn	0	0	0	0
Storage Cap Reductn	0	0	0	0
Reduced v/c Ratio	0.01	0.07	0.19	0.58

Intersection Summary



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	6	0	42	0	0	0	22	228	0	0	900	1
Future Volume (vph)	6	0	42	0	0	0	22	228	0	0	900	1
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Total Lost time (s)	7.3	7.3						6.6			6.6	
Lane Util. Factor	1.00	1.00						1.00			1.00	
Frt	1.00	0.85						1.00			1.00	
Flt Protected	0.95	1.00						1.00			1.00	
Satd. Flow (prot)	1729	1517						1622			1784	
Flt Permitted	1.00	1.00						0.90			1.00	
Satd. Flow (perm)	1820	1517						1473			1784	
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	6	0	42	0	0	0	22	228	0	0	900	1
RTOR Reduction (vph)	0	40	0	0	0	0	0	0	0	0	0	0
Lane Group Flow (vph)	6	2	0	0	0	0	0	250	0	0	901	0
Heavy Vehicles (%)	0%	14%	2%	1%	0%	0%	9%	12%	6%	1%	2%	8%
Turn Type	Perm	NA		Perm			Perm	NA	Perm	Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2		2	6		
Actuated Green, G (s)	3.9	3.9						82.2			82.2	
Effective Green, g (s)	3.9	3.9						82.2			82.2	
Actuated g/C Ratio	0.04	0.04						0.82			0.82	
Clearance Time (s)	7.3	7.3						6.6			6.6	
Vehicle Extension (s)	3.0	3.0						3.0			3.0	
Lane Grp Cap (vph)	70	59						1210			1466	
v/s Ratio Prot		0.00									c0.51	
v/s Ratio Perm	c0.00							0.17				
v/c Ratio	0.09	0.03						0.21			0.61	
Uniform Delay, d1	46.3	46.2						1.9			3.2	
Progression Factor	1.00	1.00						1.00			1.00	
Incremental Delay, d2	0.5	0.2						0.4			1.9	
Delay (s)	46.9	46.4						2.3			5.1	
Level of Service	D	D						A			A	
Approach Delay (s)		46.5			0.0			2.3			5.1	
Approach LOS		D			A			A			A	

Intersection Summary			
HCM 2000 Control Delay	6.2	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.59		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	13.9
Intersection Capacity Utilization	65.8%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

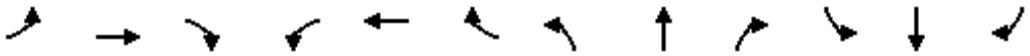
Lane Group	EBL	EBT	NBL	NBT	SBT	Ø8
Lane Configurations						
Traffic Volume (vph)	5	0	52	994	317	
Future Volume (vph)	5	0	52	994	317	
Turn Type	Perm	NA	Perm	NA	NA	
Protected Phases		4		2	6	8
Permitted Phases	4		2			
Detector Phase	4	4	2	2	6	
Switch Phase						
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0	5.0
Minimum Split (s)	39.3	39.3	35.9	35.9	38.6	25.3
Total Split (s)	39.3	39.3	60.7	60.7	60.7	39.3
Total Split (%)	39.3%	39.3%	60.7%	60.7%	60.7%	39%
Yellow Time (s)	3.0	3.0	4.6	4.6	4.6	3.0
All-Red Time (s)	4.3	4.3	2.0	2.0	2.0	4.3
Lost Time Adjust (s)	0.0	0.0		0.0	0.0	
Total Lost Time (s)	7.3	7.3		6.6	6.6	
Lead/Lag						
Lead-Lag Optimize?						
Recall Mode	None	None	C-Max	C-Max	C-Max	None
Act Effct Green (s)	6.0	6.0		87.8	87.8	
Actuated g/C Ratio	0.06	0.06		0.88	0.88	
v/c Ratio	0.05	0.06		0.68	0.20	
Control Delay	44.8	0.2		6.9	2.2	
Queue Delay	0.0	0.0		0.0	0.0	
Total Delay	44.8	0.2		6.9	2.2	
LOS	D	A		A	A	
Approach Delay		6.1		6.9	2.2	
Approach LOS		A		A	A	

Intersection Summary	
Cycle Length: 100	
Actuated Cycle Length: 100	
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: 0.68	
Intersection Signal Delay: 5.8	Intersection LOS: A
Intersection Capacity Utilization 97.3%	ICU Level of Service F
Analysis Period (min) 15	

Splits and Phases: 2: Street A & March Road

Lane Group	EBL	EBT	NBT	SBT
Lane Group Flow (vph)	5	33	1046	320
v/c Ratio	0.05	0.06	0.68	0.20
Control Delay	44.8	0.2	6.9	2.2
Queue Delay	0.0	0.0	0.0	0.0
Total Delay	44.8	0.2	6.9	2.2
Queue Length 50th (m)	1.0	0.0	75.9	11.2
Queue Length 95th (m)	4.5	0.0	131.2	18.7
Internal Link Dist (m)		124.2	196.3	287.3
Turn Bay Length (m)	37.5			
Base Capacity (vph)	582	820	1533	1566
Starvation Cap Reductn	0	0	0	0
Spillback Cap Reductn	0	0	0	0
Storage Cap Reductn	0	0	0	0
Reduced v/c Ratio	0.01	0.04	0.68	0.20

Intersection Summary



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	5	0	33	0	0	0	52	994	0	0	317	3
Future Volume (vph)	5	0	33	0	0	0	52	994	0	0	317	3
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Total Lost time (s)	7.3	7.3						6.6			6.6	
Lane Util. Factor	1.00	1.00						1.00			1.00	
Frt	1.00	0.85						1.00			1.00	
Flt Protected	0.95	1.00						1.00			1.00	
Satd. Flow (prot)	1729	1473						1798			1782	
Flt Permitted	1.00	1.00						0.97			1.00	
Satd. Flow (perm)	1820	1473						1744			1782	
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	5	0	33	0	0	0	52	994	0	0	317	3
RTOR Reduction (vph)	0	32	0	0	0	0	0	0	0	0	0	0
Lane Group Flow (vph)	5	1	0	0	0	0	0	1046	0	0	320	0
Heavy Vehicles (%)	0%	10%	5%	5%	3%	0%	0%	1%	0%	0%	2%	0%
Turn Type	Perm	NA		Perm			Perm	NA	Perm	Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2		2	6		
Actuated Green, G (s)	3.8	3.8						82.3			82.3	
Effective Green, g (s)	3.8	3.8						82.3			82.3	
Actuated g/C Ratio	0.04	0.04						0.82			0.82	
Clearance Time (s)	7.3	7.3						6.6			6.6	
Vehicle Extension (s)	3.0	3.0						3.0			3.0	
Lane Grp Cap (vph)	69	55						1435			1466	
v/s Ratio Prot		0.00									0.18	
v/s Ratio Perm	c0.00							c0.60				
v/c Ratio	0.07	0.02						0.73			0.22	
Uniform Delay, d1	46.4	46.3						3.9			1.9	
Progression Factor	1.00	1.00						1.00			1.00	
Incremental Delay, d2	0.4	0.2						3.3			0.3	
Delay (s)	46.8	46.5						7.2			2.3	
Level of Service	D	D						A			A	
Approach Delay (s)		46.5			0.0			7.2			2.3	
Approach LOS		D			A			A			A	

Intersection Summary			
HCM 2000 Control Delay	7.1	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.70		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	13.9
Intersection Capacity Utilization	97.3%	ICU Level of Service	F
Analysis Period (min)	15		
c Critical Lane Group			

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	NBR	SBL	SBT
Lane Configurations									
Traffic Volume (vph)	8	6	304	14	27	403	89	5	1132
Future Volume (vph)	8	6	304	14	27	403	89	5	1132
Turn Type	Perm	NA	Perm	NA	Perm	NA	Perm	Perm	NA
Protected Phases		4		8		2			6
Permitted Phases	4		8		2		2	6	
Detector Phase	4	4	8	8	2	2	2	6	6
Switch Phase									
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Minimum Split (s)	39.3	39.3	25.3	25.3	35.9	35.9	35.9	38.6	38.6
Total Split (s)	39.3	39.3	39.3	39.3	90.7	90.7	90.7	90.7	90.7
Total Split (%)	30.2%	30.2%	30.2%	30.2%	69.8%	69.8%	69.8%	69.8%	69.8%
Yellow Time (s)	3.0	3.0	3.0	3.0	4.6	4.6	4.6	4.6	4.6
All-Red Time (s)	4.3	4.3	4.3	4.3	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)	7.3	7.3	7.3	7.3	6.6	6.6	6.6	6.6	6.6
Lead/Lag									
Lead-Lag Optimize?									
Recall Mode	None	None	None	None	C-Max	C-Max	C-Max	C-Max	C-Max
Act Effct Green (s)	31.6	31.6	31.6	31.6	84.5	84.5	84.5	84.5	84.5
Actuated g/C Ratio	0.24	0.24	0.24	0.24	0.65	0.65	0.65	0.65	0.65
v/c Ratio	0.02	0.15	0.97	0.07	0.54	0.38	0.09	0.01	0.98
Control Delay	37.6	12.2	92.2	23.0	56.7	12.0	1.9	8.2	44.4
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	37.6	12.2	92.2	23.0	56.7	12.0	1.9	8.2	44.4
LOS	D	B	F	C	E	B	A	A	D
Approach Delay		15.1		85.9		12.6			44.2
Approach LOS		B		F		B			D

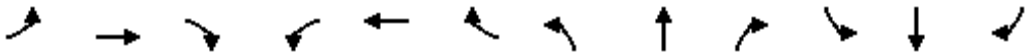
Intersection Summary	
Cycle Length: 130	
Actuated Cycle Length: 130	
Offset: 128 (98%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green	
Natural Cycle: 120	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.98	
Intersection Signal Delay: 42.0	Intersection LOS: D
Intersection Capacity Utilization 99.0%	ICU Level of Service F
Analysis Period (min) 15	

Splits and Phases: 2: Street A & March Road

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	NBR	SBL	SBT
Lane Group Flow (vph)	8	62	304	30	27	403	89	5	1134
v/c Ratio	0.02	0.15	0.97	0.07	0.54	0.38	0.09	0.01	0.98
Control Delay	37.6	12.2	92.2	23.0	56.7	12.0	1.9	8.2	44.4
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	37.6	12.2	92.2	23.0	56.7	12.0	1.9	8.2	44.4
Queue Length 50th (m)	1.6	1.2	77.2	2.8	3.5	45.1	0.0	0.4	262.5
Queue Length 95th (m)	5.8	12.3	#133.6	10.6	#21.2	64.3	5.7	1.9	#375.7
Internal Link Dist (m)		124.2		210.3		196.3			287.3
Turn Bay Length (m)	37.5		156.0		90.0		90.0	105.0	
Base Capacity (vph)	330	417	318	424	50	1056	979	567	1159
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	0.02	0.15	0.96	0.07	0.54	0.38	0.09	0.01	0.98

Intersection Summary

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



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	8	6	56	304	14	16	27	403	89	5	1132	2
Future Volume (vph)	8	6	56	304	14	16	27	403	89	5	1132	2
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Total Lost time (s)	7.3	7.3		7.3	7.3		6.6	6.6	6.6	6.6	6.6	
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	1.00	1.00	1.00	1.00	
Frt	1.00	0.86		1.00	0.92		1.00	1.00	0.85	1.00	1.00	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)	1729	1525		1712	1674		1586	1625	1459	1712	1784	
Flt Permitted	0.74	1.00		0.72	1.00		0.05	1.00	1.00	0.48	1.00	
Satd. Flow (perm)	1342	1525		1291	1674		79	1625	1459	873	1784	
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	8	6	56	304	14	16	27	403	89	5	1132	2
RTOR Reduction (vph)	0	42	0	0	12	0	0	0	31	0	0	0
Lane Group Flow (vph)	8	20	0	304	18	0	27	403	58	5	1134	0
Heavy Vehicles (%)	0%	14%	2%	1%	0%	0%	9%	12%	6%	1%	2%	8%
Turn Type	Perm	NA		Perm	NA		Perm	NA	Perm	Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2		2	6		
Actuated Green, G (s)	31.6	31.6		31.6	31.6		84.5	84.5	84.5	84.5	84.5	
Effective Green, g (s)	31.6	31.6		31.6	31.6		84.5	84.5	84.5	84.5	84.5	
Actuated g/C Ratio	0.24	0.24		0.24	0.24		0.65	0.65	0.65	0.65	0.65	
Clearance Time (s)	7.3	7.3		7.3	7.3		6.6	6.6	6.6	6.6	6.6	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	326	370		313	406		51	1056	948	567	1159	
v/s Ratio Prot		0.01			0.01			0.25			c0.64	
v/s Ratio Perm	0.01			c0.24			0.34		0.04	0.01		
v/c Ratio	0.02	0.05		0.97	0.04		0.53	0.38	0.06	0.01	0.98	
Uniform Delay, d1	37.5	37.7		48.7	37.6		12.1	10.6	8.3	8.0	21.9	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	0.0	0.1		42.9	0.0		34.2	1.0	0.1	0.0	21.7	
Delay (s)	37.5	37.8		91.6	37.7		46.3	11.6	8.4	8.0	43.6	
Level of Service	D	D		F	D		D	B	A	A	D	
Approach Delay (s)		37.8			86.8			12.9			43.5	
Approach LOS		D			F			B			D	

Intersection Summary			
HCM 2000 Control Delay	42.6	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.98		
Actuated Cycle Length (s)	130.0	Sum of lost time (s)	13.9
Intersection Capacity Utilization	99.0%	ICU Level of Service	F
Analysis Period (min)	15		
c Critical Lane Group			

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	NBR	SBL	SBT
Lane Configurations									
Traffic Volume (vph)	6	22	174	12	67	1171	312	16	455
Future Volume (vph)	6	22	174	12	67	1171	312	16	455
Turn Type	Perm	NA	Perm	NA	Perm	NA	Perm	Perm	NA
Protected Phases		4		8		2			6
Permitted Phases	4		8		2		2	6	
Detector Phase	4	4	8	8	2	2	2	6	6
Switch Phase									
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Minimum Split (s)	39.3	39.3	25.3	25.3	35.9	35.9	35.9	38.6	38.6
Total Split (s)	39.3	39.3	39.3	39.3	90.7	90.7	90.7	90.7	90.7
Total Split (%)	30.2%	30.2%	30.2%	30.2%	69.8%	69.8%	69.8%	69.8%	69.8%
Yellow Time (s)	3.0	3.0	3.0	3.0	4.6	4.6	4.6	4.6	4.6
All-Red Time (s)	4.3	4.3	4.3	4.3	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)	7.3	7.3	7.3	7.3	6.6	6.6	6.6	6.6	6.6
Lead/Lag									
Lead-Lag Optimize?									
Recall Mode	None	None	None	None	C-Max	C-Max	C-Max	C-Max	C-Max
Act Effct Green (s)	23.3	23.3	23.3	23.3	92.8	92.8	92.8	92.8	92.8
Actuated g/C Ratio	0.18	0.18	0.18	0.18	0.71	0.71	0.71	0.71	0.71
v/c Ratio	0.02	0.20	0.78	0.07	0.11	0.91	0.26	0.15	0.36
Control Delay	39.7	20.0	73.4	28.1	7.6	28.9	2.1	11.9	9.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	39.7	20.0	73.4	28.1	7.6	28.9	2.1	11.9	9.0
LOS	D	B	E	C	A	C	A	B	A
Approach Delay		21.7		68.6		22.6			9.1
Approach LOS		C		E		C			A

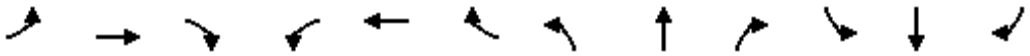
Intersection Summary	
Cycle Length: 130	
Actuated Cycle Length: 130	
Offset: 0 (0%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green	
Natural Cycle: 130	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.91	
Intersection Signal Delay: 23.7	Intersection LOS: C
Intersection Capacity Utilization 93.5%	ICU Level of Service F
Analysis Period (min) 15	

Splits and Phases: 2: Street A & March Road

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	NBR	SBL	SBT
Lane Group Flow (vph)	6	62	174	21	67	1171	312	16	459
v/c Ratio	0.02	0.20	0.78	0.07	0.11	0.91	0.26	0.15	0.36
Control Delay	39.7	20.0	73.4	28.1	7.6	28.9	2.1	11.9	9.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	39.7	20.0	73.4	28.1	7.6	28.9	2.1	11.9	9.0
Queue Length 50th (m)	1.3	4.7	42.9	2.6	4.8	222.1	3.0	1.2	41.0
Queue Length 95th (m)	4.8	15.8	63.5	9.2	12.2	#392.3	14.1	5.6	72.2
Internal Link Dist (m)		124.2		210.3		196.3			287.3
Turn Bay Length (m)	37.5		156.0		90.0		90.0	105.0	
Base Capacity (vph)	333	408	305	419	605	1286	1181	107	1272
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	0.02	0.15	0.57	0.05	0.11	0.91	0.26	0.15	0.36

Intersection Summary

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



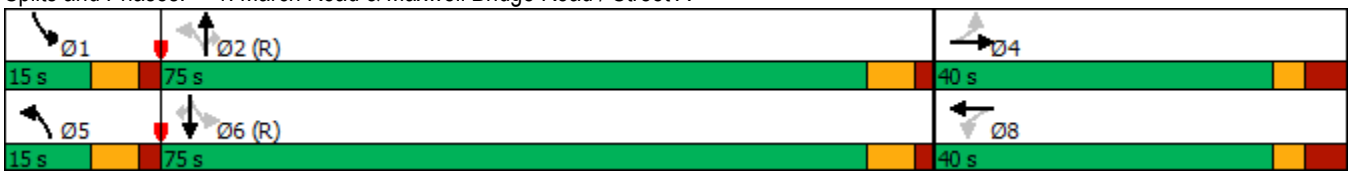
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	6	22	40	174	12	9	67	1171	312	16	455	4
Future Volume (vph)	6	22	40	174	12	9	67	1171	312	16	455	4
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Total Lost time (s)	7.3	7.3		7.3	7.3		6.6	6.6	6.6	6.6	6.6	
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	1.00	1.00	1.00	1.00	
Frt	1.00	0.90		1.00	0.94		1.00	1.00	0.85	1.00	1.00	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)	1729	1540		1647	1674		1729	1802	1547	1729	1782	
Flt Permitted	0.74	1.00		0.72	1.00		0.47	1.00	1.00	0.08	1.00	
Satd. Flow (perm)	1353	1540		1242	1674		848	1802	1547	151	1782	
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	6	22	40	174	12	9	67	1171	312	16	455	4
RTOR Reduction (vph)	0	33	0	0	7	0	0	0	77	0	0	0
Lane Group Flow (vph)	6	29	0	174	14	0	67	1171	235	16	459	0
Heavy Vehicles (%)	0%	10%	5%	5%	3%	0%	0%	1%	0%	0%	2%	0%
Turn Type	Perm	NA		Perm	NA		Perm	NA	Perm	Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2		2	6		
Actuated Green, G (s)	23.3	23.3		23.3	23.3		92.8	92.8	92.8	92.8	92.8	
Effective Green, g (s)	23.3	23.3		23.3	23.3		92.8	92.8	92.8	92.8	92.8	
Actuated g/C Ratio	0.18	0.18		0.18	0.18		0.71	0.71	0.71	0.71	0.71	
Clearance Time (s)	7.3	7.3		7.3	7.3		6.6	6.6	6.6	6.6	6.6	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	242	276		222	300		605	1286	1104	107	1272	
v/s Ratio Prot		0.02			0.01			c0.65			0.26	
v/s Ratio Perm	0.00			c0.14			0.08		0.15	0.11		
v/c Ratio	0.02	0.11		0.78	0.05		0.11	0.91	0.21	0.15	0.36	
Uniform Delay, d1	44.0	44.6		50.9	44.1		5.8	15.2	6.3	6.0	7.2	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	0.0	0.2		16.4	0.1		0.4	11.2	0.4	2.9	0.8	
Delay (s)	44.0	44.8		67.3	44.2		6.1	26.4	6.7	8.9	8.0	
Level of Service	D	D		E	D		A	C	A	A	A	
Approach Delay (s)		44.7			64.9			21.5			8.0	
Approach LOS		D			E			C			A	

Intersection Summary			
HCM 2000 Control Delay	23.1	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.88		
Actuated Cycle Length (s)	130.0	Sum of lost time (s)	13.9
Intersection Capacity Utilization	93.5%	ICU Level of Service	F
Analysis Period (min)	15		
c Critical Lane Group			

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations										
Traffic Volume (vph)	22	40	134	17	25	542	65	73	1581	13
Future Volume (vph)	22	40	134	17	25	542	65	73	1581	13
Turn Type	Perm	NA	Perm	NA	pm+pt	NA	Perm	pm+pt	NA	Perm
Protected Phases		4		8	5	2		1	6	
Permitted Phases	4		8		2		2	6		6
Detector Phase	4	4	8	8	5	2	2	1	6	6
Switch Phase										
Minimum Initial (s)	10.0	10.0	10.0	10.0	7.0	10.0	10.0	7.0	10.0	10.0
Minimum Split (s)	39.3	39.3	39.3	39.3	13.7	34.6	34.6	13.7	34.6	34.6
Total Split (s)	40.0	40.0	40.0	40.0	15.0	75.0	75.0	15.0	75.0	75.0
Total Split (%)	30.8%	30.8%	30.8%	30.8%	11.5%	57.7%	57.7%	11.5%	57.7%	57.7%
Yellow Time (s)	3.0	3.0	3.0	3.0	4.6	4.6	4.6	4.6	4.6	4.6
All-Red Time (s)	4.3	4.3	4.3	4.3	2.1	2.0	2.0	2.1	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)	7.3	7.3	7.3	7.3	6.7	6.6	6.6	6.7	6.6	6.6
Lead/Lag					Lead	Lag	Lag	Lead	Lag	Lag
Lead-Lag Optimize?					Yes	Yes	Yes	Yes	Yes	Yes
Recall Mode	None	None	None	None	None	C-Max	C-Max	None	C-Max	C-Max
Act Effct Green (s)	20.3	20.3	20.3	20.3	89.9	84.3	84.3	92.2	87.6	87.6
Actuated g/C Ratio	0.16	0.16	0.16	0.16	0.69	0.65	0.65	0.71	0.67	0.67
v/c Ratio	0.11	0.45	0.80	0.16	0.13	0.27	0.07	0.12	0.69	0.01
Control Delay	44.8	21.8	83.5	24.1	7.7	11.7	1.2	3.2	8.7	0.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	44.8	21.8	83.5	24.1	7.7	11.7	1.2	3.2	8.7	0.0
LOS	D	C	F	C	A	B	A	A	A	A
Approach Delay		24.8		69.3		10.5			8.3	
Approach LOS		C		E		B			A	

Intersection Summary	
Cycle Length: 130	
Actuated Cycle Length: 130	
Offset: 69 (53%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green	
Natural Cycle: 110	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.80	
Intersection Signal Delay: 14.0	Intersection LOS: B
Intersection Capacity Utilization 92.4%	ICU Level of Service F
Analysis Period (min) 15	

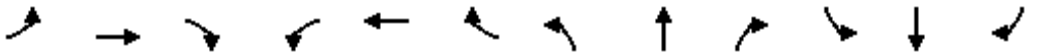
Splits and Phases: 1: March Road & Maxwell Bridge Road / Street A



Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	22	142	134	42	25	542	65	73	1581	13
v/c Ratio	0.11	0.45	0.80	0.16	0.13	0.27	0.07	0.12	0.69	0.01
Control Delay	44.8	21.8	83.5	24.1	7.7	11.7	1.2	3.2	8.7	0.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	44.8	21.8	83.5	24.1	7.7	11.7	1.2	3.2	8.7	0.0
Queue Length 50th (m)	4.9	10.9	33.5	3.8	1.5	30.6	0.0	2.9	77.2	0.0
Queue Length 95th (m)	12.0	28.4	52.8	13.2	4.9	49.8	3.4	m3.2	m97.3	m0.0
Internal Link Dist (m)		119.5		192.3		117.5			169.9	
Turn Bay Length (m)	68.0		76.0		91.0			120.0		
Base Capacity (vph)	334	457	271	414	208	2002	978	610	2284	995
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	0.07	0.31	0.49	0.10	0.12	0.27	0.07	0.12	0.69	0.01

Intersection Summary

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



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	22	40	102	134	17	25	25	542	65	73	1581	13
Future Volume (vph)	22	40	102	134	17	25	25	542	65	73	1581	13
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Total Lost time (s)	7.3	7.3		7.3	7.3		6.7	6.6	6.6	6.7	6.6	6.6
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	0.95	1.00	1.00	0.95	1.00
Frt	1.00	0.89		1.00	0.91		1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1729	1541		1712	1573		1586	3088	1459	1712	3390	1432
Flt Permitted	0.73	1.00		0.60	1.00		0.10	1.00	1.00	0.43	1.00	1.00
Satd. Flow (perm)	1328	1541		1077	1573		169	3088	1459	771	3390	1432
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	22	40	102	134	17	25	25	542	65	73	1581	13
RTOR Reduction (vph)	0	79	0	0	21	0	0	0	24	0	0	5
Lane Group Flow (vph)	22	63	0	134	21	0	25	542	42	73	1581	8
Heavy Vehicles (%)	0%	14%	2%	1%	0%	9%	9%	12%	6%	1%	2%	8%
Turn Type	Perm	NA		Perm	NA		pm+pt	NA	Perm	pm+pt	NA	Perm
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4			8			2		2	6		6
Actuated Green, G (s)	20.3	20.3		20.3	20.3		87.2	83.0	83.0	91.0	84.9	84.9
Effective Green, g (s)	20.3	20.3		20.3	20.3		87.2	83.0	83.0	91.0	84.9	84.9
Actuated g/C Ratio	0.16	0.16		0.16	0.16		0.67	0.64	0.64	0.70	0.65	0.65
Clearance Time (s)	7.3	7.3		7.3	7.3		6.7	6.6	6.6	6.7	6.6	6.6
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	207	240		168	245		159	1971	931	583	2213	935
v/s Ratio Prot		0.04			0.01		0.01	0.18		c0.01	c0.47	
v/s Ratio Perm	0.02			c0.12			0.10		0.03	0.08		0.01
v/c Ratio	0.11	0.26		0.80	0.09		0.16	0.27	0.04	0.13	0.71	0.01
Uniform Delay, d1	47.1	48.3		52.9	46.9		11.0	10.3	8.7	6.2	14.7	7.9
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00	1.00	0.54	0.54	1.00
Incremental Delay, d2	0.2	0.6		22.5	0.2		0.5	0.3	0.1	0.0	0.2	0.0
Delay (s)	47.3	48.8		75.4	47.1		11.5	10.7	8.8	3.3	8.0	7.9
Level of Service	D	D		E	D		B	B	A	A	A	A
Approach Delay (s)		48.6			68.6			10.5			7.8	
Approach LOS		D			E			B			A	

Intersection Summary			
HCM 2000 Control Delay	15.1	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.71		
Actuated Cycle Length (s)	130.0	Sum of lost time (s)	20.6
Intersection Capacity Utilization	92.4%	ICU Level of Service	F
Analysis Period (min)	15		
c Critical Lane Group			

Lane Group	EBT	WBL	WBT	NBT	NBR	SBL	SBT
Lane Configurations							
Traffic Volume (vph)	6	304	14	501	89	5	1363
Future Volume (vph)	6	304	14	501	89	5	1363
Turn Type	NA	Perm	NA	NA	Perm	Perm	NA
Protected Phases	4		8	2			6
Permitted Phases		8			2	6	
Detector Phase	4	8	8	2	2	6	6
Switch Phase							
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Minimum Split (s)	39.3	25.3	25.3	35.9	35.9	38.6	38.6
Total Split (s)	40.0	40.0	40.0	90.0	90.0	90.0	90.0
Total Split (%)	30.8%	30.8%	30.8%	69.2%	69.2%	69.2%	69.2%
Yellow Time (s)	3.0	3.0	3.0	4.6	4.6	4.6	4.6
All-Red Time (s)	4.3	4.3	4.3	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
Total Lost Time (s)	7.3	7.3	7.3	6.6	6.6	6.6	6.6
Lead/Lag							
Lead-Lag Optimize?							
Recall Mode	None	None	None	C-Max	C-Max	C-Max	C-Max
Act Effct Green (s)	31.3	31.3	31.3	84.8	84.8	84.8	84.8
Actuated g/C Ratio	0.24	0.24	0.24	0.65	0.65	0.65	0.65
v/c Ratio	0.02	0.93	0.08	0.47	0.09	0.01	1.17
Control Delay	36.8	83.6	22.7	19.0	2.4	8.6	110.5
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	36.8	83.6	22.7	19.0	2.4	8.6	110.5
LOS	D	F	C	B	A	A	F
Approach Delay	36.8		78.1	16.5			110.2
Approach LOS	D		E	B			F

Intersection Summary	
Cycle Length: 130	
Actuated Cycle Length: 130	
Offset: 26 (20%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green	
Natural Cycle: 150	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 1.17	
Intersection Signal Delay: 81.3	Intersection LOS: F
Intersection Capacity Utilization 111.8%	ICU Level of Service H
Analysis Period (min) 15	

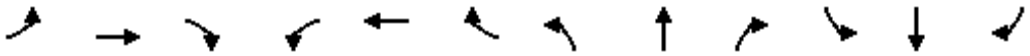
Splits and Phases: 2: March Road & Street A

Lane Group	EBT	WBL	WBT	NBT	NBR	SBL	SBT
Lane Group Flow (vph)	6	304	30	501	89	5	1363
v/c Ratio	0.02	0.93	0.08	0.47	0.09	0.01	1.17
Control Delay	36.8	83.6	22.7	19.0	2.4	8.6	110.5
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	36.8	83.6	22.7	19.0	2.4	8.6	110.5
Queue Length 50th (m)	1.2	75.5	2.7	56.7	0.0	0.5	~420.9
Queue Length 95th (m)	4.7	#127.3	10.6	117.9	6.9	2.0	#501.8
Internal Link Dist (m)	124.2		210.3	416.7			287.3
Turn Bay Length (m)		156.0			90.0	105.0	
Base Capacity (vph)	401	341	413	1060	982	491	1164
Starvation Cap Reductn	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0
Reduced v/c Ratio	0.01	0.89	0.07	0.47	0.09	0.01	1.17

Intersection Summary

~ 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.



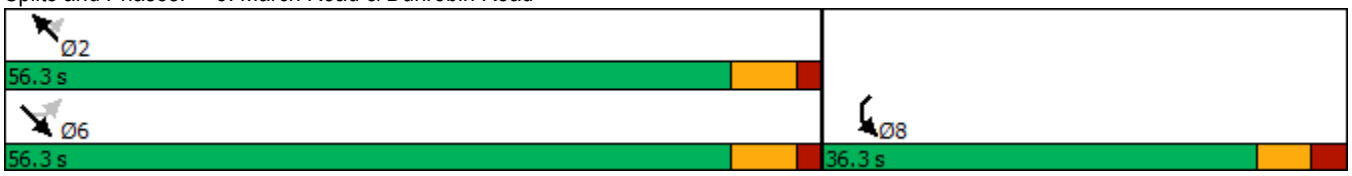
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	6	0	304	14	16	0	501	89	5	1363	0
Future Volume (vph)	0	6	0	304	14	16	0	501	89	5	1363	0
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Total Lost time (s)		7.3		7.3	7.3			6.6	6.6	6.6	6.6	
Lane Util. Factor		1.00		1.00	1.00			1.00	1.00	1.00	1.00	
Frt		1.00		1.00	0.92			1.00	0.85	1.00	1.00	
Flt Protected		1.00		0.95	1.00			1.00	1.00	0.95	1.00	
Satd. Flow (prot)		1596		1712	1598			1625	1459	1712	1784	
Flt Permitted		1.00		0.75	1.00			1.00	1.00	0.42	1.00	
Satd. Flow (perm)		1596		1358	1598			1625	1459	754	1784	
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	0	6	0	304	14	16	0	501	89	5	1363	0
RTOR Reduction (vph)	0	0	0	0	12	0	0	0	31	0	0	0
Lane Group Flow (vph)	0	6	0	304	18	0	0	501	58	5	1363	0
Heavy Vehicles (%)	0%	14%	2%	1%	0%	9%	9%	12%	6%	1%	2%	8%
Turn Type	Perm	NA		Perm	NA		Perm	NA	Perm	Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2		2	6		
Actuated Green, G (s)		31.3		31.3	31.3			84.8	84.8	84.8	84.8	
Effective Green, g (s)		31.3		31.3	31.3			84.8	84.8	84.8	84.8	
Actuated g/C Ratio		0.24		0.24	0.24			0.65	0.65	0.65	0.65	
Clearance Time (s)		7.3		7.3	7.3			6.6	6.6	6.6	6.6	
Vehicle Extension (s)		3.0		3.0	3.0			3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)		384		326	384			1060	951	491	1163	
v/s Ratio Prot		0.00			0.01			0.31			c0.76	
v/s Ratio Perm				c0.22					0.04	0.01		
v/c Ratio		0.02		0.93	0.05			0.47	0.06	0.01	1.17	
Uniform Delay, d1		37.6		48.3	37.9			11.4	8.2	7.9	22.6	
Progression Factor		1.00		1.00	1.00			1.47	1.25	1.00	1.00	
Incremental Delay, d2		0.0		32.6	0.1			1.5	0.1	0.0	86.8	
Delay (s)		37.6		81.0	37.9			18.1	10.3	7.9	109.4	
Level of Service		D		F	D			B	B	A	F	
Approach Delay (s)		37.6			77.1			17.0			109.0	
Approach LOS		D			E			B			F	

Intersection Summary			
HCM 2000 Control Delay	80.6	HCM 2000 Level of Service	F
HCM 2000 Volume to Capacity ratio	1.11		
Actuated Cycle Length (s)	130.0	Sum of lost time (s)	13.9
Intersection Capacity Utilization	111.8%	ICU Level of Service	H
Analysis Period (min)	15		
c Critical Lane Group			

Lane Group	SEL	SET	NWT	NWR	SWL
Lane Configurations					
Traffic Volume (vph)	49	553	144	235	531
Future Volume (vph)	49	553	144	235	531
Turn Type	Perm	NA	NA	Perm	Prot
Protected Phases		6	2		8
Permitted Phases	6			2	
Detector Phase	6	6	2	2	8
Switch Phase					
Minimum Initial (s)	50.0	50.0	50.0	50.0	10.0
Minimum Split (s)	56.3	56.3	56.3	56.3	27.3
Total Split (s)	56.3	56.3	56.3	56.3	36.3
Total Split (%)	60.8%	60.8%	60.8%	60.8%	39.2%
Yellow Time (s)	4.6	4.6	4.6	4.6	3.7
All-Red Time (s)	1.7	1.7	1.7	1.7	2.6
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	6.3	6.3	6.3	6.3	6.3
Lead/Lag					
Lead-Lag Optimize?					
Recall Mode	Max	Max	Max	Max	None
Act Effct Green (s)	50.1	50.1	50.1	50.1	20.0
Actuated g/C Ratio	0.61	0.61	0.61	0.61	0.24
v/c Ratio	0.08	0.51	0.14	0.25	0.75
Control Delay	8.4	12.1	8.3	2.0	34.7
Queue Delay	0.0	0.0	0.0	0.0	0.0
Total Delay	8.4	12.1	8.3	2.0	34.7
LOS	A	B	A	A	C
Approach Delay		11.8	4.4		34.7
Approach LOS		B	A		C

Intersection Summary	
Cycle Length: 92.6	
Actuated Cycle Length: 82.7	
Natural Cycle: 85	
Control Type: Actuated-Uncoordinated	
Maximum v/c Ratio: 0.75	
Intersection Signal Delay: 18.7	Intersection LOS: B
Intersection Capacity Utilization 93.8%	ICU Level of Service F
Analysis Period (min) 15	

Splits and Phases: 3: March Road & Dunrobin Road



Lane Group	SEL	SET	NWT	NWR	SWL
Lane Group Flow (vph)	49	553	144	235	591
v/c Ratio	0.08	0.51	0.14	0.25	0.75
Control Delay	8.4	12.1	8.3	2.0	34.7
Queue Delay	0.0	0.0	0.0	0.0	0.0
Total Delay	8.4	12.1	8.3	2.0	34.7
Queue Length 50th (m)	2.9	44.4	8.8	0.0	43.4
Queue Length 95th (m)	8.8	85.0	20.1	9.5	60.0
Internal Link Dist (m)		170.7	206.3		228.2
Turn Bay Length (m)	145.0			140.0	120.0
Base Capacity (vph)	611	1091	1040	929	1179
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	0.08	0.51	0.14	0.25	0.50

Intersection Summary

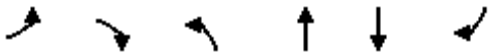
Movement	SEL	SET	NWT	NWR	SWL	SWR
Lane Configurations						
Traffic Volume (vph)	49	553	144	235	531	60
Future Volume (vph)	49	553	144	235	531	60
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800
Total Lost time (s)	6.3	6.3	6.3	6.3	6.3	
Lane Util. Factor	1.00	1.00	1.00	1.00	0.97	
Frt	1.00	1.00	1.00	0.85	0.98	
Flt Protected	0.95	1.00	1.00	1.00	0.96	
Satd. Flow (prot)	1441	1802	1717	1381	3218	
Flt Permitted	0.67	1.00	1.00	1.00	0.96	
Satd. Flow (perm)	1009	1802	1717	1381	3218	
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	49	553	144	235	531	60
RTOR Reduction (vph)	0	0	0	93	11	0
Lane Group Flow (vph)	49	553	144	142	580	0
Heavy Vehicles (%)	20%	1%	6%	12%	3%	7%
Turn Type	Perm	NA	NA	Perm	Prot	
Protected Phases		6	2		8	
Permitted Phases	6			2		
Actuated Green, G (s)	50.1	50.1	50.1	50.1	20.0	
Effective Green, g (s)	50.1	50.1	50.1	50.1	20.0	
Actuated g/C Ratio	0.61	0.61	0.61	0.61	0.24	
Clearance Time (s)	6.3	6.3	6.3	6.3	6.3	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	611	1091	1040	836	778	
v/s Ratio Prot		c0.31	0.08		c0.18	
v/s Ratio Perm	0.05			0.10		
v/c Ratio	0.08	0.51	0.14	0.17	0.75	
Uniform Delay, d1	6.8	9.3	7.0	7.2	29.0	
Progression Factor	1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	0.3	1.7	0.3	0.4	3.9	
Delay (s)	7.0	11.0	7.3	7.6	32.9	
Level of Service	A	B	A	A	C	
Approach Delay (s)		10.6	7.5		32.9	
Approach LOS		B	A		C	

Intersection Summary			
HCM 2000 Control Delay	18.3	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.57		
Actuated Cycle Length (s)	82.7	Sum of lost time (s)	12.6
Intersection Capacity Utilization	93.8%	ICU Level of Service	F
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	62	16	0	55	0	102
Future Volume (Veh/h)	62	16	0	55	0	102
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	62	16	0	55	0	102
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage veh)						
Upstream signal (m)				144		
pX, platoon unblocked						
vC, conflicting volume			78		125	70
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			78		125	70
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			100		100	90
cM capacity (veh/h)			1520		870	993

Direction, Lane #	EB 1	WB 1	NB 1
Volume Total	78	55	102
Volume Left	0	0	0
Volume Right	16	0	102
cSH	1700	1520	993
Volume to Capacity	0.05	0.00	0.10
Queue Length 95th (m)	0.0	0.0	2.6
Control Delay (s)	0.0	0.0	9.0
Lane LOS			A
Approach Delay (s)	0.0	0.0	9.0
Approach LOS			A

Intersection Summary			
Average Delay	3.9		
Intersection Capacity Utilization	17.8%	ICU Level of Service	A
Analysis Period (min)	15		



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	0	78	55	0	0	0
Future Volume (Veh/h)	0	78	55	0	0	0
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	0	78	55	0	0	0
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	110	0	0			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	110	0	0			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	100	93	97			
cM capacity (veh/h)	857	1085	1623			

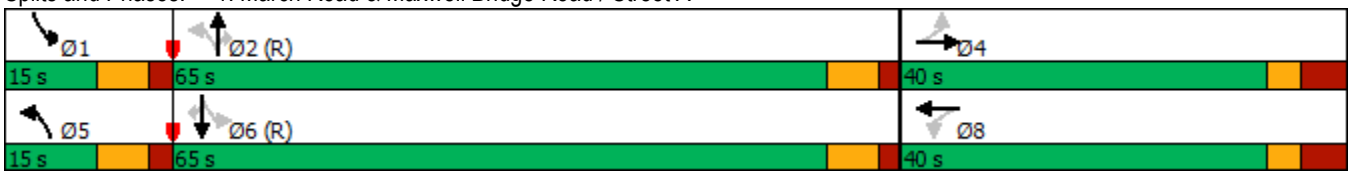
Direction, Lane #	EB 1	NB 1	SB 1
Volume Total	78	55	0
Volume Left	0	55	0
Volume Right	78	0	0
cSH	1085	1623	1700
Volume to Capacity	0.07	0.03	0.00
Queue Length 95th (m)	1.8	0.8	0.0
Control Delay (s)	8.6	7.3	0.0
Lane LOS	A	A	
Approach Delay (s)	8.6	7.3	0.0
Approach LOS	A		

Intersection Summary			
Average Delay	8.0		
Intersection Capacity Utilization	15.1%	ICU Level of Service	A
Analysis Period (min)	15		

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations										
Traffic Volume (vph)	18	59	85	62	184	1615	122	63	711	13
Future Volume (vph)	18	59	85	62	184	1615	122	63	711	13
Turn Type	Perm	NA	Perm	NA	pm+pt	NA	Perm	pm+pt	NA	Perm
Protected Phases		4		8	5	2		1	6	
Permitted Phases	4		8		2		2	6		6
Detector Phase	4	4	8	8	5	2	2	1	6	6
Switch Phase										
Minimum Initial (s)	10.0	10.0	10.0	10.0	7.0	10.0	10.0	7.0	10.0	10.0
Minimum Split (s)	39.3	39.3	39.3	39.3	13.7	34.6	34.6	13.7	34.6	34.6
Total Split (s)	40.0	40.0	40.0	40.0	15.0	65.0	65.0	15.0	65.0	65.0
Total Split (%)	33.3%	33.3%	33.3%	33.3%	12.5%	54.2%	54.2%	12.5%	54.2%	54.2%
Yellow Time (s)	3.0	3.0	3.0	3.0	4.6	4.6	4.6	4.6	4.6	4.6
All-Red Time (s)	4.3	4.3	4.3	4.3	2.1	2.0	2.0	2.1	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)	7.3	7.3	7.3	7.3	6.7	6.6	6.6	6.7	6.6	6.6
Lead/Lag					Lead	Lag	Lag	Lead	Lag	Lag
Lead-Lag Optimize?					Yes	Yes	Yes	Yes	Yes	Yes
Recall Mode	None	None	None	None	None	C-Max	C-Max	None	C-Max	C-Max
Act Effct Green (s)	14.4	14.4	14.4	14.4	87.9	80.2	80.2	83.2	75.8	75.8
Actuated g/C Ratio	0.12	0.12	0.12	0.12	0.73	0.67	0.67	0.69	0.63	0.63
v/c Ratio	0.16	0.47	0.59	0.62	0.34	0.71	0.11	0.29	0.33	0.01
Control Delay	48.2	40.5	66.0	40.2	6.1	16.4	3.1	8.2	11.6	0.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	48.2	40.5	66.0	40.2	6.1	16.4	3.1	8.2	11.6	0.0
LOS	D	D	E	D	A	B	A	A	B	A
Approach Delay		41.6		49.2		14.6			11.1	
Approach LOS		D		D		B			B	

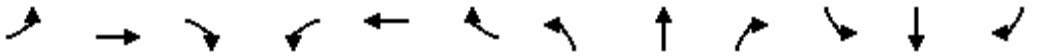
Intersection Summary	
Cycle Length: 120	
Actuated Cycle Length: 120	
Offset: 18 (15%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green	
Natural Cycle: 110	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.71	
Intersection Signal Delay: 17.5	Intersection LOS: B
Intersection Capacity Utilization 85.9%	ICU Level of Service E
Analysis Period (min) 15	

Splits and Phases: 1: March Road & Maxwell Bridge Road / Street A



Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	18	103	85	157	184	1615	122	63	711	13
v/c Ratio	0.16	0.47	0.59	0.62	0.34	0.71	0.11	0.29	0.33	0.01
Control Delay	48.2	40.5	66.0	40.2	6.1	16.4	3.1	8.2	11.6	0.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	48.2	40.5	66.0	40.2	6.1	16.4	3.1	8.2	11.6	0.0
Queue Length 50th (m)	3.9	15.9	19.4	21.1	9.5	120.6	1.7	3.0	37.2	0.0
Queue Length 95th (m)	10.4	31.6	34.2	40.9	19.7	182.3	10.0	7.9	59.9	0.0
Internal Link Dist (m)		119.5		192.3		117.5			169.9	
Turn Bay Length (m)	68.0		76.0		91.0			120.0		
Base Capacity (vph)	262	452	325	491	545	2289	1067	236	2142	1014
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	0.07	0.23	0.26	0.32	0.34	0.71	0.11	0.27	0.33	0.01

Intersection Summary



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	18	59	44	85	62	95	184	1615	122	63	711	13
Future Volume (vph)	18	59	44	85	62	95	184	1615	122	63	711	13
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Total Lost time (s)	7.3	7.3		7.3	7.3		6.7	6.6	6.6	6.7	6.6	6.6
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	0.95	1.00	1.00	0.95	1.00
Frt	1.00	0.94		1.00	0.91		1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1729	1579		1647	1635		1729	3424	1547	1729	3390	1547
Flt Permitted	0.53	1.00		0.69	1.00		0.34	1.00	1.00	0.10	1.00	1.00
Satd. Flow (perm)	965	1579		1197	1635		624	3424	1547	180	3390	1547
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	18	59	44	85	62	95	184	1615	122	63	711	13
RTOR Reduction (vph)	0	27	0	0	55	0	0	0	34	0	0	5
Lane Group Flow (vph)	18	76	0	85	102	0	184	1615	88	63	711	8
Heavy Vehicles (%)	0%	10%	5%	5%	3%	0%	0%	1%	0%	0%	2%	0%
Turn Type	Perm	NA		Perm	NA		pm+pt	NA	Perm	pm+pt	NA	Perm
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4			8			2		2	6		6
Actuated Green, G (s)	14.4	14.4		14.4	14.4		88.0	78.9	78.9	82.0	75.9	75.9
Effective Green, g (s)	14.4	14.4		14.4	14.4		88.0	78.9	78.9	82.0	75.9	75.9
Actuated g/C Ratio	0.12	0.12		0.12	0.12		0.73	0.66	0.66	0.68	0.63	0.63
Clearance Time (s)	7.3	7.3		7.3	7.3		6.7	6.6	6.6	6.7	6.6	6.6
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	115	189		143	196		541	2251	1017	201	2144	978
v/s Ratio Prot		0.05			0.06		c0.03	c0.47		0.02	0.21	
v/s Ratio Perm	0.02			c0.07			0.22		0.06	0.20		0.01
v/c Ratio	0.16	0.40		0.59	0.52		0.34	0.72	0.09	0.31	0.33	0.01
Uniform Delay, d1	47.4	48.8		50.0	49.5		5.1	13.3	7.5	10.2	10.3	8.1
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	0.6	1.4		6.5	2.3		0.4	2.0	0.2	0.9	0.4	0.0
Delay (s)	48.0	50.2		56.5	51.9		5.5	15.3	7.6	11.1	10.7	8.2
Level of Service	D	D		E	D		A	B	A	B	B	A
Approach Delay (s)		49.9			53.5			13.9			10.7	
Approach LOS		D			D			B			B	

Intersection Summary			
HCM 2000 Control Delay	17.6	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.69		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	20.6
Intersection Capacity Utilization	85.9%	ICU Level of Service	E
Analysis Period (min)	15		
c Critical Lane Group			

Lane Group	EBT	WBL	WBT	NBT	NBR	SBL	SBT
Lane Configurations							
Traffic Volume (vph)	22	174	12	1417	312	16	613
Future Volume (vph)	22	174	12	1417	312	16	613
Turn Type	NA	Perm	NA	NA	Perm	Perm	NA
Protected Phases	4		8	2			6
Permitted Phases		8			2	6	
Detector Phase	4	8	8	2	2	6	6
Switch Phase							
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Minimum Split (s)	39.3	25.3	25.3	35.9	35.9	38.6	38.6
Total Split (s)	40.0	40.0	40.0	90.0	90.0	90.0	90.0
Total Split (%)	30.8%	30.8%	30.8%	69.2%	69.2%	69.2%	69.2%
Yellow Time (s)	3.0	3.0	3.0	4.6	4.6	4.6	4.6
All-Red Time (s)	4.3	4.3	4.3	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
Total Lost Time (s)	7.3	7.3	7.3	6.6	6.6	6.6	6.6
Lead/Lag							
Lead-Lag Optimize?							
Recall Mode	None	None	None	C-Max	C-Max	C-Max	C-Max
Act Effct Green (s)	22.8	22.8	22.8	93.3	93.3	93.3	93.3
Actuated g/C Ratio	0.18	0.18	0.18	0.72	0.72	0.72	0.72
v/c Ratio	0.08	0.77	0.05	1.10	0.27	0.29	0.48
Control Delay	41.9	72.3	35.1	76.2	2.9	25.2	10.4
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	41.9	72.3	35.1	76.2	2.9	25.2	10.4
LOS	D	E	D	E	A	C	B
Approach Delay	41.9		69.3	63.0			10.7
Approach LOS	D		E	E			B

Intersection Summary	
Cycle Length: 130	
Actuated Cycle Length: 130	
Offset: 13 (10%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green	
Natural Cycle: 150	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 1.10	
Intersection Signal Delay: 50.5	Intersection LOS: D
Intersection Capacity Utilization 107.1%	ICU Level of Service G
Analysis Period (min) 15	

Splits and Phases: 2: Street A & March Road

Lane Group	EBT	WBL	WBT	NBT	NBR	SBL	SBT
Lane Group Flow (vph)	22	174	15	1417	312	16	613
v/c Ratio	0.08	0.77	0.05	1.10	0.27	0.29	0.48
Control Delay	41.9	72.3	35.1	76.2	2.9	25.2	10.4
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	41.9	72.3	35.1	76.2	2.9	25.2	10.4
Queue Length 50th (m)	4.8	43.0	2.6	~410.4	6.5	1.3	60.8
Queue Length 95th (m)	11.5	63.3	8.2	#523.0	19.2	9.3	106.1
Internal Link Dist (m)	124.2		210.3	416.7			287.3
Turn Bay Length (m)		156.0			90.0	105.0	
Base Capacity (vph)	416	323	435	1293	1171	55	1280
Starvation Cap Reductn	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0
Reduced v/c Ratio	0.05	0.54	0.03	1.10	0.27	0.29	0.48

Intersection Summary

~ 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.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	22	0	174	12	3	0	1417	312	16	613	0
Future Volume (vph)	0	22	0	174	12	3	0	1417	312	16	613	0
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Total Lost time (s)		7.3		7.3	7.3			6.6	6.6	6.6	6.6	
Lane Util. Factor		1.00		1.00	1.00			1.00	1.00	1.00	1.00	
Frt		1.00		1.00	0.97			1.00	0.85	1.00	1.00	
Flt Protected		1.00		0.95	1.00			1.00	1.00	0.95	1.00	
Satd. Flow (prot)		1655		1647	1724			1802	1547	1729	1784	
Flt Permitted		1.00		0.74	1.00			1.00	1.00	0.04	1.00	
Satd. Flow (perm)		1655		1288	1724			1802	1547	78	1784	
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	0	22	0	174	12	3	0	1417	312	16	613	0
RTOR Reduction (vph)	0	0	0	0	2	0	0	0	62	0	0	0
Lane Group Flow (vph)	0	22	0	174	13	0	0	1417	250	16	613	0
Heavy Vehicles (%)	0%	10%	5%	5%	3%	0%	0%	1%	0%	0%	2%	0%
Turn Type	Perm	NA		Perm	NA		Perm	NA	Perm	Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2		2	6		
Actuated Green, G (s)		22.8		22.8	22.8			93.3	93.3	93.3	93.3	
Effective Green, g (s)		22.8		22.8	22.8			93.3	93.3	93.3	93.3	
Actuated g/C Ratio		0.18		0.18	0.18			0.72	0.72	0.72	0.72	
Clearance Time (s)		7.3		7.3	7.3			6.6	6.6	6.6	6.6	
Vehicle Extension (s)		3.0		3.0	3.0			3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)		290		225	302			1293	1110	55	1280	
v/s Ratio Prot		0.01			0.01			c0.79			0.34	
v/s Ratio Perm				c0.14					0.16	0.21		
v/c Ratio		0.08		0.77	0.04			1.10	0.23	0.29	0.48	
Uniform Delay, d1		44.8		51.1	44.5			18.4	6.2	6.5	7.9	
Progression Factor		1.00		1.00	1.00			1.00	1.00	1.00	1.00	
Incremental Delay, d2		0.1		15.2	0.1			55.5	0.5	12.9	1.3	
Delay (s)		44.9		66.3	44.6			73.9	6.7	19.5	9.2	
Level of Service		D		E	D			E	A	B	A	
Approach Delay (s)		44.9			64.6			61.7			9.4	
Approach LOS		D			E			E			A	

Intersection Summary			
HCM 2000 Control Delay	49.0	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	1.03		
Actuated Cycle Length (s)	130.0	Sum of lost time (s)	13.9
Intersection Capacity Utilization	107.1%	ICU Level of Service	G
Analysis Period (min)	15		
c Critical Lane Group			

Lane Group	SEL	SET	NWT	NWR	SWL
Lane Configurations					
Traffic Volume (vph)	36	220	574	593	241
Future Volume (vph)	36	220	574	593	241
Turn Type	pm+pt	NA	NA	Perm	Prot
Protected Phases	1	6	2		8
Permitted Phases	6			2	
Detector Phase	1	6	2	2	8
Switch Phase					
Minimum Initial (s)	5.0	50.0	50.0	50.0	10.0
Minimum Split (s)	11.3	56.3	56.3	56.3	27.3
Total Split (s)	21.3	77.7	56.3	56.3	36.3
Total Split (%)	18.7%	68.2%	49.4%	49.4%	31.8%
Yellow Time (s)	4.6	4.6	4.6	4.6	3.7
All-Red Time (s)	1.7	1.7	1.7	1.7	2.6
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	6.3	6.3	6.3	6.3	6.3
Lead/Lag	Lead		Lag	Lag	
Lead-Lag Optimize?	Yes		Yes	Yes	
Recall Mode	None	Max	Max	Max	None
Act Effct Green (s)	71.5	71.5	63.9	63.9	14.1
Actuated g/C Ratio	0.73	0.73	0.65	0.65	0.14
v/c Ratio	0.07	0.17	0.49	0.49	0.66
Control Delay	4.6	4.9	12.4	2.4	42.1
Queue Delay	0.0	0.0	0.0	0.0	0.0
Total Delay	4.6	4.9	12.4	2.4	42.1
LOS	A	A	B	A	D
Approach Delay		4.8	7.3		42.1
Approach LOS		A	A		D

Intersection Summary	
Cycle Length: 114	
Actuated Cycle Length: 98.2	
Natural Cycle: 95	
Control Type: Actuated-Uncoordinated	
Maximum v/c Ratio: 0.66	
Intersection Signal Delay: 13.3	Intersection LOS: B
Intersection Capacity Utilization 61.9%	ICU Level of Service B
Analysis Period (min) 15	

Splits and Phases: 3: March Road & Dunrobin Road

Lane Group	SEL	SET	NWT	NWR	SWL
Lane Group Flow (vph)	36	220	574	593	315
v/c Ratio	0.07	0.17	0.49	0.49	0.66
Control Delay	4.6	4.9	12.4	2.4	42.1
Queue Delay	0.0	0.0	0.0	0.0	0.0
Total Delay	4.6	4.9	12.4	2.4	42.1
Queue Length 50th (m)	1.6	11.0	58.7	0.0	26.0
Queue Length 95th (m)	4.8	21.4	99.1	14.0	39.5
Internal Link Dist (m)		170.7	206.3		228.2
Turn Bay Length (m)	145.0			140.0	120.0
Base Capacity (vph)	601	1310	1173	1204	970
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	0.06	0.17	0.49	0.49	0.32

Intersection Summary

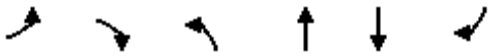
Movement	SEL	SET	NWT	NWR	SWL	SWR
Lane Configurations						
Traffic Volume (vph)	36	220	574	593	241	74
Future Volume (vph)	36	220	574	593	241	74
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800
Total Lost time (s)	6.3	6.3	6.3	6.3	6.3	
Lane Util. Factor	1.00	1.00	1.00	1.00	0.97	
Frt	1.00	1.00	1.00	0.85	0.96	
Flt Protected	0.95	1.00	1.00	1.00	0.96	
Satd. Flow (prot)	1679	1802	1802	1532	3093	
Flt Permitted	0.34	1.00	1.00	1.00	0.96	
Satd. Flow (perm)	598	1802	1802	1532	3093	
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	36	220	574	593	241	74
RTOR Reduction (vph)	0	0	0	216	31	0
Lane Group Flow (vph)	36	220	574	377	284	0
Heavy Vehicles (%)	3%	1%	1%	1%	7%	3%
Turn Type	pm+pt	NA	NA	Perm	Prot	
Protected Phases	1	6	2		8	
Permitted Phases	6			2		
Actuated Green, G (s)	74.1	74.1	64.0	64.0	14.1	
Effective Green, g (s)	74.1	74.1	64.0	64.0	14.1	
Actuated g/C Ratio	0.74	0.74	0.63	0.63	0.14	
Clearance Time (s)	6.3	6.3	6.3	6.3	6.3	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	480	1324	1144	972	432	
v/s Ratio Prot	0.00	c0.12	c0.32		c0.09	
v/s Ratio Perm	0.05			0.25		
v/c Ratio	0.07	0.17	0.50	0.39	0.66	
Uniform Delay, d1	5.2	4.0	9.9	8.9	41.1	
Progression Factor	1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	0.1	0.3	1.6	1.2	3.6	
Delay (s)	5.2	4.3	11.4	10.1	44.7	
Level of Service	A	A	B	B	D	
Approach Delay (s)		4.4	10.7		44.7	
Approach LOS		A	B		D	

Intersection Summary			
HCM 2000 Control Delay	16.0	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.52		
Actuated Cycle Length (s)	100.8	Sum of lost time (s)	18.9
Intersection Capacity Utilization	61.9%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	14	0	0	259	0	107
Future Volume (Veh/h)	14	0	0	259	0	107
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	14	0	0	259	0	107
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage veh)						
Upstream signal (m)				144		
pX, platoon unblocked					0.98	
vC, conflicting volume			14		273	14
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			14		250	14
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			100		100	90
cM capacity (veh/h)			1604		725	1066

Direction, Lane #	EB 1	WB 1	NB 1
Volume Total	14	259	107
Volume Left	0	0	0
Volume Right	0	0	107
cSH	1700	1604	1066
Volume to Capacity	0.01	0.00	0.10
Queue Length 95th (m)	0.0	0.0	2.5
Control Delay (s)	0.0	0.0	8.8
Lane LOS			A
Approach Delay (s)	0.0	0.0	8.8
Approach LOS			A

Intersection Summary			
Average Delay	2.5		
Intersection Capacity Utilization	28.0%	ICU Level of Service	A
Analysis Period (min)	15		



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	0	14	259	0	0	0
Future Volume (Veh/h)	0	14	259	0	0	0
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	0	14	259	0	0	0
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	518	0	0			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	518	0	0			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	100	99	84			
cM capacity (veh/h)	435	1085	1623			

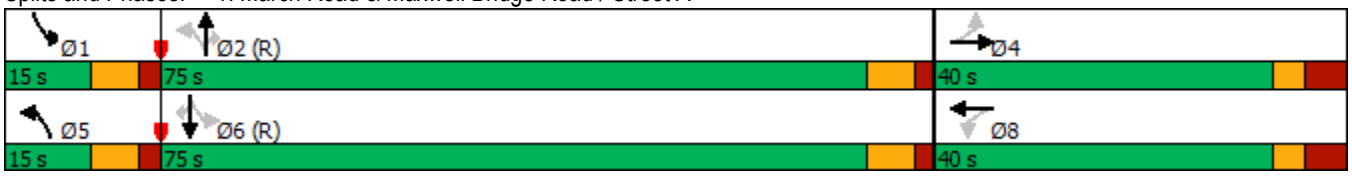
Direction, Lane #	EB 1	NB 1	SB 1
Volume Total	14	259	0
Volume Left	0	259	0
Volume Right	14	0	0
cSH	1085	1623	1700
Volume to Capacity	0.01	0.16	0.00
Queue Length 95th (m)	0.3	4.3	0.0
Control Delay (s)	8.4	7.6	0.0
Lane LOS	A	A	
Approach Delay (s)	8.4	7.6	0.0
Approach LOS	A		

Intersection Summary			
Average Delay	7.7		
Intersection Capacity Utilization	25.1%	ICU Level of Service	A
Analysis Period (min)	15		

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations										
Traffic Volume (vph)	22	40	134	17	103	614	65	73	1769	13
Future Volume (vph)	22	40	134	17	103	614	65	73	1769	13
Turn Type	Perm	NA	Perm	NA	pm+pt	NA	Perm	pm+pt	NA	Perm
Protected Phases		4		8	5	2		1	6	
Permitted Phases	4		8		2		2	6		6
Detector Phase	4	4	8	8	5	2	2	1	6	6
Switch Phase										
Minimum Initial (s)	10.0	10.0	10.0	10.0	7.0	10.0	10.0	7.0	10.0	10.0
Minimum Split (s)	39.3	39.3	39.3	39.3	13.7	34.6	34.6	13.7	34.6	34.6
Total Split (s)	40.0	40.0	40.0	40.0	15.0	75.0	75.0	15.0	75.0	75.0
Total Split (%)	30.8%	30.8%	30.8%	30.8%	11.5%	57.7%	57.7%	11.5%	57.7%	57.7%
Yellow Time (s)	3.0	3.0	3.0	3.0	4.6	4.6	4.6	4.6	4.6	4.6
All-Red Time (s)	4.3	4.3	4.3	4.3	2.1	2.0	2.0	2.1	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)	7.3	7.3	7.3	7.3	6.7	6.6	6.6	6.7	6.6	6.6
Lead/Lag					Lead	Lag	Lag	Lead	Lag	Lag
Lead-Lag Optimize?					Yes	Yes	Yes	Yes	Yes	Yes
Recall Mode	None	None	None	None	None	C-Max	C-Max	None	C-Max	C-Max
Act Effct Green (s)	29.9	29.9	29.9	29.9	81.1	74.6	74.6	79.0	71.5	71.5
Actuated g/C Ratio	0.23	0.23	0.23	0.23	0.62	0.57	0.57	0.61	0.55	0.55
v/c Ratio	0.07	0.68	1.02	0.11	0.69	0.35	0.07	0.15	0.95	0.02
Control Delay	38.1	33.9	131.8	20.6	48.3	16.8	1.4	5.6	18.5	0.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	38.1	33.9	131.8	20.6	48.3	16.8	1.4	5.6	18.5	0.0
LOS	D	C	F	C	D	B	A	A	B	A
Approach Delay		34.1		105.3		19.7			17.9	
Approach LOS		C		F		B			B	

Intersection Summary	
Cycle Length: 130	
Actuated Cycle Length: 130	
Offset: 29 (22%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green	
Natural Cycle: 120	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 1.02	
Intersection Signal Delay: 24.9	Intersection LOS: C
Intersection Capacity Utilization 108.8%	ICU Level of Service G
Analysis Period (min) 15	

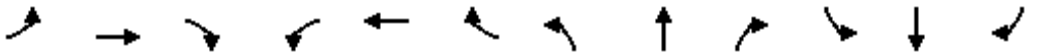
Splits and Phases: 1: March Road & Maxwell Bridge Road / Street A



Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	22	307	134	42	103	614	65	73	1769	13
v/c Ratio	0.07	0.68	1.02	0.11	0.69	0.35	0.07	0.15	0.95	0.02
Control Delay	38.1	33.9	131.8	20.6	48.3	16.8	1.4	5.6	18.5	0.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	38.1	33.9	131.8	20.6	48.3	16.8	1.4	5.6	18.5	0.0
Queue Length 50th (m)	4.3	41.2	33.7	3.3	12.6	46.6	0.0	4.2	184.5	0.0
Queue Length 95th (m)	11.5	73.1	#73.8	12.7	#38.7	60.7	3.6	m4.1	m98.7	m0.0
Internal Link Dist (m)		119.5		192.3		117.5			141.3	
Turn Bay Length (m)	68.0		76.0		91.0			120.0		
Base Capacity (vph)	334	480	144	414	152	1772	876	501	1864	829
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	0.07	0.64	0.93	0.10	0.68	0.35	0.07	0.15	0.95	0.02

Intersection Summary

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.



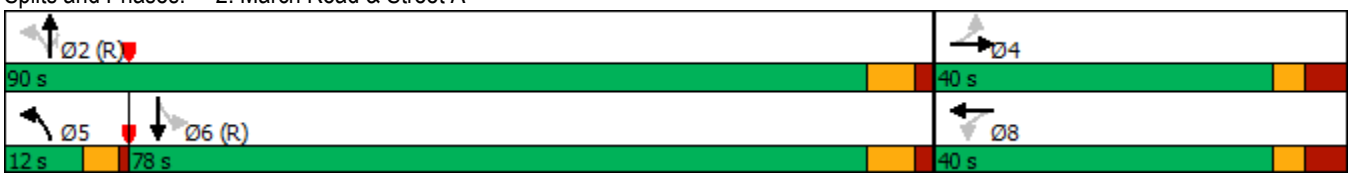
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	22	40	267	134	17	25	103	614	65	73	1769	13
Future Volume (vph)	22	40	267	134	17	25	103	614	65	73	1769	13
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Total Lost time (s)	7.3	7.3		7.3	7.3		6.7	6.6	6.6	6.7	6.6	6.6
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	0.95	1.00	1.00	0.95	1.00
Frt	1.00	0.87		1.00	0.91		1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1729	1528		1712	1573		1586	3088	1459	1712	3390	1432
Flt Permitted	0.73	1.00		0.32	1.00		0.05	1.00	1.00	0.40	1.00	1.00
Satd. Flow (perm)	1328	1528		574	1573		91	3088	1459	713	3390	1432
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	22	40	267	134	17	25	103	614	65	73	1769	13
RTOR Reduction (vph)	0	99	0	0	19	0	0	0	28	0	0	6
Lane Group Flow (vph)	22	208	0	134	23	0	103	614	37	73	1769	7
Heavy Vehicles (%)	0%	14%	2%	1%	0%	9%	9%	12%	6%	1%	2%	8%
Turn Type	Perm	NA		Perm	NA		pm+pt	NA	Perm	pm+pt	NA	Perm
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4			8			2		2	6		6
Actuated Green, G (s)	29.9	29.9		29.9	29.9		81.3	73.3	73.3	77.7	71.5	71.5
Effective Green, g (s)	29.9	29.9		29.9	29.9		81.3	73.3	73.3	77.7	71.5	71.5
Actuated g/C Ratio	0.23	0.23		0.23	0.23		0.63	0.56	0.56	0.60	0.55	0.55
Clearance Time (s)	7.3	7.3		7.3	7.3		6.7	6.6	6.6	6.7	6.6	6.6
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	305	351		132	361		148	1741	822	473	1864	787
v/s Ratio Prot		0.14			0.01		c0.04	0.20		0.01	c0.52	
v/s Ratio Perm	0.02			c0.23			0.39		0.03	0.08		0.00
v/c Ratio	0.07	0.59		1.02	0.06		0.70	0.35	0.04	0.15	0.95	0.01
Uniform Delay, d1	39.2	44.6		50.1	39.1		30.0	15.4	12.7	11.1	27.5	13.2
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00	1.00	0.63	0.55	1.00
Incremental Delay, d2	0.1	2.7		82.4	0.1		13.3	0.6	0.1	0.0	1.5	0.0
Delay (s)	39.3	47.3		132.5	39.2		43.3	16.0	12.8	7.0	16.8	13.2
Level of Service	D	D		F	D		D	B	B	A	B	B
Approach Delay (s)		46.8			110.2			19.3			16.3	
Approach LOS		D			F			B			B	

Intersection Summary			
HCM 2000 Control Delay	25.5	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.95		
Actuated Cycle Length (s)	130.0	Sum of lost time (s)	20.6
Intersection Capacity Utilization	108.8%	ICU Level of Service	G
Analysis Period (min)	15		
c Critical Lane Group			

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	NBR	SBL	SBT
Lane Configurations									
Traffic Volume (vph)	23	6	304	14	72	501	89	5	1368
Future Volume (vph)	23	6	304	14	72	501	89	5	1368
Turn Type	Perm	NA	Perm	NA	pm+pt	NA	Perm	Perm	NA
Protected Phases		4		8	5	2			6
Permitted Phases	4		8		2		2	6	
Detector Phase	4	4	8	8	5	2	2	6	6
Switch Phase									
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Minimum Split (s)	39.3	39.3	25.3	25.3	9.5	35.9	35.9	38.6	38.6
Total Split (s)	40.0	40.0	40.0	40.0	12.0	90.0	90.0	78.0	78.0
Total Split (%)	30.8%	30.8%	30.8%	30.8%	9.2%	69.2%	69.2%	60.0%	60.0%
Yellow Time (s)	3.0	3.0	3.0	3.0	3.5	4.6	4.6	4.6	4.6
All-Red Time (s)	4.3	4.3	4.3	4.3	1.0	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)	7.3	7.3	7.3	7.3	4.5	6.6	6.6	6.6	6.6
Lead/Lag					Lead			Lag	Lag
Lead-Lag Optimize?					Yes			Yes	Yes
Recall Mode	None	None	None	None	None	C-Max	C-Max	C-Max	C-Max
Act Effct Green (s)	32.7	32.7	32.7	32.7	85.5	83.4	83.4	73.9	73.9
Actuated g/C Ratio	0.25	0.25	0.25	0.25	0.66	0.64	0.64	0.57	0.57
v/c Ratio	0.07	0.32	1.09	0.07	0.52	0.48	0.09	0.01	1.36
Control Delay	37.9	10.3	124.2	22.7	44.4	27.5	6.8	13.4	193.4
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	37.9	10.3	124.2	22.7	44.4	27.5	6.8	13.4	193.4
LOS	D	B	F	C	D	C	A	B	F
Approach Delay		13.9		115.1		26.6			192.8
Approach LOS		B		F		C			F

Intersection Summary	
Cycle Length: 130	
Actuated Cycle Length: 130	
Offset: 128 (98%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green	
Natural Cycle: 150	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 1.36	
Intersection Signal Delay: 127.0	Intersection LOS: F
Intersection Capacity Utilization 121.9%	ICU Level of Service H
Analysis Period (min) 15	

Splits and Phases: 2: March Road & Street A

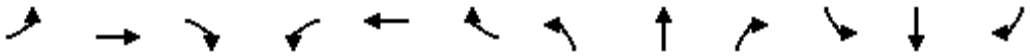


Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	NBR	SBL	SBT
Lane Group Flow (vph)	23	156	304	30	72	501	89	5	1373
v/c Ratio	0.07	0.32	1.09	0.07	0.52	0.48	0.09	0.01	1.36
Control Delay	37.9	10.3	124.2	22.7	44.4	27.5	6.8	13.4	193.4
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	37.9	10.3	124.2	22.7	44.4	27.5	6.8	13.4	193.4
Queue Length 50th (m)	4.5	3.5	~87.2	2.7	14.2	91.4	0.0	0.6	~470.3
Queue Length 95th (m)	11.9	20.8	#143.6	10.6	29.1	129.5	13.3	2.5	#551.2
Internal Link Dist (m)		124.2		210.3		416.7			287.3
Turn Bay Length (m)	37.5		156.0		90.0		90.0	105.0	
Base Capacity (vph)	337	485	280	413	143	1042	967	484	1013
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	0.07	0.32	1.09	0.07	0.50	0.48	0.09	0.01	1.36

Intersection Summary

~ 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.



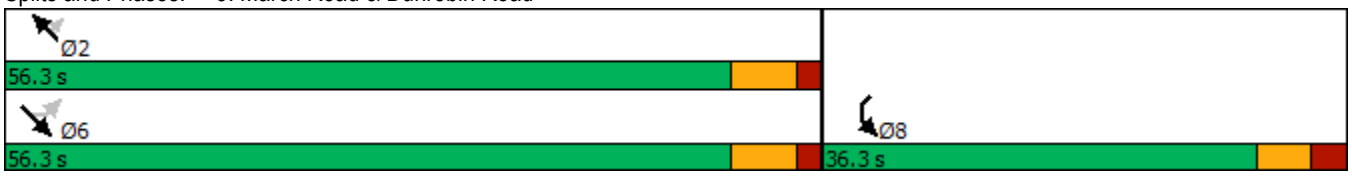
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	23	6	150	304	14	16	72	501	89	5	1368	5
Future Volume (vph)	23	6	150	304	14	16	72	501	89	5	1368	5
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Total Lost time (s)	7.3	7.3		7.3	7.3		4.5	6.6	6.6	6.6	6.6	
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	1.00	1.00	1.00	1.00	
Frt	1.00	0.86		1.00	0.92		1.00	1.00	0.85	1.00	1.00	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)	1729	1520		1712	1598		1586	1625	1459	1712	1783	
Flt Permitted	0.74	1.00		0.62	1.00		0.05	1.00	1.00	0.47	1.00	
Satd. Flow (perm)	1342	1520		1116	1598		86	1625	1459	853	1783	
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	23	6	150	304	14	16	72	501	89	5	1368	5
RTOR Reduction (vph)	0	103	0	0	12	0	0	0	32	0	0	0
Lane Group Flow (vph)	23	53	0	304	18	0	72	501	57	5	1373	0
Heavy Vehicles (%)	0%	14%	2%	1%	0%	9%	9%	12%	6%	1%	2%	8%
Turn Type	Perm	NA		Perm	NA		pm+pt	NA	Perm	Perm	NA	
Protected Phases		4			8		5	2			6	
Permitted Phases	4			8			2		2	6		
Actuated Green, G (s)	32.7	32.7		32.7	32.7		83.4	83.4	83.4	73.0	73.0	
Effective Green, g (s)	32.7	32.7		32.7	32.7		83.4	83.4	83.4	73.0	73.0	
Actuated g/C Ratio	0.25	0.25		0.25	0.25		0.64	0.64	0.64	0.56	0.56	
Clearance Time (s)	7.3	7.3		7.3	7.3		4.5	6.6	6.6	6.6	6.6	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	337	382		280	401		123	1042	936	478	1001	
v/s Ratio Prot		0.03			0.01		0.03	c0.31			c0.77	
v/s Ratio Perm	0.02			c0.27			0.35		0.04	0.01		
v/c Ratio	0.07	0.14		1.09	0.04		0.59	0.48	0.06	0.01	1.37	
Uniform Delay, d1	37.0	37.7		48.6	36.8		30.5	12.1	8.7	12.6	28.5	
Progression Factor	1.00	1.00		1.00	1.00		2.04	2.10	3.75	1.00	1.00	
Incremental Delay, d2	0.1	0.2		78.6	0.0		6.7	1.5	0.1	0.0	173.6	
Delay (s)	37.1	37.9		127.2	36.9		68.8	26.9	32.7	12.6	202.1	
Level of Service	D	D		F	D		E	C	C	B	F	
Approach Delay (s)		37.8			119.1			32.2			201.4	
Approach LOS		D			F			C			F	

Intersection Summary			
HCM 2000 Control Delay	135.3	HCM 2000 Level of Service	F
HCM 2000 Volume to Capacity ratio	1.25		
Actuated Cycle Length (s)	130.0	Sum of lost time (s)	18.4
Intersection Capacity Utilization	121.9%	ICU Level of Service	H
Analysis Period (min)	15		
c Critical Lane Group			

Lane Group	SEL	SET	NWT	NWR	SWL
Lane Configurations					
Traffic Volume (vph)	49	558	155	246	536
Future Volume (vph)	49	558	155	246	536
Turn Type	Perm	NA	NA	Perm	Prot
Protected Phases		6	2		8
Permitted Phases	6			2	
Detector Phase	6	6	2	2	8
Switch Phase					
Minimum Initial (s)	50.0	50.0	50.0	50.0	10.0
Minimum Split (s)	56.3	56.3	56.3	56.3	27.3
Total Split (s)	56.3	56.3	56.3	56.3	36.3
Total Split (%)	60.8%	60.8%	60.8%	60.8%	39.2%
Yellow Time (s)	4.6	4.6	4.6	4.6	3.7
All-Red Time (s)	1.7	1.7	1.7	1.7	2.6
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	6.3	6.3	6.3	6.3	6.3
Lead/Lag					
Lead-Lag Optimize?					
Recall Mode	Max	Max	Max	Max	None
Act Effct Green (s)	50.1	50.1	50.1	50.1	20.1
Actuated g/C Ratio	0.60	0.60	0.60	0.60	0.24
v/c Ratio	0.08	0.51	0.15	0.26	0.75
Control Delay	8.5	12.3	8.5	2.1	34.8
Queue Delay	0.0	0.0	0.0	0.0	0.0
Total Delay	8.5	12.3	8.5	2.1	34.8
LOS	A	B	A	A	C
Approach Delay		12.0	4.5		34.8
Approach LOS		B	A		C

Intersection Summary	
Cycle Length: 92.6	
Actuated Cycle Length: 82.9	
Natural Cycle: 85	
Control Type: Actuated-Uncoordinated	
Maximum v/c Ratio: 0.75	
Intersection Signal Delay: 18.6	Intersection LOS: B
Intersection Capacity Utilization 93.8%	ICU Level of Service F
Analysis Period (min) 15	

Splits and Phases: 3: March Road & Dunrobin Road



Lane Group	SEL	SET	NWT	NWR	SWL
Lane Group Flow (vph)	49	558	155	246	596
v/c Ratio	0.08	0.51	0.15	0.26	0.75
Control Delay	8.5	12.3	8.5	2.1	34.8
Queue Delay	0.0	0.0	0.0	0.0	0.0
Total Delay	8.5	12.3	8.5	2.1	34.8
Queue Length 50th (m)	2.9	45.2	9.5	0.0	43.9
Queue Length 95th (m)	8.9	86.6	21.7	9.6	60.5
Internal Link Dist (m)		170.7	206.3		228.2
Turn Bay Length (m)	145.0			140.0	120.0
Base Capacity (vph)	604	1090	1038	932	1177
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	0.08	0.51	0.15	0.26	0.51

Intersection Summary

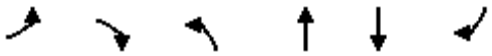
Movement	SEL	SET	NWT	NWR	SWL	SWR
Lane Configurations						
Traffic Volume (vph)	49	558	155	246	536	60
Future Volume (vph)	49	558	155	246	536	60
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800
Total Lost time (s)	6.3	6.3	6.3	6.3	6.3	
Lane Util. Factor	1.00	1.00	1.00	1.00	0.97	
Frt	1.00	1.00	1.00	0.85	0.98	
Flt Protected	0.95	1.00	1.00	1.00	0.96	
Satd. Flow (prot)	1441	1802	1717	1381	3218	
Flt Permitted	0.66	1.00	1.00	1.00	0.96	
Satd. Flow (perm)	999	1802	1717	1381	3218	
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	49	558	155	246	536	60
RTOR Reduction (vph)	0	0	0	97	11	0
Lane Group Flow (vph)	49	558	155	149	585	0
Heavy Vehicles (%)	20%	1%	6%	12%	3%	7%
Turn Type	Perm	NA	NA	Perm	Prot	
Protected Phases		6	2		8	
Permitted Phases	6			2		
Actuated Green, G (s)	50.1	50.1	50.1	50.1	20.1	
Effective Green, g (s)	50.1	50.1	50.1	50.1	20.1	
Actuated g/C Ratio	0.61	0.61	0.61	0.61	0.24	
Clearance Time (s)	6.3	6.3	6.3	6.3	6.3	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	604	1090	1038	835	781	
v/s Ratio Prot		c0.31	0.09		c0.18	
v/s Ratio Perm	0.05			0.11		
v/c Ratio	0.08	0.51	0.15	0.18	0.75	
Uniform Delay, d1	6.8	9.4	7.1	7.2	29.0	
Progression Factor	1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	0.3	1.7	0.3	0.5	4.0	
Delay (s)	7.1	11.1	7.4	7.7	33.0	
Level of Service	A	B	A	A	C	
Approach Delay (s)		10.7	7.6		33.0	
Approach LOS		B	A		C	

Intersection Summary			
HCM 2000 Control Delay	18.2	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.58		
Actuated Cycle Length (s)	82.8	Sum of lost time (s)	12.6
Intersection Capacity Utilization	93.8%	ICU Level of Service	F
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	227	16	0	133	0	102
Future Volume (Veh/h)	227	16	0	133	0	102
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	227	16	0	133	0	102
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage veh)						
Upstream signal (m)				144		
pX, platoon unblocked					1.00	
vC, conflicting volume			243		368	235
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			243		363	235
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			100		100	87
cM capacity (veh/h)			1323		634	804

Direction, Lane #	EB 1	WB 1	NB 1
Volume Total	243	133	102
Volume Left	0	0	0
Volume Right	16	0	102
cSH	1700	1323	804
Volume to Capacity	0.14	0.00	0.13
Queue Length 95th (m)	0.0	0.0	3.3
Control Delay (s)	0.0	0.0	10.1
Lane LOS			B
Approach Delay (s)	0.0	0.0	10.1
Approach LOS			B

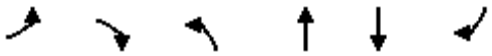
Intersection Summary			
Average Delay	2.2		
Intersection Capacity Utilization	27.0%	ICU Level of Service	A
Analysis Period (min)	15		



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	0	78	55	78	165	0
Future Volume (Veh/h)	0	78	55	78	165	0
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	0	78	55	78	165	0
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	353	165	165			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	353	165	165			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	100	91	96			
cM capacity (veh/h)	620	879	1413			

Direction, Lane #	EB 1	NB 1	SB 1
Volume Total	78	133	165
Volume Left	0	55	0
Volume Right	78	0	0
cSH	879	1413	1700
Volume to Capacity	0.09	0.04	0.10
Queue Length 95th (m)	2.2	0.9	0.0
Control Delay (s)	9.5	3.3	0.0
Lane LOS	A	A	
Approach Delay (s)	9.5	3.3	0.0
Approach LOS	A		

Intersection Summary			
Average Delay	3.2		
Intersection Capacity Utilization	31.8%	ICU Level of Service	A
Analysis Period (min)	15		



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	0	38	0	661	1811	11
Future Volume (Veh/h)	0	38	0	661	1811	11
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	0	38	0	661	1811	11
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (m)				165		
pX, platoon unblocked	0.90					
vC, conflicting volume	2147	911	1822			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	2053	911	1822			
tC, single (s)	6.8	6.9	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	100	86	100			
cM capacity (veh/h)	43	277	332			

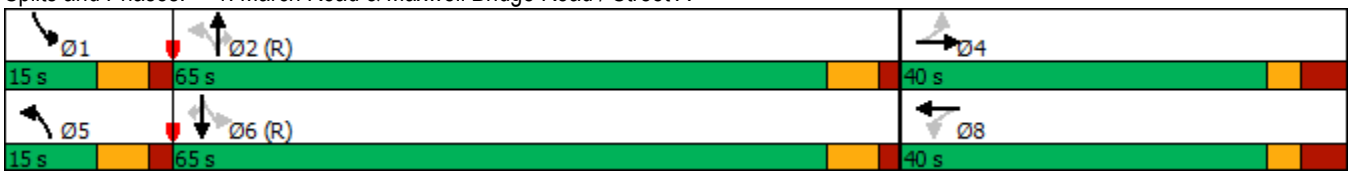
Direction, Lane #	EB 1	NB 1	NB 2	SB 1	SB 2
Volume Total	38	330	330	1207	615
Volume Left	0	0	0	0	0
Volume Right	38	0	0	0	11
cSH	277	1700	1700	1700	1700
Volume to Capacity	0.14	0.19	0.19	0.71	0.36
Queue Length 95th (m)	3.6	0.0	0.0	0.0	0.0
Control Delay (s)	20.1	0.0	0.0	0.0	0.0
Lane LOS	C				
Approach Delay (s)	20.1	0.0		0.0	
Approach LOS	C				

Intersection Summary				
Average Delay	0.3			
Intersection Capacity Utilization	63.2%	ICU Level of Service	B	
Analysis Period (min)	15			

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations										
Traffic Volume (vph)	18	59	85	62	399	1812	122	63	876	13
Future Volume (vph)	18	59	85	62	399	1812	122	63	876	13
Turn Type	Perm	NA	Perm	NA	pm+pt	NA	Perm	pm+pt	NA	Perm
Protected Phases		4		8	5	2		1	6	
Permitted Phases	4		8		2		2	6		6
Detector Phase	4	4	8	8	5	2	2	1	6	6
Switch Phase										
Minimum Initial (s)	10.0	10.0	10.0	10.0	7.0	10.0	10.0	7.0	10.0	10.0
Minimum Split (s)	39.3	39.3	39.3	39.3	13.7	34.6	34.6	13.7	34.6	34.6
Total Split (s)	40.0	40.0	40.0	40.0	15.0	65.0	65.0	15.0	65.0	65.0
Total Split (%)	33.3%	33.3%	33.3%	33.3%	12.5%	54.2%	54.2%	12.5%	54.2%	54.2%
Yellow Time (s)	3.0	3.0	3.0	3.0	4.6	4.6	4.6	4.6	4.6	4.6
All-Red Time (s)	4.3	4.3	4.3	4.3	2.1	2.0	2.0	2.1	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)	7.3	7.3	7.3	7.3	6.7	6.6	6.6	6.7	6.6	6.6
Lead/Lag					Lead	Lag	Lag	Lead	Lag	Lag
Lead-Lag Optimize?					Yes	Yes	Yes	Yes	Yes	Yes
Recall Mode	None	None	None	None	None	C-Max	C-Max	None	C-Max	C-Max
Act Effct Green (s)	17.9	17.9	17.9	17.9	87.7	76.7	76.7	65.8	58.4	58.4
Actuated g/C Ratio	0.15	0.15	0.15	0.15	0.73	0.64	0.64	0.55	0.49	0.49
v/c Ratio	0.12	0.73	1.10	0.53	0.73	0.83	0.12	0.37	0.53	0.02
Control Delay	42.3	34.5	179.0	32.9	19.9	23.3	3.8	17.8	22.8	0.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	42.3	34.5	179.0	32.9	19.9	23.3	3.8	17.8	22.8	0.0
LOS	D	C	F	C	B	C	A	B	C	A
Approach Delay		35.0		84.2		21.7			22.2	
Approach LOS		D		F		C			C	

Intersection Summary	
Cycle Length: 120	
Actuated Cycle Length: 120	
Offset: 18 (15%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green	
Natural Cycle: 120	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 1.10	
Intersection Signal Delay: 26.8	Intersection LOS: C
Intersection Capacity Utilization 105.8%	ICU Level of Service G
Analysis Period (min) 15	

Splits and Phases: 1: March Road & Maxwell Bridge Road / Street A

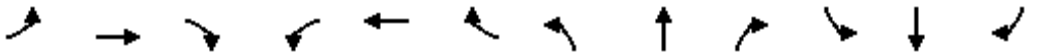


Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	18	248	85	157	399	1812	122	63	876	13
v/c Ratio	0.12	0.73	1.10	0.53	0.73	0.83	0.12	0.37	0.53	0.02
Control Delay	42.3	34.5	179.0	32.9	19.9	23.3	3.8	17.8	22.8	0.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	42.3	34.5	179.0	32.9	19.9	23.3	3.8	17.8	22.8	0.0
Queue Length 50th (m)	3.7	26.3	~23.0	20.3	28.4	167.7	1.9	3.5	72.9	0.0
Queue Length 95th (m)	9.7	50.2	#45.5	38.0	#88.1	#276.6	11.5	11.9	91.3	0.0
Internal Link Dist (m)		119.5		192.3		117.5			134.3	
Turn Bay Length (m)	68.0		76.0		91.0			120.0		
Base Capacity (vph)	281	509	141	491	546	2189	1024	183	1649	804
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	0.49	0.60	0.32	0.73	0.83	0.12	0.34	0.53	0.02

Intersection Summary

~ 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.



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	18	59	189	85	62	95	399	1812	122	63	876	13
Future Volume (vph)	18	59	189	85	62	95	399	1812	122	63	876	13
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Total Lost time (s)	7.3	7.3		7.3	7.3		6.7	6.6	6.6	6.7	6.6	6.6
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	0.95	1.00	1.00	0.95	1.00
Frt	1.00	0.89		1.00	0.91		1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1729	1518		1647	1635		1729	3424	1547	1729	3390	1547
Flt Permitted	0.57	1.00		0.30	1.00		0.22	1.00	1.00	0.07	1.00	1.00
Satd. Flow (perm)	1032	1518		521	1635		397	3424	1547	125	3390	1547
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	18	59	189	85	62	95	399	1812	122	63	876	13
RTOR Reduction (vph)	0	112	0	0	54	0	0	0	37	0	0	7
Lane Group Flow (vph)	18	136	0	85	103	0	399	1812	85	63	876	6
Heavy Vehicles (%)	0%	10%	5%	5%	3%	0%	0%	1%	0%	0%	2%	0%
Turn Type	Perm	NA		Perm	NA		pm+pt	NA	Perm	pm+pt	NA	Perm
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4			8			2		2	6		6
Actuated Green, G (s)	17.9	17.9		17.9	17.9		88.2	75.4	75.4	64.5	58.4	58.4
Effective Green, g (s)	17.9	17.9		17.9	17.9		88.2	75.4	75.4	64.5	58.4	58.4
Actuated g/C Ratio	0.15	0.15		0.15	0.15		0.74	0.63	0.63	0.54	0.49	0.49
Clearance Time (s)	7.3	7.3		7.3	7.3		6.7	6.6	6.6	6.7	6.6	6.6
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	153	226		77	243		548	2151	972	148	1649	752
v/s Ratio Prot		0.09			0.06		c0.14	c0.53		0.02	0.26	
v/s Ratio Perm	0.02			c0.16			0.40		0.05	0.21		0.00
v/c Ratio	0.12	0.60		1.10	0.43		0.73	0.84	0.09	0.43	0.53	0.01
Uniform Delay, d1	44.2	47.7		51.0	46.4		11.5	17.6	8.8	17.4	21.3	15.9
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	0.3	4.4		133.6	1.2		4.8	4.2	0.2	2.0	1.2	0.0
Delay (s)	44.6	52.1		184.7	47.6		16.3	21.8	8.9	19.4	22.6	15.9
Level of Service	D	D		F	D		B	C	A	B	C	B
Approach Delay (s)		51.6			95.7			20.2			22.3	
Approach LOS		D			F			C			C	

Intersection Summary			
HCM 2000 Control Delay	27.7	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.91		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	20.6
Intersection Capacity Utilization	105.8%	ICU Level of Service	G
Analysis Period (min)	15		
c Critical Lane Group			

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	NBR	SBL	SBT
Lane Configurations									
Traffic Volume (vph)	35	22	174	12	212	1402	312	16	620
Future Volume (vph)	35	22	174	12	212	1402	312	16	620
Turn Type	Perm	NA	Perm	NA	pm+pt	NA	Perm	Perm	NA
Protected Phases		4		8	5	2			6
Permitted Phases	4		8		2		2	6	
Detector Phase	4	4	8	8	5	2	2	6	6
Switch Phase									
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Minimum Split (s)	39.3	39.3	25.3	25.3	9.5	35.9	35.9	38.6	38.6
Total Split (s)	40.0	40.0	40.0	40.0	21.0	90.0	90.0	69.0	69.0
Total Split (%)	30.8%	30.8%	30.8%	30.8%	16.2%	69.2%	69.2%	53.1%	53.1%
Yellow Time (s)	3.0	3.0	3.0	3.0	3.5	4.6	4.6	4.6	4.6
All-Red Time (s)	4.3	4.3	4.3	4.3	1.0	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)	7.3	7.3	7.3	7.3	4.5	6.6	6.6	6.6	6.6
Lead/Lag					Lead			Lag	Lag
Lead-Lag Optimize?					Yes			Yes	Yes
Recall Mode	None	None	None	None	None	C-Max	C-Max	C-Max	C-Max
Act Effct Green (s)	25.6	25.6	25.6	25.6	92.6	90.5	90.5	75.0	75.0
Actuated g/C Ratio	0.20	0.20	0.20	0.20	0.71	0.70	0.70	0.58	0.58
v/c Ratio	0.13	0.40	0.88	0.04	0.46	1.12	0.27	0.29	0.62
Control Delay	41.2	12.1	88.5	33.3	10.4	86.1	3.2	36.5	23.6
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	41.2	12.1	88.5	33.3	10.4	86.1	3.2	36.5	23.6
LOS	D	B	F	C	B	F	A	D	C
Approach Delay		17.3		84.1		64.4			23.9
Approach LOS		B		F		E			C

Intersection Summary	
Cycle Length: 130	
Actuated Cycle Length: 130	
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: 53.6	Intersection LOS: D
Intersection Capacity Utilization 125.6%	ICU Level of Service H
Analysis Period (min) 15	

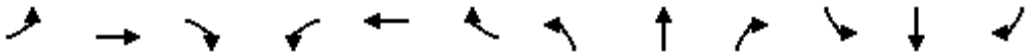
Splits and Phases: 2: Street A & March Road

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	NBR	SBL	SBT
Lane Group Flow (vph)	35	160	174	15	212	1402	312	16	639
v/c Ratio	0.13	0.40	0.88	0.04	0.46	1.12	0.27	0.29	0.62
Control Delay	41.2	12.1	88.5	33.3	10.4	86.1	3.2	36.5	23.6
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	41.2	12.1	88.5	33.3	10.4	86.1	3.2	36.5	23.6
Queue Length 50th (m)	7.4	4.6	43.3	2.5	16.5	~415.7	7.0	2.0	104.4
Queue Length 95th (m)	15.7	21.9	#70.3	8.1	29.9	#518.9	19.5	11.3	173.2
Internal Link Dist (m)		124.2		210.3		416.7			287.3
Turn Bay Length (m)	37.5		165.0		90.0		90.0	105.0	
Base Capacity (vph)	342	480	253	435	509	1254	1144	55	1026
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	0.10	0.33	0.69	0.03	0.42	1.12	0.27	0.29	0.62

Intersection Summary

~ 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.



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	35	22	138	174	12	3	212	1402	312	16	620	19
Future Volume (vph)	35	22	138	174	12	3	212	1402	312	16	620	19
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Total Lost time (s)	7.3	7.3		7.3	7.3		4.5	6.6	6.6	6.6	6.6	
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	1.00	1.00	1.00	1.00	
Frt	1.00	0.87		1.00	0.97		1.00	1.00	0.85	1.00	1.00	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)	1729	1499		1647	1724		1729	1802	1547	1729	1777	
Flt Permitted	0.75	1.00		0.58	1.00		0.27	1.00	1.00	0.05	1.00	
Satd. Flow (perm)	1361	1499		1008	1724		495	1802	1547	97	1777	
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	35	22	138	174	12	3	212	1402	312	16	620	19
RTOR Reduction (vph)	0	111	0	0	2	0	0	0	67	0	1	0
Lane Group Flow (vph)	35	49	0	174	13	0	212	1402	245	16	638	0
Heavy Vehicles (%)	0%	10%	5%	5%	3%	0%	0%	1%	0%	0%	2%	0%
Turn Type	Perm	NA		Perm	NA		pm+pt	NA	Perm	Perm	NA	
Protected Phases		4			8		5	2			6	
Permitted Phases	4			8			2		2	6		
Actuated Green, G (s)	25.6	25.6		25.6	25.6		90.5	90.5	90.5	74.9	74.9	
Effective Green, g (s)	25.6	25.6		25.6	25.6		90.5	90.5	90.5	74.9	74.9	
Actuated g/C Ratio	0.20	0.20		0.20	0.20		0.70	0.70	0.70	0.58	0.58	
Clearance Time (s)	7.3	7.3		7.3	7.3		4.5	6.6	6.6	6.6	6.6	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	268	295		198	339		449	1254	1076	55	1023	
v/s Ratio Prot		0.03			0.01		0.04	c0.78			0.36	
v/s Ratio Perm	0.03			c0.17			0.29		0.16	0.16		
v/c Ratio	0.13	0.17		0.88	0.04		0.47	1.12	0.23	0.29	0.62	
Uniform Delay, d1	43.0	43.3		50.7	42.2		11.1	19.8	7.1	14.0	18.2	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	0.2	0.3		32.7	0.0		0.8	64.3	0.5	12.9	2.9	
Delay (s)	43.2	43.6		83.3	42.3		11.9	84.1	7.6	26.9	21.1	
Level of Service	D	D		F	D		B	F	A	C	C	
Approach Delay (s)		43.5			80.1			63.7			21.2	
Approach LOS		D			F			E			C	

Intersection Summary			
HCM 2000 Control Delay	54.1	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	1.11		
Actuated Cycle Length (s)	130.0	Sum of lost time (s)	18.4
Intersection Capacity Utilization	125.6%	ICU Level of Service	H
Analysis Period (min)	15		
c Critical Lane Group			

Lane Group	SEL	SET	NWT	NWR	SWL
Lane Configurations					
Traffic Volume (vph)	36	234	584	603	254
Future Volume (vph)	36	234	584	603	254
Turn Type	pm+pt	NA	NA	Perm	Prot
Protected Phases	1	6	2		8
Permitted Phases	6			2	
Detector Phase	1	6	2	2	8
Switch Phase					
Minimum Initial (s)	5.0	50.0	50.0	50.0	10.0
Minimum Split (s)	11.3	56.3	56.3	56.3	27.3
Total Split (s)	21.3	77.7	56.3	56.3	36.3
Total Split (%)	18.7%	68.2%	49.4%	49.4%	31.8%
Yellow Time (s)	4.6	4.6	4.6	4.6	3.7
All-Red Time (s)	1.7	1.7	1.7	1.7	2.6
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	6.3	6.3	6.3	6.3	6.3
Lead/Lag	Lead		Lag	Lag	
Lead-Lag Optimize?	Yes		Yes	Yes	
Recall Mode	None	Max	Max	Max	None
Act Effct Green (s)	71.5	71.5	64.0	64.0	14.7
Actuated g/C Ratio	0.72	0.72	0.65	0.65	0.15
v/c Ratio	0.07	0.18	0.50	0.50	0.67
Control Delay	4.8	5.1	12.8	2.5	42.8
Queue Delay	0.0	0.0	0.0	0.0	0.0
Total Delay	4.8	5.1	12.8	2.5	42.8
LOS	A	A	B	A	D
Approach Delay		5.1	7.6		42.8
Approach LOS		A	A		D

Intersection Summary	
Cycle Length: 114	
Actuated Cycle Length: 98.8	
Natural Cycle: 95	
Control Type: Actuated-Uncoordinated	
Maximum v/c Ratio: 0.67	
Intersection Signal Delay: 13.7	Intersection LOS: B
Intersection Capacity Utilization 62.3%	ICU Level of Service B
Analysis Period (min) 15	

Splits and Phases: 3: March Road & Dunrobin Road

Lane Group	SEL	SET	NWT	NWR	SWL
Lane Group Flow (vph)	36	234	584	603	328
v/c Ratio	0.07	0.18	0.50	0.50	0.67
Control Delay	4.8	5.1	12.8	2.5	42.8
Queue Delay	0.0	0.0	0.0	0.0	0.0
Total Delay	4.8	5.1	12.8	2.5	42.8
Queue Length 50th (m)	1.7	12.1	61.4	0.0	27.7
Queue Length 95th (m)	4.9	23.4	103.6	14.2	41.6
Internal Link Dist (m)		170.7	206.3		228.2
Turn Bay Length (m)	145.0			140.0	120.0
Base Capacity (vph)	589	1303	1166	1204	964
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	0.06	0.18	0.50	0.50	0.34

Intersection Summary

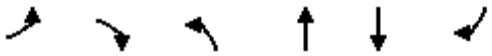
Movement	SEL	SET	NWT	NWR	SWL	SWR
Lane Configurations						
Traffic Volume (vph)	36	234	584	603	254	74
Future Volume (vph)	36	234	584	603	254	74
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800
Total Lost time (s)	6.3	6.3	6.3	6.3	6.3	
Lane Util. Factor	1.00	1.00	1.00	1.00	0.97	
Frt	1.00	1.00	1.00	0.85	0.97	
Flt Protected	0.95	1.00	1.00	1.00	0.96	
Satd. Flow (prot)	1679	1802	1802	1532	3095	
Flt Permitted	0.33	1.00	1.00	1.00	0.96	
Satd. Flow (perm)	584	1802	1802	1532	3095	
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	36	234	584	603	254	74
RTOR Reduction (vph)	0	0	0	222	28	0
Lane Group Flow (vph)	36	234	584	381	300	0
Heavy Vehicles (%)	3%	1%	1%	1%	7%	3%
Turn Type	pm+pt	NA	NA	Perm	Prot	
Protected Phases	1	6	2		8	
Permitted Phases	6			2		
Actuated Green, G (s)	74.1	74.1	64.0	64.0	14.7	
Effective Green, g (s)	74.1	74.1	64.0	64.0	14.7	
Actuated g/C Ratio	0.73	0.73	0.63	0.63	0.14	
Clearance Time (s)	6.3	6.3	6.3	6.3	6.3	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	467	1316	1137	966	448	
v/s Ratio Prot	0.00	c0.13	c0.32		c0.10	
v/s Ratio Perm	0.05			0.25		
v/c Ratio	0.08	0.18	0.51	0.39	0.67	
Uniform Delay, d1	5.4	4.2	10.2	9.2	41.0	
Progression Factor	1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	0.1	0.3	1.7	1.2	3.8	
Delay (s)	5.5	4.5	11.9	10.4	44.8	
Level of Service	A	A	B	B	D	
Approach Delay (s)		4.6	11.1		44.8	
Approach LOS		A	B		D	

Intersection Summary			
HCM 2000 Control Delay	16.3	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.53		
Actuated Cycle Length (s)	101.4	Sum of lost time (s)	18.9
Intersection Capacity Utilization	62.3%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	159	0	0	474	0	107
Future Volume (Veh/h)	159	0	0	474	0	107
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	159	0	0	474	0	107
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage veh)						
Upstream signal (m)				144		
pX, platoon unblocked					0.89	
vC, conflicting volume			159		633	159
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			159		529	159
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			100		100	88
cM capacity (veh/h)			1420		456	886

Direction, Lane #	EB 1	WB 1	NB 1
Volume Total	159	474	107
Volume Left	0	0	0
Volume Right	0	0	107
cSH	1700	1420	886
Volume to Capacity	0.09	0.00	0.12
Queue Length 95th (m)	0.0	0.0	3.1
Control Delay (s)	0.0	0.0	9.6
Lane LOS			A
Approach Delay (s)	0.0	0.0	9.6
Approach LOS			A

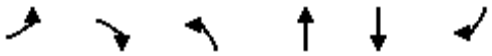
Intersection Summary			
Average Delay	1.4		
Intersection Capacity Utilization	40.0%	ICU Level of Service	A
Analysis Period (min)	15		



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	0	14	259	215	145	0
Future Volume (Veh/h)	0	14	259	215	145	0
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	0	14	259	215	145	0
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	878	145	145			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	878	145	145			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	100	98	82			
cM capacity (veh/h)	261	902	1437			

Direction, Lane #	EB 1	NB 1	SB 1
Volume Total	14	474	145
Volume Left	0	259	0
Volume Right	14	0	0
cSH	902	1437	1700
Volume to Capacity	0.02	0.18	0.09
Queue Length 95th (m)	0.4	5.0	0.0
Control Delay (s)	9.1	5.2	0.0
Lane LOS	A	A	
Approach Delay (s)	9.1	5.2	0.0
Approach LOS	A		

Intersection Summary			
Average Delay	4.1		
Intersection Capacity Utilization	48.5%	ICU Level of Service	A
Analysis Period (min)	15		



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	0	54	0	1925	900	32
Future Volume (Veh/h)	0	54	0	1925	900	32
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	0	54	0	1925	900	32
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (m)				158		
pX, platoon unblocked	0.56					
vC, conflicting volume	1878	466	932			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	989	466	932			
tC, single (s)	6.8	6.9	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	100	90	100			
cM capacity (veh/h)	136	543	730			

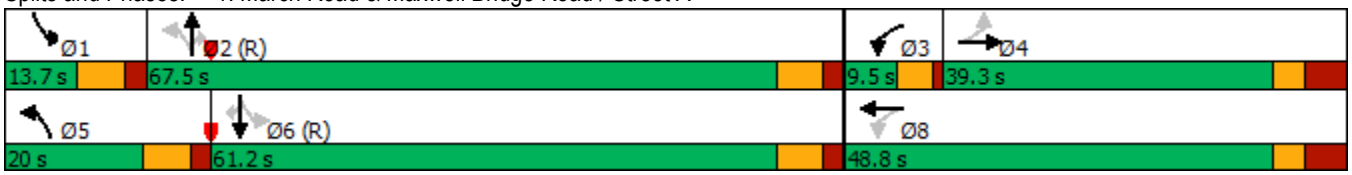
Direction, Lane #	EB 1	NB 1	NB 2	SB 1	SB 2
Volume Total	54	962	962	600	332
Volume Left	0	0	0	0	0
Volume Right	54	0	0	0	32
cSH	543	1700	1700	1700	1700
Volume to Capacity	0.10	0.57	0.57	0.35	0.20
Queue Length 95th (m)	2.5	0.0	0.0	0.0	0.0
Control Delay (s)	12.4	0.0	0.0	0.0	0.0
Lane LOS	B				
Approach Delay (s)	12.4	0.0		0.0	
Approach LOS	B				

Intersection Summary			
Average Delay	0.2		
Intersection Capacity Utilization	59.5%	ICU Level of Service	B
Analysis Period (min)	15		

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations										
Traffic Volume (vph)	18	59	85	62	399	1812	122	63	876	13
Future Volume (vph)	18	59	85	62	399	1812	122	63	876	13
Turn Type	Perm	NA	pm+pt	NA	pm+pt	NA	Perm	pm+pt	NA	Perm
Protected Phases		4	3	8	5	2		1	6	
Permitted Phases	4		8		2		2	6		6
Detector Phase	4	4	3	8	5	2	2	1	6	6
Switch Phase										
Minimum Initial (s)	10.0	10.0	5.0	10.0	7.0	10.0	10.0	7.0	10.0	10.0
Minimum Split (s)	39.3	39.3	9.5	39.3	13.7	34.6	34.6	13.7	34.6	34.6
Total Split (s)	39.3	39.3	9.5	48.8	20.0	67.5	67.5	13.7	61.2	61.2
Total Split (%)	30.2%	30.2%	7.3%	37.5%	15.4%	51.9%	51.9%	10.5%	47.1%	47.1%
Yellow Time (s)	3.0	3.0	3.5	3.0	4.6	4.6	4.6	4.6	4.6	4.6
All-Red Time (s)	4.3	4.3	1.0	4.3	2.1	2.0	2.0	2.1	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)	7.3	7.3	4.5	7.3	6.7	6.6	6.6	6.7	6.6	6.6
Lead/Lag	Lag	Lag	Lead		Lead	Lag	Lag	Lead	Lag	Lag
Lead-Lag Optimize?	Yes	Yes	Yes		Yes	Yes	Yes	Yes	Yes	Yes
Recall Mode	None	None	None	None	None	C-Max	C-Max	None	C-Max	C-Max
Act Effct Green (s)	17.8	17.8	30.1	27.3	88.7	77.1	77.1	62.2	54.6	54.6
Actuated g/C Ratio	0.14	0.14	0.23	0.21	0.68	0.59	0.59	0.48	0.42	0.42
v/c Ratio	0.11	0.80	0.66	0.40	0.76	0.89	0.13	0.40	0.62	0.02
Control Delay	46.8	46.4	64.3	27.9	27.7	31.9	2.8	22.0	40.2	0.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	46.8	46.4	64.3	27.9	27.7	31.9	2.8	22.0	40.2	0.0
LOS	D	D	E	C	C	C	A	C	D	A
Approach Delay		46.4		40.7		29.6			38.5	
Approach LOS		D		D		C			D	

Intersection Summary	
Cycle Length: 130	
Actuated Cycle Length: 130	
Offset: 94 (72%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green	
Natural Cycle: 140	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.89	
Intersection Signal Delay: 33.7	Intersection LOS: C
Intersection Capacity Utilization 100.1%	ICU Level of Service G
Analysis Period (min) 15	

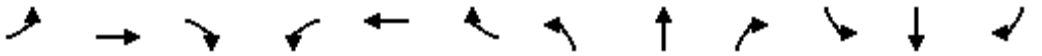
Splits and Phases: 1: March Road & Maxwell Bridge Road / Street A



Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	18	248	85	157	399	1812	122	63	876	13
v/c Ratio	0.11	0.80	0.66	0.40	0.76	0.89	0.13	0.40	0.62	0.02
Control Delay	46.8	46.4	64.3	27.9	27.7	31.9	2.8	22.0	40.2	0.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	46.8	46.4	64.3	27.9	27.7	31.9	2.8	22.0	40.2	0.0
Queue Length 50th (m)	4.1	33.2	17.8	20.7	48.3	207.4	0.0	8.1	113.8	0.0
Queue Length 95th (m)	10.7	58.6	29.3	37.3	#124.4	#317.2	8.9	m13.3	140.5	m0.0
Internal Link Dist (m)		119.5		192.3		117.5			134.3	
Turn Bay Length (m)	68.0		76.0		91.0			120.0		
Base Capacity (vph)	294	462	128	564	524	2030	969	158	1423	725
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	0.54	0.66	0.28	0.76	0.89	0.13	0.40	0.62	0.02

Intersection Summary

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.



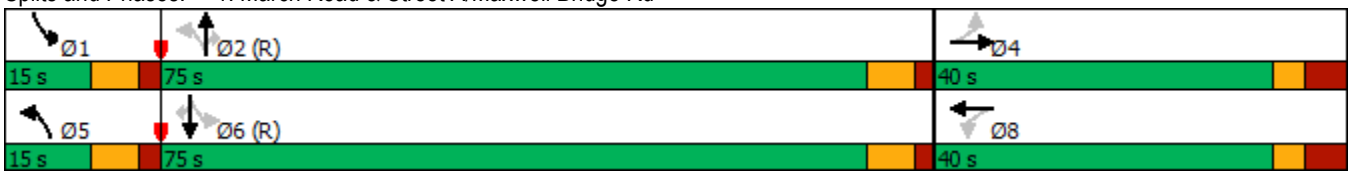
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	18	59	189	85	62	95	399	1812	122	63	876	13
Future Volume (vph)	18	59	189	85	62	95	399	1812	122	63	876	13
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Total Lost time (s)	7.3	7.3		4.5	7.3		6.7	6.6	6.6	6.7	6.6	6.6
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	0.95	1.00	1.00	0.95	1.00
Frt	1.00	0.89		1.00	0.91		1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1729	1518		1647	1635		1729	3424	1547	1729	3390	1547
Flt Permitted	0.66	1.00		0.19	1.00		0.19	1.00	1.00	0.07	1.00	1.00
Satd. Flow (perm)	1196	1518		337	1635		339	3424	1547	133	3390	1547
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	18	59	189	85	62	95	399	1812	122	63	876	13
RTOR Reduction (vph)	0	102	0	0	49	0	0	0	51	0	0	8
Lane Group Flow (vph)	18	146	0	85	108	0	399	1812	71	63	876	5
Heavy Vehicles (%)	0%	10%	5%	5%	3%	0%	0%	1%	0%	0%	2%	0%
Turn Type	Perm	NA		pm+pt	NA		pm+pt	NA	Perm	pm+pt	NA	Perm
Protected Phases		4		3	8		5	2		1	6	
Permitted Phases	4			8			2		2	6		6
Actuated Green, G (s)	17.8	17.8		27.3	27.3		88.8	75.8	75.8	60.9	54.6	54.6
Effective Green, g (s)	17.8	17.8		27.3	27.3		88.8	75.8	75.8	60.9	54.6	54.6
Actuated g/C Ratio	0.14	0.14		0.21	0.21		0.68	0.58	0.58	0.47	0.42	0.42
Clearance Time (s)	7.3	7.3		4.5	7.3		6.7	6.6	6.6	6.7	6.6	6.6
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	163	207		121	343		525	1996	902	139	1423	649
v/s Ratio Prot		0.10		c0.03	0.07		c0.16	c0.53		0.02	0.26	
v/s Ratio Perm	0.02			c0.12			0.36		0.05	0.19		0.00
v/c Ratio	0.11	0.71		0.70	0.31		0.76	0.91	0.08	0.45	0.62	0.01
Uniform Delay, d1	49.2	53.6		45.1	43.4		19.8	24.0	11.8	24.3	29.5	21.9
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00	1.00	1.05	1.29	1.00
Incremental Delay, d2	0.3	10.5		16.8	0.5		6.4	7.5	0.2	2.0	1.7	0.0
Delay (s)	49.5	64.1		62.0	44.0		26.2	31.5	12.0	27.5	39.8	22.0
Level of Service	D	E		E	D		C	C	B	C	D	C
Approach Delay (s)		63.1			50.3			29.6			38.8	
Approach LOS		E			D			C			D	

Intersection Summary			
HCM 2000 Control Delay	35.6	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.90		
Actuated Cycle Length (s)	130.0	Sum of lost time (s)	25.1
Intersection Capacity Utilization	100.1%	ICU Level of Service	G
Analysis Period (min)	15		
c Critical Lane Group			

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations										
Traffic Volume (vph)	23	41	137	18	103	619	67	74	1790	13
Future Volume (vph)	23	41	137	18	103	619	67	74	1790	13
Turn Type	Perm	NA	Perm	NA	pm+pt	NA	Perm	pm+pt	NA	Perm
Protected Phases		4		8	5	2		1	6	
Permitted Phases	4		8		2		2	6		6
Detector Phase	4	4	8	8	5	2	2	1	6	6
Switch Phase										
Minimum Initial (s)	10.0	10.0	10.0	10.0	5.0	10.0	10.0	5.0	10.0	10.0
Minimum Split (s)	39.3	39.3	39.3	39.3	11.7	34.6	34.6	11.7	34.6	34.6
Total Split (s)	40.0	40.0	40.0	40.0	15.0	75.0	75.0	15.0	75.0	75.0
Total Split (%)	30.8%	30.8%	30.8%	30.8%	11.5%	57.7%	57.7%	11.5%	57.7%	57.7%
Yellow Time (s)	3.0	3.0	3.0	3.0	4.6	4.6	4.6	4.6	4.6	4.6
All-Red Time (s)	4.3	4.3	4.3	4.3	2.1	2.0	2.0	2.1	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)	7.3	7.3	7.3	7.3	6.7	6.6	6.6	6.7	6.6	6.6
Lead/Lag					Lead	Lag	Lag	Lead	Lag	Lag
Lead-Lag Optimize?					Yes	Yes	Yes	Yes	Yes	Yes
Recall Mode	None	None	None	None	None	C-Max	C-Max	None	C-Max	C-Max
Act Effct Green (s)	30.7	30.7	30.7	30.7	80.3	73.8	73.8	78.0	70.7	70.7
Actuated g/C Ratio	0.24	0.24	0.24	0.24	0.62	0.57	0.57	0.60	0.54	0.54
v/c Ratio	0.07	0.68	1.00	0.11	0.70	0.35	0.08	0.15	0.97	0.02
Control Delay	38.0	33.7	126.2	20.7	49.0	17.1	1.5	7.2	29.7	0.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	38.0	33.7	126.2	20.7	49.0	17.1	1.5	7.2	29.7	0.0
LOS	D	C	F	C	D	B	A	A	C	A
Approach Delay		34.0		101.0		20.0			28.6	
Approach LOS		C		F		B			C	

Intersection Summary	
Cycle Length: 130	
Actuated Cycle Length: 130	
Offset: 12 (9%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green	
Natural Cycle: 120	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 1.00	
Intersection Signal Delay: 31.2	Intersection LOS: C
Intersection Capacity Utilization 109.6%	ICU Level of Service H
Analysis Period (min) 15	

Splits and Phases: 1: March Road & Street A/Maxwell Bridge Rd



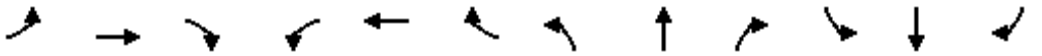
Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	23	310	137	43	103	619	67	74	1790	13
v/c Ratio	0.07	0.68	1.00	0.11	0.70	0.35	0.08	0.15	0.97	0.02
Control Delay	38.0	33.7	126.2	20.7	49.0	17.1	1.5	7.2	29.7	0.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	38.0	33.7	126.2	20.7	49.0	17.1	1.5	7.2	29.7	0.0
Queue Length 50th (m)	4.5	42.3	34.6	3.5	12.6	47.2	0.0	4.6	~75.0	0.0
Queue Length 95th (m)	11.9	74.3	#74.9	13.1	#38.7	61.3	3.9	m7.3	#289.6	m0.0
Internal Link Dist (m)		119.5		192.3		265.8			127.3	
Turn Bay Length (m)	68.0		76.0		91.0			120.0		37.5
Base Capacity (vph)	333	479	146	415	152	1752	868	492	1844	821
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	0.07	0.65	0.94	0.10	0.68	0.35	0.08	0.15	0.97	0.02

Intersection Summary

~ 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.



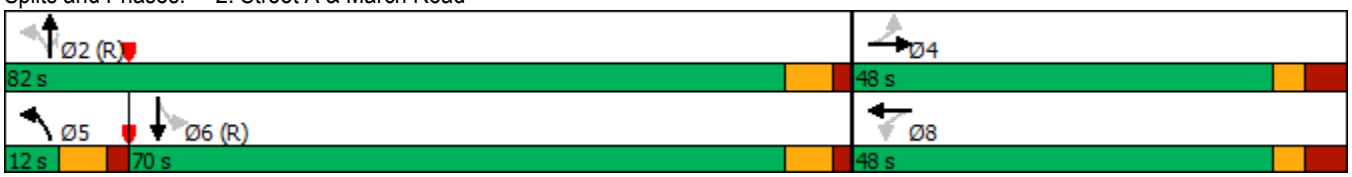
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	23	41	269	137	18	25	103	619	67	74	1790	13
Future Volume (vph)	23	41	269	137	18	25	103	619	67	74	1790	13
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Total Lost time (s)	7.3	7.3		7.3	7.3		6.7	6.6	6.6	6.7	6.6	6.6
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	0.95	1.00	1.00	0.95	1.00
Frt	1.00	0.87		1.00	0.91		1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1729	1528		1712	1579		1586	3088	1459	1712	3390	1432
Flt Permitted	0.73	1.00		0.32	1.00		0.06	1.00	1.00	0.39	1.00	1.00
Satd. Flow (perm)	1327	1528		582	1579		92	3088	1459	706	3390	1432
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	23	41	269	137	18	25	103	619	67	74	1790	13
RTOR Reduction (vph)	0	97	0	0	19	0	0	0	30	0	0	6
Lane Group Flow (vph)	23	213	0	137	24	0	103	619	37	74	1790	7
Heavy Vehicles (%)	0%	14%	2%	1%	0%	9%	9%	12%	6%	1%	2%	8%
Turn Type	Perm	NA		Perm	NA		pm+pt	NA	Perm	pm+pt	NA	Perm
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4			8			2		2	6		6
Actuated Green, G (s)	30.7	30.7		30.7	30.7		80.5	72.5	72.5	76.9	70.7	70.7
Effective Green, g (s)	30.7	30.7		30.7	30.7		80.5	72.5	72.5	76.9	70.7	70.7
Actuated g/C Ratio	0.24	0.24		0.24	0.24		0.62	0.56	0.56	0.59	0.54	0.54
Clearance Time (s)	7.3	7.3		7.3	7.3		6.7	6.6	6.6	6.7	6.6	6.6
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	313	360		137	372		148	1722	813	465	1843	778
v/s Ratio Prot		0.14			0.02		c0.04	0.20		0.01	c0.53	
v/s Ratio Perm	0.02			c0.24			0.39		0.03	0.09		0.00
v/c Ratio	0.07	0.59		1.00	0.06		0.70	0.36	0.05	0.16	0.97	0.01
Uniform Delay, d1	38.6	44.1		49.6	38.5		30.4	15.9	13.1	11.4	28.7	13.6
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00	1.00	0.75	0.58	1.00
Incremental Delay, d2	0.1	2.6		76.9	0.1		13.3	0.6	0.1	0.1	11.5	0.0
Delay (s)	38.7	46.7		126.5	38.6		43.7	16.5	13.2	8.7	28.1	13.6
Level of Service	D	D		F	D		D	B	B	A	C	B
Approach Delay (s)		46.1			105.5			19.8			27.2	
Approach LOS		D			F			B			C	

Intersection Summary			
HCM 2000 Control Delay	31.8	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.96		
Actuated Cycle Length (s)	130.0	Sum of lost time (s)	20.6
Intersection Capacity Utilization	109.6%	ICU Level of Service	H
Analysis Period (min)	15		
c Critical Lane Group			

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	NBR	SBL	SBT
Lane Configurations									
Traffic Volume (vph)	23	6	304	14	72	506	89	5	1390
Future Volume (vph)	23	6	304	14	72	506	89	5	1390
Turn Type	Perm	NA	Perm	NA	pm+pt	NA	Perm	Perm	NA
Protected Phases		4		8	5	2			6
Permitted Phases	4		8		2		2	6	
Detector Phase	4	4	8	8	5	2	2	6	6
Switch Phase									
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Minimum Split (s)	39.3	39.3	25.3	25.3	11.7	35.9	35.9	38.6	38.6
Total Split (s)	48.0	48.0	48.0	48.0	12.0	82.0	82.0	70.0	70.0
Total Split (%)	36.9%	36.9%	36.9%	36.9%	9.2%	63.1%	63.1%	53.8%	53.8%
Yellow Time (s)	3.0	3.0	3.0	3.0	4.6	4.6	4.6	4.6	4.6
All-Red Time (s)	4.3	4.3	4.3	4.3	2.1	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)	7.3	7.3	7.3	7.3	6.7	6.6	6.6	6.6	6.6
Lead/Lag					Lead			Lag	Lag
Lead-Lag Optimize?					Yes			Yes	Yes
Recall Mode	None	None	None	None	None	C-Max	C-Max	C-Max	C-Max
Act Effct Green (s)	37.4	37.4	37.4	37.4	78.6	78.7	78.7	68.8	68.8
Actuated g/C Ratio	0.29	0.29	0.29	0.29	0.60	0.61	0.61	0.53	0.53
v/c Ratio	0.06	0.30	0.93	0.06	0.50	0.27	0.10	0.01	0.78
Control Delay	32.2	13.8	79.7	19.1	47.6	11.9	2.1	17.4	30.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	32.2	13.8	79.7	19.1	47.6	11.9	2.1	17.4	30.1
LOS	C	B	E	B	D	B	A	B	C
Approach Delay		16.1		74.2		14.4			30.0
Approach LOS		B		E		B			C

Intersection Summary	
Cycle Length: 130	
Actuated Cycle Length: 130	
Offset: 128 (98%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green	
Natural Cycle: 90	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.93	
Intersection Signal Delay: 30.7	Intersection LOS: C
Intersection Capacity Utilization 96.1%	ICU Level of Service F
Analysis Period (min) 15	

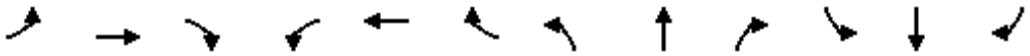
Splits and Phases: 2: Street A & March Road



Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	NBR	SBL	SBT
Lane Group Flow (vph)	23	156	304	30	72	506	89	5	1395
v/c Ratio	0.06	0.30	0.93	0.06	0.50	0.27	0.10	0.01	0.78
Control Delay	32.2	13.8	79.7	19.1	47.6	11.9	2.1	17.4	30.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	32.2	13.8	79.7	19.1	47.6	11.9	2.1	17.4	30.1
Queue Length 50th (m)	4.1	9.3	73.0	2.5	12.6	28.4	0.2	0.7	159.8
Queue Length 95th (m)	10.9	26.2	#123.3	9.6	29.4	36.1	5.2	2.9	191.6
Internal Link Dist (m)		124.2		210.3		416.7			287.3
Turn Bay Length (m)	37.5		156.0		90.0		90.0	105.0	
Base Capacity (vph)	420	548	356	511	145	1869	918	444	1791
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	0.05	0.28	0.85	0.06	0.50	0.27	0.10	0.01	0.78

Intersection Summary

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



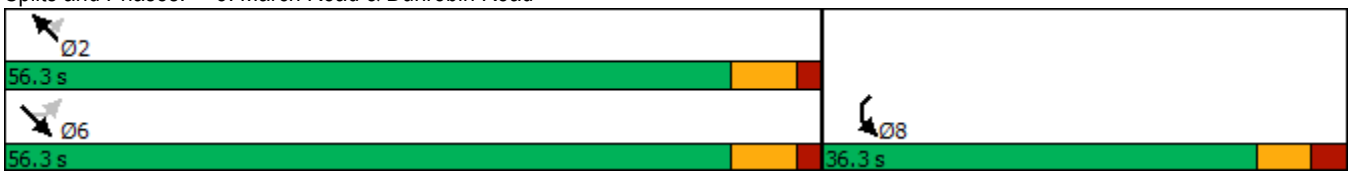
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	23	6	150	304	14	16	72	506	89	5	1390	5
Future Volume (vph)	23	6	150	304	14	16	72	506	89	5	1390	5
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Total Lost time (s)	7.3	7.3		7.3	7.3		6.7	6.6	6.6	6.6	6.6	
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	0.95	1.00	1.00	0.95	
Frt	1.00	0.86		1.00	0.92		1.00	1.00	0.85	1.00	1.00	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)	1729	1520		1712	1598		1586	3088	1459	1712	3388	
Flt Permitted	0.74	1.00		0.63	1.00		0.08	1.00	1.00	0.47	1.00	
Satd. Flow (perm)	1342	1520		1139	1598		134	3088	1459	840	3388	
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	23	6	150	304	14	16	72	506	89	5	1390	5
RTOR Reduction (vph)	0	75	0	0	11	0	0	0	35	0	0	0
Lane Group Flow (vph)	23	81	0	304	19	0	72	506	54	5	1395	0
Heavy Vehicles (%)	0%	14%	2%	1%	0%	9%	9%	12%	6%	1%	2%	8%
Turn Type	Perm	NA		Perm	NA		pm+pt	NA	Perm	Perm	NA	
Protected Phases		4			8		5	2			6	
Permitted Phases	4			8			2		2	6		
Actuated Green, G (s)	37.4	37.4		37.4	37.4		78.7	78.7	78.7	67.4	67.4	
Effective Green, g (s)	37.4	37.4		37.4	37.4		78.7	78.7	78.7	67.4	67.4	
Actuated g/C Ratio	0.29	0.29		0.29	0.29		0.61	0.61	0.61	0.52	0.52	
Clearance Time (s)	7.3	7.3		7.3	7.3		6.7	6.6	6.6	6.6	6.6	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	386	437		327	459		132	1869	883	435	1756	
v/s Ratio Prot		0.05			0.01		c0.02	0.16			c0.41	
v/s Ratio Perm	0.02			c0.27			0.31		0.04	0.01		
v/c Ratio	0.06	0.19		0.93	0.04		0.55	0.27	0.06	0.01	0.79	
Uniform Delay, d1	33.6	34.8		45.0	33.4		19.9	12.1	10.5	15.2	25.6	
Progression Factor	1.00	1.00		1.00	1.00		3.10	0.91	0.79	1.00	1.00	
Incremental Delay, d2	0.1	0.2		31.7	0.0		4.4	0.3	0.1	0.0	3.8	
Delay (s)	33.6	35.0		76.7	33.4		65.9	11.3	8.4	15.2	29.4	
Level of Service	C	D		E	C		E	B	A	B	C	
Approach Delay (s)		34.9			72.8			16.8			29.4	
Approach LOS		C			E			B			C	

Intersection Summary			
HCM 2000 Control Delay	32.1	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.83		
Actuated Cycle Length (s)	130.0	Sum of lost time (s)	20.6
Intersection Capacity Utilization	96.1%	ICU Level of Service	F
Analysis Period (min)	15		
c Critical Lane Group			

Lane Group	SEL	SET	NWT	NWR	SWL
Lane Configurations					
Traffic Volume (vph)	50	569	157	250	546
Future Volume (vph)	50	569	157	250	546
Turn Type	Perm	NA	NA	Perm	Prot
Protected Phases		6	2		8
Permitted Phases	6			2	
Detector Phase	6	6	2	2	8
Switch Phase					
Minimum Initial (s)	50.0	50.0	50.0	50.0	10.0
Minimum Split (s)	56.3	56.3	56.3	56.3	27.3
Total Split (s)	56.3	56.3	56.3	56.3	36.3
Total Split (%)	60.8%	60.8%	60.8%	60.8%	39.2%
Yellow Time (s)	4.6	4.6	4.6	4.6	3.7
All-Red Time (s)	1.7	1.7	1.7	1.7	2.6
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	6.3	6.3	6.3	6.3	6.3
Lead/Lag					
Lead-Lag Optimize?					
Recall Mode	Max	Max	Max	Max	None
Act Effct Green (s)	50.2	50.2	50.2	50.2	20.3
Actuated g/C Ratio	0.60	0.60	0.60	0.60	0.24
v/c Ratio	0.08	0.52	0.08	0.27	0.75
Control Delay	8.6	12.6	7.8	2.1	34.7
Queue Delay	0.0	0.0	0.0	0.0	0.0
Total Delay	8.6	12.6	7.8	2.1	34.7
LOS	A	B	A	A	C
Approach Delay		12.2	4.3		34.7
Approach LOS		B	A		C

Intersection Summary	
Cycle Length: 92.6	
Actuated Cycle Length: 83.1	
Natural Cycle: 85	
Control Type: Actuated-Uncoordinated	
Maximum v/c Ratio: 0.75	
Intersection Signal Delay: 18.6	Intersection LOS: B
Intersection Capacity Utilization 93.8%	ICU Level of Service F
Analysis Period (min) 15	

Splits and Phases: 3: March Road & Dunrobin Road



Lane Group	SEL	SET	NWT	NWR	SWL
Lane Group Flow (vph)	50	569	157	250	607
v/c Ratio	0.08	0.52	0.08	0.27	0.75
Control Delay	8.6	12.6	7.8	2.1	34.7
Queue Delay	0.0	0.0	0.0	0.0	0.0
Total Delay	8.6	12.6	7.8	2.1	34.7
Queue Length 50th (m)	3.0	46.8	4.8	0.0	44.7
Queue Length 95th (m)	9.1	89.5	10.6	9.7	61.5
Internal Link Dist (m)		170.7	206.3		228.2
Turn Bay Length (m)	145.0			140.0	120.0
Base Capacity (vph)	596	1087	1969	932	1186
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	0.08	0.52	0.08	0.27	0.51

Intersection Summary

Movement	SEL	SET	NWT	NWR	SWL	SWR
Lane Configurations						
Traffic Volume (vph)	50	569	157	250	546	61
Future Volume (vph)	50	569	157	250	546	61
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800
Total Lost time (s)	6.3	6.3	6.3	6.3	6.3	
Lane Util. Factor	1.00	1.00	0.95	1.00	0.97	
Frpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	
Frt	1.00	1.00	1.00	0.85	0.98	
Flt Protected	0.95	1.00	1.00	1.00	0.96	
Satd. Flow (prot)	1441	1802	3262	1381	3252	
Flt Permitted	0.65	1.00	1.00	1.00	0.96	
Satd. Flow (perm)	990	1802	3262	1381	3252	
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	50	569	157	250	546	61
RTOR Reduction (vph)	0	0	0	99	11	0
Lane Group Flow (vph)	50	569	157	151	596	0
Confl. Peds. (#/hr)					3	7
Heavy Vehicles (%)	20%	1%	6%	12%	2%	2%
Turn Type	Perm	NA	NA	Perm	Prot	
Protected Phases		6	2		8	
Permitted Phases	6			2		
Actuated Green, G (s)	50.1	50.1	50.1	50.1	20.3	
Effective Green, g (s)	50.1	50.1	50.1	50.1	20.3	
Actuated g/C Ratio	0.60	0.60	0.60	0.60	0.24	
Clearance Time (s)	6.3	6.3	6.3	6.3	6.3	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	597	1087	1968	833	795	
v/s Ratio Prot		c0.32	0.05		c0.18	
v/s Ratio Perm	0.05			0.11		
v/c Ratio	0.08	0.52	0.08	0.18	0.75	
Uniform Delay, d1	6.9	9.5	6.9	7.3	29.0	
Progression Factor	1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	0.3	1.8	0.1	0.5	4.0	
Delay (s)	7.1	11.3	6.9	7.8	33.0	
Level of Service	A	B	A	A	C	
Approach Delay (s)		11.0	7.5		33.0	
Approach LOS		B	A		C	

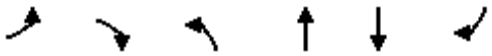
Intersection Summary			
HCM 2000 Control Delay	18.3	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.59		
Actuated Cycle Length (s)	83.0	Sum of lost time (s)	12.6
Intersection Capacity Utilization	93.8%	ICU Level of Service	F
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	229	16	0	134	0	104
Future Volume (Veh/h)	229	16	0	134	0	104
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	229	16	0	134	0	104
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage veh)						
Upstream signal (m)				144		
pX, platoon unblocked					0.99	
vC, conflicting volume			245		371	237
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			245		363	237
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			100		100	87
cM capacity (veh/h)			1321		632	802

Direction, Lane #	EB 1	WB 1	NB 1
Volume Total	245	134	104
Volume Left	0	0	0
Volume Right	16	0	104
cSH	1700	1321	802
Volume to Capacity	0.14	0.00	0.13
Queue Length 95th (m)	0.0	0.0	3.4
Control Delay (s)	0.0	0.0	10.2
Lane LOS			B
Approach Delay (s)	0.0	0.0	10.2
Approach LOS			B

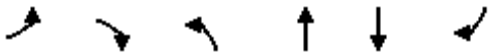
Intersection Summary			
Average Delay	2.2		
Intersection Capacity Utilization	27.2%	ICU Level of Service	A
Analysis Period (min)	15		



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	0	80	56	78	165	0
Future Volume (Veh/h)	0	80	56	78	165	0
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	0	80	56	78	165	0
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (m)				386		
pX, platoon unblocked						
vC, conflicting volume	355	165	165			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	355	165	165			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	100	91	96			
cM capacity (veh/h)	618	879	1413			

Direction, Lane #	EB 1	NB 1	SB 1
Volume Total	80	134	165
Volume Left	0	56	0
Volume Right	80	0	0
cSH	879	1413	1700
Volume to Capacity	0.09	0.04	0.10
Queue Length 95th (m)	2.3	0.9	0.0
Control Delay (s)	9.5	3.4	0.0
Lane LOS	A	A	
Approach Delay (s)	9.5	3.4	0.0
Approach LOS	A		

Intersection Summary			
Average Delay	3.2		
Intersection Capacity Utilization	32.0%	ICU Level of Service	A
Analysis Period (min)	15		



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	0	38	0	667	1833	11
Future Volume (Veh/h)	0	38	0	667	1833	11
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	0	38	0	667	1833	11
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (m)				151		
pX, platoon unblocked	0.90					
vC, conflicting volume	2172	922	1844			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	2077	922	1844			
tC, single (s)	6.8	6.9	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	100	86	100			
cM capacity (veh/h)	41	272	334			

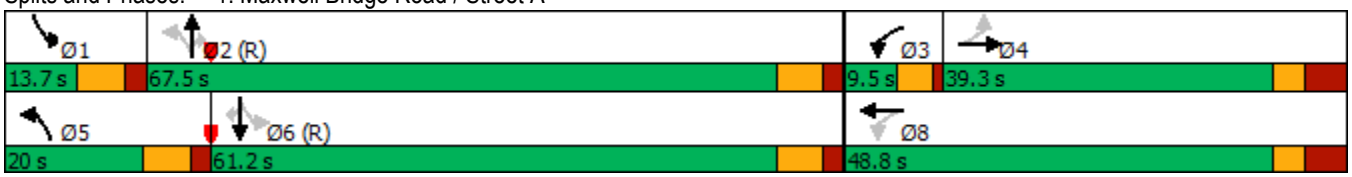
Direction, Lane #	EB 1	NB 1	NB 2	SB 1	SB 2
Volume Total	38	334	334	1222	622
Volume Left	0	0	0	0	0
Volume Right	38	0	0	0	11
cSH	272	1700	1700	1700	1700
Volume to Capacity	0.14	0.20	0.20	0.72	0.37
Queue Length 95th (m)	3.6	0.0	0.0	0.0	0.0
Control Delay (s)	20.4	0.0	0.0	0.0	0.0
Lane LOS	C				
Approach Delay (s)	20.4	0.0		0.0	
Approach LOS	C				

Intersection Summary				
Average Delay	0.3			
Intersection Capacity Utilization	63.9%	ICU Level of Service	B	
Analysis Period (min)	15			

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations										
Traffic Volume (vph)	19	60	87	64	403	1834	125	65	882	13
Future Volume (vph)	19	60	87	64	403	1834	125	65	882	13
Turn Type	Perm	NA	pm+pt	NA	pm+pt	NA	Perm	pm+pt	NA	Perm
Protected Phases		4	3	8	5	2		1	6	
Permitted Phases	4		8		2		2	6		6
Detector Phase	4	4	3	8	5	2	2	1	6	6
Switch Phase										
Minimum Initial (s)	10.0	10.0	5.0	10.0	7.0	10.0	10.0	7.0	10.0	10.0
Minimum Split (s)	39.3	39.3	9.5	39.3	13.7	34.6	34.6	13.7	34.6	34.6
Total Split (s)	39.3	39.3	9.5	48.8	20.0	67.5	67.5	13.7	61.2	61.2
Total Split (%)	30.2%	30.2%	7.3%	37.5%	15.4%	51.9%	51.9%	10.5%	47.1%	47.1%
Yellow Time (s)	3.0	3.0	3.5	3.0	4.6	4.6	4.6	4.6	4.6	4.6
All-Red Time (s)	4.3	4.3	1.0	4.3	2.1	2.0	2.0	2.1	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)	7.3	7.3	4.5	7.3	6.7	6.6	6.6	6.7	6.6	6.6
Lead/Lag	Lag	Lag	Lead		Lead	Lag	Lag	Lead	Lag	Lag
Lead-Lag Optimize?	Yes	Yes	Yes		Yes	Yes	Yes	Yes	Yes	Yes
Recall Mode	None	None	None	None	None	C-Max	C-Max	None	C-Max	C-Max
Act Effct Green (s)	18.2	18.2	30.5	27.7	88.3	76.7	76.7	62.3	54.6	54.6
Actuated g/C Ratio	0.14	0.14	0.23	0.21	0.68	0.59	0.59	0.48	0.42	0.42
v/c Ratio	0.11	0.80	0.67	0.41	0.78	0.91	0.13	0.41	0.62	0.02
Control Delay	46.7	47.1	64.0	28.2	29.4	33.4	2.9	28.3	35.1	0.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	46.7	47.1	64.0	28.2	29.4	33.4	2.9	28.3	35.1	0.1
LOS	D	D	E	C	C	C	A	C	D	A
Approach Delay		47.1		40.8		31.1			34.1	
Approach LOS		D		D		C			C	

Intersection Summary	
Cycle Length: 130	
Actuated Cycle Length: 130	
Offset: 107 (82%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green	
Natural Cycle: 150	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.91	
Intersection Signal Delay: 33.6	Intersection LOS: C
Intersection Capacity Utilization 101.0%	ICU Level of Service G
Analysis Period (min) 15	

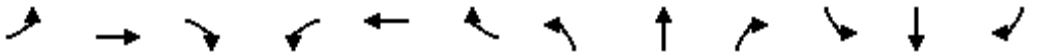
Splits and Phases: 1: Maxwell Bridge Road / Street A



Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	19	250	87	161	403	1834	125	65	882	13
v/c Ratio	0.11	0.80	0.67	0.41	0.78	0.91	0.13	0.41	0.62	0.02
Control Delay	46.7	47.1	64.0	28.2	29.4	33.4	2.9	28.3	35.1	0.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	46.7	47.1	64.0	28.2	29.4	33.4	2.9	28.3	35.1	0.1
Queue Length 50th (m)	4.3	34.2	18.2	21.6	50.6	215.3	0.0	6.3	75.8	0.0
Queue Length 95th (m)	10.9	59.4	29.6	38.4	#129.0	#325.8	9.5	m20.4	135.2	m0.0
Internal Link Dist (m)		119.5		192.3		117.5			132.3	
Turn Bay Length (m)	68.0		76.0		91.0			120.0		
Base Capacity (vph)	293	461	130	564	518	2019	965	159	1423	725
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	0.54	0.67	0.29	0.78	0.91	0.13	0.41	0.62	0.02

Intersection Summary

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.



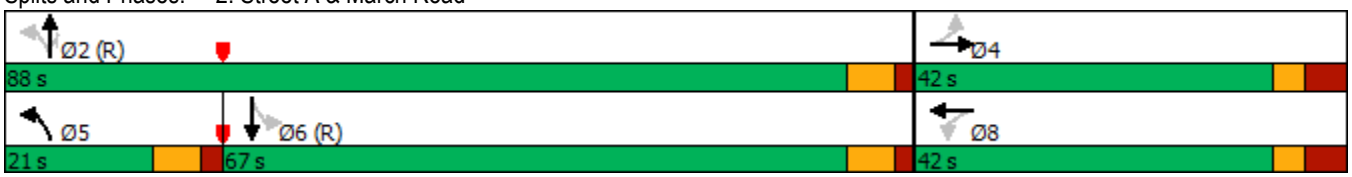
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	19	60	190	87	64	97	403	1834	125	65	882	13
Future Volume (vph)	19	60	190	87	64	97	403	1834	125	65	882	13
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Total Lost time (s)	7.3	7.3		4.5	7.3		6.7	6.6	6.6	6.7	6.6	6.6
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	0.95	1.00	1.00	0.95	1.00
Frt	1.00	0.89		1.00	0.91		1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1729	1518		1647	1636		1729	3424	1547	1729	3390	1547
Flt Permitted	0.66	1.00		0.20	1.00		0.18	1.00	1.00	0.07	1.00	1.00
Satd. Flow (perm)	1192	1518		344	1636		335	3424	1547	133	3390	1547
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	19	60	190	87	64	97	403	1834	125	65	882	13
RTOR Reduction (vph)	0	100	0	0	49	0	0	0	53	0	0	8
Lane Group Flow (vph)	19	150	0	87	112	0	403	1834	72	65	882	5
Heavy Vehicles (%)	0%	10%	5%	5%	3%	0%	0%	1%	0%	0%	2%	0%
Turn Type	Perm	NA		pm+pt	NA		pm+pt	NA	Perm	pm+pt	NA	Perm
Protected Phases		4		3	8		5	2		1	6	
Permitted Phases	4			8			2		2	6		6
Actuated Green, G (s)	18.2	18.2		27.7	27.7		88.4	75.3	75.3	61.0	54.6	54.6
Effective Green, g (s)	18.2	18.2		27.7	27.7		88.4	75.3	75.3	61.0	54.6	54.6
Actuated g/C Ratio	0.14	0.14		0.21	0.21		0.68	0.58	0.58	0.47	0.42	0.42
Clearance Time (s)	7.3	7.3		4.5	7.3		6.7	6.6	6.6	6.7	6.6	6.6
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	166	212		123	348		518	1983	896	140	1423	649
v/s Ratio Prot		0.10		c0.03	0.07		c0.16	c0.54		0.02	0.26	
v/s Ratio Perm	0.02			c0.12			0.37		0.05	0.19		0.00
v/c Ratio	0.11	0.71		0.71	0.32		0.78	0.92	0.08	0.46	0.62	0.01
Uniform Delay, d1	48.9	53.4		45.1	43.2		20.7	24.8	12.1	25.0	29.6	21.9
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00	1.00	1.39	1.11	1.00
Incremental Delay, d2	0.3	10.3		16.9	0.5		7.2	8.9	0.2	2.3	1.9	0.0
Delay (s)	49.2	63.7		62.0	43.8		28.0	33.6	12.2	37.1	34.7	22.0
Level of Service	D	E		E	D		C	C	B	D	C	C
Approach Delay (s)		62.7			50.2			31.5			34.7	
Approach LOS		E			D			C			C	

Intersection Summary			
HCM 2000 Control Delay	35.7	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.92		
Actuated Cycle Length (s)	130.0	Sum of lost time (s)	25.1
Intersection Capacity Utilization	101.0%	ICU Level of Service	G
Analysis Period (min)	15		
c Critical Lane Group			

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	NBR	SBL	SBT
Lane Configurations									
Traffic Volume (vph)	35	22	174	12	212	1426	312	16	627
Future Volume (vph)	35	22	174	12	212	1426	312	16	627
Turn Type	Perm	NA	Perm	NA	pm+pt	NA	Perm	Perm	NA
Protected Phases		4		8	5	2			6
Permitted Phases	4		8		2		2	6	
Detector Phase	4	4	8	8	5	2	2	6	6
Switch Phase									
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Minimum Split (s)	39.3	39.3	25.3	25.3	12.9	35.9	35.9	38.6	38.6
Total Split (s)	42.0	42.0	42.0	42.0	21.0	88.0	88.0	67.0	67.0
Total Split (%)	32.3%	32.3%	32.3%	32.3%	16.2%	67.7%	67.7%	51.5%	51.5%
Yellow Time (s)	3.0	3.0	3.0	3.0	4.6	4.6	4.6	4.6	4.6
All-Red Time (s)	4.3	4.3	4.3	4.3	2.1	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)	7.3	7.3	7.3	7.3	6.7	6.6	6.6	6.6	6.6
Lead/Lag					Lead			Lag	Lag
Lead-Lag Optimize?					Yes			Yes	Yes
Recall Mode	None	None	None	None	None	C-Max	C-Max	C-Max	C-Max
Act Effct Green (s)	25.9	25.9	25.9	25.9	90.1	90.2	90.2	72.4	72.4
Actuated g/C Ratio	0.20	0.20	0.20	0.20	0.69	0.69	0.69	0.56	0.56
v/c Ratio	0.13	0.39	0.87	0.06	0.41	0.60	0.27	0.09	0.34
Control Delay	40.6	11.8	85.7	26.5	2.3	1.6	0.3	19.3	17.8
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	40.6	11.8	85.7	26.5	2.3	1.6	0.3	19.3	17.8
LOS	D	B	F	C	A	A	A	B	B
Approach Delay		17.0		79.3		1.5			17.8
Approach LOS		B		E		A			B

Intersection Summary	
Cycle Length: 130	
Actuated Cycle Length: 130	
Offset: 0 (0%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green	
Natural Cycle: 95	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.87	
Intersection Signal Delay: 11.1	Intersection LOS: B
Intersection Capacity Utilization 89.3%	ICU Level of Service E
Analysis Period (min) 15	

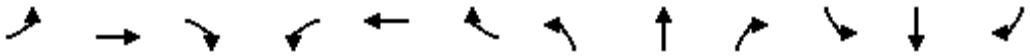
Splits and Phases: 2: Street A & March Road



Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	NBR	SBL	SBT
Lane Group Flow (vph)	35	160	174	21	212	1426	312	16	646
v/c Ratio	0.13	0.39	0.87	0.06	0.41	0.60	0.27	0.09	0.34
Control Delay	40.6	11.8	85.7	26.5	2.3	1.6	0.3	19.3	17.8
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	40.6	11.8	85.7	26.5	2.3	1.6	0.3	19.3	17.8
Queue Length 50th (m)	7.4	4.6	43.3	2.5	2.2	8.0	0.0	1.9	46.0
Queue Length 95th (m)	15.4	21.3	65.7	8.9	m2.9	m10.2	m0.0	7.2	71.2
Internal Link Dist (m)		124.2		210.3		416.7			287.3
Turn Bay Length (m)	37.5		156.0		90.0		90.0	105.0	
Base Capacity (vph)	361	501	269	453	547	2375	1169	178	1883
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	0.10	0.32	0.65	0.05	0.39	0.60	0.27	0.09	0.34

Intersection Summary

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



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	35	22	138	174	12	9	212	1426	312	16	627	19
Future Volume (vph)	35	22	138	174	12	9	212	1426	312	16	627	19
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Total Lost time (s)	7.3	7.3		7.3	7.3		6.7	6.6	6.6	6.6	6.6	
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	0.95	1.00	1.00	0.95	
Frt	1.00	0.87		1.00	0.94		1.00	1.00	0.85	1.00	1.00	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)	1729	1499		1647	1674		1729	3424	1547	1729	3377	
Flt Permitted	0.74	1.00		0.58	1.00		0.34	1.00	1.00	0.18	1.00	
Satd. Flow (perm)	1353	1499		1011	1674		613	3424	1547	321	3377	
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	35	22	138	174	12	9	212	1426	312	16	627	19
RTOR Reduction (vph)	0	111	0	0	7	0	0	0	96	0	1	0
Lane Group Flow (vph)	35	49	0	174	14	0	212	1426	216	16	645	0
Heavy Vehicles (%)	0%	10%	5%	5%	3%	0%	0%	1%	0%	0%	2%	0%
Turn Type	Perm	NA		Perm	NA		pm+pt	NA	Perm	Perm	NA	
Protected Phases		4			8		5	2			6	
Permitted Phases	4			8			2		2	6		
Actuated Green, G (s)	25.9	25.9		25.9	25.9		90.2	90.2	90.2	72.4	72.4	
Effective Green, g (s)	25.9	25.9		25.9	25.9		90.2	90.2	90.2	72.4	72.4	
Actuated g/C Ratio	0.20	0.20		0.20	0.20		0.69	0.69	0.69	0.56	0.56	
Clearance Time (s)	7.3	7.3		7.3	7.3		6.7	6.6	6.6	6.6	6.6	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	269	298		201	333		520	2375	1073	178	1880	
v/s Ratio Prot		0.03			0.01		0.03	c0.42			0.19	
v/s Ratio Perm	0.03			c0.17			0.25		0.14	0.05		
v/c Ratio	0.13	0.17		0.87	0.04		0.41	0.60	0.20	0.09	0.34	
Uniform Delay, d1	42.8	43.1		50.4	42.0		7.9	10.4	7.1	13.4	15.8	
Progression Factor	1.00	1.00		1.00	1.00		0.14	0.09	0.00	1.00	1.00	
Incremental Delay, d2	0.2	0.3		29.9	0.1		0.2	0.5	0.2	1.0	0.5	
Delay (s)	43.0	43.4		80.3	42.1		1.4	1.5	0.2	14.4	16.3	
Level of Service	D	D		F	D		A	A	A	B	B	
Approach Delay (s)		43.3			76.2			1.3			16.2	
Approach LOS		D			E			A			B	

Intersection Summary			
HCM 2000 Control Delay	12.2	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.70		
Actuated Cycle Length (s)	130.0	Sum of lost time (s)	20.6
Intersection Capacity Utilization	89.3%	ICU Level of Service	E
Analysis Period (min)	15		
c Critical Lane Group			

Lane Group	SEL	SET	NWT	NWR	SWL
Lane Configurations					
Traffic Volume (vph)	37	237	596	616	258
Future Volume (vph)	37	237	596	616	258
Turn Type	pm+pt	NA	NA	Perm	Prot
Protected Phases	1	6	2		8
Permitted Phases	6			2	
Detector Phase	1	6	2	2	8
Switch Phase					
Minimum Initial (s)	5.0	50.0	50.0	50.0	10.0
Minimum Split (s)	11.3	56.3	56.3	56.3	27.3
Total Split (s)	21.3	77.7	56.3	56.3	36.3
Total Split (%)	18.7%	68.2%	49.4%	49.4%	31.8%
Yellow Time (s)	4.6	4.6	4.6	4.6	3.7
All-Red Time (s)	1.7	1.7	1.7	1.7	2.6
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	6.3	6.3	6.3	6.3	6.3
Lead/Lag	Lead		Lag	Lag	
Lead-Lag Optimize?	Yes		Yes	Yes	
Recall Mode	None	Max	Max	Max	None
Act Effct Green (s)	71.5	71.5	63.9	63.9	14.6
Actuated g/C Ratio	0.72	0.72	0.65	0.65	0.15
v/c Ratio	0.07	0.18	0.27	0.55	0.67
Control Delay	4.8	5.1	9.2	3.0	42.6
Queue Delay	0.0	0.0	0.0	0.0	0.0
Total Delay	4.8	5.1	9.2	3.0	42.6
LOS	A	A	A	A	D
Approach Delay		5.1	6.0		42.6
Approach LOS		A	A		D

Intersection Summary	
Cycle Length: 114	
Actuated Cycle Length: 98.7	
Natural Cycle: 95	
Control Type: Actuated-Uncoordinated	
Maximum v/c Ratio: 0.67	
Intersection Signal Delay: 12.6	Intersection LOS: B
Intersection Capacity Utilization 62.5%	ICU Level of Service B
Analysis Period (min) 15	

Splits and Phases: 3: March Road & Dunrobin Road

Lane Group	SEL	SET	NWT	NWR	SWL
Lane Group Flow (vph)	37	237	596	616	334
v/c Ratio	0.07	0.18	0.27	0.55	0.67
Control Delay	4.8	5.1	9.2	3.0	42.6
Queue Delay	0.0	0.0	0.0	0.0	0.0
Total Delay	4.8	5.1	9.2	3.0	42.6
Queue Length 50th (m)	1.7	12.2	27.0	0.0	28.2
Queue Length 95th (m)	5.0	23.6	42.0	14.5	42.0
Internal Link Dist (m)		170.7	206.3		228.2
Turn Bay Length (m)	145.0			140.0	120.0
Base Capacity (vph)	638	1304	2195	1119	985
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	0.06	0.18	0.27	0.55	0.34

Intersection Summary

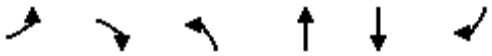
Movement	SEL	SET	NWT	NWR	SWL	SWR
Lane Configurations						
Traffic Volume (vph)	37	237	596	616	258	76
Future Volume (vph)	37	237	596	616	258	76
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800
Total Lost time (s)	6.3	6.3	6.3	6.3	6.3	
Lane Util. Factor	1.00	1.00	0.95	1.00	0.97	
Frt	1.00	1.00	1.00	0.85	0.97	
Flt Protected	0.95	1.00	1.00	1.00	0.96	
Satd. Flow (prot)	1679	1802	3390	1394	3160	
Flt Permitted	0.38	1.00	1.00	1.00	0.96	
Satd. Flow (perm)	670	1802	3390	1394	3160	
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	37	237	596	616	258	76
RTOR Reduction (vph)	0	0	0	227	29	0
Lane Group Flow (vph)	37	237	596	389	305	0
Heavy Vehicles (%)	3%	1%	2%	11%	3%	7%
Turn Type	pm+pt	NA	NA	Perm	Prot	
Protected Phases	1	6	2		8	
Permitted Phases	6			2		
Actuated Green, G (s)	74.0	74.0	63.9	63.9	14.6	
Effective Green, g (s)	74.0	74.0	63.9	63.9	14.6	
Actuated g/C Ratio	0.73	0.73	0.63	0.63	0.14	
Clearance Time (s)	6.3	6.3	6.3	6.3	6.3	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	527	1317	2140	880	455	
v/s Ratio Prot	0.00	c0.13	0.18		c0.10	
v/s Ratio Perm	0.05			c0.28		
v/c Ratio	0.07	0.18	0.28	0.44	0.67	
Uniform Delay, d1	4.1	4.2	8.3	9.5	41.0	
Progression Factor	1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	0.1	0.3	0.3	1.6	3.9	
Delay (s)	4.1	4.5	8.7	11.1	44.9	
Level of Service	A	A	A	B	D	
Approach Delay (s)		4.5	9.9		44.9	
Approach LOS		A	A		D	

Intersection Summary			
HCM 2000 Control Delay	15.5	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.48		
Actuated Cycle Length (s)	101.2	Sum of lost time (s)	18.9
Intersection Capacity Utilization	62.5%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	159	0	0	480	0	110
Future Volume (Veh/h)	159	0	0	480	0	110
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	159	0	0	480	0	110
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage veh)						
Upstream signal (m)				144		
pX, platoon unblocked					0.87	
vC, conflicting volume			159		639	159
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			159		515	159
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			100		100	88
cM capacity (veh/h)			1420		454	886

Direction, Lane #	EB 1	WB 1	NB 1
Volume Total	159	480	110
Volume Left	0	0	0
Volume Right	0	0	110
cSH	1700	1420	886
Volume to Capacity	0.09	0.00	0.12
Queue Length 95th (m)	0.0	0.0	3.2
Control Delay (s)	0.0	0.0	9.6
Lane LOS			A
Approach Delay (s)	0.0	0.0	9.6
Approach LOS			A

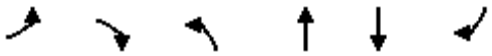
Intersection Summary			
Average Delay	1.4		
Intersection Capacity Utilization	40.5%	ICU Level of Service	A
Analysis Period (min)	15		



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	0	54	0	1950	905	32
Future Volume (Veh/h)	0	54	0	1950	905	32
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	0	54	0	1950	905	32
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (m)				156		
pX, platoon unblocked	0.49					
vC, conflicting volume	1896	468	937			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	749	468	937			
tC, single (s)	6.8	6.9	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	100	90	100			
cM capacity (veh/h)	170	541	739			

Direction, Lane #	EB 1	NB 1	NB 2	SB 1	SB 2
Volume Total	54	975	975	603	334
Volume Left	0	0	0	0	0
Volume Right	54	0	0	0	32
cSH	541	1700	1700	1700	1700
Volume to Capacity	0.10	0.57	0.57	0.35	0.20
Queue Length 95th (m)	2.5	0.0	0.0	0.0	0.0
Control Delay (s)	12.4	0.0	0.0	0.0	0.0
Lane LOS	B				
Approach Delay (s)	12.4	0.0		0.0	
Approach LOS	B				

Intersection Summary			
Average Delay	0.2		
Intersection Capacity Utilization	60.2%	ICU Level of Service	B
Analysis Period (min)	15		



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	0	14	70	410	145	0
Future Volume (Veh/h)	0	14	70	410	145	0
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	0	14	70	410	145	0
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (m)				391		
pX, platoon unblocked	0.89					
vC, conflicting volume	695	145	145			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	596	145	145			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	100	98	95			
cM capacity (veh/h)	395	902	1437			

Direction, Lane #	EB 1	NB 1	SB 1
Volume Total	14	480	145
Volume Left	0	70	0
Volume Right	14	0	0
cSH	902	1437	1700
Volume to Capacity	0.02	0.05	0.09
Queue Length 95th (m)	0.4	1.2	0.0
Control Delay (s)	9.1	1.5	0.0
Lane LOS	A	A	
Approach Delay (s)	9.1	1.5	0.0
Approach LOS	A		

Intersection Summary			
Average Delay	1.3		
Intersection Capacity Utilization	48.3%	ICU Level of Service	A
Analysis Period (min)	15		

Appendix D MMLOS ANALYSIS

Multi-Modal Level of Service - Segments Form

Consultant	**Stantec**	**Project**	**927 March Road**
Scenario	**2020 Existing**	**Date**	**11-Nov-20**
Comments			

SEGMENTS		Street A	Section	Section	Section	Section
			March Road between Maxwell Bridge Road and Street D	March Road between Street A and Street D	Halton Terrace between March Road Road and Old Carp Road	Old Carp Road between Halton Terrace and just east of Marchbrook Circle
Pedestrian	Sidewalk Width Boulevard Width	**F**	≥ 2 m < 0.5	no sidewalk n/a	1.8 m < 0.5 m	no sidewalk n/a
	Avg Daily Curb Lane Traffic Volume		≤ 3000	> 3000	≤ 3000	≤ 3000
	Operating Speed On-Street Parking		> 60 km/h no	> 60 km/h no	> 30 to 50 km/h no	> 30 to 50 km/h no
	Exposure to Traffic PLoS		**D**	**F**	**B**	**F**
	Level of Service		**D**	**F**	**B**	**F**
Bicycle	Type of Cycling Facility	**F**	Curbside Bike Lane	Mixed Traffic	Mixed Traffic	Mixed Traffic
	Number of Travel Lanes		2 ea. dir. (w median)	2-3 lanes total	2-3 lanes total	2-3 lanes total
	Operating Speed		> 70 km/h	≥ 60 km/h	≤ 40 km/h	≤ 40 km/h
	# of Lanes & Operating Speed LoS		**E**	**F**	**B**	**B**
	Bike Lane (+ Parking Lane) Width		≥ 1.8 m			
	Bike Lane Width LoS		**A**	-	-	-
	Bike Lane Blockages		Rare			
	Blockage LoS		**A**	-	-	-
	Level of Service		**E**	**F**	**B**	**B**
Transit	Facility Type	**D**	Mixed Traffic	Mixed Traffic	Mixed Traffic	Mixed Traffic
	Friction or Ratio Transit:Posted Speed		Vt/Vp ≥ 0.8	Vt/Vp ≥ 0.8	Vt/Vp ≥ 0.8	Vt/Vp ≥ 0.8
	Level of Service		**D**	**D**	**D**	**D**
Truck	Truck Lane Width	**B**	> 3.7 m	> 3.7 m		
	Travel Lanes per Direction		> 1	1		
	Level of Service		**A**	**B**	**-**	**-**
Auto	**Level of Service**	**Not Applicable**				

Multi-Modal Level of Service - Segments Form

Consultant	**Stantec**	**Project**	**927 March Road**
Scenario	**2034 Buildout**	**Date**	**11-Nov-20**
Comments			

SEGMENTS		**Street A**	Section March Road between Maxwell Bridge Road and Street D	Section March Road between Street A and Street D	Section Entirety of the Street A crescent between the intersections with March Road	Section Street D between March Road and Street A
Pedestrian	Sidewalk Width Boulevard Width	**F**	≥ 2 m < 0.5	no sidewalk n/a	≥ 2 m > 2 m	1.8 m < 0.5 m
	Avg Daily Curb Lane Traffic Volume		≤ 3000	> 3000	≤ 3000	≤ 3000
	Operating Speed On-Street Parking		> 60 km/h no	> 60 km/h no	> 30 to 50 km/h no	≤ 30 km/h no
	Exposure to Traffic PLoS		**D**	**F**	**A**	**A**
	Level of Service		**D**	**F**	**A**	**A**
Bicycle	Type of Cycling Facility	**E**	Curbside Bike Lane	Curbside Bike Lane	Physically Separated	Mixed Traffic
	Number of Travel Lanes		2 ea. dir. (w median)	≤ 1 each direction		≤ 2 (no centreline)
	Operating Speed		> 70 km/h	> 70 km/h		≤ 40 km/h
	# of Lanes & Operating Speed LoS		**E**	**E**	**-**	**A**
	Bike Lane (+ Parking Lane) Width		≥ 1.8 m	≥ 1.8 m		
	Bike Lane Width LoS		**A**	**A**	**-**	**-**
	Bike Lane Blockages		Rare	Rare		
	Blockage LoS		**A**	**A**	**-**	**-**
	Level of Service		**E**	**E**	**A**	**A**
Transit	Facility Type	**E**	Mixed Traffic	Mixed Traffic	Mixed Traffic	
	Friction or Ratio Transit:Posted Speed		Vt/Vp ≥ 0.8	Vt/Vp ≤ 0.6	Vt/Vp ≥ 0.8	
	Level of Service		**D**	**E**	**D**	**-**
Truck	Truck Lane Width	**B**	> 3.7 m	> 3.7 m		
	Travel Lanes per Direction		> 1	1		
	Level of Service		**A**	**B**	**-**	**-**

Multi-Modal Level of Service - Segments Form

Consultant	**Stantec**	**Project**	**927 March Road**
Scenario	**2034 Buildout**	**Date**	**11-Nov-20**
Comments			

SEGMENTS		**Street A**	Section March Road between Maxwell Bridge Road and Street D	Section March Road between Street A and Street D	Section Entirety of the Street A crescent between the intersections with March Road	Section Street D between March Road and Street A
Pedestrian	Sidewalk Width Boulevard Width	**F**	≥ 2 m < 0.5	no sidewalk n/a	≥ 2 m > 2 m	1.8 m < 0.5 m
	Avg Daily Curb Lane Traffic Volume		≤ 3000	> 3000	≤ 3000	≤ 3000
	Operating Speed On-Street Parking		> 60 km/h no	> 60 km/h no	> 30 to 50 km/h no	≤ 30 km/h no
	Exposure to Traffic PLoS		**D**	**F**	**A**	**A**
	Level of Service		**D**	**F**	**A**	**A**
Bicycle	Type of Cycling Facility	**E**	Curbside Bike Lane	Curbside Bike Lane	Physically Separated	Mixed Traffic
	Number of Travel Lanes		2 ea. dir. (w median)	≤ 1 each direction		≤ 2 (no centreline)
	Operating Speed		> 70 km/h	> 70 km/h		≤ 40 km/h
	# of Lanes & Operating Speed LoS		**E**	**E**	**-**	**A**
	Bike Lane (+ Parking Lane) Width		≥ 1.8 m	≥ 1.8 m		
	Bike Lane Width LoS		**A**	**A**	**-**	**-**
	Bike Lane Blockages		Rare	Rare		
	Blockage LoS		**A**	**A**	**-**	**-**
	Level of Service		**E**	**E**	**A**	**A**
Transit	Facility Type	**D**	Mixed Traffic	Mixed Traffic	Mixed Traffic	
	Friction or Ratio Transit:Posted Speed		Vt/Vp ≥ 0.8	Vt/Vp ≥ 0.8	Vt/Vp ≥ 0.8	
	Level of Service		**D**	**D**	**D**	**-**
Truck	Truck Lane Width	**B**	> 3.7 m	> 3.7 m		
	Travel Lanes per Direction		> 1	1		
	Level of Service		**A**	**B**	**-**	**-**

Multi-Modal Level of Service - Intersections Form

Consultant	**Stantec**	**Project**	**927 March Road**
Scenario	**2020 Existing**	**Date**	**11-Nov-20**
Comments			

To add intersections
Select columns LMNO, right-click and *Copy;*
Then select column P, right-click and *Insert Co*

INTERSECTIONS		March Road and Halton Terrace				March Road at Dunrobin Road		
Crossing Side		NORTH	SOUTH	EAST	WEST	NORTH	EAST	WEST
Pedestrian	Lanes	7	7	3	3	3		3
	Median	No Median - 2.4 m	No Median - 2.4 m	No Median - 2.4 m	No Median - 2.4 m	No Median - 2.4 m		Median > 2.4 m
	Conflicting Left Turns	Permissive	Permissive	Protected/ Permissive	Protected/ Permissive	Permissive		Permissive
	Conflicting Right Turns	Permissive or yield control	Permissive or yield control	Permissive or yield control	Permissive or yield control	Permissive or yield control		Permissive or yield control
	Right Turns on Red (RToR) ?	RTOR allowed	RTOR allowed	RTOR allowed	RTOR allowed	RTOR allowed		RTOR allowed
	Ped Signal Leading Interval?	No	No	No	No	No		No
	Right Turn Channel	No Channel	No Channel	No Channel	No Channel	No Channel		No Channel
	Corner Radius	10-15m	10-15m	10-15m	10-15m	10-15m		10-15m
	Crosswalk Type	Std transverse markings	Std transverse markings	Std transverse markings	Std transverse markings	Std transverse markings		Std transverse markings
	PETSI Score	**4**	**4**	**70**	**70**	**70**		**70**
	Ped. Exposure to Traffic LoS	**F**	**F**	**C**	**C**	**C**	**-**	**C**
	Cycle Length	130	130	130	130	98		98
	Effective Walk Time	8	8	47	47	37		16
	Average Pedestrian Delay	**57**	**57**	**26**	**26**	**19**		**34**
	Pedestrian Delay LoS	**E**	**E**	**C**	**C**	**B**	**-**	**D**
	Level of Service	**F**	**F**	**C**	**C**	**C**	**-**	**D**
		F				**D**		
Approach From		NORTH	SOUTH	EAST	WEST	NORTH	EAST	WEST
Bicycle	Bicycle Lane Arrangement on Approach	Pocket Bike Lane	Curb Bike Lane, Cycletrack or MUP	Mixed Traffic	Mixed Traffic	Mixed Traffic	Mixed Traffic	Mixed Traffic
	IF Dedicated Right Turn Lane, THEN Right Turn Configuration, ELSE <blank>	Bike lane shifts to the left of right turn	Not Applicable			> 50 m	> 50 m	
	Dedicated Right Turning Speed	≤ 25 km/h		≤ 25 km/h	≤ 25 km/h	≤ 25 km/h	≤ 25 km/h	
	Cyclist Through Movement	**D**	**Not Applicable**			**F**	**F**	
	Separated or Mixed Traffic	**Separated**	**Separated**	**Mixed Traffic**	**Mixed Traffic**	**Mixed Traffic**	**Mixed Traffic**	**Mixed Traffic**
	Left Turn Approach	≥ 2 lanes crossed	≥ 2 lanes crossed	One lane crossed	One lane crossed	No lane crossed	One lane crossed	One lane crossed
	Operating Speed	≥ 60 km/h	≥ 60 km/h	≤ 40 km/h	≤ 40 km/h	≥ 60 km/h	≥ 60 km/h	≥ 60 km/h
	Left Turning Cyclist	**F**	**F**	**B**	**B**	**C**	**F**	**F**
	Level of Service	**F**	**F**	**B**	**B**	**F**	**F**	**F**
		F				**F**		
Transit	Average Signal Delay	≤ 10 sec	≤ 20 sec	> 40 sec	> 40 sec	≤ 40 sec	≤ 10 sec	≤ 10 sec
	Level of Service	**B**	**C**	**F**	**F**	**E**	**B**	**B**
		F				**E**		
Truck	Effective Corner Radius	10 - 15 m	10 - 15 m	10 - 15 m	10 - 15 m	10 - 15 m	10 - 15 m	10 - 15 m
	Number of Receiving Lanes on Departure from Intersection	≥ 2	≥ 2	1	1	1	1	≥ 2
	Level of Service	**B**	**B**	**E**	**E**	**E**	**E**	**B**
		E				**E**		
Auto	Volume to Capacity Ratio	0.0 - 0.60				0.0 - 0.60		
	Level of Service	**A**				**A**		

Multi-Modal Level of Service - Intersections Form

Consultant	**Stantec**	**Project**	**927 March Road**
Scenario	**2034 FBG**	**Date**	**11-Nov-20**
Comments			

To add intersections
Select columns LMNO, right-click and *Copy;*
Then select column P, right-click and *Insert Co*

INTERSECTIONS		March Road and Halton Terrace				March Road and Street A				March Road at Dunrobin Road		
Crossing Side		NORTH	SOUTH	EAST	WEST	NORTH	SOUTH	EAST	WEST	NORTH	EAST	WEST
Pedestrian	Lanes	7	7	3	3	3	4	3	3	3		3
	Median	No Median - 2.4 m	No Median - 2.4 m	No Median - 2.4 m	No Median - 2.4 m	No Median - 2.4 m	No Median - 2.4 m	No Median - 2.4 m	No Median - 2.4 m	No Median - 2.4 m		Median > 2.4 m
	Conflicting Left Turns	Permissive	Permissive	Protected/ Permissive	Protected/ Permissive	Permissive	Permissive	Permissive	Permissive	Permissive		Permissive
	Conflicting Right Turns	Permissive or yield control	Permissive or yield control	Permissive or yield control	Permissive or yield control	Permissive or yield control	Permissive or yield control	Permissive or yield control	Permissive or yield control	Permissive or yield control		Permissive or yield control
	Right Turns on Red (RToR) ?	RTOR allowed	RTOR allowed	RTOR allowed	RTOR allowed	RTOR allowed	RTOR allowed	RTOR allowed	RTOR allowed	RTOR allowed		RTOR allowed
	Ped Signal Leading Interval?	No	No	No	No	No	No	No	No	No		No
	Right Turn Channel	No Channel	No Channel	No Channel	No Channel	No Channel	No Channel	No Channel	No Channel	No Channel		No Channel
	Corner Radius	10-15m	10-15m	10-15m	10-15m	10-15m	10-15m	10-15m	10-15m	10-15m		10-15m
	Crosswalk Type	Std transverse markings	Std transverse markings	Std transverse markings	Std transverse markings	Std transverse markings	Std transverse markings	Std transverse markings	Std transverse markings	Std transverse markings		Std transverse markings
	PETSI Score	**4**	**4**	**70**	**70**	**70**	**53**	**70**	**70**	**70**		**70**
	Ped. Exposure to Traffic LoS	**F**	**F**	**C**	**C**	**C**	**D**	**C**	**C**	**C**	**-**	**C**
	Cycle Length	130	130	130	130	130	130	130	130	98		98
	Effective Walk Time	8	8	47	47	8	8	58	50	37		16
	Average Pedestrian Delay	**57**	**57**	**26**	**26**	**57**	**57**	**20**	**25**	**19**		**34**
	Pedestrian Delay LoS	**E**	**E**	**C**	**C**	**E**	**E**	**C**	**C**	**B**	**-**	**D**
	Level of Service	**F**	**F**	**C**	**C**	**E**	**E**	**C**	**C**	**C**	**-**	**D**
		F				**E**				**D**		
Approach From		NORTH	SOUTH	EAST	WEST	NORTH	SOUTH	EAST	WEST	NORTH	EAST	WEST
Bicycle	Bicycle Lane Arrangement on Approach	Pocket Bike Lane	Curb Bike Lane, Cycletrack or MUP	Mixed Traffic	Mixed Traffic	Curb Bike Lane, Cycletrack or MUP	Curb Bike Lane, Cycletrack or MUP	Mixed Traffic	Curb Bike Lane, Cycletrack or MUP	Mixed Traffic	Mixed Traffic	Mixed Traffic
	IF Dedicated Right Turn Lane, THEN Right Turn Configuration, ELSE <blank>	Bike lane shifts to the left of right turn	Not Applicable								> 50 m	
	Dedicated Right Turning Speed	≤ 25 km/h		≤ 25 km/h	≤ 25 km/h						≤ 25 km/h	
	Cyclist Through Movement	**D**	**Not Applicable**			**Not Applicable**	**Not Applicable**		**Not Applicable**		**F**	
	Separated or Mixed Traffic	**Separated**	**Separated**	**Mixed Traffic**	**Mixed Traffic**	**Separated**	**Separated**	**Mixed Traffic**	**Separated**	**Mixed Traffic**	**Mixed Traffic**	**Mixed Traffic**
	Left Turn Approach	≥ 2 lanes crossed	≥ 2 lanes crossed	One lane crossed	One lane crossed	No lane crossed	No lane crossed	No lane crossed	No lane crossed	No lane crossed	One lane crossed	One lane crossed
	Operating Speed	≥ 60 km/h	≥ 60 km/h	≤ 40 km/h	≤ 40 km/h	≥ 60 km/h	≥ 60 km/h	≤ 40 km/h	≤ 40 km/h	≥ 60 km/h	≥ 60 km/h	≥ 60 km/h
	Left Turning Cyclist	**F**	**F**	**B**	**B**	**C**	**C**	**B**	**B**	**C**	**F**	**F**
	Level of Service	**F**	**F**	**B**	**B**	**C**	**C**	**B**	**B**	**C**	**F**	**F**
		F				**C**				**F**		
Transit	Average Signal Delay	≤ 10 sec	≤ 20 sec	> 40 sec	> 40 sec	> 40 sec	≤ 20 sec	> 40 sec	≤ 40 sec	≤ 40 sec	≤ 10 sec	≤ 20 sec
	Level of Service	**B**	**C**	**F**	**F**	**F**	**C**	**F**	**E**	**E**	**B**	**C**
		F				**F**				**E**		
Truck	Effective Corner Radius	10 - 15 m	10 - 15 m	10 - 15 m	10 - 15 m	10 - 15 m	10 - 15 m	10 - 15 m	10 - 15 m	10 - 15 m	10 - 15 m	10 - 15 m
	Number of Receiving Lanes on Departure from Intersection	≥ 2	≥ 2	1	1	1	1	1	1	1	1	≥ 2
	Level of Service	**B**	**B**	**E**	**E**	**E**	**E**	**E**	**E**	**E**	**E**	**B**
		E				**E**				**E**		
Auto	Volume to Capacity Ratio	0.71 - 0.80				> 1.00				0.0 - 0.60		
	Level of Service	**C**				**F**				**A**		

Multi-Modal Level of Service - Intersections Form

Consultant	**Stantec**	**Project**	**927 March Road**
Scenario	**2034 TF**	**Date**	**11-Nov-20**
Comments			

To add intersections
Select columns LMNO, right-click and *Copy;*
Then select column P, right-click and *Insert Co*

INTERSECTIONS		March Road and Halton Terrace				March Road and Street A				March Road at Dunrobin Road		
Crossing Side		NORTH	SOUTH	EAST	WEST	NORTH	SOUTH	EAST	WEST	NORTH	EAST	WEST
Pedestrian	Lanes	7	7	3	3	3	4	3	3	3		3
	Median	No Median - 2.4 m	No Median - 2.4 m	No Median - 2.4 m	No Median - 2.4 m	No Median - 2.4 m	No Median - 2.4 m	No Median - 2.4 m	No Median - 2.4 m	No Median - 2.4 m		Median > 2.4 m
	Conflicting Left Turns	Permissive	Permissive	Protected/ Permissive	Protected/ Permissive	Permissive	Permissive	Permissive	Protected/ Permissive	Permissive		Permissive
	Conflicting Right Turns	Permissive or yield control	Permissive or yield control	Permissive or yield control	Permissive or yield control	Permissive or yield control	Permissive or yield control	Permissive or yield control	Permissive or yield control	Permissive or yield control		Permissive or yield control
	Right Turns on Red (RToR) ?	RTOR allowed	RTOR allowed	RTOR allowed	RTOR allowed	RTOR allowed	RTOR allowed	RTOR allowed	RTOR allowed	RTOR allowed		RTOR allowed
	Ped Signal Leading Interval?	No	No	No	No	No	No	No	No	No		No
	Right Turn Channel	No Channel	No Channel	No Channel	No Channel	No Channel	No Channel	No Channel	No Channel	No Channel		No Channel
	Corner Radius	10-15m	10-15m	10-15m	10-15m	10-15m	10-15m	10-15m	10-15m	10-15m		10-15m
	Crosswalk Type	Std transverse markings	Std transverse markings	Std transverse markings	Std transverse markings	Std transverse markings	Std transverse markings	Std transverse markings	Std transverse markings	Std transverse markings		Std transverse markings
	PETSI Score	**4**	**4**	**70**	**70**	**70**	**53**	**70**	**70**	**70**		**70**
	Ped. Exposure to Traffic LoS	**F**	**F**	**C**	**C**	**C**	**D**	**C**	**C**	**C**	**-**	**C**
	Cycle Length	130	130	130	130	130	130	130	130	98		98
	Effective Walk Time	8	8	47	47	8	8	62	50	37		16
	Average Pedestrian Delay	**57**	**57**	**26**	**26**	**57**	**57**	**18**	**25**	**19**		**34**
	Pedestrian Delay LoS	**E**	**E**	**C**	**C**	**E**	**E**	**B**	**C**	**B**	**-**	**D**
	Level of Service	**F**	**F**	**C**	**C**	**E**	**E**	**C**	**C**	**C**	**-**	**D**
		F				**E**				**D**		
Approach From		NORTH	SOUTH	EAST	WEST	NORTH	SOUTH	EAST	WEST	NORTH	EAST	WEST
Bicycle	Bicycle Lane Arrangement on Approach	Pocket Bike Lane	Curb Bike Lane, Cycletrack or MUP	Mixed Traffic	Mixed Traffic	Curb Bike Lane, Cycletrack or MUP	Curb Bike Lane, Cycletrack or MUP	Mixed Traffic	Curb Bike Lane, Cycletrack or MUP	Mixed Traffic	Mixed Traffic	Mixed Traffic
	IF Dedicated Right Turn Lane, THEN Right Turn Configuration, ELSE <blank>	Bike lane shifts to the left of right turn	Not Applicable								> 50 m	
	Dedicated Right Turning Speed	≤ 25 km/h		≤ 25 km/h	≤ 25 km/h						≤ 25 km/h	
	Cyclist Through Movement	**D**	**Not Applicable**			**Not Applicable**	**Not Applicable**		**Not Applicable**		**F**	
	Separated or Mixed Traffic	**Separated**	**Separated**	**Mixed Traffic**	**Mixed Traffic**	**Separated**	**Separated**	**Mixed Traffic**	**Separated**	**Mixed Traffic**	**Mixed Traffic**	**Mixed Traffic**
	Left Turn Approach	≥ 2 lanes crossed	≥ 2 lanes crossed	One lane crossed	One lane crossed	No lane crossed	No lane crossed	No lane crossed	No lane crossed	No lane crossed	One lane crossed	One lane crossed
	Operating Speed	≥ 60 km/h	≥ 60 km/h	≤ 40 km/h	≤ 40 km/h	≥ 60 km/h	≥ 60 km/h	≤ 40 km/h	≤ 40 km/h	≥ 60 km/h	≥ 60 km/h	≥ 60 km/h
	Left Turning Cyclist	**F**	**F**	**B**	**B**	**C**	**C**	**B**	**B**	**C**	**F**	**F**
	Level of Service	**F**	**F**	**B**	**B**	**C**	**C**	**B**	**B**	**C**	**F**	**F**
		F				**C**				**F**		
Transit	Average Signal Delay	≤ 10 sec	≤ 20 sec	> 40 sec	> 40 sec	> 40 sec	≤ 20 sec	> 40 sec	≤ 40 sec	≤ 40 sec	≤ 10 sec	≤ 20 sec
	Level of Service	**B**	**C**	**F**	**F**	**F**	**C**	**F**	**E**	**E**	**B**	**C**
		F				**F**				**E**		
Truck	Effective Corner Radius	10 - 15 m	10 - 15 m	10 - 15 m	10 - 15 m	10 - 15 m	10 - 15 m	10 - 15 m	10 - 15 m	10 - 15 m	10 - 15 m	10 - 15 m
	Number of Receiving Lanes on Departure from Intersection	≥ 2	≥ 2	1	1	1	1	1	1	1	1	≥ 2
	Level of Service	**B**	**B**	**E**	**E**	**E**	**E**	**E**	**E**	**E**	**E**	**B**
		E				**E**				**E**		
Auto	Volume to Capacity Ratio	0.91 - 1.00				> 1.00				0.0 - 0.60		
	Level of Service	**E**				**F**				**A**		

Multi-Modal Level of Service - Intersections Form

Consultant	**Stantec**	**Project**	**927 March Road**
Scenario	**2039 Ultimate**	**Date**	**11-Nov-20**
Comments			

To add intersections
Select columns LMNO, right-click and *Copy;*
Then select column P, right-click and *Insert Co*

INTERSECTIONS		March Road and Halton Terrace				March Road and Street A				March Road at Dunrobin Road		
Crossing Side		NORTH	SOUTH	EAST	WEST	NORTH	SOUTH	EAST	WEST	NORTH	EAST	WEST
Pedestrian	Lanes	7	7	3	3	7	7	3	3	4		3
	Median	No Median - 2.4 m	No Median - 2.4 m	No Median - 2.4 m	No Median - 2.4 m	No Median - 2.4 m	No Median - 2.4 m	No Median - 2.4 m	No Median - 2.4 m	No Median - 2.4 m		Median > 2.4 m
	Conflicting Left Turns	Permissive	Permissive	Protected/ Permissive	Protected/ Permissive	Permissive	Permissive	Permissive	Protected/ Permissive	Permissive		Permissive
	Conflicting Right Turns	Permissive or yield control	Permissive or yield control	Permissive or yield control	Permissive or yield control	Permissive or yield control	Permissive or yield control	Permissive or yield control	Permissive or yield control	Permissive or yield control		Permissive or yield control
	Right Turns on Red (RToR) ?	RTOR allowed	RTOR allowed	RTOR allowed	RTOR allowed	RTOR allowed	RTOR allowed	RTOR allowed	RTOR allowed	RTOR allowed		RTOR allowed
	Ped Signal Leading Interval?	No	No	No	No	No	No	No	No	No		No
	Right Turn Channel	No Channel	No Channel	No Channel	No Channel	No Channel	No Channel	No Channel	No Channel	No Channel		No Channel
	Corner Radius	10-15m	10-15m	10-15m	10-15m	10-15m	10-15m	10-15m	10-15m	10-15m		10-15m
	Crosswalk Type	Std transverse markings	Std transverse markings	Std transverse markings	Std transverse markings	Std transverse markings	Std transverse markings	Std transverse markings	Std transverse markings	Std transverse markings		Std transverse markings
	PETSI Score	**4**	**4**	**70**	**70**	**4**	**4**	**70**	**70**	**53**		**70**
	Ped. Exposure to Traffic LoS	**F**	**F**	**C**	**C**	**F**	**F**	**C**	**C**	**D**	**-**	**C**
	Cycle Length	130	130	130	130	130	130	130	130	98		98
	Effective Walk Time	8	8	47	47	16	16	54	50	37		16
	Average Pedestrian Delay	**57**	**57**	**26**	**26**	**50**	**50**	**22**	**25**	**19**		**34**
	Pedestrian Delay LoS	**E**	**E**	**C**	**C**	**E**	**E**	**C**	**C**	**B**	**-**	**D**
	Level of Service	**F**	**F**	**C**	**C**	**F**	**F**	**C**	**C**	**D**	**-**	**D**
		F				**F**				**D**		
Approach From		NORTH	SOUTH	EAST	WEST	NORTH	SOUTH	EAST	WEST	NORTH	EAST	WEST
Bicycle	Bicycle Lane Arrangement on Approach	Pocket Bike Lane	Curb Bike Lane, Cycletrack or MUP	Mixed Traffic	Mixed Traffic	Curb Bike Lane, Cycletrack or MUP	Curb Bike Lane, Cycletrack or MUP	Curb Bike Lane, Cycletrack or MUP	Curb Bike Lane, Cycletrack or MUP	Mixed Traffic	Mixed Traffic	Mixed Traffic
	IF Dedicated Right Turn Lane, THEN Right Turn Configuration, ELSE <blank>	Bike lane shifts to the left of right turn	Not Applicable								> 50 m	
	Dedicated Right Turning Speed	≤ 25 km/h		≤ 25 km/h	≤ 25 km/h						≤ 25 km/h	
	Cyclist Through Movement	**D**	**Not Applicable**			**Not Applicable**	**Not Applicable**	**Not Applicable**	**Not Applicable**		**F**	
	Separated or Mixed Traffic	**Separated**	**Separated**	**Mixed Traffic**	**Mixed Traffic**	**Separated**	**Separated**	**Separated**	**Separated**	**Mixed Traffic**	**Mixed Traffic**	**Mixed Traffic**
	Left Turn Approach	≥ 2 lanes crossed	≥ 2 lanes crossed	One lane crossed	One lane crossed	2-stage, LT box	2-stage, LT box	2-stage, LT box	2-stage, LT box	No lane crossed	One lane crossed	One lane crossed
	Operating Speed	≥ 60 km/h	≥ 60 km/h	≤ 40 km/h	≤ 40 km/h	≥ 60 km/h	≥ 60 km/h	≤ 40 km/h	≤ 40 km/h	≥ 60 km/h	≥ 60 km/h	≥ 60 km/h
	Left Turning Cyclist	**F**	**F**	**B**	**B**	**A**	**A**	**A**	**A**	**C**	**F**	**F**
	Level of Service	**F**	**F**	**B**	**B**	**A**	**A**	**A**	**A**	**C**	**F**	**F**
		F				**A**				**F**		
Transit	Average Signal Delay	≤ 30 sec	≤ 20 sec	> 40 sec	> 40 sec	≤ 30 sec	≤ 20 sec	> 40 sec	≤ 40 sec	≤ 40 sec	≤ 10 sec	≤ 20 sec
	Level of Service	**D**	**C**	**F**	**F**	**D**	**C**	**F**	**E**	**E**	**B**	**C**
		F				**F**				**E**		
Truck	Effective Corner Radius	10 - 15 m	10 - 15 m	10 - 15 m	10 - 15 m	10 - 15 m	10 - 15 m	10 - 15 m	10 - 15 m	10 - 15 m	10 - 15 m	10 - 15 m
	Number of Receiving Lanes on Departure from Intersection	≥ 2	≥ 2	1	1	≥ 2	≥ 2	1	1	1	1	≥ 2
	Level of Service	**B**	**B**	**E**	**E**	**B**	**B**	**E**	**E**	**E**	**E**	**B**
		E				**E**				**E**		
Auto	Volume to Capacity Ratio	0.91 - 1.00				0.81 - 0.90				0.0 - 0.60		
	Level of Service	**E**				**D**				**A**		

Appendix E INFRASTRUCTURE DESIGN CHECKLIST

TDM-Supportive Development Design and Infrastructure Checklist:
Residential Developments (multi-family or condominium)

Legend

REQUIRED	The Official Plan or Zoning By-law provides related guidance that must be followed
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

		TDM-supportive design & infrastructure measures: *Residential developments*	Check if completed & add descriptions, explanations or plan/drawing references
	1.	**WALKING & CYCLING: ROUTES**	
	1.1	**Building location & access points**	
BASIC	1.1.1	Locate building close to the street, and do not locate parking areas between the street and building entrances	☐
BASIC	1.1.2	Locate building entrances in order to minimize walking distances to sidewalks and transit stops/stations	☐
BASIC	1.1.3	Locate building doors and windows to ensure visibility of pedestrians from the building, for their security and comfort	☐
	1.2	**Facilities for walking & cycling**	
REQUIRED	1.2.1	Provide convenient, direct access to stations or major stops along rapid transit routes within 600 metres; minimize walking distances from buildings to rapid transit; provide pedestrian-friendly, weather-protected (where possible) environment between rapid transit accesses and building entrances; ensure quality linkages from sidewalks through building entrances to integrated stops/stations *(see Official Plan policy 4.3.3)*	☑
REQUIRED	1.2.2	Provide safe, direct and attractive pedestrian access from public sidewalks to building entrances through such measures as: reducing distances between public sidewalks and major building entrances; providing walkways from public streets to major building entrances; within a site, providing walkways along the front of adjoining buildings, between adjacent buildings, and connecting areas where people may congregate, such as courtyards and transit stops; and providing weather protection through canopies, colonnades, and other design elements wherever possible *(see Official Plan policy 4.3.12)*	☐ N/A

		TDM-supportive design & infrastructure measures: *Residential developments*	Check if completed & add descriptions, explanations or plan/drawing references
REQUIRED	1.2.3	Provide sidewalks of smooth, well-drained walking surfaces of contrasting materials or treatments to differentiate pedestrian areas from vehicle areas, and provide marked pedestrian crosswalks at intersection sidewalks *(see Official Plan policy 4.3.10)*	☑
REQUIRED	1.2.4	Make sidewalks and open space areas easily accessible through features such as gradual grade transition, depressed curbs at street corners and convenient access to extra-wide parking spaces and ramps *(see Official Plan policy 4.3.10)*	☑
REQUIRED	1.2.5	Include adequately spaced inter-block/street cycling and pedestrian connections to facilitate travel by active transportation. Provide links to the existing or planned network of public sidewalks, multi-use pathways and on-road cycle routes. Where public sidewalks and multi-use pathways intersect with roads, consider providing traffic control devices to give priority to cyclists and pedestrians *(see Official Plan policy 4.3.11)*	☑
BASIC	1.2.6	Provide safe, direct and attractive walking routes from building entrances to nearby transit stops	☐
BASIC	1.2.7	Ensure that walking routes to transit stops are secure, visible, lighted, shaded and wind-protected wherever possible	☐
BASIC	1.2.8	Design roads used for access or circulation by cyclists using a target operating speed of no more than 30 km/h, or provide a separated cycling facility	☑
	1.3	**Amenities for walking & cycling**	
BASIC	1.3.1	Provide lighting, landscaping and benches along walking and cycling routes between building entrances and streets, sidewalks and trails	☑
BASIC	1.3.2	Provide wayfinding signage for site access (where required, e.g. when multiple buildings or entrances exist) and egress (where warranted, such as when directions to reach transit stops/stations, trails or other common destinations are not obvious)	☐

		TDM-supportive design & infrastructure measures: *Residential developments*	Check if completed & add descriptions, explanations or plan/drawing references
	2.	**WALKING & CYCLING: END-OF-TRIP FACILITIES**	
	2.1	**Bicycle parking**	
REQUIRED	2.1.1	Provide bicycle parking in highly visible and lighted areas, sheltered from the weather wherever possible *(see Official Plan policy 4.3.6)*	☐ N/A
REQUIRED	2.1.2	Provide the number of bicycle parking spaces specified for various land uses in different parts of Ottawa; provide convenient access to main entrances or well-used areas *(see Zoning By-law Section 111)*	☐ N/A
REQUIRED	2.1.3	Ensure that bicycle parking spaces and access aisles meet minimum dimensions; that no more than 50% of spaces are vertical spaces; and that parking racks are securely anchored *(see Zoning By-law Section 111)*	☐ N/A
BASIC	2.1.4	Provide bicycle parking spaces equivalent to the expected number of resident-owned bicycles, plus the expected peak number of visitor cyclists	☐
	2.2	**Secure bicycle parking**	
REQUIRED	2.2.1	Where more than 50 bicycle parking spaces are provided for a single residential building, locate at least 25% of spaces within a building/structure, a secure area (e.g. supervised parking lot or enclosure) or bicycle lockers *(see Zoning By-law Section 111)*	☐ N/A
BETTER	2.2.2	Provide secure bicycle parking spaces equivalent to at least the number of units at condominiums or multi-family residential developments	☐
	2.3	**Bicycle repair station**	
BETTER	2.3.1	Provide a permanent bike repair station, with commonly used tools and an air pump, adjacent to the main bicycle parking area (or secure bicycle parking area, if provided)	☐
	3.	**TRANSIT**	
	3.1	**Customer amenities**	
BASIC	3.1.1	Provide shelters, lighting and benches at any on-site transit stops	☐
BASIC	3.1.2	Where the site abuts an off-site transit stop and insufficient space exists for a transit shelter in the public right-of-way, protect land for a shelter and/or install a shelter	☐
BETTER	3.1.3	Provide a secure and comfortable interior waiting area by integrating any on-site transit stops into the building	☐

		TDM-supportive design & infrastructure measures: *Residential developments*	Check if completed & add descriptions, explanations or plan/drawing references
	4.	**RIDESHARING**	
	4.1	**Pick-up & drop-off facilities**	
BASIC	4.1.1	Provide a designated area for carpool drivers (plus taxis and ride-hailing services) to drop off or pick up passengers without using fire lanes or other no-stopping zones	☐
	5.	**CARSHARING & BIKESHARING**	
	5.1	**Carshare parking spaces**	
BETTER	5.1.1	Provide up to three carshare parking spaces in an R3, R4 or R5 Zone for specified residential uses *(see Zoning By-law Section 94)*	☐
	5.2	**Bikeshare station location**	
BETTER	5.2.1	Provide a designated bikeshare station area near a major building entrance, preferably lighted and sheltered with a direct walkway connection	☐
	6.	**PARKING**	
	6.1	**Number of parking spaces**	
REQUIRED	6.1.1	Do not provide more parking than permitted by zoning, nor less than required by zoning, unless a variance is being applied for	☐ N/A
BASIC	6.1.2	Provide parking for long-term and short-term users that is consistent with mode share targets, considering the potential for visitors to use off-site public parking	☐
BASIC	6.1.3	Where a site features more than one use, provide shared parking and reduce the cumulative number of parking spaces accordingly *(see Zoning By-law Section 104)*	☐
BETTER	6.1.4	Reduce the minimum number of parking spaces required by zoning by one space for each 13 square metres of gross floor area provided as shower rooms, change rooms, locker rooms and other facilities for cyclists in conjunction with bicycle parking *(see Zoning By-law Section 111)*	☐
	6.2	**Separate long-term & short-term parking areas**	
BETTER	6.2.1	Provide separate areas for short-term and long-term parking (using signage or physical barriers) to permit access controls and simplify enforcement (i.e. to discourage residents from parking in visitor spaces, and vice versa)	☐

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

Legend

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

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

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

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

Note: All items in this checklist were deemed non applicable to the plan of subdivision

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

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