MAYFIELD-TULLAMORE COMMUNITY

Transportation Study

Prepared For: Mayfield-Tullamore Landowners Group

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1.0 INTRODUCTION

1.1 Retainer

BA Group is retained by the Mayfield-Tullamore Landowners Group to provide transportation consulting services in support of the proposed development of a new greenfield community in Caledon, Ontario. The community extends from Mayfield Road in the south to Old School Road in the north. It extends from Torbram Road in the east to approximately midway between Bramalea Road and Dixie Road in the west.

The community is bound by planned employment areas to the east and west, existing residential uses to the south, and the planned Highway 413 to the north. **Figure 1** illustrates the site location.

1.2 Region of Peel Official Plan

The Region of Peel Official Plan (RPOP) was adopted on April 16, 2022 and provides a comprehensive land use policy framework to guide development in the Region to 2051. It includes policies that address housing and growth management; long-term planning for employment and infrastructure; protection of water resources, natural heritage, and rural/agricultural systems; and plan for climate change.

1.3 Town of Caledon *Future Caledon* Official Plan

The Town of Caledon's new Official Plan (OP), *Future Caledon* was adopted on March 6, 2024. It replaces a majority of the existing Town of Caledon Official Plan which was first implemented in 1978. Future phases of Official Plan Review process will continue to update the new OP, until all aspects of the previous official plan are replaced.

Future Caledon implements provincial and regional directions and outlines the Town's vision and guiding principles. Of note are the following land development and transportation related principles:

- Create Healthy and Complete Communities
  - *Plan for healthy and complete communities that offer a mix of housing and employment opportunities for all, a range of parks, open spaces and amenities, and the choice to conveniently access shopping and services without a car.*
- Create High Quality Transportation Options
  - *Create a mobility system that prioritizes people and transit through a network that supports all modes of transportation with an emphasis on creating great walking, cycling and transit infrastructure.*

1.4 Town of Caledon Multi-Modal Transportation Master Plan

The Town of Caledon's Multi-Modal Transportation Master Plan (MMTMP) was developed in conjunction with the *Future Caledon* OP and provides direction on transportation improvements within Caledon to 2051.

The MMTMP's supporting objectives include:

- Develop a future-ready transportation plan for the Town and expand the multi-modality of the transportation system including driving, transit, walking, cycling, and other emerging mobility options;
- Provide infrastructure to support and manage future land use growth and address the needs and priorities for both rural and urban communities;
- Deliver sustainable strategies that protect natural heritage assets while reducing transportation's effects on climate change;

- Build a safe and inclusive transportation system that supports age-friendly communities and promotes healthy living; and
- Develop complementary transportation solutions that supports Provincial, Regional, and Local policies and the Town's Official Plan (OP) update

The MMTMP also includes a series of planned improvements related to road widenings, a public transit strategy, and active transportation plan.

1.4.1 Road Network Improvements

The MMTMP recommends a series of road widenings to the collector road network concentrated to the southern half of Caledon. In proximity of the Site, the following roads are being widened:

- Torbram Road from Mayfield Road to Old School Road, widened from 2 to 4 lanes
- Bramalea Road from Mayfield Road to King Street, widened from 2 to 4 lanes
- Old School Road from Winston Churchill Boulevard to Airport Road, widened from 2 to 4 lanes

Figure 2 illustrates the road widenings planned in proximity of the Site and **Figure 3** illustrates the conceptual collector road layout. The conceptual road network plan proposed as part of this transportation study and development plan is discussed in **Section 2.0.**

1.4.2 Public Transit Strategy

The MMTMP recommends leveraging Brampton Transit within the short-term, by 2035. Beyond 2035, the MMTMP recommends that the Town develop a transit service plan over a longer-term horizon in collaboration with developers as part of secondary plan approval processes so that it can be informed by the needs at the secondary plan level.

The MMTMP itself proposes fixed-route transit corridors on collector roads across the Town, with most of them located in the southern half of Caledon. These fixed-route transit corridors are discussed further in **Section 3.0**.

1.4.3 Active Transportation Plan

The MMTMP includes active transportation recommendations that are within the MMTMP were developed as part of the Caledon Active Transportation Master Plan process as well as new road cross-sections which accommodate for different types of cycling infrastructure.

The active transportation network proposed in the MMTMP is further discussed in **Section 4.0**.

1.5 Highway 413

Highway 413 is proposed to run through York, Peel, and Halton Region. The portion of the highway near the proposed community runs north of Old School Road with a planned interchange at Bramalea Road. The Highway is currently the subject of a Provincial Environmental Assessment and a Federal Impact Assessment. It is noted that no funding has currently been allocated to the Highway, and the commencement and completion of the project is dependent on the findings of the above studies. In the case that Highway 413 is not approved, any potential considerations for the community will be studied at that time, through the course of the development process.

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FIGURE 1 SITE LOCATION

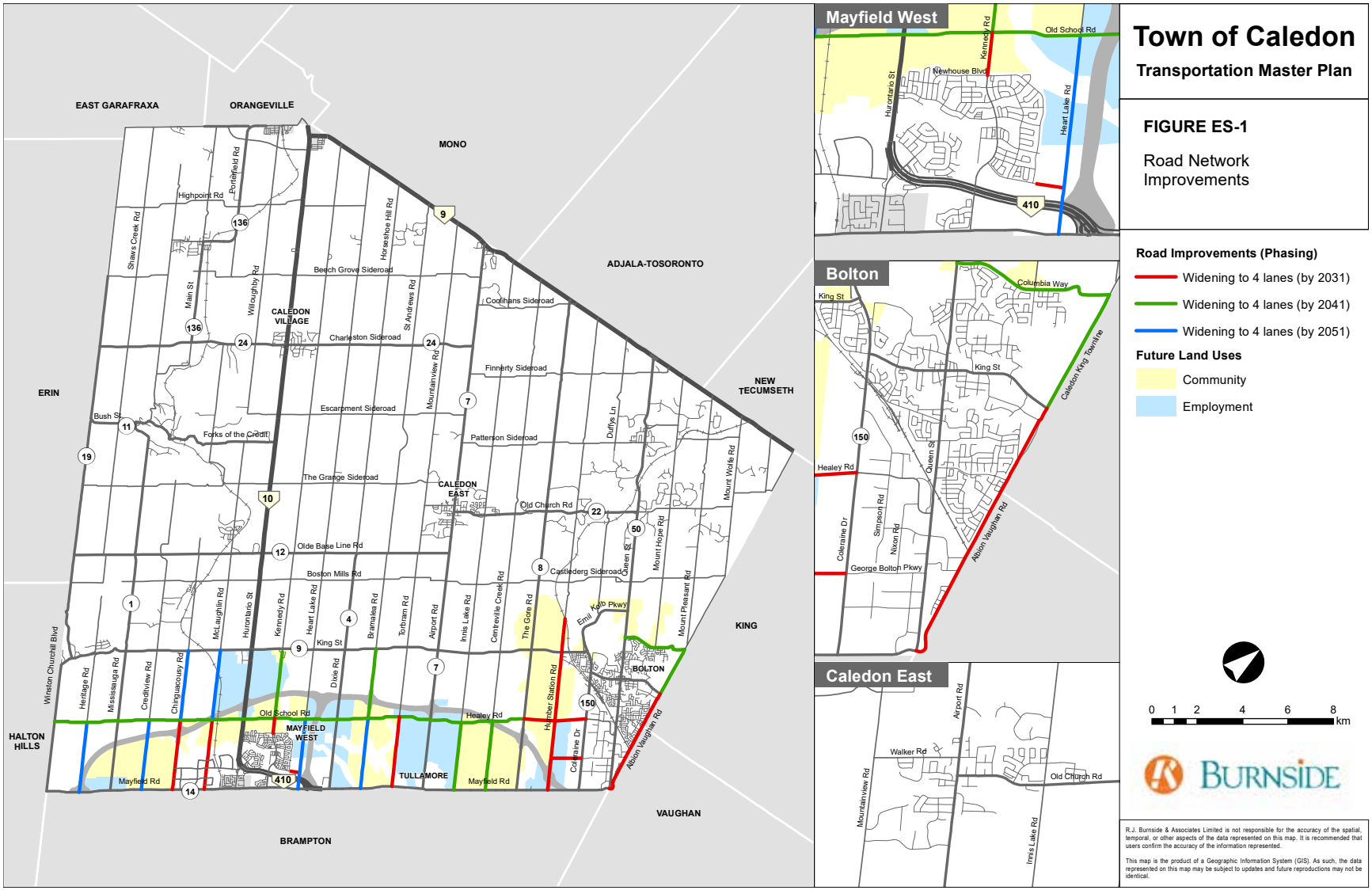

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FIGURE 2 ROAD NETWORK IMPROVEMENTS - MMTMP

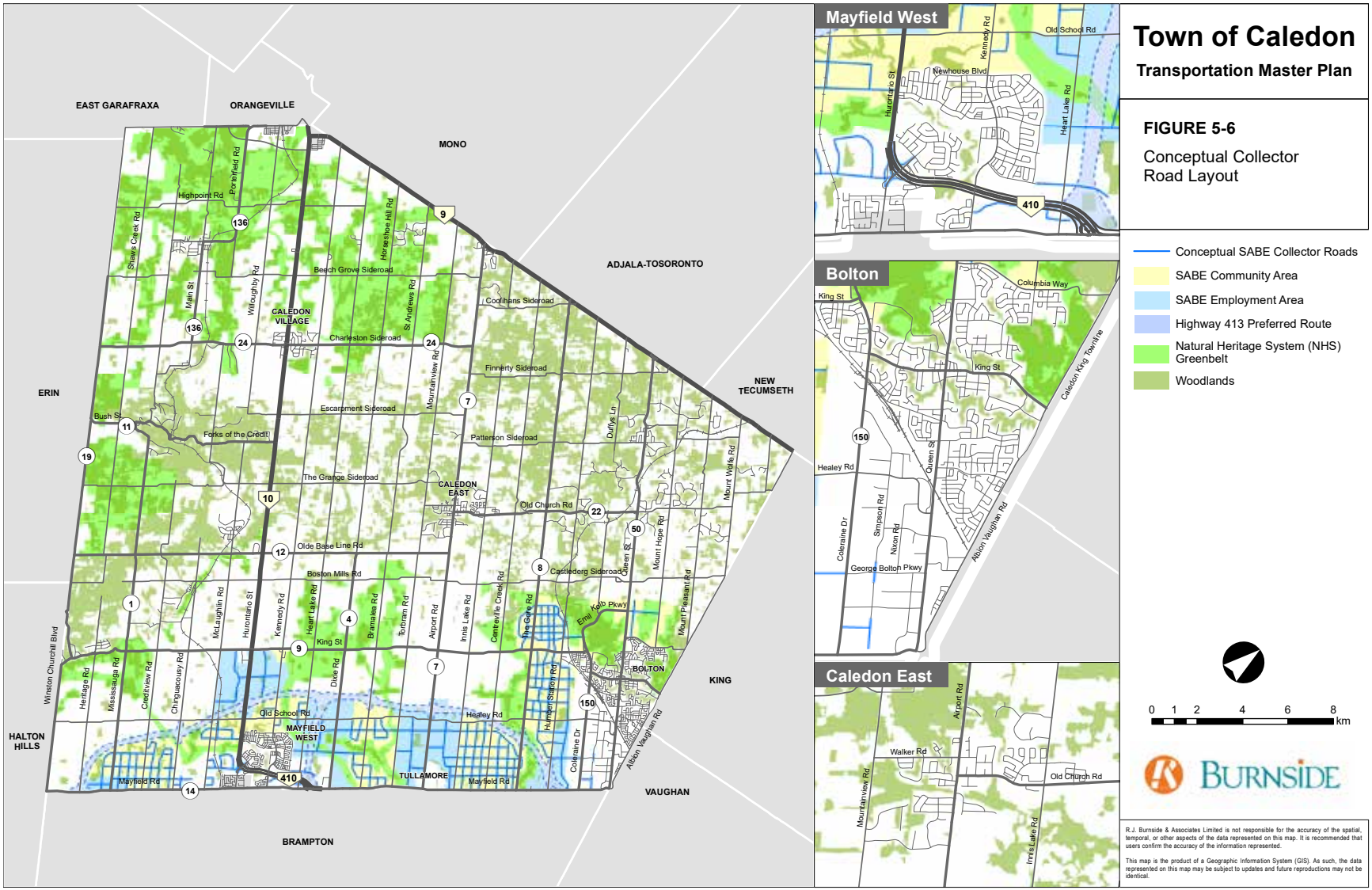

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FIGURE 3 CONCEPTUAL COLLECTOR ROAD NETWORK LAYOUT

1.6 The Proposal

The community will consist of approximately 7,800 residential units, with a mix of unit types, as well as supporting institutional, recreational and non-residential uses. As a complete community, the supporting land-uses will generally act to internalize trip-making rather than act as external generators of activity.

1.7 This Study

A terms of reference related to this study was submitted to Town of Caledon staff in addition to two transportation-focussed pre-submission meeting. The terms of reference is appended as **Appendix A**.

The proposed community will be developed over a long period of time with a series of studies providing additional details as the plan evolves, comments are received, and phasing plans are refined. The purpose of this study is to provide an end-state (full build-out) review of the community to help confirm the basic structure of the community as a prelude to further discussions with stakeholders.

2.0 THE STRUCTURE PLAN

2.1 The Proposed Road Network

The transportation system planned for the community is based on the following principles:

- Use of the existing arterial road network bordering the community (or in the case of Bramalea Road, bisecting a portion of it) for transit and automobile access to and from the community. Notably, access to the area expressway system will be via Bramalea Road (to Highway 413) and Mayfield Road (to Highway 410). The roads will generally be urbanized 4-6 lanes roads with supporting active transportation facilities.
- Development of a complete community that allows for internalization of trips and active transportation connections to non-residential uses within the community.
- Construction of a new collector road network that will provide the primary vehicular access points to the boundary roads, provide supplemental public transit access to the community, and act as the primary internal cycling spine for the community. This collector road network is described in greater detail below.
- Development of a network of local roads that will provide the primary access to structure of the planned community. These streets should be designed to be accessible, low-speed, and safe for all road users.
- Creation of a cycling network based around the planned collector roads linking the residential uses with schools, non-residential uses, and community parks.

2.2 The New Collector Roads

As noted above a new collector road network is planned for the community. This plan is based around the concept, but does not mimic, illustrated conceptually in the Multi-Modal Transportation Master Plan. The differences are due to the following factors:

1. Topographical and natural heritage challenges that make road links in some locations challenging or impactful to construct.
2. Rationilzation of access locations to onto the boundary road network to allow for the development of appropriately-spaces traffic signals at the new intersections.
3. Avoiding a direct road connection to Dixie Road vis the planned employment lands west of the community. The challenge with this connection is it would create a direct road link between the employment lands and Bramalea Road, which is the closest access to Highway 413 from the employment lands. Given the potential for high volume distribution centres in the employment lands a direct road link through the community could create a very negative condition in which smaller delivery vehicles travelling to and from the distribution centres use the collector road, through the primarily residential community, to access the highway.

The collector road network was developed to meet the following objectives:

- Provide a high degree of permeability and connectivity both within the community and onto the surrounding arterial road network.
- Create the backbone of an extensive and safe cycling network linking the community.
- Provide suitable vehicular access onto the boundary street network.
- Allow for transit access into the community where necessary as a supplement to routes planned on the boundary roads.

- Make use of modern roundabouts as key traffic calming and wayfinding elements within the community.

The proposed structure plan is illustrated in **Figure 4** below.

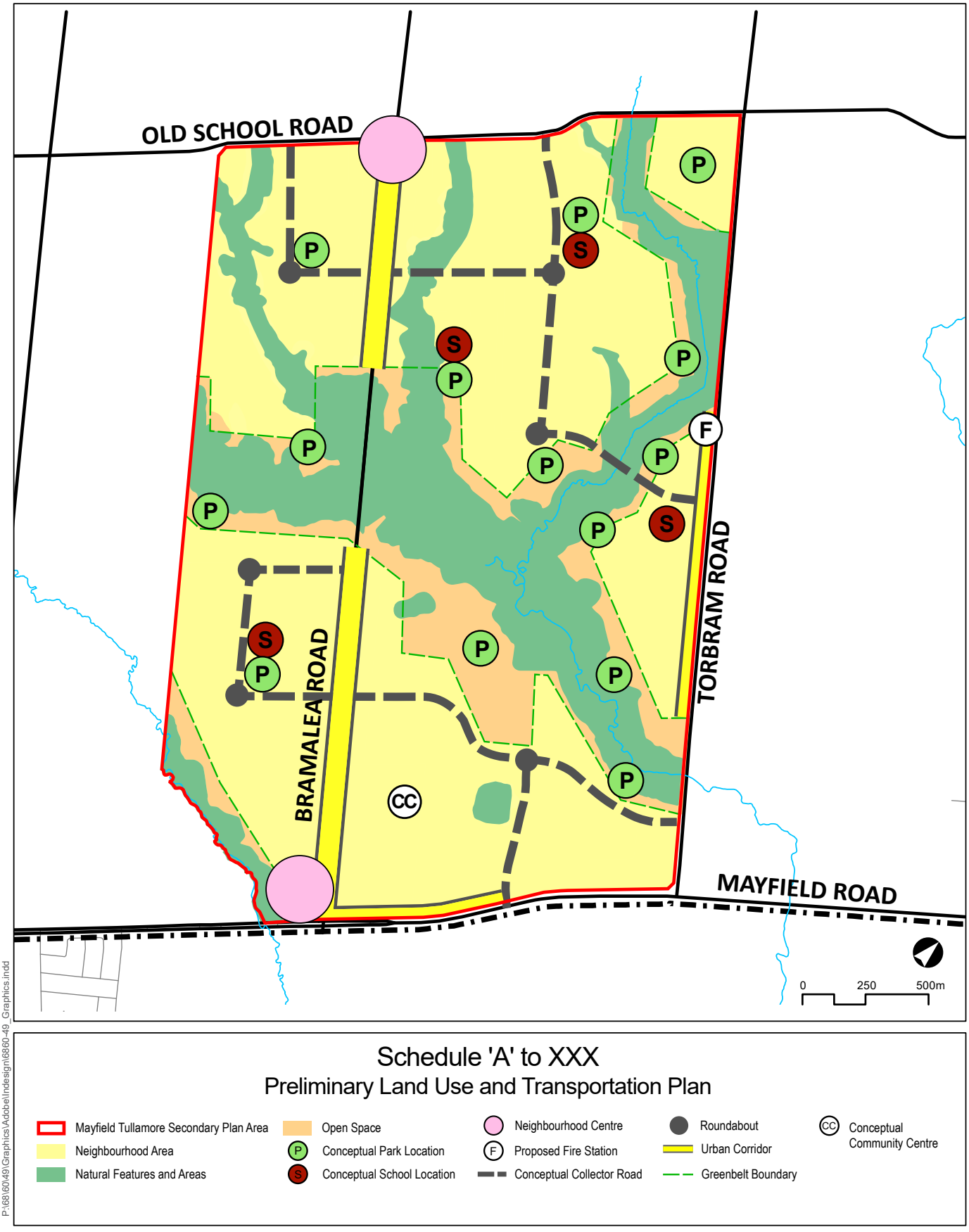

FIGURE 4 STRUCTURE PLAN

2.3 Roundabout Design

As noted in the structure plan roundabouts are proposed as a key feature of the collector road network. These allow for efficient traffic flow while providing traffic calming and aesthetic benefits to the community.

The detailed design of these interactions will require additional design effort and feedback from the Town of Caledon. An illustrative design of a typical roundabout for the planned community is shown in **Appendix B**.

3.0 PUBLIC TRANSIT

3.1 Town of Caledon Multi-Modal Transportation Master Plan

Figure 5 illustrates the location of the proposed fixed-route corridors from the MMTMP.

3.2 Recommended Approach

It is recommended to leverage the grid style network as proposed by the MMTMP. The site is bounded by Bramalea Rd, Mayfield Rd, Torbram Rd, and Old School Rd, all of which are proposed transit corridors. Use of these corridors alone could provide a high level of transit connectivity to the community on efficient linear routes. Additional supplemental routes could be introduced on the planned new collector roads as required to provide addition connectivity to transit. The collector road network, including roundabouts should be designed to accommodate transit access.

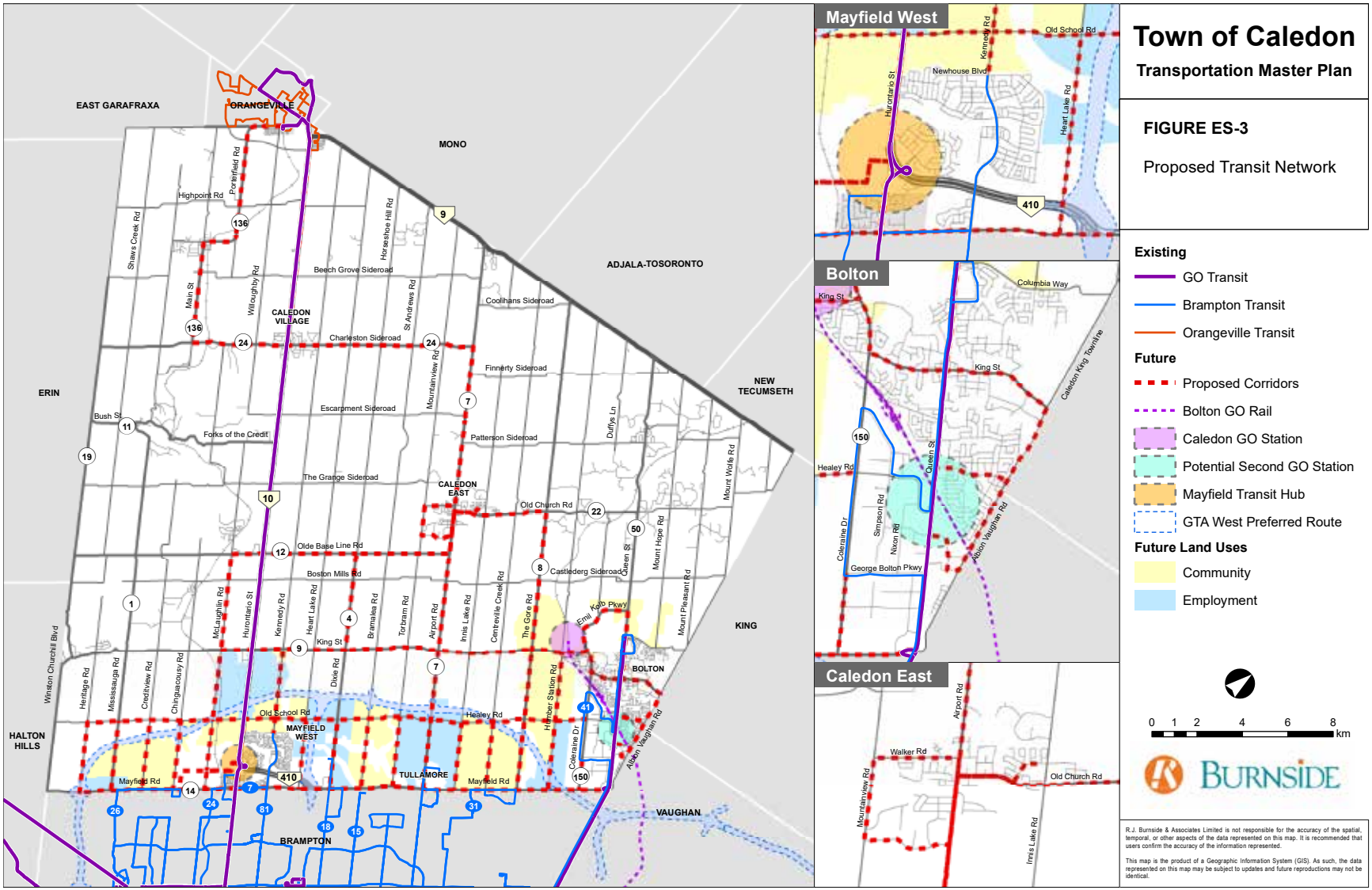

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FIGURE 5 MMTMP TRANSIT PLAN

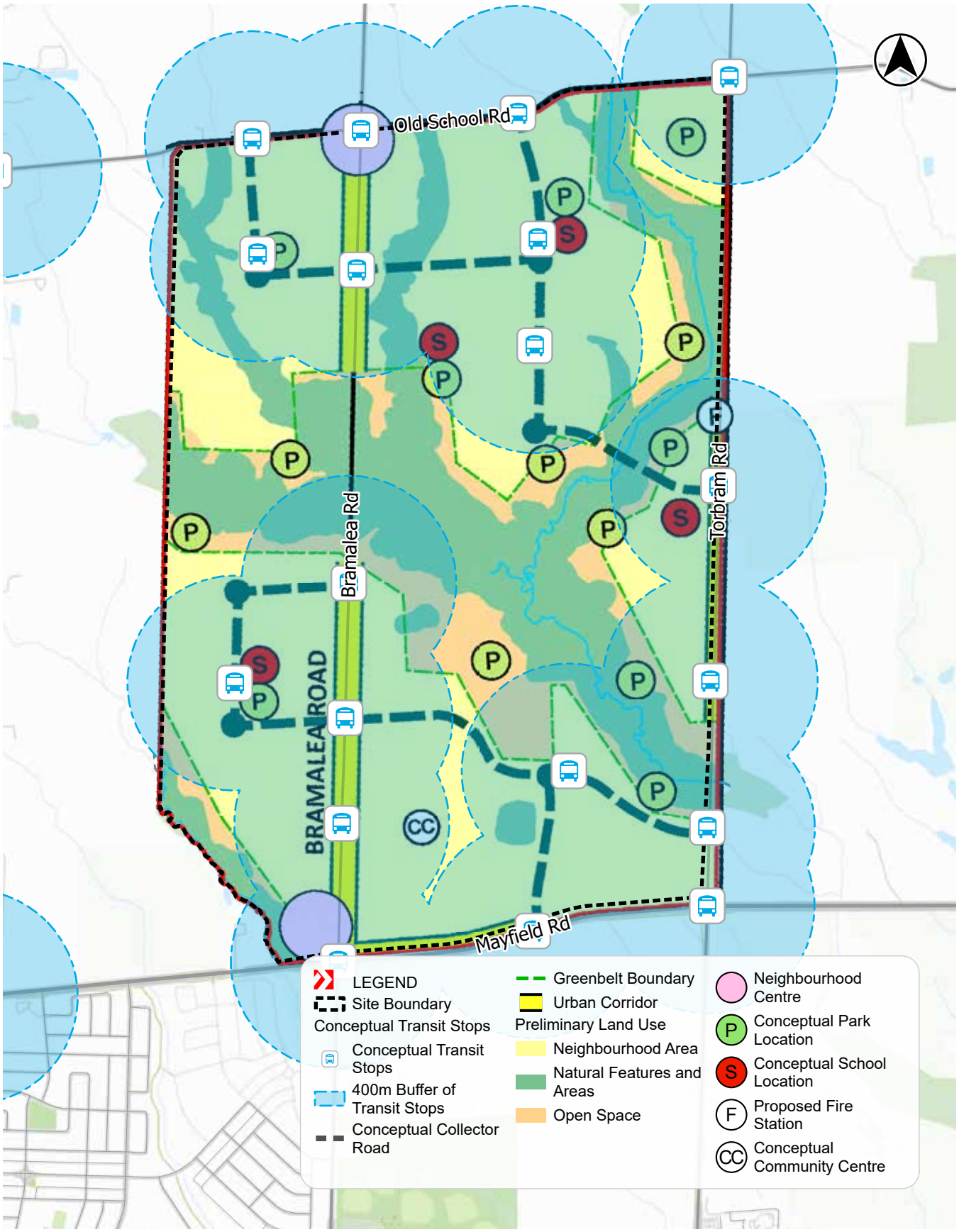

FIGURE 6 TRANSIT NETWORK PLAN

4.0 ACTIVE TRANSPORTATION

4.1 Proposed Cross-Sections

Proposed cross-sections for the new local and collector roads are provided in **Appendix C**. Local roads will include a narrow pavements and sidewalks on both sides. These will be designed to minimize speeds, provide access, and provide pedestrian connectivity.

The collector road network will include multi-use paths on both sides of the road and wider pavement for additional parking or turn lanes.

4.2 Cycling Network

Within proximity of site, the MMTMP has proposed following improvements:

Physically Separated

- Bramalea Road, north-south, from Mayfield Road to King Street
- Torbram Rd, north-south, from Mayfield Road to north of the proposed Highway 413 Corridor
- Old School Road, east-west, from Winston Churchill Blvd to Airport Rd
- Proposed Road north of Mayfield Road, east-west, from Torbram Rd to The Gore Rd

Multi-use Trail

- Running east-west through the site, connecting to physically separated bike lanes at Torbram Rd

Figure 7 illustrates the proposed active transportation network.

The 2051 cycling network will afford residents and visitors of the study area access around the entire study area via active modes. A majority of the schools and parks are all located along the collector road network which are proposed to have cycle tracks. Additional cycling priority routes on local roads will supplement the network as required.

Figure 8 illustrates the proposed cycling network in relation to the location of schools and parks in the planned development area.

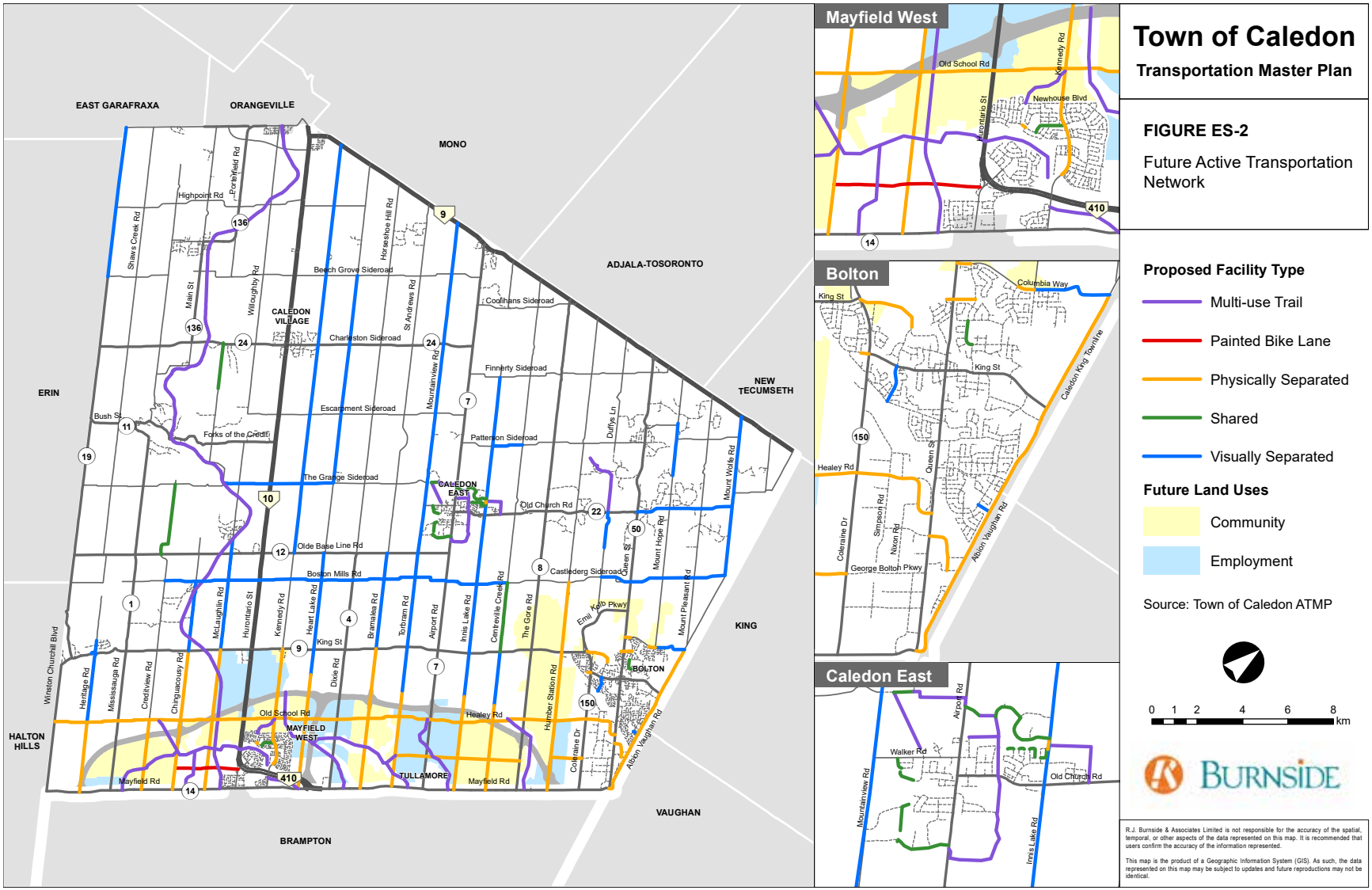

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FIGURE 7 MMTMP FUTURE ACTIVE TRANSPORTATION NETWORK

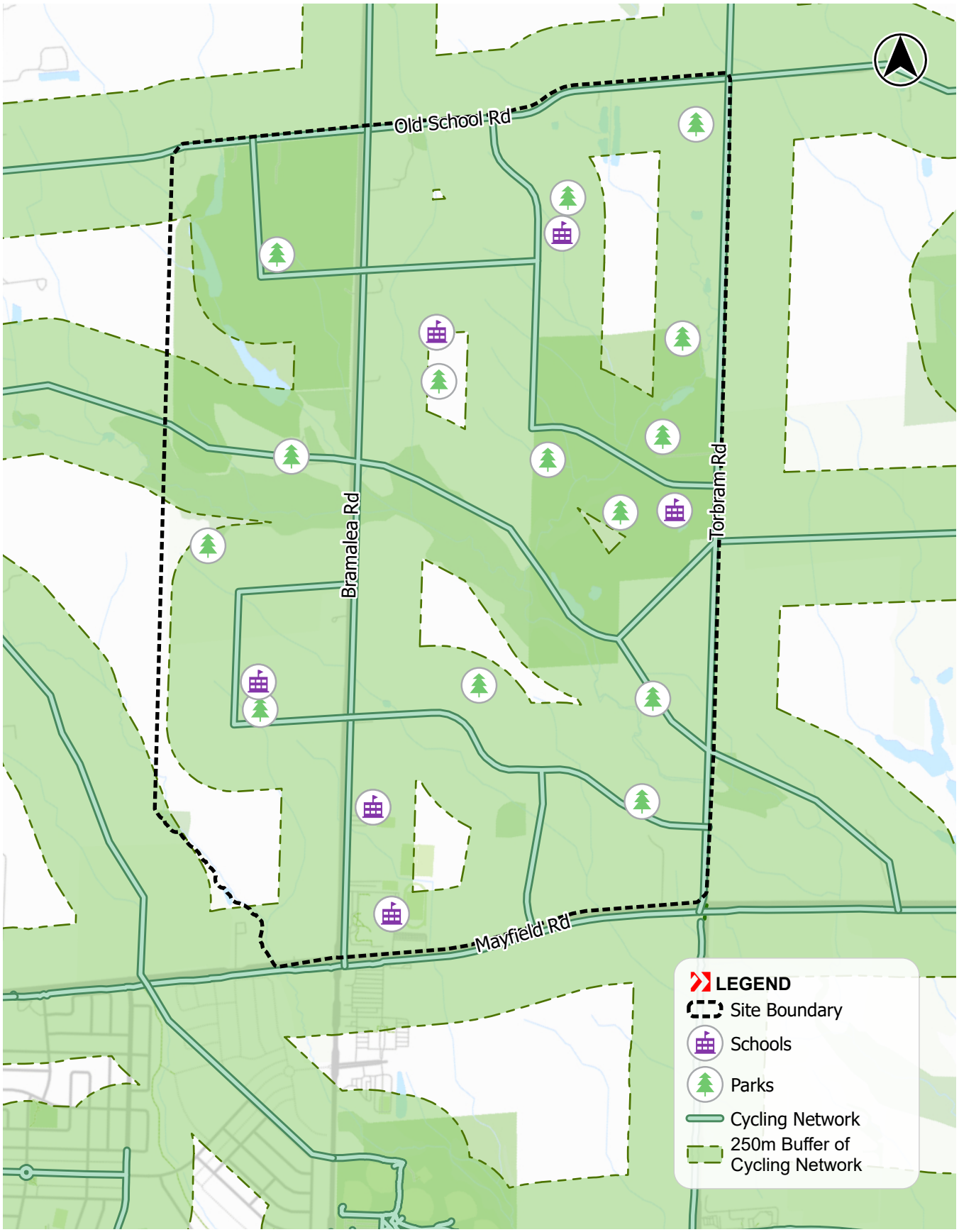

FIGURE 8 CYCLING NETWORK AND AMENITIES

5.0 TRAFFIC ANALYSIS – TRAFFIC VOLUMES

5.1 Town of Caledon 2051 Volumes

As a part of the work completed for the Town of Caledon's *Future Caledon* Official Plan and Multi-Modal Transportation Master Plan, adopted in March of 2024, the Region of Peel and the Town of Caledon undertook traffic volume projections for arterial and collector roads. Volumes projected to the 2051 horizon have been assigned to all movements of the boundary roads of the structure plan based on the through volumes provided by the Town of Caledon, with the assumption that Highway 413 and the planned Bramalea interchange are operational. An excerpt of the provided TMP volumes is provided in **Appendix D**.

It should be noted that the TMP modelling was only completed for the morning peak hour. For the purposes of this study, afternoon peak hour volumes were approximated by assuming that the volumes assigned to the peak travel direction in the morning peak hour would travel in the opposite direction in the afternoon peak hour, and vice-versa. Considering that afternoon peak hours typically have higher overall volumes than morning peak hours, a 10% factor has been added to the off-peak direction volumes. Assumed morning and afternoon peak hour TMP volumes for the 2051 horizon year are illustrated in **Figure 9**.

It is noted that the modelling undertaken for the TMP accounted for development on the subject lands. It is also noted that the road plan proposed for the site has undergone changes from the road plan proposed in the OP. The assignment of 2051 TMP horizon volumes may be refined throughout the development process.

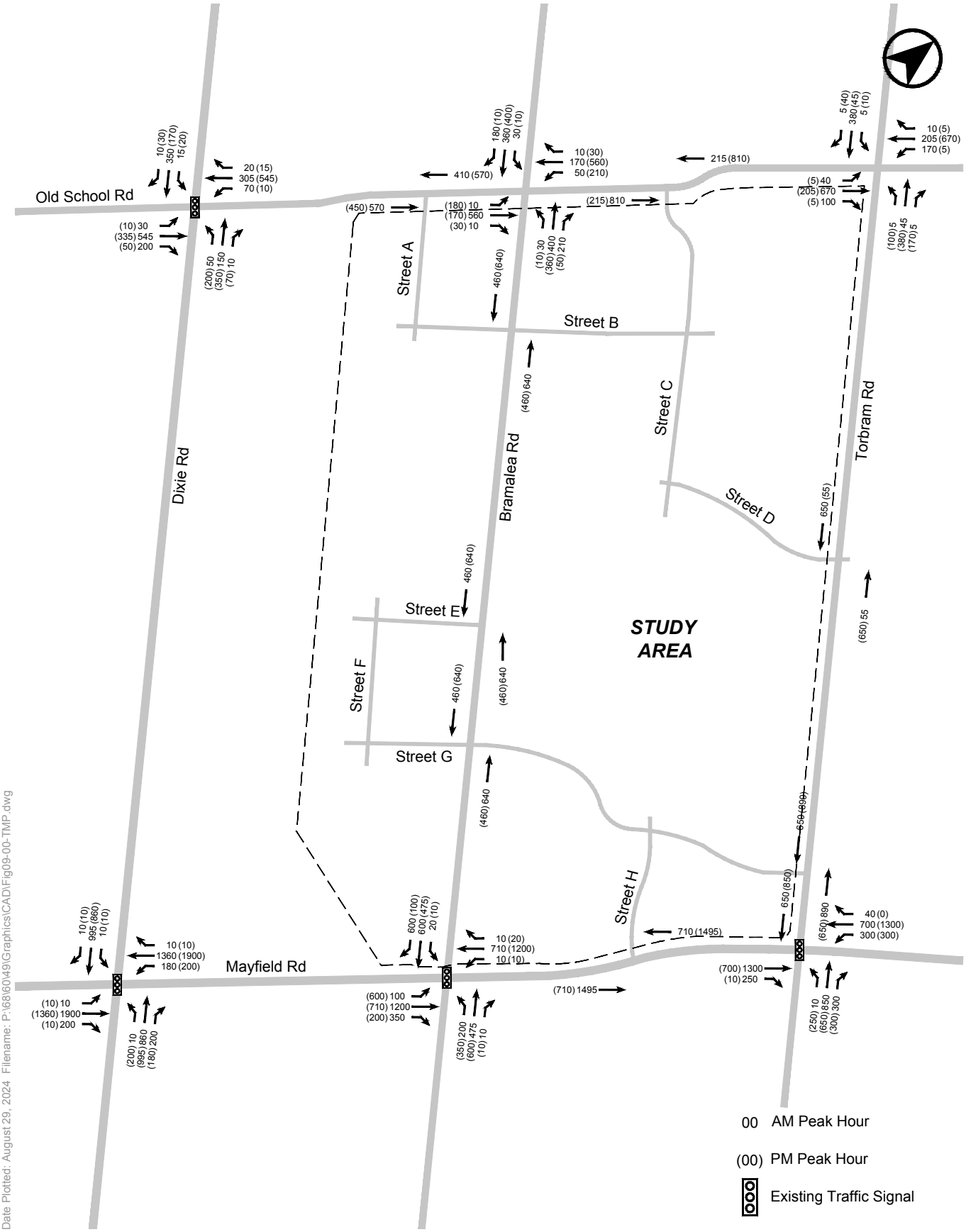

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FIGURE 9 ASSIGNED TMP VOLUMES

5.2 Site Generated Traffic

5.2.1 Residential Trip Generation

To develop an understanding of expected traffic generation and trip distribution across the internal collector road network, the structure plan has been divided into zones that are generally bounded by the proposed collector road network and the Greenbelt. **Exhibit 1** illustrates the assumed zones, lettered A to G.

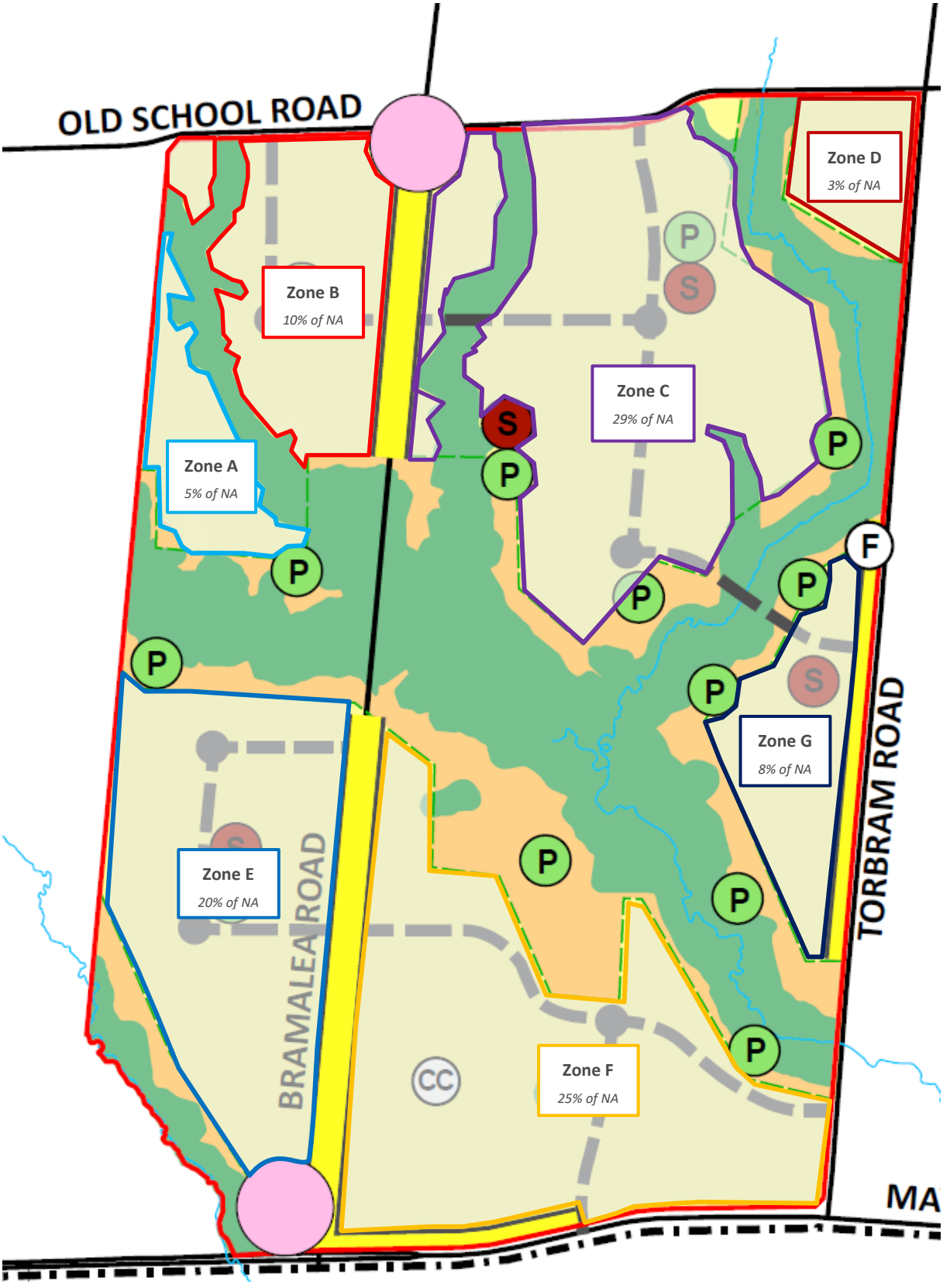


Exhibit 1: Traffic Zones

The land budget prepared for the plan provides the total number of units, by housing type across the neighbourhood area of the plan (land coloured in yellow in **Exhibit 1**). Based on the relative areas of the letter zones, an approximate number of housing units, per type, were assigned to each zone. It was assumed that single-/ semi-detached, street townhouses, and stacked houses were distributed evenly across zones, and that apartment units were concentrated in the neighbourhood centre located in Zone E. **Table 1** provides a summary of the unit distribution across letter zones.

Table 1 Neighbourhood Area - Unit Distribution by Zone

Letter Zone	Approximate Number of Units per Type					
	Single / Semi-Detached	Secondary Unit	Street Townhouse	Stacked Townhouse	Apartment	Total
A	208	0	143	59	0	410
B	375	0	257	107	0	740
C	1103	0	756	315	0	2174
D	112	0	77	32	0	221
E	749	0	513	214	325	1801
F	937	0	643	268	0	1847
G	310	0	213	89	0	612
Total	**3795**[1]	**0**	**2602**	**1084**	**325**	**7806**

Notes:
1. It is assumed that half of the single / semi-detached housing units are single detached housing units and half are semi-detached units.

Based on the above, vehicle trips were generated per zone based on trips rates provided in the 11th Edition of the ITE Trip Generation Manual for each type of housing unit. **Table 2** provides a summary of vehicle trip rates for each housing type.

Table 2 ITE Trip Generation by Housing Type

Plan Designation	ITE LUC	AM Peak Hour			PM Peak Hour		
		In	Out	2-Way	In	Out	2-Way
Single-Detached	210: Detached Single Family Housing	0.18	0.52	0.70	0.59	0.35	0.94
Semi-Detached / Townhouses	215: Attached Single Family Housing	0.12	0.36	0.48	0.34	0.23	0.57
Stacked Townhouse	220: Multi-Family Housing (Low Rise)	0.10	0.30	0.40	0.32	0.19	0.51
Apartments	221: Multi-Family Housing (Mid Rise)	0.09	0.28	0.37	0.24	0.15	0.39

Based on the above trip rates, **Table 3** summarizes the number of trips expected to be generated by the site, structured by zone, during the morning and afternoon peak hours.

Table 3 Residential Vehicle Trips

Letter Zone	Unit Type	Units	AM Peak Hour			PM Peak Hour		
			In	Out	2-Way	In	Out	2-Way
A	Single	104	20	55	75	60	35	100
	Semis & Townhouse	247	30	90	120	85	60	140
	Stacked Townhouse	59	5	20	25	20	10	30
	Zone A Total	**410**	**55**	**165**	**220**	**165**	**105**	**270**
B	Single	188	35	100	130	110	65	175
	Townhouse	445	55	160	215	150	105	255
	Stacked Townhouse	107	10	35	45	35	20	55
	Zone B Total	**740**	**100**	**295**	**390**	**295**	**190**	**485**
C	Single	551	95	285	385	325	190	520
	Townhouse	1307	155	470	630	440	305	745
	Stacked Townhouse	315	30	95	125	100	60	160
	Zone C Total	**2174**	**280**	**850**	**1140**	**865**	**555**	**1425**
D	Single	56	10	30	40	35	20	55
	Townhouse	133	15	50	65	45	30	75
	Stacked Townhouse	32	5	10	15	10	5	15
	Zone D Total	**221**	**30**	**90**	**120**	**90**	**55**	**145**
E	Single	374	65	195	260	220	130	350
	Townhouse	888	105	320	425	300	205	505
	Stacked Townhouse	214	20	65	85	70	40	110
	Apartment	325	30	95	120	75	50	125
	Zone E Total	**1801**	**220**	**675**	**890**	**665**	**425**	**1090**
F	Single	469	80	245	330	275	165	440
	Townhouse	1111	135	400	535	375	260	635
	Stacked Townhouse	268	25	80	105	85	50	135
	Zone F Total	**1847**	**240**	**725**	**970**	**735**	**475**	**1210**
G	Single	155	25	80	110	90	55	145
	Townhouse	368	45	135	175	125	85	210
	Stacked Townhouse	89	10	25	35	30	15	45
	Zone G Total	**612**	**80**	**240**	**320**	**245**	**155**	**400**
Total		**7806**	**1005**	**3040**	**4050**	**3060**	**1960**	**5025**
Blended Trip Rate (7806 units)			*0.13*	*0.39*	*0.52*	*0.39*	*0.25*	*0.64*

The site is expected to generate 4,050 and 5,025 two-way residential vehicle trips during the morning and afternoon peak hours, respectively.

5.2.2 Retail Trip Generation

The structure plan currently proposes approximately 40,000 m^2 of retail GFA, to be distributed across the Urban Corridor (UC) area proposed for the site, which will be located primarily along Bramalea Road. Considering that the planned population of the community will total over 25,000 people, it is expected that the retail uses on site will primarily be oriented towards fulfilling the needs of the community, and the retail uses on site will not generate a significant amount of external trips.

5.2.3 Trip Distribution

Site traffic has been assigned to the area road network based on a review of travel information provided by the 2016 Transportation Tomorrow Survey (TTS) and expected road network traffic patterns and connectivity at the time of the buildout of the site. Site traffic distribution is summarized in **Table 4**. Detailed TTS output data and distribution assumptions are provided in **Appendix E**.

Table 4 Site Traffic Distribution

Direction	Outbound	Inbound
To / From the North on Hurontario Street	5%	5%
To / From the South on Highway 410	30%	30%
To / From the East on Highway 413	10%	10%
To / From the West on Highway 413	15%	15%
To / From the North on Bramalea / Torbram / Dixie Road	5%	5%
To / From the South on Bramalea / Torbram / Dixie Road	35%	35%
Total	**100%**	**100%**

Notes:
1. Based on TTS Zones 3010, 3012, 2014 & 3442

5.3 Site Traffic Volumes

New site traffic generated by the community has been assigned to the proposed structure plan road network and the existing road network based upon the directional distribution summarized above. New site traffic volumes for the weekday morning and afternoon peak hours are illustrated in **Figure 10**.

5.4 Future Total Traffic Volumes

Future total traffic volumes, which reflect the addition of TMP volumes and new site traffic volumes are illustrated in **Figure 11**.

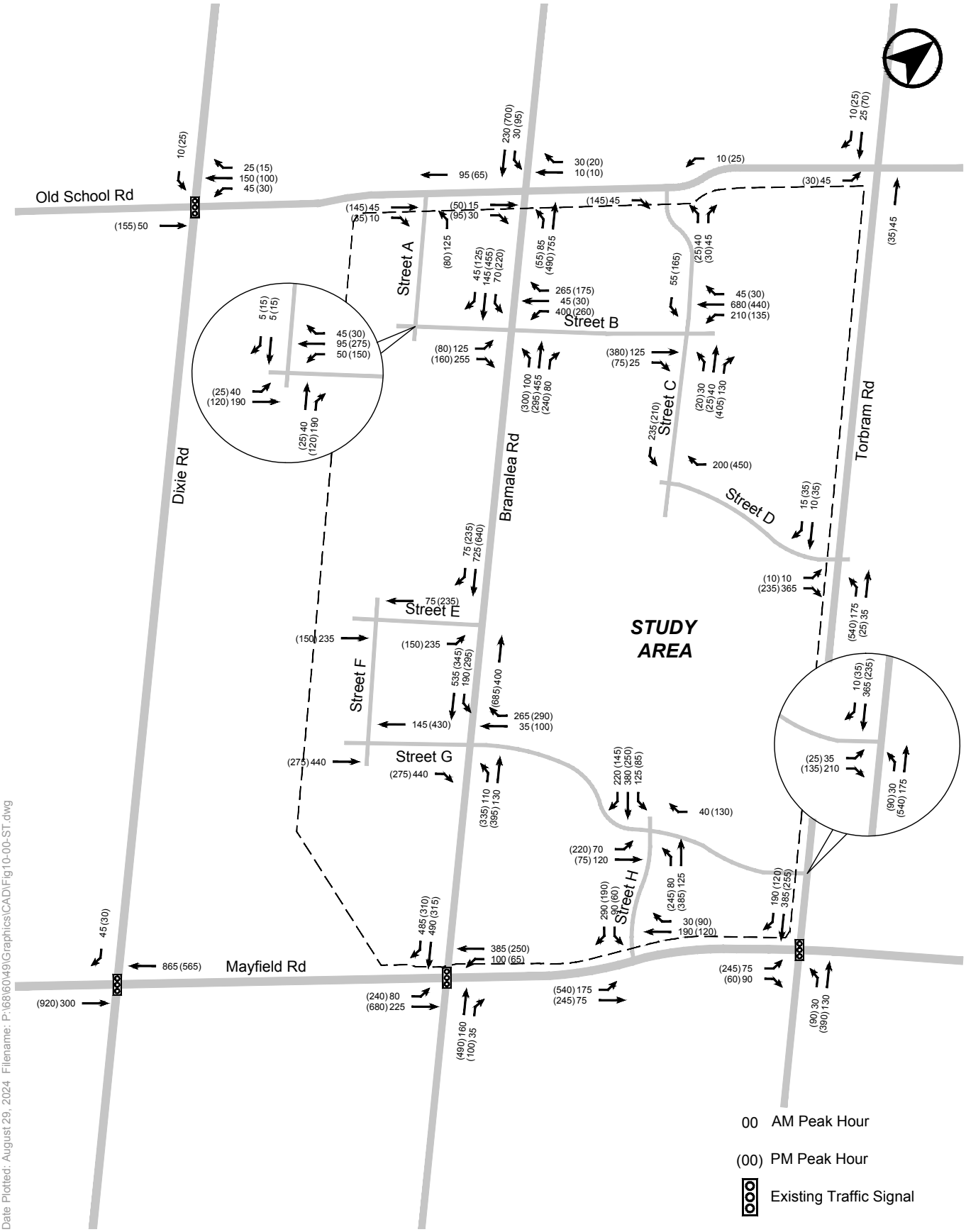


FIGURE 10 SITE TRAFFIC VOLUMES

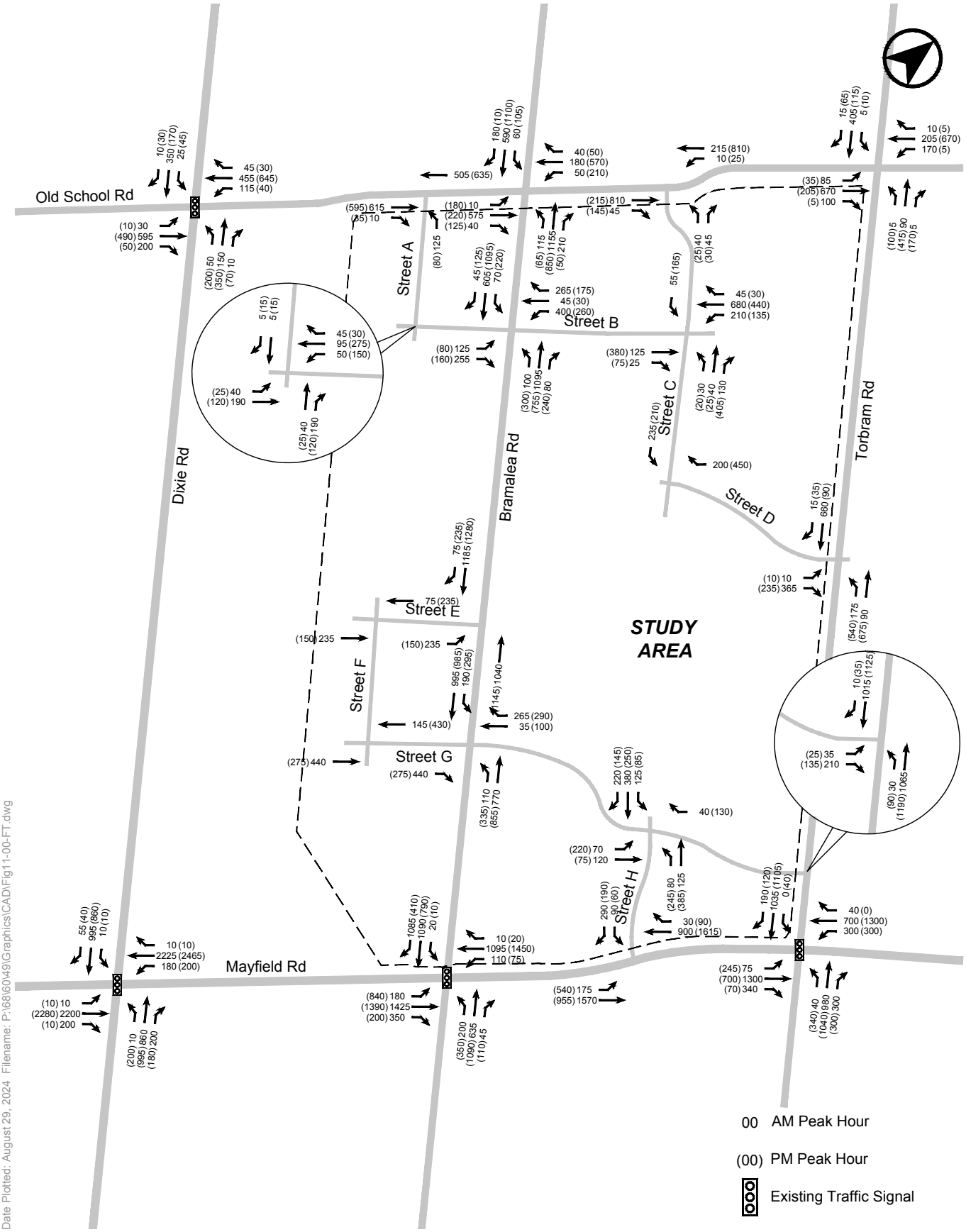


FIGURE 11 2051 FUTURE TOTAL TRAFFIC VOLUMES

6.0 TRAFFIC ANALYSIS – ANALYSIS

6.1 Analysis Methodology

Traffic operation analyses have been undertaken at the external site intersections using standard capacity analysis procedures as follows:

Signalized Intersections

Analyses undertaken at intersections operating under traffic signal control have been undertaken using the methodologies and procedures outlined in the Highway Capacity Manual (2000) and in accordance with the guidelines described in the Region of Peel's Guidelines for Using Synchro Version 7.73 Rev 8 (dated December 2010). Version 11.0 of Synchro has been used in this analysis. The product of the signalized intersection evaluation is an intersection performance index (volume to capacity ratio, "v/c"), where a v/c index of 1.00 indicates 'at or near capacity' conditions.

HCM level of service (LOS) criteria for signalized intersections are as follows:

- LOS A: Control Delay ≤ 10s
- LOS B: 10s < Control Delay ≤ 20s
- LOS C: 20s < Control Delay ≤ 35s
- LOS D: 35s < Control Delay ≤ 55s
- LOS E: 55s < Control Delay ≤ 80s
- LOS F: Control Delay > 80s

Unsignalized Intersections

Unsignalized intersection analyses have been carried out using standard capacity procedures for intersections operating under "Two-way" and "All-Way" STOP control and in accordance with the methodologies outlined in the Highway Capacity Manual 2000 (HCM 2000).

The product of these analyses is a level of service (LOS) designation, ranging from LOS A to F; which provides a relative indication of the level of delay experienced by motorists completing a turning manoeuvre at an intersection. LOS A represents conditions under which motorists would experience little delay and LOS F reflects conditions where more extended delays can be expected.

HCM level of service (LOS) criteria for unsignalized intersections are as follows:

- LOS A: Control Delay ≤ 10s
- LOS B: 10s < Control Delay ≤ 15s
- LOS C: 15s < Control Delay ≤ 25s
- LOS D: 25s < Control Delay ≤ 35s
- LOS E: 35s < Control Delay ≤ 50s
- LOS F: Control Delay > 50s

6.2 Intersection Operations Analysis

Detailed Synchro output reports are provided in **Appendix F**.

6.2.1 Mayfield Road Corridor

The intersections pertaining to the site that intersect with Mayfield Road are as follows:

- Mayfield Road and Dixie Road
- Mayfield Road and Bramalea Road
- Mayfield Road and Street "H"
- Mayfield Road and Torbram Road

To accommodate the large number of vehicles travelling along Mayfield Road, as well as site traffic travelling to and from the west on Mayfield Road, these intersections have been assigned a cycle length of 200 seconds during both the morning and afternoon peak hours. Several intersection improvements are required to accommodate the planned TMP volumes and site traffic volumes, and it is recommended that these improvements are studied and implemented in conjunction with planned road widenings along Bramalea Road and Torbram Road. Capacity results and discussion for the intersections along Mayfield Road are provided in the following sections. The recently completed widening of Mayfield Road to three lanes in each direction has been assumed for these intersections.

6.2.1.1 MAYFIELD ROAD AND DIXIE ROAD

Table 5 provides a summary of the volume to capacity ratios reported at the intersection of Mayfield Road and Dixie Road.

Table 5 Mayfield Road and Dixie Road – Capacity Analysis Results

Movement	2051 Future Total	
	v/c	LOS
EBL	0.30 (0.27)	D (D)
EBT	0.94 (0.92)	E (D)
EBR	0.23 (0.01)	C (C)
WBL	0.85 (0.93)	F (F)
WBTR	0.77 (0.83)	D (E)
NBL	0.30 (0.93)	D (F)
NBTR	0.93 (0.94)	E (E)
SBL	0.19 (0.18)	D (E)
SBTR	0.92 (0.98)	E (F)
Overall	**0.87 (0.90)**	**D (E)**

Notes:
1. XX (XX): AM (PM)

The intersection of Mayfield Road and Dixie Road will operate under busy but acceptable conditions during the morning and afternoon peak hours, with overall volume to capacity ratios of 0.87 and 0.90, respectively. It is assumed that Dixie Road will be widened to two lanes in each direction north of Mayfield Road. It is recommended that dedicated northbound and southbound lanes are implemented at this intersection, and that these improvements should be further studied simultaneously with any studies undertaken for the widening of Dixie Road.

6.2.1.2 MAYFIELD ROAD AND BRAMALEA ROAD

Table 6 provides a summary of the volume to capacity ratios reported at the intersection of Mayfield Road and Bramalea Road.

Table 6 Mayfield Road and Bramalea Road – Capacity Analysis Results

Movement	2051 Future Total	
	v/c	LOS
EBL	0.59 (0.99)	E (E)
EBTR	0.86 (0.60)	E (D)
WBL	0.80 (0.96)	F (F)
WBTR	0.54 (0.99)	E (E)
NBL	0.81 (0.98)	F (F)
NBTR	0.47 (0.84)	D (E)
SBL	0.09 (0.21)	D (E)
SBT	0.91 (0.94)	E (F)
SBR	0.68 (0.27)	E (E)
Overall	**0.85 (0.96)**	**E (E)**

Notes:
1. XX (XX): AM (PM)

The intersection of Mayfield Road and Bramalea Road will operate under very busy but acceptable conditions during the morning and afternoon peak hours, with overall volume to capacity ratios of 0.85 and 0.96, respectively. Due to the limited ability to provide an additional connection to the west, this intersection will experience a high volume of southbound right turning vehicles in the morning peak hour, and a high volume of eastbound left turning vehicles in the afternoon peak hour, as residents travel west in the morning and return to the community in the afternoon. As such, it is recommended to provide a dual channelized southbound right turn as well as dual eastbound left turn lanes. These improvements should be further studied for implementation in conjunction with any studies undertaken for the planned widening of Bramalea Road to two lanes in each direction.

6.2.1.3 MAYFIELD ROAD AND STREET "H"

Table 7 provides a summary of the volume to capacity ratios reported at the proposed "T" intersection of Mayfield Road and proposed collector street "H", located between the intersections of Mayfield Road and Bramalea Road and Mayfield Road and Torbram Road.

Table 7 Mayfield Road and Street "H" – Capacity Analysis Results

Movement	2051 Future Total	
	v/c	LOS
EBL	0.49 (0.84)	B (F)
EBT	0.42 (0.21)	B (A)
WBTR	0.25 (0.63)	A (D)
SBL	0.33 (0.52)	E (F)
SBR	0.81 (0.12)	F (F)
Overall	**0.55 (0.83)**	**C (D)**

Notes:
1. XX (XX): AM (PM)

The proposed intersection of Mayfield Road and Street "H" will operate under acceptable conditions during the morning and afternoon peak hours, with overall volume to capacity ratios of 0.55 and 0.83, respectively. It is recommended to provide a dedicated eastbound left turn lane at this intersection, as well as dedicated southbound right and left turn lanes.

6.2.1.4 MAYFIELD ROAD AND TORBRAM ROAD

Table 8 provides a summary of the volume to capacity ratios reported at the intersection of Mayfield Road and Torbram Road.

Table 8 Mayfield Road and Torbram Road – Capacity Analysis Results

Movement	2051 Future Total	
	v/c	LOS
EBL	0.33 (0.95)	E (F)
EBT	0.74 (0.49)	F (F)
EBR	0.52 (0.04)	F (F)
WBL	0.75 (0.74)	F (F)
WBT	0.29 (0.97)	C (F)
WBR	0.03 (0.00)	C (A)
NBL	0.50 (1.00)	D (F)
NBT	0.73 (0.55)	D (C)
NBR	0.27 (0.20)	C (C)
SBL	0.00 (0.23)	A (D)
SBTR	0.95 (0.95)	E (E)
Overall	**0.83 (0.96)**	**E (F)**

Notes:
1. XX (XX): AM (PM)

The intersection of Mayfield Road and Torbram Road will operate under very busy but acceptable conditions during the morning and afternoon peak hours, with overall volume to capacity ratios of 0.83 and 0.96, respectively. To accommodate the high volume of TMP volumes assigned to the westbound left movement at this intersection, it is recommended to provide dual westbound left lanes. This improvement is not related to the impacts of site traffic at this intersection. It has been assumed that Torbram Road has been widened to two lanes in each direction, with the provision of dedicated turn lanes at this intersection. The improvements described above should be further studied for implementation in conjunction with any studies undertaken for the planned widening of Torbram Road.

6.2.2 Old School Road Corridor

The intersections pertaining to the site that intersect with Old School Road are as follows:

- Old School Road and Dixie Road
- Old School Road and Street “A”
- Old School Road and Bramalea Road

- Old School Road and Street "C"
- Old School Road and Torbram Road

These intersections have been assigned a cycle length of 100 seconds during both the morning and afternoon peak hours. Several intersection improvements are required to accommodate the planned TMP volumes and site traffic volumes, and it is recommended that these improvements are studied and implemented in conjunction with planned road widenings along Old School Road, Dixie Road, Bramalea Road and Torbram Road. Capacity results and discussion for the intersections along Old School Road are provided in the following sections. It is assumed that the planned widenings of Old School, Dixie, Bramalea, and Torbram Roads to two lanes in each direction have been completed for this analysis.

6.2.2.1 OLD SCHOOL ROAD AND DIXIE ROAD

Table 9 provides a summary of the volume to capacity ratios reported at the intersection of Old School Road and Dixie Road.

Table 9 Old School Road and Dixie Road – Capacity Analysis Results

Movement	2051 Future Total	
	v/c	LOS
EBL	0.14 (0.07)	C (C)
EBT	0.70 (0.62)	D (D)
EBR	0.14 (0.03)	C (C)
WBL	0.42 (0.19)	C (C)
WBTR	0.36 (0.64)	C (C)
NBL	0.11 (0.28)	C (C)
NBT	0.09 (0.17)	C (B)
NBR	0.01 (0.04)	B (D)
SBL	0.04 (0.08)	B (A)
SBTR	0.19 (0.09)	B (A)
Overall	**0.35 (0.41)**	**C (C)**

Notes:
1. XX (XX): AM (PM)

The intersection of Old School Road and Dixie Road will operate under acceptable conditions during the morning and afternoon peak hours, with overall volume to capacity ratios of 0.35 and 0.41, respectively. All planned widenings have been assumed, and it is recommended that dedicated northbound and southbound left turn lanes be provided at this intersection, pending further study.

6.2.2.2 OLD SCHOOL ROAD AND STREET "A"

Table 10 provides a summary of the volume to capacity ratios reported at the proposed "T" intersection of Old School Road and proposed collector street "A", located between the intersections of Old School Road and Dixie Road and Old School Road and Bramalea Road.

Table 10 Old School Road and Street "A" – Capacity Analysis Results

Movement	2051 Future Total	
	v/c	LOS
EBTR	0.25 (0.22)	A (A)
WBTL	0.20 (0.22)	A (A)
NBLR	0.59 (0.53)	D (D)
Overall	**0.30 (0.25)**	**A (A)**

Notes:
1. XX (XX): AM (PM)

The proposed intersection of Old School Road and Street "A" will operate under acceptable conditions during the morning and afternoon peak hours, with overall volume to capacity ratios of 0.30 and 0.25, respectively. It is recommended to provide a shared northbound left-right lane at this intersection.

6.2.2.3 OLD SCHOOL ROAD AND BRAMALEA ROAD

Table 11 provides a summary of the volume to capacity ratios reported at the intersection of Old School Road and Bramalea Road.

Table 11 Old School Road and Bramalea Road – Capacity Analysis Results

Movement	2051 Future Total	
	v/c	LOS
EBL	0.02 (0.54)	C (D)
EBT	0.40 (0.13)	C (C)
EBR	0.03 (0.11)	E (E)
WBL	0.20 (0.38)	B (B)
WBT	0.13 (0.34)	B (B)
WBR	0.03 (0.03)	C (C)
NBL	0.41 (0.72)	B (D)
NBT	0.74 (0.57)	B (C)
NBR	0.24 (0.03)	A (B)
SBL	0.71 (0.63)	D (C)
SBT	0.38 (0.73)	B (C)
SBR	0.12 (0.01)	B (B)
Overall	**0.58 (0.63)**	**B (C)**

Notes:
1. XX (XX): AM (PM)

The intersection of Old School Road and Bramalea Road will operate under acceptable conditions during the morning and afternoon peak hours, with overall volume to capacity ratios of 0.58 and 0.63, respectively. It is recommended to provide all dedicated turning lanes at this intersection, and the configuration of this intersection should be studied in conjunction with the undertaking of widening studies along Old School Road and Bramalea Road.

6.2.2.4 OLD SCHOOL ROAD AND STREET "C"

Table 12 provides a summary of the volume to capacity ratios reported at the proposed "T" intersection of Old School Road and proposed collector street "C", located between the intersections of Old School Road and Bramalea Road and Old School Road and Torbram Road.

Table 12 Old School Road and Street "C" – Capacity Analysis Results

Movement	2051 Future Total	
	v/c	LOS
EBT	0.31 (0.12)	A (A)
WBT	0.09 (0.30)	A (A)
NBLR	0.43 (0.33)	D (D)
Overall	**0.29 (0.29)**	**A (A)**

Notes:
1. XX (XX): AM (PM)

The proposed intersection of Old School Road and Street "A" will operate under acceptable conditions during both the morning and afternoon peak hours, with an overall volume to capacity ratio of 0.29. It is recommended to provide a shared northbound left-right lane at this intersection.

6.2.2.5 OLD SCHOOL ROAD AND TOBRAM ROAD

Table 13 provides a summary of the volume to capacity ratios reported at the intersection of Old School Road and Torbram Road.

Table 13 Old School Road and Torbram Road – Capacity Analysis Results

Movement	2051 Future Total	
	v/c	LOS
EBL	0.10 (0.07)	A (A)
EBTR	0.31 (0.09)	A (A)
WBL	0.38 (0.01)	A (A)
WBTR	0.09 (0.28)	A (A)
NBL	0.04 (0.36)	C (D)
NBTR	0.12 (0.68)	D (D)
SBL	0.02 (0.11)	C (C)
SBTR	0.56 (0.16)	D (C)
Overall	**0.42 (0.38)**	**B (C)**

Notes:
1. XX (XX): AM (PM)

The intersection of Old School Road and Bramalea Road will operate under acceptable conditions during the morning and afternoon peak hours, with overall volume to capacity ratios of 0.42 and 0.38, respectively. It is recommended to provide dedicated left turn lanes for each approach at this intersection, and the configuration of this intersection should be studied in conjunction with the undertaking of widening studies along Old School Road and Torbram Road.

6.2.3 Bramalea Road Corridor

The intersections pertaining to the site that intersect with Bramalea Road are as follows:

- Bramalea Road and Street “B”
- Bramalea Road and Street “E”
- Bramalea Road and Street “G”

These intersections have been assigned a cycle length of 60 seconds during both the morning and afternoon peak hours. These intersections are located in the centre of the community, along the urban corridor, and should receive urban treatment to help create a walkable urban corridor. Capacity results and discussion for these intersections along Bramalea Road are provided in the following sections. It is assumed that the planned widening of Bramalea Road to two lanes in each direction has been completed for this analysis.

6.2.3.1 BRAMALEA ROAD AND STREET "B"

Table 14 provides a summary of the volume to capacity ratios reported at the proposed intersection of Bramalea Road and proposed collector street "B".

Table 14 Bramalea Road and Street "B" – Capacity Analysis Results

Movement	2051 Future Total	
	v/c	LOS
EBL	0.54 (0.44)	C (C)
EBTR	0.18 (0.05)	B (C)
WBL	0.89 (0.67)	D (C)
WBTR	0.16 (0.09)	B (B)
NBL	0.32 (0.63)	B (C)
NBTR	0.79 (0.69)	C (C)
SBL	0.27 (0.54)	B (B)
SBTR	0.36 (0.95)	A (C)
Overall	**0.69 (0.72)**	**C (C)**

Notes:
1. XX (XX): AM (PM)

The proposed intersection of Bramalea Road and Street "B" will operate under acceptable conditions during the morning and afternoon peak hours, with overall volume to capacity ratios of 0.69 and 0.72, respectively. Dedicated left turning lanes are recommended at this intersection.

6.2.3.2 BRAMALEA ROAD AND STREET "E"

Table 15 provides a summary of the volume to capacity ratios reported at the proposed "T" intersection of Bramalea Road and proposed collector street "E".

Table 15 Bramalea Road and Street "E" – Capacity Analysis Results

Movement	2051 Future Total	
	v/c	LOS
EBLR	0.61 (0.56)	C (C)
WBTL	0.48 (0.47)	A (A)
NBLR	0.57 (0.64)	A (A)
Overall	**0.59 (0.62)**	**A (A)**

Notes:
1. XX (XX): AM (PM)

The proposed intersection of Bramalea Road and Street "E" will operate under acceptable conditions during the morning and afternoon peak hours, with overall volume to capacity ratios of 0.59 and 0.62, respectively. No dedicated turning lanes are recommended at this intersection.

6.2.3.3 BRAMALEA ROAD AND STREET "G"

Table 16 provides a summary of the volume to capacity ratios reported at the proposed intersection of Bramalea Road and proposed collector street "G".

Table 16 Bramalea Road and Street "B" – Capacity Analysis Results

Movement	2051 Future Total	
	v/c	LOS
EBTLR	0.78 (0.17)	C (C)
WBTLR	0.21 (0.31)	B (C)
NBL	0.46 (0.63)	B (A)
NBTR	0.39 (0.53)	A (B)
SBL	0.57 (0.52)	C (A)
SBTR	0.50 (0.62)	B (B)
Overall	**0.64 (0.58)**	**B (B)**

Notes:
1. XX (XX): AM (PM)

The proposed intersection of Bramalea Road and Street "G" will operate under acceptable conditions during the morning and afternoon peak hours, with overall volume to capacity ratios of 0.64 and 0.58, respectively. Dedicated left turning lanes are recommended at this intersection.

6.2.4 Torbram Road Corridor

The intersections pertaining to the site that intersect with Torbram Road are as follows:

- Torbram Road and Street "D"
- Torbram Road and Street "G"

These intersections have been assigned a cycle length of 100 seconds during both the morning and afternoon peak hours.. Capacity results and discussion for the intersections along Torbram Road are provided in the following sections.

6.2.4.1 TORBRAM ROAD AND STREET "D"

Table 17 provides a summary of the volume to capacity ratios reported at the proposed "T" intersection of Torbram Road and proposed collector street "D".

Table 17 Torbram Road and Street "D" – Capacity Analysis Results

Movement	2051 Future Total	
	v/c	LOS
EBL	0.03 (0.06)	C (D)
EBR	0.73 (0.15)	D (D)
NBL	0.41 (0.53)	A (A)
NBT	0.04 (0.23)	A (A)
SBTR	0.29 (0.04)	B (A)
Overall	**0.48 (0.49)**	**B (A)**

Notes:
1. XX (XX): AM (PM)

The proposed intersection of Bramalea Road and Street "D" will operate under acceptable conditions during the morning and afternoon peak hours, with overall volume to capacity ratios of 0.48 and 0.49, respectively. Dedicated left turning lanes are recommended at this intersection.

6.2.4.2 TORBRAM ROAD AND STREET "G"

Table 18 provides a summary of the volume to capacity ratios reported at the proposed "T" intersection of Torbram Road and proposed collector street "G".

Table 18 Torbram Road and Street "G" – Capacity Analysis Results

Movement	2051 Future Total	
	v/c	LOS
EBL	0.10 (0.07)	C (C)
EBR	0.44 (0.23)	D (C)
NBL	0.11 (0.39)	A (A)
NBT	0.50 (0.48)	A (A)
SBTR	0.45 (0.51)	B (A)
Overall	**0.49 (0.45)**	**B (A)**

Notes:
1. XX (XX): AM (PM)

The proposed intersection of Bramalea Road and Street "G" will operate under acceptable conditions during the morning and afternoon peak hours, with overall volume to capacity ratios of 0.49 and 0.45, respectively. Dedicated left turning lanes are recommended at this intersection.

7.0 SUMMARY AND CONCLUSIONS

BA Group is retained by the Mayfield-Tullamore Landowners Group to provide transportation consulting services in support of the proposed development of a new greenfield community in Caledon, Ontario. The community extends from Mayfield Road in the south to Old School Road in the north. It extends from Torbram road in the east to approximately midway between Bramalea Road and Dixie Road in the west.

Policy Context

1. The Town of Caledon adopted its new Official Plan (OP) titled *Future Caledon* on March 6th, 2024. The plan guides land development through two of its principles: (1) create healthy and complete communities, and (2) create high quality transportation options.

2. The Town of Caledon also developed its Multi-Modal Transportation Master Plan (MMTMP) in conjunction with the *Future Caledon* OP and provides direction on transportation improvements within Caledon to 2051. Among other objectives, the MMTMP describes a series of improvements related to road widenings, a public transit strategy, and an active transportation plan.

Proposed Development

3. The proposed community will consist of approximately 7,800 residential units, with a mix of unit types, as well as supporting institutional, recreational, and non-residential uses. The supporting land-uses will help to create a complete community and help to internalize resident trips, rather than act as external trip generators.

The Structure Plan

4. The proposed road network for the community aims to leverage the existing arterial road network that borders the community, and proposes new collector roads internal to the site that will provide access to the boundary roads, and serve as public transit and active transit spines for the community.

5. The proposed collector road network for the community differs from the collector road network proposed for the community in the MMTMP. The differences are due to three main factors: (1) natural heritage challenges that make road links difficult or too impactful to construct in some locations; (2) a rationalization of access locations onto the existing boundary road network to allow for appropriate traffic signal spacing; and (3) avoiding a direct connection to Dixie Road to the west, as this would create the shortest travel distance from the planned employment lands west of the community, and allow for a condition where the community would be overrun with smaller delivery vehicles cutting through the community to access the highway.

6. The proposed collector road network was developed to meet the following objectives: (1) provide a high degree of permeability and connectivity both within the community and onto the surrounding arterial road network; (2) create the backbone of an extensive and safe cycling network linking the community; (3) provide suitable vehicular access onto the boundary street network; (4) provide suitable vehicular access onto the boundary street network; (5) allow for transit access into the community to supplement routes planned on the boundary roads; and (6) make use of modern roundabouts as key traffic calming and wayfinding elements within the community.

Proposed Public Transit

7. The MMTMP proposes Mayfield Road, Torbram Road, and Old School Road as fixed-route transit corridors. Use of these corridors alone will provide a high level of transit connectivity to the community on efficient linear routes, and there are additional opportunities for supplemental routes that operate on the internal collector road network to provide additional transit connectivity to residents.

Proposed Active Transit Infrastructure

8. All of the collector roads in the collector road network for the community will include multi-use paths on both sides of the roadway. The MMTMP has proposed several cycling infrastructure improvements within the vicinity of the site, which will help to provide external connectivity to the broader cycling network for community residents.

Traffic Analysis – Traffic Volumes

9. The work done for the OP and MMTMP included the projection of traffic volumes onto Caledon's existing arterial roads to the year 2051, assuming that Highway 413 is operational. The 2051 volumes were assigned to all movements on the boundary roads of the structure plan, and are considered to account for all future development traffic volumes in Caledon.

10. The community is expected to generate 4,050 and 5,025 two-way vehicle trips during the morning and afternoon peak hours, respectively. Site traffic has been assigned onto the area road network based on a review of travel information provided by the 2016 Transportation Tomorrow Survey (TTS).

Traffic Analysis – Analysis

11. Traffic analysis was undertaken using the methodologies and procedures outlined in the Highway Capacity Manual (HCM) and in the Region of Peel's Guidelines for Using Synchro Version 7.73 Rev 8 (dated December 2010).

12. Cycle lengths have been assigned to each of the site boundary corridors. Mayfield Road intersections have been assigned a cycle length of 200 seconds, Old School Road intersections have been assigned a cycle length of 100 seconds, Bramalea Road intersections have been assigned a cycle length of 60 seconds, and Tobram Road intersections have been assigned a cycle length of 100 seconds.

13. Any recommended intersection improvements should be further studied in conjunction with any studies that are undertaken for the widening of the boundary roads.

14. Under future total conditions, with the addition of 2051 TMP and site traffic volumes, the external site intersections will operate acceptably during both the morning and afternoon peak hours.

Appendix A:
Terms of Reference

MEMORANDUM

TO

Kavleen Younan, P.Eng

Town of Caledon

Kavleen.younan@caledon.ca

FROM
Steve Krossey, P.Eng
Clara Filipetti

PROJECT
6860-49
Tullamore

DATE
July 24, 2024

RE: MAYFIELD - TULLAMORE – TERMS OF REFERENCE

BA Group has been retained by the Tullamore Landowners Group Inc. to provide transportation advisory services in support of a proposed subdivision development located on the lands bordered by Torbram Road, Mayfield Road, Old School Road, and midway between Bramalea and Dixie Road, as shown in **Figure 1**.

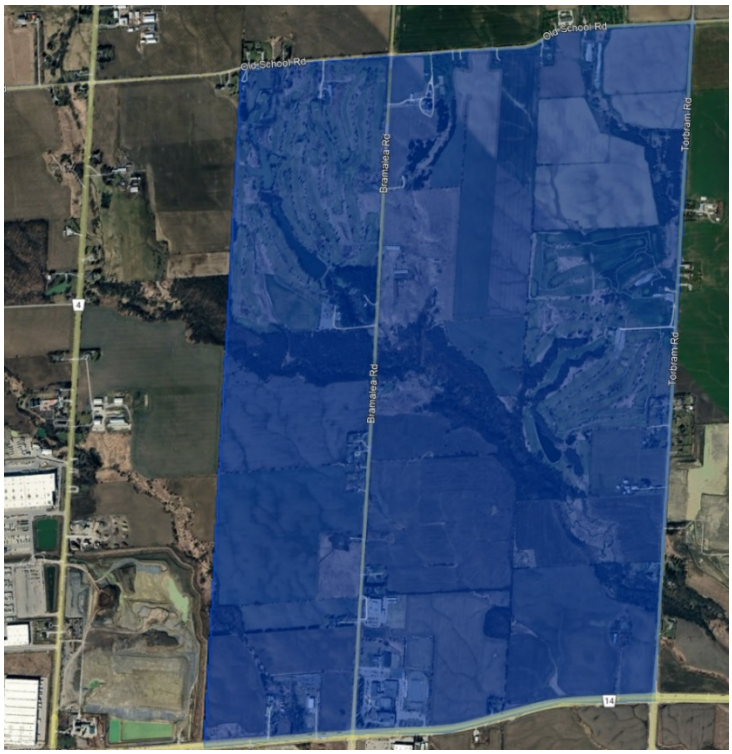


Figure 1: Subject Lands

The current concept plan proposes a mix of low-, mid-, and high-rise residential uses, as well as retail, school, and office uses. Vehicular access to the site is currently proposed via a new street network that is proposed to connect to the greater collector street network. Please see below for our proposed Terms of Reference for the Traffic Impact Study (TIS). Should you have questions or comments, please do not hesitate to contact us.

Analysis Study Area

The TIS Study Area is proposed to comprise of the following intersections for the development site:

- Old School Road & Torbram Road
- Old School Road & Bramalea Road
- Old School Road & Dixie Road
- Dixie Road & Mayfield Road
- Bramalea Road & Mayfield Road
- Torbram Road & Mayfield Road
- Major Site Intersections (to be determined)

Traffic Analysis Scenarios

The following scenarios will be reviewed:

- Existing Conditions (2024)
- Future Background 2051 Conditions (with Highway 413)
- Future Total 2051 Conditions (with Highway 413)

Traffic Analysis Periods

Traffic analysis will be undertaken for the weekday AM and PM peak hours.

Background Traffic

The Town of Caledon's EMME models will be reviewed to determine appropriate levels of general background traffic growth for the 2051 Scenario. Additionally, the Town of Caledon's and the City of Brampton's development application websites will be reviewed to evaluate the inclusion of specific background developments.

Site Trip Generation

Site trip generation will be completed for the on-site uses based on the 11th Edition of the ITE Trip Generation Manual and proxy data for similar land uses. The Transportation Tomorrow Survey (TTS) will be reviewed for mode splits.

Vehicle Trip Distribution

Vehicle trip distribution will be determined based on a review of travel patterns identified in the existing traffic counts and distribution information from the TTS.

Traffic Analysis

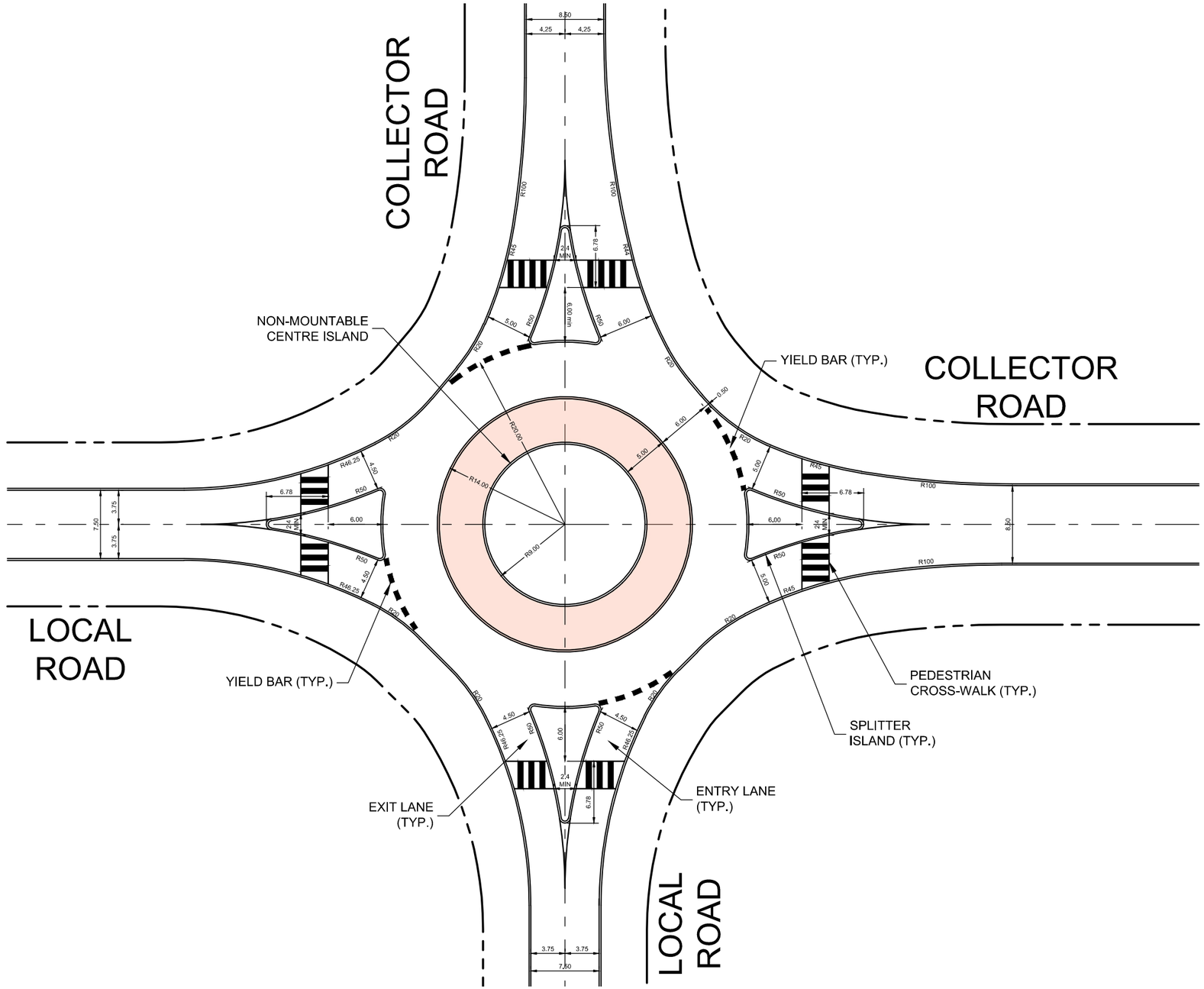
Traffic Analysis will be undertaken using Synchro 11, with analysis parameters in accordance with those outlined by the Region of Peel's Traffic Impact Study Guidelines.

Appendix B:
Typical Roundabout Design

NOTE: THESE DRAWINGS ARE ILLUSTRATIVE AND NOT TO BE APPLIED AS DETAILED DESIGN DRAWINGS. DETAILED ROUNDABOUT DESIGN MUST ENSURE APPROPRIATE SIGHT LINES ARE PROVIDED. OTHER CONSIDERATIONS INCLUDE (BUT ARE NOT LIMITED TO) AREA CONTEXT AND ROAD GEOMETRY.

DESIGN STANDARDS:

- 40m INSCRIBED CENTRE DIAMETER
- DESIGN VEHICLES: TAC B-12 BUS (ALL ROADS) AND TAC WB-20 ON COLLECTOR ROADS

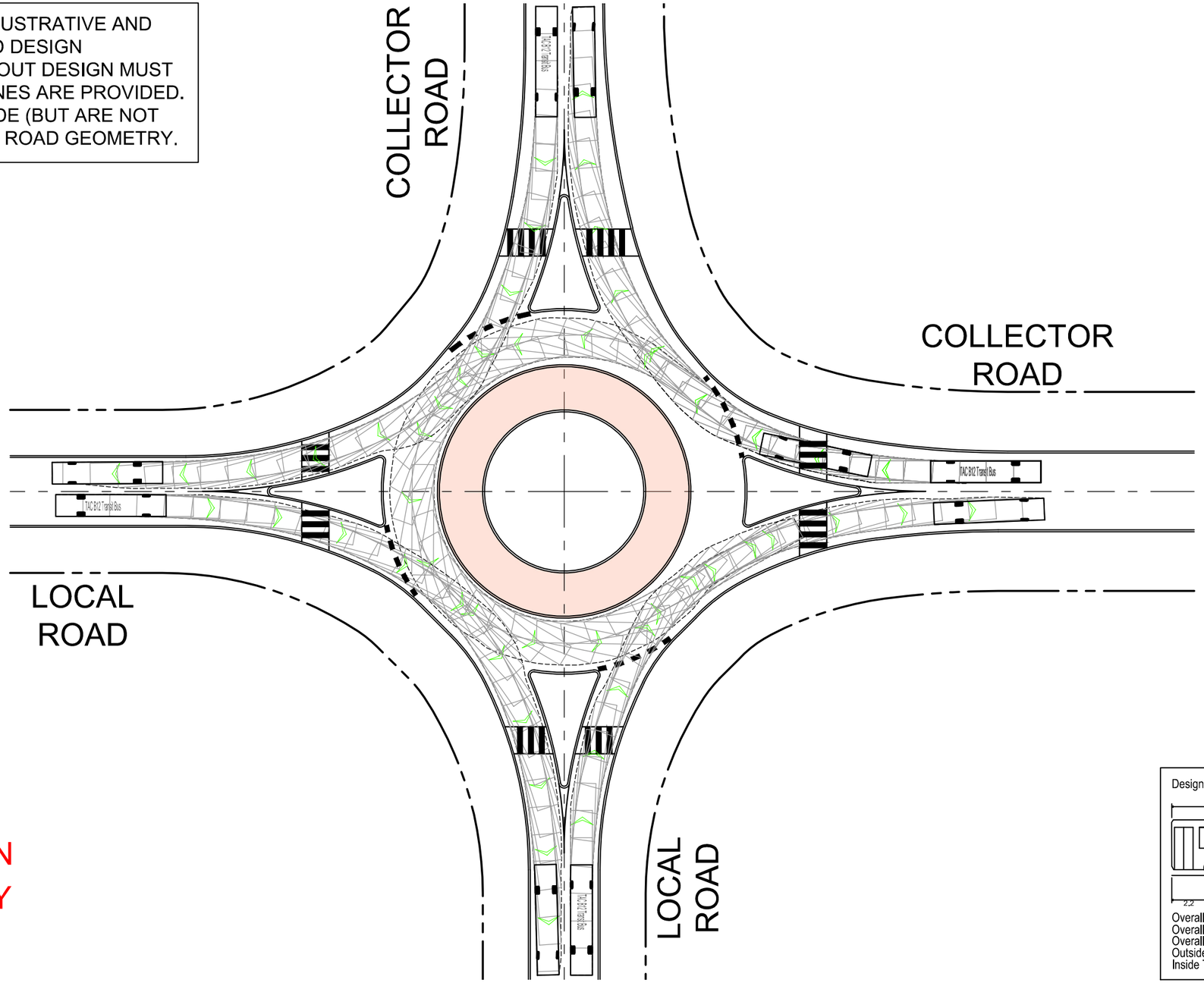


DRAFT

FOR DISCUSSION PURPOSES ONLY

BA Group	SINGLE LANE SUBURBAN ROUNDABOUT DESIGN Example 1	Project: Tullamore Project No. 6860-49 Date: August 7, 2024 Revised: --	Scale 1:500 (0 5 10 15 20m) Drawing No. FD-1

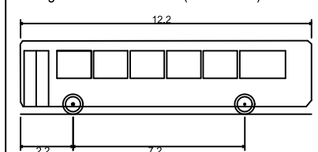
NOTE: THESE DRAWINGS ARE ILLUSTRATIVE AND NOT TO BE APPLIED AS DETAILED DESIGN DRAWINGS. DETAILED ROUNDABOUT DESIGN MUST ENSURE APPROPRIATE SIGHT LINES ARE PROVIDED. OTHER CONSIDERATIONS INCLUDE (BUT ARE NOT LIMITED TO) AREA CONTEXT AND ROAD GEOMETRY.



DRAFT

FOR DISCUSSION PURPOSES ONLY

Design Vehicle - TAC B12 (Transit Bus)



Overall Length	12.20m
Overall Width	2.40m
Overall Body Height	3.08m
Outside Turning Radius	14.23m
Inside Turning Radius	8.27m

BA Group

SINGLE LANE SUBURBAN ROUNDABOUT DESIGN

Vehicle Manoeuvring Diagram
TAC B-12 Bus

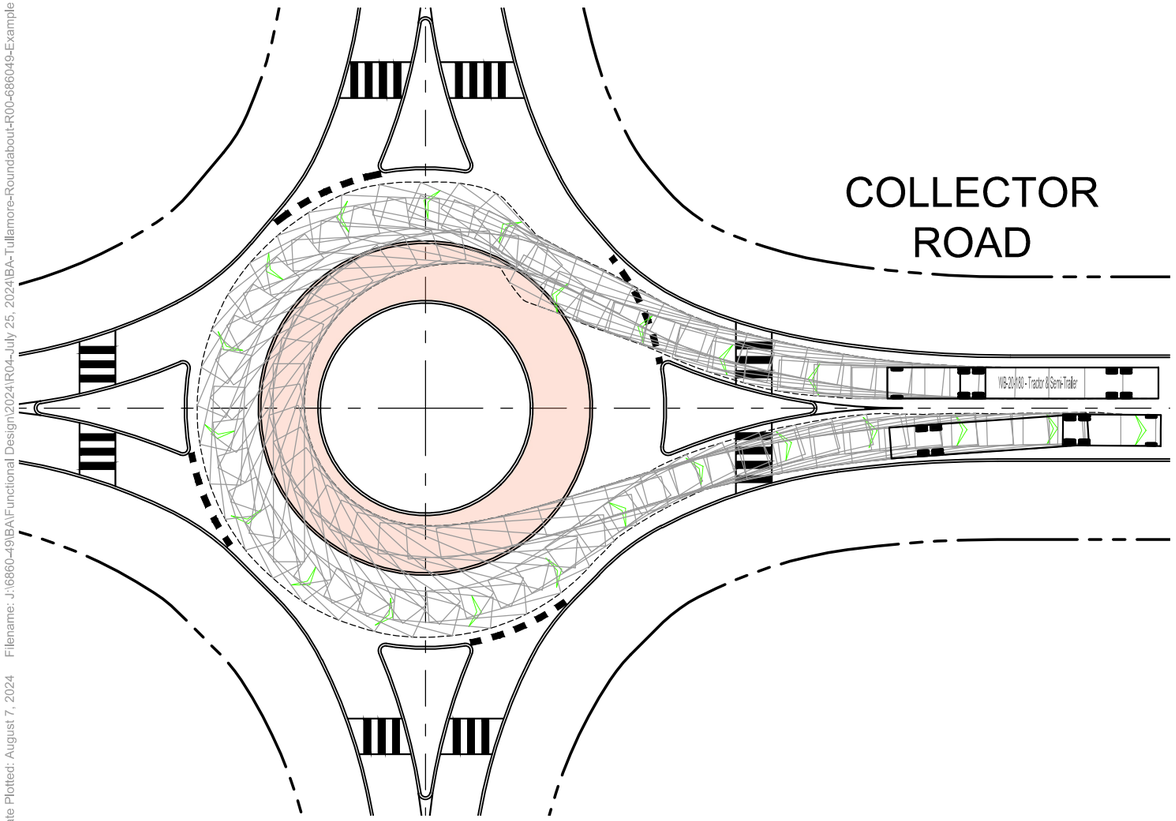
Project:	Tullamore
Project No.	6860-49
Date:	August 7, 2024
Revised:	--

Scale 1:500 (0 5 10 15 20m)

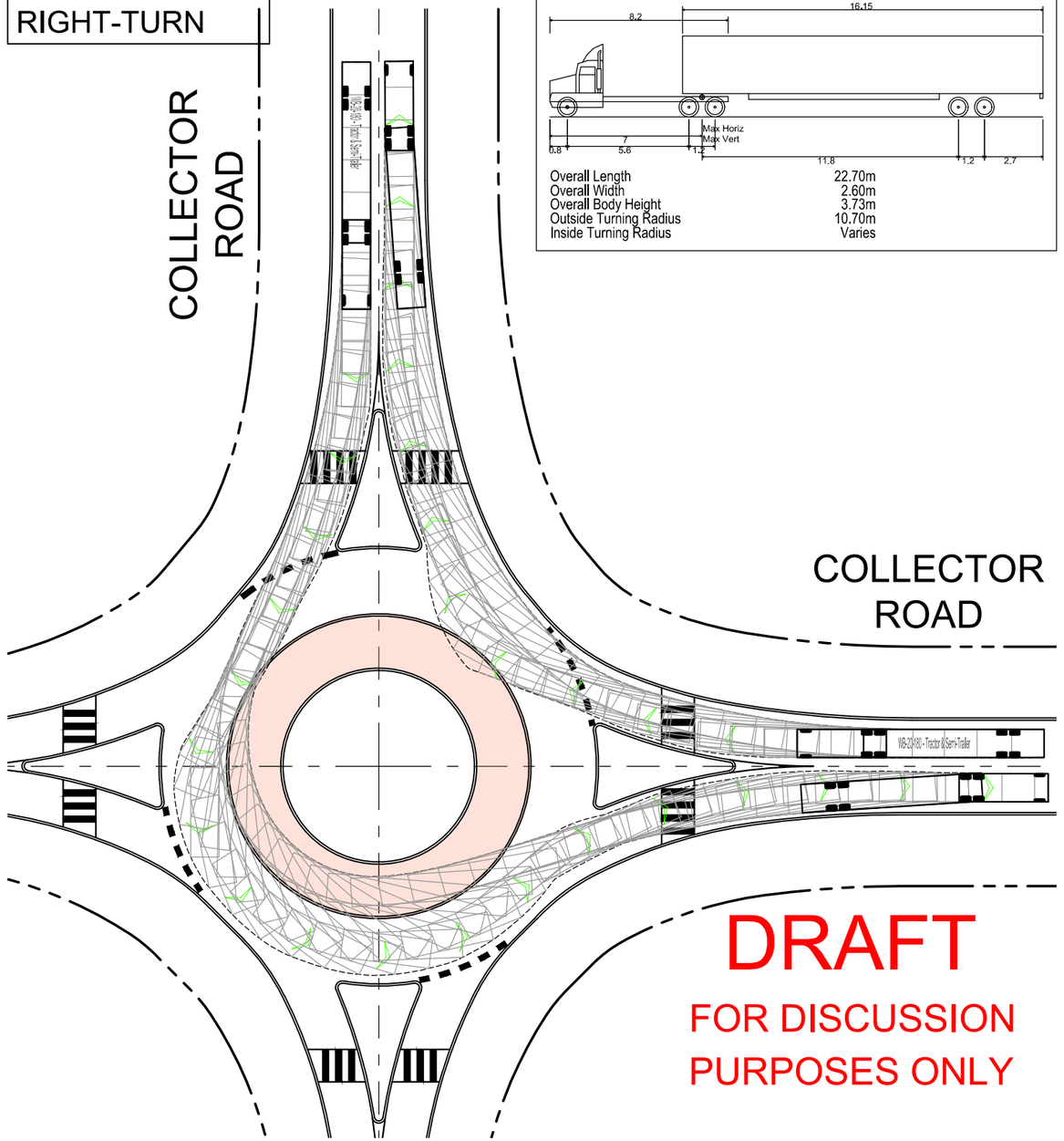
Drawing No. VMD-1

NOTE: THESE DRAWINGS ARE ILLUSTRATIVE AND NOT TO BE APPLIED AS DETAILED DESIGN DRAWINGS. DETAILED ROUNDABOUT DESIGN MUST ENSURE APPROPRIATE SIGHT LINES ARE PROVIDED. OTHER CONSIDERATIONS INCLUDE (BUT ARE NOT LIMITED TO) AREA CONTEXT AND ROAD GEOMETRY.

U-TURN



LEFT-TURN AND RIGHT-TURN



Design Vehicle - TAC WB-20

Overall Length	22.70m
Overall Width	2.60m
Overall Body Height	3.73m
Outside Turning Radius	10.70m
Inside Turning Radius	Varies

DRAFT

FOR DISCUSSION PURPOSES ONLY

Date Plotted: August 7, 2024 Filename: J:\6860-49\BA\Functional Design\2024\R04-July 25, 2024\BA-Tullamore-Roundabout-R00-6860049-Example 1.dwg

BA Group

SINGLE LANE SUBURBAN ROUNDABOUT DESIGN

Vehicle Manoeuvring Diagram
TAC WB-20 Tractor Trailer

Project:	Tullamore
Project No.	6860-49
Date:	August 7, 2024
Revised:	--

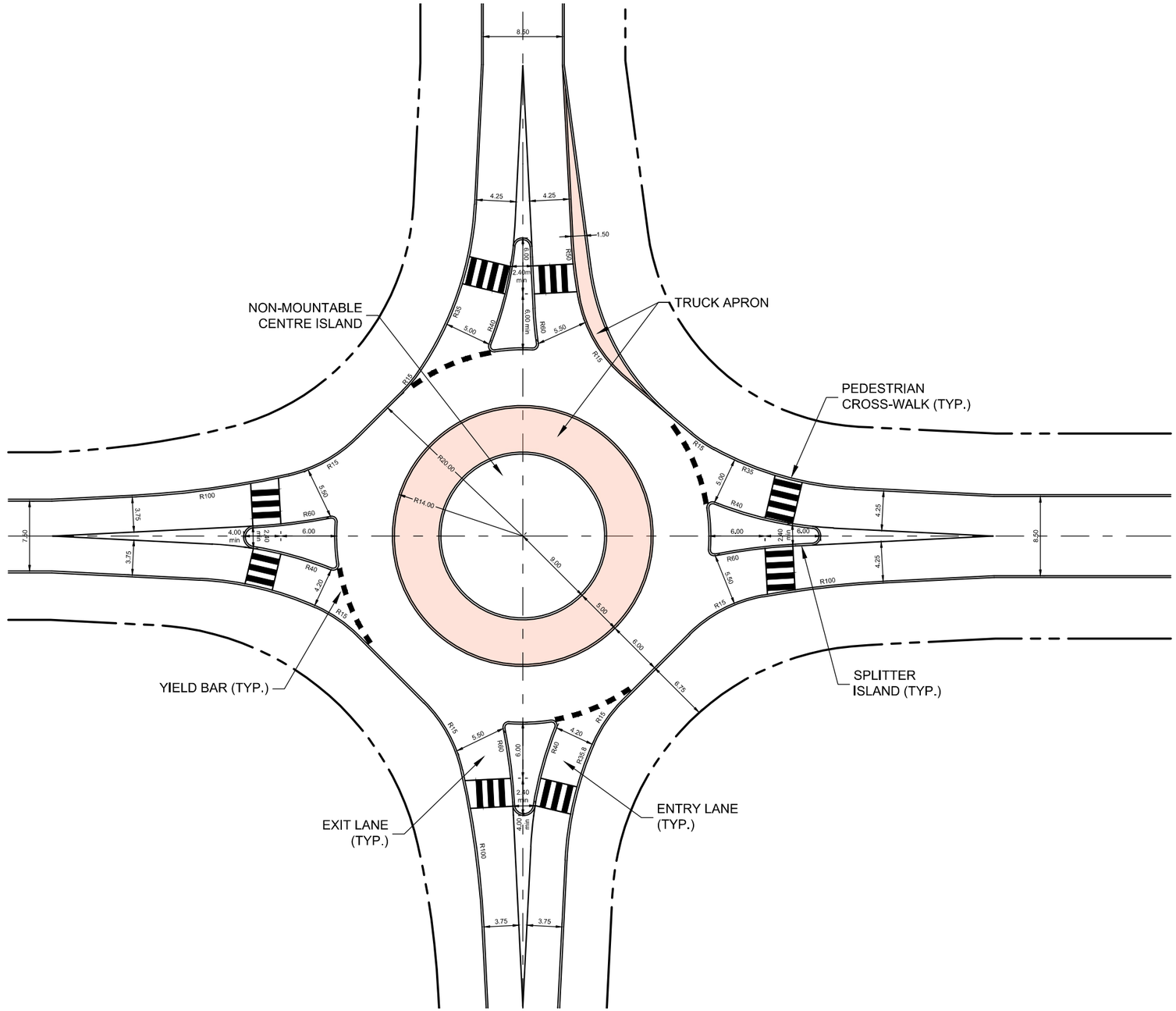
Scale 1:500 — 0 5 10 15 20m

Drawing No. VMD-2

NOTE: THESE DRAWINGS ARE ILLUSTRATIVE AND NOT TO BE APPLIED AS DETAILED DESIGN DRAWINGS. DETAILED ROUNDABOUT DESIGN MUST ENSURE APPROPRIATE SIGHT LINES ARE PROVIDED. OTHER CONSIDERATIONS INCLUDE (BUT ARE NOT LIMITED TO) AREA CONTEXT AND ROAD GEOMETRY.

DESIGN STANDARDS:

- 40m INSCRIBED CENTRE DIAMETER
- DESIGN VEHICLES: TAC B-12 BUS (ALL ROADS) AND TAC WB-20 ON COLLECTOR ROADS

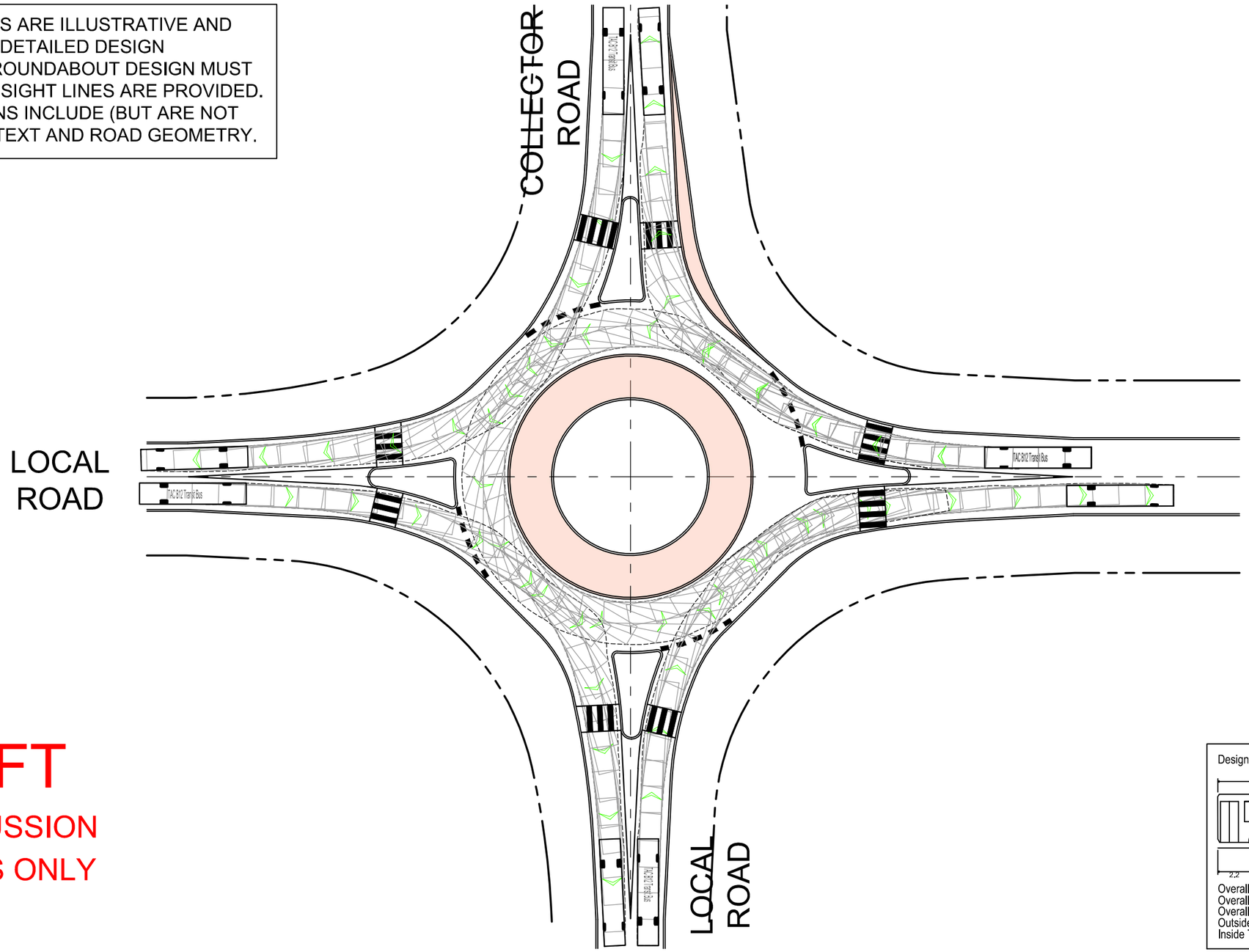


DRAFT

FOR DISCUSSION PURPOSES ONLY

BA Group	SINGLE LANE SUBURBAN ROUNDABOUT DESIGN Example 2	Project: Tullamore Project No. 6860-49 Date: August 7, 2024 Revised: --	Scale 1:500 (0 5 10 15 20m) Drawing No. FD-2

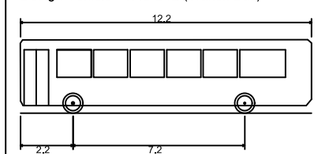
NOTE: THESE DRAWINGS ARE ILLUSTRATIVE AND NOT TO BE APPLIED AS DETAILED DESIGN DRAWINGS. DETAILED ROUNDABOUT DESIGN MUST ENSURE APPROPRIATE SIGHT LINES ARE PROVIDED. OTHER CONSIDERATIONS INCLUDE (BUT ARE NOT LIMITED TO) AREA CONTEXT AND ROAD GEOMETRY.



DRAFT

FOR DISCUSSION PURPOSES ONLY

Design Vehicle - TAC B12 (Transit Bus)



Overall Length	12.20m
Overall Width	2.40m
Overall Body Height	3.08m
Outside Turning Radius	14.23m
Inside Turning Radius	8.27m

BA Group

SINGLE LANE SUBURBAN ROUNDABOUT DESIGN

Vehicle Manoeuvring Diagram
TAC B-12 Bus

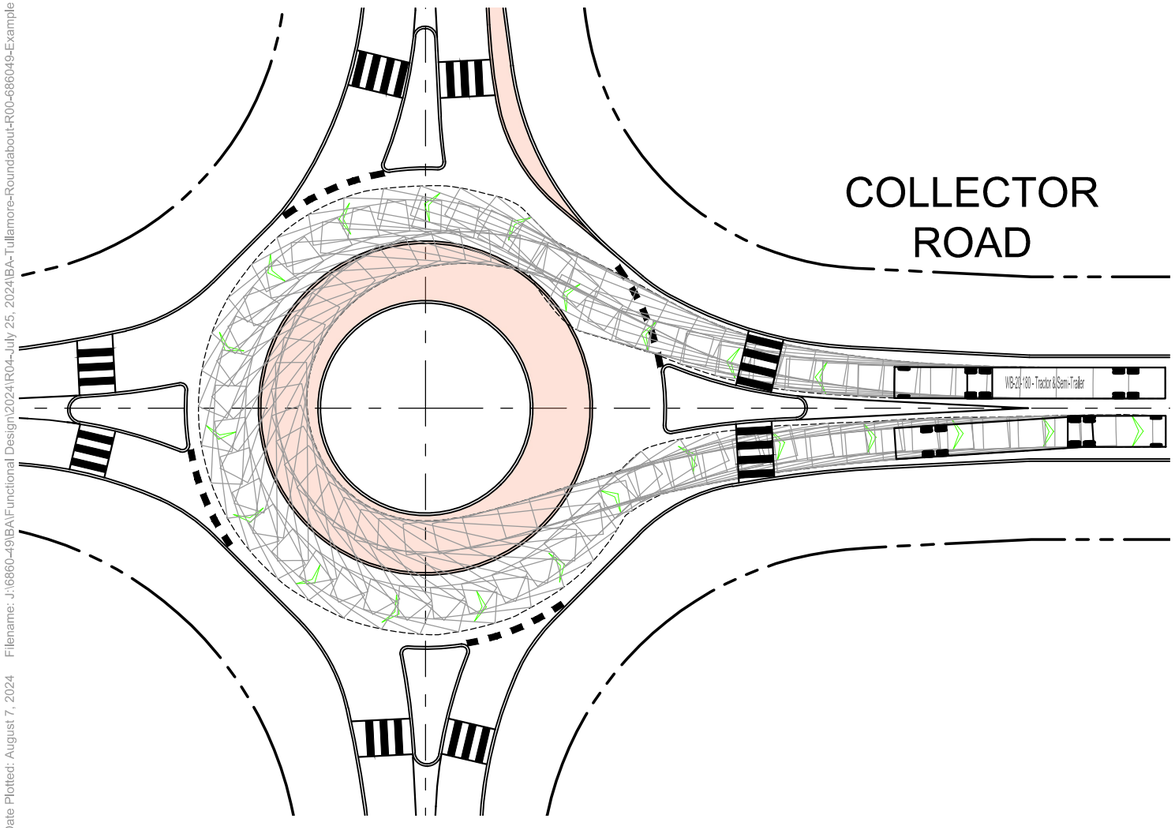
Project:	Tullamore
Project No.	6860-49
Date:	August 7, 2024
Revised:	--

Scale 1:500 (0, 5, 10, 15, 20m)

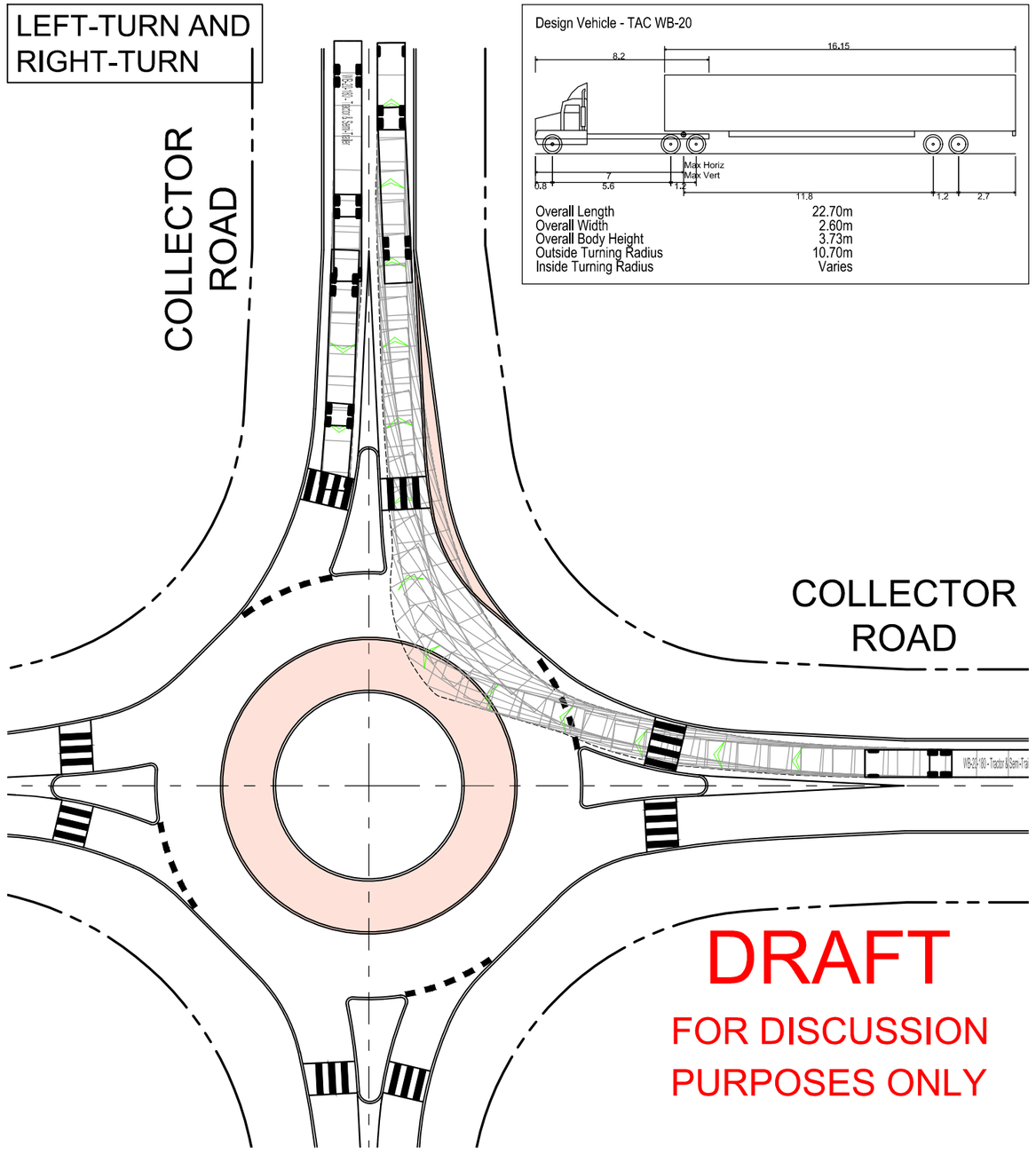
Drawing No. VMD-1

NOTE: THESE DRAWINGS ARE ILLUSTRATIVE AND NOT TO BE APPLIED AS DETAILED DESIGN DRAWINGS. DETAILED ROUNDABOUT DESIGN MUST ENSURE APPROPRIATE SIGHT LINES ARE PROVIDED. OTHER CONSIDERATIONS INCLUDE (BUT ARE NOT LIMITED TO) AREA CONTEXT AND ROAD GEOMETRY.

U-TURN



LEFT-TURN AND RIGHT-TURN



Overall Length	22.70m
Overall Width	2.60m
Overall Body Height	3.73m
Outside Turning Radius	10.70m
Inside Turning Radius	Varies

DRAFT

FOR DISCUSSION PURPOSES ONLY

Date Plotted: August 7, 2024 Filename: J:\6860-49\BA\Functional Design\20241\R04-July 25, 2024\BA-Tullamore-Roundabout-R00-6860049-Example 2.dwg

BA Group

SINGLE LANE SUBURBAN ROUNDABOUT DESIGN

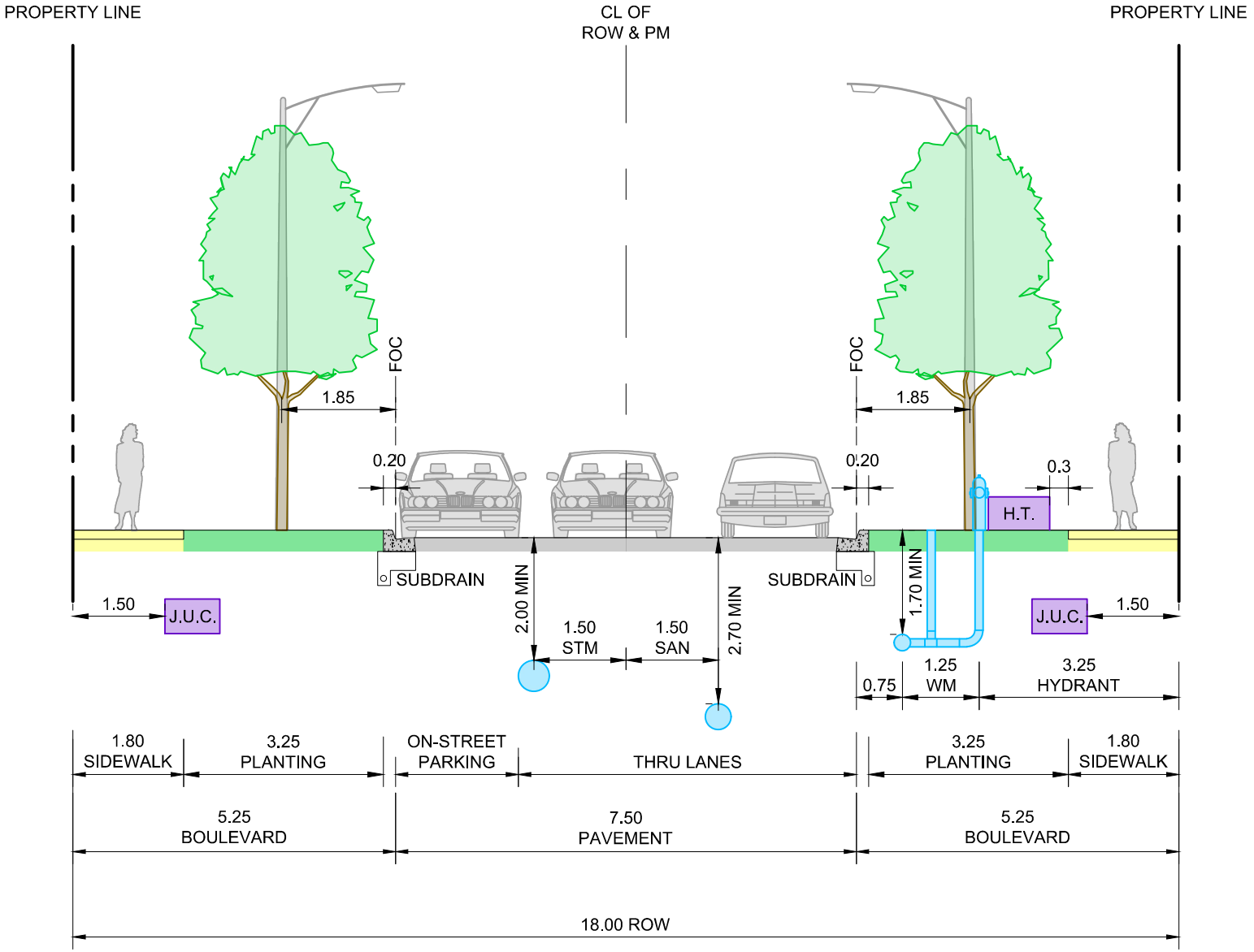
Vehicle Manoeuvring Diagram
TAC WB-20 Tractor Trailer

Project:	Tullamore
Project No.	6860-49
Date:	August 7, 2024
Revised:	--

Scale 1:500 (0, 5, 10, 15, 20m)

Drawing No. VMD-2

Appendix C:
Proposed Cross Sections



J.U.C. - JOINT USE UTILITY CORRIDOR
H.T. - HYDRO TRANSFORMER

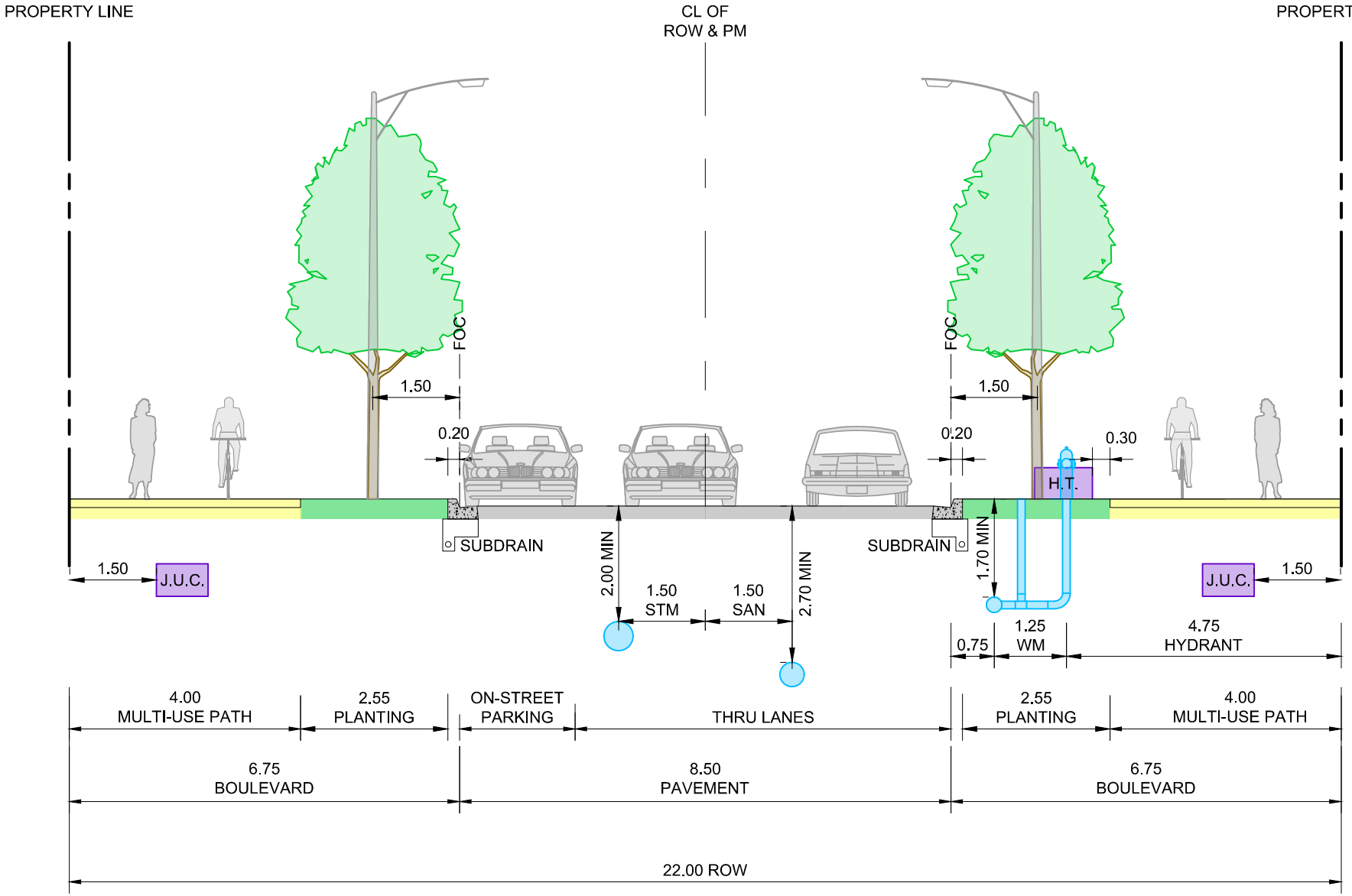
BA Group

CALEDON CROSS-SECTION

18.0m R.O.W.
Local Road

Project:	Caledon
Project No.	8155-03
Date:	March 20, 2024
Revised:	June 26, 2024
Drawing No.	XS-1

Date Plotted: June 26, 2024 Filename: J:\8155-03\BA\Cross-Sections\03 - June 26, 2024\BA-Generic Caledon-XSEC-R03-815503.dwg



J.U.C. - JOINT USE UTILITY CORRIDOR
H.T. - HYDRO TRANSFORMER

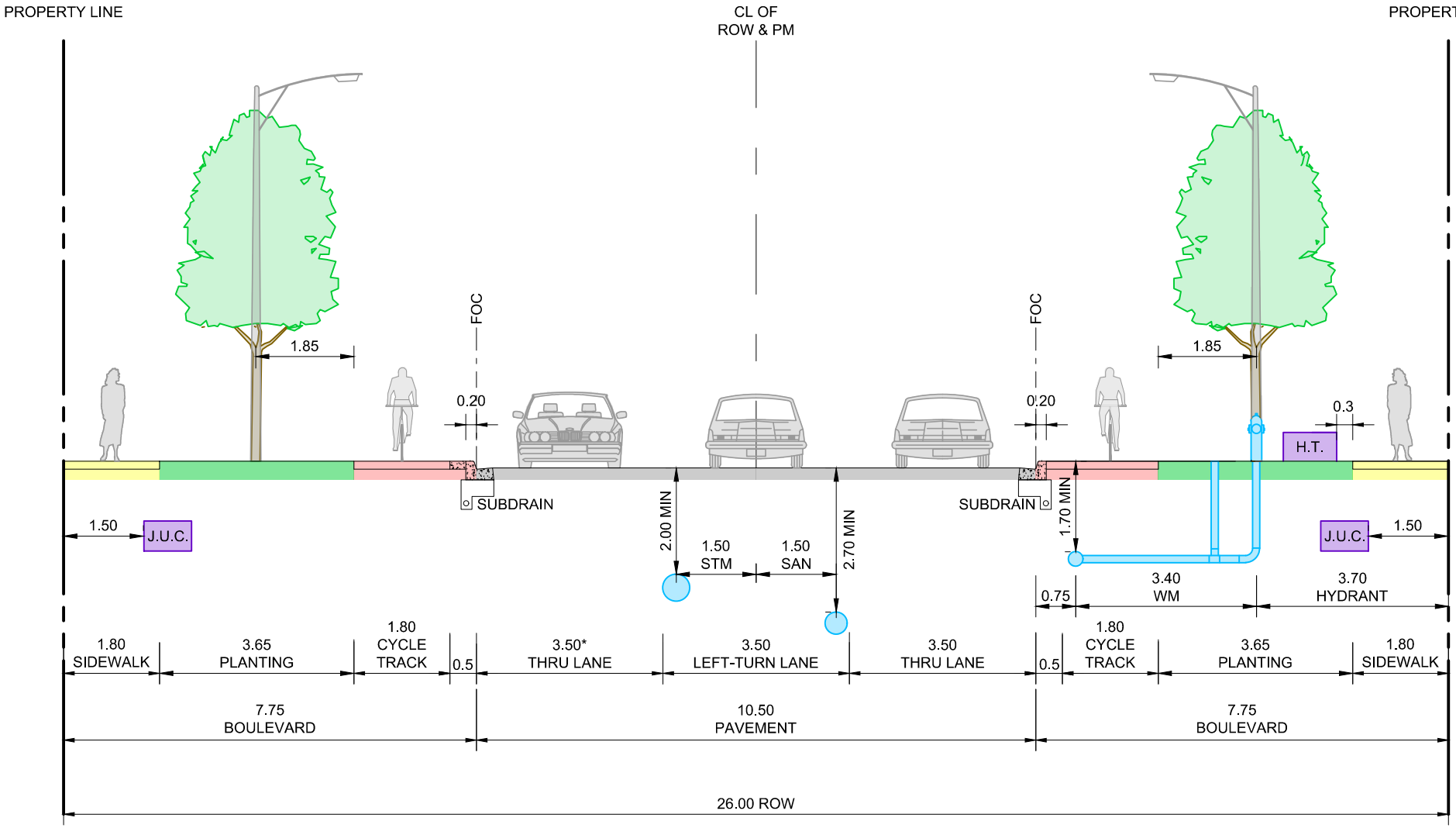
BA Group

CALEDON CROSS-SECTION

22.0m R.O.W.
Collector

Project:	Caledon
Project No.	8155-03
Date:	March 20, 2024
Revised:	June 26, 2024
Drawing No.	XS-2

Date Plotted: June 26, 2024 Filename: J:\8155-03\BA\Cross-Sections\03 - June 26, 2024\BA-Generic Caledon-XSEC-R03-815503.dwg



J.U.C. - JOINT USE UTILITY CORRIDOR
H.T. - HYDRO TRANSFORMER
* RECEIVING LANES AT INTERSECTIONS TO BE WIDENED

BA Group

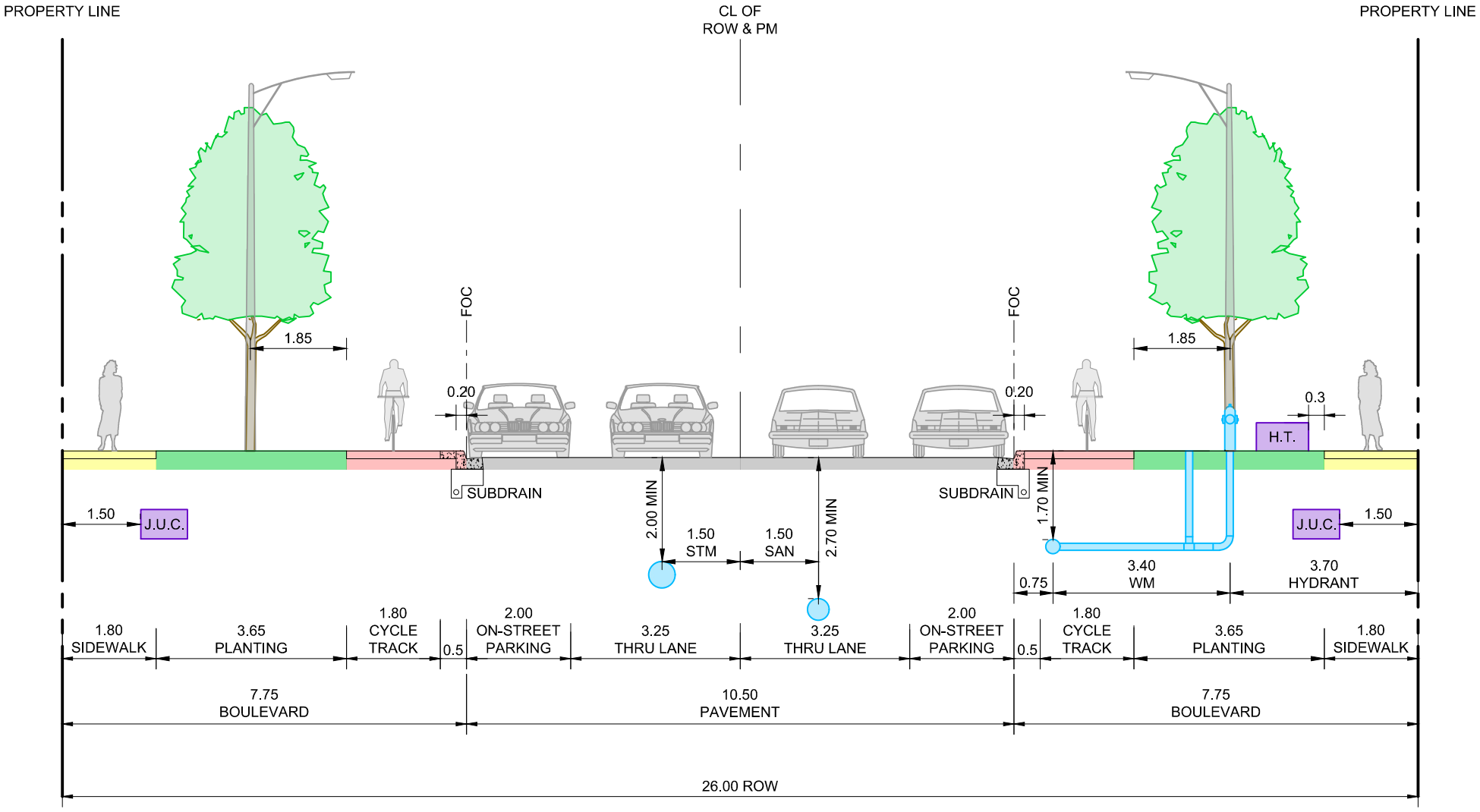
CALEDON CROSS-SECTION

26.0m R.O.W.

Urban Corridor (Intersection)

Project:	Caledon
Project No.	8155-03
Date:	March 20, 2024
Revised:	June 26, 2024
Drawing No.	XS-3A

Date Plotted: June 26, 2024 Filename: J:\8155-03\BA\Cross-Sections\03 - June 26, 2024\BA-Generic Caledon-XSEC-R03-815503.dwg



J.U.C. - JOINT USE UTILITY CORRIDOR
H.T. - HYDRO TRANSFORMER

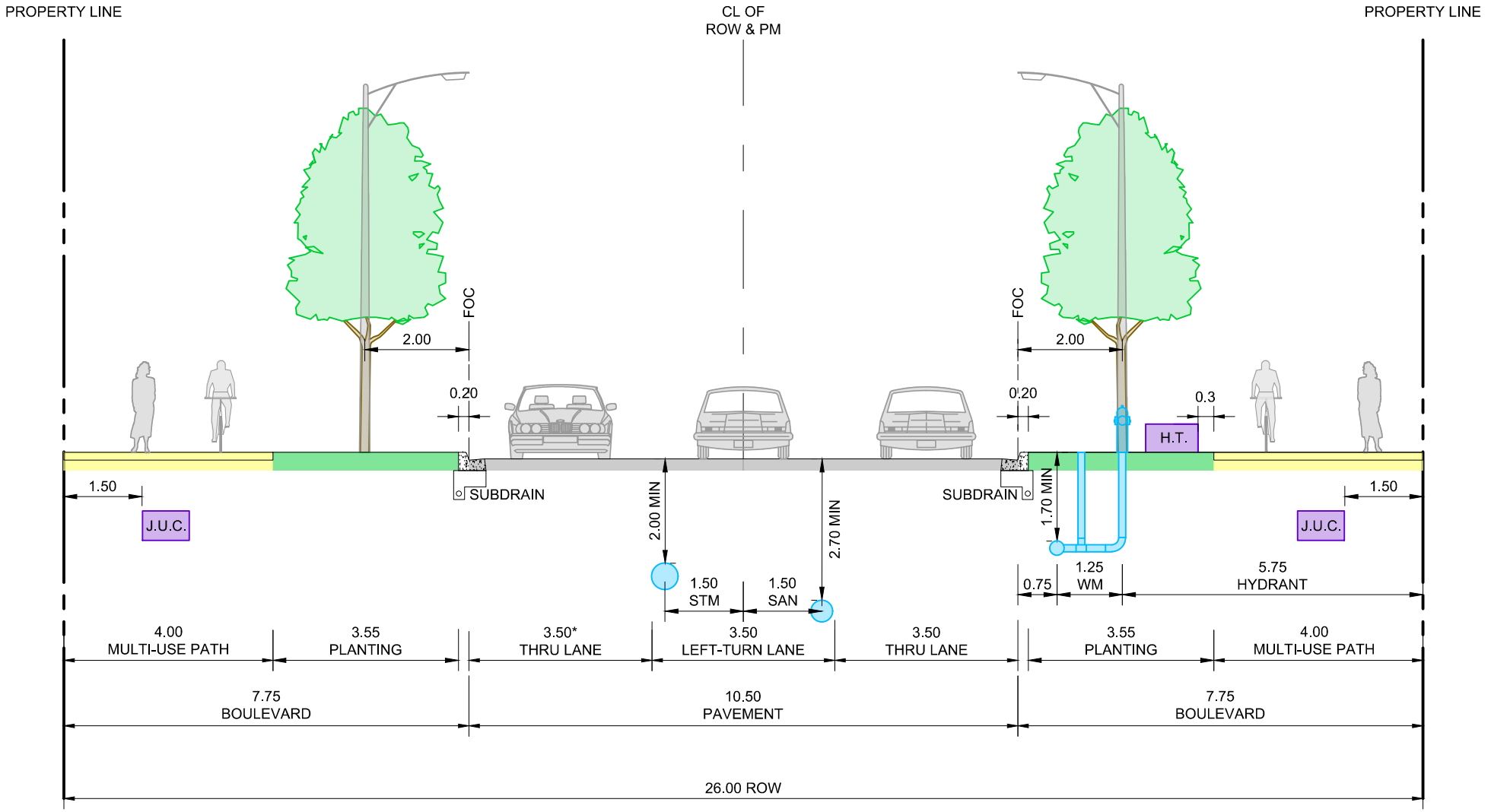
BA Group

CALEDON CROSS-SECTION

26.0m R.O.W.

Urban Corridor (Mid-Section)

Project:	Caledon
Project No.	8155-03
Date:	March 20, 2024
Revised:	June 26, 2024
Drawing No.	XS-3B



J.U.C. - JOINT USE UTILITY CORRIDOR
H.T. - HYDRO TRANSFORMER
* RECEIVING LANES AT INTERSECTIONS TO BE WIDENED

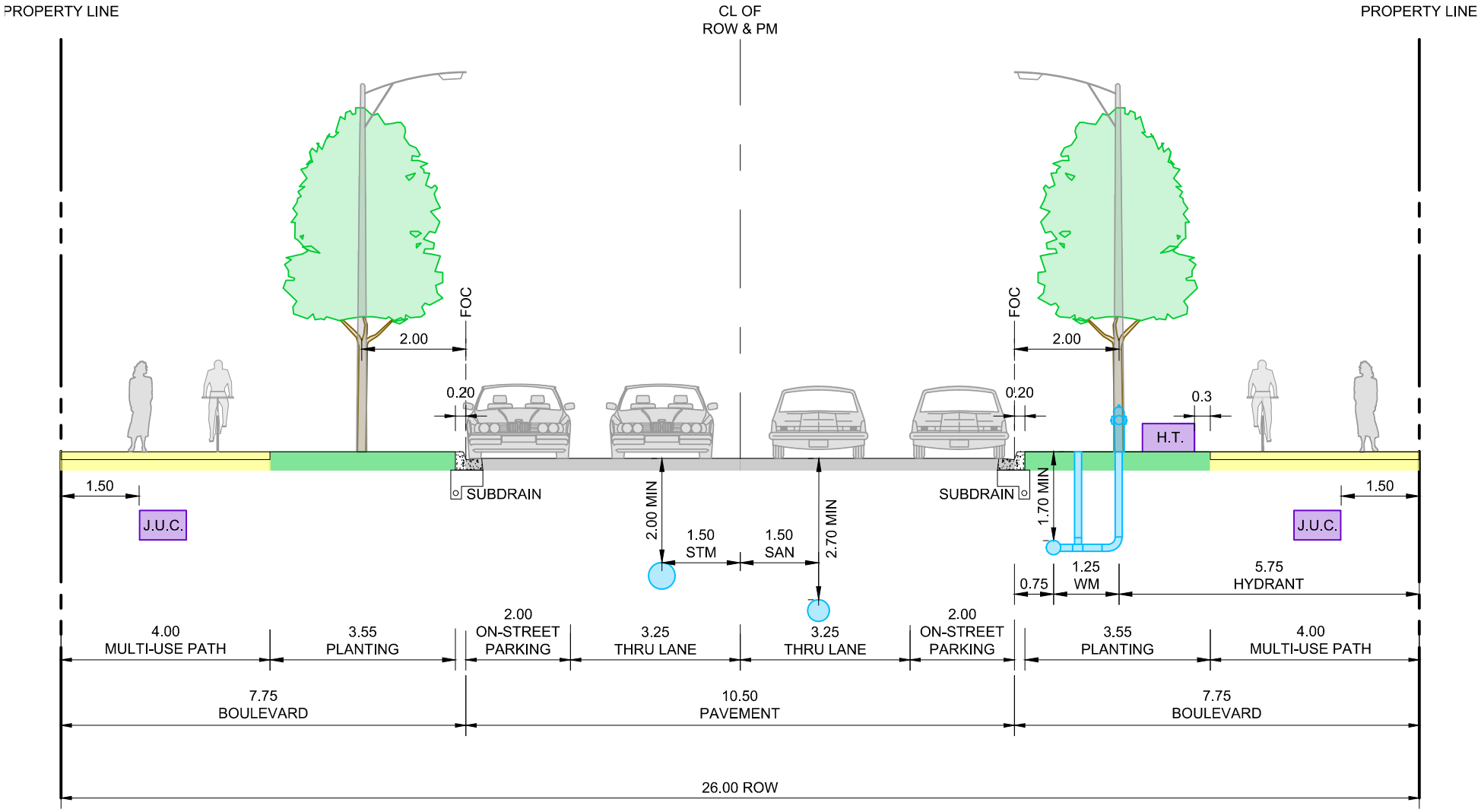
BA Group

CALEDON CROSS-SECTION

26.0m R.O.W.

Major Collector (Intersection)

Project:	Caledon
Project No.	8155-03
Date:	March 20, 2024
Revised:	June 26, 2024
Drawing No.	XS-4A



J.U.C. - JOINT USE UTILITY CORRIDOR
H.T. - HYDRO TRANSFORMER

BA Group

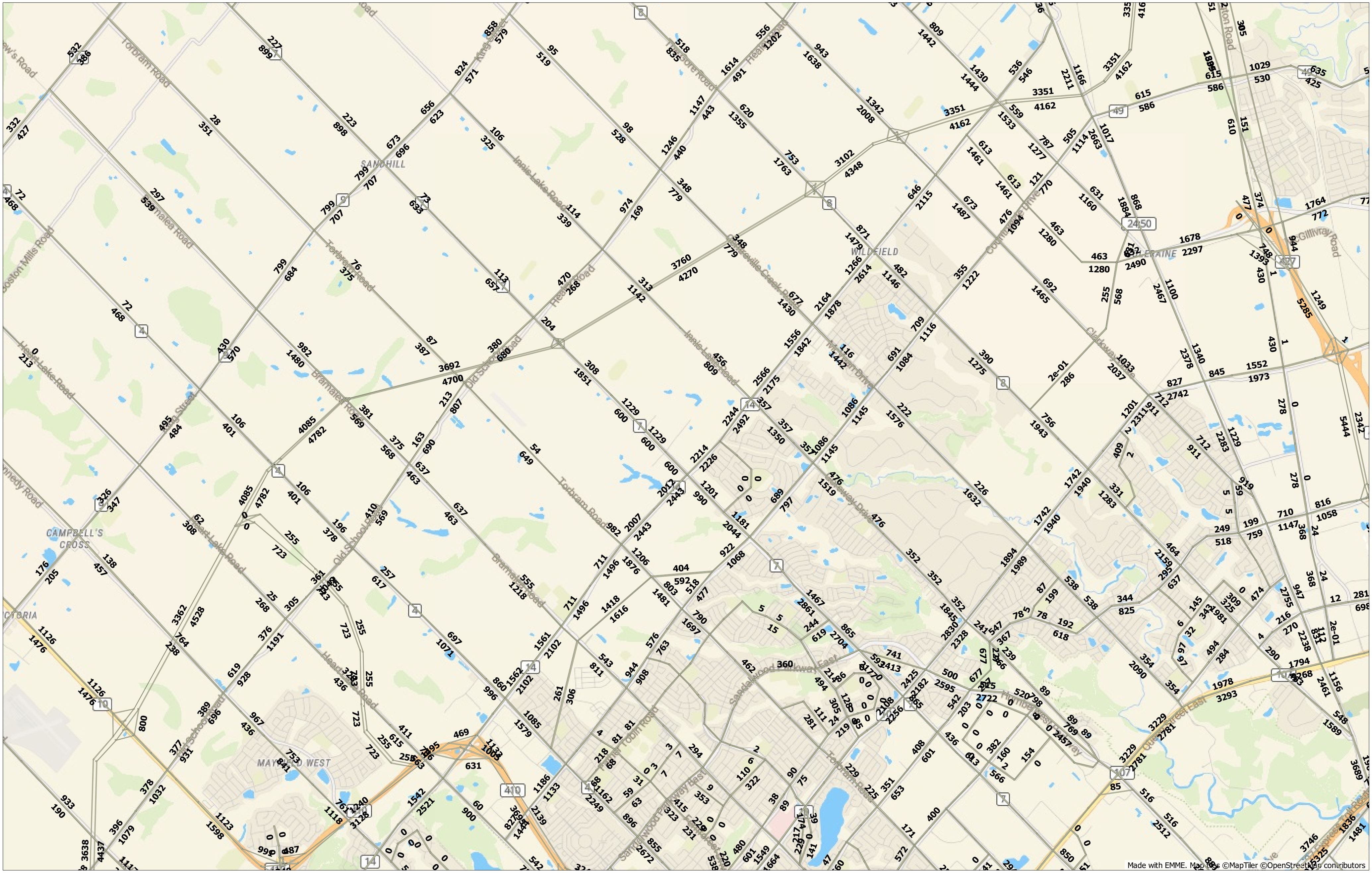
CALEDON CROSS-SECTION

26.0m R.O.W.

Major Collector (Mid-Section)

Project:	Caledon
Project No.	8155-03
Date:	March 20, 2024
Revised:	June 26, 2024
Drawing No.	XS-4B

Appendix D:
TMP Volumes


SANDHILL
WILDFIELD
CAMPBELL'S CROSS
Torbram Road
Heart Lake Road
Old School Road
Bramalea Road
Innis Lake Road
Countryside Drive
Clarkway Drive
Sandalwood Parkway East
Made with EMME.

Appendix E:
TTS Data

MayfieldTullamore

6860-49
Residential Vehicular Site Traffic Distribution (AM Peak Hour)
Outbound
BA Group - COF
2024-08-19

Thu Aug 18 2022 11:22:43 GMT-0400 (Eastern Daylight Time) - Run Time: 2836ms

Cross Tabulation Query Form - Trip - 2016 v1.1

Row: Planning district of destination - pd_dest
Column: 2006 GTA zone of origin - gta06_orig

Filters:
Start time of trip - start_time In 600-859
and
Trip purpose of origin - purp_orig In H,
and
Primary travel mode of trip - mode_prime In d,m,p,t,u
and
2006 GTA zone of origin - gta06_orig In 3014,3012,3442,3010

Trip 2016
Table:

	3010	3012	3014	3442	Total
PD 1 of Toronto	80	0	0	27	107
PD 3 of Toronto	0	0	0	35	35
PD 7 of Toronto	21	0	0	24	45
PD 8 of Toronto	66	0	0	54	120
PD 9 of Toronto	41	0	0	0	41
PD 10 of Toronto	53	0	0	32	85
PD 11 of Toronto	41	0	0	0	41
Newmarket	23	0	0	0	23
Richmond Hill	0	0	0	38	38
Markham	16	0	0	38	54
Vaughan	35	0	27	168	230
Caledon	406	57	0	14	477
Brampton	930	16	0	824	1770
Mississauga	380	0	0	427	807
Orangeville	13	0	0	0	13
Shelburne	0	0	0	24	24
			total		3910

MayfieldTullamore

6860-49

Residential Vehicular Site Traffic Distribution (AM Peak Hour)
Outbound
BA Group - COF
2024-08-19

Thu Aug 18 2022 11:32:49 GMT-0400 (Eastern Daylight Time) - Run Time: 2622ms

Cross Tabulation Query Form - Trip - 2016 v1.1

Row: Planning district of origin - pd_orig
Column: 2006 GTA zone of destination - gta06_dest

Filters:
Start time of trip - start_time In 1500-1759
and
Trip purpose of destination - purp_dest In H,
and
Primary travel mode of trip - mode_prime In d,m,p,t,u
and
2006 GTA zone of destination - gta06_dest In 3014,3012,3442,3010

Trip 2016
Table:

	3010	**3012**	**3014**	**3442**	**Total**
PD 1 of Toronto	116	0	0	62	178
PD 7 of Toronto	21	0	0	24	45
PD 8 of Toronto	66	0	0	72	138
PD 9 of Toronto	93	0	0	0	93
PD 10 of Toronto	53	0	0	12	65
Newmarket	23	0	0	0	23
Richmond Hill	0	0	0	38	38
Markham	0	0	0	57	57
King	13	0	0	0	13
Vaughan	60	0	27	155	242
Caledon	212	19	0	14	245
Brampton	759	16	0	584	1359
Mississauga	269	0	0	281	550
Oakville	18	0	0	0	18
Orangeville	24	0	0	0	24
			total		3088

Fri Sep 02 2022 08:54:00 GMT-0400 (Eastern Daylight Time) - Run Time: 2475ms

Cross Tabulation Query Form - Trip - 2016 v1.1

Row: Planning district of origin - pd_orig
Column: 2006 GTA zone of destination - gta06_dest

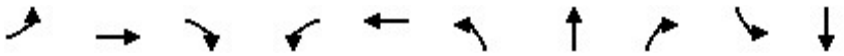
Filters:
Start time of trip - start_time In 1500-1759
and
Trip purpose of destination - purp_dest In M,
and
Primary travel mode of trip - mode_prime In d,m,p,t,u
and
2006 GTA zone of destination - gta06_dest In 3014,3012,3422,3010,3516,3370,3371,3360,3361

Trip 2016
Table:

	3360	3361	3370	3422	Total
PD 8 of Tor	0	0	0	29	29
PD 9 of Tor	0	0	22	0	22
PD 10 of To	0	0	0	9	9
Markham	0	30	0	0	30
Vaughan	0	0	20	12	32
Caledon	0	0	45	0	45
Brampton	76	44	428	74	622
Mississauga	0	0	77	11	88
Halton Hills	0	0	4	0	4
			total		881

Appendix F:
Synchro Reports

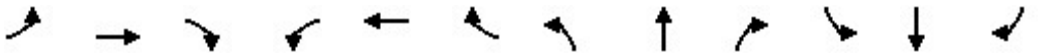
1: Dixie Road & Old School Road



Lane Group	EBL	EBT	EBR	WBL	WBT	NBL	NBT	NBR	SBL	SBT
Lane Group Flow (vph)	30	595	200	115	500	50	150	10	25	360
v/c Ratio	0.14	0.67	0.37	0.38	0.36	0.10	0.08	0.01	0.04	0.19
Control Delay	28.9	37.4	5.9	21.9	19.5	24.3	21.6	1.7	14.1	13.6
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	28.9	37.4	5.9	21.9	19.5	24.3	21.6	1.7	14.1	13.6
Queue Length 50th (m)	4.8	58.4	0.0	13.3	30.3	17.1	26.0	0.0	2.3	18.6
Queue Length 95th (m)	11.6	70.2	15.9	18.6	33.1	m21.3	m32.3	m0.0	7.9	33.1
Internal Link Dist (m)		358.4			980.7		3054.6			1216.1
Turn Bay Length (m)	100.0		100.0	100.0		100.0		100.0	100.0	
Base Capacity (vph)	358	1450	767	372	2101	514	1877	870	649	1871
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.08	0.41	0.26	0.31	0.24	0.10	0.08	0.01	0.04	0.19

Intersection Summary

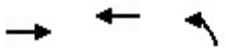
m Volume for 95th percentile queue is metered by upstream signal.



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	30	595	200	115	455	45	50	150	10	25	350	10
Future Volume (vph)	30	595	200	115	455	45	50	150	10	25	350	10
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	3.0	4.0		4.0	4.0	4.0	4.0	4.0	
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95		1.00	0.95	1.00	1.00	0.95	
Frt	1.00	1.00	0.85	1.00	0.99		1.00	1.00	0.85	1.00	1.00	
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)	1770	3539	1583	1770	3491		1770	3539	1583	1770	3524	
Flt Permitted	0.47	1.00	1.00	0.20	1.00		0.52	1.00	1.00	0.66	1.00	
Satd. Flow (perm)	873	3539	1583	375	3491		971	3539	1583	1224	3524	
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	30	595	200	115	455	45	50	150	10	25	350	10
RTOR Reduction (vph)	0	0	150	0	12	0	0	0	5	0	1	0
Lane Group Flow (vph)	30	595	50	115	488	0	50	150	5	25	359	0
Turn Type	Perm	NA	Perm	pm+pt	NA		Perm	NA	Perm	Perm	NA	
Protected Phases		4		3	8			2			6	
Permitted Phases	4		4	8			2		2	6		
Actuated Green, G (s)	24.0	24.0	24.0	37.9	37.9		52.1	52.1	52.1	52.1	52.1	
Effective Green, g (s)	25.0	25.0	25.0	38.9	38.9		53.1	53.1	53.1	53.1	53.1	
Actuated g/C Ratio	0.25	0.25	0.25	0.39	0.39		0.53	0.53	0.53	0.53	0.53	
Clearance Time (s)	5.0	5.0	5.0	4.0	5.0		5.0	5.0	5.0	5.0	5.0	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	218	884	395	297	1357		515	1879	840	649	1871	
v/s Ratio Prot		c0.17		c0.04	0.14			0.04			c0.10	
v/s Ratio Perm	0.03		0.03	0.11			0.05		0.00	0.02		
v/c Ratio	0.14	0.67	0.13	0.39	0.36		0.10	0.08	0.01	0.04	0.19	
Uniform Delay, d1	29.1	33.8	29.0	21.2	21.7		11.6	11.5	11.0	11.2	12.2	
Progression Factor	1.00	1.00	1.00	1.03	0.93		1.78	1.71	1.00	1.00	1.00	
Incremental Delay, d2	0.3	2.0	0.1	0.8	0.2		0.2	0.0	0.0	0.1	0.2	
Delay (s)	29.4	35.8	29.2	22.6	20.4		20.9	19.6	11.0	11.3	12.5	
Level of Service	C	D	C	C	C		C	B	B	B	B	
Approach Delay (s)		34.0			20.8			19.5			12.4	
Approach LOS		C			C			B			B	

Intersection Summary			
HCM 2000 Control Delay	24.4	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.35		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	11.0
Intersection Capacity Utilization	80.0%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group



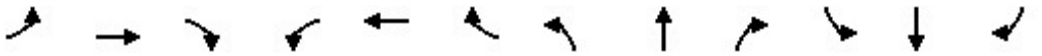
Lane Group	EBT	WBT	NBL
Lane Group Flow (vph)	625	505	125
v/c Ratio	0.23	0.18	0.57
Control Delay	0.4	3.7	50.7
Queue Delay	0.0	0.0	0.0
Total Delay	0.4	3.7	50.7
Queue Length 50th (m)	0.5	11.1	24.4
Queue Length 95th (m)	0.8	23.2	41.0
Internal Link Dist (m)	980.7	354.8	470.3
Turn Bay Length (m)			
Base Capacity (vph)	2774	2779	646
Starvation Cap Reductn	0	0	0
Spillback Cap Reductn	0	0	0
Storage Cap Reductn	0	0	0
Reduced v/c Ratio	0.23	0.18	0.19

Intersection Summary

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (vph)	615	10	0	505	125	0
Future Volume (vph)	615	10	0	505	125	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5			4.5	4.5	
Lane Util. Factor	0.95			0.95	1.00	
Frt	1.00			1.00	1.00	
Flt Protected	1.00			1.00	0.95	
Satd. Flow (prot)	3531			3539	1770	
Flt Permitted	1.00			1.00	0.95	
Satd. Flow (perm)	3531			3539	1770	
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	615	10	0	505	125	0
RTOR Reduction (vph)	0	0	0	0	0	0
Lane Group Flow (vph)	625	0	0	505	125	0
Turn Type	NA		Perm	NA	Prot	Perm
Protected Phases	4			8	2	
Permitted Phases			8			2
Actuated Green, G (s)	78.5			78.5	12.5	
Effective Green, g (s)	78.5			78.5	12.5	
Actuated g/C Ratio	0.78			0.78	0.12	
Clearance Time (s)	4.5			4.5	4.5	
Vehicle Extension (s)	3.0			3.0	3.0	
Lane Grp Cap (vph)	2771			2778	221	
v/s Ratio Prot	c0.18			0.14	c0.07	
v/s Ratio Perm						
v/c Ratio	0.23			0.18	0.57	
Uniform Delay, d1	2.8			2.7	41.2	
Progression Factor	0.09			1.19	1.00	
Incremental Delay, d2	0.2			0.1	3.3	
Delay (s)	0.4			3.4	44.5	
Level of Service	A			A	D	
Approach Delay (s)	0.4			3.4	44.5	
Approach LOS	A			A	D	

Intersection Summary			
HCM 2000 Control Delay	6.0	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.27		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	9.0
Intersection Capacity Utilization	31.7%	ICU Level of Service	A
Analysis Period (min)	15		

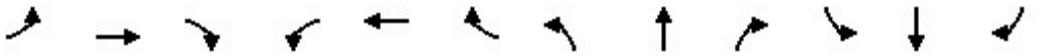
c Critical Lane Group



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	10	575	40	50	180	40	115	1155	210	60	590	180
v/c Ratio	0.02	0.35	0.05	0.15	0.11	0.05	0.38	0.72	0.27	0.62	0.37	0.22
Control Delay	29.0	30.5	20.5	19.3	15.8	7.0	20.7	24.7	7.9	49.4	18.1	2.5
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	29.0	30.5	20.5	19.3	15.8	7.0	20.7	24.7	7.9	49.4	18.1	2.5
Queue Length 50th (m)	2.1	66.5	6.3	6.5	12.0	0.0	15.0	97.0	11.7	9.0	40.0	0.0
Queue Length 95th (m)	6.3	77.8	13.0	17.5	22.4	8.1	25.2	100.9	21.5	#27.4	44.1	9.6
Internal Link Dist (m)		354.8			541.7			507.7			385.1	
Turn Bay Length (m)	100.0		100.0	100.0		100.0	100.0		100.0	100.0		100.0
Base Capacity (vph)	557	1659	763	325	1659	763	393	2088	978	126	2088	1007
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.02	0.35	0.05	0.15	0.11	0.05	0.29	0.55	0.21	0.48	0.28	0.18

Intersection Summary

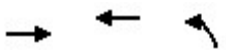
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	10	575	40	50	180	40	115	1155	210	60	590	180
Future Volume (vph)	10	575	40	50	180	40	115	1155	210	60	590	180
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1770	3539	1583	1770	3539	1583	1770	3539	1583	1770	3539	1583
Flt Permitted	0.64	1.00	1.00	0.37	1.00	1.00	0.36	1.00	1.00	0.11	1.00	1.00
Satd. Flow (perm)	1189	3539	1583	695	3539	1583	668	3539	1583	214	3539	1583
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	10	575	40	50	180	40	115	1155	210	60	590	180
RTOR Reduction (vph)	0	0	21	0	0	21	0	0	59	0	0	99
Lane Group Flow (vph)	10	575	19	50	180	19	115	1155	151	60	590	81
Turn Type	Perm	NA	Perm	Perm	NA	Perm	Perm	NA	Perm	Perm	NA	Perm
Protected Phases		4			8			2			6	
Permitted Phases	4		4	8		8	2		2	6		6
Actuated Green, G (s)	45.9	45.9	45.9	45.9	45.9	45.9	44.1	44.1	44.1	44.1	44.1	44.1
Effective Green, g (s)	46.9	46.9	46.9	46.9	46.9	46.9	45.1	45.1	45.1	45.1	45.1	45.1
Actuated g/C Ratio	0.47	0.47	0.47	0.47	0.47	0.47	0.45	0.45	0.45	0.45	0.45	0.45
Clearance Time (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	557	1659	742	325	1659	742	301	1596	713	96	1596	713
v/s Ratio Prot		c0.16			0.05			c0.33			0.17	
v/s Ratio Perm	0.01		0.01	0.07		0.01	0.17		0.10	0.28		0.05
v/c Ratio	0.02	0.35	0.03	0.15	0.11	0.03	0.38	0.72	0.21	0.62	0.37	0.11
Uniform Delay, d1	14.2	16.8	14.3	15.2	14.9	14.3	18.2	22.4	16.7	21.0	18.1	15.9
Progression Factor	1.66	1.67	4.52	0.97	0.94	1.10	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	0.1	0.6	0.1	1.0	0.1	0.1	0.8	1.7	0.1	12.0	0.1	0.1
Delay (s)	23.6	28.7	64.6	15.7	14.1	15.7	19.0	24.0	16.8	33.0	18.2	16.0
Level of Service	C	C	E	B	B	B	B	C	B	C	B	B
Approach Delay (s)		30.9			14.6			22.6			18.8	
Approach LOS		C			B			C			B	

Intersection Summary			
HCM 2000 Control Delay	22.6	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.53		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	69.5%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group



Lane Group	EBT	WBT	NBL
Lane Group Flow (vph)	855	225	85
v/c Ratio	0.28	0.08	0.43
Control Delay	2.7	0.9	29.4
Queue Delay	0.0	0.0	0.0
Total Delay	2.7	0.9	29.4
Queue Length 50th (m)	3.2	0.4	7.8
Queue Length 95th (m)	7.0	3.1	21.8
Internal Link Dist (m)	541.7	813.7	565.0
Turn Bay Length (m)			
Base Capacity (vph)	3010	2793	472
Starvation Cap Reductn	0	0	0
Spillback Cap Reductn	0	0	0
Storage Cap Reductn	0	0	0
Reduced v/c Ratio	0.28	0.08	0.18

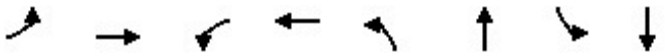
Intersection Summary

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (vph)	810	45	10	215	40	45
Future Volume (vph)	810	45	10	215	40	45
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0			4.0	4.0	
Lane Util. Factor	0.95			0.95	1.00	
Frt	0.99			1.00	0.93	
Flt Protected	1.00			1.00	0.98	
Satd. Flow (prot)	3511			3531	1690	
Flt Permitted	1.00			0.92	0.98	
Satd. Flow (perm)	3511			3260	1690	
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	810	45	10	215	40	45
RTOR Reduction (vph)	2	0	0	0	41	0
Lane Group Flow (vph)	853	0	0	225	44	0
Turn Type	NA		Perm	NA	Prot	
Protected Phases	4			8	2	
Permitted Phases			8			
Actuated Green, G (s)	82.9			82.9	7.1	
Effective Green, g (s)	83.9			83.9	8.1	
Actuated g/C Ratio	0.84			0.84	0.08	
Clearance Time (s)	5.0			5.0	5.0	
Vehicle Extension (s)	3.0			3.0	3.0	
Lane Grp Cap (vph)	2945			2735	136	
v/s Ratio Prot	c0.24				c0.03	
v/s Ratio Perm				0.07		
v/c Ratio	0.29			0.08	0.32	
Uniform Delay, d1	1.7			1.4	43.4	
Progression Factor	1.33			0.53	1.00	
Incremental Delay, d2	0.2			0.1	1.4	
Delay (s)	2.5			0.8	44.7	
Level of Service	A			A	D	
Approach Delay (s)	2.5			0.8	44.7	
Approach LOS	A			A	D	

Intersection Summary			
HCM 2000 Control Delay	5.3	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.29		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	35.5%	ICU Level of Service	A
Analysis Period (min)	15		

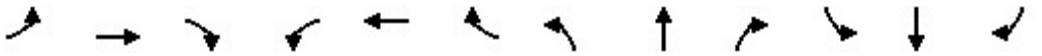
c Critical Lane Group

5: Torbram Road & Old School Road



Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	85	770	170	215	5	95	5	420
v/c Ratio	0.10	0.31	0.38	0.09	0.04	0.13	0.02	0.56
Control Delay	3.3	3.1	9.0	4.5	34.8	34.3	31.0	38.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	3.3	3.1	9.0	4.5	34.8	34.3	31.0	38.1
Queue Length 50th (m)	3.1	14.4	11.9	5.8	1.3	13.2	0.8	40.4
Queue Length 95th (m)	4.1	10.6	25.5	9.8	4.7	18.0	3.9	55.4
Internal Link Dist (m)		813.7		282.0		1511.4		433.8
Turn Bay Length (m)	100.0		100.0		100.0		100.0	
Base Capacity (vph)	812	2465	443	2487	158	881	322	882
Starvation Cap Reductn	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.10	0.31	0.38	0.09	0.03	0.11	0.02	0.48

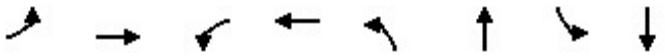
Intersection Summary



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	85	670	100	170	205	10	5	90	5	5	405	15
Future Volume (vph)	85	670	100	170	205	10	5	90	5	5	405	15
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Lane Util. Factor	1.00	0.95		1.00	0.95		1.00	0.95		1.00	0.95	
Frt	1.00	0.98		1.00	0.99		1.00	0.99		1.00	0.99	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770	3470		1770	3515		1770	3511		1770	3520	
Flt Permitted	0.62	1.00		0.34	1.00		0.34	1.00		0.69	1.00	
Satd. Flow (perm)	1150	3470		627	3515		633	3511		1290	3520	
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	85	670	100	170	205	10	5	90	5	5	405	15
RTOR Reduction (vph)	0	11	0	0	3	0	0	4	0	0	2	0
Lane Group Flow (vph)	85	759	0	170	212	0	5	91	0	5	418	0
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)	69.7	69.7		69.7	69.7		20.3	20.3		20.3	20.3	
Effective Green, g (s)	70.7	70.7		70.7	70.7		21.3	21.3		21.3	21.3	
Actuated g/C Ratio	0.71	0.71		0.71	0.71		0.21	0.21		0.21	0.21	
Clearance Time (s)	5.0	5.0		5.0	5.0		5.0	5.0		5.0	5.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	813	2453		443	2485		134	747		274	749	
v/s Ratio Prot		0.22			0.06			0.03			c0.12	
v/s Ratio Perm	0.07			c0.27			0.01			0.00		
v/c Ratio	0.10	0.31		0.38	0.09		0.04	0.12		0.02	0.56	
Uniform Delay, d1	4.6	5.5		5.9	4.6		31.2	31.8		31.1	35.1	
Progression Factor	0.63	0.53		1.00	1.00		1.09	1.13		1.00	1.00	
Incremental Delay, d2	0.3	0.3		2.5	0.1		0.1	0.1		0.0	0.9	
Delay (s)	3.2	3.2		8.4	4.6		34.3	35.9		31.1	36.0	
Level of Service	A	A		A	A		C	D		C	D	
Approach Delay (s)		3.2			6.3			35.8			36.0	
Approach LOS		A			A			D			D	

Intersection Summary			
HCM 2000 Control Delay	13.6	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.42		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	65.0%	ICU Level of Service	C
Analysis Period (min)	15		

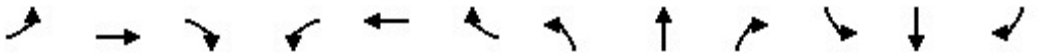
c Critical Lane Group



Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	125	255	400	310	100	1175	70	650
v/c Ratio	0.54	0.32	0.80	0.25	0.31	0.77	0.21	0.36
Control Delay	28.4	7.2	26.5	4.8	26.1	28.8	9.2	10.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	28.4	7.2	26.5	4.8	26.1	28.8	9.2	10.2
Queue Length 50th (m)	12.9	3.8	34.2	4.1	10.8	80.4	3.3	21.1
Queue Length 95th (m)	24.2	10.4	47.3	9.5	25.5	#123.5	10.1	38.8
Internal Link Dist (m)		346.6		673.9		1139.4		507.7
Turn Bay Length (m)	100.0		100.0		100.0		100.0	
Base Capacity (vph)	332	1073	501	1502	326	1526	328	1804
Starvation Cap Reductn	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.38	0.24	0.80	0.21	0.31	0.77	0.21	0.36

Intersection Summary

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



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	125	0	255	400	45	265	100	1095	80	70	605	45
Future Volume (vph)	125	0	255	400	45	265	100	1095	80	70	605	45
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		1.0	4.0		4.0	4.0		1.0	4.0	
Lane Util. Factor	1.00	0.95		1.00	0.95		1.00	0.95		1.00	0.95	
Frt	1.00	0.85		1.00	0.87		1.00	0.99		1.00	0.99	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770	3008		1770	3085		1770	3503		1770	3502	
Flt Permitted	0.56	1.00		0.55	1.00		0.40	1.00		0.15	1.00	
Satd. Flow (perm)	1049	3008		1028	3085		754	3503		283	3502	
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	125	0	255	400	45	265	100	1095	80	70	605	45
RTOR Reduction (vph)	0	138	0	0	133	0	0	8	0	0	8	0
Lane Group Flow (vph)	125	117	0	400	177	0	100	1167	0	70	642	0
Turn Type	Perm	NA		pm+pt	NA		Perm	NA		pm+pt	NA	
Protected Phases		4		3	8			2		1	6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)	12.2	12.2		20.2	20.2		24.3	24.3		29.8	29.8	
Effective Green, g (s)	13.2	13.2		21.2	21.2		25.3	25.3		30.8	30.8	
Actuated g/C Ratio	0.22	0.22		0.35	0.35		0.42	0.42		0.51	0.51	
Clearance Time (s)	5.0	5.0		2.0	5.0		5.0	5.0		2.0	5.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	230	661		449	1090		317	1477		256	1797	
v/s Ratio Prot		0.04		c0.10	0.06			c0.33		0.02	c0.18	
v/s Ratio Perm	0.12			0.21			0.13			0.12		
v/c Ratio	0.54	0.18		0.89	0.16		0.32	0.79		0.27	0.36	
Uniform Delay, d1	20.7	19.0		17.1	13.3		11.6	15.1		9.5	8.7	
Progression Factor	1.00	1.00		1.00	1.00		1.50	1.43		1.00	1.00	
Incremental Delay, d2	2.6	0.1		19.3	0.1		2.3	4.0		0.6	0.6	
Delay (s)	23.3	19.1		36.5	13.4		19.7	25.5		10.1	9.3	
Level of Service	C	B		D	B		B	C		B	A	
Approach Delay (s)		20.5			26.4			25.0			9.3	
Approach LOS		C			C			C			A	

Intersection Summary			
HCM 2000 Control Delay	21.1	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.69		
Actuated Cycle Length (s)	60.0	Sum of lost time (s)	10.0
Intersection Capacity Utilization	80.8%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

Lane Group	EBL	EBR	NBL	NBT	SBT
Lane Group Flow (vph)	10	365	175	90	675
v/c Ratio	0.03	0.80	0.33	0.03	0.25
Control Delay	29.7	27.8	3.8	1.3	7.1
Queue Delay	0.0	0.0	0.0	0.0	0.0
Total Delay	29.7	27.8	3.8	1.3	7.1
Queue Length 50th (m)	1.8	26.9	1.1	0.3	28.4
Queue Length 95th (m)	5.6	54.3	36.8	5.3	67.6
Internal Link Dist (m)	708.9			1213.1	1511.4
Turn Bay Length (m)			100.0		
Base Capacity (vph)	654	728	537	2662	2655
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	0.02	0.50	0.33	0.03	0.25

Intersection Summary

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	10	365	175	90	660	15
Future Volume (vph)	10	365	175	90	660	15
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	
Lane Util. Factor	1.00	1.00	1.00	0.95	0.95	
Frt	1.00	0.85	1.00	1.00	1.00	
Flt Protected	0.95	1.00	0.95	1.00	1.00	
Satd. Flow (prot)	1770	1583	1770	3539	3527	
Flt Permitted	0.95	1.00	0.38	1.00	1.00	
Satd. Flow (perm)	1770	1583	715	3539	3527	
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	10	365	175	90	660	15
RTOR Reduction (vph)	0	189	0	0	1	0
Lane Group Flow (vph)	10	176	175	90	674	0
Turn Type	Prot	Perm	Perm	NA	NA	
Protected Phases	4			2	6	
Permitted Phases		4	2			
Actuated Green, G (s)	15.8	15.8	74.2	74.2	74.2	
Effective Green, g (s)	16.8	16.8	75.2	75.2	75.2	
Actuated g/C Ratio	0.17	0.17	0.75	0.75	0.75	
Clearance Time (s)	5.0	5.0	5.0	5.0	5.0	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	297	265	537	2661	2652	
v/s Ratio Prot	0.01			0.03	0.19	
v/s Ratio Perm		c0.11	c0.24			
v/c Ratio	0.03	0.66	0.33	0.03	0.25	
Uniform Delay, d1	34.8	39.0	4.1	3.2	3.8	
Progression Factor	1.00	1.00	0.42	0.31	1.46	
Incremental Delay, d2	0.0	6.2	1.5	0.0	0.2	
Delay (s)	34.9	45.1	3.2	1.0	5.8	
Level of Service	C	D	A	A	A	
Approach Delay (s)	44.8			2.4	5.8	
Approach LOS	D			A	A	

Intersection Summary			
HCM 2000 Control Delay	16.2	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.39		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	48.0%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

Lane Group	EBL	NBT	SBT
Lane Group Flow (vph)	235	1040	1260
v/c Ratio	0.61	0.48	0.57
Control Delay	27.5	13.2	6.2
Queue Delay	0.0	0.0	0.0
Total Delay	27.5	13.2	6.2
Queue Length 50th (m)	24.6	42.2	36.6
Queue Length 95th (m)	39.7	85.2	48.2
Internal Link Dist (m)	392.2	445.4	1139.4
Turn Bay Length (m)			
Base Capacity (vph)	531	2177	2193
Starvation Cap Reductn	0	0	0
Spillback Cap Reductn	0	0	0
Storage Cap Reductn	0	0	0
Reduced v/c Ratio	0.44	0.48	0.57

Intersection Summary

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	235	0	0	1040	1185	75
Future Volume (vph)	235	0	0	1040	1185	75
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0			5.0	4.5	
Lane Util. Factor	1.00			0.95	0.95	
Frt	1.00			1.00	0.99	
Flt Protected	0.95			1.00	1.00	
Satd. Flow (prot)	1770			3539	3508	
Flt Permitted	0.95			1.00	1.00	
Satd. Flow (perm)	1770			3539	3508	
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	235	0	0	1040	1185	75
RTOR Reduction (vph)	0	0	0	0	6	0
Lane Group Flow (vph)	235	0	0	1040	1254	0
Turn Type	Prot			NA	NA	
Protected Phases	4			2	6	
Permitted Phases			2			
Actuated Green, G (s)	13.1			36.9	37.4	
Effective Green, g (s)	13.1			36.9	37.4	
Actuated g/C Ratio	0.22			0.61	0.62	
Clearance Time (s)	5.0			5.0	4.5	
Vehicle Extension (s)	3.0			3.0	3.0	
Lane Grp Cap (vph)	386			2176	2186	
v/s Ratio Prot	c0.13			0.29	c0.36	
v/s Ratio Perm						
v/c Ratio	0.61			0.48	0.57	
Uniform Delay, d1	21.1			6.3	6.6	
Progression Factor	1.00			1.75	0.69	
Incremental Delay, d2	2.7			0.7	1.0	
Delay (s)	23.9			11.8	5.6	
Level of Service	C			B	A	
Approach Delay (s)	23.9			11.8	5.6	
Approach LOS	C			B	A	

Intersection Summary			
HCM 2000 Control Delay	9.8	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.59		
Actuated Cycle Length (s)	60.0	Sum of lost time (s)	10.0
Intersection Capacity Utilization	56.1%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group

14: Bramalea Road & Street G

Lane Group	EBT	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	440	300	110	770	190	995
v/c Ratio	0.80	0.29	0.46	0.39	0.57	0.50
Control Delay	27.2	7.9	17.3	8.7	28.2	18.3
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	27.2	7.9	17.3	8.7	28.2	18.3
Queue Length 50th (m)	35.4	6.1	7.3	25.4	25.2	68.4
Queue Length 95th (m)	#69.1	13.6	23.2	38.1	#41.8	87.9
Internal Link Dist (m)	370.3	835.1		893.4		445.4
Turn Bay Length (m)			100.0		100.0	
Base Capacity (vph)	618	1173	240	1986	335	1986
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.71	0.26	0.46	0.39	0.57	0.50

Intersection Summary

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

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	0	440	0	35	265	110	770	0	190	995	0
Future Volume (vph)	0	0	440	0	35	265	110	770	0	190	995	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0			4.0		4.0	4.0		4.0	4.0	
Lane Util. Factor		1.00			0.95		1.00	0.95		1.00	0.95	
Frt		0.86			0.87		1.00	1.00		1.00	1.00	
Flt Protected		1.00			1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)		1611			3070		1770	3539		1770	3539	
Flt Permitted		1.00			1.00		0.23	1.00		0.32	1.00	
Satd. Flow (perm)		1611			3070		428	3539		598	3539	
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	0	0	440	0	35	265	110	770	0	190	995	0
RTOR Reduction (vph)	0	58	0	0	106	0	0	0	0	0	0	0
Lane Group Flow (vph)	0	382	0	0	194	0	110	770	0	190	995	0
Turn Type		NA			NA		Perm	NA		Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)		17.3			17.3		32.7	32.7		32.7	32.7	
Effective Green, g (s)		18.3			18.3		33.7	33.7		33.7	33.7	
Actuated g/C Ratio		0.31			0.31		0.56	0.56		0.56	0.56	
Clearance Time (s)		5.0			5.0		5.0	5.0		5.0	5.0	
Vehicle Extension (s)		3.0			3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)		491			936		240	1987		335	1987	
v/s Ratio Prot		c0.24			0.06			0.22			0.28	
v/s Ratio Perm							0.26			c0.32		
v/c Ratio		0.78			0.21		0.46	0.39		0.57	0.50	
Uniform Delay, d1		19.0			15.5		7.8	7.4		8.5	8.0	
Progression Factor		1.00			1.00		1.00	1.00		1.97	1.99	
Incremental Delay, d2		7.6			0.1		6.2	0.6		5.6	0.7	
Delay (s)		26.6			15.6		14.0	7.9		22.3	16.7	
Level of Service		C			B		B	A		C	B	
Approach Delay (s)		26.6			15.6			8.7			17.6	
Approach LOS		C			B			A			B	

Intersection Summary			
HCM 2000 Control Delay	16.0	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.64		
Actuated Cycle Length (s)	60.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	70.8%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

Lane Group	EBL	EBR	NBL	NBT	SBT
Lane Group Flow (vph)	35	210	30	1155	1025
v/c Ratio	0.09	0.49	0.09	0.46	0.41
Control Delay	32.8	18.6	5.2	5.6	12.6
Queue Delay	0.0	0.0	0.0	0.0	0.0
Total Delay	32.8	18.6	5.2	5.6	12.6
Queue Length 50th (m)	5.8	14.4	1.7	46.4	72.7
Queue Length 95th (m)	14.3	36.9	m4.9	93.0	99.9
Internal Link Dist (m)	622.0			284.9	1213.1
Turn Bay Length (m)			100.0		
Base Capacity (vph)	531	563	325	2512	2511
Starvation Cap Reductn	0	0	0	0	0
Spillback Cap Reductn	0	4	0	0	139
Storage Cap Reductn	0	0	0	0	0
Reduced v/c Ratio	0.07	0.38	0.09	0.46	0.43

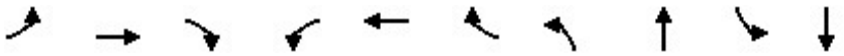
Intersection Summary

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

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	35	210	30	1155	1015	10
Future Volume (vph)	35	210	30	1155	1015	10
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	
Lane Util. Factor	1.00	1.00	1.00	0.95	0.95	
Frt	1.00	0.85	1.00	1.00	1.00	
Flt Protected	0.95	1.00	0.95	1.00	1.00	
Satd. Flow (prot)	1770	1583	1770	3539	3534	
Flt Permitted	0.95	1.00	0.25	1.00	1.00	
Satd. Flow (perm)	1770	1583	459	3539	3534	
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	35	210	30	1155	1015	10
RTOR Reduction (vph)	0	100	0	0	1	0
Lane Group Flow (vph)	35	110	30	1155	1024	0
Turn Type	Prot	Perm	Perm	NA	NA	
Protected Phases	4			2	6	
Permitted Phases		4	2			
Actuated Green, G (s)	20.0	20.0	70.0	70.0	70.0	
Effective Green, g (s)	21.0	21.0	71.0	71.0	71.0	
Actuated g/C Ratio	0.21	0.21	0.71	0.71	0.71	
Clearance Time (s)	5.0	5.0	5.0	5.0	5.0	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	371	332	325	2512	2509	
v/s Ratio Prot	0.02			c0.33	0.29	
v/s Ratio Perm		c0.07	0.07			
v/c Ratio	0.09	0.33	0.09	0.46	0.41	
Uniform Delay, d1	31.8	33.5	4.5	6.2	5.9	
Progression Factor	1.00	1.00	1.03	0.81	2.02	
Incremental Delay, d2	0.1	0.6	0.4	0.5	0.5	
Delay (s)	31.9	34.1	5.1	5.6	12.4	
Level of Service	C	C	A	A	B	
Approach Delay (s)	33.8			5.5	12.4	
Approach LOS	C			A	B	

Intersection Summary			
HCM 2000 Control Delay	11.2	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.43		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	55.3%	ICU Level of Service	B
Analysis Period (min)	15		

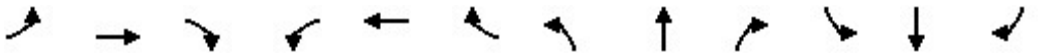
c Critical Lane Group



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	10	2200	200	180	2225	10	10	1060	10	1050
v/c Ratio	0.22	0.85	0.24	0.81	0.70	0.01	0.27	0.93	0.27	0.91
Control Delay	46.9	47.5	17.0	78.2	35.2	12.6	69.7	78.2	72.5	76.5
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	46.9	47.5	17.0	78.2	35.2	12.6	69.7	78.2	72.5	76.5
Queue Length 50th (m)	2.4	298.7	25.6	58.3	241.4	0.4	3.1	222.7	3.3	221.6
Queue Length 95th (m)	9.7	344.9	48.5	m83.7	285.0	m1.1	10.8	251.8	11.6	255.5
Internal Link Dist (m)		294.5			1349.5			377.9		3054.6
Turn Bay Length (m)	100.0		100.0	100.0		100.0			100.0	
Base Capacity (vph)	46	2587	848	283	3161	988	39	1196	39	1213
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	0.22	0.85	0.24	0.64	0.70	0.01	0.26	0.89	0.26	0.87

Intersection Summary

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



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	10	2200	200	180	2225	10	10	860	200	10	995	55
Future Volume (vph)	10	2200	200	180	2225	10	10	860	200	10	995	55
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	5.0	5.0	2.0	5.0	5.0	5.0	5.0		5.0	5.0	
Lane Util. Factor	1.00	0.91	1.00	1.00	0.91	1.00	1.00	0.95		1.00	0.95	
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.97		1.00	0.99	
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770	5085	1583	1770	5085	1583	1770	3439		1770	3511	
Flt Permitted	0.05	1.00	1.00	0.04	1.00	1.00	0.06	1.00		0.06	1.00	
Satd. Flow (perm)	91	5085	1583	72	5085	1583	113	3439		113	3511	
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	10	2200	200	180	2225	10	10	860	200	10	995	55
RTOR Reduction (vph)	0	0	43	0	0	4	0	10	0	0	2	0
Lane Group Flow (vph)	10	2200	157	180	2225	6	10	1050	0	10	1048	0
Turn Type	Perm	NA	Perm	pm+pt	NA	Perm	Perm	NA		Perm	NA	
Protected Phases		4		3	8			2			6	
Permitted Phases	4		4	8		8	2			6		
Actuated Green, G (s)	101.7	101.7	101.7	124.3	124.3	124.3	65.7	65.7		65.7	65.7	
Effective Green, g (s)	101.7	101.7	101.7	124.3	124.3	124.3	65.7	65.7		65.7	65.7	
Actuated g/C Ratio	0.51	0.51	0.51	0.62	0.62	0.62	0.33	0.33		0.33	0.33	
Clearance Time (s)	5.0	5.0	5.0	2.0	5.0	5.0	5.0	5.0		5.0	5.0	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	46	2585	804	219	3160	983	37	1129		37	1153	
v/s Ratio Prot		c0.43		c0.08	0.44			c0.31			0.30	
v/s Ratio Perm	0.11		0.10	0.43		0.00	0.09			0.09		
v/c Ratio	0.22	0.85	0.19	0.82	0.70	0.01	0.27	0.93		0.27	0.91	
Uniform Delay, d1	27.2	42.6	26.8	67.4	25.5	14.4	49.5	64.9		49.5	64.3	
Progression Factor	1.00	1.00	1.00	0.98	1.31	2.07	1.00	1.00		1.05	1.01	
Incremental Delay, d2	10.6	3.8	0.5	16.6	1.0	0.0	3.9	13.1		3.9	10.4	
Delay (s)	37.7	46.4	27.4	82.8	34.4	29.8	53.4	78.0		56.1	75.1	
Level of Service	D	D	C	F	C	C	D	E		E	E	
Approach Delay (s)		44.7			38.0			77.7			74.9	
Approach LOS		D			D			E			E	

Intersection Summary			
HCM 2000 Control Delay	52.1	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.87		
Actuated Cycle Length (s)	200.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	102.3%	ICU Level of Service	G
Analysis Period (min)	15		

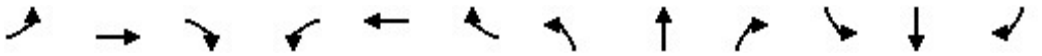
c Critical Lane Group

18: Bramalea Road & Mayfield Road

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT	SBR
Lane Group Flow (vph)	180	1875	110	1105	200	740	20	1090	1085
v/c Ratio	0.66	0.88	0.89	0.55	0.80	0.45	0.09	0.92	0.78
Control Delay	65.2	67.2	106.9	68.5	77.3	37.7	46.4	76.5	24.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	65.2	67.2	106.9	68.5	77.3	37.7	46.4	76.5	24.2
Queue Length 50th (m)	36.4	294.7	36.7	158.6	65.5	109.2	5.8	232.1	92.7
Queue Length 95th (m)	m40.6	308.1	#74.4	173.8	#130.9	135.5	13.8	263.6	125.7
Internal Link Dist (m)		1349.5		705.0		369.3		893.4	
Turn Bay Length (m)	100.0		100.0		100.0		100.0		100.0
Base Capacity (vph)	755	2267	124	2014	249	1630	234	1203	1406
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	0.24	0.83	0.89	0.55	0.80	0.45	0.09	0.91	0.77

Intersection Summary

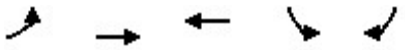
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.
m Volume for 95th percentile queue is metered by upstream signal.



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	180	1525	350	110	1095	10	200	695	45	20	1090	1085
Future Volume (vph)	180	1525	350	110	1095	10	200	695	45	20	1090	1085
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	2.0	5.0		2.0	5.0		2.0	5.0		5.0	5.0	5.0
Lane Util. Factor	0.97	0.91		1.00	0.91		1.00	0.95		1.00	0.95	0.88
Frt	1.00	0.97		1.00	1.00		1.00	0.99		1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	3433	4943		1770	5078		1770	3507		1770	3539	2787
Flt Permitted	0.95	1.00		0.05	1.00		0.06	1.00		0.37	1.00	1.00
Satd. Flow (perm)	3433	4943		94	5078		108	3507		690	3539	2787
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	180	1525	350	110	1095	10	200	695	45	20	1090	1085
RTOR Reduction (vph)	0	19	0	0	1	0	0	2	0	0	0	463
Lane Group Flow (vph)	180	1856	0	110	1104	0	200	738	0	20	1090	622
Turn Type	Prot	NA		pm+pt	NA		pm+pt	NA		Perm	NA	Perm
Protected Phases	7	4		3	8		5	2			6	
Permitted Phases				8			2			6		6
Actuated Green, G (s)	15.9	85.5		88.8	79.2		92.9	92.9		67.0	67.0	67.0
Effective Green, g (s)	15.9	85.5		88.8	79.2		92.9	92.9		67.0	67.0	67.0
Actuated g/C Ratio	0.08	0.43		0.44	0.40		0.46	0.46		0.34	0.34	0.34
Clearance Time (s)	2.0	5.0		2.0	5.0		2.0	5.0		5.0	5.0	5.0
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	3.0
Lane Grp Cap (vph)	272	2113		122	2010		248	1629		231	1185	933
v/s Ratio Prot	c0.05	c0.38		c0.04	0.22		c0.10	0.21			c0.31	
v/s Ratio Perm				0.36			0.28			0.03		0.22
v/c Ratio	0.66	0.88		0.90	0.55		0.81	0.45		0.09	0.92	0.67
Uniform Delay, d1	89.4	52.5		52.1	46.6		62.8	36.3		45.5	63.9	56.9
Progression Factor	0.66	1.25		1.23	1.44		1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	3.0	2.9		51.4	1.1		17.2	0.2		0.2	11.3	1.8
Delay (s)	62.3	68.5		115.2	68.4		80.0	36.5		45.7	75.3	58.8
Level of Service	E	E		F	E		E	D		D	E	E
Approach Delay (s)		68.0			72.7			45.8			66.8	
Approach LOS		E			E			D			E	

Intersection Summary			
HCM 2000 Control Delay	65.2	HCM 2000 Level of Service	E
HCM 2000 Volume to Capacity ratio	0.88		
Actuated Cycle Length (s)	200.0	Sum of lost time (s)	14.0
Intersection Capacity Utilization	99.6%	ICU Level of Service	F
Analysis Period (min)	15		

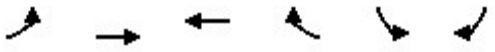
c Critical Lane Group



Lane Group	EBL	EBT	WBT	SBL	SBR
Lane Group Flow (vph)	175	1570	930	90	290
v/c Ratio	0.40	0.37	0.22	0.39	0.86
Control Delay	20.5	17.4	3.1	81.5	63.1
Queue Delay	0.0	0.0	0.0	0.0	0.0
Total Delay	20.5	17.4	3.1	81.5	63.1
Queue Length 50th (m)	57.1	187.1	18.7	35.3	61.9
Queue Length 95th (m)	m44.6	122.3	29.3	52.1	95.1
Internal Link Dist (m)		705.0	636.3	506.9	
Turn Bay Length (m)	100.0				
Base Capacity (vph)	443	4209	4189	646	672
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	0.40	0.37	0.22	0.14	0.43

Intersection Summary

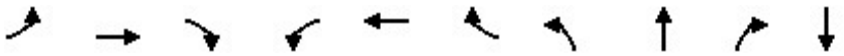
m Volume for 95th percentile queue is metered by upstream signal.



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	175	1570	900	30	90	290
Future Volume (vph)	175	1570	900	30	90	290
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0		4.0	4.0
Lane Util. Factor	1.00	0.91	0.91		1.00	1.00
Frt	1.00	1.00	1.00		1.00	0.85
Flt Protected	0.95	1.00	1.00		0.95	1.00
Satd. Flow (prot)	1770	5085	5061		1770	1583
Flt Permitted	0.29	1.00	1.00		0.95	1.00
Satd. Flow (perm)	536	5085	5061		1770	1583
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	175	1570	900	30	90	290
RTOR Reduction (vph)	0	0	1	0	0	129
Lane Group Flow (vph)	175	1570	929	0	90	161
Turn Type	Perm	NA	NA		Prot	Perm
Protected Phases		4	8		6	
Permitted Phases	4					6
Actuated Green, G (s)	164.6	164.6	164.6		25.4	25.4
Effective Green, g (s)	165.6	165.6	165.6		26.4	26.4
Actuated g/C Ratio	0.83	0.83	0.83		0.13	0.13
Clearance Time (s)	5.0	5.0	5.0		5.0	5.0
Vehicle Extension (s)	3.0	3.0	3.0		3.0	3.0
Lane Grp Cap (vph)	443	4210	4190		233	208
v/s Ratio Prot		0.31	0.18		0.05	
v/s Ratio Perm	c0.33					c0.10
v/c Ratio	0.40	0.37	0.22		0.39	0.77
Uniform Delay, d1	4.4	4.3	3.6		79.4	83.9
Progression Factor	3.12	3.50	0.71		1.00	1.00
Incremental Delay, d2	1.7	0.2	0.1		1.1	16.2
Delay (s)	15.5	15.2	2.7		80.5	100.1
Level of Service	B	B	A		F	F
Approach Delay (s)		15.2	2.7		95.4	
Approach LOS		B	A		F	

Intersection Summary			
HCM 2000 Control Delay	21.4	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.45		
Actuated Cycle Length (s)	200.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	42.7%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBT
Lane Group Flow (vph)	75	1300	340	300	700	40	40	1070	300	1225
v/c Ratio	0.27	0.64	0.49	0.74	0.26	0.05	0.39	0.70	0.36	0.90
Control Delay	67.3	75.8	56.9	95.9	27.2	6.3	41.3	48.2	8.2	67.4
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.7
Total Delay	67.3	75.8	56.9	95.9	27.2	6.3	41.3	48.2	8.2	68.1
Queue Length 50th (m)	31.6	206.5	119.5	64.0	62.3	0.0	9.2	182.4	13.9	261.1
Queue Length 95th (m)	52.6	224.2	152.5	80.4	72.7	7.8	17.8	206.8	36.7	294.3
Internal Link Dist (m)		636.3			363.2			191.0		284.9
Turn Bay Length (m)	100.0		100.0	100.0		100.0	100.0		100.0	
Base Capacity (vph)	280	2045	701	635	2675	851	102	1638	862	1442
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	54
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	0.27	0.64	0.49	0.47	0.26	0.05	0.39	0.65	0.35	0.88

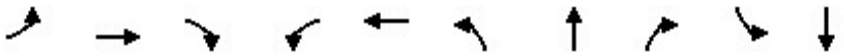
Intersection Summary

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	75	1300	340	300	700	40	40	1070	300	0	1035	190
Future Volume (vph)	75	1300	340	300	700	40	40	1070	300	0	1035	190
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	1.0	4.0	4.0	3.5	4.0	4.0		4.0	
Lane Util. Factor	1.00	0.91	1.00	0.97	0.91	1.00	1.00	0.95	1.00		0.95	
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85		0.98	
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00		1.00	
Satd. Flow (prot)	1770	5085	1583	3433	5085	1583	1770	3539	1583		3457	
Flt Permitted	0.37	1.00	1.00	0.95	1.00	1.00	0.05	1.00	1.00		1.00	
Satd. Flow (perm)	697	5085	1583	3433	5085	1583	92	3539	1583		3457	
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	75	1300	340	300	700	40	40	1070	300	0	1035	190
RTOR Reduction (vph)	0	0	65	0	0	19	0	0	135	0	8	0
Lane Group Flow (vph)	75	1300	275	300	700	21	40	1070	165	0	1217	0
Turn Type	Perm	NA	Perm	Prot	NA	Perm	pm+pt	NA	Perm	Perm	NA	
Protected Phases		4		3	8		5	2			6	
Permitted Phases	4		4			8	2		2	6		
Actuated Green, G (s)	78.5	78.5	78.5	22.8	103.3	103.3	86.7	86.7	86.7		76.9	
Effective Green, g (s)	79.5	79.5	79.5	23.8	104.3	104.3	87.7	87.7	87.7		77.9	
Actuated g/C Ratio	0.40	0.40	0.40	0.12	0.52	0.52	0.44	0.44	0.44		0.39	
Clearance Time (s)	5.0	5.0	5.0	2.0	5.0	5.0	4.5	5.0	5.0		5.0	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0		3.0	
Lane Grp Cap (vph)	277	2021	629	408	2651	825	93	1551	694		1346	
v/s Ratio Prot		c0.26		c0.09	0.14		0.01	c0.30			c0.35	
v/s Ratio Perm	0.11		0.17			0.01	0.18		0.10			
v/c Ratio	0.27	0.64	0.44	0.74	0.26	0.03	0.43	0.69	0.24		0.90	
Uniform Delay, d1	40.7	48.8	43.9	85.1	26.6	23.2	44.6	45.2	35.2		57.5	
Progression Factor	1.45	1.49	1.73	1.00	1.00	1.00	1.00	1.00	1.00		1.02	
Incremental Delay, d2	2.3	1.5	2.1	6.7	0.2	0.1	3.2	1.3	0.2		8.3	
Delay (s)	61.4	74.3	78.2	91.8	26.8	23.3	47.8	46.5	35.4		66.8	
Level of Service	E	E	E	F	C	C	D	D	D		E	
Approach Delay (s)		74.5			45.4			44.2			66.8	
Approach LOS		E			D			D			E	

Intersection Summary			
HCM 2000 Control Delay	59.2	HCM 2000 Level of Service	E
HCM 2000 Volume to Capacity ratio	0.76		
Actuated Cycle Length (s)	200.0	Sum of lost time (s)	12.5
Intersection Capacity Utilization	78.3%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

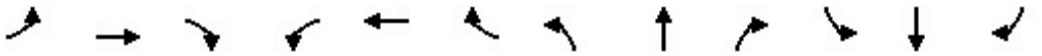
1: Dixie Road & Old School Road



Lane Group	EBL	EBT	EBR	WBL	WBT	NBL	NBT	NBR	SBL	SBT
Lane Group Flow (vph)	10	490	50	40	675	200	350	70	45	200
v/c Ratio	0.07	0.61	0.12	0.16	0.64	0.28	0.16	0.07	0.07	0.09
Control Delay	31.2	38.2	5.7	24.6	34.2	20.2	13.5	8.0	10.0	8.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	31.2	38.2	5.7	24.6	34.2	20.2	13.5	8.0	10.0	8.1
Queue Length 50th (m)	1.7	48.5	0.0	6.3	64.0	73.1	47.3	9.2	3.6	7.5
Queue Length 95th (m)	5.9	61.5	6.7	15.6	85.0	m93.5	m66.2	m12.9	10.1	14.7
Internal Link Dist (m)		358.4			980.7		3054.6			1216.1
Turn Bay Length (m)	100.0		100.0	100.0		100.0		100.0	100.0	
Base Capacity (vph)	244	1450	687	351	2111	726	2206	1013	624	2163
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	0.04	0.34	0.07	0.11	0.32	0.28	0.16	0.07	0.07	0.09

Intersection Summary

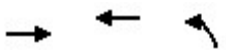
m Volume for 95th percentile queue is metered by upstream signal.



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	10	490	50	40	645	30	200	350	70	45	170	30
Future Volume (vph)	10	490	50	40	645	30	200	350	70	45	170	30
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	3.0	4.0		4.0	4.0	4.0	4.0	4.0	
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95		1.00	0.95	1.00	1.00	0.95	
Frt	1.00	1.00	0.85	1.00	0.99		1.00	1.00	0.85	1.00	0.98	
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)	1770	3539	1583	1770	3516		1770	3539	1583	1770	3460	
Flt Permitted	0.32	1.00	1.00	0.25	1.00		0.63	1.00	1.00	0.54	1.00	
Satd. Flow (perm)	595	3539	1583	470	3516		1166	3539	1583	1002	3460	
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	10	490	50	40	645	30	200	350	70	45	170	30
RTOR Reduction (vph)	0	0	39	0	6	0	0	0	27	0	8	0
Lane Group Flow (vph)	10	490	11	40	669	0	200	350	43	45	192	0
Turn Type	Perm	NA	Perm	pm+pt	NA		Perm	NA	Perm	Perm	NA	
Protected Phases		4		3	8			2			6	
Permitted Phases	4		4	8			2		2	6		
Actuated Green, G (s)	21.6	21.6	21.6	30.2	30.2		59.8	59.8	59.8	59.8	59.8	
Effective Green, g (s)	22.6	22.6	22.6	31.2	31.2		60.8	60.8	60.8	60.8	60.8	
Actuated g/C Ratio	0.23	0.23	0.23	0.31	0.31		0.61	0.61	0.61	0.61	0.61	
Clearance Time (s)	5.0	5.0	5.0	4.0	5.0		5.0	5.0	5.0	5.0	5.0	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	134	799	357	219	1096		708	2151	962	609	2103	
v/s Ratio Prot		0.14		0.01	c0.19			0.10			0.06	
v/s Ratio Perm	0.02		0.01	0.05			c0.17		0.03	0.04		
v/c Ratio	0.07	0.61	0.03	0.18	0.61		0.28	0.16	0.04	0.07	0.09	
Uniform Delay, d1	30.5	34.8	30.2	25.0	29.2		9.3	8.5	7.9	8.0	8.1	
Progression Factor	1.00	1.00	1.00	1.07	1.06		2.01	1.54	4.06	1.00	1.00	
Incremental Delay, d2	0.2	1.4	0.0	0.4	1.0		0.4	0.1	0.0	0.2	0.1	
Delay (s)	30.7	36.2	30.2	27.1	32.0		19.0	13.2	32.1	8.3	8.2	
Level of Service	C	D	C	C	C		B	B	C	A	A	
Approach Delay (s)		35.5			31.7			17.2			8.2	
Approach LOS		D			C			B			A	

Intersection Summary			
HCM 2000 Control Delay	25.8	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.41		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	11.0
Intersection Capacity Utilization	76.6%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group



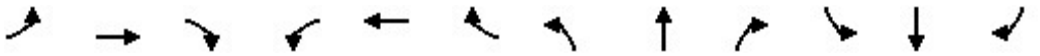
Lane Group	EBT	WBT	NBL
Lane Group Flow (vph)	630	635	80
v/c Ratio	0.21	0.21	0.46
Control Delay	0.8	1.8	50.1
Queue Delay	0.0	0.0	0.0
Total Delay	0.8	1.8	50.1
Queue Length 50th (m)	4.3	10.0	15.7
Queue Length 95th (m)	5.8	8.8	29.4
Internal Link Dist (m)	980.7	354.8	470.3
Turn Bay Length (m)			
Base Capacity (vph)	2954	2976	646
Starvation Cap Reductn	0	0	0
Spillback Cap Reductn	0	0	0
Storage Cap Reductn	0	0	0
Reduced v/c Ratio	0.21	0.21	0.12

Intersection Summary

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (vph)	595	35	0	635	80	0
Future Volume (vph)	595	35	0	635	80	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5			4.5	4.5	
Lane Util. Factor	0.95			0.95	1.00	
Frt	0.99			1.00	1.00	
Flt Protected	1.00			1.00	0.95	
Satd. Flow (prot)	3510			3539	1770	
Flt Permitted	1.00			1.00	0.95	
Satd. Flow (perm)	3510			3539	1770	
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	595	35	0	635	80	0
RTOR Reduction (vph)	2	0	0	0	0	0
Lane Group Flow (vph)	628	0	0	635	80	0
Turn Type	NA		Perm	NA	Prot	Perm
Protected Phases	4			8	2	
Permitted Phases			8			2
Actuated Green, G (s)	82.3			82.3	8.7	
Effective Green, g (s)	82.3			82.3	8.7	
Actuated g/C Ratio	0.82			0.82	0.09	
Clearance Time (s)	4.5			4.5	4.5	
Vehicle Extension (s)	3.0			3.0	3.0	
Lane Grp Cap (vph)	2888			2912	153	
v/s Ratio Prot	0.18			c0.18	c0.05	
v/s Ratio Perm						
v/c Ratio	0.22			0.22	0.52	
Uniform Delay, d1	1.9			1.9	43.7	
Progression Factor	0.31			0.74	1.00	
Incremental Delay, d2	0.2			0.2	3.2	
Delay (s)	0.8			1.6	46.9	
Level of Service	A			A	D	
Approach Delay (s)	0.8			1.6	46.9	
Approach LOS	A			A	D	

Intersection Summary			
HCM 2000 Control Delay	3.9	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.25		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	9.0
Intersection Capacity Utilization	29.5%	ICU Level of Service	A
Analysis Period (min)	15		

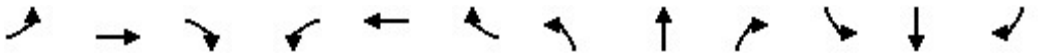
c Critical Lane Group



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	180	220	125	210	570	50	65	850	50	105	1100	10
v/c Ratio	0.51	0.13	0.15	0.37	0.33	0.06	0.70	0.56	0.07	0.61	0.73	0.01
Control Delay	50.0	35.2	26.1	20.3	17.2	8.7	60.5	22.7	4.0	37.6	26.6	2.3
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	50.0	35.2	26.1	20.3	17.2	8.7	60.5	22.7	4.0	37.6	26.6	2.3
Queue Length 50th (m)	42.8	25.7	18.2	27.1	37.8	0.8	10.5	66.9	0.0	16.2	95.5	0.0
Queue Length 95th (m)	60.1	34.3	32.1	55.7	61.8	10.1	#31.8	71.7	5.7	32.5	100.4	1.5
Internal Link Dist (m)		354.8			541.7			507.7			385.1	
Turn Bay Length (m)	100.0		100.0	100.0		100.0	100.0		100.0	100.0		100.0
Base Capacity (vph)	353	1749	829	565	1749	807	129	2088	954	237	2088	942
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.51	0.13	0.15	0.37	0.33	0.06	0.50	0.41	0.05	0.44	0.53	0.01

Intersection Summary

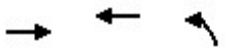
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	180	220	125	210	570	50	65	850	50	105	1100	10
Future Volume (vph)	180	220	125	210	570	50	65	850	50	105	1100	10
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1770	3539	1583	1770	3539	1583	1770	3539	1583	1770	3539	1583
Flt Permitted	0.38	1.00	1.00	0.61	1.00	1.00	0.12	1.00	1.00	0.22	1.00	1.00
Satd. Flow (perm)	714	3539	1583	1144	3539	1583	220	3539	1583	402	3539	1583
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	180	220	125	210	570	50	65	850	50	105	1100	10
RTOR Reduction (vph)	0	0	47	0	0	25	0	0	29	0	0	6
Lane Group Flow (vph)	180	220	78	210	570	25	65	850	21	105	1100	4
Turn Type	Perm	NA	Perm	Perm	NA	Perm	Perm	NA	Perm	Perm	NA	Perm
Protected Phases		4			8			2			6	
Permitted Phases	4		4	8		8	2		2	6		6
Actuated Green, G (s)	48.4	48.4	48.4	48.4	48.4	48.4	41.6	41.6	41.6	41.6	41.6	41.6
Effective Green, g (s)	49.4	49.4	49.4	49.4	49.4	49.4	42.6	42.6	42.6	42.6	42.6	42.6
Actuated g/C Ratio	0.49	0.49	0.49	0.49	0.49	0.49	0.43	0.43	0.43	0.43	0.43	0.43
Clearance Time (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	352	1748	782	565	1748	782	93	1507	674	171	1507	674
v/s Ratio Prot		0.06			0.16			0.24			c0.31	
v/s Ratio Perm	c0.25		0.05	0.18		0.02	0.30		0.01	0.26		0.00
v/c Ratio	0.51	0.13	0.10	0.37	0.33	0.03	0.70	0.56	0.03	0.61	0.73	0.01
Uniform Delay, d1	17.1	13.7	13.5	15.7	15.3	13.0	23.5	21.7	16.7	22.3	23.9	16.5
Progression Factor	2.30	2.37	5.04	1.01	1.00	1.65	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	5.2	0.1	0.3	1.8	0.5	0.1	20.5	0.5	0.0	6.4	1.8	0.0
Delay (s)	44.5	32.5	68.2	17.7	15.8	21.5	43.9	22.2	16.7	28.7	25.7	16.5
Level of Service	D	C	E	B	B	C	D	C	B	C	C	B
Approach Delay (s)		45.1			16.6			23.4			25.9	
Approach LOS		D			B			C			C	

Intersection Summary			
HCM 2000 Control Delay	25.9	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.61		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	73.6%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group



Lane Group	EBT	WBT	NBL
Lane Group Flow (vph)	360	835	55
v/c Ratio	0.12	0.29	0.33
Control Delay	0.6	0.7	29.0
Queue Delay	0.0	0.0	0.0
Total Delay	0.6	0.7	29.0
Queue Length 50th (m)	0.6	1.1	4.9
Queue Length 95th (m)	3.1	9.8	16.4
Internal Link Dist (m)	541.7	813.7	565.0
Turn Bay Length (m)			
Base Capacity (vph)	2900	2871	460
Starvation Cap Reductn	0	0	0
Spillback Cap Reductn	0	0	0
Storage Cap Reductn	0	0	0
Reduced v/c Ratio	0.12	0.29	0.12

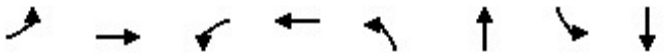
Intersection Summary

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (vph)	215	145	25	810	25	30
Future Volume (vph)	215	145	25	810	25	30
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0			4.0	4.0	
Lane Util. Factor	0.95			0.95	1.00	
Frt	0.94			1.00	0.93	
Flt Protected	1.00			1.00	0.98	
Satd. Flow (prot)	3325			3534	1687	
Flt Permitted	1.00			0.94	0.98	
Satd. Flow (perm)	3325			3316	1687	
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	215	145	25	810	25	30
RTOR Reduction (vph)	22	0	0	0	28	0
Lane Group Flow (vph)	338	0	0	835	27	0
Turn Type	NA		Perm	NA	Prot	
Protected Phases	4			8	2	
Permitted Phases			8			
Actuated Green, G (s)	83.8			83.8	6.2	
Effective Green, g (s)	84.8			84.8	7.2	
Actuated g/C Ratio	0.85			0.85	0.07	
Clearance Time (s)	5.0			5.0	5.0	
Vehicle Extension (s)	3.0			3.0	3.0	
Lane Grp Cap (vph)	2819			2811	121	
v/s Ratio Prot	0.10				c0.02	
v/s Ratio Perm				c0.25		
v/c Ratio	0.12			0.30	0.22	
Uniform Delay, d1	1.3			1.5	43.8	
Progression Factor	0.60			0.27	1.00	
Incremental Delay, d2	0.1			0.3	0.9	
Delay (s)	0.9			0.7	44.7	
Level of Service	A			A	D	
Approach Delay (s)	0.9			0.7	44.7	
Approach LOS	A			A	D	

Intersection Summary			
HCM 2000 Control Delay	2.7	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.29		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	51.3%	ICU Level of Service	A
Analysis Period (min)	15		

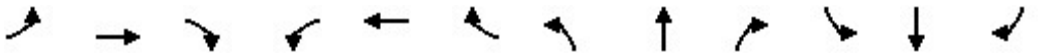
c Critical Lane Group

5: Torbram Road & Old School Road



Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	35	210	5	675	100	585	10	180
v/c Ratio	0.07	0.09	0.01	0.28	0.36	0.69	0.11	0.21
Control Delay	3.2	3.4	6.2	6.8	39.4	42.4	31.1	19.3
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	3.2	3.4	6.2	6.8	39.4	42.4	31.1	19.3
Queue Length 50th (m)	1.1	3.2	0.3	24.0	25.7	75.4	1.6	9.9
Queue Length 95th (m)	3.0	5.6	1.7	39.1	41.7	98.4	5.9	17.6
Internal Link Dist (m)		813.7		282.0		1511.4		433.8
Turn Bay Length (m)	100.0		100.0		100.0		100.0	
Base Capacity (vph)	480	2436	798	2443	302	913	103	908
Starvation Cap Reductn	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.07	0.09	0.01	0.28	0.33	0.64	0.10	0.20

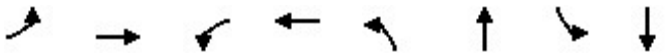
Intersection Summary



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	35	205	5	5	670	5	100	415	170	10	115	65
Future Volume (vph)	35	205	5	5	670	5	100	415	170	10	115	65
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Lane Util. Factor	1.00	0.95		1.00	0.95		1.00	0.95		1.00	0.95	
Frt	1.00	1.00		1.00	1.00		1.00	0.96		1.00	0.95	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770	3527		1770	3535		1770	3385		1770	3348	
Flt Permitted	0.37	1.00		0.62	1.00		0.63	1.00		0.22	1.00	
Satd. Flow (perm)	695	3527		1155	3535		1177	3385		403	3348	
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	35	205	5	5	670	5	100	415	170	10	115	65
RTOR Reduction (vph)	0	2	0	0	1	0	0	45	0	0	50	0
Lane Group Flow (vph)	35	208	0	5	674	0	100	540	0	10	130	0
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)	67.4	67.4		67.4	67.4		22.6	22.6		22.6	22.6	
Effective Green, g (s)	68.4	68.4		68.4	68.4		23.6	23.6		23.6	23.6	
Actuated g/C Ratio	0.68	0.68		0.68	0.68		0.24	0.24		0.24	0.24	
Clearance Time (s)	5.0	5.0		5.0	5.0		5.0	5.0		5.0	5.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	475	2412		790	2417		277	798		95	790	
v/s Ratio Prot		0.06			c0.19			c0.16			0.04	
v/s Ratio Perm	0.05			0.00			0.08			0.02		
v/c Ratio	0.07	0.09		0.01	0.28		0.36	0.68		0.11	0.16	
Uniform Delay, d1	5.3	5.3		5.0	6.2		31.9	34.7		29.9	30.4	
Progression Factor	0.46	0.59		1.00	1.00		1.14	1.22		1.00	1.00	
Incremental Delay, d2	0.3	0.1		0.0	0.3		0.8	2.3		0.5	0.1	
Delay (s)	2.7	3.2		5.0	6.5		37.2	44.6		30.4	30.5	
Level of Service	A	A		A	A		D	D		C	C	
Approach Delay (s)		3.1			6.4			43.6			30.5	
Approach LOS		A			A			D			C	

Intersection Summary			
HCM 2000 Control Delay	22.7	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.38		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	72.7%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

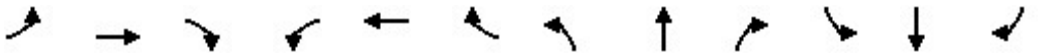


Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	80	160	260	205	300	995	220	1220
v/c Ratio	0.39	0.21	0.61	0.21	0.60	0.67	0.51	0.91
Control Delay	26.6	0.9	22.0	4.3	19.9	23.7	10.9	33.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	26.6	0.9	22.0	4.3	19.9	23.7	10.9	33.2
Queue Length 50th (m)	8.3	0.0	22.8	1.3	19.6	52.1	9.2	~82.4
Queue Length 95th (m)	17.9	0.7	35.5	6.8	#54.1	#94.0	24.3	#124.0
Internal Link Dist (m)		346.6		673.9		1139.4		507.7
Turn Bay Length (m)	100.0		100.0		100.0		100.0	
Base Capacity (vph)	367	1139	424	1436	499	1480	430	1340
Starvation Cap Reductn	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.22	0.14	0.61	0.14	0.60	0.67	0.51	0.91

Intersection Summary

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

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



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	80	0	160	260	30	175	300	755	240	220	1095	125
Future Volume (vph)	80	0	160	260	30	175	300	755	240	220	1095	125
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		1.0	4.0		1.0	4.0		1.0	4.0	
Lane Util. Factor	1.00	0.95		1.00	0.95		1.00	0.95		1.00	0.95	
Frt	1.00	0.85		1.00	0.87		1.00	0.96		1.00	0.98	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770	3008		1770	3086		1770	3411		1770	3485	
Flt Permitted	0.62	1.00		0.59	1.00		0.17	1.00		0.18	1.00	
Satd. Flow (perm)	1161	3008		1095	3086		325	3411		340	3485	
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	80	0	160	260	30	175	300	755	240	220	1095	125
RTOR Reduction (vph)	0	135	0	0	125	0	0	44	0	0	13	0
Lane Group Flow (vph)	80	25	0	260	80	0	300	951	0	220	1207	0
Turn Type	Perm	NA		pm+pt	NA		pm+pt	NA		pm+pt	NA	
Protected Phases		4		3	8		5	2		1	6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)	8.4	8.4		16.1	16.1		33.9	23.3		29.5	20.9	
Effective Green, g (s)	9.4	9.4		17.1	17.1		34.9	24.3		31.5	21.9	
Actuated g/C Ratio	0.16	0.16		0.29	0.29		0.58	0.41		0.52	0.36	
Clearance Time (s)	5.0	5.0		2.0	5.0		2.0	5.0		2.0	5.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	181	471		387	879		478	1381		407	1272	
v/s Ratio Prot		0.01		c0.07	0.03		c0.13	0.28		0.09	c0.35	
v/s Ratio Perm	0.07			0.12			0.24			0.20		
v/c Ratio	0.44	0.05		0.67	0.09		0.63	0.69		0.54	0.95	
Uniform Delay, d1	22.9	21.5		18.1	15.7		9.7	14.7		8.7	18.5	
Progression Factor	1.00	1.00		1.00	1.00		1.78	1.40		1.00	1.00	
Incremental Delay, d2	1.7	0.0		4.5	0.0		2.4	2.6		1.5	15.6	
Delay (s)	24.6	21.6		22.6	15.8		19.7	23.1		10.1	34.1	
Level of Service	C	C		C	B		B	C		B	C	
Approach Delay (s)		22.6			19.6			22.3			30.4	
Approach LOS		C			B			C			C	

Intersection Summary			
HCM 2000 Control Delay	25.4	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.72		
Actuated Cycle Length (s)	60.0	Sum of lost time (s)	10.0
Intersection Capacity Utilization	83.8%	ICU Level of Service	E
Analysis Period (min)	15		

c Critical Lane Group

10: Torbram Road & Street D

Lane Group	EBL	EBR	NBL	NBT	SBT
Lane Group Flow (vph)	10	235	540	675	125
v/c Ratio	0.06	0.66	0.52	0.23	0.04
Control Delay	39.8	14.9	4.3	0.3	2.9
Queue Delay	0.0	0.0	0.0	0.0	0.0
Total Delay	39.8	14.9	4.3	0.3	2.9
Queue Length 50th (m)	2.0	0.0	17.2	0.2	0.1
Queue Length 95th (m)	6.6	21.2	34.8	1.7	3.4
Internal Link Dist (m)	708.9			1213.1	1511.4
Turn Bay Length (m)			100.0		
Base Capacity (vph)	654	733	1040	2936	2819
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	0.02	0.32	0.52	0.23	0.04

Intersection Summary

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	10	235	540	675	90	35
Future Volume (vph)	10	235	540	675	90	35
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	
Lane Util. Factor	1.00	1.00	1.00	0.95	0.95	
Frt	1.00	0.85	1.00	1.00	0.96	
Flt Protected	0.95	1.00	0.95	1.00	1.00	
Satd. Flow (prot)	1770	1583	1770	3539	3391	
Flt Permitted	0.95	1.00	0.67	1.00	1.00	
Satd. Flow (perm)	1770	1583	1253	3539	3391	
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	10	235	540	675	90	35
RTOR Reduction (vph)	0	214	0	0	6	0
Lane Group Flow (vph)	10	21	540	675	119	0
Turn Type	Prot	Perm	Perm	NA	NA	
Protected Phases	4			2	6	
Permitted Phases		4	2			
Actuated Green, G (s)	8.0	8.0	82.0	82.0	82.0	
Effective Green, g (s)	9.0	9.0	83.0	83.0	83.0	
Actuated g/C Ratio	0.09	0.09	0.83	0.83	0.83	
Clearance Time (s)	5.0	5.0	5.0	5.0	5.0	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	159	142	1039	2937	2814	
v/s Ratio Prot	0.01			0.19	0.04	
v/s Ratio Perm		c0.01	c0.43			
v/c Ratio	0.06	0.15	0.52	0.23	0.04	
Uniform Delay, d1	41.6	42.0	2.5	1.8	1.5	
Progression Factor	1.00	1.00	0.87	0.06	2.08	
Incremental Delay, d2	0.2	0.5	1.7	0.2	0.0	
Delay (s)	41.8	42.5	3.9	0.3	3.1	
Level of Service	D	D	A	A	A	
Approach Delay (s)	42.4			1.9	3.1	
Approach LOS	D			A	A	

Intersection Summary			
HCM 2000 Control Delay	8.2	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.48		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	48.3%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

Lane Group	EBL	NBT	SBT
Lane Group Flow (vph)	150	1145	1515
v/c Ratio	0.49	0.45	0.61
Control Delay	27.3	12.5	11.9
Queue Delay	0.0	0.0	0.0
Total Delay	27.3	12.5	11.9
Queue Length 50th (m)	16.0	43.4	62.4
Queue Length 95th (m)	28.8	95.6	m81.4
Internal Link Dist (m)	392.2	445.4	1139.4
Turn Bay Length (m)			
Base Capacity (vph)	531	2532	2490
Starvation Cap Reductn	0	0	0
Spillback Cap Reductn	0	0	0
Storage Cap Reductn	0	0	0
Reduced v/c Ratio	0.28	0.45	0.61

Intersection Summary

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

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	150	0	0	1145	1280	235
Future Volume (vph)	150	0	0	1145	1280	235
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0			5.0	5.0	
Lane Util. Factor	1.00			0.95	0.95	
Frt	1.00			1.00	0.98	
Flt Protected	0.95			1.00	1.00	
Satd. Flow (prot)	1770			3539	3457	
Flt Permitted	0.95			1.00	1.00	
Satd. Flow (perm)	1770			3539	3457	
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	150	0	0	1145	1280	235
RTOR Reduction (vph)	0	0	0	0	17	0
Lane Group Flow (vph)	150	0	0	1145	1498	0
Turn Type	Prot			NA	NA	
Protected Phases	4			2	6	
Permitted Phases			2			
Actuated Green, G (s)	9.1			40.9	40.9	
Effective Green, g (s)	9.1			40.9	40.9	
Actuated g/C Ratio	0.15			0.68	0.68	
Clearance Time (s)	5.0			5.0	5.0	
Vehicle Extension (s)	3.0			3.0	3.0	
Lane Grp Cap (vph)	268			2412	2356	
v/s Ratio Prot	c0.08			0.32	c0.43	
v/s Ratio Perm						
v/c Ratio	0.56			0.47	0.64	
Uniform Delay, d1	23.6			4.5	5.4	
Progression Factor	1.00			2.25	1.80	
Incremental Delay, d2	2.5			0.6	0.8	
Delay (s)	26.1			10.7	10.4	
Level of Service	C			B	B	
Approach Delay (s)	26.1			10.7	10.4	
Approach LOS	C			B	B	

Intersection Summary			
HCM 2000 Control Delay	11.4	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.62		
Actuated Cycle Length (s)	60.0	Sum of lost time (s)	10.0
Intersection Capacity Utilization	59.5%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group

14: Bramalea Road & Street G

Lane Group	EBT	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	275	390	335	855	295	985
v/c Ratio	0.54	0.55	0.63	0.53	0.52	0.62
Control Delay	6.0	9.6	12.6	14.3	6.6	18.9
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	6.0	9.6	12.6	14.3	6.6	18.9
Queue Length 50th (m)	0.0	5.4	10.5	34.6	11.0	47.5
Queue Length 95th (m)	11.3	15.4	37.2	62.1	16.5	#92.0
Internal Link Dist (m)	370.3	835.1		893.4		445.4
Turn Bay Length (m)			100.0		100.0	
Base Capacity (vph)	730	1193	535	1624	571	1596
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.38	0.33	0.63	0.53	0.52	0.62

Intersection Summary

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

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	0	275	0	100	290	335	855	0	295	985	0
Future Volume (vph)	0	0	275	0	100	290	335	855	0	295	985	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0			4.0		3.5	4.0		3.5	4.0	
Lane Util. Factor		1.00			0.95		1.00	0.95		1.00	0.95	
Frt		0.86			0.89		1.00	1.00		1.00	1.00	
Flt Protected		1.00			1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)		1611			3144		1770	3539		1770	3539	
Flt Permitted		1.00			1.00		0.19	1.00		0.25	1.00	
Satd. Flow (perm)		1611			3144		351	3539		470	3539	
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	0	0	275	0	100	290	335	855	0	295	985	0
RTOR Reduction (vph)	0	234	0	0	247	0	0	0	0	0	0	0
Lane Group Flow (vph)	0	41	0	0	143	0	335	855	0	295	985	0
Turn Type		NA			NA		pm+pt	NA		pm+pt	NA	
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)		7.9			7.9		38.0	26.5		37.2	26.1	
Effective Green, g (s)		8.9			8.9		40.0	27.5		39.2	27.1	
Actuated g/C Ratio		0.15			0.15		0.67	0.46		0.65	0.45	
Clearance Time (s)		5.0			5.0		4.5	5.0		4.5	5.0	
Vehicle Extension (s)		3.0			3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)		238			466		529	1622		569	1598	
v/s Ratio Prot		0.03			c0.05		c0.13	0.24		0.10	0.28	
v/s Ratio Perm							c0.29			0.23		
v/c Ratio		0.17			0.31		0.63	0.53		0.52	0.62	
Uniform Delay, d1		22.3			22.8		6.2	11.6		5.0	12.5	
Progression Factor		1.00			1.00		1.00	1.00		0.85	1.19	
Incremental Delay, d2		0.3			0.4		2.5	1.2		0.6	1.4	
Delay (s)		22.7			23.2		8.6	12.8		4.9	16.3	
Level of Service		C			C		A	B		A	B	
Approach Delay (s)		22.7			23.2			11.7			13.7	
Approach LOS		C			C			B			B	

Intersection Summary			
HCM 2000 Control Delay	14.9	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.58		
Actuated Cycle Length (s)	60.0	Sum of lost time (s)	11.5
Intersection Capacity Utilization	72.8%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

Lane Group	EBL	EBR	NBL	NBT	SBT
Lane Group Flow (vph)	25	135	90	1190	1250
v/c Ratio	0.07	0.34	0.37	0.47	0.50
Control Delay	32.4	17.7	7.0	3.6	7.8
Queue Delay	0.0	0.0	0.0	0.0	0.0
Total Delay	32.4	17.7	7.0	3.6	7.8
Queue Length 50th (m)	4.1	9.3	4.7	35.6	58.0
Queue Length 95th (m)	11.3	26.2	m7.8	39.8	56.6
Internal Link Dist (m)	622.0			284.9	1213.1
Turn Bay Length (m)			100.0		
Base Capacity (vph)	531	530	242	2512	2504
Starvation Cap Reductn	0	0	0	0	0
Spillback Cap Reductn	0	1	0	0	57
Storage Cap Reductn	0	0	0	0	0
Reduced v/c Ratio	0.05	0.26	0.37	0.47	0.51

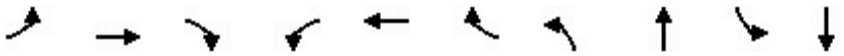
Intersection Summary

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

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	25	135	90	1190	1215	35
Future Volume (vph)	25	135	90	1190	1215	35
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	
Lane Util. Factor	1.00	1.00	1.00	0.95	0.95	
Frt	1.00	0.85	1.00	1.00	1.00	
Flt Protected	0.95	1.00	0.95	1.00	1.00	
Satd. Flow (prot)	1770	1583	1770	3539	3524	
Flt Permitted	0.95	1.00	0.18	1.00	1.00	
Satd. Flow (perm)	1770	1583	341	3539	3524	
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	25	135	90	1190	1215	35
RTOR Reduction (vph)	0	63	0	0	1	0
Lane Group Flow (vph)	25	72	90	1190	1249	0
Turn Type	Prot	Perm	Perm	NA	NA	
Protected Phases	4			2	6	
Permitted Phases		4	2			
Actuated Green, G (s)	20.0	20.0	70.0	70.0	70.0	
Effective Green, g (s)	21.0	21.0	71.0	71.0	71.0	
Actuated g/C Ratio	0.21	0.21	0.71	0.71	0.71	
Clearance Time (s)	5.0	5.0	5.0	5.0	5.0	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	371	332	242	2512	2502	
v/s Ratio Prot	0.01			0.34	c0.35	
v/s Ratio Perm		c0.05	0.26			
v/c Ratio	0.07	0.22	0.37	0.47	0.50	
Uniform Delay, d1	31.7	32.7	5.7	6.3	6.5	
Progression Factor	1.00	1.00	0.58	0.48	1.08	
Incremental Delay, d2	0.1	0.3	3.5	0.5	0.7	
Delay (s)	31.7	33.0	6.8	3.6	7.7	
Level of Service	C	C	A	A	A	
Approach Delay (s)	32.8			3.8	7.7	
Approach LOS	C			A	A	

Intersection Summary			
HCM 2000 Control Delay	7.4	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.43		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	78.0%	ICU Level of Service	D
Analysis Period (min)	15		

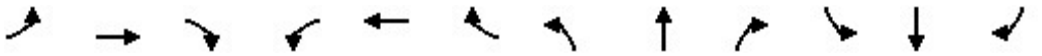
c Critical Lane Group



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	10	2280	10	200	2465	10	200	1175	10	900
v/c Ratio	0.27	0.90	0.01	0.91	0.81	0.01	0.93	0.94	0.28	0.98
Control Delay	51.2	51.0	0.0	74.6	68.2	13.0	99.6	75.4	86.2	97.5
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	51.2	51.0	0.0	74.6	68.2	13.0	99.6	75.4	86.2	97.5
Queue Length 50th (m)	2.4	313.0	0.0	67.9	372.2	0.0	67.8	253.4	3.6	203.3
Queue Length 95th (m)	9.8	331.3	0.0	m#83.5	386.2	m1.1	#125.2	#299.2	11.7	#249.1
Internal Link Dist (m)		294.5			1349.5			377.9		3054.6
Turn Bay Length (m)	100.0		100.0	100.0		100.0			100.0	
Base Capacity (vph)	37	2567	815	220	3076	958	216	1252	36	923
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	0.27	0.89	0.01	0.91	0.80	0.01	0.93	0.94	0.28	0.98

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.
m Volume for 95th percentile queue is metered by upstream signal.



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	10	2280	10	200	2465	10	200	995	180	10	860	40
Future Volume (vph)	10	2280	10	200	2465	10	200	995	180	10	860	40
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	-0.5	4.0	5.0	-0.5	4.0		4.0	4.0	
Lane Util. Factor	1.00	0.91	1.00	1.00	0.91	1.00	1.00	0.95		1.00	0.95	
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.98		1.00	0.99	
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770	5085	1583	1770	5085	1583	1770	3458		1770	3516	
Flt Permitted	0.04	1.00	1.00	0.04	1.00	1.00	0.07	1.00		0.08	1.00	
Satd. Flow (perm)	74	5085	1583	74	5085	1583	140	3458		142	3516	
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	10	2280	10	200	2465	10	200	995	180	10	860	40
RTOR Reduction (vph)	0	0	5	0	0	4	0	7	0	0	1	0
Lane Group Flow (vph)	10	2280	5	200	2465	6	200	1168	0	10	899	0
Turn Type	Perm	NA	Perm	pm+pt	NA	Perm	pm+pt	NA		Perm	NA	
Protected Phases		4		3	8		5	2			6	
Permitted Phases	4		4	8		8	2			6		
Actuated Green, G (s)	99.1	99.1	99.1	119.0	119.0	119.0	71.0	71.0		51.4	51.4	
Effective Green, g (s)	100.1	100.1	100.1	121.5	120.0	119.0	73.5	72.0		52.4	52.4	
Actuated g/C Ratio	0.50	0.50	0.50	0.61	0.60	0.60	0.37	0.36		0.26	0.26	
Clearance Time (s)	5.0	5.0	5.0	2.0	5.0	5.0	2.0	5.0		5.0	5.0	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	37	2545	792	217	3051	941	215	1244		37	921	
v/s Ratio Prot		c0.45		c0.09	0.48		0.09	c0.34			0.26	
v/s Ratio Perm	0.13		0.00	0.47		0.00	0.25			0.07		
v/c Ratio	0.27	0.90	0.01	0.92	0.81	0.01	0.93	0.94		0.27	0.98	
Uniform Delay, d1	28.9	45.2	25.0	70.7	31.1	16.5	63.3	61.9		58.6	73.2	
Progression Factor	1.00	1.00	1.00	0.69	2.13	9.22	1.00	1.00		1.07	1.02	
Incremental Delay, d2	17.1	5.5	0.0	30.9	1.7	0.0	42.3	13.3		3.9	23.6	
Delay (s)	46.0	50.7	25.0	79.6	67.8	151.9	105.6	75.2		66.7	98.5	
Level of Service	D	D	C	E	E	F	F	E		E	F	
Approach Delay (s)		50.5			69.0			79.6			98.2	
Approach LOS		D			E			E			F	

Intersection Summary			
HCM 2000 Control Delay	68.8	HCM 2000 Level of Service	E
HCM 2000 Volume to Capacity ratio	0.90		
Actuated Cycle Length (s)	200.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	127.5%	ICU Level of Service	H
Analysis Period (min)	15		

c Critical Lane Group

18: Bramalea Road & Mayfield Road

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT	SBR
Lane Group Flow (vph)	840	1590	75	1470	350	1200	10	790	410
v/c Ratio	1.01	0.58	0.91	0.97	0.95	0.82	0.19	0.92	0.46
Control Delay	62.6	36.5	116.5	62.6	97.9	57.1	71.1	90.4	16.4
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	62.6	36.5	116.5	62.6	97.9	57.1	71.1	90.4	16.4
Queue Length 50th (m)	~192.4	241.9	25.8	225.1	129.9	233.9	3.4	172.4	18.1
Queue Length 95th (m)	m#233.6	258.0	#68.6	#249.3	#199.7	264.5	10.8	#207.9	37.7
Internal Link Dist (m)		1349.5		705.0		369.3		893.4	
Turn Bay Length (m)	100.0		100.0		100.0		100.0		100.0
Base Capacity (vph)	834	2718	82	1523	367	1469	54	867	908
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	1.01	0.58	0.91	0.97	0.95	0.82	0.19	0.91	0.45

Intersection Summary

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

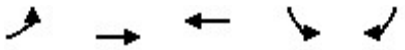
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

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

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	840	1390	200	75	1450	20	350	1090	110	10	790	410
Future Volume (vph)	840	1390	200	75	1450	20	350	1090	110	10	790	410
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	1.0	4.0		2.5	3.0		-1.0	4.0		4.0	3.0	4.0
Lane Util. Factor	0.97	0.91		1.00	0.91		1.00	0.95		1.00	0.95	0.88
Frt	1.00	0.98		1.00	1.00		1.00	0.99		1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	3433	4989		1770	5075		1770	3491		1770	3539	2787
Flt Permitted	0.95	1.00		0.15	1.00		0.08	1.00		0.12	1.00	1.00
Satd. Flow (perm)	3433	4989		274	5075		154	3491		225	3539	2787
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	840	1390	200	75	1450	20	350	1090	110	10	790	410
RTOR Reduction (vph)	0	9	0	0	1	0	0	4	0	0	0	240
Lane Group Flow (vph)	840	1581	0	75	1469	0	350	1196	0	10	790	170
Turn Type	Prot	NA		Perm	NA		pm+pt	NA		Perm	NA	Perm
Protected Phases	7	4			8		5	2			6	
Permitted Phases				8			2			6		6
Actuated Green, G (s)	47.6	107.6		58.0	58.0		82.4	82.4		46.4	46.4	46.4
Effective Green, g (s)	48.6	108.6		60.5	60.0		85.4	83.4		47.4	48.4	47.4
Actuated g/C Ratio	0.24	0.54		0.30	0.30		0.43	0.42		0.24	0.24	0.24
Clearance Time (s)	2.0	5.0		5.0	5.0		2.0	5.0		5.0	5.0	5.0
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	3.0
Lane Grp Cap (vph)	834	2709		82	1522		364	1455		53	856	660
v/s Ratio Prot	c0.24	0.32			c0.29		c0.18	0.34			c0.22	
v/s Ratio Perm				0.27			0.23			0.04		0.06
v/c Ratio	1.01	0.58		0.91	0.97		0.96	0.82		0.19	0.92	0.26
Uniform Delay, d1	75.7	30.6		67.3	69.0		66.2	51.7		60.9	74.0	62.0
Progression Factor	0.53	1.19		0.69	0.70		1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	22.3	0.4		69.0	14.2		36.9	3.9		1.7	15.2	0.2
Delay (s)	62.1	36.7		115.4	62.7		103.2	55.6		62.7	89.2	62.2
Level of Service	E	D		F	E		F	E		E	F	E
Approach Delay (s)		45.5			65.3			66.3			79.8	
Approach LOS		D			E			E			E	

Intersection Summary			
HCM 2000 Control Delay	61.0	HCM 2000 Level of Service	E
HCM 2000 Volume to Capacity ratio	0.95		
Actuated Cycle Length (s)	200.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	116.1%	ICU Level of Service	H
Analysis Period (min)	15		

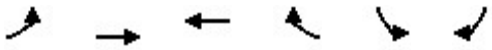
c Critical Lane Group



Lane Group	EBL	EBT	WBT	SBL	SBR
Lane Group Flow (vph)	540	955	1705	60	190
v/c Ratio	0.85	0.21	0.60	0.52	0.68
Control Delay	74.0	1.4	53.7	104.9	22.0
Queue Delay	0.0	0.0	0.0	0.0	0.0
Total Delay	74.0	1.4	53.7	104.9	22.0
Queue Length 50th (m)	205.3	11.6	213.0	25.0	0.0
Queue Length 95th (m)	245.7	3.5	m131.3	42.8	28.3
Internal Link Dist (m)		705.0	636.3	506.9	
Turn Bay Length (m)	100.0				
Base Capacity (vph)	643	4545	2873	274	405
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	0.84	0.21	0.59	0.22	0.47

Intersection Summary

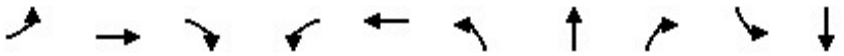
m Volume for 95th percentile queue is metered by upstream signal.



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	540	955	1615	90	60	190
Future Volume (vph)	540	955	1615	90	60	190
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.5	4.0	4.0		4.0	4.0
Lane Util. Factor	1.00	0.91	0.91		1.00	1.00
Frt	1.00	1.00	0.99		1.00	0.85
Flt Protected	0.95	1.00	1.00		0.95	1.00
Satd. Flow (prot)	1770	5085	5045		1770	1583
Flt Permitted	0.08	1.00	1.00		0.95	1.00
Satd. Flow (perm)	148	5085	5045		1770	1583
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	540	955	1615	90	60	190
RTOR Reduction (vph)	0	0	3	0	0	177
Lane Group Flow (vph)	540	955	1702	0	60	13
Turn Type	pm+pt	NA	NA		Prot	Perm
Protected Phases	7	4	8		6	
Permitted Phases	4					6
Actuated Green, G (s)	177.8	177.8	112.5		12.2	12.2
Effective Green, g (s)	178.8	178.8	113.5		13.2	13.2
Actuated g/C Ratio	0.89	0.89	0.57		0.07	0.07
Clearance Time (s)	4.5	5.0	5.0		5.0	5.0
Vehicle Extension (s)	3.0	3.0	3.0		3.0	3.0
Lane Grp Cap (vph)	633	4545	2863		116	104
v/s Ratio Prot	c0.26	0.19	0.34		c0.03	
v/s Ratio Perm	c0.50					0.01
v/c Ratio	0.85	0.21	0.59		0.52	0.12
Uniform Delay, d1	50.9	1.4	28.2		90.3	87.9
Progression Factor	1.34	0.87	1.81		1.00	1.00
Incremental Delay, d2	8.9	0.1	0.3		3.9	0.5
Delay (s)	77.1	1.3	51.3		94.2	88.5
Level of Service	E	A	D		F	F
Approach Delay (s)		28.7	51.3		89.8	
Approach LOS		C	D		F	

Intersection Summary			
HCM 2000 Control Delay	44.3	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.84		
Actuated Cycle Length (s)	200.0	Sum of lost time (s)	11.5
Intersection Capacity Utilization	77.3%	ICU Level of Service	D
Analysis Period (min)	15		

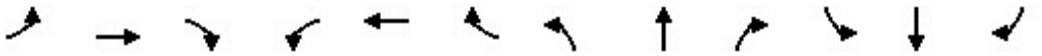
c Critical Lane Group



Lane Group	EBL	EBT	EBR	WBL	WBT	NBL	NBT	NBR	SBL	SBT
Lane Group Flow (vph)	245	700	70	300	1300	340	1040	300	40	1225
v/c Ratio	0.94	0.47	0.14	0.74	0.94	0.97	0.54	0.30	0.22	0.94
Control Delay	125.0	110.4	52.3	96.0	83.4	105.2	30.8	2.9	45.5	76.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.5
Total Delay	125.0	110.4	52.3	96.0	83.4	105.2	30.8	2.9	45.5	77.6
Queue Length 50th (m)	103.7	111.6	14.5	64.1	201.9	126.9	144.6	0.8	12.1	279.4
Queue Length 95th (m)	#148.8	127.2	31.9	80.5	#234.9	#198.6	165.1	16.4	20.3	290.7
Internal Link Dist (m)		636.3			363.2		191.0			284.9
Turn Bay Length (m)	100.0		100.0	100.0		100.0		100.0		
Base Capacity (vph)	272	1495	515	549	1388	349	1946	1003	189	1329
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	32
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	0.90	0.47	0.14	0.55	0.94	0.97	0.53	0.30	0.21	0.94

Intersection Summary

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



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	245	700	70	300	1300	0	340	1040	300	40	1105	120
Future Volume (vph)	245	700	70	300	1300	0	340	1040	300	40	1105	120
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.5	4.0	4.0	1.0	4.0		-1.0	4.0	4.0	4.0	4.0	
Lane Util. Factor	1.00	0.91	1.00	0.97	0.91		1.00	0.95	1.00	1.00	0.95	
Frt	1.00	1.00	0.85	1.00	1.00		1.00	1.00	0.85	1.00	0.99	
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)	1770	5085	1583	3433	5085		1770	3539	1583	1770	3487	
Flt Permitted	0.07	1.00	1.00	0.95	1.00		0.05	1.00	1.00	0.27	1.00	
Satd. Flow (perm)	128	5085	1583	3433	5085		99	3539	1583	500	3487	
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	245	700	70	300	1300	0	340	1040	300	40	1105	120
RTOR Reduction (vph)	0	0	49	0	0	0	0	0	136	0	4	0
Lane Group Flow (vph)	245	700	21	300	1300	0	340	1040	164	40	1221	0
Turn Type	pm+pt	NA	Perm	Prot	NA	Perm	pm+pt	NA	Perm	Perm	NA	
Protected Phases	7	4		3	8		5	2			6	
Permitted Phases	4		4			8	2		2	6		
Actuated Green, G (s)	82.3	57.9	57.9	22.7	53.7		107.4	107.4	107.4	73.3	73.3	
Effective Green, g (s)	83.6	58.9	58.9	23.7	54.7		110.4	108.4	108.4	74.3	74.3	
Actuated g/C Ratio	0.42	0.29	0.29	0.12	0.27		0.55	0.54	0.54	0.37	0.37	
Clearance Time (s)	4.5	5.0	5.0	2.0	5.0		2.0	5.0	5.0	5.0	5.0	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	262	1497	466	406	1390		347	1918	857	185	1295	
v/s Ratio Prot	c0.12	0.14		0.09	0.26		c0.17	0.29			c0.35	
v/s Ratio Perm	c0.27		0.01				0.37		0.10	0.08		
v/c Ratio	0.94	0.47	0.04	0.74	0.94		0.98	0.54	0.19	0.22	0.94	
Uniform Delay, d1	66.4	57.7	50.4	85.2	70.9		69.8	29.7	23.4	43.0	60.8	
Progression Factor	1.42	1.86	5.02	1.00	1.00		1.00	1.00	1.00	0.99	1.04	
Incremental Delay, d2	37.8	1.0	0.2	6.9	12.9		42.3	0.3	0.1	0.5	12.4	
Delay (s)	131.9	108.3	253.3	92.1	83.9		112.1	30.0	23.5	43.2	76.0	
Level of Service	F	F	F	F	F		F	C	C	D	E	
Approach Delay (s)		124.0			85.4			45.5			74.9	
Approach LOS		F			F			D			E	

Intersection Summary			
HCM 2000 Control Delay	78.0	HCM 2000 Level of Service	E
HCM 2000 Volume to Capacity ratio	0.95		
Actuated Cycle Length (s)	200.0	Sum of lost time (s)	11.5
Intersection Capacity Utilization	105.2%	ICU Level of Service	G
Analysis Period (min)	15		

c Critical Lane Group