7000 Campeau Drive
Transportation Impact Assessment

Ottawa, Ontario

Update Report / Response to Comments

Local Planning Appeals Tribunal (LPAT)

Prepared For: Minto Communities on behalf of ClubLink Corportation ULC

June 2021

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FOREWORD & RESPONSE TO COMMENTS

BA Group submitted a Transportation Impact Assessment titled *7000 Campeau Drive Transportation Impact Assessment*, dated September 2019, in support of concurrent draft plan of subdivision and zoning by-law amendment applications for a development proposal located at 7000 Campeau Drive in the City of Ottawa. In September 2019, the development consisted of 1,502 total residential dwelling units.

An updated application was submitted in June 2020 and BA Group submitted an updated Transportation Impact Assessment, including Responses to Comments, in support of the application. This application included a revised concept plan and development programme notably consisting of 1,544 total residential dwelling units.

BA Group is retained by the client – Minto Communities on behalf of ClubLink Corportation ULC – to provide an update to the aforementioned transportation impact assessments given subsequent updates to the development proposal and to address comments provided by the City of Ottawa in October 2020 in response to the second application, and to provide further review of the revised land use concept plan.

The transportation impact assessment contained herein is based on the reports submitted in September 2019 and June 2020, and updated where appropriate to reflect changes to the concept plan and development programme. At this time, the proposal consists of in the order of 1,480 total residential dwelling units, consisting of a variety of housing types.

RESPONSE TO COMMENTS

City of Ottawa File Numbers D07-16-19-0026, D02-02-19-0123 – Review Comments Dated October 9, 2020 – Transportation Comments

General

Comment #5:
As mentioned in the pre-consultation notes (April 19, 2019), as well as the first round circulation comments (December 19, 2019), the minimum right-of-way width to be considered will be 18-metres for local roads. The current proposal for 16.5 metre right-of-way widths is not in keeping with the existing community and will not be approved. Please revise the plan to reflect right-of-way widths no less than 18-metres.

Response:
As is illustrated in **Appendix B**, the concept plan has been revised to include local roads with 18.0-metre local roads.

Planning & Urban Design

Comment #10:
Please clarify that cycling facilities (on-road bike lanes) exist on Knudson Drive and Weslock Way? If they do not, who is responsible for creating them? Is any on-street cycling facility being considered for any of the proposed new streets within the subject development? If not, one should be considered central to the development for example on Street No. 7.

Response:
Bicycle lanes currently exist on both Knudson Drive and Weslock Way although they lack signage and pavement marking symbols for bike lanes; lines are painted on the road but bicycle signage is not painted within the lanes. BA Group conducted a site visit on Monday, April 5, 2021 to ensure their existence; photos are provided below for reference:



(Knudson Drive / Weslock Way intersection)



(Knudson Drive / Weslock Way intersection)



(Knudson Drive at Weslock Way)



(Weslock Way at Knudson Drive)

In addition, both routes are identified as “Bicycle Lane (on-road)” on the *Official Cycling Map for Ottawa-Gatineau and the Outaouais Region* (2018).

As it pertains to the inclusion of bicycle lanes on proposed new streets, it is our opinion that on-street cycling facilities on internal local roads are not necessary. The proposed internal streets are low volume, low speed roads and consistent with the Ontario Traffic Manual Book 18, it is appropriate to accommodate cyclists in a shared manner on all proposed internal streets, as is outlined in **Element 4.1.1**. Implementing bike lanes on internal streets would likely require upgrading streets to a collector standard which would require a wider right-of-way (ROW) and pavement width.

Street Cross-Sections / Street Network

Comment #14:
The 16.5 metre cross section does not include adequate room to allow for a sidewalk, trees and utility spacing based on recent attempted implementation. The proposed cross section illustrates the JUT located under the proposed sidewalk. This approach is currently not agreed upon and not in use. It should also be noted that this width of right-of-way is not in keeping with the surrounding community which has right-of-way widths of 20 metres and greater. Please revise to accommodate a minimum right-of-way of 18 metres.

Response:
As is illustrated in **Appendix B**, the concept plan has been revised to include local roads with 18.0 metre right-of-way (ROW).

Comment #15:
Sidewalks are not required on both sides of local roads. Please revise.

Response:
While not required, certain local roads within the development have been proposed to have sidewalks on both sides to better accommodate pedestrian demands. In this regard the local roads with a 20m ROW are proposed to have sidewalks both sides. The proposed local roads with 18m ROW are to have sidewalks on one side per the standard City of Ottawa engineering cross sections.

As is noted in **Element 4.1.1**, a 20m ROW and an 18.0 metre ROW are proposed. Streets with a 20.0 metre ROW include Street 1, which runs north-south from Campeau Drive to Knudson Drive. A 20.0 metre ROW is also proposed for Street 16 which is the extension of Street 1 north of Knudson Drive, terminating at Weslock Way. In addition, a 20.0 metre ROW is proposed for Street 7 between Campeau Drive and Street 9, for Street 9 between Street 7 and Street 11, and for Street 11. These streets are generally regarded as having a higher importance and connectivity from a pedestrian perspective because of their length and connections to other pedestrian routes.

All other streets are proposed to have an 18.0 metre ROW with a sidewalk on one side of the street in order to accommodate pedestrian / active transportation.

Transportation Engineering Services

Comment #37:
(Element 2.1.2 – Existing Conditions)
Existing Area Traffic Management Measures: The TIA states that there are no existing traffic calming measures in the study area except for stop signs. However, Knudson Drive includes numerous regularly spaced "speed cushions". The existing pedestrian crossover at Knudson Drive / Nelford Crescent is also notable. Please revise.

Response:
Noted. At the time of preparing the initial submission of the TIA the speed cushions had not been installed on Knudson Drive. **Element 2.1.2** has since been revised to note the presence of 11 speed cushions along Knudson Drive and the existing pedestrian crossover at the Knudson Drive / Nelford Crescent intersection. The existence and location of the speed cushions was verified during the aforementioned site visit on Monday, April 5, 2021; the locations of the speed cushions have been marked in the following graphic:



Comment #38:
(Element 3.1.1 – Trip Generation and Mode Shares)
B. Estimate Total Development-Generated Person Trips: Table 12 correctly uses modal splits found in Table 3.13 of the TRANS Trip Generation Study, not the modal splits found in the TRANS 2011 OD study as stated in the text. Please correct the text.

Response:
Noted. **Element 3.1.1, Section B**, has been revised to state TRANS Trip Generation Study.

Comment #39:
(Element 3.1.1 – Trip Generation and Mode Shares)
C. Identify Existing Mode Shares for Traffic Assessment Zones: Note 1 under Table 13 is no longer accurate; other mode choice has not been included into the Auto Passenger percentage. As this is a residential development, modal split during the AM peak is more accurately estimated by blending from / within and modal split during the PM peak is more accurately estimated by blending to / within. Please revise.

Response:
Noted. Modal splits during the AM and PM peak periods were estimated by taking the average of the to/from and within since we believe it gives a better estimate for the overall period than just a single directional approach as we generate trips for both inbound and outbound movements during the AM and PM peak hours. Notwithstanding, **Table 13** of **Element 3.1.1** has been revised to reflect the modal split for the AM peak and PM peak periods as requested.

Comment #40:
(Element 3.1.1 – Trip Generation and Mode Shares)
D. Set Future Mode Share Targets for the Development: Justify why future mode share targets do not include the existing 'other' mode choice.

Response:
Noted. **Table 14** of **Element 3.1.1** has been revised to include the existing 'other' mode choice.

Comment #41:
(Module 4.1 Development Design)
Any new enhanced intersections or pedestrian crossings on boundary streets will require an RMA. Please confirm where an RMA will be required.

Response:
As required by the City of Ottawa's Traffic Impact Study Guidelines, BA Group went through a rigorous multi-step pre-consultation process to identify the scope and requirements of the Transportation Impact Assessment for the site. This process included multiple submissions made to City of Ottawa staff in advance of the first formal development application in September 2019. During that process we were advised by City Staff that Road Modification Approval (RMA) report drawings were not required for any improvements that do not modify the physical geometry of existing streets. As such it, the proposed development, which does not recommend any geometric road improvements to existing roads to accommodate site traffic, will not require an RMA.

There are locations where some improvements to the pedestrian treatments or supplementary traffic calming measures have been recommended (e.g. enhanced intersections). However, as these measures will consist of improved pavement markings and/or adding paving textures to improve pedestrian crossings. There are also locations where sidewalks are proposed to be added to existing streets. In all the above examples these improvements will not change the geometric layout of existing intersections and an RMA is not required. Rather, and the details of these improvements can be adequately confirmed as a condition of the subdivision approval.

Comment #42:
(Module 4.1 Development Design)
Please provide justification for the method of traffic control- and this should include warrants for any proposed all-way stop control intersections, and/or selection of the appropriate pedestrian crossover (PXO) type per OTM Book 15.

Response:
As requested by City Staff, an All-Way Stop Control Warrant was undertaken for the proposed all-way stop controlled intersections within the internal site network. The warrant is based on a review of Ontario Traffic Manual (OTM) Book 5, *All-way Stop Minimum Volume Warrant (Minor Roads)*, where:

All-way stop control may be considered on minor roads where the following conditions are met:

- *Total vehicle volumes on all intersection approaches exceed 350 for the highest hour recorded; and*
- *Volumes split does not exceed 75/25 for three-way control or 65/35 for four-way control. Volume is defined as vehicles only.*

The warrant analysis indicates that all internal intersections will not meet the minimum vehicular volume thresholds set out in the OTM warrants. As such it is proposed that the majority of intersections within the development will operate as side-street stop control. There are, however a few locations within the proposed development where an all-way stop control intersection is desirable to accommodate movement and enhance pedestrian safety. These intersections have been denoted as full 'Enhanced Intersections' where an improved pedestrian treatment will be provided on all four approaches of the intersection. See **Module 4.1** for the All-Way Stop Control Warrant analysis results and **Figure 13** and **Figure 16** show the proposed internal intersection controls and the proposed traffic calming / pedestrian enhancements, respectively.

Comment #43:
(Module 4.1 Development Design)
At the intersection of Beaverbrook Road and Street No. 17, Figure 12 shows pedestrian crossings on the east and west sides of the intersection and Figure 14 shows a potential enhanced intersection. These two figures therefore seem to indicate that an all-way stop is envisioned for this location. However, it is unlikely this intersection would warrant an all-way stop control. The intersection is also too close to the existing all-way stop controls on Beaverbrook Road at Weslock Way to the west and at Varley Drive to the east. Please provide a sidewalk or pathway on the south side of Beaverbrook Road from Street No. 17 to Weslock Way. Please also provide new crosswalks on the south and east sides of the Weslock Way and Beaverbrook Road intersection. This would also partially address the deficiency noted in point #35 of the Summary and Conclusions section.

Response:
The proposed pedestrian network and crossings have been refined in consultation with the project team and based on the all-way stop control warrant analysis undertaken above.

Figure 10 (formerly Figure 12 of the June 2020 BA Report), has been revised to illustrate a sidewalk on the south side of Beaverbrook Road from Street No. 17 to Weslock Way. In addition, new crosswalks are illustrated on the south and east sides of the Weslock Way and Beaverbrook Road intersection.

Figure 13, (formerly Figure 14 of the June 2020 BA Report) has been altered to identify the Beaverbrook Road and Street No. 17 intersection in a different manner. It is now identified as: "Enhanced Treatments on side street approaches." The refinement reflects the intention for the intersection to not be an all-way stop; however, it is intended for the Street No. 17 approach at Beaverbrook Road to include curb extensions and enhanced treatments on the side street as a traffic calming measure. No changes to Beaverbrook Road are proposed at this location.

Comment #44:
(Module 4.1 Development Design)
There are numerous inconsistencies within this module, and between this module of the TIA and the May 2020 Urban Design Brief by NAK Design Strategies. Please revise the below accordingly.

a. ***The TIA states that "on-street parking is proposed not to be restricted on either side of the street allowing for short term on-street parking to occur on either side of the road", whereas on page 32 and page 33 of the Urban Design Brief the descriptions of the 20.0m and 16.5m ROW concepts state that parking will be on one-side only. Figure 48 of the Urban Design Brief also provides a map of "single-sided on-street parking".***
b. ***The TIA and the Urban Design Brief differ in their placement of the sidewalk on one side of the 20.0m ROW concept.***
c. ***Figure 14 of the TIA shows an enhanced intersection at Street No. 1 and Street No. 5, whereas the Urban Design Brief instead shows an enhanced intersection at Street No. 1's southern intersection with Street No. 2. Figure 12 of the TIA doesn't show pedestrian crossings at either the intersection of Street No. 1 and Street No. 5 or the southern intersection of Street No. 1 and Street No. 2. The stop control locations shown in Figure 17 are also inconsistent with the pedestrian crossings of Figure 12 and the enhanced intersection locations of Figure 14. Overall, it is unclear if "enhanced intersections" are always intended to be all-way stop control with pedestrian crossings (as shown in Figure 43 of the Urban Design Brief) – or not. Please address.***
d. ***Figure 14 of the TIA shows the proposed midblock pedestrian crossings of Street No. 1 and Street No.2 too far south (not in-line with the pathway blocks). Please revise.***

Response:
Noted. In accordance with updates to the Concept Plan, the updates to the NAK Design Strategies Urban Design Brief and this report have been coordinated.

a. Parking will be provided on-street as a traffic calming measure. However, after further consultation with the project team, it is intended to limit on-street parking to one side of the roadway; the description within **Element 4.1.1** of this report has been revised to match the work done by NAK Design Strategies.
b. BA Group has removed cross sections from this update report; cross section design defers to the City of Ottawa Standards and for specific detail, the updated Urban Design Brief by NAK Design Strategies.
c. Proposed enhanced intersections have been divided into two categories to differentiate between intersections proposed to include all-way stops and intersections that will not be all-way stops:
    1. "Enhanced Intersection (All Approaches)
    (Upgraded Treatment on All Approaches)"
    2. "Enhanced Intersection (Side Street Approaches)
    (Upgraded Treatment on Side Street Approaches Only)"

    Further detail is provided in **Element 4.1.3**. Under this framework, NAK Design Strategies and BA Group have identified intersections to be enhanced. **Figure 13**, (formerly Figure 14 of the June 2020 BA Report) reflects the proposed enhanced intersections.
d. Noted, **Figure 13**, (formerly Figure 14 of the June 2020 BA Report) has been revised to reflect the introduction of Street 20 in the updated Concept Plan.

Comment #45:
(Appendix D – MMLOS Assessment)
Note that transit LOS is only supposed to be evaluated for transit movements. For example, since there is no eastbound transit movement at the Campeau Drive and Terry Fox Drive intersection, the 'west' column of this intersection should not receive a TLOS score. Please revise.

Response:
Noted. **Appendix D** has been revised for the transit LOS at each of the intersections.

Comment #46:
(Transit)
The influence of Terry Fox Station is overstated throughout. Existing transit service in the development area is not oriented to Terry Fox Station - this could have been identified by consulting OC Transpo route maps and the system map. Peak period Connexion routes 265 and 268 do not connect to Terry Fox, instead operating along Westlock / Knudson / Kanata Ave before traveling east on Campeau in the AM towards downtown, and the reverse in the PM. The same applies to Route 62, which operates directly along Campeau. Taking Route 62 or walking to Terry Fox Station would be backtracking, as direct trips towards downtown are already provided in the community. While the West Transitway Extension (Eagleson/March to Terry Fox) by 2024 may draw some new residents to walk to Terry Fox, service along Campeau and the other existing neighbourhood service is unlikely to change and should therefore be able to accommodate all development-generated transit trips. Please revise.

Response:
It is acknowledged that transit access is spread throughout the local area; a number of routes can be directly accessed from Campeau Drive, Kanata Avenue, Knudson Drive, and Weslock Way, all of which permeate, are adjacent, or are nearly adjacent to the site. Existing transit service accessed at these locations will accommodate transit demand generated by the site.

Notwithstanding the City's comments, it is our position that Terry Fox Station is important as part of the existing and future transit network given the routes that access it and their far-reaching access in the City of Ottawa. Specifically when the West Transitway Extension occurs (planned to be complete by 2024 as noted above), it will result in additional service capacity for the area which will be beneficial for the site and surrounding neighbourhood. The above comment recognizes this directly by acknowledging that the Transitway Extension may draw some new residents. Moreover, the West Transitway Extension may also allow OC Transpo to make other service adjustments in the area to improve connectivity to Terry Fox Station.

To address the above comment however BA Group However has made minor changes to the text throughout the report to refine the emphasis placed on connectivity to the Terry Fox Transit Terminal. It is noted however that the transit capacity assessment confirms that the existing services can adequately accommodate the projected transit ridership.

Comment #47:
(Transit)
Please revise Figure 13 - Proximity to Existing Transit Network to include a scale bar and to use a network-based approach to walking distance rather than straight-line distance. This will provide a more realistic view of 400m (5-min) walk transit coverage, accounting only for actual street and pathway connections between new residential units and existing bus stops. Include only pathways that would be winter maintained (i.e. MUPs or major pathway connections).

Response:
A revised Transit figure has been prepared and is included as **Figure 11** (it replaces Figure 13 of the June 2020 BA Report). A pedestrian walkshed analysis was conducted using Geographic Information Systems (GIS) in preparation of the revised analysis.

Comment #48:
(Transit)
Please create a new figure showing 400m (5-min) walk distance increments from Terry Fox Station using a network-based approach instead of straight-line distance. Please report the percent of proposed units at each increment. Based on a cursory review, the closest part of the proposed development is Block 705 (Campeau at Street 11) which is approximately 1.2km from Terry Fox Station via Campeau Dr, Cordillera St, an assumed extension of Canadian Shield Ave to Kanata Ave, and Lord Byng Way.

Response:
A new figure has been prepared and is included as **Figure 12**. A pedestrian walkshed analysis was conducted using Geographic Information Systems (GIS) in preparation of the analysis.

Comment #49:
(Transit)
Please revise Table 24 to reflect OC Transpo standard planning capacities in the peak periods: 45 persons on a standard forty-foot bus, 70 persons on a sixty-foot articulated bus, and 90 persons on a double decker bus.

Response:
Noted. **Table 27** (previously Table 24) has been revised to reflect OC Transpo standard planning capacity in the peak periods.

INTRODUCTION

BA Group has been retained by Minto Communities on behalf of ClubLink Corporation ULC to prepare a review of the transportation considerations associated with a proposed residential development located in the City of Ottawa. The site is currently occupied by Kanata Golf & Country Club with a municipal address of 7000 Campeau Drive. It is generally located within the Kanata Lakes neighbourhood; the proposed site (the existing golf course) generally meanders through an existing residential neighbourhood crossing several streets.

The 2017 City of Ottawa Transportation Impact Assessment Guidelines set out a multi-step pre-application process where the scope, assumptions, study area and methodology for a Transportation Impact Assessment for new development projects are submitted and approved in a step wise fashion. The City of Ottawa's Transportation Impact Assessment Study Process is illustrated in **Figure 1** for reference purposes.

In February 2019, "Step 1 – Screening" was completed and submitted to the City of Ottawa, and it is included in this report as **Appendix A**. It was determined through Step 1 that a complete Transportation Impact Assessment (TIA) would be required for the project. Several "triggers" were satisfied, resulting in the need to continue with the TIA process.

In June 2019, "Step 2 – Scoping" was completed and submitted to the City of Ottawa. This document was reviewed by City Staff and comments were provided June 16th 2019. A revised & finalized Step 2 report addressing feedback from City Staff is dated July 2019.

In July 2019, "Step 3 – Forecasting" was completed and submitted to the City of Ottawa. This document, which included the previous Steps, was reviewed by City Staff and comments were provided. A revised and finalized Step 3 Update report addressing feedback from City Staff was submitted in August 2019.

In September 2019, "Step 4 – Analysis/Strategy" was completed and submitted to the City of Ottawa. This document, which included the previous Steps, was reviewed by City Staff and direction was provided to Complete Step 5 and finalize the Transportation Impact Assessment submission.

This updated and consolidated report includes "Step 5 – Transportation Impact Assessment Submission", as described in the City of Ottawa's *Transportation Impact Assessment Guidelines (2017)*. The completion of Step 5 is representative of completion of the Transportation Impact Assessment process; this report is a finalized Transportation Impact Assessment included as part of the submission with the development application.

For reference purposes, the following summarizes the proposed development statistics:

- Single Detached Homes: 654 units
- Front Drive Townhouses: 247 units
- Back to Back Townhouses: 68 units
- Stacked Block Townhouses: 74 units
- Medium Density: 437 units
- **Total Residential Dwelling Units: 1,480 units**

The Concept Plan is included in **Appendix B** of this report.

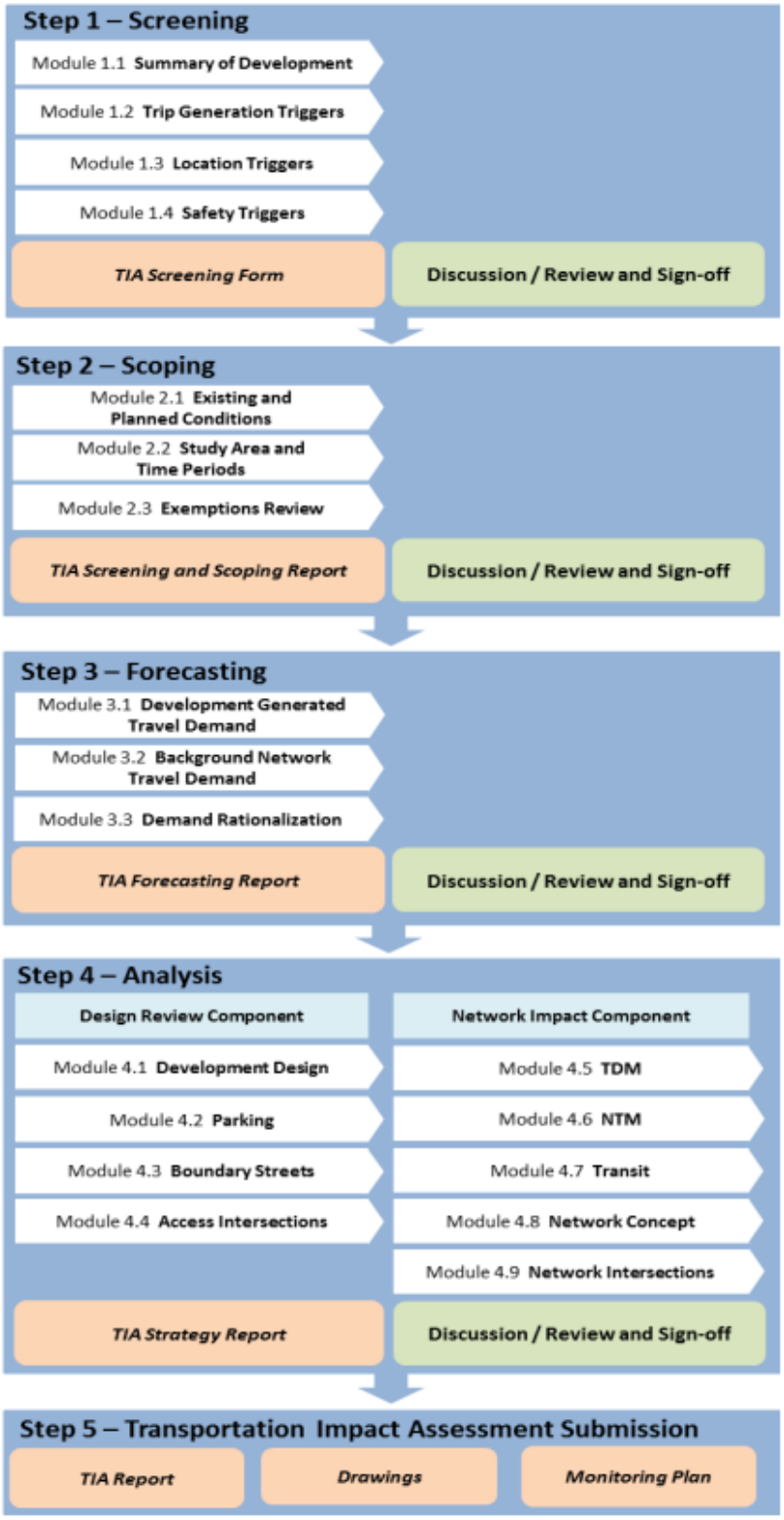


FIGURE 1: CITY OF OTTAWA TIA STUDY PROCESS

Source: Ottawa TIA Guidelines (2017), Page 9

SUMMARY AND CONCLUSIONS

BA Group has been retained by Minto Communities on behalf of ClubLink Corporation ULC to prepare a review of the transportation considerations associated with a proposed residential development located in the City of Ottawa. The site is currently occupied by Kanata Golf & Country Club with a municipal address of 7000 Campeau Drive. It is generally located within the Kanata Lakes neighbourhood; the site (the existing golf course) generally meanders through an existing residential neighbourhood crossing several streets.

The Site Today and Transportation Context

1. The entirety of the site is currently occupied by Kanata Golf & Country Club. The site includes an 18 hole golf course, driving range, and clubhouse, which itself includes a banquet hall and a larger hall for special events.

2. Located in close proximity to three arterial roads, the site is well-connected from a vehicular accessibility perspective. Furthermore, the Highway 417 corridor is located within 1.5km of the site to the south. The site has convenient access to Highway 417 with 3 interchanges in the area (March Road, Kanata Drive, and Terry Fox Drive are interchanges within approximately 1.5 to 2 kilometres of the site).

3. The subject site is geographically large and is embedded within an existing residential neighbourhood; its northernmost point is located approximately 1.6 kilometres north of Campeau Drive. Given its nature, the site intersects or is located adjacent to several roads within the existing street network. Vehicular access is provided from Campeau Drive, Knudson Drive, Weslock Way, and Beaverbrook Road.

4. The existing vehicular driveways for the site are accessed from Campeau Drive. They are in proximity to existing private driveways on the south side of Campeau Drive. Around the remainder of the site, the existing area is residential in nature and character, with primarily detached homes with individual driveways.

5. With respect to transit access, a number of routes can be directly accessed from Campeau Drive (four existing transit routes – 62, 161, 164, 268 – utilize Campeau Drive), Kanata Avenue, Knudson Drive, and Weslock Way, all of which permeate, are adjacent, or are nearly adjacent to the site. The site is also located within as little as 750 metres to Terry Fox Station that services routes with far reaching access in the City of Ottawa.

6. The site is well-connected with respect to cycling infrastructure. There are on-road bicycle lanes along Campeau Drive and Kanata Avenue which are within the immediate vicinity of the site.

7. Given that the site stretches throughout the neighbourhood north of Campeau Drive, the site is therefore served by a large number of different roads with different classifications (arterial, collector and local) where pedestrian sidewalks are provided. Sidewalks are located on both sides of arterial roads. Collector roads generally have sidewalks on at least one side. Local roads in the area vary with sidewalks on one side in some areas and no sidewalks on other local roads. The pedestrian network is supplemented by the local trail network.

8. The sidewalks provided within the area of the site serve as primary pedestrian connections to several key destinations including, but not limited to, Kanata Centrum Shopping Centre, Earl of March Secondary School, Ottawa Public Library Beaverbrook, Beaverbrook Park and All-Saints High School.

Proposed Development

9. The proposed development is residential and consists of a variety of housing types. The concept plan consists of the following:
    - Single Detached Homes: 654 units
    - Front Drive Townhouses: 247 units
    - Back to Back Townhouses: 68 units
    - Stacked Block Townhouses: 74 units
    - Medium Density: 437 units
    - **Total Residential Dwelling Units: 1,480 units**

10. The development is planned to be approved in one phase and marketed and constructed in phases. The analyzed horizon years for the development, within this report, are 2024 and 2029.

11. It is anticipated that there will be seven (7) vehicular access points to the site located at Campeau Drive, Knudson Drive, Weslock Way, and Beaverbrook Road; of which all are proposed as full movement.

Planned Conditions

12. The City of Ottawa's Transportation Master Plan (TMP), 2013, identifies two potential transportation infrastructure buildout scenarios for future rapid transit, transit priority, and road networks in Ottawa; the "2031 Network Concept" and the "2031 Affordable Network". A number of road improvements and transit expansion projects are identified in each that are located within the site vicinity.

13. Road projects include the widening of Campeau Drive, its westward extension, the widening of Kanata Avenue, and the widening of Terry Fox Drive.

14. Transit expansion projects include the West Transitway Extension (two phases), transit priority signal on Terry Fox Way, and the Kanata North Transitway (on March Road). Within the "Ultimate Network" (which does not have an identified timeframe), the West Transitway is replaced by light rail transit (LRT).

15. Projects identified above (that are part of the "2031 Affordable Network") have been allocated timing in the "Long Range Financial Plan," based upon the City of Ottawa 2014 Development Charges Background Study (2014 DC Study), amended October 2017.

16. Similar to the TMP, the Ottawa Cycling Plan, 2013, includes a "2031 Affordable Cycling Project List". Terry Fox Drive from Highway 417 (WB) to south of Campeau Drive has been identified for the implementation of bike lanes.

17. Traffic allowances are made for other specific proposed developments in the area, based on a review of the City of Ottawa's list of current development projects as of April 2019 (which was confirmed through the Step 2 process). These sites represent a total development in the order of 1,375 residential units, 5,803 m^2 GFA of retail space, and 759 m^2 GFA of office space.

Multi-Modal Travel Demand Forecasting

18. Travel demand forecasts have been developed following the methodology outlined in the City of Ottawa Transportation Impact Assessment Guidelines as the basis. Vehicular trip generation was conducted based upon the Ottawa's 2009 TRANS Study for the medium density blocks and townhouse units (all types). For the lower density (i.e. single detached homes) dwelling units, the trip generation was based upon neighbourhood traffic surveys in the existing local area, as this is representative of the future character of the proposed lower density development. This approach has been reviewed by City of Ottawa staff and has been approved through the Step 3 review process.

19. The results of the aforementioned trip generation estimate were used for the purpose of a sensitivity analysis in the forthcoming traffic and capacity analysis for the project assessment.

20. To assess multi-modal trip generation, the aforementioned adopted vehicle trip generation was converted to person trips utilizing mode splits found in the TRANS 2011 OD Study.

21. The volumes listed below are estimated to be generated by the proposed development.

    Person Trips
    - Weekday morning peak hour = 1,590 two-way person trips (510 trips in, 1,080 trips out)
    - Weekday afternoon peak hour = 1,630 two-way person trips (920 trips in, 710 trips out)

    Transit Trips
    - Weekday morning peak hour = 400 two-way person trips (130 trips in, 270 trips out)
    - Weekday afternoon peak hour = 410 two-way person trips (230 trips in, 180 trips out)

    Walking Trips
    - Weekday morning peak hour = 80 two-way person trips (25 trips in, 55 trips out)
    - Weekday afternoon peak hour = 80 two-way person trips (45 trips in, 35 trips out)

    Cycling Trips
    - Weekday morning peak hour = 80 two-way person trips (25 trips in, 55 trips out)
    - Weekday afternoon peak hour = 80 two-way person trips (45 trips in, 35 trips out)

    Auto Passenger Trips
    - Weekday morning peak hour = 160 two-way person trips (50 trips in, 110 trips out)
    - Weekday afternoon peak hour = 165 two-way person trips (95 trips in, 70 trips out)

    Auto Driver Trips
    - Weekday morning peak hour = 870 two-way person trips (280 trips in, 590 trips out)
    - Weekday afternoon peak hour = 895 two-way person trips (505 trips in, 390 trips out)

Development Design

22. All roads within the development plan are proposed to be local roads. All roads are projected to have daily traffic volumes of less than 1,000 vehicles per day (the local road traffic threshold) aside from three which only exceed this threshold in short segments near the Campeau Drive corridor. The development plan is comprised of 23 distinct road segments which have been designed to provide safe and efficient access for all users (i.e. vehicles, pedestrians, and cyclists).

23. To accommodate pedestrians two different local cross sections are proposed; a 20m right-of-way (ROW) and an 18m ROW. The former has been proposed to allow for streets with sidewalks on both sides; these streets are generally regarded as having a higher importance and connectivity from a pedestrian perspective because of their length and connections to other pedestrian routes. All other streets are proposed to have an 18m ROW with a sidewalk on one side of the street in order to accommodate pedestrian / active transportation. The cross sections are based upon the City of Ottawa engineering cross sections.

24. Consistent with the condition on the other area local streets surrounding the site, on-street parking is proposed to be unrestricted on either side of streets, permitting short term on-street parking to occur.

25. In addition to the proposed sidewalk connections, several strategic trail / off-street pathway connections have been proposed throughout the development to provide connections from the proposed new development to the existing neighbourhood areas.

26. Based on the existing transit service, approximately 62% of the households proposed in the development area will be within 400 metres of a transit stop based on a pedestrian walkshed analysis conducted using Geographic Information Systems (GIS). In particular, 100% of proposed higher density housing types (i.e. “Medium Density” and “Stacked Townhouses” housing types) will be within 400 metres of a transit stop.

27. Cyclists will be accommodated on-street in a shared manner on all proposed internal streets and also accommodated through various future trail connections by providing an appropriately sized multi-use pathway to accommodate cyclists and pedestrians, consistent with other area local roads. The proposed internal streets are low volume, low speed roads; projected volumes range 325 to 1,700 vehicles per day. Given that the projected speed limit for the local roads is 30 km/h, on-street cycling facilities on internal local roads are not necessary, consistent with the Ontario Traffic Manual Book 18. It is appropriate to accommodate cyclists in a shared manner on all proposed internal streets.

28. Traffic calming measures are proposed for consideration for the purposes of reducing speeds on longer road segments within the plan. Traffic calming measures include the provision of speed display devices, provision of on-road messaging in strategic areas, permitting on-street parking, reducing effective roadway width with curb extensions (e.g. with bulbouts) at key locations / intersections, and the provision of raised intersections at strategic locations. In addition, specific intersections have been identified as “Enhanced Intersections”, divided into two categories based upon whether the intersection is an all-way stop or whether only side street approaches will be stop-controlled.

Boundary Street Design

29. A Multi-Modal Level of Service (MMLOS) assessment was undertaken at area signalized intersections and at external street segments between signalized intersections for pedestrians, cyclists, transit, trucks and cars.

30. BA Group undertook an MMLOS assessment of the segments of street along the Campeau Drive corridor. Based on a review of the MMLOS, the pedestrian network along the segments between intersections typically range between LOS A to LOS D. Along the portion of Campeau Drive where the development site is located, the pedestrian LOS is D. The pedestrian LOS for the intersections in the area ranges from C to F with the LOS F existing at the March Road / Campeau Drive intersection and at the Herlihey Way / Campeau Dr. intersection. The pedestrian LOS for the intersections closest to the site are LOS C to D.

31. The cycling LOS along Campeau Drive corridor ranges between LOS A to LOS F which is the result of the wide variety of cycling provisions along the Campeau Drive corridor. In this regard there is a physically separated bikeway located on the north side of Campeau Drive east of the site (LOS A) compared to segments that have no formal cycling accommodation west and east of the site (LOS F). In the vicinity of the site frontage the cycling LOS is C on account of the on-street painted cycling lanes that exist. The cycling LOS for intersections in the study area are LOS D to LOS F.

32. The transit LOS for the Campeau Drive corridor is LOS E throughout the corridor.

33. The trucks and auto LOS typically range between LOS A to LOS E.

34. Based on the MMLOS, the area street segments closest to the site have an acceptable MMLOS. Certain segments beyond the site on Campeau Drive have cycling LOS of F due to the limited cycling provisions available under existing conditions.

35. The City of Ottawa's MMLOS assessment focuses on street segments in proximity to signalized intersections. BA Group therefore also undertook a review of existing pedestrian and cycling connections within the existing neighbourhood surrounding the site in order to identify any missing links. Based on our review there is one notable missing link in the existing pedestrian network on the south side of Beaverbrook Road, from Weslock Way to Varley Drive. This link will be an important pedestrian route that connects to an existing bus stop on Beaverbook Road. Note that this link will offer better pedestrian connection in the future as part of the proposed development plan. BA Group did not identify any notable missing links in the area cycling network.

36. Based on a review of area collision data there is no discernable trends of increasing collision behaviour. The largest number of collisions in the study area is at the March Road / Campeau Drive intersection which has had 14-35 collisions per year for the past 5 years. The proposed development will not require any physical modifications to the March Road / Campeau Drive intersection and therefore will not have a significant impact on the safety characteristics of this intersection.

Access Intersections Design

37. Based on projected operations at the future access points, all proposed access points will operate acceptably as unsignalized intersections with side-street stop control. No new signalized intersections are being proposed, or are required, as part of the development.

38. Based on the traffic analysis conducted at the proposed site access intersections under future total conditions, all site accesses operate at an acceptable level of service. All proposed access intersections will operate with two-way stop control with STOP control on the minor side streets (i.e. proposed) street approaches. No roundabouts or traffic signals are proposed or required within the development area to accommodate site traffic.

Site Access Design and Operations

39. The following intersections were considered in the analysis undertaken as part of this study:
    - Campeau Drive / Park Ridge Place (East) & Street No. 1
    - Campeau Drive / Street No. 7
    - Campeau Drive / Omni Health Care Centre & Street No. 11
    - Knudson Drive / Street No. 1 & Street No. 16
    - Weslock Way / Street No. 16
    - Beaverbrook Road / Street No. 23

40. Based on the analysis the proposed accesses will operate acceptably under two-way STOP control. Individual movements at the proposed site access locations will generally operate with good levels of service with LOS C or better. The one exception is the southbound approach of Street 11 at Campeau Drive which is projected to operate with a LOS of D during the peak hours. The LOS of D is considered acceptable for a peak hour period in a built-out urban environment with delays not significant enough to warrant consideration of a traffic signal.

41. Anticipated modifications to the existing area streets at the proposed access connections will generally consist of the addition / modification of the existing pavement markings on existing streets to accommodate a new intersection, and the addition of new stop signs in the right of way for the new streets.

Transportation Demand Management (TDM)

42. BA Group has reviewed the need and opportunity for TDM in the area and a preliminary TDM program has been developed for the project, based upon the City's *TDM Measures Checklist* (Version 1.0, June 2017), to ensure the City's stated mode share goals are met. These measures will be refined and an implementation plan will be developed at a subsequent stage of the development process.

43. TDM Measures included as part of the preliminary TDM Plan are as follows:
    - travel/commuting surveys;
    - local area walking/cycling access route maps and transit schedules in the lobbies of buildings within the "medium density residential uses";
    - the possibility of a bikeshare station, car share vehicles in the vicinity of the medium density blocks (and memberships for their residents);
    - the unbundling of parking from the purchase of medium density units; and
    - a multi-modal travel option information package for new residents.

Neighbourhood Traffic Management

44. BA Group has assessed the projected traffic volume changes on area streets that may be affected by the development. Based upon our analysis, there are several roads in the study area that operate with daily traffic volumes in excess of the City's desired targets under existing conditions. Of note, Kanata Avenue north of Campeau Drive is designated as a major collector street and has daily traffic volumes that are consistent with an arterial road designation. This is an indication that Kanata Avenue operates as an arterial road in the site area, consistent with its current classification south of Campeau Drive.

45. Similar to the above, Knudson Drive, Weslock Way, and Beaverbrook Road are minor collector streets that also have existing daily traffic volumes that exceed the City of Ottawa's guideline for collector streets. This in an indication that notwithstanding their classification, portions of these minor collector roads (i.e. the portions of street near intersections with arterial and major collector streets) operate with characteristics comparable to major collector streets based on existing traffic volumes.

46. BA Group has reviewed the projected change to the daily traffic volume on the area study network and determined that the projected site traffic will not appreciably affect the current character or function of the roads in the study area.

Transit

47. Based on a review of the TRANS 2011 O-D survey data, residential trips are more oriented towards high-density employment areas in the City (i.e. the downtown core), therefore, are more likely to make use of the downtown-oriented transit routes that are mostly accessed via Terry Fox Terminal, with some transit trips to the local area where smaller density employment areas are located.

Network Concept

48. Given the uncertainty of the completion for the widening of Kanata Avenue, BA Group has conservatively in the capacity analysis undertaken herein assumed that all the existing boundary streets will retain their existing lane configurations.

49. BA Group has assessed whether the proposed development changes the City of Ottawa's plans for autos and transit as set out in the current TMP.

50. Based on the capacity analysis undertaken, all study area intersections along Kanata Avenue, Terry Fox Drive, and Campeau Drive can accommodate the forecast site traffic without physical improvement. As such, the proposed development will not affect the timing of the planned road network changes in the 2013 TMP.

Area Intersection Operations

51. Multi-modal level of service assessment was conducted at the signalized intersections within the study area as outlined in the MMLOS guidelines. Based on the assessment, the future road network remained consistent as the existing road network and no additional mitigation measures or improvements are anticipated to occur during this time period. As such, the future MMLOS assessment produced the same results as the existing MMLOS assessment and the signalized intersections typically ranged between LOS C to LOS E.

52. The following signalized intersections were considered in the vehicular operations analysis undertaken as part of this study:
    - Campeau Drive / Terry Fox Drive
    - Campeau Drive / Herlihey Way
    - Campeau Drive / Kanata Avenue
    - Campeau Drive / Knudson Drive & Maritime Way
    - Campeau Drive / Hawkstone Gate
    - Campeau Drive / Teron Road
    - March Road / Campeau Drive & Highway 417 Off-Ramp

53. With the addition of site-related traffic under future total traffic conditions, all intersections operate at a v/c ratio of 0.81 and 0.94 in the morning and afternoon peak periods or better.

54. Based upon the vehicular capacity analysis undertaken by BA Group, new site related traffic can be accommodated at all signalized intersections. No physical or operational improvements are required or recommended with the exception of the March Road / Campeau Drive / Highway 417 off-ramp intersection which is discussed below.

55. The intersection of March Road / Campeau Drive / Highway 417 is forecast to operate with movements at or near capacity under future traffic scenarios. The at or near capacity operation is also experienced under existing conditions and are comparable to existing conditions. This intersection can accommodate forecast future total traffic volumes, including site traffic, without any physical modifications subject to minor optimization of the traffic signal timing. Moreover site generated traffic will not have a significant impact to any movements that are projected to operate at capacity.

56. The following unsignalized intersections were considered in the operations analysis undertaken as part of this study:
    - Kanata Avenue / Knudson Drive
    - Knudson Drive / Shaughnessy Crescent (East)
    - Knudson Drive / Shaughnessy Crescent (West)
    - Knudson Drive / Sherk Crescent (North)
    - Knudson Drive / Sherk Crescent (South)
    - Knudson Drive / Weslock Way
    - Weslock Way / Beaverbrook Road
    - Campeau Drive / Park Ridge Place (West)
    - Coulson Court / Robson Court
    - Robson Court / Evanshen Crescent

57. Based on the capacity analysis, the traffic operations at all existing unsignalized intersections within the study area can accommodate new site traffic and will operate at acceptable levels of service under future total traffic volumes without any need for road improvements or mitigation measures. All existing unsignalized movements in the study area are forecast to operate with good levels of service (LOS A-C) under future total conditions.

Drawings

58. City of Ottawa Road Modification Approval (RMA) report drawings are not required for the proposed development as the project will not require any changes to the geometric layout of any existing streets to accommodate site traffic. Transportation improvements required to accommodate site traffic consist of adjustments to existing pavement markings on Campeau Drive and new traffic control signage (i.e. stop signs) at proposed new intersections.

Recommendations

59. This TIA report does not identify issues that need to be resolved or deferred and therefore, does not recommend mitigation actions.

Monitoring Plan

60. A Monitoring Plan is not required as part of this application because the development is not proposing to defer any required transportation improvements and is not relying on any planned future road infrastructure that is not yet in place. Therefore monitoring of build-out impacts and potential mitigation actions in lieu of the planned infrastructure is not required.

STEP 1: SCREENING FORM

In February 2019, “Step 1 – Screening” was completed and submitted to the City of Ottawa; it is included in this report as **Appendix A**. It was determined through Step 1 that a complete Transportation Impact Assessment (TIA) would be required for the project. Several “triggers” were satisfied, resulting in the need to continue with the TIA process.

It should be noted that the project statistics included within **Appendix A** reflect the project statistics at the time of the submission of “Step 1 – Screening” (February 2019) and do not reflect the current project statistics (April 2021).

STEP 2: SCREENING & SCOPING

MODULE 2.1 – EXISTING AND PLANNED CONDITIONS

ELEMENT 2.1.1 – PROPOSED DEVELOPMENT

Existing Land Uses & Permitted Use Provisions in the Official Plan, Zoning By-law, etc.

The entirety of the site is currently occupied by Kanata Golf & Country Club. Ancillary uses include the clubhouse, which itself includes a banquet hall and a larger hall for special events.

Within the City of Ottawa Official Plan (OP), the site is designated “General Urban Area”. Under Zoning By-law 2008-250, the site is zoned O1A. Zone O1 is “Parks and Open Space Zone”; the O1A subzone exists to include “golf course” as a permitted use.

It is noteworthy that the site is bordered by the “Kanata Town Centre” Secondary Plan area, to its south.

Land Uses & Relevant Planning Regulations

The land use proposed as part of the development is residential. As the existing use is a golf course, the proposal (and this report) pertains to a draft plan of subdivision. The existing land will be divided into multiple lots for the purpose of the development.

In addition, the application will seek a Zoning By-law Amendment as residential uses are currently not permitted as part of the O1A zone the site is located within.

Development Size

The current iteration of the land use concept plan includes the following development programme:

- Single Detached Homes: 630 units
- Front Drive Townhouses: 332 units
- Back-to-Back Townhouses: 70 units
- Stacked Townhouses: 76 units
- Medium Density: 436 units
- **Total Residential Dwelling Units: 1,544 units**

The concept plan is included in **Appendix B**.

Estimated Date of Occupancy & Planned Phasing of Development

The development is planned to be approved in one phase and marketed and constructed in phases. The analyzed horizon years for the development, within this report, are 2024 and 2029.

Number of Parking Spaces

As per the Exemptions Review (see **Module 2.3**), parking analysis is only required for site plans.

Access Points for All Modes

As is illustrated in the concept plan (**Appendix B**), it is anticipated that there will be seven (7) vehicular access points to the site, inclusive of the following:

- Campeau Drive – 3 vehicular access points
    - The proposed access points on Campeau Drive have been located such that they integrate with the existing access points on the south side of Campeau Drive.
- Knudson Drive – 2 vehicular access points
    - Located approximately 145 metres east of the Kanata Avenue / Knudson Drive intersection
- Weslock Way – 1 vehicular access point
    - Located approximately 280 metres north of the Weslock Way / Beaverbrook Road intersection
- Beaverbrook Road – 1 vehicular access point
    - Located approximately 80 metres east of the Weslock Way / Beaverbrook Road intersection

It is anticipated that none of the aforementioned vehicular access points will have restrictions. All intersections will permit all movements.

ELEMENT 2.1.2 – EXISTING CONDITIONS

Existing Road Network

A description of the streets within the local area road network is provided in **Table 1**. The existing road network and lane configurations is illustrated in **Figure 2**.

Located in close proximity to three arterial roads, the site is well-connected from a vehicular accessibility perspective. Furthermore, the Highway 417 ramp terminals are located along March Road and Terry Fox Drive, within approximately 1.5 to 2 kilometres of the site.

TABLE 1 AREA ROAD NETWORK

Street Name	Road Cross Section (Proximate to site)	Parking / Traffic Regulations	Jurisdiction	Posted Speed	Description
Arterial Roads					
Campeau Drive	A 2-lane cross section (i.e. 1 lane in each direction). Auxiliary turning lanes provided at key intersections. Cycling lanes are provided on both sides of road.	No Parking is permitted at any time.	City of Ottawa	60 km/h	Campeau Drive is an east-west arterial road extending between March Road in the east and Didsbury Road in the west.
March Road	A 6-lane cross section (i.e. 3 lanes in each direction). Auxiliary turning lanes provided at key intersections. Cycling lanes are provided on both sides of road.	No Stopping is permitted at any time.	City of Ottawa	80 km/h	March Road is a north-south arterial road extending between Dunrobin Road in the north and Campeau Drive in the south. March Road continues as Eagleson Road south of Campeau Drive.
Terry Fox Drive	A 4-lane cross section (i.e. 2 lanes in each direction). Auxiliary turning lanes provided at key intersections. Cycling lanes are provided on both sides of road.	No Parking is permitted at any time.	City of Ottawa	70 km/h	Terry Fox Drive is an arterial road that encircles the west side of Kanata. It extends from March Road northeast of the site, and travels west & south around the site. In the vicinity of the site Terry Fox Drive is generally in a north-south orientation, located west of the site.
Kanata Avenue *(south of Campeau Drive)*	A 2-lane cross section (i.e. 1 lane in each direction). Auxiliary turning lanes provided at key intersections. Cycling lanes are provided on both sides of road.	No Parking is permitted at any time.	City of Ottawa	50 km/h	Kanata Avenue is a north-south arterial road extending between Campeau Drive in the north and Katimavik Road in the south. Kanata Avenue continues as major collector road north of Campeau Drive Kanata Avenue continues as Castlefrank Road south of Katimavik Road.
Continued on Next Page					

Street Name	Road Cross Section (Proximate to site)	Parking / Traffic Regulations	Jurisdiction	Posted Speed	Description
Major Collector Roads					
Teron Road	A 2-lane cross section (i.e. 1 lane in each direction). Auxiliary turning lanes provided at key intersections. Cycling lanes are provided on both sides of road.	No Parking is permitted at any time.	City of Ottawa	50 km/h	Teron Road is a north-south major collector road extending between March Road in the north and Campeau Drive in the south.
Kanata Avenue *(north of Campeau Drive)*	A 2-lane cross section (i.e. 1 lane in each direction). Auxiliary turning lanes provided at key intersections. Cycling lanes are provided on both sides of road.	No Parking is permitted at any time.	City of Ottawa	50 km/h	Kanata Avenue is a north-south major collector road extending between Terry Fox Drive in the north and Campeau Drive in the south. Kanata Avenue continues as an Arterial Road south of Campeau Drive.
Collector Roads					
Knudson Drive	A 2-lane cross section (i.e. 1 lane in each direction). Left turning lane is provided at Campeau Drive. Cycling lanes are provided on both sides of road.	No Parking is permitted at any time.	City of Ottawa	40 km/h	Knudson Drive is a north-south collector road extending between Kanata Avenue in the north and Campeau Drive in the south. Knudson Drive continues as Maritime Way, south of Campeau Drive.
Weslock Way	A 2-lane cross section (i.e. 1 lane in each direction). Cycling lanes are provided on both sides of road.	No Parking is permitted at any time.	City of Ottawa	40 km/h	Weslock Way is a north-south collector road extending between Knudson Drive in the south to Walden Drive in the north.
Beaverbrook Road	A 2-lane cross section (i.e. 1 lane in each direction). Cycling lanes are provided on both sides of road.	No Parking is permitted at any time.	City of Ottawa	40 km/h	Beaverbrook Road is an east-west collector road extending from Weslock Way in the west to Teron Road in the east. Beaverbrook Road continues as Penfield Drive east of Teron Road.
Local Roads					
Sherk Crescent	A 2-lane cross section (i.e. 1 lane in each direction).	Parking is permitted at any time on either side of the road.	City of Ottawa	40 km/h	Sherk Crescent is a local road that circulates and connects with Knudson Drive.
Shaughnessy Crescent	A 2-lane cross section (i.e. 1 lane in each direction).	Parking is permitted at any time on either side of the road.	City of Ottawa	40 km/h	Shaughnessy Crescent is a local road that circulates and connects with Knudson Drive.

Existing Driveways to Adjacent Developments within 200 metres of the Proposed Site Driveway, indicating land use associated with the driveway

The majority of the existing driveways located in the general area of the site are private residential driveways for low density homes in the neighbourhood.

Aside from these driveways, others include the following:

- Two driveways on the south side of Campeau Drive providing access to Park Ridge Place, an apartment complex with three buildings (it has a 3rd access driveway on the east side of Kanata Avenue)
- One driveway on the south side of Campeau Drive providing access to the Forest Hill Long Term Care Home

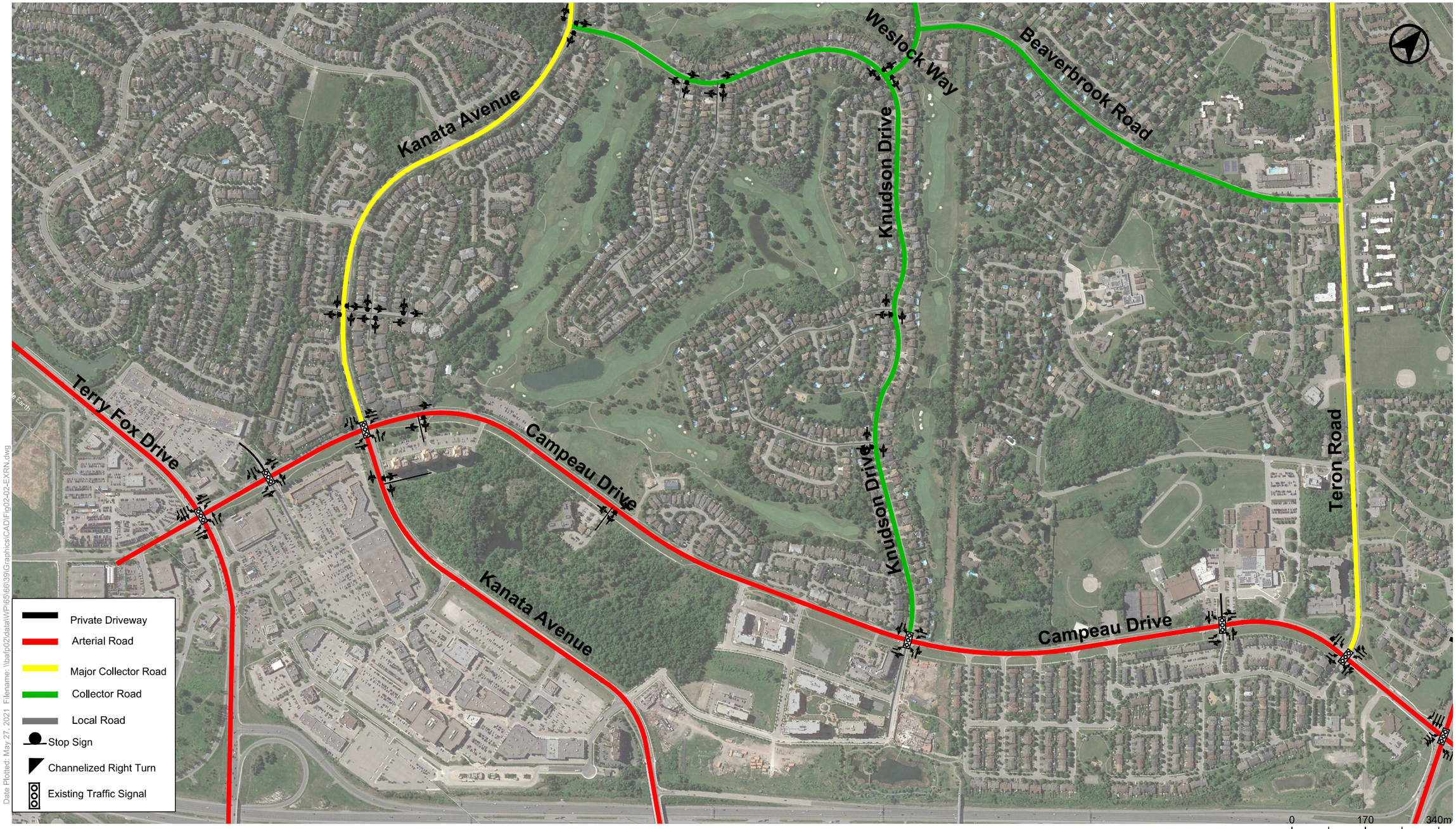


FIGURE 2 EXISTING ROAD NETWORK & LANE CONFIGURATIONS

Existing Transit Network

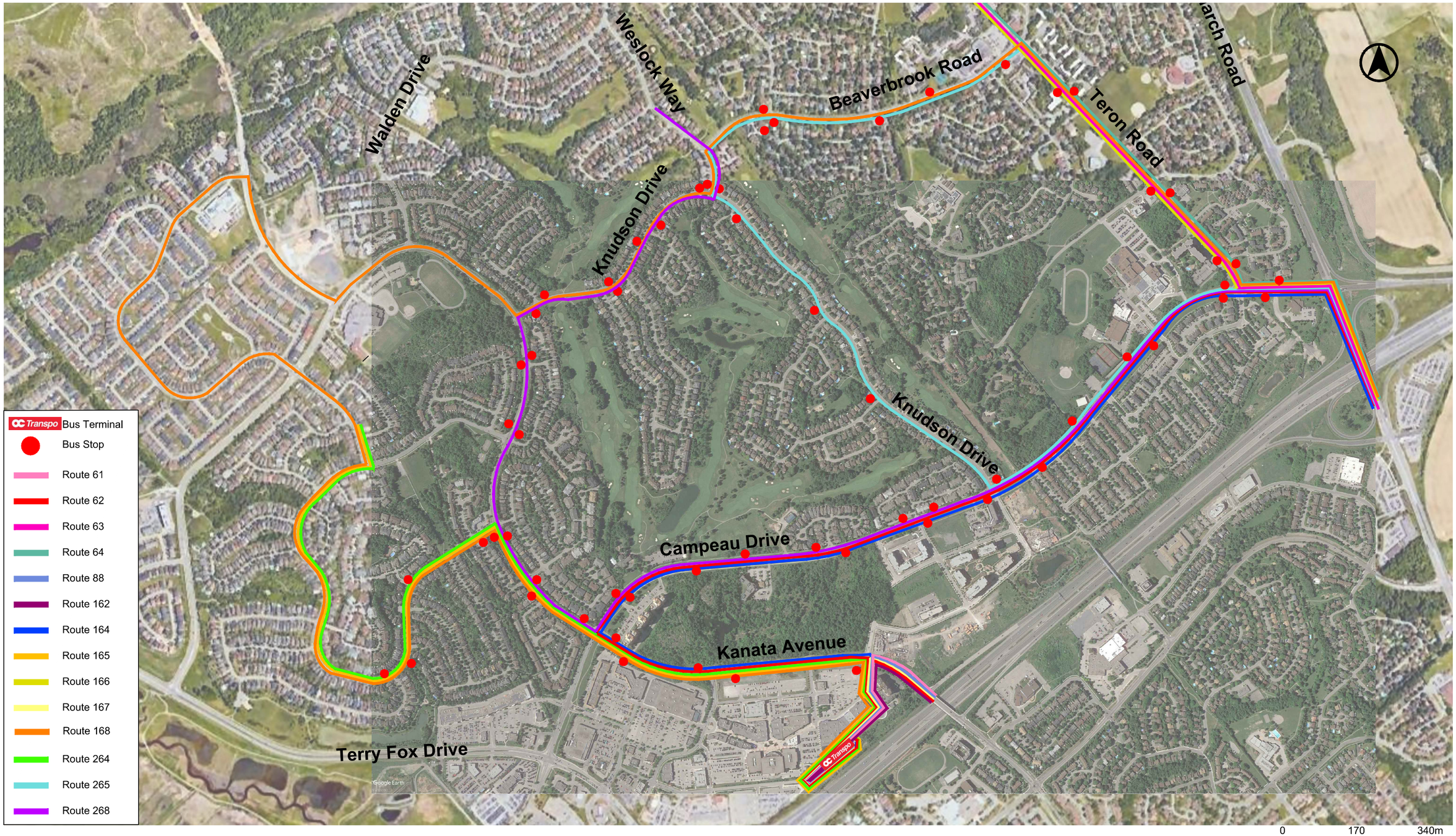
The proposed development is well-situated relative to existing transit infrastructure due to its proximity to a variety of OC Transpo routes including several that stop in close proximity along the Campeau Drive corridor. A summary of the local transit lines is provided in **Table 2**.

The existing transit network is illustrated in **Figure 3**.

TABLE 2 AREA TRANSIT NETWORK

Route	Nearby Stops	Headways	Route Description
61 Tunney's Pasture & Gatineau ↔ Terry Fox & Stittsville	Terry Fox Station	7 to 16 minutes during rush hours and 15 to 30 minutes during all hours	The 61 bus rote operates generally in an east-west direction between Sittsville and Tunney's Pasture (and Gatineau during rush hours).
62 Tunney's Pasture ↔ Stittsville & Terry Fox	Campeau Drive, bordering Site to the south	30 minutes during all hours	The 62 bus route operates generally in an east-west direction between Terry Fox and Tunney's Pasture. It also serves the area of Stittsville on weekdays only.
63 Innovation & Briarbrook ↔ Tunney's Pasture & Gatineau	Campeau Drive / Teron Road	7 to 15 minutes during rush hours and 30 minutes outside of rush hours	The 63 bus route operates generally in an east-west direction between the area of Briarbrook and Tunney's Pasture (and Gatineau during rush hours).
64 Morgan's Grant via Innovation ↔ Tunney's Pasture	Campeau Drive / Teron Road	30 minutes during all hours	The 64 bus route operates generally in an east-west direction between the area of Morgan's Grant and Tunney's Pasture.
88 Hurdman ↔ Terry Fox	Terry Fox Station	10 to 15 minute during all hours	The 88 bus route operates generally in an east-west direction between Terry Fox and Hurdman.
161 Bridlewood ↔ Terry Fox	Campeau Drive, bordering Site to the south	30 minutes during rush hours and 60 minutes outside of rush hours	The 161 bus route operates generally in a north-south direction between Terry Fox and the area of Bridlewood.
162 Stittsville ↔ Terry Fox	Terry Fox Station	60 minutes during all hours	The 162 bus route operates generally in a north-south direction between Terry Fox and the area of Stittsville.
164 Hope Side ↔ Terry Fox	Campeau Drive, bordering Site to the south	30 minutes during all hours	The 164 bus route operates generally in a north-south direction between Terry Fox and Hope Side.
165 Innovation ↔ Terry Fox	Several stops on Kanata Avenue	60 minutes during all hours	The 165 bus route operates generally in a north-south direction between the area of Innovation and Terry Fox.

Route	Nearby Stops	Headways	Route Description
167 Blackstone ↔ Terry Fox	Terry Fox Station	30 minutes during rush hours and 60 minutes outside of rush hours	The 164 bus route operates generally in a north-south direction between Terry Fox and Blackstone.
168 Terry Fox ↔ Bridlewood	Several stops on Kanata Avenue	30 minutes during all hours	The 168 bus route operates generally in a north-south direction between Terry Fox and the area of Bridlewood.
264 Tunney's Pasture ↔ Terry Fox	Several stops on Kanata Avenue	20 minutes during rush hours	The 264 bus route operates generally in an east-west direction between Terry Fox and Tunney's Pasture. The bus route travels east towards Tunney's Pasture in the morning peak period and west towards Terry Fox in the afternoon peak period.
265 Tunney's Pasture ↔ Beaverbrook	Several stops on Knudson Drive	45 to 65 minutes during rush hours	The 265 bus route operates generally in an east-west direction between Tunney's Pasture and Beaverbrook. The bus route travels east towards Tunney's Pasture in the morning peak period and west towards the area of Beaverbrook in the afternoon peak period.
268 Tunney's Pasture ↔ Kanata Lakes	Campeau Drive, bordering Site to the south	19 to 30 minutes during rush hours	The 268 bus route operates generally in an east-west direction between Tunney's Pasture and the area of Kanata Lakes. The bus route travels east towards Tunney's Pasture in the morning peak period and west towards the area of Kanata Lakes in the afternoon peak period.



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FIGURE 3 EXISTING TRANSIT NETWORK

Existing Cycling Network

Table 3 lists the characteristics of cycling routes within the local area of the proposed development. The site is well-connected with respect to cycling infrastructure, as it is adjacent to on-road bicycle lanes along Campeau Drive and Kanata Avenue, which provides cycling connectivity to a number of other cycling routes and facilities within the Kanata area. The existing cycling network is illustrated in **Figure 4**.

TABLE 3 AREA CYCLING NETWORK

Route	Cycling Infrastructure	Description	Image
Campeau Drive From Teron Road to Terry Fox Drive	Bicycle Lanes	Bicycle lanes are provided along both sides of Campeau Drive. These lanes extend from Terry Fox Drive eastward until Teron Road.	 Campeau Drive at Kanata Avenue facing East
March Road From Campeau Drive to the limits of the Kanata Area	Bicycle Lanes	Bicycle lanes are provided along both sides of March Road. These lanes extend from Campeau Drive northward until the limits of the Kanata Area.	 March Road at Corkstown Road facing North

Continued on Next Page

Route	Cycling Infrastructure	Description	Image
Kanata Avenue From Terry Fox Drive to Katimavik Road	Bicycle Lanes	Bicycle lanes are provided along both sides of Kanata Avenue. These lanes extend from Terry Fox Drive southward until Katimavik Road.	 Kanata Avenue at Knudson Drive facing North
Knudson Drive From Kanata Avenue to Campeau Drive	Bicycle Lanes	Bicycle lanes are provided on both sides of Knudson Drive. These lanes extend from Kanata Avenue southward until Campeau Drive.	 Knudson Drive at Campeau Drive facing North
Terry Fox Drive From Hazeldean Road to Carling Avenue	Bicycle Lanes	Bicycle lanes are provided on both sides of Terry Fox Drive. These lanes extend from Hazeldean Road northward until Carling Avenue.	 Terry Fox Drive at Kanata Avenue facing North

Continued on Next Page

Route	Cycling Infrastructure	Description	Image
Teron Road From Campeau Drive to March Road	Bicycle Lanes	Bicycle lanes are provided on both sides of Teron Road. These lanes extend from Campeau Drive northward until March Road.	 Teron Road at Salter Crescent facing north
Watts Creek Pathway	Multi-Use Pathway	The Watts Creek Pathway is a multi-use pathway that provides a connection from the Kanata Area to other areas and pathways throughout the City of Ottawa.	 Watts Creek Pathway in the Kanata Area
Cross-Town Bikeway	Multi-Use Pathway	The Cross-Town Bikeway is a collection of multi-use pathways and spine cycling routes that continuously connect throughout the City of Ottawa. In the vicinity of the site, a multi-use pathway generally in a north-south direction (west of Kanata Avenue) between Campeau Drive and Kanata Avenue. Numerous trail connections provide access to the local neighbourhood.	 Cross-Town Bikeway at Campeau Drive facing north



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FIGURE 4 EXISTING CYCLING CONTEXT

Existing Pedestrian Network

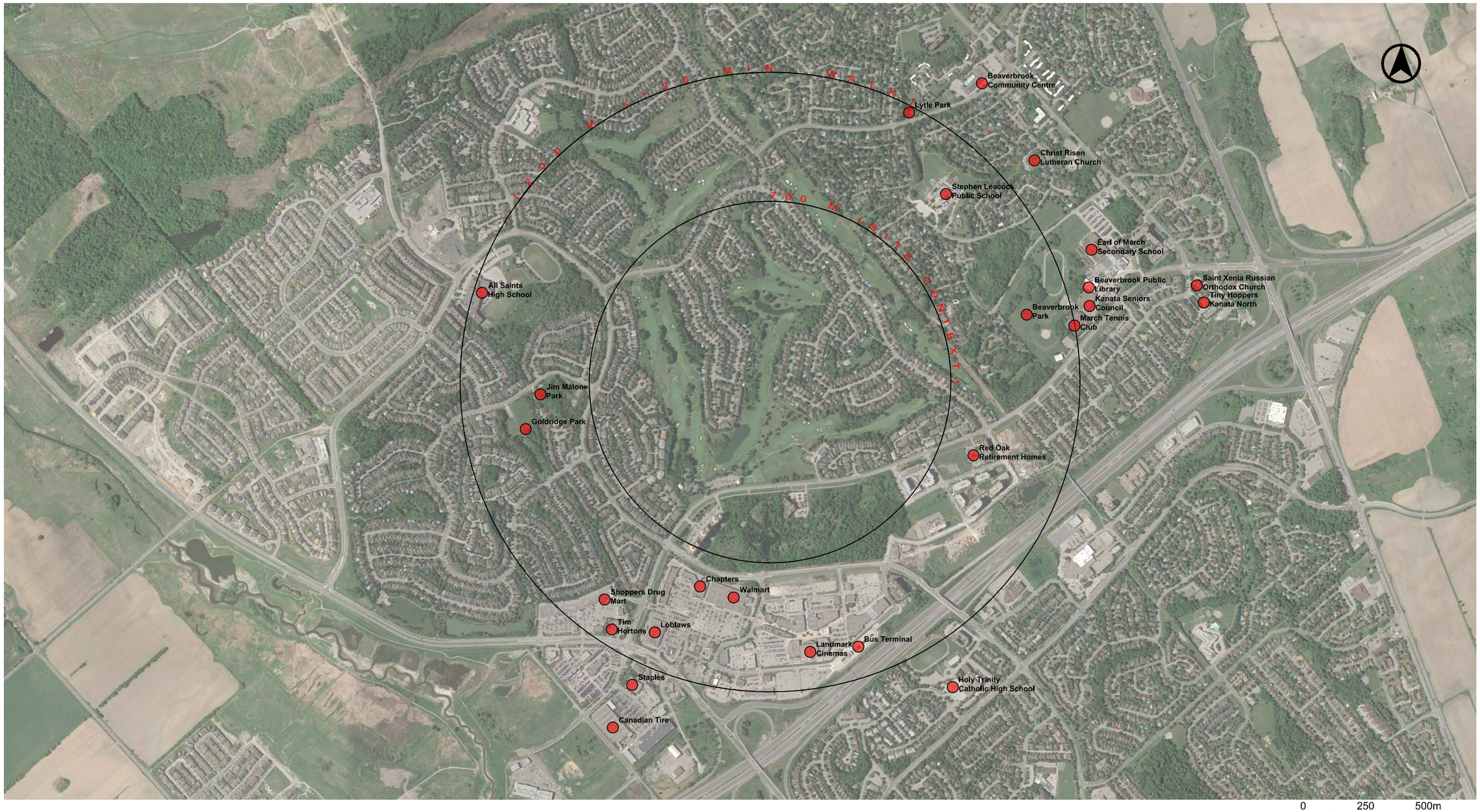
The location of the site provides for a strong pedestrian-oriented environment that encourages the use of non-automobile modes of travel. The site vicinity is served by a combination of road types (arterial, collector and local) where pedestrian sidewalks are provided.

The level of transit accessibility provided in the area offers excellent non-automobile travel opportunities for residents. A number of routes can be directly accessed from Campeau Drive, Kanata Avenue, Knudson Drive, and Weslock Way, all of which permeate, are adjacent, or are nearly adjacent to the site. The site is also located within as little as 750 metres to Terry Fox Station that services routes with far reaching access in the City of Ottawa. Overall, area transit access reduces the need for existing and future residents to use or own a car for their daily travel.

The sidewalks provided on all roads within the area of the site serve as primary pedestrian connections to several key destinations including, but not limited to, Kanata Centrum Shopping Centre, Earl of March Secondary School, Ottawa Public Library Beaverbrook, Beaverbrook Park and All-Saints High School.

As mentioned in **Table 3**, a number of multi-use pathway connections are provided, most notably those that connect to the Cross-Town Bikeway, itself a major multi-use pathway that is a major City of Ottawa connection route.

The existing pedestrian context is illustrated in **Figure 5**.



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FIGURE 5 EXISTING PEDESTRIAN CONTEXT

Historical Collision Data

Current traffic safety issues within the study area were reviewed. The City of Ottawa provided a total of 5 years of collision data from 2013 to 2017 at the major intersections bounded within the study area.

The collision data were summarized to identify higher incident locations and reviewed to provide a general determination of potential safety issues within the study area. For collisions at intersections, an average number of collisions were calculated.

Intersection collision rate findings and calculations are summarized in **Table 4**.

TABLE 4 COLLISION EVALUATION FOR INTERSECTIONS

Intersection	2013	2014	2015	2016	2017	Average No. Collision per Year
Campeau Drive / Terry Fox Drive	7	19	12	13	12	12.6
Campeau Drive / Kanata Avenue	8	2	8	6	4	5.6
Campeau Drive / Knudson Drive	5	0	2	1	2	2.0
Campeau Drive / Teron Road	9	9	9	7	7	8.2
March Road / Campeau Drive & Highway 417 Off-Ramp	26	32	26	12	26	24.4

As requested by the City of Ottawa, further breakdown of the collision data is provided in **Table 5**.

TABLE 5 DETAIL SUMMARY OF COLLISON DATA FOR INTERSECTIONS

Year	Collison Type			Total	Fatality			Impact Type				
	Car	Cycle	Ped		P.D.	Non	Fatal	Angle	Rear	Side	Turn	Other
March Road / Campeau Drive & Highway 417 Off-Ramp												
2013	26	0	0	26	21	5	0	5	18	1	1	1
2014	32	0	0	32	26	6	0	4	21	5	1	1
2015	25	1	0	26	21	5	0	6	14	5	1	0
2016	12	0	0	12	10	2	0	1	8	2	0	1
2017	26	0	0	26	24	2	0	1	16	5	1	3
Campeau Drive Segment between Kanata Avenue and Knudson Drive												
2013	2	0	0	2	2	0	0	0	1	0	0	1
2014	4	0	0	4	3	1	0	1	3	0	0	0
2015	3	0	0	3	3	0	0	0	1	0	0	2
2016	2	0	0	2	1	1	0	0	2	0	0	0
2017	0	0	0	0	0	0	0	0	0	0	0	0

Existing Area Travel Characteristics

The City of Ottawa has provided an origin-destination (O-D) matrix for the area travel characteristics within different districts of Ottawa. The O-D matrix was developed based on a 2011 survey where it collects information on how members of households use the transportation system in Ottawa and divides the information into districts. For the purposes of this study, the district that the proposed development is located in is the area of Kanata / Stittsville. The area modal splits are summarized in **Table 6**.

TABLE 6 AREA MODE SPLITS

Travel Mode	AM Peak Hour			PM Peak Hour		
	In	Out	Within District	In	Out	Within District
Auto Driver	74%	60%	44%	67%	67%	56%
Auto Passenger	7%	9%	17%	16%	16%	20%
Transit	8%	24%	4%	13%	13%	3%
Bicycle	1%	0%	1%	0%	0%	1%
Walk	0%	0%	19%	0%	0%	13%
Other	10%	7%	15%	4%	4%	7%

Based on the 2011 survey data, a total of approximately 60% to 75% of all home-based trips taken during the weekday peak periods were undertaken by auto drivers for the entire City of Ottawa, with the balance of the trips being undertaken by auto passengers, transit and other modes of transportation. Within the district of Kanata / Stittsville, approximately 45 to 55% of the total of all home-based trips taken during the weekday peak periods were undertaken by auto drivers, with the balance of trips being undertaken by auto passengers, transit, walk, bicycle and other modes of transportation.

Existing traffic volumes are provided in **Appendix C**.

Existing Area Traffic Management Measures

Along Knudson Way, there are 11 regularly spaced “speed cushions” through the extent of the roadway, from Kanata Avenue to Campeau Drive. In addition, there is an existing pedestrian crossover at the Knudson Drive / Nelford Crescent intersection.

ELEMENT 2.1.3 – PLANNED CONDITIONS

A number of changes to the area transportation network – and included within the Study Area for this project, as identified and defined in **Element 2.2.1** – have been identified within City of Ottawa policy documents.

Transportation Master Plan

The *Transportation Master Plan* (TMP), November 2013 identifies two potential transportation infrastructure buildout scenarios for future rapid transit, transit priority, and road networks in Ottawa. They are the "2031 Network Concept" and the "2031 Affordable Network". The former has been designed to achieve the City's desired transportation mode share targets; the latter strategically selected aspects of the former with the intention of coming close to achieving mode share targets while remaining affordable. Funding has been allocated only towards projects identified as part of the "2031 Affordable Network" while maintaining flexibility to fund "2031 Network Concept" projects should they become pressing or if additional funding becomes available.

Road Network

Within the "2031 Network Concept," Campeau Drive is identified as a "Widened Arterial"; it is planned to be widened from two to four lanes within the vicinity of the site. An environmental assessment has been completed on the project. However, it is not included as part of the "2031 Affordable Network".

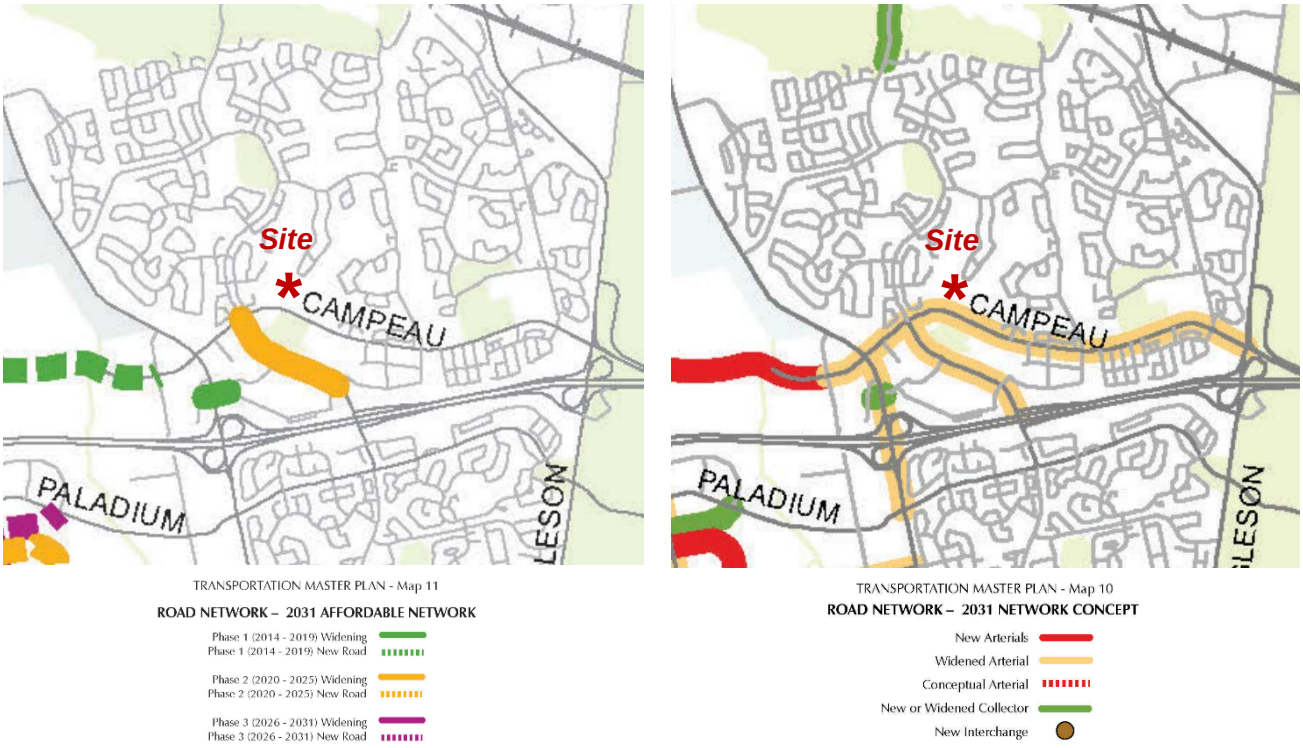
Within the "2031 Network Concept" and the "2031 Affordable Network," Campeau Drive is planned to be extended to the west of the site, between Didsbury Road and Huntmar Drive; it will be a four-lane road. An environmental assessment has been completed on the project. It is included in Phase 1 (2014-2019) of the TMP.

Within the "2031 Network Concept" and the "2031 Affordable Network," Kanata Avenue is identified as a "Widened Arterial"; it is planned to be widened from two to four lanes from Highway 417 to Campeau Drive. An environmental assessment is "in progress". It is included in Phase 2 (2020-2025) of the TMP.

Within the "2031 Network Concept," Terry Fox Drive is identified as a "Widened Arterial"; it is planned to be widened from four to six lanes from Palladium Drive to Campeau Drive. An environmental assessment has been completed on the project. However, it is not included as part of the "2031 Affordable Network".

The planned road infrastructure projects included in the TMP are illustrated in **Figure 6**.

FIGURE 6: TRANSPORTATION MASTER PLAN PLANNED ROAD IMPROVEMENTS



Rapid Transit and Transit Priority Network

In addition to the "2031 Network Concept" and the "2031 Affordable Network," the TMP includes an "Ultimate Network".

Within the "2031 Network Concept" and the "2031 Affordable Network," a Transitway bus rapid transit (BRT) segment – the "West Transitway Extension" – is planned between March Road and Terry Fox Station. An environmental assessment has been completed on the project. It is designated as part of a "2014-2031" phase.

Within the "2031 Network Concept," the "West Transitway Extension" is planned to extend westward and southward to Fernbank Road, and to replace the existing bus lanes on Highway 417 east of the site, between Eagleson Road and Moodie Drive. An environmental assessment has been completed on the project. It is not included as part of the "2031 Affordable Network".

Within the "2031 Network Concept," Terry Fox Way is designated to have transit signal priority between Hazeldean Road and the West Transitway, to improve transit access. It is not included as part of the "2031 Affordable Network".

Within the "2031 Network Concept" and the "2031 Affordable Network," an at-grade BRT – the "Kanata North Transitway" – located on March Road is planned, to be located from Highway 417 to Solandt Road – it will have at-grade crossings. An environmental assessment has been completed on the project. It is designated as part of a "2014-2031" phase.

Within the “Ultimate Network,” the West Transitway is replaced by light rail transit (LRT) with grade separated crossings.

The planned rapid transit and transit priority network is illustrated in **Figure 7**.

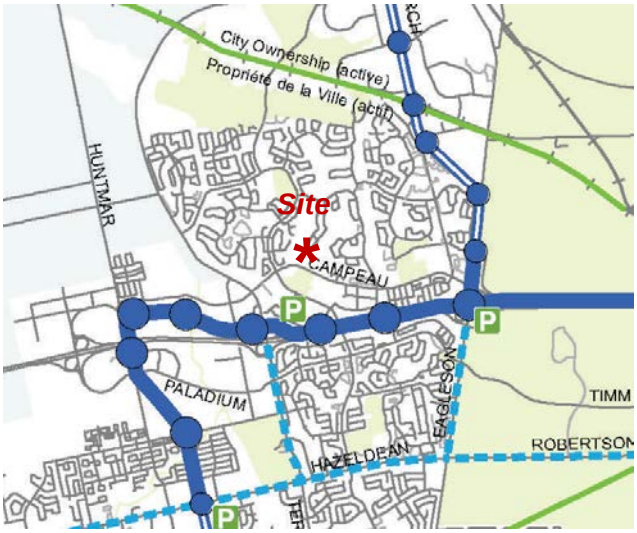
FIGURE 7: TRANSPORTATION MASTER PLAN PLANNED RAPID TRANSIT AND TRANSIT PRIORITY NETWORK



TRANSPORTATION MASTER PLAN - Map 5
RAPID TRANSIT AND TRANSIT PRIORITY NETWORK - 2031 AFFORDABLE NETWORK

RAPID TRANSIT
- Existing Bus Rapid Transit (BRT)
- Existing Bus Lanes
- Existing / Committed Rail
- Future Rail
- Future Bus Rapid Transit (BRT)
- Future Bus Rapid Transit (BRT) - At-Grade Crossings

TRANSIT PRIORITY
- Transit Priority Corridor (Continuous Lanes)
- Transit Priority Corridor (Isolated Measures)



TRANSPORTATION MASTER PLAN - Map 4
RAPID TRANSIT AND TRANSIT PRIORITY NETWORK - 2031 NETWORK CONCEPT

RAPID TRANSIT
- Light Rail Transit (LRT) - Grade Separated Crossings
- Light Rail Transit (LRT) - At-Grade Crossings
- Bus Rapid Transit (BRT) - Grade Separated Crossings
- Bus Rapid Transit (BRT) - At-Grade Crossings

TRANSIT PRIORITY
- Transit Priority Corridor (Continuous Lanes)
- Transit Priority Corridor (Isolated Measures)



TRANSPORTATION MASTER PLAN - Map 3
RAPID TRANSIT AND TRANSIT PRIORITY NETWORK - ULTIMATE NETWORK

RAPID TRANSIT
- Light Rail Transit (LRT) - Grade Separated Crossings
- Light Rail Transit (LRT) - At-Grade Crossings
- Bus Rapid Transit (BRT) - Grade Separated Crossings
- Bus Rapid Transit (BRT) - At-Grade Crossings

TRANSIT PRIORITY
- Transit Priority Corridor (Continuous Lanes)
- Transit Priority Corridor (Isolated Measures)

Road Network
It is worth noting that within the City of Ottawa OP (Schedule E) the following road designations are identified:

- Provincial Highway: Highway 417 (Queensway)
- Arterial Roads: Campeau Drive (including westward extension), Terry Fox Way, and Kanata Avenue (south of Campeau Drive), March Road
- Major Collector Roads: Kanata Avenue (north of Campeau Drive), Teron Road, Goulbourn Forced Road
- Collector Roads: Knudson Drive, Weslock Way, Beaverbrook Road, Varley Drive, Leacock Drive, Walden Drive, Goldridge Drive, Stikine Drive

Rapid Transit and Transit Priority Network
Similarly, the City of Ottawa OP (Schedule D) designates the route running alongside Highway 417 as "Bus Rapid Transit (BRT) – Grade Separated Crossings," with stops located at Terry Fox Way and Kanata Avenue.

Ottawa Cycling Plan

Similar to the TMP, the *Ottawa Cycling Plan* (Cycling Plan), November 2013, includes a "2031 Affordable Cycling Project List". It was designed to provide a functional, interconnected and safe cycling network commensurate to the City's financial affordability envelope.

Within the "2031 Affordable Cycling Project List," Terry Fox Drive from Highway 417 (WB) to south of Campeau Drive has been identified for the implementation of bike lanes. It is included in Phase 1 (2014-2019) of the Cycling Plan.

City of Ottawa Long-Range Financial Plan

As per the City of Ottawa TIA Guidelines, the *Long-Range Financial Plan* is the accepted source regarding timing of major projects. Regarding public transit and road infrastructure improvements, specific projects are outlined in the City of Ottawa 2014 Development Charges Background Study (2014 DC Study), amended October 2017. The projects identified in the 2014 DC Study – which include specific target years for development – inform the *Long-Range Financial Plan*.

It should be noted that there is, at the time of the submission of this document, a 2019 Development Charges Background Study (2019 DC Study). However, the 2019 DC Study states the following:

> *The analysis contained herein is generally consistent with the projects and calculation methodologies included in the 2014 and 2017 DC Background Studies. The City has not completed a comprehensive update to the 2013 Transportation Master Plan (TMP) and Infrastructure Master Plan (IMP), and as such the capital costs and development forecasts are generally consistent with these documents which were used as the basis for the City's past DC Background Studies.*
>
> *It is anticipated that the City's next DC Background Study will be completed once relevant master plans and capital planning documents have been updated.*

As such all information relating to the project, contained within the 2014 DC Study remains current and relevant to the project.

Road Network
All road network projects identified in the TMP "2031 Affordable Network" are included within the DC Study. Updated timings include the following:

- Campeau Drive westward extension – 2015-2016 (however, it is not yet completed)
- Kanata Avenue lane widening (Campeau Drive to Highway 417) – 2019-2020

Projects identified as part of the "2031 Network Concept" (i.e. Campeau Drive lane widening, Terry Fox Drive lane widening) are not included in the 2014 DC Study.

Rapid Transit and Transit Priority Network
All rapid transit and transit priority network projects identified in the TMP "2031 Affordable Network" are included within the DC Study. Updated timings include the following:

- West Transitway Extension (Terry Fox – March/Eagleson) – 2016-2024
- Kanata North Transitway (March Road, from Highway 417 to Solandt Road) - 2022

Projects identified as part of the "2031 Network Concept" and "Ultimate Network" are not included in the 2014 DC Study.

Other Study Area Developments

Traffic allowances will be made for other specific proposed developments in the area, based on a review of the City of Ottawa's list of current development projects as of April 2019. These sites represent a total development in the order of 1,375 residential units, 5,803 m^2 GFA of retail space, and 759 m^2 GFA of office space.

Area background developments are summarized in **Table 7** together with a description of the key development statistics for each. Traffic allowances made for each development were based upon traffic impact studies submitted to the City of Ottawa as part of the development application process.

TABLE 7 AREA BACKGROUND DEVELOPMENTS

Site Location	Development Statistics			Sources	Status of Completion
	Residential Units	Retail GFA (m^2)	Office GFA (m^2)		
255 Kanata Avenue	-	2,010 m^2	759 m^2	Urban Design Analysis June 2015	OPA submitted
1250 Maritime Way	154 units	111 m^2	-	Novatech Transportation Brief May 2017	Under construction
1088 & 1136 Maritime Way	298 units	-	-	Novatech Transportation Brief March 2017	Under construction
124 Battersea Crescent	103 units	-	-	Novatech Transportation Brief September 2015	SPA submitted
469 Terry Fox Drive	677 units	-	-	IBI Traffic Impact Study September 2015	Under construction
5100 Kanata Avenue	-	3,682 m^2	-	Dillon Consulting October 2017	Under construction
130 Goulbourn Forced Road	143 units	-	-	Castleglenn Consultants 2015	Under construction

MODULE 2.2 – STUDY AREA AND TIME PERIODS

ELEMENT 2.2.1 – STUDY AREA

Transit

Existing transit Routes that serve the development property:

- Route 61: St. Laurent ↔ Terry Fox & Stittsville
- Route 62: St. Laurent ↔ Stittsville & Terry Fox
- Route 63: Briarbrook via Innovation ↔ Mackenzie King via Briarbrook
- Route 64: Morgan's Grant via Innovation ↔ Mackenzie King via Morgan's Grant
- Route 88: Hurdman ↔ Terry Fox
- Route 161: Bridlewood ↔ Terry Fox
- Route 164: Hope Side ↔ Terry Fox
- Route 165: Innovation ↔ Terry Fox
- Route 168: Terry Fox ↔ Bridlewood
- Route 264: Mackenzie King ↔ Terry Fox
- Route 265: Mackenzie King ↔ Beaverbrook
- Route 268: Mackenzie King ↔ Kanata Lakes

Intersection Design

The traffic impact assessment (TIA) Study Area is proposed to comprise of the following intersections:

- Campeau Drive / Terry Fox Drive (Signalized)
- Campeau Drive / Herlihey way (Signalized)
- Campeau Drive / Kanata Avenue (Signalized)
- Campeau Drive / Knudson Drive & Maritime Way (Signalized)
- Campeau Drive / Hawkstone Gate & Ottawa Public Library Access (Signalized)
- Campeau Drive / Teron Road (Signalized)
- Campeau Drive / March Road (Signalized)
- Kanata Avenue / Knudson Drive
- Knudson Drive / Shaughnessy Crescent (East)
- Knudson Drive / Shaughnessy Crescent (West)
- Knudson Drive / Sherk Crescent (North)
- Knudson Drive / Sherk Crescent (South)
- Knudson Drive / Weslock Way
- Beaverbrook Road / Weslock Way
- Campeau Drive / Omni Health Care Centre
- Campeau Drive / Park Ridge Place (East)
- Campeau Drive / Park Ridge Place (West)
- Robson Court / Colson Court
- Robson Court / Evanshen Crescent
- Kanata Avenue / Park Ridge Place

The traffic data collection undertaken will also include pedestrians, cyclists, buses and cars on a typical weekday during typical morning and afternoon peak periods.

ELEMENT 2.2.2 – TIME PERIODS

Given that the proposed development will primarily consist of residential uses, the weekday morning and afternoon peak hours on adjacent streets will be assessed for the purposes of this analysis.

ELEMENT 2.2.3 – HORIZON YEARS

A 2024 horizon year is proposed representing a five-year horizon from the original submission date of the TIA report. A five-year horizon year beyond initial build-out horizon will be analyzed for a 2029 horizon year.

MODULE 2.3 – EXEMPTIONS REVIEW

As per the City of Ottawa TIA Guidelines, BA Group has reviewed a list of potential exemptions in order to identify individual elements that will not inform decisions about development design, street design, and mitigation measures. In **Table 8**, elements are identified that can be exempted to reduce the scope of the TIA.

TABLE 8 POSSIBLE EXEMPTIONS

Module	Element	Exemption Consideration	BA Group Commentary:
Design Review Component			
4.1 Development Design	4.1.2 Circulation and Access	• Only required for site plans	• EXEMPT: This element is only required for site plans. As a result, the project is exempt from this element.
	4.1.3 New Street Networks	• Only required for plans of subdivision	• (not exempt)
4.2 Parking	4.2.1 Parking Supply	• Only required for site plans	• EXEMPT: This module is only required for site plans. As a result, the project is exempt from this element.
	4.2.2 Spillover Parking	• Only required for site plans where parking supply is 15% below unconstrained demand	
Network Impact Component			
4.5 Transportation Demand Management	All elements	• Not required for site plans expected to have fewer than 60 employees and/or students on location at any given time	• (not exempt)
4.6 Neighbourhood Traffic Management	4.6.1 Adjacent Neighbourhoods	• Only required when the development relies on local or collector streets for access and total volumes exceed ATM capacity thresholds	• (not exempt)
4.8 Network Concept	-	• Only required when proposed development generates more than 200 person-trips during the peak hour in excess of the equivalent volume permitted by established zoning	• (not exempt)

STEP 3: FORECASTING REPORT

MODULE 3.1 – DEVELOPMENT-GENERATED TRAVEL DEMAND

ELEMENT 3.1.1 – TRIP GENERATION AND MODE SHARES

A. Select Base Trip Generation Rate

For the purposes of undertaking the trip generation analysis, trip rates extracted from Ottawa's 2009 TRANS Trip Generation Study will be estimated. The adopted trip generation rates are summarized in **Table 9**.

TABLE 9 RESIDENTIAL TRIP GENERATION RATES – OTTAWA'S 2009 TRANS STUDY

Methodology	AM Peak Hour			PM Peak Hour		
	In	Out	2-Way	In	Out	2-Way
LUC 210 – Single Detached Dwellings Trip Rates	0.20	0.50	0.70	0.55	0.35	0.90
Number of Trips (630 single detached units)	125	315	440	345	220	565
LUC 224 – Semi-detached dwellings / townhouse / rowhouses Trip Rates	0.20	0.34	0.54	0.38	0.33	0.71
Number of Trips (478 townhouse units)	95	165	260	180	160	340
LUC 223 – Mid-Rise Apartments (3-10 floors) Trip Rate	0.07	0.22	0.29	0.23	0.14	0.37
Number of Trips (436 units)	30	95	125	100	60	160
Total Site Trips	**250**	**575**	**825**	**625**	**440**	**1,065**

Notes:
1. Site statistics are based on the land use concept plan provided by Minto Communities, dated May 14, 2020.
2. Trips rounded to the nearest 5 trips.

Based on the Ottawa's 2009 TRANS Study, the proposed development is anticipated to generate approximately 825 and 1,065 two-way vehicle trips during the weekday morning and afternoon peak hours, respectively.

Given that the proposed detached lots will be similar to the existing residential uses in the area, a trip generation rate for the detached lots was derived based on trip generation surveys undertaken in the existing residential area surrounding the site. This projection is representative of a sensitivity analysis; a trip rate and site trip generation estimate have been developed for the purposes of a sensitivity analysis based on the existing proxy data collected from the area.

The adopted trip generation rates were derived from traffic counts undertaken for the communities along Sherk Crescent, Shaugnessy Crescent, Coulson Court, and Robson Court. These neighbourhoods were surveyed by Spectrum Traffic Data Inc. on behalf of BA Group on Wednesday, November 7 2018.

The peak hour for each community was chosen and the two-way trips were recorded. The counts and corresponding trip rates for each community is summarized in **Table 10**.

TABLE 10 RESIDENTIAL TRIP GENERATION RATES – PROXY SITES

Site Locations	AM Peak Hour			PM Peak Hour		
	In	Out	2-Way	In	Out	2-Way
Sherk Crescent (154 units)	0.21	0.53	0.74	0.43	0.28	0.71
Shaugnessy Crescent (169 units)	0.14	0.41	0.55	0.44	0.33	0.77
Coulson Court (60 units)	0.18	0.25	0.43	0.18	0.17	0.35
Robson Court (22 units)	0.41	0.86	1.27	0.77	0.64	1.41
Average Trip Rate for Local Proxy Surveys (Single-Detached Dwelling Units)	**0.24**	**0.52**	**0.76**	**0.46**	**0.35**	**0.81**
Total Number of Trips Based on Proxy Data (630 residential units)	**150**	**325**	**475**	**290**	**220**	**510**
Compare to Trip Gen for Detached Units Per Ottawa LUC 210	**125**	**315**	**440**	**345**	**220**	**565**

Notes:
1. Site statistics are based on Concept Plan provided by Minto Communities, dated May 14, 2020.
2. Proxy sites surveyed on Wednesday, November 7, 2018.
3. Trip rates are for single-detached dwelling units.
4. Trips rounded to the nearest 5 trips.

Based on the neighbouring proxy sites, the proposed single detached dwelling units on the site are anticipated to generate approximately 475 and 510 two-way vehicle trips during the weekday morning and afternoon peak hours, respectively. By comparison, the proxy survey will generate approximately an additional 35 two-way trips in the weekday morning peak hour and a deduction of 55 two-way trips in the weekday afternoon peak hour.

A summary of the proposed residential trip generation estimate for the site used for the purposes of a sensitivity analysis is provided in **Table 11**.

TABLE 11 SUMMARY OF RESIDENTIAL TRIP GENERATION – OTTAWA'S 2009 TRANS STUDY & SITE LOCATIONS

	AM Peak Hour			PM Peak Hour		
	In	Out	2-Way	In	Out	2-Way
Ottawa's 2009 TRANS Study Trip Rates						
LUC 224 – Semi-detached dwellings / townhouse / rowhouses Trip Rates	0.20	0.34	0.54	0.38	0.33	0.71
LUC 223 – Mid-Rise Apartments (3-10 floors) Trip Rate	0.07	0.22	0.29	0.23	0.14	0.37
Proxy Site Trip Rates						
Proposed Trip Rates (Single Detached Dwelling Units)	0.24	0.52	0.76	0.46	0.35	0.81
Total Site Trips (Sensitivity Analysis)	**275**	**585**	**860**	**570**	**440**	**1,010**
Compare to Trip Gen for Ottawa's 2009 TRANS Study	**250**	**575**	**825**	**625**	**440**	**1,065**

Notes:
1. Site statistics are based on Concept Plan provided by Minto Communities, dated May 14, 2020.
2. Trips rounded to the nearest 5 trips.

Using the site specific proxy data for the single detached lots, the project is estimated to generate in the order of 860 and 1,010 two-way vehicle trips during the weekday morning and afternoon peak hours, respectively. This adopted trip generation estimate will be used for the purposes of a sensitivity analysis in the forthcoming traffic and capacity analysis for the project assessment.

B. Estimate Total Development-Generated Person-Trips

The proposed development is estimated to have 630 single detached units, 332 townhouse units, 70 back to back townhouse units, 76 stacked townhouse units and 436 medium density units. This results in a total 1,544 residential units. Using the adopted trip rates from the Ottawa's 2009 TRANS study, the total vehicle trips generated by the proposed development were summarized. By using the mode splits found in the TRANS Trip Generation study, the vehicle trips were converted to person trips and summarized in **Table 12**.

TABLE 12 ESTIMATED DEVELOPMENT-GENERATED PERSON-TRIPS

1,544 Residential Units	AM Peak Hour			PM Peak Hour		
	In	Out	2-Way	In	Out	2-Way
Vehicle Trips	250	575	825	625	440	1,065
Auto Mode Split for Suburban Area (All Types)	54%			62%		
Person Trips	460	1,065	1,525	1,010	710	1,720

The proposed development is anticipated to generate in the order of 1,525 and 1,720- two-way person trips in the weekday morning and afternoon peak hours, respectively. A sensitivity analysis using the proxy site trip rates for the single detached dwelling units was conducted and it is anticipated to generate in the order of 1,590 and 1,630 two-way person trips during the weekday morning and afternoon peak hours, respectively.

C. Identify Existing Mode Shares for Traffic Assessment Zones

The proposed development falls in the Kanata/Stittsville (Traffic Assessment Zone 500) zone according to the National Capital Region Origin-Destination survey. From this, the 2011 TRANS O-D Survey data for mode split for the region was collected. **Table 13** summarizes the mode splits to / from and within the Kanata/Stittsville zone for the AM peak, PM peak and 24-hour.

TABLE 13 KANATA / STITTSVILLE MODE SPLIT

Mode Choice	AM Peak	PM Peak	24-Hour
Auto	56%	62%	62%
Auto Passenger	12%	19%	18%
Transit	12%	9%	8%
Bicycle	1%	1%	1%
Pedestrian	8%	5%	6%
Other	11%	4%	5%
Total	**100%**	**100%**	**100%**

Notes:
1. AM Peak includes a blend of from and within district in the AM Peak Hour for each mode choice.
2. PM Peak includes a blend of to and within district in the PM Peak Hour for each mode choice.
3. 24 Hour includes a blend of to / from and within district in the 24 hour for each mode choice.
4. Information for the different mode choice in the Kanata/Stittsville district was based upon a review of the TRANS 2011 O-D Data found at the following link: http://www.ncr-trans-rcn.ca/wp-content/uploads/2013/03/500-KanataStittsville-2011.pdf

From the above table, it can be seen that transit typically comprises between 9% to 12% of total trips during the peak hours in the Kanata/Stittsville area.

D. Set Future Mode Share Targets for the Development

In the future, it is anticipated that transit and cycling mode share will increase and auto mode share will decrease. As part of the proposed development, efforts will be made to encourage sustainable travel mode shares and reduce auto modes by providing excellent pedestrian connections throughout the site to nearby transit stops. Given the site's close proximity to a variety of transit service accessed from the existing road network and Terry Fox Terminal, it is anticipated that residents will take advantage of the transit network and use transit as an alternative mode choice to private vehicles travelling longer distances. In addition, the City of Ottawa's vision continues to encourage sustainable travel mode shares by providing numerous pedestrian connections, cycling lanes and multi-use trails in the vicinity of the site. **Table 14** summarizes the future mode share target within the vicinity of the site.

TABLE 14 FUTURE MODE SHARE TARGETS FOR THE DEVELOPMENT

Travel Mode	Mode Share Target	Rationale
Transit	20%	With the existing transit infrastructure in the area it is expected that new residents will continue to use the existing bus routes with the numerous stops in the area for their internal zone trips.
Walking	5%	The new residential units will be located centrally between various public parks and Kanata Centrum Shopping Centre and should therefore be encouraged to walk to these destinations.
Cycling	5%	The existing cycling context provides numerous bike lanes and bike trails to allow for safe and supported bicycling routes.
Auto Passenger	10%	This percentage is expected to be similar to the existing conditions.
Auto Driver	55%	With the proximity to the Trans-Canada Highway and people's need to make trips to the downtown centre of Ottawa, it is expected that the Auto Driver mode share will stay approximately the same.
Other	5%	This percentage is expected to be similar to the existing conditions.

E. Project Development Trips by Mode and Phase

The person trips generated by the proposed development for the base and sensitivity scenario based on the future mode share targets for each mode is summarized in **Table 15** .

TABLE 15 ESTIMATED DEVELOPMENT GENERATED PERSON-TRIPS

Mode Split	AM Peak Hour			PM Peak Hour		
	In	Out	2-Way	In	Out	2-Way
Base Scenario						
Transit	115	265	380	255	180	435
Walking	20	55	75	50	35	85
Cycling	20	55	75	50	35	85
Auto Passenger	45	105	150	100	70	170
Auto Driver	260	585	845	555	390	945
Total	**460**	**1,065**	**1,525**	**1,010**	**710**	**1,720**
Sensitivity Scenario						
Transit	130	270	400	230	180	410
Walking	25	55	80	45	35	80
Cycling	25	55	80	45	35	80
Auto Passenger	50	110	160	95	70	165
Auto Driver	280	590	870	505	390	895
Total	**510**	**1,080**	**1,590**	**920**	**710**	**1,630**

Notes:
1. Trips rounded to the nearest 5 trips.

F. APPLY APPROPRIATE TRIP REDUCTION FACTORS

Deduction of Existing Development Trips

Currently, there is an 18-hole golf course and country club on the development grounds. This golf course will be removed for the new proposed residential development. The golf course is accessed through Campeau Drive and extends north past Knudson Drive. With the removal of the golf course, it is expected that the existing trips related to the golf course will be removed completely as there will be no similar land use in the area after the new development is completed. It is estimated that approximately 5 two-way trips in the weekday morning peak hour and 0 two-way trips in the weekday afternoon peak hour will be removed from the Campeau Drive corridor.

ELEMENT 3.1.2 – TRIP DISTRIBUTION

Using the Trans OD 2011 survey, a preliminary trip distribution plan was developed based on the "All Modes OD". For the AM peak hours, the outbound trips were analyzed and for the PM peak the inbound trips were analyzed. Since the development is for residential use, it was assumed that the primary trips that would be taken would be towards work in the AM peak hours and back home in the PM peak hours. The data from the Trans Survey is summarized in **Table 16**.

TABLE 16 KANATA/STITTSVILLE OD

Region	AM Peak	%	PM Peak	%	Cardinal Direction (To From)
001 - Ottawa Centre	4,600	8%	4,300	6%	East
050 - Ottawa Inner Area	3,300	6%	2,900	4%	East
100 - Ottawa East	700	1%	800	1%	East
120 - Beacon Hill	300	1%	500	1%	East
140 - Alta Vista	1,800	3%	1,900	3%	East
180 - Hunt Club	500	1%	700	1%	East
200 - Merivale	3,400	6%	3,700	5%	East
240 - Ottawa West	2,000	4%	1,900	3%	East
260 - Bayshore / Cedarview	5,000	9%	5,700	8%	East
300 - Orléans	300	1%	700	1%	East
350 - Rural East	100	0%	200	0%	East
360 - Rural Southeast	100	0%	-	0%	East
400 - South Gloucester / Leitrim	100	0%	100	0%	East
425 - South Nepean	700	1%	1,000	1%	East
450 - Rural Southwest	1,100	2%	1,400	2%	South
560 - Rural West	1,100	2%	3,500	5%	North
600 - Île de Hull	700	1%	-	0%	East
625 - Hull Périphérie	200	0%	-	0%	North

Continued on Next Page

Region	AM Peak	%	PM Peak	%	Cardinal Direction (To From)
650 - Plateau	100	0%	200	0%	North
700 - Aylmer	-	0%	100	0%	North
750 - Rural Northwest	-	0%	100	0%	North
800 - Pointe Gatineau	-	0%	100	0%	East
820 - Gatineau Est	-	0%	100	0%	East
500 - Kanata / Stittsville	30,400	54%	37,500	56%	Internal
Total	**56,500**	**100%**	**67,400**	**100%**	

Since Kanata, and the location of the proposed site is on the western edge of Ottawa, the majority of the trips from Kanata are destined to the east as presented in **Table 16**. The rest of the trips primarily stay within the Kanata region. With the majority of the trips heading to Ottawa City to the east, it is expected that the majority of the trips generated by the new development will use the Trans Canada Highway east to reach their destinations. The rest of the routes will be discussed in **Element 3.1.3.**

ELEMENT 3.1.3 – TRIP ASSIGNMENT

A distribution of assignment (DOA) was created for each peak hour based on where the majority of the trips were destined. The major roads near the proposed development that are considered for the DOA were Campeau Drive, Terry Fox Drive, March Road, and the Trans-Canada Highway. A percentage of all trips produced or destined to the development site were assigned to each major road based on the TRANS OD survey data. As mentioned in **Element 3.1.2.**, due to the location of the development site in relation to the rest of the City of Ottawa, it is expected that the majority of people in the area would generally have an eastward orientation in the morning peak hour and an arrival orientation coming from the east in the PM peak due to the attractions found in the downtown Ottawa region. The fastest and most direct path to the Ottawa center is the Trans-Canada Highway (Highway 417) and it is therefore expected that the majority of people would use this route for their morning outbound trips and afternoon inbound trips.

For the internal trips where people are expected to travel within the Kanata/Stittsville region, it was expected that the majority of people would be travelling to the commercial district found north on March Road, and the businesses on Palladium Drive. The trip assignment assumptions adopted for the proposed development is summarized in **Table 17**.

The trip distribution for the site traffic is illustrated and provided in **Appendix C**.

TABLE 17 SITE TRIP ASSIGNMENT

Major Roads	Outbound				Inbound			
	East	West	North	South	East	West	North	South
Campeau Drive	0%	0%	-	-	0%	0%	-	-
Terry Fox Drive	-	-	15%	0%	-	-	20%	0%
March Road	-	-	15%	10%	-	-	20%	5%
Teron Road	-	-	15%	0%	-	-	15%	0%
Goulbourn Forced Road	-	-	5%	0%	-	-	5%	0%
Trans-Canada Highway	40%	0%	-	-	35%	0%	-	-

MODULE 3.2 – BACKGROUND NETWORK TRAVEL DEMANDS

To capture all changes, BA Group will consider all background developments in the vicinity of the site, corridor growth along major corridors connecting to the site, as well as updates to the regional transportation networks by the City of Ottawa.

ELEMENT 3.2.1 – TRANSPORTATION NETWORK PLANS

According to the long term financial planning meeting held on February 24, 2017, the stage 2 of the Ottawa LRT has been approved, the Confederation Line west extension has been funded, and construction has begun in 2019. This extension is planned to reach Moodie just west of Highway 416. This station will have bus rapid transit routes from Terry Fox to Moodie station. This is the only major transportation development in the area that is expected to affect the development. The development of the LRT will likely encourage more people to take public transit and may encourage residents in the Kanata area to take the rapid bus routes to the LRT instead of using the Trans-Canada Highway. The plan for the proposed LRT expansion is illustrated in **Figure 8**.

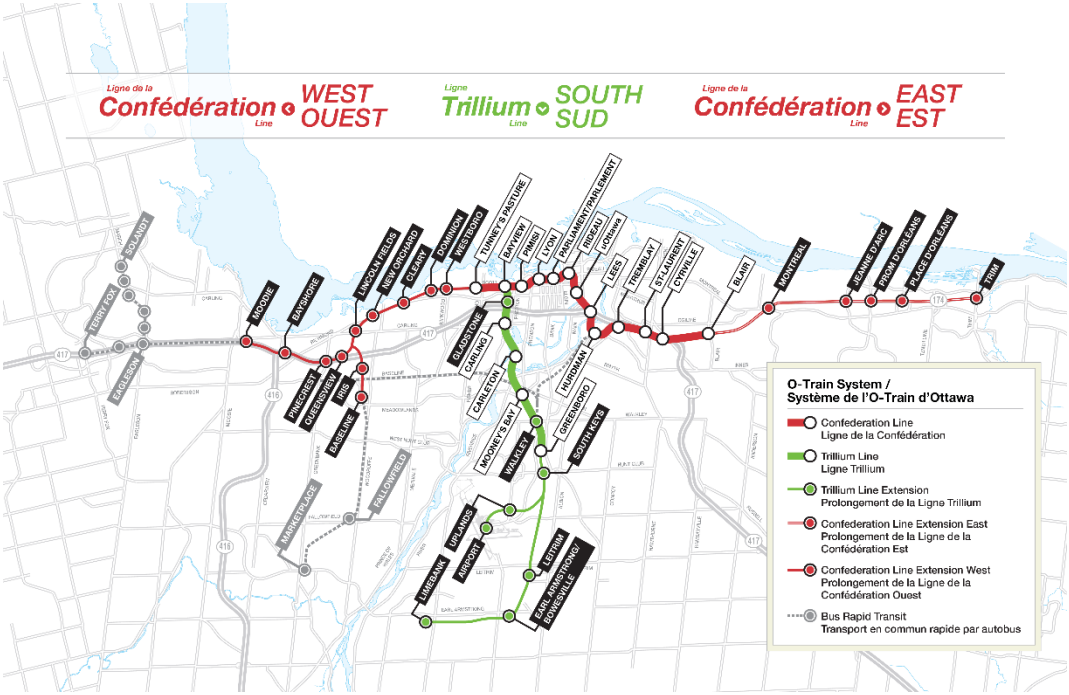


FIGURE 8: LRT CONFEDERATION LINE EXPANSION

The construction of these expansions is expected to be completed by 2025 which is expected to be within the horizon years of the site.

ELEMENT 3.2.2 – BACKGROUND GROWTH

BA has conservatively adopted a 2% per annum corridor growth factor for major arterial roads surrounding the proposed development area. These corridors include Terry Fox Drive, March Road, and the Highway 417 off and on-ramp terminals. This growth rate is expected to accommodate for the general growth in population in the greater Ottawa-Gatineau area.

ELEMENT 3.2.3 – OTHER DEVELOPMENTS

Traffic allowances will be made for other specific proposed developments in the area based on a review of the City of Ottawa's list of current development projects as of April 2019. These sites represents a total development in the order of 1,375 residential units, 5,803 m^2 GFA of retail space and 759 m^2 GFA of office space.

Area background developments to be included in the analysis were summarized in Step 2 (see **Table 7**) together with a description of the key development statistics for each. Traffic allowances made for each development were based upon the individual traffic impact studies submitted to the City of Ottawa as part of the development application process for each site. Trip generation summaries for each background development are provided in **Table 18**.

The distribution of the other developments are provided in **Appendix C**.

TABLE 18 PROPOSED AREA BACKGROUND DEVELOPMENTS TRIP GENERATION SUMMARY

Site Locations	AM Peak Hour			PM Peak Hour		
	In	Out	2-Way	In	Out	2-Way
255 Kanata Avenue	Trip Generation Rates are not provided.					
1250 Maritime Way *(Timberwalk Retirement Home Transportation Brief, May 2017)*	14	52	66	58	36	94
1088 & 1136 Maritime Way *(Transportation Brief, March 2017)*	29	124	153	129	70	199
124 Battersea Crescent (Transportation Impact Study Addendum #3, September 2015)	10	50	60	45	23	68
469 Terry Fox Drive *(Richardson Ridge TIS Update, September 2015)*	91	302	393	315	178	493
5100 Kanata Avenue *(Kanata Lakes Plaza TIS, October 2017 Update)*	199	184	382	111	122	233
130 Goulbourn Forced Road *(Proposed Retirement Residence Goulbourn Forced Road Traffic Impact Brief, July 2015)*	7	12	19	14	9	23

Future background traffic volumes are provided in **Appendix C**.

MODULE 3.3 – DEMAND RATIONALIZATION

ELEMENT 3.3.1 – DESCRIPTION OF CAPACITY ISSUE(S)

Based on preliminary intersection analysis, all signalized and unsignalized intersections in the study area are operating at acceptable level of service with the exception of the Campeau Drive / March Road signalized intersection which aligns with the westbound Highway 417 off-ramp at March Road. The Campeau Drive / March Road intersection is operating at busy, yet acceptable level of service with v/c ratios approaching capacity of 1.00. Note that eastbound left and westbound left movements are critical movements and are operating near capacity under existing traffic conditions. It is expected that these movements will continue to operate near capacity under future traffic conditions.

As part of the “2031 Network Concept”, Campeau Drive is identified as a “Widened Arterial”; it is planned to be widened from two to four lanes within the vicinity of the site. An environmental assessment has been completed on the project, but it is not included as part of the “2031 Affordable Network”. With the planned widening of Campeau Drive in the future, it could potentially help create more capacity for intersections along the Campeau Drive corridor, but the City of Ottawa has currently not allocated funding towards the widening of Campeau Drive.

ELEMENT 3.3.2 – ADJUSTMENT TO DEVELOPMENT GENERATED DEMANDS

The proposed development is located between Terry Fox Drive and March Road corridors. Residents and visitors of the proposed development have the option of accessing the Highway 417 corridor (Trans Canada Highway) from either major arterial corridors, or via Kanata Ave which has on/off ramps to/from the east on Highway 417. Given that Kanata Ave will be the closest and most direct path to access the east on Highway 417, and since there are expected capacity constraints at the Campeau Drive / March Road signalized intersection under existing conditions, it is reasonable to assume that the majority of site-related trips will use the Kanata Ave and Terry Fox Drive corridors to access the Highway 417 corridor. Therefore, more weighting is proposed to be placed onto the Kanata Ave and Terry Fox Drive routing options for accessing Highway 417.

It is noted however that a minor number of site trips will still be assigned to the March Road / Campeau Drive intersection to access Highway 417. These trips will largely be associated with portions of the site located furthest to the east where the March Road / Campeau Drive intersection would be closest and most direct path to access the highway.

ELEMENT 3.3.3 – ADJUSTMENTS TO BACKGROUND NETWORK DEMANDS

Given that there are no capacity constraints at any of the signalized or unsignalized intersection in the study area, except for the capacity constraint at the Campeau Drive / March Road signalized intersection under existing conditions, no adjustments are proposed to the background network demands.

STEP 4: ANALYSIS/STRATEGY

DESIGN REVIEW COMPONENT

MODULE 4.1 – DEVELOPMENT DESIGN

This module examines the proposed transportation network to ensure safe and efficient facilities are provided for pedestrians, cyclists and motorists.

All roads within the development plan are proposed to be local roads. The development plan is comprised of 23 distinct road segments which have been designed to provide safe and efficient access for all users (i.e. vehicles, pedestrians, and cyclists). The draft plan roads have been numbered for reference purposes. The proposed road names are reflected in **Figure 9**.

ELEMENT 4.1.1 – DESIGN FOR SUSTAINABLE MODES

To accommodate pedestrians two different local cross sections are proposed; a 20m ROW and an 18m ROW. A wider 20 metre ROW has been proposed to allow for streets with sidewalks on both sides. Streets with a 20m ROW include Street 1, which runs north-south from Campeau Drive to Knudson Drive. A 20 metre ROW is also proposed for Street 16 which is the extension of Street 1 north of Knudson Drive, terminating at Weslock Way. In addition, a 20m ROW is proposed for Street 7 between Campeau Drive and Street 9, for Street 9 between Street 7 and Street 11, and for Street 11. These streets are generally regarded as having a higher importance and connectivity from a pedestrian perspective because of their length and connections to other pedestrian routes.

All other streets are proposed to have an 18 metre ROW with a sidewalk on one side of the street in order to accommodate pedestrian / active transportation. The cross sections are based upon the City of Ottawa engineering cross sections.

On-street parking is included within the cross-sections as a traffic calming measure, illustrated in the updated NAK Design Strategies Urban Design Brief. On-street parking will be limited to one side of a roadway; its placement will be aligned with planned curb extensions at intersections to better define on-street parking areas.

In addition to the proposed sidewalk connections, several strategic trail / off-street pathway connections have been proposed throughout the development to provide connections from the new development to the existing neighbourhood areas to ensure the new development is well integrated into the existing community and to encourage active transportation. **Figure 10** illustrates the overall pedestrian routes including the proposed on-street sidewalks and trail connections.

With respect to transit, bus routes are located along Kanata Avenue, Campeau Drive, Knudson Drive, and Beaverbrook Road.

In order to understand the development's proximity to transit services, a pedestrian walkshed analysis was conducted using Geographic Information Systems (GIS). This type of analysis creates pedestrian walksheds via a network based approach where walking distances are determined based on actual street lengths and connectivity.

This specific analysis looked at pedestrian walksheds from transit stops in the vicinity of the site in a range of travel times. The analyzed condition reflects the implementation of new streets within the proposed development site.

Household transit coverage as part of the proposed development is illustrated in **Figure 11**. Based on the existing transit routes and bus stops, approximately 62% of the households proposed in the development area will be within 400 metres of a transit stop based on our analysis. Further detail is provided below in **Table 19** regarding the transit accessibility of the different housing types included in the Concept Plan.

TABLE 19 PEDESTRIAN WALKSHED ANALYSIS – 400M OF BUS STOP

Housing Type	# of Units	# of Units with 400m of Bus Stop[1]	% of Units with 400m of Bus Stop
Single Detached	654	240	37%
Front Drive Townhouses	247	159	64%
Back to Back Townhouses	68	10	15%
Stacked Townhouses	74	437	100%
Medium Density	437	74	100%
TOTAL	**1,480**	**920**	**62%**

Notes:
1. Some discretion was applied for units that cannot be precisely located at this time, notably including the "Medium Density" and "Stacked Townhouses" housing types. Determination of housing was made based off of "percentage of land parcel" approach.

It is acknowledged, as noted in the City of Ottawa Transportation Impact Assessment Guidelines, that OC Transpo's service design guideline for peak period service is to provide service within a five minute (400m) walk of the home, school, and work location of 95% of residents.

The concept plan has located the proposed higher density development (i.e. "Medium Density" and "Stacked Townhouses" housing types) in close proximity to existing transit, as the pedestrian walkshed analysis illustrates with 100% of these housing types located within a 400m walk of a bus stop.

While the pedestrian walkshed analysis yields a lower overall percentage (62%), this can be partially attributed to the unique nature of subject site; there are locations within the site that would not be within the 400m walking distance of existing bus stops even with straight line (i.e. as the crow flies) connections.

It should also be noted that overall yield percentage of 62% will likely ultimately be an underestimate; when the higher density blocks (which are located adjacent to public transit routes) are developed, (i.e. at the Site Plan Application development stage), it is likely that the road network through these sites will expand which will result in more pedestrian routing options. In addition, added OC Transpo service (i.e. through the proposed development site) can increase the overall yield of households within a 400m walk of transit service.

In addition, in response to a City comment, a pedestrian walkshed analysis is provided in **Figure 12** illustrating walk distance increments from Terry Fox Station, utilizing the same methodology outlined above. Further detail is provided below in **Table 20** outlining the proportion of proposed units at each increment.

TABLE 20 PEDESTRIAN WALKSHED ANALYSIS – DISTANCE FROM TERRY FOX STATION

Distance from Terry Fox Station	Housing Type					TOTAL Units
	Single Detached	Front Drive Townhouses	Back to Back Townhouses	Stacked Townhouses	Medium Density	
1,600 metres	6%	10%	5%	0%	100%	**34%**
2,000 metres	23%	69%	100%	100%	--	**61%**
2,400 metres	64%	69%	--	--	--	**79%**
2,800 metres	74%	96%	--	--	--	**88%**
3,200 metres	94%	100%	--	--	--	**97%**
3,600 metres	99%	--	--	--	--	**100%**
4,000 metres	100%	--	--	--	--	**100%**

Based on the pedestrian walkshed analysis, 61% of the proposed households will be within a 2km walk of Terry Fox Station.

Given the low volume, low speed, nature of the proposed local roads, cyclists will be accommodated on-street in a shared manner on all proposed internal streets. Cyclists will also be accommodated through the pathway connections by ensuring a multi-use pathway is provided with a minimum width of 3.0 metres.

Ontario Traffic Manual Book 18 was referenced in consideration of the provision of cycling facilities as part of the proposed street network.

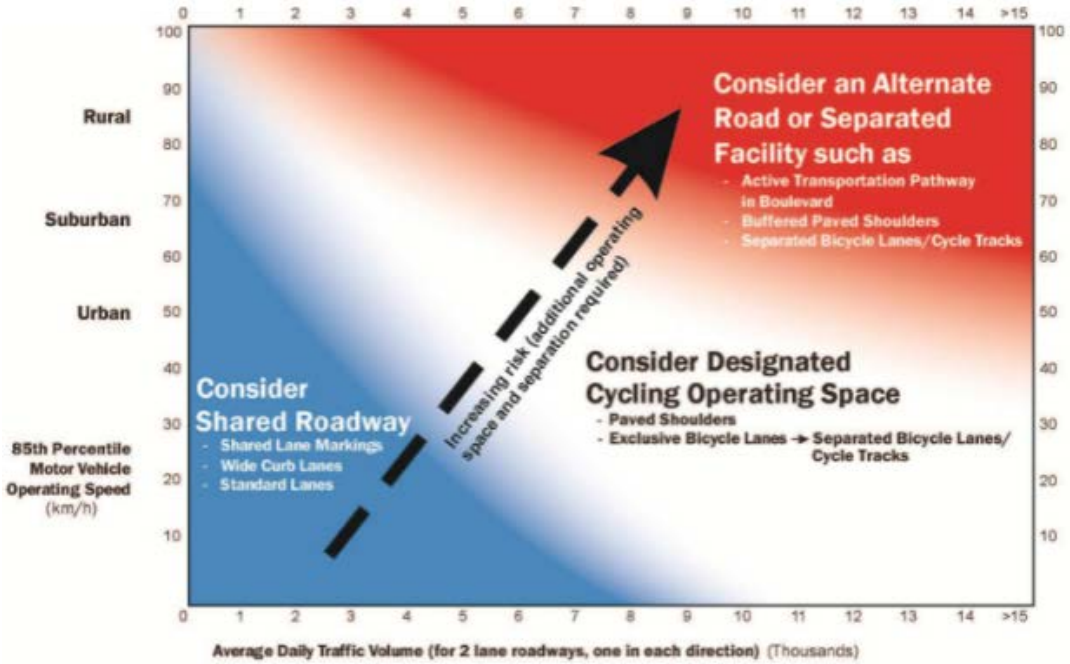


Figure 1 – Desirable Bicycle Facility Pre-Selection Nomograph (refer to OTM Book 18 figure 3.3 for footnotes)

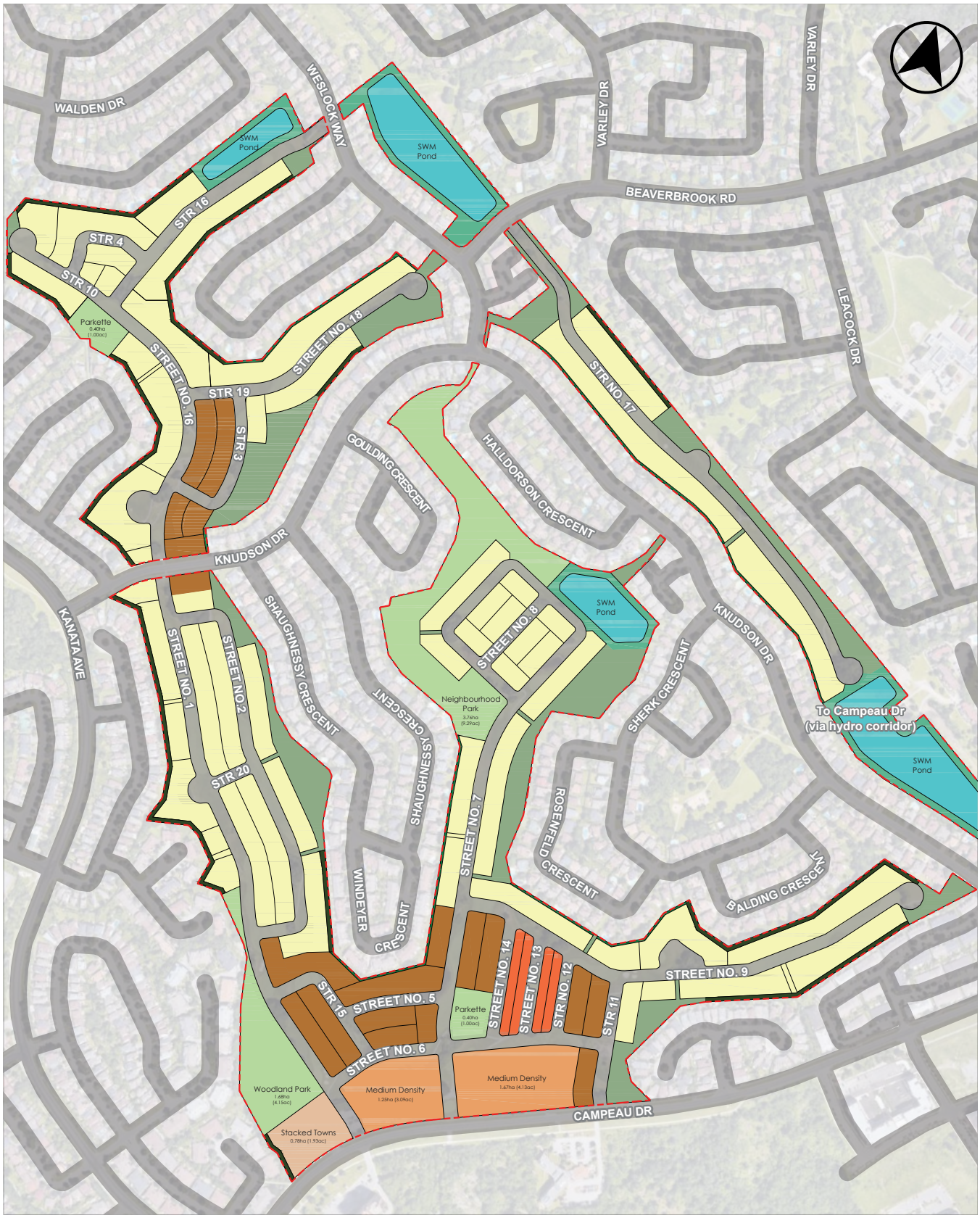
Given that the local roads in the proposed street network are to have speed limits of 30 km/h, consideration has been given to up to an 85th percentile scenario where vehicular speeds reach 40 km/h. At 40km/h, any local road with projected average daily traffic volumes at approximately 3,000 vehicles or more should be given consideration for designated cycling operating space (e.g. exclusive bicycle lanes). At 3,000 vehicles or less, shared roadway scenarios (e.g. shared lane markings) are to be considered.

In **Element 4.1.3**, projected average daily traffic volumes are provided for the proposed new local street network, as outlined in **Table 21**. Projected volumes range from 325 to 1,700 vehicles per day.

The proposed internal streets are low volume, low speed roads and consistent with the Ontario Traffic Manual Book 18 and therefore, on-street cycling facilities on internal local roads are not necessary. It is appropriate to accommodate cyclists in a shared manner on all proposed internal streets.

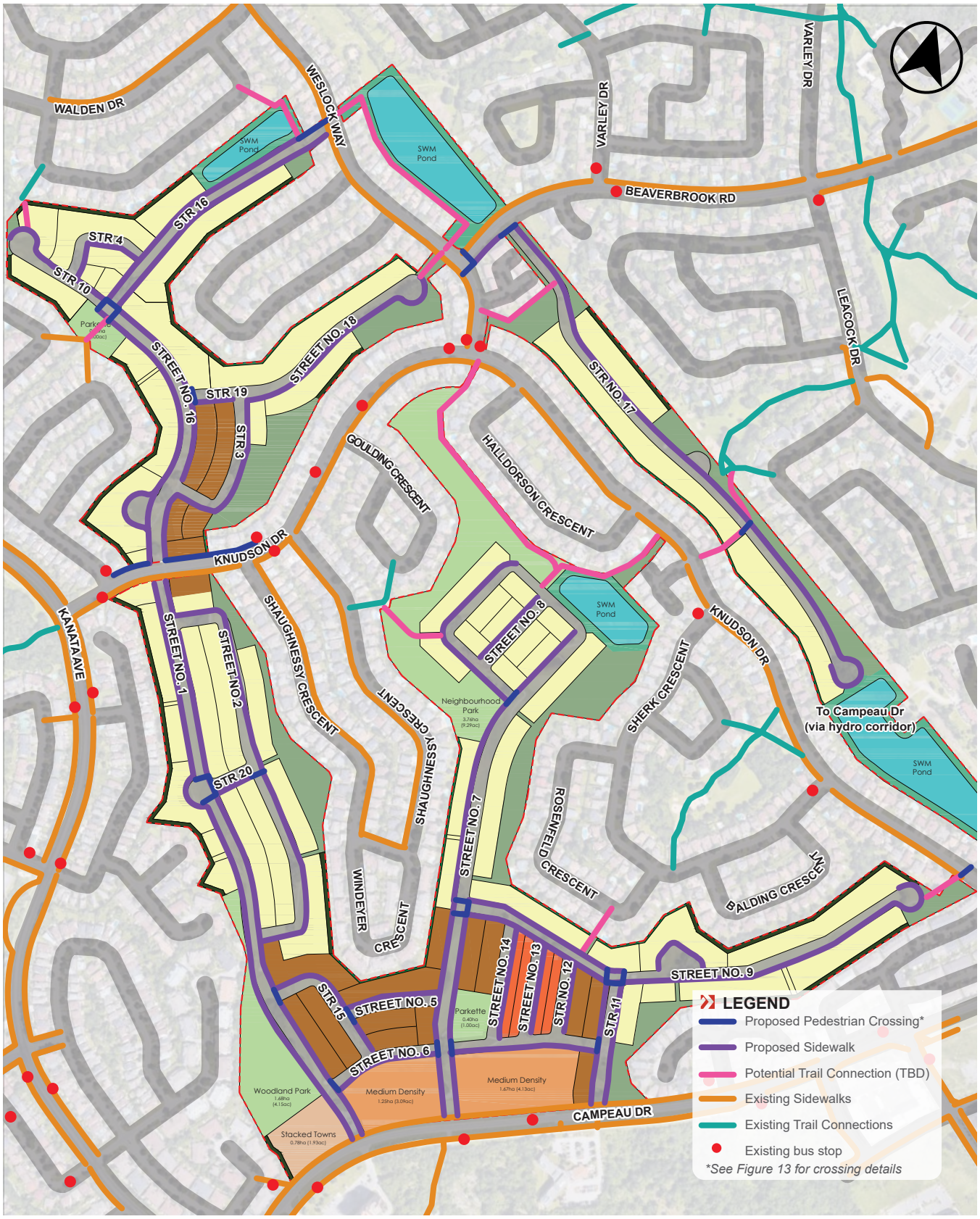
ELEMENT 4.1.2 – CIRCULATION AND ACCESS

As is noted in Module 2.3 of BA Group's "Step 2 – Scoping" Report for the project, this element is only required for site plans; it is not required for applications involving plans of subdivision. As a result, the project is exempt from this element.



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FIGURE 9 CONCEPT PLAN WITH OVERVIEW OF ROAD LINKS



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FIGURE 10 PROPOSED PEDESTRIAN LINKS

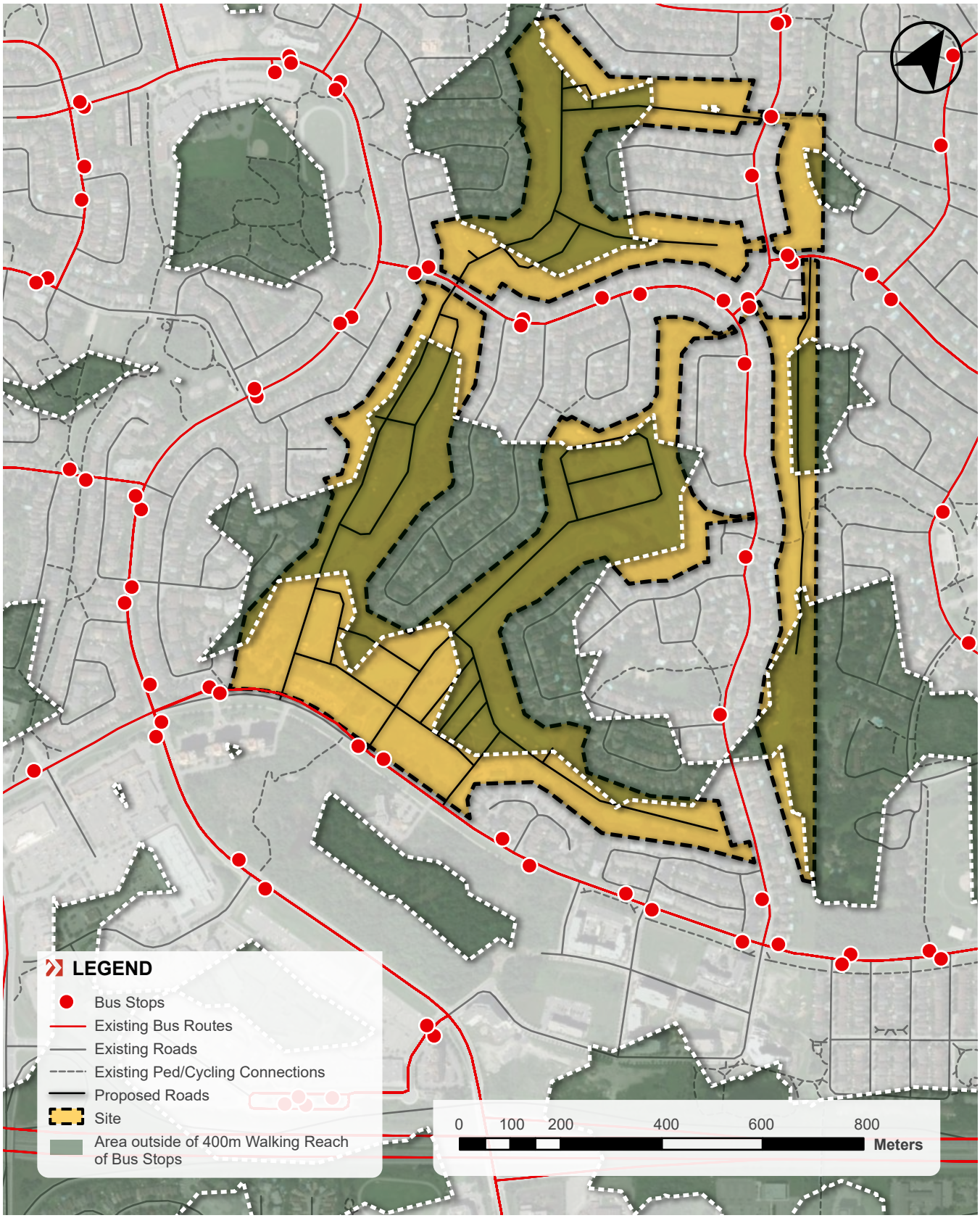
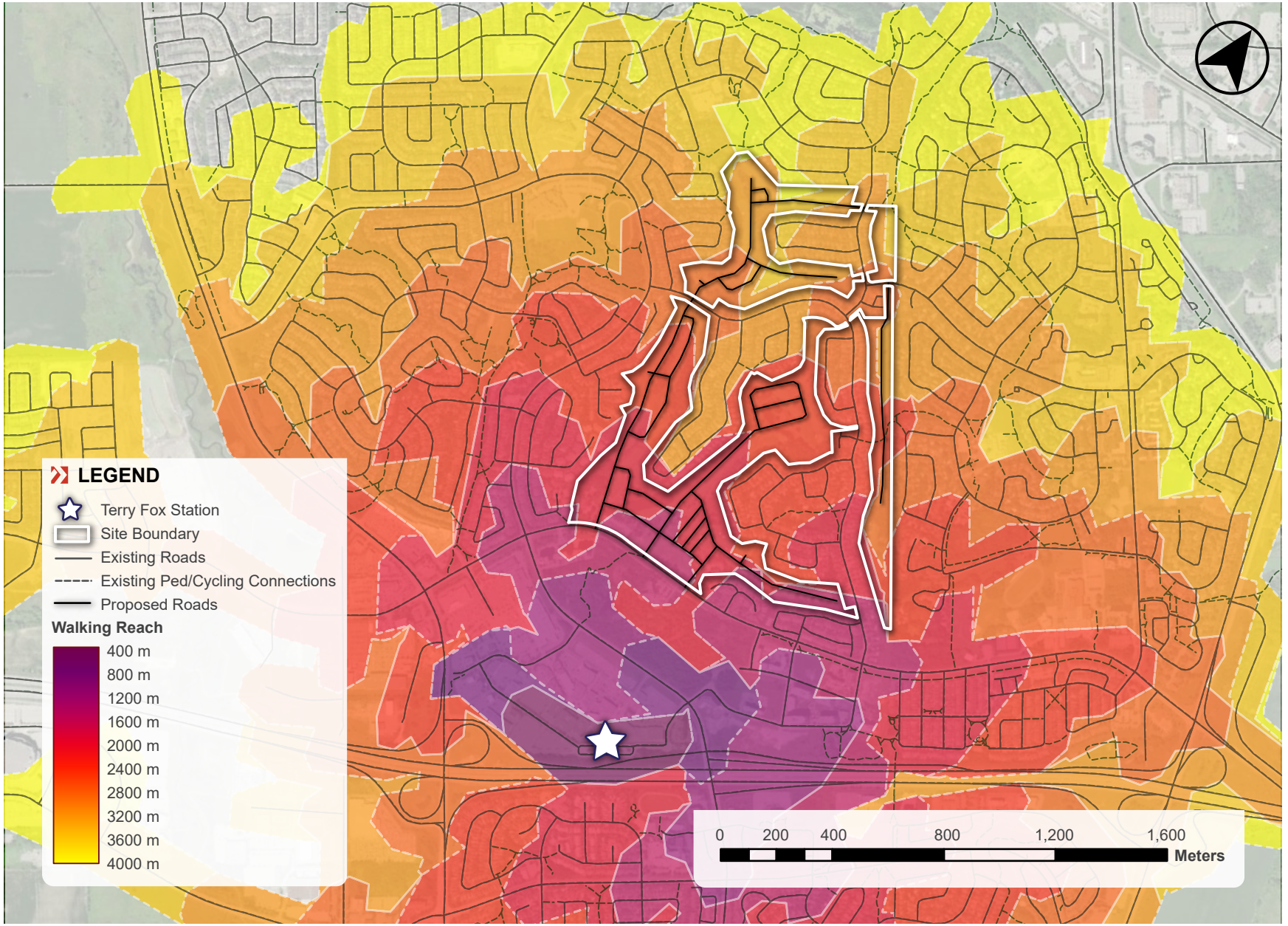


FIGURE 11 PEDESTRIAN WALKSHED ANALYSIS – 400M OF BUS STOP



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FIGURE 12 PEDESTRIAN WALKSHED ANALYSIS – DISTANCE FROM TERRY FOX STATION

ELEMENT 4.1.3 – NEW STREET NETWORKS

Review of Consistency with Road Classification Criteria

This section reviews the planned street network to confirm that the network design results in demands that are consistent with the City of Ottawa's daily traffic threshold for local roads which is 1000 vehicles per day or 120 vehicles per hour. Projected daily traffic volumes were estimated at key access points for the purposes of this assessment as it represents the locations where traffic is highest on the proposed internal roads with volumes being less than what is reported within the interior of the plan as traffic distributes to the other streets and to the houses.

Table 21 below summarizes the projected future traffic flows on the internal (new) street networks.

TABLE 21 PROJECTED TRAFFIC VOLUMES ON PROPOSED DEVELOPMENT ROADS

Location	Proposed Classification	Local Road Traffic Threshold[1]	Projected Future Weekday Daily Traffic Volumes[2]
Street No. 1 (North of Campeau Drive)	Local	<1,000 vpd or 120 veh/hr	1,700 vpd
Street No. 1 (South of Knudson Drive)	Local	<1,000 vpd or 120 veh/hr	875 vpd
Street No. 7 (North of Campeau Drive)	Local	<1,000 vpd or 120 veh/hr	1,350 vpd
Street No. 11 (North of Campeau Drive)	Local	<1,000 vpd or 120 veh/hr	1,350 vpd
Street No. 16 (West of Weslock Way)	Local	<1,000 vpd or 120 veh/hr	325 vpd
Street No 16. (North of Knudson Drive)	Local	<1,000 vpd or 120 veh/hr	700 vpd
Street No. 17 (South of Beaverbrook Road)	Local	<1,000 vpd or 120 veh/hr	700 vpd

Notes:
1. Based on threshold for a local road listed in City of Ottawa's TIA Guidelines (see Page 46).
2. Daily traffic volumes estimated based on peak hour traffic volumes by averaging the AM&PM volumes and dividing by 10% (i.e. assumes that peak hour traffic volumes represent 10% of typical daily traffic volumes).

Generally, all proposed local roads will have daily traffic volumes consistent with the character of a local road (i.e. with daily traffic volumes less than 1,000 vpd). The exceptions are the three streets that connect to Campeau Drive. These three streets are projected to have daily traffic volumes of 1,350 to 1,700 vpd. The higher volumes are the result of the majority of site traffic funnelling to these three intersection locations on Campeau Drive, and due to the presence of medium density and existing high density blocks along the Campeau Drive corridor.

Given that the street links with daily traffic volumes above the City's typical local road threshold are short segments near the medium density / high density blocks, the estimated daily traffic volumes for these roads is appropriate and consistent with other comparable local roads with areas with higher density uses. Similarly, the proposed local road classification is appropriate for the other remaining streets in the lower density areas which will have daily traffic volumes less than 1,000 vehicles per day.

Assessment of Neighbourhood Traffic Calming Needs

Given that the estimated daily traffic volumes on proposed future streets are consistent with the local road classifications, neighbourhood traffic calming measures to shift traffic volumes are not required.

Traffic calming measures are proposed for consideration, however, for the purposes of reducing speeds on longer road segments within the plan. Based on the City of Ottawa's "Traffic Calming Design Guidelines" the following traffic calming measures are proposed:

- Provision of speed display devices (i.e. speed radar stations).
- Allowing on-street parking will be provided on all roads.
- Reducing the effective roadway width with curb extensions (e.g. curb extensions and chicanes) at various locations / intersections within the neighbourhood.
- Provision of enhanced intersections with upgraded paving materials for pedestrian crossings for intersections at strategic locations.

With respect to the proposed enhanced intersections, these locations have been divided into two categories to differentiate between intersections proposed to include all-way stops (to improve pedestrian safety) and intersections that will operate under side street stop control:

1. Enhanced Intersection (All Approaches)
   (Upgraded Treatment on All Approaches)
   - A proposed or existing all-way stop location where an improved paving material is proposed to increase pedestrian visibility and safety.
2. Enhanced Intersection (Side Street Approaches)
   (Upgraded Treatment on Side Street Approaches Only)
   - Not an all-way stop; side street approaches are stop-controlled with improved pedestrian treatments.

Figure 13 illustrates the locations and type of neighbourhood traffic calming that are proposed to be designed into the proposed street network, including the location of both types of enhanced intersections.

Enhanced intersections internal to the site may also include curb extensions to further add a further traffic calming measure and to increase pedestrian safety. The locations and details with respect to where the curb extensions may apply will be confirmed through future detailed design engineering submissions for the internal streets.

It is noted there are several enhancements to existing all-way stop control intersections within the external road network surrounding the site that may be warranted. These include:

- Kanata Avenue / Knudson Drive
- Weslock Way / Beaverbrook Road
- Knudson Drive / Weslock Way

The enhancements involve providing improved paving treatments to the existing pedestrian crosswalks at the intersections to improve overall neighbourhood safety. The enhancements will not include geometric changes to the existing intersections and therefore an RMA is not required.

All-Way Stop Control (AWSC) Warrant

The following provides a review of traffic control warrant review for the following internal intersections:

- Street No. 1 / Street No. 20
- Street No. 7 / Street No. 9
- Street No. 9 / Street No. 11
- Street No. 10 / Street No. 16

As part of the proposed development, it is proposed that these intersections within the site operates as an unsignalized intersection under an all-way stop control.

As requested by City staff, an All-Way Stop Control Warrant was undertaken for the proposed unsignalized intersections within the site. The warrant is based on a review of Ontario Traffic Manual (OTM) Book 5, *All-way Stop Minimum Volume Warrant (Minor Roads)*, where:

- *Total vehicle volumes on all intersection approaches exceed 350 for the highest hour recorded; and*
- *Volumes split does not exceed 75/25 for three-way control or 65/35 for four-way control. Volume is defined as vehicles only.*

Table 22 summarizes the All-Way Stop Control warrant undertaken at the site internal intersections.

TABLE 22 ALL-WAY STOP CONTROL WARRANT ANALYSIS

Intersection	Condition	Volumes / Percent		% of Threshold	Warrant Met
Street No. 1 / Street No. 20	Highest hour of volume (all approaches)	100 vehicles		29%	NO
	Volumes Split	80	20	-	NO
		80%	20%	-	
Street No. 7 / Street No. 9	Highest hour of volume (all approaches)	75 vehicles		21%	NO
	Volumes Split	60	15	NO	NO
		80%	20%	-	
Street No. 9 / Street No. 11	Highest hour of volume (all approaches)	90 vehicles		26%	NO
	Volumes Split	65	25	-	NO
		72%	28%	-	
Street No. 10 / Street No. 16	Highest hour of volume (all approaches)	50 vehicles		14%	NO
	Volumes Split	35	15	-	NO
		70%	30%	-	

While the internal intersections do not warrant an All-Way Stop Control, it is recommended that the proposed intersections operate under an all-way stop control in the future. The proposed all-way stop control at this intersection will provide benefits to pedestrian activity as well as provide traffic calming to the site by minimizing vehicle travel speed along the roads.

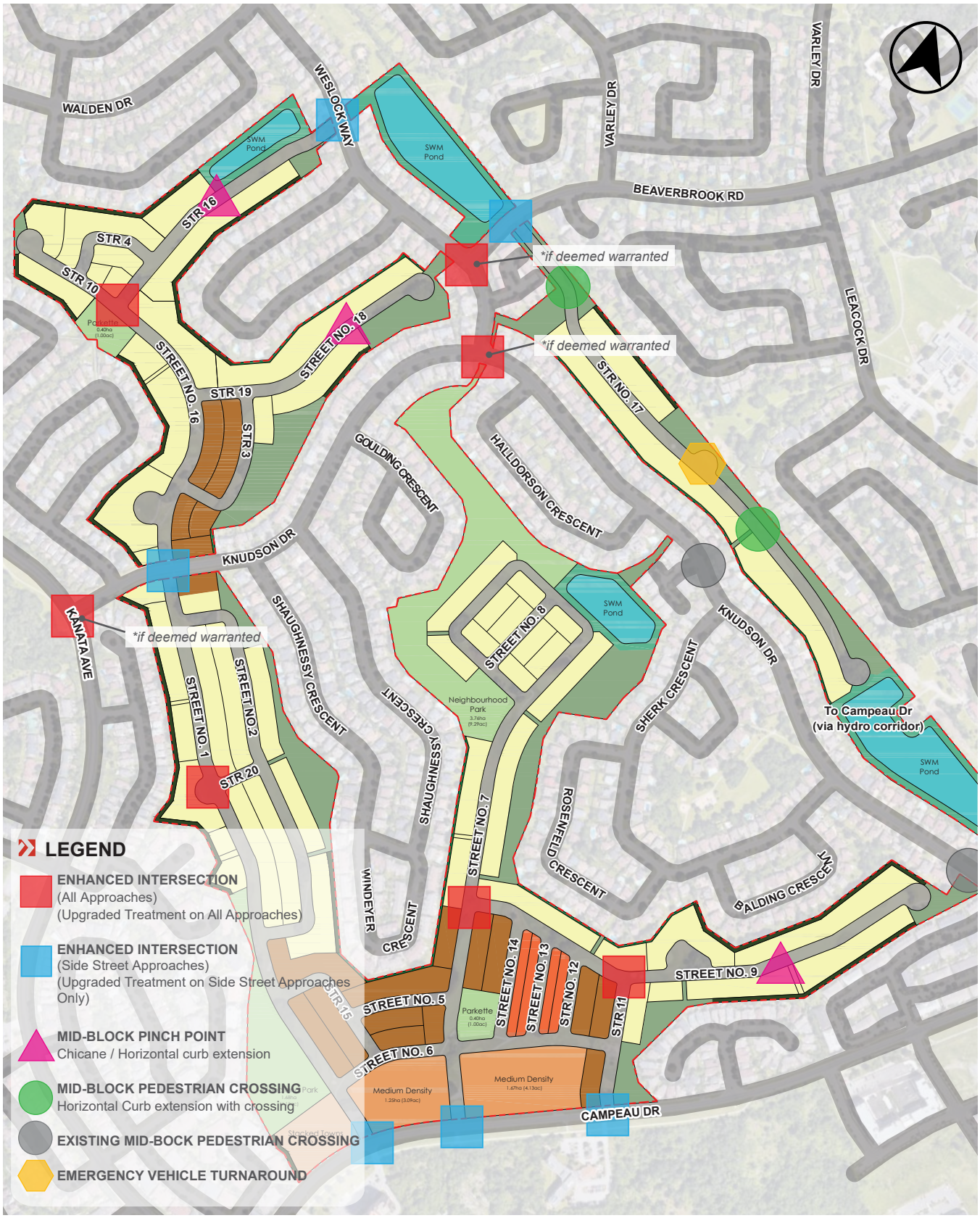


FIGURE 13 PROPOSED NEIGHBOURHOOD TRAFFIC CALMING LOCATIONS AND TYPE

MODULE 4.2 – PARKING

As is noted in Module 2.3 of BA Group's "Step 2 – Scoping" Report for the project, this module is only required for site plans. As a result, the project is exempt from this element.

MODULE 4.3 – BOUNDARY STREET DESIGN

Mobility

Based on our review of information available from the City, none of the area boundary streets have had a 'Complete Streets Concept' prepared. Therefore, consistent with the City's TIA guidelines, a Multi-Modal Level of Service (MMLOS) assessment was undertaken at area signalized intersections and at external street segments between signalized intersections for pedestrians, cyclists, transit, trucks and autos. A summary of the MMLOS results is provided in **Appendix D**.

BA Group undertook an MMLOS assessment of the segments of street along the Campeau Drive corridor. Based on a review of the MMLOS, the pedestrian network along the segments between intersections typically range between LOS A to LOS D. Along the portion of Campeau Drive where the development site is located, the pedestrian LOS is D. The pedestrian LOS for the intersections in the area ranges from C to F with the LOS F existing at the March Road / Campeau intersection and at the Herlihey Way / Campeau Dr. intersection. The pedestrian LOS for the intersections closest to the site are LOS C to D.

The cycling LOS along Campeau Drive corridor ranges between LOS A to LOS F which is the result of the wide variety of cycling provisions along the Campeau Drive corridor. In this regard there is a physically separated bikeway located on the north side of Campeau Drive east of the site (LOS A) compared to segments that have no formal cycling accommodation west and east of the site (LOS F). In the vicinity of the site frontage the cycling LOS is C on account of the on-street painted cycling lanes that exist. The cycling LOS for intersections in the study area are LOS D to LOS F.

The transit LOS for the Campeau Drive corridor is generally LOS E throughout the corridor.

The trucks and auto LOS typically range between LOS A to LOS E.

Based on the MMLOS, the area street segments closest to the site have an acceptable MMLOS. Certain segments beyond the site on Campeau Road have cycling LOS of F due to the limited cycling provisions available under existing conditions.

The City of Ottawa's MMLOS assessment focuses on street segments in proximity to signalized intersections. BA Group therefore also undertook a review of existing pedestrian and cycling connections within the existing neighbourhood surrounding the site in order to identify any missing links. Based on our review there is one notable missing link in the existing pedestrian network on the south side of Beaverbrook Road, from Weslock Way to Varley Drive. This link will be an important pedestrian route that connects to an existing bus stop on Beaverbook Road. Note that this link will offer better pedestrian connection in the future as part of the proposed development plan. BA Group did not identify any notable missing links in the area cycling network.

Road Safety

Historical collision records have been reviewed in Step 2 – Table 4. In addition, **Figure 14** shows collision records for the past five years at nearby intersections.

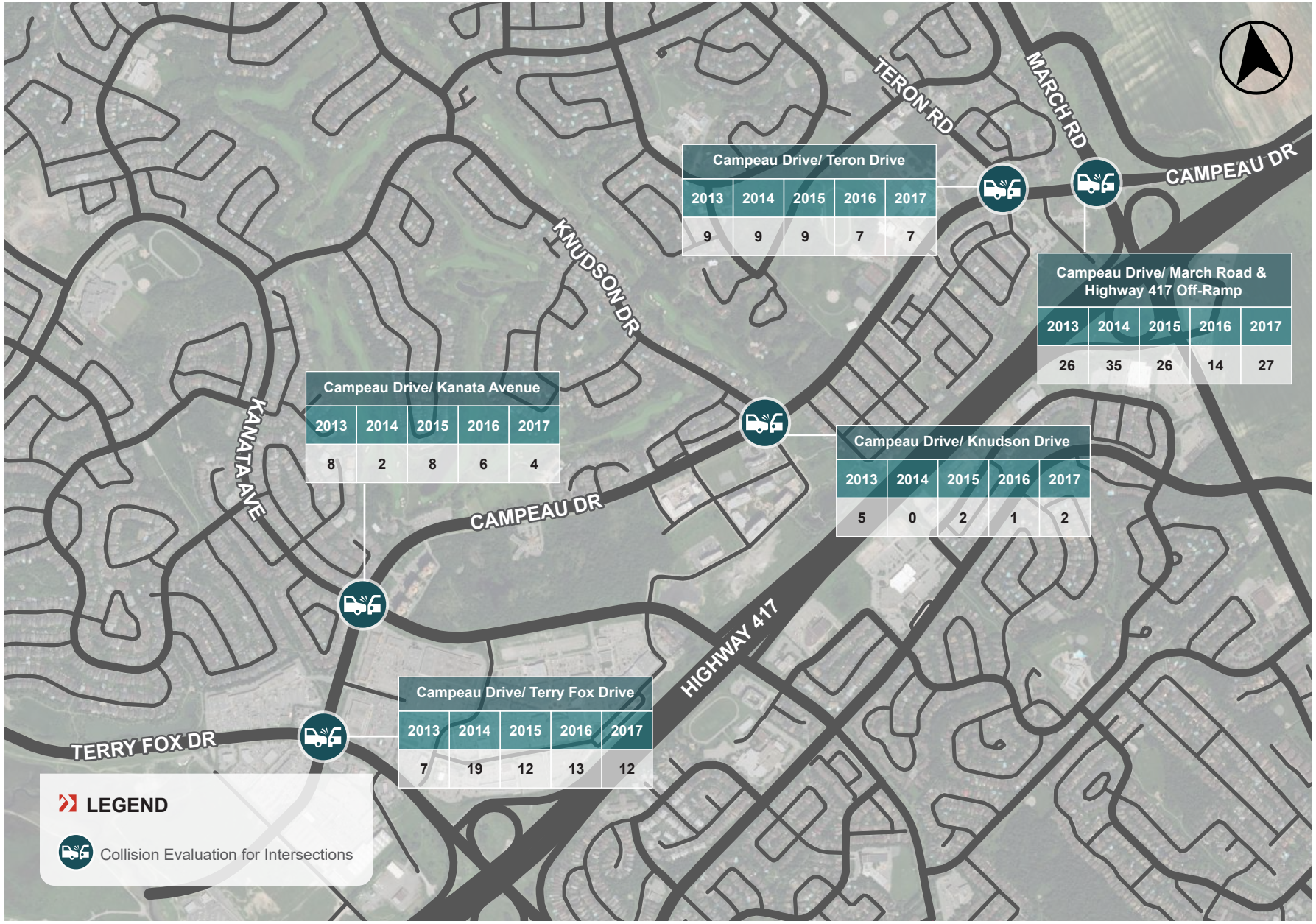
Based on a review of area collision data there is no discernable trends of increasing collision behaviour. The largest number of collisions in the study area is at the March Road / Campeau Drive intersection which has had 14-35 collisions per year for the past 5 years. Other intersections that have more than six collisions per year are:

- Campeau Drive / Kanata Ave (4-8 per year);
- Campeau Drive / Terry Fox Drive (7-19 per year)
- Campeau Drive / Teron Drive (7-9 per year)

Generally, the locations with the higher occurrences of accidents are correlated to the intersections that carry higher traffic volumes. Moreover, based on the capacity analysis completed at the study area intersections, no physical improvements are required at external intersections to accommodate projected site traffic. As such, the site will not have any impact on the physical design of the external intersections and therefore the site will not impact the overall safety of these intersections.

Neighbourhood Traffic Management (NTM)

There are no existing neighborhood traffic management issues that we are aware of that will be exacerbated by the proposed development.



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FIGURE 14 HISTORICAL COLLISION DATA (FIVE YEARS)

MODULE 4.4 – ACCESS INTERSECTIONS DESIGN

ELEMENT 4.4.1 – LOCATION AND DESIGN OF ACCESS

The development concept features seven (7) proposed new access locations that will connect to existing streets, as shown in **Figure 15**. The location of the proposed access points was developed based on consideration of the proximity to adjacent intersections and driveways.

Based on projected operations at the future access points, all proposed access points will operate acceptably as unsignalized intersections with side-street stop control. No new signalized intersections are being proposed, or are required, as part of the development. With respect to proximity to existing signalized intersections, the nearest traffic signal to any proposed access point is the Kanata / Campeau traffic signal.

The proposed Street 1 connection to Campeau Drive is located 270 metres from the existing signal which is an appropriate distance for an unsignalized access from an adjacent traffic signal. Moreover, the proposed unsignalized intersection spacing between Streets 1, 4, and 11 within the concept plan are in the order of 130 to 215 metres apart which is appropriate for unsignalized intersections on an arterial road.

At the proposed driveway locations along Knudson Drive, Campeau Drive, Beaverbrook Road and Weslock Way, there are no existing medians that will be affected.

ELEMENT 4.4.2 – INTERSECTION CONTROL

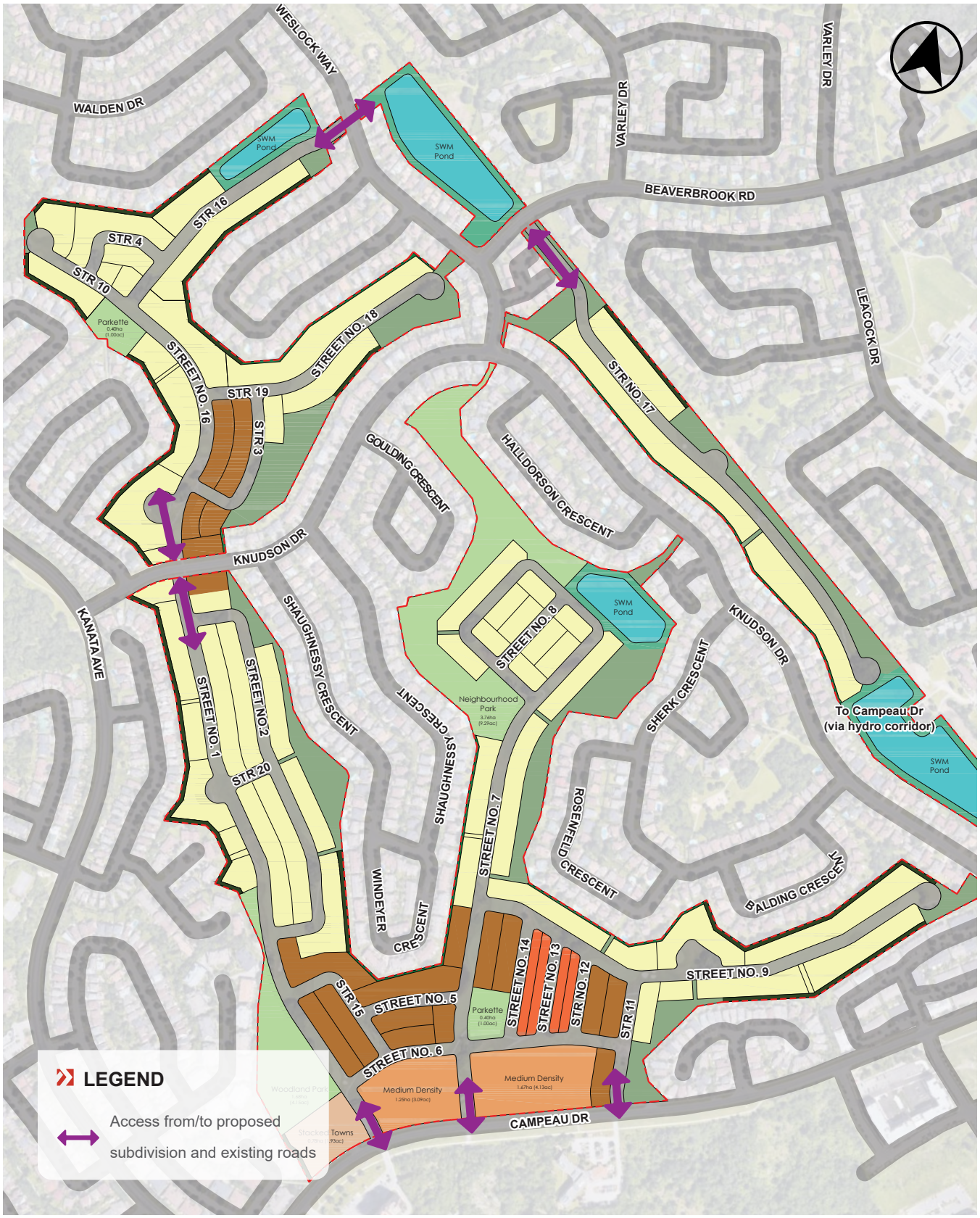
Based on the traffic analysis conducted at the proposed site access intersections under future total conditions, all site accesses operate at an acceptable level of service. All proposed access intersections will operate with two-way stop control with STOP control on the minor side streets (i.e. proposed) street approaches.

No roundabouts are proposed within the development area. This is consistent with Ottawa's roundabout screening guidelines which indicate that roundabouts are best suited for 4 leg intersections with balanced traffic flows (i.e. where at least 10% of total traffic is generated from the minor road[1]). Moreover, given that a roundabout is typically considered as an alternative to a traffic signal and a traffic signal is not required or recommended for the proposed development, a roundabout is therefore not applicable for the development.

A figure illustrating the proposed intersection control at the access locations is presented in **Figure 16**.

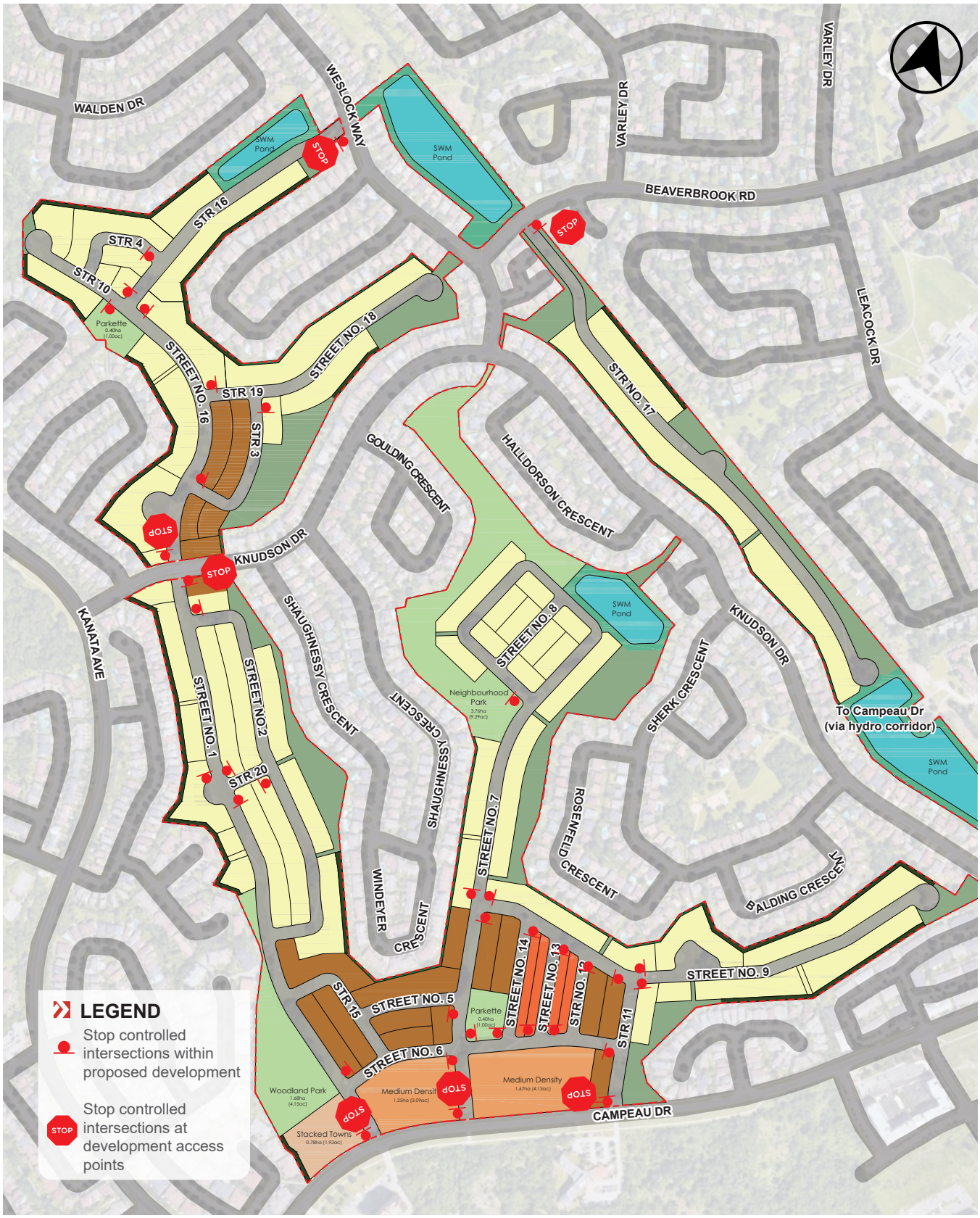
See the following section (Element 4.4.3) for a detailed discussion of the intersection analysis conducted for the proposed site access intersections.

[1] Page 1 of City of Ottawa Mini-Roundabout Guidelines, January 2017



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FIGURE 15 PROPOSED ACCESS LOCATIONS



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FIGURE 16 PROPOSED INTERSECTION CONTROL

ELEMENT 4.4.3 – INTERSECTION DESIGN

This section reviews the adequacy of the proposed new site access intersections from a capacity perspective and the associated design requirements related to turn lanes, etc.

Capacity Analysis

Capacity analysis to assess the operation of the proposed site access locations was undertaken using Synchro Capacity analysis software. The results of the capacity analysis undertaken at the site accesses are summarized in **Table 23**.

TABLE 23 SITE ACCESS CAPACITY ANALYSIS RESULTS

Intersections / Key Movements	Existing Traffic Conditions		Future Background Traffic Conditions		Future Total Traffic Conditions	
	Delay (s)	LOS	Delay (s)	LOS	Delay (s)	LOS
Campeau Drive / Park Ridge Place (East) & Street No. 1						
EBLTR	-- (--)	-- (--)	-- (--)	-- (--)	0.4 (1.4)	A (A)
WBLTR	0.0 (0.3)	A (A)	0.0 (0.3)	A (A)	0.0 (0.3)	A (A)
NBLTR	10.2 (13.5)	B (B)	10.1 (12.9)	B (B)	10.2 (19.6)	B (C)
SBLTR	-- (--)	-- (--)	-- (--)	-- (--)	21.8 (20.7)	C (C)
Campeau Drive / Street No. 7						
EBLT	-- (--)	-- (--)	-- (--)	-- (--)	0.4 (0.8)	A (A)
SBLR	-- (--)	-- (--)	-- (--)	-- (--)	20.9 (21.5)	C (C)
Campeau Drive / Omni Health Care Centre & Street No. 11						
EBLTR	-- (--)	-- (--)	-- (--)	-- (--)	0.4 (0.7)	A (A)
WBLTR	0.3 (0.2)	A (A)	0.3 (0.1)	A (A)	0.3 (0.1)	A (A)
NBLTR	12.9 (14.8)	B (B)	12.3 (14.1)	B (B)	18.1 (23.5)	C (C)
SBLTR	-- (--)	-- (--)	-- (--)	-- (--)	32.4 (30.9)	D (D)
Knudson Drive / Street No. 1 & Street No. 16						
EBLTR	-- (--)	-- (--)	-- (--)	-- (--)	0.8 (1.6)	A (A)
NBLTR	-- (--)	-- (--)	-- (--)	-- (--)	0.6 (0.7)	A (A)
SBLTR	-- (--)	-- (--)	-- (--)	-- (--)	14.3 (14.1)	B (B)
Weslock Way / Street No. 16						
EBLR	-- (--)	-- (--)	-- (--)	-- (--)	9.7 (8.8)	A (A)
NBLT	-- (--)	-- (--)	-- (--)	-- (--)	1.0 (0.9)	A (A)
Beaverbrook Road / Street No. 23						
NBLR	-- (--)	-- (--)	-- (--)	-- (--)	18.6 (15.0)	C (B)

Notes:
1. XX (XX) – Weekday Morning Peak Hour (Weekday Afternoon Peak Hour)

Based on the analysis the proposed accesses will operate acceptably under two-way STOP control. Individual movements at the proposed site access locations will generally operate with good levels of service with LOS C or better. The one exception is the southbound approach of Street 11 at Campeau Drive which is projected to operate with a LOS of D during the peak hours. The LOS of D is considered acceptable for a peak hour period in a built-out urban environment with delays not significant enough to warrant consideration of a traffic signal.

Auxiliary Lane Review

Forecast inbound left turning movements from Campeau Drive into the development are projected to be approximately up to 100 vehicles per hour at Street 1, and in the order of 30-50 vehicles per hour at Streets 7 and 11. Based on a review of the projected delays forecasted in the table above, the inbound left turns from Campeau Drive to Streets 1, 7, and 11 will experience minimal delay (LOS A) during the peak hour periods and therefore have little or no impact on through traffic volumes. In addition, Campeau Drive currently has a wide pavement width with an adjacent painted cycling lane which can accommodate through vehicles going around any occasional vehicles turning left into the site from Campeau Drive. As such, dedicated left turn lanes are not recommended or required on Campeau Drive at the proposed site accesses.

Forecast inbound turning volumes from the access points on Knudson Drive, Weslock Way, and Beaverbrook Road are forecast to be less than 100 vehicles per hour and will operate with good levels of service (LOS A to B). Auxiliary turn lanes at these locations are therefore not required or recommended.

Based on the foregoing, the anticipated modifications to the existing area streets at the proposed access connections will generally consist of the addition / modification of the existing pavement markings on existing streets to accommodate a new intersection, and the addition of new stop signs in the right of way for the new streets.

NETWORK IMPACT COMPONENT

MODULE 4.5 – TRANSPORTATION DEMAND MANAGEMENT

ELEMENT 4.5.1 – CONTEXT FOR TDM

As is noted in E**lement 3.1.1**, existing mode share for Kanata/Stittsville (Traffic Assessment Zone – TAZ – 500) was provided (Section C) and future mode share targets for the development were identified (Section D). A summary of this analysis is provided in **Table 24** based upon the mode share analysis provided in **Table 13**.

TABLE 24 EXISTING TAZ 500 MODE SHARE VS. PROPOSED DEVELOPMENT MODE SHARE

Travel Mode	Existing TAZ 500			Proposed Development Target Mode Share
	AM Peak	PM Peak	24 Hour	
Auto Driver	52%	59%	63%	55%
Auto Passenger	25%	24%	23%	10%
Transit	13%	10%	8%	25%
Bicycle	0%	0%	0%	5%
Pedestrian	10%	7%	6%	5%

The primary difference between observed mode share in the area and the proposed mode share is a significant shift away from auto passenger activity and, in turn, an increase to transit and cycling activity.

Given the residential character of the local area, local residents could be adversely affected if traffic volumes generated by the proposed development were higher than expected.

Development Location and Involved Parties

The proposed development is not located in a Design Priority Area (DPA) or a Transit-oriented Development (TOD) zone. However, it borders the Kanata Town Centre (TC) Site-Specific Policy Area; the northern border of the Kanata TC Site-Specific Policy Area is Campeau Drive (with the exception of Parc Bill Teron Park, located west of the Forest Hill Long Term Care Home).

As per Schedule B of the Official Plan, the Kanata TC is a “Mixed Use Centre” and as per Section 2.5.1 of the Official Plan, all Mixed Use Centres are Design Priority Areas.

Land Ownership/Tenure

For the proposed single detached houses, the eventual owner will be private homeowners. For the townhouses, back-to-back townhouses, and medium density residential uses, the eventual owner is expected to be a homeowner (freehold), condominium corporation or potentially an apartment property manager, respectively. Details will be confirmed as the development proceeds closer to the marketing / sales stage depending on market conditions.

Development Operation

The development operation for non-residential uses is not applicable because the proposed development is a residential use.

There will be no age restrictions for the residential uses.

Residential Unit Mix

For the proposed single detached houses, the residential unit mix will likely consist of 3- and 4-bedroom homes. For the townhouses and back-to-back townhouses, the residential unit mix will likely consist of 2- and 3-bedroom homes. For the medium density residential uses, the residential unit mix will likely consist of 1- and 2-bedroom homes. Details will be confirmed as the development proceeds closer to the marketing / sales stage depending on market conditions.

ELEMENT 4.5.2 – NEED AND OPPORTUNITY

Possible Negative Impacts of a Failure to Meet Proposed Sustainable Mode Share Targets

If the proposed mode share targets are not met, there could be adverse effects on local residents (i.e. the future private homeowners) and potential condominium corporation. For local residents living on the streets with single detached houses, higher than expected auto driver mode share will result in increased vehicular traffic on local roads during peak periods. This result could negatively impact safety, particularly during periods when children are walking to school (i.e. All Saints High School, Elementary School Catholic Saint-Rémi, Al-Madinah School, St. Gabriel School, Stephen Leacock Public School, Holy Trinity Catholic High School, etc.).

For the medium density residential uses, high auto driver mode share could result in higher than expected parking demand, which may not be accommodated onsite. It is important to facilitate TDM initiatives to keep parking demand within the site supply at these sites.

How a Post-Occupancy TDM Program will Achieve Proposed Sustainable Mode Share Targets

A post-occupancy TDM program is appropriate because of the projected increase to transit and cycling activity with the new development in comparison to observed mode splits in the local area. As is noted in **Element 2.1.2**, the site is serviced by a number of transit routes can be directly accessed from the surrounding streets and Terry Fox Station, located as little as 750 metres from the site. Various cycling amenities permeate the area. These adjacent transit and cycling amenities are representative of an opportunity; a post-occupancy TDM program will leverage these amenities in order for the proposed development to successfully reach the stated mode share targets. Conversely, the absence of a TDM program could result in new residents of the proposed development not using them because of a lack of awareness, lack of convenience, or otherwise.

TDM-Supportive Design & Infrastructure Elements

It should be mentioned that the proposed development is a draft plan of subdivision and, therefore, it is exempt from the *TDM-Supportive Development Design and Infrastructure Checklist* (Version 1.0, June 2017). Nevertheless, elements of the proposed development (which will be planned in greater detail at a subsequent stage of the development process) will be assessed according to its requirements, like the Site Plan Applications concerning the medium density residential uses.

Generally, as is outlined in **Module 4.1**, the development has been designed to accommodate sustainable transportation modes. There is a sidewalk on at least one side of the road at all locations, with a sidewalk on both sides of all streets with 20m ROW. In addition, strategic connections have been proposed throughout the development to ensure convenience for pedestrians and encourage active transportation. These shortcuts give pedestrians more direct access to destinations in different directions. This feature is important as it provides access to bus service which, as mentioned, currently surrounds the subject site.

Contextual Issues

As is outlined in **Element 4.5.1**, it is projected that the proposed development mode share will include increases in transit and cycling activity in comparison to the observed mode share in the local area (TAZ 500). As such, this projected increase is representative of an opportunity for a TDM program with a variety of measures intended to assist in accomplishing these targets.

General Quality of Existing and Future Access by All Modes

The site is conveniently well located in close proximity to a variety of OC Transpo transit routes and the City of Ottawa cycling network. The proposed development has been designed to leverage connections to these existing facilities.

ELEMENT 4.5.3 – TDM PROGRAM

Based upon the context for the proposed development and the aforementioned need and opportunity for TDM, a comprehensive TDM program has been developed. Based upon the *TDM Measures Checklist* (Version 1.0, June 2017), the TDM program is outlined in **Table 25**.

Implementation Plan

It is proposed that a comprehensive implementation plan will be developed at a subsequent stage of the development process. The comprehensive implementation plan will include planning and coordination, funding and human resources, timelines for action, performance targets and monitoring requirements. At this stage, the client asks that the City of Ottawa identify external resources (e.g. consultants) to provide TDM program development and implementation services.

TABLE 25 TDM MEASURES CHECKLIST (RESIDENTIAL DEVELOPMENTS; SUBDIVISION)

TDM measures: Residential developments		Description
1. TDM PROGRAM MANAGEMENT		
1.1	**Program coordinator**	
1.1.1	Designate an internal coordinator, or contract with an external coordinator.	Not applicable.
1.2	**Travel surveys**	
1.2.1	Conduct periodic surveys to identify travel-related behaviours, attitudes, challenges and solutions, and to track progress.	As part of TDM program development and implementation services, travel/commuting surveys will be conducted throughout the buildout period to assess evolving commuting behaviour.
2. WALKING AND CYCLING		
2.1	**Information on walking/cycling routes & destinations**	
2.1.1	Display local area maps with walking/cycling access routes and key destinations at major entrances (multi-family, condominium)	Where applicable, the lobby areas of the “medium density residential uses” will contain these materials.
2.2	**Bicycle skills training**	
2.2.1	Offer on-site cycling courses for residents, or subsidize off-site courses.	Not applicable.
3. TRANSIT		
3.1	**Transit information**	
3.1.1	Display relevant transit schedules and route maps at entrances (multi-family, condominium)	Where applicable, the lobby areas of the “medium density residential uses” will contain these materials.
3.1.2	Provide real-time arrival information display at entrances (multi-family, condominium)	Not applicable. There is insufficient existing bus service on Campeau Drive to warrant real-time travel information screens.
3.2	**Transit fare incentives**	
3.2.1 / 3.2.2	Offer PRESTO cards preloaded with one monthly transit pass on residence purchase/move-in, to encourage residents to use transit. / Offer at least one year of free monthly transit passes on residence purchase/move-in.	The developer will consider providing purchasers of residences with PRESTO cards preloaded with one year of monthly OC Transpo passes.
3.3	**Enhanced public transit service**	
3.3.1	Contract with OC Transpo to provide early transit services until regular services are warranted by occupancy levels (subdivision).	Given the nature of the proposed development (i.e. the proposed road plan) and the current level of transit provision, it may be impractical to add new OC Transpo routes to the new neighbourhood. However, service levels should be increased on the existing network to better service the proposed development and to facilitate easier connections to downtown Ottawa via Terry Fox Terminal.

TDM measures: Residential developments		Description
4. CARSHARING & BIKESHARING		
4.1	**Bikeshare stations & memberships**	
4.1.1	Contract with provider to install on-site bikeshare station (multi-family).	Will be considered for medium density uses. To be confirmed through site plan process for medium density blocks.
4.1.2	Provide residents with bikeshare memberships, either free or subsidized (multi-family).	Will be considered for medium density uses. To be confirmed through site plan process for medium density blocks.
4.2	**Carshare vehicles & memberships**	
4.2.1	Contract with provider to install on-site carshare vehicles and promote their use by residents.	To be investigated through Site Plan process for the medium density blocks.
4.2.2	Provide residents with carshare memberships, either free or subsidized.	To be investigated through Site Plan process for medium density blocks.
5. PARKING		
5.1	**Priced parking**	
5.1.1 / 5.1.2	Unbundle parking cost from purchase price (condominium) / monthly rent (multi-family).	The provision of parking will be unbundled from the purchase of medium density units.
6. TDM MARKETING & COMMUNICATIONS		
6.1	**Multimodal travel information**	
6.1.1	Provide a multimodal travel option information package to new residents.	All travel options that are available to residents, including those provided as part of the TDM program, will be included as part of printed travel mode information packages (given to new residents), and will be included as part of email communications with residents.
6.2	**Personalized trip planning**	
6.2.1	Offer personalized trip planning to new residents.	Not applicable.

MODULE 4.6 – NEIGHBOURHOOD TRAFFIC MANAGEMENT

ELEMENT 4.6.1 – ADJACENT NEIGHBOURHOODS

This section assesses the extent to which the proposed development will affect the character and function of any existing streets in the study area.

BA Group has assessed the projected traffic volume changes on area streets that may be affected by the development. A summary of the projected weekday daily traffic volumes, and corresponding road classifications for the adjacent road network, are summarized in **Table 26**.

TABLE 26 DAILY TRAFFIC VOLUMES ON EXISTING ADJACENT ROADS

Location	Classification	Traffic Threshold	Existing Weekday Daily Traffic Volumes[4]	Projected Future Weekday Daily Traffic Volumes[4]
Kanata Avenue (South of Campeau Drive)	Arterial	5,000 vpd–30,000 vpd[1]	8,900 vpd	11,900 vpd
Kanata Avenue (Campeau Drive to Robson Court)	Major Collector	5,000 vpd to 8,000 vpd[2]	11,425 vpd	14,050 vpd
Kanata Avenue (Robson Court to Knudson Drive)	Major Collector	5,000 vpd to 8,000 vpd[2]	5,900 vpd	8,550 vpd
Kanata Avenue (North of Knudson Drive)	Major Collector	5,000 vpd to 8,000 vpd[2]	5,475 vpd	7,625 vpd
Knudson Drive (Kanata Avenue to Shaughnessy Crescent)	Minor Collector	Up to 2,500 vehicles per day[3]	5,175 vpd	7,075 vpd
Knudson Drive (Shaughnessy Crescent to Weslock Way)	Minor Collector	Up to 2,500 vehicles per day	5,075 vpd	5,400 vpd
Knudson Drive (Weslock Way to Sherk Crescent)	Minor Collector	Up to 2,500 vehicles per day	2,700 vpd	3,425 vpd
Knudson Drive (Sherk Crescent to Campeau Drive)	Minor Collector	Up to 2,500 vehicles per day	3,075 vpd	3,825 vpd
Weslock Way	Minor Collector	Up to 2,500 vehicles per day	4,725 vpd	5,775 vpd
Beaverbrook Road	Minor Collector	Up to 2,500 vehicles per day	7,075 vpd	7,775 vpd

Notes:
1. Arterial road daily traffic classification based on range presented in Transportation Association of Canada (TAC), Geometric Design Guide for Canadian Roads – Table 1.3.4.2 (Characteristics of Urban Roads).
2. Low end of range based on maximum volume for a major collector road listed in City of Ottawa's TIA Guidelines (see Page 46) and high end of range based on the threshold for a residential collector in the TAC Geometric Design Guide – Table 1.3.4.2 for collector roads.
3. Based on threshold for a minor collector road listed in City of Ottawa's TIA Guidelines (see Page 46).
4. Daily traffic volumes estimated based on peak hour traffic volumes by averaging the AM&PM volumes and dividing by 10% (i.e. assumes that peak hour traffic volumes represent 10% of the typical daily traffic volumes).

Based on the City of Ottawa's Official Plan, Kanata Avenue is currently classified as a major collector road north of Campeau Drive and is an arterial road south of Campeau Drive. Based upon the existing traffic volumes surveyed along the Kanata Avenue corridor within the study area, existing weekday daily traffic volumes both north and south of Campeau Drive are generally more consistent with an arterial road with existing daily traffic volumes on Kanata Avenue in the order of 9,000 to 11,000 vehicles per day near Campeau Drive and 5,000 to 6000 vpd in the vicinity of Knudson Drive. These existing volumes along Kanata Avenue in the vicinity of the site exceed the City's threshold for Major Collector streets of 5,000 vpd. Moreover, in the vicinity of Campeau Drive the volumes on Kanata Avenue even exceed the threshold for collector roads in the TAC Manual of 8,000 vpd. This indicates that, notwithstanding Kanata Avenue's collector designation north of Campeau Drive, it functions like an arterial road in the vicinity of the site under existing conditions.

It is estimated that the proposed development will increase daily traffic volumes on Kanata Avenue by an estimated 2,000 to 3,000 vehicles. Given that Kanata Avenue is already functioning as an arterial street in the vicinity of the development, this increase will not affect the character or function of Kanata Avenue.

Based on the City of Ottawa's Official Plan, Knudson Drive, Weslock Way and Beaverbrook Road are classified as minor collector roads. Per the City of Ottawa's TIA Guidelines the threshold for minor collectors is up to 2,500 vpd. Existing traffic volumes surveyed along these corridors suggest that all these collector streets currently operate with volumes exceeding the City of Ottawa's thresholds for daily traffic on a minor collector road. This suggests that all roads are currently functioning as major collector streets.

Site traffic is estimated to add in the order of 500 to 1,000 new daily trips to the minor collector roads in the study area. The exception is Knudson Drive just east of Kanata Avenue where the projected increase will be in the order of 1,900 new daily trips. Even with the additional site traffic, forecast future daily traffic volumes on all minor collector streets are less than 8,000 vehicles per day which is the upper threshold for residential collector streets in the TAC manual. Traffic generated by the proposed development will therefore not appreciably change the character and function of the existing minor collector roads in the study area compared to what exists currently.

MODULE 4.7 – TRANSIT

ELEMENT 4.7.1 – ROUTE CAPACITY

The proposed development is well-situated relative to existing transit infrastructure with a number of routes can be directly accessed from Campeau Drive (four existing transit routes – 62, 161, 164, 268 – utilize Campeau Drive), Kanata Avenue, Knudson Drive, and Weslock Way, all of which permeate, are adjacent, or are nearly adjacent to the site. The site is also located within as little as 750 metres to Terry Fox Station that services routes with far reaching access in the City of Ottawa. The area transit network generally offers services with approximately 30 minutes to 60 minutes headways.

The site is currently well-served by several transit services including the 62 bus route, 265 bus route and 268 bus route. The existing ridership information at the local transit stops within the vicinity of the site have been provided by OC Transpo for each of the routes and are summarized in **Table 27**.

TABLE 27 AREA SURFACE TRANSIT ROUTES – OC TRANSPO DATA

Route	Stop No. / Direction		Boarding	Alighting	Average Load per vehicle	
					Persons	% full
62 Tunney's Pasture ←→ Stittsville & Terry Fox	Kanata / Campeau	EB	0 (13)	0 (7)	13 (27)	13% (26%)
		WB	0 (8)	9 (17)	33 (19)	32% (18%)
	Campeau / Stonecroft	EB	0 (0)	0 (0)	11 (28)	11% (27%)
		WB	0 (0)	0 (0)	37 (22)	36% (21%)
	6501 Campeau	EB	0 (4)	2 (0)	11 (28)	11% (27%)
		WB	0 (0)	2 (1)	36 (21)	35% (20%)
	Campeau / Canacher	EB	2 (1)	1 (0)	11 (28)	11% (27%)
		WB	1 (0)	0 (2)	37 (21)	36% (20%)
	Campeau / Maritime	EB	3 (10)	0 (2)	12 (29)	12% (28%)
		WB	2 (0)	3 (7)	36 (22)	35% (21%)
	7000 Campeau	EB	2 (0)	6 (0)	11 (27)	11% (26%)
		WB	0 (0)	1 (6)	36 (21)	35% (20%)
265 Tunney's Pasture ←→ Beaverbrook	Beaverbrook / Weslock	EB (WB)	1 (0)	0 (0)	11 (3)	11% (3%)
	Knudson / Campeau	EB (WB)	0 (0)	0 (0)	19 (0)	18% (0%)
	Knudson / Sherk	EB (WB)	10 (0)	0 (1)	19 (0)	18% (0%)
	Knudson / Nelford	EB (WB)	7 (0)	0 (2)	16 (1)	15% (1%)
	Weslock / Knudson	EB (WB)	4 (0)	0 (0)	12 (2)	12% (2%)
	Knudson / Halldorson	EB (WB)	2 (0)	0 (0)	13 (2)	13% (2%)
	Weslock / Knudson	EB (WB)	0 (0)	0 (5)	14 (13)	13% (13%)

Table Continued on next page …

Route	Stop No. / Direction		Boarding	Alighting	Average Load per vehicle	
					Persons	% full
265 Tunney's Pasture ←→ Beaverbrook	Weslock / Zokol	EB (WB)	5 (0)	2 (0)	14 (12)	13% (12%)
	Knudson / Weslock	EB (WB)	9 (0)	1 (0)	15 (0)	14% (0%)
	Knudson / Goulding	EB (WB)	10 (0)	0 (5)	16 (14)	15% (13%)
	Knudson / Shaughnessy	EB (WB)	12 (0)	0 (8)	18 (15)	17% (14%)
	Knudson / Langford	EB (WB)	9 (0)	0 (5)	19 (17)	18% (16%)
	Kanata / Knudson	EB (WB)	16 (0)	0 (7)	21 (18)	20% (17%)
	Campeau / Stonecroft	EB (WB)	1 (0)	0 (1)	27 (25)	26% (24%)
	6501 Campeau	EB (WB)	1 (0)	1 (0)	27 (25)	26% (24%)
	Campeau / Canacher	EB (WB)	8 (0)	0 (4)	28 (26)	27% (25%)
	Campeau / Maritime	EB (WB)	17 (0)	0 (7)	30 (26)	29% (25%)
	7000 Campeau	EB (WB)	3 (0)	0 (0)	27 (26)	26% (25%)

Notes:
1. XX (XX) - Weekday AM Peak Hour (Weekday PM Peak Hour)
2. OC Transpo capacity for a typical bus is approximately 90 passengers.

The transit routes currently servicing the study area generally operate under capacity during the weekday peak hours in both directions at approximately 36% or better.

Forecast transit trips for the proposed development were established based upon a review of TRANS 2011 study as outlined in **Module 3.1** within this report. Transit trips to and from the site during the weekday morning and afternoon peak hours are summarized in **Table 28**.

TABLE 28 SITE GENERATED TRANSIT TRIPS

Land Use	AM Peak Hour			PM Peak Hour		
	In	Out	2-Way	In	Out	2-Way
Residential	130	270	400	230	180	410
Total	130	270	400	230	180	410

It is anticipated that the proposed development will generate approximately 400 and 410 two-way transit trips during the weekday morning and afternoon peak hours, respectively.

Site transit trips are predominantly oriented to / from the downtown area to the east of the proposed development. Terry Fox Terminal, located as little as 750 metres to the south, is the primary transit terminal for downtown-oriented transit users of bus services as a number of routes are accessed at the Terminal that connect directly to the downtown area.

Based on a review of the TRANS 2011 O-D survey data, residential trips are more oriented towards high-density employment areas in the City (i.e. the downtown core), therefore, are more likely to make use of the

downtown-oriented transit routes that are mostly accessed via Terry Fox Terminal, with some transit trips to the local area where smaller density employment areas are located.

Based on the foregoing, the area transit system has capacity to accommodate the anticipated new transit traffic generated by the proposed development during the weekday morning and afternoon peak hours.

ELEMENT 4.7.2 – TRANSIT PRIORITY

There are no planned transit priority corridors within the study area of the proposed development as outlined in the Transportation Master Plan. Within the “2031 Network Concept”, Terry Fox Way is designated to have a transit signal priority between Hazeldean Road and the West Transitway, to improve transit access. However, it is not included as part of the “2031 Affordable Network”.

MODULE 4.8 – REVIEW OF NETWORK CONCEPT

The purpose of this section is to identify whether the proposed development changes the City of Ottawa's plans for autos and transit as set out in the current Transportation Master Plan (TMP).

Identify Affected Links

The City of Ottawa's 2013 Transportation Master Plan (TMP) lists Campeau Drive, Kanata Avenue and Terry Fox Drive as recommended "Widened Arterials" with Campeau Drive and Kanata Avenue to be widened from two to four lanes within the vicinity of the site and Terry Fox Drive to be widened from four to six lanes within the vicinity of the site.

The Campeau Drive and Terry Fox Drive widening projects are not however included as part of the 2031 Affordable Network listed in the TMP. The widening of Kanata Avenue south of Campeau Drive is identified in the 2031 Affordable Network and it is planned to be widened from two to four lanes between Highway 417 and Campeau Drive. It is included in the Phase 2 plans, which is anticipated to be completed by 2025.

Review Network Adequacy

Given the uncertainty of the completion for the widening of Kanata Avenue, BA Group has conservatively in the capacity analysis undertaken herein (see Module 4.9) assumed that all the existing boundary streets will retain their existing lane configurations.

Based on the capacity analysis undertaken, all study area intersections along Kanata Avenue, Terry Fox Drive, and Campeau Drive can accommodate the forecast site traffic without physical improvement. As such, the proposed development will not affect the timing of the planned road network changes in the 2013 TMP.

MODULE 4.9 – INTERSECTION DESIGN

This module focuses on assessing the network impact on the external study area intersections.

ELEMENT 4.9.1 – INTERSECTION CONTROL

Capacity analysis and Multi-Modal Analysis was undertaken based on the existing area intersection controls, as illustrated in **Figure 16**.

ELEMENT 4.9.2 – INTERSECTION DESIGN

Multi-modal level of service assessment was conducted at the signalized intersections within the study area as outlined in the MMLOS guidelines. Based on the assessment, the future road network remained consistent as the existing road network and no additional mitigation measures or improvements are anticipated to occur during this time period. As such, the future MMLOS assessment produced the same results as the existing MMLOS assessment and the signalized intersections typically ranged between LOS C to LOS E. A summary of the MMLOS assessment is provided in **Appendix D**.

Detailed Synchro analysis worksheets are provided in **Appendix E**. A discussion of the traffic analysis results for the signalized and unsignalized intersections within the study area are provided herein in the following sub-sections.

ELEMENT 4.9.2.1 – SIGNALIZED INTERSECTIONS

A summary of the traffic analysis results for the signalized intersections within the study area is provided in **Table 29**. The corresponding results are discussed following the table.

Methodology

Traffic operations analyses have been completed using the Synchro (Version 9.2) software package in accordance with the methodologies outlined in the Highway Capacity Manual (HCM 2000) and City of Ottawa's *Transportation Impact Assessment Guidelines (2017)*.

The key performance indicator of the signalized intersection evaluation is an intersection performance index (volume to capacity, or v/c), where v/c index of 1.00 indicates 'at capacity' conditions.

The key performance indicator of the unsignalized intersection / driveway analyses is the average delay per vehicle (in seconds) and a level of service (LOS) designation, ranging from LOS A (little delay) to LOS F (extended delay), with respect to the relative time for a motorist to complete a travel movement at an intersection or driveway.

Signal Timing Plans

Existing traffic signal timing plans for all signalized intersections within the study area were obtained from the City of Ottawa. Analyses were undertaken using these signal timing plans for existing, future background and future total traffic conditions.

The existing traffic signal timing plans are provided in **Appendix F**.

Saturation Flow Rates

A base saturation flow rate of 1,800 passenger cars per hour of green time per lane (pcphgpl) was adopted as the base assumption within the Synchro analysis. This default rate was assumed in all analysis scenarios unless otherwise specified.

Peak Hour Factors

Based on the City of Ottawa's *Transportation Impact Assessment Guidelines (2017)*, a peak hour factor of 0.90 was assumed for all intersections under existing conditions and a peak hour factor of 1.00 was assumed for all intersections under future analysis scenarios.

TABLE 29 SIGNALIZED INTERSECTIONS CAPACITY ANALYSIS RESULTS

Intersections / Key Movements	Existing Traffic Conditions		Future Background Traffic Conditions		Future Total Traffic Conditions	
	v/c	LOS	v/c	LOS	v/c	LOS
Campeau Drive / Terry Fox Drive						
EBL	0.07 (0.23)	A (A)	0.07 (0.22)	A (A)	0.06 (0.21)	A (A)
EBT	0.04 (0.13)	A (A)	0.06 (0.18)	A (A)	0.06 (0.17)	A (A)
EBR	0.03 (0.05)	A (A)	0.02 (0.04)	A (A)	0.02 (0.04)	A (A)
WBL	0.81 (0.90)	D (D)	0.80 (0.88)	C (D)	0.81 (0.90)	D (D)
WBT	0.06 (0.12)	A (A)	0.08 (0.13)	A (A)	0.08 (0.12)	A (A)
WBR	0.07 (0.10)	A (A)	0.06 (0.09)	A (A)	0.10 (0.12)	A (A)
NBL	0.11 (0.13)	A (A)	0.10 (0.11)	A (A)	0.10 (0.11)	A (A)
NBT	0.56 (0.59)	A (A)	0.50 (0.57)	A (A)	0.54 (0.62)	A (B)
NBR	0.14 (0.18)	A (A)	0.12 (0.16)	A (A)	0.12 (0.19)	A (A)
SBL	0.40 (0.30)	A (A)	0.33 (0.27)	A (A)	0.42 (0.43)	A (A)
SBT	0.40 (0.57)	A (A)	0.41 (0.53)	A (A)	0.43 (0.54)	A (A)
SBR	0.03 (0.15)	A (A)	0.03 (0.13)	A (A)	0.03 (0.13)	A (A)
Overall	**0.64 (0.69)**	**B (B)**	**0.59 (0.66)**	**A (B)**	**0.63 (0.72)**	**B (C)**
Campeau Drive / Herlihey Way						
EBL	0.03 (0.08)	A (A)	0.03 (0.06)	A (A)	0.03 (0.07)	A (A)
EBTR	0.27 (0.66)	A (B)	0.25 (0.59)	A (A)	0.29 (0.69)	A (B)
WBL	0.10 (0.41)	A (A)	0.09 (0.33)	A (A)	0.09 (0.38)	A (A)
WBT	0.36 (0.47)	A (A)	0.33 (0.41)	A (A)	0.40 (0.48)	A (A)
WBR	0.03 (0.09)	A (A)	0.02 (0.08)	A (A)	0.02 (0.08)	A (A)
NBL	0.48 (0.54)	A (A)	0.43 (0.51)	A (A)	0.43 (0.51)	A (A)
NBTR	0.08 (0.68)	A (B)	0.07 (0.58)	A (A)	0.07 (0.58)	A (A)
SBL	0.45 (0.66)	A (B)	0.43 (0.63)	A (B)	0.43 (0.63)	A (B)
SBT	0.03 (0.16)	A (A)	0.03 (0.15)	A (A)	0.03 (0.15)	A (A)
SBR	0.01 (0.07)	A (A)	0.01 (0.06)	A (A)	0.01 (0.06)	A (A)
Overall	**0.33 (0.64)**	**A (B)**	**0.30 (0.56)**	**A (A)**	**0.37 (0.63)**	**A (B)**

Table Continued on next page …

Intersections / Key Movements	Existing Traffic Conditions		Future Background Traffic Conditions		Future Total Traffic Conditions	
	v/c	LOS	v/c	LOS	v/c	LOS
Campeau Drive / Kanata Avenue						
EBL	0.26 (0.63)	A (B)	0.22 (0.56)	A (A)	0.38 (0.76)	A (C)
EBTR	0.46 (0.62)	A (B)	0.42 (0.60)	A (A)	0.50 (0.70)	A (B)
WBL	0.12 (0.17)	A (A)	0.10 (0.16)	A (A)	0.27 (0.29)	A (A)
WBTR	0.54 (0.66)	A (B)	0.51 (0.61)	A (B)	0.67 (0.81)	B (D)
NBL	0.31 (0.57)	A (A)	0.29 (0.54)	A (A)	0.32 (0.56)	A (A)
NBT	0.19 (0.68)	A (B)	0.29 (0.69)	A (B)	0.31 (0.73)	A (C)
NBR	0.02 (0.03)	A (A)	0.02 (0.02)	A (A)	0.04 (0.06)	A (A)
SBL	0.40 (0.27)	A (A)	0.38 (0.25)	A (A)	0.36 (0.43)	A (A)
SBT	0.86 (0.78)	D (C)	0.87 (0.82)	D (D)	0.91 (0.86)	E (D)
SBR	0.17 (0.15)	A (A)	0.15 (0.14)	A (A)	0.17 (0.15)	A (A)
Overall	**0.63 (0.72)**	**B (C)**	**0.63 (0.72)**	**B (C)**	**0.73 (0.84)**	**C (D)**
Campeau Drive / Knudson Drive & Maritime Way						
EBL	0.05 (0.09)	A (A)	0.04 (0.08)	A (A)	0.22 (0.18)	A (A)
EBTR	0.52 (0.22)	A (A)	0.51 (0.23)	A (A)	0.70 (0.32)	B (A)
WBL	0.05 (0.11)	A (A)	0.07 (0.17)	A (A)	0.11 (0.19)	A (A)
WBTR	0.48 (0.47)	A (A)	0.45 (0.44)	A (A)	0.55 (0.58)	A (A)
NBL	0.00 (0.05)	A (A)	0.05 (0.12)	A (A)	0.04 (0.13)	A (A)
NBTR	0.07 (0.12)	A (A)	0.11 (0.12)	A (A)	0.10 (0.12)	A (A)
SBL	0.54 (0.41)	A (A)	0.50 (0.38)	A (A)	0.52 (0.38)	A (A)
SBTR	0.04 (0.08)	A (A)	0.04 (0.10)	A (A)	0.06 (0.14)	A (A)
Overall	**0.52 (0.46)**	**A (A)**	**0.50 (0.43)**	**A (A)**	**0.64 (0.55)**	**B (A)**
Campeau Drive / Hawkstone Gate						
EBL	0.30 (0.12)	A (A)	0.25 (0.11)	A (A)	0.29 (0.14)	A (A)
EBTR	0.35 (0.24)	A (A)	0.36 (0.25)	A (A)	0.55 (0.33)	A (A)
WBL	0.03 (0.03)	A (A)	0.02 (0.03)	A (A)	0.03 (0.03)	A (A)
WBTR	0.41 (0.57)	A (A)	0.37 (0.55)	A (A)	0.48 (0.68)	A (B)
NBL	0.03 (0.10)	A (A)	0.03 (0.10)	A (A)	0.03 (0.10)	A (A)
NBTR	0.04 (0.04)	A (A)	0.04 (0.04)	A (A)	0.04 (0.04)	A (A)
SBLTR	0.71 (0.22)	C (A)	0.67 (0.13)	B (A)	0.69 (0.13)	B (A)
Overall	**0.50 (0.51)**	**A (A)**	**0.46 (0.50)**	**A (A)**	**0.63 (0.61)**	**B (B)**

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Intersections / Key Movements	Existing Traffic Conditions		Future Background Traffic Conditions		Future Total Traffic Conditions	
	v/c	LOS	v/c	LOS	v/c	LOS
Campeau Drive / Teron Road						
EBL	0.39 (0.37)	A (A)	0.34 (0.33)	A (A)	0.39 (0.44)	A (A)
EBTR	0.35 (0.19)	A (A)	0.37 (0.21)	A (A)	0.59 (0.32)	A (A)
WBL	0.08 (0.19)	A (A)	0.07 (0.17)	A (A)	0.09 (0.19)	A (A)
WBT	0.24 (0.46)	A (A)	0.23 (0.47)	A (A)	0.37 (0.66)	A (B)
WBR	0.39 (0.32)	A (A)	0.35 (0.29)	A (A)	0.35 (0.32)	A (A)
NBLT	0.08 (0.08)	A (A)	0.08 (0.08)	A (A)	0.08 (0.08)	A (A)
NBR	0.05 (0.05)	A (A)	0.05 (0.05)	A (A)	0.05 (0.05)	A (A)
SBL	0.92 (0.92)	E (E)	0.90 (0.89)	D (D)	0.90 (0.89)	D (D)
SBT	0.02 (0.07)	A (A)	0.02 (0.07)	A (A)	0.02 (0.07)	A (A)
SBR	0.10 (0.20)	A (A)	0.09 (0.18)	A (A)	0.09 (0.18)	A (A)
Overall	**0.62 (0.63)**	**B (B)**	**0.58 (0.61)**	**A (B)**	**0.73 (0.72)**	**C (C)**
March Road / Campeau Drive & Highway 417 Off-Ramp						
EBL	0.60 (0.43)	A (A)	0.56 (0.61)	A (B)	0.82 (0.97)	D (E)
EBR	0.71 (0.98)	C (E)	0.61 (0.59)	B (A)	0.92 (0.69)	E (B)
WBL	0.45 (0.59)	A (A)	0.42 (0.81)	A (D)	0.34 (0.81)	A (D)
WBT	0.63 (0.77)	B (C)	0.63 (0.53)	B (A)	0.67 (0.61)	B (B)
NBL	0.44 (0.66)	A (B)	0.35 (0.91)	A (E)	0.47 (0.98)	A (E)
NBT	0.64 (0.27)	B (A)	0.57 (0.28)	A (A)	0.63 (0.27)	B (A)
SBT	0.80 (0.97)	C (E)	0.83 (1.01)	D (F)	0.79 (1.00)	C (E)
SBR	0.01 (0.03)	A (A)	0.01 (0.03)	A (A)	0.06 (0.08)	A (A)
Overall	**0.72 (0.93)**	**C (E)**	**0.68 (0.92)**	**B (E)**	**0.81 (0.94)**	**D (E)**

Notes:
1. XX (XX) – Weekday Morning Peak Hour (Weekday Afternoon Peak Hour)

Campeau Drive / Terry Fox Drive

The Campeau Drive / Terry Fox Drive intersection operates under traffic signal control with cycle lengths of 110 seconds and 120 seconds during the weekday morning and afternoon peak hours, respectively. The existing cycle length and signal timings were maintained in the future scenarios.

Under existing traffic conditions, the intersection operates at acceptable level of service during the weekday morning and afternoon peak hours, with overall v/c ratios of 0.64 and 0.69, respectively.

Under future background with the allowances of specific area development, the intersection operates at acceptable level of service with overall v/c ratios of 0.59 and 0.66, respectively.

With the addition of site-related traffic under future total traffic conditions, the intersection operates at acceptable level of service with overall v/c ratios of 0.63 and 0.72, respectively.

Based on the foregoing, new site related traffic can be accommodated at the Campeau Drive / Terry Fox Drive signalized intersection. No mitigation measures or improvements are recommended at this intersection.

Campeau Drive / Herlihey Way

The Campeau Drive / Herlihey Way intersection operates under traffic signal control with cycle lengths of 110 seconds and 120 seconds during the weekday morning and afternoon peak hours, respectively. The existing cycle length and signal timings were maintained in the future scenarios.

Under existing traffic conditions, the intersection operates at acceptable level of service during the weekday morning and afternoon peak hours, with overall v/c ratios of 0.33 and 0.64, respectively.

Under future background with the allowances of specific area development, the intersection operates at acceptable level of service with overall v/c ratios of 0.30 and 0.56, respectively.

With the addition of site-related traffic under future total traffic conditions, the intersection operates at acceptable level of service with overall v/c ratios of 0.37 and 0.63, respectively.

Based on the foregoing, new site related traffic can be accommodated at the Campeau Drive / Herlihey Way signalized intersection. No mitigation measures or improvements are recommended at this intersection.

Campeau Drive / Kanata Avenue

The Campeau Drive / Kanata Avenue intersection operates under traffic signal control with cycle lengths of 110 seconds and 120 seconds during the weekday morning and afternoon peak hours, respectively. The existing cycle length and signal timings were maintained in the future scenarios.

Under existing traffic conditions, the intersection operates at acceptable level of service during the weekday morning and afternoon peak hours, with overall v/c ratios of 0.63 and 0.72, respectively.

Under future background with the allowances of specific area development, the intersection operates at acceptable level of service with overall v/c ratios of 0.63 and 0.72, respectively.

With the addition of site-related traffic under future total traffic conditions, the intersection operates at acceptable level of service with overall v/c ratios of 0.73 and 0.84, respectively.

Based on the foregoing, new site related traffic can be accommodated at the Campeau Drive / Kanata Avenue signalized intersection. No mitigation measures or improvements are recommended at this intersection.

Campeau Drive / Knudson Drive & Maritime Way

The Campeau Drive / Knudson Drive & Maritime Way intersection operates under traffic signal control with a cycle length of 91.7 seconds and 90 seconds during the weekday morning and afternoon peak hours, respectively. The existing cycle length and signal timings were maintained in the future scenarios.

Under existing traffic conditions, the intersection operates at acceptable level of service during the weekday morning and afternoon peak hours, with overall v/c ratios of 0.52 and 0.46, respectively.

Under future background with the allowances of specific area development, the intersection operates at acceptable level of service with overall v/c ratios of 0.50 and 0.43, respectively.

With the addition of site-related traffic under future total traffic conditions, the intersection operates at acceptable level of service with overall v/c ratios of 0.64 and 0.55.

Based on the foregoing, new site related traffic can be accommodated at the Campeau Drive / Knudson Drive & Maritime Way signalized intersection. No mitigation measures or improvements are recommended at this intersection.

Campeau Drive / Hawkstone Gate

The Campeau Drive / Hawkstone Gate intersection operates under traffic signal control with cycle lengths of 80 seconds and 90 seconds during the weekday morning and afternoon peak hours, respectively. The existing cycle length and signal timings were maintained in the future scenarios.

Under existing traffic conditions, the intersection operates at acceptable level of service during the weekday morning and afternoon peak hours, with overall v/c ratios of 0.50 and 0.51, respectively.

Under future background with the allowances of specific area development, the intersection operates at acceptable level of service with overall v/c ratios of 0.46 and 0.50, respectively.

With the addition of site-related traffic under future total traffic conditions, the intersection operates at acceptable level of service with overall v/c ratios of 0.63 and 0.61, respectively.

Based on the foregoing, new site related traffic can be accommodated at the Campeau Drive / Hawkstone Gate signalized intersection. No mitigation measures or improvements are recommended at this intersection.

Campeau Drive / Teron Road

The Campeau Drive / Teron Road intersection operates under traffic signal control with a cycle length of 132.7 seconds during the weekday morning and afternoon peak hours. The existing cycle length and signal timings were maintained in the future scenarios.

Under existing traffic conditions, the intersection operates at acceptable level of service during the weekday morning and afternoon peak hours, with overall v/c ratios of 0.62 and 0.63, respectively.

Under future background with the allowances of specific area development, the intersection operates at acceptable level of service with overall v/c ratios of 0.58 and 0.61, respectively.

With the addition of site-related traffic under future total traffic conditions, the intersection operates at acceptable level of service with overall v/c ratios of 0.73 and 0.72, respectively.

Based on the foregoing, new site related traffic can be accommodated at the Campeau Drive / Teron Road signalized intersection. No mitigation measures or improvements are recommended at this intersection.

Campeau Drive / March Road / Highway 417 Off-Ramp

The Campeau Drive / March Road / Highway 417 Off-Ramp intersection operates under traffic signal control with cycle lengths of 110 seconds and 150 seconds during the weekday morning and afternoon peak hours, respectively. For future scenarios signal timings were optimized within the bounds of the existing overall cycle lengths during the respective peak hour periods. It is also noted that adjustments were made to the capacity analysis for the Campeau Drive / March Road / Highway 417 intersection during the weekday afternoon peak hour for all analysis scenarios in order to calibrate the existing conditions analysis at this intersection. Adjustments include:

- an increased saturation flow rate of 1,900 pcphgpl;
- adjustment to the lane utilization factor for the southbound through movement; and
- the calculated peak hour factor observed from the existing conditions traffic count was utilized for the eastbound right and southbound through movements.

Under existing traffic conditions, the intersection operates at busy, but acceptable level of service during the weekday morning and afternoon peak hours, with overall v/c ratios of 0.72 and 0.93, respectively. In the afternoon peak hour, the eastbound right and southbound through movements are approaching capacity with individual v/c ratios of 0.98 and 0.97, respectively.

Under future background with the allowances of specific area development, the intersection operates at acceptable level of service with overall v/c ratios of 0.68 and 0.92, respectively. The background growth does result in significant increases to the v/c ratio for the westbound left movement and northbound left turn movement in the afternoon peak hour. The southbound through movement, which will continue to operate at or near capacity during the afternoon peak hour period, will also be impacted by background growth with its v/c ratio estimated to increase to 1.01 under future background conditions.

With the addition of site-related traffic under future total traffic conditions, site traffic impacts are generally small or can be accommodated with minor adjustments / optimization to the signal timing of the intersection. The intersection is forecast to operate at an acceptably overall with overall v/c ratios of 0.81 and 0.94, estimated for the weekday morning and weekday afternoon peak hours, respectively. In the afternoon peak hour the northbound left turn and southbound through movement will continue to operate at or near capacity with individual v/c ratios of 0.98 and 1.00, respectively. The site impact to these movements is small or negligible however.

Based on the foregoing, new site related traffic can be accommodated at the Campeau Drive / March Road / Highway 417 Off-Ramp signalized intersection. A minor signal timing optimization is recommended to accommodate forecast background growth and site traffic. No physical modifications to the intersection are required or recommended however.

ELEMENT 4.9.2.2 – UNSIGNALIZED INTERSECTIONS

A summary of the traffic analysis results for un-signalized intersections within the study area is provided in **Table 30**.

Based on the capacity analysis, the traffic operations at all unsignalized intersections within the study area can accommodate new site traffic and will operate at acceptable levels of service under future total traffic volumes without any need for road improvements or mitigation measures. All existing unsignalized movements in the study area are forecast to operate with good levels of service (LOS A-C) under future total conditions.

TABLE 30 UNSIGNALIZED INTERSECTIONS CAPACITY ANALYSIS RESULTS

Intersections / Key Movements	Existing Traffic Conditions		Future Background Traffic Conditions		Future Total Traffic Conditions	
	Delay (s)	LOS	Delay (s)	LOS	Delay (s)	LOS
Kanata Avenue / Knudson Drive						
WBLR	10.2 (12.1)	B (B)	10.4 (12.1)	B (B)	15.2 (18.3)	C (C)
NBTR	10.6 (11.5)	B (B)	11.9 (12.6)	B (B)	16.7 (21.3)	C (C)
SBL	9.4 (8.8)	A (A)	9.2 (8.8)	B (A)	11.1 (10.6)	B (B)
Knudson Drive / Shaughnessy Crescent (East)						
WBLT	0.4 (0.8)	A (A)	0.3 (0.8)	A (A)	0.2 (0.7)	A (A)
NBLR	11.1 (11.4)	B (B)	10.7 (11.0)	B (B)	11.4 (11.8)	B (B)
Knudson Drive / Shaughnessy Crescent (West)						
WBLT	0.3 (0.5)	A (A)	0.3 (0.5)	A (A)	0.2 (0.4)	A (A)
NBLR	11.7 (11.4)	B (B)	11.3 (11.0)	B (B)	12.2 (11.8)	B (B)
Knudson Drive / Sherk Crescent (North)						
EBLR	9.5 (9.7)	A (A)	9.4 (9.6)	A (A)	9.9 (10.1)	A (B)
NBLT	0.5 (0.9)	A (A)	0.4 (0.9)	A (A)	0.3 (0.7)	A (A)
Knudson Drive / Sherk Crescent (South)						
EBLR	9.7 (9.3)	A (A)	9.6 (9.2)	A (A)	10.1 (9.6)	B (A)
NBLT	1.4 (1.3)	A (A)	1.3 (1.3)	A (A)	0.8 (1.1)	A (A)
Knudson Drive / Weslock Way						
EBLT	11.7 (9.6)	B (A)	10.8 (9.2)	B (A)	13.6 (10.6)	B (B)
WBTR	8.0 (8.7)	A (A)	7.9 (8.4)	A (A)	9.1 (9.3)	A (A)
SBLR	9.0 (10.2)	A (B)	8.7 (9.5)	A (A)	11.2 (12.4)	B (B)

Table Continued on Next Page …

Intersections / Key Movements	Existing Traffic Conditions		Future Background Traffic Conditions		Future Total Traffic Conditions	
	Delay (s)	LOS	Delay (s)	LOS	Delay (s)	LOS
Weslock Way / Beaverbrook Road						
WBLR	10.8 (16.0)	B (C)	10.1 (13.6)	B (B)	14.0 (21.8)	B (C)
NBTR	10.5 (9.3)	B (A)	9.7 (8.9)	A (A)	14.0 (10.7)	B (B)
SBLT	11.4 (9.6)	B (A)	10.6 (9.2)	B (A)	12.9 (10.2)	B (B)
Campeau Drive / Park Ridge Place (West)						
WBLT	0.0 (0.2)	A (A)	0.0 (0.1)	A (A)	0.0 (0.1)	A (A)
NBLR	14.8 (15.4)	B (C)	13.9 (14.6)	B (B)	16.6 (18.5)	C (C)
Coulson Court / Robson Court						
EBLTR	2.4 (2.5)	A (A)	2.5 (2.5)	A (A)	2.5 (2.5)	A (A)
NBLTR	9.2 (9.5)	A (A)	9.2 (9.4)	A (A)	9.2 (9.4)	A (A)
SBLTR	0.0 (8.9)	A (A)	0.0 (8.8)	A (A)	0.0 (8.8)	A (A)
Robson Court / Evanshen Crescent						
EBLT	2.6 (3.2)	A (A)	2.4 (3.1)	A (A)	2.4 (3.1)	A (A)
SBLR	8.5 (8.4)	A (A)	8.5 (8.4)	A (A)	8.5 (8.4)	A (A)

Notes:
1. XX (XX) – Weekday Morning Peak Hour (Weekday Afternoon Peak Hour)

ELEMENT 4.9.2.3 – SENSITIVITY ANALYSIS

A sensitivity analysis was conducted by BA Group to assess the impacts of the March Road / Campeau Drive & Highway 417 signalized intersection with additional site-generated traffic added to the eastbound right-turn movement to access the Highway 417 EB On-Ramp Terminal. Based on the site distribution patterns outlined in **Table 17**, it is anticipated approximately 40% of site traffic will access the Highway 417 EB On-Ramp Terminal. The site-generated traffic has three route options to access Highway 417 from the site as outlined in the following:

- **Route Option 1**: Campeau Drive → March Road → Highway 417
- **Route Option 2**: Campeau Drive → Kanata Avenue → Highway 417
- **Route Option 3**: Campeau Drive → Terry Fox Drive → Highway 417

It is our understanding that route option 1 is the most direct and attractive route for residents of the site to utilize in the future. Notwithstanding, it is anticipated that a small portion of site-generated traffic will utilize route options 2 and 3 in the future as an alternative route to avoid traffic congestion (i.e. extended delays and long queues). Therefore, the following distribution for site-generated traffic accessing Highway 417 assigned to each route option has been summarized in **Table 31**.

TABLE 31 SITE DISTRIBUTION PATTERN ACCESSING HIGHWAY 417 EASTBOUND

Route Options	AM Peak Hour		PM Peak Hour	
	Distribution	Trips	Distribution	Trips
Route 1	30%	135	30%	95
Route 2	5%	20	5%	15
Route 3	5%	20	5%	15
Total	**40%**	**175**	**40%**	**125**

A summary of the traffic analysis results for the March Road / Campeau Drive & Highway 417 signalized intersection is provided in **Table 32**.

With the redistribution of site-generated traffic under future total traffic conditions, site traffic impacts are generally small or can be accommodated with minor adjustments / optimization to the signal timing of the intersection. The intersection is forecast to operate acceptably with overall v/c ratios of 0.81 and 0.94, estimated for the weekday morning and weekday afternoon peak hours, respectively. In the afternoon peak hour the northbound left turn and southbound through movement will continue to operate at or near capacity with individual v/c ratios of 0.98 and 1.00, respectively. The site impact to these movements is small or negligible however.

Based on the foregoing, new site-generated traffic can be accommodated at the Campeau Drive / March Road / Highway 417 Off-Ramp signalized intersection. A minor signal timing optimization is recommended to accommodate forecast background growth and site traffic. No physical modifications to the intersection are required or recommended however.

TABLE 32 MARCH ROAD / CAMPEAU DRIVE & HIGHWAY 417 CAPACITY ANALYSIS RESULTS

Intersections / Key Movements	Existing Traffic Conditions		Future Background Traffic Conditions		Future Total Traffic Conditions	
	v/c	LOS	v/c	LOS	v/c	LOS
EBL	0.60 (0.43)	A (A)	0.56 (0.61)	A (B)	0.79 (0.90)	C (D)
EBR	0.71 (0.98)	C (E)	0.61 (0.59)	B (A)	0.91 (0.72)	E (C)
WBL	0.45 (0.59)	A (A)	0.42 (0.81)	A (D)	0.36 (0.81)	A (D)
WBT	0.63 (0.77)	B (C)	0.63 (0.53)	B (A)	0.66 (0.60)	B (A)
NBL	0.44 (0.66)	A (B)	0.35 (0.91)	A (E)	0.44 (0.98)	A (E)
NBT	0.64 (0.27)	B (A)	0.57 (0.28)	A (A)	0.62 (0.27)	B (A)
SBT	0.80 (0.97)	C (E)	0.83 (1.01)	D (F)	0.79 (1.00)	C (E)
SBR	0.01 (0.03)	A (A)	0.01 (0.03)	A (A)	0.05 (0.07)	A (A)
Overall	**0.72 (0.93)**	**C (E)**	**0.68 (0.92)**	**B (E)**	**0.81 (0.94)**	**D (E)**

Notes:
1. XX (XX) – Weekday Morning Peak Hour (Weekday Afternoon Peak Hour)

STEP 5: TRANSPORTATION IMPACT ASSESSMENT SUBMISSION

DRAWINGS

City of Ottawa Road Modification Approval (RMA) report drawings are not required for the proposed development as the project will not require any changes to the geometric layout of any existing streets to accommodate site traffic. Transportation improvements required to accommodate site traffic consist of adjustments to existing pavement markings on Campeau Drive and new traffic control signage (i.e. stop signs) at proposed new intersections.

RECOMMENDATIONS

This TIA report does not identify issues that need to be resolved or deferred and therefore, does not recommend mitigation actions.

MONITORING PLAN

A Monitoring Plan is not required as part of this application because the development is not proposing to defer any required transportation improvements and is not relying on any planned future road infrastructure that is not yet in place. Therefore monitoring of build-out impacts and potential mitigation actions in lieu of the planned infrastructure is not required.

APPENDIX A:
Step 1 – TIA Screening Form

City of Ottawa 2017 TIA Guidelines Screening Form

1. Description of Proposed Development

Municipal Address	7000 Campeau Dr, Kanata, ON K2T 0A3
Description of Location	Kanata Golf & Country Club
Land Use Classification	Residential & Park / Open Space
Development Size (units)	Approximately 1,500 - 2,000 residential units
Development Size (m^2)	Approximately 700,000 sq. m. total GFA
Number of Accesses and Locations	Total of 8 - Beaverbrook Road (2), Weslock Way (1), Knudson Drive (2), Campeau Drive (3)
Phase of Development	Multiple phases (to be confirmed)
Buildout Year	2024

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

2. Trip Generation Trigger

Considering the Development's Land Use type and Size (as filled out in the previous section), please refer to the Trip Generation Trigger checks below.

Land Use Type	Minimum Development Size
Single-family homes	>40 units (trigger)
Townhomes or apartments	>90 units (trigger)
~~Office~~	
~~Industrial~~	
~~Fast-food restaurant or coffee shop~~	
~~Destination retail~~	
~~Gas station or convenience market~~	

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

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

3. Location Triggers

	Yes	No
Does the development propose a new driveway to a boundary street that is designated as part of the City's Transit Priority, Rapid Transit or Spine Bicycle Networks?	Yes - Campeau Drive is a Spine Cycling route	
Is the development in a Design Priority Area (DPA) or Transit-oriented Development (TOD) zone?*		No - however, it is located adjacent to Kanata Town Centre

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

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

4. Safety Triggers

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

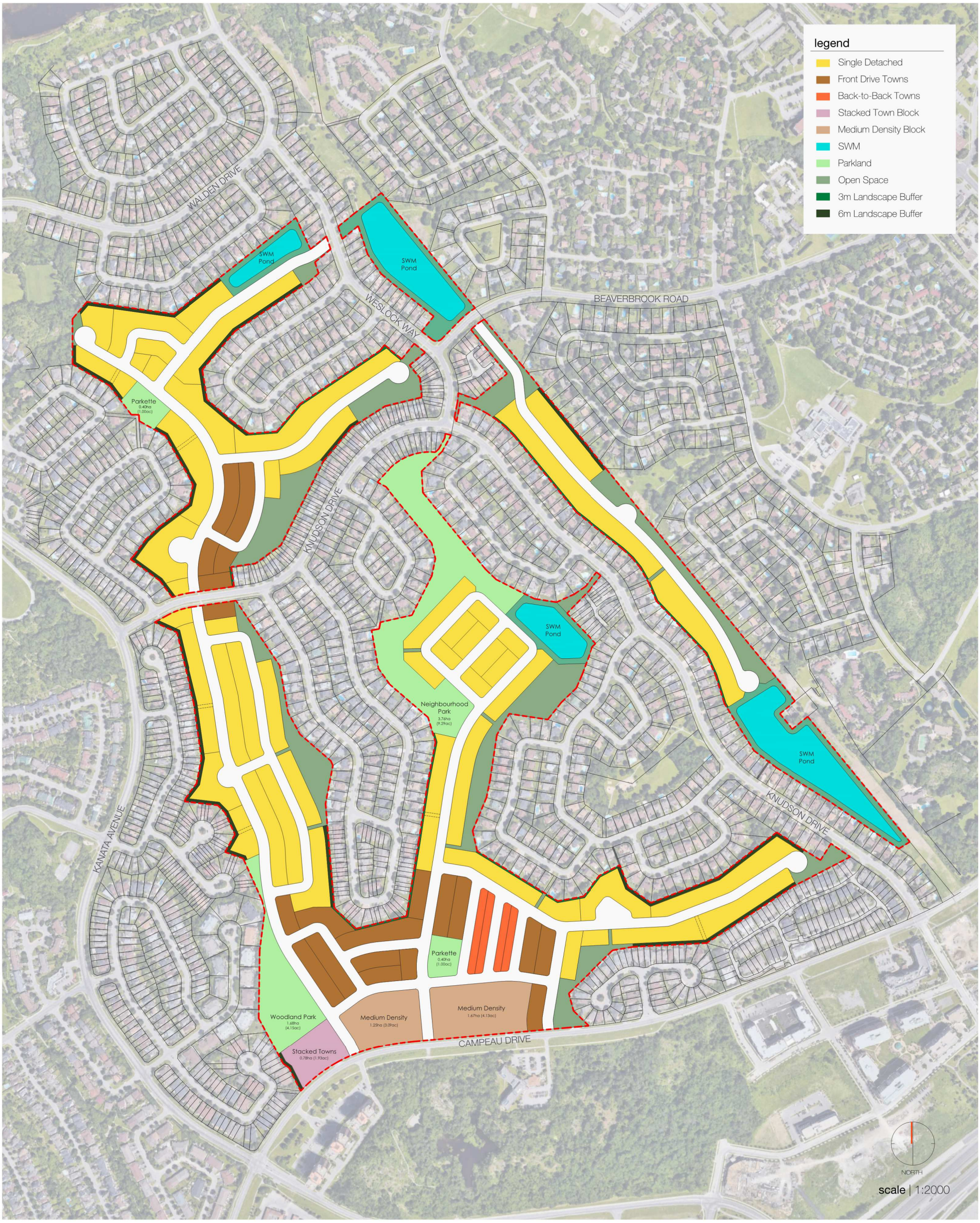
If any of the above questions were answered with 'Yes,' the Safety Trigger is satisfied.

5. Summary

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

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

APPENDIX B:
Concept Plan



CLUBLINK CORPORATION ULC

minto Communities

RICHCRAFT™ Group of Companies

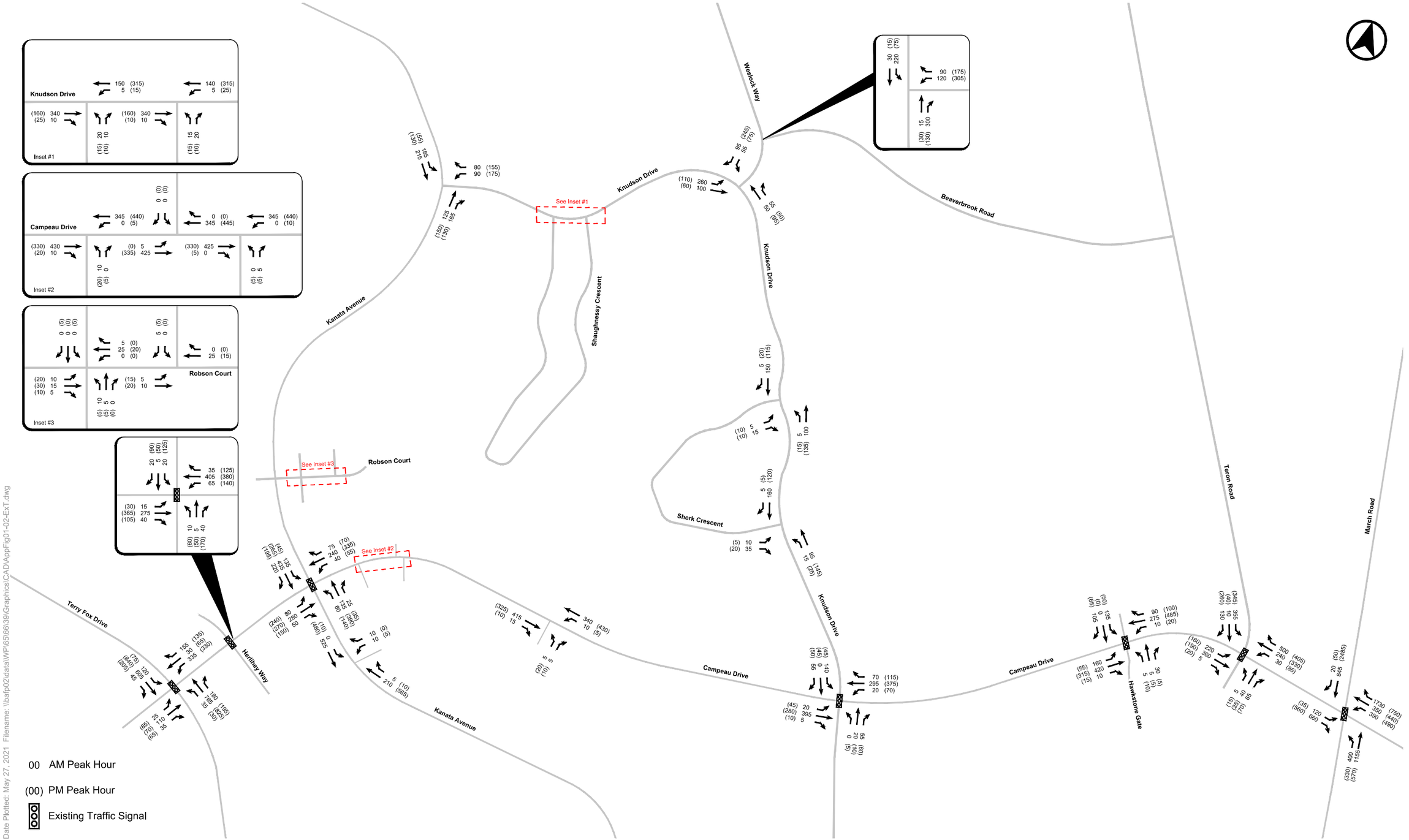
MINTO | 7000 Campeau Dr

revised concept plan

25 February 2021

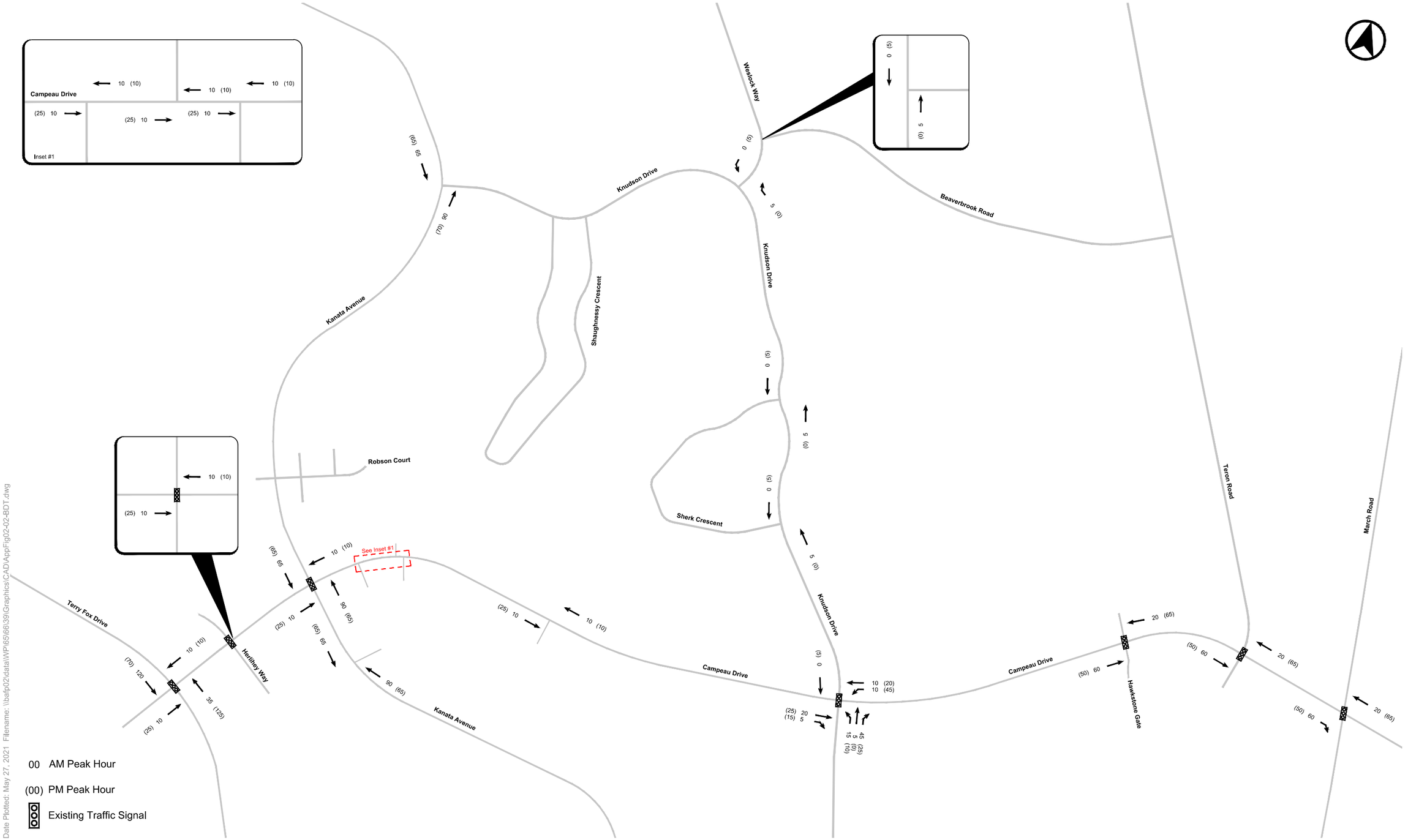
NAK design strategies

APPENDIX C:
Traffic Volume Figures



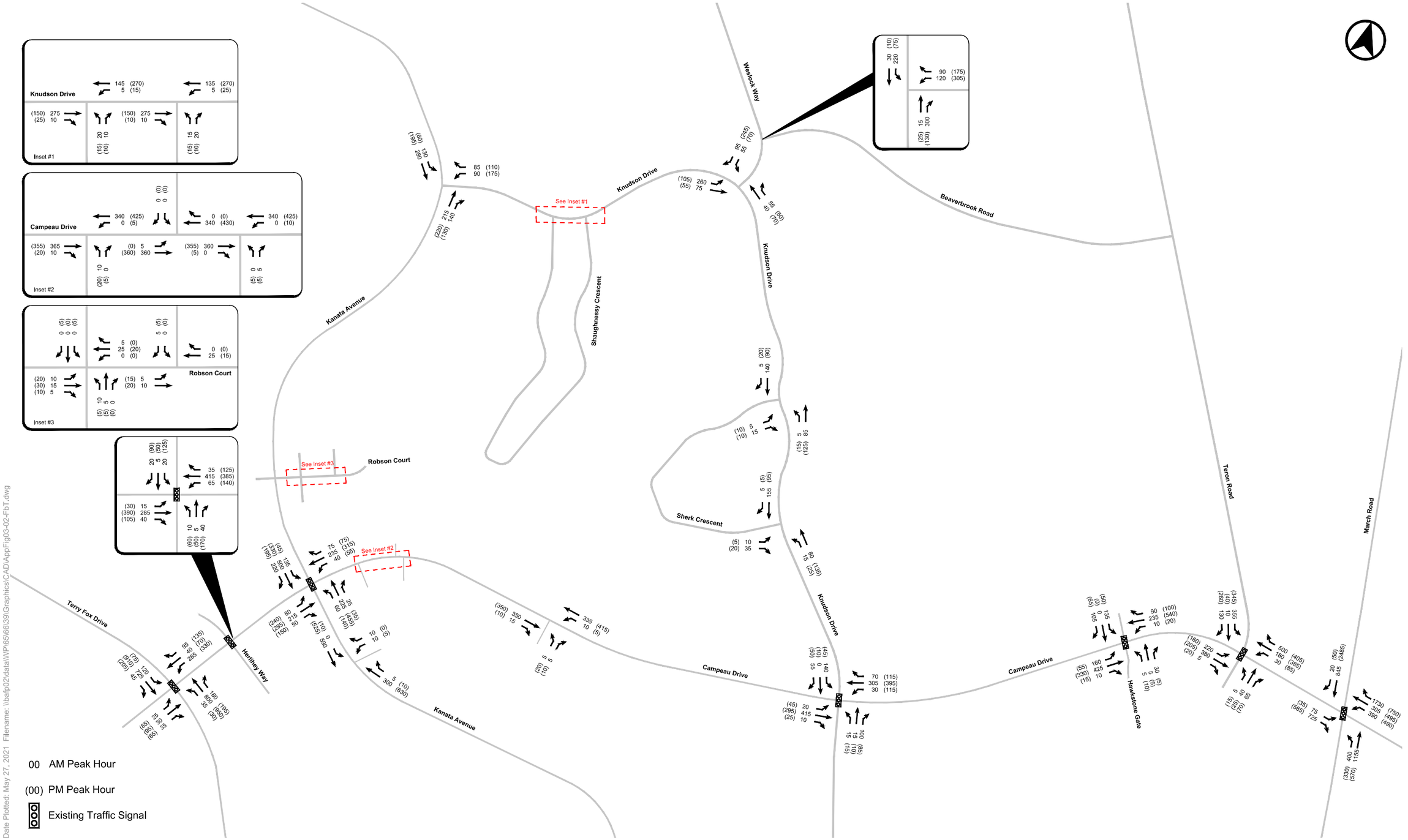
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APPENDIX C FIGURE 1 EXISTING TRAFFIC VOLUMES

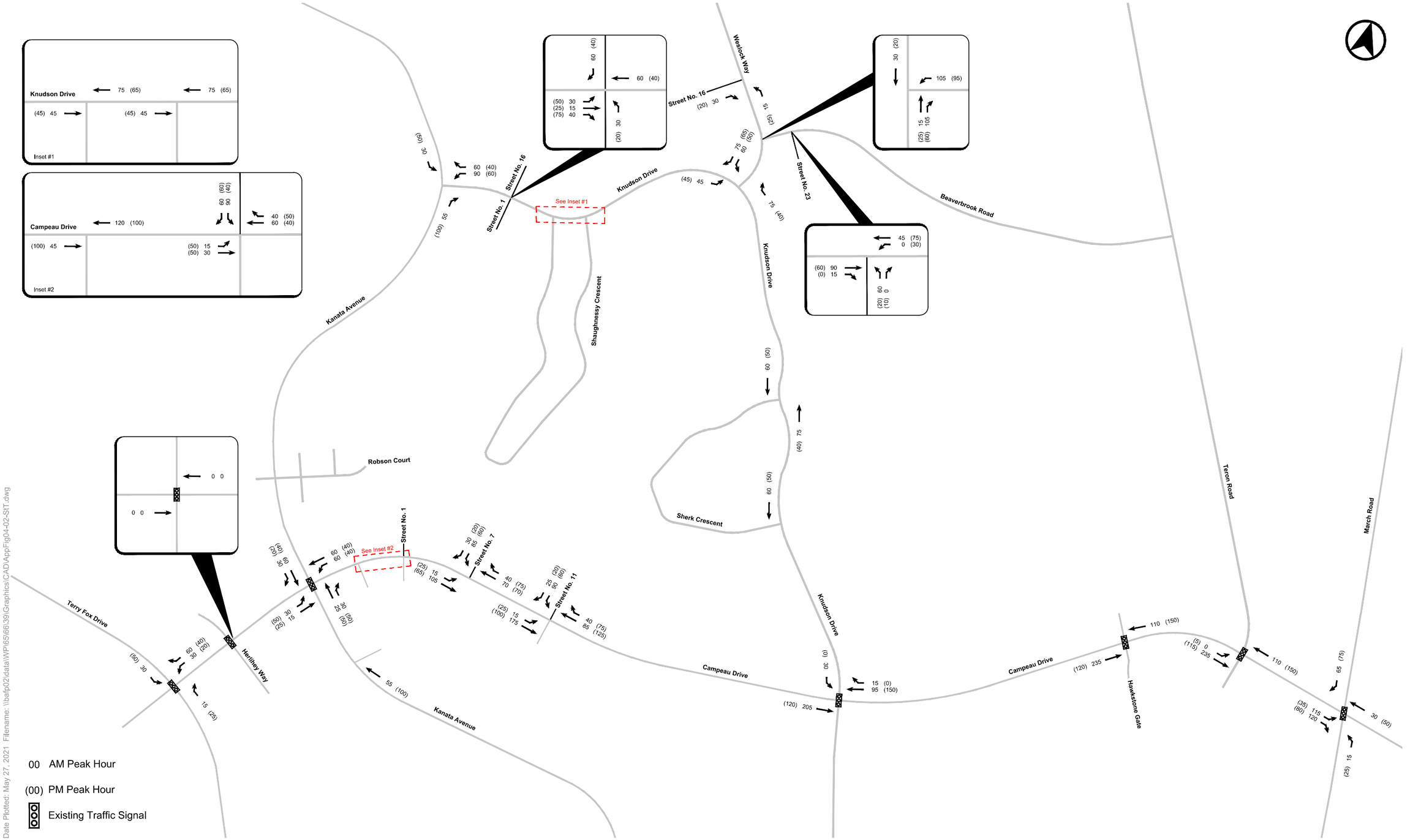


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APPENDIX C FIGURE 2 BACKGROUND DEVELOPMENTS TRAFFIC VOLUMES

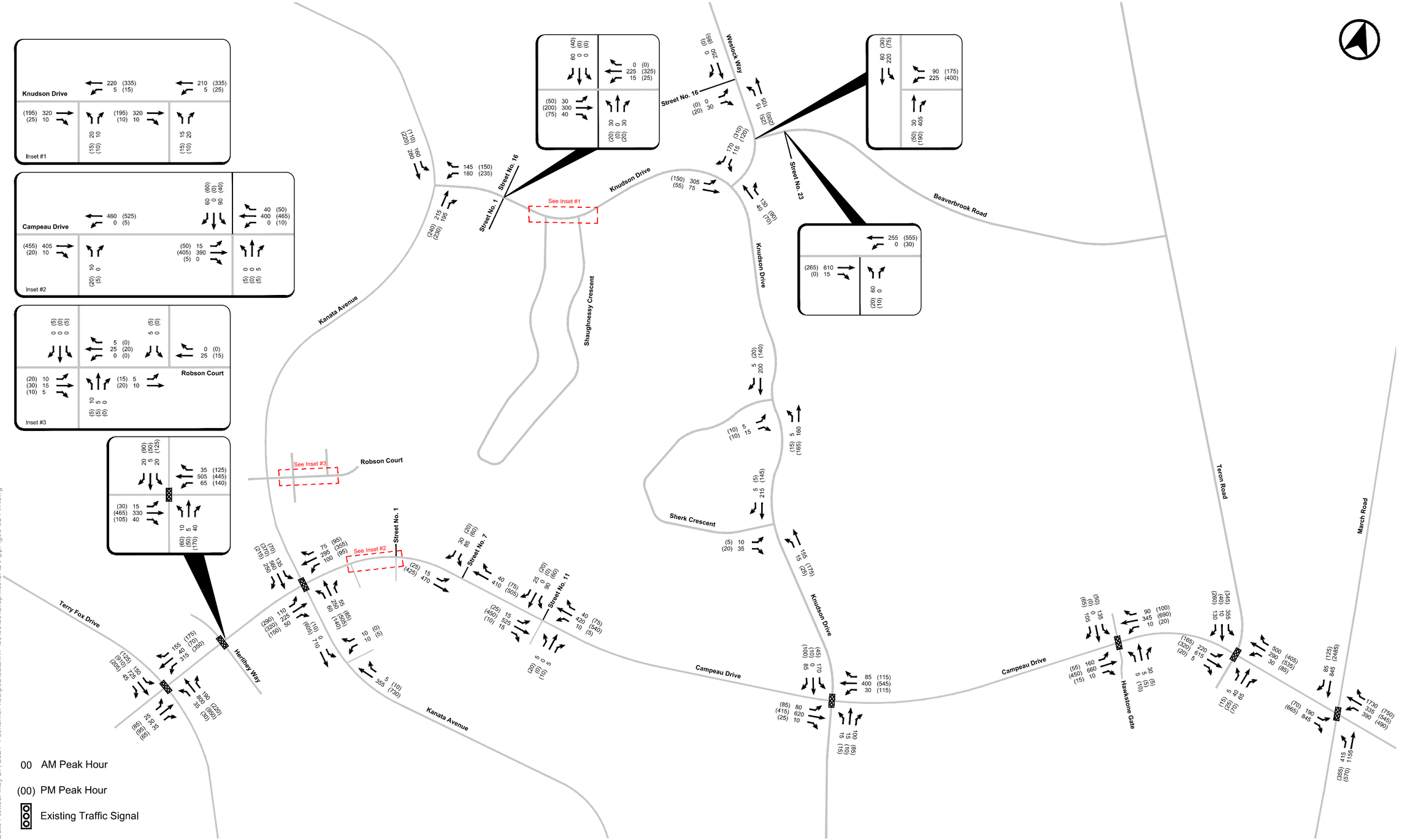


APPENDIX C FIGURE 3 FUTURE BACKGROUND TRAFFIC VOLUMES



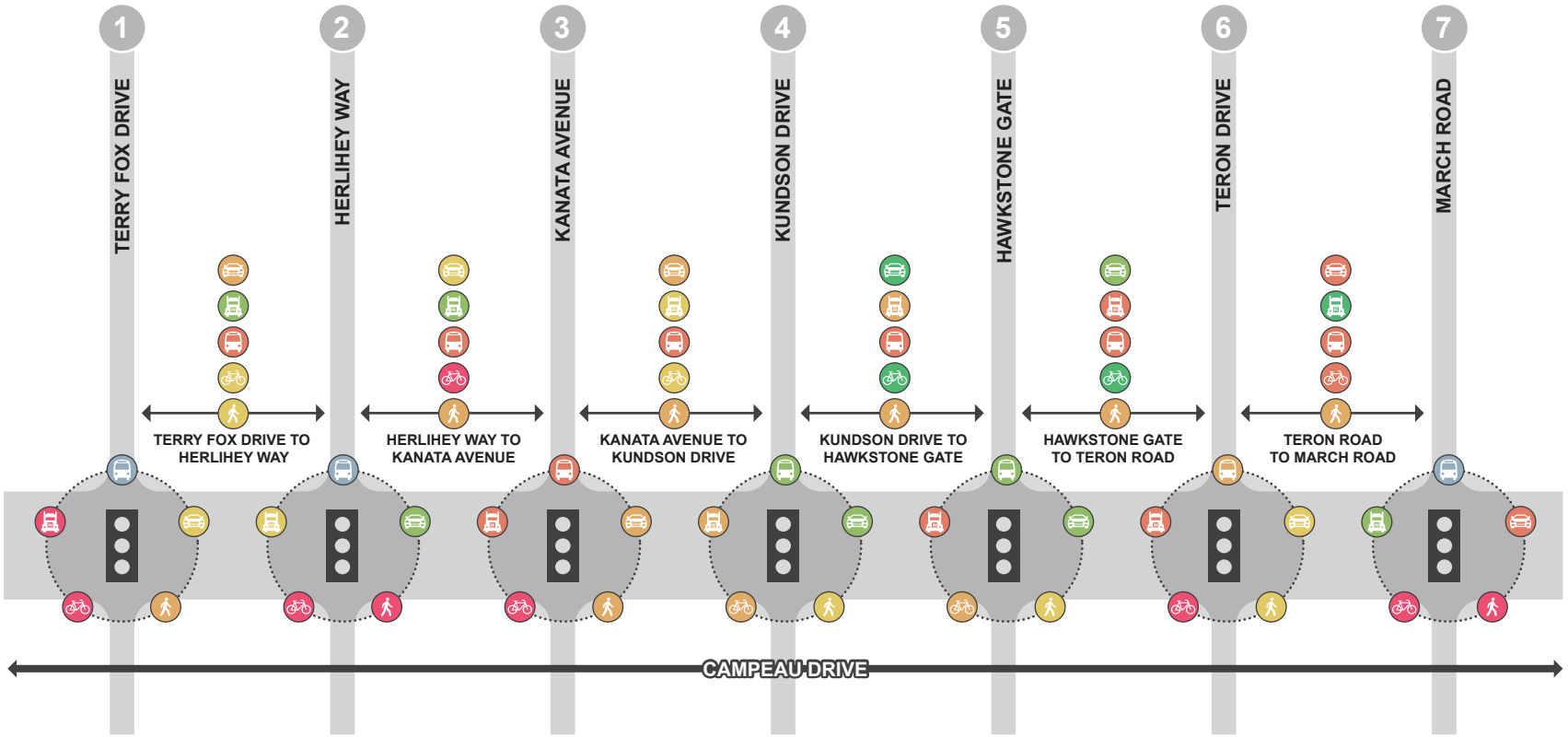
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APPENDIX C FIGURE 4 SITE TRAFFIC VOLUMES



APPENDIX C FIGURE 5 FUTURE TOTAL TRAFFIC VOLUMES

APPENDIX D:
Multi-Modal Level of Service (MMLOS) Assessment



LEGEND

Travel mode

Pedestrian | Cyclist | Transit | Truck | Auto

Level of Service (LOS)

A | B | C | D | E | F | N/A



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APPENDIX FIGURE 00 MULTI-MODAL LEVEL OF SERVICE ASSESSMENT

BA GROUP INTERSECTION MMLOS ANALYSIS - September 26th 2019

	INTERSECTIONS	Campeau Dr / Terry Fox Dr				Campeau Dr / Herlihey Wy				Campeau Dr / Kanata Ave				Campeau Dr / Knudson Dr & Maritime Way				Campeau Dr / Hawkstone Gate & Ottawa Public Library				Campeau Dr / Teron Rd				Campeau Dr / March Rd			
		NORTH	SOUTH	EAST	WEST	NORTH	SOUTH	EAST	WEST	NORTH	SOUTH	EAST	WEST	NORTH	SOUTH	EAST	WEST	NORTH	SOUTH	EAST	WEST	NORTH	SOUTH	EAST	WEST	NORTH	SOUTH	EAST	WEST
Pedestrian	Lanes	3	3	6	5	4	3	3	4	3	3	4	4	3	3	3	3	3	3	3	3	3	2	3	3	6	7	4	5
	Median	No	Yes	No	No	No	No	Yes	No	No	No	No	No	No	No	No	No	No	No	No	No	No	Yes	No	No	Yes	No	Yes	No
	Island Refuge	Yes	Yes	Yes	Yes	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	Yes	Yes	Yes	Yes	Yes	No	Yes	Yes
	Conflicting Left Turns	Protected/ Permissive	Protected/ Permissive	Permissive	Permissive	Permissive	Permissive	Protected/ Permissive	Protected/ Permissive	Permissive	Protected/ Permissive	Protected/ Permissive	Protected/ Permissive	Permissive	Permissive	Protected/ Permissive	Permissive	Permissive	Permissive	Protected/ Permissive	Permissive	Permissive	Permissive	Protected/ Permissive	Permissive	Permissive	Protected/ Permissive	Protected/ Permissive	Protected/ Permissive
	Conflicting Right Turns	Permissive	Permissive	Permissive	Permissive	Permissive	Permissive	Permissive	Permissive	Permissive	Permissive	Permissive	Permissive	Permissive	Permissive	Permissive	Permissive	Permissive	Permissive	Permissive	Permissive	Permissive	Permissive	Permissive	Permissive	Permissive	No right turn	Permissive	Permissive
	RTOR?	Allowed	Allowed	Allowed	Allowed	Allowed	Allowed	Allowed	Allowed	Allowed	Allowed	Allowed	Allowed	Allowed	Allowed	Allowed	Allowed	Allowed	Allowed	Allowed	Allowed	Allowed	Allowed	Allowed	Allowed	Allowed	Prohibited	Allowed	Prohibited
	Ped Leading Interval?	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No
	Corner Radius (largest)	Conventional Right turn channel*	Conventional Right turn channel*	> 15m to 25m	Conventional Right turn channel*	> 15m to 25m	> 15m to 25m	> 15m to 25m	> 15m to 25m	> 15m to 25m	> 15m to 25m	> 15m to 25m	> 15m to 25m	>10m to 15m	> 15m to 25m	> 15m to 25m	> 15m to 25m	> 15m to 25m	> 15m to 25m	>10m to 15m	>10m to 15m	Conventional Right turn channel*	Conventional Right turn channel*	Conventional Right turn channel*	> 15m to 25m	>10m to 15m	No right turn	Right turn channel with receiving	Conventional Right turn channel*
	Crosswalk Type	Standard	Standard	Standard	Standard	Standard	Standard	Standard	Standard	Standard	Standard	Standard	Standard	Standard	Standard	Standard	Standard	Standard	Standard	Standard	Standard	Standard	Standard	Standard	Standard	Standard		Standard	Standard
	Level of Service	**B (79)**	**B (80)**	**F (22)**	**D (47)**	**D (51)**	**C (68)**	**C (68)**	**D (51)**	**C (68)**	**C (68)**	**D (51)**	**D (51)**	**C (70)**	**C (70)**	**C (68)**	**C (68)**	**C (68)**	**C (68)**	**C (70)**	**C (70)**	**B (80)**	**A (95)**	**B (80)**	**C (72)**	**F (29)**	**F (<25)**	**C (62)**	**D (50)**
		F				**D**				**D**				**C**				**C**				**C**				**F**			
Cyclist	Type of Bikeway	Pocket Bike Lane	Mixed Traffic	Pocket Bike Lane	Pocket Bike Lane	Pocket Bike Lane	Bike Lane	Mixed Traffic	Mixed Traffic	Mixed Traffic	Mixed Traffic	Pocket Bike Lane	Mixed Traffic	Higher Order Facility	Mixed Traffic	Higher Order Facility	Higher Order Facility	Mixed Traffic	Mixed Traffic	Higher Order Facility	Higher Order Facility	Mixed Traffic	Mixed Traffic	Mixed Traffic	Mixed Traffic	Mixed Traffic	Mixed Traffic	Mixed Traffic	Mixed Traffic
	Turning Speed (25km to 80km/h)								<25 km/hr																				
	Right Turn Storage Length	> 50m	>50m	>50m	>50m	>50m			<50m			>50m	>50m									> 50m	>50m	>50m	>50m	>50m		>50m	>50m
	Dual Right Turn?	No	No	No	No	No		No	No	No	No	No	No		No			No	No			No	No	No	No	No		No	Yes
	Shared Through-Right?	No	No	No	No	No		Yes	No	Yes	Yes	No	No		Yes			Yes	Yes			No	No	No	Yes	No		No	No
	Bike Box?	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No
	Number of Lanes Crossed for Left Turns	1	1	2	2	1	1	1	1	2	1	1	1	Two-stage	1	1	1	1	1	1	1	1	1	2	2		3	3	2
	Operating Speed on Approach	60 km/hr	60 km/hr	70 km/hr	70 km/hr	60 km/hr	60 km/hr	>40 km/hr	>40 km/hr	60 km/hr	60 km/hr	50 km/ hr	50 km/hr	40 km/hr	40 km/hr	60 km/hr	60 km/hr	<40 km/hr	40 km/hr	60 km/hr	60 km/hr	50 km/hr	40 km/hr	60 km/hr	60 km/hr	>60 km/hr	>60 km/hr	> 60 km/hr	60 km/hr
	Dual Left Turn Lanes?	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	Yes	Yes	No
	Level of Service	**E**	**F**	**F**	**F**	**E**	**E**	**F**	**D**	**F**	**F**	**D**	**F**	**A**	**D****	**A**	**A**	**A**	**D****	**A**	**A**	**F**	**F**	**F**	**F**	**F**	**F**	**F**	**F**
		F				**F**				**F**				**D**				**D**				**F**				**F**			
Transit	Average Signal Delay																												
	Level of Service									**E**	**D**					**B**	**B**			**B**	**A**			**D**	**B**			**N/A**	
		N/A				**N/A**				**E**				**B**				**B**				**D**				**N/A**			
Truck	Turning Radius (smallest)	> 15m	> 15m	> 15m	> 15m	10 to 15m	< 10m	< 10m	10 to 15m	> 15m	10 to 15m	10 to 15m	> 15m	10 to 15m	10 to 15m	10 to 15m	10 to 15m	10 to 15m	10 to 15m	10 to 15m	10 to 15m	> 15m	> 15m	10 to 15m	> 15m	10 to 15m		> 15m	> 15m
	Number of Receiving Lanes	1	1	2+	2+	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	2+	2+	2+		2+
	Level of Service	**C**	**C**	**A**	**A**	**E**	**F**	**F**	**E**	**C**	**E**	**E**	**C**	**E**	**E**	**E**	**E**	**E**	**E**	**E**	**E**	**C**	**C**	**E**	**A**	**B**	**N/A**	**N/A**	**A**
		C				**F**				**E**				**E**				**E**				**E**				**B**			
Auto	**Level of Service**	**C**				**B**				**D**				**B**				**B**				**C**				**E**			

*Observed condition appears to be a conventional right turn channel; not provided as an option, 0 points awarded

**Observed condition is unique; cyclists will not turn right directly onto Campeau Drive given availability of protected, bi-directional multi-use trail on the north side of Campeau Drive.

BA GROUP SEGMENT LOS - September 26, 2019

	SEGMENTS	Campeau Dr from Terry Fox Dr to Herlihey Way	Campeau Dr from to Herlihey Way to Kanata Ave	Campeau Dr from to Kanata Ave to Knudson Dr/ Maritime Way			Campeau Dr from Knudson Dr/ Maritime Way to Hawkstone Gate				Campeau Dr from Hawkstone Gate to Teron Rd	Campeau Dr Teron Rd to March Rd
		Section	Section	Section			Section				Section	Section
		1	1	1	2	3	1	2	3	4	1	1
				Kanata Ave to Stonecroft Terrace	Stonecroft Terrace to Cordillera St	Cordillera St to Knudson Dr/ Maritime Way	Knudson Dr/ Maritime Way to Drysdale St	Drysdale St to Dunn St	Dunn St to Bellrock Dr	Bellrock Dr to Hawkstone Gate		
Pedestrian	Sidewalk Width (m)	2.0 m or more	1.8	1.8	1.8	2.0 m or more	2.0 m or more				2.0 m or more	2.0 m or more
	Boulevard Width (m)	>2	>2	>2	>2	>2	0	0	>2	>2	>2	>2
	AADT	More than 3000	More than 3000	More than 3000	More than 3000	More than 3000	More than 3000	More than 3000	More than 3000	More than 3000	More than 3000	More than 3000
	On-Street Parking	No	No	No			No				No	No
	Operating Speed (km/hr)	50 to 60	50 to 60	50 to 60			50 to 60				50 to 60	50 to 60
	Level of Service	**C**	**D**	**D**	**D**	**D**	**E**	**E**	**C**	**C**	**D**	**D**
				D			**D**					
Cyclist	Number of Travel Lanes (per direction)	1	1	1			1				1	2
	Type of Bikeway	Bike Lanes	Mixed Traffic	Bike Lanes			Physically separated bikeway				Physically separated bikeway	Mixed Traffic
	Bike Lane Width (m)	>= 1.8		>= 1.8			>= 1.8			>=1.5 to <1.8	>= 1.5 to <1.8	
	Operating Speed	60 km/hr	60 km/hr	60 km/hr			60 km/hr				60 km/hr	60 km/hr
	Bike Lane Blockages											
	Unsignalized Lane Crossings (no median)			2			2			2		2
	Unsignalized Lane Crossings (median >1.8m)							2				
	Sidestreet Operating Speed			40 km/hr			40 km/hr					> 40 km/hr
	Level of Service	**C**	**F**	**C**			**A**	**A**	**A**	**A**	**A**	**E**
		C	**F**	**C**			**A**				**A**	**E**
Transit	Facility Type	Mixed Traffic	Mixed Traffic	Mixed Traffic			Mixed Traffic				Mixed Traffic	Mixed Traffic
	Friction / Congestion / Incident Potential	Vt/Vp < 0.6	Vt/Vp < 0.6	Vt/Vp < 0.6			Vt/Vp < 0.6				Vt/Vp < 0.6	Vt/Vp < 0.6
	Level of Service	**E**	**E**	**E**			**E**				**E**	**E**
		E	**E**	**E**			**E**				**E**	**E**
Truck	Lane Width (m)	> 3.7	> 3.7	<= 3.5			> 3.7	<= 3.5	<= 3.3		<= 3.2	> 3.7
	Travel Lanes per Direction	<= 2	<= 2	<= 2			<= 2				<= 2	>2
	Level of Service	**B**	**B**	**C**			**B**	**C**	**D**		**E**	**A**
		B	**B**	**C**			**D**				**E**	**A**
Auto	**Level of Service**	**D**	**C**	**D**			**A**				**B**	**E**

APPENDIX E:
Synchro Capacity Analysis Worksheets

Queues
1: Terry Fox Drive & Campeau Drive

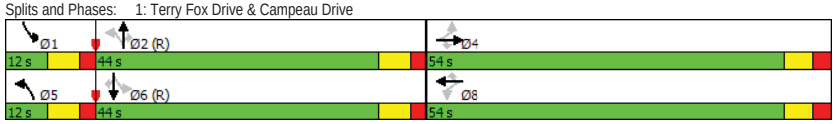
Existing AM Peak Hour

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	25	20	35	285	30	95	35	765	180	120	605	45
Future Volume (vph)	25	20	35	285	30	95	35	765	180	120	605	45
Lane Group Flow (vph)	28	22	39	317	33	106	39	850	200	133	672	50
Turn Type	Perm	NA	Perm	Perm	NA	Perm	pm+pt	NA	Perm	pm+pt	NA	Perm
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4		4	8		8	2		2	6		6
Detector Phase	4	4	4	8	8	8	5	2	2	1	6	6
Switch Phase												
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Minimum Split (s)	43.4	43.4	43.4	43.4	43.4	43.4	11.4	40.4	40.4	11.4	40.4	40.4
Total Split (s)	54.0	54.0	54.0	54.0	54.0	54.0	12.0	44.0	44.0	12.0	44.0	44.0
Total Split (%)	49.1%	49.1%	49.1%	49.1%	49.1%	49.1%	10.9%	40.0%	40.0%	10.9%	40.0%	40.0%
Yellow Time (s)	3.7	3.7	3.7	3.7	3.7	3.7	4.2	4.2	4.2	4.2	4.2	4.2
All-Red Time (s)	2.7	2.7	2.7	2.7	2.7	2.7	2.2	2.2	2.2	2.2	2.2	2.2
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4
Lead/Lag							Lead	Lag	Lag	Lead	Lag	Lag
Lead-Lag Optimize?							Yes	Yes	Yes	Yes	Yes	Yes
Recall Mode	None	None	None	None	None	None	None	C-Min	C-Min	None	C-Min	C-Min
v/c Ratio	0.07	0.04	0.07	0.81	0.06	0.20	0.10	0.56	0.25	0.40	0.38	0.06
Control Delay	24.5	23.8	0.3	44.7	19.2	6.0	13.3	26.3	5.1	16.0	20.2	0.6
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	24.5	23.8	0.3	44.7	19.2	6.0	13.3	26.3	5.1	16.0	20.2	0.6
Queue Length 50th (m)	4.6	3.5	0.0	56.5	5.3	1.7	3.5	73.9	1.4	12.7	51.2	0.0
Queue Length 95th (m)	9.9	8.2	0.0	64.1	6.1	7.1	10.4	112.1	17.7	28.1	82.9	1.2
Internal Link Dist (m)		139.7			148.2			149.3			180.0	
Turn Bay Length (m)	70.0			75.0			50.0		60.0	105.0		
Base Capacity (vph)	573	778	717	572	778	722	405	1508	786	330	1752	831
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	0.05	0.03	0.05	0.55	0.04	0.15	0.10	0.56	0.25	0.40	0.38	0.06

Intersection Summary

Cycle Length: 110
Actuated Cycle Length: 110
Offset: 27 (25%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green
Natural Cycle: 100
Control Type: Actuated-Coordinated

Splits and Phases: 1: Terry Fox Drive & Campeau Drive



HCM Signalized Intersection Capacity Analysis
1: Terry Fox Drive & Campeau Drive

Existing AM Peak Hour

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	25	20	35	285	30	95	35	765	180	120	605	45
Future Volume (vph)	25	20	35	285	30	95	35	765	180	120	605	45
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Total Lost time (s)	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	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)	1710	1800	1530	1693	1800	1530	1710	3386	1530	1693	3420	1530
Flt Permitted	0.74	1.00	1.00	0.74	1.00	1.00	0.38	1.00	1.00	0.22	1.00	1.00
Satd. Flow (perm)	1324	1800	1530	1324	1800	1530	676	3386	1530	388	3420	1530
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	28	22	39	317	33	106	39	850	200	133	672	50
RTOR Reduction (vph)	0	0	27	0	0	75	0	0	105	0	0	26
Lane Group Flow (vph)	28	22	12	317	33	31	39	850	95	133	672	24
Heavy Vehicles (%)	0%	0%	0%	1%	0%	0%	0%	1%	0%	1%	0%	0%
Turn Type	Perm	NA	Perm	Perm	NA	Perm	pm+pt	NA	Perm	pm+pt	NA	Perm
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4		4	8		8	2		2	6		6
Actuated Green, G (s)	32.6	32.6	32.6	32.6	32.6	32.6	53.4	49.0	49.0	63.0	53.8	53.8
Effective Green, g (s)	32.6	32.6	32.6	32.6	32.6	32.6	53.4	49.0	49.0	63.0	53.8	53.8
Actuated g/C Ratio	0.30	0.30	0.30	0.30	0.30	0.30	0.49	0.45	0.45	0.57	0.49	0.49
Clearance Time (s)	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4
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)	392	533	453	392	533	453	369	1508	681	331	1672	748
v/s Ratio Prot		0.01			0.02		0.00	c0.25		c0.03	c0.20	
v/s Ratio Perm	0.02		0.01	c0.24		0.02	0.05		0.06	0.20		0.02
v/c Ratio	0.07	0.04	0.03	0.81	0.06	0.07	0.11	0.56	0.14	0.40	0.40	0.03
Uniform Delay, d1	27.8	27.6	27.4	35.8	27.7	27.8	14.9	22.6	18.0	12.9	17.9	14.6
Progression Factor	1.00	1.00	1.00	0.83	0.79	1.16	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	0.1	0.0	0.0	11.3	0.0	0.1	0.1	1.5	0.4	0.8	0.7	0.1
Delay (s)	27.9	27.6	27.5	41.0	21.8	32.4	15.1	24.1	18.5	13.7	18.6	14.7
Level of Service	C	C	C	D	C	C	B	C	B	B	B	B
Approach Delay (s)		27.6			37.6			22.8			17.6	
Approach LOS		C			D			C			B	

Intersection Summary

HCM 2000 Control Delay	23.9	HCM 2000 Level of Service	C		
HCM 2000 Volume to Capacity ratio	0.64				
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	19.2		
Intersection Capacity Utilization	68.7%	ICU Level of Service	C		
Analysis Period (min)	15				

c Critical Lane Group

Queues
2: Kanata Avenue & Campeau Drive

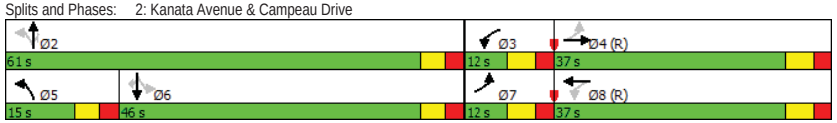
Existing AM Peak Hour

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations										
Traffic Volume (vph)	80	205	40	225	60	135	25	135	435	220
Future Volume (vph)	80	205	40	225	60	135	25	135	435	220
Lane Group Flow (vph)	89	284	44	333	67	150	28	150	483	244
Turn Type	pm+pt	NA	pm+pt	NA	pm+pt	NA	Perm	Perm	NA	Perm
Protected Phases	7	4	3	8	5	2			6	
Permitted Phases	4		8		2		2	6		6
Detector Phase	7	4	3	8	5	2	2	6	6	6
Switch Phase										
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Minimum Split (s)	11.2	36.2	11.2	36.2	10.9	29.9	29.9	29.9	29.9	29.9
Total Split (s)	12.0	37.0	12.0	37.0	15.0	61.0	61.0	46.0	46.0	46.0
Total Split (%)	10.9%	33.6%	10.9%	33.6%	13.6%	55.5%	55.5%	41.8%	41.8%	41.8%
Yellow Time (s)	3.7	3.7	3.7	3.7	3.3	3.3	3.3	3.3	3.3	3.3
All-Red Time (s)	2.5	2.5	2.5	2.5	2.6	2.6	2.6	2.6	2.6	2.6
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	6.2	6.2	6.2	6.2	5.9	5.9	5.9	5.9	5.9	5.9
Lead/Lag	Lead	Lag	Lead	Lag	Lead			Lag	Lag	Lag
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes			Yes	Yes	Yes
Recall Mode	None	C-Min	None	C-Min	None	None	None	None	None	None
v/c Ratio	0.24	0.44	0.11	0.52	0.29	0.20	0.04	0.40	0.86	0.39
Control Delay	16.1	25.3	21.3	33.7	19.0	18.5	0.1	31.9	50.4	5.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	16.1	25.3	21.3	33.7	19.0	18.5	0.1	31.9	50.4	5.0
Queue Length 50th (m)	13.1	53.6	5.7	63.1	8.2	19.3	0.0	26.1	100.3	0.0
Queue Length 95th (m)	9.5	57.0	13.7	97.1	15.3	30.0	0.0	42.5	134.8	16.5
Internal Link Dist (m)		217.6		101.3		108.6			167.9	
Turn Bay Length (m)	95.0		35.0		55.0		55.0	115.0		100.0
Base Capacity (vph)	372	656	407	648	241	896	815	434	656	689
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	0.24	0.43	0.11	0.51	0.28	0.17	0.03	0.35	0.74	0.35

Intersection Summary

Cycle Length: 110
Actuated Cycle Length: 110
Offset: 67 (61%), Referenced to phase 4:EBTL and 8:WBTL, Start of Green
Natural Cycle: 90
Control Type: Actuated-Coordinated

Splits and Phases: 2: Kanata Avenue & Campeau Drive



HCM Signalized Intersection Capacity Analysis
2: Kanata Avenue & Campeau Drive

Existing AM Peak Hour

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	80	205	50	40	225	75	60	135	25	135	435	220
Future Volume (vph)	80	205	50	40	225	75	60	135	25	135	435	220
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Total Lost time (s)	6.2	6.2		6.2	6.2		5.9	5.9	5.9	5.9	5.9	5.9
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00
Frpb, ped/bikes	1.00	0.99		1.00	1.00		1.00	1.00	1.00	1.00	1.00	0.96
Flpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	0.97		1.00	0.96		1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1710	1723		1706	1720		1710	1782	1530	1710	1800	1465
Flt Permitted	0.40	1.00		0.48	1.00		0.15	1.00	1.00	0.66	1.00	1.00
Satd. Flow (perm)	729	1723		870	1720		276	1782	1530	1191	1800	1465
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	89	228	56	44	250	83	67	150	28	150	483	244
RTOR Reduction (vph)	0	7	0	0	10	0	0	0	16	0	0	167
Lane Group Flow (vph)	89	277	0	44	323	0	67	150	12	150	483	77
Confl. Peds. (#/hr)			5	5			10					10
Heavy Vehicles (%)	0%	1%	0%	0%	1%	0%	0%	1%	0%	0%	0%	0%
Turn Type	pm+pt	NA		pm+pt	NA		pm+pt	NA	Perm	Perm	NA	Perm
Protected Phases	7	4		3	8		5	2			6	
Permitted Phases	4			8			2		2	6		6
Actuated Green, G (s)	44.4	38.7		43.2	38.1		47.9	47.9	47.9	34.5	34.5	34.5
Effective Green, g (s)	44.4	38.7		43.2	38.1		47.9	47.9	47.9	34.5	34.5	34.5
Actuated g/C Ratio	0.40	0.35		0.39	0.35		0.44	0.44	0.44	0.31	0.31	0.31
Clearance Time (s)	6.2	6.2		6.2	6.2		5.9	5.9	5.9	5.9	5.9	5.9
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)	345	606		380	595		217	775	666	373	564	459
v/s Ratio Prot	c0.01	0.16		0.01	c0.19		c0.02	0.08			c0.27	
v/s Ratio Perm	0.09			0.04			0.11		0.01	0.13		0.05
v/c Ratio	0.26	0.46		0.12	0.54		0.31	0.19	0.02	0.40	0.86	0.17
Uniform Delay, d1	21.2	27.5		21.0	28.9		22.0	19.1	17.7	29.6	35.4	27.3
Progression Factor	0.70	0.78		1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	0.4	2.4		0.1	3.5		0.8	0.1	0.0	0.7	12.2	0.2
Delay (s)	15.3	24.0		21.2	32.5		22.8	19.3	17.7	30.4	47.6	27.5
Level of Service	B	C		C	C		C	B	B	C	D	C
Approach Delay (s)		21.9			31.2			20.1			39.1	
Approach LOS		C			C			C			D	

Intersection Summary

HCM 2000 Control Delay	31.6	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.63		
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	24.2
Intersection Capacity Utilization	77.7%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

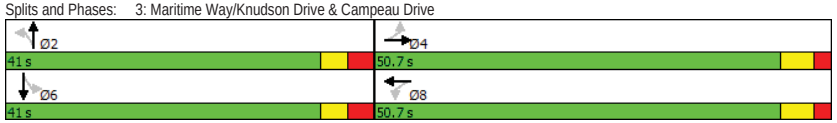
Queues
3: Maritime Way/Knudson Drive & Campeau Drive

Existing AM Peak Hour

Lane Group	EBL	EBT	WBL	WBT	NBT	SBL	SBT
Lane Configurations							
Traffic Volume (vph)	20	395	20	295	10	140	0
Future Volume (vph)	20	395	20	295	10	140	0
Lane Group Flow (vph)	22	445	22	406	72	156	61
Turn Type	Perm	NA	Perm	NA	NA	Perm	NA
Protected Phases		4		8	2		6
Permitted Phases	4		8			6	
Detector Phase	4	4	8	8	2	6	6
Switch Phase							
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Minimum Split (s)	50.7	50.7	50.7	50.7	24.0	24.0	24.0
Total Split (s)	50.7	50.7	50.7	50.7	41.0	41.0	41.0
Total Split (%)	55.3%	55.3%	55.3%	55.3%	44.7%	44.7%	44.7%
Yellow Time (s)	3.7	3.7	3.7	3.7	3.0	3.0	3.0
All-Red Time (s)	2.0	2.0	2.0	2.0	3.0	3.0	3.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	5.7	5.7	5.7	5.7	6.0	6.0	6.0
Lead/Lag							
Lead-Lag Optimize?							
Recall Mode	Min	Min	Min	Min	None	None	None
v/c Ratio	0.05	0.47	0.05	0.44	0.16	0.44	0.09
Control Delay	8.1	11.0	8.2	10.4	5.9	16.7	0.3
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	8.1	11.0	8.2	10.4	5.9	16.7	0.3
Queue Length 50th (m)	0.8	21.4	0.8	18.1	0.5	8.1	0.0
Queue Length 95th (m)	4.3	52.7	4.3	46.3	7.5	24.9	0.0
Internal Link Dist (m)		436.9		443.4	129.6		89.7
Turn Bay Length (m)	55.0		55.0			50.0	
Base Capacity (vph)	871	1742	827	1674	1365	1123	1342
Starvation Cap Reductn	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0
Reduced v/c Ratio	0.03	0.26	0.03	0.24	0.05	0.14	0.05

Intersection Summary
Cycle Length: 91.7
Actuated Cycle Length: 39.1
Natural Cycle: 75
Control Type: Actuated-Uncoordinated

Splits and Phases: 3: Maritime Way/Knudson Drive & Campeau Drive



HCM Signalized Intersection Capacity Analysis
3: Maritime Way/Knudson Drive & Campeau Drive

Existing AM Peak Hour

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	20	395	5	20	295	70	0	10	55	140	0	55
Future Volume (vph)	20	395	5	20	295	70	0	10	55	140	0	55
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Total Lost time (s)	5.7	5.7		5.7	5.7			6.0		6.0	6.0	
Lane Util. Factor	1.00	1.00		1.00	1.00			1.00		1.00	1.00	
Frpb, ped/bikes	1.00	1.00		1.00	0.99			0.98		1.00	0.97	
Flpb, ped/bikes	0.98	1.00		1.00	1.00			1.00		0.99	1.00	
Frt	1.00	1.00		1.00	0.97			0.87		1.00	0.85	
Flt Protected	0.95	1.00		0.95	1.00			1.00		0.95	1.00	
Satd. Flow (prot)	1684	1791		1706	1732			1537		1701	1482	
Flt Permitted	0.51	1.00		0.47	1.00			1.00		0.71	1.00	
Satd. Flow (perm)	909	1791		853	1732			1537		1271	1482	
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	22	439	6	22	328	78	0	11	61	156	0	61
RTOR Reduction (vph)	0	1	0	0	9	0	0	47	0	0	47	0
Lane Group Flow (vph)	22	444	0	22	397	0	0	25	0	156	14	0
Confl. Peds. (#/hr)	30		5	5		30	10		5	5		10
Heavy Vehicles (%)	0%	0%	20%	0%	0%	0%	0%	0%	0%	0%	0%	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)	19.4	19.4		19.4	19.4			9.2		9.2	9.2	
Effective Green, g (s)	19.4	19.4		19.4	19.4			9.2		9.2	9.2	
Actuated g/C Ratio	0.48	0.48		0.48	0.48			0.23		0.23	0.23	
Clearance Time (s)	5.7	5.7		5.7	5.7			6.0		6.0	6.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0			3.0		3.0	3.0	
Lane Grp Cap (vph)	437	862		410	833			350		290	338	
v/s Ratio Prot		c0.25			0.23			0.02			0.01	
v/s Ratio Perm	0.02			0.03						c0.12		
v/c Ratio	0.05	0.52		0.05	0.48			0.07		0.54	0.04	
Uniform Delay, d1	5.6	7.2		5.6	7.0			12.2		13.7	12.1	
Progression Factor	1.00	1.00		1.00	1.00			1.00		1.00	1.00	
Incremental Delay, d2	0.0	0.5		0.1	0.4			0.1		1.9	0.1	
Delay (s)	5.6	7.7		5.6	7.5			12.3		15.6	12.2	
Level of Service	A	A		A	A			B		B	B	
Approach Delay (s)		7.6			7.4			12.3			14.6	
Approach LOS		A			A			B			B	

Intersection Summary			
HCM 2000 Control Delay	9.1	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.52		
Actuated Cycle Length (s)	40.3	Sum of lost time (s)	11.7
Intersection Capacity Utilization	46.9%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

Queues
4: Teron Road & Campeau Drive

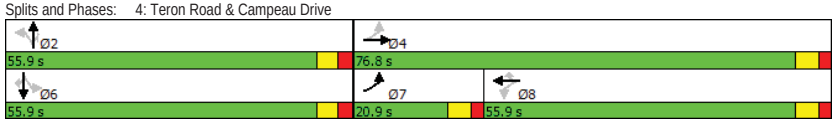
Existing AM Peak Hour

Lane Group	EBL	EBT	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations											
Traffic Volume (vph)	220	315	30	160	500	5	40	65	355	10	130
Future Volume (vph)	220	315	30	160	500	5	40	65	355	10	130
Lane Group Flow (vph)	244	356	33	178	556	0	50	72	394	11	144
Turn Type	pm+pt	NA	Perm	NA	Perm	Perm	NA	Perm	Perm	NA	Perm
Protected Phases	7	4		8			2			6	
Permitted Phases	4		8		8	2		2	6		6
Detector Phase	7	4	8	8	8	2	2	2	6	6	6
Switch Phase											
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Minimum Split (s)	10.9	55.9	55.9	55.9	55.9	26.9	26.9	26.9	26.9	26.9	26.9
Total Split (s)	20.9	76.8	55.9	55.9	55.9	55.9	55.9	55.9	55.9	55.9	55.9
Total Split (%)	15.7%	57.9%	42.1%	42.1%	42.1%	42.1%	42.1%	42.1%	42.1%	42.1%	42.1%
Yellow Time (s)	3.7	3.7	3.7	3.7	3.7	3.3	3.3	3.3	3.3	3.3	3.3
All-Red Time (s)	2.2	2.2	2.2	2.2	2.2	2.6	2.6	2.6	2.6	2.6	2.6
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	5.9	5.9	5.9	5.9	5.9		5.9	5.9	5.9	5.9	5.9
Lead/Lag	Lead		Lag	Lag	Lag						
Lead-Lag Optimize?	Yes		Yes	Yes	Yes						
Recall Mode	None	Max	Max	Max	Max	None	None	None	None	None	None
v/c Ratio	0.39	0.35	0.08	0.24	0.61		0.08	0.14	0.93	0.02	0.24
Control Delay	17.2	17.2	26.7	27.3	5.5		27.5	6.5	69.0	26.3	5.3
Queue Delay	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0
Total Delay	17.2	17.2	26.7	27.3	5.5		27.5	6.5	69.0	26.3	5.3
Queue Length 50th (m)	33.5	52.0	5.6	32.4	0.0		8.8	0.0	98.3	1.9	0.0
Queue Length 95th (m)	52.7	77.9	13.7	52.5	27.3		18.1	10.5	#156.4	6.1	14.1
Internal Link Dist (m)		269.3		262.3			58.3			132.3	
Turn Bay Length (m)	65.0		160.0					70.0	85.0		
Base Capacity (vph)	632	1013	403	743	908		700	609	496	717	664
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	0.39	0.35	0.08	0.24	0.61		0.07	0.12	0.79	0.02	0.22

Intersection Summary

Cycle Length: 132.7
Actuated Cycle Length: 126
Natural Cycle: 105
Control Type: Actuated-Uncoordinated
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 4: Teron Road & Campeau Drive



HCM Signalized Intersection Capacity Analysis
4: Teron Road & Campeau Drive

Existing AM Peak Hour

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	220	315	5	30	160	500	5	40	65	355	10	130
Future Volume (vph)	220	315	5	30	160	500	5	40	65	355	10	130
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Total Lost time (s)	5.9	5.9		5.9	5.9	5.9		5.9	5.9	5.9	5.9	5.9
Lane Util. Factor	1.00	1.00		1.00	1.00	1.00		1.00	1.00	1.00	1.00	1.00
Frpb, ped/bikes	1.00	1.00		1.00	1.00	0.92		1.00	0.93	1.00	1.00	0.95
Flpb, ped/bikes	0.98	1.00		0.99	1.00	1.00		1.00	1.00	0.96	1.00	1.00
Frt	1.00	1.00		1.00	1.00	0.85		1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00	1.00		0.99	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1677	1794		1695	1800	1414		1783	1424	1638	1800	1454
Flt Permitted	0.55	1.00		0.55	1.00	1.00		0.98	1.00	0.72	1.00	1.00
Satd. Flow (perm)	979	1794		978	1800	1414		1760	1424	1249	1800	1454
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	244	350	6	33	178	556	6	44	72	394	11	144
RTOR Reduction (vph)	0	0	0	0	0	326	0	0	47	0	0	95
Lane Group Flow (vph)	244	356	0	33	178	230	0	50	25	394	11	49
Confl. Peds. (#/hr)	20		5	5		20	10		15	15		10
Confl. Bikes (#/hr)									5			
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Turn Type	pm+pt	NA		Perm	NA	Perm	Perm	NA	Perm	Perm	NA	Perm
Protected Phases	7	4			8			2			6	
Permitted Phases	4			8		8	2		2	6		6
Actuated Green, G (s)	71.2	71.2		52.1	52.1	52.1		43.0	43.0	43.0	43.0	43.0
Effective Green, g (s)	71.2	71.2		52.1	52.1	52.1		43.0	43.0	43.0	43.0	43.0
Actuated g/C Ratio	0.57	0.57		0.41	0.41	0.41		0.34	0.34	0.34	0.34	0.34
Clearance Time (s)	5.9	5.9		5.9	5.9	5.9		5.9	5.9	5.9	5.9	5.9
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)	626	1013		404	744	584		600	485	426	614	496
v/s Ratio Prot	c0.04	0.20			0.10						0.01	
v/s Ratio Perm	c0.18			0.03		0.16		0.03	0.02	c0.32		0.03
v/c Ratio	0.39	0.35		0.08	0.24	0.39		0.08	0.05	0.92	0.02	0.10
Uniform Delay, d1	14.3	14.9		22.4	24.1	25.9		28.1	27.8	39.9	27.5	28.3
Progression Factor	1.00	1.00		1.00	1.00	1.00		1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	0.4	1.0		0.4	0.8	2.0		0.1	0.0	25.7	0.0	0.1
Delay (s)	14.7	15.8		22.8	24.8	27.9		28.2	27.9	65.7	27.5	28.4
Level of Service	B	B		C	C	C		C	C	E	C	C
Approach Delay (s)		15.4			26.9			28.0			55.1	
Approach LOS		B			C			C			E	

Intersection Summary

HCM 2000 Control Delay	31.2	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.62		
Actuated Cycle Length (s)	126.0	Sum of lost time (s)	17.7
Intersection Capacity Utilization	73.4%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

Queues
5: March Road & Campeau Drive/Hwy 417 Off Ramp

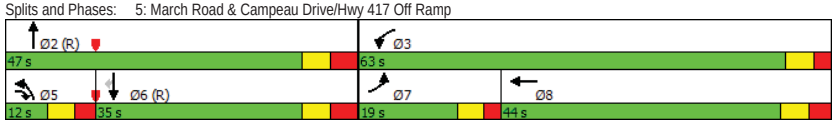
Existing AM Peak Hour

Lane Group	EBL	EBR	WBL	WBT	NBL	NBT	SBT	SBR
Lane Configurations								
Traffic Volume (vph)	75	660	390	285	400	1155	845	20
Future Volume (vph)	75	660	390	285	400	1155	845	20
Lane Group Flow (vph)	83	733	433	317	444	1283	939	22
Turn Type	Prot	Over	Prot	NA	Prot	NA	NA	Perm
Protected Phases	7	5	3	8	5	2	6	
Permitted Phases								6
Detector Phase	7	5	3	8	5	2	6	6
Switch Phase								
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Minimum Split (s)	11.0	11.5	24.2	43.8	11.5	30.5	30.5	30.5
Total Split (s)	19.0	12.0	63.0	44.0	12.0	47.0	35.0	35.0
Total Split (%)	17.3%	10.9%	57.3%	40.0%	10.9%	42.7%	31.8%	31.8%
Yellow Time (s)	3.7	3.7	3.7	3.7	3.7	3.7	3.7	3.7
All-Red Time (s)	2.3	2.8	2.5	3.1	2.8	3.8	3.8	3.8
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	6.0	6.5	6.2	6.8	6.5	7.5	7.5	7.5
Lead/Lag	Lead	Lead		Lag	Lead		Lag	Lag
Lead-Lag Optimize?	Yes	Yes		Yes	Yes		Yes	Yes
Recall Mode	None	None	None	None	None	C-Min	C-Min	C-Min
v/c Ratio	0.52	0.71	0.47	0.63	0.44	0.63	0.76	0.04
Control Delay	58.6	41.5	33.5	49.8	35.7	17.6	43.1	0.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	58.6	41.5	33.5	49.8	35.7	17.6	43.1	0.1
Queue Length 50th (m)	18.1	76.3	40.5	36.1	43.4	97.4	72.2	0.0
Queue Length 95th (m)	33.7	#121.6	50.4	49.2	64.3	140.4	88.7	0.0
Internal Link Dist (m)				269.9		155.6	164.4	
Turn Bay Length (m)	60.0	190.0	150.0		150.0			150.0
Base Capacity (vph)	202	1038	1712	1156	1006	2043	1228	496
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	0.41	0.71	0.25	0.27	0.44	0.63	0.76	0.04

Intersection Summary

Cycle Length: 110
Actuated Cycle Length: 110
Offset: 97 (88%), Referenced to phase 2:NBT and 6:SBT, Start of Green
Natural Cycle: 110
Control Type: Actuated-Coordinated
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 5: March Road & Campeau Drive/Hwy 417 Off Ramp



HCM Signalized Intersection Capacity Analysis
5: March Road & Campeau Drive/Hwy 417 Off Ramp

Existing AM Peak Hour

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	75	0	660	390	285	0	400	1155	0	0	845	20
Future Volume (vph)	75	0	660	390	285	0	400	1155	0	0	845	20
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Total Lost time (s)	6.0		6.5	6.2	6.8		6.5	7.5			7.5	7.5
Lane Util. Factor	1.00		*1.00	0.97	0.95		0.97	0.95			0.91	1.00
Frpb, ped/bikes	1.00		1.00	1.00	1.00		1.00	1.00			1.00	0.98
Flpb, ped/bikes	1.00		1.00	1.00	1.00		1.00	1.00			1.00	1.00
Frt	1.00		1.00	1.00	1.00		1.00	1.00			1.00	0.85
Flt Protected	0.95		1.00	0.95	1.00		1.00	1.00			1.00	1.00
Satd. Flow (prot)	1710		3600	3317	3420		3492	3420			4914	1501
Flt Permitted	0.95		1.00	0.95	1.00		1.00	1.00			1.00	1.00
Satd. Flow (perm)	1710		3600	3317	3420		3492	3420			4914	1501
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	83	0	733	433	317	0	444	1283	0	0	939	22
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	0	0	17
Lane Group Flow (vph)	83	0	733	433	317	0	444	1283	0	0	939	5
Confl. Peds. (#/hr)							5					5
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Turn Type	Prot		Over	Prot	NA		Prot	NA			NA	Perm
Protected Phases	7		5	3	8		5	2			6	
Permitted Phases												6
Actuated Green, G (s)	9.0		31.7	31.8	16.2		31.7	64.5			26.3	26.3
Effective Green, g (s)	9.0		31.7	31.8	16.2		31.7	64.5			26.3	26.3
Actuated g/C Ratio	0.08		0.29	0.29	0.15		0.29	0.59			0.24	0.24
Clearance Time (s)	6.0		6.5	6.2	6.8		6.5	7.5			7.5	7.5
Vehicle Extension (s)	3.0		3.0	3.0	3.0		3.0	3.0			3.0	3.0
Lane Grp Cap (vph)	139		1037	958	503		1006	2005			1174	358
v/s Ratio Prot	0.05		0.20	c0.13	c0.09		0.13	c0.38			c0.19	
v/s Ratio Perm												0.00
v/c Ratio	0.60		0.71	0.45	0.63		0.44	0.64			0.80	0.01
Uniform Delay, d1	48.7		35.0	32.0	44.1		31.9	15.1			39.4	32.0
Progression Factor	1.00		1.00	1.00	1.00		1.00	1.00			1.00	1.00
Incremental Delay, d2	6.7		2.2	0.3	2.6		0.3	1.6			5.8	0.1
Delay (s)	55.5		37.2	32.3	46.7		32.2	16.6			45.1	32.0
Level of Service	E		D	C	D		C	B			D	C
Approach Delay (s)		39.1			38.4			20.7			44.8	
Approach LOS		D			D			C			D	

Intersection Summary

HCM 2000 Control Delay	32.8	HCM 2000 Level of Service		C	
HCM 2000 Volume to Capacity ratio	0.72				
Actuated Cycle Length (s)	110.0	Sum of lost time (s)		26.8	
Intersection Capacity Utilization	72.1%	ICU Level of Service		C	
Analysis Period (min)	15				

c Critical Lane Group

HCM Unsignalized Intersection Capacity Analysis
6: Kanata Avenue & Knudson Drive

Existing AM Peak Hour



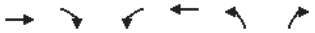
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Sign Control	Stop		Stop			Stop
Traffic Volume (vph)	90	80	125	140	130	215
Future Volume (vph)	90	80	125	140	130	215
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	100	89	139	156	144	239

Direction, Lane #	WB 1	NB 1	SB 1	SB 2
Volume Total (vph)	189	295	144	239
Volume Left (vph)	100	0	144	0
Volume Right (vph)	89	156	0	0
Hadj (s)	-0.18	-0.32	0.50	0.00
Departure Headway (s)	5.3	4.7	5.8	5.3
Degree Utilization, x	0.28	0.38	0.23	0.35
Capacity (veh/h)	627	737	595	654
Control Delay (s)	10.2	10.6	9.4	10.0
Approach Delay (s)	10.2	10.6	9.8	
Approach LOS	B	B	A	

Intersection Summary				
Delay			10.1	
Level of Service			B	
Intersection Capacity Utilization			44.0%	ICU Level of Service A
Analysis Period (min)			15	

HCM Unsignalized Intersection Capacity Analysis
7: Shaughnessy Crescent (East) & Knudson Drive

Existing AM Peak Hour



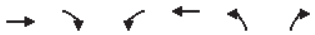
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	275	10	5	130	15	20
Future Volume (Veh/h)	275	10	5	130	15	20
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	306	11	6	144	17	22
Pedestrians					10	
Lane Width (m)					3.6	
Walking Speed (m/s)					1.2	
Percent Blockage					1	
Right turn flare (veh)						
Median type	None			None		
Median storage veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume			327		478	322
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			327		478	322
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			100		97	97
cM capacity (veh/h)			1234		543	718

Direction, Lane #	EB 1	WB 1	NB 1
Volume Total	317	150	39
Volume Left	0	6	17
Volume Right	11	0	22
cSH	1700	1234	629
Volume to Capacity	0.19	0.00	0.06
Queue Length 95th (m)	0.0	0.1	1.6
Control Delay (s)	0.0	0.4	11.1
Lane LOS		A	B
Approach Delay (s)	0.0	0.4	11.1
Approach LOS			B

Intersection Summary				
Average Delay			1.0	
Intersection Capacity Utilization			26.0%	ICU Level of Service A
Analysis Period (min)			15	

HCM Unsignalized Intersection Capacity Analysis
8: Shaughnessy Crescent (West) & Knudson Drive

Existing AM Peak Hour



Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	275	10	5	140	20	10
Future Volume (Veh/h)	275	10	5	140	20	10
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	306	11	6	156	22	11
Pedestrians				5	20	
Lane Width (m)				3.6	3.6	
Walking Speed (m/s)				1.2	1.2	
Percent Blockage				0	2	
Right turn flare (veh)						
Median type	None			None		
Median storage veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume			337		500	336
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			337		500	336
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			100		96	98
cM capacity (veh/h)			1213		523	695

Direction, Lane #	EB 1	WB 1	NB 1
Volume Total	317	162	33
Volume Left	0	6	22
Volume Right	11	0	11
cSH	1700	1213	570
Volume to Capacity	0.19	0.00	0.06
Queue Length 95th (m)	0.0	0.1	1.5
Control Delay (s)	0.0	0.3	11.7
Lane LOS		A	B
Approach Delay (s)	0.0	0.3	11.7
Approach LOS			B

Intersection Summary				
Average Delay		0.9		
Intersection Capacity Utilization		27.5%	ICU Level of Service	A
Analysis Period (min)		15		

HCM Unsignalized Intersection Capacity Analysis
9: Knudson Drive & Sherk Crescent (North)

Existing AM Peak Hour



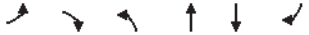
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	5	15	5	80	140	5
Future Volume (Veh/h)	5	15	5	80	140	5
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	6	17	6	89	156	6
Pedestrians	10					
Lane Width (m)	3.6					
Walking Speed (m/s)	1.2					
Percent Blockage	1					
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	270	169	172			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	270	169	172			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	99	98	100			
cM capacity (veh/h)	715	873	1405			

Direction, Lane #	EB 1	NB 1	SB 1
Volume Total	23	95	162
Volume Left	6	6	0
Volume Right	17	0	6
cSH	825	1405	1700
Volume to Capacity	0.03	0.00	0.10
Queue Length 95th (m)	0.7	0.1	0.0
Control Delay (s)	9.5	0.5	0.0
Lane LOS	A	A	
Approach Delay (s)	9.5	0.5	0.0
Approach LOS	A		

Intersection Summary				
Average Delay		1.0		
Intersection Capacity Utilization		19.6%	ICU Level of Service	A
Analysis Period (min)		15		

HCM Unsignalized Intersection Capacity Analysis
10: Knudson Drive & Sherk Crescent (South)

Existing AM Peak Hour



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	10	35	15	75	155	5
Future Volume (Veh/h)	10	35	15	75	155	5
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	11	39	17	83	172	6
Pedestrians	10					
Lane Width (m)	3.6					
Walking Speed (m/s)	1.2					
Percent Blockage	1					
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	302	185	188			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	302	185	188			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	98	95	99			
cM capacity (veh/h)	680	855	1387			

Direction, Lane #	EB 1	NB 1	SB 1
Volume Total	50	100	178
Volume Left	11	17	0
Volume Right	39	0	6
cSH	809	1387	1700
Volume to Capacity	0.06	0.01	0.10
Queue Length 95th (m)	1.6	0.3	0.0
Control Delay (s)	9.7	1.4	0.0
Lane LOS	A	A	
Approach Delay (s)	9.7	1.4	0.0
Approach LOS	A		

Intersection Summary				
Average Delay		1.9		
Intersection Capacity Utilization		27.7%	ICU Level of Service	A
Analysis Period (min)		15		

HCM Unsignalized Intersection Capacity Analysis
11: Knudson Drive & Weslock Way

Existing AM Peak Hour



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Sign Control		Stop	Stop		Stop	
Traffic Volume (vph)	260	75	35	55	55	95
Future Volume (vph)	260	75	35	55	55	95
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	289	83	39	61	61	106

Direction, Lane #	EB 1	WB 1	SB 1
Volume Total (vph)	372	100	167
Volume Left (vph)	289	0	61
Volume Right (vph)	0	61	106
Hadj (s)	0.16	-0.37	-0.31
Departure Headway (s)	4.6	4.4	4.7
Degree Utilization, x	0.47	0.12	0.22
Capacity (veh/h)	756	768	707
Control Delay (s)	11.7	8.0	9.0
Approach Delay (s)	11.7	8.0	9.0
Approach LOS	B	A	A

Intersection Summary				
Delay		10.4		
Level of Service		B		
Intersection Capacity Utilization		43.7%	ICU Level of Service	A
Analysis Period (min)		15		

HCM Unsignalized Intersection Capacity Analysis
12: Weslock Way & Beaverbrook Road

Existing AM Peak Hour



Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Sign Control	Stop		Stop			Stop
Traffic Volume (vph)	120	90	15	300	220	30
Future Volume (vph)	120	90	15	300	220	30
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	133	100	17	333	244	33

Direction, Lane #	WB 1	NB 1	SB 1
Volume Total (vph)	233	350	277
Volume Left (vph)	133	0	244
Volume Right (vph)	100	333	0
Hadj (s)	-0.14	-0.57	0.18
Departure Headway (s)	5.2	4.4	5.1
Degree Utilization, x	0.34	0.42	0.40
Capacity (veh/h)	633	787	665
Control Delay (s)	10.8	10.5	11.4
Approach Delay (s)	10.8	10.5	11.4
Approach LOS	B	B	B

Intersection Summary			
Delay		10.9	
Level of Service		B	
Intersection Capacity Utilization		58.1%	ICU Level of Service B
Analysis Period (min)		15	

HCM Unsignalized Intersection Capacity Analysis
13: Omni Health Care & Campeau Drive

Existing AM Peak Hour



Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	340	15	10	325	5	5
Future Volume (Veh/h)	340	15	10	325	5	5
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	378	17	11	361	6	6
Pedestrians					5	
Lane Width (m)					3.6	
Walking Speed (m/s)					1.2	
Percent Blockage					0	
Right turn flare (veh)						
Median type	None			None		
Median storage veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume			400		774	392
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			400		774	392
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			99		98	99
cM capacity (veh/h)			1165		364	659

Direction, Lane #	EB 1	WB 1	NB 1
Volume Total	395	372	12
Volume Left	0	11	6
Volume Right	17	0	6
cSH	1700	1165	469
Volume to Capacity	0.23	0.01	0.03
Queue Length 95th (m)	0.0	0.2	0.6
Control Delay (s)	0.0	0.3	12.9
Lane LOS		A	B
Approach Delay (s)	0.0	0.3	12.9
Approach LOS			B

Intersection Summary			
Average Delay		0.4	
Intersection Capacity Utilization		36.6%	ICU Level of Service A
Analysis Period (min)		15	

Queues
14: Hawkstone Gate & Campeau Drive

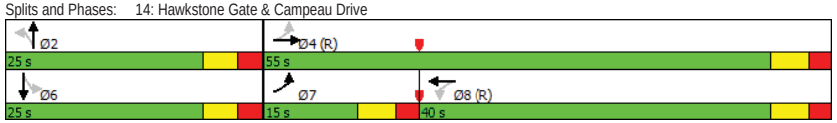
Existing AM Peak Hour

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations								
Traffic Volume (vph)	160	360	10	215	5	5	135	0
Future Volume (vph)	160	360	10	215	5	5	135	0
Lane Group Flow (vph)	178	411	11	339	6	39	0	267
Turn Type	pm+pt	NA	Perm	NA	Perm	NA	Perm	NA
Protected Phases	7	4		8		2		6
Permitted Phases	4		8		2		6	
Detector Phase	7	4	8	8	2	2	6	6
Switch Phase								
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Minimum Split (s)	11.0	32.0	32.0	32.0	23.9	23.9	23.9	23.9
Total Split (s)	15.0	55.0	40.0	40.0	25.0	25.0	25.0	25.0
Total Split (%)	18.8%	68.8%	50.0%	50.0%	31.3%	31.3%	31.3%	31.3%
Yellow Time (s)	3.7	3.7	3.7	3.7	3.3	3.3	3.3	3.3
All-Red Time (s)	2.3	2.3	2.3	2.3	2.6	2.6	2.6	2.6
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0		0.0
Total Lost Time (s)	6.0	6.0	6.0	6.0	5.9	5.9		5.9
Lead/Lag	Lead		Lag	Lag				
Lead-Lag Optimize?	Yes		Yes	Yes				
Recall Mode	None	C-Min	C-Min	C-Min	None	None	None	None
v/c Ratio	0.30	0.36	0.03	0.42	0.03	0.12		0.79
Control Delay	8.7	9.1	16.5	17.1	21.0	9.9		31.6
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0		0.0
Total Delay	8.7	9.1	16.5	17.1	21.0	9.9		31.6
Queue Length 50th (m)	10.0	26.7	0.9	31.3	0.8	0.8		21.6
Queue Length 95th (m)	25.0	59.1	4.7	65.7	3.3	7.2		43.1
Internal Link Dist (m)		214.6		269.3		89.1		74.7
Turn Bay Length (m)	80.0		120.0					
Base Capacity (vph)	603	1196	459	851	242	396		395
Starvation Cap Reductn	0	0	0	0	0	0		0
Spillback Cap Reductn	0	0	0	0	0	0		0
Storage Cap Reductn	0	0	0	0	0	0		0
Reduced v/c Ratio	0.30	0.34	0.02	0.40	0.02	0.10		0.68

Intersection Summary

Cycle Length: 80
Actuated Cycle Length: 80
Offset: 0 (0%), Referenced to phase 4:EBTL and 8:WBTL, Start of Green
Natural Cycle: 70
Control Type: Actuated-Coordinated

Splits and Phases: 14: Hawkstone Gate & Campeau Drive



HCM Signalized Intersection Capacity Analysis
14: Hawkstone Gate & Campeau Drive

Existing AM Peak Hour

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	160	360	10	10	215	90	5	5	30	135	0	105
Future Volume (vph)	160	360	10	10	215	90	5	5	30	135	0	105
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Total Lost time (s)	6.0	6.0		6.0	6.0		5.9	5.9			5.9	
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	1.00			1.00	
Frpb, ped/bikes	1.00	1.00		1.00	0.99		1.00	0.91			0.90	
Flpb, ped/bikes	1.00	1.00		1.00	1.00		0.89	1.00			0.95	
Frt	1.00	1.00		1.00	0.96		1.00	0.87			0.94	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00			0.97	
Satd. Flow (prot)	1705	1793		1710	1703		1524	1429			1413	
Flt Permitted	0.43	1.00		0.52	1.00		0.58	1.00			0.80	
Satd. Flow (perm)	769	1793		938	1703		937	1429			1168	
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	178	400	11	11	239	100	6	6	33	150	0	117
RTOR Reduction (vph)	0	1	0	0	18	0	0	26	0	0	98	0
Lane Group Flow (vph)	178	410	0	11	321	0	6	13	0	0	169	0
Confl. Peds. (#/hr)	10					10	95		40	40		95
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Turn Type	pm+pt	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases	7	4			8			2			6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)	51.6	51.6		37.2	37.2		16.5	16.5			16.5	
Effective Green, g (s)	51.6	51.6		37.2	37.2		16.5	16.5			16.5	
Actuated g/C Ratio	0.65	0.65		0.47	0.47		0.21	0.21			0.21	
Clearance Time (s)	6.0	6.0		6.0	6.0		5.9	5.9			5.9	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0			3.0	
Lane Grp Cap (vph)	594	1156		436	791		193	294			240	
v/s Ratio Prot	0.03	c0.23			c0.19			0.01				
v/s Ratio Perm	0.16			0.01			0.01				c0.14	
v/c Ratio	0.30	0.35		0.03	0.41		0.03	0.04			0.71	
Uniform Delay, d1	6.4	6.5		11.6	14.1		25.4	25.4			29.5	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00			1.00	
Incremental Delay, d2	0.3	0.9		0.1	1.5		0.1	0.1			9.1	
Delay (s)	6.7	7.4		11.7	15.7		25.4	25.5			38.6	
Level of Service	A	A		B	B		C	C			D	
Approach Delay (s)		7.2			15.5			25.5			38.6	
Approach LOS		A			B			C			D	

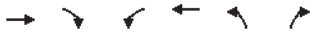
Intersection Summary

HCM 2000 Control Delay	16.9	HCM 2000 Level of Service	B	
HCM 2000 Volume to Capacity ratio	0.50			
Actuated Cycle Length (s)	80.0	Sum of lost time (s)	17.9	
Intersection Capacity Utilization	69.8%	ICU Level of Service	C	
Analysis Period (min)	15			

c Critical Lane Group

HCM Unsignalized Intersection Capacity Analysis
15: Park Ridge Place (West) & Campeau Drive

Existing AM Peak Hour



Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	355	10	0	330	10	0
Future Volume (Veh/h)	355	10	0	330	10	0
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	394	11	0	367	11	0
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage veh)						
Upstream signal (m)	125					
pX, platoon unblocked			0.84		0.84	0.84
vC, conflicting volume			405		766	400
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			190		622	183
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			100		97	100
cM capacity (veh/h)			1167		379	723

Direction, Lane #	EB 1	WB 1	NB 1
Volume Total	405	367	11
Volume Left	0	0	11
Volume Right	11	0	0
cSH	1700	1167	379
Volume to Capacity	0.24	0.00	0.03
Queue Length 95th (m)	0.0	0.0	0.7
Control Delay (s)	0.0	0.0	14.8
Lane LOS			B
Approach Delay (s)	0.0	0.0	14.8
Approach LOS			B

Intersection Summary				
Average Delay	0.2			
Intersection Capacity Utilization	30.4%	ICU Level of Service		A
Analysis Period (min)	15			

HCM Unsignalized Intersection Capacity Analysis
16: Coulson Court & Robson Court

Existing AM Peak Hour



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	10	15	5	0	25	5	10	5	0	0	0	0
Future Volume (Veh/h)	10	15	5	0	25	5	10	5	0	0	0	0
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	11	17	6	0	28	6	11	6	0	0	0	0
Pedestrians		5									5	
Lane Width (m)		3.6									3.6	
Walking Speed (m/s)		1.2									1.2	
Percent Blockage		0									0	
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	39			23			78	81	20	81	81	41
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	39			23			78	81	20	81	81	41
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	99			100			99	99	100	100	100	100
cM capacity (veh/h)	1577			1605			904	804	1064	895	804	1027

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	34	34	17	0
Volume Left	11	0	11	0
Volume Right	6	6	0	0
cSH	1577	1605	866	1700
Volume to Capacity	0.01	0.00	0.02	0.00
Queue Length 95th (m)	0.2	0.0	0.5	0.0
Control Delay (s)	2.4	0.0	9.2	0.0
Lane LOS	A		A	A
Approach Delay (s)	2.4	0.0	9.2	0.0
Approach LOS			A	A

Intersection Summary				
Average Delay	2.8			
Intersection Capacity Utilization	19.9%	ICU Level of Service		A
Analysis Period (min)	15			

HCM Unsignalized Intersection Capacity Analysis
17: Robson Court & Evanshen Crescent

Existing AM Peak Hour



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	5	10	25	0	0	5
Future Volume (Veh/h)	5	10	25	0	0	5
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	6	11	28	0	0	6
Pedestrians					5	
Lane Width (m)					3.6	
Walking Speed (m/s)					1.2	
Percent Blockage					0	
Right turn flare (veh)						
Median type		None	None			
Median storage veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	33				56	33
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	33				56	33
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	100				100	99
cM capacity (veh/h)	1585				949	1042

Direction, Lane #	EB 1	WB 1	SB 1
Volume Total	17	28	6
Volume Left	6	0	0
Volume Right	0	0	6
cSH	1585	1700	1042
Volume to Capacity	0.00	0.02	0.01
Queue Length 95th (m)	0.1	0.0	0.1
Control Delay (s)	2.6	0.0	8.5
Lane LOS	A		A
Approach Delay (s)	2.6	0.0	8.5
Approach LOS			A

Intersection Summary				
Average Delay	1.9			
Intersection Capacity Utilization	15.2%	ICU Level of Service		A
Analysis Period (min)	15			

HCM Unsignalized Intersection Capacity Analysis
18: Kanata Avenue & Park Ridge Place

Existing AM Peak Hour



Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	10	10	210	5	0	525
Future Volume (Veh/h)	10	10	210	5	0	525
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	11	11	233	6	0	583
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			None			None
Median storage veh)						
Upstream signal (m)						133
pX, platoon unblocked	0.74					
vC, conflicting volume	819	236			239	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	586	236			239	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	97	99			100	
cM capacity (veh/h)	355	808			1340	

Direction, Lane #	WB 1	NB 1	SB 1
Volume Total	22	239	583
Volume Left	11	0	0
Volume Right	11	6	0
cSH	493	1700	1340
Volume to Capacity	0.04	0.14	0.00
Queue Length 95th (m)	1.1	0.0	0.0
Control Delay (s)	12.6	0.0	0.0
Lane LOS	B		
Approach Delay (s)	12.6	0.0	0.0
Approach LOS	B		

Intersection Summary				
Average Delay	0.3			
Intersection Capacity Utilization	39.2%	ICU Level of Service		A
Analysis Period (min)	15			

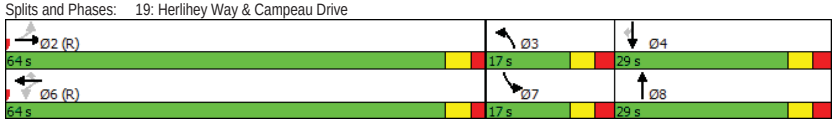
Queues
19: Herlihey Way & Campeau Drive

Existing AM Peak Hour

Lane Group	EBL	EBT	WBL	WBT	WBR	NBL	NBT	SBL	SBT	SBR
Lane Configurations										
Traffic Volume (vph)	15	275	65	405	35	10	5	20	5	20
Future Volume (vph)	15	275	65	405	35	10	5	20	5	20
Lane Group Flow (vph)	17	350	72	450	39	11	50	22	6	22
Turn Type	Perm	NA	Perm	NA	Perm	Prot	NA	Prot	NA	Perm
Protected Phases		2		6		3	8	7	4	
Permitted Phases	2		6		6					4
Detector Phase	2	2	6	6	6	3	8	7	4	4
Switch Phase										
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Minimum Split (s)	34.5	34.5	34.5	34.5	34.5	10.9	28.9	10.9	28.9	28.9
Total Split (s)	64.0	64.0	64.0	64.0	64.0	17.0	29.0	17.0	29.0	29.0
Total Split (%)	58.2%	58.2%	58.2%	58.2%	58.2%	15.5%	26.4%	15.5%	26.4%	26.4%
Yellow Time (s)	3.3	3.3	3.3	3.3	3.3	3.3	3.3	3.3	3.3	3.3
All-Red Time (s)	2.2	2.2	2.2	2.2	2.2	2.6	2.6	2.6	2.6	2.6
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	5.5	5.5	5.5	5.5	5.5	5.9	5.9	5.9	5.9	5.9
Lead/Lag						Lead	Lag	Lead	Lag	Lag
Lead-Lag Optimize?						Yes	Yes	Yes	Yes	Yes
Recall Mode	C-Min	C-Min	C-Min	C-Min	C-Min	None	None	None	None	None
v/c Ratio	0.03	0.25	0.09	0.33	0.03	0.11	0.30	0.22	0.03	0.09
Control Delay	7.5	7.3	7.3	7.4	0.6	51.2	19.2	53.2	36.8	0.7
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	7.5	7.3	7.3	7.4	0.6	51.2	19.2	53.2	36.8	0.7
Queue Length 50th (m)	0.3	5.8	2.7	20.2	0.1	2.4	1.3	4.8	1.3	0.0
Queue Length 95th (m)	m6.9	85.0	12.9	62.7	m0.2	8.4	11.5	12.9	4.7	0.0
Internal Link Dist (m)		148.2		217.6			87.8		129.5	
Turn Bay Length (m)	40.0		85.0		75.0			50.0		30.0
Base Capacity (vph)	589	1376	764	1377	1188	172	344	155	383	384
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.03	0.25	0.09	0.33	0.03	0.06	0.15	0.14	0.02	0.06

Intersection Summary
Cycle Length: 110
Actuated Cycle Length: 110
Offset: 75 (68%), Referenced to phase 2:EBTL and 6:WBTL, Start of Green
Natural Cycle: 75
Control Type: Actuated-Coordinated
m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 19: Herlihey Way & Campeau Drive



HCM Signalized Intersection Capacity Analysis
19: Herlihey Way & Campeau Drive

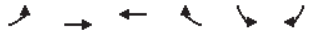
Existing AM Peak Hour

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	15	275	40	65	405	35	10	5	40	20	5	20
Future Volume (vph)	15	275	40	65	405	35	10	5	40	20	5	20
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Total Lost time (s)	5.5	5.5		5.5	5.5	5.5	5.9	5.9		5.9	5.9	5.9
Lane Util. Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00
Frpb, ped/bikes	1.00	1.00		1.00	1.00	1.00	1.00	0.96		1.00	1.00	0.98
Flpb, ped/bikes	1.00	1.00		1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00
Frt	1.00	0.98		1.00	1.00	0.85	1.00	0.87		1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	1500	1744		1710	1748	1485	1710	1477		1541	1800	1501
Flt Permitted	0.47	1.00		0.54	1.00	1.00	0.95	1.00		0.95	1.00	1.00
Satd. Flow (perm)	748	1744		970	1748	1485	1710	1477		1541	1800	1501
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	17	306	44	72	450	39	11	6	44	22	6	22
RTOR Reduction (vph)	0	3	0	0	0	11	0	40	0	0	0	20
Lane Group Flow (vph)	17	347	0	72	450	28	11	10	0	22	6	2
Confl. Peds. (#/hr)							5		10	10		5
Heavy Vehicles (%)	14%	1%	3%	0%	3%	3%	0%	0%	2%	11%	0%	0%
Turn Type	Perm	NA		Perm	NA	Perm	Prot	NA		Prot	NA	Perm
Protected Phases		2			6		3	8		7	4	
Permitted Phases	2			6		6						4
Actuated Green, G (s)	79.7	79.7		79.7	79.7	79.7	1.5	9.5		3.5	11.5	11.5
Effective Green, g (s)	79.7	79.7		79.7	79.7	79.7	1.5	9.5		3.5	11.5	11.5
Actuated g/C Ratio	0.72	0.72		0.72	0.72	0.72	0.01	0.09		0.03	0.10	0.10
Clearance Time (s)	5.5	5.5		5.5	5.5	5.5	5.9	5.9		5.9	5.9	5.9
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)	541	1263		702	1266	1075	23	127		49	188	156
v/s Ratio Prot		0.20			c0.26		0.01	c0.01		c0.01	0.00	
v/s Ratio Perm	0.02			0.07		0.02						0.00
v/c Ratio	0.03	0.27		0.10	0.36	0.03	0.48	0.08		0.45	0.03	0.01
Uniform Delay, d1	4.3	5.2		4.5	5.6	4.3	53.9	46.2		52.3	44.2	44.2
Progression Factor	0.99	1.10		1.05	1.00	1.00	1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	0.1	0.5		0.3	0.7	0.0	14.8	0.3		6.4	0.1	0.0
Delay (s)	4.3	6.3		5.0	6.3	4.3	68.7	46.5		58.7	44.3	44.2
Level of Service	A	A		A	A	A	E	D		E	D	D
Approach Delay (s)		6.2			6.0			50.5			50.6	
Approach LOS		A			A			D			D	

Intersection Summary					
HCM 2000 Control Delay	10.8	HCM 2000 Level of Service	B		
HCM 2000 Volume to Capacity ratio	0.33				
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	17.3		
Intersection Capacity Utilization	51.4%	ICU Level of Service	A		
Analysis Period (min)	15				
c Critical Lane Group					

HCM Unsignalized Intersection Capacity Analysis
20: Campeau Drive & Golf Course Access

Existing AM Peak Hour



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	5	350	330	0	0	0
Future Volume (Veh/h)	5	350	330	0	0	0
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	6	389	367	0	0	0
Pedestrians					15	
Lane Width (m)					3.6	
Walking Speed (m/s)					1.2	
Percent Blockage					1	
Right turn flare (veh)						
Median type		None	None			
Median storage veh)						
Upstream signal (m)		232				
pX, platoon unblocked					0.87	
vC, conflicting volume	382				783	382
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	382				678	382
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	99				100	100
cM capacity (veh/h)	1173				361	661

Direction, Lane #	EB 1	WB 1	SB 1
Volume Total	395	367	0
Volume Left	6	0	0
Volume Right	0	0	0
cSH	1173	1700	1700
Volume to Capacity	0.01	0.22	0.00
Queue Length 95th (m)	0.1	0.0	0.0
Control Delay (s)	0.2	0.0	0.0
Lane LOS	A		A
Approach Delay (s)	0.2	0.0	0.0
Approach LOS			A

Intersection Summary				
Average Delay		0.1		
Intersection Capacity Utilization		27.0%	ICU Level of Service	A
Analysis Period (min)		15		

HCM Unsignalized Intersection Capacity Analysis
21: Park Ridge Place (East) & Campeau Drive

Existing AM Peak Hour



Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	350	0	0	330	0	5
Future Volume (Veh/h)	350	0	0	330	0	5
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	389	0	0	367	0	6
Pedestrians					5	
Lane Width (m)					3.6	
Walking Speed (m/s)					1.2	
Percent Blockage					0	
Right turn flare (veh)						
Median type	None			None		
Median storage veh)						
Upstream signal (m)	269					
pX, platoon unblocked			0.89		0.89	0.89
vC, conflicting volume			394		761	394
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			259		671	259
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			100		100	99
cM capacity (veh/h)			1169		377	696

Direction, Lane #	EB 1	WB 1	NB 1
Volume Total	389	367	6
Volume Left	0	0	0
Volume Right	0	0	6
cSH	1700	1169	696
Volume to Capacity	0.23	0.00	0.01
Queue Length 95th (m)	0.0	0.0	0.2
Control Delay (s)	0.0	0.0	10.2
Lane LOS			B
Approach Delay (s)	0.0	0.0	10.2
Approach LOS			B

Intersection Summary				
Average Delay		0.1		
Intersection Capacity Utilization		29.4%	ICU Level of Service	A
Analysis Period (min)		15		

Intersection Sign configuration not allowed in HCM analysis.

Intersection Sign configuration not allowed in HCM analysis.

Queues
1: Terry Fox Drive & Campeau Drive

Existing PM Peak Hour

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	85	70	65	330	65	135	30	825	195	75	840	205
Future Volume (vph)	85	70	65	330	65	135	30	825	195	75	840	205
Lane Group Flow (vph)	94	78	72	367	72	150	33	917	217	83	933	228
Turn Type	Perm	NA	Perm	Perm	NA	Perm	pm+pt	NA	Perm	pm+pt	NA	Perm
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4		4	8		8	2		2	6		6
Detector Phase	4	4	4	8	8	8	5	2	2	1	6	6
Switch Phase												
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Minimum Split (s)	43.4	43.4	43.4	43.4	43.4	43.4	11.4	40.4	40.4	11.4	40.4	40.4
Total Split (s)	48.0	48.0	48.0	48.0	48.0	48.0	22.0	50.0	50.0	22.0	50.0	50.0
Total Split (%)	40.0%	40.0%	40.0%	40.0%	40.0%	40.0%	18.3%	41.7%	41.7%	18.3%	41.7%	41.7%
Yellow Time (s)	3.7	3.7	3.7	3.7	3.7	3.7	4.2	4.2	4.2	4.2	4.2	4.2
All-Red Time (s)	2.7	2.7	2.7	2.7	2.7	2.7	2.2	2.2	2.2	2.2	2.2	2.2
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4
Lead/Lag							Lead	Lag	Lag	Lead	Lag	Lag
Lead-Lag Optimize?							Yes	Yes	Yes	Yes	Yes	Yes
Recall Mode	None	None	None	None	None	None	None	C-Min	C-Min	None	C-Min	C-Min
v/c Ratio	0.23	0.13	0.13	0.90	0.12	0.25	0.12	0.57	0.27	0.28	0.54	0.26
Control Delay	29.8	27.8	4.1	60.1	25.5	4.8	14.3	27.2	6.4	15.6	24.3	3.6
Queue Delay	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	29.8	27.8	4.1	60.1	25.5	4.8	14.3	27.2	6.4	15.6	24.3	3.6
Queue Length 50th (m)	16.5	13.2	0.0	83.9	8.9	3.2	3.6	91.4	5.3	9.3	91.1	0.0
Queue Length 95th (m)	30.1	24.8	7.3	#136.4	13.1	3.4	8.7	119.3	21.9	17.5	116.8	14.9
Internal Link Dist (m)		139.7			148.2			149.3			180.0	
Turn Bay Length (m)	70.0			75.0			50.0		60.0	105.0		
Base Capacity (vph)	452	637	589	447	637	633	400	1601	791	382	1716	881
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	131	0	0	0	0	0	0	13	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.21	0.15	0.12	0.82	0.11	0.24	0.08	0.57	0.28	0.22	0.54	0.26

Intersection Summary

Cycle Length: 120
Actuated Cycle Length: 120
Offset: 93 (78%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green
Natural Cycle: 100
Control Type: Actuated-Coordinated
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 1: Terry Fox Drive & Campeau Drive



HCM Signalized Intersection Capacity Analysis
1: Terry Fox Drive & Campeau Drive

Existing PM Peak Hour

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	85	70	65	330	65	135	30	825	195	75	840	205
Future Volume (vph)	85	70	65	330	65	135	30	825	195	75	840	205
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Total Lost time (s)	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95	1.00	1.00	0.95	1.00
Frpb, ped/bikes	1.00	1.00	0.98	1.00	1.00	1.00	1.00	1.00	0.97	1.00	1.00	1.00
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	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)	1710	1800	1504	1703	1800	1515	1710	3420	1486	1710	3420	1530
Flt Permitted	0.71	1.00	1.00	0.71	1.00	1.00	0.23	1.00	1.00	0.20	1.00	1.00
Satd. Flow (perm)	1278	1800	1504	1266	1800	1515	409	3420	1486	363	3420	1530
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	94	78	72	367	72	150	33	917	217	83	933	228
RTOR Reduction (vph)	0	0	49	0	0	102	0	0	98	0	0	118
Lane Group Flow (vph)	94	78	23	367	72	49	33	917	119	83	933	110
Confl. Peds. (#/hr)			5	5					5	5		
Heavy Vehicles (%)	0%	0%	0%	0%	0%	1%	0%	0%	0%	0%	0%	0%
Turn Type	Perm	NA	Perm	Perm	NA	Perm	pm+pt	NA	Perm	pm+pt	NA	Perm
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4		4	8		8	2		2	6		6
Actuated Green, G (s)	38.8	38.8	38.8	38.8	38.8	38.8	59.2	54.9	54.9	64.8	57.7	57.7
Effective Green, g (s)	38.8	38.8	38.8	38.8	38.8	38.8	59.2	54.9	54.9	64.8	57.7	57.7
Actuated g/C Ratio	0.32	0.32	0.32	0.32	0.32	0.32	0.49	0.46	0.46	0.54	0.48	0.48
Clearance Time (s)	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4
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)	413	582	486	409	582	489	248	1564	679	275	1644	735
v/s Ratio Prot		0.04			0.04		0.00	0.27		c0.02	c0.27	
v/s Ratio Perm	0.07		0.02	c0.29		0.03	0.06		0.08	0.14		0.07
v/c Ratio	0.23	0.13	0.05	0.90	0.12	0.10	0.13	0.59	0.18	0.30	0.57	0.15
Uniform Delay, d1	29.7	28.7	27.9	38.7	28.6	28.4	16.6	24.1	19.2	15.3	22.2	17.4
Progression Factor	1.00	1.00	1.00	0.93	0.93	0.91	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	0.3	0.1	0.0	20.6	0.1	0.1	0.2	1.6	0.6	0.6	1.4	0.4
Delay (s)	29.9	28.8	27.9	56.7	26.6	25.9	16.8	25.7	19.8	16.0	23.7	17.9
Level of Service	C	C	C	E	C	C	B	C	B	B	C	B
Approach Delay (s)		29.0			45.2			24.4			22.1	
Approach LOS		C			D			C			C	

Intersection Summary

HCM 2000 Control Delay	27.6	HCM 2000 Level of Service		C	
HCM 2000 Volume to Capacity ratio	0.69				
Actuated Cycle Length (s)	120.0	Sum of lost time (s)		19.2	
Intersection Capacity Utilization	74.7%	ICU Level of Service		D	
Analysis Period (min)	15				

c Critical Lane Group

Queues
2: Kanata Avenue & Campeau Drive

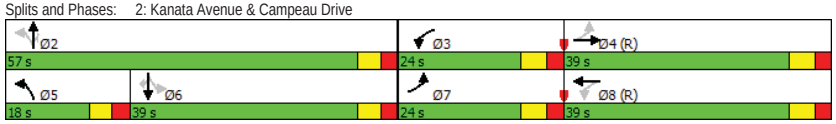
Existing PM Peak Hour

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations										
Traffic Volume (vph)	240	270	55	310	140	390	35	45	265	195
Future Volume (vph)	240	270	55	310	140	390	35	45	265	195
Lane Group Flow (vph)	267	467	61	422	156	433	39	50	294	217
Turn Type	pm+pt	NA	pm+pt	NA	pm+pt	NA	Perm	Perm	NA	Perm
Protected Phases	7	4	3	8	5	2			6	
Permitted Phases	4		8		2		2	6		6
Detector Phase	7	4	3	8	5	2	2	6	6	6
Switch Phase										
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Minimum Split (s)	11.2	36.2	11.2	36.2	10.9	29.9	29.9	29.9	29.9	29.9
Total Split (s)	24.0	39.0	24.0	39.0	18.0	57.0	57.0	39.0	39.0	39.0
Total Split (%)	20.0%	32.5%	20.0%	32.5%	15.0%	47.5%	47.5%	32.5%	32.5%	32.5%
Yellow Time (s)	3.7	3.7	3.7	3.7	3.3	3.3	3.3	3.3	3.3	3.3
All-Red Time (s)	2.5	2.5	2.5	2.5	2.6	2.6	2.6	2.6	2.6	2.6
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	6.2	6.2	6.2	6.2	5.9	5.9	5.9	5.9	5.9	5.9
Lead/Lag	Lead	Lag	Lead	Lag	Lead			Lag	Lag	Lag
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes			Yes	Yes	Yes
Recall Mode	None	C-Min	None	C-Min	None	None	None	None	None	None
v/c Ratio	0.63	0.61	0.17	0.66	0.58	0.68	0.07	0.27	0.78	0.46
Control Delay	27.5	29.9	17.2	40.1	34.8	37.9	0.2	41.5	58.9	7.9
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	27.5	29.9	17.2	40.1	34.8	37.9	0.2	41.5	58.9	7.9
Queue Length 50th (m)	30.8	53.4	6.9	86.6	27.1	90.1	0.0	10.5	69.6	0.0
Queue Length 95th (m)	72.6	#136.1	16.1	#156.3	39.4	113.0	0.2	21.0	93.4	18.9
Internal Link Dist (m)		217.6		101.3		108.6			167.9	
Turn Bay Length (m)	95.0		35.0		55.0		55.0	115.0		100.0
Base Capacity (vph)	450	763	510	635	277	766	679	240	496	551
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	0.59	0.61	0.12	0.66	0.56	0.57	0.06	0.21	0.59	0.39

Intersection Summary

Cycle Length: 120
Actuated Cycle Length: 120
Offset: 31 (26%), Referenced to phase 4:EBTL and 8:WBTL, Start of Green
Natural Cycle: 90
Control Type: Actuated-Coordinated
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 2: Kanata Avenue & Campeau Drive



HCM Signalized Intersection Capacity Analysis
2: Kanata Avenue & Campeau Drive

Existing PM Peak Hour

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	240	270	150	55	310	70	140	390	35	45	265	195
Future Volume (vph)	240	270	150	55	310	70	140	390	35	45	265	195
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Total Lost time (s)	6.2	6.2		6.2	6.2		5.9	5.9	5.9	5.9	5.9	5.9
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00
Frpb, ped/bikes	1.00	0.98		1.00	0.99		1.00	1.00	0.97	1.00	1.00	0.94
Flpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00	1.00	0.99	1.00	1.00
Frt	1.00	0.95		1.00	0.97		1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1707	1673		1701	1737		1705	1800	1481	1699	1800	1429
Flt Permitted	0.27	1.00		0.40	1.00		0.23	1.00	1.00	0.49	1.00	1.00
Satd. Flow (perm)	490	1673		717	1737		419	1800	1481	873	1800	1429
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	267	300	167	61	344	78	156	433	39	50	294	217
RTOR Reduction (vph)	0	13	0	0	6	0	0	0	25	0	0	172
Lane Group Flow (vph)	267	454	0	61	416	0	156	433	14	50	294	45
Confl. Peds. (#/hr)	10		15	15		10	15		5	5		15
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%
Turn Type	pm+pt	NA		pm+pt	NA		pm+pt	NA	Perm	Perm	NA	Perm
Protected Phases	7	4		3	8		5	2			6	
Permitted Phases	4			8			2		2	6		6
Actuated Green, G (s)	65.3	52.6		50.0	43.5		42.6	42.6	42.6	25.1	25.1	25.1
Effective Green, g (s)	65.3	52.6		50.0	43.5		42.6	42.6	42.6	25.1	25.1	25.1
Actuated g/C Ratio	0.54	0.44		0.42	0.36		0.36	0.36	0.36	0.21	0.21	0.21
Clearance Time (s)	6.2	6.2		6.2	6.2		5.9	5.9	5.9	5.9	5.9	5.9
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)	424	733		352	629		273	639	525	182	376	298
v/s Ratio Prot	c0.08	c0.27		0.01	0.24		0.06	c0.24			c0.16	
v/s Ratio Perm	c0.26			0.06			0.15		0.01	0.06		0.03
v/c Ratio	0.63	0.62		0.17	0.66		0.57	0.68	0.03	0.27	0.78	0.15
Uniform Delay, d1	18.0	26.0		21.5	32.1		29.2	32.9	25.2	39.8	44.9	38.8
Progression Factor	1.34	0.98		1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	2.3	3.1		0.2	5.4		2.9	2.9	0.0	0.8	10.1	0.2
Delay (s)	26.4	28.5		21.7	37.5		32.0	35.7	25.2	40.6	55.0	39.0
Level of Service	C	C		C	D		C	D	C	D	E	D
Approach Delay (s)		27.7			35.5			34.2			47.5	
Approach LOS		C			D			C			D	

Intersection Summary

HCM 2000 Control Delay	35.6	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.72		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	24.2
Intersection Capacity Utilization	85.0%	ICU Level of Service	E
Analysis Period (min)	15		

c Critical Lane Group

Queues
3: Maritime Way/Knudson Drive & Campeau Drive

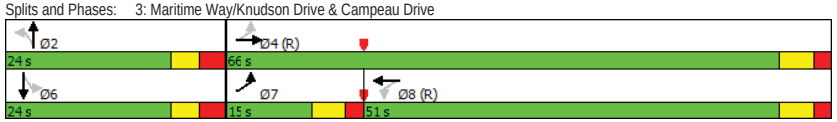
Existing PM Peak Hour

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations								
Traffic Volume (vph)	45	270	70	375	5	10	45	5
Future Volume (vph)	45	270	70	375	5	10	45	5
Lane Group Flow (vph)	50	311	78	545	6	78	50	62
Turn Type	pm+pt	NA	Perm	NA	Perm	NA	Perm	NA
Protected Phases	7	4		8		2		6
Permitted Phases	4		8		2		6	
Detector Phase	7	4	8	8	2	2	6	6
Switch Phase								
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Minimum Split (s)	10.7	27.7	27.7	27.7	23.0	23.0	23.0	23.0
Total Split (s)	15.0	66.0	51.0	51.0	24.0	24.0	24.0	24.0
Total Split (%)	16.7%	73.3%	56.7%	56.7%	26.7%	26.7%	26.7%	26.7%
Yellow Time (s)	3.7	3.7	3.7	3.7	3.0	3.0	3.0	3.0
All-Red Time (s)	2.0	2.0	2.0	2.0	3.0	3.0	3.0	3.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	5.7	5.7	5.7	5.7	6.0	6.0	6.0	6.0
Lead/Lag	Lead		Lag	Lag				
Lead-Lag Optimize?	Yes		Yes	Yes				
Recall Mode	None	C-Min	C-Min	C-Min	None	None	None	None
v/c Ratio	0.08	0.22	0.11	0.44	0.04	0.34	0.36	0.29
Control Delay	3.8	3.9	14.0	16.4	33.2	15.3	42.7	14.8
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	3.8	3.9	14.0	16.4	33.2	15.3	42.7	14.8
Queue Length 50th (m)	1.7	12.0	5.9	51.9	1.0	1.8	8.7	1.0
Queue Length 95th (m)	6.1	29.6	m24.7	137.0	4.3	13.6	18.3	11.6
Internal Link Dist (m)		436.9		443.4		129.6		89.7
Turn Bay Length (m)	55.0		55.0		45.0		50.0	
Base Capacity (vph)	626	1431	736	1237	255	367	254	344
Starvation Cap Reductn	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.08	0.22	0.11	0.44	0.02	0.21	0.20	0.18

Intersection Summary

Cycle Length: 90
Actuated Cycle Length: 90
Offset: 0 (0%), Referenced to phase 4:EBTL and 8:WBTL, Start of Green
Natural Cycle: 65
Control Type: Actuated-Coordinated
m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 3: Maritime Way/Knudson Drive & Campeau Drive



HCM Signalized Intersection Capacity Analysis
3: Maritime Way/Knudson Drive & Campeau Drive

Existing PM Peak Hour

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	45	270	10	70	375	115	5	10	60	45	5	50
Future Volume (vph)	45	270	10	70	375	115	5	10	60	45	5	50
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Total Lost time (s)	5.7	5.7		5.7	5.7		6.0	6.0		6.0	6.0	
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Frpb, ped/bikes	1.00	1.00		1.00	0.99		1.00	1.00		1.00	0.95	
Flpb, ped/bikes	1.00	1.00		1.00	1.00		0.99	1.00		1.00	1.00	
Frt	1.00	0.99		1.00	0.96		1.00	0.87		1.00	0.86	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1704	1790		1710	1716		1689	1568		1710	1483	
Flt Permitted	0.37	1.00		0.57	1.00		0.72	1.00		0.71	1.00	
Satd. Flow (perm)	662	1790		1028	1716		1274	1568		1271	1483	
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	50	300	11	78	417	128	6	11	67	50	6	56
RTOR Reduction (vph)	0	1	0	0	8	0	0	61	0	0	51	0
Lane Group Flow (vph)	50	310	0	78	537	0	6	17	0	50	11	0
Confl. Peds. (#/hr)	15					15	5					5
Confl. Bikes (#/hr)												5
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Turn Type	pm+pt	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases	7	4			8			2			6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)	69.6	69.6		59.9	59.9		8.7	8.7		8.7	8.7	
Effective Green, g (s)	69.6	69.6		59.9	59.9		8.7	8.7		8.7	8.7	
Actuated g/C Ratio	0.77	0.77		0.67	0.67		0.10	0.10		0.10	0.10	
Clearance Time (s)	5.7	5.7		5.7	5.7		6.0	6.0		6.0	6.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	558	1384		684	1142		123	151		122	143	
v/s Ratio Prot	0.00	c0.17			c0.31			0.01			0.01	
v/s Ratio Perm	0.07			0.08			0.00			c0.04		
v/c Ratio	0.09	0.22		0.11	0.47		0.05	0.12		0.41	0.08	
Uniform Delay, d1	3.4	2.8		5.4	7.3		36.9	37.1		38.2	37.0	
Progression Factor	1.00	1.00		1.74	1.79		1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.1	0.4		0.3	1.2		0.2	0.3		2.2	0.2	
Delay (s)	3.5	3.2		9.8	14.3		37.1	37.5		40.5	37.2	
Level of Service	A	A		A	B		D	D		D	D	
Approach Delay (s)		3.2			13.8			37.4			38.7	
Approach LOS		A			B			D			D	

Intersection Summary

HCM 2000 Control Delay	14.6	HCM 2000 Level of Service		B	
HCM 2000 Volume to Capacity ratio	0.46				
Actuated Cycle Length (s)	90.0	Sum of lost time (s)		17.4	
Intersection Capacity Utilization	57.3%	ICU Level of Service		B	
Analysis Period (min)	15				

c Critical Lane Group

Queues
4: Teron Road & Campeau Drive

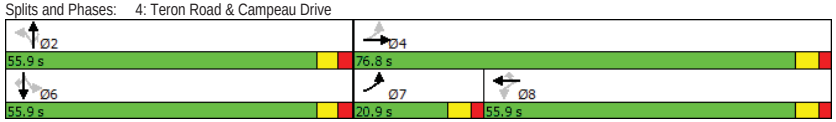
Existing PM Peak Hour

Lane Group	EBL	EBT	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations											
Traffic Volume (vph)	160	155	85	320	405	15	25	70	345	40	260
Future Volume (vph)	160	155	85	320	405	15	25	70	345	40	260
Lane Group Flow (vph)	178	194	94	356	450	0	45	78	383	44	289
Turn Type	pm+pt	NA	Perm	NA	Perm	Perm	NA	Perm	Perm	NA	Perm
Protected Phases	7	4		8			2			6	
Permitted Phases	4		8		8	2		2	6		6
Detector Phase	7	4	8	8	8	2	2	2	6	6	6
Switch Phase											
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Minimum Split (s)	10.9	55.9	55.9	55.9	55.9	26.9	26.9	26.9	26.9	26.9	26.9
Total Split (s)	20.9	76.8	55.9	55.9	55.9	55.9	55.9	55.9	55.9	55.9	55.9
Total Split (%)	15.7%	57.9%	42.1%	42.1%	42.1%	42.1%	42.1%	42.1%	42.1%	42.1%	42.1%
Yellow Time (s)	3.7	3.7	3.7	3.7	3.7	3.3	3.3	3.3	3.3	3.3	3.3
All-Red Time (s)	2.2	2.2	2.2	2.2	2.2	2.6	2.6	2.6	2.6	2.6	2.6
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	5.9	5.9	5.9	5.9	5.9		5.9	5.9	5.9	5.9	5.9
Lead/Lag	Lead		Lag	Lag	Lag						
Lead-Lag Optimize?	Yes		Yes	Yes	Yes						
Recall Mode	None	Max	Max	Max	Max	None	None	None	None	None	None
v/c Ratio	0.37	0.19	0.19	0.46	0.52		0.08	0.15	0.92	0.07	0.42
Control Delay	16.9	14.5	27.0	30.4	4.9		27.6	6.4	67.4	27.4	5.1
Queue Delay	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0
Total Delay	16.9	14.5	27.0	30.4	4.9		27.6	6.4	67.4	27.4	5.1
Queue Length 50th (m)	23.0	24.3	16.0	69.3	0.0		7.9	0.0	94.4	7.7	0.0
Queue Length 95th (m)	38.6	40.5	31.5	107.1	24.1		16.6	10.9	#150.2	16.4	18.9
Internal Link Dist (m)		269.3		262.3			58.3			132.3	
Turn Bay Length (m)	65.0		160.0					70.0	85.0		
Base Capacity (vph)	504	1004	483	769	859		652	619	497	721	755
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	0.35	0.19	0.19	0.46	0.52		0.07	0.13	0.77	0.06	0.38

Intersection Summary

Cycle Length: 132.7
Actuated Cycle Length: 125.3
Natural Cycle: 105
Control Type: Actuated-Uncoordinated
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 4: Teron Road & Campeau Drive



HCM Signalized Intersection Capacity Analysis
4: Teron Road & Campeau Drive

Existing PM Peak Hour

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	160	155	20	85	320	405	15	25	70	345	40	260
Future Volume (vph)	160	155	20	85	320	405	15	25	70	345	40	260
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Total Lost time (s)	5.9	5.9		5.9	5.9	5.9		5.9	5.9	5.9	5.9	5.9
Lane Util. Factor	1.00	1.00		1.00	1.00	1.00		1.00	1.00	1.00	1.00	1.00
Frpb, ped/bikes	1.00	1.00		1.00	1.00	0.92		1.00	0.94	1.00	1.00	0.95
Flpb, ped/bikes	0.99	1.00		0.99	1.00	1.00		0.99	1.00	0.96	1.00	1.00
Frt	1.00	0.98		1.00	1.00	0.85		1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00	1.00		0.98	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1681	1763		1691	1800	1414		1748	1432	1622	1800	1455
Flt Permitted	0.39	1.00		0.64	1.00	1.00		0.91	1.00	0.73	1.00	1.00
Satd. Flow (perm)	681	1763		1132	1800	1414		1628	1432	1242	1800	1455
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	178	172	22	94	356	450	17	28	78	383	44	289
RTOR Reduction (vph)	0	3	0	0	0	258	0	0	52	0	0	192
Lane Group Flow (vph)	178	191	0	94	356	192	0	45	26	383	44	97
Confl. Peds. (#/hr)	20		5	5		20	10		15	15		10
Heavy Vehicles (%)	1%	0%	0%	0%	0%	0%	0%	0%	0%	1%	0%	0%
Turn Type	pm+pt	NA		Perm	NA	Perm	Perm	NA	Perm	Perm	NA	Perm
Protected Phases	7	4			8			2			6	
Permitted Phases	4			8		8	2		2	6		6
Actuated Green, G (s)	71.2	71.2		53.5	53.5	53.5		42.2	42.2	42.2	42.2	42.2
Effective Green, g (s)	71.2	71.2		53.5	53.5	53.5		42.2	42.2	42.2	42.2	42.2
Actuated g/C Ratio	0.57	0.57		0.43	0.43	0.43		0.34	0.34	0.34	0.34	0.34
Clearance Time (s)	5.9	5.9		5.9	5.9	5.9		5.9	5.9	5.9	5.9	5.9
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)	481	1002		483	769	604		548	482	418	606	490
v/s Ratio Prot	c0.03	0.11			c0.20						0.02	
v/s Ratio Perm	0.18			0.08		0.14		0.03	0.02	c0.31		0.07
v/c Ratio	0.37	0.19		0.19	0.46	0.32		0.08	0.05	0.92	0.07	0.20
Uniform Delay, d1	14.6	13.1		22.4	25.6	23.8		28.3	28.0	39.8	28.2	29.5
Progression Factor	1.00	1.00		1.00	1.00	1.00		1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	0.5	0.4		0.9	2.0	1.4		0.1	0.0	24.5	0.1	0.2
Delay (s)	15.0	13.5		23.3	27.6	25.1		28.4	28.1	64.3	28.3	29.7
Level of Service	B	B		C	C	C		C	C	E	C	C
Approach Delay (s)		14.2			25.9			28.2			48.1	
Approach LOS		B			C			C			D	

Intersection Summary

HCM 2000 Control Delay	31.5	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.63		
Actuated Cycle Length (s)	125.2	Sum of lost time (s)	17.7
Intersection Capacity Utilization	69.3%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

Queues
5: March Road & Campeau Drive/Hwy 417 Off Ramp

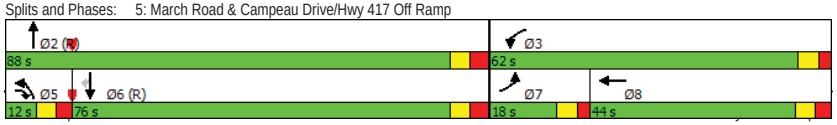
Existing PM Peak Hour

Lane Group	EBL	EBR	WBL	WBT	NBL	NBT	SBT	SBR
Lane Configurations								
Traffic Volume (vph)	35	535	490	430	330	570	2485	50
Future Volume (vph)	35	535	490	430	330	570	2485	50
Lane Group Flow (vph)	39	563	544	478	367	633	2485	56
Turn Type	Prot	Over	Prot	NA	Prot	NA	NA	Perm
Protected Phases	7	5	3	8	5	2	6	
Permitted Phases								6
Detector Phase	7	5	3	8	5	2	6	6
Switch Phase								
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Minimum Split (s)	11.0	11.5	24.2	43.8	11.5	30.5	30.5	30.5
Total Split (s)	18.0	12.0	62.0	44.0	12.0	88.0	76.0	76.0
Total Split (%)	12.0%	8.0%	41.3%	29.3%	8.0%	58.7%	50.7%	50.7%
Yellow Time (s)	3.7	3.7	3.7	3.7	3.7	3.7	3.7	3.7
All-Red Time (s)	2.3	2.8	2.5	3.1	2.8	3.8	3.8	3.8
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-1.0
Total Lost Time (s)	6.0	6.5	6.2	6.8	6.5	7.5	7.5	6.5
Lead/Lag	Lead	Lead		Lag	Lead		Lag	Lag
Lead-Lag Optimize?	Yes	Yes		Yes	Yes		Yes	Yes
Recall Mode	None	None	None	None	None	C-Min	C-Min	C-Min
v/c Ratio	0.38	0.98	0.61	0.77	0.66	0.27	0.95	0.07
Control Delay	77.6	94.5	51.1	68.1	66.7	12.5	49.1	0.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	77.6	94.5	51.1	68.1	66.7	12.5	49.1	0.2
Queue Length 50th (m)	12.0	~96.8	76.5	76.5	57.4	43.2	246.4	0.0
Queue Length 95th (m)	24.6	#170.6	88.3	93.1	#107.1	63.2	267.2	0.0
Internal Link Dist (m)				269.9		155.6	164.4	
Turn Bay Length (m)	60.0	190.0	150.0		150.0			150.0
Base Capacity (vph)	144	573	1289	895	556	2349	2603	812
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	0.27	0.98	0.42	0.53	0.66	0.27	0.95	0.07

Intersection Summary

Cycle Length: 150
Actuated Cycle Length: 150
Offset: 79 (53%), Referenced to phase 2:NBT and 6:SBT, Start of Green
Natural Cycle: 150
Control Type: Actuated-Coordinated
~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 5: March Road & Campeau Drive/Hwy 417 Off Ramp



HCM Signalized Intersection Capacity Analysis
5: March Road & Campeau Drive/Hwy 417 Off Ramp

Existing PM Peak Hour

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	35	0	535	490	430	0	330	570	0	0	2485	50
Future Volume (vph)	35	0	535	490	430	0	330	570	0	0	2485	50
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.0		6.5	6.2	6.8		6.5	7.5			7.5	6.5
Lane Util. Factor	1.00		*1.00	0.97	0.95		0.97	0.95			*1.00	1.00
Frt	1.00		1.00	1.00	1.00		1.00	1.00			1.00	0.85
Flt Protected	0.95		1.00	0.95	1.00		1.00	1.00			1.00	1.00
Satd. Flow (prot)	1805		3800	3467	3610		3686	3610			5700	1615
Flt Permitted	0.95		1.00	0.95	1.00		1.00	1.00			1.00	1.00
Satd. Flow (perm)	1805		3800	3467	3610		3686	3610			5700	1615
Peak-hour factor, PHF	0.90	0.90	0.95	0.90	0.90	0.90	0.90	0.90	0.90	0.90	1.00	0.90
Adj. Flow (vph)	39	0	563	544	478	0	367	633	0	0	2485	56
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	0	0	30
Lane Group Flow (vph)	39	0	563	544	478	0	367	633	0	0	2485	26
Heavy Vehicles (%)	0%	0%	0%	1%	0%	0%	0%	0%	0%	0%	0%	0%
Turn Type	Prot		Over	Prot	NA		Prot	NA			NA	Perm
Protected Phases	7		5	3	8		5	2			6	
Permitted Phases												6
Actuated Green, G (s)	7.5		22.6	39.8	25.7		22.6	96.5			67.4	67.4
Effective Green, g (s)	7.5		22.6	39.8	25.7		22.6	96.5			67.4	68.4
Actuated g/C Ratio	0.05		0.15	0.27	0.17		0.15	0.64			0.45	0.46
Clearance Time (s)	6.0		6.5	6.2	6.8		6.5	7.5			7.5	7.5
Vehicle Extension (s)	3.0		3.0	3.0	3.0		3.0	3.0			3.0	3.0
Lane Grp Cap (vph)	90		572	919	618		555	2322			2561	736
v/s Ratio Prot	0.02		c0.15	c0.16	c0.13		0.10	0.18			c0.44	
v/s Ratio Perm												0.02
v/c Ratio	0.43		0.98	0.59	0.77		0.66	0.27			0.97	0.03
Uniform Delay, d1	69.2		63.5	48.0	59.4		60.1	11.6			40.3	22.6
Progression Factor	1.00		1.00	1.00	1.00		1.00	1.00			1.00	1.00
Incremental Delay, d2	3.3		33.4	1.0	6.0		3.0	0.3			12.1	0.1
Delay (s)	72.5		96.9	49.1	65.4		63.0	11.9			52.4	22.6
Level of Service	E		F	D	E		E	B			D	C
Approach Delay (s)		95.3			56.7			30.6			51.7	
Approach LOS		F			E			C			D	

Intersection Summary

HCM 2000 Control Delay	53.7	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.93		
Actuated Cycle Length (s)	150.0	Sum of lost time (s)	26.8
Intersection Capacity Utilization	97.5%	ICU Level of Service	F
Analysis Period (min)	15		

c Critical Lane Group

HCM Unsignalized Intersection Capacity Analysis
6: Kanata Avenue & Knudson Drive

Existing PM Peak Hour



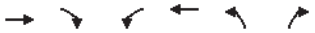
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Sign Control	Stop		Stop			Stop
Traffic Volume (vph)	175	110	150	130	55	130
Future Volume (vph)	175	110	150	130	55	130
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	194	122	167	144	61	144

Direction, Lane #	WB 1	NB 1	SB 1	SB 2
Volume Total (vph)	316	311	61	144
Volume Left (vph)	194	0	61	0
Volume Right (vph)	122	144	0	0
Hadj (s)	-0.11	-0.28	0.50	0.00
Departure Headway (s)	5.1	4.9	6.3	5.7
Degree Utilization, x	0.45	0.43	0.11	0.23
Capacity (veh/h)	666	698	542	591
Control Delay (s)	12.1	11.5	8.8	9.3
Approach Delay (s)	12.1	11.5	9.1	
Approach LOS	B	B	A	

Intersection Summary				
Delay			11.2	
Level of Service			B	
Intersection Capacity Utilization			47.5%	ICU Level of Service A
Analysis Period (min)			15	

HCM Unsignalized Intersection Capacity Analysis
7: Shaughnessy Crescent (East) & Knudson Drive

Existing PM Peak Hour



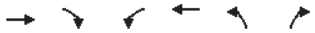
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	145	10	25	270	15	10
Future Volume (Veh/h)	145	10	25	270	15	10
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	161	11	28	300	17	11
Pedestrians					15	
Lane Width (m)					3.6	
Walking Speed (m/s)					1.2	
Percent Blockage					1	
Right turn flare (veh)						
Median type	None			None		
Median storage veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume			187		538	182
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			187		538	182
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			98		97	99
cM capacity (veh/h)			1382		491	855

Direction, Lane #	EB 1	WB 1	NB 1
Volume Total	172	328	28
Volume Left	0	28	17
Volume Right	11	0	11
cSH	1700	1382	590
Volume to Capacity	0.10	0.02	0.05
Queue Length 95th (m)	0.0	0.5	1.2
Control Delay (s)	0.0	0.8	11.4
Lane LOS		A	B
Approach Delay (s)	0.0	0.8	11.4
Approach LOS			B

Intersection Summary				
Average Delay			1.1	
Intersection Capacity Utilization			40.4%	ICU Level of Service A
Analysis Period (min)			15	

HCM Unsignalized Intersection Capacity Analysis
8: Shaughnessy Crescent (West) & Knudson Drive

Existing PM Peak Hour



Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	145	25	15	270	15	10
Future Volume (Veh/h)	145	25	15	270	15	10
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	161	28	17	300	17	11
Pedestrians					20	
Lane Width (m)					3.6	
Walking Speed (m/s)					1.2	
Percent Blockage					2	
Right turn flare (veh)						
Median type	None			None		
Median storage veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume			209		529	195
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			209		529	195
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			99		97	99
cM capacity (veh/h)			1351		499	837

Direction, Lane #	EB 1	WB 1	NB 1
Volume Total	189	317	28
Volume Left	0	17	17
Volume Right	28	0	11
cSH	1700	1351	593
Volume to Capacity	0.11	0.01	0.05
Queue Length 95th (m)	0.0	0.3	1.2
Control Delay (s)	0.0	0.5	11.4
Lane LOS		A	B
Approach Delay (s)	0.0	0.5	11.4
Approach LOS			B

Intersection Summary				
Average Delay		0.9		
Intersection Capacity Utilization		37.9%	ICU Level of Service	A
Analysis Period (min)		15		

HCM Unsignalized Intersection Capacity Analysis
9: Knudson Drive & Sherk Crescent (North)

Existing PM Peak Hour



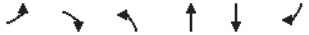
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	10	10	15	125	85	20
Future Volume (Veh/h)	10	10	15	125	85	20
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	11	11	17	139	94	22
Pedestrians	15					
Lane Width (m)	3.6					
Walking Speed (m/s)	1.2					
Percent Blockage	1					
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	293	120	131			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	293	120	131			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	98	99	99			
cM capacity (veh/h)	685	925	1448			

Direction, Lane #	EB 1	NB 1	SB 1
Volume Total	22	156	116
Volume Left	11	17	0
Volume Right	11	0	22
cSH	787	1448	1700
Volume to Capacity	0.03	0.01	0.07
Queue Length 95th (m)	0.7	0.3	0.0
Control Delay (s)	9.7	0.9	0.0
Lane LOS	A	A	
Approach Delay (s)	9.7	0.9	0.0
Approach LOS	A		

Intersection Summary				
Average Delay		1.2		
Intersection Capacity Utilization		24.5%	ICU Level of Service	A
Analysis Period (min)		15		

HCM Unsignalized Intersection Capacity Analysis
10: Knudson Drive & Sherk Crescent (South)

Existing PM Peak Hour



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	5	20	25	135	90	5
Future Volume (Veh/h)	5	20	25	135	90	5
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	6	22	28	150	100	6
Pedestrians	10					
Lane Width (m)	3.6					
Walking Speed (m/s)	1.2					
Percent Blockage	1					
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	319	113	116			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	319	113	116			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	99	98	98			
cM capacity (veh/h)	660	937	1473			

Direction, Lane #	EB 1	NB 1	SB 1
Volume Total	28	178	106
Volume Left	6	28	0
Volume Right	22	0	6
cSH	860	1473	1700
Volume to Capacity	0.03	0.02	0.06
Queue Length 95th (m)	0.8	0.5	0.0
Control Delay (s)	9.3	1.3	0.0
Lane LOS	A	A	
Approach Delay (s)	9.3	1.3	0.0
Approach LOS	A		

Intersection Summary				
Average Delay		1.6		
Intersection Capacity Utilization		25.6%	ICU Level of Service	A
Analysis Period (min)		15		

HCM Unsignalized Intersection Capacity Analysis
11: Knudson Drive & Weslock Way

Existing PM Peak Hour



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Sign Control		Stop	Stop		Stop	
Traffic Volume (vph)	105	50	70	50	70	245
Future Volume (vph)	105	50	70	50	70	245
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	117	56	78	56	78	272

Direction, Lane #	EB 1	WB 1	SB 1
Volume Total (vph)	173	134	350
Volume Left (vph)	117	0	78
Volume Right (vph)	0	56	272
Hadj (s)	0.14	-0.25	-0.42
Departure Headway (s)	5.0	4.7	4.2
Degree Utilization, x	0.24	0.17	0.41
Capacity (veh/h)	668	706	809
Control Delay (s)	9.6	8.7	10.2
Approach Delay (s)	9.6	8.7	10.2
Approach LOS	A	A	B

Intersection Summary				
Delay		9.7		
Level of Service		A		
Intersection Capacity Utilization		42.7%	ICU Level of Service	A
Analysis Period (min)		15		

HCM Unsignalized Intersection Capacity Analysis
12: Weslock Way & Beaverbrook Road

Existing PM Peak Hour



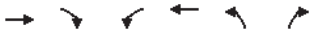
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Sign Control	Stop		Stop			Stop
Traffic Volume (vph)	305	175	25	130	75	10
Future Volume (vph)	305	175	25	130	75	10
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	339	194	28	144	83	11

Direction, Lane #	WB 1	NB 1	SB 1
Volume Total (vph)	533	172	94
Volume Left (vph)	339	0	83
Volume Right (vph)	194	144	0
Hadj (s)	-0.09	-0.50	0.18
Departure Headway (s)	4.5	4.8	5.6
Degree Utilization, x	0.67	0.23	0.15
Capacity (veh/h)	774	663	575
Control Delay (s)	16.0	9.3	9.6
Approach Delay (s)	16.0	9.3	9.6
Approach LOS	C	A	A

Intersection Summary			
Delay		13.8	
Level of Service		B	
Intersection Capacity Utilization		54.1%	ICU Level of Service A
Analysis Period (min)		15	

HCM Unsignalized Intersection Capacity Analysis
13: Omni Health Care & Campeau Drive

Existing PM Peak Hour



Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	325	10	5	405	20	10
Future Volume (Veh/h)	325	10	5	405	20	10
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	361	11	6	450	22	11
Pedestrians					10	
Lane Width (m)					3.6	
Walking Speed (m/s)					1.2	
Percent Blockage					1	
Right turn flare (veh)						
Median type	None			None		
Median storage veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume			382		838	376
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			382		838	376
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			99		93	98
cM capacity (veh/h)			1178		334	669

Direction, Lane #	EB 1	WB 1	NB 1
Volume Total	372	456	33
Volume Left	0	6	22
Volume Right	11	0	11
cSH	1700	1178	401
Volume to Capacity	0.22	0.01	0.08
Queue Length 95th (m)	0.0	0.1	2.1
Control Delay (s)	0.0	0.2	14.8
Lane LOS		A	B
Approach Delay (s)	0.0	0.2	14.8
Approach LOS			B

Intersection Summary			
Average Delay		0.7	
Intersection Capacity Utilization		36.7%	ICU Level of Service A
Analysis Period (min)		15	

Queues
14: Hawkstone Gate & Campeau Drive

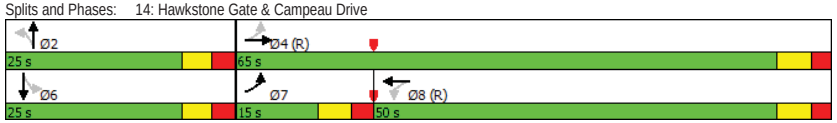
Existing PM Peak Hour

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations								
Traffic Volume (vph)	55	280	20	475	10	5	50	0
Future Volume (vph)	55	280	20	475	10	5	50	0
Lane Group Flow (vph)	61	328	22	639	11	12	0	128
Turn Type	pm+pt	NA	Perm	NA	Perm	NA	Perm	NA
Protected Phases	7	4		8		2		6
Permitted Phases	4		8		2		6	
Detector Phase	7	4	8	8	2	2	6	6
Switch Phase								
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Minimum Split (s)	11.0	32.0	32.0	32.0	23.9	23.9	23.9	23.9
Total Split (s)	15.0	65.0	50.0	50.0	25.0	25.0	25.0	25.0
Total Split (%)	16.7%	72.2%	55.6%	55.6%	27.8%	27.8%	27.8%	27.8%
Yellow Time (s)	3.7	3.7	3.7	3.7	3.3	3.3	3.3	3.3
All-Red Time (s)	2.3	2.3	2.3	2.3	2.6	2.6	2.6	2.6
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0		0.0
Total Lost Time (s)	6.0	6.0	6.0	6.0	5.9	5.9		5.9
Lead/Lag	Lead		Lag	Lag				
Lead-Lag Optimize?	Yes		Yes	Yes				
Recall Mode	None	C-Min	C-Min	C-Min	None	None	None	None
v/c Ratio	0.12	0.24	0.03	0.56	0.10	0.07		0.54
Control Delay	3.3	3.3	8.6	12.7	35.2	25.6		18.8
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0		0.0
Total Delay	3.3	3.3	8.6	12.7	35.2	25.6		18.8
Queue Length 50th (m)	1.5	9.3	1.2	53.9	1.9	1.0		3.3
Queue Length 95th (m)	5.7	24.3	5.7	124.7	6.3	5.6		17.9
Internal Link Dist (m)		214.6		269.3		89.1		74.7
Turn Bay Length (m)	80.0		120.0					
Base Capacity (vph)	535	1371	663	1147	232	352		375
Starvation Cap Reductn	0	0	0	0	0	0		0
Spillback Cap Reductn	0	0	0	0	0	0		0
Storage Cap Reductn	0	0	0	0	0	0		0
Reduced v/c Ratio	0.11	0.24	0.03	0.56	0.05	0.03		0.34

Intersection Summary

Cycle Length: 90
Actuated Cycle Length: 90
Offset: 0 (0%), Referenced to phase 4:EBTL and 8:WBTL, Start of Green
Natural Cycle: 70
Control Type: Actuated-Coordinated

Splits and Phases: 14: Hawkstone Gate & Campeau Drive



HCM Signalized Intersection Capacity Analysis
14: Hawkstone Gate & Campeau Drive

Existing PM Peak Hour

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	55	280	15	20	475	100	10	5	5	50	0	65
Future Volume (vph)	55	280	15	20	475	100	10	5	5	50	0	65
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Total Lost time (s)	6.0	6.0		6.0	6.0		5.9	5.9			5.9	
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	1.00			1.00	
Frpb, ped/bikes	1.00	1.00		1.00	0.99		1.00	0.98			0.97	
Flpb, ped/bikes	1.00	1.00		1.00	1.00		0.97	1.00			0.99	
Frt	1.00	0.99		1.00	0.97		1.00	0.93			0.92	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00			0.98	
Satd. Flow (prot)	1708	1786		1710	1742		1664	1638			1567	
Flt Permitted	0.30	1.00		0.56	1.00		0.63	1.00			0.85	
Satd. Flow (perm)	548	1786		1012	1742		1096	1638			1367	
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	61	311	17	22	528	111	11	6	6	56	0	72
RTOR Reduction (vph)	0	1	0	0	6	0	0	5	0	0	98	0
Lane Group Flow (vph)	61	327	0	22	633	0	11	7	0	0	30	0
Confl. Peds. (#/hr)	10					10	15		5	5		15
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Turn Type	pm+pt	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases	7	4			8			2			6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)	69.1	69.1		57.8	57.8		9.0	9.0			9.0	
Effective Green, g (s)	69.1	69.1		57.8	57.8		9.0	9.0			9.0	
Actuated g/C Ratio	0.77	0.77		0.64	0.64		0.10	0.10			0.10	
Clearance Time (s)	6.0	6.0		6.0	6.0		5.9	5.9			5.9	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0			3.0	
Lane Grp Cap (vph)	489	1371		649	1118		109	163			136	
v/s Ratio Prot	0.01	c0.18			c0.36			0.00				
v/s Ratio Perm	0.09			0.02			0.01				c0.02	
v/c Ratio	0.12	0.24		0.03	0.57		0.10	0.04			0.22	
Uniform Delay, d1	4.4	3.0		5.9	9.1		36.8	36.6			37.3	
Progression Factor	0.80	0.78		1.00	1.00		1.00	1.00			1.00	
Incremental Delay, d2	0.1	0.4		0.1	2.1		0.4	0.1			0.8	
Delay (s)	3.7	2.7		6.0	11.1		37.2	36.7			38.1	
Level of Service	A	A		A	B		D	D			D	
Approach Delay (s)		2.9			11.0			37.0			38.1	
Approach LOS		A			B			D			D	

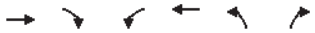
Intersection Summary

HCM 2000 Control Delay	11.7	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.51		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	17.9
Intersection Capacity Utilization	66.9%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

HCM Unsignalized Intersection Capacity Analysis
15: Park Ridge Place (West) & Campeau Drive

Existing PM Peak Hour



Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	330	20	5	415	20	5
Future Volume (Veh/h)	330	20	5	415	20	5
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	367	22	6	461	22	6
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage veh)						
Upstream signal (m)	125					
pX, platoon unblocked			0.83		0.83	0.83
vC, conflicting volume			389		851	378
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			163		719	149
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			99		93	99
cM capacity (veh/h)			1187		329	750

Direction, Lane #	EB 1	WB 1	NB 1
Volume Total	389	467	28
Volume Left	0	6	22
Volume Right	22	0	6
cSH	1700	1187	374
Volume to Capacity	0.23	0.01	0.07
Queue Length 95th (m)	0.0	0.1	1.9
Control Delay (s)	0.0	0.2	15.4
Lane LOS		A	C
Approach Delay (s)	0.0	0.2	15.4
Approach LOS			C

Intersection Summary				
Average Delay		0.6		
Intersection Capacity Utilization	37.3%	ICU Level of Service	A	
Analysis Period (min)	15			

HCM Unsignalized Intersection Capacity Analysis
16: Coulson Court & Robson Court

Existing PM Peak Hour



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	20	30	10	0	20	0	5	5	0	5	0	5
Future Volume (Veh/h)	20	30	10	0	20	0	5	5	0	5	0	5
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	22	33	11	0	22	0	6	6	0	6	0	6
Pedestrians											5	
Lane Width (m)											3.6	
Walking Speed (m/s)											1.2	
Percent Blockage											0	
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	27			44			110	110	38	112	115	27
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	27			44			110	110	38	112	115	27
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	99			100			99	99	100	99	100	99
cM capacity (veh/h)	1593			1577			856	770	1039	849	765	1050

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	66	22	12	12
Volume Left	22	0	6	6
Volume Right	11	0	0	6
cSH	1593	1577	811	939
Volume to Capacity	0.01	0.00	0.01	0.01
Queue Length 95th (m)	0.3	0.0	0.4	0.3
Control Delay (s)	2.5	0.0	9.5	8.9
Lane LOS	A		A	A
Approach Delay (s)	2.5	0.0	9.5	8.9
Approach LOS			A	A

Intersection Summary				
Average Delay	3.4			
Intersection Capacity Utilization	20.1%	ICU Level of Service	A	
Analysis Period (min)	15			

HCM Unsignalized Intersection Capacity Analysis
17: Robson Court & Evanshen Crescent

Existing PM Peak Hour



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	15	20	15	0	0	5
Future Volume (Veh/h)	15	20	15	0	0	5
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	17	22	17	0	0	6
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	17				73	17
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	17				73	17
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	99				100	99
cM capacity (veh/h)	1613				926	1068

Direction, Lane #	EB 1	WB 1	SB 1
Volume Total	39	17	6
Volume Left	17	0	0
Volume Right	0	0	6
cSH	1613	1700	1068
Volume to Capacity	0.01	0.01	0.01
Queue Length 95th (m)	0.3	0.0	0.1
Control Delay (s)	3.2	0.0	8.4
Lane LOS	A		A
Approach Delay (s)	3.2	0.0	8.4
Approach LOS			A

Intersection Summary				
Average Delay		2.8		
Intersection Capacity Utilization		18.7%	ICU Level of Service	A
Analysis Period (min)		15		

HCM Unsignalized Intersection Capacity Analysis
18: Kanata Avenue & Park Ridge Place

Existing PM Peak Hour



Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	5	0	565	10	10	460
Future Volume (Veh/h)	5	0	565	10	10	460
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	6	0	628	11	11	511
Pedestrians	5					
Lane Width (m)	3.6					
Walking Speed (m/s)	1.2					
Percent Blockage	0					
Right turn flare (veh)						
Median type			None			None
Median storage veh)						
Upstream signal (m)						133
pX, platoon unblocked	0.85					
vC, conflicting volume	1172	638			644	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1112	638			644	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	97	100			99	
cM capacity (veh/h)	194	478			947	

Direction, Lane #	WB 1	NB 1	SB 1
Volume Total	6	639	522
Volume Left	6	0	11
Volume Right	0	11	0
cSH	194	1700	947
Volume to Capacity	0.03	0.38	0.01
Queue Length 95th (m)	0.8	0.0	0.3
Control Delay (s)	24.1	0.0	0.3
Lane LOS	C		A
Approach Delay (s)	24.1	0.0	0.3
Approach LOS	C		

Intersection Summary				
Average Delay		0.3		
Intersection Capacity Utilization		44.0%	ICU Level of Service	A
Analysis Period (min)		15		

Queues
19: Herlihey Way & Campeau Drive

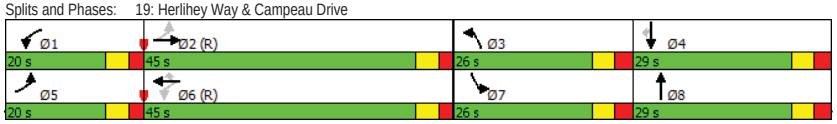
Existing PM Peak Hour

Lane Group	EBL	EBT	WBL	WBT	WBR	NBL	NBT	SBL	SBT	SBR
Lane Configurations										
Traffic Volume (vph)	30	365	140	380	125	60	50	125	50	90
Future Volume (vph)	30	365	140	380	125	60	50	125	50	90
Lane Group Flow (vph)	33	523	156	422	139	67	245	139	56	100
Turn Type	pm+pt	NA	pm+pt	NA	Perm	Prot	NA	Prot	NA	Perm
Protected Phases	5	2	1	6		3	8	7	4	
Permitted Phases	2		6		6					4
Detector Phase	5	2	1	6	6	3	8	7	4	4
Switch Phase										
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Minimum Split (s)	10.5	34.5	10.5	34.5	34.5	10.9	28.9	10.9	28.9	28.9
Total Split (s)	20.0	45.0	20.0	45.0	45.0	26.0	29.0	26.0	29.0	29.0
Total Split (%)	16.7%	37.5%	16.7%	37.5%	37.5%	21.7%	24.2%	21.7%	24.2%	24.2%
Yellow Time (s)	3.3	3.3	3.3	3.3	3.3	3.3	3.3	3.3	3.3	3.3
All-Red Time (s)	2.2	2.2	2.2	2.2	2.2	2.6	2.6	2.6	2.6	2.6
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	5.5	5.5	5.5	5.5	5.5	5.9	5.9	5.9	5.9	5.9
Lead/Lag	Lead	Lag	Lead	Lag	Lag	Lead	Lag	Lead	Lag	Lag
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Recall Mode	None	C-Min	None	C-Min	C-Min	None	None	None	None	None
v/c Ratio	0.07	0.65	0.40	0.45	0.16	0.48	0.82	0.66	0.16	0.26
Control Delay	15.5	34.0	18.7	23.8	7.9	62.6	45.6	64.3	39.7	4.9
Queue Delay	0.0	1.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	15.5	35.0	18.7	23.8	7.9	62.6	45.6	64.3	39.7	4.9
Queue Length 50th (m)	3.6	107.3	15.4	51.3	1.1	16.1	29.5	33.3	11.9	0.0
Queue Length 95th (m)	10.9	#189.4	m38.2	96.6	m9.7	30.5	57.4	53.0	22.3	8.8
Internal Link Dist (m)		148.2		217.6			87.8		129.5	
Turn Bay Length (m)	40.0		85.0		75.0			50.0		30.0
Base Capacity (vph)	582	806	426	948	871	280	370	286	380	413
Starvation Cap Reductn	0	109	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.06	0.75	0.37	0.45	0.16	0.24	0.66	0.49	0.15	0.24

Intersection Summary

Cycle Length: 120
Actuated Cycle Length: 120
Offset: 26 (22%), Referenced to phase 2:EBTL and 6:WBTL, Start of Green
Natural Cycle: 85
Control Type: Actuated-Coordinated
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.
m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 19: Herlihey Way & Campeau Drive



HCM Signalized Intersection Capacity Analysis
19: Herlihey Way & Campeau Drive

Existing PM Peak Hour

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	30	365	105	140	380	125	60	50	170	125	50	90
Future Volume (vph)	30	365	105	140	380	125	60	50	170	125	50	90
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Total Lost time (s)	5.5	5.5		5.5	5.5	5.5	5.9	5.9		5.9	5.9	5.9
Lane Util. Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00
Frpb, ped/bikes	1.00	1.00		1.00	1.00	1.00	1.00	0.89		1.00	1.00	1.00
Flpb, ped/bikes	1.00	1.00		1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00
Frt	1.00	0.97		1.00	1.00	0.85	1.00	0.88		1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	1710	1740		1710	1782	1515	1676	1399		1710	1800	1485
Flt Permitted	0.46	1.00		0.26	1.00	1.00	0.95	1.00		0.95	1.00	1.00
Satd. Flow (perm)	824	1740		462	1782	1515	1676	1399		1710	1800	1485
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	33	406	117	156	422	139	67	56	189	139	56	100
RTOR Reduction (vph)	0	7	0	0	0	69	0	107	0	0	0	81
Lane Group Flow (vph)	33	516	0	156	422	70	67	138	0	139	56	20
Confl. Peds. (#/hr)									50	50		
Heavy Vehicles (%)	0%	0%	0%	0%	1%	1%	2%	0%	1%	0%	0%	3%
Turn Type	pm+pt	NA		pm+pt	NA	Perm	Prot	NA		Prot	NA	Perm
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases	2			6		6						4
Actuated Green, G (s)	58.3	54.0		70.4	60.6	60.6	8.9	17.4		14.9	23.4	23.4
Effective Green, g (s)	58.3	54.0		70.4	60.6	60.6	8.9	17.4		14.9	23.4	23.4
Actuated g/C Ratio	0.49	0.45		0.59	0.51	0.51	0.07	0.14		0.12	0.19	0.19
Clearance Time (s)	5.5	5.5		5.5	5.5	5.5	5.9	5.9		5.9	5.9	5.9
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)	432	783		384	899	765	124	202		212	351	289
v/s Ratio Prot	0.00	c0.30		c0.04	c0.24		0.04	c0.10		c0.08	0.03	
v/s Ratio Perm	0.03			0.20		0.05						0.01
v/c Ratio	0.08	0.66		0.41	0.47	0.09	0.54	0.68		0.66	0.16	0.07
Uniform Delay, d1	16.3	25.8		15.0	19.3	15.4	53.6	48.7		50.1	40.1	39.4
Progression Factor	1.08	1.06		1.22	1.03	1.91	1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	0.1	4.3		0.6	1.5	0.2	4.7	9.2		7.1	0.2	0.1
Delay (s)	17.7	31.6		18.9	21.4	29.7	58.3	57.9		57.2	40.3	39.5
Level of Service	B	C		B	C	C	E	E		E	D	D
Approach Delay (s)		30.8			22.5			58.0			48.0	
Approach LOS		C			C			E			D	

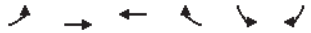
Intersection Summary

HCM 2000 Control Delay	34.8	HCM 2000 Level of Service	C	
HCM 2000 Volume to Capacity ratio	0.64			
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	22.8	
Intersection Capacity Utilization	80.3%	ICU Level of Service	D	
Analysis Period (min)	15			

c Critical Lane Group

HCM Unsignalized Intersection Capacity Analysis
20: Campeau Drive & Golf Course Access

Existing PM Peak Hour



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	0	335	420	0	0	0
Future Volume (Veh/h)	0	335	420	0	0	0
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	0	372	467	0	0	0
Pedestrians					10	
Lane Width (m)					3.6	
Walking Speed (m/s)					1.2	
Percent Blockage					1	
Right turn flare (veh)						
Median type		None	None			
Median storage veh)						
Upstream signal (m)		232				
pX, platoon unblocked					0.95	
vC, conflicting volume	477				849	477
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	477				814	477
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	100				100	100
cM capacity (veh/h)	1087				330	587

Direction, Lane #	EB 1	WB 1	SB 1
Volume Total	372	467	0
Volume Left	0	0	0
Volume Right	0	0	0
cSH	1087	1700	1700
Volume to Capacity	0.00	0.27	0.00
Queue Length 95th (m)	0.0	0.0	0.0
Control Delay (s)	0.0	0.0	0.0
Lane LOS			A
Approach Delay (s)	0.0	0.0	0.0
Approach LOS			A

Intersection Summary				
Average Delay		0.0		
Intersection Capacity Utilization		26.7%	ICU Level of Service	A
Analysis Period (min)		15		

HCM Unsignalized Intersection Capacity Analysis
21: Park Ridge Place (East) & Campeau Drive

Existing PM Peak Hour



Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	330	5	10	415	5	5
Future Volume (Veh/h)	330	5	10	415	5	5
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	367	6	11	461	6	6
Pedestrians					10	
Lane Width (m)					3.6	
Walking Speed (m/s)					1.2	
Percent Blockage					1	
Right turn flare (veh)						
Median type	None			None		
Median storage veh)						
Upstream signal (m)	269					
pX, platoon unblocked			0.97		0.97	0.97
vC, conflicting volume			383		863	380
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			352		845	349
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			99		98	99
cM capacity (veh/h)			1175		321	674

Direction, Lane #	EB 1	WB 1	NB 1
Volume Total	373	472	12
Volume Left	0	11	6
Volume Right	6	0	6
cSH	1700	1175	435
Volume to Capacity	0.22	0.01	0.03
Queue Length 95th (m)	0.0	0.2	0.7
Control Delay (s)	0.0	0.3	13.5
Lane LOS		A	B
Approach Delay (s)	0.0	0.3	13.5
Approach LOS			B

Intersection Summary				
Average Delay		0.3		
Intersection Capacity Utilization		41.5%	ICU Level of Service	A
Analysis Period (min)		15		

Intersection Sign configuration not allowed in HCM analysis.

Intersection Sign configuration not allowed in HCM analysis.

Queues
1: Terry Fox Drive & Campeau Drive

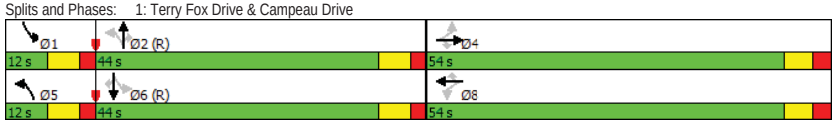
Future Background AM Peak Hour

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	25	30	35	285	40	95	35	800	180	120	725	45
Future Volume (vph)	25	30	35	285	40	95	35	800	180	120	725	45
Lane Group Flow (vph)	25	30	35	285	40	95	35	800	180	120	725	45
Turn Type	Perm	NA	Perm	Perm	NA	Perm	pm+pt	NA	Perm	pm+pt	NA	Perm
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4		4	8		8	2		2	6		6
Detector Phase	4	4	4	8	8	8	5	2	2	1	6	6
Switch Phase												
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Minimum Split (s)	43.4	43.4	43.4	43.4	43.4	43.4	11.4	40.4	40.4	11.4	40.4	40.4
Total Split (s)	54.0	54.0	54.0	54.0	54.0	54.0	12.0	44.0	44.0	12.0	44.0	44.0
Total Split (%)	49.1%	49.1%	49.1%	49.1%	49.1%	49.1%	10.9%	40.0%	40.0%	10.9%	40.0%	40.0%
Yellow Time (s)	3.7	3.7	3.7	3.7	3.7	3.7	4.2	4.2	4.2	4.2	4.2	4.2
All-Red Time (s)	2.7	2.7	2.7	2.7	2.7	2.7	2.2	2.2	2.2	2.2	2.2	2.2
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4
Lead/Lag							Lead	Lag	Lag	Lead	Lag	Lag
Lead-Lag Optimize?							Yes	Yes	Yes	Yes	Yes	Yes
Recall Mode	None	None	None	None	None	None	None	C-Min	C-Min	None	C-Min	C-Min
v/c Ratio	0.07	0.06	0.07	0.80	0.08	0.20	0.09	0.50	0.22	0.33	0.39	0.05
Control Delay	26.3	26.2	0.3	50.7	25.1	7.5	12.0	23.7	4.3	13.3	18.6	0.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	26.3	26.2	0.3	50.7	25.1	7.5	12.0	23.7	4.3	13.3	18.6	0.1
Queue Length 50th (m)	4.2	5.0	0.0	58.0	7.3	2.0	2.9	63.7	0.0	10.6	53.3	0.0
Queue Length 95th (m)	9.7	10.9	0.0	61.7	9.6	10.6	9.1	103.9	14.9	24.0	85.6	0.0
Internal Link Dist (m)		139.7			148.2			149.3			180.0	
Turn Bay Length (m)	70.0			75.0			50.0		60.0	105.0		
Base Capacity (vph)	569	778	717	569	778	717	399	1593	815	367	1837	866
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	0.04	0.04	0.05	0.50	0.05	0.13	0.09	0.50	0.22	0.33	0.39	0.05

Intersection Summary

Cycle Length: 110
Actuated Cycle Length: 110
Offset: 27 (25%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green
Natural Cycle: 100
Control Type: Actuated-Coordinated

Splits and Phases: 1: Terry Fox Drive & Campeau Drive



HCM Signalized Intersection Capacity Analysis
1: Terry Fox Drive & Campeau Drive

Future Background AM Peak Hour

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	25	30	35	285	40	95	35	800	180	120	725	45
Future Volume (vph)	25	30	35	285	40	95	35	800	180	120	725	45
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Total Lost time (s)	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	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)	1710	1800	1530	1693	1800	1530	1710	3386	1530	1693	3420	1530
Flt Permitted	0.73	1.00	1.00	0.74	1.00	1.00	0.35	1.00	1.00	0.25	1.00	1.00
Satd. Flow (perm)	1316	1800	1530	1315	1800	1530	634	3386	1530	446	3420	1530
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)	25	30	35	285	40	95	35	800	180	120	725	45
RTOR Reduction (vph)	0	0	25	0	0	69	0	0	95	0	0	22
Lane Group Flow (vph)	25	30	10	285	40	26	35	800	85	120	725	23
Heavy Vehicles (%)	0%	0%	0%	1%	0%	0%	0%	1%	0%	1%	0%	0%
Turn Type	Perm	NA	Perm	Perm	NA	Perm	pm+pt	NA	Perm	pm+pt	NA	Perm
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4		4	8		8	2		2	6		6
Actuated Green, G (s)	30.0	30.0	30.0	30.0	30.0	30.0	56.1	51.8	51.8	65.5	56.5	56.5
Effective Green, g (s)	30.0	30.0	30.0	30.0	30.0	30.0	56.1	51.8	51.8	65.5	56.5	56.5
Actuated g/C Ratio	0.27	0.27	0.27	0.27	0.27	0.27	0.51	0.47	0.47	0.60	0.51	0.51
Clearance Time (s)	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4
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)	358	490	417	358	490	417	365	1594	720	367	1756	785
v/s Ratio Prot		0.02			0.02		0.00	c0.24		c0.03	c0.21	
v/s Ratio Perm	0.02		0.01	c0.22		0.02	0.05		0.06	0.17		0.02
v/c Ratio	0.07	0.06	0.02	0.80	0.08	0.06	0.10	0.50	0.12	0.33	0.41	0.03
Uniform Delay, d1	29.7	29.6	29.3	37.2	29.8	29.6	13.5	20.2	16.3	11.1	16.5	13.2
Progression Factor	1.00	1.00	1.00	0.96	0.94	1.38	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	0.1	0.1	0.0	11.3	0.1	0.1	0.1	1.1	0.3	0.5	0.7	0.1
Delay (s)	29.7	29.6	29.3	47.0	28.1	40.8	13.6	21.3	16.6	11.7	17.2	13.3
Level of Service	C	C	C	D	C	D	B	C	B	B	B	B
Approach Delay (s)		29.5			43.8			20.2			16.3	
Approach LOS		C			D			C			B	

Intersection Summary

HCM 2000 Control Delay	23.2	HCM 2000 Level of Service	C	
HCM 2000 Volume to Capacity ratio	0.59			
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	19.2	
Intersection Capacity Utilization	69.7%	ICU Level of Service	C	
Analysis Period (min)	15			

c Critical Lane Group

Queues
2: Kanata Avenue & Campeau Drive

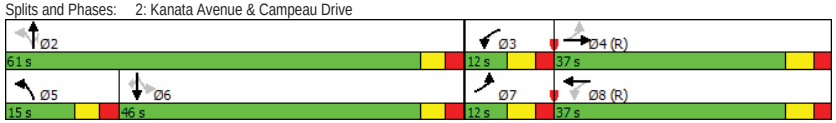
Future Background AM Peak Hour

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations										
Traffic Volume (vph)	80	215	40	235	60	225	25	135	500	220
Future Volume (vph)	80	215	40	235	60	225	25	135	500	220
Lane Group Flow (vph)	80	265	40	310	60	225	25	135	500	220
Turn Type	pm+pt	NA	pm+pt	NA	pm+pt	NA	Perm	Perm	NA	Perm
Protected Phases	7	4	3	8	5	2			6	
Permitted Phases	4		8		2		2	6		6
Detector Phase	7	4	3	8	5	2	2	6	6	6
Switch Phase										
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Minimum Split (s)	11.2	36.2	11.2	36.2	10.9	29.9	29.9	29.9	29.9	29.9
Total Split (s)	12.0	37.0	12.0	37.0	15.0	61.0	61.0	46.0	46.0	46.0
Total Split (%)	10.9%	33.6%	10.9%	33.6%	13.6%	55.5%	55.5%	41.8%	41.8%	41.8%
Yellow Time (s)	3.7	3.7	3.7	3.7	3.3	3.3	3.3	3.3	3.3	3.3
All-Red Time (s)	2.5	2.5	2.5	2.5	2.6	2.6	2.6	2.6	2.6	2.6
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	6.2	6.2	6.2	6.2	5.9	5.9	5.9	5.9	5.9	5.9
Lead/Lag	Lead	Lag	Lead	Lag	Lead			Lag	Lag	Lag
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes			Yes	Yes	Yes
Recall Mode	None	C-Min	None	C-Min	None	None	None	None	None	None
v/c Ratio	0.21	0.39	0.09	0.49	0.27	0.29	0.04	0.38	0.87	0.36
Control Delay	16.8	24.5	21.3	33.3	18.4	20.0	0.1	31.0	50.8	4.9
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	16.8	24.5	21.3	33.3	18.4	20.0	0.1	31.0	50.8	4.9
Queue Length 50th (m)	11.5	48.2	5.2	57.6	7.3	30.1	0.0	23.0	103.7	0.0
Queue Length 95th (m)	9.0	79.3	12.9	89.1	14.0	43.9	0.0	39.0	140.8	15.9
Internal Link Dist (m)		217.6		101.3		108.6			167.9	
Turn Bay Length (m)	95.0		35.0		55.0		55.0	115.0		100.0
Base Capacity (vph)	383	690	434	644	234	898	817	406	658	674
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	0.21	0.38	0.09	0.48	0.26	0.25	0.03	0.33	0.76	0.33

Intersection Summary

Cycle Length: 110
Actuated Cycle Length: 110
Offset: 67 (61%), Referenced to phase 4:EBTL and 8:WBTL, Start of Green
Natural Cycle: 90
Control Type: Actuated-Coordinated

Splits and Phases: 2: Kanata Avenue & Campeau Drive



HCM Signalized Intersection Capacity Analysis
2: Kanata Avenue & Campeau Drive

Future Background AM Peak Hour

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	80	215	50	40	235	75	60	225	25	135	500	220
Future Volume (vph)	80	215	50	40	235	75	60	225	25	135	500	220
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Total Lost time (s)	6.2	6.2		6.2	6.2		5.9	5.9	5.9	5.9	5.9	5.9
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00
Frpb, ped/bikes	1.00	0.99		1.00	1.00		1.00	1.00	1.00	1.00	1.00	0.96
Flpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	0.97		1.00	0.96		1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1710	1725		1705	1722		1710	1782	1530	1710	1800	1465
Flt Permitted	0.42	1.00		0.53	1.00		0.15	1.00	1.00	0.62	1.00	1.00
Satd. Flow (perm)	748	1725		949	1722		262	1782	1530	1112	1800	1465
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	215	50	40	235	75	60	225	25	135	500	220
RTOR Reduction (vph)	0	7	0	0	10	0	0	0	14	0	0	149
Lane Group Flow (vph)	80	258	0	40	300	0	60	225	11	135	500	71
Confl. Peds. (#/hr)			5	5			10					10
Heavy Vehicles (%)	0%	1%	0%	0%	1%	0%	0%	1%	0%	0%	0%	0%
Turn Type	pm+pt	NA		pm+pt	NA		pm+pt	NA	Perm	Perm	NA	Perm
Protected Phases	7	4		3	8		5	2			6	
Permitted Phases	4			8			2		2	6		6
Actuated Green, G (s)	45.1	39.2		41.5	37.4		48.4	48.4	48.4	35.3	35.3	35.3
Effective Green, g (s)	45.1	39.2		41.5	37.4		48.4	48.4	48.4	35.3	35.3	35.3
Actuated g/C Ratio	0.41	0.36		0.38	0.34		0.44	0.44	0.44	0.32	0.32	0.32
Clearance Time (s)	6.2	6.2		6.2	6.2		5.9	5.9	5.9	5.9	5.9	5.9
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)	358	614		386	585		210	784	673	356	577	470
v/s Ratio Prot	c0.01	0.15		0.00	c0.17		0.02	c0.13			c0.28	
v/s Ratio Perm	0.08			0.04			0.11		0.01	0.12		0.05
v/c Ratio	0.22	0.42		0.10	0.51		0.29	0.29	0.02	0.38	0.87	0.15
Uniform Delay, d1	20.6	26.8		21.9	29.0		21.9	19.7	17.4	28.9	35.1	26.6
Progression Factor	0.75	0.81		1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	0.3	2.1		0.1	3.2		0.8	0.2	0.0	0.7	12.9	0.1
Delay (s)	15.7	23.7		22.0	32.2		22.7	19.9	17.4	29.6	48.1	26.8
Level of Service	B	C		C	C		C	B	B	C	D	C
Approach Delay (s)		21.8			31.1			20.3			39.7	
Approach LOS		C			C			C			D	

Intersection Summary

HCM 2000 Control Delay	31.5	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.63		
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	24.2
Intersection Capacity Utilization	81.3%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

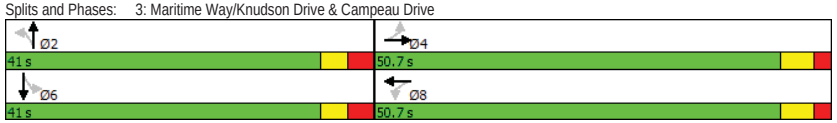
Queues
3: Maritime Way/Knudson Drive & Campeau Drive

Future Background AM Peak Hour

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations								
Traffic Volume (vph)	20	415	30	305	15	15	140	0
Future Volume (vph)	20	415	30	305	15	15	140	0
Lane Group Flow (vph)	20	425	30	375	15	115	140	55
Turn Type	Perm	NA	Perm	NA	Perm	NA	Perm	NA
Protected Phases		4		8		2		6
Permitted Phases	4		8		2		6	
Detector Phase	4	4	8	8	2	2	6	6
Switch Phase								
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Minimum Split (s)	50.7	50.7	50.7	50.7	24.0	24.0	24.0	24.0
Total Split (s)	50.7	50.7	50.7	50.7	41.0	41.0	41.0	41.0
Total Split (%)	55.3%	55.3%	55.3%	55.3%	44.7%	44.7%	44.7%	44.7%
Yellow Time (s)	3.7	3.7	3.7	3.7	3.0	3.0	3.0	3.0
All-Red Time (s)	2.0	2.0	2.0	2.0	3.0	3.0	3.0	3.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	5.7	5.7	5.7	5.7	6.0	6.0	6.0	6.0
Lead/Lag								
Lead-Lag Optimize?								
Recall Mode	Min	Min	Min	Min	None	None	None	None
v/c Ratio	0.04	0.46	0.06	0.41	0.04	0.24	0.41	0.08
Control Delay	8.1	10.9	8.3	10.1	11.2	5.5	15.9	0.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	8.1	10.9	8.3	10.1	11.2	5.5	15.9	0.2
Queue Length 50th (m)	0.7	19.4	1.1	15.8	0.7	0.7	6.9	0.0
Queue Length 95th (m)	4.1	50.1	5.4	42.3	4.1	9.4	22.0	0.0
Internal Link Dist (m)		436.9		443.4		129.6		89.7
Turn Bay Length (m)	55.0		55.0		45.0		50.0	
Base Capacity (vph)	918	1742	868	1683	1146	1387	1101	1361
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	0.02	0.24	0.03	0.22	0.01	0.08	0.13	0.04

Intersection Summary
Cycle Length: 91.7
Actuated Cycle Length: 37.7
Natural Cycle: 75
Control Type: Actuated-Uncoordinated

Splits and Phases: 3: Maritime Way/Knudson Drive & Campeau Drive



HCM Signalized Intersection Capacity Analysis
3: Maritime Way/Knudson Drive & Campeau Drive

Future Background AM Peak Hour

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	20	415	10	30	305	70	15	15	100	140	0	55
Future Volume (vph)	20	415	10	30	305	70	15	15	100	140	0	55
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Total Lost time (s)	5.7	5.7		5.7	5.7		6.0	6.0		6.0	6.0	
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Frpb, ped/bikes	1.00	1.00		1.00	0.99		1.00	0.98		1.00	0.97	
Flpb, ped/bikes	0.98	1.00		1.00	1.00		0.99	1.00		1.00	1.00	
Frt	1.00	1.00		1.00	0.97		1.00	0.87		1.00	0.85	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1683	1784		1706	1735		1692	1530		1702	1482	
Flt Permitted	0.54	1.00		0.50	1.00		0.72	1.00		0.68	1.00	
Satd. Flow (perm)	954	1784		890	1735		1284	1530		1223	1482	
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)	20	415	10	30	305	70	15	15	100	140	0	55
RTOR Reduction (vph)	0	1	0	0	10	0	0	77	0	0	42	0
Lane Group Flow (vph)	20	424	0	30	365	0	15	38	0	140	13	0
Confl. Peds. (#/hr)	30		5	5		30	10		5	5		10
Heavy Vehicles (%)	0%	0%	20%	0%	0%	0%	0%	0%	0%	0%	0%	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)	18.3	18.3		18.3	18.3		8.9	8.9		8.9	8.9	
Effective Green, g (s)	18.3	18.3		18.3	18.3		8.9	8.9		8.9	8.9	
Actuated g/C Ratio	0.47	0.47		0.47	0.47		0.23	0.23		0.23	0.23	
Clearance Time (s)	5.7	5.7		5.7	5.7		6.0	6.0		6.0	6.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	448	839		418	816		293	350		279	339	
v/s Ratio Prot		c0.24			0.21			0.02			0.01	
v/s Ratio Perm	0.02			0.03			0.01			c0.11		
v/c Ratio	0.04	0.51		0.07	0.45		0.05	0.11		0.50	0.04	
Uniform Delay, d1	5.6	7.2		5.6	6.9		11.7	11.9		13.1	11.7	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.0	0.5		0.1	0.4		0.1	0.1		1.4	0.0	
Delay (s)	5.6	7.6		5.7	7.3		11.8	12.0		14.5	11.7	
Level of Service	A	A		A	A		B	B		B	B	
Approach Delay (s)		7.5			7.2			12.0			13.7	
Approach LOS		A			A			B			B	

Intersection Summary					
HCM 2000 Control Delay	8.9	HCM 2000 Level of Service	A		
HCM 2000 Volume to Capacity ratio	0.50				
Actuated Cycle Length (s)	38.9	Sum of lost time (s)	11.7		
Intersection Capacity Utilization	50.9%	ICU Level of Service	A		
Analysis Period (min)	15				

c Critical Lane Group

Queues
4: Teron Road & Campeau Drive

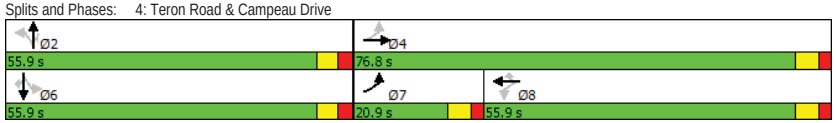
Future Background AM Peak Hour

Lane Group	EBL	EBT	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations											
Traffic Volume (vph)	220	380	30	180	500	5	40	65	355	10	130
Future Volume (vph)	220	380	30	180	500	5	40	65	355	10	130
Lane Group Flow (vph)	220	385	30	180	500	0	45	65	355	10	130
Turn Type	pm+pt	NA	Perm	NA	Perm	Perm	NA	Perm	Perm	NA	Perm
Protected Phases	7	4		8			2			6	
Permitted Phases	4		8		8	2		2	6		6
Detector Phase	7	4	8	8	8	2	2	2	6	6	6
Switch Phase											
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Minimum Split (s)	10.9	55.9	55.9	55.9	55.9	26.9	26.9	26.9	26.9	26.9	26.9
Total Split (s)	20.9	76.8	55.9	55.9	55.9	55.9	55.9	55.9	55.9	55.9	55.9
Total Split (%)	15.7%	57.9%	42.1%	42.1%	42.1%	42.1%	42.1%	42.1%	42.1%	42.1%	42.1%
Yellow Time (s)	3.7	3.7	3.7	3.7	3.7	3.3	3.3	3.3	3.3	3.3	3.3
All-Red Time (s)	2.2	2.2	2.2	2.2	2.2	2.6	2.6	2.6	2.6	2.6	2.6
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	5.9	5.9	5.9	5.9	5.9		5.9	5.9	5.9	5.9	5.9
Lead/Lag	Lead		Lag	Lag	Lag						
Lead-Lag Optimize?	Yes		Yes	Yes	Yes						
Recall Mode	None	Max	Max	Max	Max	None	None	None	None	None	None
v/c Ratio	0.34	0.37	0.07	0.23	0.56		0.08	0.13	0.90	0.02	0.24
Control Delay	15.1	15.9	25.1	25.2	5.0		28.1	5.8	65.6	26.8	5.6
Queue Delay	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0
Total Delay	15.1	15.9	25.1	25.2	5.0		28.1	5.8	65.6	26.8	5.6
Queue Length 50th (m)	25.4	49.2	4.4	28.6	0.0		7.9	0.0	84.5	1.7	0.0
Queue Length 95th (m)	47.3	85.3	12.7	53.2	25.7		16.6	8.7	125.6	5.8	13.5
Internal Link Dist (m)		269.3		262.3			58.3			132.3	
Turn Bay Length (m)	65.0		160.0					70.0	85.0		
Base Capacity (vph)	662	1054	416	786	897		729	630	518	744	677
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	0.33	0.37	0.07	0.23	0.56		0.06	0.10	0.69	0.01	0.19

Intersection Summary

Cycle Length: 132.7
Actuated Cycle Length: 121.5
Natural Cycle: 95
Control Type: Actuated-Uncoordinated

Splits and Phases: 4: Teron Road & Campeau Drive



HCM Signalized Intersection Capacity Analysis
4: Teron Road & Campeau Drive

Future Background AM Peak Hour

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	220	380	5	30	180	500	5	40	65	355	10	130
Future Volume (vph)	220	380	5	30	180	500	5	40	65	355	10	130
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Total Lost time (s)	5.9	5.9		5.9	5.9	5.9		5.9	5.9	5.9	5.9	5.9
Lane Util. Factor	1.00	1.00		1.00	1.00	1.00		1.00	1.00	1.00	1.00	1.00
Frpb, ped/bikes	1.00	1.00		1.00	1.00	0.93		1.00	0.93	1.00	1.00	0.95
Flpb, ped/bikes	0.98	1.00		0.99	1.00	1.00		1.00	1.00	0.96	1.00	1.00
Frt	1.00	1.00		1.00	1.00	0.85		1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00	1.00		0.99	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1677	1796		1696	1800	1417		1784	1426	1640	1800	1456
Flt Permitted	0.56	1.00		0.53	1.00	1.00		0.98	1.00	0.73	1.00	1.00
Satd. Flow (perm)	991	1796		953	1800	1417		1765	1426	1256	1800	1456
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)	220	380	5	30	180	500	5	40	65	355	10	130
RTOR Reduction (vph)	0	0	0	0	0	281	0	0	44	0	0	89
Lane Group Flow (vph)	220	385	0	30	180	219	0	45	21	355	10	41
Confl. Peds. (#/hr)	20		5	5		20	10		15	15		10
Confl. Bikes (#/hr)									5			
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Turn Type	pm+pt	NA		Perm	NA	Perm	Perm	NA	Perm	Perm	NA	Perm
Protected Phases	7	4			8			2			6	
Permitted Phases	4			8		8	2		2	6		6
Actuated Green, G (s)	71.3	71.3		53.2	53.2	53.2		38.4	38.4	38.4	38.4	38.4
Effective Green, g (s)	71.3	71.3		53.2	53.2	53.2		38.4	38.4	38.4	38.4	38.4
Actuated g/C Ratio	0.59	0.59		0.44	0.44	0.44		0.32	0.32	0.32	0.32	0.32
Clearance Time (s)	5.9	5.9		5.9	5.9	5.9		5.9	5.9	5.9	5.9	5.9
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)	650	1053		417	788	620		557	450	396	568	460
v/s Ratio Prot	0.03	c0.21			0.10						0.01	
v/s Ratio Perm	0.16			0.03		0.15		0.03	0.01	c0.28		0.03
v/c Ratio	0.34	0.37		0.07	0.23	0.35		0.08	0.05	0.90	0.02	0.09
Uniform Delay, d1	12.2	13.2		19.8	21.3	22.7		29.2	28.8	39.7	28.6	29.2
Progression Factor	1.00	1.00		1.00	1.00	1.00		1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	0.3	1.0		0.3	0.7	1.6		0.1	0.0	22.0	0.0	0.1
Delay (s)	12.5	14.2		20.2	22.0	24.3		29.2	28.9	61.7	28.6	29.3
Level of Service	B	B		C	C	C		C	C	E	C	C
Approach Delay (s)		13.6			23.5			29.0			52.5	
Approach LOS		B			C			C			D	

Intersection Summary

HCM 2000 Control Delay	28.2	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.58		
Actuated Cycle Length (s)	121.5	Sum of lost time (s)	17.7
Intersection Capacity Utilization	73.4%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

Queues
5: March Road & Campeau Drive/Hwy 417 Off Ramp

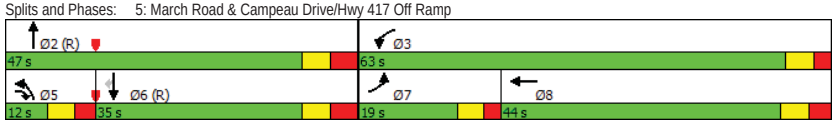
Future Background AM Peak Hour

Lane Group	EBL	EBR	WBL	WBT	NBL	NBT	SBT	SBR
Lane Configurations								
Traffic Volume (vph)	75	725	390	305	400	1155	845	20
Future Volume (vph)	75	725	390	305	400	1155	845	20
Lane Group Flow (vph)	75	725	390	305	400	1155	845	20
Turn Type	Prot	Over	Prot	NA	Prot	NA	NA	Perm
Protected Phases	7	5	3	8	5	2	6	
Permitted Phases								6
Detector Phase	7	5	3	8	5	2	6	6
Switch Phase								
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Minimum Split (s)	11.0	11.5	24.2	43.8	11.5	30.5	30.5	30.5
Total Split (s)	19.0	12.0	63.0	44.0	12.0	47.0	35.0	35.0
Total Split (%)	17.3%	10.9%	57.3%	40.0%	10.9%	42.7%	31.8%	31.8%
Yellow Time (s)	3.7	3.7	3.7	3.7	3.7	3.7	3.7	3.7
All-Red Time (s)	2.3	2.8	2.5	3.1	2.8	3.8	3.8	3.8
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	6.0	6.5	6.2	6.8	6.5	7.5	7.5	7.5
Lead/Lag	Lead	Lead		Lag	Lead		Lag	Lag
Lead-Lag Optimize?	Yes	Yes		Yes	Yes		Yes	Yes
Recall Mode	None	None	None	None	None	C-Min	C-Min	C-Min
v/c Ratio	0.49	0.61	0.44	0.63	0.35	0.56	0.79	0.04
Control Delay	57.6	36.7	33.4	50.3	32.1	15.8	46.4	0.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	57.6	36.7	33.4	50.3	32.1	15.8	46.4	0.2
Queue Length 50th (m)	16.4	70.9	36.4	34.7	36.3	81.1	66.4	0.0
Queue Length 95th (m)	30.9	#117.5	45.7	47.6	57.6	118.5	78.9	0.0
Internal Link Dist (m)				269.9		155.6	164.4	
Turn Bay Length (m)	60.0	190.0	150.0		150.0			150.0
Base Capacity (vph)	202	1184	1712	1156	1149	2070	1228	496
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	0.37	0.61	0.23	0.26	0.35	0.56	0.69	0.04

Intersection Summary

Cycle Length: 110
Actuated Cycle Length: 110
Offset: 97 (88%), Referenced to phase 2:NBT and 6:SBT, Start of Green
Natural Cycle: 110
Control Type: Actuated-Coordinated
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 5: March Road & Campeau Drive/Hwy 417 Off Ramp



HCM Signalized Intersection Capacity Analysis
5: March Road & Campeau Drive/Hwy 417 Off Ramp

Future Background AM Peak Hour

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	75	0	725	390	305	0	400	1155	0	0	845	20
Future Volume (vph)	75	0	725	390	305	0	400	1155	0	0	845	20
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Total Lost time (s)	6.0		6.5	6.2	6.8		6.5	7.5			7.5	7.5
Lane Util. Factor	1.00		*1.00	0.97	0.95		0.97	0.95			0.91	1.00
Frpb, ped/bikes	1.00		1.00	1.00	1.00		1.00	1.00			1.00	0.98
Flpb, ped/bikes	1.00		1.00	1.00	1.00		1.00	1.00			1.00	1.00
Frt	1.00		1.00	1.00	1.00		1.00	1.00			1.00	0.85
Flt Protected	0.95		1.00	0.95	1.00		1.00	1.00			1.00	1.00
Satd. Flow (prot)	1710		3600	3317	3420		3492	3420			4914	1501
Flt Permitted	0.95		1.00	0.95	1.00		1.00	1.00			1.00	1.00
Satd. Flow (perm)	1710		3600	3317	3420		3492	3420			4914	1501
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	0	725	390	305	0	400	1155	0	0	845	20
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	0	0	16
Lane Group Flow (vph)	75	0	725	390	305	0	400	1155	0	0	845	4
Confl. Peds. (#/hr)							5					5
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Turn Type	Prot		Over	Prot	NA		Prot	NA			NA	Perm
Protected Phases	7		5	3	8		5	2			6	
Permitted Phases												6
Actuated Green, G (s)	8.7		36.2	30.9	15.6		36.2	65.4			22.7	22.7
Effective Green, g (s)	8.7		36.2	30.9	15.6		36.2	65.4			22.7	22.7
Actuated g/C Ratio	0.08		0.33	0.28	0.14		0.33	0.59			0.21	0.21
Clearance Time (s)	6.0		6.5	6.2	6.8		6.5	7.5			7.5	7.5
Vehicle Extension (s)	3.0		3.0	3.0	3.0		3.0	3.0			3.0	3.0
Lane Grp Cap (vph)	135		1184	931	485		1149	2033			1014	309
v/s Ratio Prot	0.04		0.20	c0.12	c0.09		0.11	c0.34			c0.17	
v/s Ratio Perm												0.00
v/c Ratio	0.56		0.61	0.42	0.63		0.35	0.57			0.83	0.01
Uniform Delay, d1	48.8		31.0	32.2	44.5		28.0	13.7			41.8	34.7
Progression Factor	1.00		1.00	1.00	1.00		1.00	1.00			1.00	1.00
Incremental Delay, d2	4.9		0.9	0.3	2.6		0.2	1.2			8.0	0.1
Delay (s)	53.7		32.0	32.5	47.0		28.1	14.8			49.9	34.8
Level of Service	D		C	C	D		C	B			D	C
Approach Delay (s)		34.0			38.9			18.2			49.5	
Approach LOS		C			D			B			D	

Intersection Summary

HCM 2000 Control Delay	32.0	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.68		
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	26.8
Intersection Capacity Utilization	74.5%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

HCM Unsignalized Intersection Capacity Analysis
6: Kanata Avenue & Knudson Drive

Future Background AM Peak Hour



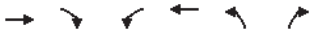
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Sign Control	Stop		Stop			Stop
Traffic Volume (vph)	90	85	215	140	130	280
Future Volume (vph)	90	85	215	140	130	280
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	90	85	215	140	130	280

Direction, Lane #	WB 1	NB 1	SB 1	SB 2
Volume Total (vph)	175	355	130	280
Volume Left (vph)	90	0	130	0
Volume Right (vph)	85	140	0	0
Hadj (s)	-0.19	-0.24	0.50	0.00
Departure Headway (s)	5.4	4.8	5.9	5.3
Degree Utilization, x	0.26	0.47	0.21	0.42
Capacity (veh/h)	601	729	593	651
Control Delay (s)	10.4	11.9	9.2	10.9
Approach Delay (s)	10.4	11.9	10.4	
Approach LOS	B	B	B	

Intersection Summary			
Delay	11.0		
Level of Service	B		
Intersection Capacity Utilization	49.3%	ICU Level of Service	A
Analysis Period (min)	15		

HCM Unsignalized Intersection Capacity Analysis
7: Shaughnessy Crescent (East) & Knudson Drive

Future Background AM Peak Hour



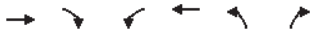
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	275	10	5	135	15	20
Future Volume (Veh/h)	275	10	5	135	15	20
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	275	10	5	135	15	20
Pedestrians					10	
Lane Width (m)					3.6	
Walking Speed (m/s)					1.2	
Percent Blockage					1	
Right turn flare (veh)						
Median type	None			None		
Median storage veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume			295		435	290
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			295		435	290
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			100		97	97
cM capacity (veh/h)			1267		575	748

Direction, Lane #	EB 1	WB 1	NB 1
Volume Total	285	140	35
Volume Left	0	5	15
Volume Right	10	0	20
cSH	1700	1267	662
Volume to Capacity	0.17	0.00	0.05
Queue Length 95th (m)	0.0	0.1	1.3
Control Delay (s)	0.0	0.3	10.7
Lane LOS		A	B
Approach Delay (s)	0.0	0.3	10.7
Approach LOS			B

Intersection Summary			
Average Delay	0.9		
Intersection Capacity Utilization	26.0%	ICU Level of Service	A
Analysis Period (min)	15		

HCM Unsignalized Intersection Capacity Analysis
8: Shaughnessy Crescent (West) & Knudson Drive

Future Background AM Peak Hour



Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	275	10	5	145	20	10
Future Volume (Veh/h)	275	10	5	145	20	10
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	275	10	5	145	20	10
Pedestrians				5	20	
Lane Width (m)				3.6	3.6	
Walking Speed (m/s)				1.2	1.2	
Percent Blockage				0	2	
Right turn flare (veh)						
Median type	None			None		
Median storage veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume			305		455	305
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			305		455	305
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			100		96	99
cM capacity (veh/h)			1246		555	724

Direction, Lane #	EB 1	WB 1	NB 1
Volume Total	285	150	30
Volume Left	0	5	20
Volume Right	10	0	10
cSH	1700	1246	602
Volume to Capacity	0.17	0.00	0.05
Queue Length 95th (m)	0.0	0.1	1.3
Control Delay (s)	0.0	0.3	11.3
Lane LOS		A	B
Approach Delay (s)	0.0	0.3	11.3
Approach LOS			B

Intersection Summary				
Average Delay		0.8		
Intersection Capacity Utilization		27.5%	ICU Level of Service	A
Analysis Period (min)		15		

HCM Unsignalized Intersection Capacity Analysis
9: Knudson Drive & Sherk Crescent (North)

Future Background AM Peak Hour



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	5	15	5	85	140	5
Future Volume (Veh/h)	5	15	5	85	140	5
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	5	15	5	85	140	5
Pedestrians	10					
Lane Width (m)	3.6					
Walking Speed (m/s)	1.2					
Percent Blockage	1					
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	248	152	155			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	248	152	155			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	99	98	100			
cM capacity (veh/h)	737	891	1426			

Direction, Lane #	EB 1	NB 1	SB 1
Volume Total	20	90	145
Volume Left	5	5	0
Volume Right	15	0	5
cSH	847	1426	1700
Volume to Capacity	0.02	0.00	0.09
Queue Length 95th (m)	0.6	0.1	0.0
Control Delay (s)	9.4	0.4	0.0
Lane LOS	A	A	
Approach Delay (s)	9.4	0.4	0.0
Approach LOS	A		

Intersection Summary				
Average Delay		0.9		
Intersection Capacity Utilization		19.6%	ICU Level of Service	A
Analysis Period (min)		15		

HCM Unsignalized Intersection Capacity Analysis
10: Knudson Drive & Sherk Crescent (South)

Future Background AM Peak Hour



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	10	35	15	80	155	5
Future Volume (Veh/h)	10	35	15	80	155	5
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	10	35	15	80	155	5
Pedestrians	10					
Lane Width (m)	3.6					
Walking Speed (m/s)	1.2					
Percent Blockage	1					
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	278	168	170			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	278	168	170			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	99	96	99			
cM capacity (veh/h)	703	875	1408			

Direction, Lane #	EB 1	NB 1	SB 1
Volume Total	45	95	160
Volume Left	10	15	0
Volume Right	35	0	5
cSH	830	1408	1700
Volume to Capacity	0.05	0.01	0.09
Queue Length 95th (m)	1.4	0.3	0.0
Control Delay (s)	9.6	1.3	0.0
Lane LOS	A	A	
Approach Delay (s)	9.6	1.3	0.0
Approach LOS	A		

Intersection Summary				
Average Delay		1.8		
Intersection Capacity Utilization		27.9%	ICU Level of Service	A
Analysis Period (min)		15		

HCM Unsignalized Intersection Capacity Analysis
11: Knudson Drive & Weslock Way

Future Background AM Peak Hour



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Sign Control		Stop	Stop		Stop	
Traffic Volume (vph)	260	75	40	55	55	95
Future Volume (vph)	260	75	40	55	55	95
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	260	75	40	55	55	95

Direction, Lane #	EB 1	WB 1	SB 1
Volume Total (vph)	335	95	150
Volume Left (vph)	260	0	55
Volume Right (vph)	0	55	95
Hadj (s)	0.16	-0.35	-0.31
Departure Headway (s)	4.5	4.3	4.6
Degree Utilization, x	0.42	0.11	0.19
Capacity (veh/h)	765	786	725
Control Delay (s)	10.8	7.9	8.7
Approach Delay (s)	10.8	7.9	8.7
Approach LOS	B	A	A

Intersection Summary				
Delay		9.8		
Level of Service		A		
Intersection Capacity Utilization		43.7%	ICU Level of Service	A
Analysis Period (min)		15		

HCM Unsignalized Intersection Capacity Analysis
12: Weslock Way & Beaverbrook Road

Future Background AM Peak Hour



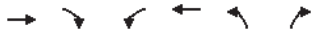
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Sign Control	Stop		Stop			Stop
Traffic Volume (vph)	120	90	15	300	220	30
Future Volume (vph)	120	90	15	300	220	30
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	120	90	15	300	220	30

Direction, Lane #	WB 1	NB 1	SB 1
Volume Total (vph)	210	315	250
Volume Left (vph)	120	0	220
Volume Right (vph)	90	300	0
Hadj (s)	-0.14	-0.57	0.18
Departure Headway (s)	5.0	4.2	5.0
Degree Utilization, x	0.29	0.37	0.35
Capacity (veh/h)	656	811	684
Control Delay (s)	10.1	9.7	10.6
Approach Delay (s)	10.1	9.7	10.6
Approach LOS	B	A	B

Intersection Summary			
Delay		10.1	
Level of Service		B	
Intersection Capacity Utilization		58.1%	ICU Level of Service B
Analysis Period (min)		15	

HCM Unsignalized Intersection Capacity Analysis
13: Omni Health Care & Campeau Drive

Future Background AM Peak Hour



Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	350	15	10	335	5	5
Future Volume (Veh/h)	350	15	10	335	5	5
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	350	15	10	335	5	5
Pedestrians					5	
Lane Width (m)					3.6	
Walking Speed (m/s)					1.2	
Percent Blockage					0	
Right turn flare (veh)						
Median type	None			None		
Median storage veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume			370		718	362
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			370		718	362
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			99		99	99
cM capacity (veh/h)			1195		394	684

Direction, Lane #	EB 1	WB 1	NB 1
Volume Total	365	345	10
Volume Left	0	10	5
Volume Right	15	0	5
cSH	1700	1195	500
Volume to Capacity	0.21	0.01	0.02
Queue Length 95th (m)	0.0	0.2	0.5
Control Delay (s)	0.0	0.3	12.3
Lane LOS		A	B
Approach Delay (s)	0.0	0.3	12.3
Approach LOS			B

Intersection Summary			
Average Delay		0.3	
Intersection Capacity Utilization		37.1%	ICU Level of Service A
Analysis Period (min)		15	

Queues
14: Hawkstone Gate & Campeau Drive

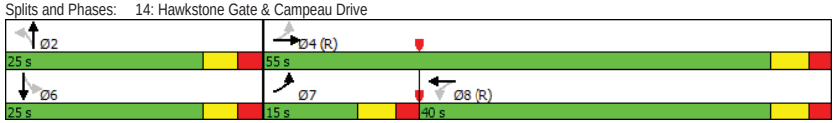
Future Background AM Peak Hour

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations								
Traffic Volume (vph)	160	425	10	235	5	5	135	0
Future Volume (vph)	160	425	10	235	5	5	135	0
Lane Group Flow (vph)	160	435	10	325	5	35	0	240
Turn Type	pm+pt	NA	Perm	NA	Perm	NA	Perm	NA
Protected Phases	7	4		8		2		6
Permitted Phases	4		8		2		6	
Detector Phase	7	4	8	8	2	2	6	6
Switch Phase								
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Minimum Split (s)	11.0	32.0	32.0	32.0	23.9	23.9	23.9	23.9
Total Split (s)	15.0	55.0	40.0	40.0	25.0	25.0	25.0	25.0
Total Split (%)	18.8%	68.8%	50.0%	50.0%	31.3%	31.3%	31.3%	31.3%
Yellow Time (s)	3.7	3.7	3.7	3.7	3.3	3.3	3.3	3.3
All-Red Time (s)	2.3	2.3	2.3	2.3	2.6	2.6	2.6	2.6
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0		0.0
Total Lost Time (s)	6.0	6.0	6.0	6.0	5.9	5.9		5.9
Lead/Lag	Lead		Lag	Lag				
Lead-Lag Optimize?	Yes		Yes	Yes				
Recall Mode	None	C-Min	C-Min	C-Min	None	None	None	None
v/c Ratio	0.25	0.36	0.02	0.38	0.03	0.13		0.78
Control Delay	7.2	7.9	15.7	15.6	22.8	11.1		31.5
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0		0.0
Total Delay	7.2	7.9	15.7	15.6	22.8	11.1		31.5
Queue Length 50th (m)	7.9	25.3	0.8	27.1	0.7	0.7		17.6
Queue Length 95th (m)	20.9	58.1	4.5	63.7	3.1	7.0		38.3
Internal Link Dist (m)		214.6		269.3		89.1		74.7
Turn Bay Length (m)	80.0		120.0					
Base Capacity (vph)	654	1229	468	886	233	377		384
Starvation Cap Reductn	0	0	0	0	0	0		0
Spillback Cap Reductn	0	0	0	0	0	0		0
Storage Cap Reductn	0	0	0	0	0	0		0
Reduced v/c Ratio	0.24	0.35	0.02	0.37	0.02	0.09		0.63

Intersection Summary

Cycle Length: 80
Actuated Cycle Length: 80
Offset: 0 (0%), Referenced to phase 4:EBTL and 8:WBTL, Start of Green
Natural Cycle: 70
Control Type: Actuated-Coordinated

Splits and Phases: 14: Hawkstone Gate & Campeau Drive



HCM Signalized Intersection Capacity Analysis
14: Hawkstone Gate & Campeau Drive

Future Background AM Peak Hour

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	160	425	10	10	235	90	5	5	30	135	0	105
Future Volume (vph)	160	425	10	10	235	90	5	5	30	135	0	105
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Total Lost time (s)	6.0	6.0		6.0	6.0		5.9	5.9			5.9	
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	1.00			1.00	
Frpb, ped/bikes	1.00	1.00		1.00	0.99		1.00	0.91			0.90	
Flpb, ped/bikes	1.00	1.00		1.00	1.00		0.88	1.00			0.95	
Frt	1.00	1.00		1.00	0.96		1.00	0.87			0.94	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00			0.97	
Satd. Flow (prot)	1704	1794		1710	1708		1512	1425			1413	
Flt Permitted	0.45	1.00		0.51	1.00		0.59	1.00			0.81	
Satd. Flow (perm)	812	1794		918	1708		942	1425			1171	
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)	160	425	10	10	235	90	5	5	30	135	0	105
RTOR Reduction (vph)	0	1	0	0	15	0	0	25	0	0	101	0
Lane Group Flow (vph)	160	434	0	10	310	0	5	10	0	0	139	0
Confl. Peds. (#/hr)	10					10	95		40	40		95
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Turn Type	pm+pt	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases	7	4			8			2			6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)	53.9	53.9		39.4	39.4		14.2	14.2			14.2	
Effective Green, g (s)	53.9	53.9		39.4	39.4		14.2	14.2			14.2	
Actuated g/C Ratio	0.67	0.67		0.49	0.49		0.18	0.18			0.18	
Clearance Time (s)	6.0	6.0		6.0	6.0		5.9	5.9			5.9	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0			3.0	
Lane Grp Cap (vph)	641	1208		452	841		167	252			207	
v/s Ratio Prot	0.03	c0.24			0.18			0.01				
v/s Ratio Perm	0.14			0.01			0.01				c0.12	
v/c Ratio	0.25	0.36		0.02	0.37		0.03	0.04			0.67	
Uniform Delay, d1	5.3	5.6		10.4	12.6		27.2	27.3			30.7	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00			1.00	
Incremental Delay, d2	0.2	0.8		0.1	1.2		0.1	0.1			8.3	
Delay (s)	5.5	6.5		10.5	13.8		27.3	27.3			39.0	
Level of Service	A	A		B	B		C	C			D	
Approach Delay (s)		6.2			13.7			27.3			39.0	
Approach LOS		A			B			C			D	

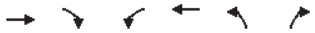
Intersection Summary

HCM 2000 Control Delay	15.5	HCM 2000 Level of Service	B	
HCM 2000 Volume to Capacity ratio	0.46			
Actuated Cycle Length (s)	80.0	Sum of lost time (s)	17.9	
Intersection Capacity Utilization	69.8%	ICU Level of Service	C	
Analysis Period (min)	15			

c Critical Lane Group

HCM Unsignalized Intersection Capacity Analysis
15: Park Ridge Place (West) & Campeau Drive

Future Background AM Peak Hour



Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	365	10	0	340	10	0
Future Volume (Veh/h)	365	10	0	340	10	0
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	365	10	0	340	10	0
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage veh)						
Upstream signal (m)	125					
pX, platoon unblocked			0.85		0.85	0.85
vC, conflicting volume			375		710	370
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			183		575	177
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			100		98	100
cM capacity (veh/h)			1199		413	744

Direction, Lane #	EB 1	WB 1	NB 1
Volume Total	375	340	10
Volume Left	0	0	10
Volume Right	10	0	0
cSH	1700	1199	413
Volume to Capacity	0.22	0.00	0.02
Queue Length 95th (m)	0.0	0.0	0.6
Control Delay (s)	0.0	0.0	13.9
Lane LOS			B
Approach Delay (s)	0.0	0.0	13.9
Approach LOS			B

Intersection Summary				
Average Delay		0.2		
Intersection Capacity Utilization		30.9%	ICU Level of Service	A
Analysis Period (min)		15		

HCM Unsignalized Intersection Capacity Analysis
16: Coulson Court & Robson Court

Future Background AM Peak Hour



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	10	15	5	0	25	5	10	5	0	0	0	0
Future Volume (Veh/h)	10	15	5	0	25	5	10	5	0	0	0	0
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	10	15	5	0	25	5	10	5	0	0	0	0
Pedestrians		5									5	
Lane Width (m)		3.6									3.6	
Walking Speed (m/s)		1.2									1.2	
Percent Blockage		0									0	
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	35			20			70	72	18	72	72	38
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	35			20			70	72	18	72	72	38
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	99			100			99	99	100	100	100	100
cM capacity (veh/h)	1583			1609			916	813	1067	908	813	1032

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	30	30	15	0
Volume Left	10	0	10	0
Volume Right	5	5	0	0
cSH	1583	1609	879	1700
Volume to Capacity	0.01	0.00	0.02	0.00
Queue Length 95th (m)	0.2	0.0	0.4	0.0
Control Delay (s)	2.5	0.0	9.2	0.0
Lane LOS	A		A	A
Approach Delay (s)	2.5	0.0	9.2	0.0
Approach LOS			A	A

Intersection Summary				
Average Delay		2.8		
Intersection Capacity Utilization		19.9%	ICU Level of Service	A
Analysis Period (min)		15		

HCM Unsignalized Intersection Capacity Analysis
17: Robson Court & Evanshen Crescent

Future Background AM Peak Hour



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	5	10	25	0	0	5
Future Volume (Veh/h)	5	10	25	0	0	5
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	5	10	25	0	0	5
Pedestrians					5	
Lane Width (m)					3.6	
Walking Speed (m/s)					1.2	
Percent Blockage					0	
Right turn flare (veh)						
Median type		None	None			
Median storage veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	30				50	30
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	30				50	30
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	100				100	100
cM capacity (veh/h)	1589				957	1046

Direction, Lane #	EB 1	WB 1	SB 1
Volume Total	15	25	5
Volume Left	5	0	0
Volume Right	0	0	5
cSH	1589	1700	1046
Volume to Capacity	0.00	0.01	0.00
Queue Length 95th (m)	0.1	0.0	0.1
Control Delay (s)	2.4	0.0	8.5
Lane LOS	A		A
Approach Delay (s)	2.4	0.0	8.5
Approach LOS			A

Intersection Summary				
Average Delay		1.8		
Intersection Capacity Utilization		15.2%	ICU Level of Service	A
Analysis Period (min)		15		

HCM Unsignalized Intersection Capacity Analysis
18: Kanata Avenue & Park Ridge Place

Future Background AM Peak Hour



Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	10	10	300	5	0	590
Future Volume (Veh/h)	10	10	300	5	0	590
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	10	10	300	5	0	590
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			None			None
Median storage veh)						
Upstream signal (m)						133
pX, platoon unblocked	0.73					
vC, conflicting volume	892	302			305	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	673	302			305	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	97	99			100	
cM capacity (veh/h)	311	742			1267	

Direction, Lane #	WB 1	NB 1	SB 1
Volume Total	20	305	590
Volume Left	10	0	0
Volume Right	10	5	0
cSH	438	1700	1267
Volume to Capacity	0.05	0.18	0.00
Queue Length 95th (m)	1.1	0.0	0.0
Control Delay (s)	13.6	0.0	0.0
Lane LOS	B		
Approach Delay (s)	13.6	0.0	0.0
Approach LOS	B		

Intersection Summary				
Average Delay		0.3		
Intersection Capacity Utilization		42.8%	ICU Level of Service	A
Analysis Period (min)		15		

Queues
19: Herlihey Way & Campeau Drive

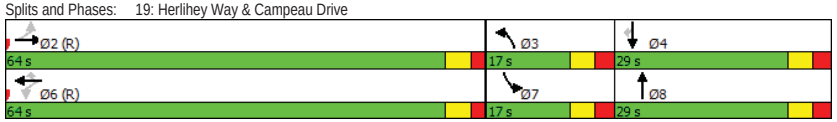
Future Background AM Peak Hour

Lane Group	EBL	EBT	WBL	WBT	WBR	NBL	NBT	SBL	SBT	SBR
Lane Configurations										
Traffic Volume (vph)	15	285	65	415	35	10	5	20	5	20
Future Volume (vph)	15	285	65	415	35	10	5	20	5	20
Lane Group Flow (vph)	15	325	65	415	35	10	45	20	5	20
Turn Type	Perm	NA	Perm	NA	Perm	Prot	NA	Prot	NA	Perm
Protected Phases		2		6		3	8	7	4	
Permitted Phases	2		6		6					4
Detector Phase	2	2	6	6	6	3	8	7	4	4
Switch Phase										
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Minimum Split (s)	34.5	34.5	34.5	34.5	34.5	10.9	28.9	10.9	28.9	28.9
Total Split (s)	64.0	64.0	64.0	64.0	64.0	17.0	29.0	17.0	29.0	29.0
Total Split (%)	58.2%	58.2%	58.2%	58.2%	58.2%	15.5%	26.4%	15.5%	26.4%	26.4%
Yellow Time (s)	3.3	3.3	3.3	3.3	3.3	3.3	3.3	3.3	3.3	3.3
All-Red Time (s)	2.2	2.2	2.2	2.2	2.2	2.6	2.6	2.6	2.6	2.6
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	5.5	5.5	5.5	5.5	5.5	5.9	5.9	5.9	5.9	5.9
Lead/Lag						Lead	Lag	Lead	Lag	Lag
Lead-Lag Optimize?						Yes	Yes	Yes	Yes	Yes
Recall Mode	C-Min	C-Min	C-Min	C-Min	C-Min	None	None	None	None	None
v/c Ratio	0.02	0.24	0.08	0.30	0.03	0.10	0.28	0.20	0.02	0.08
Control Delay	7.6	7.0	7.3	7.2	0.5	51.1	19.0	53.1	36.6	0.7
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	7.6	7.0	7.3	7.2	0.5	51.1	19.0	53.1	36.6	0.7
Queue Length 50th (m)	0.2	5.5	1.8	13.8	0.0	2.2	1.1	4.4	1.1	0.0
Queue Length 95th (m)	6.0	73.2	12.1	58.8	m0.2	7.9	10.7	12.3	4.1	0.0
Internal Link Dist (m)		148.2		217.6			87.8		129.5	
Turn Bay Length (m)	40.0		85.0		75.0			50.0		30.0
Base Capacity (vph)	618	1380	790	1379	1190	172	341	155	383	384
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	0.02	0.24	0.08	0.30	0.03	0.06	0.13	0.13	0.01	0.05

Intersection Summary

Cycle Length: 110
Actuated Cycle Length: 110
Offset: 75 (68%), Referenced to phase 2:EBTL and 6:WBTL, Start of Green
Natural Cycle: 75
Control Type: Actuated-Coordinated
m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 19: Herlihey Way & Campeau Drive



HCM Signalized Intersection Capacity Analysis
19: Herlihey Way & Campeau Drive

Future Background AM Peak Hour

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	15	285	40	65	415	35	10	5	40	20	5	20
Future Volume (vph)	15	285	40	65	415	35	10	5	40	20	5	20
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Total Lost time (s)	5.5	5.5		5.5	5.5	5.5	5.9	5.9		5.9	5.9	5.9
Lane Util. Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00
Frpb, ped/bikes	1.00	1.00		1.00	1.00	1.00	1.00	0.96		1.00	1.00	0.98
Flpb, ped/bikes	1.00	1.00		1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00
Frt	1.00	0.98		1.00	1.00	0.85	1.00	0.87		1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	1500	1745		1710	1748	1485	1710	1474		1541	1800	1501
Flt Permitted	0.50	1.00		0.56	1.00	1.00	0.95	1.00		0.95	1.00	1.00
Satd. Flow (perm)	783	1745		1000	1748	1485	1710	1474		1541	1800	1501
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)	15	285	40	65	415	35	10	5	40	20	5	20
RTOR Reduction (vph)	0	3	0	0	0	10	0	37	0	0	0	18
Lane Group Flow (vph)	15	322	0	65	415	25	10	8	0	20	5	2
Confl. Peds. (#/hr)							5		10	10		5
Heavy Vehicles (%)	14%	1%	3%	0%	3%	3%	0%	0%	2%	11%	0%	0%
Turn Type	Perm	NA		Perm	NA	Perm	Prot	NA		Prot	NA	Perm
Protected Phases		2			6		3	8		7	4	
Permitted Phases	2			6		6						4
Actuated Green, G (s)	79.8	79.8		79.8	79.8	79.8	1.5	9.5		3.4	11.4	11.4
Effective Green, g (s)	79.8	79.8		79.8	79.8	79.8	1.5	9.5		3.4	11.4	11.4
Actuated g/C Ratio	0.73	0.73		0.73	0.73	0.73	0.01	0.09		0.03	0.10	0.10
Clearance Time (s)	5.5	5.5		5.5	5.5	5.5	5.9	5.9		5.9	5.9	5.9
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)	568	1265		725	1268	1077	23	127		47	186	155
v/s Ratio Prot		0.18			c0.24		0.01	c0.01		c0.01	0.00	
v/s Ratio Perm	0.02			0.06		0.02						0.00
v/c Ratio	0.03	0.25		0.09	0.33	0.02	0.43	0.07		0.43	0.03	0.01
Uniform Delay, d1	4.2	5.1		4.4	5.4	4.2	53.8	46.2		52.3	44.3	44.3
Progression Factor	1.00	1.10		1.07	1.02	1.00	1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	0.1	0.5		0.2	0.6	0.0	12.6	0.2		6.1	0.1	0.0
Delay (s)	4.3	6.1		5.0	6.2	4.3	66.4	46.4		58.4	44.4	44.3
Level of Service	A	A		A	A	A	E	D		E	D	D
Approach Delay (s)		6.0			5.9			50.0			50.6	
Approach LOS		A			A			D			D	

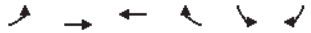
Intersection Summary

HCM 2000 Control Delay	10.6	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.30		
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	17.3
Intersection Capacity Utilization	51.9%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

HCM Unsignalized Intersection Capacity Analysis
20: Campeau Drive & Golf Course Access

Future Background AM Peak Hour



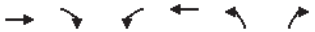
Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	5	360	340	0	0	0
Future Volume (Veh/h)	5	360	340	0	0	0
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	5	360	340	0	0	0
Pedestrians					15	
Lane Width (m)					3.6	
Walking Speed (m/s)					1.2	
Percent Blockage					1	
Right turn flare (veh)						
Median type		None	None			
Median storage veh)						
Upstream signal (m)		232				
pX, platoon unblocked					0.89	
vC, conflicting volume	355				725	355
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	355				631	355
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	100				100	100
cM capacity (veh/h)	1200				393	685

Direction, Lane #	EB 1	WB 1	SB 1
Volume Total	365	340	0
Volume Left	5	0	0
Volume Right	0	0	0
cSH	1200	1700	1700
Volume to Capacity	0.00	0.20	0.00
Queue Length 95th (m)	0.1	0.0	0.0
Control Delay (s)	0.2	0.0	0.0
Lane LOS	A		A
Approach Delay (s)	0.2	0.0	0.0
Approach LOS			A

Intersection Summary				
Average Delay		0.1		
Intersection Capacity Utilization		27.5%	ICU Level of Service	A
Analysis Period (min)		15		

HCM Unsignalized Intersection Capacity Analysis
21: Park Ridge Place (East) & Campeau Drive

Future Background AM Peak Hour



Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	360	0	0	340	0	5
Future Volume (Veh/h)	360	0	0	340	0	5
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	360	0	0	340	0	5
Pedestrians					5	
Lane Width (m)					3.6	
Walking Speed (m/s)					1.2	
Percent Blockage					0	
Right turn flare (veh)						
Median type	None			None		
Median storage veh)						
Upstream signal (m)	269					
pX, platoon unblocked			0.91		0.91	0.91
vC, conflicting volume			365		705	365
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			254		627	254
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			100		100	99
cM capacity (veh/h)			1200		409	716

Direction, Lane #	EB 1	WB 1	NB 1
Volume Total	360	340	5
Volume Left	0	0	0
Volume Right	0	0	5
cSH	1700	1200	716
Volume to Capacity	0.21	0.00	0.01
Queue Length 95th (m)	0.0	0.0	0.2
Control Delay (s)	0.0	0.0	10.1
Lane LOS			B
Approach Delay (s)	0.0	0.0	10.1
Approach LOS			B

Intersection Summary				
Average Delay		0.1		
Intersection Capacity Utilization		30.0%	ICU Level of Service	A
Analysis Period (min)		15		

Intersection Sign configuration not allowed in HCM analysis.

Intersection Sign configuration not allowed in HCM analysis.

Queues
1: Terry Fox Drive & Campeau Drive

Future Background PM Peak Hour

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	85	95	65	330	70	135	30	950	195	75	910	205
Future Volume (vph)	85	95	65	330	70	135	30	950	195	75	910	205
Lane Group Flow (vph)	85	95	65	330	70	135	30	950	195	75	910	205
Turn Type	Perm	NA	Perm	Perm	NA	Perm	pm+pt	NA	Perm	pm+pt	NA	Perm
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4		4	8		8	2		2	6		6
Detector Phase	4	4	4	8	8	8	5	2	2	1	6	6
Switch Phase												
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Minimum Split (s)	43.4	43.4	43.4	43.4	43.4	43.4	11.4	40.4	40.4	11.4	40.4	40.4
Total Split (s)	48.0	48.0	48.0	48.0	48.0	48.0	22.0	50.0	50.0	22.0	50.0	50.0
Total Split (%)	40.0%	40.0%	40.0%	40.0%	40.0%	40.0%	18.3%	41.7%	41.7%	18.3%	41.7%	41.7%
Yellow Time (s)	3.7	3.7	3.7	3.7	3.7	3.7	4.2	4.2	4.2	4.2	4.2	4.2
All-Red Time (s)	2.7	2.7	2.7	2.7	2.7	2.7	2.2	2.2	2.2	2.2	2.2	2.2
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4
Lead/Lag							Lead	Lag	Lag	Lead	Lag	Lag
Lead-Lag Optimize?							Yes	Yes	Yes	Yes	Yes	Yes
Recall Mode	None	None	None	None	None	None	None	C-Min	C-Min	None	C-Min	C-Min
v/c Ratio	0.22	0.18	0.13	0.88	0.13	0.25	0.10	0.56	0.24	0.25	0.51	0.23
Control Delay	31.2	30.1	3.2	62.6	28.1	5.8	13.1	25.1	6.5	14.2	22.0	3.5
Queue Delay	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	31.2	30.2	3.2	62.6	28.1	5.8	13.1	25.1	6.5	14.2	22.0	3.5
Queue Length 50th (m)	15.5	17.0	0.0	81.4	11.3	3.7	3.0	90.2	5.2	7.8	83.0	0.0
Queue Length 95th (m)	27.6	29.2	5.8	#116.3	12.7	2.6	8.0	124.1	21.3	16.1	112.9	14.2
Internal Link Dist (m)		139.7			148.2			149.3			180.0	
Turn Bay Length (m)	70.0			75.0			50.0		60.0	105.0		
Base Capacity (vph)	444	625	580	432	625	614	425	1692	814	390	1799	902
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	114	0	0	0	0	0	0	9	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.19	0.19	0.11	0.76	0.11	0.22	0.07	0.56	0.24	0.19	0.51	0.23

Intersection Summary

Cycle Length: 120
Actuated Cycle Length: 120
Offset: 93 (78%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green
Natural Cycle: 100
Control Type: Actuated-Coordinated
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 1: Terry Fox Drive & Campeau Drive



HCM Signalized Intersection Capacity Analysis
1: Terry Fox Drive & Campeau Drive

Future Background PM Peak Hour

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	85	95	65	330	70	135	30	950	195	75	910	205
Future Volume (vph)	85	95	65	330	70	135	30	950	195	75	910	205
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Total Lost time (s)	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95	1.00	1.00	0.95	1.00
Frpb, ped/bikes	1.00	1.00	0.98	1.00	1.00	1.00	1.00	1.00	0.97	1.00	1.00	1.00
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	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)	1710	1800	1504	1703	1800	1515	1710	3420	1486	1710	3420	1530
Flt Permitted	0.71	1.00	1.00	0.70	1.00	1.00	0.25	1.00	1.00	0.20	1.00	1.00
Satd. Flow (perm)	1281	1800	1504	1247	1800	1515	441	3420	1486	364	3420	1530
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	95	65	330	70	135	30	950	195	75	910	205
RTOR Reduction (vph)	0	0	46	0	0	95	0	0	80	0	0	101
Lane Group Flow (vph)	85	95	20	330	70	41	30	950	115	75	910	104
Confl. Peds. (#/hr)			5	5					5	5		
Heavy Vehicles (%)	0%	0%	0%	0%	0%	1%	0%	0%	0%	0%	0%	0%
Turn Type	Perm	NA	Perm	Perm	NA	Perm	pm+pt	NA	Perm	pm+pt	NA	Perm
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4		4	8		8	2		2	6		6
Actuated Green, G (s)	36.0	36.0	36.0	36.0	36.0	36.0	62.3	58.1	58.1	67.3	60.6	60.6
Effective Green, g (s)	36.0	36.0	36.0	36.0	36.0	36.0	62.3	58.1	58.1	67.3	60.6	60.6
Actuated g/C Ratio	0.30	0.30	0.30	0.30	0.30	0.30	0.52	0.48	0.48	0.56	0.51	0.51
Clearance Time (s)	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4
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)	384	540	451	374	540	454	273	1655	719	279	1727	772
v/s Ratio Prot		0.05			0.04		0.00	c0.28		c0.01	0.27	
v/s Ratio Perm	0.07		0.01	c0.26		0.03	0.05		0.08	0.14		0.07
v/c Ratio	0.22	0.18	0.04	0.88	0.13	0.09	0.11	0.57	0.16	0.27	0.53	0.13
Uniform Delay, d1	31.5	31.0	29.8	40.0	30.6	30.2	14.8	22.1	17.3	14.0	20.0	15.8
Progression Factor	1.00	1.00	1.00	0.97	0.96	1.05	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	0.3	0.2	0.0	20.2	0.1	0.1	0.2	1.5	0.5	0.5	1.2	0.4
Delay (s)	31.8	31.2	29.8	59.0	29.6	31.9	15.0	23.6	17.8	14.5	21.2	16.1
Level of Service	C	C	C	E	C	C	B	C	B	B	C	B
Approach Delay (s)		31.0			48.3			22.4			19.9	
Approach LOS		C			D			C			B	

Intersection Summary

HCM 2000 Control Delay	26.5	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.66		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	19.2
Intersection Capacity Utilization	74.7%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

Queues
2: Kanata Avenue & Campeau Drive

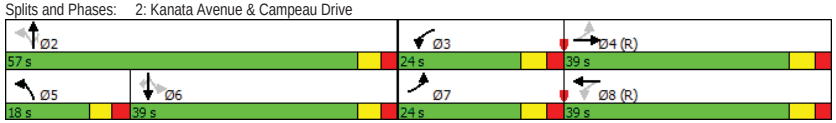
Future Background PM Peak Hour

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations										
Traffic Volume (vph)	240	295	55	315	140	455	35	45	330	195
Future Volume (vph)	240	295	55	315	140	455	35	45	330	195
Lane Group Flow (vph)	240	445	55	390	140	455	35	45	330	195
Turn Type	pm+pt	NA	pm+pt	NA	pm+pt	NA	Perm	Perm	NA	Perm
Protected Phases	7	4	3	8	5	2			6	
Permitted Phases	4		8		2		2	6		6
Detector Phase	7	4	3	8	5	2	2	6	6	6
Switch Phase										
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Minimum Split (s)	11.2	36.2	11.2	36.2	10.9	29.9	29.9	29.9	29.9	29.9
Total Split (s)	24.0	39.0	24.0	39.0	18.0	57.0	57.0	39.0	39.0	39.0
Total Split (%)	20.0%	32.5%	20.0%	32.5%	15.0%	47.5%	47.5%	32.5%	32.5%	32.5%
Yellow Time (s)	3.7	3.7	3.7	3.7	3.3	3.3	3.3	3.3	3.3	3.3
All-Red Time (s)	2.5	2.5	2.5	2.5	2.6	2.6	2.6	2.6	2.6	2.6
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	6.2	6.2	6.2	6.2	5.9	5.9	5.9	5.9	5.9	5.9
Lead/Lag	Lead	Lag	Lead	Lag	Lead			Lag	Lag	Lag
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes			Yes	Yes	Yes
Recall Mode	None	C-Min	None	C-Min	None	None	None	None	None	None
v/c Ratio	0.56	0.60	0.15	0.62	0.54	0.69	0.06	0.25	0.82	0.41
Control Delay	23.9	29.9	17.6	38.5	32.8	37.4	0.2	39.8	60.6	7.5
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	23.9	29.9	17.6	38.5	32.8	37.4	0.2	39.8	60.6	7.5
Queue Length 50th (m)	25.1	88.5	6.5	78.7	23.3	93.2	0.0	9.2	78.0	0.0
Queue Length 95th (m)	61.1	108.2	15.0	#137.8	35.6	120.3	0.0	19.3	106.4	18.1
Internal Link Dist (m)		217.6		101.3		108.6			167.9	
Turn Bay Length (m)	95.0		35.0		55.0		55.0	115.0		100.0
Base Capacity (vph)	461	747	513	632	267	766	679	222	496	535
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.52	0.60	0.11	0.62	0.52	0.59	0.05	0.20	0.67	0.36

Intersection Summary

Cycle Length: 120
Actuated Cycle Length: 120
Offset: 31 (26%), Referenced to phase 4:EBTL and 8:WBTL, Start of Green
Natural Cycle: 90
Control Type: Actuated-Coordinated
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 2: Kanata Avenue & Campeau Drive



HCM Signalized Intersection Capacity Analysis
2: Kanata Avenue & Campeau Drive

Future Background PM Peak Hour

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	240	295	150	55	315	75	140	455	35	45	330	195
Future Volume (vph)	240	295	150	55	315	75	140	455	35	45	330	195
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Total Lost time (s)	6.2	6.2		6.2	6.2		5.9	5.9	5.9	5.9	5.9	5.9
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00
Frpb, ped/bikes	1.00	0.98		1.00	0.99		1.00	1.00	0.97	1.00	1.00	0.94
Flpb, ped/bikes	1.00	1.00		0.99	1.00		1.00	1.00	1.00	0.99	1.00	1.00
Frt	1.00	0.95		1.00	0.97		1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1707	1681		1701	1735		1706	1800	1481	1699	1800	1429
Flt Permitted	0.30	1.00		0.41	1.00		0.20	1.00	1.00	0.45	1.00	1.00
Satd. Flow (perm)	545	1681		730	1735		363	1800	1481	808	1800	1429
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)	240	295	150	55	315	75	140	455	35	45	330	195
RTOR Reduction (vph)	0	12	0	0	6	0	0	0	22	0	0	151
Lane Group Flow (vph)	240	433	0	55	384	0	140	455	13	45	330	44
Confl. Peds. (#/hr)	10		15	15		10	15		5	5		15
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%
Turn Type	pm+pt	NA		pm+pt	NA		pm+pt	NA	Perm	Perm	NA	Perm
Protected Phases	7	4		3	8		5	2			6	
Permitted Phases	4			8			2		2	6		6
Actuated Green, G (s)	63.9	51.3		49.7	43.3		44.0	44.0	44.0	26.8	26.8	26.8
Effective Green, g (s)	63.9	51.3		49.7	43.3		44.0	44.0	44.0	26.8	26.8	26.8
Actuated g/C Ratio	0.53	0.43		0.41	0.36		0.37	0.37	0.37	0.22	0.22	0.22
Clearance Time (s)	6.2	6.2		6.2	6.2		5.9	5.9	5.9	5.9	5.9	5.9
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)	429	718		354	626		259	660	543	180	402	319
v/s Ratio Prot	c0.07	c0.26		0.01	0.22		0.05	c0.25			c0.18	
v/s Ratio Perm	0.23			0.06			0.15		0.01	0.06		0.03
v/c Ratio	0.56	0.60		0.16	0.61		0.54	0.69	0.02	0.25	0.82	0.14
Uniform Delay, d1	17.8	26.5		21.6	31.5		28.3	32.2	24.3	38.3	44.3	37.3
Progression Factor	1.16	0.96		1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	1.3	3.1		0.2	4.4		2.3	3.0	0.0	0.7	12.6	0.2
Delay (s)	21.9	28.6		21.8	35.9		30.6	35.2	24.3	39.1	56.9	37.5
Level of Service	C	C		C	D		C	D	C	D	E	D
Approach Delay (s)		26.3			34.2			33.6			48.9	
Approach LOS		C			C			C			D	

Intersection Summary

HCM 2000 Control Delay	35.3	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.72		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	24.2
Intersection Capacity Utilization	88.6%	ICU Level of Service	E
Analysis Period (min)	15		

c Critical Lane Group

Queues
3: Maritime Way/Knudson Drive & Campeau Drive

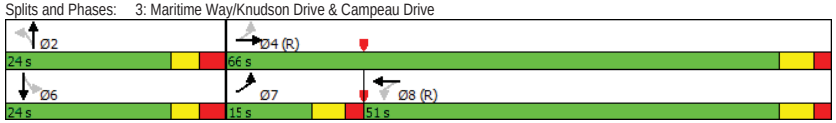
Future Background PM Peak Hour

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations								
Traffic Volume (vph)	45	295	115	395	15	10	45	10
Future Volume (vph)	45	295	115	395	15	10	45	10
Lane Group Flow (vph)	45	320	115	510	15	95	45	60
Turn Type	pm+pt	NA	Perm	NA	Perm	NA	Perm	NA
Protected Phases	7	4		8		2		6
Permitted Phases	4		8		2		6	
Detector Phase	7	4	8	8	2	2	6	6
Switch Phase								
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Minimum Split (s)	10.7	27.7	27.7	27.7	23.0	23.0	23.0	23.0
Total Split (s)	15.0	66.0	51.0	51.0	24.0	24.0	24.0	24.0
Total Split (%)	16.7%	73.3%	56.7%	56.7%	26.7%	26.7%	26.7%	26.7%
Yellow Time (s)	3.7	3.7	3.7	3.7	3.0	3.0	3.0	3.0
All-Red Time (s)	2.0	2.0	2.0	2.0	3.0	3.0	3.0	3.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	5.7	5.7	5.7	5.7	6.0	6.0	6.0	6.0
Lead/Lag	Lead		Lag	Lag				
Lead-Lag Optimize?	Yes		Yes	Yes				
Recall Mode	None	C-Min	C-Min	C-Min	None	None	None	None
v/c Ratio	0.07	0.22	0.16	0.41	0.11	0.39	0.34	0.29
Control Delay	3.7	3.8	13.3	15.1	35.3	14.6	42.2	16.6
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	3.7	3.8	13.3	15.1	35.3	14.6	42.2	16.6
Queue Length 50th (m)	1.5	12.0	9.1	48.3	2.5	1.7	7.8	1.7
Queue Length 95th (m)	5.6	30.1	36.5	129.2	7.8	14.4	16.9	12.1
Internal Link Dist (m)		436.9		443.4		129.6		89.7
Turn Bay Length (m)	55.0		55.0		45.0		50.0	
Base Capacity (vph)	653	1426	734	1243	255	379	250	344
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	0.22	0.16	0.41	0.06	0.25	0.18	0.17

Intersection Summary

Cycle Length: 90
Actuated Cycle Length: 90
Offset: 0 (0%), Referenced to phase 4:EBTL and 8:WBTL, Start of Green
Natural Cycle: 65
Control Type: Actuated-Coordinated

Splits and Phases: 3: Maritime Way/Knudson Drive & Campeau Drive



HCM Signalized Intersection Capacity Analysis
3: Maritime Way/Knudson Drive & Campeau Drive

Future Background PM Peak Hour

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	45	295	25	115	395	115	15	10	85	45	10	50
Future Volume (vph)	45	295	25	115	395	115	15	10	85	45	10	50
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Total Lost time (s)	5.7	5.7		5.7	5.7		6.0	6.0		6.0	6.0	
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Frpb, ped/bikes	1.00	1.00		1.00	0.99		1.00	1.00		1.00	0.96	
Flpb, ped/bikes	1.00	1.00		1.00	1.00		0.99	1.00		1.00	1.00	
Frt	1.00	0.99		1.00	0.97		1.00	0.87		1.00	0.88	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1703	1779		1710	1719		1689	1558		1710	1507	
Flt Permitted	0.39	1.00		0.57	1.00		0.72	1.00		0.70	1.00	
Satd. Flow (perm)	700	1779		1020	1719		1276	1558		1252	1507	
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)	45	295	25	115	395	115	15	10	85	45	10	50
RTOR Reduction (vph)	0	2	0	0	8	0	0	77	0	0	45	0
Lane Group Flow (vph)	45	318	0	115	502	0	15	18	0	45	15	0
Confl. Peds. (#/hr)	15					15	5					5
Confl. Bikes (#/hr)												5
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Turn Type	pm+pt	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases	7	4			8			2			6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)	69.7	69.7		60.1	60.1		8.6	8.6		8.6	8.6	
Effective Green, g (s)	69.7	69.7		60.1	60.1		8.6	8.6		8.6	8.6	
Actuated g/C Ratio	0.77	0.77		0.67	0.67		0.10	0.10		0.10	0.10	
Clearance Time (s)	5.7	5.7		5.7	5.7		6.0	6.0		6.0	6.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	585	1377		681	1147		121	148		119	144	
v/s Ratio Prot	0.00	c0.18			c0.29			0.01			0.01	
v/s Ratio Perm	0.06			0.11			0.01			c0.04		
v/c Ratio	0.08	0.23		0.17	0.44		0.12	0.12		0.38	0.10	
Uniform Delay, d1	3.2	2.8		5.6	7.0		37.3	37.2		38.2	37.2	
Progression Factor	1.00	1.00		1.67	1.73		1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.1	0.4		0.5	1.1		0.5	0.4		2.0	0.3	
Delay (s)	3.2	3.2		9.8	13.2		37.7	37.6		40.2	37.5	
Level of Service	A	A		A	B		D	D		D	D	
Approach Delay (s)		3.2			12.6			37.6			38.7	
Approach LOS		A			B			D			D	

Intersection Summary

HCM 2000 Control Delay	14.3	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.43		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	17.4
Intersection Capacity Utilization	58.4%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group

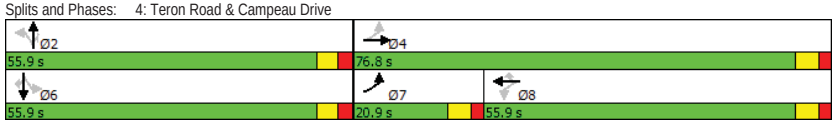
Queues
4: Teron Road & Campeau Drive

Future Background PM Peak Hour

Lane Group	EBL	EBT	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations											
Traffic Volume (vph)	160	205	85	385	405	15	25	70	345	40	260
Future Volume (vph)	160	205	85	385	405	15	25	70	345	40	260
Lane Group Flow (vph)	160	225	85	385	405	0	40	70	345	40	260
Turn Type	pm+pt	NA	Perm	NA	Perm	Perm	NA	Perm	Perm	NA	Perm
Protected Phases	7	4		8			2			6	
Permitted Phases	4		8		8	2		2	6		6
Detector Phase	7	4	8	8	8	2	2	2	6	6	6
Switch Phase											
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Minimum Split (s)	10.9	55.9	55.9	55.9	55.9	26.9	26.9	26.9	26.9	26.9	26.9
Total Split (s)	20.9	76.8	55.9	55.9	55.9	55.9	55.9	55.9	55.9	55.9	55.9
Total Split (%)	15.7%	57.9%	42.1%	42.1%	42.1%	42.1%	42.1%	42.1%	42.1%	42.1%	42.1%
Yellow Time (s)	3.7	3.7	3.7	3.7	3.7	3.3	3.3	3.3	3.3	3.3	3.3
All-Red Time (s)	2.2	2.2	2.2	2.2	2.2	2.6	2.6	2.6	2.6	2.6	2.6
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	5.9	5.9	5.9	5.9	5.9		5.9	5.9	5.9	5.9	5.9
Lead/Lag	Lead		Lag	Lag	Lag						
Lead-Lag Optimize?	Yes		Yes	Yes	Yes						
Recall Mode	None	Max	Max	Max	Max	None	None	None	None	None	None
v/c Ratio	0.33	0.21	0.17	0.47	0.47		0.08	0.14	0.89	0.07	0.41
Control Delay	14.9	13.5	24.7	28.2	4.5		28.2	6.5	65.1	28.1	5.3
Queue Delay	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0
Total Delay	14.9	13.5	24.7	28.2	4.5		28.2	6.5	65.1	28.1	5.3
Queue Length 50th (m)	17.3	24.5	12.4	66.0	0.0		7.0	0.0	81.4	7.0	0.0
Queue Length 95th (m)	34.8	47.3	29.2	117.4	22.2		15.3	10.0	121.9	15.2	17.9
Internal Link Dist (m)		269.3		262.3			58.3			132.3	
Turn Bay Length (m)	65.0		160.0					70.0	85.0		
Base Capacity (vph)	522	1048	497	814	859		680	636	518	750	756
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	0.31	0.21	0.17	0.47	0.47		0.06	0.11	0.67	0.05	0.34

Intersection Summary
Cycle Length: 132.7
Actuated Cycle Length: 120.8
Natural Cycle: 95
Control Type: Actuated-Uncoordinated

Splits and Phases: 4: Teron Road & Campeau Drive



HCM Signalized Intersection Capacity Analysis
4: Teron Road & Campeau Drive

Future Background PM Peak Hour

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	160	205	20	85	385	405	15	25	70	345	40	260
Future Volume (vph)	160	205	20	85	385	405	15	25	70	345	40	260
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Total Lost time (s)	5.9	5.9		5.9	5.9	5.9		5.9	5.9	5.9	5.9	5.9
Lane Util. Factor	1.00	1.00		1.00	1.00	1.00		1.00	1.00	1.00	1.00	1.00
Frpb, ped/bikes	1.00	1.00		1.00	1.00	0.93		1.00	0.94	1.00	1.00	0.95
Flpb, ped/bikes	0.99	1.00		0.99	1.00	1.00		0.99	1.00	0.96	1.00	1.00
Frt	1.00	0.99		1.00	1.00	0.85		1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00	1.00		0.98	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1682	1771		1693	1800	1417		1749	1435	1624	1800	1456
Flt Permitted	0.38	1.00		0.62	1.00	1.00		0.92	1.00	0.73	1.00	1.00
Satd. Flow (perm)	665	1771		1101	1800	1417		1635	1435	1250	1800	1456
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)	160	205	20	85	385	405	15	25	70	345	40	260
RTOR Reduction (vph)	0	2	0	0	0	222	0	0	48	0	0	179
Lane Group Flow (vph)	160	223	0	85	385	183	0	40	22	345	40	81
Confl. Peds. (#/hr)	20		5	5		20	10		15	15		10
Heavy Vehicles (%)	1%	0%	0%	0%	0%	0%	0%	0%	0%	1%	0%	0%
Turn Type	pm+pt	NA		Perm	NA	Perm	Perm	NA	Perm	Perm	NA	Perm
Protected Phases	7	4			8			2			6	
Permitted Phases	4			8		8	2		2	6		6
Actuated Green, G (s)	71.3	71.3		54.6	54.6	54.6		37.5	37.5	37.5	37.5	37.5
Effective Green, g (s)	71.3	71.3		54.6	54.6	54.6		37.5	37.5	37.5	37.5	37.5
Actuated g/C Ratio	0.59	0.59		0.45	0.45	0.45		0.31	0.31	0.31	0.31	0.31
Clearance Time (s)	5.9	5.9		5.9	5.9	5.9		5.9	5.9	5.9	5.9	5.9
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)	484	1047		498	814	641		508	446	388	559	452
v/s Ratio Prot	c0.03	0.13			c0.21						0.02	
v/s Ratio Perm	0.17			0.08		0.13		0.02	0.02	c0.28		0.06
v/c Ratio	0.33	0.21		0.17	0.47	0.29		0.08	0.05	0.89	0.07	0.18
Uniform Delay, d1	12.7	11.5		19.6	23.0	20.7		29.3	29.1	39.6	29.3	30.3
Progression Factor	1.00	1.00		1.00	1.00	1.00		1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	0.4	0.5		0.7	2.0	1.1		0.1	0.0	21.1	0.1	0.2
Delay (s)	13.1	12.0		20.3	24.9	21.9		29.4	29.1	60.7	29.3	30.5
Level of Service	B	B		C	C	C		C	C	E	C	C
Approach Delay (s)		12.5			23.1			29.2			46.6	
Approach LOS		B			C			C			D	

Intersection Summary			
HCM 2000 Control Delay	28.9	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.61		
Actuated Cycle Length (s)	120.6	Sum of lost time (s)	17.7
Intersection Capacity Utilization	72.3%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

Queues
5: March Road & Campeau Drive/Hwy 417 Off Ramp

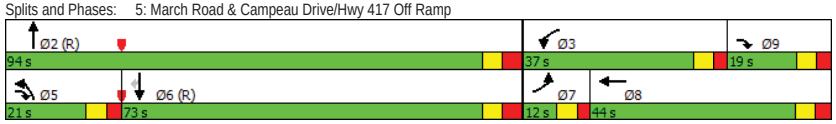
Future Background PM Peak Hour

Lane Group	EBL	EBR	WBL	WBT	NBL	NBT	SBT	SBR	Ø9
Lane Configurations									
Traffic Volume (vph)	35	585	490	495	330	570	2485	50	
Future Volume (vph)	35	585	490	495	330	570	2485	50	
Lane Group Flow (vph)	35	585	490	495	330	570	2485	50	
Turn Type	Prot	pt+ov	Prot	NA	Prot	NA	NA	Perm	
Protected Phases	7	5 9	3	8	5	2	6		9
Permitted Phases								6	
Detector Phase	7	5 9	3	8	5	2	6	6	
Switch Phase									
Minimum Initial (s)	5.0		5.0	5.0	5.0	5.0	5.0	5.0	5.0
Minimum Split (s)	11.0		24.2	43.8	11.5	30.5	30.5	30.5	11.5
Total Split (s)	12.0		37.0	44.0	21.0	94.0	73.0	73.0	19.0
Total Split (%)	8.0%		24.7%	29.3%	14.0%	62.7%	48.7%	48.7%	13%
Yellow Time (s)	3.7		3.7	3.7	3.7	3.7	3.7	3.7	3.7
All-Red Time (s)	2.3		2.5	3.1	2.8	3.8	3.8	3.8	2.8
Lost Time Adjust (s)	0.0		0.0	0.0	0.0	0.0	0.0	-1.0	
Total Lost Time (s)	6.0		6.2	6.8	6.5	7.5	7.5	6.5	
Lead/Lag	Lead			Lag	Lead		Lag	Lag	
Lead-Lag Optimize?	Yes			Yes	Yes		Yes	Yes	
Recall Mode	None		None	None	None	C-Min	C-Min	C-Min	None
v/c Ratio	0.49	0.61	0.81	0.53	0.91	0.27	0.99	0.06	
Control Delay	93.8	53.4	70.8	50.6	95.6	16.2	57.9	0.1	
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Total Delay	93.8	53.4	70.8	50.6	95.6	16.2	57.9	0.1	
Queue Length 50th (m)	11.0	81.5	76.8	71.6	53.7	45.5	256.3	0.0	
Queue Length 95th (m)	#25.3	105.7	94.2	91.2	#83.6	56.9	#292.8	0.0	
Internal Link Dist (m)				269.9		155.6	164.4		
Turn Bay Length (m)	60.0	190.0	150.0		150.0			150.0	
Base Capacity (vph)	72	958	711	937	362	2096	2503	811	
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	0.49	0.61	0.69	0.53	0.91	0.27	0.99	0.06	

Intersection Summary

Cycle Length: 150
Actuated Cycle Length: 150
Offset: 79 (53%), Referenced to phase 2:NBT and 6:SBT, Start of Green
Natural Cycle: 140
Control Type: Actuated-Coordinated
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 5: March Road & Campeau Drive/Hwy 417 Off Ramp



HCM Signalized Intersection Capacity Analysis
5: March Road & Campeau Drive/Hwy 417 Off Ramp

Future Background PM Peak Hour

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	35	0	585	490	495	0	330	570	0	0	2485	50
Future Volume (vph)	35	0	585	490	495	0	330	570	0	0	2485	50
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.0		6.5	6.2	6.8		6.5	7.5			7.5	6.5
Lane Util. Factor	1.00		*1.00	0.97	0.95		0.97	0.95			*1.00	1.00
Frt	1.00		1.00	1.00	1.00		1.00	1.00			1.00	0.85
Flt Protected	0.95		1.00	0.95	1.00		1.00	1.00			1.00	1.00
Satd. Flow (prot)	1805		3800	3467	3610		3686	3610			5700	1615
Flt Permitted	0.95		1.00	0.95	1.00		1.00	1.00			1.00	1.00
Satd. Flow (perm)	1805		3800	3467	3610		3686	3610			5700	1615
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	0	585	490	495	0	330	570	0	0	2485	50
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	0	0	28
Lane Group Flow (vph)	35	0	585	490	495	0	330	570	0	0	2485	22
Heavy Vehicles (%)	0%	0%	0%	1%	0%	0%	0%	0%	0%	0%	0%	0%
Turn Type	Prot		pt+ov	Prot	NA		Prot	NA			NA	Perm
Protected Phases	7		5 9	3	8		5	2			6	
Permitted Phases												6
Actuated Green, G (s)	4.8		39.1	26.1	39.0		14.8	85.9			64.6	64.6
Effective Green, g (s)	4.8		39.1	26.1	39.0		14.8	85.9			64.6	65.6
Actuated g/C Ratio	0.03		0.26	0.17	0.26		0.10	0.57			0.43	0.44
Clearance Time (s)	6.0			6.2	6.8		6.5	7.5			7.5	7.5
Vehicle Extension (s)	3.0			3.0	3.0		3.0	3.0			3.0	3.0
Lane Grp Cap (vph)	57		990	603	938		363	2067			2454	706
v/s Ratio Prot	0.02		c0.15	c0.14	0.14		c0.09	0.16			c0.44	
v/s Ratio Perm												0.01
v/c Ratio	0.61		0.59	0.81	0.53		0.91	0.28			1.01	0.03
Uniform Delay, d1	71.7		48.5	59.6	47.6		66.9	16.3			42.7	24.1
Progression Factor	1.00		1.00	1.00	1.00		1.00	1.00			1.00	1.00
Incremental Delay, d2	18.0		1.0	8.2	0.5		25.6	0.3			21.3	0.1
Delay (s)	89.7		49.4	67.8	48.1		92.5	16.6			64.0	24.2
Level of Service	F		D	E	D		F	B			E	C
Approach Delay (s)		51.7			57.9			44.4			63.3	
Approach LOS		D			E			D			E	

Intersection Summary

HCM 2000 Control Delay	57.4	HCM 2000 Level of Service	E
HCM 2000 Volume to Capacity ratio	0.92		
Actuated Cycle Length (s)	150.0	Sum of lost time (s)	26.8
Intersection Capacity Utilization	99.3%	ICU Level of Service	F
Analysis Period (min)	15		

c Critical Lane Group

HCM Unsignalized Intersection Capacity Analysis
6: Kanata Avenue & Knudson Drive

Future Background PM Peak Hour



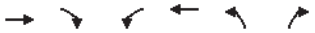
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Sign Control	Stop		Stop			Stop
Traffic Volume (vph)	175	110	220	130	60	195
Future Volume (vph)	175	110	220	130	60	195
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	175	110	220	130	60	195

Direction, Lane #	WB 1	NB 1	SB 1	SB 2
Volume Total (vph)	285	350	60	195
Volume Left (vph)	175	0	60	0
Volume Right (vph)	110	130	0	0
Hadj (s)	-0.11	-0.22	0.50	0.00
Departure Headway (s)	5.3	5.0	6.2	5.7
Degree Utilization, x	0.42	0.48	0.10	0.31
Capacity (veh/h)	633	694	547	597
Control Delay (s)	12.1	12.6	8.8	10.1
Approach Delay (s)	12.1	12.6	9.8	
Approach LOS	B	B	A	

Intersection Summary			
Delay		11.6	
Level of Service		B	
Intersection Capacity Utilization		51.6%	ICU Level of Service A
Analysis Period (min)		15	

HCM Unsignalized Intersection Capacity Analysis
7: Shaughnessy Crescent (East) & Knudson Drive

Future Background PM Peak Hour



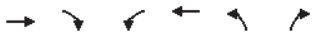
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	150	10	25	270	15	10
Future Volume (Veh/h)	150	10	25	270	15	10
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	150	10	25	270	15	10
Pedestrians					15	
Lane Width (m)					3.6	
Walking Speed (m/s)					1.2	
Percent Blockage					1	
Right turn flare (veh)						
Median type	None			None		
Median storage veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume			175		490	170
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			175		490	170
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			98		97	99
cM capacity (veh/h)			1396		525	868

Direction, Lane #	EB 1	WB 1	NB 1
Volume Total	160	295	25
Volume Left	0	25	15
Volume Right	10	0	10
cSH	1700	1396	623
Volume to Capacity	0.09	0.02	0.04
Queue Length 95th (m)	0.0	0.4	1.0
Control Delay (s)	0.0	0.8	11.0
Lane LOS		A	B
Approach Delay (s)	0.0	0.8	11.0
Approach LOS			B

Intersection Summary			
Average Delay		1.1	
Intersection Capacity Utilization		40.5%	ICU Level of Service A
Analysis Period (min)		15	

HCM Unsignalized Intersection Capacity Analysis
8: Shaughnessy Crescent (West) & Knudson Drive

Future Background PM Peak Hour



Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	150	25	15	270	15	10
Future Volume (Veh/h)	150	25	15	270	15	10
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	150	25	15	270	15	10
Pedestrians					20	
Lane Width (m)					3.6	
Walking Speed (m/s)					1.2	
Percent Blockage					2	
Right turn flare (veh)						
Median type	None			None		
Median storage veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume			195		482	182
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			195		482	182
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			99		97	99
cM capacity (veh/h)			1367		532	851

Direction, Lane #	EB 1	WB 1	NB 1
Volume Total	175	285	25
Volume Left	0	15	15
Volume Right	25	0	10
cSH	1700	1367	625
Volume to Capacity	0.10	0.01	0.04
Queue Length 95th (m)	0.0	0.3	1.0
Control Delay (s)	0.0	0.5	11.0
Lane LOS		A	B
Approach Delay (s)	0.0	0.5	11.0
Approach LOS			B

Intersection Summary				
Average Delay		0.9		
Intersection Capacity Utilization		37.9%	ICU Level of Service	A
Analysis Period (min)		15		

HCM Unsignalized Intersection Capacity Analysis
9: Knudson Drive & Sherk Crescent (North)

Future Background PM Peak Hour



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	10	10	15	125	90	20
Future Volume (Veh/h)	10	10	15	125	90	20
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	10	10	15	125	90	20
Pedestrians	15					
Lane Width (m)	3.6					
Walking Speed (m/s)	1.2					
Percent Blockage	1					
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	270	115	125			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	270	115	125			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	99	99	99			
cM capacity (veh/h)	707	931	1456			

Direction, Lane #	EB 1	NB 1	SB 1
Volume Total	20	140	110
Volume Left	10	15	0
Volume Right	10	0	20
cSH	804	1456	1700
Volume to Capacity	0.02	0.01	0.06
Queue Length 95th (m)	0.6	0.2	0.0
Control Delay (s)	9.6	0.9	0.0
Lane LOS	A	A	
Approach Delay (s)	9.6	0.9	0.0
Approach LOS	A		

Intersection Summary				
Average Delay		1.2		
Intersection Capacity Utilization		24.5%	ICU Level of Service	A
Analysis Period (min)		15		

HCM Unsignalized Intersection Capacity Analysis
10: Knudson Drive & Sherk Crescent (South)

Future Background PM Peak Hour



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	5	20	25	135	95	5
Future Volume (Veh/h)	5	20	25	135	95	5
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	5	20	25	135	95	5
Pedestrians	10					
Lane Width (m)	3.6					
Walking Speed (m/s)	1.2					
Percent Blockage	1					
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	292	108	110			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	292	108	110			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	99	98	98			
cM capacity (veh/h)	685	944	1480			

Direction, Lane #	EB 1	NB 1	SB 1
Volume Total	25	160	100
Volume Left	5	25	0
Volume Right	20	0	5
cSH	878	1480	1700
Volume to Capacity	0.03	0.02	0.06
Queue Length 95th (m)	0.7	0.4	0.0
Control Delay (s)	9.2	1.3	0.0
Lane LOS	A	A	
Approach Delay (s)	9.2	1.3	0.0
Approach LOS	A		

Intersection Summary				
Average Delay	1.5			
Intersection Capacity Utilization	25.6%	ICU Level of Service	A	
Analysis Period (min)	15			

HCM Unsignalized Intersection Capacity Analysis
11: Knudson Drive & Weslock Way

Future Background PM Peak Hour



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Sign Control		Stop	Stop		Stop	
Traffic Volume (vph)	105	55	70	50	70	245
Future Volume (vph)	105	55	70	50	70	245
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	105	55	70	50	70	245

Direction, Lane #	EB 1	WB 1	SB 1
Volume Total (vph)	160	120	315
Volume Left (vph)	105	0	70
Volume Right (vph)	0	50	245
Hadj (s)	0.13	-0.25	-0.42
Departure Headway (s)	4.9	4.6	4.2
Degree Utilization, x	0.22	0.15	0.36
Capacity (veh/h)	686	727	824
Control Delay (s)	9.2	8.4	9.5
Approach Delay (s)	9.2	8.4	9.5
Approach LOS	A	A	A

Intersection Summary				
Delay	9.2			
Level of Service	A			
Intersection Capacity Utilization	43.0%	ICU Level of Service	A	
Analysis Period (min)	15			

HCM Unsignalized Intersection Capacity Analysis
12: Weslock Way & Beaverbrook Road

Future Background PM Peak Hour



Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Sign Control	Stop		Stop			Stop
Traffic Volume (vph)	305	175	25	130	75	10
Future Volume (vph)	305	175	25	130	75	10
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	305	175	25	130	75	10

Direction, Lane #	WB 1	NB 1	SB 1
Volume Total (vph)	480	155	85
Volume Left (vph)	305	0	75
Volume Right (vph)	175	130	0
Hadj (s)	-0.09	-0.50	0.18
Departure Headway (s)	4.4	4.7	5.4
Degree Utilization, x	0.59	0.20	0.13
Capacity (veh/h)	786	701	598
Control Delay (s)	13.6	8.9	9.2
Approach Delay (s)	13.6	8.9	9.2
Approach LOS	B	A	A

Intersection Summary			
Delay		12.0	
Level of Service		B	
Intersection Capacity Utilization		54.1%	ICU Level of Service A
Analysis Period (min)		15	

HCM Unsignalized Intersection Capacity Analysis
13: Omni Health Care & Campeau Drive

Future Background PM Peak Hour



Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	350	10	5	415	20	10
Future Volume (Veh/h)	350	10	5	415	20	10
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	350	10	5	415	20	10
Pedestrians					10	
Lane Width (m)					3.6	
Walking Speed (m/s)					1.2	
Percent Blockage					1	
Right turn flare (veh)						
Median type	None			None		
Median storage veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume			370		790	365
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			370		790	365
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			100		94	99
cM capacity (veh/h)			1190		357	679

Direction, Lane #	EB 1	WB 1	NB 1
Volume Total	360	420	30
Volume Left	0	5	20
Volume Right	10	0	10
cSH	1700	1190	424
Volume to Capacity	0.21	0.00	0.07
Queue Length 95th (m)	0.0	0.1	1.8
Control Delay (s)	0.0	0.1	14.1
Lane LOS		A	B
Approach Delay (s)	0.0	0.1	14.1
Approach LOS			B

Intersection Summary			
Average Delay		0.6	
Intersection Capacity Utilization		37.3%	ICU Level of Service A
Analysis Period (min)		15	

Queues
14: Hawkstone Gate & Campeau Drive

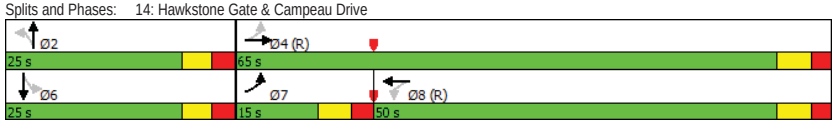
Future Background PM Peak Hour

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations								
Traffic Volume (vph)	55	330	20	540	10	5	50	0
Future Volume (vph)	55	330	20	540	10	5	50	0
Lane Group Flow (vph)	55	345	20	640	10	10	0	115
Turn Type	pm+pt	NA	Perm	NA	Perm	NA	Perm	NA
Protected Phases	7	4		8		2		6
Permitted Phases	4		8		2		6	
Detector Phase	7	4	8	8	2	2	6	6
Switch Phase								
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Minimum Split (s)	11.0	32.0	32.0	32.0	23.9	23.9	23.9	23.9
Total Split (s)	15.0	65.0	50.0	50.0	25.0	25.0	25.0	25.0
Total Split (%)	16.7%	72.2%	55.6%	55.6%	27.8%	27.8%	27.8%	27.8%
Yellow Time (s)	3.7	3.7	3.7	3.7	3.3	3.3	3.3	3.3
All-Red Time (s)	2.3	2.3	2.3	2.3	2.6	2.6	2.6	2.6
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0		0.0
Total Lost Time (s)	6.0	6.0	6.0	6.0	5.9	5.9		5.9
Lead/Lag	Lead		Lag	Lag				
Lead-Lag Optimize?	Yes		Yes	Yes				
Recall Mode	None	C-Min	C-Min	C-Min	None	None	None	None
v/c Ratio	0.10	0.24	0.03	0.52	0.09	0.06		0.50
Control Delay	3.2	3.0	8.4	11.8	35.2	26.0		15.7
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0		0.0
Total Delay	3.2	3.0	8.4	11.8	35.2	26.0		15.7
Queue Length 50th (m)	1.3	9.6	1.1	52.9	1.8	0.9		1.1
Queue Length 95th (m)	5.4	25.6	5.3	124.3	5.9	5.1		15.0
Internal Link Dist (m)		214.6		269.3		89.1		74.7
Turn Bay Length (m)	80.0		120.0					
Base Capacity (vph)	560	1448	696	1225	241	351		376
Starvation Cap Reductn	0	0	0	0	0	0		0
Spillback Cap Reductn	0	0	0	0	0	0		0
Storage Cap Reductn	0	0	0	0	0	0		0
Reduced v/c Ratio	0.10	0.24	0.03	0.52	0.04	0.03		0.31

Intersection Summary

Cycle Length: 90
Actuated Cycle Length: 90
Offset: 0 (0%), Referenced to phase 4:EBTL and 8:WBTL, Start of Green
Natural Cycle: 70
Control Type: Actuated-Coordinated

Splits and Phases: 14: Hawkstone Gate & Campeau Drive



HCM Signalized Intersection Capacity Analysis
14: Hawkstone Gate & Campeau Drive

Future Background PM Peak Hour

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	55	330	15	20	540	100	10	5	5	50	0	65
Future Volume (vph)	55	330	15	20	540	100	10	5	5	50	0	65
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Total Lost time (s)	6.0	6.0		6.0	6.0		5.9	5.9			5.9	
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	1.00			1.00	
Frpb, ped/bikes	1.00	1.00		1.00	0.99		1.00	0.98			0.97	
Flpb, ped/bikes	1.00	1.00		1.00	1.00		0.97	1.00			0.99	
Frt	1.00	0.99		1.00	0.98		1.00	0.93			0.92	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00			0.98	
Satd. Flow (prot)	1708	1788		1710	1748		1662	1638			1567	
Flt Permitted	0.31	1.00		0.55	1.00		0.65	1.00			0.86	
Satd. Flow (perm)	562	1788		997	1748		1139	1638			1369	
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)	55	330	15	20	540	100	10	5	5	50	0	65
RTOR Reduction (vph)	0	1	0	0	5	0	0	5	0	0	100	0
Lane Group Flow (vph)	55	344	0	20	635	0	10	5	0	0	15	0
Confl. Peds. (#/hr)	10					10	15		5	5		15
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Turn Type	pm+pt	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases	7	4			8			2			6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)	70.5	70.5		59.3	59.3		7.6	7.6			7.6	
Effective Green, g (s)	70.5	70.5		59.3	59.3		7.6	7.6			7.6	
Actuated g/C Ratio	0.78	0.78		0.66	0.66		0.08	0.08			0.08	
Clearance Time (s)	6.0	6.0		6.0	6.0		5.9	5.9			5.9	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0			3.0	
Lane Grp Cap (vph)	506	1400		656	1151		96	138			115	
v/s Ratio Prot	0.01	c0.19			c0.36			0.00				
v/s Ratio Perm	0.08			0.02			0.01				c0.01	
v/c Ratio	0.11	0.25		0.03	0.55		0.10	0.04			0.13	
Uniform Delay, d1	3.9	2.6		5.3	8.2		38.1	37.8			38.1	
Progression Factor	0.81	0.77		1.00	1.00		1.00	1.00			1.00	
Incremental Delay, d2	0.1	0.4		0.1	1.9		0.5	0.1			0.5	
Delay (s)	3.3	2.4		5.4	10.1		38.5	38.0			38.7	
Level of Service	A	A		A	B		D	D			D	
Approach Delay (s)		2.5			10.0			38.2			38.7	
Approach LOS		A			A			D			D	

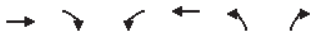
Intersection Summary

HCM 2000 Control Delay	10.7	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.50		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	17.9
Intersection Capacity Utilization	70.4%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

HCM Unsignalized Intersection Capacity Analysis
15: Park Ridge Place (West) & Campeau Drive

Future Background PM Peak Hour



Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	355	20	5	425	20	5
Future Volume (Veh/h)	355	20	5	425	20	5
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	355	20	5	425	20	5
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage veh)						
Upstream signal (m)	125					
pX, platoon unblocked			0.84		0.84	0.84
vC, conflicting volume			375		800	365
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			156		664	144
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			100		94	99
cM capacity (veh/h)			1202		358	761

Direction, Lane #	EB 1	WB 1	NB 1
Volume Total	375	430	25
Volume Left	0	5	20
Volume Right	20	0	5
cSH	1700	1202	400
Volume to Capacity	0.22	0.00	0.06
Queue Length 95th (m)	0.0	0.1	1.6
Control Delay (s)	0.0	0.1	14.6
Lane LOS		A	B
Approach Delay (s)	0.0	0.1	14.6
Approach LOS			B

Intersection Summary				
Average Delay		0.5		
Intersection Capacity Utilization		37.8%	ICU Level of Service	A
Analysis Period (min)		15		

HCM Unsignalized Intersection Capacity Analysis
16: Coulson Court & Robson Court

Future Background PM Peak Hour



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	20	30	10	0	20	0	5	5	0	5	0	5
Future Volume (Veh/h)	20	30	10	0	20	0	5	5	0	5	0	5
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	20	30	10	0	20	0	5	5	0	5	0	5
Pedestrians											5	
Lane Width (m)											3.6	
Walking Speed (m/s)											1.2	
Percent Blockage											0	
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	25			40			100	100	35	102	105	25
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	25			40			100	100	35	102	105	25
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	99			100			99	99	100	99	100	100
cM capacity (veh/h)	1596			1583			871	781	1044	864	776	1053

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	60	20	10	10
Volume Left	20	0	5	5
Volume Right	10	0	0	5
cSH	1596	1583	823	949
Volume to Capacity	0.01	0.00	0.01	0.01
Queue Length 95th (m)	0.3	0.0	0.3	0.3
Control Delay (s)	2.5	0.0	9.4	8.8
Lane LOS	A		A	A
Approach Delay (s)	2.5	0.0	9.4	8.8
Approach LOS			A	A

Intersection Summary				
Average Delay		3.3		
Intersection Capacity Utilization		20.1%	ICU Level of Service	A
Analysis Period (min)		15		

HCM Unsignalized Intersection Capacity Analysis
17: Robson Court & Evanshen Crescent

Future Background PM Peak Hour



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	15	20	15	0	0	5
Future Volume (Veh/h)	15	20	15	0	0	5
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	15	20	15	0	0	5
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	15				65	15
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	15				65	15
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	99				100	100
cM capacity (veh/h)	1616				937	1070

Direction, Lane #	EB 1	WB 1	SB 1
Volume Total	35	15	5
Volume Left	15	0	0
Volume Right	0	0	5
cSH	1616	1700	1070
Volume to Capacity	0.01	0.01	0.00
Queue Length 95th (m)	0.2	0.0	0.1
Control Delay (s)	3.1	0.0	8.4
Lane LOS	A		A
Approach Delay (s)	3.1	0.0	8.4
Approach LOS			A

Intersection Summary				
Average Delay	2.8			
Intersection Capacity Utilization	18.7%	ICU Level of Service		A
Analysis Period (min)	15			

HCM Unsignalized Intersection Capacity Analysis
18: Kanata Avenue & Park Ridge Place

Future Background PM Peak Hour



Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	5	0	630	10	10	525
Future Volume (Veh/h)	5	0	630	10	10	525
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	5	0	630	10	10	525
Pedestrians	5					
Lane Width (m)	3.6					
Walking Speed (m/s)	1.2					
Percent Blockage	0					
Right turn flare (veh)						
Median type			None			None
Median storage veh)						
Upstream signal (m)						133
pX, platoon unblocked	0.83					
vC, conflicting volume	1185	640			645	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1119	640			645	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	97	100			99	
cM capacity (veh/h)	188	477			946	

Direction, Lane #	WB 1	NB 1	SB 1
Volume Total	5	640	535
Volume Left	5	0	10
Volume Right	0	10	0
cSH	188	1700	946
Volume to Capacity	0.03	0.38	0.01
Queue Length 95th (m)	0.7	0.0	0.3
Control Delay (s)	24.7	0.0	0.3
Lane LOS	C		A
Approach Delay (s)	24.7	0.0	0.3
Approach LOS	C		

Intersection Summary				
Average Delay	0.2			
Intersection Capacity Utilization	47.6%	ICU Level of Service		A
Analysis Period (min)	15			

Queues
19: Herlihey Way & Campeau Drive

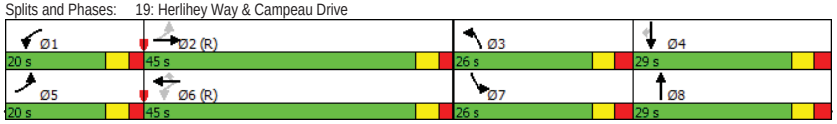
Future Background PM Peak Hour

Lane Group	EBL	EBT	WBL	WBT	WBR	NBL	NBT	SBL	SBT	SBR
Lane Configurations										
Traffic Volume (vph)	30	390	140	385	125	60	50	125	50	90
Future Volume (vph)	30	390	140	385	125	60	50	125	50	90
Lane Group Flow (vph)	30	495	140	385	125	60	220	125	50	90
Turn Type	pm+pt	NA	pm+pt	NA	Perm	Prot	NA	Prot	NA	Perm
Protected Phases	5	2	1	6		3	8	7	4	
Permitted Phases	2		6		6					4
Detector Phase	5	2	1	6	6	3	8	7	4	4
Switch Phase										
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Minimum Split (s)	10.5	34.5	10.5	34.5	34.5	10.9	28.9	10.9	28.9	28.9
Total Split (s)	20.0	45.0	20.0	45.0	45.0	26.0	29.0	26.0	29.0	29.0
Total Split (%)	16.7%	37.5%	16.7%	37.5%	37.5%	21.7%	24.2%	21.7%	24.2%	24.2%
Yellow Time (s)	3.3	3.3	3.3	3.3	3.3	3.3	3.3	3.3	3.3	3.3
All-Red Time (s)	2.2	2.2	2.2	2.2	2.2	2.6	2.6	2.6	2.6	2.6
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	5.5	5.5	5.5	5.5	5.5	5.9	5.9	5.9	5.9	5.9
Lead/Lag	Lead	Lag	Lead	Lag	Lag	Lead	Lag	Lead	Lag	Lag
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Recall Mode	None	C-Min	None	C-Min	C-Min	None	None	None	None	None
v/c Ratio	0.06	0.59	0.33	0.39	0.14	0.44	0.76	0.63	0.15	0.24
Control Delay	14.3	29.5	17.0	22.4	7.3	62.1	37.9	63.8	40.2	3.9
Queue Delay	0.0	0.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	14.3	30.2	17.0	22.4	7.3	62.1	37.9	63.8	40.2	3.9
Queue Length 50th (m)	2.8	75.7	14.3	48.6	0.4	14.4	22.8	30.0	10.9	0.0
Queue Length 95th (m)	9.6	#172.8	35.3	88.7	m7.7	28.2	48.1	48.4	20.5	6.1
Internal Link Dist (m)		148.2		217.6			87.8		129.5	
Turn Bay Length (m)	40.0		85.0		75.0			50.0		30.0
Base Capacity (vph)	630	845	468	978	890	280	372	286	380	413
Starvation Cap Reductn	0	125	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.05	0.69	0.30	0.39	0.14	0.21	0.59	0.44	0.13	0.22

Intersection Summary

Cycle Length: 120
Actuated Cycle Length: 120
Offset: 26 (22%), Referenced to phase 2:EBTL and 6:WBTL, Start of Green
Natural Cycle: 85
Control Type: Actuated-Coordinated
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.
m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 19: Herlihey Way & Campeau Drive



HCM Signalized Intersection Capacity Analysis
19: Herlihey Way & Campeau Drive

Future Background PM Peak Hour

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	30	390	105	140	385	125	60	50	170	125	50	90
Future Volume (vph)	30	390	105	140	385	125	60	50	170	125	50	90
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Total Lost time (s)	5.5	5.5		5.5	5.5	5.5	5.9	5.9		5.9	5.9	5.9
Lane Util. Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00
Frpb, ped/bikes	1.00	1.00		1.00	1.00	1.00	1.00	0.89		1.00	1.00	1.00
Flpb, ped/bikes	1.00	1.00		1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00
Frt	1.00	0.97		1.00	1.00	0.85	1.00	0.88		1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	1710	1743		1710	1782	1515	1676	1399		1710	1800	1485
Flt Permitted	0.49	1.00		0.30	1.00	1.00	0.95	1.00		0.95	1.00	1.00
Satd. Flow (perm)	889	1743		532	1782	1515	1676	1399		1710	1800	1485
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	390	105	140	385	125	60	50	170	125	50	90
RTOR Reduction (vph)	0	6	0	0	0	60	0	109	0	0	0	74
Lane Group Flow (vph)	30	489	0	140	385	65	60	111	0	125	50	17
Confl. Peds. (#/hr)									50	50		
Heavy Vehicles (%)	0%	0%	0%	0%	1%	1%	2%	0%	1%	0%	0%	3%
Turn Type	pm+pt	NA		pm+pt	NA	Perm	Prot	NA		Prot	NA	Perm
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases	2			6		6						4
Actuated Green, G (s)	60.8	56.6		72.2	62.5	62.5	8.5	16.5		14.0	22.0	22.0
Effective Green, g (s)	60.8	56.6		72.2	62.5	62.5	8.5	16.5		14.0	22.0	22.0
Actuated g/C Ratio	0.51	0.47		0.60	0.52	0.52	0.07	0.14		0.12	0.18	0.18
Clearance Time (s)	5.5	5.5		5.5	5.5	5.5	5.9	5.9		5.9	5.9	5.9
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)	479	822		419	928	789	118	192		199	330	272
v/s Ratio Prot	0.00	c0.28		c0.03	c0.22		0.04	c0.08		c0.07	c0.03	
v/s Ratio Perm	0.03			0.17		0.04						0.01
v/c Ratio	0.06	0.59		0.33	0.41	0.08	0.51	0.58		0.63	0.15	0.06
Uniform Delay, d1	14.9	23.3		13.2	17.6	14.4	53.7	48.5		50.5	41.2	40.5
Progression Factor	1.05	1.01		1.22	1.06	1.90	1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	0.1	3.1		0.4	1.2	0.2	3.4	4.2		6.1	0.2	0.1
Delay (s)	15.7	26.7		16.5	19.8	27.6	57.2	52.7		56.6	41.4	40.6
Level of Service	B	C		B	B	C	E	D		E	D	D
Approach Delay (s)		26.1			20.6			53.7			48.3	
Approach LOS		C			C			D			D	

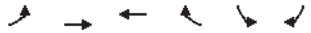
Intersection Summary

HCM 2000 Control Delay	31.9	HCM 2000 Level of Service	C	
HCM 2000 Volume to Capacity ratio	0.56			
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	22.8	
Intersection Capacity Utilization	81.6%	ICU Level of Service	D	
Analysis Period (min)	15			

c Critical Lane Group

HCM Unsignalized Intersection Capacity Analysis
20: Campeau Drive & Golf Course Access

Future Background PM Peak Hour



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	0	360	430	0	0	0
Future Volume (Veh/h)	0	360	430	0	0	0
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	0	360	430	0	0	0
Pedestrians					10	
Lane Width (m)					3.6	
Walking Speed (m/s)					1.2	
Percent Blockage					1	
Right turn flare (veh)						
Median type		None	None			
Median storage veh)						
Upstream signal (m)		232				
pX, platoon unblocked					0.90	
vC, conflicting volume	440				800	440
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	440				723	440
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	100				100	100
cM capacity (veh/h)	1121				354	616

Direction, Lane #	EB 1	WB 1	SB 1
Volume Total	360	430	0
Volume Left	0	0	0
Volume Right	0	0	0
cSH	1121	1700	1700
Volume to Capacity	0.00	0.25	0.00
Queue Length 95th (m)	0.0	0.0	0.0
Control Delay (s)	0.0	0.0	0.0
Lane LOS			A
Approach Delay (s)	0.0	0.0	0.0
Approach LOS			A

Intersection Summary				
Average Delay		0.0		
Intersection Capacity Utilization		27.2%	ICU Level of Service	A
Analysis Period (min)		15		

HCM Unsignalized Intersection Capacity Analysis
21: Park Ridge Place (East) & Campeau Drive

Future Background PM Peak Hour



Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	355	5	10	425	5	5
Future Volume (Veh/h)	355	5	10	425	5	5
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	355	5	10	425	5	5
Pedestrians					10	
Lane Width (m)					3.6	
Walking Speed (m/s)					1.2	
Percent Blockage					1	
Right turn flare (veh)						
Median type	None			None		
Median storage veh)						
Upstream signal (m)	269					
pX, platoon unblocked			0.92		0.92	0.92
vC, conflicting volume			370		812	368
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			267		750	265
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			99		99	99
cM capacity (veh/h)			1189		344	708

Direction, Lane #	EB 1	WB 1	NB 1
Volume Total	360	435	10
Volume Left	0	10	5
Volume Right	5	0	5
cSH	1700	1189	463
Volume to Capacity	0.21	0.01	0.02
Queue Length 95th (m)	0.0	0.2	0.5
Control Delay (s)	0.0	0.3	12.9
Lane LOS		A	B
Approach Delay (s)	0.0	0.3	12.9
Approach LOS			B

Intersection Summary				
Average Delay		0.3		
Intersection Capacity Utilization		42.1%	ICU Level of Service	A
Analysis Period (min)		15		

Queues
1: Terry Fox Drive & Campeau Drive

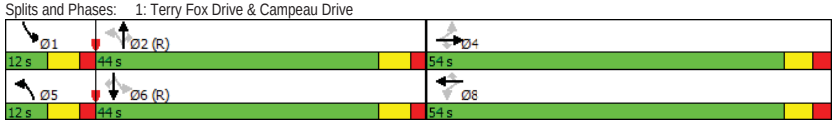
Future Total AM Peak Hour

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	25	30	35	315	40	155	35	800	190	150	725	45
Future Volume (vph)	25	30	35	315	40	155	35	800	190	150	725	45
Lane Group Flow (vph)	25	30	35	315	40	155	35	800	190	150	725	45
Turn Type	Perm	NA	Perm	Perm	NA	Perm	pm+pt	NA	Perm	pm+pt	NA	Perm
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4		4	8		8	2		2	6		6
Detector Phase	4	4	4	8	8	8	5	2	2	1	6	6
Switch Phase												
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Minimum Split (s)	43.4	43.4	43.4	43.4	43.4	43.4	11.4	40.4	40.4	11.4	40.4	40.4
Total Split (s)	54.0	54.0	54.0	54.0	54.0	54.0	12.0	44.0	44.0	12.0	44.0	44.0
Total Split (%)	49.1%	49.1%	49.1%	49.1%	49.1%	49.1%	10.9%	40.0%	40.0%	10.9%	40.0%	40.0%
Yellow Time (s)	3.7	3.7	3.7	3.7	3.7	3.7	4.2	4.2	4.2	4.2	4.2	4.2
All-Red Time (s)	2.7	2.7	2.7	2.7	2.7	2.7	2.2	2.2	2.2	2.2	2.2	2.2
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4
Lead/Lag							Lead	Lag	Lag	Lead	Lag	Lag
Lead-Lag Optimize?							Yes	Yes	Yes	Yes	Yes	Yes
Recall Mode	None	None	None	None	None	None	None	C-Min	C-Min	None	C-Min	C-Min
v/c Ratio	0.06	0.06	0.07	0.81	0.08	0.28	0.09	0.54	0.24	0.43	0.41	0.05
Control Delay	24.3	24.3	0.3	51.4	24.7	7.8	13.4	26.0	4.4	16.2	20.5	0.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	24.3	24.3	0.3	51.4	24.7	7.8	13.4	26.0	4.4	16.2	20.5	0.1
Queue Length 50th (m)	4.0	4.8	0.0	73.0	8.1	10.6	3.1	69.0	0.0	14.5	56.2	0.0
Queue Length 95th (m)	9.2	10.3	0.0	62.0	5.4	2.4	9.7	103.9	15.5	31.2	90.3	0.0
Internal Link Dist (m)		139.7			148.2			149.3			180.0	
Turn Bay Length (m)	70.0			75.0			50.0		60.0	105.0		
Base Capacity (vph)	569	778	717	569	778	750	380	1495	782	351	1755	832
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	0.04	0.04	0.05	0.55	0.05	0.21	0.09	0.54	0.24	0.43	0.41	0.05

Intersection Summary

Cycle Length: 110
Actuated Cycle Length: 110
Offset: 27 (25%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green
Natural Cycle: 100
Control Type: Actuated-Coordinated

Splits and Phases: 1: Terry Fox Drive & Campeau Drive



HCM Signalized Intersection Capacity Analysis
1: Terry Fox Drive & Campeau Drive

Future Total AM Peak Hour

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	25	30	35	315	40	155	35	800	190	150	725	45
Future Volume (vph)	25	30	35	315	40	155	35	800	190	150	725	45
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Total Lost time (s)	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	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)	1710	1800	1530	1693	1800	1530	1710	3386	1530	1693	3420	1530
Flt Permitted	0.73	1.00	1.00	0.74	1.00	1.00	0.35	1.00	1.00	0.23	1.00	1.00
Satd. Flow (perm)	1316	1800	1530	1315	1800	1530	630	3386	1530	419	3420	1530
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)	25	30	35	315	40	155	35	800	190	150	725	45
RTOR Reduction (vph)	0	0	25	0	0	109	0	0	106	0	0	23
Lane Group Flow (vph)	25	30	10	315	40	46	35	800	84	150	725	22
Heavy Vehicles (%)	0%	0%	0%	1%	0%	0%	0%	1%	0%	1%	0%	0%
Turn Type	Perm	NA	Perm	Perm	NA	Perm	pm+pt	NA	Perm	pm+pt	NA	Perm
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4		4	8		8	2		2	6		6
Actuated Green, G (s)	32.6	32.6	32.6	32.6	32.6	32.6	52.9	48.6	48.6	63.5	53.9	53.9
Effective Green, g (s)	32.6	32.6	32.6	32.6	32.6	32.6	52.9	48.6	48.6	63.5	53.9	53.9
Actuated g/C Ratio	0.30	0.30	0.30	0.30	0.30	0.30	0.48	0.44	0.44	0.58	0.49	0.49
Clearance Time (s)	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4
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)	390	533	453	389	533	453	345	1495	675	353	1675	749
v/s Ratio Prot		0.02			0.02		0.00	c0.24		c0.04	c0.21	
v/s Ratio Perm	0.02		0.01	c0.24		0.03	0.04		0.05	0.21		0.01
v/c Ratio	0.06	0.06	0.02	0.81	0.08	0.10	0.10	0.54	0.12	0.42	0.43	0.03
Uniform Delay, d1	27.8	27.7	27.4	35.8	27.9	28.1	15.2	22.4	18.1	12.6	18.2	14.5
Progression Factor	1.00	1.00	1.00	1.02	1.00	1.81	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	0.1	0.0	0.0	11.3	0.1	0.1	0.1	1.4	0.4	0.8	0.8	0.1
Delay (s)	27.8	27.7	27.4	47.9	27.9	51.0	15.3	23.8	18.5	13.5	19.0	14.6
Level of Service	C	C	C	D	C	D	B	C	B	B	B	B
Approach Delay (s)		27.6			47.3			22.5			17.9	
Approach LOS		C			D			C			B	

Intersection Summary

HCM 2000 Control Delay	26.0	HCM 2000 Level of Service	C		
HCM 2000 Volume to Capacity ratio	0.63				
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	19.2		
Intersection Capacity Utilization	73.2%	ICU Level of Service	D		
Analysis Period (min)	15				

c Critical Lane Group

Queues
2: Kanata Avenue & Campeau Drive

Future Total AM Peak Hour

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations										
Traffic Volume (vph)	110	225	100	295	60	250	55	135	560	250
Future Volume (vph)	110	225	100	295	60	250	55	135	560	250
Lane Group Flow (vph)	110	275	100	370	60	250	55	135	560	250
Turn Type	pm+pt	NA	pm+pt	NA	pm+pt	NA	Perm	Perm	NA	Perm
Protected Phases	7	4	3	8	5	2			6	
Permitted Phases	4		8		2		2	6		6
Detector Phase	7	4	3	8	5	2	2	6	6	6
Switch Phase										
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Minimum Split (s)	11.2	36.2	11.2	36.2	10.9	29.9	29.9	29.9	29.9	29.9
Total Split (s)	12.0	37.0	12.0	37.0	15.0	61.0	61.0	46.0	46.0	46.0
Total Split (%)	10.9%	33.6%	10.9%	33.6%	13.6%	55.5%	55.5%	41.8%	41.8%	41.8%
Yellow Time (s)	3.7	3.7	3.7	3.7	3.3	3.3	3.3	3.3	3.3	3.3
All-Red Time (s)	2.5	2.5	2.5	2.5	2.6	2.6	2.6	2.6	2.6	2.6
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	6.2	6.2	6.2	6.2	5.9	5.9	5.9	5.9	5.9	5.9
Lead/Lag	Lead	Lag	Lead	Lag	Lead			Lag	Lag	Lag
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes			Yes	Yes	Yes
Recall Mode	None	C-Min	None	C-Min	None	None	None	None	None	None
v/c Ratio	0.37	0.49	0.27	0.65	0.30	0.31	0.07	0.36	0.91	0.38
Control Delay	19.6	28.0	23.6	39.7	18.5	19.3	1.0	29.5	54.1	4.8
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	19.6	28.0	23.6	39.7	18.5	19.3	1.0	29.5	54.1	4.8
Queue Length 50th (m)	17.7	55.1	14.6	76.6	6.7	31.1	0.0	21.6	113.7	0.0
Queue Length 95th (m)	11.3	23.0	26.5	#111.1	14.0	48.9	2.2	39.2	#177.7	16.7
Internal Link Dist (m)		217.6		101.3		108.6			167.9	
Turn Bay Length (m)	95.0		35.0		55.0		55.0	115.0		100.0
Base Capacity (vph)	298	574	372	575	216	895	814	398	659	694
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.37	0.48	0.27	0.64	0.28	0.28	0.07	0.34	0.85	0.36

Intersection Summary

Cycle Length: 110
Actuated Cycle Length: 110
Offset: 67 (61%), Referenced to phase 4:EBTL and 8:WBTL, Start of Green
Natural Cycle: 90
Control Type: Actuated-Coordinated
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 2: Kanata Avenue & Campeau Drive



HCM Signalized Intersection Capacity Analysis
2: Kanata Avenue & Campeau Drive

Future Total AM Peak Hour

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	110	225	50	100	295	75	60	250	55	135	560	250
Future Volume (vph)	110	225	50	100	295	75	60	250	55	135	560	250
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Total Lost time (s)	6.2	6.2		6.2	6.2		5.9	5.9	5.9	5.9	5.9	5.9
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00
Frpb, ped/bikes	1.00	0.99		1.00	1.00		1.00	1.00	1.00	1.00	1.00	0.96
Flpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	0.97		1.00	0.97		1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1710	1728		1706	1731		1710	1782	1530	1710	1800	1465
Flt Permitted	0.33	1.00		0.46	1.00		0.11	1.00	1.00	0.60	1.00	1.00
Satd. Flow (perm)	594	1728		835	1731		205	1782	1530	1087	1800	1465
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)	110	225	50	100	295	75	60	250	55	135	560	250
RTOR Reduction (vph)	0	7	0	0	8	0	0	0	30	0	0	164
Lane Group Flow (vph)	110	268	0	100	362	0	60	250	25	135	560	86
Confl. Peds. (#/hr)			5	5			10					10
Heavy Vehicles (%)	0%	1%	0%	0%	1%	0%	0%	1%	0%	0%	0%	0%
Turn Type	pm+pt	NA		pm+pt	NA		pm+pt	NA	Perm	Perm	NA	Perm
Protected Phases	7	4		3	8		5	2			6	
Permitted Phases	4			8			2		2	6		6
Actuated Green, G (s)	41.3	34.5		41.1	34.4		50.5	50.5	50.5	37.7	37.7	37.7
Effective Green, g (s)	41.3	34.5		41.1	34.4		50.5	50.5	50.5	37.7	37.7	37.7
Actuated g/C Ratio	0.38	0.31		0.37	0.31		0.46	0.46	0.46	0.34	0.34	0.34
Clearance Time (s)	6.2	6.2		6.2	6.2		5.9	5.9	5.9	5.9	5.9	5.9
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)	292	541		365	541		188	818	702	372	616	502
v/s Ratio Prot	c0.02	0.16		0.02	c0.21		0.02	c0.14			c0.31	
v/s Ratio Perm	0.12			0.09			0.13		0.02	0.12		0.06
v/c Ratio	0.38	0.50		0.27	0.67		0.32	0.31	0.04	0.36	0.91	0.17
Uniform Delay, d1	23.9	30.7		23.2	32.8		21.9	18.7	16.4	27.1	34.5	25.2
Progression Factor	0.72	0.79		1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	0.8	3.2		0.4	6.4		1.0	0.2	0.0	0.6	17.3	0.2
Delay (s)	18.1	27.5		23.6	39.3		22.9	18.9	16.4	27.7	51.8	25.4
Level of Service	B	C		C	D		C	B	B	C	D	C
Approach Delay (s)		24.8			35.9			19.2			41.4	
Approach LOS		C			D			B			D	

Intersection Summary

HCM 2000 Control Delay	33.5	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.73		
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	24.2
Intersection Capacity Utilization	86.3%	ICU Level of Service	E
Analysis Period (min)	15		

c Critical Lane Group

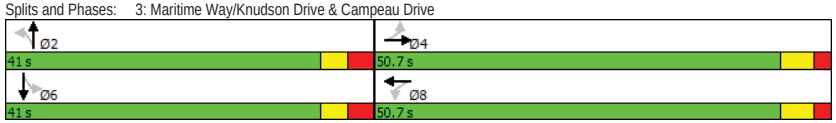
Queues
3: Maritime Way/Knudson Drive & Campeau Drive

Future Total AM Peak Hour

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations								
Traffic Volume (vph)	80	620	30	400	15	15	170	0
Future Volume (vph)	80	620	30	400	15	15	170	0
Lane Group Flow (vph)	80	630	30	485	15	115	170	85
Turn Type	Perm	NA	Perm	NA	Perm	NA	Perm	NA
Protected Phases		4		8		2		6
Permitted Phases	4		8		2		6	
Detector Phase	4	4	8	8	2	2	6	6
Switch Phase								
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Minimum Split (s)	50.7	50.7	50.7	50.7	24.0	24.0	24.0	24.0
Total Split (s)	50.7	50.7	50.7	50.7	41.0	41.0	41.0	41.0
Total Split (%)	55.3%	55.3%	55.3%	55.3%	44.7%	44.7%	44.7%	44.7%
Yellow Time (s)	3.7	3.7	3.7	3.7	3.0	3.0	3.0	3.0
All-Red Time (s)	2.0	2.0	2.0	2.0	3.0	3.0	3.0	3.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	5.7	5.7	5.7	5.7	6.0	6.0	6.0	6.0
Lead/Lag								
Lead-Lag Optimize?								
Recall Mode	Min	Min	Min	Min	None	None	None	None
v/c Ratio	0.22	0.71	0.11	0.56	0.05	0.24	0.53	0.14
Control Delay	10.2	16.0	9.4	12.3	16.4	7.0	23.9	0.5
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	10.2	16.0	9.4	12.3	16.4	7.0	23.9	0.5
Queue Length 50th (m)	3.8	40.6	1.3	27.0	0.9	0.9	12.3	0.0
Queue Length 95th (m)	13.5	97.1	6.3	66.4	5.6	12.4	37.9	0.0
Internal Link Dist (m)		436.9		443.4		129.6		89.7
Turn Bay Length (m)	55.0		55.0		45.0		50.0	
Base Capacity (vph)	639	1562	459	1510	867	1099	854	1122
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	0.13	0.40	0.07	0.32	0.02	0.10	0.20	0.08

Intersection Summary
Cycle Length: 91.7
Actuated Cycle Length: 52.2
Natural Cycle: 75
Control Type: Actuated-Uncoordinated

Splits and Phases: 3: Maritime Way/Knudson Drive & Campeau Drive



HCM Signalized Intersection Capacity Analysis
3: Maritime Way/Knudson Drive & Campeau Drive

Future Total AM Peak Hour

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	80	620	10	30	400	85	15	15	100	170	0	85
Future Volume (vph)	80	620	10	30	400	85	15	15	100	170	0	85
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Total Lost time (s)	5.7	5.7		5.7	5.7		6.0	6.0		6.0	6.0	
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Frpb, ped/bikes	1.00	1.00		1.00	0.99		1.00	0.98		1.00	0.97	
Flpb, ped/bikes	0.98	1.00		1.00	1.00		0.99	1.00		0.99	1.00	
Frt	1.00	1.00		1.00	0.97		1.00	0.87		1.00	0.85	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1682	1789		1707	1736		1687	1528		1699	1477	
Flt Permitted	0.42	1.00		0.29	1.00		0.70	1.00		0.68	1.00	
Satd. Flow (perm)	738	1789		527	1736		1246	1528		1221	1477	
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	620	10	30	400	85	15	15	100	170	0	85
RTOR Reduction (vph)	0	0	0	0	8	0	0	73	0	0	62	0
Lane Group Flow (vph)	80	630	0	30	477	0	15	42	0	170	23	0
Confl. Peds. (#/hr)	30		5	5		30	10		5	5		10
Heavy Vehicles (%)	0%	0%	20%	0%	0%	0%	0%	0%	0%	0%	0%	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)	26.0	26.0		26.0	26.0		13.9	13.9		13.9	13.9	
Effective Green, g (s)	26.0	26.0		26.0	26.0		13.9	13.9		13.9	13.9	
Actuated g/C Ratio	0.50	0.50		0.50	0.50		0.27	0.27		0.27	0.27	
Clearance Time (s)	5.7	5.7		5.7	5.7		6.0	6.0		6.0	6.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	371	901		265	874		335	411		328	397	
v/s Ratio Prot		c0.35			0.27			0.03			0.02	
v/s Ratio Perm	0.11			0.06			0.01			c0.14		
v/c Ratio	0.22	0.70		0.11	0.55		0.04	0.10		0.52	0.06	
Uniform Delay, d1	7.1	9.8		6.7	8.8		13.9	14.2		16.0	14.0	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.3	2.4		0.2	0.7		0.1	0.1		1.4	0.1	
Delay (s)	7.4	12.2		6.9	9.5		14.0	14.3		17.4	14.1	
Level of Service	A	B		A	A		B	B		B	B	
Approach Delay (s)		11.6			9.3			14.2			16.3	
Approach LOS		B			A			B			B	

Intersection Summary				
HCM 2000 Control Delay	11.8	HCM 2000 Level of Service	B	
HCM 2000 Volume to Capacity ratio	0.64			
Actuated Cycle Length (s)	51.6	Sum of lost time (s)	11.7	
Intersection Capacity Utilization	70.4%	ICU Level of Service	C	
Analysis Period (min)	15			

c Critical Lane Group

Queues
4: Teron Road & Campeau Drive

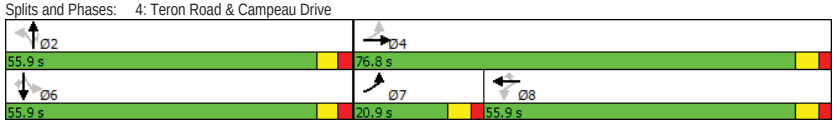
Future Total AM Peak Hour

Lane Group	EBL	EBT	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations											
Traffic Volume (vph)	220	615	30	290	500	5	40	65	355	10	130
Future Volume (vph)	220	615	30	290	500	5	40	65	355	10	130
Lane Group Flow (vph)	220	620	30	290	500	0	45	65	355	10	130
Turn Type	pm+pt	NA	Perm	NA	Perm	Perm	NA	Perm	Perm	NA	Perm
Protected Phases	7	4		8			2			6	
Permitted Phases	4		8		8	2		2	6		6
Detector Phase	7	4	8	8	8	2	2	2	6	6	6
Switch Phase											
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Minimum Split (s)	10.9	55.9	55.9	55.9	55.9	26.9	26.9	26.9	26.9	26.9	26.9
Total Split (s)	20.9	76.8	55.9	55.9	55.9	55.9	55.9	55.9	55.9	55.9	55.9
Total Split (%)	15.7%	57.9%	42.1%	42.1%	42.1%	42.1%	42.1%	42.1%	42.1%	42.1%	42.1%
Yellow Time (s)	3.7	3.7	3.7	3.7	3.7	3.3	3.3	3.3	3.3	3.3	3.3
All-Red Time (s)	2.2	2.2	2.2	2.2	2.2	2.6	2.6	2.6	2.6	2.6	2.6
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	5.9	5.9	5.9	5.9	5.9		5.9	5.9	5.9	5.9	5.9
Lead/Lag	Lead		Lag	Lag	Lag						
Lead-Lag Optimize?	Yes		Yes	Yes	Yes						
Recall Mode	None	Max	Max	Max	Max	None	None	None	None	None	None
v/c Ratio	0.39	0.59	0.09	0.37	0.56		0.08	0.13	0.90	0.02	0.24
Control Delay	15.8	20.4	25.8	27.2	5.0		28.1	5.8	65.6	26.8	5.6
Queue Delay	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0
Total Delay	15.8	20.4	25.8	27.2	5.0		28.1	5.8	65.6	26.8	5.6
Queue Length 50th (m)	25.4	95.4	4.5	49.3	0.0		7.9	0.0	84.5	1.7	0.0
Queue Length 95th (m)	47.3	159.6	13.0	85.5	25.7		16.6	8.7	125.6	5.8	13.5
Internal Link Dist (m)		269.3		262.3			58.3			132.3	
Turn Bay Length (m)	65.0		160.0					70.0	85.0		
Base Capacity (vph)	579	1054	321	786	897		729	630	518	744	677
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	0.38	0.59	0.09	0.37	0.56		0.06	0.10	0.69	0.01	0.19

Intersection Summary

Cycle Length: 132.7
Actuated Cycle Length: 121.5
Natural Cycle: 95
Control Type: Actuated-Uncoordinated

Splits and Phases: 4: Teron Road & Campeau Drive



HCM Signalized Intersection Capacity Analysis
4: Teron Road & Campeau Drive

Future Total AM Peak Hour

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	220	615	5	30	290	500	5	40	65	355	10	130
Future Volume (vph)	220	615	5	30	290	500	5	40	65	355	10	130
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Total Lost time (s)	5.9	5.9		5.9	5.9	5.9		5.9	5.9	5.9	5.9	5.9
Lane Util. Factor	1.00	1.00		1.00	1.00	1.00		1.00	1.00	1.00	1.00	1.00
Frpb, ped/bikes	1.00	1.00		1.00	1.00	0.93		1.00	0.93	1.00	1.00	0.95
Flpb, ped/bikes	0.99	1.00		0.99	1.00	1.00		1.00	1.00	0.96	1.00	1.00
Frt	1.00	1.00		1.00	1.00	0.85		1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00	1.00		0.99	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1691	1797		1701	1800	1417		1784	1426	1640	1800	1456
Flt Permitted	0.45	1.00		0.41	1.00	1.00		0.98	1.00	0.73	1.00	1.00
Satd. Flow (perm)	807	1797		735	1800	1417		1765	1426	1256	1800	1456
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)	220	615	5	30	290	500	5	40	65	355	10	130
RTOR Reduction (vph)	0	0	0	0	0	281	0	0	44	0	0	89
Lane Group Flow (vph)	220	620	0	30	290	219	0	45	21	355	10	41
Confl. Peds. (#/hr)	20		5	5		20	10		15	15		10
Confl. Bikes (#/hr)									5			
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Turn Type	pm+pt	NA		Perm	NA	Perm	Perm	NA	Perm	Perm	NA	Perm
Protected Phases	7	4			8			2			6	
Permitted Phases	4			8		8	2		2	6		6
Actuated Green, G (s)	71.3	71.3		53.2	53.2	53.2		38.4	38.4	38.4	38.4	38.4
Effective Green, g (s)	71.3	71.3		53.2	53.2	53.2		38.4	38.4	38.4	38.4	38.4
Actuated g/C Ratio	0.59	0.59		0.44	0.44	0.44		0.32	0.32	0.32	0.32	0.32
Clearance Time (s)	5.9	5.9		5.9	5.9	5.9		5.9	5.9	5.9	5.9	5.9
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)	562	1054		321	788	620		557	450	396	568	460
v/s Ratio Prot	0.04	c0.34			0.16						0.01	
v/s Ratio Perm	0.19			0.04		0.15		0.03	0.01	c0.28		0.03
v/c Ratio	0.39	0.59		0.09	0.37	0.35		0.08	0.05	0.90	0.02	0.09
Uniform Delay, d1	12.8	15.8		20.0	22.9	22.7		29.2	28.8	39.7	28.6	29.2
Progression Factor	1.00	1.00		1.00	1.00	1.00		1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	0.5	2.4		0.6	1.3	1.6		0.1	0.0	22.0	0.0	0.1
Delay (s)	13.3	18.2		20.6	24.2	24.3		29.2	28.9	61.7	28.6	29.3
Level of Service	B	B		C	C	C		C	C	E	C	C
Approach Delay (s)		16.9			24.1			29.0			52.5	
Approach LOS		B			C			C			D	

Intersection Summary

HCM 2000 Control Delay	27.9	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.73		
Actuated Cycle Length (s)	121.5	Sum of lost time (s)	17.7
Intersection Capacity Utilization	80.8%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

Queues
5: March Road & Campeau Drive/Hwy 417 Off Ramp

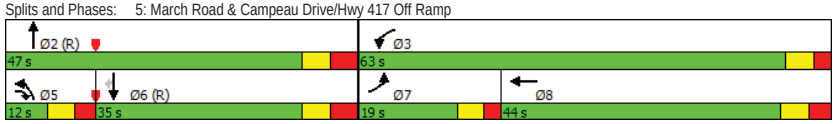
Future Total AM Peak Hour

Lane Group	EBL	EBR	WBL	WBT	NBL	NBT	SBT	SBR
Lane Configurations								
Traffic Volume (vph)	190	845	390	335	415	1155	845	85
Future Volume (vph)	190	845	390	335	415	1155	845	85
Lane Group Flow (vph)	190	845	390	335	415	1155	845	85
Turn Type	Prot	Over	Prot	NA	Prot	NA	NA	Perm
Protected Phases	7	5	3	8	5	2	6	
Permitted Phases								6
Detector Phase	7	5	3	8	5	2	6	6
Switch Phase								
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Minimum Split (s)	11.0	11.5	24.2	43.8	11.5	30.5	30.5	30.5
Total Split (s)	19.0	12.0	63.0	44.0	12.0	47.0	35.0	35.0
Total Split (%)	17.3%	10.9%	57.3%	40.0%	10.9%	42.7%	31.8%	31.8%
Yellow Time (s)	3.7	3.7	3.7	3.7	3.7	3.7	3.7	3.7
All-Red Time (s)	2.3	2.8	2.5	3.1	2.8	3.8	3.8	3.8
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	6.0	6.5	6.2	6.8	6.5	7.5	7.5	7.5
Lead/Lag	Lead	Lead		Lag	Lead		Lag	Lag
Lead-Lag Optimize?	Yes	Yes		Yes	Yes		Yes	Yes
Recall Mode	None	None	None	None	None	C-Min	C-Min	C-Min
v/c Ratio	0.82	0.92	0.34	0.67	0.47	0.63	0.78	0.19
Control Delay	75.0	57.6	27.7	50.7	38.1	20.4	45.9	0.9
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	75.0	57.6	27.7	50.7	38.1	20.4	45.9	0.9
Queue Length 50th (m)	42.1	95.1	33.2	38.1	41.8	93.6	65.5	0.0
Queue Length 95th (m)	#88.1	#152.1	44.8	51.3	60.7	121.6	78.9	0.0
Internal Link Dist (m)				269.9		155.6	164.4	
Turn Bay Length (m)	60.0	190.0	150.0		150.0			150.0
Base Capacity (vph)	231	916	1712	1156	889	1823	1228	496
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	0.82	0.92	0.23	0.29	0.47	0.63	0.69	0.17

Intersection Summary

Cycle Length: 110
Actuated Cycle Length: 110
Offset: 97 (88%), Referenced to phase 2:NBT and 6:SBT, Start of Green
Natural Cycle: 130
Control Type: Actuated-Coordinated
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 5: March Road & Campeau Drive/Hwy 417 Off Ramp



HCM Signalized Intersection Capacity Analysis
5: March Road & Campeau Drive/Hwy 417 Off Ramp

Future Total AM Peak Hour

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	190	0	845	390	335	0	415	1155	0	0	845	85
Future Volume (vph)	190	0	845	390	335	0	415	1155	0	0	845	85
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Total Lost time (s)	6.0		6.5	6.2	6.8		6.5	7.5			7.5	7.5
Lane Util. Factor	1.00		*1.00	0.97	0.95		0.97	0.95			0.91	1.00
Frpb, ped/bikes	1.00		1.00	1.00	1.00		1.00	1.00			1.00	0.98
Flpb, ped/bikes	1.00		1.00	1.00	1.00		1.00	1.00			1.00	1.00
Frt	1.00		1.00	1.00	1.00		1.00	1.00			1.00	0.85
Flt Protected	0.95		1.00	0.95	1.00		1.00	1.00			1.00	1.00
Satd. Flow (prot)	1710		3600	3317	3420		3492	3420			4914	1501
Flt Permitted	0.95		1.00	0.95	1.00		1.00	1.00			1.00	1.00
Satd. Flow (perm)	1710		3600	3317	3420		3492	3420			4914	1501
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)	190	0	845	390	335	0	415	1155	0	0	845	85
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	0	0	66
Lane Group Flow (vph)	190	0	845	390	335	0	415	1155	0	0	845	19
Confl. Peds. (#/hr)							5					5
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Turn Type	Prot		Over	Prot	NA		Prot	NA			NA	Perm
Protected Phases	7		5	3	8		5	2			6	
Permitted Phases												6
Actuated Green, G (s)	14.9		28.0	37.7	16.2		28.0	58.6			24.1	24.1
Effective Green, g (s)	14.9		28.0	37.7	16.2		28.0	58.6			24.1	24.1
Actuated g/C Ratio	0.14		0.25	0.34	0.15		0.25	0.53			0.22	0.22
Clearance Time (s)	6.0		6.5	6.2	6.8		6.5	7.5			7.5	7.5
Vehicle Extension (s)	3.0		3.0	3.0	3.0		3.0	3.0			3.0	3.0
Lane Grp Cap (vph)	231		916	1136	503		888	1821			1076	328
v/s Ratio Prot	c0.11		c0.23	0.12	c0.10		0.12	0.34			c0.17	
v/s Ratio Perm												0.01
v/c Ratio	0.82		0.92	0.34	0.67		0.47	0.63			0.79	0.06
Uniform Delay, d1	46.3		39.9	26.9	44.3		34.7	18.1			40.5	34.0
Progression Factor	1.00		1.00	1.00	1.00		1.00	1.00			1.00	1.00
Incremental Delay, d2	20.5		14.4	0.2	3.3		0.4	1.7			5.8	0.3
Delay (s)	66.7		54.4	27.1	47.7		35.1	19.8			46.3	34.3
Level of Service	E		D	C	D		D	B			D	C
Approach Delay (s)		56.6			36.6			23.9			45.2	
Approach LOS		E			D			C			D	

Intersection Summary

HCM 2000 Control Delay	38.7	HCM 2000 Level of Service		D	
HCM 2000 Volume to Capacity ratio	0.81				
Actuated Cycle Length (s)	110.0	Sum of lost time (s)		26.8	
Intersection Capacity Utilization	78.9%	ICU Level of Service		D	
Analysis Period (min)	15				

c Critical Lane Group

HCM Unsignalized Intersection Capacity Analysis
6: Kanata Avenue & Knudson Drive

Future Total AM Peak Hour



Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Sign Control	Stop		Stop			Stop
Traffic Volume (vph)	180	145	215	195	160	280
Future Volume (vph)	180	145	215	195	160	280
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	180	145	215	195	160	280

Direction, Lane #	WB 1	NB 1	SB 1	SB 2
Volume Total (vph)	325	410	160	280
Volume Left (vph)	180	0	160	0
Volume Right (vph)	145	195	0	0
Hadj (s)	-0.16	-0.29	0.50	0.00
Departure Headway (s)	5.8	5.4	6.6	6.1
Degree Utilization, x	0.53	0.62	0.29	0.47
Capacity (veh/h)	579	638	524	570
Control Delay (s)	15.2	16.7	11.1	13.3
Approach Delay (s)	15.2	16.7	12.5	
Approach LOS	C	C	B	

Intersection Summary			
Delay		14.7	
Level of Service		B	
Intersection Capacity Utilization	63.8%	ICU Level of Service	B
Analysis Period (min)		15	

HCM Unsignalized Intersection Capacity Analysis
7: Shaughnessy Crescent (East) & Knudson Drive

Future Total AM Peak Hour



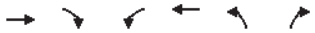
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	320	10	5	210	15	20
Future Volume (Veh/h)	320	10	5	210	15	20
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	320	10	5	210	15	20
Pedestrians					10	
Lane Width (m)					3.6	
Walking Speed (m/s)					1.2	
Percent Blockage					1	
Right turn flare (veh)						
Median type	None			None		
Median storage veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume			340		555	335
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			340		555	335
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			100		97	97
cM capacity (veh/h)			1220		490	706

Direction, Lane #	EB 1	WB 1	NB 1
Volume Total	330	215	35
Volume Left	0	5	15
Volume Right	10	0	20
cSH	1700	1220	594
Volume to Capacity	0.19	0.00	0.06
Queue Length 95th (m)	0.0	0.1	1.5
Control Delay (s)	0.0	0.2	11.4
Lane LOS		A	B
Approach Delay (s)	0.0	0.2	11.4
Approach LOS			B

Intersection Summary			
Average Delay	0.8		
Intersection Capacity Utilization	28.4%	ICU Level of Service	A
Analysis Period (min)	15		

HCM Unsignalized Intersection Capacity Analysis
8: Shaughnessy Crescent (West) & Knudson Drive

Future Total AM Peak Hour



Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	320	10	5	220	20	10
Future Volume (Veh/h)	320	10	5	220	20	10
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	320	10	5	220	20	10
Pedestrians				5	20	
Lane Width (m)				3.6	3.6	
Walking Speed (m/s)				1.2	1.2	
Percent Blockage				0	2	
Right turn flare (veh)						
Median type	None			None		
Median storage veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume			350		575	350
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			350		575	350
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			100		96	99
cM capacity (veh/h)			1200		473	683

Direction, Lane #	EB 1	WB 1	NB 1
Volume Total	330	225	30
Volume Left	0	5	20
Volume Right	10	0	10
cSH	1700	1200	527
Volume to Capacity	0.19	0.00	0.06
Queue Length 95th (m)	0.0	0.1	1.4
Control Delay (s)	0.0	0.2	12.2
Lane LOS		A	B
Approach Delay (s)	0.0	0.2	12.2
Approach LOS			B

Intersection Summary				
Average Delay		0.7		
Intersection Capacity Utilization		30.0%	ICU Level of Service	A
Analysis Period (min)		15		

HCM Unsignalized Intersection Capacity Analysis
9: Knudson Drive & Sherk Crescent (North)

Future Total AM Peak Hour



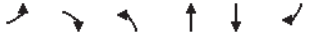
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	5	15	5	160	200	5
Future Volume (Veh/h)	5	15	5	160	200	5
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	5	15	5	160	200	5
Pedestrians	10					
Lane Width (m)	3.6					
Walking Speed (m/s)	1.2					
Percent Blockage	1					
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	382	212	215			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	382	212	215			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	99	98	100			
cM capacity (veh/h)	616	826	1356			

Direction, Lane #	EB 1	NB 1	SB 1
Volume Total	20	165	205
Volume Left	5	5	0
Volume Right	15	0	5
cSH	761	1356	1700
Volume to Capacity	0.03	0.00	0.12
Queue Length 95th (m)	0.6	0.1	0.0
Control Delay (s)	9.9	0.3	0.0
Lane LOS	A	A	
Approach Delay (s)	9.9	0.3	0.0
Approach LOS	A		

Intersection Summary				
Average Delay		0.6		
Intersection Capacity Utilization		23.1%	ICU Level of Service	A
Analysis Period (min)		15		

HCM Unsignalized Intersection Capacity Analysis
10: Knudson Drive & Sherk Crescent (South)

Future Total AM Peak Hour



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	10	35	15	155	215	5
Future Volume (Veh/h)	10	35	15	155	215	5
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	10	35	15	155	215	5
Pedestrians	10					
Lane Width (m)	3.6					
Walking Speed (m/s)	1.2					
Percent Blockage	1					
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	412	228	230			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	412	228	230			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	98	96	99			
cM capacity (veh/h)	588	810	1339			

Direction, Lane #	EB 1	NB 1	SB 1
Volume Total	45	170	220
Volume Left	10	15	0
Volume Right	35	0	5
cSH	747	1339	1700
Volume to Capacity	0.06	0.01	0.13
Queue Length 95th (m)	1.5	0.3	0.0
Control Delay (s)	10.1	0.8	0.0
Lane LOS	B	A	
Approach Delay (s)	10.1	0.8	0.0
Approach LOS	B		

Intersection Summary			
Average Delay	1.3		
Intersection Capacity Utilization	31.8%	ICU Level of Service	A
Analysis Period (min)	15		

HCM Unsignalized Intersection Capacity Analysis
11: Knudson Drive & Weslock Way

Future Total AM Peak Hour



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Sign Control		Stop	Stop		Stop	
Traffic Volume (vph)	305	75	40	130	115	170
Future Volume (vph)	305	75	40	130	115	170
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	305	75	40	130	115	170

Direction, Lane #	EB 1	WB 1	SB 1
Volume Total (vph)	380	170	285
Volume Left (vph)	305	0	115
Volume Right (vph)	0	130	170
Hadj (s)	0.16	-0.46	-0.28
Departure Headway (s)	5.0	4.7	5.0
Degree Utilization, x	0.53	0.22	0.39
Capacity (veh/h)	683	705	665
Control Delay (s)	13.6	9.1	11.2
Approach Delay (s)	13.6	9.1	11.2
Approach LOS	B	A	B

Intersection Summary			
Delay	11.9		
Level of Service	B		
Intersection Capacity Utilization	61.0%	ICU Level of Service	B
Analysis Period (min)	15		

HCM Unsignalized Intersection Capacity Analysis
12: Weslock Way & Beaverbrook Road

Future Total AM Peak Hour



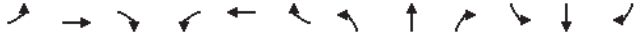
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Sign Control	Stop		Stop			Stop
Traffic Volume (vph)	225	90	30	405	220	60
Future Volume (vph)	225	90	30	405	220	60
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	225	90	30	405	220	60

Direction, Lane #	WB 1	NB 1	SB 1
Volume Total (vph)	315	435	280
Volume Left (vph)	225	0	220
Volume Right (vph)	90	405	0
Hadj (s)	-0.03	-0.56	0.16
Departure Headway (s)	5.6	4.8	5.6
Degree Utilization, x	0.49	0.57	0.44
Capacity (veh/h)	595	721	608
Control Delay (s)	14.0	14.0	12.9
Approach Delay (s)	14.0	14.0	12.9
Approach LOS	B	B	B

Intersection Summary			
Delay		13.7	
Level of Service		B	
Intersection Capacity Utilization		73.4%	ICU Level of Service D
Analysis Period (min)		15	

HCM Unsignalized Intersection Capacity Analysis
13: Omni Health Care/Street No. 11 & Campeau Drive

Future Total AM Peak Hour



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	15	525	15	10	420	40	5	0	5	90	0	25
Future Volume (Veh/h)	15	525	15	10	420	40	5	0	5	90	0	25
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	15	525	15	10	420	40	5	0	5	90	0	25
Pedestrians								5				
Lane Width (m)								3.6				
Walking Speed (m/s)								1.2				
Percent Blockage								0				
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	460			545			1052	1048	538	1028	1035	440
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	460			545			1052	1048	538	1028	1035	440
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	99			99			97	100	99	57	100	96
cM capacity (veh/h)	1112			1030			193	224	545	208	227	621

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	555	470	10	115
Volume Left	15	10	5	90
Volume Right	15	40	5	25
cSH	1112	1030	285	243
Volume to Capacity	0.01	0.01	0.04	0.47
Queue Length 95th (m)	0.3	0.2	0.9	18.8
Control Delay (s)	0.4	0.3	18.1	32.4
Lane LOS	A	A	C	D
Approach Delay (s)	0.4	0.3	18.1	32.4
Approach LOS			C	D

Intersection Summary			
Average Delay		3.7	
Intersection Capacity Utilization		55.3%	ICU Level of Service B
Analysis Period (min)		15	

Queues
14: Hawkstone Gate & Campeau Drive

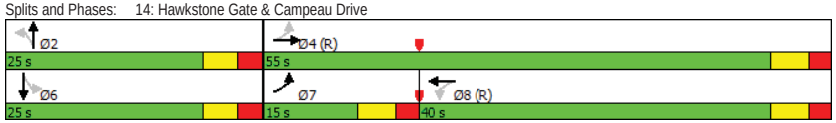
Future Total AM Peak Hour

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations								
Traffic Volume (vph)	160	660	10	345	5	5	135	0
Future Volume (vph)	160	660	10	345	5	5	135	0
Lane Group Flow (vph)	160	670	10	435	5	35	0	240
Turn Type	pm+pt	NA	Perm	NA	Perm	NA	Perm	NA
Protected Phases	7	4		8		2		6
Permitted Phases	4		8		2		6	
Detector Phase	7	4	8	8	2	2	6	6
Switch Phase								
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Minimum Split (s)	11.0	32.0	32.0	32.0	23.9	23.9	23.9	23.9
Total Split (s)	15.0	55.0	40.0	40.0	25.0	25.0	25.0	25.0
Total Split (%)	18.8%	68.8%	50.0%	50.0%	31.3%	31.3%	31.3%	31.3%
Yellow Time (s)	3.7	3.7	3.7	3.7	3.3	3.3	3.3	3.3
All-Red Time (s)	2.3	2.3	2.3	2.3	2.6	2.6	2.6	2.6
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0		0.0
Total Lost Time (s)	6.0	6.0	6.0	6.0	5.9	5.9		5.9
Lead/Lag	Lead		Lag	Lag				
Lead-Lag Optimize?	Yes		Yes	Yes				
Recall Mode	None	C-Min	C-Min	C-Min	None	None	None	None
v/c Ratio	0.29	0.55	0.03	0.49	0.03	0.13		0.80
Control Delay	7.0	9.9	13.7	16.5	24.2	11.8		34.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0		0.0
Total Delay	7.0	9.9	13.7	16.5	24.2	11.8		34.2
Queue Length 50th (m)	7.9	47.5	0.8	41.7	0.7	0.7		17.6
Queue Length 95th (m)	18.8	96.3	4.0	80.9	3.3	7.5		40.6
Internal Link Dist (m)		214.6		269.3		89.1		74.7
Turn Bay Length (m)	80.0		120.0					
Base Capacity (vph)	572	1229	376	893	225	367		376
Starvation Cap Reductn	0	0	0	0	0	0		0
Spillback Cap Reductn	0	0	0	0	0	0		0
Storage Cap Reductn	0	0	0	0	0	0		0
Reduced v/c Ratio	0.28	0.55	0.03	0.49	0.02	0.10		0.64

Intersection Summary

Cycle Length: 80
Actuated Cycle Length: 80
Offset: 0 (0%), Referenced to phase 4:EBTL and 8:WBTL, Start of Green
Natural Cycle: 70
Control Type: Actuated-Coordinated

Splits and Phases: 14: Hawkstone Gate & Campeau Drive



HCM Signalized Intersection Capacity Analysis
14: Hawkstone Gate & Campeau Drive

Future Total AM Peak Hour

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	160	660	10	10	345	90	5	5	30	135	0	105
Future Volume (vph)	160	660	10	10	345	90	5	5	30	135	0	105
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Total Lost time (s)	6.0	6.0		6.0	6.0		5.9	5.9			5.9	
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	1.00			1.00	
Frpb, ped/bikes	1.00	1.00		1.00	0.99		1.00	0.91			0.90	
Flpb, ped/bikes	1.00	1.00		1.00	1.00		0.88	1.00			0.95	
Frt	1.00	1.00		1.00	0.97		1.00	0.87			0.94	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00			0.97	
Satd. Flow (prot)	1706	1796		1710	1731		1513	1425			1413	
Flt Permitted	0.37	1.00		0.41	1.00		0.59	1.00			0.81	
Satd. Flow (perm)	669	1796		738	1731		940	1425			1171	
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)	160	660	10	10	345	90	5	5	30	135	0	105
RTOR Reduction (vph)	0	1	0	0	10	0	0	25	0	0	102	0
Lane Group Flow (vph)	160	669	0	10	425	0	5	10	0	0	138	0
Confl. Peds. (#/hr)	10					10	95		40	40		95
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Turn Type	pm+pt	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases	7	4			8			2			6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)	54.5	54.5		40.6	40.6		13.6	13.6			13.6	
Effective Green, g (s)	54.5	54.5		40.6	40.6		13.6	13.6			13.6	
Actuated g/C Ratio	0.68	0.68		0.51	0.51		0.17	0.17			0.17	
Clearance Time (s)	6.0	6.0		6.0	6.0		5.9	5.9			5.9	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0			3.0	
Lane Grp Cap (vph)	558	1223		374	878		159	242			199	
v/s Ratio Prot	0.03	c0.37			0.25			0.01				
v/s Ratio Perm	0.17			0.01			0.01				c0.12	
v/c Ratio	0.29	0.55		0.03	0.48		0.03	0.04			0.69	
Uniform Delay, d1	5.7	6.5		9.8	12.9		27.7	27.8			31.2	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00			1.00	
Incremental Delay, d2	0.3	1.8		0.1	1.9		0.1	0.1			10.0	
Delay (s)	6.0	8.2		10.0	14.8		27.8	27.8			41.2	
Level of Service	A	A		A	B		C	C			D	
Approach Delay (s)		7.8			14.7			27.8			41.2	
Approach LOS		A			B			C			D	

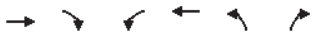
Intersection Summary

HCM 2000 Control Delay	15.4	HCM 2000 Level of Service	B	
HCM 2000 Volume to Capacity ratio	0.63			
Actuated Cycle Length (s)	80.0	Sum of lost time (s)	17.9	
Intersection Capacity Utilization	80.3%	ICU Level of Service	D	
Analysis Period (min)	15			

c Critical Lane Group

HCM Unsignalized Intersection Capacity Analysis
15: Park Ridge Place (West) & Campeau Drive

Future Total AM Peak Hour



Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	405	10	0	460	10	0
Future Volume (Veh/h)	405	10	0	460	10	0
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	405	10	0	460	10	0
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage veh)						
Upstream signal (m)	125					
pX, platoon unblocked			0.84		0.84	0.84
vC, conflicting volume			415		870	410
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			211		752	206
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			100		97	100
cM capacity (veh/h)			1154		321	707

Direction, Lane #	EB 1	WB 1	NB 1
Volume Total	415	460	10
Volume Left	0	0	10
Volume Right	10	0	0
cSH	1700	1154	321
Volume to Capacity	0.24	0.00	0.03
Queue Length 95th (m)	0.0	0.0	0.8
Control Delay (s)	0.0	0.0	16.6
Lane LOS			C
Approach Delay (s)	0.0	0.0	16.6
Approach LOS			C

Intersection Summary				
Average Delay		0.2		
Intersection Capacity Utilization		35.6%	ICU Level of Service	A
Analysis Period (min)		15		

HCM Unsignalized Intersection Capacity Analysis
16: Coulson Court & Robson Court

Future Total AM Peak Hour



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	10	15	5	0	25	5	10	5	0	0	0	0
Future Volume (Veh/h)	10	15	5	0	25	5	10	5	0	0	0	0
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	10	15	5	0	25	5	10	5	0	0	0	0
Pedestrians		5									5	
Lane Width (m)		3.6									3.6	
Walking Speed (m/s)		1.2									1.2	
Percent Blockage		0									0	
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	35			20			70	72	18	72	72	38
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	35			20			70	72	18	72	72	38
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	99			100			99	99	100	100	100	100
cM capacity (veh/h)	1583			1609			916	813	1067	908	813	1032

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	30	30	15	0
Volume Left	10	0	10	0
Volume Right	5	5	0	0
cSH	1583	1609	879	1700
Volume to Capacity	0.01	0.00	0.02	0.00
Queue Length 95th (m)	0.2	0.0	0.4	0.0
Control Delay (s)	2.5	0.0	9.2	0.0
Lane LOS	A		A	A
Approach Delay (s)	2.5	0.0	9.2	0.0
Approach LOS			A	A

Intersection Summary				
Average Delay		2.8		
Intersection Capacity Utilization		19.9%	ICU Level of Service	A
Analysis Period (min)		15		

HCM Unsignalized Intersection Capacity Analysis
17: Robson Court & Evanshen Crescent

Future Total AM Peak Hour



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	5	10	25	0	0	5
Future Volume (Veh/h)	5	10	25	0	0	5
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	5	10	25	0	0	5
Pedestrians					5	
Lane Width (m)					3.6	
Walking Speed (m/s)					1.2	
Percent Blockage					0	
Right turn flare (veh)						
Median type		None	None			
Median storage veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	30				50	30
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	30				50	30
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	100				100	100
cM capacity (veh/h)	1589				957	1046

Direction, Lane #	EB 1	WB 1	SB 1
Volume Total	15	25	5
Volume Left	5	0	0
Volume Right	0	0	5
cSH	1589	1700	1046
Volume to Capacity	0.00	0.01	0.00
Queue Length 95th (m)	0.1	0.0	0.1
Control Delay (s)	2.4	0.0	8.5
Lane LOS	A		A
Approach Delay (s)	2.4	0.0	8.5
Approach LOS			A

Intersection Summary				
Average Delay		1.8		
Intersection Capacity Utilization		15.2%	ICU Level of Service	A
Analysis Period (min)		15		

HCM Unsignalized Intersection Capacity Analysis
18: Kanata Avenue & Park Ridge Place

Future Total AM Peak Hour



Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	10	10	355	5	0	710
Future Volume (Veh/h)	10	10	355	5	0	710
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	10	10	355	5	0	710
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			None			None
Median storage veh)						
Upstream signal (m)						133
pX, platoon unblocked	0.67					
vC, conflicting volume	1068	358			360	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	855	358			360	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	95	99			100	
cM capacity (veh/h)	222	691			1210	

Direction, Lane #	WB 1	NB 1	SB 1
Volume Total	20	360	710
Volume Left	10	0	0
Volume Right	10	5	0
cSH	336	1700	1210
Volume to Capacity	0.06	0.21	0.00
Queue Length 95th (m)	1.5	0.0	0.0
Control Delay (s)	16.4	0.0	0.0
Lane LOS	C		
Approach Delay (s)	16.4	0.0	0.0
Approach LOS	C		

Intersection Summary				
Average Delay		0.3		
Intersection Capacity Utilization		49.4%	ICU Level of Service	A
Analysis Period (min)		15		

Queues
19: Herlihey Way & Campeau Drive

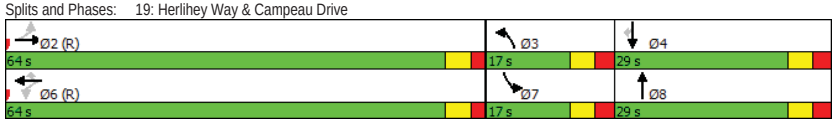
Future Total AM Peak Hour

Lane Group	EBL	EBT	WBL	WBT	WBR	NBL	NBT	SBL	SBT	SBR
Lane Configurations										
Traffic Volume (vph)	15	330	65	505	35	10	5	20	5	20
Future Volume (vph)	15	330	65	505	35	10	5	20	5	20
Lane Group Flow (vph)	15	370	65	505	35	10	45	20	5	20
Turn Type	Perm	NA	Perm	NA	Perm	Prot	NA	Prot	NA	Perm
Protected Phases		2		6		3	8	7	4	
Permitted Phases	2		6		6					4
Detector Phase	2	2	6	6	6	3	8	7	4	4
Switch Phase										
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Minimum Split (s)	34.5	34.5	34.5	34.5	34.5	10.9	28.9	10.9	28.9	28.9
Total Split (s)	64.0	64.0	64.0	64.0	64.0	17.0	29.0	17.0	29.0	29.0
Total Split (%)	58.2%	58.2%	58.2%	58.2%	58.2%	15.5%	26.4%	15.5%	26.4%	26.4%
Yellow Time (s)	3.3	3.3	3.3	3.3	3.3	3.3	3.3	3.3	3.3	3.3
All-Red Time (s)	2.2	2.2	2.2	2.2	2.2	2.6	2.6	2.6	2.6	2.6
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	5.5	5.5	5.5	5.5	5.5	5.9	5.9	5.9	5.9	5.9
Lead/Lag						Lead	Lag	Lead	Lag	Lag
Lead-Lag Optimize?						Yes	Yes	Yes	Yes	Yes
Recall Mode	C-Min	C-Min	C-Min	C-Min	C-Min	None	None	None	None	None
v/c Ratio	0.03	0.27	0.09	0.37	0.03	0.10	0.28	0.20	0.02	0.08
Control Delay	8.9	8.4	7.2	7.9	0.4	51.1	19.0	53.1	36.6	0.7
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	8.9	8.4	7.2	7.9	0.4	51.1	19.0	53.1	36.6	0.7
Queue Length 50th (m)	0.2	6.3	5.4	52.5	0.2	2.2	1.1	4.4	1.1	0.0
Queue Length 95th (m)	m6.4	92.6	m9.2	60.9	m0.3	7.9	10.7	12.3	4.1	0.0
Internal Link Dist (m)		148.2		217.6			87.8		129.5	
Turn Bay Length (m)	40.0		85.0		75.0			50.0		30.0
Base Capacity (vph)	548	1383	746	1379	1190	172	341	155	383	384
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.03	0.27	0.09	0.37	0.03	0.06	0.13	0.13	0.01	0.05

Intersection Summary

Cycle Length: 110
Actuated Cycle Length: 110
Offset: 75 (68%), Referenced to phase 2:EBTL and 6:WBTL, Start of Green
Natural Cycle: 75
Control Type: Actuated-Coordinated
m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 19: Herlihey Way & Campeau Drive



HCM Signalized Intersection Capacity Analysis
19: Herlihey Way & Campeau Drive

Future Total AM Peak Hour

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	15	330	40	65	505	35	10	5	40	20	5	20
Future Volume (vph)	15	330	40	65	505	35	10	5	40	20	5	20
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Total Lost time (s)	5.5	5.5		5.5	5.5	5.5	5.9	5.9		5.9	5.9	5.9
Lane Util. Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00
Frpb, ped/bikes	1.00	1.00		1.00	1.00	1.00	1.00	0.96		1.00	1.00	0.98
Flpb, ped/bikes	1.00	1.00		1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00
Frt	1.00	0.98		1.00	1.00	0.85	1.00	0.87		1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	1500	1750		1710	1748	1485	1710	1474		1541	1800	1501
Flt Permitted	0.44	1.00		0.53	1.00	1.00	0.95	1.00		0.95	1.00	1.00
Satd. Flow (perm)	695	1750		946	1748	1485	1710	1474		1541	1800	1501
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)	15	330	40	65	505	35	10	5	40	20	5	20
RTOR Reduction (vph)	0	2	0	0	0	10	0	37	0	0	0	18
Lane Group Flow (vph)	15	368	0	65	505	25	10	8	0	20	5	2
Confl. Peds. (#/hr)							5		10	10		5
Heavy Vehicles (%)	14%	1%	3%	0%	3%	3%	0%	0%	2%	11%	0%	0%
Turn Type	Perm	NA		Perm	NA	Perm	Prot	NA		Prot	NA	Perm
Protected Phases		2			6		3	8		7	4	
Permitted Phases	2			6		6						4
Actuated Green, G (s)	79.8	79.8		79.8	79.8	79.8	1.5	9.5		3.4	11.4	11.4
Effective Green, g (s)	79.8	79.8		79.8	79.8	79.8	1.5	9.5		3.4	11.4	11.4
Actuated g/C Ratio	0.73	0.73		0.73	0.73	0.73	0.01	0.09		0.03	0.10	0.10
Clearance Time (s)	5.5	5.5		5.5	5.5	5.5	5.9	5.9		5.9	5.9	5.9
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)	504	1269		686	1268	1077	23	127		47	186	155
v/s Ratio Prot		0.21			c0.29		0.01	c0.01		c0.01	0.00	
v/s Ratio Perm	0.02			0.07		0.02						0.00
v/c Ratio	0.03	0.29		0.09	0.40	0.02	0.43	0.07		0.43	0.03	0.01
Uniform Delay, d1	4.2	5.2		4.5	5.8	4.2	53.8	46.2		52.3	44.3	44.3
Progression Factor	1.17	1.27		1.04	1.03	1.00	1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	0.1	0.6		0.2	0.8	0.0	12.6	0.2		6.1	0.1	0.0
Delay (s)	5.1	7.2		4.9	6.9	4.3	66.4	46.4		58.4	44.4	44.3
Level of Service	A	A		A	A	A	E	D		E	D	D
Approach Delay (s)		7.1			6.5			50.0			50.6	
Approach LOS		A			A			D			D	

Intersection Summary

HCM 2000 Control Delay	10.7	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.37		
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	17.3
Intersection Capacity Utilization	56.9%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group

HCM Unsignalized Intersection Capacity Analysis
21: Park Ridge Place (East)/Street No. 1 & Campeau Drive

Future Total AM Peak Hour



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	15	390	0	0	400	40	0	0	5	90	0	60
Future Volume (Veh/h)	15	390	0	0	400	40	0	0	5	90	0	60
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	15	390	0	0	400	40	0	0	5	90	0	60
Pedestrians								5				
Lane Width (m)								3.6				
Walking Speed (m/s)								1.2				
Percent Blockage								0				
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (m)		269										
pX, platoon unblocked				0.89			0.89	0.89	0.89	0.89	0.89	
vC, conflicting volume	440			395			905	865	395	845	845	420
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	440			262			833	788	262	766	766	420
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	99			100			100	100	99	68	100	91
cM capacity (veh/h)	1131			1168			230	285	695	282	294	638

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	405	440	5	150
Volume Left	15	0	0	90
Volume Right	0	40	5	60
cSH	1131	1168	695	362
Volume to Capacity	0.01	0.00	0.01	0.41
Queue Length 95th (m)	0.3	0.0	0.2	15.8
Control Delay (s)	0.4	0.0	10.2	21.8
Lane LOS	A		B	C
Approach Delay (s)	0.4	0.0	10.2	21.8
Approach LOS			B	C

Intersection Summary				
Average Delay	3.5			
Intersection Capacity Utilization	57.0%	ICU Level of Service	B	
Analysis Period (min)	15			

HCM Unsignalized Intersection Capacity Analysis
22: Campeau Drive & Street No. 7

Future Total AM Peak Hour



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	15	470	410	40	85	30
Future Volume (Veh/h)	15	470	410	40	85	30
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	15	470	410	40	85	30
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage veh)						
Upstream signal (m)		400				
pX, platoon unblocked					0.95	
vC, conflicting volume	450				930	430
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	450				902	430
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	99				71	95
cM capacity (veh/h)	1121				292	629

Direction, Lane #	EB 1	WB 1	SB 1
Volume Total	485	450	115
Volume Left	15	0	85
Volume Right	0	40	30
cSH	1121	1700	340
Volume to Capacity	0.01	0.26	0.34
Queue Length 95th (m)	0.3	0.0	11.7
Control Delay (s)	0.4	0.0	20.9
Lane LOS	A		C
Approach Delay (s)	0.4	0.0	20.9
Approach LOS			C

Intersection Summary				
Average Delay	2.5			
Intersection Capacity Utilization	52.5%	ICU Level of Service	A	
Analysis Period (min)	15			

HCM Unsignalized Intersection Capacity Analysis
23: Street No. 1/Street No. 16 & Knudson Drive

Future Total AM Peak Hour



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	30	300	40	15	225	0	30	0	30	0	0	60
Future Volume (Veh/h)	30	300	40	15	225	0	30	0	30	0	0	60
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	30	300	40	15	225	0	30	0	30	0	0	60
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	225			340			695	635	320	665	655	225
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	225			340			695	635	320	665	655	225
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	98			99			91	100	96	100	100	93
cM capacity (veh/h)	1356			1230			324	385	725	351	375	819

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	370	240	60	60
Volume Left	30	15	30	0
Volume Right	40	0	30	60
cSH	1356	1230	448	819
Volume to Capacity	0.02	0.01	0.13	0.07
Queue Length 95th (m)	0.5	0.3	3.7	1.9
Control Delay (s)	0.8	0.6	14.3	9.7
Lane LOS	A	A	B	A
Approach Delay (s)	0.8	0.6	14.3	9.7
Approach LOS			B	A

Intersection Summary				
Average Delay	2.6			
Intersection Capacity Utilization	46.0%	ICU Level of Service	A	
Analysis Period (min)	15			

HCM Unsignalized Intersection Capacity Analysis
24: Weslock Way & Street No. 16

Future Total AM Peak Hour



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	0	30	15	105	250	0
Future Volume (Veh/h)	0	30	15	105	250	0
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	0	30	15	105	250	0
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	385	250	250			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	385	250	250			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	100	96	99			
cM capacity (veh/h)	615	794	1327			

Direction, Lane #	EB 1	NB 1	SB 1
Volume Total	30	120	250
Volume Left	0	15	0
Volume Right	30	0	0
cSH	794	1327	1700
Volume to Capacity	0.04	0.01	0.15
Queue Length 95th (m)	0.9	0.3	0.0
Control Delay (s)	9.7	1.0	0.0
Lane LOS	A	A	
Approach Delay (s)	9.7	1.0	0.0
Approach LOS	A		

Intersection Summary				
Average Delay	1.0			
Intersection Capacity Utilization	29.2%	ICU Level of Service	A	
Analysis Period (min)	15			

HCM Unsignalized Intersection Capacity Analysis
25: Street No. 23 & Beaverbrook Road

Future Total AM Peak Hour

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	610	15	0	255	60	0
Future Volume (Veh/h)	610	15	0	255	60	0
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	610	15	0	255	60	0
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume			625		872	618
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			625		872	618
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			100		81	100
cM capacity (veh/h)			966		323	493

Direction, Lane #	EB 1	WB 1	NB 1
Volume Total	625	255	60
Volume Left	0	0	60
Volume Right	15	0	0
cSH	1700	966	323
Volume to Capacity	0.37	0.00	0.19
Queue Length 95th (m)	0.0	0.0	5.4
Control Delay (s)	0.0	0.0	18.6
Lane LOS			C
Approach Delay (s)	0.0	0.0	18.6
Approach LOS			C

Intersection Summary				
Average Delay			1.2	
Intersection Capacity Utilization			45.0%	ICU Level of Service A
Analysis Period (min)			15	

Queues
1: Terry Fox Drive & Campeau Drive

Future Total PM Peak Hour

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	85	95	65	350	70	175	30	950	220	125	910	205
Future Volume (vph)	85	95	65	350	70	175	30	950	220	125	910	205
Lane Group Flow (vph)	85	95	65	350	70	175	30	950	220	125	910	205
Turn Type	Perm	NA	Perm	Perm	NA	Perm	pm+pt	NA	Perm	pm+pt	NA	Perm
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4		4	8		8	2		2	6		6
Detector Phase	4	4	4	8	8	8	5	2	2	1	6	6
Switch Phase												
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Minimum Split (s)	43.4	43.4	43.4	43.4	43.4	43.4	11.4	40.4	40.4	11.4	40.4	40.4
Total Split (s)	48.0	48.0	48.0	48.0	48.0	48.0	22.0	50.0	50.0	22.0	50.0	50.0
Total Split (%)	40.0%	40.0%	40.0%	40.0%	40.0%	40.0%	18.3%	41.7%	41.7%	18.3%	41.7%	41.7%
Yellow Time (s)	3.7	3.7	3.7	3.7	3.7	3.7	4.2	4.2	4.2	4.2	4.2	4.2
All-Red Time (s)	2.7	2.7	2.7	2.7	2.7	2.7	2.2	2.2	2.2	2.2	2.2	2.2
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4
Lead/Lag							Lead	Lag	Lag	Lead	Lag	Lag
Lead-Lag Optimize?							Yes	Yes	Yes	Yes	Yes	Yes
Recall Mode	None	None	None	None	None	None	None	C-Min	C-Min	None	C-Min	C-Min
v/c Ratio	0.21	0.17	0.12	0.90	0.12	0.29	0.10	0.62	0.29	0.43	0.52	0.23
Control Delay	30.0	29.0	3.1	61.5	25.8	5.2	13.9	29.4	7.2	17.4	23.1	3.6
Queue Delay	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	30.0	29.1	3.1	61.5	25.8	5.2	13.9	29.4	7.2	17.4	23.1	3.6
Queue Length 50th (m)	15.0	16.5	0.0	89.5	9.1	4.9	3.2	96.5	6.3	14.0	86.2	0.0
Queue Length 95th (m)	27.6	29.2	5.8	#127.9	12.2	3.6	8.0	129.3	24.5	24.8	112.9	14.2
Internal Link Dist (m)		139.7			148.2			149.3			180.0	
Turn Bay Length (m)	70.0			75.0			50.0		60.0	105.0		
Base Capacity (vph)	448	631	585	436	631	645	421	1520	758	363	1750	882
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	145	0	0	0	0	0	0	14	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.19	0.20	0.11	0.80	0.11	0.27	0.07	0.63	0.30	0.34	0.52	0.23

Intersection Summary
Cycle Length: 120
Actuated Cycle Length: 120
Offset: 93 (78%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green
Natural Cycle: 100
Control Type: Actuated-Coordinated
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 1: Terry Fox Drive & Campeau Drive



HCM Signalized Intersection Capacity Analysis
1: Terry Fox Drive & Campeau Drive

Future Total PM Peak Hour

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	85	95	65	350	70	175	30	950	220	125	910	205
Future Volume (vph)	85	95	65	350	70	175	30	950	220	125	910	205
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Total Lost time (s)	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95	1.00	1.00	0.95	1.00
Frpb, ped/bikes	1.00	1.00	0.98	1.00	1.00	1.00	1.00	1.00	0.97	1.00	1.00	1.00
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	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)	1710	1800	1504	1703	1800	1515	1710	3420	1486	1710	3420	1530
Flt Permitted	0.71	1.00	1.00	0.70	1.00	1.00	0.25	1.00	1.00	0.17	1.00	1.00
Satd. Flow (perm)	1281	1800	1504	1247	1800	1515	456	3420	1486	315	3420	1530
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	95	65	350	70	175	30	950	220	125	910	205
RTOR Reduction (vph)	0	0	45	0	0	120	0	0	98	0	0	104
Lane Group Flow (vph)	85	95	20	350	70	55	30	950	122	125	910	101
Confl. Peds. (#/hr)			5	5					5	5		
Heavy Vehicles (%)	0%	0%	0%	0%	0%	1%	0%	0%	0%	0%	0%	0%
Turn Type	Perm	NA	Perm	Perm	NA	Perm	pm+pt	NA	Perm	pm+pt	NA	Perm
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4		4	8		8	2		2	6		6
Actuated Green, G (s)	37.7	37.7	37.7	37.7	37.7	37.7	57.6	53.4	53.4	68.6	58.9	58.9
Effective Green, g (s)	37.7	37.7	37.7	37.7	37.7	37.7	57.6	53.4	53.4	68.6	58.9	58.9
Actuated g/C Ratio	0.31	0.31	0.31	0.31	0.31	0.31	0.48	0.44	0.44	0.57	0.49	0.49
Clearance Time (s)	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4
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)	402	565	472	391	565	475	262	1521	661	292	1678	750
v/s Ratio Prot		0.05			0.04		0.00	c0.28		c0.03	c0.27	
v/s Ratio Perm	0.07		0.01	c0.28		0.04	0.05		0.08	0.21		0.07
v/c Ratio	0.21	0.17	0.04	0.90	0.12	0.12	0.11	0.62	0.19	0.43	0.54	0.13
Uniform Delay, d1	30.2	29.8	28.6	39.3	29.4	29.3	17.0	25.6	20.1	15.2	21.2	16.7
Progression Factor	1.00	1.00	1.00	0.95	0.92	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	0.3	0.1	0.0	21.0	0.1	0.1	0.2	1.9	0.6	1.0	1.3	0.4
Delay (s)	30.5	29.9	28.6	58.4	27.1	29.5	17.2	27.5	20.8	16.2	22.5	17.0
Level of Service	C	C	C	E	C	C	B	C	C	B	C	B
Approach Delay (s)		29.8			46.2			26.0			20.9	
Approach LOS		C			D			C			C	

Intersection Summary				
HCM 2000 Control Delay	28.0	HCM 2000 Level of Service	C	
HCM 2000 Volume to Capacity ratio	0.72			
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	19.2	
Intersection Capacity Utilization	78.8%	ICU Level of Service	D	
Analysis Period (min)	15			

c Critical Lane Group

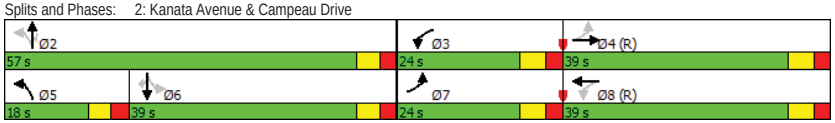
Queues
2: Kanata Avenue & Campeau Drive

Future Total PM Peak Hour

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations										
Traffic Volume (vph)	290	320	95	355	140	505	85	70	370	215
Future Volume (vph)	290	320	95	355	140	505	85	70	370	215
Lane Group Flow (vph)	290	470	95	450	140	505	85	70	370	215
Turn Type	pm+pt	NA	pm+pt	NA	pm+pt	NA	Perm	Perm	NA	Perm
Protected Phases	7	4	3	8	5	2			6	
Permitted Phases	4		8		2		2	6		6
Detector Phase	7	4	3	8	5	2	2	6	6	6
Switch Phase										
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Minimum Split (s)	11.2	36.2	11.2	36.2	10.9	29.9	29.9	29.9	29.9	29.9
Total Split (s)	24.0	39.0	24.0	39.0	18.0	57.0	57.0	39.0	39.0	39.0
Total Split (%)	20.0%	32.5%	20.0%	32.5%	15.0%	47.5%	47.5%	32.5%	32.5%	32.5%
Yellow Time (s)	3.7	3.7	3.7	3.7	3.3	3.3	3.3	3.3	3.3	3.3
All-Red Time (s)	2.5	2.5	2.5	2.5	2.6	2.6	2.6	2.6	2.6	2.6
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	6.2	6.2	6.2	6.2	5.9	5.9	5.9	5.9	5.9	5.9
Lead/Lag	Lead	Lag	Lead	Lag	Lead			Lag	Lag	Lag
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes			Yes	Yes	Yes
Recall Mode	None	C-Min	None	C-Min	None	None	None	None	None	None
v/c Ratio	0.76	0.70	0.29	0.82	0.56	0.73	0.14	0.43	0.86	0.43
Control Delay	43.6	35.0	19.9	52.0	32.8	38.2	4.9	46.1	62.8	7.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	43.6	35.0	19.9	52.0	32.8	38.2	4.9	46.1	62.8	7.2
Queue Length 50th (m)	42.9	66.8	12.1	106.9	22.4	103.2	0.0	14.6	87.1	0.0
Queue Length 95th (m)	#87.5	#159.5	23.2	#172.5	35.6	137.6	9.7	29.2	120.8	18.7
Internal Link Dist (m)		217.6		101.3		108.6			167.9	
Turn Bay Length (m)	95.0		35.0		55.0		55.0	115.0		100.0
Base Capacity (vph)	388	667	451	551	258	766	679	188	496	549
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	0.75	0.70	0.21	0.82	0.54	0.66	0.13	0.37	0.75	0.39

Intersection Summary
Cycle Length: 120
Actuated Cycle Length: 120
Offset: 31 (26%), Referenced to phase 4:EBTL and 8:WBTL, Start of Green
Natural Cycle: 90
Control Type: Actuated-Coordinated
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 2: Kanata Avenue & Campeau Drive



HCM Signalized Intersection Capacity Analysis
2: Kanata Avenue & Campeau Drive

Future Total PM Peak Hour

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	290	320	150	95	355	95	140	505	85	70	370	215
Future Volume (vph)	290	320	150	95	355	95	140	505	85	70	370	215
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Total Lost time (s)	6.2	6.2		6.2	6.2		5.9	5.9	5.9	5.9	5.9	5.9
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00
Frpb, ped/bikes	1.00	0.98		1.00	0.99		1.00	1.00	0.97	1.00	1.00	0.94
Flpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00	1.00	0.99	1.00	1.00
Frt	1.00	0.95		1.00	0.97		1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1709	1687		1703	1728		1708	1800	1481	1701	1800	1429
Flt Permitted	0.19	1.00		0.35	1.00		0.17	1.00	1.00	0.38	1.00	1.00
Satd. Flow (perm)	341	1687		632	1728		309	1800	1481	683	1800	1429
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)	290	320	150	95	355	95	140	505	85	70	370	215
RTOR Reduction (vph)	0	12	0	0	8	0	0	0	52	0	0	164
Lane Group Flow (vph)	290	458	0	95	442	0	140	505	33	70	370	51
Confl. Peds. (#/hr)	10		15	15		10	15		5	5		15
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%
Turn Type	pm+pt	NA		pm+pt	NA		pm+pt	NA	Perm	Perm	NA	Perm
Protected Phases	7	4		3	8		5	2			6	
Permitted Phases	4			8			2		2	6		6
Actuated Green, G (s)	62.0	46.7		46.9	37.8		45.9	45.9	45.9	28.7	28.7	28.7
Effective Green, g (s)	62.0	46.7		46.9	37.8		45.9	45.9	45.9	28.7	28.7	28.7
Actuated g/C Ratio	0.52	0.39		0.39	0.31		0.38	0.38	0.38	0.24	0.24	0.24
Clearance Time (s)	6.2	6.2		6.2	6.2		5.9	5.9	5.9	5.9	5.9	5.9
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)	381	656		328	544		249	688	566	163	430	341
v/s Ratio Prot	c0.11	0.27		0.02	c0.26		0.05	c0.28			c0.21	
v/s Ratio Perm	0.28			0.09			0.16		0.02	0.10		0.04
v/c Ratio	0.76	0.70		0.29	0.81		0.56	0.73	0.06	0.43	0.86	0.15
Uniform Delay, d1	21.5	30.7		24.1	37.9		27.6	31.8	23.4	38.7	43.7	36.0
Progression Factor	1.70	0.93		1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	6.9	4.8		0.5	12.5		2.9	4.1	0.0	1.8	16.0	0.2
Delay (s)	43.4	33.4		24.6	50.4		30.5	35.9	23.4	40.5	59.7	36.2
Level of Service	D	C		C	D		C	D	C	D	E	D
Approach Delay (s)		37.2			45.9			33.4			50.0	
Approach LOS		D			D			C			D	

Intersection Summary				
HCM 2000 Control Delay	41.0	HCM 2000 Level of Service	D	
HCM 2000 Volume to Capacity ratio	0.84			
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	24.2	
Intersection Capacity Utilization	95.4%	ICU Level of Service	F	
Analysis Period (min)	15			

c Critical Lane Group

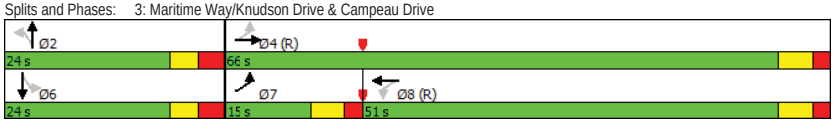
Queues
3: Maritime Way/Knudson Drive & Campeau Drive

Future Total PM Peak Hour

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations								
Traffic Volume (vph)	85	415	115	545	15	10	45	10
Future Volume (vph)	85	415	115	545	15	10	45	10
Lane Group Flow (vph)	85	440	115	660	15	95	45	110
Turn Type	pm+pt	NA	Perm	NA	Perm	NA	Perm	NA
Protected Phases	7	4		8		2		6
Permitted Phases	4		8		2		6	
Detector Phase	7	4	8	8	2	2	6	6
Switch Phase								
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Minimum Split (s)	10.7	50.7	50.7	50.7	24.0	24.0	24.0	24.0
Total Split (s)	15.0	66.0	51.0	51.0	24.0	24.0	24.0	24.0
Total Split (%)	16.7%	73.3%	56.7%	56.7%	26.7%	26.7%	26.7%	26.7%
Yellow Time (s)	3.7	3.7	3.7	3.7	3.0	3.0	3.0	3.0
All-Red Time (s)	2.0	2.0	2.0	2.0	3.0	3.0	3.0	3.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	5.7	5.7	5.7	5.7	6.0	6.0	6.0	6.0
Lead/Lag	Lead		Lag	Lag				
Lead-Lag Optimize?	Yes		Yes	Yes				
Recall Mode	None	C-Min	C-Min	C-Min	None	None	None	None
v/c Ratio	0.17	0.31	0.18	0.55	0.11	0.39	0.34	0.44
Control Delay	4.1	4.3	17.1	21.4	35.5	14.6	42.2	14.7
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	4.1	4.3	17.1	21.4	35.5	14.6	42.2	14.7
Queue Length 50th (m)	2.8	18.2	13.3	104.9	2.5	1.7	7.8	1.7
Queue Length 95th (m)	9.1	44.1	m31.4	146.2	7.8	14.4	16.9	15.5
Internal Link Dist (m)		436.9		443.4		129.6		89.7
Turn Bay Length (m)	55.0		55.0		45.0		50.0	
Base Capacity (vph)	541	1430	628	1201	244	379	250	379
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	0.16	0.31	0.18	0.55	0.06	0.25	0.18	0.29

Intersection Summary
Cycle Length: 90
Actuated Cycle Length: 90
Offset: 0 (0%), Referenced to phase 4:EBTL and 8:WBTL, Start of Green
Natural Cycle: 90
Control Type: Actuated-Coordinated
m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 3: Maritime Way/Knudson Drive & Campeau Drive



HCM Signalized Intersection Capacity Analysis
3: Maritime Way/Knudson Drive & Campeau Drive

Future Total PM Peak Hour

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	85	415	25	115	545	115	15	10	85	45	10	100
Future Volume (vph)	85	415	25	115	545	115	15	10	85	45	10	100
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Total Lost time (s)	5.7	5.7		5.7	5.7		6.0	6.0		6.0	6.0	
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Frpb, ped/bikes	1.00	1.00		1.00	0.99		1.00	1.00		1.00	0.95	
Flpb, ped/bikes	1.00	1.00		1.00	1.00		0.99	1.00		1.00	1.00	
Frt	1.00	0.99		1.00	0.97		1.00	0.87		1.00	0.86	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1707	1785		1710	1738		1691	1558		1710	1481	
Flt Permitted	0.30	1.00		0.51	1.00		0.69	1.00		0.70	1.00	
Satd. Flow (perm)	532	1785		913	1738		1221	1558		1252	1481	
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	415	25	115	545	115	15	10	85	45	10	100
RTOR Reduction (vph)	0	2	0	0	6	0	0	77	0	0	90	0
Lane Group Flow (vph)	85	438	0	115	654	0	15	18	0	45	20	0
Confl. Peds. (#/hr)	15					15	5					5
Confl. Bikes (#/hr)												5
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Turn Type	pm+pt	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases	7	4			8			2			6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)	69.7	69.7		58.4	58.4		8.6	8.6		8.6	8.6	
Effective Green, g (s)	69.7	69.7		58.4	58.4		8.6	8.6		8.6	8.6	
Actuated g/C Ratio	0.77	0.77		0.65	0.65		0.10	0.10		0.10	0.10	
Clearance Time (s)	5.7	5.7		5.7	5.7		6.0	6.0		6.0	6.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	485	1382		592	1127		116	148		119	141	
v/s Ratio Prot	0.01	c0.25			c0.38			0.01			0.01	
v/s Ratio Perm	0.12			0.13			0.01			c0.04		
v/c Ratio	0.18	0.32		0.19	0.58		0.13	0.12		0.38	0.14	
Uniform Delay, d1	4.5	3.0		6.3	8.9		37.3	37.2		38.2	37.3	
Progression Factor	1.00	1.00		1.89	1.84		1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.2	0.6		0.6	1.8		0.5	0.4		2.0	0.5	
Delay (s)	4.7	3.6		12.6	18.2		37.8	37.6		40.2	37.8	
Level of Service	A	A		B	B		D	D		D	D	
Approach Delay (s)		3.8			17.3			37.6			38.5	
Approach LOS		A			B			D			D	

Intersection Summary				
HCM 2000 Control Delay	16.3	HCM 2000 Level of Service	B	
HCM 2000 Volume to Capacity ratio	0.55			
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	17.4	
Intersection Capacity Utilization	67.4%	ICU Level of Service	C	
Analysis Period (min)	15			
c Critical Lane Group				

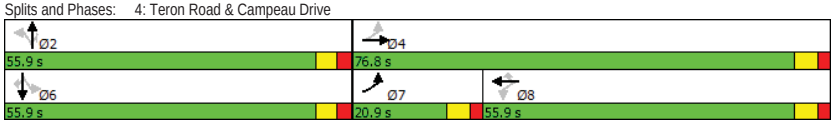
Queues
4: Teron Road & Campeau Drive

Future Total PM Peak Hour

Lane Group	EBL	EBT	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations											
Traffic Volume (vph)	165	320	85	535	405	15	25	70	345	40	260
Future Volume (vph)	165	320	85	535	405	15	25	70	345	40	260
Lane Group Flow (vph)	165	340	85	535	405	0	40	70	345	40	260
Turn Type	pm+pt	NA	Perm	NA	Perm	Perm	NA	Perm	Perm	NA	Perm
Protected Phases	7	4		8			2			6	
Permitted Phases	4		8		8	2		2	6		6
Detector Phase	7	4	8	8	8	2	2	2	6	6	6
Switch Phase											
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Minimum Split (s)	10.9	55.9	55.9	55.9	55.9	26.9	26.9	26.9	26.9	26.9	26.9
Total Split (s)	20.9	76.8	55.9	55.9	55.9	55.9	55.9	55.9	55.9	55.9	55.9
Total Split (%)	15.7%	57.9%	42.1%	42.1%	42.1%	42.1%	42.1%	42.1%	42.1%	42.1%	42.1%
Yellow Time (s)	3.7	3.7	3.7	3.7	3.7	3.3	3.3	3.3	3.3	3.3	3.3
All-Red Time (s)	2.2	2.2	2.2	2.2	2.2	2.6	2.6	2.6	2.6	2.6	2.6
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	5.9	5.9	5.9	5.9	5.9		5.9	5.9	5.9	5.9	5.9
Lead/Lag	Lead		Lag	Lag	Lag						
Lead-Lag Optimize?	Yes		Yes	Yes	Yes						
Recall Mode	None	Max	Max	Max	Max	None	None	None	None	None	None
v/c Ratio	0.44	0.32	0.19	0.66	0.49		0.08	0.14	0.89	0.07	0.41
Control Delay	16.8	14.9	25.3	33.6	6.4		28.2	6.5	65.1	28.1	5.3
Queue Delay	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0
Total Delay	16.8	14.9	25.3	33.6	6.4		28.2	6.5	65.1	28.1	5.3
Queue Length 50th (m)	17.9	40.6	12.5	102.8	6.0		7.0	0.0	81.4	7.0	0.0
Queue Length 95th (m)	36.1	73.5	29.7	177.7	34.7		15.3	10.0	121.9	15.2	17.9
Internal Link Dist (m)		269.3		262.3			58.3			132.3	
Turn Bay Length (m)	65.0		160.0					70.0	85.0		
Base Capacity (vph)	419	1053	447	812	834		680	636	518	750	756
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	0.39	0.32	0.19	0.66	0.49		0.06	0.11	0.67	0.05	0.34

Intersection Summary
Cycle Length: 132.7
Actuated Cycle Length: 120.8
Natural Cycle: 95
Control Type: Actuated-Uncoordinated

Splits and Phases: 4: Teron Road & Campeau Drive



HCM Signalized Intersection Capacity Analysis
4: Teron Road & Campeau Drive

Future Total PM Peak Hour

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	165	320	20	85	535	405	15	25	70	345	40	260
Future Volume (vph)	165	320	20	85	535	405	15	25	70	345	40	260
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Total Lost time (s)	5.9	5.9		5.9	5.9	5.9		5.9	5.9	5.9	5.9	5.9
Lane Util. Factor	1.00	1.00		1.00	1.00	1.00		1.00	1.00	1.00	1.00	1.00
Frpb, ped/bikes	1.00	1.00		1.00	1.00	0.93		1.00	0.94	1.00	1.00	0.95
Flpb, ped/bikes	1.00	1.00		0.99	1.00	1.00		0.99	1.00	0.96	1.00	1.00
Frt	1.00	0.99		1.00	1.00	0.85		1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00	1.00		0.98	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1693	1781		1695	1800	1417		1749	1435	1624	1800	1456
Flt Permitted	0.25	1.00		0.56	1.00	1.00		0.92	1.00	0.73	1.00	1.00
Satd. Flow (perm)	445	1781		993	1800	1417		1635	1435	1250	1800	1456
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)	165	320	20	85	535	405	15	25	70	345	40	260
RTOR Reduction (vph)	0	2	0	0	0	198	0	0	48	0	0	179
Lane Group Flow (vph)	165	338	0	85	535	207	0	40	22	345	40	81
Confl. Peds. (#/hr)	20		5	5		20	10		15	15		10
Heavy Vehicles (%)	1%	0%	0%	0%	0%	0%	0%	0%	0%	1%	0%	0%
Turn Type	pm+pt	NA		Perm	NA	Perm	Perm	NA	Perm	Perm	NA	Perm
Protected Phases	7	4			8			2			6	
Permitted Phases	4			8		8	2		2	6		6
Actuated Green, G (s)	71.3	71.3		54.5	54.5	54.5		37.5	37.5	37.5	37.5	37.5
Effective Green, g (s)	71.3	71.3		54.5	54.5	54.5		37.5	37.5	37.5	37.5	37.5
Actuated g/C Ratio	0.59	0.59		0.45	0.45	0.45		0.31	0.31	0.31	0.31	0.31
Clearance Time (s)	5.9	5.9		5.9	5.9	5.9		5.9	5.9	5.9	5.9	5.9
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)	375	1052		448	813	640		508	446	388	559	452
v/s Ratio Prot	c0.04	0.19			c0.30						0.02	
v/s Ratio Perm	0.22			0.09		0.15		0.02	0.02	c0.28		0.06
v/c Ratio	0.44	0.32		0.19	0.66	0.32		0.08	0.05	0.89	0.07	0.18
Uniform Delay, d1	15.2	12.4		19.8	25.8	21.2		29.3	29.1	39.6	29.3	30.3
Progression Factor	1.00	1.00		1.00	1.00	1.00		1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	0.8	0.8		0.9	4.1	1.3		0.1	0.0	21.1	0.1	0.2
Delay (s)	16.0	13.3		20.8	29.9	22.5		29.4	29.1	60.7	29.3	30.5
Level of Service	B	B		C	C	C		C	C	E	C	C
Approach Delay (s)		14.2			26.3			29.2			46.6	
Approach LOS		B			C			C			D	

Intersection Summary				
HCM 2000 Control Delay	29.5	HCM 2000 Level of Service	C	
HCM 2000 Volume to Capacity ratio	0.72			
Actuated Cycle Length (s)	120.6	Sum of lost time (s)	17.7	
Intersection Capacity Utilization	81.0%	ICU Level of Service	D	
Analysis Period (min)	15			

c Critical Lane Group

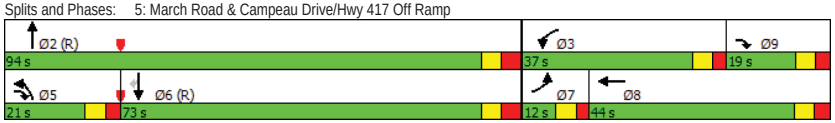
Queues
5: March Road & Campeau Drive/Hwy 417 Off Ramp

Future Total PM Peak Hour

Lane Group	EBL	EBR	WBL	WBT	NBL	NBT	SBT	SBR	Ø9
Lane Configurations									
Traffic Volume (vph)	70	665	490	545	355	570	2485	125	
Future Volume (vph)	70	665	490	545	355	570	2485	125	
Lane Group Flow (vph)	70	665	490	545	355	570	2485	125	
Turn Type	Prot	pt+ov	Prot	NA	Prot	NA	NA	Perm	
Protected Phases	7	5 9	3	8	5	2	6		9
Permitted Phases								6	
Detector Phase	7	5 9	3	8	5	2	6	6	
Switch Phase									
Minimum Initial (s)	5.0		5.0	5.0	5.0	5.0	5.0	5.0	5.0
Minimum Split (s)	11.0		24.2	43.8	11.5	30.5	30.5	30.5	11.5
Total Split (s)	12.0		37.0	44.0	21.0	94.0	73.0	73.0	19.0
Total Split (%)	8.0%		24.7%	29.3%	14.0%	62.7%	48.7%	48.7%	13%
Yellow Time (s)	3.7		3.7	3.7	3.7	3.7	3.7	3.7	3.7
All-Red Time (s)	2.3		2.5	3.1	2.8	3.8	3.8	3.8	2.8
Lost Time Adjust (s)	0.0		0.0	0.0	0.0	0.0	0.0	0.0	
Total Lost Time (s)	6.0		6.2	6.8	6.5	7.5	7.5	7.5	
Lead/Lag	Lead			Lag	Lead		Lag	Lag	
Lead-Lag Optimize?	Yes			Yes	Yes		Yes	Yes	
Recall Mode	None		None	None	None	C-Min	C-Min	C-Min	None
v/c Ratio	0.97	0.69	0.81	0.61	0.98	0.27	1.00	0.16	
Control Delay	167.8	55.5	70.8	53.6	109.5	16.3	59.5	1.6	
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Total Delay	167.8	55.5	70.8	53.6	109.5	16.3	59.5	1.6	
Queue Length 50th (m)	22.3	95.0	76.8	80.1	58.2	45.5	256.3	0.0	
Queue Length 95th (m)	#56.4	121.7	94.2	100.9	#92.9	56.9	#292.8	5.3	
Internal Link Dist (m)				269.9		155.6	164.4		
Turn Bay Length (m)	60.0	190.0	150.0		150.0			150.0	
Base Capacity (vph)	72	968	711	895	361	2086	2489	797	
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	0.97	0.69	0.69	0.61	0.98	0.27	1.00	0.16	

Intersection Summary
Cycle Length: 150
Actuated Cycle Length: 150
Offset: 79 (53%), Referenced to phase 2:NBT and 6:SBT, Start of Green
Natural Cycle: 150
Control Type: Actuated-Coordinated
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 5: March Road & Campeau Drive/Hwy 417 Off Ramp



HCM Signalized Intersection Capacity Analysis
5: March Road & Campeau Drive/Hwy 417 Off Ramp

Future Total PM Peak Hour



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	70	0	665	490	545	0	355	570	0	0	2485	125
Future Volume (vph)	70	0	665	490	545	0	355	570	0	0	2485	125
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.0		6.5	6.2	6.8		6.5	7.5			7.5	7.5
Lane Util. Factor	1.00		*1.00	0.97	0.95		0.97	0.95			*1.00	1.00
Frt	1.00		1.00	1.00	1.00		1.00	1.00			1.00	0.85
Flt Protected	0.95		1.00	0.95	1.00		1.00	1.00			1.00	1.00
Satd. Flow (prot)	1805		3800	3467	3610		3686	3610			5700	1615
Flt Permitted	0.95		1.00	0.95	1.00		1.00	1.00			1.00	1.00
Satd. Flow (perm)	1805		3800	3467	3610		3686	3610			5700	1615
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)	70	0	665	490	545	0	355	570	0	0	2485	125
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	0	0	70
Lane Group Flow (vph)	70	0	665	490	545	0	355	570	0	0	2485	55
Heavy Vehicles (%)	0%	0%	0%	1%	0%	0%	0%	0%	0%	0%	0%	0%
Turn Type	Prot		pt+ov	Prot	NA		Prot	NA			NA	Perm
Protected Phases	7		5 9	3	8		5	2			6	
Permitted Phases												6
Actuated Green, G (s)	6.0		38.2	26.1	37.0		14.7	86.7			65.5	65.5
Effective Green, g (s)	6.0		38.2	26.1	37.0		14.7	86.7			65.5	65.5
Actuated g/C Ratio	0.04		0.25	0.17	0.25		0.10	0.58			0.44	0.44
Clearance Time (s)	6.0			6.2	6.8		6.5	7.5			7.5	7.5
Vehicle Extension (s)	3.0			3.0	3.0		3.0	3.0			3.0	3.0
Lane Grp Cap (vph)	72		967	603	890		361	2086			2489	705
v/s Ratio Prot	0.04		c0.17	c0.14	0.15		c0.10	0.16			c0.44	
v/s Ratio Perm												0.03
v/c Ratio	0.97		0.69	0.81	0.61		0.98	0.27			1.00	0.08
Uniform Delay, d1	71.9		50.5	59.6	50.1		67.5	15.9			42.2	24.6
Progression Factor	1.00		1.00	1.00	1.00		1.00	1.00			1.00	1.00
Incremental Delay, d2	96.0		2.1	8.2	1.3		42.6	0.3			17.7	0.2
Delay (s)	167.9		52.6	67.8	51.4		110.2	16.2			59.9	24.8
Level of Service	F		D	E	D		F	B			E	C
Approach Delay (s)		63.5			59.2			52.2			58.2	
Approach LOS		E			E			D			E	

Intersection Summary				
HCM 2000 Control Delay	58.1	HCM 2000 Level of Service	E	
HCM 2000 Volume to Capacity ratio	0.94			
Actuated Cycle Length (s)	150.0	Sum of lost time (s)	26.8	
Intersection Capacity Utilization	102.1%	ICU Level of Service	G	
Analysis Period (min)	15			
c Critical Lane Group				

HCM Unsignalized Intersection Capacity Analysis
6: Kanata Avenue & Knudson Drive

Future Total PM Peak Hour



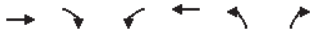
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Sign Control	Stop		Stop			Stop
Traffic Volume (vph)	235	150	240	230	110	220
Future Volume (vph)	235	150	240	230	110	220
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	235	150	240	230	110	220

Direction, Lane #	WB 1	NB 1	SB 1	SB 2
Volume Total (vph)	385	470	110	220
Volume Left (vph)	235	0	110	0
Volume Right (vph)	150	230	0	0
Hadj (s)	-0.11	-0.29	0.50	0.00
Departure Headway (s)	5.9	5.5	7.0	6.4
Degree Utilization, x	0.63	0.72	0.21	0.39
Capacity (veh/h)	581	630	489	528
Control Delay (s)	18.3	21.3	10.6	12.4
Approach Delay (s)	18.3	21.3	11.8	
Approach LOS	C	C	B	

Intersection Summary				
Delay	17.7			
Level of Service	C			
Intersection Capacity Utilization	68.2%	ICU Level of Service	C	
Analysis Period (min)	15			

HCM Unsignalized Intersection Capacity Analysis
7: Shaughnessy Crescent (East) & Knudson Drive

Future Total PM Peak Hour



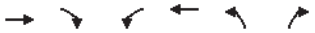
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	195	10	25	335	15	10
Future Volume (Veh/h)	195	10	25	335	15	10
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	195	10	25	335	15	10
Pedestrians					15	
Lane Width (m)					3.6	
Walking Speed (m/s)					1.2	
Percent Blockage					1	
Right turn flare (veh)						
Median type	None			None		
Median storage veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume			220		600	215
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			220		600	215
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			98		97	99
cM capacity (veh/h)			1344		453	820

Direction, Lane #	EB 1	WB 1	NB 1
Volume Total	205	360	25
Volume Left	0	25	15
Volume Right	10	0	10
cSH	1700	1344	552
Volume to Capacity	0.12	0.02	0.05
Queue Length 95th (m)	0.0	0.5	1.1
Control Delay (s)	0.0	0.7	11.8
Lane LOS		A	B
Approach Delay (s)	0.0	0.7	11.8
Approach LOS			B

Intersection Summary				
Average Delay		0.9		
Intersection Capacity Utilization		45.7%	ICU Level of Service	A
Analysis Period (min)		15		

HCM Unsignalized Intersection Capacity Analysis
8: Shaughnessy Crescent (West) & Knudson Drive

Future Total PM Peak Hour



Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	195	25	15	335	15	10
Future Volume (Veh/h)	195	25	15	335	15	10
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	195	25	15	335	15	10
Pedestrians					20	
Lane Width (m)					3.6	
Walking Speed (m/s)					1.2	
Percent Blockage					2	
Right turn flare (veh)						
Median type	None			None		
Median storage veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume			240		592	228
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			240		592	228
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			99		97	99
cM capacity (veh/h)			1316		459	803

Direction, Lane #	EB 1	WB 1	NB 1
Volume Total	220	350	25
Volume Left	0	15	15
Volume Right	25	0	10
cSH	1700	1316	554
Volume to Capacity	0.13	0.01	0.05
Queue Length 95th (m)	0.0	0.3	1.1
Control Delay (s)	0.0	0.4	11.8
Lane LOS		A	B
Approach Delay (s)	0.0	0.4	11.8
Approach LOS			B

Intersection Summary				
Average Delay		0.8		
Intersection Capacity Utilization		41.5%	ICU Level of Service	A
Analysis Period (min)		15		

HCM Unsignalized Intersection Capacity Analysis
9: Knudson Drive & Sherk Crescent (North)

Future Total PM Peak Hour



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	10	10	15	165	140	20
Future Volume (Veh/h)	10	10	15	165	140	20
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	10	10	15	165	140	20
Pedestrians	15					
Lane Width (m)	3.6					
Walking Speed (m/s)	1.2					
Percent Blockage	1					
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	360	165	175			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	360	165	175			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	98	99	99			
cM capacity (veh/h)	628	874	1396			

Direction, Lane #	EB 1	NB 1	SB 1
Volume Total	20	180	160
Volume Left	10	15	0
Volume Right	10	0	20
cSH	731	1396	1700
Volume to Capacity	0.03	0.01	0.09
Queue Length 95th (m)	0.7	0.3	0.0
Control Delay (s)	10.1	0.7	0.0
Lane LOS	B	A	
Approach Delay (s)	10.1	0.7	0.0
Approach LOS	B		

Intersection Summary			
Average Delay		0.9	
Intersection Capacity Utilization		32.3%	ICU Level of Service A
Analysis Period (min)		15	

HCM Unsignalized Intersection Capacity Analysis
10: Knudson Drive & Sherk Crescent (South)

Future Total PM Peak Hour



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	5	20	25	175	145	5
Future Volume (Veh/h)	5	20	25	175	145	5
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	5	20	25	175	145	5
Pedestrians	10					
Lane Width (m)	3.6					
Walking Speed (m/s)	1.2					
Percent Blockage	1					
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	382	158	160			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	382	158	160			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	99	98	98			
cM capacity (veh/h)	608	886	1420			

Direction, Lane #	EB 1	NB 1	SB 1
Volume Total	25	200	150
Volume Left	5	25	0
Volume Right	20	0	5
cSH	812	1420	1700
Volume to Capacity	0.03	0.02	0.09
Queue Length 95th (m)	0.8	0.4	0.0
Control Delay (s)	9.6	1.1	0.0
Lane LOS	A	A	
Approach Delay (s)	9.6	1.1	0.0
Approach LOS	A		

Intersection Summary			
Average Delay		1.2	
Intersection Capacity Utilization		34.3%	ICU Level of Service A
Analysis Period (min)		15	

HCM Unsignalized Intersection Capacity Analysis
11: Knudson Drive & Weslock Way

Future Total PM Peak Hour



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Sign Control		Stop	Stop		Stop	
Traffic Volume (vph)	150	55	70	90	120	310
Future Volume (vph)	150	55	70	90	120	310
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	150	55	70	90	120	310

Direction, Lane #	EB 1	WB 1	SB 1
Volume Total (vph)	205	160	430
Volume Left (vph)	150	0	120
Volume Right (vph)	0	90	310
Hadj (s)	0.15	-0.34	-0.38
Departure Headway (s)	5.3	4.9	4.5
Degree Utilization, x	0.30	0.22	0.53
Capacity (veh/h)	629	667	762
Control Delay (s)	10.6	9.3	12.4
Approach Delay (s)	10.6	9.3	12.4
Approach LOS	B	A	B

Intersection Summary				
Delay		11.3		
Level of Service		B		
Intersection Capacity Utilization		59.1%	ICU Level of Service	B
Analysis Period (min)		15		

HCM Unsignalized Intersection Capacity Analysis
12: Weslock Way & Beaverbrook Road

Future Total PM Peak Hour



Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Sign Control	Stop		Stop			Stop
Traffic Volume (vph)	400	175	50	190	75	30
Future Volume (vph)	400	175	50	190	75	30
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	400	175	50	190	75	30

Direction, Lane #	WB 1	NB 1	SB 1
Volume Total (vph)	575	240	105
Volume Left (vph)	400	0	75
Volume Right (vph)	175	190	0
Hadj (s)	-0.04	-0.47	0.14
Departure Headway (s)	4.8	5.1	5.9
Degree Utilization, x	0.77	0.34	0.17
Capacity (veh/h)	575	638	555
Control Delay (s)	21.8	10.7	10.2
Approach Delay (s)	21.8	10.7	10.2
Approach LOS	C	B	B

Intersection Summary				
Delay		17.6		
Level of Service		C		
Intersection Capacity Utilization		66.0%	ICU Level of Service	C
Analysis Period (min)		15		

HCM Unsignalized Intersection Capacity Analysis
13: Omni Health Care/Street No. 11 & Campeau Drive

Future Total PM Peak Hour

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	25	450	10	5	540	75	20	0	10	60	0	20
Future Volume (Veh/h)	25	450	10	5	540	75	20	0	10	60	0	20
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	25	450	10	5	540	75	20	0	10	60	0	20
Pedestrians								10				
Lane Width (m)								3.6				
Walking Speed (m/s)								1.2				
Percent Blockage								1				
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	615			470			1122	1140	465	1102	1108	578
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	615			470			1122	1140	465	1102	1108	578
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	97			100			88	100	98	67	100	96
cM capacity (veh/h)	974			1093			171	195	597	182	204	520

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	485	620	30	80
Volume Left	25	5	20	60
Volume Right	10	75	10	20
cSH	974	1093	224	217
Volume to Capacity	0.03	0.00	0.13	0.37
Queue Length 95th (m)	0.6	0.1	3.6	12.8
Control Delay (s)	0.7	0.1	23.5	30.9
Lane LOS	A	A	C	D
Approach Delay (s)	0.7	0.1	23.5	30.9
Approach LOS			C	D

Intersection Summary				
Average Delay			3.0	
Intersection Capacity Utilization			55.7%	ICU Level of Service
Analysis Period (min)			15	

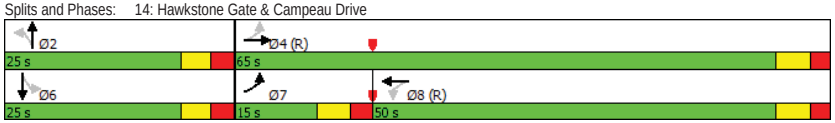
Queues
14: Hawkstone Gate & Campeau Drive

Future Total PM Peak Hour

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations								
Traffic Volume (vph)	55	450	20	690	10	5	50	0
Future Volume (vph)	55	450	20	690	10	5	50	0
Lane Group Flow (vph)	55	465	20	790	10	10	0	115
Turn Type	pm+pt	NA	Perm	NA	Perm	NA	Perm	NA
Protected Phases	7	4		8		2		6
Permitted Phases	4		8		2		6	
Detector Phase	7	4	8	8	2	2	6	6
Switch Phase								
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Minimum Split (s)	11.0	32.0	32.0	32.0	23.9	23.9	23.9	23.9
Total Split (s)	15.0	65.0	50.0	50.0	25.0	25.0	25.0	25.0
Total Split (%)	16.7%	72.2%	55.6%	55.6%	27.8%	27.8%	27.8%	27.8%
Yellow Time (s)	3.7	3.7	3.7	3.7	3.3	3.3	3.3	3.3
All-Red Time (s)	2.3	2.3	2.3	2.3	2.6	2.6	2.6	2.6
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0		0.0
Total Lost Time (s)	6.0	6.0	6.0	6.0	5.9	5.9		5.9
Lead/Lag	Lead		Lag	Lag				
Lead-Lag Optimize?	Yes		Yes	Yes				
Recall Mode	None	C-Min	C-Min	C-Min	None	None	None	None
v/c Ratio	0.13	0.32	0.03	0.64	0.09	0.06		0.50
Control Delay	3.5	3.5	8.4	14.9	35.2	26.0		15.7
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0		0.0
Total Delay	3.5	3.5	8.4	14.9	35.2	26.0		15.7
Queue Length 50th (m)	1.4	14.7	1.1	76.1	1.8	0.9		1.1
Queue Length 95th (m)	5.7	38.7	5.4	#197.3	5.9	5.1		15.0
Internal Link Dist (m)		214.6		269.3		89.1		74.7
Turn Bay Length (m)	80.0		120.0					
Base Capacity (vph)	462	1451	624	1232	241	351		376
Starvation Cap Reductn	0	0	0	0	0	0		0
Spillback Cap Reductn	0	0	0	0	0	0		0
Storage Cap Reductn	0	0	0	0	0	0		0
Reduced v/c Ratio	0.12	0.32	0.03	0.64	0.04	0.03		0.31

Intersection Summary
Cycle Length: 90
Actuated Cycle Length: 90
Offset: 0 (0%), Referenced to phase 4:EBTL and 8:WBTL, Start of Green
Natural Cycle: 80
Control Type: Actuated-Coordinated
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 14: Hawkstone Gate & Campeau Drive



HCM Signalized Intersection Capacity Analysis
14: Hawkstone Gate & Campeau Drive

Future Total PM Peak Hour

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	55	450	15	20	690	100	10	5	5	50	0	65
Future Volume (vph)	55	450	15	20	690	100	10	5	5	50	0	65
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Total Lost time (s)	6.0	6.0		6.0	6.0		5.9	5.9			5.9	
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	1.00			1.00	
Frpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	0.98			0.97	
Flpb, ped/bikes	1.00	1.00		1.00	1.00		0.97	1.00			0.99	
Frt	1.00	1.00		1.00	0.98		1.00	0.93			0.92	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00			0.98	
Satd. Flow (prot)	1709	1791		1710	1758		1662	1638			1567	
Flt Permitted	0.23	1.00		0.50	1.00		0.65	1.00			0.86	
Satd. Flow (perm)	417	1791		893	1758		1139	1638			1369	
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)	55	450	15	20	690	100	10	5	5	50	0	65
RTOR Reduction (vph)	0	1	0	0	4	0	0	5	0	0	100	0
Lane Group Flow (vph)	55	464	0	20	786	0	10	5	0	0	15	0
Confl. Peds. (#/hr)	10					10	15		5	5		15
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Turn Type	pm+pt	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases	7	4			8			2			6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)	70.5	70.5		59.3	59.3		7.6	7.6			7.6	
Effective Green, g (s)	70.5	70.5		59.3	59.3		7.6	7.6			7.6	
Actuated g/C Ratio	0.78	0.78		0.66	0.66		0.08	0.08			0.08	
Clearance Time (s)	6.0	6.0		6.0	6.0		5.9	5.9			5.9	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0			3.0	
Lane Grp Cap (vph)	401	1402		588	1158		96	138			115	
v/s Ratio Prot	0.01	c0.26			c0.45			0.00				
v/s Ratio Perm	0.10			0.02			0.01				c0.01	
v/c Ratio	0.14	0.33		0.03	0.68		0.10	0.04			0.13	
Uniform Delay, d1	5.7	2.9		5.4	9.5		38.1	37.8			38.1	
Progression Factor	0.86	0.81		1.00	1.00		1.00	1.00			1.00	
Incremental Delay, d2	0.2	0.6		0.1	3.2		0.5	0.1			0.5	
Delay (s)	5.0	2.9		5.5	12.7		38.5	38.0			38.7	
Level of Service	A	A		A	B		D	D			D	
Approach Delay (s)		3.1			12.5			38.2			38.7	
Approach LOS		A			B			D			D	

Intersection Summary				
HCM 2000 Control Delay	11.6	HCM 2000 Level of Service	B	
HCM 2000 Volume to Capacity ratio	0.61			
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	17.9	
Intersection Capacity Utilization	72.9%	ICU Level of Service	C	
Analysis Period (min)	15			

c Critical Lane Group

HCM Unsignalized Intersection Capacity Analysis
15: Park Ridge Place (West) & Campeau Drive

Future Total PM Peak Hour

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	455	20	5	525	20	5
Future Volume (Veh/h)	455	20	5	525	20	5
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	455	20	5	525	20	5
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage veh)						
Upstream signal (m)	125					
pX, platoon unblocked			0.78		0.78	0.78
vC, conflicting volume			475		1000	465
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			193		863	181
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			100		92	99
cM capacity (veh/h)			1092		256	680

Direction, Lane #	EB 1	WB 1	NB 1
Volume Total	475	530	25
Volume Left	0	5	20
Volume Right	20	0	5
cSH	1700	1092	292
Volume to Capacity	0.28	0.00	0.09
Queue Length 95th (m)	0.0	0.1	2.2
Control Delay (s)	0.0	0.1	18.5
Lane LOS		A	C
Approach Delay (s)	0.0	0.1	18.5
Approach LOS			C

Intersection Summary			
Average Delay	0.5		
Intersection Capacity Utilization	43.4%	ICU Level of Service	A
Analysis Period (min)	15		

HCM Unsignalized Intersection Capacity Analysis
16: Coulson Court & Robson Court

Future Total PM Peak Hour



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	20	30	10	0	20	0	5	5	0	5	0	5
Future Volume (Veh/h)	20	30	10	0	20	0	5	5	0	5	0	5
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	20	30	10	0	20	0	5	5	0	5	0	5
Pedestrians											5	
Lane Width (m)											3.6	
Walking Speed (m/s)											1.2	
Percent Blockage											0	
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	25			40			100	100	35	102	105	25
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	25			40			100	100	35	102	105	25
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	99			100			99	99	100	99	100	100
cM capacity (veh/h)	1596			1583			871	781	1044	864	776	1053

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	60	20	10	10
Volume Left	20	0	5	5
Volume Right	10	0	0	5
cSH	1596	1583	823	949
Volume to Capacity	0.01	0.00	0.01	0.01
Queue Length 95th (m)	0.3	0.0	0.3	0.3
Control Delay (s)	2.5	0.0	9.4	8.8
Lane LOS	A		A	A
Approach Delay (s)	2.5	0.0	9.4	8.8
Approach LOS			A	A

Intersection Summary				
Average Delay	3.3			
Intersection Capacity Utilization	20.1%	ICU Level of Service	A	
Analysis Period (min)	15			

HCM Unsignalized Intersection Capacity Analysis
17: Robson Court & Evanshen Crescent

Future Total PM Peak Hour



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	15	20	15	0	0	5
Future Volume (Veh/h)	15	20	15	0	0	5
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	15	20	15	0	0	5
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	15				65	15
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	15				65	15
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	99				100	100
cM capacity (veh/h)	1616				937	1070

Direction, Lane #	EB 1	WB 1	SB 1
Volume Total	35	15	5
Volume Left	15	0	0
Volume Right	0	0	5
cSH	1616	1700	1070
Volume to Capacity	0.01	0.01	0.00
Queue Length 95th (m)	0.2	0.0	0.1
Control Delay (s)	3.1	0.0	8.4
Lane LOS	A		A
Approach Delay (s)	3.1	0.0	8.4
Approach LOS			A

Intersection Summary				
Average Delay	2.8			
Intersection Capacity Utilization	18.7%	ICU Level of Service	A	
Analysis Period (min)	15			

HCM Unsignalized Intersection Capacity Analysis
18: Kanata Avenue & Park Ridge Place

Future Total PM Peak Hour

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	5	0	730	10	10	605
Future Volume (Veh/h)	5	0	730	10	10	605
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	5	0	730	10	10	605
Pedestrians	5					
Lane Width (m)	3.6					
Walking Speed (m/s)	1.2					
Percent Blockage	0					
Right turn flare (veh)						
Median type			None			None
Median storage veh)						
Upstream signal (m)						133
pX, platoon unblocked	0.78					
vC, conflicting volume	1365	740			745	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1326	740			745	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	96	100			99	
cM capacity (veh/h)	133	418			868	

Direction, Lane #	WB 1	NB 1	SB 1
Volume Total	5	740	615
Volume Left	5	0	10
Volume Right	0	10	0
cSH	133	1700	868
Volume to Capacity	0.04	0.44	0.01
Queue Length 95th (m)	0.9	0.0	0.3
Control Delay (s)	33.2	0.0	0.3
Lane LOS	D		A
Approach Delay (s)	33.2	0.0	0.3
Approach LOS	D		

Intersection Summary			
Average Delay		0.3	
Intersection Capacity Utilization		52.1%	ICU Level of Service A
Analysis Period (min)		15	

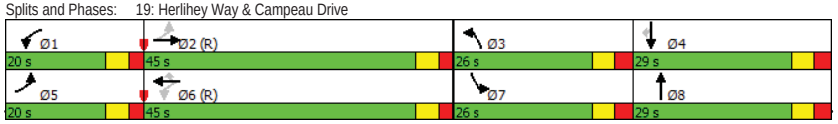
Queues
19: Herlihey Way & Campeau Drive

Future Total PM Peak Hour

Lane Group	EBL	EBT	WBL	WBT	WBR	NBL	NBT	SBL	SBT	SBR
Lane Configurations										
Traffic Volume (vph)	30	465	140	445	125	60	50	125	50	90
Future Volume (vph)	30	465	140	445	125	60	50	125	50	90
Lane Group Flow (vph)	30	570	140	445	125	60	220	125	50	90
Turn Type	pm+pt	NA	pm+pt	NA	Perm	Prot	NA	Prot	NA	Perm
Protected Phases	5	2	1	6		3	8	7	4	
Permitted Phases	2		6		6					4
Detector Phase	5	2	1	6	6	3	8	7	4	4
Switch Phase										
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Minimum Split (s)	10.5	34.5	10.5	34.5	34.5	10.9	28.9	10.9	28.9	28.9
Total Split (s)	20.0	45.0	20.0	45.0	45.0	26.0	29.0	26.0	29.0	29.0
Total Split (%)	16.7%	37.5%	16.7%	37.5%	37.5%	21.7%	24.2%	21.7%	24.2%	24.2%
Yellow Time (s)	3.3	3.3	3.3	3.3	3.3	3.3	3.3	3.3	3.3	3.3
All-Red Time (s)	2.2	2.2	2.2	2.2	2.2	2.6	2.6	2.6	2.6	2.6
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	5.5	5.5	5.5	5.5	5.5	5.9	5.9	5.9	5.9	5.9
Lead/Lag	Lead	Lag	Lead	Lag	Lag	Lead	Lag	Lead	Lag	Lag
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Recall Mode	None	C-Min	None	C-Min	C-Min	None	None	None	None	None
v/c Ratio	0.06	0.68	0.38	0.46	0.14	0.44	0.76	0.63	0.15	0.24
Control Delay	14.9	34.3	19.5	24.8	8.4	62.1	37.9	63.8	40.2	3.9
Queue Delay	0.0	1.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	14.9	35.9	19.5	24.8	8.4	62.1	37.9	63.8	40.2	3.9
Queue Length 50th (m)	3.1	120.9	16.6	64.6	1.5	14.4	22.8	30.0	10.9	0.0
Queue Length 95th (m)	10.1	#216.7	m30.3	m97.2	m5.3	28.2	48.1	48.4	20.5	6.1
Internal Link Dist (m)		148.2		217.6			87.8		129.5	
Turn Bay Length (m)	40.0		85.0		75.0			50.0		30.0
Base Capacity (vph)	583	837	412	978	890	280	372	286	380	413
Starvation Cap Reductn	0	125	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.05	0.80	0.34	0.46	0.14	0.21	0.59	0.44	0.13	0.22

Intersection Summary
Cycle Length: 120
Actuated Cycle Length: 120
Offset: 26 (22%), Referenced to phase 2:EBTL and 6:WBTL, Start of Green
Natural Cycle: 85
Control Type: Actuated-Coordinated
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.
m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 19: Herlihey Way & Campeau Drive



HCM Signalized Intersection Capacity Analysis
19: Herlihey Way & Campeau Drive

Future Total PM Peak Hour



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	30	465	105	140	445	125	60	50	170	125	50	90
Future Volume (vph)	30	465	105	140	445	125	60	50	170	125	50	90
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Total Lost time (s)	5.5	5.5		5.5	5.5	5.5	5.9	5.9		5.9	5.9	5.9
Lane Util. Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00
Frpb, ped/bikes	1.00	1.00		1.00	1.00	1.00	1.00	0.89		1.00	1.00	1.00
Flpb, ped/bikes	1.00	1.00		1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00
Frt	1.00	0.97		1.00	1.00	0.85	1.00	0.88		1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	1710	1750		1710	1782	1515	1676	1399		1710	1800	1485
Flt Permitted	0.44	1.00		0.23	1.00	1.00	0.95	1.00		0.95	1.00	1.00
Satd. Flow (perm)	799	1750		418	1782	1515	1676	1399		1710	1800	1485
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	465	105	140	445	125	60	50	170	125	50	90
RTOR Reduction (vph)	0	5	0	0	0	60	0	109	0	0	0	74
Lane Group Flow (vph)	30	565	0	140	445	65	60	111	0	125	50	17
Confl. Peds. (#/hr)									50	50		
Heavy Vehicles (%)	0%	0%	0%	0%	1%	1%	2%	0%	1%	0%	0%	3%
Turn Type	pm+pt	NA		pm+pt	NA	Perm	Prot	NA		Prot	NA	Perm
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases	2			6		6						4
Actuated Green, G (s)	60.1	55.9		72.2	62.5	62.5	8.5	16.5		14.0	22.0	22.0
Effective Green, g (s)	60.1	55.9		72.2	62.5	62.5	8.5	16.5		14.0	22.0	22.0
Actuated g/C Ratio	0.50	0.47		0.60	0.52	0.52	0.07	0.14		0.12	0.18	0.18
Clearance Time (s)	5.5	5.5		5.5	5.5	5.5	5.9	5.9		5.9	5.9	5.9
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)	432	815		367	928	789	118	192		199	330	272
v/s Ratio Prot	0.00	c0.32		c0.03	c0.25		0.04	c0.08		c0.07	c0.03	
v/s Ratio Perm	0.03			0.19		0.04						0.01
v/c Ratio	0.07	0.69		0.38	0.48	0.08	0.51	0.58		0.63	0.15	0.06
Uniform Delay, d1	15.4	25.3		14.8	18.4	14.4	53.7	48.5		50.5	41.2	40.5
Progression Factor	1.08	1.06		1.38	1.12	2.21	1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	0.1	4.8		0.5	1.4	0.2	3.4	4.2		6.1	0.2	0.1
Delay (s)	16.7	31.6		21.0	22.0	31.9	57.2	52.7		56.6	41.4	40.6
Level of Service	B	C		C	C	C	E	D		E	D	D
Approach Delay (s)		30.8			23.5			53.7			48.3	
Approach LOS		C			C			D			D	

Intersection Summary				
HCM 2000 Control Delay	34.0	HCM 2000 Level of Service	C	
HCM 2000 Volume to Capacity ratio	0.63			
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	22.8	
Intersection Capacity Utilization	85.8%	ICU Level of Service	E	
Analysis Period (min)	15			

c Critical Lane Group

HCM Unsignalized Intersection Capacity Analysis
21: Park Ridge Place (East)/Street No. 1 & Campeau Drive

Future Total PM Peak Hour



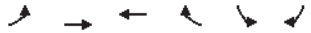
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	50	405	5	10	465	50	5	0	5	40	0	60
Future Volume (Veh/h)	50	405	5	10	465	50	5	0	5	40	0	60
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	50	405	5	10	465	50	5	0	5	40	0	60
Pedestrians								10				
Lane Width (m)								3.6				
Walking Speed (m/s)								1.2				
Percent Blockage								1				
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (m)		269										
pX, platoon unblocked				0.86			0.86	0.86	0.86	0.86	0.86	
vC, conflicting volume	515			420			1088	1052	418	1022	1030	490
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	515			244			1020	980	241	945	954	490
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	95			99			97	100	99	80	100	90
cM capacity (veh/h)	1061			1138			158	203	684	198	210	582

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	460	525	10	100
Volume Left	50	10	5	40
Volume Right	5	50	5	60
cSH	1061	1138	256	328
Volume to Capacity	0.05	0.01	0.04	0.30
Queue Length 95th (m)	1.2	0.2	1.0	10.1
Control Delay (s)	1.4	0.3	19.6	20.7
Lane LOS	A	A	C	C
Approach Delay (s)	1.4	0.3	19.6	20.7
Approach LOS			C	C

Intersection Summary				
Average Delay	2.8			
Intersection Capacity Utilization	66.0%	ICU Level of Service	C	
Analysis Period (min)	15			

HCM Unsignalized Intersection Capacity Analysis
22: Campeau Drive & Street No. 7

Future Total PM Peak Hour



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	25	425	505	75	60	20
Future Volume (Veh/h)	25	425	505	75	60	20
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	25	425	505	75	60	20
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage veh)						
Upstream signal (m)		400				
pX, platoon unblocked						
vC, conflicting volume	580				1018	542
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	580				1018	542
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	98				77	96
cM capacity (veh/h)	1004				259	544

Direction, Lane #	EB 1	WB 1	SB 1
Volume Total	450	580	80
Volume Left	25	0	60
Volume Right	0	75	20
cSH	1004	1700	298
Volume to Capacity	0.02	0.34	0.27
Queue Length 95th (m)	0.6	0.0	8.5
Control Delay (s)	0.8	0.0	21.5
Lane LOS	A		C
Approach Delay (s)	0.8	0.0	21.5
Approach LOS			C

Intersection Summary				
Average Delay	1.9			
Intersection Capacity Utilization	56.7%	ICU Level of Service		B
Analysis Period (min)	15			

HCM Unsignalized Intersection Capacity Analysis
23: Street No. 1/Street No. 16 & Knudson Drive

Future Total PM Peak Hour



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	50	200	75	25	325	0	20	0	20	0	0	40
Future Volume (Veh/h)	50	200	75	25	325	0	20	0	20	0	0	40
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	50	200	75	25	325	0	20	0	20	0	0	40
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	325			275			752	712	238	732	750	325
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	325			275			752	712	238	732	750	325
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	96			98			93	100	98	100	100	94
cM capacity (veh/h)	1246			1300			297	339	806	316	322	721

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	325	350	40	40
Volume Left	50	25	20	0
Volume Right	75	0	20	40
cSH	1246	1300	434	721
Volume to Capacity	0.04	0.02	0.09	0.06
Queue Length 95th (m)	1.0	0.5	2.4	1.4
Control Delay (s)	1.6	0.7	14.1	10.3
Lane LOS	A	A	B	B
Approach Delay (s)	1.6	0.7	14.1	10.3
Approach LOS			B	B

Intersection Summary				
Average Delay	2.3			
Intersection Capacity Utilization	48.0%	ICU Level of Service		A
Analysis Period (min)	15			

HCM Unsignalized Intersection Capacity Analysis
24: Weslock Way & Street No. 16

Future Total PM Peak Hour



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	0	20	25	200	85	0
Future Volume (Veh/h)	0	20	25	200	85	0
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	0	20	25	200	85	0
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	335	85	85			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	335	85	85			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	100	98	98			
cM capacity (veh/h)	653	980	1524			

Direction, Lane #	EB 1	NB 1	SB 1
Volume Total	20	225	85
Volume Left	0	25	0
Volume Right	20	0	0
cSH	980	1524	1700
Volume to Capacity	0.02	0.02	0.05
Queue Length 95th (m)	0.5	0.4	0.0
Control Delay (s)	8.8	0.9	0.0
Lane LOS	A	A	
Approach Delay (s)	8.8	0.9	0.0
Approach LOS	A		

Intersection Summary			
Average Delay	1.2		
Intersection Capacity Utilization	29.2%	ICU Level of Service	A
Analysis Period (min)	15		

HCM Unsignalized Intersection Capacity Analysis
25: Street No. 23 & Beaverbrook Road

Future Total PM Peak Hour



Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	265	0	30	555	20	10
Future Volume (Veh/h)	265	0	30	555	20	10
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	265	0	30	555	20	10
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume			265		880	265
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			265		880	265
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			98		94	99
cM capacity (veh/h)			1311		313	779

Direction, Lane #	EB 1	WB 1	NB 1
Volume Total	265	585	30
Volume Left	0	30	20
Volume Right	0	0	10
cSH	1700	1311	391
Volume to Capacity	0.16	0.02	0.08
Queue Length 95th (m)	0.0	0.6	2.0
Control Delay (s)	0.0	0.7	15.0
Lane LOS		A	B
Approach Delay (s)	0.0	0.7	15.0
Approach LOS			B

Intersection Summary			
Average Delay	0.9		
Intersection Capacity Utilization	60.6%	ICU Level of Service	B
Analysis Period (min)	15		

Queues
1: Terry Fox Drive & Campeau Drive

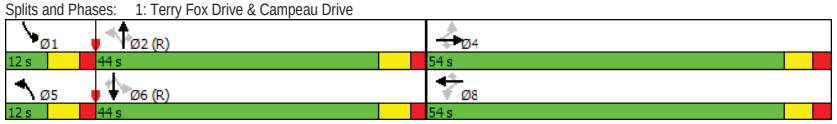
Future Total (Sensitivity) AM Peak Hour

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	25	30	35	305	40	140	35	800	185	140	725	45
Future Volume (vph)	25	30	35	305	40	140	35	800	185	140	725	45
Lane Group Flow (vph)	25	30	35	305	40	140	35	800	185	140	725	45
Turn Type	Perm	NA	Perm	Perm	NA	Perm	pm+pt	NA	Perm	pm+pt	NA	Perm
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4		4	8		8	2		2	6		6
Detector Phase	4	4	4	8	8	8	5	2	2	1	6	6
Switch Phase												
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Minimum Split (s)	43.4	43.4	43.4	43.4	43.4	43.4	11.4	40.4	40.4	11.4	40.4	40.4
Total Split (s)	54.0	54.0	54.0	54.0	54.0	54.0	12.0	44.0	44.0	12.0	44.0	44.0
Total Split (%)	49.1%	49.1%	49.1%	49.1%	49.1%	49.1%	10.9%	40.0%	40.0%	10.9%	40.0%	40.0%
Yellow Time (s)	3.7	3.7	3.7	3.7	3.7	3.7	4.2	4.2	4.2	4.2	4.2	4.2
All-Red Time (s)	2.7	2.7	2.7	2.7	2.7	2.7	2.2	2.2	2.2	2.2	2.2	2.2
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4
Lead/Lag							Lead	Lag	Lag	Lead	Lag	Lag
Lead-Lag Optimize?							Yes	Yes	Yes	Yes	Yes	Yes
Recall Mode	None	None	None	None	None	None	None	C-Min	C-Min	None	C-Min	C-Min
v/c Ratio	0.07	0.06	0.07	0.80	0.08	0.26	0.09	0.52	0.23	0.39	0.41	0.05
Control Delay	24.9	24.8	0.3	50.9	24.9	7.6	12.9	25.2	4.4	15.2	19.9	0.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	24.9	24.8	0.3	50.9	24.9	7.6	12.9	25.2	4.4	15.2	19.9	0.1
Queue Length 50th (m)	4.1	4.9	0.0	68.0	8.0	6.9	3.1	67.3	0.0	13.2	55.4	0.0
Queue Length 95th (m)	9.3	10.5	0.0	62.3	6.8	5.4	9.5	103.9	15.3	28.8	89.1	0.0
Internal Link Dist (m)		139.7			148.2			149.3			180.0	
Turn Bay Length (m)	70.0			75.0			50.0		60.0	105.0		
Base Capacity (vph)	569	778	717	569	778	741	387	1528	792	355	1780	843
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	0.04	0.04	0.05	0.54	0.05	0.19	0.09	0.52	0.23	0.39	0.41	0.05

Intersection Summary

Cycle Length: 110
Actuated Cycle Length: 110
Offset: 27 (25%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green
Natural Cycle: 100
Control Type: Actuated-Coordinated

Splits and Phases: 1: Terry Fox Drive & Campeau Drive



HCM Signalized Intersection Capacity Analysis
1: Terry Fox Drive & Campeau Drive

Future Total (Sensitivity) AM Peak Hour

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	25	30	35	305	40	140	35	800	185	140	725	45
Future Volume (vph)	25	30	35	305	40	140	35	800	185	140	725	45
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Total Lost time (s)	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	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)	1710	1800	1530	1693	1800	1530	1710	3386	1530	1693	3420	1530
Flt Permitted	0.73	1.00	1.00	0.74	1.00	1.00	0.35	1.00	1.00	0.24	1.00	1.00
Satd. Flow (perm)	1316	1800	1530	1315	1800	1530	631	3386	1530	427	3420	1530
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)	25	30	35	305	40	140	35	800	185	140	725	45
RTOR Reduction (vph)	0	0	25	0	0	100	0	0	102	0	0	23
Lane Group Flow (vph)	25	30	10	305	40	40	35	800	83	140	725	22
Heavy Vehicles (%)	0%	0%	0%	1%	0%	0%	0%	1%	0%	1%	0%	0%
Turn Type	Perm	NA	Perm	Perm	NA	Perm	pm+pt	NA	Perm	pm+pt	NA	Perm
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4		4	8		8	2		2	6		6
Actuated Green, G (s)	31.8	31.8	31.8	31.8	31.8	31.8	53.9	49.6	49.6	64.1	54.7	54.7
Effective Green, g (s)	31.8	31.8	31.8	31.8	31.8	31.8	53.9	49.6	49.6	64.1	54.7	54.7
Actuated g/C Ratio	0.29	0.29	0.29	0.29	0.29	0.29	0.49	0.45	0.45	0.58	0.50	0.50
Clearance Time (s)	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4
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)	380	520	442	380	520	442	351	1526	689	357	1700	760
v/s Ratio Prot		0.02			0.02		0.00	c0.24		c0.03	c0.21	
v/s Ratio Perm	0.02		0.01	c0.23		0.03	0.04		0.05	0.19		0.01
v/c Ratio	0.07	0.06	0.02	0.80	0.08	0.09	0.10	0.52	0.12	0.39	0.43	0.03
Uniform Delay, d1	28.3	28.3	28.0	36.2	28.4	28.6	14.7	21.7	17.5	12.2	17.6	14.1
Progression Factor	1.00	1.00	1.00	1.00	0.99	1.61	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	0.1	0.0	0.0	11.2	0.1	0.1	0.1	1.3	0.4	0.7	0.8	0.1
Delay (s)	28.4	28.3	28.0	47.4	28.1	46.0	14.8	23.0	17.9	12.9	18.4	14.2
Level of Service	C	C	C	D	C	D	B	C	B	B	B	B
Approach Delay (s)		28.2			45.4			21.8			17.4	
Approach LOS		C			D			C			B	

Intersection Summary

HCM 2000 Control Delay	25.0	HCM 2000 Level of Service	C	
HCM 2000 Volume to Capacity ratio	0.61			
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	19.2	
Intersection Capacity Utilization	72.0%	ICU Level of Service	C	
Analysis Period (min)	15			

c Critical Lane Group

Queues
2: Kanata Avenue & Campeau Drive

Future Total (Sensitivity) AM Peak Hour

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations										
Traffic Volume (vph)	100	220	40	280	60	245	45	135	525	240
Future Volume (vph)	100	220	40	280	60	245	45	135	525	240
Lane Group Flow (vph)	100	270	40	355	60	245	45	135	525	240
Turn Type	pm+pt	NA	pm+pt	NA	pm+pt	NA	Perm	Perm	NA	Perm
Protected Phases	7	4	3	8	5	2			6	
Permitted Phases	4		8		2		2	6		6
Detector Phase	7	4	3	8	5	2	2	6	6	6
Switch Phase										
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Minimum Split (s)	11.2	36.2	11.2	36.2	10.9	29.9	29.9	29.9	29.9	29.9
Total Split (s)	12.0	37.0	12.0	37.0	15.0	61.0	61.0	46.0	46.0	46.0
Total Split (%)	10.9%	33.6%	10.9%	33.6%	13.6%	55.5%	55.5%	41.8%	41.8%	41.8%
Yellow Time (s)	3.7	3.7	3.7	3.7	3.3	3.3	3.3	3.3	3.3	3.3
All-Red Time (s)	2.5	2.5	2.5	2.5	2.6	2.6	2.6	2.6	2.6	2.6
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	6.2	6.2	6.2	6.2	5.9	5.9	5.9	5.9	5.9	5.9
Lead/Lag	Lead	Lag	Lead	Lag	Lead			Lag	Lag	Lag
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes			Yes	Yes	Yes
Recall Mode	None	C-Min	None	C-Min	None	None	None	None	None	None
v/c Ratio	0.31	0.40	0.10	0.61	0.28	0.32	0.06	0.38	0.89	0.37
Control Delay	17.9	23.9	21.4	37.5	18.5	20.0	0.2	30.6	52.5	4.9
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	17.9	23.9	21.4	37.5	18.5	20.0	0.2	30.6	52.5	4.9
Queue Length 50th (m)	15.4	51.4	5.4	71.7	7.1	32.2	0.0	22.5	108.3	0.0
Queue Length 95th (m)	10.8	35.7	12.9	104.8	14.0	47.8	0.4	39.2	#154.5	16.4
Internal Link Dist (m)		217.6		101.3		108.6			167.9	
Turn Bay Length (m)	95.0		35.0		55.0		55.0	115.0		100.0
Base Capacity (vph)	325	674	418	591	226	893	813	398	656	686
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	0.31	0.40	0.10	0.60	0.27	0.27	0.06	0.34	0.80	0.35

Intersection Summary

Cycle Length: 110
Actuated Cycle Length: 110
Offset: 67 (61%), Referenced to phase 4:EBTL and 8:WBTL, Start of Green
Natural Cycle: 90
Control Type: Actuated-Coordinated
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 2: Kanata Avenue & Campeau Drive



HCM Signalized Intersection Capacity Analysis
2: Kanata Avenue & Campeau Drive

Future Total (Sensitivity) AM Peak Hour

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	100	220	50	40	280	75	60	245	45	135	525	240
Future Volume (vph)	100	220	50	40	280	75	60	245	45	135	525	240
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Total Lost time (s)	6.2	6.2		6.2	6.2		5.9	5.9	5.9	5.9	5.9	5.9
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00
Frpb, ped/bikes	1.00	0.99		1.00	1.00		1.00	1.00	1.00	1.00	1.00	0.96
Flpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	0.97		1.00	0.97		1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1710	1727		1705	1729		1710	1782	1530	1710	1800	1465
Flt Permitted	0.33	1.00		0.54	1.00		0.13	1.00	1.00	0.61	1.00	1.00
Satd. Flow (perm)	597	1727		973	1729		235	1782	1530	1092	1800	1465
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)	100	220	50	40	280	75	60	245	45	135	525	240
RTOR Reduction (vph)	0	6	0	0	8	0	0	0	25	0	0	161
Lane Group Flow (vph)	100	264	0	40	347	0	60	245	20	135	525	79
Confl. Peds. (#/hr)			5	5			10					10
Heavy Vehicles (%)	0%	1%	0%	0%	1%	0%	0%	1%	0%	0%	0%	0%
Turn Type	pm+pt	NA		pm+pt	NA		pm+pt	NA	Perm	Perm	NA	Perm
Protected Phases	7	4		3	8		5	2			6	
Permitted Phases	4			8			2		2	6		6
Actuated Green, G (s)	45.9	38.9		39.3	35.6		49.1	49.1	49.1	36.2	36.2	36.2
Effective Green, g (s)	45.9	38.9		39.3	35.6		49.1	49.1	49.1	36.2	36.2	36.2
Actuated g/C Ratio	0.42	0.35		0.36	0.32		0.45	0.45	0.45	0.33	0.33	0.33
Clearance Time (s)	6.2	6.2		6.2	6.2		5.9	5.9	5.9	5.9	5.9	5.9
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)	319	610		372	559		198	795	682	359	592	482
v/s Ratio Prot	c0.02	c0.15		0.00	c0.20		0.02	c0.14			c0.29	
v/s Ratio Perm	0.11			0.03			0.12		0.01	0.12		0.05
v/c Ratio	0.31	0.43		0.11	0.62		0.30	0.31	0.03	0.38	0.89	0.16
Uniform Delay, d1	21.0	27.1		23.3	31.5		22.0	19.5	17.1	28.3	35.0	26.2
Progression Factor	0.73	0.78		1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	0.6	2.2		0.1	5.1		0.9	0.2	0.0	0.7	14.9	0.2
Delay (s)	15.9	23.3		23.4	36.6		22.9	19.8	17.1	28.9	49.9	26.3
Level of Service	B	C		C	D		C	B	B	C	D	C
Approach Delay (s)		21.3			35.3			20.0			40.4	
Approach LOS		C			D			B			D	

Intersection Summary

HCM 2000 Control Delay	32.4	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.70		
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	24.2
Intersection Capacity Utilization	82.7%	ICU Level of Service	E
Analysis Period (min)	15		

c Critical Lane Group

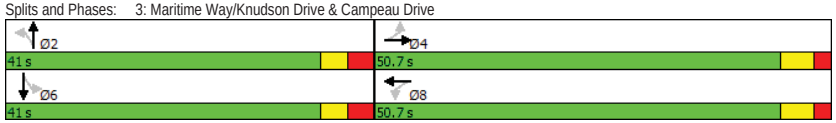
Queues
3: Maritime Way/Knudson Drive & Campeau Drive

Future Total (Sensitivity) AM Peak Hour

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations								
Traffic Volume (vph)	65	615	30	380	15	15	185	0
Future Volume (vph)	65	615	30	380	15	15	185	0
Lane Group Flow (vph)	65	625	30	460	15	115	185	75
Turn Type	Perm	NA	Perm	NA	Perm	NA	Perm	NA
Protected Phases		4		8		2		6
Permitted Phases	4		8		2		6	
Detector Phase	4	4	8	8	2	2	6	6
Switch Phase								
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Minimum Split (s)	50.7	50.7	50.7	50.7	24.0	24.0	24.0	24.0
Total Split (s)	50.7	50.7	50.7	50.7	41.0	41.0	41.0	41.0
Total Split (%)	55.3%	55.3%	55.3%	55.3%	44.7%	44.7%	44.7%	44.7%
Yellow Time (s)	3.7	3.7	3.7	3.7	3.0	3.0	3.0	3.0
All-Red Time (s)	2.0	2.0	2.0	2.0	3.0	3.0	3.0	3.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	5.7	5.7	5.7	5.7	6.0	6.0	6.0	6.0
Lead/Lag								
Lead-Lag Optimize?								
Recall Mode	Min	Min	Min	Min	None	None	None	None
v/c Ratio	0.17	0.71	0.12	0.53	0.04	0.23	0.55	0.12
Control Delay	9.9	16.5	9.8	12.3	16.4	6.9	24.6	0.4
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	9.9	16.5	9.8	12.3	16.4	6.9	24.6	0.4
Queue Length 50th (m)	3.1	41.8	1.4	26.1	1.0	1.0	13.8	0.0
Queue Length 95th (m)	11.4	99.9	6.6	64.5	5.7	12.4	41.7	0.0
Internal Link Dist (m)		436.9		443.4		129.6		89.7
Turn Bay Length (m)	55.0		55.0		45.0		50.0	
Base Capacity (vph)	656	1539	450	1488	859	1082	840	1114
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	0.41	0.07	0.31	0.02	0.11	0.22	0.07

Intersection Summary
Cycle Length: 91.7
Actuated Cycle Length: 53.3
Natural Cycle: 75
Control Type: Actuated-Uncoordinated

Splits and Phases: 3: Maritime Way/Knudson Drive & Campeau Drive



HCM Signalized Intersection Capacity Analysis
3: Maritime Way/Knudson Drive & Campeau Drive

Future Total (Sensitivity) AM Peak Hour

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	65	615	10	30	380	80	15	15	100	185	0	75
Future Volume (vph)	65	615	10	30	380	80	15	15	100	185	0	75
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Total Lost time (s)	5.7	5.7		5.7	5.7		6.0	6.0		6.0	6.0	
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Frpb, ped/bikes	1.00	1.00		1.00	0.99		1.00	0.98		1.00	0.96	
Flpb, ped/bikes	0.98	1.00		1.00	1.00		0.99	1.00		0.99	1.00	
Frt	1.00	1.00		1.00	0.97		1.00	0.87		1.00	0.85	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1680	1789		1707	1736		1686	1528		1699	1476	
Flt Permitted	0.43	1.00		0.29	1.00		0.71	1.00		0.68	1.00	
Satd. Flow (perm)	768	1789		525	1736		1257	1528		1221	1476	
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)	65	615	10	30	380	80	15	15	100	185	0	75
RTOR Reduction (vph)	0	1	0	0	8	0	0	72	0	0	54	0
Lane Group Flow (vph)	65	624	0	30	452	0	15	43	0	185	21	0
Confl. Peds. (#/hr)	30		5	5		30	10		5	5		10
Heavy Vehicles (%)	0%	0%	20%	0%	0%	0%	0%	0%	0%	0%	0%	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)	26.3	26.3		26.3	26.3		14.7	14.7		14.7	14.7	
Effective Green, g (s)	26.3	26.3		26.3	26.3		14.7	14.7		14.7	14.7	
Actuated g/C Ratio	0.50	0.50		0.50	0.50		0.28	0.28		0.28	0.28	
Clearance Time (s)	5.7	5.7		5.7	5.7		6.0	6.0		6.0	6.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	383	892		262	866		350	426		340	411	
v/s Ratio Prot		c0.35			0.26			0.03			0.01	
v/s Ratio Perm	0.08			0.06			0.01			c0.15		
v/c Ratio	0.17	0.70		0.11	0.52		0.04	0.10		0.54	0.05	
Uniform Delay, d1	7.2	10.2		7.0	8.9		13.9	14.1		16.2	13.9	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.2	2.5		0.2	0.6		0.1	0.1		1.8	0.1	
Delay (s)	7.4	12.7		7.2	9.5		13.9	14.2		17.9	13.9	
Level of Service	A	B		A	A		B	B		B	B	
Approach Delay (s)		12.2			9.4			14.2			16.8	
Approach LOS		B			A			B			B	

Intersection Summary			
HCM 2000 Control Delay	12.2	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.64		
Actuated Cycle Length (s)	52.7	Sum of lost time (s)	11.7
Intersection Capacity Utilization	71.0%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

Queues
4: Teron Road & Campeau Drive

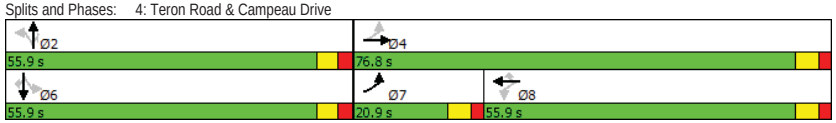
Future Total (Sensitivity) AM Peak Hour

Lane Group	EBL	EBT	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations											
Traffic Volume (vph)	220	625	30	265	500	5	40	65	355	10	130
Future Volume (vph)	220	625	30	265	500	5	40	65	355	10	130
Lane Group Flow (vph)	220	630	30	265	500	0	45	65	355	10	130
Turn Type	pm+pt	NA	Perm	NA	Perm	Perm	NA	Perm	Perm	NA	Perm
Protected Phases	7	4		8			2			6	
Permitted Phases	4		8		8	2		2	6		6
Detector Phase	7	4	8	8	8	2	2	2	6	6	6
Switch Phase											
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Minimum Split (s)	10.9	55.9	55.9	55.9	55.9	26.9	26.9	26.9	26.9	26.9	26.9
Total Split (s)	20.9	76.8	55.9	55.9	55.9	55.9	55.9	55.9	55.9	55.9	55.9
Total Split (%)	15.7%	57.9%	42.1%	42.1%	42.1%	42.1%	42.1%	42.1%	42.1%	42.1%	42.1%
Yellow Time (s)	3.7	3.7	3.7	3.7	3.7	3.3	3.3	3.3	3.3	3.3	3.3
All-Red Time (s)	2.2	2.2	2.2	2.2	2.2	2.6	2.6	2.6	2.6	2.6	2.6
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	5.9	5.9	5.9	5.9	5.9		5.9	5.9	5.9	5.9	5.9
Lead/Lag	Lead		Lag	Lag	Lag						
Lead-Lag Optimize?	Yes		Yes	Yes	Yes						
Recall Mode	None	Max	Max	Max	Max	None	None	None	None	None	None
v/c Ratio	0.38	0.60	0.10	0.34	0.56		0.08	0.13	0.90	0.02	0.24
Control Delay	15.6	20.7	25.9	26.7	5.0		28.1	5.8	65.6	26.8	5.6
Queue Delay	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0
Total Delay	15.6	20.7	25.9	26.7	5.0		28.1	5.8	65.6	26.8	5.6
Queue Length 50th (m)	25.4	97.7	4.5	44.4	0.0		7.9	0.0	84.5	1.7	0.0
Queue Length 95th (m)	47.3	163.6	13.0	77.8	25.7		16.6	8.7	125.6	5.8	13.5
Internal Link Dist (m)		269.3		262.3			58.3			132.3	
Turn Bay Length (m)	65.0		160.0					70.0	85.0		
Base Capacity (vph)	598	1054	313	786	897		729	630	518	744	677
Starvation Cap Reductn	0	0	0	0	0		0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0		0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0		0	0	0	0	0
Reduced v/c Ratio	0.37	0.60	0.10	0.34	0.56		0.06	0.10	0.69	0.01	0.19

Intersection Summary

Cycle Length: 132.7
Actuated Cycle Length: 121.5
Natural Cycle: 95
Control Type: Actuated-Uncoordinated

Splits and Phases: 4: Teron Road & Campeau Drive



HCM Signalized Intersection Capacity Analysis
4: Teron Road & Campeau Drive

Future Total (Sensitivity) AM Peak Hour

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	220	625	5	30	265	500	5	40	65	355	10	130
Future Volume (vph)	220	625	5	30	265	500	5	40	65	355	10	130
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Total Lost time (s)	5.9	5.9		5.9	5.9	5.9		5.9	5.9	5.9	5.9	5.9
Lane Util. Factor	1.00	1.00		1.00	1.00	1.00		1.00	1.00	1.00	1.00	1.00
Frpb, ped/bikes	1.00	1.00		1.00	1.00	0.93		1.00	0.93	1.00	1.00	0.95
Flpb, ped/bikes	0.99	1.00		0.99	1.00	1.00		1.00	1.00	0.96	1.00	1.00
Frt	1.00	1.00		1.00	1.00	0.85		1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00	1.00		0.99	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1688	1797		1701	1800	1417		1784	1426	1640	1800	1456
Flt Permitted	0.48	1.00		0.40	1.00	1.00		0.98	1.00	0.73	1.00	1.00
Satd. Flow (perm)	848	1797		719	1800	1417		1765	1426	1256	1800	1456
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)	220	625	5	30	265	500	5	40	65	355	10	130
RTOR Reduction (vph)	0	0	0	0	0	281	0	0	44	0	0	89
Lane Group Flow (vph)	220	630	0	30	265	219	0	45	21	355	10	41
Confl. Peds. (#/hr)	20		5	5		20	10		15	15		10
Confl. Bikes (#/hr)									5			
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Turn Type	pm+pt	NA		Perm	NA	Perm	Perm	NA	Perm	Perm	NA	Perm
Protected Phases	7	4			8			2			6	
Permitted Phases	4			8		8	2		2	6		6
Actuated Green, G (s)	71.3	71.3		53.2	53.2	53.2		38.4	38.4	38.4	38.4	38.4
Effective Green, g (s)	71.3	71.3		53.2	53.2	53.2		38.4	38.4	38.4	38.4	38.4
Actuated g/C Ratio	0.59	0.59		0.44	0.44	0.44		0.32	0.32	0.32	0.32	0.32
Clearance Time (s)	5.9	5.9		5.9	5.9	5.9		5.9	5.9	5.9	5.9	5.9
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)	581	1054		314	788	620		557	450	396	568	460
v/s Ratio Prot	0.04	c0.35			0.15						0.01	
v/s Ratio Perm	0.18			0.04		0.15		0.03	0.01	c0.28		0.03
v/c Ratio	0.38	0.60		0.10	0.34	0.35		0.08	0.05	0.90	0.02	0.09
Uniform Delay, d1	12.6	16.0		20.0	22.5	22.7		29.2	28.8	39.7	28.6	29.2
Progression Factor	1.00	1.00		1.00	1.00	1.00		1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	0.4	2.5		0.6	1.2	1.6		0.1	0.0	22.0	0.0	0.1
Delay (s)	13.1	18.5		20.6	23.7	24.3		29.2	28.9	61.7	28.6	29.3
Level of Service	B	B		C	C	C		C	C	E	C	C
Approach Delay (s)		17.1			23.9			29.0			52.5	
Approach LOS		B			C			C			D	

Intersection Summary

HCM 2000 Control Delay	27.9	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.74		
Actuated Cycle Length (s)	121.5	Sum of lost time (s)	17.7
Intersection Capacity Utilization	81.4%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

Queues
5: March Road & Campeau Drive/Hwy 417 Off Ramp

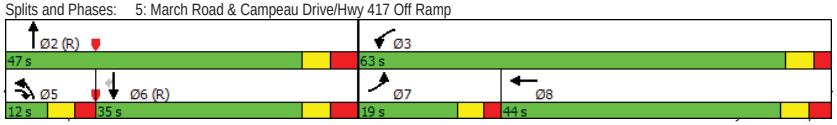
Future Total (Sensitivity) AM Peak Hour

Lane Group	EBL	EBR	WBL	WBT	NBL	NBT	SBT	SBR
Lane Configurations								
Traffic Volume (vph)	165	880	390	330	410	1155	845	70
Future Volume (vph)	165	880	390	330	410	1155	845	70
Lane Group Flow (vph)	165	880	390	330	410	1155	845	70
Turn Type	Prot	Over	Prot	NA	Prot	NA	NA	Perm
Protected Phases	7	5	3	8	5	2	6	
Permitted Phases								6
Detector Phase	7	5	3	8	5	2	6	6
Switch Phase								
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Minimum Split (s)	11.0	11.5	24.2	43.8	11.5	30.5	30.5	30.5
Total Split (s)	19.0	12.0	63.0	44.0	12.0	47.0	35.0	35.0
Total Split (%)	17.3%	10.9%	57.3%	40.0%	10.9%	42.7%	31.8%	31.8%
Yellow Time (s)	3.7	3.7	3.7	3.7	3.7	3.7	3.7	3.7
All-Red Time (s)	2.3	2.8	2.5	3.1	2.8	3.8	3.8	3.8
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	6.0	6.5	6.2	6.8	6.5	7.5	7.5	7.5
Lead/Lag	Lead	Lead		Lag	Lead		Lag	Lag
Lead-Lag Optimize?	Yes	Yes		Yes	Yes		Yes	Yes
Recall Mode	None	None	None	None	None	C-Min	C-Min	C-Min
v/c Ratio	0.79	0.91	0.36	0.66	0.44	0.62	0.79	0.15
Control Delay	72.9	54.8	28.6	50.8	36.8	19.4	46.0	0.7
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	72.9	54.8	28.6	50.8	36.8	19.4	46.0	0.7
Queue Length 50th (m)	35.9	~101.0	33.2	37.6	41.1	93.6	65.7	0.0
Queue Length 95th (m)	#73.5	#159.8	45.0	50.8	59.8	121.1	78.9	0.0
Internal Link Dist (m)				269.9		155.6	164.4	
Turn Bay Length (m)	60.0	190.0	150.0		150.0			150.0
Base Capacity (vph)	215	967	1712	1156	938	1871	1228	496
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	0.77	0.91	0.23	0.29	0.44	0.62	0.69	0.14

Intersection Summary

Cycle Length: 110
Actuated Cycle Length: 110
Offset: 97 (88%), Referenced to phase 2:NBT and 6:SBT, Start of Green
Natural Cycle: 130
Control Type: Actuated-Coordinated
~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 5: March Road & Campeau Drive/Hwy 417 Off Ramp



HCM Signalized Intersection Capacity Analysis
5: March Road & Campeau Drive/Hwy 417 Off Ramp

Future Total (Sensitivity) AM Peak Hour

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	165	0	880	390	330	0	410	1155	0	0	845	70
Future Volume (vph)	165	0	880	390	330	0	410	1155	0	0	845	70
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Total Lost time (s)	6.0		6.5	6.2	6.8		6.5	7.5			7.5	7.5
Lane Util. Factor	1.00		*1.00	0.97	0.95		0.97	0.95			0.91	1.00
Frpb, ped/bikes	1.00		1.00	1.00	1.00		1.00	1.00			1.00	0.98
Flpb, ped/bikes	1.00		1.00	1.00	1.00		1.00	1.00			1.00	1.00
Frt	1.00		1.00	1.00	1.00		1.00	1.00			1.00	0.85
Flt Protected	0.95		1.00	0.95	1.00		1.00	1.00			1.00	1.00
Satd. Flow (prot)	1710		3600	3317	3420		3492	3420			4914	1501
Flt Permitted	0.95		1.00	0.95	1.00		1.00	1.00			1.00	1.00
Satd. Flow (perm)	1710		3600	3317	3420		3492	3420			4914	1501
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)	165	0	880	390	330	0	410	1155	0	0	845	70
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	0	0	55
Lane Group Flow (vph)	165	0	880	390	330	0	410	1155	0	0	845	15
Confl. Peds. (#/hr)							5					5
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Turn Type	Prot		Over	Prot	NA		Prot	NA			NA	Perm
Protected Phases	7		5	3	8		5	2			6	
Permitted Phases												6
Actuated Green, G (s)	13.5		29.6	36.1	16.0		29.6	60.2			24.1	24.1
Effective Green, g (s)	13.5		29.6	36.1	16.0		29.6	60.2			24.1	24.1
Actuated g/C Ratio	0.12		0.27	0.33	0.15		0.27	0.55			0.22	0.22
Clearance Time (s)	6.0		6.5	6.2	6.8		6.5	7.5			7.5	7.5
Vehicle Extension (s)	3.0		3.0	3.0	3.0		3.0	3.0			3.0	3.0
Lane Grp Cap (vph)	209		968	1088	497		939	1871			1076	328
v/s Ratio Prot	c0.10		c0.24	0.12	c0.10		0.12	0.34			c0.17	
v/s Ratio Perm												0.01
v/c Ratio	0.79		0.91	0.36	0.66		0.44	0.62			0.79	0.05
Uniform Delay, d1	46.9		38.9	28.1	44.5		33.3	17.0			40.5	33.9
Progression Factor	1.00		1.00	1.00	1.00		1.00	1.00			1.00	1.00
Incremental Delay, d2	17.7		12.1	0.2	3.3		0.3	1.5			5.8	0.3
Delay (s)	64.6		51.0	28.3	47.8		33.6	18.6			46.3	34.2
Level of Service	E		D	C	D		C	B			D	C
Approach Delay (s)		53.1			37.3			22.5			45.4	
Approach LOS		D			D			C			D	

Intersection Summary

HCM 2000 Control Delay	37.5	HCM 2000 Level of Service		D	
HCM 2000 Volume to Capacity ratio	0.81				
Actuated Cycle Length (s)	110.0	Sum of lost time (s)		26.8	
Intersection Capacity Utilization	80.2%	ICU Level of Service		D	
Analysis Period (min)	15				

c Critical Lane Group

HCM Unsignalized Intersection Capacity Analysis
6: Kanata Avenue & Knudson Drive

Future Total (Sensitivity) AM Peak Hour



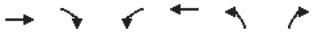
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Sign Control	Stop		Stop			Stop
Traffic Volume (vph)	135	130	215	180	150	280
Future Volume (vph)	135	130	215	180	150	280
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	135	130	215	180	150	280

Direction, Lane #	WB 1	NB 1	SB 1	SB 2
Volume Total (vph)	265	395	150	280
Volume Left (vph)	135	0	150	0
Volume Right (vph)	130	180	0	0
Hadj (s)	-0.19	-0.27	0.50	0.00
Departure Headway (s)	5.7	5.1	6.3	5.8
Degree Utilization, x	0.42	0.56	0.26	0.45
Capacity (veh/h)	587	669	550	600
Control Delay (s)	12.7	14.6	10.3	12.3
Approach Delay (s)	12.7	14.6	11.6	
Approach LOS	B	B	B	

Intersection Summary			
Delay		12.9	
Level of Service		B	
Intersection Capacity Utilization	58.6%	ICU Level of Service	B
Analysis Period (min)		15	

HCM Unsignalized Intersection Capacity Analysis
7: Shaughnessy Crescent (East) & Knudson Drive

Future Total (Sensitivity) AM Peak Hour



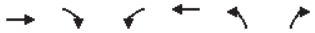
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	310	10	5	170	15	20
Future Volume (Veh/h)	310	10	5	170	15	20
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	310	10	5	170	15	20
Pedestrians					10	
Lane Width (m)					3.6	
Walking Speed (m/s)					1.2	
Percent Blockage					1	
Right turn flare (veh)						
Median type	None			None		
Median storage veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume			330		505	325
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			330		505	325
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			100		97	97
cM capacity (veh/h)			1230		524	715

Direction, Lane #	EB 1	WB 1	NB 1
Volume Total	320	175	35
Volume Left	0	5	15
Volume Right	10	0	20
cSH	1700	1230	618
Volume to Capacity	0.19	0.00	0.06
Queue Length 95th (m)	0.0	0.1	1.4
Control Delay (s)	0.0	0.3	11.2
Lane LOS		A	B
Approach Delay (s)	0.0	0.3	11.2
Approach LOS			B

Intersection Summary			
Average Delay		0.8	
Intersection Capacity Utilization	27.9%	ICU Level of Service	A
Analysis Period (min)		15	

HCM Unsignalized Intersection Capacity Analysis
8: Shaughnessy Crescent (West) & Knudson Drive

Future Total (Sensitivity) AM Peak Hour



Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	310	10	5	180	20	10
Future Volume (Veh/h)	310	10	5	180	20	10
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	310	10	5	180	20	10
Pedestrians				5	20	
Lane Width (m)				3.6	3.6	
Walking Speed (m/s)				1.2	1.2	
Percent Blockage				0	2	
Right turn flare (veh)						
Median type	None			None		
Median storage veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume			340		525	340
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			340		525	340
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			100		96	99
cM capacity (veh/h)			1210		506	692

Direction, Lane #	EB 1	WB 1	NB 1
Volume Total	320	185	30
Volume Left	0	5	20
Volume Right	10	0	10
cSH	1700	1210	556
Volume to Capacity	0.19	0.00	0.05
Queue Length 95th (m)	0.0	0.1	1.4
Control Delay (s)	0.0	0.3	11.8
Lane LOS		A	B
Approach Delay (s)	0.0	0.3	11.8
Approach LOS			B

Intersection Summary				
Average Delay		0.8		
Intersection Capacity Utilization		29.5%	ICU Level of Service	A
Analysis Period (min)		15		

HCM Unsignalized Intersection Capacity Analysis
9: Knudson Drive & Sherk Crescent (North)

Future Total (Sensitivity) AM Peak Hour



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	5	15	5	140	205	5
Future Volume (Veh/h)	5	15	5	140	205	5
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	5	15	5	140	205	5
Pedestrians	10					
Lane Width (m)	3.6					
Walking Speed (m/s)	1.2					
Percent Blockage	1					
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	368	218	220			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	368	218	220			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	99	98	100			
cM capacity (veh/h)	629	820	1350			

Direction, Lane #	EB 1	NB 1	SB 1
Volume Total	20	145	210
Volume Left	5	5	0
Volume Right	15	0	5
cSH	762	1350	1700
Volume to Capacity	0.03	0.00	0.12
Queue Length 95th (m)	0.6	0.1	0.0
Control Delay (s)	9.8	0.3	0.0
Lane LOS	A	A	
Approach Delay (s)	9.8	0.3	0.0
Approach LOS	A		

Intersection Summary				
Average Delay		0.6		
Intersection Capacity Utilization		22.2%	ICU Level of Service	A
Analysis Period (min)		15		

HCM Unsignalized Intersection Capacity Analysis
10: Knudson Drive & Sherk Crescent (South)

Future Total (Sensitivity) AM Peak Hour



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	10	35	15	135	220	5
Future Volume (Veh/h)	10	35	15	135	220	5
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	10	35	15	135	220	5
Pedestrians	10					
Lane Width (m)	3.6					
Walking Speed (m/s)	1.2					
Percent Blockage	1					
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	398	232	235			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	398	232	235			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	98	96	99			
cM capacity (veh/h)	600	805	1333			

Direction, Lane #	EB 1	NB 1	SB 1
Volume Total	45	150	225
Volume Left	10	15	0
Volume Right	35	0	5
cSH	748	1333	1700
Volume to Capacity	0.06	0.01	0.13
Queue Length 95th (m)	1.5	0.3	0.0
Control Delay (s)	10.1	0.9	0.0
Lane LOS	B	A	
Approach Delay (s)	10.1	0.9	0.0
Approach LOS	B		

Intersection Summary				
Average Delay		1.4		
Intersection Capacity Utilization		30.7%	ICU Level of Service	A
Analysis Period (min)		15		

HCM Unsignalized Intersection Capacity Analysis
11: Knudson Drive & Weslock Way

Future Total (Sensitivity) AM Peak Hour



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Sign Control		Stop	Stop		Stop	
Traffic Volume (vph)	295	75	40	110	120	130
Future Volume (vph)	295	75	40	110	120	130
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	295	75	40	110	120	130

Direction, Lane #	EB 1	WB 1	SB 1
Volume Total (vph)	370	150	250
Volume Left (vph)	295	0	120
Volume Right (vph)	0	110	130
Hadj (s)	0.16	-0.44	-0.22
Departure Headway (s)	4.9	4.6	4.9
Degree Utilization, x	0.50	0.19	0.34
Capacity (veh/h)	702	724	667
Control Delay (s)	12.8	8.7	10.5
Approach Delay (s)	12.8	8.7	10.5
Approach LOS	B	A	B

Intersection Summary				
Delay		11.3		
Level of Service		B		
Intersection Capacity Utilization		56.7%	ICU Level of Service	B
Analysis Period (min)		15		

HCM Unsignalized Intersection Capacity Analysis
12: Weslock Way & Beaverbrook Road

Future Total (Sensitivity) AM Peak Hour



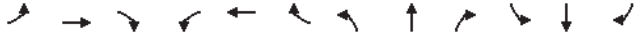
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Sign Control	Stop		Stop			Stop
Traffic Volume (vph)	195	90	25	380	220	55
Future Volume (vph)	195	90	25	380	220	55
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	195	90	25	380	220	55

Direction, Lane #	WB 1	NB 1	SB 1
Volume Total (vph)	285	405	275
Volume Left (vph)	195	0	220
Volume Right (vph)	90	380	0
Hadj (s)	-0.05	-0.56	0.16
Departure Headway (s)	5.5	4.6	5.4
Degree Utilization, x	0.44	0.52	0.42
Capacity (veh/h)	607	740	628
Control Delay (s)	12.7	12.4	12.2
Approach Delay (s)	12.7	12.4	12.2
Approach LOS	B	B	B

Intersection Summary			
Delay		12.4	
Level of Service		B	
Intersection Capacity Utilization		69.5%	ICU Level of Service C
Analysis Period (min)		15	

HCM Unsignalized Intersection Capacity Analysis
13: Omni Health Care/Street No. 11 & Campeau Drive

Future Total (Sensitivity) AM Peak Hour



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	10	530	15	10	400	30	5	0	5	65	0	20
Future Volume (Veh/h)	10	530	15	10	400	30	5	0	5	65	0	20
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	10	530	15	10	400	30	5	0	5	65	0	20
Pedestrians								5				
Lane Width (m)								3.6				
Walking Speed (m/s)								1.2				
Percent Blockage								0				
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	430			550			1018	1012	542	998	1005	415
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	430			550			1018	1012	542	998	1005	415
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	99			99			98	100	99	70	100	97
cM capacity (veh/h)	1140			1026			206	236	542	219	238	642

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	555	440	10	85
Volume Left	10	10	5	65
Volume Right	15	30	5	20
cSH	1140	1026	299	259
Volume to Capacity	0.01	0.01	0.03	0.33
Queue Length 95th (m)	0.2	0.2	0.8	11.0
Control Delay (s)	0.3	0.3	17.5	25.6
Lane LOS	A	A	C	D
Approach Delay (s)	0.3	0.3	17.5	25.6
Approach LOS			C	D

Intersection Summary			
Average Delay		2.4	
Intersection Capacity Utilization		49.9%	ICU Level of Service A
Analysis Period (min)		15	

Queues
14: Hawkstone Gate & Campeau Drive

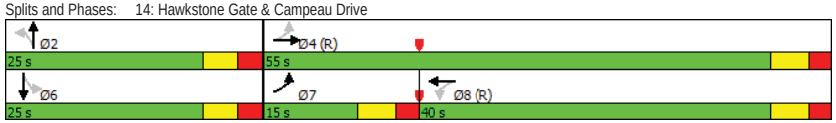
Future Total (Sensitivity) AM Peak Hour

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations								
Traffic Volume (vph)	160	670	10	320	5	5	135	0
Future Volume (vph)	160	670	10	320	5	5	135	0
Lane Group Flow (vph)	160	680	10	410	5	35	0	240
Turn Type	pm+pt	NA	Perm	NA	Perm	NA	Perm	NA
Protected Phases	7	4		8		2		6
Permitted Phases	4		8		2		6	
Detector Phase	7	4	8	8	2	2	6	6
Switch Phase								
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Minimum Split (s)	11.0	32.0	32.0	32.0	23.9	23.9	23.9	23.9
Total Split (s)	15.0	55.0	40.0	40.0	25.0	25.0	25.0	25.0
Total Split (%)	18.8%	68.8%	50.0%	50.0%	31.3%	31.3%	31.3%	31.3%
Yellow Time (s)	3.7	3.7	3.7	3.7	3.3	3.3	3.3	3.3
All-Red Time (s)	2.3	2.3	2.3	2.3	2.6	2.6	2.6	2.6
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0		0.0
Total Lost Time (s)	6.0	6.0	6.0	6.0	5.9	5.9		5.9
Lead/Lag	Lead		Lag	Lag				
Lead-Lag Optimize?	Yes		Yes	Yes				
Recall Mode	None	C-Min	C-Min	C-Min	None	None	None	None
v/c Ratio	0.28	0.56	0.03	0.47	0.03	0.13		0.79
Control Delay	7.1	10.2	14.1	16.3	23.6	11.5		33.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0		0.0
Total Delay	7.1	10.2	14.1	16.3	23.6	11.5		33.2
Queue Length 50th (m)	7.9	48.5	0.8	38.2	0.7	0.7		17.6
Queue Length 95th (m)	19.5	102.7	4.1	76.7	3.3	7.3		39.8
Internal Link Dist (m)		214.6		269.3		89.1		74.7
Turn Bay Length (m)	80.0		120.0					
Base Capacity (vph)	587	1229	373	892	229	370		379
Starvation Cap Reductn	0	0	0	0	0	0		0
Spillback Cap Reductn	0	0	0	0	0	0		0
Storage Cap Reductn	0	0	0	0	0	0		0
Reduced v/c Ratio	0.27	0.55	0.03	0.46	0.02	0.09		0.63

Intersection Summary

Cycle Length: 80
Actuated Cycle Length: 80
Offset: 0 (0%), Referenced to phase 4:EBTL and 8:WBTL, Start of Green
Natural Cycle: 70
Control Type: Actuated-Coordinated

Splits and Phases: 14: Hawkstone Gate & Campeau Drive



HCM Signalized Intersection Capacity Analysis
14: Hawkstone Gate & Campeau Drive

Future Total (Sensitivity) AM Peak Hour

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	160	670	10	10	320	90	5	5	30	135	0	105
Future Volume (vph)	160	670	10	10	320	90	5	5	30	135	0	105
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Total Lost time (s)	6.0	6.0		6.0	6.0		5.9	5.9			5.9	
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	1.00			1.00	
Frpb, ped/bikes	1.00	1.00		1.00	0.99		1.00	0.91			0.90	
Flpb, ped/bikes	1.00	1.00		1.00	1.00		0.88	1.00			0.95	
Frt	1.00	1.00		1.00	0.97		1.00	0.87			0.94	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00			0.97	
Satd. Flow (prot)	1706	1796		1710	1727		1513	1425			1413	
Flt Permitted	0.39	1.00		0.41	1.00		0.59	1.00			0.81	
Satd. Flow (perm)	701	1796		732	1727		941	1425			1171	
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)	160	670	10	10	320	90	5	5	30	135	0	105
RTOR Reduction (vph)	0	1	0	0	11	0	0	25	0	0	102	0
Lane Group Flow (vph)	160	679	0	10	399	0	5	10	0	0	138	0
Confl. Peds. (#/hr)	10					10	95		40	40		95
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Turn Type	pm+pt	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases	7	4			8			2			6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)	54.3	54.3		40.4	40.4		13.8	13.8			13.8	
Effective Green, g (s)	54.3	54.3		40.4	40.4		13.8	13.8			13.8	
Actuated g/C Ratio	0.68	0.68		0.50	0.50		0.17	0.17			0.17	
Clearance Time (s)	6.0	6.0		6.0	6.0		5.9	5.9			5.9	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0			3.0	
Lane Grp Cap (vph)	575	1219		369	872		162	245			201	
v/s Ratio Prot	0.03	c0.38			0.23			0.01				
v/s Ratio Perm	0.16			0.01			0.01				c0.12	
v/c Ratio	0.28	0.56		0.03	0.46		0.03	0.04			0.69	
Uniform Delay, d1	5.6	6.6		9.9	12.7		27.5	27.6			31.1	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00			1.00	
Incremental Delay, d2	0.3	1.8		0.1	1.7		0.1	0.1			9.4	
Delay (s)	5.8	8.5		10.1	14.5		27.6	27.7			40.5	
Level of Service	A	A		B	B		C	C			D	
Approach Delay (s)		8.0			14.4			27.7			40.5	
Approach LOS		A			B			C			D	

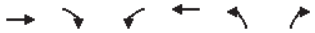
Intersection Summary

HCM 2000 Control Delay	15.3	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.64		
Actuated Cycle Length (s)	80.0	Sum of lost time (s)	17.9
Intersection Capacity Utilization	80.8%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

HCM Unsignalized Intersection Capacity Analysis
15: Park Ridge Place (West) & Campeau Drive

Future Total (Sensitivity) AM Peak Hour



Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	390	10	0	385	10	0
Future Volume (Veh/h)	390	10	0	385	10	0
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	390	10	0	385	10	0
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage veh)						
Upstream signal (m)	125					
pX, platoon unblocked			0.85		0.85	0.85
vC, conflicting volume			400		780	395
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			208		654	202
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			100		97	100
cM capacity (veh/h)			1171		370	718

Direction, Lane #	EB 1	WB 1	NB 1
Volume Total	400	385	10
Volume Left	0	0	10
Volume Right	10	0	0
cSH	1700	1171	370
Volume to Capacity	0.24	0.00	0.03
Queue Length 95th (m)	0.0	0.0	0.7
Control Delay (s)	0.0	0.0	15.0
Lane LOS			C
Approach Delay (s)	0.0	0.0	15.0
Approach LOS			C

Intersection Summary				
Average Delay	0.2			
Intersection Capacity Utilization	32.3%	ICU Level of Service	A	
Analysis Period (min)	15			

HCM Unsignalized Intersection Capacity Analysis
16: Coulson Court & Robson Court

Future Total (Sensitivity) AM Peak Hour



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	10	15	5	0	25	5	10	5	0	0	0	0
Future Volume (Veh/h)	10	15	5	0	25	5	10	5	0	0	0	0
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	10	15	5	0	25	5	10	5	0	0	0	0
Pedestrians		5									5	
Lane Width (m)		3.6									3.6	
Walking Speed (m/s)		1.2									1.2	
Percent Blockage		0									0	
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	35			20			70	72	18	72	72	38
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	35			20			70	72	18	72	72	38
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	99			100			99	99	100	100	100	100
cM capacity (veh/h)	1583			1609			916	813	1067	908	813	1032

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	30	30	15	0
Volume Left	10	0	10	0
Volume Right	5	5	0	0
cSH	1583	1609	879	1700
Volume to Capacity	0.01	0.00	0.02	0.00
Queue Length 95th (m)	0.2	0.0	0.4	0.0
Control Delay (s)	2.5	0.0	9.2	0.0
Lane LOS	A		A	A
Approach Delay (s)	2.5	0.0	9.2	0.0
Approach LOS			A	A

Intersection Summary				
Average Delay	2.8			
Intersection Capacity Utilization	19.9%	ICU Level of Service	A	
Analysis Period (min)	15			

HCM Unsignalized Intersection Capacity Analysis
17: Robson Court & Evanshen Crescent

Future Total (Sensitivity) AM Peak Hour



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	5	10	25	0	0	5
Future Volume (Veh/h)	5	10	25	0	0	5
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	5	10	25	0	0	5
Pedestrians					5	
Lane Width (m)					3.6	
Walking Speed (m/s)					1.2	
Percent Blockage					0	
Right turn flare (veh)						
Median type		None	None			
Median storage veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	30				50	30
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	30				50	30
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	100				100	100
cM capacity (veh/h)	1589				957	1046

Direction, Lane #	EB 1	WB 1	SB 1
Volume Total	15	25	5
Volume Left	5	0	0
Volume Right	0	0	5
cSH	1589	1700	1046
Volume to Capacity	0.00	0.01	0.00
Queue Length 95th (m)	0.1	0.0	0.1
Control Delay (s)	2.4	0.0	8.5
Lane LOS	A		A
Approach Delay (s)	2.4	0.0	8.5
Approach LOS			A

Intersection Summary				
Average Delay		1.8		
Intersection Capacity Utilization	15.2%	ICU Level of Service	A	
Analysis Period (min)	15			

HCM Unsignalized Intersection Capacity Analysis
18: Kanata Avenue & Park Ridge Place

Future Total (Sensitivity) AM Peak Hour



Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	10	10	340	5	0	615
Future Volume (Veh/h)	10	10	340	5	0	615
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	10	10	340	5	0	615
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			None			None
Median storage veh)						
Upstream signal (m)						133
pX, platoon unblocked	0.72					
vC, conflicting volume	958	342			345	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	745	342			345	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	96	99			100	
cM capacity (veh/h)	276	705			1225	

Direction, Lane #	WB 1	NB 1	SB 1
Volume Total	20	345	615
Volume Left	10	0	0
Volume Right	10	5	0
cSH	397	1700	1225
Volume to Capacity	0.05	0.20	0.00
Queue Length 95th (m)	1.3	0.0	0.0
Control Delay (s)	14.6	0.0	0.0
Lane LOS	B		
Approach Delay (s)	14.6	0.0	0.0
Approach LOS	B		

Intersection Summary				
Average Delay		0.3		
Intersection Capacity Utilization	44.2%	ICU Level of Service	A	
Analysis Period (min)	15			

Queues
19: Herlihey Way & Campeau Drive

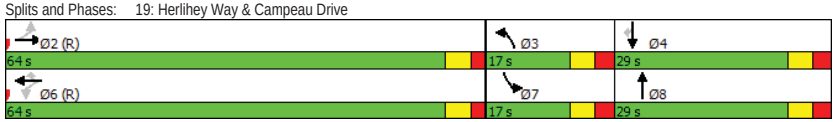
Future Total (Sensitivity) AM Peak Hour

Lane Group	EBL	EBT	WBL	WBT	WBR	NBL	NBT	SBL	SBT	SBR
Lane Configurations										
Traffic Volume (vph)	15	315	65	480	35	10	5	20	5	20
Future Volume (vph)	15	315	65	480	35	10	5	20	5	20
Lane Group Flow (vph)	15	355	65	480	35	10	45	20	5	20
Turn Type	Perm	NA	Perm	NA	Perm	Prot	NA	Prot	NA	Perm
Protected Phases		2		6		3	8	7	4	
Permitted Phases	2		6		6					4
Detector Phase	2	2	6	6	6	3	8	7	4	4
Switch Phase										
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Minimum Split (s)	34.5	34.5	34.5	34.5	34.5	10.9	28.9	10.9	28.9	28.9
Total Split (s)	64.0	64.0	64.0	64.0	64.0	17.0	29.0	17.0	29.0	29.0
Total Split (%)	58.2%	58.2%	58.2%	58.2%	58.2%	15.5%	26.4%	15.5%	26.4%	26.4%
Yellow Time (s)	3.3	3.3	3.3	3.3	3.3	3.3	3.3	3.3	3.3	3.3
All-Red Time (s)	2.2	2.2	2.2	2.2	2.2	2.6	2.6	2.6	2.6	2.6
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	5.5	5.5	5.5	5.5	5.5	5.9	5.9	5.9	5.9	5.9
Lead/Lag						Lead	Lag	Lead	Lag	Lag
Lead-Lag Optimize?						Yes	Yes	Yes	Yes	Yes
Recall Mode	C-Min	C-Min	C-Min	C-Min	C-Min	None	None	None	None	None
v/c Ratio	0.03	0.26	0.09	0.35	0.03	0.10	0.28	0.20	0.02	0.08
Control Delay	8.4	7.9	7.3	7.6	0.5	51.1	19.0	53.1	36.6	0.7
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	8.4	7.9	7.3	7.6	0.5	51.1	19.0	53.1	36.6	0.7
Queue Length 50th (m)	0.3	6.0	4.5	39.7	0.2	2.2	1.1	4.4	1.1	0.0
Queue Length 95th (m)	m6.2	85.9	m9.9	60.1	m0.1	7.9	10.7	12.3	4.1	0.0
Internal Link Dist (m)		148.2		217.6			87.8		129.5	
Turn Bay Length (m)	40.0		85.0		75.0			50.0		30.0
Base Capacity (vph)	568	1382	760	1379	1190	172	341	155	383	384
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.03	0.26	0.09	0.35	0.03	0.06	0.13	0.13	0.01	0.05

Intersection Summary

Cycle Length: 110
Actuated Cycle Length: 110
Offset: 75 (68%), Referenced to phase 2:EBTL and 6:WBTL, Start of Green
Natural Cycle: 75
Control Type: Actuated-Coordinated
m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 19: Herlihey Way & Campeau Drive



HCM Signalized Intersection Capacity Analysis
19: Herlihey Way & Campeau Drive

Future Total (Sensitivity) AM Peak Hour

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	15	315	40	65	480	35	10	5	40	20	5	20
Future Volume (vph)	15	315	40	65	480	35	10	5	40	20	5	20
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Total Lost time (s)	5.5	5.5		5.5	5.5	5.5	5.9	5.9		5.9	5.9	5.9
Lane Util. Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00
Frpb, ped/bikes	1.00	1.00		1.00	1.00	1.00	1.00	0.96		1.00	1.00	0.98
Flpb, ped/bikes	1.00	1.00		1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00
Frt	1.00	0.98		1.00	1.00	0.85	1.00	0.87		1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	1500	1748		1710	1748	1485	1710	1474		1541	1800	1501
Flt Permitted	0.46	1.00		0.54	1.00	1.00	0.95	1.00		0.95	1.00	1.00
Satd. Flow (perm)	719	1748		964	1748	1485	1710	1474		1541	1800	1501
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)	15	315	40	65	480	35	10	5	40	20	5	20
RTOR Reduction (vph)	0	2	0	0	0	10	0	37	0	0	0	18
Lane Group Flow (vph)	15	353	0	65	480	25	10	8	0	20	5	2
Confl. Peds. (#/hr)							5		10	10		5
Heavy Vehicles (%)	14%	1%	3%	0%	3%	3%	0%	0%	2%	11%	0%	0%
Turn Type	Perm	NA		Perm	NA	Perm	Prot	NA		Prot	NA	Perm
Protected Phases		2			6		3	8		7	4	
Permitted Phases	2			6		6						4
Actuated Green, G (s)	79.8	79.8		79.8	79.8	79.8	1.5	9.5		3.4	11.4	11.4
Effective Green, g (s)	79.8	79.8		79.8	79.8	79.8	1.5	9.5		3.4	11.4	11.4
Actuated g/C Ratio	0.73	0.73		0.73	0.73	0.73	0.01	0.09		0.03	0.10	0.10
Clearance Time (s)	5.5	5.5		5.5	5.5	5.5	5.9	5.9		5.9	5.9	5.9
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)	521	1268		699	1268	1077	23	127		47	186	155
v/s Ratio Prot		0.20			c0.27		0.01	c0.01		c0.01	0.00	
v/s Ratio Perm	0.02			0.07		0.02						0.00
v/c Ratio	0.03	0.28		0.09	0.38	0.02	0.43	0.07		0.43	0.03	0.01
Uniform Delay, d1	4.2	5.2		4.4	5.7	4.2	53.8	46.2		52.3	44.3	44.3
Progression Factor	1.10	1.21		1.05	1.02	1.00	1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	0.1	0.5		0.2	0.8	0.0	12.6	0.2		6.1	0.1	0.0
Delay (s)	4.7	6.8		4.9	6.6	4.3	66.4	46.4		58.4	44.4	44.3
Level of Service	A	A		A	A	A	E	D		E	D	D
Approach Delay (s)		6.7			6.3			50.0			50.6	
Approach LOS		A			A			D			D	

Intersection Summary

HCM 2000 Control Delay	10.6	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.35		
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	17.3
Intersection Capacity Utilization	55.5%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group

HCM Unsignalized Intersection Capacity Analysis
20: Campeau Drive & Golf Course Access

Future Total (Sensitivity) AM Peak Hour



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	0	390	385	0	0	0
Future Volume (Veh/h)	0	390	385	0	0	0
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	0	390	385	0	0	0
Pedestrians					15	
Lane Width (m)					3.6	
Walking Speed (m/s)					1.2	
Percent Blockage					1	
Right turn flare (veh)						
Median type		None	None			
Median storage veh)						
Upstream signal (m)		232				
pX, platoon unblocked					0.89	
vC, conflicting volume	400				790	400
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	400				701	400
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	100				100	100
cM capacity (veh/h)	1155				358	646

Direction, Lane #	EB 1	WB 1	SB 1
Volume Total	390	385	0
Volume Left	0	0	0
Volume Right	0	0	0
cSH	1155	1700	1700
Volume to Capacity	0.00	0.23	0.00
Queue Length 95th (m)	0.0	0.0	0.0
Control Delay (s)	0.0	0.0	0.0
Lane LOS			A
Approach Delay (s)	0.0	0.0	0.0
Approach LOS			A

Intersection Summary				
Average Delay		0.0		
Intersection Capacity Utilization		25.0%	ICU Level of Service	A
Analysis Period (min)		15		

HCM Unsignalized Intersection Capacity Analysis
21: Park Ridge Place (East)/Street No. 1 & Campeau Drive

Future Total (Sensitivity) AM Peak Hour



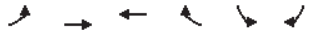
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	10	380	0	0	385	30	0	0	5	110	0	0
Future Volume (Veh/h)	10	380	0	0	385	30	0	0	5	110	0	0
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	10	380	0	0	385	30	0	0	5	110	0	0
Pedestrians								5				
Lane Width (m)								3.6				
Walking Speed (m/s)								1.2				
Percent Blockage								0				
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (m)		269										
pX, platoon unblocked				0.90			0.90	0.90	0.90	0.90	0.90	
vC, conflicting volume	415			385			805	820	385	805	805	400
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	415			265			730	747	265	730	730	400
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	99			100			100	100	99	64	100	100
cM capacity (veh/h)	1155			1178			303	307	700	302	313	654

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	390	415	5	110
Volume Left	10	0	0	110
Volume Right	0	30	5	0
cSH	1155	1178	700	302
Volume to Capacity	0.01	0.00	0.01	0.36
Queue Length 95th (m)	0.2	0.0	0.2	12.9
Control Delay (s)	0.3	0.0	10.2	23.6
Lane LOS	A		B	C
Approach Delay (s)	0.3	0.0	10.2	23.6
Approach LOS			B	C

Intersection Summary				
Average Delay		3.0		
Intersection Capacity Utilization		49.4%	ICU Level of Service	A
Analysis Period (min)		15		

HCM Unsignalized Intersection Capacity Analysis
22: Campeau Drive & Street No. 7

Future Total (Sensitivity) AM Peak Hour



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	10	485	395	30	65	20
Future Volume (Veh/h)	10	485	395	30	65	20
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	10	485	395	30	65	20
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage veh)						
Upstream signal (m)		400				
pX, platoon unblocked					0.96	
vC, conflicting volume	425				915	410
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	425				893	410
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	99				78	97
cM capacity (veh/h)	1145				301	646

Direction, Lane #	EB 1	WB 1	SB 1
Volume Total	495	425	85
Volume Left	10	0	65
Volume Right	0	30	20
cSH	1145	1700	344
Volume to Capacity	0.01	0.25	0.25
Queue Length 95th (m)	0.2	0.0	7.7
Control Delay (s)	0.3	0.0	18.9
Lane LOS	A		C
Approach Delay (s)	0.3	0.0	18.9
Approach LOS			C

Intersection Summary				
Average Delay	1.7			
Intersection Capacity Utilization	47.2%	ICU Level of Service		A
Analysis Period (min)	15			

HCM Unsignalized Intersection Capacity Analysis
23: Street No. 1/Street No. 16 & Knudson Drive

Future Total (Sensitivity) AM Peak Hour



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	20	295	30	10	190	0	20	0	20	5	0	45
Future Volume (Veh/h)	20	295	30	10	190	0	20	0	20	5	0	45
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	20	295	30	10	190	0	20	0	20	5	0	45
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	190			325			605	560	310	580	575	190
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	190			325			605	560	310	580	575	190
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	99			99			95	100	97	99	100	95
cM capacity (veh/h)	1396			1246			384	430	735	410	422	857

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	345	200	40	50
Volume Left	20	10	20	5
Volume Right	30	0	20	45
cSH	1396	1246	505	773
Volume to Capacity	0.01	0.01	0.08	0.06
Queue Length 95th (m)	0.3	0.2	2.1	1.7
Control Delay (s)	0.6	0.5	12.7	10.0
Lane LOS	A	A	B	A
Approach Delay (s)	0.6	0.5	12.7	10.0
Approach LOS			B	A

Intersection Summary				
Average Delay	2.0			
Intersection Capacity Utilization	40.2%	ICU Level of Service		A
Analysis Period (min)	15			

HCM Unsignalized Intersection Capacity Analysis
24: Weslock Way & Street No. 16

Future Total (Sensitivity) AM Peak Hour



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	0	20	10	105	255	0
Future Volume (Veh/h)	0	20	10	105	255	0
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	0	20	10	105	255	0
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	380	255	255			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	380	255	255			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	100	97	99			
cM capacity (veh/h)	621	789	1322			

Direction, Lane #	EB 1	NB 1	SB 1
Volume Total	20	115	255
Volume Left	0	10	0
Volume Right	20	0	0
cSH	789	1322	1700
Volume to Capacity	0.03	0.01	0.15
Queue Length 95th (m)	0.6	0.2	0.0
Control Delay (s)	9.7	0.7	0.0
Lane LOS	A	A	
Approach Delay (s)	9.7	0.7	0.0
Approach LOS	A		

Intersection Summary			
Average Delay		0.7	
Intersection Capacity Utilization		24.6%	ICU Level of Service A
Analysis Period (min)		15	

HCM Unsignalized Intersection Capacity Analysis
25: Street No. 23 & Beaverbrook Road

Future Total (Sensitivity) AM Peak Hour



Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	580	20	0	240	45	0
Future Volume (Veh/h)	580	20	0	240	45	0
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	580	20	0	240	45	0
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume			600		830	590
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			600		830	590
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			100		87	100
cM capacity (veh/h)			987		343	511

Direction, Lane #	EB 1	WB 1	NB 1
Volume Total	600	240	45
Volume Left	0	0	45
Volume Right	20	0	0
cSH	1700	987	343
Volume to Capacity	0.35	0.00	0.13
Queue Length 95th (m)	0.0	0.0	3.6
Control Delay (s)	0.0	0.0	17.1
Lane LOS			C
Approach Delay (s)	0.0	0.0	17.1
Approach LOS			C

Intersection Summary			
Average Delay		0.9	
Intersection Capacity Utilization		43.5%	ICU Level of Service A
Analysis Period (min)		15	

Queues
1: Terry Fox Drive & Campeau Drive

Future Total (Sensitivity) PM Peak Hour

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	85	95	65	345	70	165	30	950	215	120	910	205
Future Volume (vph)	85	95	65	345	70	165	30	950	215	120	910	205
Lane Group Flow (vph)	85	95	65	345	70	165	30	950	215	120	910	205
Turn Type	Perm	NA	Perm	Perm	NA	Perm	pm+pt	NA	Perm	pm+pt	NA	Perm
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4		4	8		8	2		2	6		6
Detector Phase	4	4	4	8	8	8	5	2	2	1	6	6
Switch Phase												
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Minimum Split (s)	43.4	43.4	43.4	43.4	43.4	43.4	11.4	40.4	40.4	11.4	40.4	40.4
Total Split (s)	48.0	48.0	48.0	48.0	48.0	48.0	22.0	50.0	50.0	22.0	50.0	50.0
Total Split (%)	40.0%	40.0%	40.0%	40.0%	40.0%	40.0%	18.3%	41.7%	41.7%	18.3%	41.7%	41.7%
Yellow Time (s)	3.7	3.7	3.7	3.7	3.7	3.7	4.2	4.2	4.2	4.2	4.2	4.2
All-Red Time (s)	2.7	2.7	2.7	2.7	2.7	2.7	2.2	2.2	2.2	2.2	2.2	2.2
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4
Lead/Lag							Lead	Lag	Lag	Lead	Lag	Lag
Lead-Lag Optimize?							Yes	Yes	Yes	Yes	Yes	Yes
Recall Mode	None	None	None	None	None	None	None	C-Min	C-Min	None	C-Min	C-Min
v/c Ratio	0.21	0.17	0.12	0.89	0.12	0.28	0.10	0.62	0.28	0.41	0.52	0.23
Control Delay	30.2	29.2	3.1	62.0	26.9	5.5	13.8	29.0	7.1	17.0	23.0	3.5
Queue Delay	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	30.2	29.3	3.1	62.0	26.9	5.5	13.8	29.0	7.1	17.0	23.0	3.5
Queue Length 50th (m)	15.1	16.7	0.0	87.7	9.9	5.9	3.1	95.2	6.1	13.2	85.4	0.0
Queue Length 95th (m)	27.6	29.2	5.8	#125.5	12.2	3.4	8.0	128.5	23.6	23.9	112.9	14.2
Internal Link Dist (m)		139.7			148.2			149.3			180.0	
Turn Bay Length (m)	70.0			75.0			50.0		60.0	105.0		
Base Capacity (vph)	449	632	585	436	632	639	423	1534	761	365	1758	886
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	141	0	0	0	0	0	0	13	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.19	0.19	0.11	0.79	0.11	0.26	0.07	0.62	0.29	0.33	0.52	0.23

Intersection Summary

Cycle Length: 120
Actuated Cycle Length: 120
Offset: 93 (78%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green
Natural Cycle: 100
Control Type: Actuated-Coordinated
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 1: Terry Fox Drive & Campeau Drive



HCM Signalized Intersection Capacity Analysis
1: Terry Fox Drive & Campeau Drive

Future Total (Sensitivity) PM Peak Hour

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	85	95	65	345	70	165	30	950	215	120	910	205
Future Volume (vph)	85	95	65	345	70	165	30	950	215	120	910	205
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Total Lost time (s)	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95	1.00	1.00	0.95	1.00
Frpb, ped/bikes	1.00	1.00	0.98	1.00	1.00	1.00	1.00	1.00	0.97	1.00	1.00	1.00
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	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)	1710	1800	1504	1703	1800	1515	1710	3420	1486	1710	3420	1530
Flt Permitted	0.71	1.00	1.00	0.70	1.00	1.00	0.25	1.00	1.00	0.18	1.00	1.00
Satd. Flow (perm)	1281	1800	1504	1247	1800	1515	456	3420	1486	319	3420	1530
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	95	65	345	70	165	30	950	215	120	910	205
RTOR Reduction (vph)	0	0	45	0	0	114	0	0	95	0	0	104
Lane Group Flow (vph)	85	95	20	345	70	51	30	950	120	120	910	101
Confl. Peds. (#/hr)			5	5					5	5		
Heavy Vehicles (%)	0%	0%	0%	0%	0%	1%	0%	0%	0%	0%	0%	0%
Turn Type	Perm	NA	Perm	Perm	NA	Perm	pm+pt	NA	Perm	pm+pt	NA	Perm
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4		4	8		8	2		2	6		6
Actuated Green, G (s)	37.4	37.4	37.4	37.4	37.4	37.4	58.1	53.9	53.9	68.7	59.2	59.2
Effective Green, g (s)	37.4	37.4	37.4	37.4	37.4	37.4	58.1	53.9	53.9	68.7	59.2	59.2
Actuated g/C Ratio	0.31	0.31	0.31	0.31	0.31	0.31	0.48	0.45	0.45	0.57	0.49	0.49
Clearance Time (s)	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4
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)	399	561	468	388	561	472	264	1536	667	292	1687	754
v/s Ratio Prot		0.05			0.04		0.00	c0.28		c0.03	c0.27	
v/s Ratio Perm	0.07		0.01	c0.28		0.03	0.05		0.08	0.20		0.07
v/c Ratio	0.21	0.17	0.04	0.89	0.12	0.11	0.11	0.62	0.18	0.41	0.54	0.13
Uniform Delay, d1	30.4	30.0	28.8	39.3	29.6	29.4	16.7	25.2	19.8	15.0	21.0	16.5
Progression Factor	1.00	1.00	1.00	0.98	0.95	1.06	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	0.3	0.1	0.0	20.2	0.1	0.1	0.2	1.9	0.6	0.9	1.2	0.4
Delay (s)	30.7	30.2	28.9	58.8	28.2	31.3	16.9	27.1	20.4	15.9	22.2	16.9
Level of Service	C	C	C	E	C	C	B	C	C	B	C	B
Approach Delay (s)		30.0			47.3			25.6			20.7	
Approach LOS		C			D			C			C	

Intersection Summary

HCM 2000 Control Delay	28.0	HCM 2000 Level of Service		C	
HCM 2000 Volume to Capacity ratio	0.71				
Actuated Cycle Length (s)	120.0	Sum of lost time (s)		19.2	
Intersection Capacity Utilization	78.2%	ICU Level of Service		D	
Analysis Period (min)	15				

c Critical Lane Group

Queues
2: Kanata Avenue & Campeau Drive

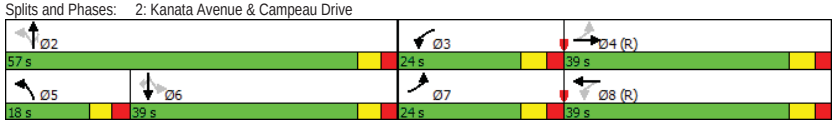
Future Total (Sensitivity) PM Peak Hour

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations										
Traffic Volume (vph)	285	315	55	345	140	500	80	65	345	210
Future Volume (vph)	285	315	55	345	140	500	80	65	345	210
Lane Group Flow (vph)	285	465	55	435	140	500	80	65	345	210
Turn Type	pm+pt	NA	pm+pt	NA	pm+pt	NA	Perm	Perm	NA	Perm
Protected Phases	7	4	3	8	5	2			6	
Permitted Phases	4		8		2		2	6		6
Detector Phase	7	4	3	8	5	2	2	6	6	6
Switch Phase										
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Minimum Split (s)	11.2	36.2	11.2	36.2	10.9	29.9	29.9	29.9	29.9	29.9
Total Split (s)	24.0	39.0	24.0	39.0	18.0	57.0	57.0	39.0	39.0	39.0
Total Split (%)	20.0%	32.5%	20.0%	32.5%	15.0%	47.5%	47.5%	32.5%	32.5%	32.5%
Yellow Time (s)	3.7	3.7	3.7	3.7	3.3	3.3	3.3	3.3	3.3	3.3
All-Red Time (s)	2.5	2.5	2.5	2.5	2.6	2.6	2.6	2.6	2.6	2.6
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	6.2	6.2	6.2	6.2	5.9	5.9	5.9	5.9	5.9	5.9
Lead/Lag	Lead	Lag	Lead	Lag	Lead			Lag	Lag	Lag
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes			Yes	Yes	Yes
Recall Mode	None	C-Min	None	C-Min	None	None	None	None	None	None
v/c Ratio	0.72	0.63	0.16	0.74	0.55	0.75	0.13	0.42	0.83	0.43
Control Delay	37.3	30.3	18.3	45.4	32.7	39.5	4.5	46.4	61.2	7.4
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	37.3	30.3	18.3	45.4	32.7	39.5	4.5	46.4	61.2	7.4
Queue Length 50th (m)	36.0	51.4	6.6	97.3	23.0	104.3	0.0	13.7	81.4	0.0
Queue Length 95th (m)	#83.7	#116.8	15.0	#163.9	35.6	135.8	8.8	27.3	111.4	18.7
Internal Link Dist (m)		217.6		101.3		108.6			167.9	
Turn Bay Length (m)	95.0		35.0		55.0		55.0	115.0		100.0
Base Capacity (vph)	413	738	493	588	265	766	679	187	496	546
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	0.69	0.63	0.11	0.74	0.53	0.65	0.12	0.35	0.70	0.38

Intersection Summary

Cycle Length: 120
Actuated Cycle Length: 120
Offset: 31 (26%), Referenced to phase 4:EBTL and 8:WBTL, Start of Green
Natural Cycle: 90
Control Type: Actuated-Coordinated
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 2: Kanata Avenue & Campeau Drive



HCM Signalized Intersection Capacity Analysis
2: Kanata Avenue & Campeau Drive

Future Total (Sensitivity) PM Peak Hour

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	285	315	150	55	345	90	140	500	80	65	345	210
Future Volume (vph)	285	315	150	55	345	90	140	500	80	65	345	210
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Total Lost time (s)	6.2	6.2		6.2	6.2		5.9	5.9	5.9	5.9	5.9	5.9
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00
Frpb, ped/bikes	1.00	0.98		1.00	0.99		1.00	1.00	0.97	1.00	1.00	0.94
Flpb, ped/bikes	1.00	1.00		0.99	1.00		1.00	1.00	1.00	0.99	1.00	1.00
Frt	1.00	0.95		1.00	0.97		1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1708	1686		1701	1730		1707	1800	1481	1701	1800	1429
Flt Permitted	0.23	1.00		0.40	1.00		0.19	1.00	1.00	0.38	1.00	1.00
Satd. Flow (perm)	416	1686		716	1730		344	1800	1481	678	1800	1429
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)	285	315	150	55	345	90	140	500	80	65	345	210
RTOR Reduction (vph)	0	12	0	0	7	0	0	0	50	0	0	162
Lane Group Flow (vph)	285	453	0	55	428	0	140	500	30	65	345	48
Confl. Peds. (#/hr)	10		15	15		10	15		5	5		15
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%
Turn Type	pm+pt	NA		pm+pt	NA		pm+pt	NA	Perm	Perm	NA	Perm
Protected Phases	7	4		3	8		5	2			6	
Permitted Phases	4			8			2		2	6		6
Actuated Green, G (s)	63.1	50.5		46.7	40.3		44.8	44.8	44.8	27.6	27.6	27.6
Effective Green, g (s)	63.1	50.5		46.7	40.3		44.8	44.8	44.8	27.6	27.6	27.6
Actuated g/C Ratio	0.53	0.42		0.39	0.34		0.37	0.37	0.37	0.23	0.23	0.23
Clearance Time (s)	6.2	6.2		6.2	6.2		5.9	5.9	5.9	5.9	5.9	5.9
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)	397	709		331	580		256	672	552	155	414	328
v/s Ratio Prot	c0.10	0.27		0.01	0.25		0.05	c0.28			c0.19	
v/s Ratio Perm	c0.28			0.06			0.15		0.02	0.10		0.03
v/c Ratio	0.72	0.64		0.17	0.74		0.55	0.74	0.05	0.42	0.83	0.15
Uniform Delay, d1	20.1	27.5		23.4	35.2		28.0	32.6	24.0	39.4	44.0	36.8
Progression Factor	1.60	0.93		1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	4.9	3.5		0.2	8.2		2.4	4.5	0.0	1.8	13.4	0.2
Delay (s)	37.0	29.1		23.6	43.3		30.4	37.1	24.1	41.2	57.4	37.0
Level of Service	D	C		C	D		C	D	C	D	E	D
Approach Delay (s)		32.1			41.1			34.3			48.8	
Approach LOS		C			D			C			D	

Intersection Summary

HCM 2000 Control Delay	38.5	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.81		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	24.2
Intersection Capacity Utilization	93.9%	ICU Level of Service	F
Analysis Period (min)	15		

c Critical Lane Group

Queues
3: Maritime Way/Knudson Drive & Campeau Drive

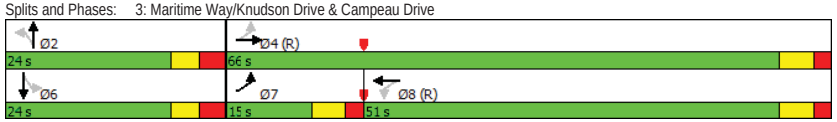
Future Total (Sensitivity) PM Peak Hour

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations								
Traffic Volume (vph)	75	425	115	525	15	10	60	10
Future Volume (vph)	75	425	115	525	15	10	60	10
Lane Group Flow (vph)	75	450	115	645	15	95	60	105
Turn Type	pm+pt	NA	Perm	NA	Perm	NA	Perm	NA
Protected Phases	7	4		8		2		6
Permitted Phases	4		8		2		6	
Detector Phase	7	4	8	8	2	2	6	6
Switch Phase								
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Minimum Split (s)	10.7	50.7	50.7	50.7	24.0	24.0	24.0	24.0
Total Split (s)	15.0	66.0	51.0	51.0	24.0	24.0	24.0	24.0
Total Split (%)	16.7%	73.3%	56.7%	56.7%	26.7%	26.7%	26.7%	26.7%
Yellow Time (s)	3.7	3.7	3.7	3.7	3.0	3.0	3.0	3.0
All-Red Time (s)	2.0	2.0	2.0	2.0	3.0	3.0	3.0	3.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	5.7	5.7	5.7	5.7	6.0	6.0	6.0	6.0
Lead/Lag	Lead		Lag	Lag				
Lead-Lag Optimize?	Yes		Yes	Yes				
Recall Mode	None	C-Min	C-Min	C-Min	None	None	None	None
v/c Ratio	0.15	0.32	0.19	0.54	0.11	0.38	0.42	0.41
Control Delay	4.2	4.6	17.2	21.0	34.7	14.0	44.4	14.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	4.2	4.6	17.2	21.0	34.7	14.0	44.4	14.1
Queue Length 50th (m)	2.7	20.0	12.9	96.2	2.5	1.7	10.4	1.7
Queue Length 95th (m)	8.2	45.4	m31.7	143.0	7.8	14.4	21.0	15.3
Internal Link Dist (m)		436.9		443.4		129.6		89.7
Turn Bay Length (m)	55.0		55.0		45.0		50.0	
Base Capacity (vph)	545	1419	617	1188	245	379	250	375
Starvation Cap Reductn	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.14	0.32	0.19	0.54	0.06	0.25	0.24	0.28

Intersection Summary

Cycle Length: 90
Actuated Cycle Length: 90
Offset: 0 (0%), Referenced to phase 4:EBTL and 8:WBTL, Start of Green
Natural Cycle: 90
Control Type: Actuated-Coordinated
m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 3: Maritime Way/Knudson Drive & Campeau Drive



HCM Signalized Intersection Capacity Analysis
3: Maritime Way/Knudson Drive & Campeau Drive

Future Total (Sensitivity) PM Peak Hour

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	75	425	25	115	525	120	15	10	85	60	10	95
Future Volume (vph)	75	425	25	115	525	120	15	10	85	60	10	95
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Total Lost time (s)	5.7	5.7		5.7	5.7		6.0	6.0		6.0	6.0	
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Frpb, ped/bikes	1.00	1.00		1.00	0.99		1.00	1.00		1.00	0.95	
Flpb, ped/bikes	1.00	1.00		1.00	1.00		0.99	1.00		1.00	1.00	
Frt	1.00	0.99		1.00	0.97		1.00	0.87		1.00	0.86	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1707	1785		1710	1733		1690	1558		1710	1484	
Flt Permitted	0.30	1.00		0.50	1.00		0.69	1.00		0.70	1.00	
Satd. Flow (perm)	542	1785		905	1733		1226	1558		1252	1484	
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	425	25	115	525	120	15	10	85	60	10	95
RTOR Reduction (vph)	0	2	0	0	6	0	0	76	0	0	85	0
Lane Group Flow (vph)	75	448	0	115	639	0	15	19	0	60	20	0
Confl. Peds. (#/hr)	15					15	5					5
Confl. Bikes (#/hr)												5
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Turn Type	pm+pt	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases	7	4			8			2			6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)	69.1	69.1		57.9	57.9		9.2	9.2		9.2	9.2	
Effective Green, g (s)	69.1	69.1		57.9	57.9		9.2	9.2		9.2	9.2	
Actuated g/C Ratio	0.77	0.77		0.64	0.64		0.10	0.10		0.10	0.10	
Clearance Time (s)	5.7	5.7		5.7	5.7		6.0	6.0		6.0	6.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	487	1370		582	1114		125	159		127	151	
v/s Ratio Prot	0.01	c0.25			c0.37			0.01			0.01	
v/s Ratio Perm	0.11			0.13			0.01			c0.05		
v/c Ratio	0.15	0.33		0.20	0.57		0.12	0.12		0.47	0.13	
Uniform Delay, d1	4.5	3.2		6.6	9.1		36.7	36.7		38.1	36.8	
Progression Factor	1.00	1.00		1.85	1.78		1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.1	0.6		0.6	1.8		0.4	0.3		2.8	0.4	
Delay (s)	4.7	3.9		12.7	17.9		37.2	37.0		40.9	37.2	
Level of Service	A	A		B	B		D	D		D	D	
Approach Delay (s)		4.0			17.1			37.1			38.5	
Approach LOS		A			B			D			D	

Intersection Summary

HCM 2000 Control Delay	16.4	HCM 2000 Level of Service		B	
HCM 2000 Volume to Capacity ratio	0.56				
Actuated Cycle Length (s)	90.0	Sum of lost time (s)		17.4	
Intersection Capacity Utilization	66.8%	ICU Level of Service		C	
Analysis Period (min)	15				

c Critical Lane Group

Queues
4: Teron Road & Campeau Drive

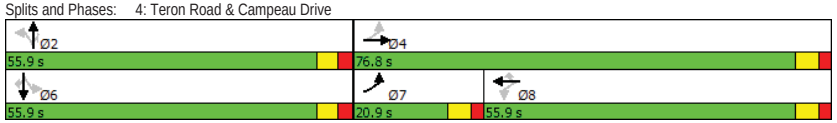
Future Total (Sensitivity) PM Peak Hour

Lane Group	EBL	EBT	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations											
Traffic Volume (vph)	160	350	85	520	405	15	25	70	345	40	260
Future Volume (vph)	160	350	85	520	405	15	25	70	345	40	260
Lane Group Flow (vph)	160	370	85	520	405	0	40	70	345	40	260
Turn Type	pm+pt	NA	Perm	NA	Perm	Perm	NA	Perm	Perm	NA	Perm
Protected Phases	7	4		8			2			6	
Permitted Phases	4		8		8	2		2	6		6
Detector Phase	7	4	8	8	8	2	2	2	6	6	6
Switch Phase											
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Minimum Split (s)	10.9	55.9	55.9	55.9	55.9	26.9	26.9	26.9	26.9	26.9	26.9
Total Split (s)	20.9	76.8	55.9	55.9	55.9	55.9	55.9	55.9	55.9	55.9	55.9
Total Split (%)	15.7%	57.9%	42.1%	42.1%	42.1%	42.1%	42.1%	42.1%	42.1%	42.1%	42.1%
Yellow Time (s)	3.7	3.7	3.7	3.7	3.7	3.3	3.3	3.3	3.3	3.3	3.3
All-Red Time (s)	2.2	2.2	2.2	2.2	2.2	2.6	2.6	2.6	2.6	2.6	2.6
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	5.9	5.9	5.9	5.9	5.9		5.9	5.9	5.9	5.9	5.9
Lead/Lag	Lead		Lag	Lag	Lag						
Lead-Lag Optimize?	Yes		Yes	Yes	Yes						
Recall Mode	None	Max	Max	Max	Max	None	None	None	None	None	None
v/c Ratio	0.42	0.35	0.19	0.64	0.48		0.08	0.14	0.89	0.07	0.41
Control Delay	16.4	15.4	25.4	32.8	5.9		28.2	6.5	65.1	28.1	5.3
Queue Delay	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0
Total Delay	16.4	15.4	25.4	32.8	5.9		28.2	6.5	65.1	28.1	5.3
Queue Length 50th (m)	17.3	45.3	12.6	98.5	4.4		7.0	0.0	81.4	7.0	0.0
Queue Length 95th (m)	34.8	81.4	29.8	171.0	31.5		15.3	10.0	121.9	15.2	17.9
Internal Link Dist (m)		269.3		262.3			58.3			132.3	
Turn Bay Length (m)	65.0		160.0					70.0	85.0		
Base Capacity (vph)	429	1054	436	814	841		680	636	518	750	756
Starvation Cap Reductn	0	0	0	0	0		0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0		0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0		0	0	0	0	0
Reduced v/c Ratio	0.37	0.35	0.19	0.64	0.48		0.06	0.11	0.67	0.05	0.34

Intersection Summary

Cycle Length: 132.7
Actuated Cycle Length: 120.8
Natural Cycle: 95
Control Type: Actuated-Uncoordinated

Splits and Phases: 4: Teron Road & Campeau Drive



HCM Signalized Intersection Capacity Analysis
4: Teron Road & Campeau Drive

Future Total (Sensitivity) PM Peak Hour

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	160	350	20	85	520	405	15	25	70	345	40	260
Future Volume (vph)	160	350	20	85	520	405	15	25	70	345	40	260
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Total Lost time (s)	5.9	5.9		5.9	5.9	5.9		5.9	5.9	5.9	5.9	5.9
Lane Util. Factor	1.00	1.00		1.00	1.00	1.00		1.00	1.00	1.00	1.00	1.00
Frpb, ped/bikes	1.00	1.00		1.00	1.00	0.93		1.00	0.94	1.00	1.00	0.95
Flpb, ped/bikes	1.00	1.00		0.99	1.00	1.00		0.99	1.00	0.96	1.00	1.00
Frt	1.00	0.99		1.00	1.00	0.85		1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00	1.00		0.98	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1693	1782		1696	1800	1417		1749	1435	1624	1800	1456
Flt Permitted	0.26	1.00		0.54	1.00	1.00		0.92	1.00	0.73	1.00	1.00
Satd. Flow (perm)	468	1782		966	1800	1417		1635	1435	1250	1800	1456
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)	160	350	20	85	520	405	15	25	70	345	40	260
RTOR Reduction (vph)	0	1	0	0	0	204	0	0	48	0	0	179
Lane Group Flow (vph)	160	369	0	85	520	201	0	40	22	345	40	81
Confl. Peds. (#/hr)	20		5	5		20	10		15	15		10
Heavy Vehicles (%)	1%	0%	0%	0%	0%	0%	0%	0%	0%	1%	0%	0%
Turn Type	pm+pt	NA		Perm	NA	Perm	Perm	NA	Perm	Perm	NA	Perm
Protected Phases	7	4			8			2			6	
Permitted Phases	4			8		8	2		2	6		6
Actuated Green, G (s)	71.3	71.3		54.6	54.6	54.6		37.5	37.5	37.5	37.5	37.5
Effective Green, g (s)	71.3	71.3		54.6	54.6	54.6		37.5	37.5	37.5	37.5	37.5
Actuated g/C Ratio	0.59	0.59		0.45	0.45	0.45		0.31	0.31	0.31	0.31	0.31
Clearance Time (s)	5.9	5.9		5.9	5.9	5.9		5.9	5.9	5.9	5.9	5.9
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)	386	1053		437	814	641		508	446	388	559	452
v/s Ratio Prot	0.04	c0.21			c0.29						0.02	
v/s Ratio Perm	0.21			0.09		0.14		0.02	0.02	c0.28		0.06
v/c Ratio	0.41	0.35		0.19	0.64	0.31		0.08	0.05	0.89	0.07	0.18
Uniform Delay, d1	14.8	12.7		19.8	25.4	21.0		29.3	29.1	39.6	29.3	30.3
Progression Factor	1.00	1.00		1.00	1.00	1.00		1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	0.7	0.9		1.0	3.8	1.3		0.1	0.0	21.1	0.1	0.2
Delay (s)	15.5	13.6		20.8	29.2	22.3		29.4	29.1	60.7	29.3	30.5
Level of Service	B	B		C	C	C		C	C	E	C	C
Approach Delay (s)		14.2			25.7			29.2			46.6	
Approach LOS		B			C			C			D	

Intersection Summary

HCM 2000 Control Delay	29.1	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.71		
Actuated Cycle Length (s)	120.6	Sum of lost time (s)	17.7
Intersection Capacity Utilization	79.8%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

Queues
5: March Road & Campeau Drive/Hwy 417 Off Ramp

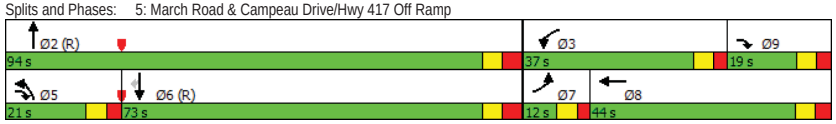
Future Total (Sensitivity) PM Peak Hour

Lane Group	EBL	EBR	WBL	WBT	NBL	NBT	SBT	SBR	Ø9
Lane Configurations									
Traffic Volume (vph)	65	700	490	540	350	570	2485	120	
Future Volume (vph)	65	700	490	540	350	570	2485	120	
Lane Group Flow (vph)	65	700	490	540	350	570	2485	120	
Turn Type	Prot	pt+ov	Prot	NA	Prot	NA	NA	Perm	
Protected Phases	7	5 9	3	8	5	2	6		9
Permitted Phases								6	
Detector Phase	7	5 9	3	8	5	2	6	6	
Switch Phase									
Minimum Initial (s)	5.0		5.0	5.0	5.0	5.0	5.0	5.0	5.0
Minimum Split (s)	11.0		24.2	43.8	11.5	30.5	30.5	30.5	11.5
Total Split (s)	12.0		37.0	44.0	21.0	94.0	73.0	73.0	19.0
Total Split (%)	8.0%		24.7%	29.3%	14.0%	62.7%	48.7%	48.7%	13%
Yellow Time (s)	3.7		3.7	3.7	3.7	3.7	3.7	3.7	3.7
All-Red Time (s)	2.3		2.5	3.1	2.8	3.8	3.8	3.8	2.8
Lost Time Adjust (s)	0.0		0.0	0.0	0.0	0.0	0.0	0.0	
Total Lost Time (s)	6.0		6.2	6.8	6.5	7.5	7.5	7.5	
Lead/Lag	Lead			Lag	Lead		Lag	Lag	
Lead-Lag Optimize?	Yes			Yes	Yes		Yes	Yes	
Recall Mode	None		None	None	None	C-Min	C-Min	C-Min	None
v/c Ratio	0.90	0.72	0.81	0.60	0.98	0.27	1.00	0.15	
Control Delay	150.8	56.7	70.8	53.2	110.2	16.4	59.5	1.4	
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Total Delay	150.8	56.7	70.8	53.2	110.2	16.4	59.5	1.4	
Queue Length 50th (m)	20.7	101.2	76.8	79.3	57.3	45.5	256.3	0.0	
Queue Length 95th (m)	#52.5	128.8	94.2	99.7	#91.2	56.9	#292.8	4.1	
Internal Link Dist (m)				269.9		155.6	164.4		
Turn Bay Length (m)	60.0	190.0	150.0		150.0			150.0	
Base Capacity (vph)	72	968	711	895	356	2081	2489	797	
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	0.90	0.72	0.69	0.60	0.98	0.27	1.00	0.15	

Intersection Summary

Cycle Length: 150
Actuated Cycle Length: 150
Offset: 79 (53%), Referenced to phase 2:NBT and 6:SBT, Start of Green
Natural Cycle: 150
Control Type: Actuated-Coordinated
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 5: March Road & Campeau Drive/Hwy 417 Off Ramp



HCM Signalized Intersection Capacity Analysis
5: March Road & Campeau Drive/Hwy 417 Off Ramp

Future Total (Sensitivity) PM Peak Hour

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	65	0	700	490	540	0	350	570	0	0	2485	120
Future Volume (vph)	65	0	700	490	540	0	350	570	0	0	2485	120
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.0		6.5	6.2	6.8		6.5	7.5			7.5	7.5
Lane Util. Factor	1.00		*1.00	0.97	0.95		0.97	0.95			*1.00	1.00
Frt	1.00		1.00	1.00	1.00		1.00	1.00			1.00	0.85
Flt Protected	0.95		1.00	0.95	1.00		1.00	1.00			1.00	1.00
Satd. Flow (prot)	1805		3800	3467	3610		3686	3610			5700	1615
Flt Permitted	0.95		1.00	0.95	1.00		1.00	1.00			1.00	1.00
Satd. Flow (perm)	1805		3800	3467	3610		3686	3610			5700	1615
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)	65	0	700	490	540	0	350	570	0	0	2485	120
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	0	0	68
Lane Group Flow (vph)	65	0	700	490	540	0	350	570	0	0	2485	52
Heavy Vehicles (%)	0%	0%	0%	1%	0%	0%	0%	0%	0%	0%	0%	0%
Turn Type	Prot		pt+ov	Prot	NA		Prot	NA			NA	Perm
Protected Phases	7		5 9	3	8		5	2			6	
Permitted Phases												6
Actuated Green, G (s)	6.0		38.2	26.1	37.2		14.5	86.5			65.5	65.5
Effective Green, g (s)	6.0		38.2	26.1	37.2		14.5	86.5			65.5	65.5
Actuated g/C Ratio	0.04		0.25	0.17	0.25		0.10	0.58			0.44	0.44
Clearance Time (s)	6.0			6.2	6.8		6.5	7.5			7.5	7.5
Vehicle Extension (s)	3.0			3.0	3.0		3.0	3.0			3.0	3.0
Lane Grp Cap (vph)	72		967	603	895		356	2081			2489	705
v/s Ratio Prot	0.04		c0.18	c0.14	0.15		c0.09	0.16			c0.44	
v/s Ratio Perm												0.03
v/c Ratio	0.90		0.72	0.81	0.60		0.98	0.27			1.00	0.07
Uniform Delay, d1	71.7		51.1	59.6	49.9		67.6	16.0			42.2	24.6
Progression Factor	1.00		1.00	1.00	1.00		1.00	1.00			1.00	1.00
Incremental Delay, d2	73.0		2.7	8.2	1.2		42.9	0.3			17.7	0.2
Delay (s)	144.8		53.8	67.8	51.0		110.5	16.3			59.9	24.8
Level of Service	F		D	E	D		F	B			E	C
Approach Delay (s)		61.5			59.0			52.1			58.2	
Approach LOS		E			E			D			E	

Intersection Summary

HCM 2000 Control Delay	57.8	HCM 2000 Level of Service	E
HCM 2000 Volume to Capacity ratio	0.94		
Actuated Cycle Length (s)	150.0	Sum of lost time (s)	26.8
Intersection Capacity Utilization	103.3%	ICU Level of Service	G
Analysis Period (min)	15		

c Critical Lane Group

HCM Unsignalized Intersection Capacity Analysis
6: Kanata Avenue & Knudson Drive

Future Total (Sensitivity) PM Peak Hour



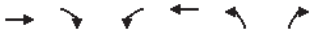
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Sign Control	Stop		Stop			Stop
Traffic Volume (vph)	205	140	235	220	105	215
Future Volume (vph)	205	140	235	220	105	215
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	205	140	235	220	105	215

Direction, Lane #	WB 1	NB 1	SB 1	SB 2
Volume Total (vph)	345	455	105	215
Volume Left (vph)	205	0	105	0
Volume Right (vph)	140	220	0	0
Hadj (s)	-0.12	-0.29	0.50	0.00
Departure Headway (s)	5.8	5.3	6.7	6.2
Degree Utilization, x	0.55	0.67	0.20	0.37
Capacity (veh/h)	588	653	509	549
Control Delay (s)	15.6	18.5	10.1	11.6
Approach Delay (s)	15.6	18.5	11.1	
Approach LOS	C	C	B	

Intersection Summary			
Delay		15.5	
Level of Service		C	
Intersection Capacity Utilization	64.6%	ICU Level of Service	C
Analysis Period (min)		15	

HCM Unsignalized Intersection Capacity Analysis
7: Shaughnessy Crescent (East) & Knudson Drive

Future Total (Sensitivity) PM Peak Hour



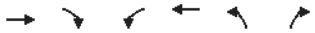
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	190	10	25	310	15	10
Future Volume (Veh/h)	190	10	25	310	15	10
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	190	10	25	310	15	10
Pedestrians					15	
Lane Width (m)					3.6	
Walking Speed (m/s)					1.2	
Percent Blockage					1	
Right turn flare (veh)						
Median type	None			None		
Median storage veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume			215		570	210
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			215		570	210
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			98		97	99
cM capacity (veh/h)			1350		471	825

Direction, Lane #	EB 1	WB 1	NB 1
Volume Total	200	335	25
Volume Left	0	25	15
Volume Right	10	0	10
cSH	1700	1350	569
Volume to Capacity	0.12	0.02	0.04
Queue Length 95th (m)	0.0	0.5	1.1
Control Delay (s)	0.0	0.7	11.6
Lane LOS		A	B
Approach Delay (s)	0.0	0.7	11.6
Approach LOS			B

Intersection Summary			
Average Delay	1.0		
Intersection Capacity Utilization	44.1%	ICU Level of Service	A
Analysis Period (min)	15		

HCM Unsignalized Intersection Capacity Analysis
8: Shaughnessy Crescent (West) & Knudson Drive

Future Total (Sensitivity) PM Peak Hour



Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	190	25	15	310	15	10
Future Volume (Veh/h)	190	25	15	310	15	10
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	190	25	15	310	15	10
Pedestrians					20	
Lane Width (m)					3.6	
Walking Speed (m/s)					1.2	
Percent Blockage					2	
Right turn flare (veh)						
Median type	None			None		
Median storage veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume			235		562	222
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			235		562	222
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			99		97	99
cM capacity (veh/h)			1322		478	808

Direction, Lane #	EB 1	WB 1	NB 1
Volume Total	215	325	25
Volume Left	0	15	15
Volume Right	25	0	10
cSH	1700	1322	571
Volume to Capacity	0.13	0.01	0.04
Queue Length 95th (m)	0.0	0.3	1.1
Control Delay (s)	0.0	0.5	11.6
Lane LOS		A	B
Approach Delay (s)	0.0	0.5	11.6
Approach LOS			B

Intersection Summary				
Average Delay		0.8		
Intersection Capacity Utilization		40.1%	ICU Level of Service	A
Analysis Period (min)		15		

HCM Unsignalized Intersection Capacity Analysis
9: Knudson Drive & Sherk Crescent (North)

Future Total (Sensitivity) PM Peak Hour



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	10	10	15	155	150	20
Future Volume (Veh/h)	10	10	15	155	150	20
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	10	10	15	155	150	20
Pedestrians	15					
Lane Width (m)	3.6					
Walking Speed (m/s)	1.2					
Percent Blockage	1					
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	360	175	185			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	360	175	185			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	98	99	99			
cM capacity (veh/h)	628	863	1384			

Direction, Lane #	EB 1	NB 1	SB 1
Volume Total	20	170	170
Volume Left	10	15	0
Volume Right	10	0	20
cSH	727	1384	1700
Volume to Capacity	0.03	0.01	0.10
Queue Length 95th (m)	0.7	0.3	0.0
Control Delay (s)	10.1	0.8	0.0
Lane LOS	B	A	
Approach Delay (s)	10.1	0.8	0.0
Approach LOS	B		

Intersection Summary				
Average Delay		0.9		
Intersection Capacity Utilization		31.8%	ICU Level of Service	A
Analysis Period (min)		15		

HCM Unsignalized Intersection Capacity Analysis
10: Knudson Drive & Sherk Crescent (South)

Future Total (Sensitivity) PM Peak Hour



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	5	20	25	165	155	5
Future Volume (Veh/h)	5	20	25	165	155	5
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	5	20	25	165	155	5
Pedestrians	10					
Lane Width (m)	3.6					
Walking Speed (m/s)	1.2					
Percent Blockage	1					
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	382	168	170			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	382	168	170			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	99	98	98			
cM capacity (veh/h)	608	875	1408			

Direction, Lane #	EB 1	NB 1	SB 1
Volume Total	25	190	160
Volume Left	5	25	0
Volume Right	20	0	5
cSH	804	1408	1700
Volume to Capacity	0.03	0.02	0.09
Queue Length 95th (m)	0.8	0.4	0.0
Control Delay (s)	9.6	1.1	0.0
Lane LOS	A	A	
Approach Delay (s)	9.6	1.1	0.0
Approach LOS	A		

Intersection Summary			
Average Delay	1.2		
Intersection Capacity Utilization	34.2%	ICU Level of Service	A
Analysis Period (min)	15		

HCM Unsignalized Intersection Capacity Analysis
11: Knudson Drive & Weslock Way

Future Total (Sensitivity) PM Peak Hour



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Sign Control		Stop	Stop		Stop	
Traffic Volume (vph)	145	55	70	80	130	285
Future Volume (vph)	145	55	70	80	130	285
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	145	55	70	80	130	285

Direction, Lane #	EB 1	WB 1	SB 1
Volume Total (vph)	200	150	415
Volume Left (vph)	145	0	130
Volume Right (vph)	0	80	285
Hadj (s)	0.15	-0.32	-0.35
Departure Headway (s)	5.3	4.9	4.4
Degree Utilization, x	0.29	0.20	0.51
Capacity (veh/h)	636	675	774
Control Delay (s)	10.4	9.1	12.0
Approach Delay (s)	10.4	9.1	12.0
Approach LOS	B	A	B

Intersection Summary			
Delay	11.0		
Level of Service	B		
Intersection Capacity Utilization	57.1%	ICU Level of Service	B
Analysis Period (min)	15		

HCM Unsignalized Intersection Capacity Analysis
12: Weslock Way & Beaverbrook Road

Future Total (Sensitivity) PM Peak Hour



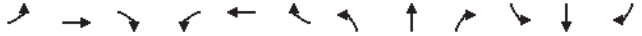
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Sign Control	Stop		Stop			Stop
Traffic Volume (vph)	385	175	45	180	75	30
Future Volume (vph)	385	175	45	180	75	30
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	385	175	45	180	75	30

Direction, Lane #	WB 1	NB 1	SB 1
Volume Total (vph)	560	225	105
Volume Left (vph)	385	0	75
Volume Right (vph)	175	180	0
Hadj (s)	-0.05	-0.48	0.14
Departure Headway (s)	4.7	5.1	5.9
Degree Utilization, x	0.74	0.32	0.17
Capacity (veh/h)	738	645	553
Control Delay (s)	19.9	10.4	10.1
Approach Delay (s)	19.9	10.4	10.1
Approach LOS	C	B	B

Intersection Summary			
Delay		16.3	
Level of Service		C	
Intersection Capacity Utilization		64.2%	ICU Level of Service C
Analysis Period (min)		15	

HCM Unsignalized Intersection Capacity Analysis
13: Omni Health Care/Street No. 11 & Campeau Drive

Future Total (Sensitivity) PM Peak Hour



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	20	465	10	5	525	65	20	0	10	45	0	15
Future Volume (Veh/h)	20	465	10	5	525	65	20	0	10	45	0	15
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	20	465	10	5	525	65	20	0	10	45	0	15
Pedestrians								10				
Lane Width (m)								3.6				
Walking Speed (m/s)								1.2				
Percent Blockage								1				
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	590			485			1102	1120	480	1088	1092	558
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	590			485			1102	1120	480	1088	1092	558
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	98			100			89	100	98	76	100	97
cM capacity (veh/h)	995			1079			179	201	585	187	209	533

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	495	595	30	60
Volume Left	20	5	20	45
Volume Right	10	65	10	15
cSH	995	1079	233	223
Volume to Capacity	0.02	0.00	0.13	0.27
Queue Length 95th (m)	0.5	0.1	3.5	8.4
Control Delay (s)	0.6	0.1	22.7	27.0
Lane LOS	A	A	C	D
Approach Delay (s)	0.6	0.1	22.7	27.0
Approach LOS			C	D

Intersection Summary			
Average Delay		2.3	
Intersection Capacity Utilization		51.4%	ICU Level of Service A
Analysis Period (min)		15	

Queues
14: Hawkstone Gate & Campeau Drive

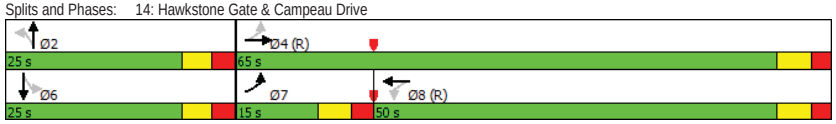
Future Total (Sensitivity) PM Peak Hour

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations								
Traffic Volume (vph)	55	475	20	675	10	5	50	0
Future Volume (vph)	55	475	20	675	10	5	50	0
Lane Group Flow (vph)	55	490	20	775	10	10	0	115
Turn Type	pm+pt	NA	Perm	NA	Perm	NA	Perm	NA
Protected Phases	7	4		8		2		6
Permitted Phases	4		8		2		6	
Detector Phase	7	4	8	8	2	2	6	6
Switch Phase								
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Minimum Split (s)	11.0	32.0	32.0	32.0	23.9	23.9	23.9	23.9
Total Split (s)	15.0	65.0	50.0	50.0	25.0	25.0	25.0	25.0
Total Split (%)	16.7%	72.2%	55.6%	55.6%	27.8%	27.8%	27.8%	27.8%
Yellow Time (s)	3.7	3.7	3.7	3.7	3.3	3.3	3.3	3.3
All-Red Time (s)	2.3	2.3	2.3	2.3	2.6	2.6	2.6	2.6
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0		0.0
Total Lost Time (s)	6.0	6.0	6.0	6.0	5.9	5.9		5.9
Lead/Lag	Lead		Lag	Lag				
Lead-Lag Optimize?	Yes		Yes	Yes				
Recall Mode	None	C-Min	C-Min	C-Min	None	None	None	None
v/c Ratio	0.13	0.34	0.03	0.63	0.09	0.06		0.50
Control Delay	3.4	3.5	8.4	14.5	35.2	26.0		15.7
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0		0.0
Total Delay	3.4	3.5	8.4	14.5	35.2	26.0		15.7
Queue Length 50th (m)	1.3	15.2	1.1	73.2	1.8	0.9		1.1
Queue Length 95th (m)	5.6	39.9	5.4	#191.3	5.9	5.1		15.0
Internal Link Dist (m)		214.6		269.3		89.1		74.7
Turn Bay Length (m)	80.0		120.0					
Base Capacity (vph)	471	1451	610	1231	241	351		376
Starvation Cap Reductn	0	0	0	0	0	0		0
Spillback Cap Reductn	0	0	0	0	0	0		0
Storage Cap Reductn	0	0	0	0	0	0		0
Reduced v/c Ratio	0.12	0.34	0.03	0.63	0.04	0.03		0.31

Intersection Summary

Cycle Length: 90
Actuated Cycle Length: 90
Offset: 0 (0%), Referenced to phase 4:EBTL and 8:WBTL, Start of Green
Natural Cycle: 80
Control Type: Actuated-Coordinated
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 14: Hawkstone Gate & Campeau Drive



HCM Signalized Intersection Capacity Analysis
14: Hawkstone Gate & Campeau Drive

Future Total (Sensitivity) PM Peak Hour

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	55	475	15	20	675	100	10	5	5	50	0	65
Future Volume (vph)	55	475	15	20	675	100	10	5	5	50	0	65
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Total Lost time (s)	6.0	6.0		6.0	6.0		5.9	5.9			5.9	
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	1.00			1.00	
Frpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	0.98			0.97	
Flpb, ped/bikes	1.00	1.00		1.00	1.00		0.97	1.00			0.99	
Frt	1.00	1.00		1.00	0.98		1.00	0.93			0.92	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00			0.98	
Satd. Flow (prot)	1709	1792		1710	1757		1662	1638			1567	
Flt Permitted	0.24	1.00		0.48	1.00		0.65	1.00			0.86	
Satd. Flow (perm)	431	1792		872	1757		1139	1638			1369	
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)	55	475	15	20	675	100	10	5	5	50	0	65
RTOR Reduction (vph)	0	1	0	0	4	0	0	5	0	0	100	0
Lane Group Flow (vph)	55	489	0	20	771	0	10	5	0	0	15	0
Confl. Peds. (#/hr)	10					10	15		5	5		15
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Turn Type	pm+pt	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases	7	4			8			2			6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)	70.5	70.5		59.3	59.3		7.6	7.6			7.6	
Effective Green, g (s)	70.5	70.5		59.3	59.3		7.6	7.6			7.6	
Actuated g/C Ratio	0.78	0.78		0.66	0.66		0.08	0.08			0.08	
Clearance Time (s)	6.0	6.0		6.0	6.0		5.9	5.9			5.9	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0			3.0	
Lane Grp Cap (vph)	411	1403		574	1157		96	138			115	
v/s Ratio Prot	0.01	c0.27			c0.44			0.00				
v/s Ratio Perm	0.10			0.02			0.01				c0.01	
v/c Ratio	0.13	0.35		0.03	0.67		0.10	0.04			0.13	
Uniform Delay, d1	5.4	2.9		5.4	9.3		38.1	37.8			38.1	
Progression Factor	0.83	0.78		1.00	1.00		1.00	1.00			1.00	
Incremental Delay, d2	0.1	0.7		0.1	3.0		0.5	0.1			0.5	
Delay (s)	4.7	2.9		5.5	12.4		38.5	38.0			38.7	
Level of Service	A	A		A	B		D	D			D	
Approach Delay (s)		3.1			12.2			38.2			38.7	
Approach LOS		A			B			D			D	

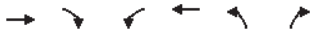
Intersection Summary

HCM 2000 Control Delay	11.3	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.60		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	17.9
Intersection Capacity Utilization	72.9%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

HCM Unsignalized Intersection Capacity Analysis
15: Park Ridge Place (West) & Campeau Drive

Future Total (Sensitivity) PM Peak Hour



Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	420	20	5	470	20	5
Future Volume (Veh/h)	420	20	5	470	20	5
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	420	20	5	470	20	5
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage veh)						
Upstream signal (m)	125					
pX, platoon unblocked			0.82		0.82	0.82
vC, conflicting volume			440		910	430
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			201		777	188
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			100		93	99
cM capacity (veh/h)			1129		299	701

Direction, Lane #	EB 1	WB 1	NB 1
Volume Total	440	475	25
Volume Left	0	5	20
Volume Right	20	0	5
cSH	1700	1129	338
Volume to Capacity	0.26	0.00	0.07
Queue Length 95th (m)	0.0	0.1	1.9
Control Delay (s)	0.0	0.1	16.5
Lane LOS		A	C
Approach Delay (s)	0.0	0.1	16.5
Approach LOS			C

Intersection Summary				
Average Delay		0.5		
Intersection Capacity Utilization	40.3%	ICU Level of Service	A	
Analysis Period (min)	15			

HCM Unsignalized Intersection Capacity Analysis
16: Coulson Court & Robson Court

Future Total (Sensitivity) PM Peak Hour



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	20	30	10	0	20	0	5	5	0	5	0	5
Future Volume (Veh/h)	20	30	10	0	20	0	5	5	0	5	0	5
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	20	30	10	0	20	0	5	5	0	5	0	5
Pedestrians											5	
Lane Width (m)											3.6	
Walking Speed (m/s)											1.2	
Percent Blockage											0	
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	25			40			100	100	35	102	105	25
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	25			40			100	100	35	102	105	25
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	99			100			99	99	100	99	100	100
cM capacity (veh/h)	1596			1583			871	781	1044	864	776	1053

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	60	20	10	10
Volume Left	20	0	5	5
Volume Right	10	0	0	5
cSH	1596	1583	823	949
Volume to Capacity	0.01	0.00	0.01	0.01
Queue Length 95th (m)	0.3	0.0	0.3	0.3
Control Delay (s)	2.5	0.0	9.4	8.8
Lane LOS	A		A	A
Approach Delay (s)	2.5	0.0	9.4	8.8
Approach LOS			A	A

Intersection Summary				
Average Delay		3.3		
Intersection Capacity Utilization	20.1%	ICU Level of Service	A	
Analysis Period (min)	15			

HCM Unsignalized Intersection Capacity Analysis
17: Robson Court & Evanshen Crescent

Future Total (Sensitivity) PM Peak Hour



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	15	20	15	0	0	5
Future Volume (Veh/h)	15	20	15	0	0	5
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	15	20	15	0	0	5
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	15				65	15
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	15				65	15
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	99				100	100
cM capacity (veh/h)	1616				937	1070

Direction, Lane #	EB 1	WB 1	SB 1
Volume Total	35	15	5
Volume Left	15	0	0
Volume Right	0	0	5
cSH	1616	1700	1070
Volume to Capacity	0.01	0.01	0.00
Queue Length 95th (m)	0.2	0.0	0.1
Control Delay (s)	3.1	0.0	8.4
Lane LOS	A		A
Approach Delay (s)	3.1	0.0	8.4
Approach LOS			A

Intersection Summary				
Average Delay	2.8			
Intersection Capacity Utilization	18.7%	ICU Level of Service		A
Analysis Period (min)	15			

HCM Unsignalized Intersection Capacity Analysis
18: Kanata Avenue & Park Ridge Place

Future Total (Sensitivity) PM Peak Hour



Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	5	0	720	10	10	540
Future Volume (Veh/h)	5	0	720	10	10	540
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	5	0	720	10	10	540
Pedestrians	5					
Lane Width (m)	3.6					
Walking Speed (m/s)	1.2					
Percent Blockage	0					
Right turn flare (veh)						
Median type			None			None
Median storage veh)						
Upstream signal (m)						133
pX, platoon unblocked	0.82					
vC, conflicting volume	1290	730			735	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1243	730			735	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	97	100			99	
cM capacity (veh/h)	157	424			876	

Direction, Lane #	WB 1	NB 1	SB 1
Volume Total	5	730	550
Volume Left	5	0	10
Volume Right	0	10	0
cSH	157	1700	876
Volume to Capacity	0.03	0.43	0.01
Queue Length 95th (m)	0.8	0.0	0.3
Control Delay (s)	28.8	0.0	0.3
Lane LOS	D		A
Approach Delay (s)	28.8	0.0	0.3
Approach LOS	D		

Intersection Summary				
Average Delay	0.2			
Intersection Capacity Utilization	50.6%	ICU Level of Service		A
Analysis Period (min)	15			

Queues
19: Herlihey Way & Campeau Drive

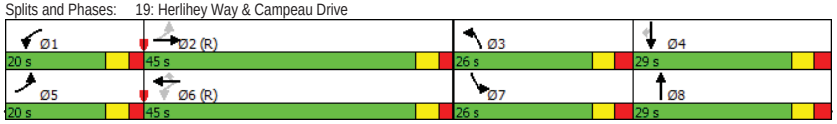
Future Total (Sensitivity) PM Peak Hour

Lane Group	EBL	EBT	WBL	WBT	WBR	NBL	NBT	SBL	SBT	SBR
Lane Configurations										
Traffic Volume (vph)	30	455	140	430	125	60	50	125	50	90
Future Volume (vph)	30	455	140	430	125	60	50	125	50	90
Lane Group Flow (vph)	30	560	140	430	125	60	220	125	50	90
Turn Type	pm+pt	NA	pm+pt	NA	Perm	Prot	NA	Prot	NA	Perm
Protected Phases	5	2	1	6		3	8	7	4	
Permitted Phases	2		6		6					4
Detector Phase	5	2	1	6	6	3	8	7	4	4
Switch Phase										
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Minimum Split (s)	10.5	34.5	10.5	34.5	34.5	10.9	28.9	10.9	28.9	28.9
Total Split (s)	20.0	45.0	20.0	45.0	45.0	26.0	29.0	26.0	29.0	29.0
Total Split (%)	16.7%	37.5%	16.7%	37.5%	37.5%	21.7%	24.2%	21.7%	24.2%	24.2%
Yellow Time (s)	3.3	3.3	3.3	3.3	3.3	3.3	3.3	3.3	3.3	3.3
All-Red Time (s)	2.2	2.2	2.2	2.2	2.2	2.6	2.6	2.6	2.6	2.6
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	5.5	5.5	5.5	5.5	5.5	5.9	5.9	5.9	5.9	5.9
Lead/Lag	Lead	Lag	Lead	Lag	Lag	Lead	Lag	Lead	Lag	Lag
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Recall Mode	None	C-Min	None	C-Min	C-Min	None	None	None	None	None
v/c Ratio	0.06	0.67	0.37	0.44	0.14	0.44	0.76	0.63	0.15	0.24
Control Delay	15.0	34.3	18.7	23.9	8.0	62.1	37.9	63.8	40.2	3.9
Queue Delay	0.0	1.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	15.0	35.8	18.7	23.9	8.0	62.1	37.9	63.8	40.2	3.9
Queue Length 50th (m)	3.1	118.5	13.9	53.5	0.3	14.4	22.8	30.0	10.9	0.0
Queue Length 95th (m)	9.9	#211.6	m32.1	97.1	m6.0	28.2	48.1	48.4	20.5	6.1
Internal Link Dist (m)		148.2		217.6			87.8		129.5	
Turn Bay Length (m)	40.0		85.0		75.0			50.0		30.0
Base Capacity (vph)	594	836	418	978	890	280	372	286	380	413
Starvation Cap Reductn	0	128	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.05	0.79	0.33	0.44	0.14	0.21	0.59	0.44	0.13	0.22

Intersection Summary

Cycle Length: 120
Actuated Cycle Length: 120
Offset: 26 (22%), Referenced to phase 2:EBTL and 6:WBTL, Start of Green
Natural Cycle: 85
Control Type: Actuated-Coordinated
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.
m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 19: Herlihey Way & Campeau Drive



HCM Signalized Intersection Capacity Analysis
19: Herlihey Way & Campeau Drive

Future Total (Sensitivity) PM Peak Hour

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	30	455	105	140	430	125	60	50	170	125	50	90
Future Volume (vph)	30	455	105	140	430	125	60	50	170	125	50	90
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Total Lost time (s)	5.5	5.5		5.5	5.5	5.5	5.9	5.9		5.9	5.9	5.9
Lane Util. Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00
Frpb, ped/bikes	1.00	1.00		1.00	1.00	1.00	1.00	0.89		1.00	1.00	1.00
Flpb, ped/bikes	1.00	1.00		1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00
Frt	1.00	0.97		1.00	1.00	0.85	1.00	0.88		1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	1710	1749		1710	1782	1515	1676	1399		1710	1800	1485
Flt Permitted	0.46	1.00		0.24	1.00	1.00	0.95	1.00		0.95	1.00	1.00
Satd. Flow (perm)	825	1749		431	1782	1515	1676	1399		1710	1800	1485
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	455	105	140	430	125	60	50	170	125	50	90
RTOR Reduction (vph)	0	5	0	0	0	60	0	109	0	0	0	74
Lane Group Flow (vph)	30	555	0	140	430	65	60	111	0	125	50	17
Confl. Peds. (#/hr)									50	50		
Heavy Vehicles (%)	0%	0%	0%	0%	1%	1%	2%	0%	1%	0%	0%	3%
Turn Type	pm+pt	NA		pm+pt	NA	Perm	Prot	NA		Prot	NA	Perm
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases	2			6		6						4
Actuated Green, G (s)	60.0	55.8		72.2	62.5	62.5	8.5	16.5		14.0	22.0	22.0
Effective Green, g (s)	60.0	55.8		72.2	62.5	62.5	8.5	16.5		14.0	22.0	22.0
Actuated g/C Ratio	0.50	0.46		0.60	0.52	0.52	0.07	0.14		0.12	0.18	0.18
Clearance Time (s)	5.5	5.5		5.5	5.5	5.5	5.9	5.9		5.9	5.9	5.9
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)	443	813		375	928	789	118	192		199	330	272
v/s Ratio Prot	0.00	c0.32		c0.03	c0.24		0.04	c0.08		c0.07	c0.03	
v/s Ratio Perm	0.03			0.19		0.04						0.01
v/c Ratio	0.07	0.68		0.37	0.46	0.08	0.51	0.58		0.63	0.15	0.06
Uniform Delay, d1	15.4	25.2		14.6	18.2	14.4	53.7	48.5		50.5	41.2	40.5
Progression Factor	1.09	1.07		1.31	1.09	2.10	1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	0.1	4.6		0.5	1.4	0.2	3.4	4.2		6.1	0.2	0.1
Delay (s)	16.9	31.6		19.7	21.2	30.3	57.2	52.7		56.6	41.4	40.6
Level of Service	B	C		B	C	C	E	D		E	D	D
Approach Delay (s)		30.8			22.5			53.7			48.3	
Approach LOS		C			C			D			D	

Intersection Summary

HCM 2000 Control Delay	33.7	HCM 2000 Level of Service	C	
HCM 2000 Volume to Capacity ratio	0.62			
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	22.8	
Intersection Capacity Utilization	85.2%	ICU Level of Service	E	
Analysis Period (min)	15			

c Critical Lane Group

HCM Unsignalized Intersection Capacity Analysis
20: Campeau Drive & Golf Course Access

Future Total (Sensitivity) PM Peak Hour



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	0	425	475	0	0	0
Future Volume (Veh/h)	0	425	475	0	0	0
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	0	425	475	0	0	0
Pedestrians					10	
Lane Width (m)					3.6	
Walking Speed (m/s)					1.2	
Percent Blockage					1	
Right turn flare (veh)						
Median type		None	None			
Median storage veh)						
Upstream signal (m)		232				
pX, platoon unblocked					0.90	
vC, conflicting volume	485				910	485
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	485				841	485
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	100				100	100
cM capacity (veh/h)	1079				300	581

Direction, Lane #	EB 1	WB 1	SB 1
Volume Total	425	475	0
Volume Left	0	0	0
Volume Right	0	0	0
cSH	1079	1700	1700
Volume to Capacity	0.00	0.28	0.00
Queue Length 95th (m)	0.0	0.0	0.0
Control Delay (s)	0.0	0.0	0.0
Lane LOS			A
Approach Delay (s)	0.0	0.0	0.0
Approach LOS			A

Intersection Summary				
Average Delay		0.0		
Intersection Capacity Utilization		29.7%	ICU Level of Service	A
Analysis Period (min)		15		

HCM Unsignalized Intersection Capacity Analysis
21: Park Ridge Place (East)/Street No. 1 & Campeau Drive

Future Total (Sensitivity) PM Peak Hour



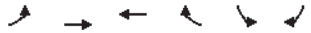
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	20	400	5	10	455	45	5	0	5	65	0	15
Future Volume (Veh/h)	20	400	5	10	455	45	5	0	5	65	0	15
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	20	400	5	10	455	45	5	0	5	65	0	15
Pedestrians								10				
Lane Width (m)								3.6				
Walking Speed (m/s)								1.2				
Percent Blockage								1				
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (m)		269										
pX, platoon unblocked				0.91			0.91	0.91	0.91	0.91	0.91	
vC, conflicting volume	500			415			965	972	412	945	952	478
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	500			311			914	922	308	892	900	478
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	98			99			98	100	99	72	100	97
cM capacity (veh/h)	1075			1141			220	240	666	233	247	592

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	425	510	10	80
Volume Left	20	10	5	65
Volume Right	5	45	5	15
cSH	1075	1141	331	263
Volume to Capacity	0.02	0.01	0.03	0.30
Queue Length 95th (m)	0.5	0.2	0.7	9.9
Control Delay (s)	0.6	0.3	16.2	24.5
Lane LOS	A	A	C	C
Approach Delay (s)	0.6	0.3	16.2	24.5
Approach LOS			C	C

Intersection Summary				
Average Delay		2.4		
Intersection Capacity Utilization		47.7%	ICU Level of Service	A
Analysis Period (min)		15		

HCM Unsignalized Intersection Capacity Analysis
22: Campeau Drive & Street No. 7

Future Total (Sensitivity) PM Peak Hour



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	20	450	495	65	45	15
Future Volume (Veh/h)	20	450	495	65	45	15
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	20	450	495	65	45	15
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage veh)						
Upstream signal (m)		400				
pX, platoon unblocked						
vC, conflicting volume	560				1018	528
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	560				1018	528
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	98				83	97
cM capacity (veh/h)	1021				260	555

Direction, Lane #	EB 1	WB 1	SB 1
Volume Total	470	560	60
Volume Left	20	0	45
Volume Right	0	65	15
cSH	1021	1700	300
Volume to Capacity	0.02	0.33	0.20
Queue Length 95th (m)	0.5	0.0	5.9
Control Delay (s)	0.6	0.0	20.0
Lane LOS	A		C
Approach Delay (s)	0.6	0.0	20.0
Approach LOS			C

Intersection Summary				
Average Delay	1.4			
Intersection Capacity Utilization	52.4%	ICU Level of Service		A
Analysis Period (min)	15			

HCM Unsignalized Intersection Capacity Analysis
23: Street No. 1/Street No. 16 & Knudson Drive

Future Total (Sensitivity) PM Peak Hour



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	45	200	65	20	300	5	15	0	15	0	0	30
Future Volume (Veh/h)	45	200	65	20	300	5	15	0	15	0	0	30
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	45	200	65	20	300	5	15	0	15	0	0	30
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	305			265			695	668	232	680	698	302
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	305			265			695	668	232	680	698	302
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	96			98			95	100	98	100	100	96
cM capacity (veh/h)	1267			1311			332	363	812	347	349	742

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	310	325	30	30
Volume Left	45	20	15	0
Volume Right	65	5	15	30
cSH	1267	1311	471	742
Volume to Capacity	0.04	0.02	0.06	0.04
Queue Length 95th (m)	0.9	0.4	1.6	1.0
Control Delay (s)	1.4	0.6	13.2	10.1
Lane LOS	A	A	B	B
Approach Delay (s)	1.4	0.6	13.2	10.1
Approach LOS			B	B

Intersection Summary				
Average Delay	1.9			
Intersection Capacity Utilization	46.4%	ICU Level of Service		A
Analysis Period (min)	15			

HCM Unsignalized Intersection Capacity Analysis
24: Weslock Way & Street No. 16

Future Total (Sensitivity) PM Peak Hour



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	0	15	20	200	90	0
Future Volume (Veh/h)	0	15	20	200	90	0
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	0	15	20	200	90	0
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	330	90	90			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	330	90	90			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	100	98	99			
cM capacity (veh/h)	660	973	1518			

Direction, Lane #	EB 1	NB 1	SB 1
Volume Total	15	220	90
Volume Left	0	20	0
Volume Right	15	0	0
cSH	973	1518	1700
Volume to Capacity	0.02	0.01	0.05
Queue Length 95th (m)	0.4	0.3	0.0
Control Delay (s)	8.8	0.8	0.0
Lane LOS	A	A	
Approach Delay (s)	8.8	0.8	0.0
Approach LOS	A		

Intersection Summary			
Average Delay	0.9		
Intersection Capacity Utilization	28.9%	ICU Level of Service	A
Analysis Period (min)	15		

HCM Unsignalized Intersection Capacity Analysis
25: Street No. 23 & Beaverbrook Road

Future Total (Sensitivity) PM Peak Hour



Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	210	45	25	530	30	15
Future Volume (Veh/h)	210	45	25	530	30	15
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	210	45	25	530	30	15
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume			255		812	232
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			255		812	232
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			98		91	98
cM capacity (veh/h)			1322		344	812

Direction, Lane #	EB 1	WB 1	NB 1
Volume Total	255	555	45
Volume Left	0	25	30
Volume Right	45	0	15
cSH	1700	1322	426
Volume to Capacity	0.15	0.02	0.11
Queue Length 95th (m)	0.0	0.5	2.8
Control Delay (s)	0.0	0.6	14.4
Lane LOS		A	B
Approach Delay (s)	0.0	0.6	14.4
Approach LOS			B

Intersection Summary			
Average Delay	1.1		
Intersection Capacity Utilization	58.8%	ICU Level of Service	B
Analysis Period (min)	15		

APPENDIX F:
Signal Timing Plans

Traffic Signal Timing

City of Ottawa, Transportation Services Department

Traffic Signal Operations Unit

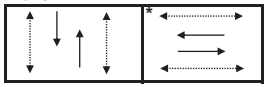
Intersection: **Main:** Terry Fox **Side:** Campeau
Controller: **ATC-3** **TSD:** **6032**
Author: Yassine Bennani **Date:** 16-Nov-2018

Existing Timing Plans†

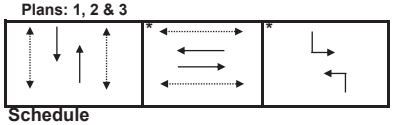
	Plan				Ped Minimum Time		
	AM Peak 1	Off Peak 2	PM Peak 3	Night 4	*Walk*	*DW*	*A+R*
Cycle	110	115	120	83			
Offset	27	33	93	X			
NB Thru	44	43	50	40	7	27	4.2+2.2
SB Thru	44	43	50	40	7	27	4.2+2.2
EB Thru	54	50	48	43	7	30	3.7+2.7
WB Thru	54	50	48	43	7	30	3.7+2.7
NB Left	12	22	22	-	-	-	4.2+2.2
SB Left	12	22	22	-	-	-	4.2+2.2

Phasing Sequence‡

Plans: 4



Plans: 1, 2 & 3



Schedule

Weekday

Time	Plan
0:10	4
6:30	1
9:30	2
15:00	3
19:00	2
23:00	4

Saturday

Time	Plan
0:10	4
9:00	2
22:30	4

Sunday

Time	Plan
0:10	4
8:00	2
22:30	4

Notes

†: Time for each direction includes amber and all red intervals
‡: Start of first phase should be used as reference point for offset
Asterisk (*) Indicates actuated phase
(fp): Fully Protected Left Turn
◄·····► Pedestrian signal

Cost is $56.50 ($50 + HST)

Traffic Signal Timing

City of Ottawa, Transportation Services Department

Traffic Signal Operations Unit

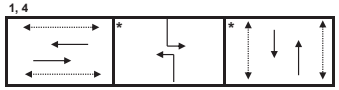
Intersection: ***Main:*** Campeau ***Side:*** Herlihey / Signature Centre
Controller: **ATC 3** **TSD:** **6532**
Author: Ahmed Abdullah **Date:** 18-Sep-2019

Existing Timing Plans†

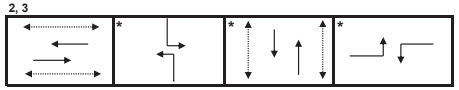
	Plan				Ped Minimum Time		
	AM Peak 1	Off Peak 2	PM Peak 3	Night 4	*Walk*	*DW*	*A+R*
Cycle	110	115	120	79			
Offset	75	78	26	X			
EB Thru	64	51	45	35	7	22	3.3+2.2
WB Thru	64	51	45	35	7	22	3.3+2.2
NB Left (fp)	17	20	26	15	-	-	3.3+2.6
SB Left (fp)	17	20	26	15	-	-	3.3+2.6
NB Thru	29	29	29	29	7	16	3.3+2.6
SB Thru	29	29	29	29	7	16	3.3+2.6
EB Left	-	15	20	-	-	-	3.3+2.2
WB Left	-	15	20	-	-	-	3.3+2.2

Phasing Sequence‡

Plan: 1, 4



Plan: 2, 3



Note: 1) Plan 3 has min recall of 10 seconds green on the North-South movement

Schedule

Weekday

Time	Plan
0:10	4
6:30	1
9:30	2
15:00	3
19:00	2
23:00	4

Saturday

Time	Plan
0:10	4
9:00	2
22:30	4

Sunday

Time	Plan
0:10	4
8:00	2
22:30	4

Notes

†: Time for each direction includes amber and all red intervals
‡: Start of first phase should be used as reference point for offset
Asterisk (*) Indicates actuated phase
(fp): Fully Protected Left Turn
◄·····► Pedestrian signal

Cost is $57.63 ($51 + HST)

Traffic Signal Timing

City of Ottawa, Transportation Services Department

Traffic Signal Operations Unit

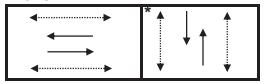
Intersection: Main: Campeau Side: Kanata
Controller: MS-3200 TSD: 6035
Author: Yassine Bennani Date: 16-Nov-2018

Existing Timing Plans†

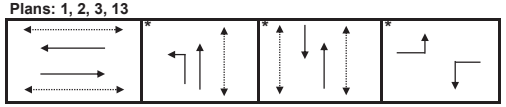
	Plan					Ped Minimum Time		
	AM Peak 1	Off Peak 2	PM Peak 3	Night 4	Noon 13	*Walk*	*DW*	*A+R*
Cycle	110	115	120	85	115			
Offset	67	82	31	X	82			
EB Thru	37	42	39	37	42	9	22	3.7+2.5
WB Thru	37	42	39	37	42	9	22	3.7+2.5
NB Left	15	16	18	-	16	-	-	3.3+2.6
SB Thru	46	42	39	48	42	9	15	3.3+2.6
NB Thru	61	58	63	48	58	9	15	3.3+2.6
EB Left	12	15	24	-	15	-	-	3.7+2.5
WB Left	12	15	24	-	15	-	-	3.7+2.5

Phasing Sequence‡

Plans: 4



Plans: 1, 2, 3, 13



Schedule

Weekday

Time	Plan
0:10	4
6:45	1
9:30	2
12:00	13
15:00	3
19:00	2
23:00	4

Saturday

Time	Plan
0:10	4
8:45	1
9:45	2
22:30	4

Sunday

Time	Plan
0:10	4
8:00	2
22:30	4

Notes

†: Time for each direction includes amber and all red intervals
‡: Start of first phase should be used as reference point for offset
Asterisk (*) Indicates actuated phase
(fp): Fully Protected Left Turn
◄·····► Pedestrian signal

Cost is $56.50 ($50 + HST)

Traffic Signal Timing

City of Ottawa, Transportation Services Department

Traffic Signal Operations Unit

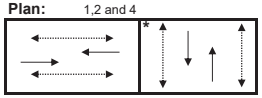
Intersection: Main: Kanata Side: Knudson/Maritime Way
Controller: MS-3200 TSD: 6548
Author: Yassine Bennani Date: 16-Nov-2018

Existing Timing Plans†

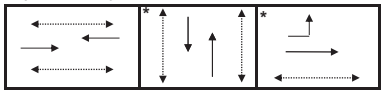
	Plan				Ped Minimum Time		
	AM Peak 1	Off Peak 2	PM Peak 3	Night 4	*Walk*	*DW*	*A+R*
Cycle	Free	60	90	Free			
Offset	X	0	0	X			
EB Thru	min=50.7	35	66	min=45.7	7	15	3.7+2.0
WB Thru	min=50.7	35	51	min=45.7	7	15	3.7+2.0
NB Thru	max=41	25	24	max=26.0	7	10	3.0+3.0
SB Thru	max=41	25	24	max=26.0	7	10	3.0+3.0
EBLT	-	-	15	-	-	-	3.7+2.0

Phasing Sequence‡

Plan: 1,2 and 4



Plan: 3



Schedule

Weekday

Time	Plan
0:10	4
6:30	2
7:00	1
9:30	2
15:30	3
18:00	2
20:00	4

Weekend

Time	Plan
0:10	4
10:00	2
19:00	4

Notes

†: Time for each direction includes amber and all red intervals
‡: Start of first phase should be used as reference point for offset
Asterisk (*) Indicates actuated phase
(fp): Fully Protected Left Turn
◄·····► Pedestrian signal

Cost is $56.50 ($50 + HST)

Traffic Signal Timing

City of Ottawa, Transportation Services Department

Traffic Signal Operations Unit

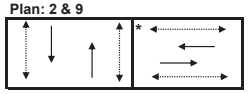
Intersection: Main: Campeau Side: Hawkstone
Controller: MS-3200 **TSD:** 6513
Author: Yassine Bennani **Date:** 16-Nov-2018

Existing Timing Plans†

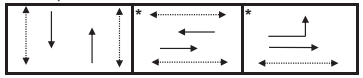
	Plan					Ped Minimum Time		
	AM Peak 1	Off Peak 2	PM Peak 3	PM Rush 7	Night 9	*Walk*	*DW*	*A+R*
Cycle	80	70	90	90	Free			
Offset	0	0	0	0	X			
EB Thru	55	45	65	65	min: 55	10	16	3.7+2.3
WB Thru	40	45	50	50	min: 55	10	16	3.7+2.3
NB Thru	25	25	25	25	max :35.9	7	11	3.3+2.6
SB Thru	25	25	25	25	max: 35.9	7	11	3.3+2.6
EB Left	15	-	15	15	-	-	-	3.7+2.3

Phasing Sequence‡

Plan: 2 & 9



Plan: 1, 3 & 7



Schedule

Weekday

Time	Plan
0:10	9
7:30	1
9:00	9
11:30	2
13:30	9
15:00	3
16:00	7
18:30	9

Weekend

Time	Plan
0:10	9
22:30	9

Notes

†: Time for each direction includes amber and all red intervals
‡: Start of first phase should be used as reference point for offset
Asterisk (*) Indicates actuated phase
(fp): Fully Protected Left Turn
◄·····► Pedestrian signal

Cost is $56.50 ($50 + HST)

Traffic Signal Timing

City of Ottawa, Transportation Services Department

Traffic Signal Operations Unit

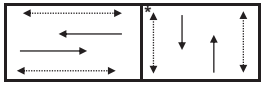
Intersection: Main: Campeau Side: Teron
Controller: MS-3200 **TSD:** 5171
Author: Yassine Bennani **Date:** 16-Nov-2018

Existing Timing Plans†

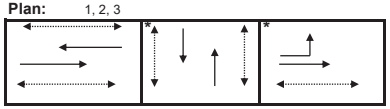
	Plan				Ped Minimum Time		
	AM Peak 1	Off Peak 2	PM Peak 3	Night 4	*Walk*	*DW*	*A+R*
Cycle	free	free	free	free			
Offset	X	X	X	X			
EB Thru	min: 55.9	min: 55.9	min: 55.9	min: 55.9	7	15	3.7+2.2
WB Thru	min: 55.9	min: 55.9	min: 55.9	min: 55.9	7	15	3.7+2.2
NB Thru	max: 55.9	max: 55.9	max: 55.9	max: 55.9	7	14	3.3+2.6
SB Thru	max: 55.9	max: 55.9	max: 55.9	max: 55.9	7	14	3.3+2.6
EBLT	max: 20.9	max: 20.9	max: 20.9	-	-	-	3.7+2.2

Phasing Sequence‡

Plan: 4



Plan: 1, 2, 3



Schedule

Weekday

Time	Plan
0:10	4
6:30	1
9:30	2
15:00	3
18:30	2
21:00	4

Weekend

Time	Plan
0:10	4
9:30	2
18:30	4

Notes

†: Time for each direction includes amber and all red intervals
‡: Start of first phase should be used as reference point for offset
Asterisk (*) Indicates actuated phase
(fp): Fully Protected Left Turn
◄·····► Pedestrian signal

Cost is $56.50 ($50 + HST)

Traffic Signal Timing

City of Ottawa, Transportation Services Department

Traffic Signal Operations Unit

Intersection: ***Main:*** March ***Side:*** Campeau/HWY417 WB ramp
Controller: MS-3200 **TSD:** 5642
Author: Yassine Bennani **Date:** 16-Nov-2018

Existing Timing Plans†

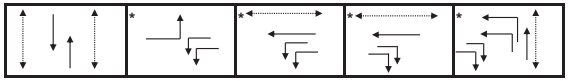
	Plan							Ped Minimum Time		
	AM Peak 1	Off Peak 2	PM Peak 3	Night 4	Saturday 5	PM 13	PM 15	*Walk*	*DW*	*A+R*
Cycle	110	100	120	100	100	150	130			
Offset	97	0	0	X	0	79	29			
NB Thru	47	43	62	31	45	88	72	7	16	3.7+3.8
SB Thru	35	31	50	31	31	76	60	7	16	3.7+3.8
EB Left (fp)	19	13	14	13	11	18	14	-	-	3.7+2.3
WB Left (fp)	63	57	58	57	55	62	58	-	-	3.7+2.5
WB Thru	44	44	44	44	44	44	44	7	30	3.7+3.1
EB Right *(fp)*	12	12	12	12	14	12	12	-	-	3.7+2.8
NB Left (fp)	12	12	12	12	14	12	12	-	-	3.7+2.8

Notes: 1) Plan 1 has a minimum recall of 5 seconds for the NB Left movement.

2) If there is no faze 8 pedestrian actuation, fazes 3 & 8 terminate after 17 seconds of green.

Phasing Sequence‡

Plans:All



Schedule

Weekday

Time	Plan
0:10	4
5:20	1
9:50	2
15:00	3
15:45	15
16:30	13
19:00	2
23:00	4

Saturday

Time	Plan
0:10	4
8:00	5
22:30	4

Sunday

Time	Plan
0:10	4
8:00	2
22:30	4

Notes

†: Time for each direction includes amber and all red intervals
‡: Start of first phase should be used as reference point for offset
Asterisk (*) Indicates actuated phase
(fp): Fully Protected Left Turn

Pedestrian signal

Cost is $56.50 ($50 + HST)