7000 Campeau Drive
Transportation Impact Assessment

Ottawa, Ontario

Prepared For: Minto Communities on behalf of ClubLink Corportation ULC

September 2019

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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 a completion of the Transportation Impact Assessment process; this report is a finalized Transportation Impact Assessment included as part of submission with the development application.

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

- Single Detached Homes: 545 units
- Townhouses: 498 units
- Back to Back Townhouses: 88 units
- Medium Density: 371 units
- **Total Residential Dwelling Units: 1,502 units**

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

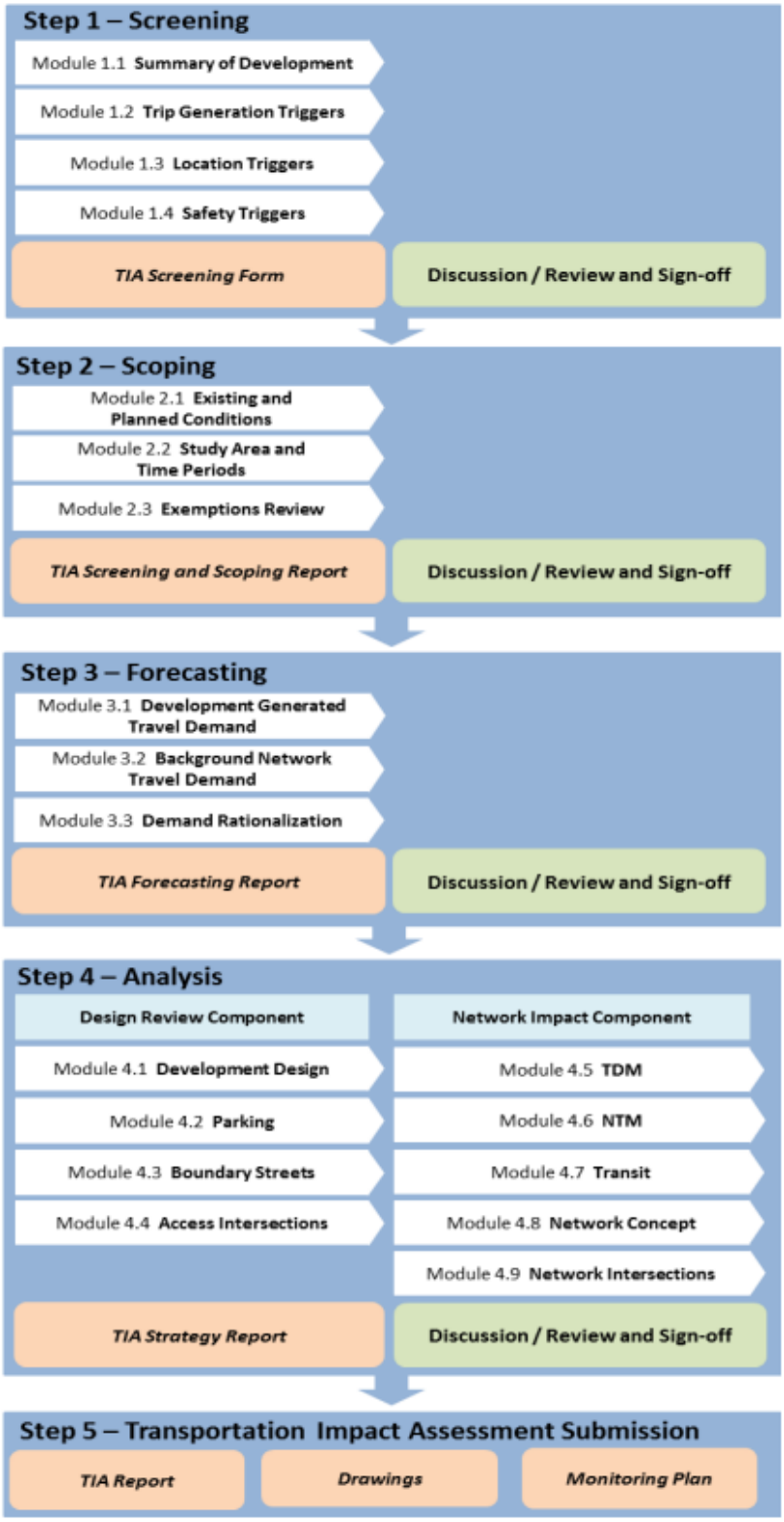

FIGURE 1: CITY OF OTTAWA TIA STUDY PROCESS

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 proposed 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 detached homes with individual driveways.

5. With respect to transit access, the site is located within approximately 750 metres of the Terry Fox Bus Terminal south of the site. Furthermore, the site is located within close proximity to transit stops along the Campeau Drive corridor. Four (4) existing transit routes (62, 161, 164, 268) utilize Campeau Drive providing connections to a number of additional routes, primarily via the Terry Fox Bus Terminal.

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: 545 units
    - Townhouses: 498 units
    - Back to Back Townhouses: 88 units
    - Medium Density: 371 units
    - **Total Residential Dwelling Units: 1,502 units**

10. The development is planned to be developed in one large phase but marketed and constructed in several sub-phases. The planned date of completion for the project (i.e. occupancy) is 2025.

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," 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 represents a total development in the order of 1,375 residential units, 5,803 m2 GFA of retail space, and 759 m2 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 (both types). For the lower density (i.e. single detached home areas) dwelling units, the trip generation was based upon neighbourhood traffic surveys in the existing local area, as this is representative of the future characteristic 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 = 1,230 two-way person trips (400 trips in, 830 trips out)
    - Weekday afternoon peak hour = 1,305 two-way person trips (730 trips in, 575 trips out)

    Transit Trips
    - Weekday morning peak hour = 310 two-way person trips (100 trips in, 210 trips out)
    - Weekday afternoon peak hour = 325 two-way person trips (180 trips in, 145 trips out)

    Walking Trips
    - Weekday morning peak hour = 60 two-way person trips (20 trips in, 40 trips out)
    - Weekday afternoon peak hour = 65 two-way person trips (35 trips in, 30 trips out)

    Cycling Trips
    - Weekday morning peak hour = 60 two-way person trips (20 trips in, 40 trips out)
    - Weekday afternoon peak hour = 65 two-way person trips (35 trips in, 30 trips out)

    Auto Passenger Trips
    - Weekday morning peak hour = 125 two-way person trips (40 trips in, 85 trips out)
    - Weekday afternoon peak hour = 130 two-way person trips (75 trips in, 55 trips out)

    Auto Driver Trips
    - Weekday morning peak hour = 675 two-way person trips (220 trips in, 455 trips out)
    - Weekday afternoon peak hour = 720 two-way person trips (405 trips in, 315 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 a 16.5m 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 a 16.5 metre ROW with a sidewalk on one side of the street in order to accommodate pedestrian / active transportation. Cross-sections are included as part of this report.

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 new development to the existing neighbourhood areas.

26. Based on the existing transit service, approximately 97% of the households proposed in the development area 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.

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 (e.g. with bulbouts) at key locations / intersections, and the provision of raised intersections at strategic locations. Specific prescribed locations include the placement of “bulbouts” on Street Number 1, Street Number 16, and Street Number 23, and a raised intersection at the intersection of Street Number 7 and Street Number 9.

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 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 generally LOS E with an LOS F existing between Terry Fox Drive and Herlihey Way.

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 Road 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 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 transit services provided at the Terry Fox Bus 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 0.83 and 0.93 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.

59. Notwithstanding that RMA drawings are not required, preliminary functional design plans outlining the proposed modifications to the pavement marking on Campeau Drive and the signage adjustments required have been provided with this study for the City of Ottawa's review.

Recommendations

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

Monitoring Plan

61. 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.

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 site plan includes the following development programme:

- Single Detached Homes: 545 units
- Executive Townhouses: 498 units
- Avenue Townhouses: 88 units
- Medium Density: 371 units
- **Total Residential Dwelling Units: 1,502 units**

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

Estimated Date of Occupancy & Planned Phasing of Development

The development is planned to be developed in one large phase but marketed and constructed in several sub-phases. The planned date of completion for the project (i.e. occupancy) is 2025.

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 location of the three vehicular access points will be coordinated with the development proponents of Parc Bill Teron Park (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 an Arterial 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 local road extending between Kanata Avenue in the north and Campeau Drive in the south. Knudson Drive continues as Maritime Way, south of Campeau Drive.
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

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EXISTING ROAD NETWORK & LANE CONFIGURATIONS

BA Group

Project Fore
6566-39 September 2019

Figure 2

Existing Transit Network

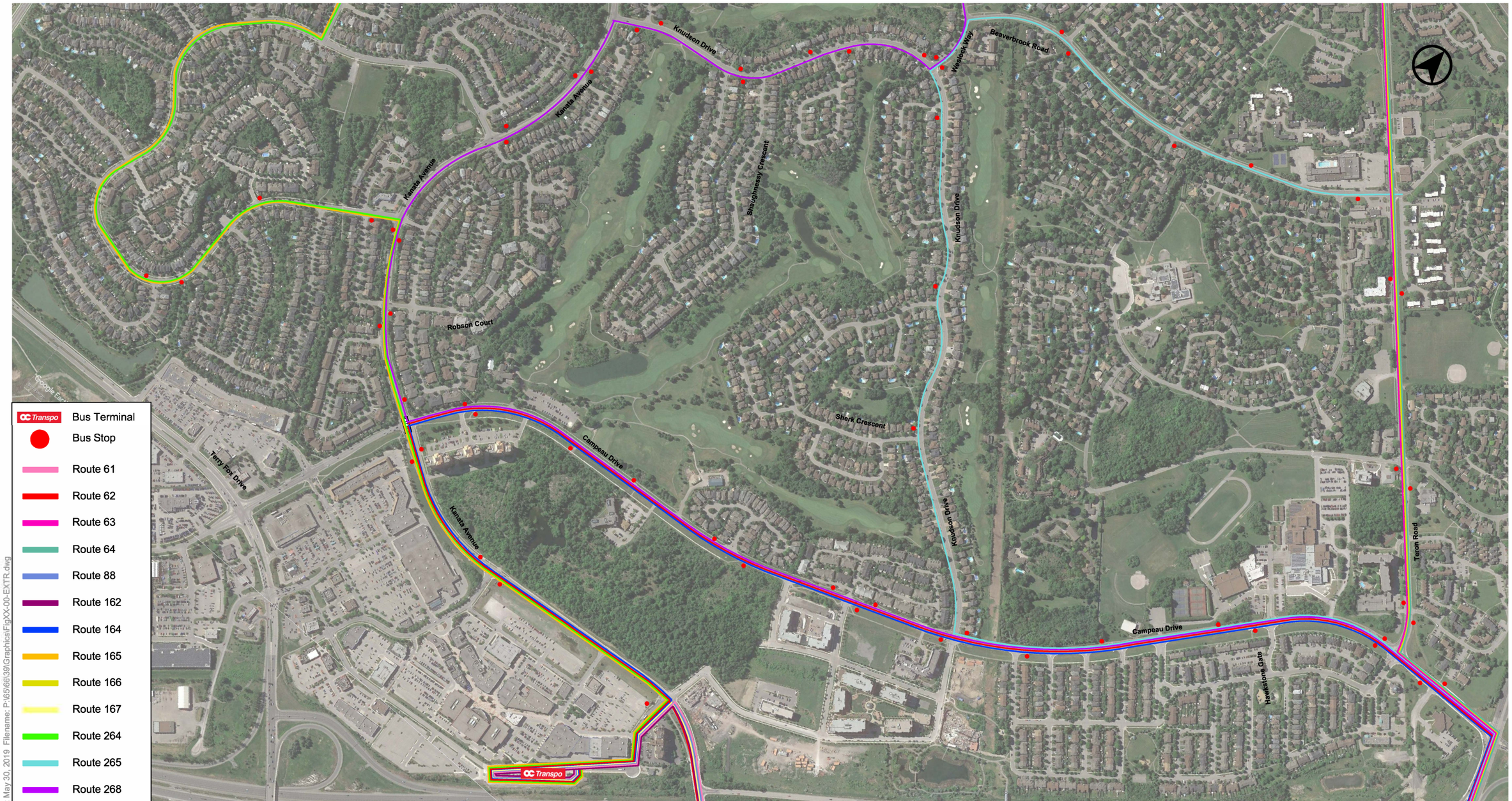
The proposed development is well-situated relative to existing transit infrastructure with the Terry Fox Bus Terminal located within approximately 750 metres. Furthermore, the site is located within close proximity to transit stops along the Campeau Drive corridor. A summary of the local transit lines 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 St. Laurent ↔ Terry Fox & Stittsville	Terry Fox Station	30 minutes during all hours	The 61 bus rote operates generally in an east-west direction between Terry Fox and St. Laurent.
62 St. Laurent ↔ 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 St. Laurent. It also serves the area of Stittsville on weekdays only.
63 Briarbrook via Innovation ↔ Mackenzie King via Briarbrook	Campeau Drive / Teron Road	10 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 Mackenzie King.
64 Morgan's Grant via Innovation ↔ Mackenzie King via Morgan's Grant	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 Mackenzie King.
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
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 Mackenzie King ↔ 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 Mackenzie King. The bus route travels east towards Mackenzie King in the morning peak period and west towards Terry Fox in the afternoon peak period.
265 Mackenzie King ↔ Beaverbrook	Several stops on Kundson Drive	60 minutes during rush hours	The 265 bus route operates generally in an east-west direction between Mackenzie King and Beaverbrook. The bus route travels east towards Mackenzie King in the morning peak period and west towards the area of Beaverbrook in the afternoon peak period.
268 Mackenzie King ↔ Kanata Lakes	Campeau Drive, bordering Site to the south	30 minutes during rush hours	The 268 bus route operates generally in an east-west direction between Mackenzie King and the area of Kanata Lakes. The bus route travels east towards Mackenzie King in the morning peak period and west towards the area of Kanata Lakes in the afternoon peak period.



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EXISTING TRANSIT NETWORK

BA Group

7000 Campeau Drive
6566-39 September 2019

Figure 3

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

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EXISTING CYCLING CONTEXT

BA Group

7000 Campeau Drive
6566-39 September 2019

Figure 4

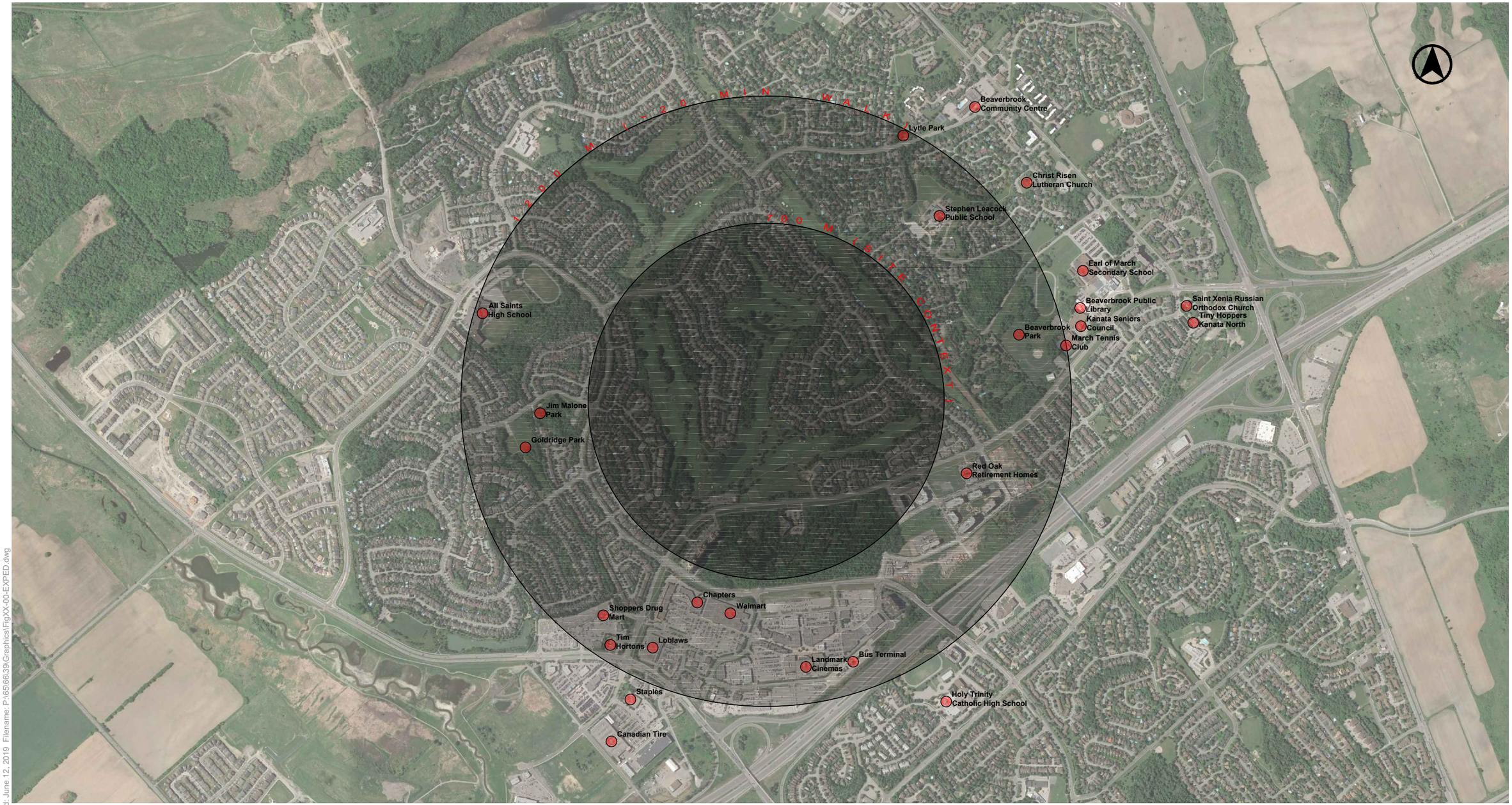
Existing Pedestrian Network

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. The site is also located within 750 metres to the Terry Fox bus terminal that services the majority of bus routes in the area. This reduces the need for 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.

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



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EXISTING PEDESTRIAN CONTEXT

BA Group

7000 Campeau Drive
6566-39 September 2019

Figure 5

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	35	26	14	27	25.6

Existing Area Travel Characteristics

The City of Ottawa has provided an origin-destination (O-D) matrix for the area travel characteristic 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 is summarized in **Table 5**.

TABLE 5 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

There are no existing traffic calming measures in the study area except for stop signs at the unsignalized intersections.

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

TRANSPORTATION MASTER PLAN - Map 11

ROAD NETWORK – 2031 AFFORDABLE NETWORK

Phase 1 (2014 - 2019) Widening
Phase 1 (2014 - 2019) New Road
Phase 2 (2020 - 2025) Widening
Phase 2 (2020 - 2025) New Road
Phase 3 (2026 - 2031) Widening
Phase 3 (2026 - 2031) New Road

TRANSPORTATION MASTER PLAN - Map 10

ROAD NETWORK – 2031 NETWORK CONCEPT

New Arterials
Widened Arterial
Conceptual Arterial
New or Widened Collector
New Interchange

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 6** 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 6 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 expected submission date of the TIA report. A five-year horizon year beyond 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 7**, elements are identified that can be exempted to reduce the scope of the TIA.

TABLE 7 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: Circulation and access to be assessed through future site plan applications.
	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: Parking supply to be assessed through future site plan applications.
	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 8**.

TABLE 8 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 (545 single detached units)	110	270	380	300	190	490
LUC 224 – Semi-detached dwellings / townhouse / rowhouses Trip Rates	0.20	0.34	0.54	0.38	0.33	0.71
Number of Trips (586 townhouse units)	115	200	315	220	195	415
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 (371 units)	25	80	105	85	50	135
Total Site Trips	**250**	**550**	**800**	**605**	**435**	**1,040**

Notes:
1. Site statistics are based on Concept Plan provided by Minto Communities, dated February 28th, 2019.
2. Trips rounded to the nearest 5 trips.

Based on the Ottawa's 2009 TRANS Study, the proposed development is anticipated to generate approximately 800 and 1,040 two-way vehicle trips during the weekday morning and afternoon peak hours, respectively.

Given that the proposed detached lots will be very 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 9**.

TABLE 9 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 (545 residential units)	**130**	**285**	**415**	**250**	**190**	**440**
Compare to Trip Gen for Detached Units Per Ottawa LUC 210	**110**	**270**	**380**	**300**	**190**	**490**

Notes:
1. Site statistics are based on Concept Plan provided by Minto Communities, dated February 28th, 2019.
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 415 and 440 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 50 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 10**.

TABLE 10 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)	**270**	**565**	**835**	**555**	**435**	**990**
Compare to Trip Gen for Ottawa's 2009 TRANS Study	**250**	**550**	**800**	**605**	**435**	**1,040**

Notes:
1. Site statistics are based on Concept Plan provided by Minto Communities, dated February 28th, 2019.
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 835 and 990 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 545 single detached units, 498 townhouse units, 88 back to back townhouse units, and 371 medium density units. This results in a total 1,502 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 2011 OD study, the vehicle trips were converted to person trips and summarized in **Table 11**.

TABLE 11 ESTIMATED DEVELOPMENT-GENERATED PERSON-TRIPS

1502 Residential Units	AM Peak Hour			PM Peak Hour		
	In	Out	2-Way	In	Out	2-Way
Vehicle Trips	250	550	800	605	435	1,040
Auto and Auto Passenger Mode Split	68%			76%		
Person Trips	370	810	1,180	795	575	1,370

The proposed development is anticipated to generate in the order of 1,180 and 1,370 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 1,230 and 1,305 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. In the AM Peak, it was assumed that the proposed development would primarily be external trips from the district while in the PM peak it was assumed that most trips would be going to the district therefore the appropriate mode splits from the TRANS report were collected.

TABLE 12 KANATA / STITTSVILLE MODE SPLIT

Mode Choice	AM Peak	PM Peak	24 Hour
Auto	52%	59%	63%
Auto Passenger	25%	24%	23%
Transit	13%	10%	8%
Bicycle	0%	0%	0%
Pedestrian	10%	7%	6%

Notes:
1. Other mode choice options include taxi, school bus and motorcycle and has been included into the Auto Passenger percentage.
2. AM Peak includes a blend of both from and within district in the AM Peak Hour for each mode choice.
3. PM Peak includes a blend of both to and within district in the PM Peak Hour for each mode choice.
4. 24 Hour includes a blend of to, from and within district in the 24 hour for each mode choice.
5. 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 20-25% 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 expected that mode shares will stay generally the same. Even with the proposed residential units, efforts will be made to encourage continued transit use and to keep transit mode shares similar to what was observed during the TRANS 2011 study. With the City of Ottawa's continued efforts to move people via transit, it is expected that this project will keep in line with that vision. The proposed residences will be near the Terry Fox Park and Ride and will also be near the Terry Fox Terminal for local bus routes. This should encourage continued transit use and provide alternatives to private vehicle transportation.

TABLE 13 FUTURE MODE SHARE TARGETS FOR THE DEVELOPMENT

Travel Mode	Mode Share Target	Rationale
Transit	25%	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.

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 14** .

TABLE 14 ESTIMATED DEVELOPMENT GENERATED PERSON-TRIPS

Mode Split	AM Peak Hour			PM Peak Hour		
	In	Out	2-Way	In	Out	2-Way
Base Scenario						
Transit	90	205	295	200	145	345
Walking	20	40	60	40	30	70
Cycling	20	40	60	40	30	70
Auto Passenger	35	80	115	80	55	135
Auto Driver	205	445	650	435	315	750
Total	**370**	**810**	**1,180**	**795**	**575**	**1,370**
Sensitivity Scenario						
Transit	100	210	310	180	145	325
Walking	20	40	60	35	30	65
Cycling	20	40	60	35	30	65
Auto Passenger	40	85	125	75	55	130
Auto Driver	220	455	675	405	315	720
Total	**400**	**830**	**1,230**	**730**	**575**	**1,305**

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 15**.

TABLE 15 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

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 15**. 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 16**.

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

TABLE 16 SITE TRIP ASSIGNMENT

Major Roads	AM Out (%)				PM In (%)			
	East	West	North	South	East	West	North	South
Campeau Drive	5%	0%	-	-	5%	0%	-	-
Terry Fox Drive	-	-	15%	0%	-	-	20%	0%
March Road	-	-	35%	5%	-	-	40%	5%
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**.

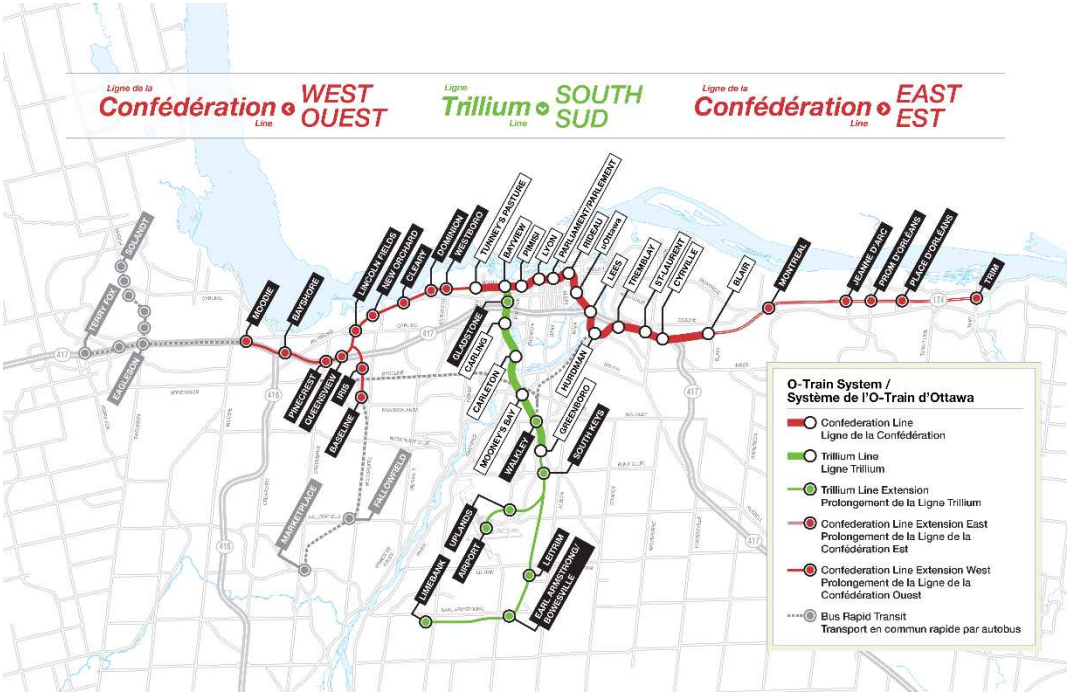


FIGURE 8: LRT CONFEDERATION LINE EXPANSION

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 6**) 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 17**.

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

TABLE 17 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 a 16.5m 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. 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 a 16.5 metre ROW with a sidewalk on one side of the street in order to accommodate pedestrian / active transportation.

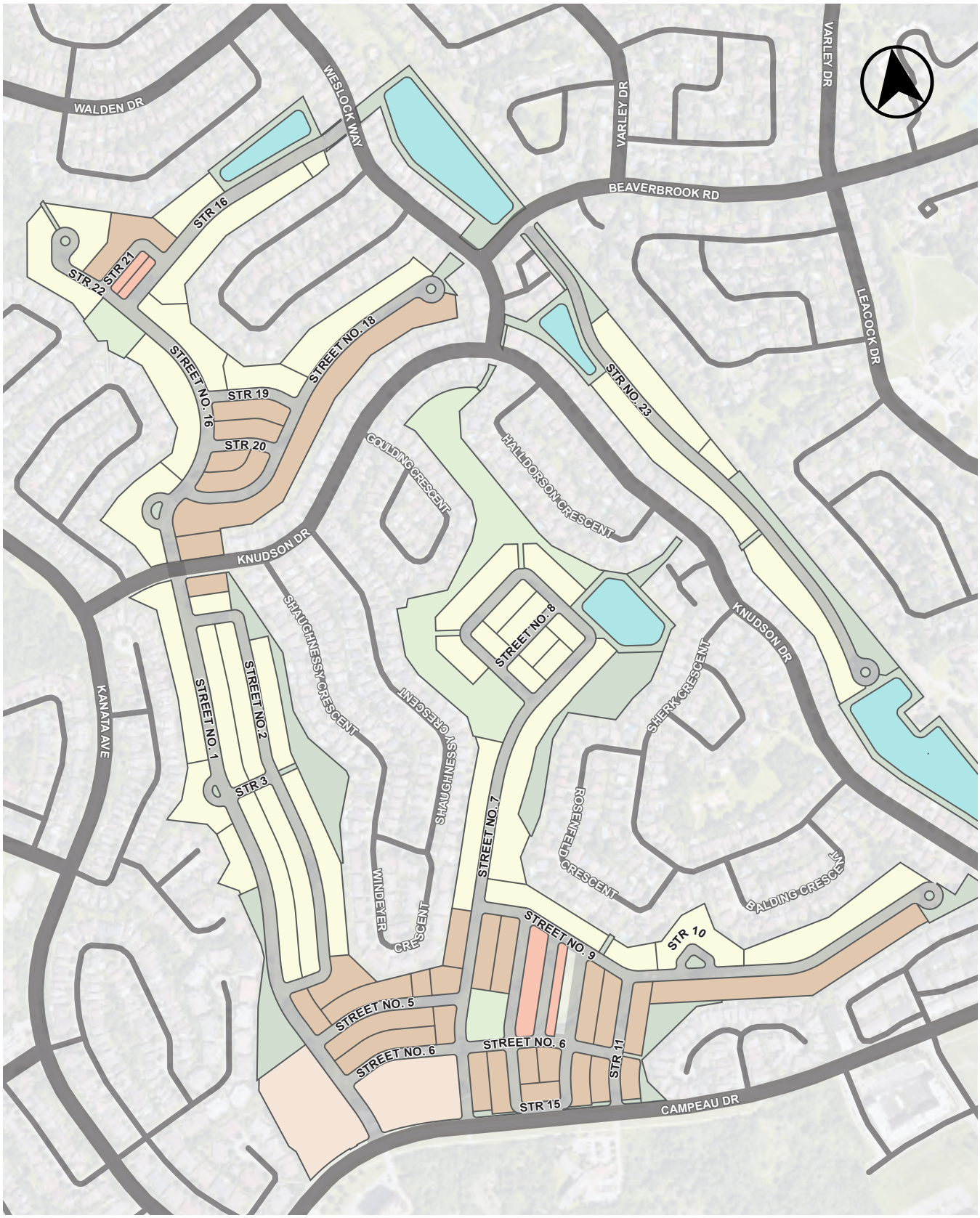
The proposed street cross sections, which are all based on the City of Ottawa's standard cross sections, are illustrated as **Figure 10** and **Figure 11**, respectively**.**

Consistent with the condition on the other area local streets surrounding the site, 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.

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 12** 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. Based on the existing transit routes, approximately 97% of the households proposed in the development area will be within 400 metres of a transit stop. **Figure 13** illustrates the transit coverage.

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.



CONCEPT PLAN WITH OVERVIEW OF ROAD LINKS

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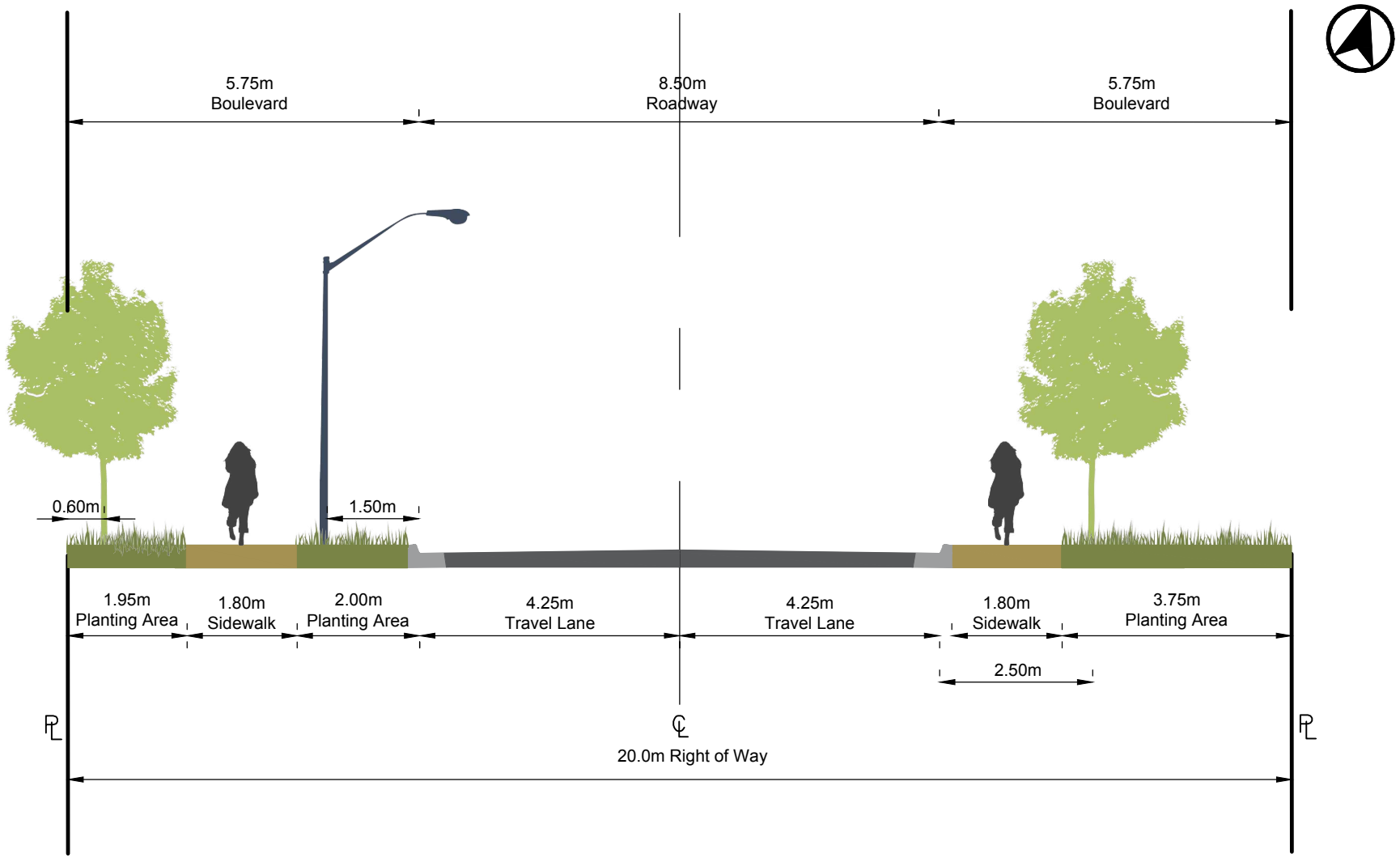
Figure 9

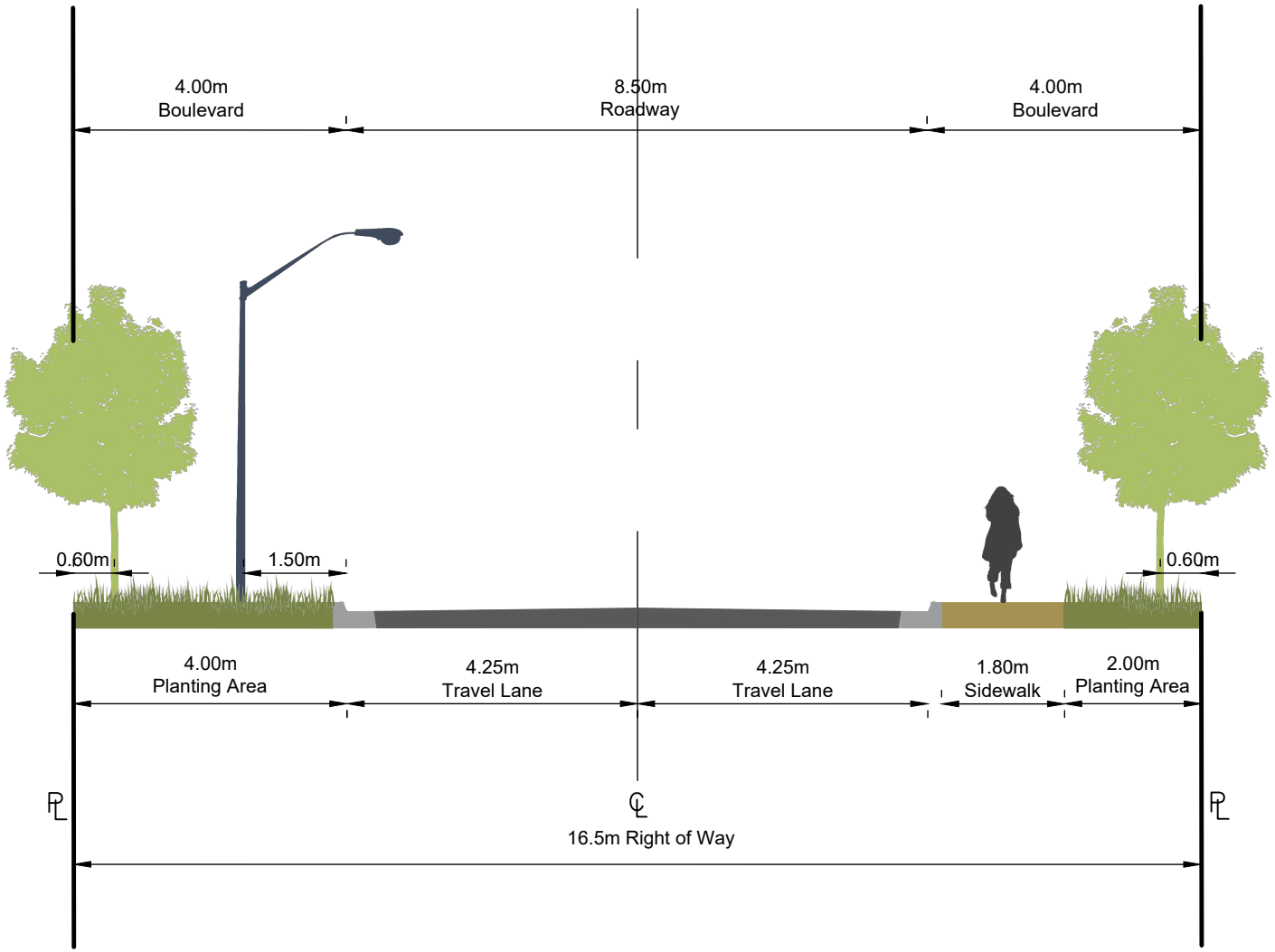


NOTE: Cross section as per City of Ottawa DWG. No ROW-20

N.T.S

7000 CAMPEAU DRIVE

20.0m ROW cross-section



NOTE: Cross section as per City of Ottawa DWG. No ROW-16.5

N.T.S

7000 CAMPEAU DRIVE

16.5m ROW cross-section

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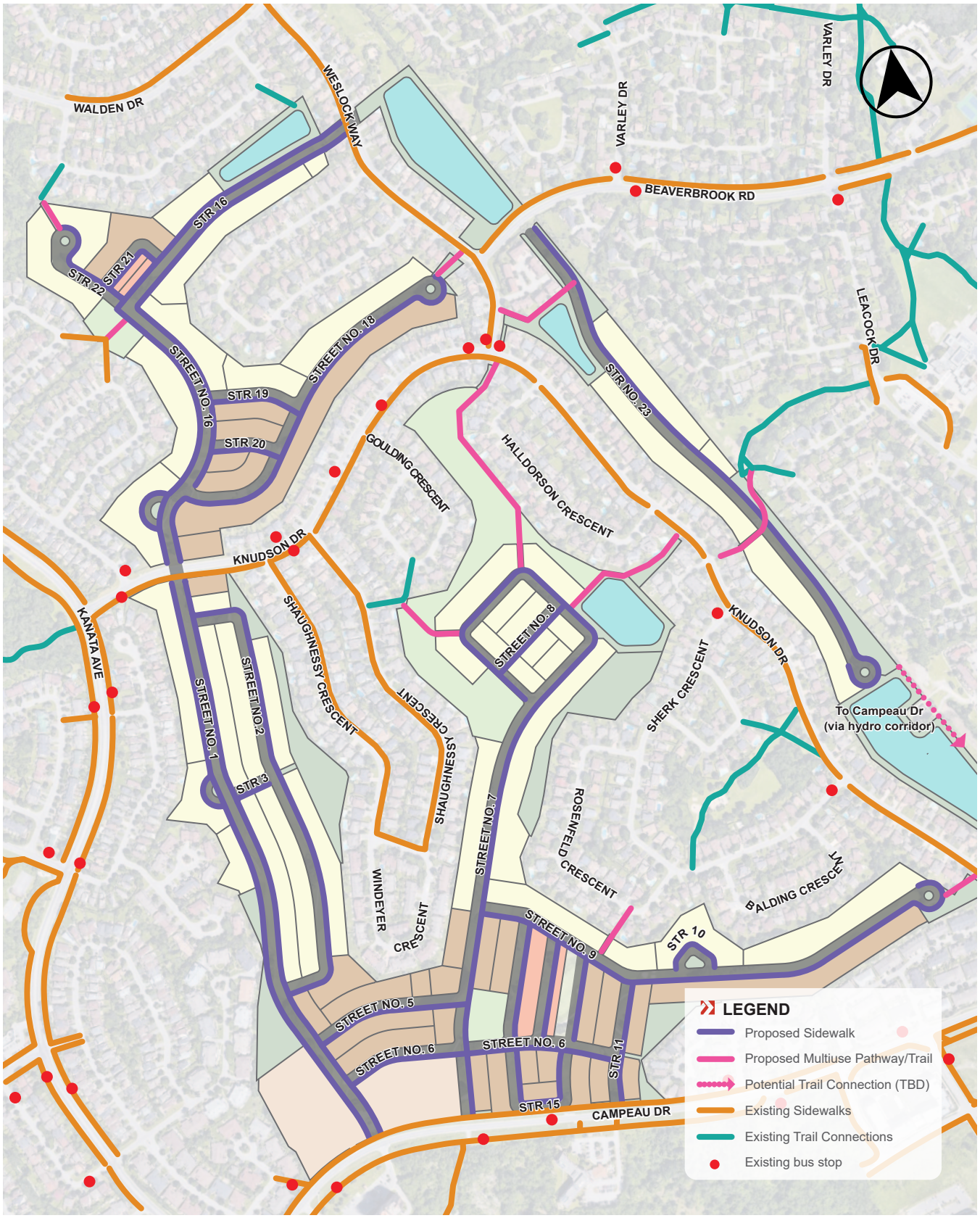
Figure 11



PROPOSED PEDESTRIAN NETWORK

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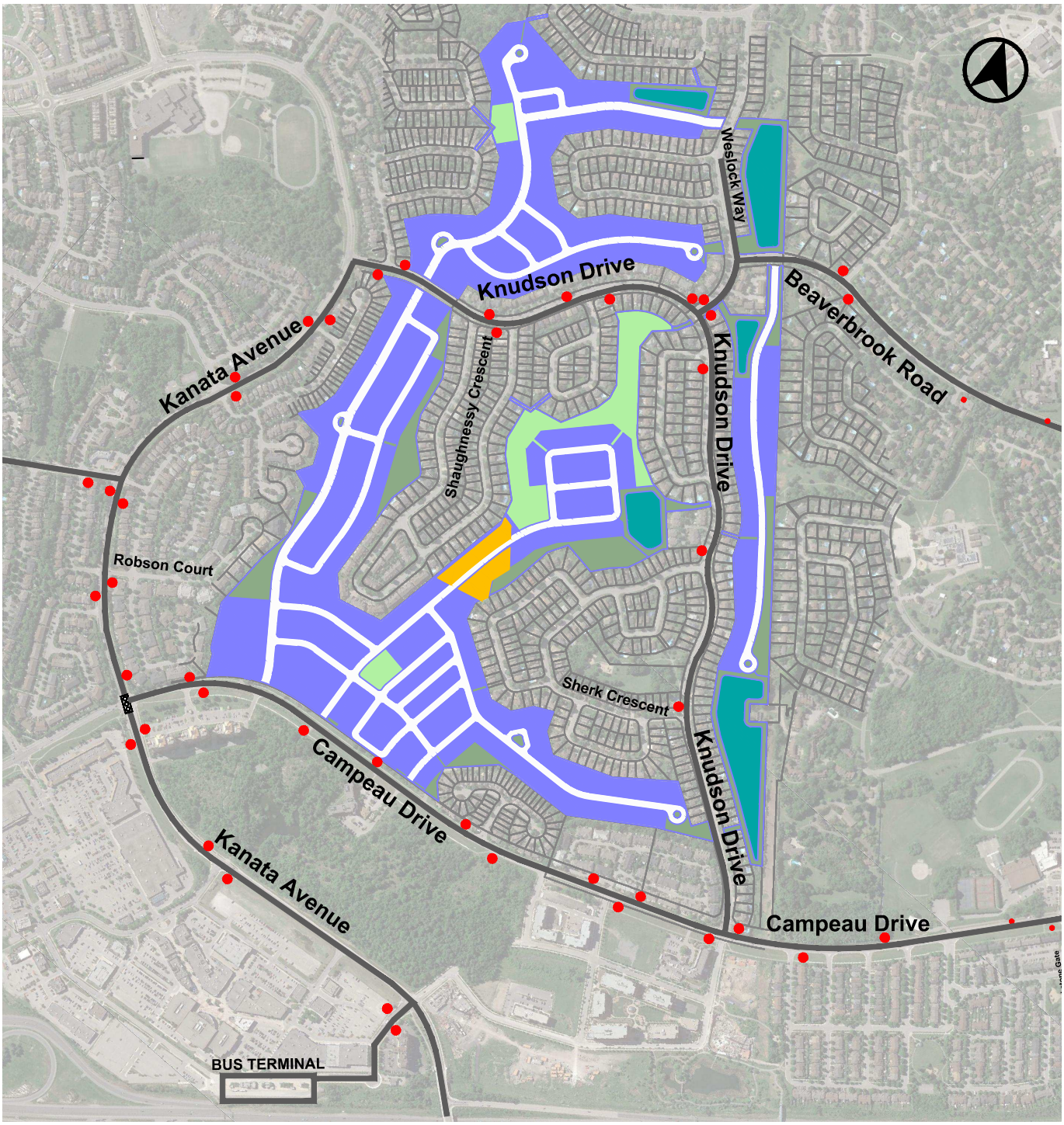
Figure 12



Existing bus route

Area of new development residences within 400m of existing transit stop

Area of new development residences outside of 400m distance to existing transit stop

Area of new development not occupied by residences, including neighborhood parks, open spaces and SWM ponds

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PROXIMITY TO EXISTING TRANSIT NETWORK

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Figure 13

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.

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

TABLE 18 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 (South of Knudson 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. 23 (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.

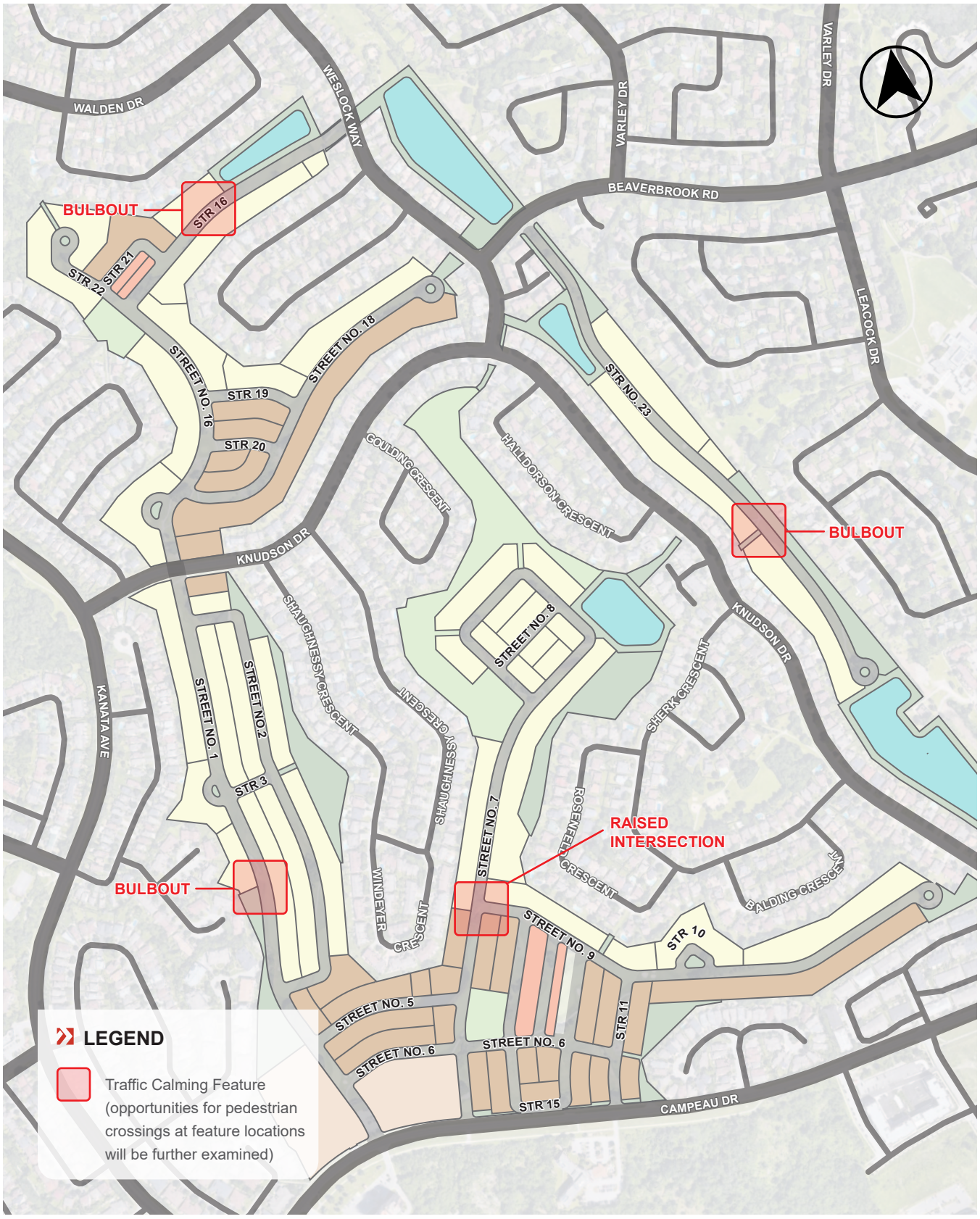
Assessment of Neighbourhood Traffic Calming Needs

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 for consideration within the internal road network.

- Provision of speed display devices (i.e. speed radar stations).
- Provision of on-road messaging in strategic areas.
- Allowing on-street parking will be provided on all roads.
- Reducing the effective roadway width (e.g. bulb-outs, neck-downs) at key locations / intersections within the neighbourhood.
- Provision of raised intersections at strategic locations.

Figure 14 illustrates the locations and type of neighbourhood traffic calming being considered within the development plan. Specific prescribed locations include the placement of "bulbouts" on Street Number 1, Street Number 16, and Street Number 23, and a raised intersection at the Street Number 7 and Street Number 9 intersection.



PROPOSED NEIGHBOURHOOD TRAFFIC CALMING LOCATIONS AND TYPE

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Figure 14

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 with an LOS F existing between Terry Fox Drive and Herlihey Way.

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 15** shows collision records for the past five years at nearby intersections.

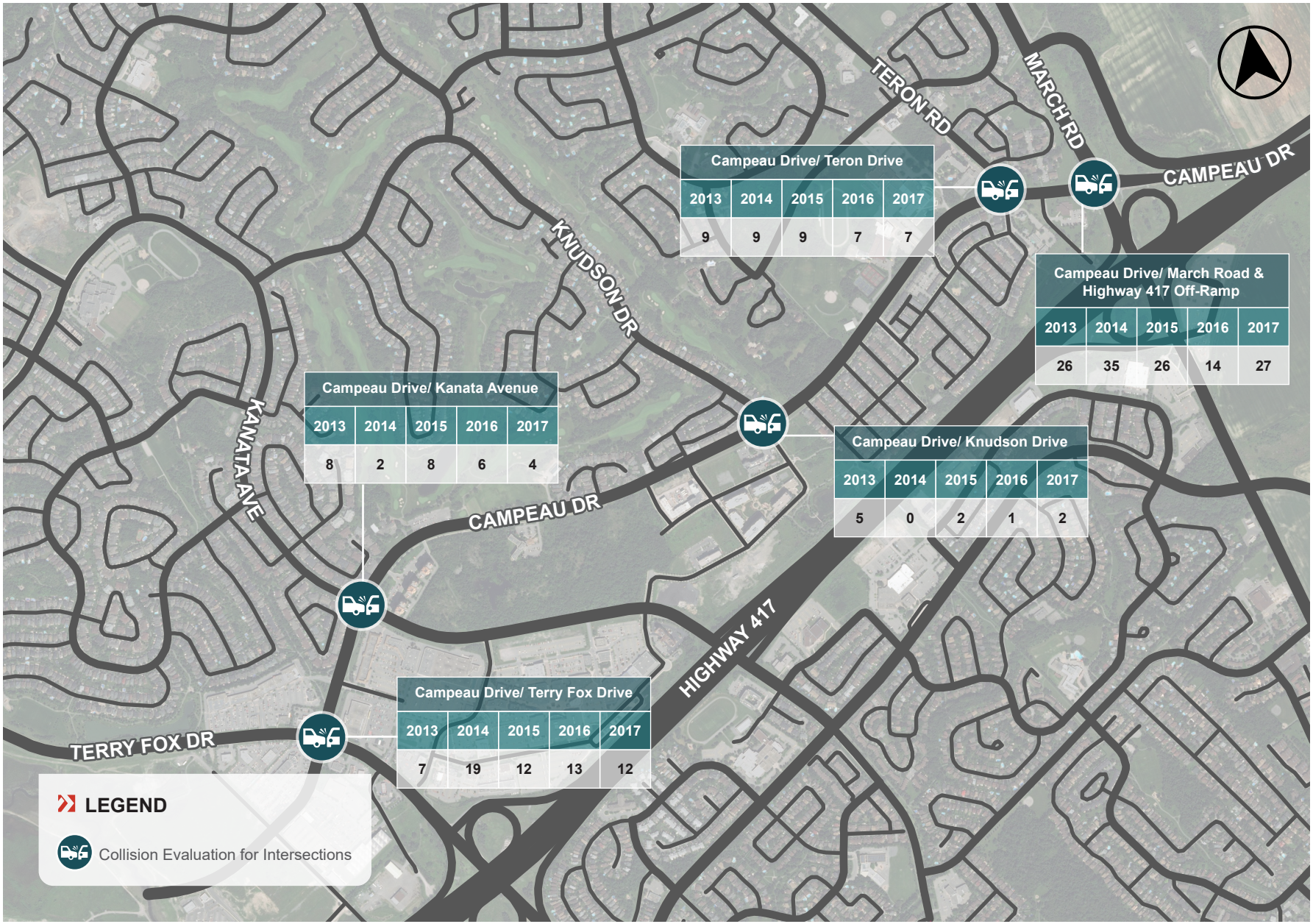
Based on a review of area collision data there is no discernable trends of increasing collision behaviour. The largest number of collisions in the study area is at the March Road / Campeau Drive intersection which has had 14-35 collisions per year for the past 5 years. Other intersections that have more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



HISTORICAL COLLISION DATA (FIVE YEARS)

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Figure 15

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 16**. 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

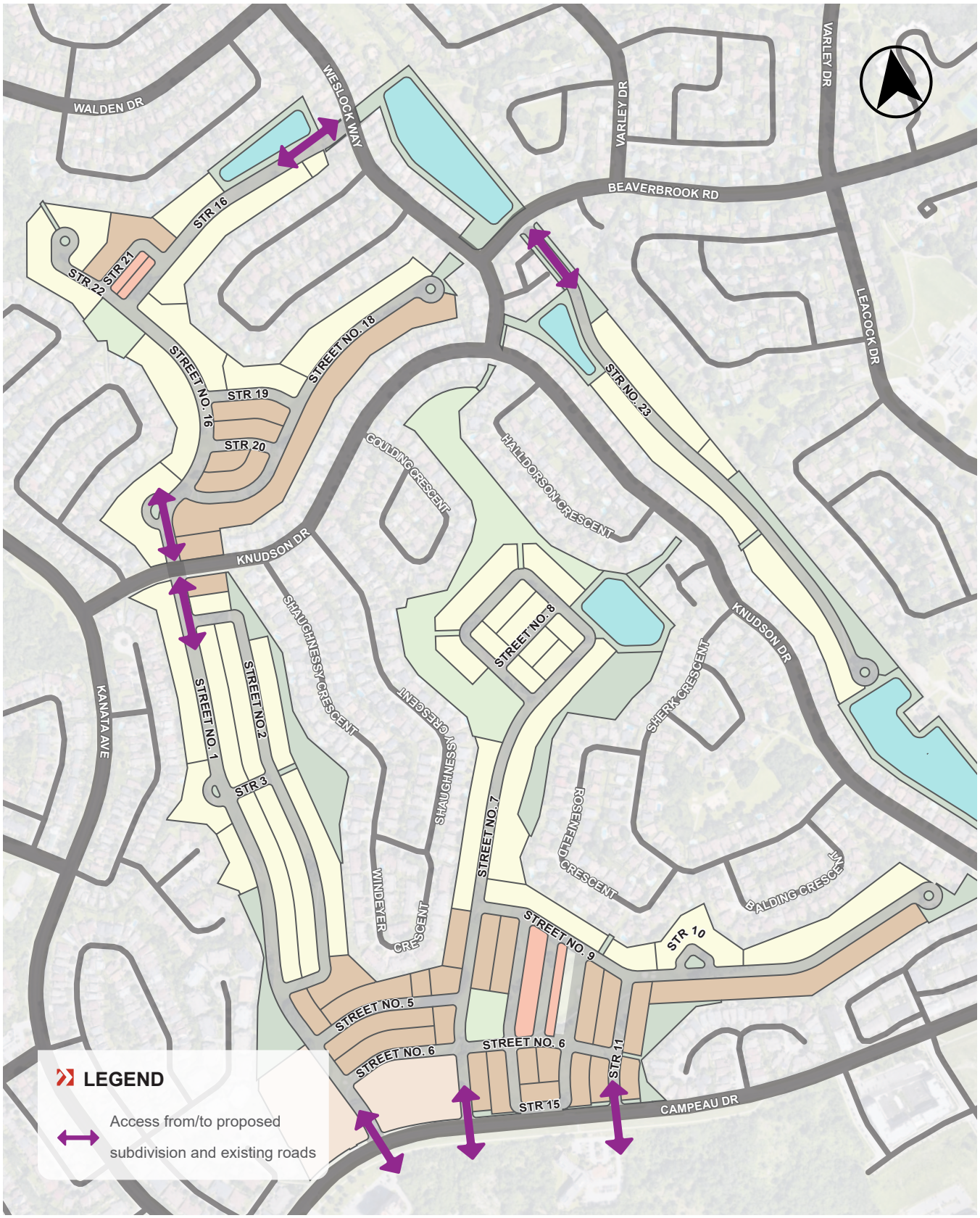
Based on the traffic analysis conducted at the proposed site access intersections under future total conditions, all site accesses operate at an acceptable level of service. All proposed access intersections will operate with two-way stop control with STOP control on the minor side streets (i.e. proposed) 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 17**.

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



PROPOSED ACCESS LOCATIONS

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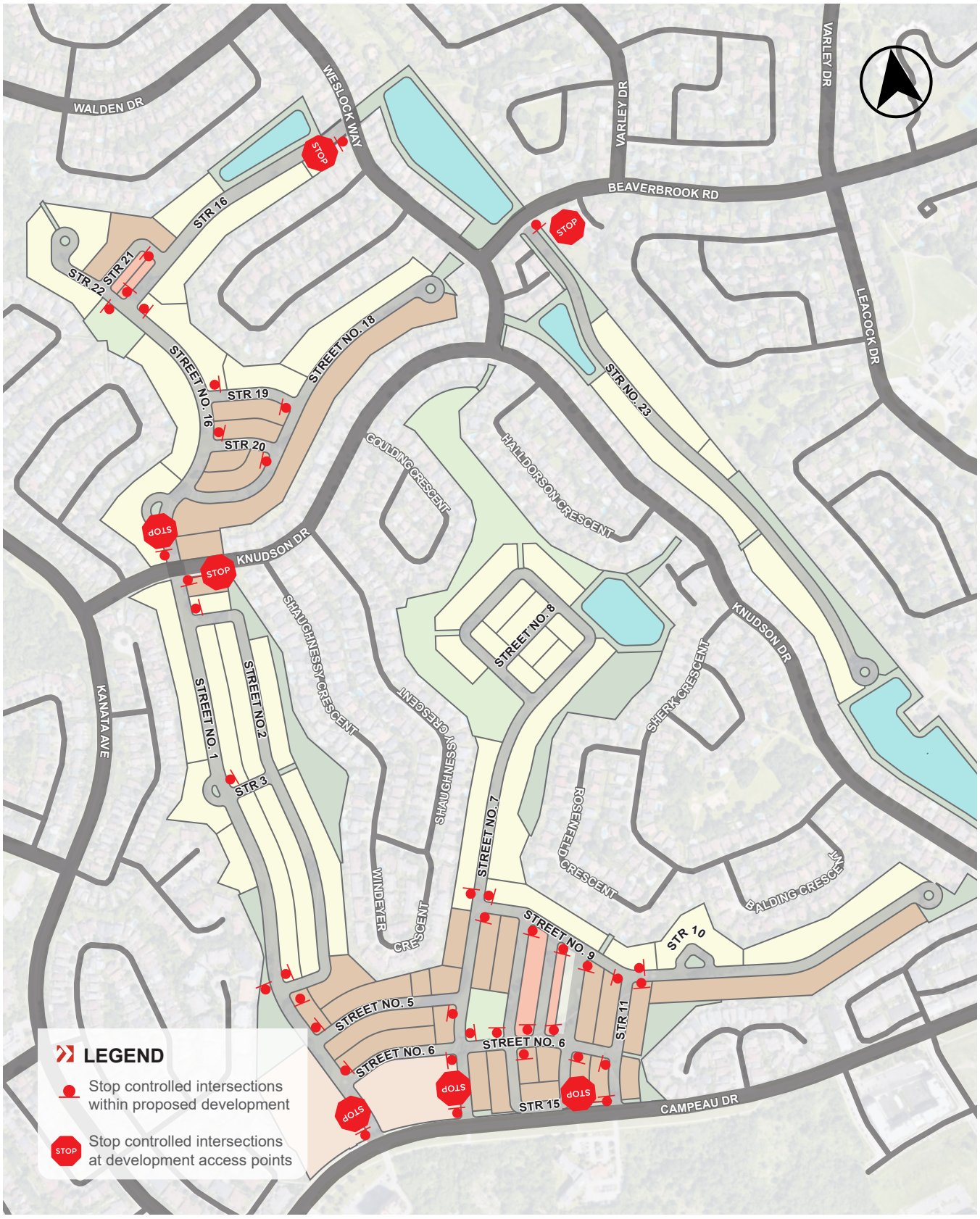
Figure 16



PROPOSED INTERSECTION CONTROL

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Figure 17

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 19**.

TABLE 19 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	-- (--)	-- (--)	-- (--)	-- (--)	0.7 (0.6)	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 (17.4)	B (C)
SBLTR	-- (--)	-- (--)	-- (--)	-- (--)	18.7 (20.0)	C (C)
Campeau Drive / Street No. 7						
EBLT	-- (--)	-- (--)	-- (--)	-- (--)	0.3 (0.6)	A (A)
SBLR	-- (--)	-- (--)	-- (--)	-- (--)	18.0 (20.1)	C (C)
Campeau Drive / Omni Health Care Centre & Street No. 11						
EBLTR	-- (--)	-- (--)	-- (--)	-- (--)	0.3 (0.6)	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)	16.6 (22.7)	C (C)
SBLTR	-- (--)	-- (--)	-- (--)	-- (--)	23.7 (27.0)	C (D)
Knudson Drive / Street No. 1 & Street No. 16						
EBLTR	-- (--)	-- (--)	-- (--)	-- (--)	0.6 (1.4)	A (A)
NBLTR	-- (--)	-- (--)	-- (--)	-- (--)	15.0 (15.9)	B (C)
SBLTR	-- (--)	-- (--)	-- (--)	-- (--)	9.4 (10.0)	A (B)
Weslock Way / Street No. 16						
EBLR	-- (--)	-- (--)	-- (--)	-- (--)	9.7 (8.7)	A (A)
NBLT	-- (--)	-- (--)	-- (--)	-- (--)	0.7 (0.8)	A (A)
Beaverbrook Road / Street No. 23						
NBLR	-- (--)	-- (--)	-- (--)	-- (--)	15.5 (14.6)	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 20** based upon the mode share analysis provided in **Table 12**.

TABLE 20 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, respecitvely. 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 located 750 metres from the Terry Fox Bus Terminal and, further, each surrounding road (i.e. Campeau Drive, Kanata Avenue, and Knudson Drive) is serviced by on-street bicycle lanes and OC Transpo local bus service. These adjacent transit and cycling amenities are representative of an opportunity; a post-occupancy TDM program will leverage these amenities to ensure that the proposed development mode share targets are reached. 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 the Terry Fox Bus Terminal 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 21**.

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 21 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 the Terry Fox Bus 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 22**.

TABLE 22 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 the Terry Fox Bus Terminal located within approximately 750 metres. Furthermore, the site is located within close proximity to transit stops along the Campeau Drive corridor. The area transit network generally offers services with approximately 30 minutes to 60 minutes headways.

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 23**.

TABLE 23 SITE GENERATED TRANSIT TRIPS

Land Use	AM Peak Hour			PM Peak Hour		
	In	Out	2-Way	In	Out	2-Way
Residential	100	210	310	180	145	325
Total	100	210	310	180	145	325

It is anticipated that the proposed development will generate approximately 310 and 325 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. The Terry Fox Bus Terminal located approximately 750 metres to the southwest is the primary transit terminal for transit users of bus services as it connects 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 transit services provided at the Terry Fox Bus Terminal, with some transit trips to the local area where smaller density employment areas are located.

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 17**.

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 24**. 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 24 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)	C (C)	0.07 (0.22)	C (C)	0.07 (0.21)	C (C)
EBT	0.04 (0.13)	C (C)	0.06 (0.18)	C (C)	0.06 (0.17)	C (C)
EBR	0.03 (0.05)	C (C)	0.02 (0.04)	C (C)	0.02 (0.04)	C (C)
WBL	0.81 (0.90)	D (E)	0.80 (0.88)	D (E)	0.80 (0.89)	D (E)
WBT	0.06 (0.12)	C (C)	0.08 (0.13)	C (C)	0.08 (0.12)	C (C)
WBR	0.07 (0.10)	C (C)	0.06 (0.09)	D (C)	0.09 (0.11)	D (C)
NBL	0.11 (0.13)	B (B)	0.10 (0.11)	B (B)	0.10 (0.11)	B (B)
NBT	0.56 (0.59)	C (C)	0.50 (0.57)	C (C)	0.52 (0.62)	C (C)
NBR	0.14 (0.18)	B (B)	0.12 (0.16)	B (B)	0.12 (0.18)	B (C)
SBL	0.40 (0.30)	B (B)	0.33 (0.27)	B (B)	0.39 (0.41)	B (B)
SBT	0.40 (0.57)	B (C)	0.41 (0.53)	B (C)	0.43 (0.54)	B (C)
SBR	0.03 (0.15)	B (B)	0.03 (0.13)	B (B)	0.03 (0.13)	B (B)
Overall	**0.64 (0.69)**	**C (C)**	**0.59 (0.66)**	**C (C)**	**0.61 (0.71)**	**C (C)**
Campeau Drive / Herlihey Way						
EBL	0.03 (0.08)	A (B)	0.03 (0.06)	A (B)	0.03 (0.07)	A (B)
EBTR	0.27 (0.66)	A (C)	0.25 (0.59)	A (C)	0.27 (0.68)	A (C)
WBL	0.10 (0.41)	A (B)	0.09 (0.33)	A (B)	0.09 (0.37)	A (B)
WBT	0.36 (0.47)	A (C)	0.33 (0.41)	A (B)	0.38 (0.46)	A (C)
WBR	0.03 (0.09)	A (C)	0.02 (0.08)	A (C)	0.02 (0.08)	A (C)
NBL	0.48 (0.54)	E (E)	0.43 (0.51)	E (E)	0.43 (0.51)	E (E)
NBTR	0.08 (0.68)	D (E)	0.07 (0.58)	D (D)	0.07 (0.58)	D (D)
SBL	0.45 (0.66)	E (E)	0.43 (0.63)	E (E)	0.43 (0.63)	E (E)
SBT	0.03 (0.16)	D (D)	0.03 (0.15)	D (D)	0.03 (0.15)	D (D)
SBR	0.01 (0.07)	D (D)	0.01 (0.06)	D (D)	0.01 (0.06)	D (D)
Overall	**0.33 (0.64)**	**B (C)**	**0.30 (0.56)**	**B (C)**	**0.35 (0.62)**	**B (C)**

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)	B (C)	0.22 (0.56)	B (C)	0.30 (0.71)	B (D)
EBTR	0.46 (0.62)	C (C)	0.42 (0.60)	C (C)	0.50 (0.69)	C (C)
WBL	0.12 (0.17)	C (C)	0.10 (0.16)	C (C)	0.26 (0.30)	C (C)
WBTR	0.54 (0.66)	C (D)	0.51 (0.61)	C (D)	0.61 (0.72)	D (D)
NBL	0.31 (0.57)	C (C)	0.29 (0.54)	C (C)	0.31 (0.55)	C (C)
NBT	0.19 (0.68)	B (D)	0.29 (0.69)	B (D)	0.30 (0.73)	B (D)
NBR	0.02 (0.03)	B (C)	0.02 (0.02)	B (C)	0.04 (0.05)	B (C)
SBL	0.40 (0.27)	C (D)	0.38 (0.25)	C (D)	0.37 (0.28)	C (D)
SBT	0.86 (0.78)	D (E)	0.87 (0.82)	D (E)	0.90 (0.85)	D (E)
SBR	0.17 (0.15)	C (D)	0.15 (0.14)	C (D)	0.16 (0.15)	C (D)
Overall	**0.63 (0.72)**	**C (D)**	**0.63 (0.72)**	**C (D)**	**0.70 (0.81)**	**C (D)**
Campeau Drive / Knudson Drive & Maritime Way						
EBL	0.05 (0.09)	A (A)	0.04 (0.08)	A (A)	0.06 (0.11)	A (A)
EBTR	0.52 (0.22)	A (A)	0.51 (0.23)	A (A)	0.70 (0.34)	B (A)
WBL	0.05 (0.11)	A (A)	0.07 (0.17)	A (A)	0.12 (0.20)	A (B)
WBTR	0.48 (0.47)	A (B)	0.45 (0.44)	A (B)	0.56 (0.66)	A (B)
NBL	0.00 (0.05)	A (D)	0.05 (0.12)	B (D)	0.04 (0.11)	B (D)
NBTR	0.07 (0.12)	B (D)	0.11 (0.12)	B (D)	0.10 (0.11)	B (D)
SBL	0.54 (0.41)	B (D)	0.50 (0.38)	B (D)	0.54 (0.55)	B (D)
SBTR	0.04 (0.08)	B (D)	0.04 (0.10)	B (D)	0.04 (0.09)	B (D)
Overall	**0.52 (0.46)**	**A (B)**	**0.50 (0.43)**	**A (B)**	**0.64 (0.64)**	**B (B)**
Campeau Drive / Hawkstone Gate						
EBL	0.30 (0.12)	A (A)	0.25 (0.11)	A (A)	0.29 (0.16)	A (A)
EBTR	0.35 (0.24)	A (A)	0.36 (0.25)	A (A)	0.56 (0.37)	A (A)
WBL	0.03 (0.03)	B (A)	0.02 (0.03)	B (A)	0.03 (0.04)	A (A)
WBTR	0.41 (0.57)	B (B)	0.37 (0.55)	B (B)	0.49 (0.76)	B (B)
NBL	0.03 (0.10)	C (D)	0.03 (0.10)	C (D)	0.03 (0.10)	C (D)
NBTR	0.04 (0.04)	C (D)	0.04 (0.04)	C (D)	0.04 (0.04)	C (D)
SBLTR	0.71 (0.22)	D (D)	0.67 (0.13)	D (D)	0.69 (0.13)	D (D)
Overall	**0.50 (0.51)**	**B (B)**	**0.46 (0.50)**	**B (B)**	**0.64 (0.68)**	**B (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 / Teron Road						
EBL	0.39 (0.37)	B (B)	0.34 (0.33)	B (B)	0.39 (0.73)	B (C)
EBTR	0.35 (0.19)	B (B)	0.37 (0.21)	B (B)	0.60 (0.30)	B (B)
WBL	0.08 (0.19)	C (C)	0.07 (0.17)	C (C)	0.10 (0.20)	C (C)
WBT	0.24 (0.46)	C (C)	0.23 (0.47)	C (C)	0.37 (0.82)	C (D)
WBR	0.39 (0.32)	C (C)	0.35 (0.29)	C (C)	0.35 (0.38)	C (C)
NBLT	0.08 (0.08)	C (C)	0.08 (0.08)	C (C)	0.08 (0.08)	C (C)
NBR	0.05 (0.05)	C (C)	0.05 (0.05)	C (C)	0.05 (0.05)	C (C)
SBL	0.92 (0.92)	E (E)	0.90 (0.89)	E (E)	0.90 (0.89)	E (E)
SBT	0.02 (0.07)	C (C)	0.02 (0.07)	C (C)	0.02 (0.07)	C (C)
SBR	0.10 (0.20)	C (C)	0.09 (0.18)	C (C)	0.09 (0.18)	C (C)
Overall	**0.62 (0.63)**	**C (C)**	**0.58 (0.61)**	**C (C)**	**0.74 (0.84)**	**C (C)**
March Road / Campeau Drive & Highway 417 Off-Ramp						
EBL	0.60 (0.43)	E (E)	0.56 (0.61)	D (F)	0.91 (0.90)	E (F)
EBR	0.71 (0.98)	D (F)	0.61 (0.59)	C (D)	0.93 (0.66)	E (D)
WBL	0.45 (0.59)	C (D)	0.42 (0.81)	C (E)	0.33 (0.81)	C (E)
WBT	0.63 (0.77)	D (E)	0.63 (0.53)	D (D)	0.66 (0.61)	D (D)
NBL	0.44 (0.66)	C (E)	0.35 (0.91)	C (F)	0.48 (0.96)	D (F)
NBT	0.64 (0.27)	B (B)	0.57 (0.28)	B (B)	0.65 (0.27)	C (B)
SBT	0.80 (0.97)	D (D)	0.83 (1.01)	D (E)	0.79 (1.00)	D (E)
SBR	0.01 (0.03)	C (C)	0.01 (0.03)	C (C)	0.07 (0.19)	C (C)
Overall	**0.72 (0.93)**	**C (D)**	**0.68 (0.92)**	**C (E)**	**0.83 (0.93)**	**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 0.61 and 0.71, 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 0.35 and 0.61, 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 0.70 and 0.81, 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.

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 0.64 and 0.68, 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 0.74 and 0.84, 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 0.83 and 0.93, 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 0.96 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 25**.

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 25 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)	13.3 (16.0)	B (C)
NBTR	10.6 (11.5)	B (B)	11.9 (12.6)	B (B)	14.7 (17.6)	B (C)
SBL	9.4 (8.8)	A (A)	9.2 (8.8)	B (A)	10.5 (10.2)	B (B)
Knudson Drive / Shaughnessy Crescent (East)						
WBLT	0.4 (0.8)	A (A)	0.3 (0.8)	A (A)	0.3 (0.8)	A (A)
NBLR	11.1 (11.4)	B (B)	10.7 (11.0)	B (B)	10.9 (11.3)	B (B)
Knudson Drive / Shaughnessy Crescent (West)						
WBLT	0.3 (0.5)	A (A)	0.3 (0.5)	A (A)	0.3 (0.5)	A (A)
NBLR	11.7 (11.4)	B (B)	11.3 (11.0)	B (B)	11.5 (11.3)	B (B)
Knudson Drive / Sherk Crescent (North)						
EBLR	9.5 (9.7)	A (A)	9.4 (9.6)	A (A)	9.7 (10.0)	A (A)
NBLT	0.5 (0.9)	A (A)	0.4 (0.9)	A (A)	0.4 (0.7)	A (A)
Knudson Drive / Sherk Crescent (South)						
EBLR	9.7 (9.3)	A (A)	9.6 (9.2)	A (A)	9.9 (9.5)	A (A)
NBLT	1.4 (1.3)	A (A)	1.3 (1.3)	A (A)	1.1 (1.0)	A (A)
Knudson Drive / Weslock Way						
EBLT	11.7 (9.6)	B (A)	10.8 (9.2)	B (A)	11.6 (9.8)	B (A)
WBTR	8.0 (8.7)	A (A)	7.9 (8.4)	A (A)	8.2 (8.9)	A (A)
SBLR	9.0 (10.2)	A (B)	8.7 (9.5)	A (A)	9.7 (10.7)	A (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)	11.3 (16.2)	B (C)
NBTR	10.5 (9.3)	B (A)	9.7 (8.9)	A (A)	10.7 (9.9)	B (A)
SBLT	11.4 (9.6)	B (A)	10.6 (9.2)	B (A)	11.5 (9.7)	B (A)
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)	16.3 (17.1)	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)

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.

Notwithstanding that RMA figures are not required, preliminary functional design plans outlining the proposed modifications to the pavement marking on Campeau Drive and the signage adjustments required have been provided with this study for the City of Ottawa's review.

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

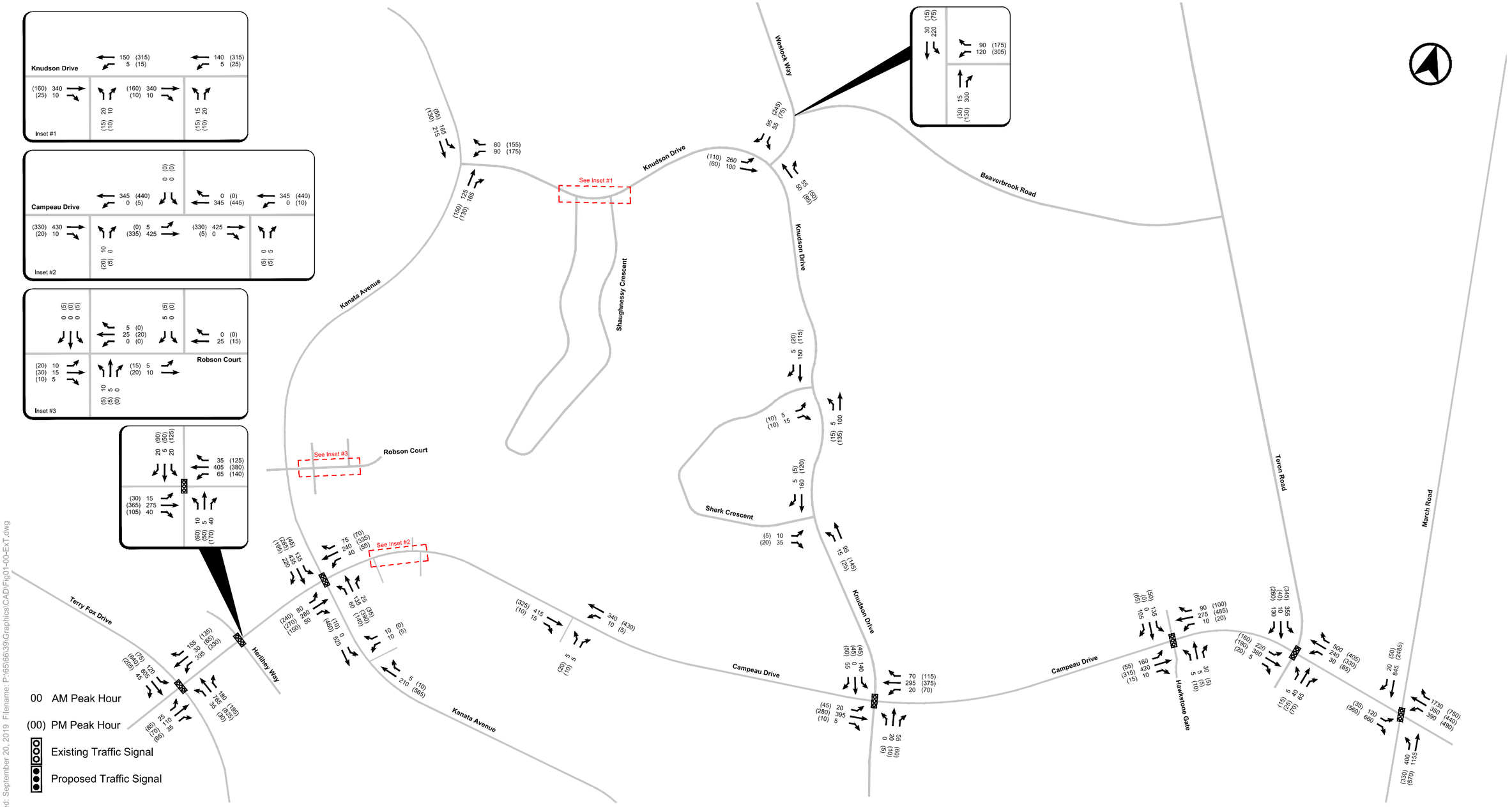
	Yes	No
Does the development satisfy the Trip Generation Trigger?	Yes	
Does the development satisfy the Location Trigger?	Yes	
Does the development satisfy the Safety Trigger?	Yes	

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


legend
Single Detached
Executive Towns
Avenue Towns
Medium Density
SWM
Parkland
Open Space
Residential Buffer
SWM Pond
SWM Pond
SWM Pond
SWM Pond
SWM Pond
Parkette
Parkette
Neighbourhood Park
Medium Density
Medium Density
NORTH
scale | 1:2000

APPENDIX C:
Traffic Volume Figures



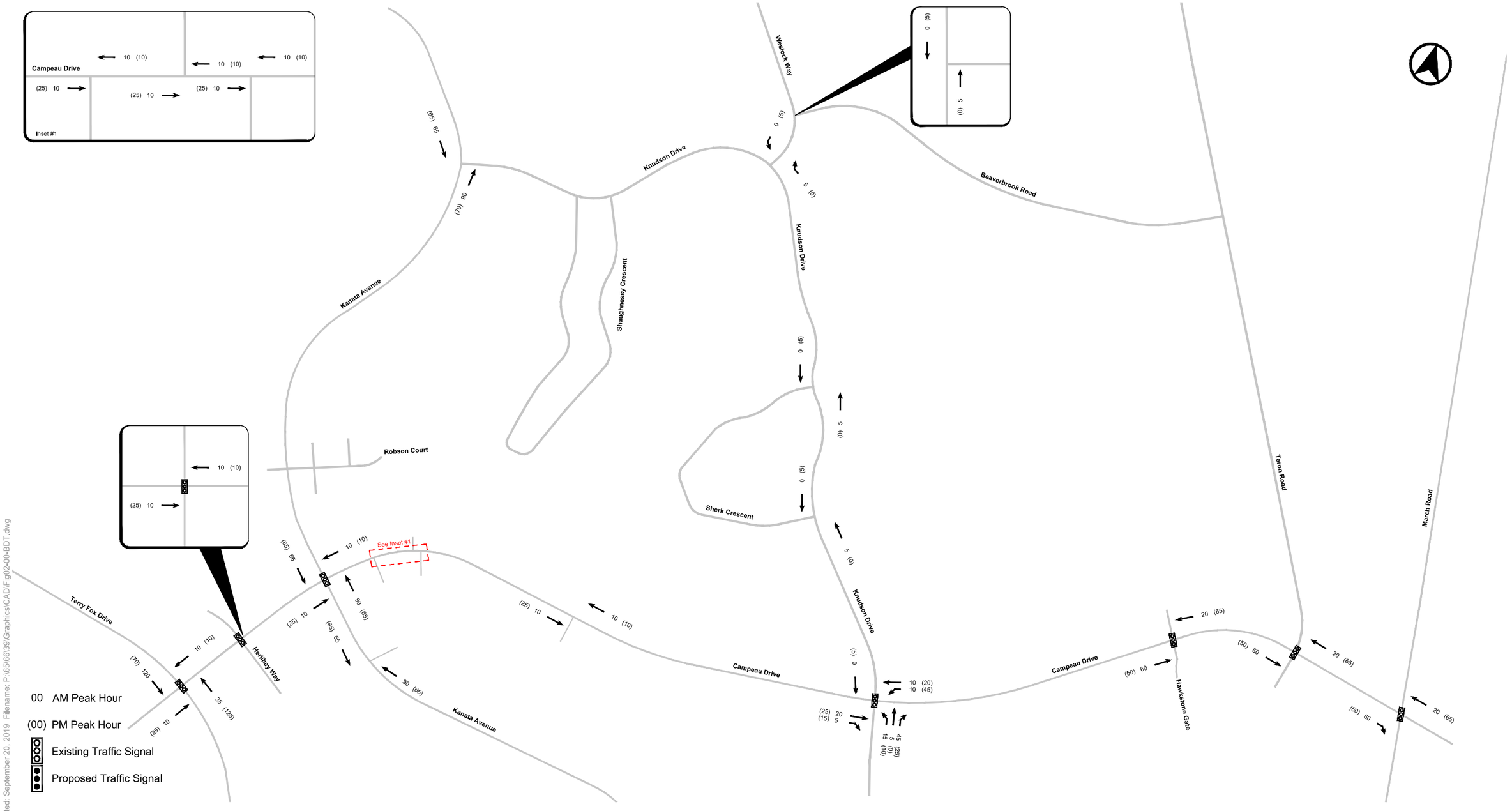
Date Plotted: September 20, 2019 Filename: P:\65\6639\Graphics\CAD\Fig01-00-ExT.dwg

EXISTING TRAFFIC VOLUMES

BA Group

7000 Campeau Drive
6566-39 September 2019

Appendix C - Figure 1



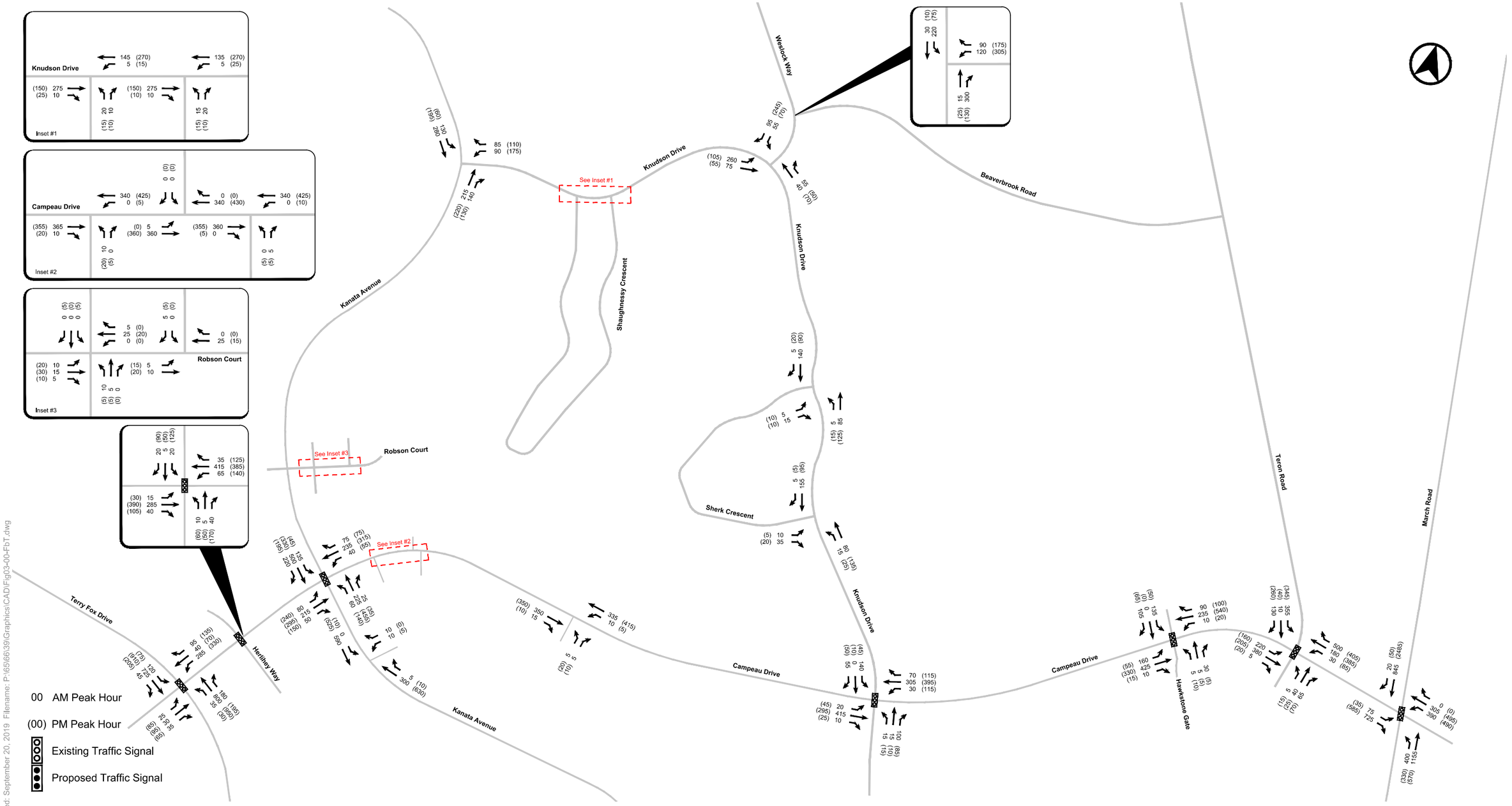
Date Plotted: September 20, 2019 Filename: P:\65\6639\Graphics\CAD\Fig02-00-BDT.dwg

BACKGROUND DEVELOPMENTS TRAFFIC VOLUMES

BA Group

7000 Campeau Drive
6566-39 September 2019

Appendix C - Figure 2

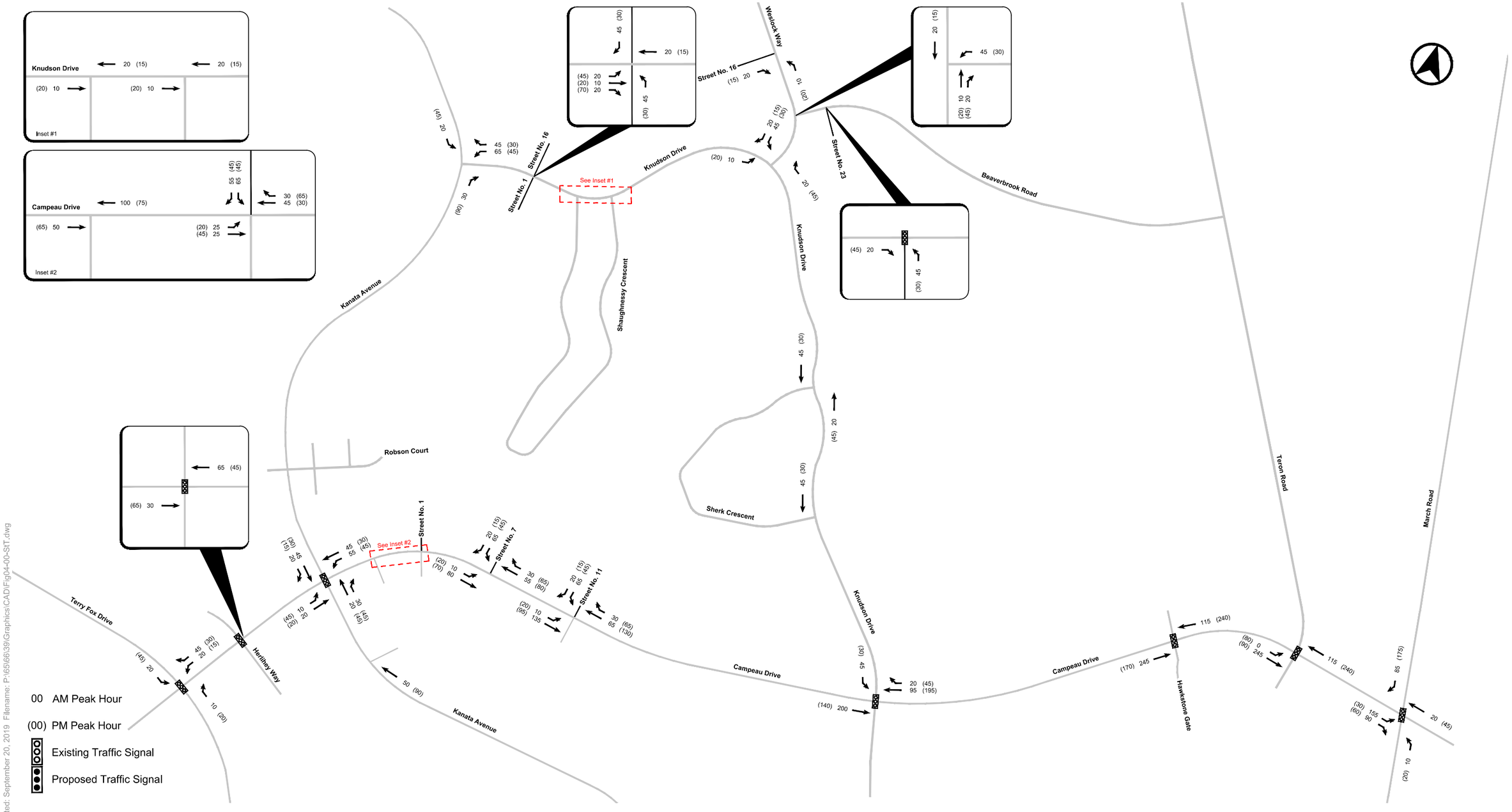


FUTURE BACKGROUND TRAFFIC VOLUMES

BA Group

7000 Campeau Drive
6566-39 September 2019

Appendix C - Figure 3



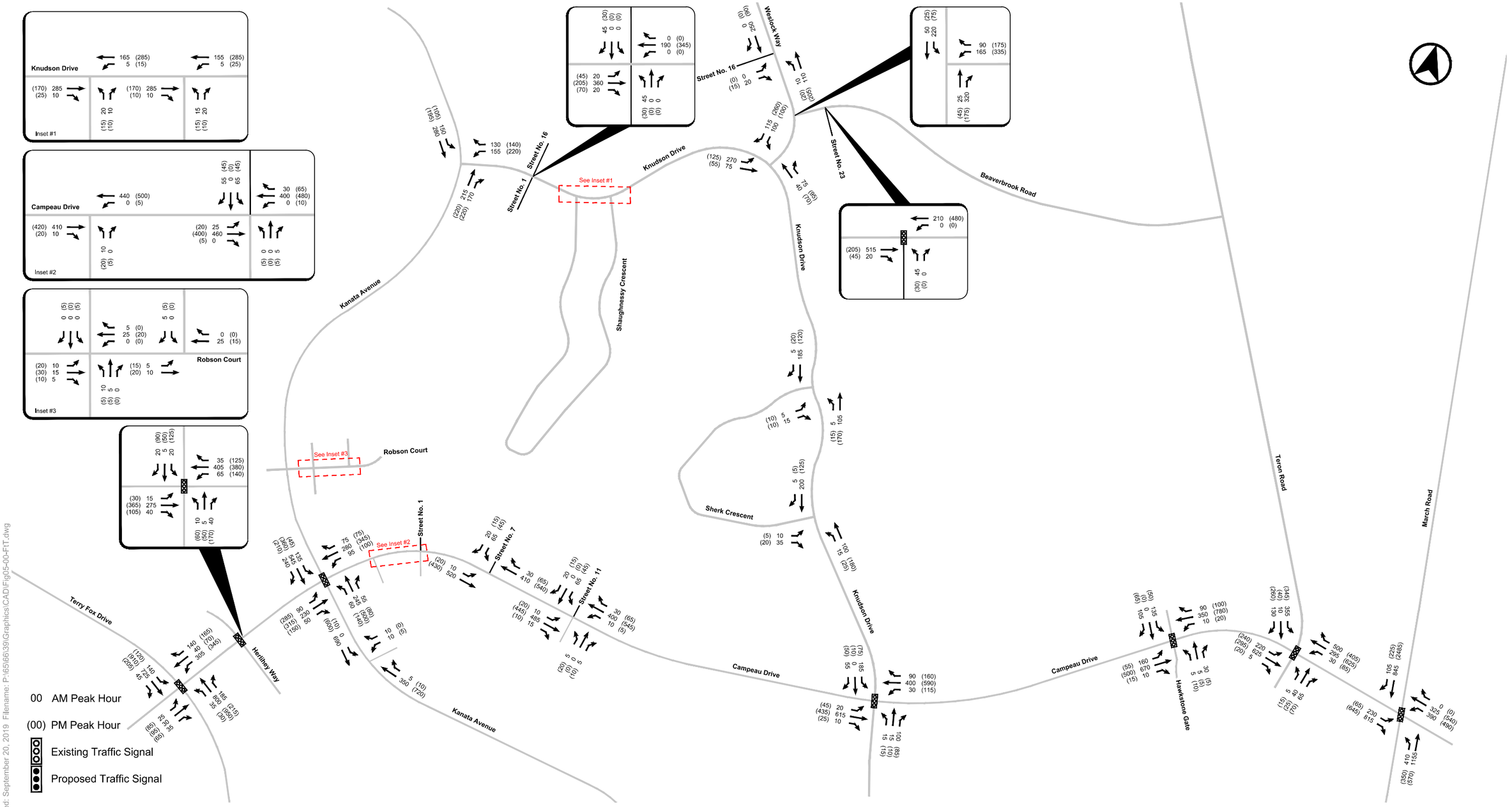
Date Plotted: September 20, 2019 Filename: P:\65\6639\Graphics\CAD\Fig04-00-SIT.dwg

SITE TRAFFIC VOLUMES

BA Group

7000 Campeau Drive
6566-39 September 2019

Appendix C - Figure 4



Date Plotted: September 20, 2019 Filename: P:\65\6639\Graphics\CAD\Fig05-00-FIT.dwg

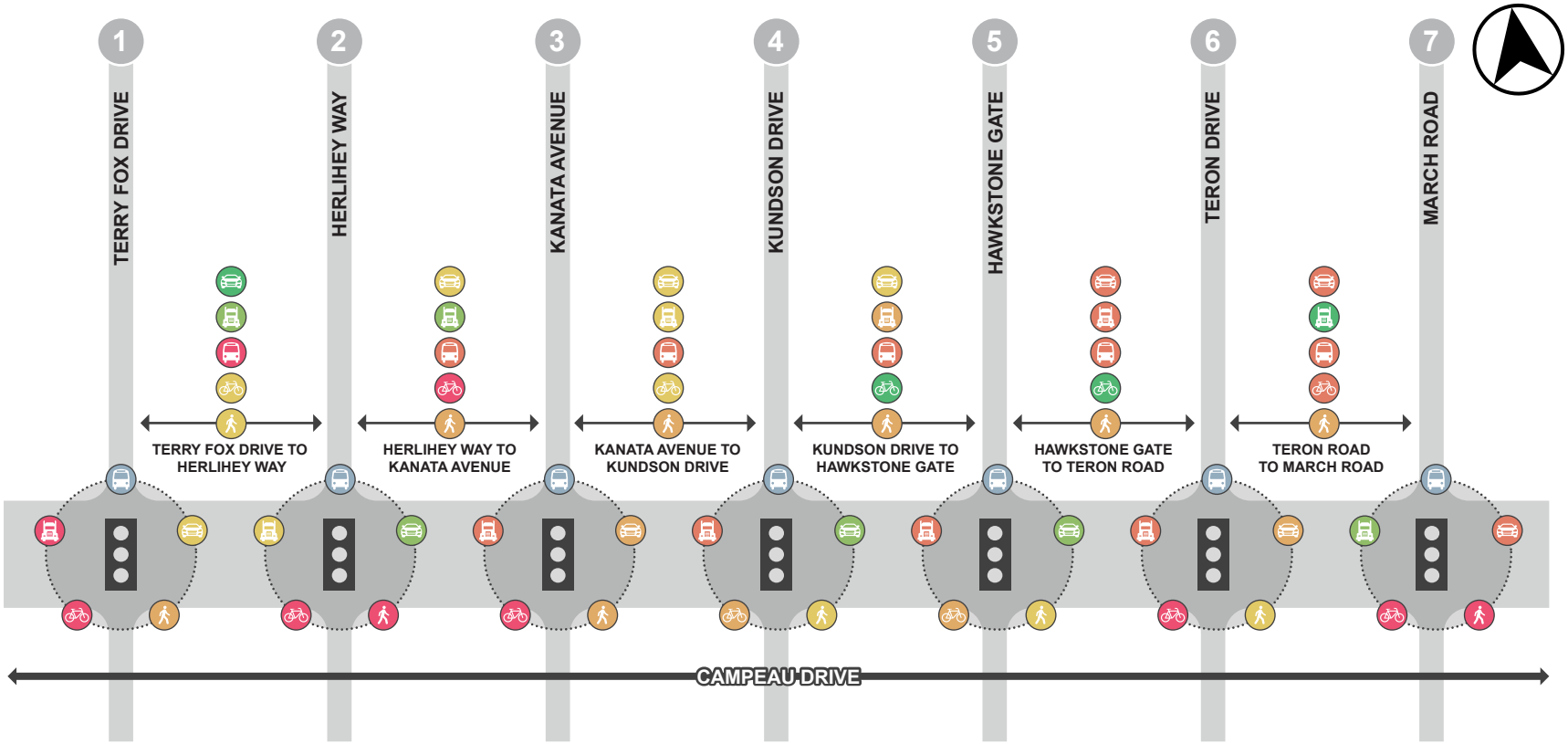
FUTURE TOTAL TRAFFIC VOLUMES

BA Group

7000 Campeau Drive
6566-39 September 2019

Appendix C - Figure 5

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

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																												
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**				**C**				**D**				**B**				**C**				**D**				**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	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	1	1
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**	**A**	**C**	**C**			**C**				**E**	**E**

APPENDIX E:
Synchro Capacity Analysis Worksheets

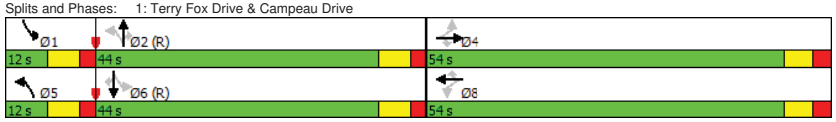
Queues
1: Terry Fox Drive & Campeau Drive

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

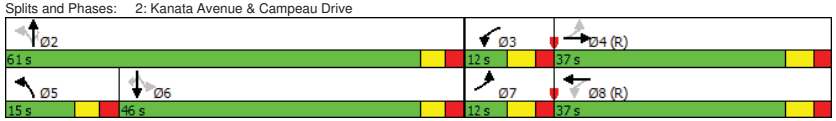
Existing AM Peak Hour

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

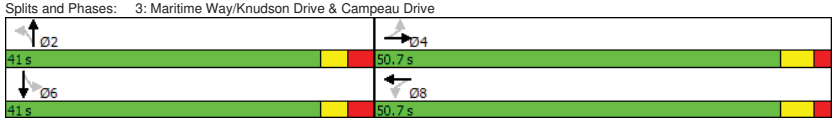
Queues
3: Maritime Way/Knudson Drive & Campeau Drive

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

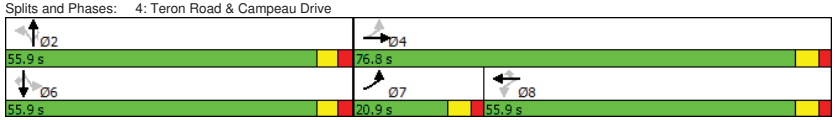
Existing AM Peak Hour

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

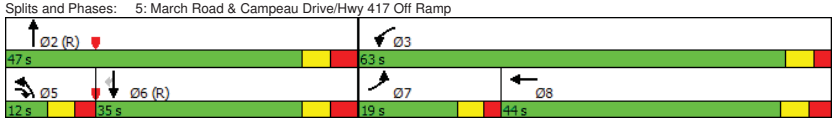
Existing AM Peak Hour

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

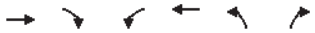
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	275	10	5	130	15	20
Future Volume (Veh/h)	275	10	5	130	15	20
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	306	11	6	144	17	22
Pedestrians					10	
Lane 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

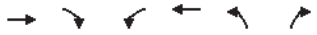
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Sign Control	Stop		Stop			Stop
Traffic Volume (vph)	120	90	15	300	220	30
Future Volume (vph)	120	90	15	300	220	30
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	133	100	17	333	244	33

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

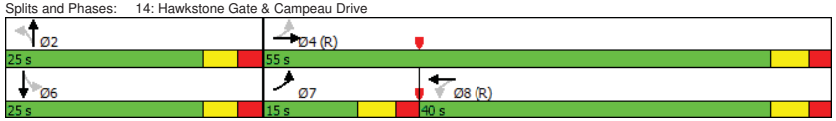
Existing AM Peak Hour

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	

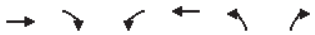
Intersection Summary

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

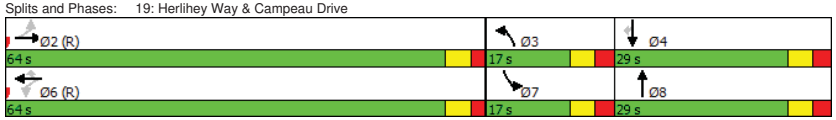
Existing AM Peak Hour

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

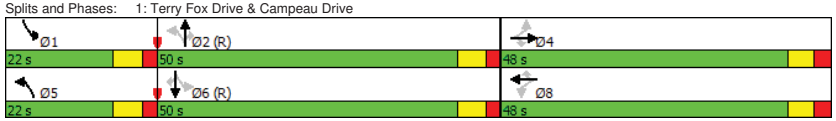
Existing PM Peak Hour

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

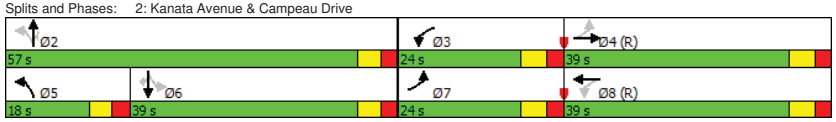
Existing PM Peak Hour

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

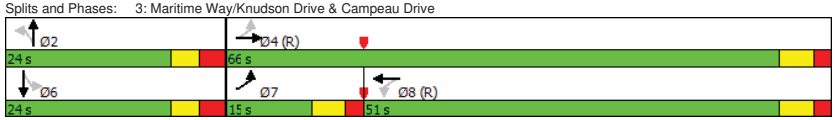
Existing PM Peak Hour

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

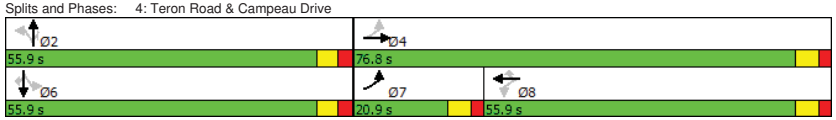
Queues
4: Teron Road & Campeau Drive

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

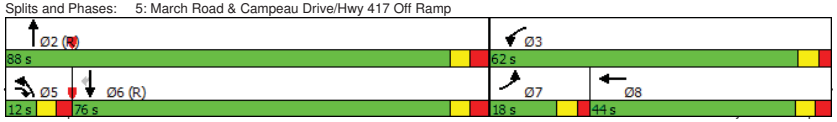
Queues
5: March Road & Campeau Drive/Hwy 417 Off Ramp

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

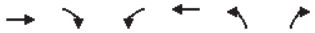
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	145	10	25	270	15	10
Future Volume (Veh/h)	145	10	25	270	15	10
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	161	11	28	300	17	11
Pedestrians					15	
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

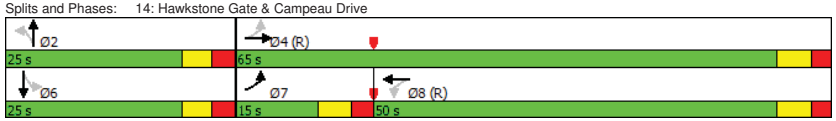
Existing PM Peak Hour

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

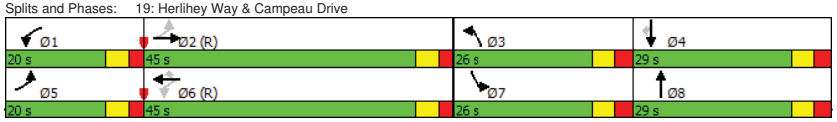
Existing PM Peak Hour

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.

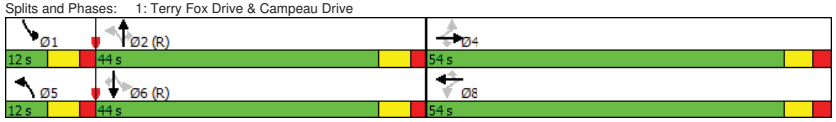
Queues
1: Terry Fox Drive & Campeau Drive

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

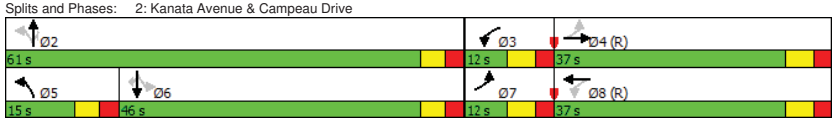
Future Background AM Peak Hour

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

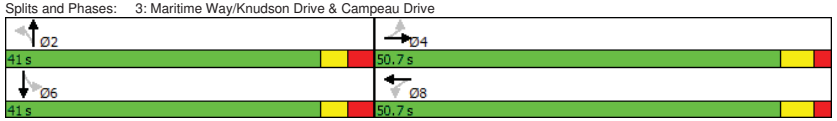
Queues
3: Maritime Way/Knudson Drive & Campeau Drive

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

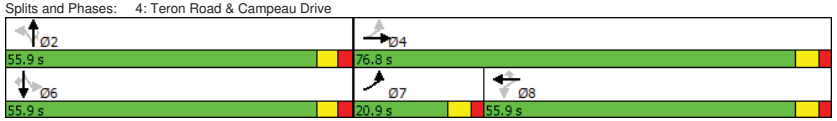
Future Background AM Peak Hour

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

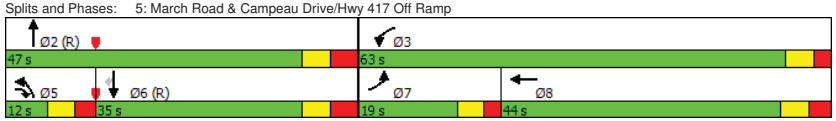
Future Background AM Peak Hour

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

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
Analysis Period (min)			15	

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

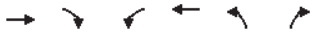
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	275	10	5	135	15	20
Future Volume (Veh/h)	275	10	5	135	15	20
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	275	10	5	135	15	20
Pedestrians					10	
Lane 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
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

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

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

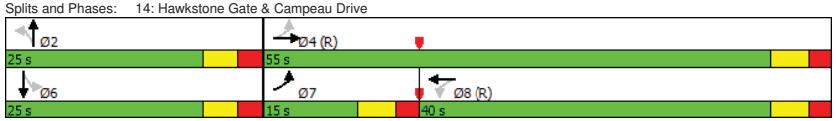
Future Background AM Peak Hour

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
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
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

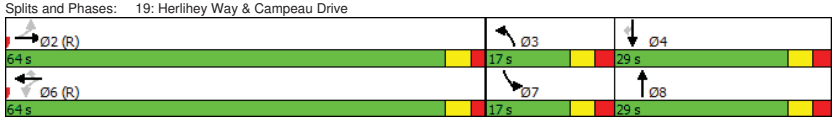
Future Background AM Peak Hour

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

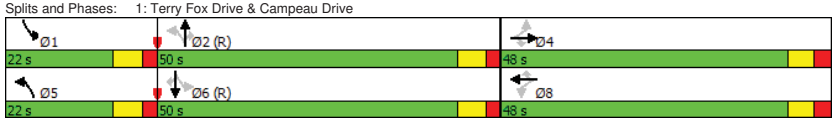
Future Background PM Peak Hour

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

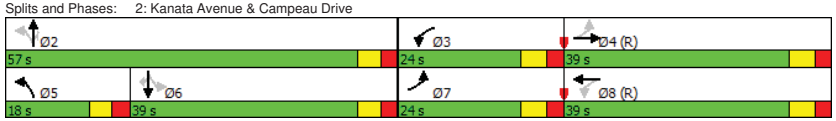
Future Background PM Peak Hour

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

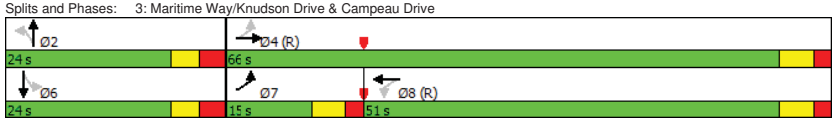
Future Background PM Peak Hour

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

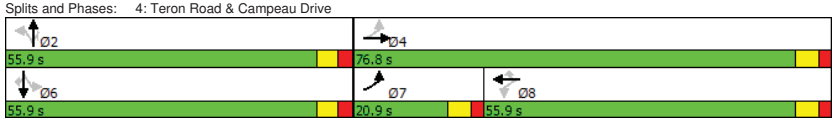
Queues
4: Teron Road & Campeau Drive

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

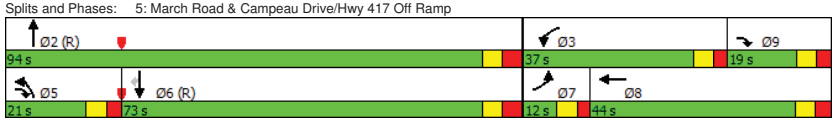
Future Background PM Peak Hour

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

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

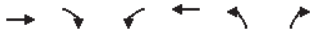
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	150	10	25	270	15	10
Future Volume (Veh/h)	150	10	25	270	15	10
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	150	10	25	270	15	10
Pedestrians					15	
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

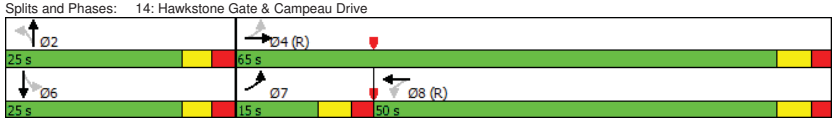
Future Background PM Peak Hour

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	

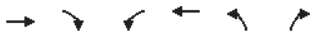
Intersection Summary

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
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
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

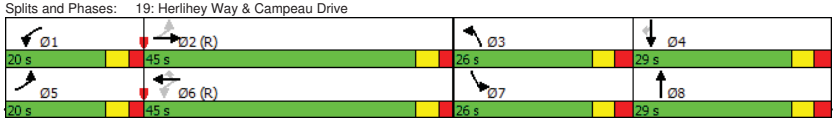
Future Background PM Peak Hour

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

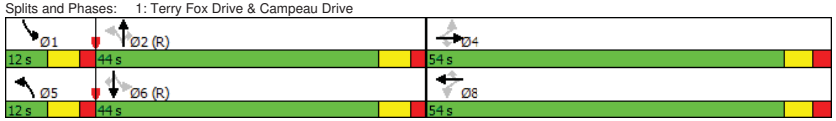
Future Total AM Peak Hour

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	25	30	35	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	52.0	25.4	7.9	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	52.0	25.4	7.9	12.9	25.2	4.4	15.2	19.9	0.1
Queue Length 50th (m)	4.1	4.9	0.0	70.2	8.3	7.8	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 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	1.03	1.01	1.69	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	48.5	28.6	48.2	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			46.8			21.8			17.4	
Approach LOS		C			D			C			B	

Intersection Summary

HCM 2000 Control Delay	25.3	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

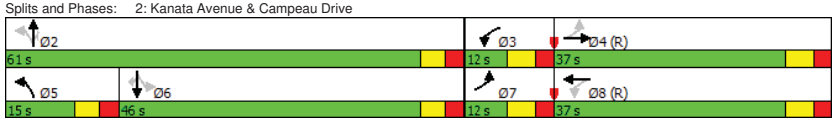
Future Total AM Peak Hour

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations										
Traffic Volume (vph)	90	230	95	280	60	245	55	135	545	240
Future Volume (vph)	90	230	95	280	60	245	55	135	545	240
Lane Group Flow (vph)	90	280	95	355	60	245	55	135	545	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	0.27	0.49	0.25	0.58	0.29	0.31	0.08	0.37	0.90	0.37
Control Delay	17.7	28.6	23.1	36.5	18.5	19.6	1.0	30.0	53.7	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	17.7	28.6	23.1	36.5	18.5	19.6	1.0	30.0	53.7	4.8
Queue Length 50th (m)	14.0	56.1	13.5	72.6	6.9	31.4	0.0	22.1	111.9	0.0
Queue Length 95th (m)	9.8	38.2	25.4	104.8	14.0	47.8	2.2	39.2	#170.1	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)	331	582	376	621	220	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	0.27	0.48	0.25	0.57	0.27	0.27	0.07	0.34	0.83	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 AM Peak Hour

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	90	230	50	95	280	75	60	245	55	135	545	240
Future Volume (vph)	90	230	50	95	280	75	60	245	55	135	545	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	1729		1706	1729		1710	1782	1530	1710	1800	1465
Flt Permitted	0.38	1.00		0.44	1.00		0.12	1.00	1.00	0.61	1.00	1.00
Satd. Flow (perm)	685	1729		794	1729		216	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)	90	230	50	95	280	75	60	245	55	135	545	240
RTOR Reduction (vph)	0	7	0	0	8	0	0	0	30	0	0	159
Lane Group Flow (vph)	90	273	0	95	347	0	60	245	25	135	545	81
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)	40.5	34.8		43.1	36.1		49.9	49.9	49.9	37.0	37.0	37.0
Effective Green, g (s)	40.5	34.8		43.1	36.1		49.9	49.9	49.9	37.0	37.0	37.0
Actuated g/C Ratio	0.37	0.32		0.39	0.33		0.45	0.45	0.45	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)	305	546		369	567		193	808	694	367	605	492
v/s Ratio Prot	0.02	0.16		c0.02	c0.20		0.02	c0.14			c0.30	
v/s Ratio Perm	0.09			0.08			0.12		0.02	0.12		0.06
v/c Ratio	0.30	0.50		0.26	0.61		0.31	0.30	0.04	0.37	0.90	0.16
Uniform Delay, d1	23.7	30.5		21.9	31.1		21.9	19.0	16.7	27.6	34.8	25.6
Progression Factor	0.73	0.81		1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	0.5	3.2		0.4	4.9		0.9	0.2	0.0	0.6	16.6	0.2
Delay (s)	17.9	27.9		22.3	35.9		22.9	19.2	16.7	28.3	51.3	25.8
Level of Service	B	C		C	D		C	B	B	C	D	C
Approach Delay (s)		25.5			33.1			19.5			41.3	
Approach LOS		C			C			B			D	

Intersection Summary

HCM 2000 Control Delay	33.0	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	85.2%	ICU Level of Service	E
Analysis Period (min)	15		

c Critical Lane Group

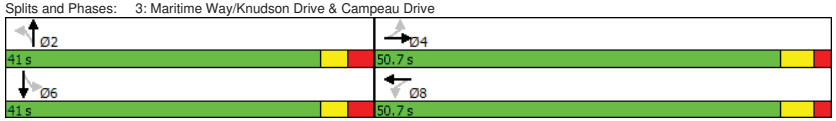
Queues
3: Maritime Way/Knudson Drive & Campeau Drive

Future Total AM Peak Hour

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations								
Traffic Volume (vph)	20	615	30	400	15	15	185	0
Future Volume (vph)	20	615	30	400	15	15	185	0
Lane Group Flow (vph)	20	625	30	490	15	115	185	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	0.06	0.71	0.12	0.57	0.04	0.23	0.55	0.09
Control Delay	8.8	16.6	9.9	13.0	16.1	6.8	24.2	0.3
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	8.8	16.6	9.9	13.0	16.1	6.8	24.2	0.3
Queue Length 50th (m)	0.9	41.4	1.4	28.3	0.9	0.9	13.3	0.0
Queue Length 95th (m)	4.7	100.4	6.6	70.7	5.5	12.2	41.0	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)	620	1548	452	1492	876	1083	841	1109
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	0.03	0.40	0.07	0.33	0.02	0.11	0.22	0.05

Intersection Summary
Cycle Length: 91.7
Actuated Cycle Length: 53.1
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

Future Total AM Peak Hour

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	20	615	10	30	400	90	15	15	100	185	0	55
Future Volume (vph)	20	615	10	30	400	90	15	15	100	185	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	0.96	
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)	1682	1789		1707	1733		1686	1528		1699	1476	
Flt Permitted	0.41	1.00		0.29	1.00		0.72	1.00		0.68	1.00	
Satd. Flow (perm)	721	1789		523	1733		1279	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)	20	615	10	30	400	90	15	15	100	185	0	55
RTOR Reduction (vph)	0	1	0	0	9	0	0	72	0	0	40	0
Lane Group Flow (vph)	20	624	0	30	481	0	15	43	0	185	15	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)	26.1	26.1		26.1	26.1		14.7	14.7		14.7	14.7	
Effective Green, g (s)	26.1	26.1		26.1	26.1		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)	358	889		260	861		358	427		341	413	
v/s Ratio Prot		c0.35			0.28			0.03			0.01	
v/s Ratio Perm	0.03			0.06			0.01			c0.15		
v/c Ratio	0.06	0.70		0.12	0.56		0.04	0.10		0.54	0.04	
Uniform Delay, d1	6.8	10.2		7.0	9.2		13.8	14.0		16.0	13.8	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.1	2.5		0.2	0.8		0.0	0.1		1.8	0.0	
Delay (s)	6.9	12.7		7.2	10.0		13.8	14.1		17.8	13.8	
Level of Service	A	B		A	A		B	B		B	B	
Approach Delay (s)		12.6			9.8			14.1			16.9	
Approach LOS		B			A			B			B	

Intersection Summary				
HCM 2000 Control Delay	12.4	HCM 2000 Level of Service	B	
HCM 2000 Volume to Capacity ratio	0.64			
Actuated Cycle Length (s)	52.5	Sum of lost time (s)	11.7	
Intersection Capacity Utilization	62.0%	ICU Level of Service	B	
Analysis Period (min)	15			

c Critical Lane Group

Queues
4: Teron Road & Campeau Drive

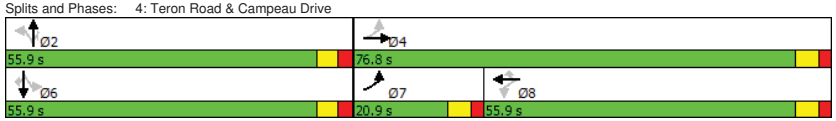
Future Total AM Peak Hour

Lane Group	EBL	EBT	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations											
Traffic Volume (vph)	220	625	30	295	500	5	40	65	355	10	130
Future Volume (vph)	220	625	30	295	500	5	40	65	355	10	130
Lane Group Flow (vph)	220	630	30	295	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	0.40	0.60	0.10	0.38	0.56		0.08	0.13	0.90	0.02	0.24
Control Delay	15.8	20.7	25.9	27.4	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	20.7	25.9	27.4	5.0		28.1	5.8	65.6	26.8	5.6
Queue Length 50th (m)	25.4	97.7	4.5	50.3	0.0		7.9	0.0	84.5	1.7	0.0
Queue Length 95th (m)	47.3	163.6	13.0	87.1	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)	576	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	0.38	0.60	0.10	0.38	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	625	5	30	295	500	5	40	65	355	10	130
Future Volume (vph)	220	625	5	30	295	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)	1692	1797		1701	1800	1417		1784	1426	1640	1800	1456
Flt Permitted	0.45	1.00		0.40	1.00	1.00		0.98	1.00	0.73	1.00	1.00
Satd. Flow (perm)	798	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	295	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	295	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)	558	1054		314	788	620		557	450	396	568	460
v/s Ratio Prot	0.04	c0.35			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	0.60		0.10	0.37	0.35		0.08	0.05	0.90	0.02	0.09
Uniform Delay, d1	12.9	16.0		20.0	23.0	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	2.5		0.6	1.4	1.6		0.1	0.0	22.0	0.0	0.1
Delay (s)	13.3	18.5		20.6	24.3	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			24.2			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

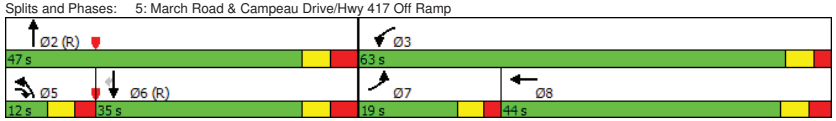
Future Total AM Peak Hour

Lane Group	EBL	EBR	WBL	WBT	NBL	NBT	SBT	SBR
Lane Configurations								
Traffic Volume (vph)	230	815	390	325	410	1155	845	105
Future Volume (vph)	230	815	390	325	410	1155	845	105
Lane Group Flow (vph)	230	815	390	325	410	1155	845	105
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	0.91	0.93	0.33	0.66	0.48	0.65	0.78	0.23
Control Delay	84.8	59.2	27.2	50.8	38.6	21.0	45.9	2.3
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	84.8	59.2	27.2	50.8	38.6	21.0	45.9	2.3
Queue Length 50th (m)	52.4	90.4	33.5	37.0	41.0	93.1	65.5	0.0
Queue Length 95th (m)	#110.8	#143.2	45.1	50.2	59.7	120.6	78.9	3.3
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)	254	877	1712	1156	851	1786	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	0.91	0.93	0.23	0.28	0.48	0.65	0.69	0.21

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)	230	0	815	390	325	0	410	1155	0	0	845	105
Future Volume (vph)	230	0	815	390	325	0	410	1155	0	0	845	105
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)	230	0	815	390	325	0	410	1155	0	0	845	105
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	0	0	82
Lane Group Flow (vph)	230	0	815	390	325	0	410	1155	0	0	845	23
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)	16.4		26.8	38.9	15.9		26.8	57.4			24.1	24.1
Effective Green, g (s)	16.4		26.8	38.9	15.9		26.8	57.4			24.1	24.1
Actuated g/C Ratio	0.15		0.24	0.35	0.14		0.24	0.52			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)	254		877	1173	494		850	1784			1076	328
v/s Ratio Prot	c0.13		c0.23	0.12	c0.10		0.12	0.34			c0.17	
v/s Ratio Perm												0.02
v/c Ratio	0.91		0.93	0.33	0.66		0.48	0.65			0.79	0.07
Uniform Delay, d1	46.0		40.7	26.0	44.5		35.7	19.0			40.5	34.1
Progression Factor	1.00		1.00	1.00	1.00		1.00	1.00			1.00	1.00
Incremental Delay, d2	32.4		15.7	0.2	3.2		0.4	1.8			5.8	0.4
Delay (s)	78.4		56.4	26.2	47.6		36.1	20.8			46.3	34.5
Level of Service	E		E	C	D		D	C			D	C
Approach Delay (s)		61.3			35.9			24.8			45.0	
Approach LOS		E			D			C			D	

Intersection Summary

HCM 2000 Control Delay	40.1	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.83		
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	26.8
Intersection Capacity Utilization	77.8%	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)	155	130	215	170	150	280
Future Volume (vph)	155	130	215	170	150	280
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	155	130	215	170	150	280

Direction, Lane #	WB 1	NB 1	SB 1	SB 2
Volume Total (vph)	285	385	150	280
Volume Left (vph)	155	0	150	0
Volume Right (vph)	130	170	0	0
Hadj (s)	-0.16	-0.26	0.50	0.00
Departure Headway (s)	5.7	5.2	6.4	5.9
Degree Utilization, x	0.45	0.56	0.27	0.46
Capacity (veh/h)	588	657	543	592
Control Delay (s)	13.3	14.7	10.5	12.5
Approach Delay (s)	13.3	14.7	11.8	
Approach LOS	B	B	B	

Intersection Summary				
Delay			13.2	
Level of Service			B	
Intersection Capacity Utilization			59.1%	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

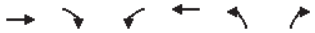
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	285	10	5	155	15	20
Future Volume (Veh/h)	285	10	5	155	15	20
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	285	10	5	155	15	20
Pedestrians					10	
Lane 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			305		465	300
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			305		465	300
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)			1257		552	738

Direction, Lane #	EB 1	WB 1	NB 1
Volume Total	295	160	35
Volume Left	0	5	15
Volume Right	10	0	20
cSH	1700	1257	645
Volume to Capacity	0.17	0.00	0.05
Queue Length 95th (m)	0.0	0.1	1.4
Control Delay (s)	0.0	0.3	10.9
Lane LOS		A	B
Approach Delay (s)	0.0	0.3	10.9
Approach LOS			B

Intersection Summary				
Average Delay			0.9	
Intersection Capacity Utilization			26.5%	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)	285	10	5	165	20	10
Future Volume (Veh/h)	285	10	5	165	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)	285	10	5	165	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			315		485	315
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			315		485	315
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)			1236		533	715

Direction, Lane #	EB 1	WB 1	NB 1
Volume Total	295	170	30
Volume Left	0	5	20
Volume Right	10	0	10
cSH	1700	1236	583
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	11.5
Lane LOS		A	B
Approach Delay (s)	0.0	0.3	11.5
Approach LOS			B

Intersection Summary				
Average Delay		0.8		
Intersection Capacity Utilization		28.1%	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	105	185	5
Future Volume (Veh/h)	5	15	5	105	185	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	105	185	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	312	198	200			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	312	198	200			
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)	676	842	1373			

Direction, Lane #	EB 1	NB 1	SB 1
Volume Total	20	110	190
Volume Left	5	5	0
Volume Right	15	0	5
cSH	793	1373	1700
Volume to Capacity	0.03	0.00	0.11
Queue Length 95th (m)	0.6	0.1	0.0
Control Delay (s)	9.7	0.4	0.0
Lane LOS	A	A	
Approach Delay (s)	9.7	0.4	0.0
Approach LOS	A		

Intersection Summary				
Average Delay		0.7		
Intersection Capacity Utilization		21.4%	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	100	200	5
Future Volume (Veh/h)	10	35	15	100	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)	10	35	15	100	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	342	212	215			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	342	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 %	98	96	99			
cM capacity (veh/h)	645	826	1356			

Direction, Lane #	EB 1	NB 1	SB 1
Volume Total	45	115	205
Volume Left	10	15	0
Volume Right	35	0	5
cSH	777	1356	1700
Volume to Capacity	0.06	0.01	0.12
Queue Length 95th (m)	1.5	0.3	0.0
Control Delay (s)	9.9	1.1	0.0
Lane LOS	A	A	
Approach Delay (s)	9.9	1.1	0.0
Approach LOS	A		

Intersection Summary				
Average Delay		1.6		
Intersection Capacity Utilization		28.9%	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)	270	75	40	75	100	115
Future Volume (vph)	270	75	40	75	100	115
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	270	75	40	75	100	115

Direction, Lane #	EB 1	WB 1	SB 1
Volume Total (vph)	345	115	215
Volume Left (vph)	270	0	100
Volume Right (vph)	0	75	115
Hadj (s)	0.16	-0.39	-0.23
Departure Headway (s)	4.7	4.5	4.8
Degree Utilization, x	0.45	0.14	0.28
Capacity (veh/h)	726	746	702
Control Delay (s)	11.6	8.2	9.7
Approach Delay (s)	11.6	8.2	9.7
Approach LOS	B	A	A

Intersection Summary				
Delay		10.4		
Level of Service		B		
Intersection Capacity Utilization		47.1%	ICU Level of Service	A
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)	165	90	25	320	220	50
Future Volume (vph)	165	90	25	320	220	50
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	165	90	25	320	220	50

Direction, Lane #	WB 1	NB 1	SB 1
Volume Total (vph)	255	345	270
Volume Left (vph)	165	0	220
Volume Right (vph)	90	320	0
Hadj (s)	-0.08	-0.56	0.16
Departure Headway (s)	5.3	4.4	5.2
Degree Utilization, x	0.37	0.42	0.39
Capacity (veh/h)	630	771	656
Control Delay (s)	11.3	10.7	11.5
Approach Delay (s)	11.3	10.7	11.5
Approach LOS	B	B	B

Intersection Summary				
Delay		11.1		
Level of Service		B		
Intersection Capacity Utilization		63.5%	ICU Level of Service	B
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)	10	485	15	10	400	30	5	0	5	65	0	20
Future Volume (Veh/h)	10	485	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	485	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			505			972	968	498	952	960	415
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	430			505			972	968	498	952	960	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	72	100	97
cM capacity (veh/h)	1140			1066			222	250	574	235	253	642

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	510	440	10	85
Volume Left	10	10	5	65
Volume Right	15	30	5	20
cSH	1140	1066	320	276
Volume to Capacity	0.01	0.01	0.03	0.31
Queue Length 95th (m)	0.2	0.2	0.8	10.1
Control Delay (s)	0.3	0.3	16.6	23.7
Lane LOS	A	A	C	C
Approach Delay (s)	0.3	0.3	16.6	23.7
Approach LOS			C	C

Intersection Summary				
Average Delay		2.3		
Intersection Capacity Utilization		47.4%	ICU Level of Service	A
Analysis Period (min)		15		

Queues
14: Hawkstone Gate & Campeau Drive

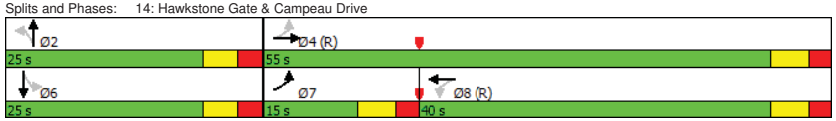
Future Total AM Peak Hour

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations								
Traffic Volume (vph)	160	670	10	350	5	5	135	0
Future Volume (vph)	160	670	10	350	5	5	135	0
Lane Group Flow (vph)	160	680	10	440	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	0.56	0.03	0.50	0.03	0.13		0.80
Control Delay	7.0	9.9	13.7	16.6	24.2	11.9		34.4
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0		0.0
Total Delay	7.0	9.9	13.7	16.6	24.2	11.9		34.4
Queue Length 50th (m)	7.9	48.5	0.8	42.4	0.7	0.7		17.6
Queue Length 95th (m)	18.6	97.9	4.0	81.5	3.3	7.5		40.8
Internal Link Dist (m)		214.6		269.3		89.1		74.7
Turn Bay Length (m)	80.0		120.0					
Base Capacity (vph)	569	1229	373	893	228	366		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	670	10	10	350	90	5	5	30	135	0	105
Future Volume (vph)	160	670	10	10	350	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	1732		1513	1425			1413	
Flt Permitted	0.37	1.00		0.41	1.00		0.59	1.00			0.81	
Satd. Flow (perm)	662	1796		732	1732		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	670	10	10	350	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	679	0	10	430	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)	554	1223		371	878		159	242			199	
v/s Ratio Prot	0.03	c0.38			0.25			0.01				
v/s Ratio Perm	0.17			0.01			0.01				c0.12	
v/c Ratio	0.29	0.56		0.03	0.49		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	2.0		0.1	0.1			10.0	
Delay (s)	6.0	8.4		10.0	14.9		27.8	27.8			41.2	
Level of Service	A	A		A	B		C	C			D	
Approach Delay (s)		7.9			14.8			27.8			41.2	
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	0.64		
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 AM Peak Hour

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	410	10	0	440	10	0
Future Volume (Veh/h)	410	10	0	440	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)	410	10	0	440	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			420		855	415
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			212		731	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)			1149		329	704

Direction, Lane #	EB 1	WB 1	NB 1
Volume Total	420	440	10
Volume Left	0	0	10
Volume Right	10	0	0
cSH	1700	1149	329
Volume to Capacity	0.25	0.00	0.03
Queue Length 95th (m)	0.0	0.0	0.8
Control Delay (s)	0.0	0.0	16.3
Lane LOS			C
Approach Delay (s)	0.0	0.0	16.3
Approach LOS			C

Intersection Summary				
Average Delay		0.2		
Intersection Capacity Utilization		34.4%	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	350	5	0	690
Future Volume (Veh/h)	10	10	350	5	0	690
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	350	5	0	690
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	0.68					
vC, conflicting volume	1042	352			355	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	831	352			355	
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)	234	696			1215	

Direction, Lane #	WB 1	NB 1	SB 1
Volume Total	20	355	690
Volume Left	10	0	0
Volume Right	10	5	0
cSH	350	1700	1215
Volume to Capacity	0.06	0.21	0.00
Queue Length 95th (m)	1.4	0.0	0.0
Control Delay (s)	15.9	0.0	0.0
Lane LOS	C		
Approach Delay (s)	15.9	0.0	0.0
Approach LOS	C		

Intersection Summary				
Average Delay		0.3		
Intersection Capacity Utilization		48.3%	ICU Level of Service	A
Analysis Period (min)		15		

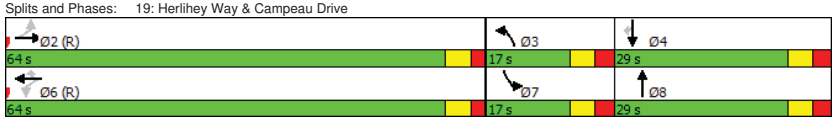
Queues
19: Herlihey Way & Campeau Drive

Future Total AM Peak Hour

Lane Group	EBL	EBT	WBL	WBT	WBR	NBL	NBT	SBL	SBT	SBR
Lane Configurations										
Traffic Volume (vph)	15	310	65	480	35	10	5	20	5	20
Future Volume (vph)	15	310	65	480	35	10	5	20	5	20
Lane Group Flow (vph)	15	350	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	0.25	0.08	0.35	0.03	0.10	0.28	0.20	0.02	0.08
Control Delay	8.3	7.9	7.3	7.8	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	8.3	7.9	7.3	7.8	0.5	51.1	19.0	53.1	36.6	0.7
Queue Length 50th (m)	0.2	5.9	4.9	43.4	0.3	2.2	1.1	4.4	1.1	0.0
Queue Length 95th (m)	m6.2	84.9	m10.3	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	765	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	0.25	0.08	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 AM Peak Hour

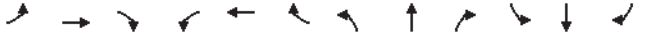
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	15	310	40	65	480	35	10	5	40	20	5	20
Future Volume (vph)	15	310	40	65	480	35	10	5	40	20	5	20
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Total Lost time (s)	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		970	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	310	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	348	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		703	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	0.27		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	1.09	1.21		1.06	1.03	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	6.7	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	10.7	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
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)	25	385	0	0	385	30	0	0	5	65	0	55
Future Volume (Veh/h)	25	385	0	0	385	30	0	0	5	65	0	55
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	385	0	0	385	30	0	0	5	65	0	55
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	415			390			895	855	390	840	840	400
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	415			250			819	774	250	757	757	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 %	98			100			100	100	99	77	100	92
cM capacity (veh/h)	1155			1174			236	287	702	282	294	654

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	410	415	5	120
Volume Left	25	0	0	65
Volume Right	0	30	5	55
cSH	1155	1174	702	382
Volume to Capacity	0.02	0.00	0.01	0.31
Queue Length 95th (m)	0.5	0.0	0.2	10.6
Control Delay (s)	0.7	0.0	10.2	18.7
Lane LOS	A		B	C
Approach Delay (s)	0.7	0.0	10.2	18.7
Approach LOS			B	C

Intersection Summary				
Average Delay	2.7			
Intersection Capacity Utilization	63.7%	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)	10	445	395	30	65	20
Future Volume (Veh/h)	10	445	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	445	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				875	410
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	425				846	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				80	97
cM capacity (veh/h)	1145				318	646

Direction, Lane #	EB 1	WB 1	SB 1
Volume Total	455	425	85
Volume Left	10	0	65
Volume Right	0	30	20
cSH	1145	1700	361
Volume to Capacity	0.01	0.25	0.24
Queue Length 95th (m)	0.2	0.0	7.2
Control Delay (s)	0.3	0.0	18.0
Lane LOS	A		C
Approach Delay (s)	0.3	0.0	18.0
Approach LOS			C

Intersection Summary				
Average Delay	1.7			
Intersection Capacity Utilization	45.0%	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)	20	295	20	0	185	0	45	0	0	0	0	45
Future Volume (Veh/h)	20	295	20	0	185	0	45	0	0	0	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	20	0	185	0	45	0	0	0	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	185			315			575	530	305	530	540	185
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	185			315			575	530	305	530	540	185
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			89	100	100	100	100	95
cM capacity (veh/h)	1402			1257			405	451	740	458	445	862

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	335	185	45	45
Volume Left	20	0	45	0
Volume Right	20	0	0	45
cSH	1402	1257	405	862
Volume to Capacity	0.01	0.00	0.11	0.05
Queue Length 95th (m)	0.3	0.0	3.0	1.3
Control Delay (s)	0.6	0.0	15.0	9.4
Lane LOS	A		B	A
Approach Delay (s)	0.6	0.0	15.0	9.4
Approach LOS			B	A

Intersection Summary					
Average Delay	2.1				
Intersection Capacity Utilization	48.4%	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	20	10	105	250	0
Future Volume (Veh/h)	0	20	10	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	20	10	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	375	250	250			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	375	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	97	99			
cM capacity (veh/h)	625	794	1327			

Direction, Lane #	EB 1	NB 1	SB 1
Volume Total	20	115	250
Volume Left	0	10	0
Volume Right	20	0	0
cSH	794	1327	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 AM Peak Hour

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	520	20	0	210	45	0
Future Volume (Veh/h)	520	20	0	210	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)	520	20	0	210	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			540		740	530
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			540		740	530
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		88	100
cM capacity (veh/h)			1039		387	553

Direction, Lane #	EB 1	WB 1	NB 1
Volume Total	540	210	45
Volume Left	0	0	45
Volume Right	20	0	0
cSH	1700	1039	387
Volume to Capacity	0.32	0.00	0.12
Queue Length 95th (m)	0.0	0.0	3.1
Control Delay (s)	0.0	0.0	15.5
Lane LOS			C
Approach Delay (s)	0.0	0.0	15.5
Approach LOS			C

Intersection Summary			
Average Delay		0.9	
Intersection Capacity Utilization		40.2%	ICU Level of Service
Analysis Period (min)		15	

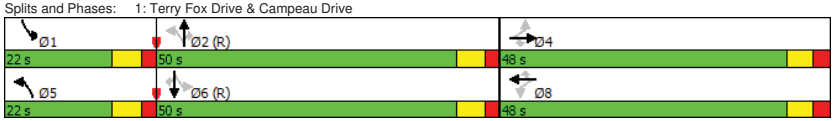
Queues
1: Terry Fox Drive & Campeau Drive

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	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	62.6	27.2	5.7	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	62.6	27.2	5.7	13.8	29.0	7.1	17.0	23.0	3.5
Queue Length 50th (m)	15.1	16.7	0.0	88.2	10.2	6.4	3.1	95.2	6.1	13.2	85.4	0.0
Queue Length 95th (m)	27.6	29.2	5.8	#125.2	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 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	1.00	0.96	1.10	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	59.4	28.6	32.6	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			48.0			25.6			20.7	
Approach LOS		C			D			C			C	

Intersection Summary				
HCM 2000 Control Delay	28.1	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

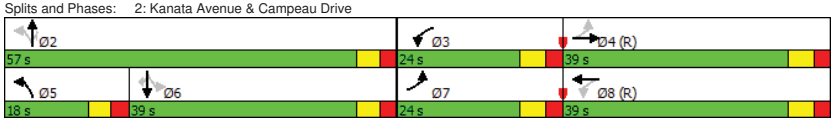
Queues
2: Kanata Avenue & Campeau Drive

Future Total PM Peak Hour

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations										
Traffic Volume (vph)	285	315	100	345	140	500	80	45	360	210
Future Volume (vph)	285	315	100	345	140	500	80	45	360	210
Lane Group Flow (vph)	285	465	100	420	140	500	80	45	360	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	0.69	0.30	0.72	0.56	0.73	0.13	0.28	0.85	0.42
Control Delay	36.4	34.6	19.6	44.5	32.7	38.5	4.5	40.4	62.2	7.3
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	36.4	34.6	19.6	44.5	32.7	38.5	4.5	40.4	62.2	7.3
Queue Length 50th (m)	33.9	63.4	12.6	93.6	22.7	103.0	0.0	9.1	84.9	0.0
Queue Length 95th (m)	#81.5	#157.3	24.2	#155.6	35.6	135.8	8.8	19.8	117.1	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)	416	672	457	586	261	766	679	190	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	0.69	0.22	0.72	0.54	0.65	0.12	0.24	0.73	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 PM Peak Hour

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	285	315	150	100	345	75	140	500	80	45	360	210
Future Volume (vph)	285	315	150	100	345	75	140	500	80	45	360	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		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)	1708	1686		1703	1739		1707	1800	1481	1701	1800	1429
Flt Permitted	0.24	1.00		0.34	1.00		0.18	1.00	1.00	0.39	1.00	1.00
Satd. Flow (perm)	439	1686		614	1739		324	1800	1481	691	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	100	345	75	140	500	80	45	360	210
RTOR Reduction (vph)	0	12	0	0	6	0	0	0	50	0	0	160
Lane Group Flow (vph)	285	453	0	100	414	0	140	500	30	45	360	50
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)	62.4	46.9		49.3	40.0		45.5	45.5	45.5	28.3	28.3	28.3
Effective Green, g (s)	62.4	46.9		49.3	40.0		45.5	45.5	45.5	28.3	28.3	28.3
Actuated g/C Ratio	0.52	0.39		0.41	0.33		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)	399	658		336	579		253	682	561	162	424	337
v/s Ratio Prot	c0.10	c0.27		0.02	0.24		0.05	c0.28			c0.20	
v/s Ratio Perm	c0.27			0.10			0.16		0.02	0.07		0.03
v/c Ratio	0.71	0.69		0.30	0.72		0.55	0.73	0.05	0.28	0.85	0.15
Uniform Delay, d1	20.2	30.5		22.8	35.0		27.7	32.0	23.6	37.5	43.8	36.3
Progression Factor	1.52	0.94		1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	4.8	4.6		0.5	7.4		2.6	4.1	0.0	0.9	14.6	0.2
Delay (s)	35.3	33.1		23.3	42.4		30.4	36.1	23.7	38.4	58.4	36.5
Level of Service	D	C		C	D		C	D	C	D	E	D
Approach Delay (s)		33.9			38.7			33.6			49.5	
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	93.8%	ICU Level of Service	F	
Analysis Period (min)	15			

c Critical Lane Group

Queues
3: Maritime Way/Knudson Drive & Campeau Drive

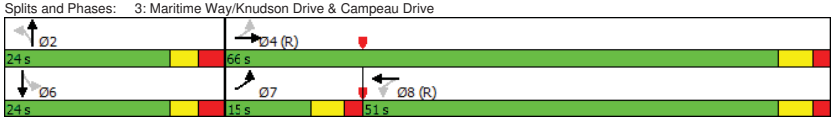
Future Total PM Peak Hour

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations								
Traffic Volume (vph)	45	435	115	590	15	10	75	10
Future Volume (vph)	45	435	115	590	15	10	75	10
Lane Group Flow (vph)	45	460	115	750	15	95	75	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	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	0.10	0.33	0.18	0.61	0.10	0.36	0.49	0.26
Control Delay	4.3	4.8	16.5	21.9	33.9	13.5	46.6	15.5
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	4.3	4.8	16.5	21.9	33.9	13.5	46.6	15.5
Queue Length 50th (m)	1.7	22.2	13.5	116.3	2.5	1.6	13.0	1.7
Queue Length 95th (m)	5.6	46.8	m27.7	163.3	7.8	14.4	25.2	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)	478	1406	631	1222	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	0.09	0.33	0.18	0.61	0.06	0.25	0.30	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: 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)	45	435	25	115	590	160	15	10	85	75	10	50
Future Volume (vph)	45	435	25	115	590	160	15	10	85	75	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)	1710	1785		1710	1724		1689	1558		1710	1510	
Flt Permitted	0.25	1.00		0.50	1.00		0.72	1.00		0.70	1.00	
Satd. Flow (perm)	450	1785		897	1724		1276	1558		1252	1510	
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	435	25	115	590	160	15	10	85	75	10	50
RTOR Reduction (vph)	0	2	0	0	8	0	0	76	0	0	45	0
Lane Group Flow (vph)	45	458	0	115	742	0	15	19	0	75	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)	68.5	68.5		58.9	58.9		9.8	9.8		9.8	9.8	
Effective Green, g (s)	68.5	68.5		58.9	58.9		9.8	9.8		9.8	9.8	
Actuated g/C Ratio	0.76	0.76		0.65	0.65		0.11	0.11		0.11	0.11	
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)	397	1358		587	1128		138	169		136	164	
v/s Ratio Prot	0.00	c0.26			c0.43			0.01			0.01	
v/s Ratio Perm	0.08			0.13			0.01			c0.06		
v/c Ratio	0.11	0.34		0.20	0.66		0.11	0.11		0.55	0.09	
Uniform Delay, d1	5.6	3.5		6.2	9.4		36.2	36.2		38.0	36.1	
Progression Factor	1.00	1.00		1.88	1.78		1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.1	0.7		0.6	2.2		0.3	0.3		4.8	0.3	
Delay (s)	5.7	4.1		12.2	19.1		36.5	36.5		42.8	36.4	
Level of Service	A	A		B	B		D	D		D	D	
Approach Delay (s)		4.3			18.1			36.5			39.9	
Approach LOS		A			B			D			D	

Intersection Summary				
HCM 2000 Control Delay	16.9	HCM 2000 Level of Service	B	
HCM 2000 Volume to Capacity ratio	0.64			
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	17.4	
Intersection Capacity Utilization	73.6%	ICU Level of Service	D	
Analysis Period (min)	15			
c Critical Lane Group				

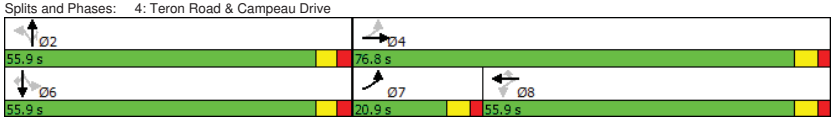
Queues
4: Teron Road & Campeau Drive

Future Total PM Peak Hour

Lane Group	EBL	EBT	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations											
Traffic Volume (vph)	240	295	85	625	405	15	25	70	345	40	260
Future Volume (vph)	240	295	85	625	405	15	25	70	345	40	260
Lane Group Flow (vph)	240	315	85	625	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	0.73	0.30	0.20	0.82	0.52		0.08	0.14	0.89	0.07	0.41
Control Delay	30.4	14.6	26.7	43.5	9.8		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	30.4	14.6	26.7	43.5	9.8		28.2	6.5	65.1	28.1	5.3
Queue Length 50th (m)	27.4	36.9	13.4	138.1	14.7		7.0	0.0	81.4	7.0	0.0
Queue Length 95th (m)	#72.7	67.5	29.6	#238.0	49.9		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)	335	1052	427	759	773		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	0.72	0.30	0.20	0.82	0.52		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
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

Future Total PM Peak Hour

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	240	295	20	85	625	405	15	25	70	345	40	260
Future Volume (vph)	240	295	20	85	625	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	1779		1695	1800	1417		1749	1435	1624	1800	1456
Flt Permitted	0.15	1.00		0.57	1.00	1.00		0.92	1.00	0.73	1.00	1.00
Satd. Flow (perm)	265	1779		1015	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)	240	295	20	85	625	405	15	25	70	345	40	260
RTOR Reduction (vph)	0	2	0	0	0	179	0	0	48	0	0	179
Lane Group Flow (vph)	240	313	0	85	625	226	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		50.9	50.9	50.9		37.5	37.5	37.5	37.5	37.5
Effective Green, g (s)	71.3	71.3		50.9	50.9	50.9		37.5	37.5	37.5	37.5	37.5
Actuated g/C Ratio	0.59	0.59		0.42	0.42	0.42		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)	328	1051		428	759	598		508	446	388	559	452
v/s Ratio Prot	c0.09	0.18			c0.35						0.02	
v/s Ratio Perm	0.34			0.08		0.16		0.02	0.02	c0.28		0.06
v/c Ratio	0.73	0.30		0.20	0.82	0.38		0.08	0.05	0.89	0.07	0.18
Uniform Delay, d1	20.1	12.2		22.0	30.9	24.0		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	8.2	0.7		1.0	9.8	1.8		0.1	0.0	21.1	0.1	0.2
Delay (s)	28.2	13.0		23.0	40.7	25.8		29.4	29.1	60.7	29.3	30.5
Level of Service	C	B		C	D	C		C	C	E	C	C
Approach Delay (s)		19.6			33.9			29.2			46.6	
Approach LOS		B			C			C			D	

Intersection Summary				
HCM 2000 Control Delay	33.8	HCM 2000 Level of Service	C	
HCM 2000 Volume to Capacity ratio	0.84			
Actuated Cycle Length (s)	120.6	Sum of lost time (s)	17.7	
Intersection Capacity Utilization	90.3%	ICU Level of Service	E	
Analysis Period (min)	15			

c Critical Lane Group

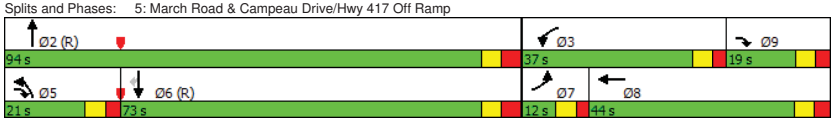
Queues
5: March Road & Campeau Drive/Hwy 417 Off Ramp

Future Total PM Peak Hour

Lane Group	EBL	EBR	WBL	WBT	NBL	NBT	SBT	SBR	Ø9
Lane Configurations									
Traffic Volume (vph)	65	645	490	540	350	570	2485	225	
Future Volume (vph)	65	645	490	540	350	570	2485	225	
Lane Group Flow (vph)	65	645	490	540	350	570	2485	225	
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	0.67	0.81	0.61	0.96	0.27	1.00	0.28	
Control Delay	150.8	54.8	70.8	53.5	104.2	16.3	59.5	8.5	
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Total Delay	150.8	54.8	70.8	53.5	104.2	16.3	59.5	8.5	
Queue Length 50th (m)	20.7	91.6	76.8	79.3	57.3	45.5	256.3	10.9	
Queue Length 95th (m)	#52.5	117.6	94.2	99.7	#91.2	56.9	#292.8	28.8	
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	365	2090	2489	798	
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	0.67	0.69	0.60	0.96	0.27	1.00	0.28	

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)	65	0	645	490	540	0	350	570	0	0	2485	225
Future Volume (vph)	65	0	645	490	540	0	350	570	0	0	2485	225
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	645	490	540	0	350	570	0	0	2485	225
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	0	0	93
Lane Group Flow (vph)	65	0	645	490	540	0	350	570	0	0	2485	132
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		38.3	26.1	36.9		14.9	86.8			65.4	65.4
Effective Green, g (s)	6.0		38.3	26.1	36.9		14.9	86.8			65.4	65.4
Actuated g/C Ratio	0.04		0.26	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		970	603	888		366	2088			2485	704
v/s Ratio Prot	0.04		c0.17	c0.14	0.15		c0.09	0.16			c0.44	
v/s Ratio Perm												0.08
v/c Ratio	0.90		0.66	0.81	0.61		0.96	0.27			1.00	0.19
Uniform Delay, d1	71.7		50.1	59.6	50.1		67.2	15.8			42.3	26.0
Progression Factor	1.00		1.00	1.00	1.00		1.00	1.00			1.00	1.00
Incremental Delay, d2	73.0		1.7	8.2	1.2		35.4	0.3			18.1	0.6
Delay (s)	144.8		51.8	67.8	51.3		102.6	16.1			60.4	26.6
Level of Service	F		D	E	D		F	B			E	C
Approach Delay (s)		60.3			59.2			49.0			57.5	
Approach LOS		E			E			D			E	

Intersection Summary				
HCM 2000 Control Delay	56.8	HCM 2000 Level of Service	E	
HCM 2000 Volume to Capacity ratio	0.93			
Actuated Cycle Length (s)	150.0	Sum of lost time (s)	26.8	
Intersection Capacity Utilization	101.4%	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

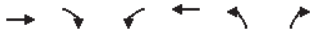
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Sign Control	Stop		Stop			Stop
Traffic Volume (vph)	220	140	220	220	105	195
Future Volume (vph)	220	140	220	220	105	195
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	220	140	220	220	105	195

Direction, Lane #	WB 1	NB 1	SB 1	SB 2
Volume Total (vph)	360	440	105	195
Volume Left (vph)	220	0	105	0
Volume Right (vph)	140	220	0	0
Hadj (s)	-0.11	-0.30	0.50	0.00
Departure Headway (s)	5.7	5.3	6.7	6.2
Degree Utilization, x	0.57	0.65	0.20	0.34
Capacity (veh/h)	596	651	506	545
Control Delay (s)	16.0	17.6	10.2	11.2
Approach Delay (s)	16.0	17.6	10.8	
Approach LOS	C	C	B	

Intersection Summary			
Delay	15.2		
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 PM Peak Hour



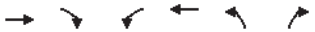
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	170	10	25	285	15	10
Future Volume (Veh/h)	170	10	25	285	15	10
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	170	10	25	285	15	10
Pedestrians					15	
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			195		525	190
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			195		525	190
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)			1373		501	846

Direction, Lane #	EB 1	WB 1	NB 1
Volume Total	180	310	25
Volume Left	0	25	15
Volume Right	10	0	10
cSH	1700	1373	598
Volume to Capacity	0.11	0.02	0.04
Queue Length 95th (m)	0.0	0.4	1.0
Control Delay (s)	0.0	0.8	11.3
Lane LOS		A	B
Approach Delay (s)	0.0	0.8	11.3
Approach LOS			B

Intersection Summary				
Average Delay		1.0		
Intersection Capacity Utilization		42.0%	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)	170	25	15	285	15	10
Future Volume (Veh/h)	170	25	15	285	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)	170	25	15	285	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			215		518	202
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			215		518	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 %			99		97	99
cM capacity (veh/h)			1344		507	829

Direction, Lane #	EB 1	WB 1	NB 1
Volume Total	195	300	25
Volume Left	0	15	15
Volume Right	25	0	10
cSH	1700	1344	601
Volume to Capacity	0.11	0.01	0.04
Queue Length 95th (m)	0.0	0.3	1.0
Control Delay (s)	0.0	0.5	11.3
Lane LOS		A	B
Approach Delay (s)	0.0	0.5	11.3
Approach LOS			B

Intersection Summary				
Average Delay		0.8		
Intersection Capacity Utilization		38.7%	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	170	120	20
Future Volume (Veh/h)	10	10	15	170	120	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	170	120	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	345	145	155			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	345	145	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 %	98	99	99			
cM capacity (veh/h)	641	896	1420			

Direction, Lane #	EB 1	NB 1	SB 1
Volume Total	20	185	140
Volume Left	10	15	0
Volume Right	10	0	20
cSH	747	1420	1700
Volume to Capacity	0.03	0.01	0.08
Queue Length 95th (m)	0.7	0.3	0.0
Control Delay (s)	10.0	0.7	0.0
Lane LOS	A	A	
Approach Delay (s)	10.0	0.7	0.0
Approach LOS	A		

Intersection Summary				
Average Delay		0.9		
Intersection Capacity Utilization		32.6%	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	180	125	5
Future Volume (Veh/h)	5	20	25	180	125	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	180	125	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	138	140			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	368	138	140			
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)	620	909	1444			

Direction, Lane #	EB 1	NB 1	SB 1
Volume Total	25	205	130
Volume Left	5	25	0
Volume Right	20	0	5
cSH	831	1444	1700
Volume to Capacity	0.03	0.02	0.08
Queue Length 95th (m)	0.7	0.4	0.0
Control Delay (s)	9.5	1.0	0.0
Lane LOS	A	A	
Approach Delay (s)	9.5	1.0	0.0
Approach LOS	A		

Intersection Summary				
Average Delay		1.3		
Intersection Capacity Utilization		33.8%	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)	125	55	70	95	100	260
Future Volume (vph)	125	55	70	95	100	260
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	125	55	70	95	100	260

Direction, Lane #	EB 1	WB 1	SB 1
Volume Total (vph)	180	165	360
Volume Left (vph)	125	0	100
Volume Right (vph)	0	95	260
Hadj (s)	0.14	-0.35	-0.38
Departure Headway (s)	5.1	4.7	4.4
Degree Utilization, x	0.26	0.21	0.44
Capacity (veh/h)	655	711	782
Control Delay (s)	9.8	8.9	10.7
Approach Delay (s)	9.8	8.9	10.7
Approach LOS	A	A	B

Intersection Summary				
Delay	10.1			
Level of Service	B			
Intersection Capacity Utilization	53.5%	ICU Level of Service	A	
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)	335	175	45	175	75	25
Future Volume (vph)	335	175	45	175	75	25
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	335	175	45	175	75	25

Direction, Lane #	WB 1	NB 1	SB 1
Volume Total (vph)	510	220	100
Volume Left (vph)	335	0	75
Volume Right (vph)	175	175	0
Hadj (s)	-0.07	-0.48	0.15
Departure Headway (s)	4.7	4.9	5.7
Degree Utilization, x	0.66	0.30	0.16
Capacity (veh/h)	746	668	572
Control Delay (s)	16.2	9.9	9.7
Approach Delay (s)	16.2	9.9	9.7
Approach LOS	C	A	A

Intersection Summary				
Delay	13.8			
Level of Service	B			
Intersection Capacity Utilization	60.7%	ICU Level of Service	B	
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)	20	445	10	5	545	65	20	0	10	45	0	15
Future Volume (Veh/h)	20	445	10	5	545	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	445	10	5	545	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	610			465			1102	1120	460	1088	1092	578
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	610			465			1102	1120	460	1088	1092	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 %	98			100			89	100	98	76	100	97
cM capacity (veh/h)	979			1098			179	201	600	187	209	520

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	475	615	30	60
Volume Left	20	5	20	45
Volume Right	10	65	10	15
cSH	979	1098	234	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			50.4%	ICU Level of Service	A
Analysis Period (min)			15		

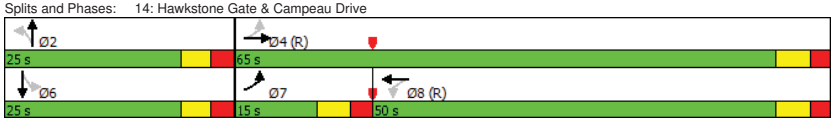
Queues
14: Hawkstone Gate & Campeau Drive

Future Total PM Peak Hour

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations								
Traffic Volume (vph)	55	500	20	780	10	5	50	0
Future Volume (vph)	55	500	20	780	10	5	50	0
Lane Group Flow (vph)	55	515	20	880	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	0.15	0.35	0.03	0.71	0.09	0.06		0.50
Control Delay	3.6	3.6	8.5	17.2	35.2	26.0		15.7
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0		0.0
Total Delay	3.6	3.6	8.5	17.2	35.2	26.0		15.7
Queue Length 50th (m)	1.3	15.8	1.1	93.3	1.8	0.9		1.1
Queue Length 95th (m)	5.4	41.1	5.4	#234.6	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)	404	1452	596	1234	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	0.14	0.35	0.03	0.71	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: 90
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	500	15	20	780	100	10	5	5	50	0	65
Future Volume (vph)	55	500	15	20	780	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)	1710	1792		1710	1762		1662	1638			1567	
Flt Permitted	0.19	1.00		0.47	1.00		0.65	1.00			0.86	
Satd. Flow (perm)	334	1792		852	1762		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	500	15	20	780	100	10	5	5	50	0	65
RTOR Reduction (vph)	0	1	0	0	3	0	0	5	0	0	100	0
Lane Group Flow (vph)	55	514	0	20	877	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)	341	1403		561	1160		96	138			115	
v/s Ratio Prot	0.01	c0.29			c0.50			0.00				
v/s Ratio Perm	0.12			0.02			0.01				c0.01	
v/c Ratio	0.16	0.37		0.04	0.76		0.10	0.04			0.13	
Uniform Delay, d1	7.5	3.0		5.4	10.4		38.1	37.8			38.1	
Progression Factor	0.82	0.75		1.00	1.00		1.00	1.00			1.00	
Incremental Delay, d2	0.2	0.7		0.1	4.6		0.5	0.1			0.5	
Delay (s)	6.3	2.9		5.5	15.0		38.5	38.0			38.7	
Level of Service	A	A		A	B		D	D			D	
Approach Delay (s)		3.3			14.8			38.2			38.7	
Approach LOS		A			B			D			D	

Intersection Summary				
HCM 2000 Control Delay	12.7	HCM 2000 Level of Service	B	
HCM 2000 Volume to Capacity ratio	0.68			
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	17.9	
Intersection Capacity Utilization	74.6%	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 PM Peak Hour

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	420	20	5	500	20	5
Future Volume (Veh/h)	420	20	5	500	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	500	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			0.81		0.81	0.81
vC, conflicting volume			440		940	430
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			186		806	174
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)			1130		284	706

Direction, Lane #	EB 1	WB 1	NB 1
Volume Total	440	505	25
Volume Left	0	5	20
Volume Right	20	0	5
cSH	1700	1130	323
Volume to Capacity	0.26	0.00	0.08
Queue Length 95th (m)	0.0	0.1	2.0
Control Delay (s)	0.0	0.1	17.1
Lane LOS		A	C
Approach Delay (s)	0.0	0.1	17.1
Approach LOS			C

Intersection Summary			
Average Delay	0.5		
Intersection Capacity Utilization	42.0%	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	720	10	10	600
Future Volume (Veh/h)	5	0	720	10	10	600
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	600
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	1350	730			735	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1308	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 %	96	100			99	
cM capacity (veh/h)	137	424			876	

Direction, Lane #	WB 1	NB 1	SB 1
Volume Total	5	730	610
Volume Left	5	0	10
Volume Right	0	10	0
cSH	137	1700	876
Volume to Capacity	0.04	0.43	0.01
Queue Length 95th (m)	0.9	0.0	0.3
Control Delay (s)	32.3	0.0	0.3
Lane LOS	D		A
Approach Delay (s)	32.3	0.0	0.3
Approach LOS	D		

Intersection Summary			
Average Delay		0.3	
Intersection Capacity Utilization		51.8%	ICU Level of Service A
Analysis Period (min)		15	

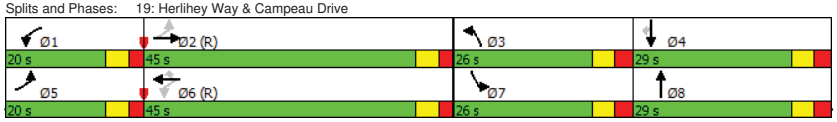
Queues
19: Herlihey Way & Campeau Drive

Future Total PM Peak Hour

Lane Group	EBL	EBT	WBL	WBT	WBR	NBL	NBT	SBL	SBT	SBR
Lane Configurations										
Traffic Volume (vph)	30	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	18.6	23.7	7.9	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	18.6	23.7	7.9	62.1	37.9	63.8	40.2	3.9
Queue Length 50th (m)	3.1	118.5	13.5	52.2	0.3	14.4	22.8	30.0	10.9	0.0
Queue Length 95th (m)	9.9	#211.6	m32.6	97.1	m6.3	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)	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 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	1.08	2.07	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		19.6	21.0	30.0	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			22.3			53.7			48.3	
Approach LOS		C			C			D			D	

Intersection Summary				
HCM 2000 Control Delay	33.6	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
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)	20	400	5	10	455	65	5	0	5	45	0	45
Future Volume (Veh/h)	20	400	5	10	455	65	5	0	5	45	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	400	5	10	455	65	5	0	5	45	0	45
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				0.87			0.87	0.87	0.87	0.87	0.87	
vC, conflicting volume	520			415			1005	992	412	955	962	488
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	520			251			930	916	248	873	881	488
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			97	100	99	80	100	92
cM capacity (veh/h)	1056			1142			193	230	685	229	241	584

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	425	530	10	90
Volume Left	20	10	5	45
Volume Right	5	65	5	45
cSH	1056	1142	301	329
Volume to Capacity	0.02	0.01	0.03	0.27
Queue Length 95th (m)	0.5	0.2	0.8	8.7
Control Delay (s)	0.6	0.3	17.4	20.0
Lane LOS	A	A	C	C
Approach Delay (s)	0.6	0.3	17.4	20.0
Approach LOS			C	C

Intersection Summary				
Average Delay	2.2			
Intersection Capacity Utilization	47.3%	ICU Level of Service	A	
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)	20	430	515	65	45	15
Future Volume (Veh/h)	20	430	515	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	430	515	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					0.99	
vC, conflicting volume	580				1018	548
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	580				1014	548
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)	1004				259	540

Direction, Lane #	EB 1	WB 1	SB 1
Volume Total	450	580	60
Volume Left	20	0	45
Volume Right	0	65	15
cSH	1004	1700	298
Volume to Capacity	0.02	0.34	0.20
Queue Length 95th (m)	0.5	0.0	5.9
Control Delay (s)	0.6	0.0	20.1
Lane LOS	A		C
Approach Delay (s)	0.6	0.0	20.1
Approach LOS			C

Intersection Summary				
Average Delay		1.4		
Intersection Capacity Utilization		51.3%	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 PM Peak Hour

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	45	195	70	0	300	0	30	0	0	0	0	30
Future Volume (Veh/h)	45	195	70	0	300	0	30	0	0	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	195	70	0	300	0	30	0	0	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	300			265			650	620	230	620	655	300
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	300			265			650	620	230	620	655	300
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			100			92	100	100	100	100	96
cM capacity (veh/h)	1273			1311			360	392	814	392	375	744

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	310	300	30	30
Volume Left	45	0	30	0
Volume Right	70	0	0	30
cSH	1273	1311	360	744
Volume to Capacity	0.04	0.00	0.08	0.04
Queue Length 95th (m)	0.9	0.0	2.2	1.0
Control Delay (s)	1.4	0.0	15.9	10.0
Lane LOS	A		C	B
Approach Delay (s)	1.4	0.0	15.9	10.0
Approach LOS			C	B

Intersection Summary				
Average Delay		1.8		
Intersection Capacity Utilization		53.0%	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	15	20	200	85	0
Future Volume (Veh/h)	0	15	20	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	15	20	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	325	85	85			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	325	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	99			
cM capacity (veh/h)	664	980	1524			

Direction, Lane #	EB 1	NB 1	SB 1
Volume Total	15	220	85
Volume Left	0	20	0
Volume Right	15	0	0
cSH	980	1524	1700
Volume to Capacity	0.02	0.01	0.05
Queue Length 95th (m)	0.4	0.3	0.0
Control Delay (s)	8.7	0.8	0.0
Lane LOS	A	A	
Approach Delay (s)	8.7	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 PM Peak Hour

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	205	45	0	480	30	0
Future Volume (Veh/h)	205	45	0	480	30	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)	205	45	0	480	30	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			250		708	228
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			250		708	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 %			100		93	100
cM capacity (veh/h)			1327		404	817

Direction, Lane #	EB 1	WB 1	NB 1
Volume Total	250	480	30
Volume Left	0	0	30
Volume Right	45	0	0
cSH	1700	1327	404
Volume to Capacity	0.15	0.00	0.07
Queue Length 95th (m)	0.0	0.0	1.9
Control Delay (s)	0.0	0.0	14.6
Lane LOS			B
Approach Delay (s)	0.0	0.0	14.6
Approach LOS			B

Intersection Summary				
Average Delay		0.6		
Intersection Capacity Utilization		36.7%	ICU Level of Service	A
Analysis Period (min)		15		

APPENDIX F:
Signal Timing Plans

Traffic Signal Timing

City of Ottawa, Transportation Services Department

Traffic Signal Operations Unit

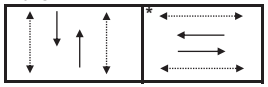
Intersection: **Main:** Terry Fox **Side:** Campeau
Controller: ATC-3 **TSD:** 6032
Author: Yassine Bennani **Date:** 16-Nov-2018

Existing Timing Plans†

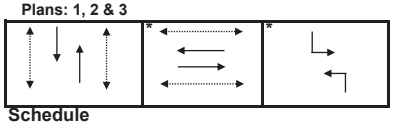
	Plan				Ped Minimum Time		
	AM Peak 1	Off Peak 2	PM Peak 3	Night 4	*Walk*	*DW*	*A+R*
Cycle	110	115	120	83			
Offset	27	33	93	X			
NB Thru	44	43	50	40	7	27	4.2+2.2
SB Thru	44	43	50	40	7	27	4.2+2.2
EB Thru	54	50	48	43	7	30	3.7+2.7
WB Thru	54	50	48	43	7	30	3.7+2.7
NB Left	12	22	22	-	-	-	4.2+2.2
SB Left	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

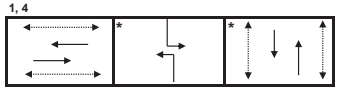
Intersection: ***Main:*** Campeau ***Side:*** Herlihey / Signature Centre
Controller: ATC 3 **TSD:** 6532
Author: Ahmed Abdullah **Date:** 18-Sep-2019

Existing Timing Plans†

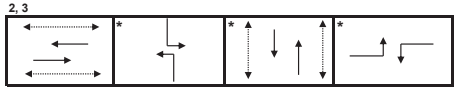
	Plan				Ped Minimum Time		
	AM Peak 1	Off Peak 2	PM Peak 3	Night 4	*Walk*	*DW*	*A+R*
Cycle	110	115	120	79			
Offset	75	78	26	X			
EB Thru	64	51	45	35	7	22	3.3+2.2
WB Thru	64	51	45	35	7	22	3.3+2.2
NB Left (fp)	17	20	26	15	-	-	3.3+2.6
SB Left (fp)	17	20	26	15	-	-	3.3+2.6
NB Thru	29	29	29	29	7	16	3.3+2.6
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

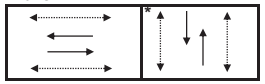
Intersection: Main: Campeau Side: Kanata
Controller: MS-3200 **TSD:** 6035
Author: Yassine Bennani **Date:** 16-Nov-2018

Existing Timing Plans†

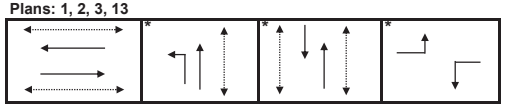
	Plan					Ped Minimum Time		
	AM Peak 1	Off Peak 2	PM Peak 3	Night 4	Noon 13	*Walk*	*DW*	*A+R*
Cycle	110	115	120	85	115			
Offset	67	82	31	X	82			
EB Thru	37	42	39	37	42	9	22	3.7+2.5
WB Thru	37	42	39	37	42	9	22	3.7+2.5
NB Left	15	16	18	-	16	-	-	3.3+2.6
SB Thru	46	42	39	48	42	9	15	3.3+2.6
NB Thru	61	58	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

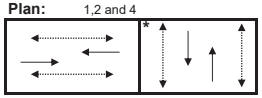
Intersection: Main: Kanata Side: Knudson/Maritime Way
Controller: MS-3200 **TSD:** 6548
Author: Yassine Bennani **Date:** 16-Nov-2018

Existing Timing Plans†

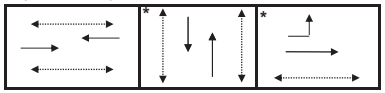
	Plan				Ped Minimum Time		
	AM Peak 1	Off Peak 2	PM Peak 3	Night 4	*Walk*	*DW*	*A+R*
Cycle	Free	60	90	Free			
Offset	X	0	0	X			
EB Thru	min=50.7	35	66	min=45.7	7	15	3.7+2.0
WB Thru	min=50.7	35	51	min=45.7	7	15	3.7+2.0
NB Thru	max=41	25	24	max=26.0	7	10	3.0+3.0
SB Thru	max=41	25	24	max=26.0	7	10	3.0+3.0
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

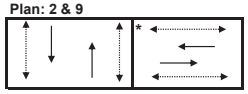
Intersection: Main: Campeau Side: Hawkstone
Controller: MS-3200 **TSD:** 6513
Author: Yassine Bennani **Date:** 16-Nov-2018

Existing Timing Plans†

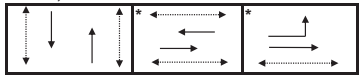
	Plan					Ped Minimum Time		
	AM Peak 1	Off Peak 2	PM Peak 3	PM Rush 7	Night 9	*Walk*	*DW*	*A+R*
Cycle	80	70	90	90	Free			
Offset	0	0	0	0	X			
EB Thru	55	45	65	65	min: 55	10	16	3.7+2.3
WB Thru	40	45	50	50	min: 55	10	16	3.7+2.3
NB Thru	25	25	25	25	max :35.9	7	11	3.3+2.6
SB Thru	25	25	25	25	max: 35.9	7	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

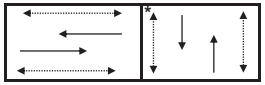
Intersection: Main: Campeau Side: Teron
Controller: MS-3200 **TSD:** 5171
Author: Yassine Bennani **Date:** 16-Nov-2018

Existing Timing Plans†

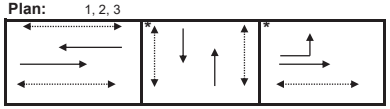
	Plan				Ped Minimum Time		
	AM Peak 1	Off Peak 2	PM Peak 3	Night 4	*Walk*	*DW*	*A+R*
Cycle	free	free	free	free			
Offset	X	X	X	X			
EB Thru	min: 55.9	min: 55.9	min: 55.9	min: 55.9	7	15	3.7+2.2
WB Thru	min: 55.9	min: 55.9	min: 55.9	min: 55.9	7	15	3.7+2.2
NB Thru	max: 55.9	max: 55.9	max: 55.9	max: 55.9	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†

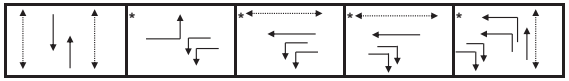
	Plan							Ped Minimum Time		
	AM Peak 1	Off Peak 2	PM Peak 3	Night 4	Saturday 5	PM 13	PM 15	*Walk*	*DW*	*A+R*
Cycle	110	100	120	100	100	150	130			
Offset	97	0	0	X	0	79	29			
NB Thru	47	43	62	31	45	88	72	7	16	3.7+3.8
SB Thru	35	31	50	31	31	76	60	7	16	3.7+3.8
EB Left (fp)	19	13	14	13	11	18	14	-	-	3.7+2.3
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)