Stantec

1020 and 1070 March Road

Transportation Impact Assessment

Strategy Report

July 17, 2019

Prepared for:

Valecraft Homes Ltd.

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1.0 SCREENING

1.1 SUMMARY OF DEVELOPMENT

Municipal Address	**1020 and 1070 March Road**
Description of Location	Kanata North Urban Expansion Area – Northeast Quadrant
Land Use Classification	Residential, Commercial, Institutional
Development Size (units)	297 Single Family Homes, 315 Townhomes, 116 Apartment Units
Development Size (m^2)	Commercial: 80,000 GFA (7,400m^2) Institutional: TBD
Number of Accesses and Locations	2 Accesses: March Road at Street 1 and Street 8 into proposed Minto development to the south
Phase of Development	1 of 1 total
Buildout Year	2031

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

Valecraft Homes Ltd. (Valecraft) is proceeding with an application for Plan of Subdivision and Zoning By-Law Amendment for their proposed residential development located at 1020 and 1070 March Road in the City of Ottawa's Kanata North community. The subject development encompasses the northeastern quadrant of the Kanata North Urban Expansion Area (KNUEA). It is bound by March Road to the west, existing country residential to the north, future Minto residential to the south, and undeveloped land to the east.

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 plan of subdivision in **Figure 2** below.

Figure 1 - Site Location

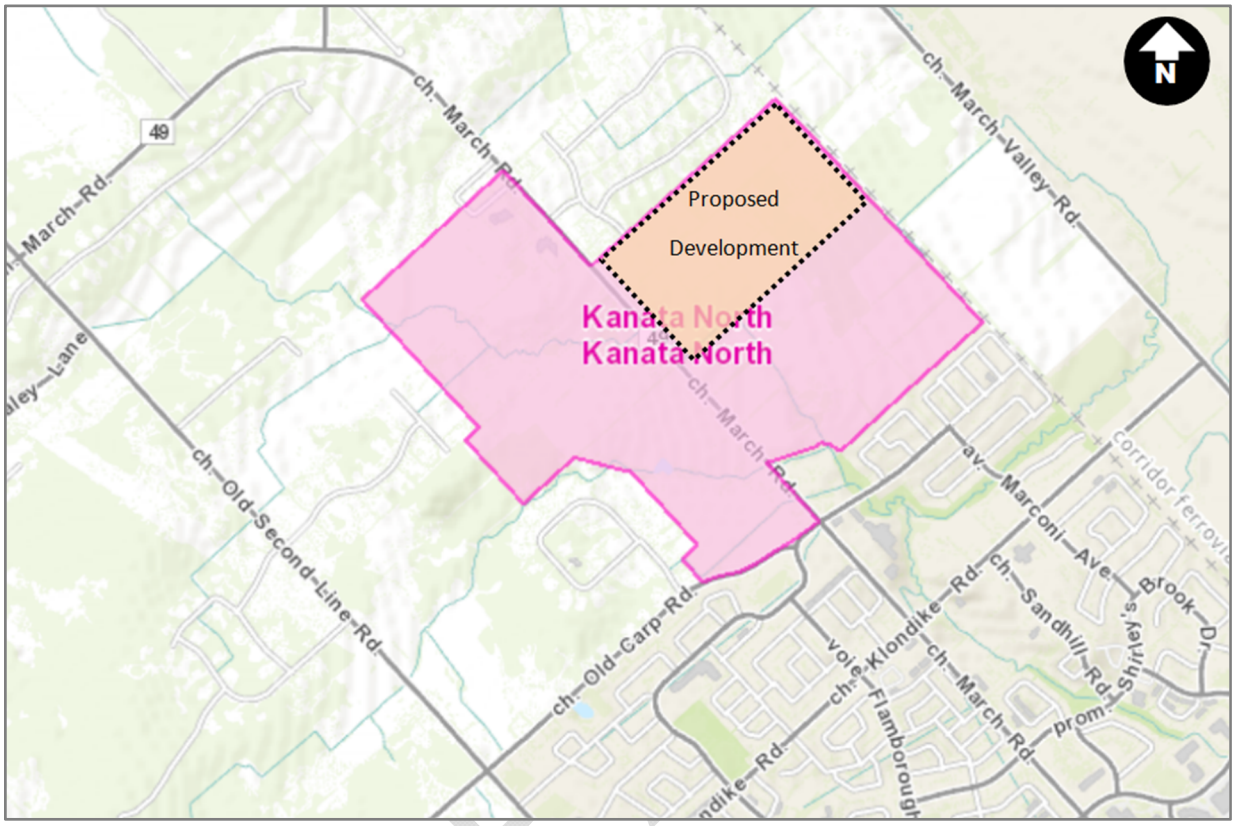
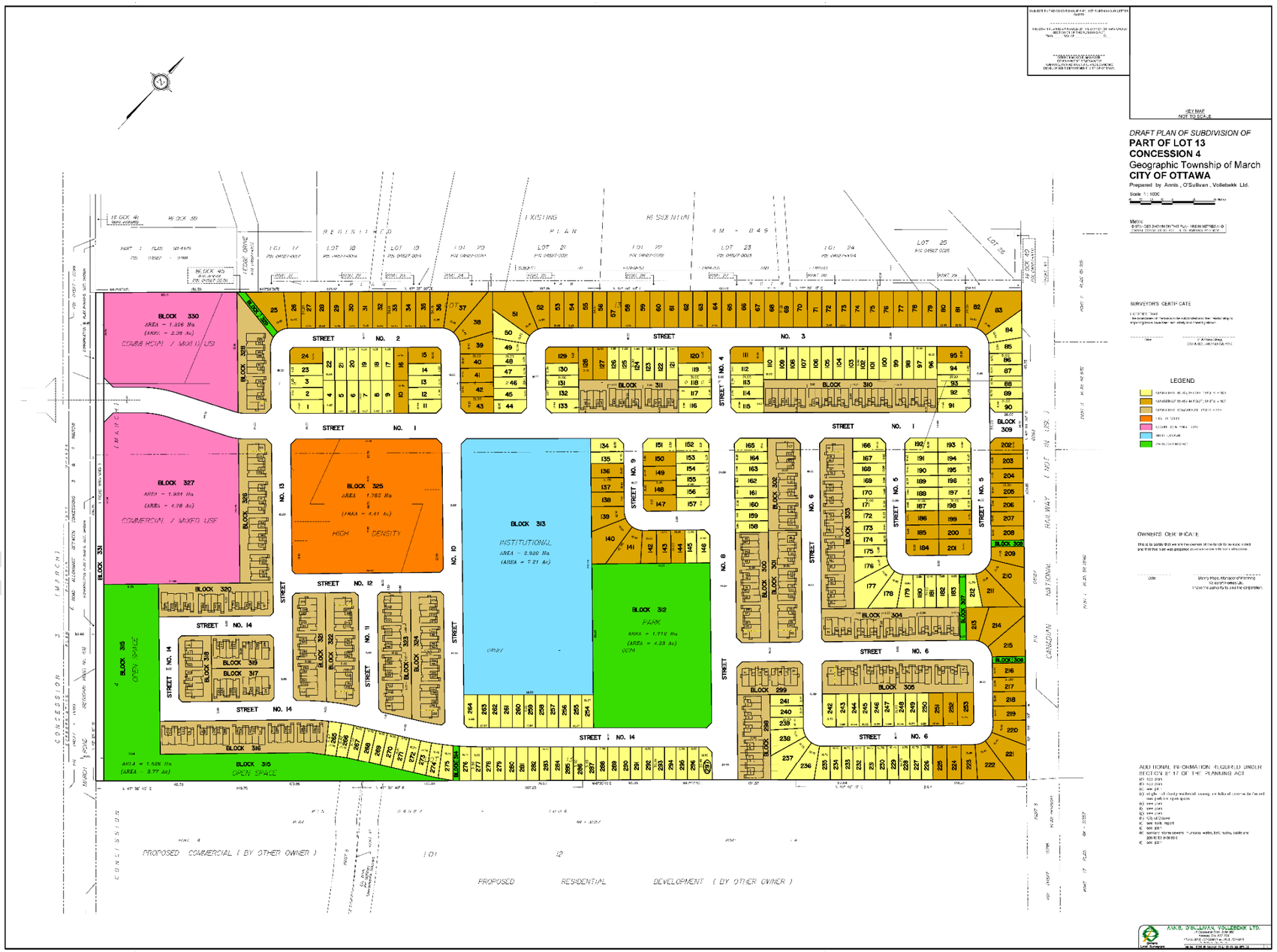


Figure 2 - Proposed Plan of Subdivision



The subdivision is proposed to include 297 single family homes, 315 townhomes, 116 apartment units, one school, and two commercial parcels. Build-out and occupancy is anticipated to occur by 2031. The exact phasing of the development is not known at this time; however, the subdivision will proceed from west to east, starting with the residential units closest to March Road.

Table 1 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*. These land use codes are consistent with those used in the approved *Kanata North Community Design Plan Transportation Master Plan* (Novatech, June 2016).

Table 1 - Proposed Land Uses / Land Use Codes

Land Use	Size	Land Use Code (LUC)
LUC 210	297 Singles	Single-Family Detached
LUC 230	315 Townhomes	Townhomes
LUC 220	116 Units	Apartments
LUC 520	580 Students[1]	Elementary School
LUC 826	80,000 GFA	Specialty Retail

Notes: 1. The size of the proposed school is not yet known at this time, and therefore, the estimated size was taken from the recently completed Kanata North Community Design Plan Transportation Master Plan (Novatech, June 2016).

Primary access to the proposed development will be achieved via a new Street 1 connection to March Road. This access will be a shared access with the proposed future Claridge development on the west side of March Road. A secondary access to will also be provided via Street 8 into the proposed Minto development to the south.

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 with a rural cross-section. 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, however, it is noted that the condition of the shoulders appear to be poor. 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.

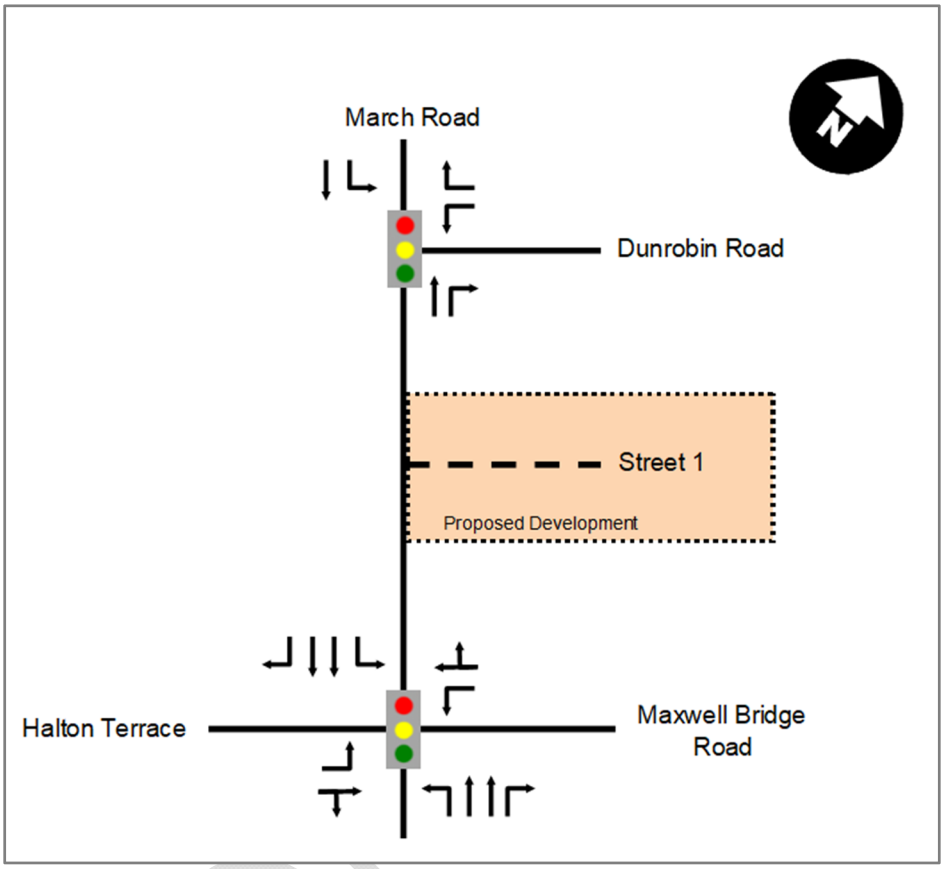
The intersection of March Road at Dunrobin Road is currently signalized. Auxiliary left turn lanes are provided in all directions and an auxiliary right turn lane is provided in the northbound direction.

The intersection of March Road at Maxwell Bridge Road / Halton Terrace is currently signalized. Auxiliary left turn lanes are provided in all directions and auxiliary right turn lanes are provided in the southbound and northbound directions.

There are a few residential driveways along March Road within 200m of the proposed site access. In addition, the St. Isidore School, which has three accesses to March Road, is also within 200m of the proposed site access.

Figure 3 illustrates the existing lane configuration and traffic control.

Figure 3 - Existing Lane Configuration and Traffic Control



2.1.2.2 Walking and Cycling

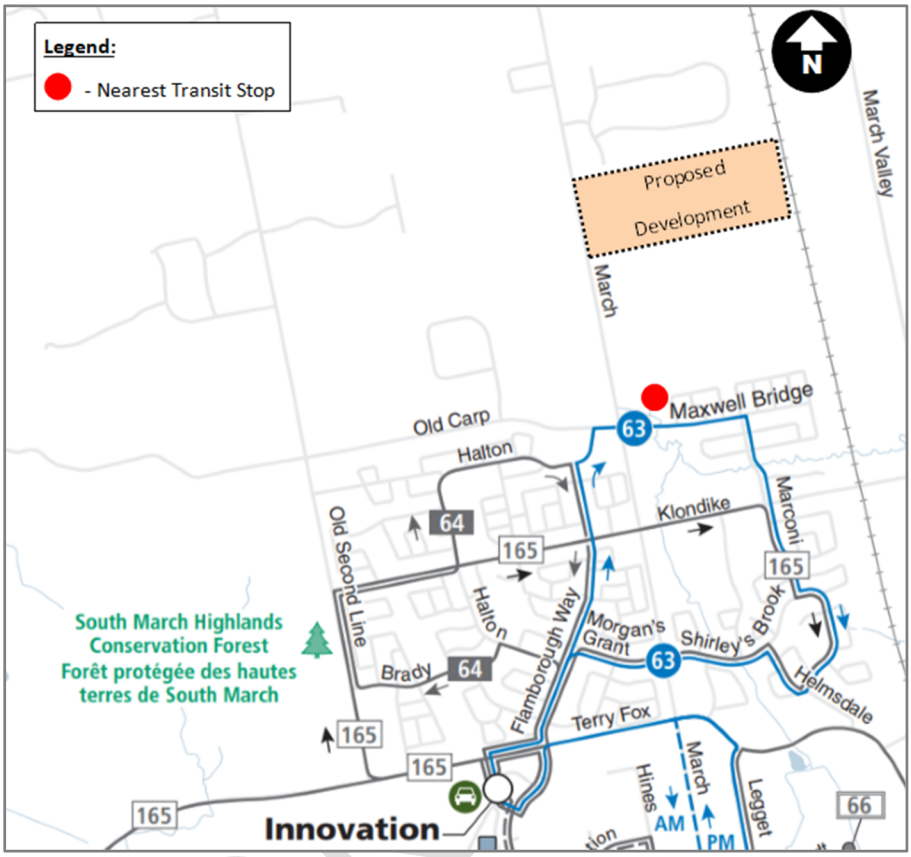
As the proposed development is currently surrounded by greenfield and undeveloped land, there are currently no existing sidewalks or bicycle lanes in the immediate vicinity of the site.

2.1.2.3 Transit

Transit service is not currently provided in the immediate vicinity of the proposed development. The closest transit stop to the proposed development is located at the March Road at Maxwell Bridge Road / Halton Terrace intersection, which is more than 1km away. This transit stop is serviced by OC Transpo Route 63 which is a Rapid route that operates all day, seven days per week between Kanata North and Tunney's Pasture Station. During peak period, the transit service is extended east until Mackenzie King Station.

Figure 4 illustrates nearby transit routes and closest transit stop.

Figure 4 - Study Area Transit Routes and Stops



Source: OC Transpo System Map, accessed April 2019

2.1.2.4 Traffic Management Measures

No traffic management measures are currently provided near the subject site.

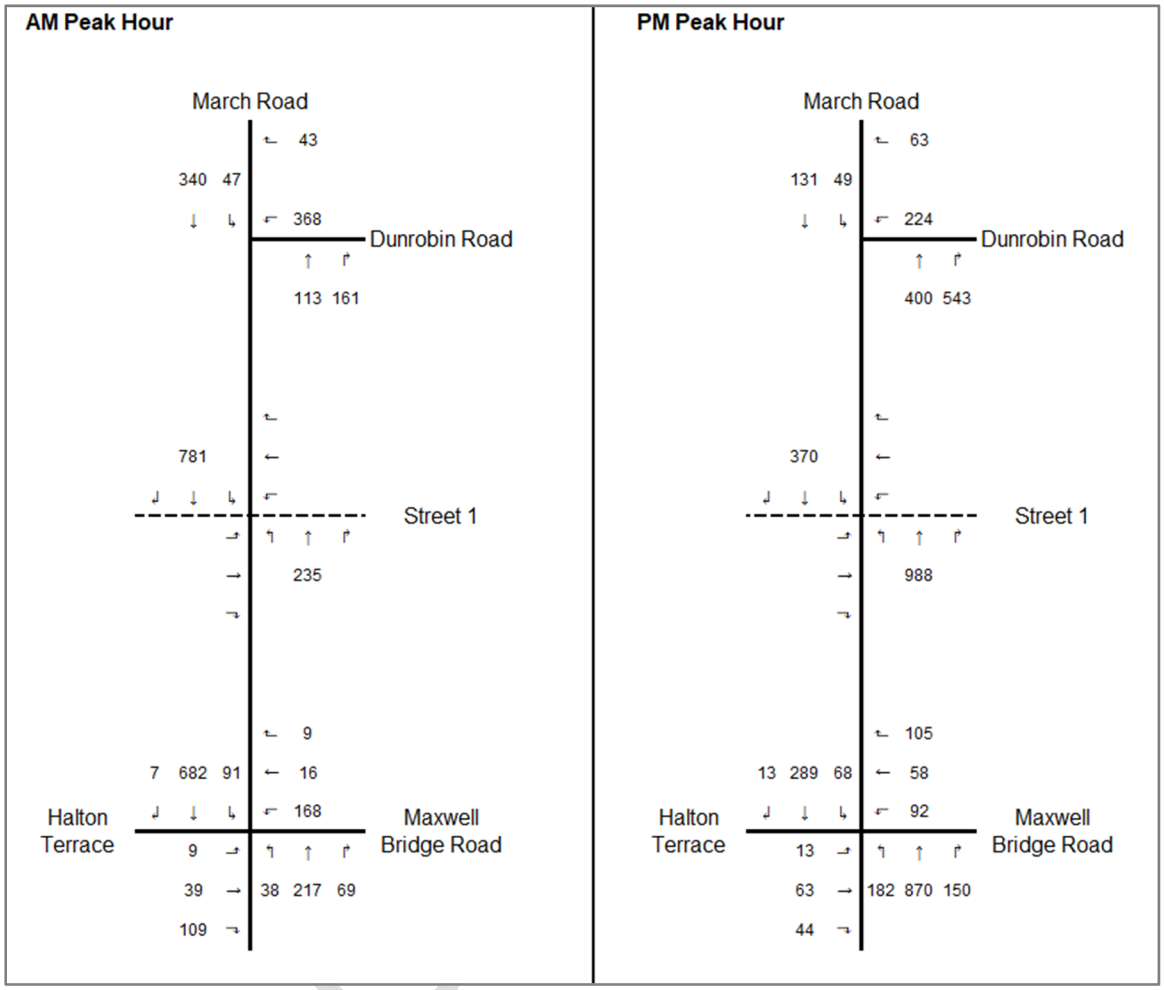
2.1.2.5 Traffic Volumes

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 2016 and were therefore adjusted to 2019 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 5 illustrates the existing 2019 traffic volumes during the AM and PM peak hours.

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

Figure 5 - 2019 Existing Traffic Volumes



2.1.2.6 Collision History

Collision data was provided by the City of Ottawa for the period January 2013 to December 2017 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 2 summarizes the collision class and impact types for each road segment and intersection within the study area.

Table 2 – 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	17	8	2	18	1	19
	Non-Fatal Injury	2	5	1	7	3	4
Collision Type	Sideswipe	2	2	0	0	0	4
	Angle / Turning	10	7	1	3	1	1
	Rear End	5	0	2	1	0	4
	Single Motor Vehicle	2	3	0	19	2	14
	Other	0	1	0	2	1	0
Event	Other Motor Vehicle	17	10	3	5	1	9
	Ran off Road	2	0	0	2	0	3
	Pedestrian	0	1	0	0	0	0
	Skidding	0	2	0	2	1	0
	Wild Animal	0	0	0	14	1	9
	Physical (culvert, pole, barrier)	0	0	0	2	0	2
	Other	0	0	0	0	1	0

Based on the collision data summarized in **Table 2** above, it was found that the majority of the collisions resulted in property damage only (75%), 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 (51%), which is a common finding at intersections. One interesting thing to note is that along March Road, wild animals were the leading cause of collisions (46%).

2.1.3 Planned Conditions

2.1.3.1 Road Network Modifications

Table 3 identifies the City of Ottawa Transportation Master Plan (TMP) projects located in the vicinity of the study area.

Table 3 - 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)
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
	At-grade BRT between Maxwell Bridge Road and Highway 417.	Concept

The transportation projects listed in **Table 3** above have undefined timelines. As such, for analysis purposes, they were not assumed to be in place for the subject transportation impact study (i.e., it is assumed they will not be in place by the 2036 ultimate horizon).

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 6** and outlined in **Table 4** below.

Figure 6 - Background Developments

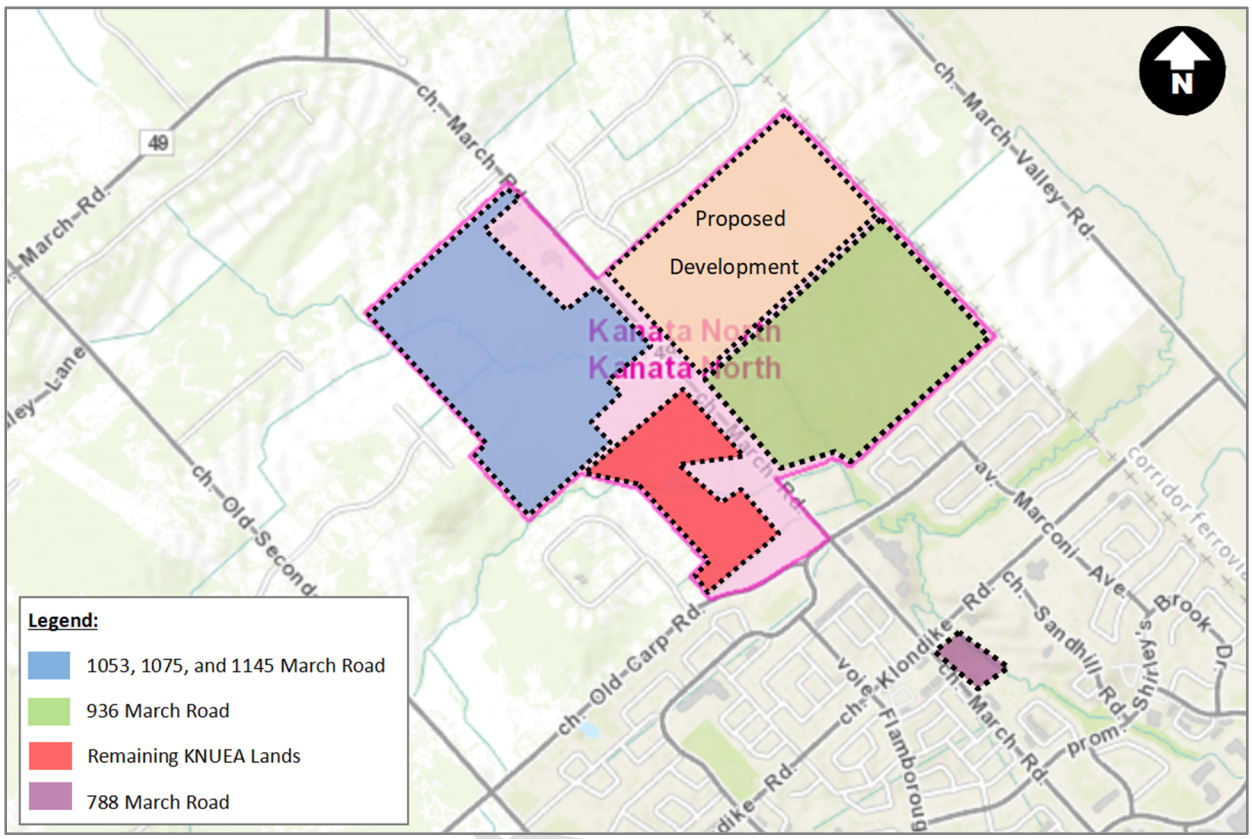


Table 4 - Background Developments

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
Remaining Portion of the KNUEA[1]	Southwestern quadrant of the Kanata North Urban Expansion Area	Unknown	2031
788 March Road	Southeastern quadrant of the March Road at Klondike Road intersection	196 residential units	2023

Notes: 1. As of the date of this report, there is no active development application. For the purposes of the subject TIA, it was assumed that this development will be built by 2031.

2.2 STUDY AREA AND TIME PERIODS

2.2.1 Study Area

The proposed study area is limited to the following intersections:

1. March Road at Dunrobin Road;
2. March Road at Maxwell Bridge Road / Halton Terrace; and
3. March Road at Street 1 (Site Access).

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:

- 2019 existing conditions;
- 2031 future background conditions;
- 2031 total future conditions (build-out); and
- 2036 total future conditions (5 years beyond build-out).

2.3 EXEMPTIONS REVIEW

Table 5 summarizes the Exemptions Review table from the City of Ottawa's *2017 Transportation Impact Assessment Guidelines*.

Table 5 - 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	Yes
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	No
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* was used to forecast auto trip generation for the proposed development. Land use codes 210 – Single-Family Detached, 230 – Townhomes, 220 – Apartment, 826 – Specialty Retail, and 520 – Elementary School were thought to be the most representative of the proposed land uses.

The Kanata North TMP included two designations for the commercial land uses: community commercial and neighbourhood commercial. A community commercial land use implies that it will service the entire KNUEA lands whereas a neighbourhood commercial land use implies that it will service the residential lands in the immediate vicinity (i.e. within the same neighbourhood). The Kanata North TMP designated the commercial lands within the subject Valecraft community as neighbourhood commercial, which as its name implies, will service the surrounding neighbourhood. This distinction between the types of commercial land uses is important when determining the trip generation potential of the development.

Table 6 outlines the assumed land uses and the trip generation rates for each land use.

Table 6 - 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	297 Units	25%	72%	0.73	63%	37%	0.94
230	Townhomes	315 units	17%	83%	0.41	67%	33%	0.49
220	Apartments	116 units	20%	80%	0.52	65%	35%	0.70
826	Specialty Retail[1]	80,000 GFA	0	0	0	44%	56%	2.67
520	Elementary School	580 students	55%	45%	0.45	49%	51%	0.15

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.

As per the City of Ottawa's *2017 TIA Guidelines,* the auto trip generation rates of the proposed land uses were converted to person trips using a conversion factor of 1.28.

Table 7 outlines development-generated person trips for each land use.

Table 7 - 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	55	157	218	176	104	280
		Person Trip Factor	1.28	1.28	1.28	1.28	1.28	1.28
		Person Trips	70	201	279	225	133	358
230	Townhomes	Auto Trips	22	107	129	103	51	154
		Person Trip Factor	1.28	1.28	1.28	1.28	1.28	1.28
		Person Trips	28	137	165	132	65	197
220	Apartments	Auto Trips	12	49	61	53	28	81
		Person Trip Factor	1.28	1.28	1.28	1.28	1.28	1.28
		Person Trips	15	63	78	68	36	104
826	Specialty Retail	Auto Trips	0	0	0	94	119	213
		Person Trip Factor	1.28	1.28	1.28	1.28	1.28	1.28
		Person Trips	0	0	0	120	152	273
520	Elementary School	Auto Trips	144	117	261	43	44	87
		Person Trip Factor	1.28	1.28	1.28	1.28	1.28	1.28
		Person Trips	184	150	334	55	56	111
Total Development		**Auto Trips**	**233**	**430**	**669**	**469**	**346**	**815**
		Person Trip Factor	**1.28**	**1.28**	**1.28**	**1.28**	**1.28**	**1.28**
		Person Trips	**297**	**551**	**856**	**600**	**442**	**1043**

The previously approved *Kanata North Community Design Plan Transportation Master Plan* (Novatech, June 2016) assumed that all trips generated by the proposed schools are anticipated to be vehicle trips and therefore the TMP did not convert the school auto trips to person trips and then across the various modes of transportation. However, based on the traffic patterns to / from local schools within suburban communities in Ottawa, it is safe to assume that a large percentage of students will take a school bus, and as such, the vehicle trips were converted to person trips for the subject TIA.

As outlined in the *TRANS Committee's 2011 NCR Household Origin-Destination* Survey (2013), the subject development is located within the Rural West district. However, as it is part of the Kanata North Urban Expansion Area, it will behave more like the Kanata / Stittsville district which is a suburban community rather than a rural one. The modal shares outlined in the approved *Kanata North Community Design Plan Transportation Master Plan* (Novatech, June 2016) were used as a baseline and the modal shares for each of the three land uses (residential, commercial, and institutional) were developed and are outlined in **Table 8** below.

Table 8 - Modal Share Assumptions

Land Use	Travel Mode	TMP	Subject TIA	Rationale
Residential	Transit	20%	20%	No change.
	Auto Passenger	15%	15%	No change.
	Walk / Bike	5%	5%	No change.
	Auto Driver	60%	60%	No change.
Commercial	Transit	20%	0%	As outlined in the TMP, the commercial within the subject development is considered 'neighbourhood commercial' and therefore, it will only be serving the immediate neighbourhood, thus eliminating the need to take public transit to get to this land use.
	Auto Passenger	15%	15%	No change.
	Walk / Bike	5%	15%	As outlined in the TMP, the commercial parcels within the subject development is considered 'neighbourhood commercial' and therefore, an increase in the walk / bike modal share is reasonable to assume.
	Auto Driver	60%	70%	Increased as compared to the TMP to account for the reduction in transit to this land use.
Institutional	Transit	0%	70%	Increased to account for the number of school buses that will serve the proposed elementary school. This transit modal share has already been vetted by the City through the submission of the Step 3 Forecasting Report.
	Auto Passenger	0%	0%	No change.
	Walk / Bike	0%	0%	No change.
	Auto Driver	100%[1]	30%	Decreased as compared to the TMP to account for the increase in transit modal share.

Notes: 1. The TMP did not convert the school trips to person trips and therefore did not assign the school trips across the four modal shares.

Table 9 outlines the anticipated trip generation potential of the proposed development.

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%	42	121	167	135	80	215
		Passenger	15%	11	30	42	34	20	54
		Walk / Bike	5%	4	10	14	11	7	18
		Transit	20%	14	40	56	45	27	72
230	Townhomes	Auto	60%	17	82	99	79	39	118
		Passenger	15%	4	21	25	20	10	30
		Walk / Bike	5%	1	7	8	7	3	10
		Transit	20%	6	27	33	26	13	39
220	Apartments	Auto	60%	9	38	47	41	22	62
		Passenger	15%	2	9	12	10	5	16
		Walk / Bike	5%	1	3	4	3	2	5
		Transit	20%	3	13	16	14	7	21
826	Specialty Retail	Auto	70%	0	0	0	84	106	191
		Passenger	15%	0	0	0	18	23	41
		Walk / Bike	15%	0	0	0	18	23	41
		Transit	0%	0	0	0	0	0	0
520	Elementary School	Auto	30%	55	45	100	17	17	33
		Passenger	0%	0	0	0	0	0	0
		Walk / Bike	0%	0	0	0	0	0	0
		Transit	70%	163	301	234	39	39	78
Total Development		**Auto Trips**		**123**	**286**	**409**	**356**	**264**	**619**
		Passenger		**17**	**60**	**79**	**82**	**58**	**141**
		Walk / Bike		**6**	**20**	**26**	**39**	**35**	**74**
		Transit		**152**	**185**	**339**	**124**	**86**	**210**

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. Based on the TMP’s designation of neighbourhood commercial for the subject commercial land uses, it is safe to assume that there will be a large percentage of trips destined to the 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.

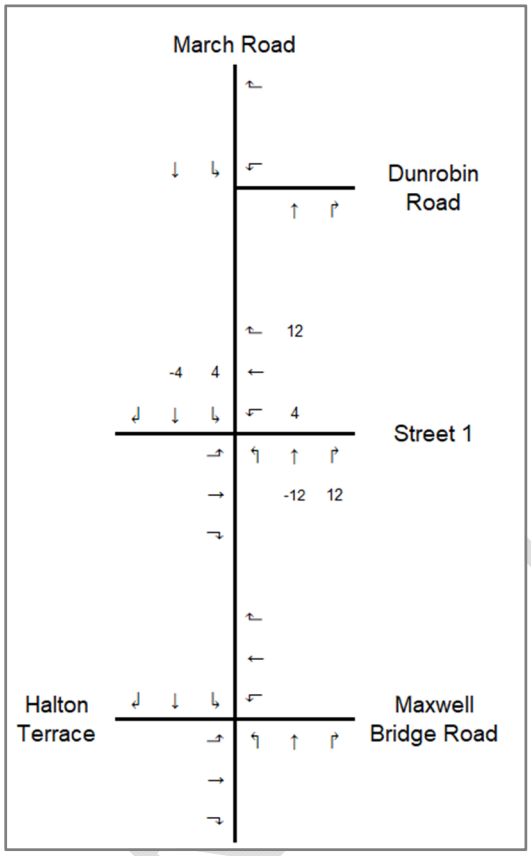
Table 10 outlines the pass-by, internal capture, and net new trips anticipated for the proposed development.

Figure 7 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		42	121	167	135	80	215
		Internal Capture	0%	0	0	0	0	0	0
		Net Auto Trips		42	121	167	135	80	215
		Pass-By	0%	0	0	0	0	0	0
		Net New Auto Trips		42	121	167	135	80	215
230	Townhomes	Auto Trips		17	82	99	79	39	118
		Internal Capture	0%	0	0	0	0	0	0
		Net Auto Trips		17	82	99	79	39	118
		Pass-By	0%	0	0	0	0	0	0
		Net New Auto Trips		17	82	99	79	39	118
220	Apartments	Auto Trips		9	38	47	41	22	62
		Internal Capture	0%	0	0	0	0	0	0
		Net Auto Trips		9	38	47	41	22	62
		Pass-By	0%	0	0	0	0	0	0
		Net New Auto Trips		9	38	47	41	22	62
826	Specialty Retail	Auto Trips		0	0	0	84	106	191
		Internal Capture	50%	0	0	0	42	53	95
		Net Auto Trips		0	0	0	42	53	96
		Pass-By	34%	0	0	0	16	16	32
		Net New Auto Trips		0	0	0	26	37	64
520	Elementary School	Auto Trips		55	45	100	17	17	33
		Internal Capture	0%	0	0	0	0	0	0
		Net Auto Trips		55	45	100	17	17	33
		Pass-By	0%	0	0	0	0	0	0
		Net New Auto Trips		55	45	100	17	17	33
Total Development		**Auto Trips**		**123**	**286**	**409**	**356**	**264**	**619**
		Internal Capture		**0**	**0**	**0**	**42**	**53**	**95**
		Net Auto Trips		**123**	**286**	**409**	**314**	**211**	**524**
		Pass-By		**0**	**0**	**0**	**16**	**16**	**32**
		Net New Auto Trips		**123**	**286**	**409**	**298**	**195**	**492**

Figure 7 - 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).

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)**	**Street 1 (West)**
North	15%	15%	-	-
East	30%	-	30%	-
South	5%	-	5%	-
West	0%	-	-	-
Internal [1]	50%	-	30%	20% [2]
Total	**100%**	**15%**	**65%**	**20%**

Notes: 1. Refers to trip origins/destinations within the same O-D Ward.
2. These trips are assumed to be destined to / from the KNUEA Park and Ride

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 8 illustrates the site traffic assignment.

Figure 9 illustrates new site generated trips during the AM and PM peak hours.

Figure 8 - Site Traffic Assignment

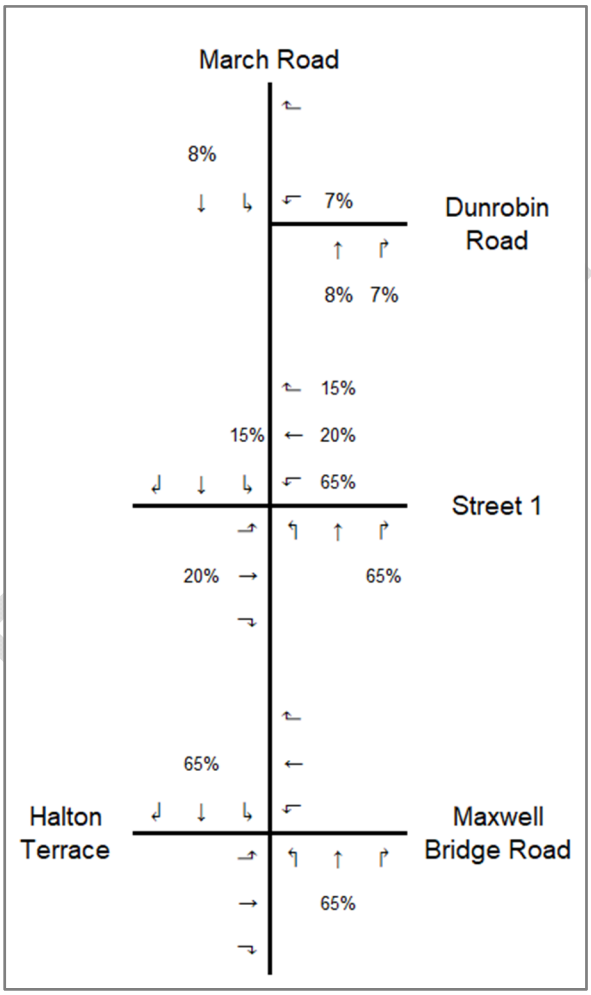
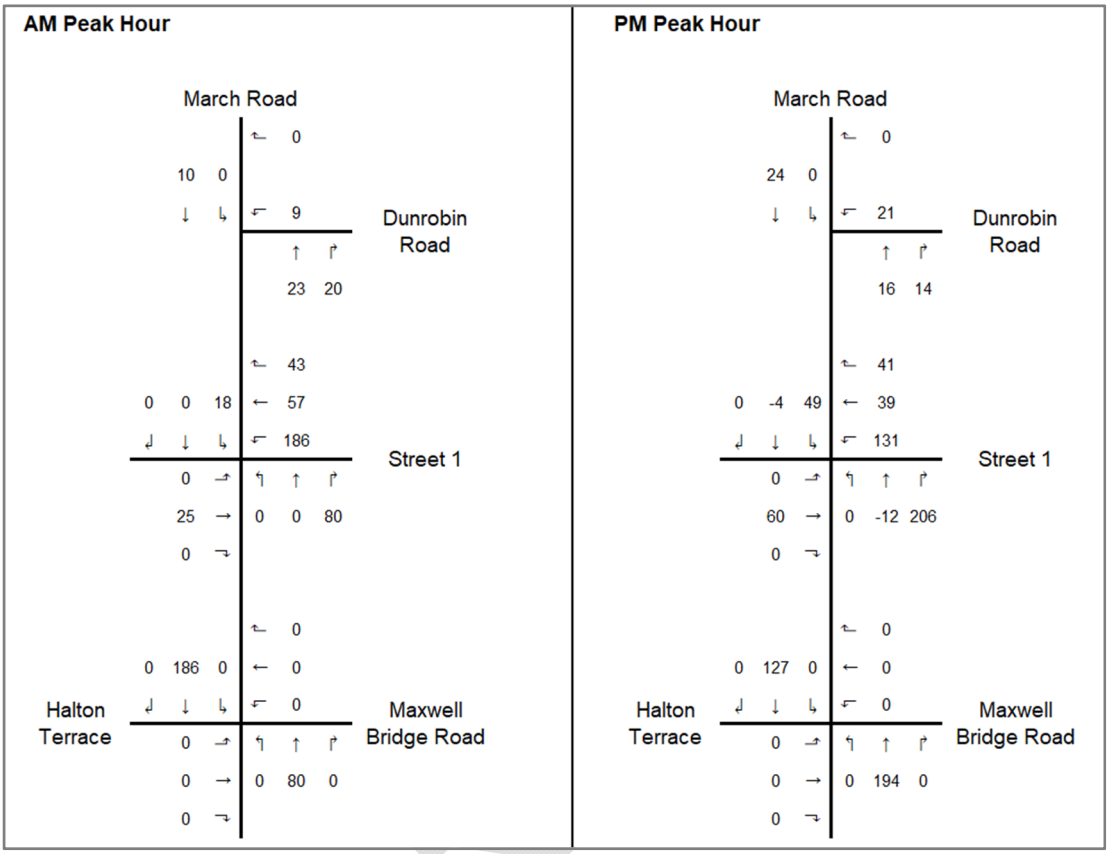


Figure 9 - Site Traffic Volumes



3.2 BACKGROUND NETWORK TRAVEL DEMAND

3.2.1 Transportation Network Plans

As outlined in **Table 3** in **Section 2.1.3.1**, the March Road widening and March Road Transit projects are anticipated to occur within the study area. In the absence of any definitive timelines in the TMP, these transportation improvements are not assumed to be in place for the study horizons of the subject TIA.

3.2.2 Background Growth

Existing traffic volumes were grown at a rate of 0.5% annually, non-compounding, to represent 2031 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 4** in **section 2.1.3.2**, the remaining portion of the Kanata North Urban Expansion Area lands and the proposed development at 788 March Road are planned to be fully built and occupied by 2031. The traffic volumes that these lands will generate were obtained from the approved *Kanata North Community Design Plan Transportation Master Plan* (Novatech, June 2016) and the *788 March Road TIA Strategy Report* (Parsons, August 2018) and added to the transportation network as background growth.

3.3 DEMAND RATIONALIZATION

The traffic forecasts indicate that 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 traffic volumes start to increase along March Road, delays at intersections will subsequently start to increase. Motorists will start to see their commute times increase which may lead to some changes in their behaviours with the intention of reducing commute times. The following subsections outline the potential ways in which motorists could change their bevahiours, which would in turn help to reduce traffic volumes on the roads during peak hours, thus assisting with rationalizing the demands.

3.3.1 Rerouting of Traffic

Motorists may alter their regular route in order to select a route with less delays to reduce their overall commute time. However, this is not a feasible solution in the subject study area mainly because March Road is one of the only roads that connect Dunrobin and Constance Bay to Highway 417. Changing the route selection for motorists traveling to / from these communities would require them to take a circuitous route around Kanata North which is likely not a realistic option.

Based on the road network surrounding the subject development, the residents must use March Road to enter and exit the proposed development. There are no alternate routes that they could take that would alter their travel patterns to avoid the traffic along March Road. Based on the aforementioned information, the rerouting of traffic is not a feasible option for demand rationalization.

3.3.2 Change in Travel Times

Since motorists do not have an alternate route they could take to commute to / from their development, motorists may start to alter their travel times to travel outside of the peak hour. This would reduce the demand on the network during the peak hour and subsequently increase the demand on the network just before and just after the peak hour, which is referred to as peak spreading. It was assumed that 10% of motorists will change their travel times to travel outside of the peak hour to reduce their commute. The traffic volumes were therefore reduced by 10%, however, it is recognized that this reduction does not eliminate the capacity concerns along March Road entirely, it merely reduces it. **Section 4.9** includes the future traffic volumes with the 10% reduction to account for peak spreading.

3.3.3 Reduction in Auto Modal Share

As a last effort to reduce the demands along March Road, motorists may alter their mode of transportation and opt to use public transit. This would reduce number of vehicles on the road during the peak hours, thus improving the

operations along March Road. This is only a feasible option for residents if they have reliable and frequent public transit service within close proximity to their house. There is a planned Park and Ride lot proposed on the northwest quadrant of the March Road at Street 1 intersection. In addition to this, as part of the subject TIA, it is recommended that OC Transpo provide transit service along the two collector roads within the subject development. The TMP assumed the transit modal share will be 20% for the Kanata North Urban Expansion Area Lands, which was adopted as part of the subject TIA to remain consistent. Until the March Road BRT is in place, the transit modal share will not realistically exceed the assumed 20%, therefore, it is not likely that the auto modal share will be reduced.

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 active modes within the community. Sidewalks were strategically placed throughout the development to connect destinations within the community (i.e. parks, the future school, adjacent communities, etc.). As outlined in the Community Design Plan, the collector roads will include multi-use pathways throughout the entire KNUEA lands. The general location of these sidewalks and multi-use pathways was taken from the CDP. A pedestrian crossover (PXO) was placed along Street 1 at the intersection with Street 8, that will help improve connectivity for pedestrians. Based on the anticipated traffic volumes along Street 1, the PXO is recommended to be Type D, in accordance with the *Ontario Traffic Manual Book 15 – Pedestrian Crossing Treatments*.

There are two proposed transit stops located along Street 1. The first transit stop location is approximately 180m east of March Road and the second transit stop location is located approximately 600m east of March Road. OC Transpo will be consulted to determine the location of these transit stops as the proposed development proceeds through the approvals process. Based on the proposed locations, approximately 95% of the subject development is within a 400m walking distance of a transit stop.

Figure 10 illustrates the sustainable modes facilities.

Figure 11 illustrates the transit walking distance with the subject development.

4.1.2 Circulation and Access

Not applicable; exempted during screening and scoping.

4.1.3 New Street Networks

There are two new collector roads within the subject development that are being referred to as Street 1 and Street 8. Street 1 runs east / west and is the main access for the subject development connecting to March Road. Street 8 runs north / south and connects the subject community to the future Minto residential development to the south. Traffic calming measures were included as a means to proactively calm traffic that is anticipated to travel along both collectors. The curb radii were reduced from 10m to 5m at intersections that feature sidewalk crossings in order to reduce the crossing distances for pedestrians. A pedestrian crossover (PXO) was included along Street 1 at the intersection with Street 8, to improve the connectivity for pedestrians as they navigate through the community. Intersection narrowings were included at the proposed transit stop locations along Street 1 to help reduce the crossing distances for pedestrians as well as slow vehicular traffic down as motorists are traveling through the community.

Figure 10 illustrates the planned traffic calming measures along Street 1 and Street 8.

Figure 10 – Facilities for Sustainable Modes

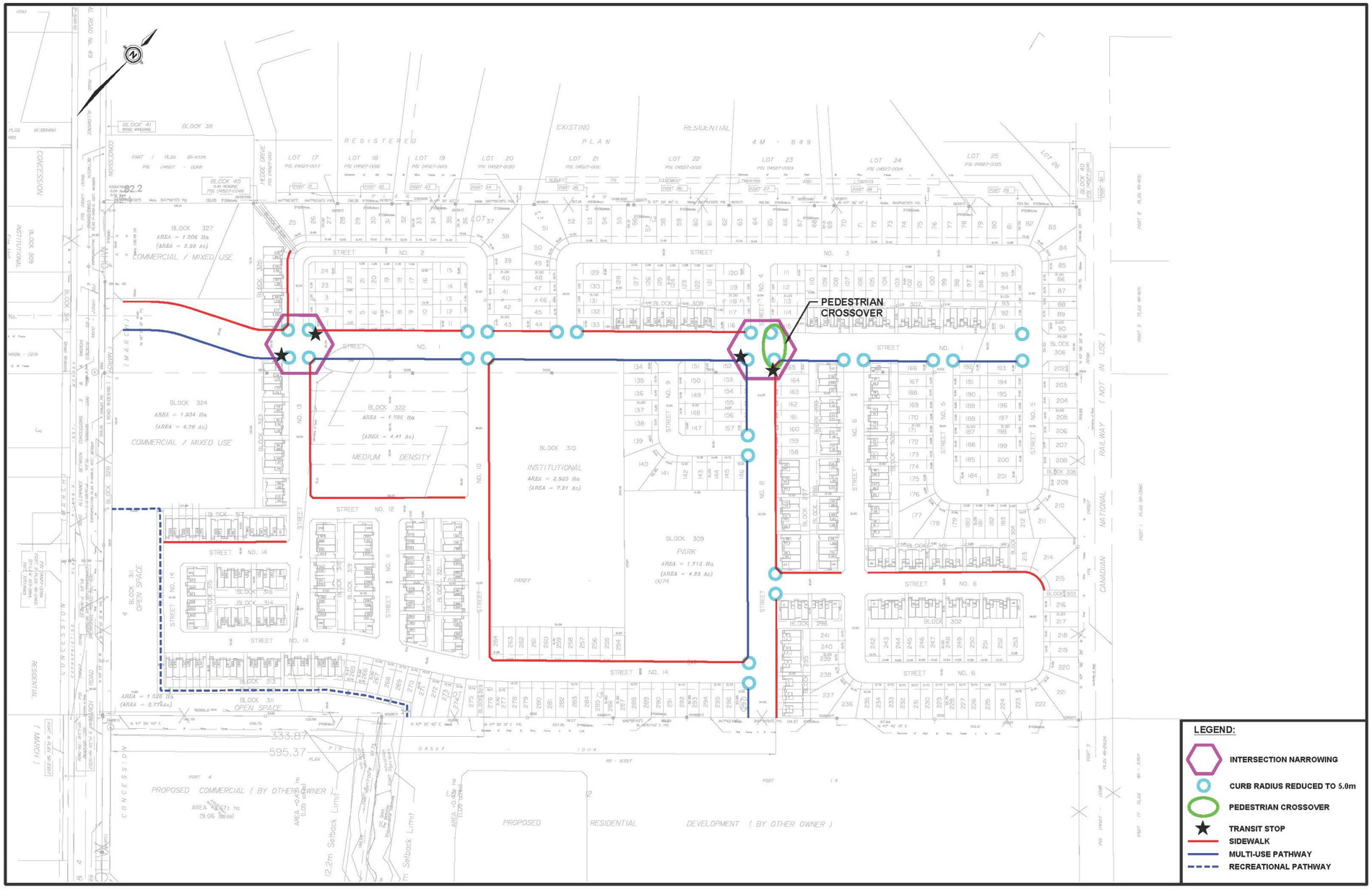
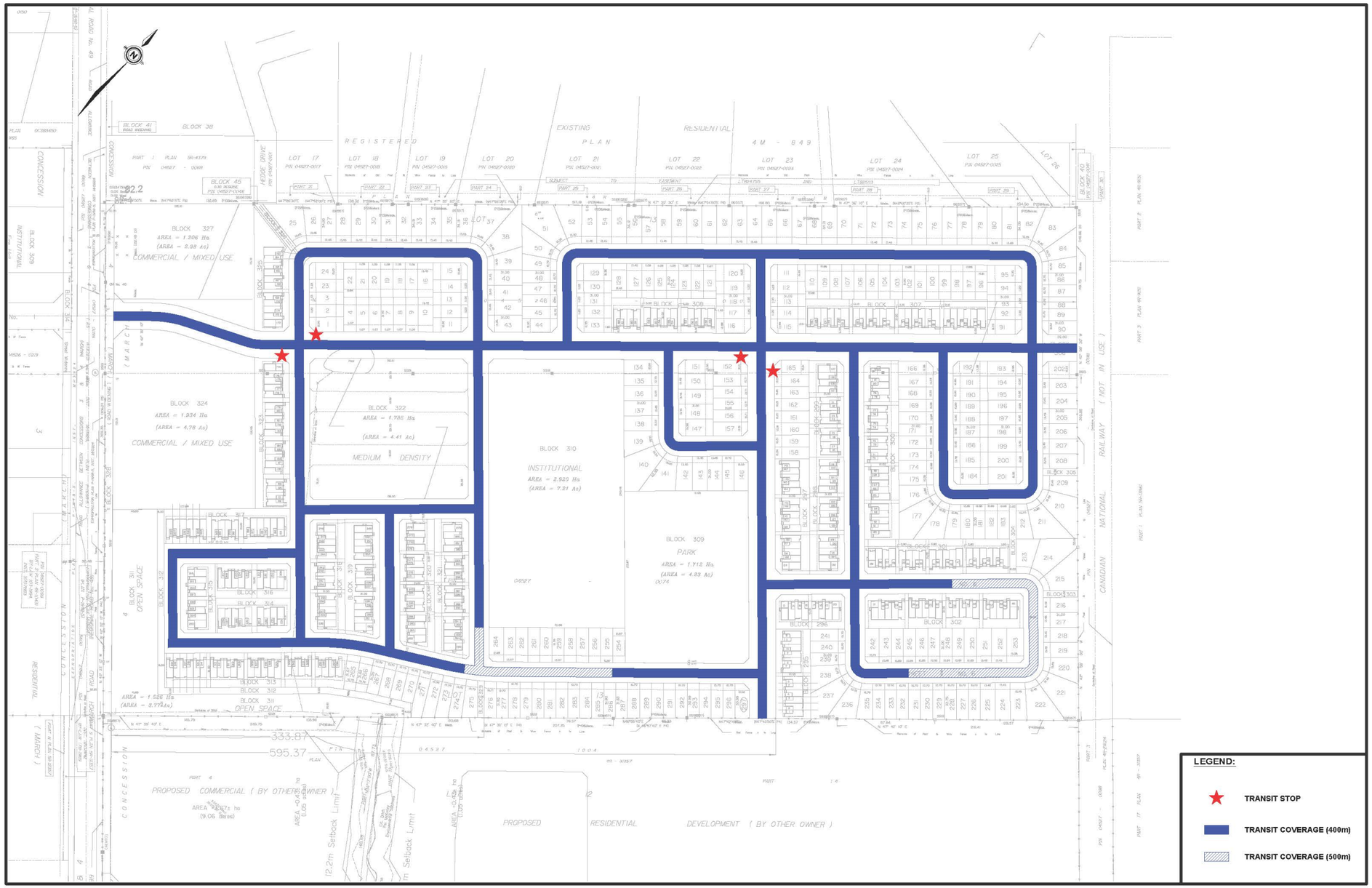


Figure 11 - Transit Walking Distances



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 1, and Street 8 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:

- March Road, across the frontage of the subject development, falls under the 'within 300m of a school' Policy Area due to the existing school located at 1095 March Road, and
- Street 1 and Street 8 also fall under the 'within 300m of a school' Policy Area due to the proposed elementary school within the subject development.

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

All three roadway segments have a Pedestrian Level of Service (PLOS) target of A due to the proximity to the existing and future schools.

The Ultimate Cycling Network from the City of Ottawa's *Cycling Plan* (2013) designates March Road as a 'spine route', and as such, it is subject to a Bicycle Level of Service (BLOS) target of C. Street 1 and Street 8 have no formal cycling designation, and therefore they are both subject to a BLOS target of D.

It is assumed that OC Transpo will be extending their bus service to the subject development to accommodate the projected number of transit users. As such, March Road, Street 1, and Street 8 will all be transit routes in the future and are all subject to a Transit Level of Service (TLOS) target of D.

March Road is currently designated as a full truck route, and is therefore subject to a Truck Level of Serivce (TkLOS) target of D. Neither Street 1 nor Street 8 will be truck routes, and therefore the TkLOS does not apply to these two collector roadways.

Table 12 presents the MMLOS conditions for roadway segments.

March Road

March Road currently meets the TLOS and TkLOS targets. The existing school located on March Road has resulted in an unrealistically high PLOS target for March Road, considering it is an arterial roadway with high volumes and high speeds. Due to the lack of pedestrian and cycling facilities along March Road, it is not surprising that this facility does not meet the targets for PLOS and BLOS. With the current volume of traffic along this facility, in order to meet the PLOS target, sidewalks and boulevards would need to be implemented as well as a considerable reduction in the speed limit. To meet the BLOS target, there are a few options: maintain mixed traffic and reduce the speed limit to 40 km/hr, implement bicycle lanes and reduce the speed limit to 50 km/hr, or implement physically separated bicycle facilities.

The *Kanata North Community Design Plan Transportation Master Plan* (Novatech, June 2016) includes the ultimate cross-section for March Road with median Bus Rapid Transit. Although the March Road widening is not within the horizons of the subject study, consideration should be given to ensure the ultimate cross-section of March Road is in accordance with the City of Ottawa's Multi-Modal Level of Service Guidelines.

Street 1

The proposed cross-section for Street 1, as outlined in the *Kanata North Community Design Plan Transportation Master Plan* (Novatech, June 2016) includes a sidewalk along one side of the road and a multi-use pathway on the other side of the road. With these facilities in place, both the PLOS and BLOS targets can be met. In addition, based on the low driveway frequency along both collector roads, the TLOS target can also be met along Street 1.

Street 8

The proposed cross-section for Street 8, as outlined in the *Kanata North Community Design Plan Transportation Master Plan* (Novatech, June 2016) includes a sidewalk along one side of the road and a multi-use pathway on the other side of the road. With these facilities in place, both the PLOS and BLOS targets can be met. In addition, based on the low driveway frequency along both collector roads, the TLOS target can also be met along Street 8.

Table 12 - MMLOS Conditions – Segments

Road Segment		March Road (arterial, spine cycling route)		Street 1 (collector)		Street 8 (collector)		Target
		Existing	Build-out	Existing	Build-out	Existing	Build-out	
Pedestrian	Sidewalk width (m)	None	**	-	2.0 or more	-	2.0 or more	**A / A / A**
	Boulevard width (m)	None	**	-	> 2	-	> 2	
	AADT > 3000?	Yes	**	-	No	-	No	
	On-Street parking	No	**	-	Yes	-	Yes	
	Operating speed (kph)	80	**	-	50	-	50	
	Level of Service	**F**	**	-	**A**	-	**A**	
Bicycle	Type of facility	Mixed	**	-	Multi-Use Pathway	-	Multi-Use Pathway	**C / D / D**
	Number of travel lanes	2	**	-	2	-	2	
	Bike lane width (m)	None	**	-	None	-	None	
	Operating speed (kph)	80	**	-	40	-	40	
	Centreline (yes/no)	Yes	**	-	No	-	No	
	Level of Service	**F**	**	-	**A**	-	**A**	
Transit	Type of facility	Mixed	**	-	Mixed	-	Mixed	**D / D / D**
	Parking/driveway friction	Limited	**	-	Low	-	Low	
	Level of Service	**D**	**	-	**D**	-	**D**	
Truck	Curb lane width (m)	≤ 3.5	**	Not Applicable		Not Applicable		**D / N/A / N/A**
	Number of travel lanes	2	**					
	Level of Service	**C**	**					

Notes:
Auto LOS is not considered for segments in the MMLOS Guidelines.
"Mixed" means either cyclists or transit operate in a shared lane with general traffic, i.e. they do not have their own dedicated facilities.
The number of travel lanes is two-way, i.e. in both directions.
Bike lane blockage frequency is only applicable when cycling is in mixed traffic and in a commercial area.
The target C/A/A indicates that the target is C for March Road, A for Street 1, and A for Street 8
N/A indicates there is no target
** indicates no change between horizons or scenarios.
- indicates the road is not currently built

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 1

The intersection of March Road at Street 1 is the main access point for not only the subject Valecraft development, but also the future Claridge development on the west side of March Road. As outlined in the recently completed *1053, 1075, and 1145 March Road Transportation Impact Assessment* (Novatech, October 2018), this intersection is planned to include traffic signals with auxiliary left turn lanes in all directions as well as a northbound right turn auxiliary lane. This configuration was used in the analysis of future horizons.

4.5 TRANSPORTATION DEMAND MANGEMENT

The proposed development is not located in a Design Priority Area (DPA) or Transit-oriented Development (TOD) zone. The proposed development consists of approximately 700 residential units, 80, 000ft^2 of specialty retail, and one elementary school. City of Ottawa TDM Checklists were used to determine what TDM measures could be implemented based on the available information.

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

As outlined on the checklist contained in **Appendix B**, enhanced public transit service can be explored between the developer and OC Transpo.

4.6 NEIGHBHOURHOOD TRAFFIC MANAGEMENT

Not applicable; exempted during screening and scoping.

4.7 TRANSIT

4.7.1 Route Capacity

In the absence of any timelines for the implementation of the March Road Bus Rapid Transit, 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 339 and 210 total transit trips during the AM and PM peak hours, respectively. These volumes represent public transit riders as well as school bus riders to / from the elementary school. Removing the school bus volumes, the subject development is anticipated to generate 105 and 132 total public transit trips during the AM and PM peak hours, respectively.

Articulated buses and double-decker buses have seated capacities of 70 and 90 people; respectively. If OC Transpo provides service to the subject development operating at 15-minute headways during the morning and afternoon peak hours, the hourly transit capacity will be 280 – 360 people per hour. Based on these assumptions, the proposed development will occupy 30% to 45% of transit capacity at full build-out.

4.7.2 Transit Priority

As transit routes are not currently located along the boundary streets, transit priority measures were not considered. Transit measures are already planned for March Road Road, however, the timing is outside the scope of this assessment.

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. Intersection operational analysis was facilitated with Synchro 10.0™ software package and the MMLOS analysis was completed for all modes and compared against the City of Ottawa's MMLOS targets.

4.9.2.1 2019 Existing Conditions

Figure 5 illustrates 2019 existing traffic volumes at the study area intersection during the AM and PM peak hours, respectively.

Intersection Capacity Analysis

Table 13 summarizes the results of the Synchro analysis for 2019 existing intersection operations.

Both 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.

Multi-Modal Level of Service Assessment

March Road at Maxwell Bridge Road / Halton Terrace

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 B. The transit (TLOS) and truck (TkLOS) level of service targets for this intersection are both D.

The Pedestrian Level of Service at the intersection of March Road at Maxwell Bridge Road / Halton Terrace currently operates with a PLOS of F. 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 be to the detriment of the vehicles.

The Bicycle Level of Service at the intersection of March Road at Maxwell Bridge Road / Halton Terrace currently operates with a BLOS of F. Methods for improving the BLOS at this intersection include reducing the speed limit and number of lanes along March Road, introducing the northbound right turn lane to the right of the northbound bike lane, and reducing the speed limit along Maxwell Bridge Road. 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.

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.

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.

Table 14 outlines the 2019 existing MMLOS analysis for the intersection of March Road at Maxwell Bridge Road / Halton Terrace.

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 route, 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.

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. 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.

Table 15 outlines the 2019 existing MMLOS analysis for the intersection of March Road at Dunrobin Road.

Figure 3 illustrates the existing intersection control and lane configuration.

Table 13 - 2019 Existing 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)	0.04 (0.13)	36.3 (46.2)	6.2 (8.8)
			Through / Right	A (A)	0.39 (0.50)	18.2 (42.4)	29.6 (35.9)
		WB	Left	D (B)	0.85 (0.66)	79.1 (68.6)	68.3 (39.3)
			Through / Right	A (B)	0.08 (0.67)	27.0 (40.0)	10.8 (44.7)
		NB	Left	A (A)	0.10 (0.27)	9.6 (5.7)	9.0 (23.1)
			Through	A (A)	0.13 (0.43)	15.1 (11.8)	26.4 (85.2)
			Right	A (A)	0.09 (0.16)	2.7 (2.0)	6.4 (9.0)
		SB	Left	A (A)	0.14 (0.19)	9.1 (6.2)	18.1 (9.8)
			Through	A (A)	0.38 (0.15)	16.2 (11.0)	81.7 (27.7)
			Right	A (A)	0.01 (0.01)	0.01 (0.0)	0.0 (0.0)
		Overall Intersection		**D (B)**	**0.85 (0.67)**	**22.5 (17.0)**	**-**
March Road at Dunrobin Road	Traffic Signals	WB	Left / Right	A (A)	0.48 (0.45)	13.3 (22.0)	25.6 (30.6)
		NB	Through	A (A)	0.19 (0.60)	9.1 (17.8)	13.8 (72.6)
			Right	A (B)	0.27 (0.61)	3.0 (4.4)	7.8 (16.5)
		SB	Left	A (A)	0.12 (0.12)	8.8 (6.1)	7.2 (6.5)
			Through	A (A)	0.57 (0.15)	13.7 (6.2)	40.4 (14.5)
		Overall Intersection		**A (B)**	**0.57 (0.61)**	**11.3 (12.0)**	**-**

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

Table 14 – 2019 Existing March Road at Maxwell Bridge Road / Halton Terrace MMLOS

		East and West Legs	North and South Legs	Target
PLOS	Lanes crossed	3	6	C
	Median (yes/no)	No	No	
	Left turn phasing	Permissive	Permissive + Protected	
	Right turn conflict	Permissive	Permissive	
	RTOR (yes/no)	Yes	Yes	
	Leading ped interval (yes/no)	No	No	
	Right turn corner radius (m)	10-15	10-15	
	Right Turn Channel	N/A	N/A	
	Crosswalk treatment	Standard	Standard	
	PETSI Points	70	20	
	PETSI LOS	C	F	
	Cycle Length (s)	130	130	
	Effective Walk Time (s)	7	47	
	Average Ped Delay (s)	58	26	
	Ped Delay LOS	E	C	
	Level of Service	E	F	
	Overall Level of Service	**F**		
BLOS	Type of bike lane	Mixed	Pocket Bike Lane	B
	Left-turn - lanes crossed	1	2 or more	
	Vehicle operating speed (km/hr)	> 60	> 60	
	Right-turn	N/A	Bike lane shifts to the left of the right turn lane	
	Level of Service	F	F	
	Overall Level of Service	**F**		
TLOS	Maximum Average Delay (s)	> 40	< 20	D
	Level of Service	F	C	
	Overall Level of Service	**F**		
TkLOS	Effective corner radius (m)	10 to 15	10 to 15	D
	Number of receiving lanes	2	1	
	Level of Service	B	E	
	Overall Level of Service	**E**		

Note: the worst-case scenario between the AM and PM peak hours was taken for each individual leg of the intersection

Table 15 – 2019 Existing March Road at Dunrobin Road MMLOS

		East Leg	North and South Legs	Target
PLOS	Lanes crossed	Not Applicable		**N/A**
	Median (yes/no)			
	Left turn phasing			
	Right turn conflict			
	RTOR (yes/no)			
	Leading ped interval (yes/no)			
	Right turn corner radius (m)			
	Right Turn Channel			
	Crosswalk treatment			
	PETSI Points			
	PETSI LOS			
	Cycle Length (s)			
	Effective Walk Time (s)			
	Average Ped Delay (s)			
	Ped Delay LOS			
	Level of Service			
	Overall Level of Service			
BLOS	Type of bike lane	Mixed	Mixed	**D**
	Left-turn - lanes crossed	0	0	
	Vehicle operating speed (km/hr)	> 60	> 60	
	Right-turn - number of turn lanes	1	1	
	Right-turn - turn lane length (m)	> 50	> 50	
	Right-turn - turning speed (km/hr)	< 25	< 25	
	Right-turn - location of bike lane	N/A	N/A	
	Level of Service	F	F	
	Overall Level of Service	**F**		
TLOS	Maximum Average Delay (s)	Not Applicable		**N/A**
	Level of Service			
	Overall Level of Service			
TkLOS	Effective corner radius (m)	10 – 15	10 - 15	**C**
	Number of receiving lanes	1	1	
	Level of Service	E	E	
	Overall Level of Service	**E**		

4.9.2.2 2031 Future Background Conditions

Figure 12 illustrates 2031 Future Background AM and PM peak hour traffic volumes at the study area intersections with demand rationalization.

Intersection Capacity Analysis

Table 16 summarizes the results of the Synchro analysis for 2031 Future Background intersection operations.

The March Road at Street 1 intersection will provide access to the future Claridge development on the west side of March Road. The lane configuration at this intersection taken from the recently completed *1053, 1075, and 1145 March Road Transportation Impact Assessment* (Novatech, October 2018). It features one northbound through lane, one northbound left turn lane, one shared southbound through / right turn lane, one eastbound left turn lane, and one eastbound right turn lane.

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 2031 Future Background conditions.

Appendix C contains detailed intersection performance worksheets.

Multi-Modal Level of Service Assessment

March Road at Maxwell Bridge Road / Halton Terrace

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 B. The transit (TLOS) and truck (TkLOS) level of service targets for this intersection are both D.

The Pedestrian Level of Service at the intersection of March Road at Maxwell Bridge Road / Halton Terrace is projected to operate with a PLOS of F. 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 be to the detriment of the vehicles.

The Bicycle Level of Service at the intersection of March Road at Maxwell Bridge Road / Halton Terrace is projected to operate with a BLOS of F. Methods for improving the BLOS at this intersection include reducing the speed limit and number of lanes along March Road, introducing the northbound right turn lane to the right of the northbound bike lane,

and reducing the speed limit along Maxwell Bridge Road. 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.

The Transit Level of Service at the intersection of March Road at Maxwell Bridge Road / Halton Terrace is projected to operate 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.

The Truck Level of Service at the intersection of March Road at Maxwell Bridge Road / Halton Terrace is projected to 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.

Table 17 outlines the 2031 Future Background MMLOS analysis for the intersection of March Road at Maxwell Bridge Road / Halton Terrace.

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 route, 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.

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. 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.

Table 18 outlines the 2031 Future Background MMLOS analysis for the intersection of March Road at Dunrobin Road.

March Road at Street 1

There is an existing school located at 1095 March Road, approximately 170m north of the proposed Street 1, therefore, the Policy Area for the March Road at Street 1 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 1 intersection was taken from the recently completed *1053, 1075 and 1145 March Road Transportation Impact Assessment* (Novatech 2018). **Appendix D** contains the Functional Design of this intersection which was used for the MMLOS analysis in the subject TIA.

The Pedestrian Level of Service at the intersection of March Road at Street 1 is projected to operate with a PLOS of F, 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 vehicles. The location of the school at 1095 March Road, just north 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 1.

The Bicycle Level of Service at the intersection of March Road at Street 1 is projected to operate with a BLOS of F, which does not meet the desired target of C. Methods for improving the BLOS at this intersection include reducing the speed limit along March Road, reducing the length of the northbound right turn lane, and implementing cycling facilities along March Road.

The Transit Level of Service at the intersection of March Road at Street 1 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 1 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 1. 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.

Table 19 outlines the 2031 Future Background MMLOS analysis for the intersection of March Road at Street 1.

Figure 13 illustrates the required intersection control and lane configuration to accommodate the 2031 Future Background traffic volumes.

Figure 12 - 2031 Future Background Traffic Volumes

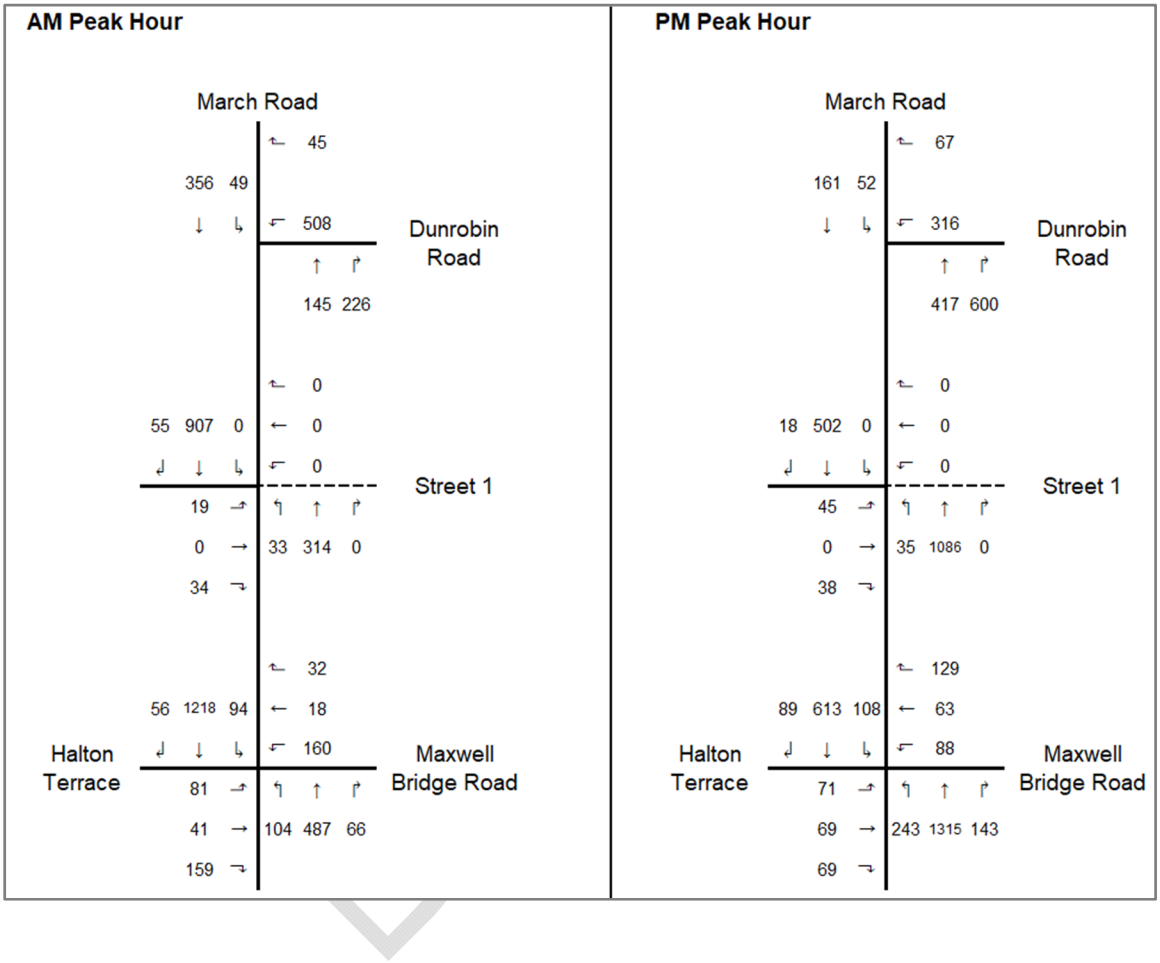


Table 16 – 2031 Future Background Intersection Operations

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 (D)	0.31 (0.84)	45.2 (109.9)	30.4 (#33.2)
			Through / Right	A (A)	0.47 (0.59)	16.6 (44.3)	31.9 (39.8)
		WB	Left	D (B)	0.90 (0.69)	95.7 (75.9)	#66.6 (35.7)
			Through / Right	A (C)	0.14 (0.72)	19.3 (43.2)	13.4 (46.5)
		NB	Left	A (A)	0.39 (0.41)	12.5 (6.8)	17.3 (27.0)
			Through	A (B)	0.25 (0.61)	14.8 (15.9)	47.3 (140.1)
			Right	A (A)	0.07 (0.14)	1.5 (2.7)	3.7 (10.1)
		SB	Left	A (A)	0.16 (0.36)	8.7 (8.4)	15.8 (12.7)
			Through	B (A)	0.62 (0.29)	21.0 (12.1)	146.1 (54.6)
			Right	A (A)	0.06 (0.09)	0.9 (2.3)	2.1 (6.4)
		Overall Intersection		**D (D)**	**0.90 (0.84)**	**23.2 (20.1)**	**-**
March Road at Dunrobin Road	Traffic Signals	WB	Left / Right	A (A)	0.53 (0.51)	13.6 (22.9)	31.5 (36.8)
		NB	Through	A (A)	0.23 (0.58)	10.4 (17.9)	17.3 (67.5)
			Right	A (B)	0.33 (0.62)	3.3 (4.6)	9.5 (16.7)
		SB	Left	A (A)	0.12 (0.12)	9.8 (6.4)	7.7 (6.6)
			Through	A (A)	0.56 (0.17)	14.4 (6.8)	42.1 (16.4)
		Overall Intersection		**A (B)**	**0.56 (0.62)**	**11.6 (12.7)**	**-**
March Road at Street 1	Traffic Signals	EB	Left	A (A)	0.10 (0.24)	33.7 (41.8)	9.0 (19.9)
			Right	A (A)	0.17 (0.19)	15.2 (16.3)	8.1 (9.6)
		NB	Left	A (A)	0.09 (0.05)	3.1 (2.7)	3.0 (3.3)
			Through	A (C)	0.21 (0.75)	2.6 (10.0)	17.4 (152.2)
		SB	Through / Right	B (A)	0.64 (0.36)	6.3 (3.9)	96.3 (37.5)
				B (C)	**0.64 (0.75)**	**6.0 (9.0)**	**-**

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

Table 17 – 2031 Future Background March Road at Maxwell Bridge Road / Halton Terrace MMLOS

		East and West Legs	North and South Legs	Target
PLOS	Lanes crossed	3	6	C
	Median (yes/no)	No	No	
	Left turn phasing	Permissive	Permissive + Protected	
	Right turn conflict	Permissive	Permissive	
	RTOR (yes/no)	Yes	Yes	
	Leading ped interval (yes/no)	No	No	
	Right turn corner radius (m)	10-15	10-15	
	Right Turn Channel	N/A	N/A	
	Crosswalk treatment	Standard	Standard	
	PETSI Points	70	20	
	PETSI LOS	C	F	
	Cycle Length (s)	130	130	
	Effective Walk Time (s)	7	47	
	Average Ped Delay (s)	58	26	
	Ped Delay LOS	E	C	
	Level of Service	E	F	
	Overall Level of Service	**F**		
BLOS	Type of bike lane	Mixed	Pocket Bike Lane	B
	Left-turn - lanes crossed	1	2 or more	
	Vehicle operating speed (km/hr)	> 60	> 60	
	Right-turn	N/A	Bike lane shifts to the left of the right turn lane	
	Level of Service	E	F	
	Overall Level of Service	**F**		
TLOS	Maximum Average Delay (s)	> 40	< 20	D
	Level of Service	F	C	
	Overall Level of Service	**F**		
TkLOS	Effective corner radius (m)	10 to 15	10 to 15	D
	Number of receiving lanes	2	1	
	Level of Service	B	E	
	Overall Level of Service	**E**		

Note: the worst-case scenario between the AM and PM peak hours was taken for each individual leg of the intersection

Table 18 – 2031 Future Background March Road at Dunrobin Road MMLOS

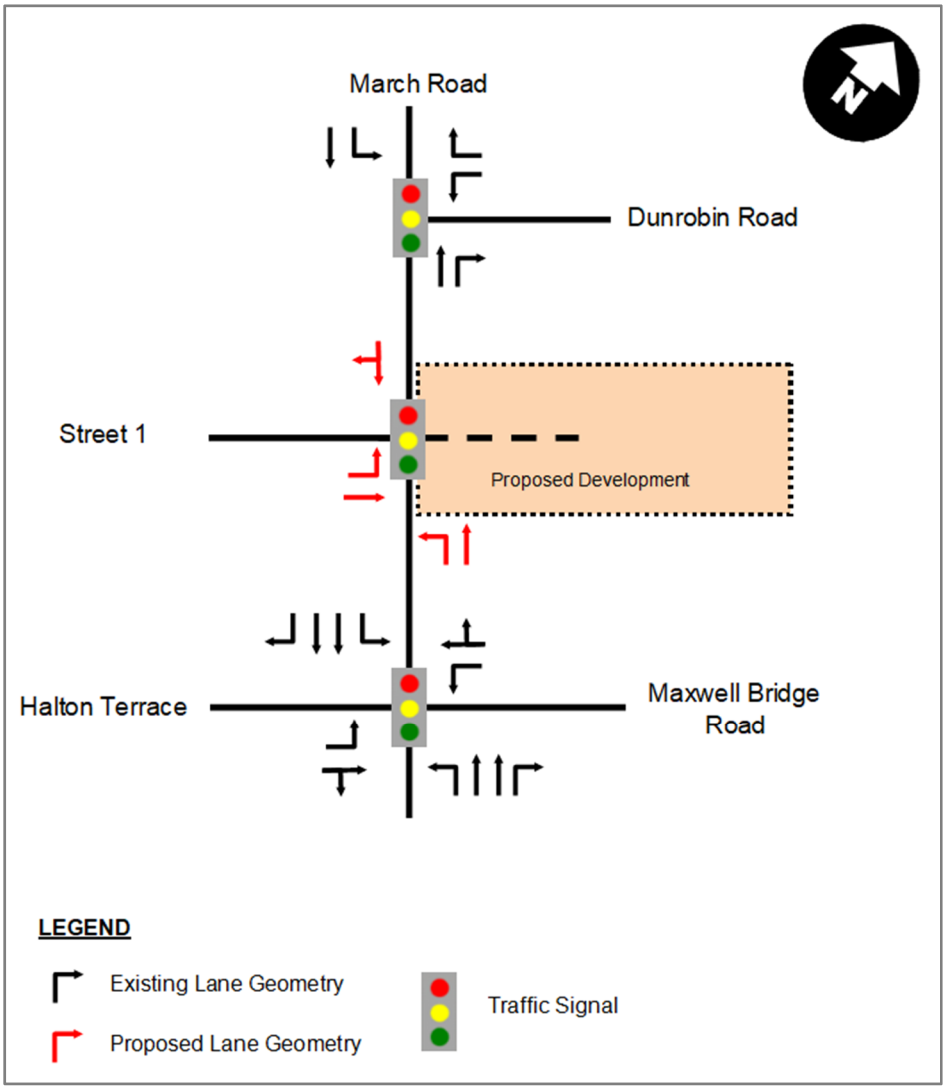
		East Leg	North and South Legs	Target
PLOS	Lanes crossed	Not Applicable		**N/A**
	Median (yes/no)			
	Left turn phasing			
	Right turn conflict			
	RTOR (yes/no)			
	Leading ped interval (yes/no)			
	Right turn corner radius (m)			
	Right Turn Channel			
	Crosswalk treatment			
	PETSI Points			
	PETSI LOS			
	Cycle Length (s)			
	Effective Walk Time (s)			
	Average Ped Delay (s)			
	Ped Delay LOS			
	Level of Service			
	Overall Level of Service			
BLOS	Type of bike lane	Mixed	Mixed	**D**
	Left-turn - lanes crossed	0	0	
	Vehicle operating speed (km/hr)	> 60	> 60	
	Right-turn - number of turn lanes	1	1	
	Right-turn - turn lane length (m)	> 50	> 50	
	Right-turn - turning speed (km/hr)	< 25	< 25	
	Right-turn - location of bike lane	N/A	N/A	
	Level of Service	F	F	
	Overall Level of Service	**F**		
TLOS	Maximum Average Delay (s)	Not Applicable		**N/A**
	Level of Service			
	Overall Level of Service			
TkLOS	Effective corner radius (m)	10 – 15	10 - 15	**C**
	Number of receiving lanes	1	1	
	Level of Service	E	E	
	Overall Level of Service	**E**		

Table 19 – 2031 Future Background March Road at Street 1 MMLOS

		West Leg	North and South Legs	Target
PLOS	Lanes crossed	3	3	A
	Median (yes/no)	No	No	
	Left turn phasing	No Left	Permissive	
	Right turn conflict	Permissive	Permissive	
	RTOR (yes/no)	Yes	Yes	
	Leading ped interval (yes/no)	No	No	
	Right turn corner radius (m)	5-10	10-15	
	Right Turn Channel	N/A	N/A	
	Crosswalk treatment	Standard	Standard	
	PETSI Points	79	20	
	PETSI LOS	B	C	
	Cycle Length (s)	120	120	
	Effective Walk Time (s)	7	68	
	Average Ped Delay (s)	53	11	
	Ped Delay LOS	E	B	
	Level of Service	E	C	
	Overall Level of Service	**F**		
BLOS	Type of bike lane	MUP	Mixed	C
	Left-turn - lanes crossed	0	0	
	Vehicle operating speed (km/hr)	< 50	> 60	
	Right-turn	N/A	Right turn lane > 50m	
	Level of Service	B	F	
	Overall Level of Service	**F**		
TLOS	Maximum Average Delay (s)	> 40	10	D
	Level of Service	F	B	
	Overall Level of Service	**F**		
TkLOS	Effective corner radius (m)	10 to 15	10 to 15	D
	Number of receiving lanes	1	1	
	Level of Service	E	E	
	Overall Level of Service	**E**		

Note: the worst-case scenario between the AM and PM peak hours was taken for each individual leg of the intersection

Figure 13 - 2031 Future Background Lane Configuration and Traffic Control



4.9.2.3 2031 Total Future Conditions

Figure 14 illustrates 2031 Total Future AM and PM peak hour traffic volumes at the study area intersections.

Intersection Capacity Analysis

Table 20 summarizes the results of the Synchro analysis for 2031 Total Future intersection operations.

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 2031 Total Future conditions.

Appendix C contains detailed intersection performance worksheets.

Multi-Modal Level of Service Assessment

March Road at Maxwell Bridge Road / Halton Terrace

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 B. The transit (TLOS) and truck (TkLOS) level of service targets for this intersection are both D.

The Pedestrian Level of Service at the intersection of March Road at Maxwell Bridge Road / Halton Terrace is projected to operate with a PLOS of F. 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 be to the detriment of the vehicles.

The Bicycle Level of Service at the intersection of March Road at Maxwell Bridge Road / Halton Terrace is projected to operate with a BLOS of F. Methods for improving the BLOS at this intersection include reducing the speed limit and number of lanes along March Road, introducing the northbound right turn lane to the right of the northbound bike lane, and reducing the speed limit along Maxwell Bridge Road. 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.

The Transit Level of Service at the intersection of March Road at Maxwell Bridge Road / Halton Terrace is projected to operate 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.

The Truck Level of Service at the intersection of March Road at Maxwell Bridge Road / Halton Terrace is projected to 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.

Table 21 outlines the 2031 Total Future MMLOS analysis for the intersection of March Road at Maxwell Bridge Road / Halton Terrace.

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 route, 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.

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. 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.

Table 22 outlines the 2031 Total Future MMLOS analysis for the intersection of March Road at Dunrobin Road.

March Road at Street 1

There is an existing school located at 1095 March Road, approximately 170m north of the proposed Street 1, therefore, the Policy Area for the March Road at Street 1 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 1 intersection was taken from the recently completed *1053, 1075 and 1145 March Road Transportation Impact Assessment* (Novatech 2018). **Appendix D** contains the Functional Design of this intersection which was used for the MMLOS analysis in the subject TIA.

The Pedestrian Level of Service at the intersection of March Road at Street 1 is projected to operate with a PLOS of F, 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 vehicles. The location of the school at 1095 March Road, just north 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 1.

The Bicycle Level of Service at the intersection of March Road at Street 1 is projected to operate with a BLOS of F, which does not meet the desired target of C. Methods for improving the BLOS at this intersection include reducing the speed limit along March Road, reducing the length of the northbound right turn lane, and implementing cycling facilities along March Road.

The Transit Level of Service at the intersection of March Road at Street 1 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 1 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 1. 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.

Table 23 outlines the 2031 Total Future MMLOS analysis for the intersection of March Road at Street 1.

Figure 15 illustrates the required intersection control and lane configuration to accommodate the 2031 Total Future traffic volumes.

Figure 14 - 2031 Total Future Traffic Volumes

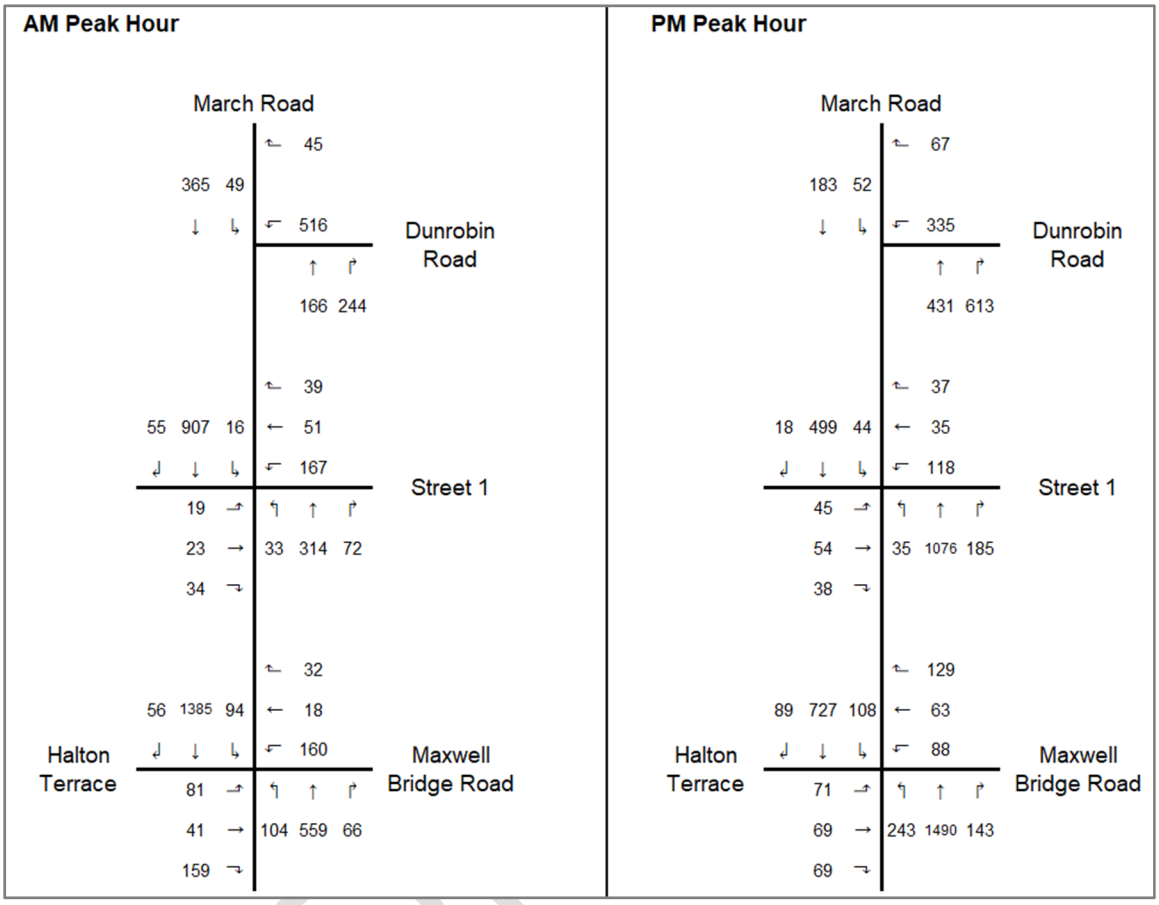


Table 20 – 2031 Total Future Intersection Operations

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 (D)	0.32 (0.84)	45.8 (109.9)	31.0 (#33.2)
			Through / Right	A (A)	0.47 (0.59)	16.9 (44.3)	32.6 (39.8)
		WB	Left	E (B)	0.92 (0.69)	99.9 (75.9)	#70.0 (35.7)
			Through / Right	A (C)	0.14 (0.72)	19.7 (43.2)	13.7 (46.5)
		NB	Left	A (A)	0.47 (0.46)	15.1 (7.6)	16.6 (27.0)
			Through	A (B)	0.28 (0.70)	15.0 (18.5)	53.3 (178.7)
			Right	A (A)	0.07 (0.14)	1.5 (3.6)	3.6 (12.4)
		SB	Left	A (A)	0.18 (0.42)	8.6 (10.6)	15.2 (13.3)
			Through	B (A)	0.70 (0.35)	22.9 (12.7)	173.4 (66.5)
			Right	A (A)	0.06 (0.09)	0.9 (2.3)	2.0 (6.4)
		Overall Intersection		**E (D)**	**0.92 (0.84)**	**24.2 (21.1)**	-
March Road at Dunrobin Road	Traffic Signals	WB	Left / Right	A (A)	0.54 (0.52)	14.0 (23.5)	32.8 (39.5)
		NB	Through	A (A)	0.26 (0.59)	10.6 (18.3)	19.7 (71.4)
			Right	A (B)	0.35 (0.62)	3.3 (4.6)	9.9 (16.8)
		SB	Left	A (A)	0.12 (0.12)	9.8 (6.6)	7.8 (6.8)
			Through	A (A)	0.57 (0.20)	14.6 (7.1)	43.5 (19.0)
		Overall Intersection		**A (B)**	**0.57 (0.62)**	**11.7 (13.0)**	-
March Road at Street 1	Traffic Signals	WB	Left	A (A)	0.08 (0.22)	33.7 (40.4)	10.2 (20.3)
			Through / Right	A (A)	0.16 (0.32)	19.1 (32.0)	15.6 (29.2)
		EB	Left	B (A)	0.65 (0.60)	47.0 (51.7)	59.6 (45.5)
			Through / Right	A (A)	0.25 (0.24)	25.5 (24.1)	26.3 (20.2)
		NB	Left	A (A)	0.17 (0.06)	8.5 (4.6)	6.7 (4.8)
			Through	A (D)	0.27 (0.86)	6.8 (18.5)	36.3 (217.3)
			Right	A (A)	0.07 (0.17)	1.6 (1.0)	4.1 (5.3)
		SB	Left	A (A)	0.02 (0.25)	5.6 (9.2)	3.2 (8.2)
			Through / Right	D (A)	0.83 (0.41)	18.7 (6.6)	194.9 (55.1)
				D (D)	**0.83 (0.86)**	**18.8 (16.8)**	-

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

Table 21 – 2031 Total Future March Road at Maxwell Bridge Road / Halton Terrace MMLOS

		East and West Legs	North and South Legs	Target
PLOS	Lanes crossed	3	6	C
	Median (yes/no)	No	No	
	Left turn phasing	Permissive	Permissive + Protected	
	Right turn conflict	Permissive	Permissive	
	RTOR (yes/no)	Yes	Yes	
	Leading ped interval (yes/no)	No	No	
	Right turn corner radius (m)	10-15	10-15	
	Right Turn Channel	N/A	N/A	
	Crosswalk treatment	Standard	Standard	
	PETSI Points	70	20	
	PETSI LOS	C	F	
	Cycle Length (s)	130	130	
	Effective Walk Time (s)	58	47	
	Average Ped Delay (s)	43	26	
	Ped Delay LOS	E	C	
	Level of Service	E	F	
	Overall Level of Service	**F**		
BLOS	Type of bike lane	Mixed	Pocket Bike Lane	B
	Left-turn - lanes crossed	1	2 or more	
	Vehicle operating speed (km/hr)	> 60	> 60	
	Right-turn	N/A	Bike lane shifts to the left of the right turn lane	
	Level of Service	E	F	
	Overall Level of Service	**F**		
TLOS	Maximum Average Delay (s)	> 40	< 30	D
	Level of Service	F	D	
	Overall Level of Service	**F**		
TkLOS	Effective corner radius (m)	10 to 15	10 to 15	D
	Number of receiving lanes	2	1	
	Level of Service	B	E	
	Overall Level of Service	**E**		

Note: the worst-case scenario between the AM and PM peak hours was taken for each individual leg of the intersection

Table 22 – 2031 Total Future March Road at Dunrobin Road MMLOS

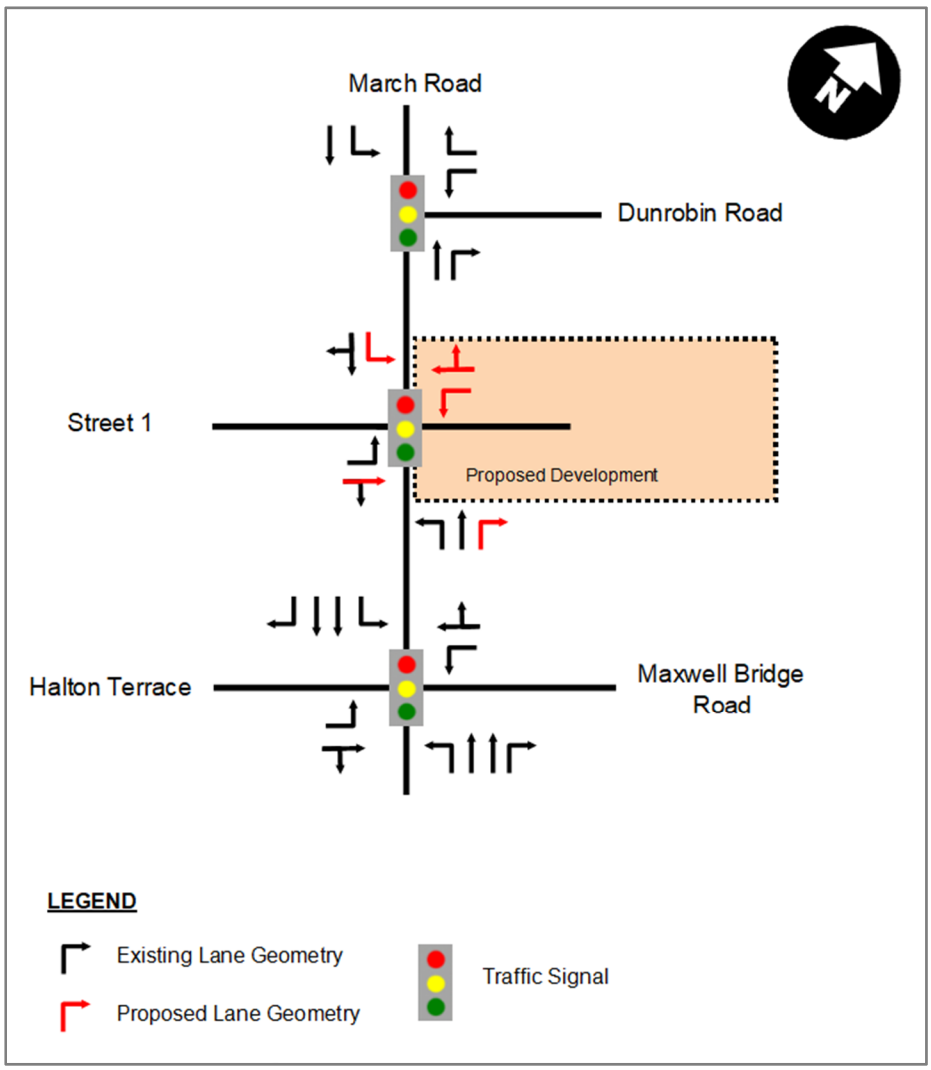
		East Leg	North and South Legs	Target
PLOS	Lanes crossed	Not Applicable		**N/A**
	Median (yes/no)			
	Left turn phasing			
	Right turn conflict			
	RTOR (yes/no)			
	Leading ped interval (yes/no)			
	Right turn corner radius (m)			
	Right Turn Channel			
	Crosswalk treatment			
	PETSI Points			
	PETSI LOS			
	Cycle Length (s)			
	Effective Walk Time (s)			
	Average Ped Delay (s)			
	Ped Delay LOS			
	Level of Service			
	Overall Level of Service			
BLOS	Type of bike lane	Mixed	Mixed	**D**
	Left-turn - lanes crossed	0	0	
	Vehicle operating speed (km/hr)	> 60	> 60	
	Right-turn - number of turn lanes	1	1	
	Right-turn - turn lane length (m)	> 50	> 50	
	Right-turn - turning speed (km/hr)	< 25	< 25	
	Right-turn - location of bike lane	N/A	N/A	
	Level of Service	F	F	
	Overall Level of Service	**F**		
TLOS	Maximum Average Delay (s)	Not Applicable		**N/A**
	Level of Service			
	Overall Level of Service			
TkLOS	Effective corner radius (m)	10 – 15	10 - 15	**C**
	Number of receiving lanes	1	1	
	Level of Service	E	E	
	Overall Level of Service	**E**		

Table 23 – 2031 Total Future March Road at Street 1 MMLOS

		East and West Legs	North and South Legs	Target
PLOS	Lanes crossed	3	3	A
	Median (yes/no)	No	No	
	Left turn phasing	Permissive	Permissive	
	Right turn conflict	Permissive	Permissive	
	RTOR (yes/no)	Yes	Yes	
	Leading ped interval (yes/no)	No	No	
	Right turn corner radius (m)	10-15	10-15	
	Right Turn Channel	N/A	N/A	
	Crosswalk treatment	Standard	Standard	
	PETSI Points	70	53	
	PETSI LOS	C	D	
	Cycle Length (s)	120	120	
	Effective Walk Time (s)	7	62	
	Average Ped Delay (s)	53	14	
	Ped Delay LOS	E	B	
	Level of Service	E	D	
	Overall Level of Service	**F**		
BLOS	Type of bike lane	MUP	Mixed	C
	Left-turn - lanes crossed	0	0	
	Vehicle operating speed (km/hr)	< 50	> 60	
	Right-turn	N/A	Right turn lane > 50m	
	Level of Service	B	F	
	Overall Level of Service	**F**		
TLOS	Maximum Average Delay (s)	> 40	< 20	D
	Level of Service	F	C	
	Overall Level of Service	**F**		
TkLOS	Effective corner radius (m)	10 to 15	10 to 15	D
	Number of receiving lanes	1	1	
	Level of Service	E	E	
	Overall Level of Service	**E**		

Note: the worst-case scenario between the AM and PM peak hours was taken for each individual leg of the intersection

Figure 15 - 2031 Total Lane Configuration and Traffic Control



4.9.2.4 2036 Ultimate Conditions

Figure 16 illustrates 2036 Ultimate AM and PM peak hour traffic volumes at the study area intersections.

Intersection Capacity Analysis

Table 24 summarizes the results of the Synchro analysis for 2036 Ultimate intersection operations.

Consistent with the previous two horizons, 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 2036 Ultimate conditions.

Appendix C contains detailed intersection performance worksheets.

Multi-Modal Level of Service Assessment

March Road at Maxwell Bridge Road / Halton Terrace

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 B. The transit (TLOS) and truck (TkLOS) level of service targets for this intersection are both D.

The Pedestrian Level of Service at the intersection of March Road at Maxwell Bridge Road / Halton Terrace is projected to operate with a PLOS of F. 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 be to the detriment of the vehicles.

The Bicycle Level of Service at the intersection of March Road at Maxwell Bridge Road / Halton Terrace is projected to operate with a BLOS of F. Methods for improving the BLOS at this intersection include reducing the speed limit and number of lanes along March Road, introducing the northbound right turn lane to the right of the northbound bike lane, and reducing the speed limit along Maxwell Bridge Road. 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.

The Transit Level of Service at the intersection of March Road at Maxwell Bridge Road / Halton Terrace is projected to operate 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.

The Truck Level of Service at the intersection of March Road at Maxwell Bridge Road / Halton Terrace is projected to 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.

Table 25 outlines the 2036 Ultimate MMLOS analysis for the intersection of March Road at Maxwell Bridge Road / Halton Terrace.

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 route, 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.

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. 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.

Table 26 outlines the 2036 Ultimate MMLOS analysis for the intersection of March Road at Dunrobin Road.

March Road at Street 1

There is an existing school located at 1095 March Road, approximately 170m north of the proposed Street 1, therefore, the Policy Area for the March Road at Street 1 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 1 intersection was taken from the recently completed *1053, 1075 and 1145 March Road Transportation Impact Assessment* (Novatech 2018). **Appendix D** contains the Functional Design of this intersection which was used for the MMLOS analysis in the subject TIA.

The Pedestrian Level of Service at the intersection of March Road at Street 1 is projected to operate with a PLOS of F, 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 vehicles. The location of the school at 1095 March Road, just north 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 1.

The Bicycle Level of Service at the intersection of March Road at Street 1 is projected to operate with a BLOS of F, which does not meet the desired target of C. Methods for improving the BLOS at this intersection include reducing the speed limit along March Road, reducing the length of the northbound right turn lane, and implementing cycling facilities along March Road.

The Transit Level of Service at the intersection of March Road at Street 1 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 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 1. 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.

Table 27 outlines the 2031 Total Future MMLOS analysis for the intersection of March Road at Street 1.

Figure 16 - 2036 Ultimate Traffic Volumes

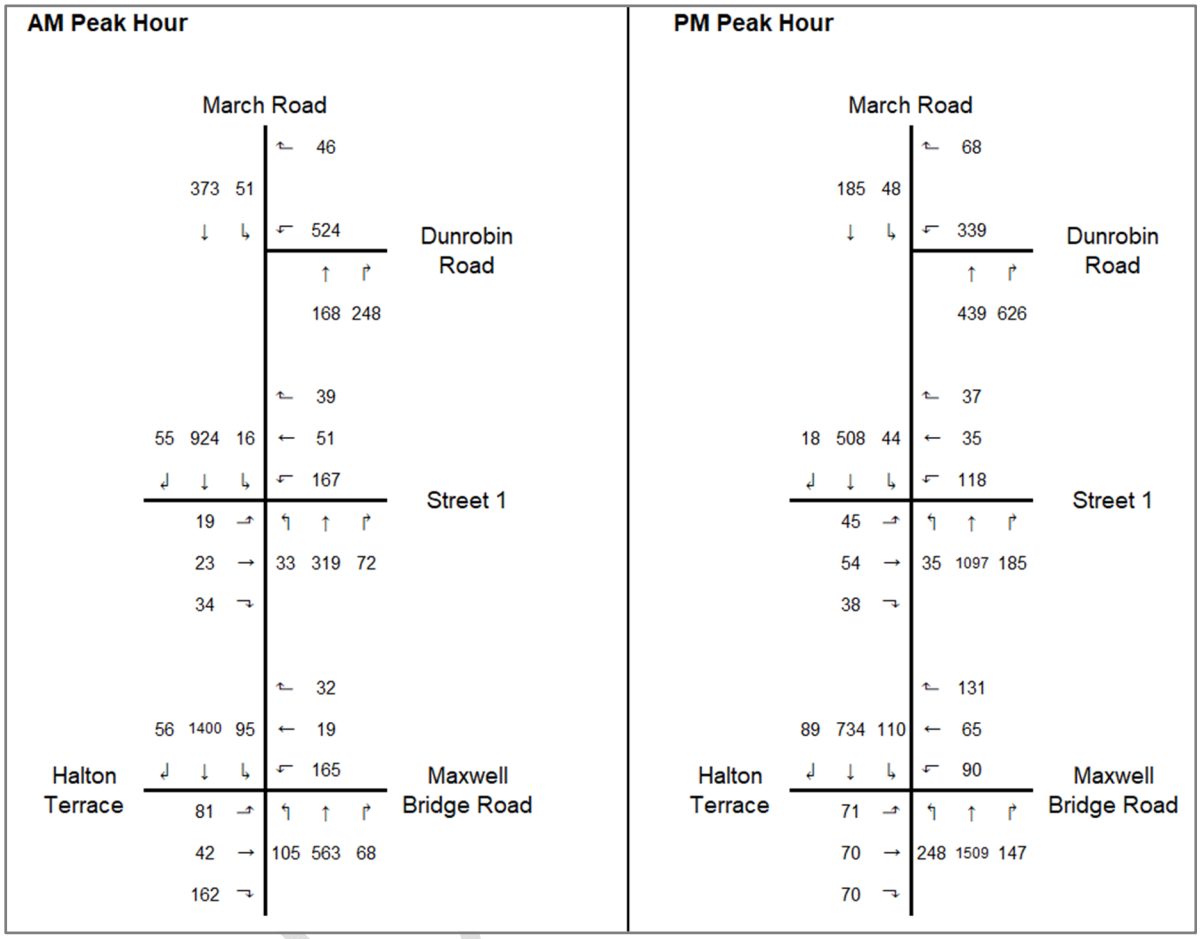


Table 24 – 2036 Ultimate Intersection Operations

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 (D)	0.31 (0.84)	44.9 (110.7)	31.0 (#33.3)
			Through / Right	A (A)	0.47 (0.59)	17.1 (44.1)	33.8 (40.0)
		WB	Left	E (B)	0.92 (0.70)	97.6 (76.2)	#73.4 (36.1)
			Through / Right	A (C)	0.14 (0.73)	19.5 (44.1)	14.1 (47.8)
		NB	Left	A (A)	0.49 (0.47)	16.3 (7.9)	16.8 (28.1)
			Through	A (C)	0.29 (0.71)	15.5 (19.2)	53.6 (185.4)
			Right	A (A)	0.07 (0.15)	1.6 (3.8)	4.0 (12.8)
		SB	Left	A (A)	0.18 (0.43)	8.9 (12.0)	15.3 (15.1)
			Through	C (A)	0.72 (0.35)	24.0 (13.0)	177.0 (68.3)
			Right	A (A)	0.06 (0.09)	0.9 (2.3)	2.0 (6.5)
		Overall Intersection		**E (D)**	**0.92 (0.84)**	**24.8 (21.6)**	-
March Road at Dunrobin Road	Traffic Signals	WB	Left / Right	A (A)	0.55 (0.53)	14.2 (23.9)	33.8 (40.4)
		NB	Through	A (A)	0.26 (0.60)	10.7 (18.3)	20.1 (73.2)
			Right	A (B)	0.35 (0.63)	3.3 (4.6)	10.0 (16.8)
		SB	Left	A (A)	0.12 (0.11)	9.9 (6.5)	8.0 (6.4)
			Through	A (A)	0.57 (0.20)	14.8 (7.1)	45.1 (19.2)
		Overall Intersection		**A (B)**	**0.57 (0.63)**	**11.8 (13.1)**	-
March Road at Street 1	Traffic Signals	WB	Left	A (A)	0.08 (0.23)	34.3 (41.4)	10.2 (20.3)
			Through / Right	A (A)	0.16 (0.32)	19.3 (32.8)	15.6 (29.2)
		EB	Left	B (A)	0.66 (0.60)	47.8 (53.2)	59.6 (45.5)
			Through / Right	A (A)	0.26 (0.25)	25.9 (24.6)	26.3 (20.2)
		NB	Left	A (A)	0.18 (0.06)	8.7 (4.6)	6.9 (4.8)
			Through	A (D)	0.27 (0.87)	6.8 (19.3)	36.8 (229.8)
			Right	A (A)	0.07 (0.16)	1.6 (1.0)	4.1 (5.3)
		SB	Left	A (A)	0.02 (0.27)	5.6 (9.6)	3.2 (8.5)
			Through / Right	D (A)	0.84 (0.42)	19.3 (6.6)	203.3 (56.4)
				D (D)	**0.84 (0.87)**	**19.2 (17.3)**	-

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

Table 25 – 2036 Ultimate March Road at Maxwell Bridge Road / Halton Terrace MMLOS

		East and West Legs	North and South Legs	Target
PLOS	Lanes crossed	3	6	C
	Median (yes/no)	No	No	
	Left turn phasing	Permissive	Permissive + Protected	
	Right turn conflict	Permissive	Permissive	
	RTOR (yes/no)	Yes	Yes	
	Leading ped interval (yes/no)	No	No	
	Right turn corner radius (m)	10-15	10-15	
	Right Turn Channel	N/A	N/A	
	Crosswalk treatment	Standard	Standard	
	PETSI Points	70	20	
	PETSI LOS	C	F	
	Cycle Length (s)	130	130	
	Effective Walk Time (s)	7	47	
	Average Ped Delay (s)	58	26	
	Ped Delay LOS	E	C	
	Level of Service	E	F	
	Overall Level of Service	**F**		
BLOS	Type of bike lane	Mixed	Pocket Bike Lane	B
	Left-turn - lanes crossed	1	2 or more	
	Vehicle operating speed (km/hr)	> 60	> 60	
	Right-turn	N/A	Bike lane shifts to the left of the right turn lane	
	Level of Service	E	F	
	Overall Level of Service	**F**		
TLOS	Maximum Average Delay (s)	> 40	< 30	D
	Level of Service	F	D	
	Overall Level of Service	**F**		
TkLOS	Effective corner radius (m)	10 to 15	10 to 15	D
	Number of receiving lanes	2	1	
	Level of Service	B	E	
	Overall Level of Service	**E**		

Note: the worst-case scenario between the AM and PM peak hours was taken for each individual leg of the intersection

Table 26 – 2036 Ultimate March Road at Dunrobin Road MMLOS

		East Leg	North and South Legs	Target
PLOS	Lanes crossed	Not Applicable		**N/A**
	Median (yes/no)			
	Left turn phasing			
	Right turn conflict			
	RTOR (yes/no)			
	Leading ped interval (yes/no)			
	Right turn corner radius (m)			
	Right Turn Channel			
	Crosswalk treatment			
	PETSI Points			
	PETSI LOS			
	Cycle Length (s)			
	Effective Walk Time (s)			
	Average Ped Delay (s)			
	Ped Delay LOS			
	Level of Service			
	Overall Level of Service			
BLOS	Type of bike lane	Mixed	Mixed	**D**
	Left-turn - lanes crossed	0	0	
	Vehicle operating speed (km/hr)	> 60	> 60	
	Right-turn - number of turn lanes	1	1	
	Right-turn - turn lane length (m)	> 50	> 50	
	Right-turn - turning speed (km/hr)	< 25	< 25	
	Right-turn - location of bike lane	N/A	N/A	
	Level of Service	F	F	
	Overall Level of Service	**F**		
TLOS	Maximum Average Delay (s)	Not Applicable		**N/A**
	Level of Service			
	Overall Level of Service			
TkLOS	Effective corner radius (m)	10 – 15	10 - 15	**C**
	Number of receiving lanes	1	1	
	Level of Service	E	E	
	Overall Level of Service	**E**		

Table 27 – 2036 Ultimate March Road at Street 1 MMLOS

		East and West Legs	North and South Legs	Target
PLOS	Lanes crossed	3	3	A
	Median (yes/no)	No	No	
	Left turn phasing	Permissive	Permissive	
	Right turn conflict	Permissive	Permissive	
	RTOR (yes/no)	Yes	Yes	
	Leading ped interval (yes/no)	No	No	
	Right turn corner radius (m)	10-15	10-15	
	Right Turn Channel	N/A	N/A	
	Crosswalk treatment	Standard	Standard	
	PETSI Points	70	53	
	PETSI LOS	C	D	
	Cycle Length (s)	120	120	
	Effective Walk Time (s)	7	62	
	Average Ped Delay (s)	53	14	
	Ped Delay LOS	E	B	
	Level of Service	E	D	
	Overall Level of Service	**F**		
BLOS	Type of bike lane	MUP	Mixed	C
	Left-turn - lanes crossed	0	0	
	Vehicle operating speed (km/hr)	< 50	> 60	
	Right-turn	N/A	Right turn lane > 50m	
	Level of Service	B	F	
	Overall Level of Service	**F**		
TLOS	Maximum Average Delay (s)	> 40	< 20	D
	Level of Service	F	C	
	Overall Level of Service	**F**		
TkLOS	Effective corner radius (m)	10 to 15	10 to 15	D
	Number of receiving lanes	1	1	
	Level of Service	E	E	
	Overall Level of Service	**E**		

Note: the worst-case scenario between the AM and PM peak hours was taken for each individual leg of the intersection

4.9.3 Summary of Required Road Improvements

Table 28 provides a summary of the road improvements required in each horizon to accommodate the proposed development.

Table 28 - Summary of Required Road Improvements

Intersection / Road Segment	2019 Existing	2031 Future Background	2031 Total Future	2036 Ultimate
March Road at Dunrobin Road	Traffic Signals	N/A	N/A	N/A
March Road at Maxwell Bridge Road / Halton Terrace	Traffic Signals	N/A	N/A	N/A
March Road at Street 1[1]	-	Traffic Signals[2]	Northbound Right Turn and Southbound Left Turn Lanes[2]	N/A
March Road	Two-Lane Roadway	Four-Lane Roadway[3]	N/A	N/A

Notes:
1. Traffic control and lane configuration at this intersection take from the recently completed 1053, 1075 and 1145 March Road TIA
2. Denotes projects that are DC eligible
3. Despite this recommendation to widen March Road in the 2031 future background horizon, this road configuration was not used in the subject analysis.

5.0 SUMMARY

This Transportation Impact Assessment (TIA) was prepared in support of a Draft Plan of Subdivision and Zoning By-Law Amendment application for the proposed Valecraft development. The development is located at 1020 and 1070 March Road in the City of Ottawa's Kanata North community. The site is located in the northeast quadrant of the Kanata North Urban Expansion Area Lands. It is bound by March Road to the west, existing residential to the north, future Minto residential to the south, and undeveloped land to the east. The subdivision is proposed to include 297 single family homes, 315 townhomes, 116 apartment units, one school, and two commercial parcels. Build-out and occupancy is anticipated to occur by 2031.

Primary access to the proposed development will be achieved via a new Street 1 connection to March Road. This access will be a shared access with the proposed future Claridge development on the west side of March Road. A secondary access to will also be provided via Street 8 into the proposed Minto development to the south. The proposed development is anticipated to generate 409 and 492 net new auto trips (two-way) during the AM and PM peak hours, respectively.

As per the recommended cross-section in the recently approved *Kanata North Community Design Plan Transportation Master Plan* (Novatech, June 2016)., Street 1 and Street 8 will both include a sidewalk on one side and a multi-use pathway on the other side. The curb radii were reduced from 10m to 5m at intersections along Street 1 and Street 8 in order to reduce the crossing distances for pedestrians. A pedestrian crossover (PXO) was included along Street 1 at the intersection with Street 8, to improve the connectivity for pedestrians as they navigate through the community. There are two proposed transit stops located along Street 1. The first transit stop location is approximately 180m east of March Road and the second transit stop location is located approximately 600m east of March Road. Intersection narrowings were included at the proposed transit stop locations along Street 1 to help reduce the crossing distances for pedestrians as well as slow vehicular traffic down as motorists are traveling through the community. With the aforementioned facilities in place, Street 1 and Street 8 are both able 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.

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) by the 2031 horizon. 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 all study horizons.

In terms of multi-modal level of service, all three study area intersections do not meet the MMLOS targets under any horizon. Once March Road is widened with the Bus Rapid Transit in place, the operations at the Maxwell Bridge and Street 1 intersections will change drastically. 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. The MMLOS at the March Road at Dunrobin Road will not improve with the March Road widening in place, however, as it is designated as rural area with minimal active modes, it is not recommended to address the MMLOS at this intersection.

Appendix A TRAFFIC DATA

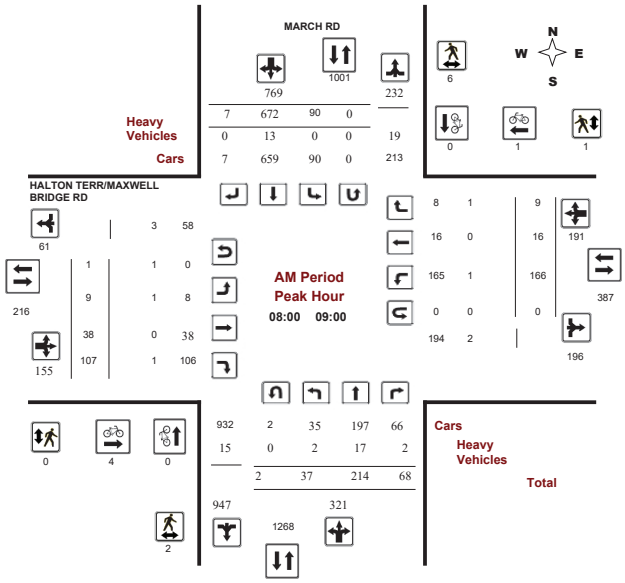
Transportation Services - Traffic Services

Turning Movement Count - Peak Hour Diagram

HALTON TERR/MAXWELL BRIDGE RD @ MARCH RD

Survey Date: Wednesday, August 10, 2016 **WO No:** 36161

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



Comments

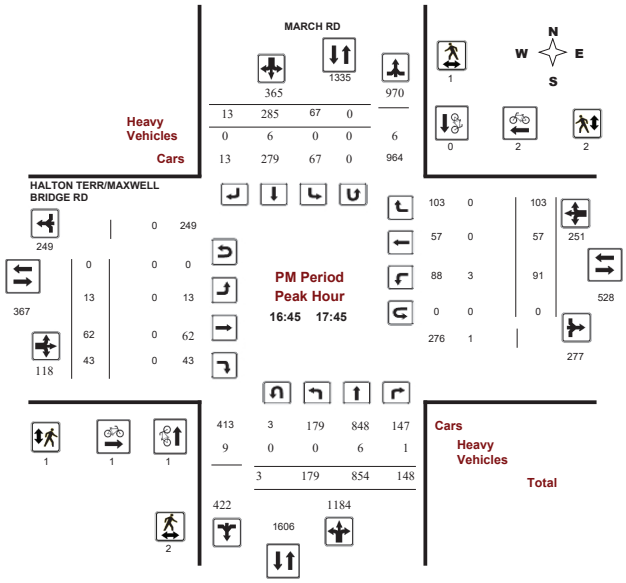
Transportation Services - Traffic Services

Turning Movement Count - Peak Hour Diagram

HALTON TERR/MAXWELL BRIDGE RD @ MARCH RD

Survey Date: Wednesday, August 10, 2016 **WO No:** 36161

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



Comments

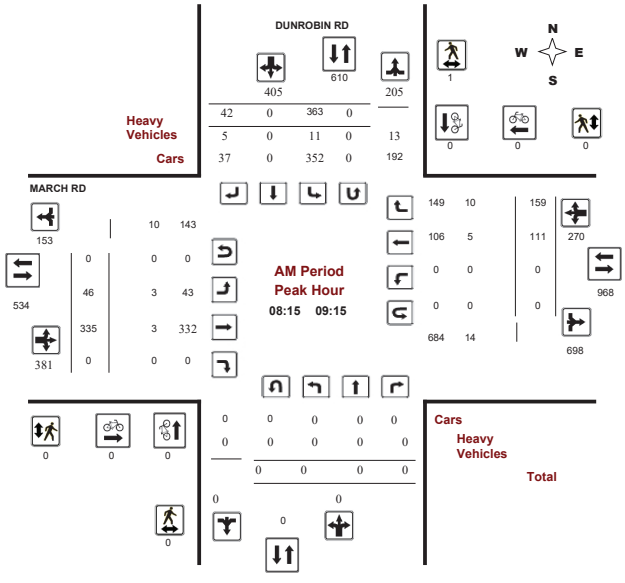
Transportation Services - Traffic Services

Turning Movement Count - Peak Hour Diagram

DUNROBIN RD @ MARCH RD

Survey Date: Thursday, August 04, 2016 **WO No:** 36126

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



Comments

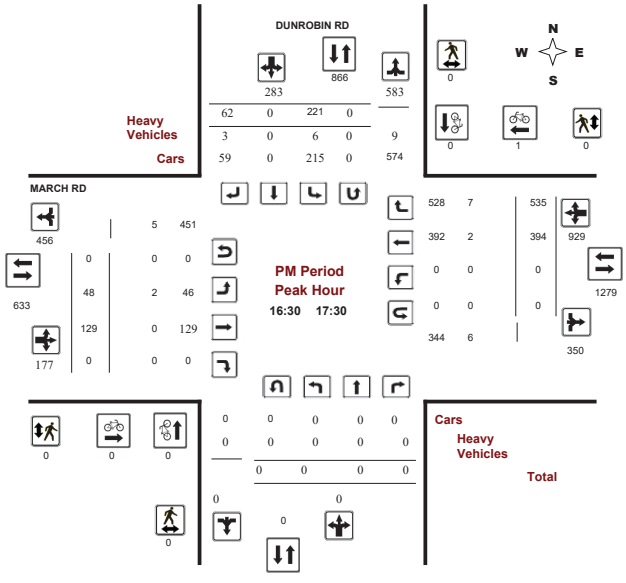
Transportation Services - Traffic Services

Turning Movement Count - Peak Hour Diagram

DUNROBIN RD @ MARCH RD

Survey Date: Thursday, August 04, 2016 **WO No:** 36126

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



Comments

Appendix B TRANSPORTATION DEMAND MANAGEMENT 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)*	☐ Not within 600m of rapid transit
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)*	☑

		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)*	☐ as this is a plan of subdivision, bicycle parking is not provided.
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)*	☐ as this is a plan of subdivision, bicycle parking is not provided.
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)*	☐ as this is a plan of subdivision, bicycle parking is not provided.
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)*	☐ as this is a plan of subdivision, bicycle parking is not provided.
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	☐ this criterion does not apply to plans of subdivision
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	☐

			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)*	☑ Transit Service will likely be required as residents move in
		3.4	**Private transit service**	
BETTER		3.4.1	Provide shuttle service for seniors homes or lifestyle communities (e.g. scheduled mall or supermarket runs)	☐
		4.	**CARSHARING & BIKESHARING**	
		4.1	**Bikeshare stations & memberships**	
BETTER		4.1.1	Contract with provider to install on-site bikeshare station (*multi-family)*	☐
BETTER		4.1.2	Provide residents with bikeshare memberships, either free or subsidized *(multi-family)*	☐
		4.2	**Carshare vehicles & memberships**	
BETTER		4.2.1	Contract with provider to install on-site carshare vehicles and promote their use by residents	☐
BETTER		4.2.2	Provide residents with carshare memberships, either free or subsidized	☐
		5.	**PARKING**	
		5.1	**Priced parking**	
BASIC	★	5.1.1	Unbundle parking cost from purchase price *(condominium)*	☐
BASIC	★	5.1.2	Unbundle parking cost from monthly rent *(multi-family)*	☐

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

Appendix C INTERSECTION PERFORMANCE WORKSHEETS

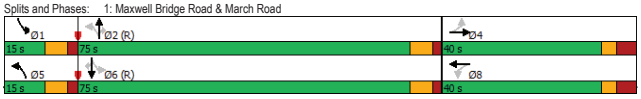
C.1 2019 EXISTING CONDITIONS

1020 and 1070 March — 2019 Existing AM
1: Maxwell Bridge Road & March Road — 05/22/2019

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	9	39	109	168	16	9	38	217	69	91	682	7
Future Volume (vph)	9	39	109	168	16	9	38	217	69	91	682	7
Satd. Flow (prot)	1695	1586	0	1695	1688	0	1695	3390	1517	1695	3390	1517
Flt Permitted	0.739			0.583			0.335			0.580		
Satd. Flow (perm)	1319	1586	0	1040	1688	0	598	3390	1517	1035	3390	1517
Satd. Flow (RTOR)		104			10				92			92
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Shared Lane Traffic (%)												
Lane Group Flow (vph)	10	164	0	187	28	0	42	241	77	101	758	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
Total Split (s)	40.0	40.0		40.0	40.0		15.0	75.0	75.0	15.0	75.0	75.0
Total Lost Time (s)	7.3	7.3		7.3	7.3		6.7	6.6	6.6	6.7	6.6	6.6
Act Effct Green (s)	27.6	27.6		27.6	27.6		80.0	73.4	73.4	84.6	77.5	77.5
Actuated g/C Ratio	0.21	0.21		0.21	0.21		0.62	0.56	0.56	0.65	0.60	0.60
v/c Ratio	0.04	0.39		0.85	0.08		0.10	0.13	0.09	0.14	0.38	0.01
Control Delay	36.3	18.2		79.1	27.0		9.6	15.1	2.7	9.1	16.2	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	36.3	18.2		79.1	27.0		9.6	15.1	2.7	9.1	16.2	0.0
LOS	D	B		E	C		A	B	A	A	B	A
Approach Delay		19.2			72.3			11.8			15.3	
Approach LOS		B			E			B			B	
Queue Length 50th (m)	2.1	12.7		46.3	3.7		3.3	14.5	0.0	8.1	53.2	0.0
Queue Length 95th (m)	6.2	29.6		68.3	10.8		9.0	26.4	6.4	18.1	81.7	0.0
Internal Link Dist (m)		75.7			119.4			174.9			207.9	
Turn Bay Length (m)	50.0			40.0			80.0			100.0		40.0
Base Capacity (vph)	341	487		269	445		445	1957	914	721	2046	952
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	0.03	0.34		0.70	0.06		0.09	0.12	0.08	0.14	0.37	0.01

Intersection Summary
Cycle Length: 130
Actuated Cycle Length: 130
Offset: 69 (53%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.85
Intersection Signal Delay: 22.5 — Intersection LOS: C
Intersection Capacity Utilization 66.4% — ICU Level of Service C
Analysis Period (min) 15

Splits and Phases: 1: Maxwell Bridge Road & March Road

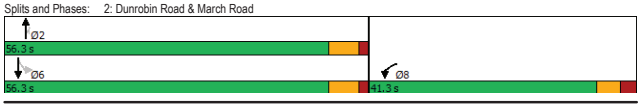


1020 and 1070 March — 2019 Existing AM
2: Dunrobin Road & March Road — 05/22/2019

Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	368	43	113	161	47	340
Future Volume (vph)	368	43	113	161	47	340
Satd. Flow (prot)	3260	0	1784	1517	1695	1784
Flt Permitted	0.957				0.676	
Satd. Flow (perm)	3260	0	1784	1517	1206	1784
Satd. Flow (RTOR)	15			179		
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Shared Lane Traffic (%)						
Lane Group Flow (vph)	457	0	126	179	52	378
Turn Type	Prot		NA	Perm	Perm	NA
Protected Phases	8		2			6
Permitted Phases				2	6	
Total Split (s)	41.3		56.3	56.3	56.3	56.3
Total Lost Time (s)	6.3		6.3	6.3	6.3	6.3
Act Effct Green (s)	11.1		14.2	14.2	14.2	14.2
Actuated g/C Ratio	0.29		0.37	0.37	0.37	0.37
v/c Ratio	0.48		0.19	0.27	0.12	0.57
Control Delay	13.3		9.1	3.0	8.8	13.7
Queue Delay	0.0		0.0	0.0	0.0	0.0
Total Delay	13.3		9.1	3.0	8.8	13.7
LOS	B		A	A	A	B
Approach Delay	13.3		5.6			13.1
Approach LOS	B		A			B
Queue Length 50th (m)	11.3		5.0	0.0	2.0	17.6
Queue Length 95th (m)	25.6		13.8	7.8	7.2	40.4
Internal Link Dist (m)	257.3		110.4			200.5
Turn Bay Length (m)	90.0			110.0	90.0	
Base Capacity (vph)	2938		1784	1517	1206	1784
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	0.16		0.07	0.12	0.04	0.21

Intersection Summary
Cycle Length: 97.6
Actuated Cycle Length: 38.3
Control Type: Semi Act-Uncoord
Maximum v/c Ratio: 0.57
Intersection Signal Delay: 11.3 — Intersection LOS: B
Intersection Capacity Utilization 41.9% — ICU Level of Service A
Analysis Period (min) 15

Splits and Phases: 2: Dunrobin Road & March Road

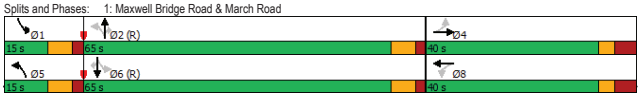


1020 and 1070 March — 2019 Existing PM
1: Maxwell Bridge Road & March Road — 05/22/2019

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	13	63	44	92	58	105	182	870	150	68	289	13
Future Volume (vph)	13	63	44	92	58	105	182	870	150	68	289	13
Satd. Flow (prot)	1695	1674	0	1695	1611	0	1695	3390	1517	1695	3390	1517
Flt Permitted	0.460			0.676			0.530			0.272		
Satd. Flow (perm)	821	1674	0	1206	1611	0	946	3390	1517	485	3390	1517
Satd. Flow (RTOR)		29			75				167			100
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Shared Lane Traffic (%)												
Lane Group Flow (vph)	14	119	0	102	181	0	202	967	167	76	321	14
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
Total Split (s)	40.0	40.0		40.0	40.0		15.0	65.0	65.0	15.0	65.0	65.0
Total Lost Time (s)	7.3	7.3		7.3	7.3		6.7	6.6	6.6	6.7	6.6	6.6
Act Effct Green (s)	15.4	15.4		15.4	15.4		87.7	79.4	79.4	81.1	74.2	74.2
Actuated g/C Ratio	0.13	0.13		0.13	0.13		0.73	0.66	0.66	0.68	0.62	0.62
v/c Ratio	0.13	0.50		0.66	0.67		0.27	0.43	0.16	0.19	0.15	0.01
Control Delay	46.2	42.4		68.6	40.0		5.7	11.8	2.0	6.2	11.0	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	46.2	42.4		68.6	40.0		5.7	11.8	2.0	6.2	11.0	0.0
LOS	D	D		E	D		A	B	A	A	B	A
Approach Delay		42.8			50.3			9.6			9.7	
Approach LOS		D			D			A			A	
Queue Length 50th (m)	3.0	19.8		23.2	23.8		11.3	55.2	0.0	3.9	15.5	0.0
Queue Length 95th (m)	8.8	35.9		39.3	44.7		23.1	85.2	9.0	9.8	27.7	0.0
Internal Link Dist (m)		75.7			119.4			174.9			207.9	
Turn Bay Length (m)	50.0			40.0			80.0			100.0		40.0
Base Capacity (vph)	223	477		328	493		754	2244	1060	417	2096	976
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	0.25		0.31	0.37		0.27	0.43	0.16	0.18	0.15	0.01

Intersection Summary
Cycle Length: 120
Actuated Cycle Length: 120
Offset: 18 (15%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.67
Intersection Signal Delay: 17.0 — Intersection LOS: B
Intersection Capacity Utilization 58.8% — ICU Level of Service B
Analysis Period (min) 15

Splits and Phases: 1: Maxwell Bridge Road & March Road



1020 and 1070 March — 2019 Existing PM
2: Dunrobin Road & March Road — 05/22/2019

Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	224	63	400	543	49	131
Future Volume (vph)	224	63	400	543	49	131
Satd. Flow (prot)	3220	0	1784	1517	1695	1784
Flt Permitted	0.962				0.314	
Satd. Flow (perm)	3220	0	1784	1517	560	1784
Satd. Flow (RTOR)	32			603		
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Shared Lane Traffic (%)						
Lane Group Flow (vph)	319	0	444	603	54	146
Turn Type	Prot		NA	Perm	pm+pt	NA
Protected Phases	8		2		1	6
Permitted Phases				2	6	
Total Split (s)	36.3		56.3	56.3	21.3	77.6
Total Lost Time (s)	6.3		6.3	6.3	6.3	6.3
Act Effct Green (s)	11.8		23.1	23.1	29.6	29.6
Actuated g/C Ratio	0.21		0.42	0.42	0.53	0.53
v/c Ratio	0.45		0.60	0.61	0.12	0.15
Control Delay	22.0		17.8	4.4	6.1	6.2
Queue Delay	0.0		0.0	0.0	0.0	0.0
Total Delay	22.0		17.8	4.4	6.1	6.2
LOS	C		B	A	A	A
Approach Delay	22.0		10.1			6.2
Approach LOS	C		B			A
Queue Length 50th (m)	14.3		38.0	0.0	2.1	6.0
Queue Length 95th (m)	30.6		72.6	16.5	6.5	14.5
Internal Link Dist (m)	257.3		110.4			200.5
Turn Bay Length (m)	90.0			110.0	90.0	
Base Capacity (vph)	1947		1513	1378	648	1751
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	0.16		0.29	0.44	0.08	0.08

Intersection Summary
Cycle Length: 113.9
Actuated Cycle Length: 55.4
Control Type: Semi Act-Uncoord
Maximum v/c Ratio: 0.61
Intersection Signal Delay: 12.0 — Intersection LOS: B
Intersection Capacity Utilization 51.0% — ICU Level of Service A
Analysis Period (min) 15

Splits and Phases: 2: Dunrobin Road & March Road

C.2 2031 FUTURE BACKGROUND CONDITIONS

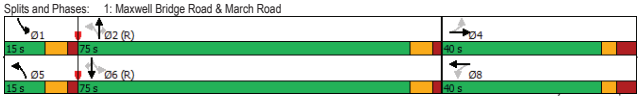
1020 and 1070 March
1: Maxwell Bridge Road & March Road

2031 FBG AM
07/16/2019

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	81	41	159	160	18	32	104	487	66	94	1218	56
Future Volume (vph)	81	41	159	160	18	32	104	487	66	94	1218	56
Satd. Flow (prot)	1695	1572	0	1695	1613	0	1695	3390	1517	1695	3390	1517
Flt Permitted	0.724			0.495			0.158			0.461		
Satd. Flow (perm)	1292	1572	0	883	1613	0	282	3390	1517	823	3390	1517
Satd. Flow (RTOR)		143			32				92			92
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Shared Lane Traffic (%)												
Lane Group Flow (vph)	81	200	0	160	50	0	104	487	66	94	1218	56
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
Total Split (s)	40.0	40.0		40.0	40.0		15.0	75.0	75.0	15.0	75.0	75.0
Total Lost Time (s)	7.3	7.3		7.3	7.3		6.7	6.6	6.6	6.7	6.6	6.6
Act Effct Green (s)	26.2	26.2		26.2	26.2		83.3	75.6	75.6	82.9	75.4	75.4
Actuated g/C Ratio	0.20	0.20		0.20	0.20		0.64	0.58	0.58	0.64	0.58	0.58
v/c Ratio	0.31	0.47		0.90	0.14		0.39	0.25	0.07	0.16	0.62	0.06
Control Delay	45.2	16.6		95.7	19.3		12.5	14.8	1.5	8.7	21.0	0.9
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	45.2	16.6		95.7	19.3		12.5	14.8	1.5	8.7	21.0	0.9
LOS	D	B		F	B		B	B	A	A	C	A
Approach Delay		24.9			77.5			13.1			19.3	
Approach LOS		C			E			B			B	
Queue Length 50th (m)	17.7	12.1		40.0	3.7		8.2	31.3	0.0	7.4	105.1	0.0
Queue Length 95th (m)	30.4	31.9		#66.6	13.4		17.3	47.3	3.7	15.8	146.1	2.1
Internal Link Dist (m)		75.7			119.4			174.9			207.9	
Turn Bay Length (m)	50.0			40.0			80.0			100.0		40.0
Base Capacity (vph)	327	506		224	433		274	1980	924	586	1975	922
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	0.25	0.40		0.71	0.12		0.38	0.25	0.07	0.16	0.62	0.06

Intersection Summary
Cycle Length: 130
Actuated Cycle Length: 130
Offset: 69 (53%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.90
Intersection Signal Delay: 23.2 Intersection LOS: C
Intersection Capacity Utilization 86.8% ICU Level of Service E
Analysis Period (min) 15
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 1: Maxwell Bridge Road & March Road



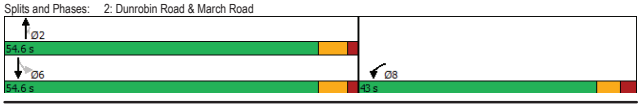
1020 and 1070 March
2: Dunrobin Road & March Road

2031 FBG AM
07/16/2019

Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	508	45	145	226	49	356
Future Volume (vph)	508	45	145	226	49	356
Satd. Flow (prot)	3270	0	1784	1517	1695	1784
Flt Permitted	0.956				0.665	
Satd. Flow (perm)	3270	0	1784	1517	1187	1784
Satd. Flow (RTOR)	11			226		
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Shared Lane Traffic (%)						
Lane Group Flow (vph)	553	0	145	226	49	356
Turn Type	Prot		NA	Perm	Perm	NA
Protected Phases	8		2			6
Permitted Phases				2	6	
Total Split (s)	43.0		54.6	54.6	54.6	54.6
Total Lost Time (s)	6.3		6.3	6.3	6.3	6.3
Act Effct Green (s)	12.6		14.3	14.3	14.3	14.3
Actuated g/C Ratio	0.32		0.36	0.36	0.36	0.36
v/c Ratio	0.53		0.23	0.33	0.12	0.56
Control Delay	13.6		10.4	3.3	9.8	14.4
Queue Delay	0.0		0.0	0.0	0.0	0.0
Total Delay	13.6		10.4	3.3	9.8	14.4
LOS	B		B	A	A	B
Approach Delay	13.6		6.1			13.9
Approach LOS	B		A			B
Queue Length 50th (m)	14.3		6.2	0.0	2.0	17.6
Queue Length 95th (m)	31.5		17.3	9.5	7.7	42.1
Internal Link Dist (m)	257.3		110.4			200.5
Turn Bay Length (m)	90.0			110.0	90.0	
Base Capacity (vph)	2949		1752	1494	1166	1752
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	0.19		0.08	0.15	0.04	0.20

Intersection Summary
Cycle Length: 97.6
Actuated Cycle Length: 39.9
Control Type: Semi Act-Uncoord
Maximum v/c Ratio: 0.56
Intersection Signal Delay: 11.6 Intersection LOS: B
Intersection Capacity Utilization 47.1% ICU Level of Service A
Analysis Period (min) 15

Splits and Phases: 2: Dunrobin Road & March Road



Synchro 10 Report

1020 and 1070 March
3: Site Access 1 & March Road

2031 FBG AM
07/16/2019

Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	19	34	33	314	907	55
Future Volume (vph)	19	34	33	314	907	55
Satd. Flow (prot)	1695	1517	1695	1784	1770	0
Flt Permitted	0.950		0.243			
Satd. Flow (perm)	1695	1517	434	1784	1770	0
Satd. Flow (RTOR)		34			7	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Shared Lane Traffic (%)						
Lane Group Flow (vph)	19	34	33	314	962	0
Turn Type	Prot	Perm	Perm	NA	NA	
Protected Phases	4			2	6	
Permitted Phases		4	2			
Total Split (s)	24.8	24.8	65.2	65.2	65.2	
Total Lost Time (s)	4.7	4.7	6.6	6.6	6.6	
Act Effct Green (s)	7.0	7.0	51.3	51.3	51.3	
Actuated g/C Ratio	0.12	0.12	0.85	0.85	0.85	
v/c Ratio	0.10	0.17	0.09	0.21	0.64	
Control Delay	33.7	15.2	3.1	2.6	6.3	
Queue Delay	0.0	0.0	0.0	0.0	0.0	
Total Delay	33.7	15.2	3.1	2.6	6.3	
LOS	C	B	A	A	A	
Approach Delay	21.8			2.6	6.3	
Approach LOS	C			A	A	
Queue Length 50th (m)	2.2	0.0	0.9	9.4	51.2	
Queue Length 95th (m)	9.0	8.1	3.0	17.4	96.3	
Internal Link Dist (m)	84.2			795.9	1276.9	
Turn Bay Length (m)	40.0		40.0			
Base Capacity (vph)	634	589	385	1582	1570	
Starvation Cap Reductn	0	0	0	0	0	
Spillback Cap Reductn	0	0	0	0	0	
Storage Cap Reductn	0	0	0	0	0	
Reduced v/c Ratio	0.03	0.06	0.09	0.20	0.61	

Intersection Summary
Cycle Length: 90
Actuated Cycle Length: 60.2
Control Type: Semi Act-Uncoord
Maximum v/c Ratio: 0.64
Intersection Signal Delay: 6.0 Intersection LOS: A
Intersection Capacity Utilization 67.5% ICU Level of Service C
Analysis Period (min) 15

Splits and Phases: 3: Site Access 1 & March Road

Synchro 10 Report

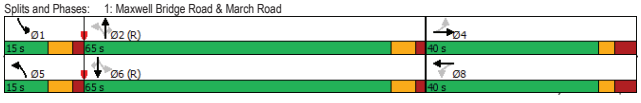
1020 and 1070 March
1: Maxwell Bridge Road & March Road

2031 FBG PM
07/16/2019

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	71	69	69	88	63	129	243	1315	143	108	613	89
Future Volume (vph)	71	69	69	88	63	129	243	1315	143	108	613	89
Satd. Flow (prot)	1695	1650	0	1695	1604	0	1695	3390	1517	1695	3390	1517
Flt Permitted	0.402			0.601			0.392			0.155		
Satd. Flow (perm)	717	1650	0	1072	1604	0	699	3390	1517	277	3390	1517
Satd. Flow (RTOR)		41			84				133			100
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Shared Lane Traffic (%)												
Lane Group Flow (vph)	71	138	0	88	192	0	243	1315	143	108	613	89
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
Total Split (s)	40.0	40.0		40.0	40.0		15.0	65.0	65.0	15.0	65.0	65.0
Total Lost Time (s)	7.3	7.3		7.3	7.3		6.7	6.6	6.6	6.7	6.6	6.6
Act Effct Green (s)	14.4	14.4		14.4	14.4		86.5	76.0	76.0	83.4	74.5	74.5
Actuated g/C Ratio	0.12	0.12		0.12	0.12		0.72	0.63	0.63	0.70	0.62	0.62
v/c Ratio	0.84	0.59		0.69	0.72		0.41	0.61	0.14	0.36	0.29	0.09
Control Delay	109.9	44.3		75.9	43.2		6.8	15.9	2.7	8.4	12.1	2.3
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	109.9	44.3		75.9	43.2		6.8	15.9	2.7	8.4	12.1	2.3
LOS	F	D		E	D		A	B	A	A	B	A
Approach Delay		66.6			53.4			13.5			10.5	
Approach LOS		E			D			B			B	
Queue Length 50th (m)	16.6	21.8		20.2	24.6		13.3	90.5	0.8	5.4	32.4	0.0
Queue Length 95th (m)	#33.2	39.8		35.7	46.5		27.0	140.1	10.1	12.7	54.6	6.4
Internal Link Dist (m)		75.7			119.4			174.9			207.9	
Turn Bay Length (m)	50.0			40.0			80.0			100.0		40.0
Base Capacity (vph)	195	479		292	498		594	2147	1009	307	2103	979
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	0.36	0.29		0.30	0.39		0.41	0.61	0.14	0.35	0.29	0.09

Intersection Summary
Cycle Length: 120
Actuated Cycle Length: 120
Offset: 18 (15%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.84
Intersection Signal Delay: 20.1 Intersection LOS: C
Intersection Capacity Utilization 84.0% ICU Level of Service E
Analysis Period (min) 15
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 1: Maxwell Bridge Road & March Road



Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	316	67	417	600	52	161
Future Volume (vph)	316	67	417	600	52	161
Satd. Flow (prot)	3237	0	1784	1517	1695	1784
Flt Permitted	0.960				0.328	
Satd. Flow (perm)	3237	0	1784	1517	585	1784
Satd. Flow (RTOR)	21			600		
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Shared Lane Traffic (%)						
Lane Group Flow (vph)	383	0	417	600	52	161
Turn Type	Prot		NA	Perm	pm+pt	NA
Protected Phases	8		2		1	6
Permitted Phases				2	6	
Total Split (s)	33.0		67.9	67.9	13.0	80.9
Total Lost Time (s)	6.3		6.3	6.3	6.3	6.3
Act Effct Green (s)	12.6		22.3	22.3	28.6	28.6
Actuated g/C Ratio	0.23		0.40	0.40	0.52	0.52
v/c Ratio	0.51		0.58	0.62	0.12	0.17
Control Delay	22.9		17.9	4.6	6.4	6.8
Queue Delay	0.0		0.0	0.0	0.0	0.0
Total Delay	22.9		17.9	4.6	6.4	6.8
LOS	C		B	A	A	A
Approach Delay	22.9		10.0			6.7
Approach LOS	C		B			A
Queue Length 50th (m)	18.4		36.2	0.0	2.1	7.0
Queue Length 95th (m)	36.8		67.5	16.7	6.6	16.4
Internal Link Dist (m)	257.3		110.4			200.5
Turn Bay Length (m)	90.0			110.0	90.0	
Base Capacity (vph)	1747		1684	1466	452	1769
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	0.22		0.25	0.41	0.12	0.09

Intersection Summary		
Cycle Length: 113.9		
Actuated Cycle Length: 55.3		
Control Type: Semi Act-Uncoord		
Maximum v/c Ratio: 0.62		
Intersection Signal Delay: 12.7	Intersection LOS: B	
Intersection Capacity Utilization 54.8%	ICU Level of Service A	
Analysis Period (min) 15		

Splits and Phases: 2: Dunrobin Road & March Road

Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	45	38	35	1086	502	18
Future Volume (vph)	45	38	35	1086	502	18
Satd. Flow (prot)	1695	1517	1695	1784	1775	0
Flt Permitted	0.950		0.467			
Satd. Flow (perm)	1695	1517	833	1784	1775	0
Satd. Flow (RTOR)		38			4	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Shared Lane Traffic (%)						
Lane Group Flow (vph)	45	38	35	1086	520	0
Turn Type	Prot	Perm	Perm	NA	NA	
Protected Phases	4			2	6	
Permitted Phases		4	2			
Total Split (s)	24.7	24.7	95.3	95.3	95.3	
Total Lost Time (s)	4.7	4.7	6.6	6.6	6.6	
Act Effct Green (s)	8.5	8.5	61.5	61.5	61.5	
Actuated g/C Ratio	0.11	0.11	0.81	0.81	0.81	
v/c Ratio	0.24	0.19	0.05	0.75	0.36	
Control Delay	41.8	16.3	2.7	10.0	3.9	
Queue Delay	0.0	0.0	0.0	0.0	0.0	
Total Delay	41.8	16.3	2.7	10.0	3.9	
LOS	D	B	A	A	A	
Approach Delay	30.1			9.7	3.9	
Approach LOS	C			A	A	
Queue Length 50th (m)	6.3	0.0	1.0	77.6	20.3	
Queue Length 95th (m)	19.9	9.6	3.3	152.2	37.5	
Internal Link Dist (m)	57.0			795.9	1276.9	
Turn Bay Length (m)	40.0		40.0			
Base Capacity (vph)	504	477	802	1717	1708	
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	0.09	0.08	0.04	0.63	0.30	

Intersection Summary		
Cycle Length: 120		
Actuated Cycle Length: 76.1		
Control Type: Semi Act-Uncoord		
Maximum v/c Ratio: 0.75		
Intersection Signal Delay: 9.0	Intersection LOS: A	
Intersection Capacity Utilization 73.9%	ICU Level of Service D	
Analysis Period (min) 15		

Splits and Phases: 3: Site Access 1 & March Road

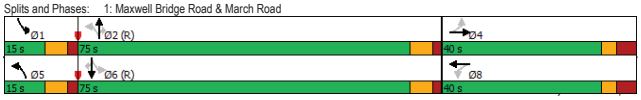
C.3 2031 TOTAL FUTURE CONDITIONS

1020 and 1070 March — 2031 TF AM
1: Maxwell Bridge Road & March Road — 07/16/2019

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	81	41	159	160	18	32	104	559	66	94	1385	56
Future Volume (vph)	81	41	159	160	18	32	104	559	66	94	1385	56
Satd. Flow (prot)	1695	1572	0	1695	1613	0	1695	3390	1517	1695	3390	1517
Flt Permitted	0.724			0.492			0.117			0.421		
Satd. Flow (perm)	1292	1572	0	878	1613	0	209	3390	1517	751	3390	1517
Satd. Flow (RTOR)		143			32				92			92
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Shared Lane Traffic (%)												
Lane Group Flow (vph)	81	200	0	160	50	0	104	559	66	94	1385	56
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
Total Split (s)	40.0	40.0		40.0	40.0		15.0	75.0	75.0	15.0	75.0	75.0
Total Lost Time (s)	7.3	7.3		7.3	7.3		6.7	6.6	6.6	6.7	6.6	6.6
Act Effct Green (s)	25.8	25.8		25.8	25.8		83.7	76.0	76.0	83.3	75.8	75.8
Actuated g/C Ratio	0.20	0.20		0.20	0.20		0.64	0.58	0.58	0.64	0.58	0.58
v/c Ratio	0.32	0.47		0.92	0.14		0.47	0.28	0.07	0.18	0.70	0.06
Control Delay	45.8	16.9		99.9	19.7		15.1	15.0	1.5	8.6	22.9	0.9
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	45.8	16.9		99.9	19.7		15.1	15.0	1.5	8.6	22.9	0.9
LOS	D	B		F	B		B	B	A	A	C	A
Approach Delay		25.3			80.8			13.7			21.2	
Approach LOS		C			F			B			C	
Queue Length 50th (m)	17.7	12.1		40.1	3.7		8.2	36.7	0.0	7.4	129.3	0.0
Queue Length 95th (m)	31.0	32.6		#70.0	13.7		16.6	53.3	3.6	15.2	173.4	2.0
Internal Link Dist (m)		75.7			119.4			174.9			207.9	
Turn Bay Length (m)	50.0			40.0			80.0			100.0		40.0
Base Capacity (vph)	324	502		220	429		232	1980	924	546	1975	922
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	0.25	0.40		0.73	0.12		0.45	0.28	0.07	0.17	0.70	0.06

Intersection Summary
Cycle Length: 130
Actuated Cycle Length: 130
Offset: 69 (53%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.92
Intersection Signal Delay: 24.2 — Intersection LOS: C
Intersection Capacity Utilization 91.7% — ICU Level of Service F
Analysis Period (min) 15
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 1: Maxwell Bridge Road & March Road

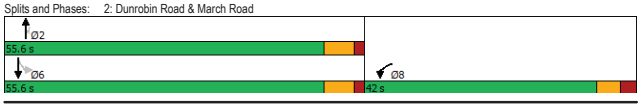


1020 and 1070 March — 2031 TF AM
2: Dunrobin Road & March Road — 07/16/2019

Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	516	45	166	244	49	365
Future Volume (vph)	516	45	166	244	49	365
Satd. Flow (prot)	3270	0	1784	1517	1695	1784
Flt Permitted	0.956				0.652	
Satd. Flow (perm)	3270	0	1784	1517	1163	1784
Satd. Flow (RTOR)	11			244		
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Shared Lane Traffic (%)						
Lane Group Flow (vph)	561	0	166	244	49	365
Turn Type	Prot		NA	Perm	Perm	NA
Protected Phases	8		2			6
Permitted Phases				2	6	
Total Split (s)	42.0		55.6	55.6	55.6	55.6
Total Lost Time (s)	6.3		6.3	6.3	6.3	6.3
Act Effct Green (s)	12.8		14.7	14.7	14.7	14.7
Actuated g/C Ratio	0.32		0.36	0.36	0.36	0.36
v/c Ratio	0.54		0.26	0.35	0.12	0.57
Control Delay	14.0		10.6	3.3	9.8	14.6
Queue Delay	0.0		0.0	0.0	0.0	0.0
Total Delay	14.0		10.6	3.3	9.8	14.6
LOS	B		B	A	A	B
Approach Delay	14.0		6.3			14.0
Approach LOS	B		A			B
Queue Length 50th (m)	14.9		7.3	0.0	2.0	18.4
Queue Length 95th (m)	32.8		19.7	9.9	7.8	43.5
Internal Link Dist (m)	257.3		110.4			200.5
Turn Bay Length (m)	90.0			110.0	90.0	
Base Capacity (vph)	2877		1752	1494	1142	1752
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	0.19		0.09	0.16	0.04	0.21

Intersection Summary
Cycle Length: 97.6
Actuated Cycle Length: 40.5
Control Type: Semi Act-Uncoord
Maximum v/c Ratio: 0.57
Intersection Signal Delay: 11.7 — Intersection LOS: B
Intersection Capacity Utilization 47.8% — ICU Level of Service A
Analysis Period (min) 15

Splits and Phases: 2: Dunrobin Road & March Road



Synchro 10 Report

1020 and 1070 March — 2031 TF AM
3: Site Access 1 & March Road — 07/16/2019

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	19	23	34	167	51	39	33	314	72	16	907	55
Future Volume (vph)	19	23	34	167	51	39	33	314	72	16	907	55
Satd. Flow (prot)	1695	1626	0	1695	1668	0	1695	1784	1517	1695	1768	0
Flt Permitted	0.699			0.720			0.166			0.570		
Satd. Flow (perm)	1247	1626	0	1285	1668	0	296	1784	1517	1017	1768	0
Satd. Flow (RTOR)		34			29				72		6	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Shared Lane Traffic (%)												
Lane Group Flow (vph)	19	57	0	167	90	0	33	314	72	16	962	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		
Total Split (s)	30.0	30.0		30.0	30.0		90.0	90.0	90.0	90.0	90.0	
Total Lost Time (s)	4.7	4.7		4.7	4.7		6.6	6.6	6.6	6.6	6.6	
Act Effct Green (s)	16.3	16.3		16.3	16.3		53.5	53.5	53.5	53.5	53.5	
Actuated g/C Ratio	0.20	0.20		0.20	0.20		0.65	0.65	0.65	0.65	0.65	
v/c Ratio	0.08	0.16		0.65	0.25		0.17	0.27	0.07	0.02	0.83	
Control Delay	33.7	19.1		47.0	25.5		8.5	6.8	1.6	5.6	18.7	
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	
Total Delay	33.7	19.1		47.0	25.5		8.5	6.8	1.6	5.6	18.7	
LOS	C	B		D	C		A	A	A	A	B	
Approach Delay		22.7			39.5			6.0			18.5	
Approach LOS		C			D			A			B	
Queue Length 50th (m)	2.2	2.7		21.8	7.2		1.7	16.9	0.0	0.7	93.0	
Queue Length 95th (m)	10.2	15.6		59.6	26.3		6.7	36.3	4.1	3.2	194.9	
Internal Link Dist (m)		84.2			81.4			795.9			1276.9	
Turn Bay Length (m)	40.0			40.0			80.0		80.0	80.0		
Base Capacity (vph)	414	563		427	574		270	1631	1393	930	1617	
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	0.10		0.39	0.16		0.12	0.19	0.05	0.02	0.59	

Intersection Summary
Cycle Length: 120
Actuated Cycle Length: 81.9
Control Type: Semi Act-Uncoord
Maximum v/c Ratio: 0.83
Intersection Signal Delay: 18.8 — Intersection LOS: B
Intersection Capacity Utilization 79.8% — ICU Level of Service D
Analysis Period (min) 15

Splits and Phases: 3: Site Access 1 & March Road

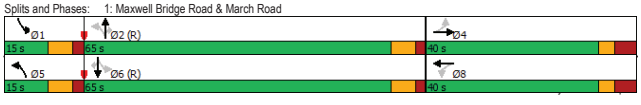
Synchro 10 Report

1020 and 1070 March — 2031 TF PM
1: Maxwell Bridge Road & March Road — 07/16/2019

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	71	69	69	88	63	129	243	1490	143	108	727	89
Future Volume (vph)	71	69	69	88	63	129	243	1490	143	108	727	89
Satd. Flow (prot)	1695	1650	0	1695	1604	0	1695	3390	1517	1695	3390	1517
Flt Permitted	0.402			0.601			0.342			0.112		
Satd. Flow (perm)	717	1650	0	1072	1604	0	610	3390	1517	200	3390	1517
Satd. Flow (RTOR)		41			84				117			100
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Shared Lane Traffic (%)												
Lane Group Flow (vph)	71	138	0	88	192	0	243	1490	143	108	727	89
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
Total Split (s)	40.0	40.0		40.0	40.0		15.0	65.0	65.0	15.0	65.0	65.0
Total Lost Time (s)	7.3	7.3		7.3	7.3		6.7	6.6	6.6	6.7	6.6	6.6
Act Effct Green (s)	14.4	14.4		14.4	14.4		85.9	75.4	75.4	84.0	74.5	74.5
Actuated g/C Ratio	0.12	0.12		0.12	0.12		0.72	0.63	0.63	0.70	0.62	0.62
v/c Ratio	0.84	0.59		0.69	0.72		0.46	0.70	0.14	0.42	0.35	0.09
Control Delay	109.9	44.3		75.9	43.2		7.6	18.5	3.6	10.6	12.7	2.3
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	109.9	44.3		75.9	43.2		7.6	18.5	3.6	10.6	12.7	2.3
LOS	F	D		E	D		A	B	A	B	B	A
Approach Delay		66.6			53.4			16.0			11.4	
Approach LOS		E			D			B			B	
Queue Length 50th (m)	16.6	21.8		20.2	24.6		13.3	112.8	2.1	5.4	40.1	0.0
Queue Length 95th (m)	#33.2	39.8		35.7	46.5		27.0	178.7	12.4	13.3	66.5	6.4
Internal Link Dist (m)		75.7			119.4			174.9			207.9	
Turn Bay Length (m)	50.0			40.0			80.0			100.0		40.0
Base Capacity (vph)	195	479		292	498		534	2131	997	266	2103	979
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	0.36	0.29		0.30	0.39		0.46	0.70	0.14	0.41	0.35	0.09

Intersection Summary
Cycle Length: 120
Actuated Cycle Length: 120
Offset: 18 (15%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.84
Intersection Signal Delay: 21.1 — Intersection LOS: C
Intersection Capacity Utilization 89.1% — ICU Level of Service E
Analysis Period (min) 15
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 1: Maxwell Bridge Road & March Road



Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	335	67	431	613	52	183
Future Volume (vph)	335	67	431	613	52	183
Satd. Flow (prot)	3240	0	1784	1517	1695	1784
Flt Permitted	0.960				0.318	
Satd. Flow (perm)	3240	0	1784	1517	567	1784
Satd. Flow (RTOR)	20			613		
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Shared Lane Traffic (%)						
Lane Group Flow (vph)	402	0	431	613	52	183
Turn Type	Prot		NA	Perm	pm+pt	NA
Protected Phases	8		2		1	6
Permitted Phases				2	6	
Total Split (s)	33.0		67.9	67.9	13.0	80.9
Total Lost Time (s)	6.3		6.3	6.3	6.3	6.3
Act Effct Green (s)	13.2		23.1	23.1	29.5	29.5
Actuated g/C Ratio	0.23		0.41	0.41	0.52	0.52
v/c Ratio	0.52		0.59	0.62	0.12	0.20
Control Delay	23.5		18.3	4.6	6.6	7.1
Queue Delay	0.0		0.0	0.0	0.0	0.0
Total Delay	23.5		18.3	4.6	6.6	7.1
LOS	C		B	A	A	A
Approach Delay	23.5		10.2			7.0
Approach LOS	C		B			A
Queue Length 50th (m)	20.0		38.4	0.0	2.2	8.3
Queue Length 95th (m)	39.5		71.4	16.8	6.8	19.0
Internal Link Dist (m)	257.3		110.4			200.5
Turn Bay Length (m)	90.0			110.0	90.0	
Base Capacity (vph)	1710		1668	1458	443	1759
Starvation Cap Reductn	0		0	0	0	0
Spillback Cap Reductn	0		0	0	0	0
Storage Cap Reductn	0		0	0	0	0
Reduced v/c Ratio	0.24		0.26	0.42	0.12	0.10

Intersection Summary
Cycle Length: 113.9
Actuated Cycle Length: 56.7
Control Type: Semi Act-Uncoord
Maximum v/c Ratio: 0.62
Intersection Signal Delay: 13.0 Intersection LOS: B
Intersection Capacity Utilization 56.2% ICU Level of Service B
Analysis Period (min) 15

Splits and Phases: 2: Dunrobin Road & March Road

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	45	54	38	118	35	37	35	1076	185	44	499	18
Future Volume (vph)	45	54	38	118	35	37	35	1076	185	44	499	18
Satd. Flow (prot)	1695	1674	0	1695	1647	0	1695	1784	1517	1695	1775	0
Flt Permitted	0.710			0.697			0.445			0.139		
Satd. Flow (perm)	1267	1674	0	1244	1647	0	794	1784	1517	248	1775	0
Satd. Flow (RTOR)		25			37				185		4	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Shared Lane Traffic (%)												
Lane Group Flow (vph)	45	92	0	118	72	0	35	1076	185	44	517	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		
Total Split (s)	25.0	25.0		25.0	25.0		95.0	95.0	95.0	95.0	95.0	
Total Lost Time (s)	4.7	4.7		4.7	4.7		6.6	6.6	6.6	6.6	6.6	
Act Effct Green (s)	13.9	13.9		13.9	13.9		61.0	61.0	61.0	61.0	61.0	
Actuated g/C Ratio	0.16	0.16		0.16	0.16		0.70	0.70	0.70	0.70	0.70	
v/c Ratio	0.22	0.32		0.60	0.24		0.06	0.86	0.17	0.25	0.41	
Control Delay	40.4	32.0		51.7	24.1		4.6	18.5	1.0	9.2	6.6	
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	
Total Delay	40.4	32.0		51.7	24.1		4.6	18.5	1.0	9.2	6.6	
LOS	D	C		D	C		A	B	A	A	A	
Approach Delay		34.7			41.2			15.7			6.8	
Approach LOS		C			D			B			A	
Queue Length 50th (m)	6.1	9.1		17.1	4.7		1.5	108.9	0.0	2.2	29.0	
Queue Length 95th (m)	20.3	29.2		45.5	20.2		4.8	217.3	5.3	8.2	55.1	
Internal Link Dist (m)		57.0			59.2			795.9			1276.9	
Turn Bay Length (m)	40.0			40.0			80.0		80.0	80.0		
Base Capacity (vph)	316	436		310	439		725	1630	1402	226	1622	
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	0.14	0.21		0.38	0.16		0.05	0.66	0.13	0.19	0.32	

Intersection Summary
Cycle Length: 120
Actuated Cycle Length: 87
Control Type: Semi Act-Uncoord
Maximum v/c Ratio: 0.86
Intersection Signal Delay: 16.8 Intersection LOS: B
Intersection Capacity Utilization 82.8% ICU Level of Service E
Analysis Period (min) 15

Splits and Phases: 3: Site Access 1 & March Road

C.4 2036 ULTIMATE CONDITIONS

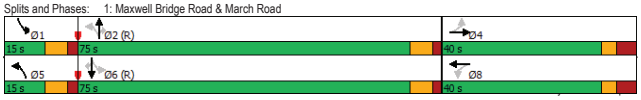
1020 and 1070 March
1: Maxwell Bridge Road & March Road

2036 Ult AM
07/16/2019

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	81	42	162	165	19	32	105	563	68	95	1400	56
Future Volume (vph)	81	42	162	165	19	32	105	563	68	95	1400	56
Satd. Flow (prot)	1695	1572	0	1695	1617	0	1695	3390	1517	1695	3390	1517
Flt Permitted	0.724			0.491			0.111			0.416		
Satd. Flow (perm)	1292	1572	0	876	1617	0	198	3390	1517	742	3390	1517
Satd. Flow (RTOR)		143			32				92			92
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Shared Lane Traffic (%)												
Lane Group Flow (vph)	81	204	0	165	51	0	105	563	68	95	1400	56
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
Total Split (s)	40.0	40.0		40.0	40.0		15.0	75.0	75.0	15.0	75.0	75.0
Total Lost Time (s)	7.3	7.3		7.3	7.3		6.7	6.6	6.6	6.7	6.6	6.6
Act Effct Green (s)	26.8	26.8		26.8	26.8		82.7	74.9	74.9	82.4	74.8	74.8
Actuated g/C Ratio	0.21	0.21		0.21	0.21		0.64	0.58	0.58	0.63	0.58	0.58
v/c Ratio	0.31	0.47		0.92	0.14		0.49	0.29	0.07	0.18	0.72	0.06
Control Delay	44.9	17.1		97.6	19.5		16.3	15.5	1.6	8.9	24.0	0.9
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	44.9	17.1		97.6	19.5		16.3	15.5	1.6	8.9	24.0	0.9
LOS	D	B		F	B		B	B	A	A	C	A
Approach Delay		25.0			79.2			14.3			22.2	
Approach LOS		C			E			B			C	
Queue Length 50th (m)	17.5	12.8		41.1	3.9		8.6	38.2	0.0	7.7	135.4	0.0
Queue Length 95th (m)	31.0	33.8		#73.4	14.1		16.8	53.6	4.0	15.3	177.0	2.0
Internal Link Dist (m)		75.7			119.4			174.9			207.9	
Turn Bay Length (m)	50.0			40.0			80.0			100.0		40.0
Base Capacity (vph)	324	502		220	430		225	1958	915	536	1956	914
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	0.25	0.41		0.75	0.12		0.47	0.29	0.07	0.18	0.72	0.06

Intersection Summary
Cycle Length: 130
Actuated Cycle Length: 130
Offset: 69 (53%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.92
Intersection Signal Delay: 24.8 Intersection LOS: C
Intersection Capacity Utilization 92.8% ICU Level of Service F
Analysis Period (min) 15
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 1: Maxwell Bridge Road & March Road



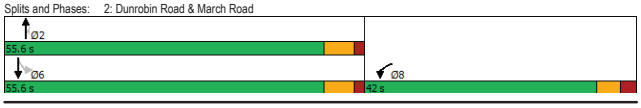
1020 and 1070 March
2: Dunrobin Road & March Road

2036 Ult AM
07/16/2019

Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	524	46	168	248	51	373
Future Volume (vph)	524	46	168	248	51	373
Satd. Flow (prot)	3270	0	1784	1517	1695	1784
Flt Permitted	0.956				0.651	
Satd. Flow (perm)	3270	0	1784	1517	1162	1784
Satd. Flow (RTOR)	11			248		
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Shared Lane Traffic (%)						
Lane Group Flow (vph)	570	0	168	248	51	373
Turn Type	Prot		NA	Perm	Perm	NA
Protected Phases	8		2			6
Permitted Phases				2	6	
Total Split (s)	42.0		55.6	55.6	55.6	55.6
Total Lost Time (s)	6.3		6.3	6.3	6.3	6.3
Act Effct Green (s)	13.0		15.0	15.0	15.0	15.0
Actuated g/C Ratio	0.32		0.36	0.36	0.36	0.36
v/c Ratio	0.55		0.26	0.35	0.12	0.57
Control Delay	14.2		10.7	3.3	9.9	14.8
Queue Delay	0.0		0.0	0.0	0.0	0.0
Total Delay	14.2		10.7	3.3	9.9	14.8
LOS	B		B	A	A	B
Approach Delay	14.2		6.3			14.2
Approach LOS	B		A			B
Queue Length 50th (m)	15.4		7.5	0.0	2.2	19.0
Queue Length 95th (m)	33.8		20.1	10.0	8.0	45.1
Internal Link Dist (m)	257.3		110.4			200.5
Turn Bay Length (m)	90.0			110.0	90.0	
Base Capacity (vph)	2854		1747	1491	1138	1747
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	0.20		0.10	0.17	0.04	0.21

Intersection Summary
Cycle Length: 97.6
Actuated Cycle Length: 41.1
Control Type: Semi Act-Uncoord
Maximum v/c Ratio: 0.57
Intersection Signal Delay: 11.8 Intersection LOS: B
Intersection Capacity Utilization 48.5% ICU Level of Service A
Analysis Period (min) 15

Splits and Phases: 2: Dunrobin Road & March Road



Synchro 10 Report

1020 and 1070 March
3: Site Access 1 & March Road

2036 Ult AM
07/16/2019

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	19	23	34	167	51	39	33	319	72	16	924	55
Future Volume (vph)	19	23	34	167	51	39	33	319	72	16	924	55
Satd. Flow (prot)	1695	1626	0	1695	1668	0	1695	1784	1517	1695	1770	0
Flt Permitted	0.699			0.720			0.158			0.567		
Satd. Flow (perm)	1247	1626	0	1285	1668	0	282	1784	1517	1012	1770	0
Satd. Flow (RTOR)		34			29				72		6	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Shared Lane Traffic (%)												
Lane Group Flow (vph)	19	57	0	167	90	0	33	319	72	16	979	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		
Total Split (s)	30.0	30.0		30.0	30.0		90.0	90.0	90.0	90.0	90.0	
Total Lost Time (s)	4.7	4.7		4.7	4.7		6.6	6.6	6.6	6.6	6.6	
Act Effct Green (s)	16.5	16.5		16.5	16.5		54.7	54.7	54.7	54.7	54.7	
Actuated g/C Ratio	0.20	0.20		0.20	0.20		0.66	0.66	0.66	0.66	0.66	
v/c Ratio	0.08	0.16		0.66	0.26		0.18	0.27	0.07	0.02	0.84	
Control Delay	34.3	19.3		47.8	25.9		8.7	6.8	1.6	5.6	19.3	
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	
Total Delay	34.3	19.3		47.8	25.9		8.7	6.8	1.6	5.6	19.3	
LOS	C	B		D	C		A	A	A	A	B	
Approach Delay		23.1			40.1			6.1			19.1	
Approach LOS		C			D			A			B	
Queue Length 50th (m)	2.3	2.7		22.4	7.4		1.7	17.5	0.0	0.7	97.9	
Queue Length 95th (m)	10.2	15.6		59.6	26.3		6.9	36.8	4.1	3.2	203.3	
Internal Link Dist (m)		84.2			81.4			795.9			1276.9	
Turn Bay Length (m)	40.0			40.0			80.0		80.0	80.0		
Base Capacity (vph)	407	554		419	564		256	1619	1384	919	1607	
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	0.10		0.40	0.16		0.13	0.20	0.05	0.02	0.61	

Intersection Summary
Cycle Length: 120
Actuated Cycle Length: 83.3
Control Type: Semi Act-Uncoord
Maximum v/c Ratio: 0.84
Intersection Signal Delay: 19.2 Intersection LOS: B
Intersection Capacity Utilization 80.7% ICU Level of Service D
Analysis Period (min) 15

Splits and Phases: 3: Site Access 1 & March Road

Synchro 10 Report

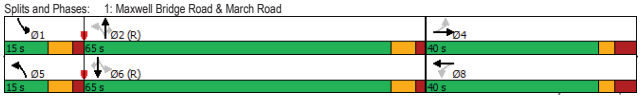
1020 and 1070 March
1: Maxwell Bridge Road & March Road

2036 Ult PM
07/16/2019

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	71	70	70	90	65	131	248	1509	147	110	734	89
Future Volume (vph)	71	70	70	90	65	131	248	1509	147	110	734	89
Satd. Flow (prot)	1695	1650	0	1695	1606	0	1695	3390	1517	1695	3390	1517
Flt Permitted	0.392			0.595			0.338			0.107		
Satd. Flow (perm)	699	1650	0	1062	1606	0	603	3390	1517	191	3390	1517
Satd. Flow (RTOR)		41			83				119			100
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Shared Lane Traffic (%)												
Lane Group Flow (vph)	71	140	0	90	196	0	248	1509	147	110	734	89
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
Total Split (s)	40.0	40.0		40.0	40.0		15.0	65.0	65.0	15.0	65.0	65.0
Total Lost Time (s)	7.3	7.3		7.3	7.3		6.7	6.6	6.6	6.7	6.6	6.6
Act Effct Green (s)	14.6	14.6		14.6	14.6		85.7	75.0	75.0	83.6	74.0	74.0
Actuated g/C Ratio	0.12	0.12		0.12	0.12		0.71	0.62	0.62	0.70	0.62	0.62
v/c Ratio	0.84	0.59		0.70	0.73		0.47	0.71	0.15	0.43	0.35	0.09
Control Delay	110.7	44.1		76.2	44.1		7.9	19.2	3.8	12.0	13.0	2.3
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	110.7	44.1		76.2	44.1		7.9	19.2	3.8	12.0	13.0	2.3
LOS	F	D		E	D		A	B	A	B	B	A
Approach Delay		66.5			54.2			16.5			11.8	
Approach LOS		E			D			B			B	
Queue Length 50th (m)	16.6	22.2		20.7	25.9		13.7	116.1	2.3	5.6	41.0	0.0
Queue Length 95th (m)	#33.3	40.0		36.1	47.8		28.1	185.4	12.8	15.1	68.3	6.5
Internal Link Dist (m)		75.7			119.4			174.9			207.9	
Turn Bay Length (m)	50.0			40.0			80.0			100.0		40.0
Base Capacity (vph)	190	479		289	498		530	2119	993	261	2091	974
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	0.37	0.29		0.31	0.39		0.47	0.71	0.15	0.42	0.35	0.09

Intersection Summary
Cycle Length: 120
Actuated Cycle Length: 120
Offset: 18 (15%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.84
Intersection Signal Delay: 21.6 Intersection LOS: C
Intersection Capacity Utilization 90.0% ICU Level of Service E
Analysis Period (min) 15
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 1: Maxwell Bridge Road & March Road



Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	339	68	439	626	48	185
Future Volume (vph)	339	68	439	626	48	185
Satd. Flow (prot)	3240	0	1784	1517	1695	1784
Flt Permitted	0.960				0.314	
Satd. Flow (perm)	3240	0	1784	1517	560	1784
Satd. Flow (RTOR)	20			626		
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Shared Lane Traffic (%)						
Lane Group Flow (vph)	407	0	439	626	48	185
Turn Type	Prot		NA	Perm	pm+pt	NA
Protected Phases	8		2		1	6
Permitted Phases				2	6	
Total Split (s)	32.0		68.9	68.9	13.0	81.9
Total Lost Time (s)	6.3		6.3	6.3	6.3	6.3
Act Effct Green (s)	13.3		23.5	23.5	29.9	29.9
Actuated g/C Ratio	0.23		0.41	0.41	0.52	0.52
v/c Ratio	0.53		0.60	0.63	0.11	0.20
Control Delay	23.9		18.3	4.6	6.5	7.1
Queue Delay	0.0		0.0	0.0	0.0	0.0
Total Delay	23.9		18.3	4.6	6.5	7.1
LOS	C		B	A	A	A
Approach Delay	23.9		10.3			7.0
Approach LOS	C		B			A
Queue Length 50th (m)	20.4		39.4	0.0	2.0	8.5
Queue Length 95th (m)	40.4		73.2	16.8	6.4	19.2
Internal Link Dist (m)	257.3		110.4			200.5
Turn Bay Length (m)	90.0			110.0	90.0	
Base Capacity (vph)	1633		1671	1460	440	1760
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	0.25		0.26	0.43	0.11	0.11

Intersection Summary
Cycle Length: 113.9
Actuated Cycle Length: 57.2
Control Type: Semi Act-Uncoord
Maximum v/c Ratio: 0.63
Intersection Signal Delay: 13.1 Intersection LOS: B
Intersection Capacity Utilization 56.8% ICU Level of Service B
Analysis Period (min) 15

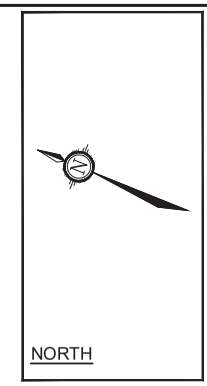
Splits and Phases: 2: Dunrobin Road & March Road

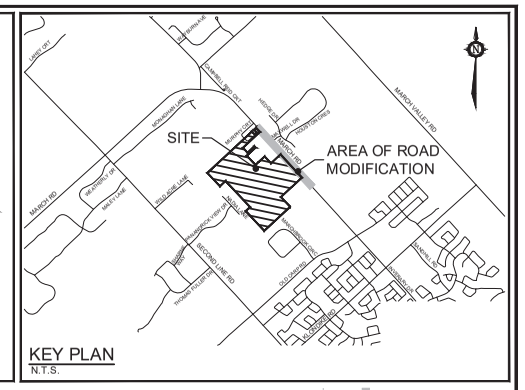
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	45	54	38	118	35	37	35	1097	185	44	508	18
Future Volume (vph)	45	54	38	118	35	37	35	1097	185	44	508	18
Satd. Flow (prot)	1695	1674	0	1695	1647	0	1695	1784	1517	1695	1775	0
Flt Permitted	0.710			0.697			0.440			0.132		
Satd. Flow (perm)	1267	1674	0	1244	1647	0	785	1784	1517	236	1775	0
Satd. Flow (RTOR)		25			37				185		4	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Shared Lane Traffic (%)												
Lane Group Flow (vph)	45	92	0	118	72	0	35	1097	185	44	526	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		
Total Split (s)	25.0	25.0		25.0	25.0		95.0	95.0	95.0	95.0	95.0	
Total Lost Time (s)	4.7	4.7		4.7	4.7		6.6	6.6	6.6	6.6	6.6	
Act Effct Green (s)	14.1	14.1		14.1	14.1		63.4	63.4	63.4	63.4	63.4	
Actuated g/C Ratio	0.16	0.16		0.16	0.16		0.71	0.71	0.71	0.71	0.71	
v/c Ratio	0.23	0.32		0.60	0.25		0.06	0.87	0.16	0.27	0.42	
Control Delay	41.4	32.8		53.2	24.6		4.6	19.3	1.0	9.6	6.6	
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	
Total Delay	41.4	32.8		53.2	24.6		4.6	19.3	1.0	9.6	6.6	
LOS	D	C		D	C		A	B	A	A	A	
Approach Delay		35.6			42.3			16.3			6.8	
Approach LOS		D			D			B			A	
Queue Length 50th (m)	6.4	9.6		17.9	4.9		1.5	117.1	0.0	2.2	30.4	
Queue Length 95th (m)	20.3	29.2		45.5	20.2		4.8	229.8	5.3	8.5	56.4	
Internal Link Dist (m)		57.0			59.2			795.9			1276.9	
Turn Bay Length (m)	40.0			40.0			80.0		80.0	80.0		
Base Capacity (vph)	305	422		300	425		711	1616	1392	214	1608	
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	0.15	0.22		0.39	0.17		0.05	0.68	0.13	0.21	0.33	

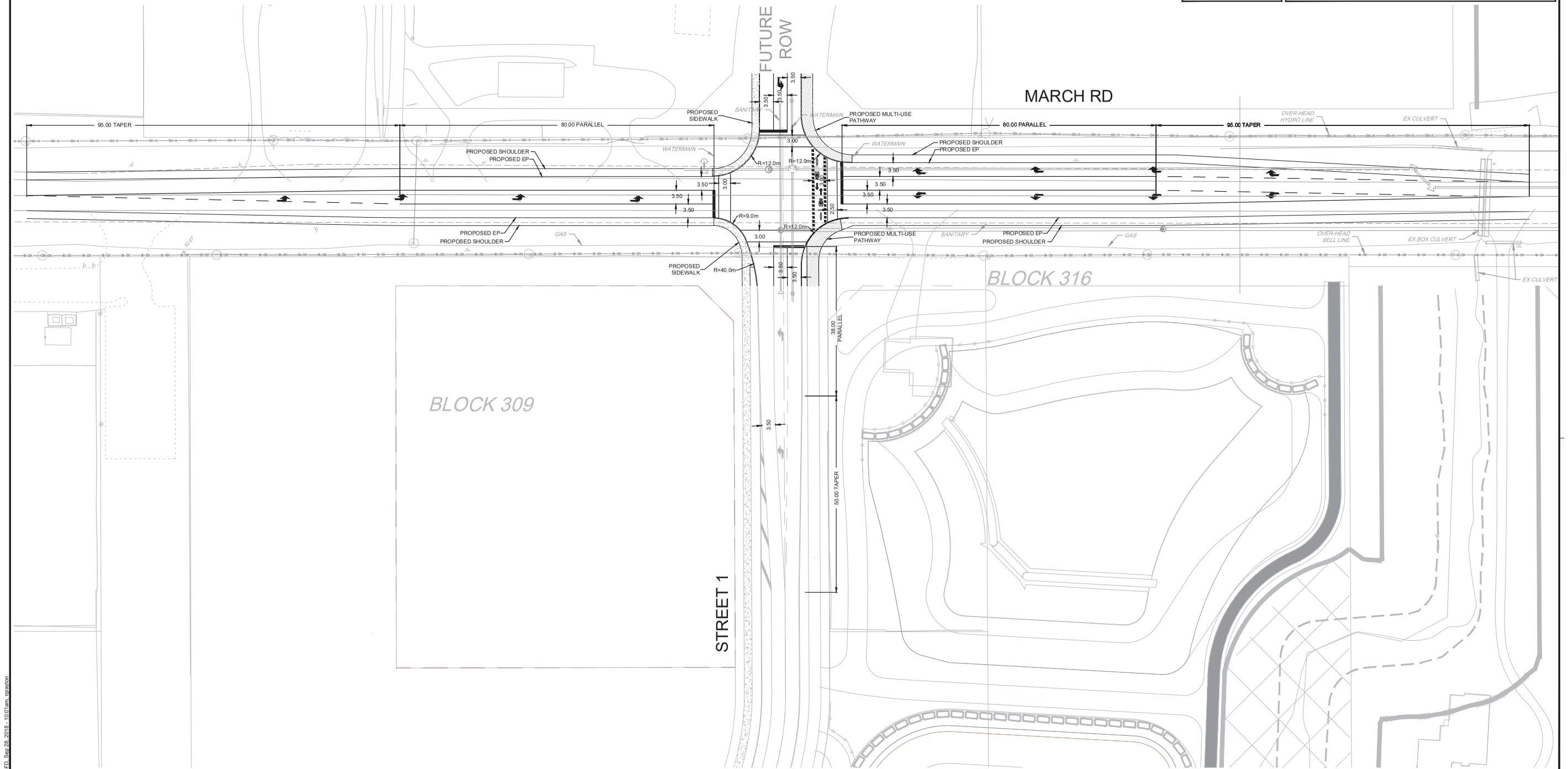
Intersection Summary
Cycle Length: 120
Actuated Cycle Length: 89.6
Control Type: Semi Act-Uncoord
Maximum v/c Ratio: 0.87
Intersection Signal Delay: 17.3 Intersection LOS: B
Intersection Capacity Utilization 83.9% ICU Level of Service E
Analysis Period (min) 15

Splits and Phases: 3: Site Access 1 & March Road

Appendix D MARCH ROAD AT SITE ACCESS FUNCTIONAL DESIGN







NOTE:
THE POSITION OF ALL POLE LINES, CONDUITS, WATERMAINS, SEWERS AND OTHER UNDERGROUND AND OVERGROUND UTILITIES AND STRUCTURES IS NOT NECESSARILY SHOWN ON THE CONTRACT DRAWINGS, AND WHERE SHOWN, THE ACCURACY OF THE POSITION OF SUCH UTILITIES AND STRUCTURES IS NOT GUARANTEED. BEFORE STARTING WORK, DETERMINE THE EXACT LOCATION OF ALL SUCH UTILITIES AND STRUCTURES AND ASSUME ALL LIABILITY FOR DAMAGE TO THEM.

No.	REVISION	DATE	BY
1.	ISSUED FOR CITY OF OTTAWA REVIEW	SEPT 28/18	BJB

SCALE
1:500
1:500
0 5 10 15 20

DESIGN BJB
CHECKED JLL
DRAWN RCH
CHECKED BJB
APPROVED JLL

FOR REVIEW ONLY

NOVATECH
Engineers, Planners & Landscape Architects
Suite 200, 240 Michael Cowpland Drive
Ottawa, Ontario, Canada K2M 1P6
Telephone (613) 254-9643
Facsimile (613) 254-5867
Website www.novatech-eng.com

LOCATION
CITY of OTTAWA
MULTIVESCO LANDS - KANATA NORTH

DRAWING NAME
MARCH ROAD/STREET 1
MODIFICATIONS
FUNCTIONAL DESIGN

PROJECT No. 116132-00
REV REV # 1
DRAWING No. 116132-FD

M:\2016\116132\CAD\Design\116132-FD.dwg, 116132-RMA-FD, Sep 28, 2018 - 10:31am, mravton

Appendix E CORRESPONDANCE

From:	Franklin, Carol
To:	O"Grady, Lauren
Cc:	Doueidar, Rahmie; McMahon, Patrick; Baggs, Rosanna; Danny Page; Moroz, Peter; Smadella, Karin
Subject:	RE: 1020 and 1070 March Road - Step 3 TIA
Date:	Tuesday, July 2, 2019 1:47:55 PM

Hi Lauren,

My response is in purple below.

Carol

From: O'Grady, Lauren <Lauren.OGrady@stantec.com>
Sent: July 02, 2019 8:22 AM
To: Franklin, Carol <carol.franklin@ottawa.ca>
Cc: Doueidar, Rahmie <Rahmie.Doueidar@ottawa.ca>; McMahon, Patrick <patrick.mcmahon@ottawa.ca>; Baggs, Rosanna <Rosanna.Baggs@ottawa.ca>; Danny Page <dpage@valecraft.com>; Moroz, Peter <peter.moroz@stantec.com>; Smadella, Karin <Karin.Smadella@stantec.com>
Subject: RE: 1020 and 1070 March Road - Step 3 TIA

Good morning Carol,

I hope you had a great Canada Day long weekend. Thank you for providing your responses. I've included some follow up responses to two of the points below in green for you to review.

Thank you,

Lauren O'Grady P.Eng.
Transportation Engineer

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

Stantec
400 - 1331 Clyde Avenue
Ottawa ON K2C 3G4

From: Franklin, Carol <carol.franklin@ottawa.ca>
Sent: Friday, June 28, 2019 3:17 PM

To: O'Grady, Lauren <Lauren.OGrady@stantec.com>
Cc: Doueidar, Rahmie <Rahmie.Doueidar@ottawa.ca>; McMahon, Patrick <patrick.mcmahon@ottawa.ca>; Baggs, Rosanna <Rosanna.Baggs@ottawa.ca>
Subject: RE: 1020 and 1070 March Road - Step 3 TIA

Hi Lauren,

I've just copied your response and added answers.

I've considered the comments you provided below and have the following responses:

- **School land use: OK**
  - Transit modal share will be revised to 70% per your comment below. As such, I will not include any internal capture for the school land use.
- **Commercial land use: OK**
  - The 50% internal capture rate that I assumed in the Step 3 report can be justified as follows:
    - The blocks are designated as 'neighbourhood commercial' and not 'community commercial' as per the TMP. This implies that the commercial blocks will service the immediate neighbourhood instead of the entire KNUEA community.
    - There may be commercial accesses along Street 1, which would allow the residents from the subject Valecraft development to access the commercial blocks without having to use the boundary road (March Road), thus allowing for a high internal capture percentage, rather than only pass-by.
    - The nature and size of these commercial blocks suggest that there will be minimal traffic that are destined to these commercial blocks. This means that there will be few people who make a trip for the sole purpose of traveling to these commercial blocks. The majority of the trips will be pass-by and internal capture, thus a 34% pass-by rate (as per the ITE trip gen manual) and a 50% internal capture rate should be deemed acceptable.
- **Demand Rationalization:**
  - As the demands along March Road are projected to exceed the available capacity, and as the March Road widening is not within the affordable TMP, this module will be included in the TIA. Methods for demand rationalization will include:
    - Rerouting of traffic:
      - However, this will conclude by saying that there are no alternate routes besides March Road that people can take both from Dunrobin as well as from the subject development
    - Change in Travel Times (aka Peak Spreading):
      - This is something that can happen for the subject development, however, the projected volumes along March Road are quite high, therefore, the demands will not realistically be able to fall below the available capacity by peak spreading. Agreed It can be assumed that roughly **20%** of the background traffic and subject site traffic will travel outside the peak hour to avoid traffic. It is acknowledged that while this 20% reduction in traffic will remove vehicles from March Road, it will not eliminate the capacity concerns along March Road entirely. Of course otherwise there is no need to shift times. Can you

confirm that this 20% assumption is valid? The 20% may be difficult to achieve but basically the percent reduction is a balance between motorists either sitting in long queues or shifting their driving times. The percent reduction should still result in intersection failure. You're right, 20% reduction is likely too ambitious. For the TIA I will assume 10% reduction in traffic along March Road to account for a shift in travel times for the existing and background traffic. Do you agree with the 10% reduction? OK

- Shift in Modal Share:
  - The transit modal share can go as high as 20% to be in line with the approved TMP, however, not higher. This 20% is accepted but will require a conversation with OC Transpo and perhaps some TDM measures to support the shift in modal share. We can work through this in the Strategy report. The approved TMP assumed a 20% transit modal share. Presumably OC Transpo was involved during the development / approval of the TMP so I'm wondering if there a need to circle back to OC Transpo again at the TIA stage to discuss the 20% modal share. One of the TDM measures we will recommend as part of the Strategy Report is to provide early transit services until regular services are warranted. The strategy report will be reviewed by Transit Planning so they will see the TDM recommendations.

Hope that answers your questions. Let me know if you still have concerns.

Carol Franklin, P.Eng
Specialist, Development Review & Transportation Engineering
Transportation Services Department | *Services des transports*
City of Ottawa | Ville d'Ottawa
110 Laurier Avenue West, Ottawa, ON K1P 1J1
613.580.2424 ext./poste **27582**, fax/téléc:613-580-6060
carol.franklin@ottawa.ca

From: O'Grady, Lauren <Lauren.OGrady@stantec.com>
Sent: June 28, 2019 2:42 PM
To: Franklin, Carol <carol.franklin@ottawa.ca>
Cc: Danny Page <dpage@valecraft.com>; Smadella, Karin <Karin.Smadella@stantec.com>; Moroz, Peter <peter.moroz@stantec.com>
Subject: RE: 1020 and 1070 March Road - Step 3 TIA

Hi Carol,

I'm following up on our correspondence chain below and am wondering if you've had a chance to review

my comment responses.

Have a great long weekend,

Lauren O'Grady P.Eng.
Transportation Engineer

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

Stantec
400 - 1331 Clyde Avenue
Ottawa ON K2C 3G4

From: Franklin, Carol <carol.franklin@ottawa.ca>
Sent: Tuesday, June 25, 2019 3:17 PM
To: O'Grady, Lauren <Lauren.OGrady@stantec.com>
Subject: RE: 1020 and 1070 March Road - Step 3 TIA

Hi Lauren,

I'll have a look at this and hope to respond by the end of the week.

Carol

From: O'Grady, Lauren <Lauren.OGrady@stantec.com>
Sent: June 25, 2019 1:28 PM
To: Franklin, Carol <carol.franklin@ottawa.ca>
Cc: Baggs, Rosanna <Rosanna.Baggs@ottawa.ca>; Danny Page <dpage@valecraft.com>; Smadella, Karin <Karin.Smadella@stantec.com>; Moroz, Peter <peter.moroz@stantec.com>
Subject: RE: 1020 and 1070 March Road - Step 3 TIA

Good afternoon Carol,

I'm following up to our phone call from last week regarding the Step 3 comments for Valecraft's Kanata North development (see email chain below).

I've considered the comments you provided below and have the following responses:

- **School land use:**
  - Transit modal share will be revised to 70% per your comment below. As such, I will not

include any internal capture for the school land use.

- **Commercial land use:**
  - The 50% internal capture rate that I assumed in the Step 3 report can be justified as follows:
    - The blocks are designated as ‘neighbourhood commercial’ and not ‘community commercial’ as per the TMP. This implies that the commercial blocks will service the immediate neighbourhood instead of the entire KNUEA community.
    - There may be commercial accesses along Street 1, which would allow the residents from the subject Valecraft development to access the commercial blocks without having to use the boundary road (March Road), thus allowing for a high internal capture percentage, rather than only pass-by.
    - The nature and size of these commercial blocks suggest that there will be minimal traffic that are destined to these commercial blocks. This means that there will be few people who make a trip for the sole purpose of traveling to these commercial blocks. The majority of the trips will be pass-by and internal capture, thus a 34% pass-by rate (as per the ITE trip gen manual) and a 50% internal capture rate should be deemed acceptable.
- **Demand Rationalization:**
  - As the demands along March Road are projected to exceed the available capacity, and as the March Road widening is not within the affordable TMP, this module will be included in the TIA. Methods for demand rationalization will include:
    - Rerouting of traffic:
      - However, this will conclude by saying that there are no alternate routes besides March Road that people can take both from Dunrobin as well as from the subject development
    - Change in Travel Times (aka Peak Spreading):
      - This is something that can happen for the subject development, however, the projected volumes along March Road are quite high, therefore, the demands will not realistically be able to fall below the available capacity by peak spreading. It can be assumed that roughly **20%** of the background traffic and subject site traffic will travel outside the peak hour to avoid traffic. It is acknowledged that while this 20% reduction in traffic will remove vehicles from March Road, it will not eliminate the capacity concerns along March Road entirely. Can you confirm that this 20% assumption is valid?
    - Shift in Modal Share:
      - The transit modal share can go as high as 20% to be in line with the approved TMP, however, not higher.

As we discussed on the phone last week, the adjacent Minto development did not explicitly account for the commercial land uses within their trip generation. In addition, there is no mention of the trip generation potential of the school land use. The Minto TIA also recognized that March Road widening is not within the 2031 Affordable Network, however, it included the widening in the analysis of the 2028 horizon year. For these reasons, it is hard to remain consistent across both developments in terms of the TIAs and the findings.

Can you please provide your concurrence on the above so we can proceed with the Step 4 Strategy Report?

Have a great day,

Lauren O'Grady P.Eng.
Transportation Engineer

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

Stantec
400 - 1331 Clyde Avenue
Ottawa ON K2C 3G4

From: Baggs, Rosanna <Rosanna.Baggs@ottawa.ca>
Sent: Thursday, June 13, 2019 2:07 PM
To: O'Grady, Lauren <Lauren.OGrady@stantec.com>
Subject: Re: 1020 and 1070 March Road - Step 3 TIA

I'd call Carol. She'd be the one reviewing it and would know better.

Regards,

Rosanna Baggs, C.E.T.

On Jun 13, 2019, at 10:46 AM, O'Grady, Lauren <Lauren.OGrady@stantec.com> wrote:

>
>
> Hi Rosanna,
>
> Thanks for sending the comments along quickly. Do you have time for a phone call Monday morning to discuss the third comment regarding demand rationalization? It's not to dispute what Carol is saying, but rather to pick your brain about how you'd like to see us handle this module.
>
> Thanks,
>
> **Lauren O'Grady** P.Eng.
> Transportation Engineer
>
> Direct: 613-784-2264
> lauren.o'grady@stantec.com
>
> Stantec
> 400 - 1331 Clyde Avenue

Ottawa ON K2C 3G4

From: Baggs, Rosanna <Rosanna.Baggs@ottawa.ca>
Sent: Thursday, June 13, 2019 11:28 AM
To: O'Grady, Lauren <Lauren.OGrady@stantec.com>
Cc: Vastag, Robert <Rob.Vastag@stantec.com>
Subject: Fwd: 1020 and 1070 March Road - Step 3 TIA

Hi Lauren,

Please see comments in red below.

Regards,

Rosanna Baggs, C.E.T.

Begin forwarded message:

> **From:** "Franklin, Carol" <carol.franklin@ottawa.ca>
> **Date:** June 13, 2019 at 8:11:03 AM PDT
> **To:** "Baggs, Rosanna" <Rosanna.Baggs@ottawa.ca>
> **Subject: FW: 1020 and 1070 March Road - Step 3 TIA**
>
> Hi Rosanna,
>
> I didn't forward this to Traffic Signals as I can respond to all of the comments. See below in red.
>
> Carol
>
> ---
>
> **From:** Baggs, Rosanna
> **Sent:** June 12, 2019 11:23 AM
> **To:** Franklin, Carol <carol.franklin@ottawa.ca>
> **Cc:** Paudel, Neeti <neeti.paudel@ottawa.ca>; Prevost, Pauline <Pauline.Prevost@ottawa.ca>
> **Subject:** Fwd: 1020 and 1070 March Road - Step 3 TIA
>
> Hi Carol,
>
> Can you ease review the responses below and confirm with TS if they are

ok with the response too.

Please log the responses in the circulation.

Thanks

Regards,

Rosanna Baggs, C.E.T.

Begin forwarded message:

> **From:** "O'Grady, Lauren" <Lauren.OGrady@stantec.com>
> **Date:** June 11, 2019 at 2:28:34 PM PDT
> **To:** "Baggs, Rosanna" <Rosanna.Baggs@ottawa.ca>
> **Cc:** "Moroz, Peter" <peter.moroz@stantec.com>, "Smadella, Karin" <Karin.Smadella@stantec.com>, "Vastag, Robert" <Rob.Vastag@stantec.com>
> **Subject: RE: 1020 and 1070 March Road - Step 3 TIA**

Good morning Rosanna,

Thank you for providing your comments. Please see my comment responses embedded in green below. Please let me know if these responses satisfy the commenters so I can proceed with the Strategy Report.

Thank you,

Lauren O'Grady P.Eng.
Transportation Engineer

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

Stantec
400 - 1331 Clyde Avenue
Ottawa ON K2C 3G4

From: Baggs, Rosanna <Rosanna.Baggs@ottawa.ca>
Sent: Tuesday, June 11, 2019 1:23 PM
To: O'Grady, Lauren <Lauren.OGrady@stantec.com>
Cc: Moroz, Peter <peter.moroz@stantec.com>; Smadella, Karin <Karin.Smadella@stantec.com>; Vastag, Robert <Rob.Vastag@stantec.com>
Subject: RE: 1020 and 1070 March Road - Step 3 TIA

Hi Lauren,

Please see the comments for the forecasting:

Transportation Engineering Services

1. The Kanata North Community Master Plan uses a 20% internal trip capture rate for commercial land uses. Please justify the use of 50% internal capture for both commercial and institutional land uses. As outlined in the Forecasting report, the CDP combined all commercial blocks (neighbourhood commercial and community commercial) within the CDP lands and applied a generic 20% internal capture rate to all of it. Also outlined in the CDP, however, is that the commercial block located within the subject Valecraft development is designated as 'neighbourhood commercial'. As such, the subject commercial block will serve the surrounding neighbourhood and not the overall CDP community, thus, the internal capture rate should be higher than the generic 20% as stated in the CDP. Based on this, an internal capture rate of 50% was assumed for the subject development's neighbourhood commercial blocks. As for the proposed institutional land use, it is assumed that the majority of the students will originate from the surrounding neighbourhood given that it is an elementary school (which typically have smaller catchment areas as compared to high schools). An internal capture rate of 50% was assumed for the elementary school. This internal capture rate is similar to that of a recently completed TIA for a proposed elementary school in Barrhaven South (*Half Moon Bay Catholic Elementary School Transportation Brief*, Parsons Feb 2015). It should be noted that the elementary school produces relatively low traffic volumes as compared to the overall subject development, therefore, tweaking the internal capture percentage has little technical bearing on the outcome

of this TIA.

Institutional

-The internal capture rate for Half Moon Bay Catholic Elementary School (HMBES) Transportation Brief is not clearly identified in the submission. The HMBES brief assigned 40 staff vehicle trips for 500 students per period peak. If transit mode is expected at 0%, the 117 two-way AM-peak trips are a reasonable amount for a school of 580 students.

-If school bus service is proposed as part of the school, reassigning most of the auto passenger trips to transit mode would also be accepted. Similar schools have been shown to have at least 70% overall transit (school bus) mode share.

Commercial

-Given that 34% of the commercial trips are pass-by, and the fact that the commercial buildings are visible from March Road and will be immediately accessed after exiting March Road onto Street 1, an internal capture rate of 50% seems overly conservative.

2. Section 1.1 shows 197 single family homes while the rest of the document uses 297. This was a typo in Section 1.1 The proposed development includes 297 single family homes, 315 townhomes, and 116 apartment units.

   Ok

Traffic Signal Operations

1. Please provide v/c calculations in support of the statement that traffic demands do not exceed capacity. The demand along March Road is projected to exceed the available capacity, however, March Road is scheduled to be widened, as outlined in the TMP. This widening will alleviate the projected congestion along March Road. This rationalization will be further explored as part of the Step 4 Strategy Report which will include the analysis component of the TIA. Module 3.3 – Demand Rationalization is part of the Forecasting Report and is required prior to Analysis to adjust traffic volumes to create a more realistic picture of future conditions.

Provide response to concerns prior to submitting the Strategy

Report.

Rosanna Baggs, C.E.T.
Project Manager, Infrastructure Approvals | GPRJ Approbation demandes infrastructure
Development Review West Branch | Dir Services d'exam des dem d'amgt
Tel |Tél. : 613-580- 2424 ext. | poste 26388

ABSENCE ALERT: I will be out of the office June 3rd-14th, returning June 17th.

From: O'Grady, Lauren <Lauren.OGrady@stantec.com>
Sent: May 07, 2019 10:52 AM
To: Baggs, Rosanna <Rosanna.Baggs@ottawa.ca>
Cc: dpage@valecraft.com; Moroz, Peter <peter.moroz@stantec.com>; Smadella, Karin <Karin.Smadella@stantec.com>; Vastag, Robert <Rob.Vastag@stantec.com>
Subject: 1020 and 1070 March Road - Step 3 TIA

Good morning Rosanna,

Please see attached our Step 3 Report for Valecraft's proposed development located at 1020 and 1070 March Road in Kanata North. Please let me know if you have any comments or questions.

Thanks,

Lauren O'Grady P.Eng.
Transportation Engineer

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

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