1131 & 1151 Teron Road

TIA Strategy Report Final

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477778 - 01000

TIA Plan Reports

On 14 June 2017, the Council of the City of Ottawa adopted new Transportation Impact Assessment (TIA) Guidelines. In adopting the guidelines, Council established a requirement for those preparing and delivering transportation impact assessments and reports to sign a letter of certification.

Individuals submitting TIA reports will be responsible for all aspects of development-related transportation assessment and reporting, and undertaking such work, in accordance and compliance with the City of Ottawa's Official Plan, the Transportation Master Plan and the Transportation Impact Assessment (2017) Guidelines.

By submitting the attached TIA report (and any associated documents) and signing this document, the individual acknowledges that s/he meets the four criteria listed below.

CERTIFICATION

1. I have reviewed and have a sound understanding of the objectives, needs and requirements of the City of Ottawa's Official Plan, Transportation Master Plan and the Transportation Impact Assessment (2017) Guidelines;
2. I have a sound knowledge of industry standard practice with respect to the preparation of transportation impact assessment reports, including multi modal level of service review;
3. I have substantial experience (more than 5 years) in undertaking and delivering transportation impact studies (analysis, reporting and geometric design) with strong background knowledge in transportation planning, engineering or traffic operations; and
4. I am either a licensed1 or registered 2 professional in good standing, whose field of expertise [check ✓ appropriate field(s)] is either transportation engineering ☑ or transportation planning □.

[1,2] **License of registration body that oversees the profession is required to have a code of conduct and ethics guidelines that will ensure appropriate conduct and representation for transportation planning and/or transportation engineering works.**

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FINAL REPORT

Parsons has been retained by Manor Park Management to prepare a Transportation Impact Assessment (TIA) in support of a Site Plan Application (SPA) for a residential development located at the joint addresses of 1131 and 1151 Teron Road in Kanata. This document follows the new TIA process, as outlined by the City Transportation Impact Assessment (TIA) Guidelines (2017). The following report represents Step 5 – Final Report. Note that this report begins as a Step 4 Report given that a recent step 5 submission for this location was completed by Parsons. The new SPA features slight changes from the previously submitted Step 5 Report.

1. SCREENING FORM

The screening form confirmed the need for a TIA in support of the proposed development based on the Trip Generation, Location and Safety Triggers, as follows: the envisioned land use consist for the combined development consists of approximately 131 residential units; the site is located between the March and Teron Road spine cycling network and within the March Road Transit Oriented Development (TOD) area; and due to the proximity of the Teron Road access point to the existing Steacie/Teron intersection. The screening form has been provided in **Appendix A**.

2. SCOPING REPORT

2.1. Existing and Planned Conditions

2.1.1. Proposed Development

The proposed development is located at the municipal addresses of 1131 and 1151 Teron Road. The existing site is currently an empty field with overhead hydro wires.

A two-phased project is proposed. Phase 1 will consist of a 3-storey, 18-unit residential building located at 1131 Teron Road. Phase 2 will consist of the addition of a 9-storey, 113-unit residential building located at 1151 Teron Road. Phase 1 is anticipated to be built by the year 2022 and Phase 2 is expected to follow promptly after. For the purpose of this study, full buildout will be assumed for the year 2022 and the horizon full buildout plus 5 years will be 2027. The site is currently zoned as R5A [2144] S327 which allows mid-rise buildings up to 9-storeys or 30 meters high and O1[2143] which allows parks and open space, making the development be within zoning allowances. The site's context is displayed in **Figure 1**.

The future site proposes a single full movement vehicle access to Teron Road. A total of 102 underground and 98 surface parking spots are proposed. The latest site plan concept is shown in **Figure 2**.

Figure 1: Local Context

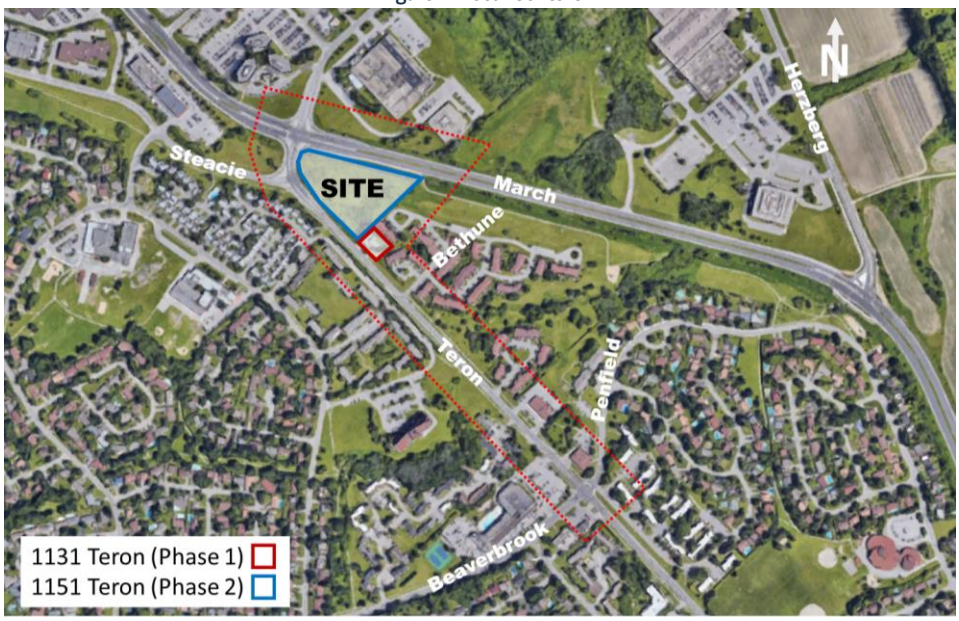
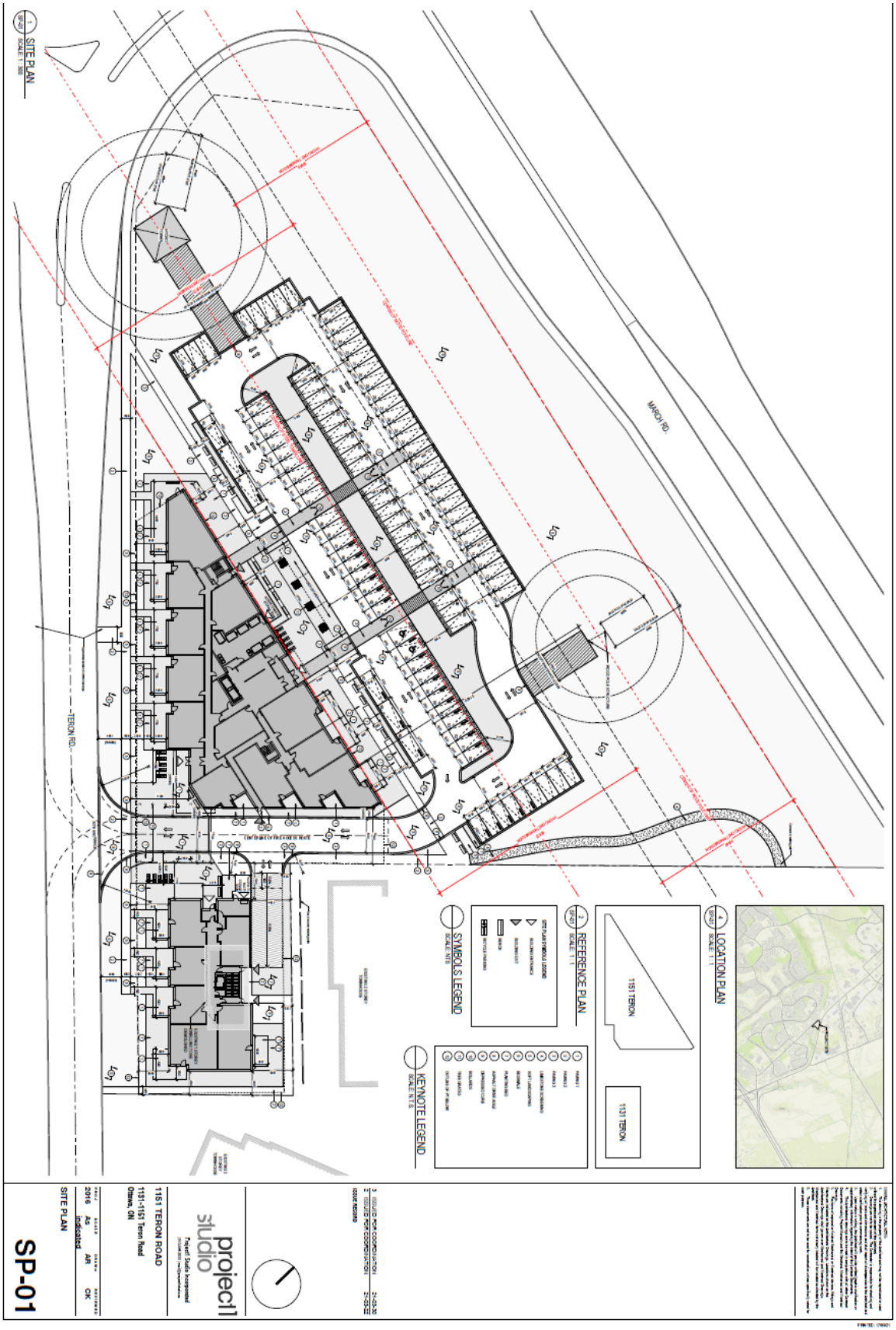


Figure 2: Proposed Site Plan



2.1.2. Existing Conditions

Area Road Network

March Road is a north-south arterial roadway, which extends from the Highway 417 in the south (continues as Eagleson south of the highway) to the town of Almonte in the north-west. The cross section within the study area is a divided roadway with two travel lanes in each direction and has auxiliary left-turn and right-turn lanes at main intersections. March Road is identified as a future bus rapid transit (BRT) corridor. The posted speed limit within the study area is 80 km/h.

Teron Road is a north-south major collector roadway which extends from Campeau Drive in the south to Carling Avenue in the north. The cross section within the study area consists of one lane per direction with auxiliary left and right turn lanes at main intersections and no median. The posted speed limit is 50 km/h.

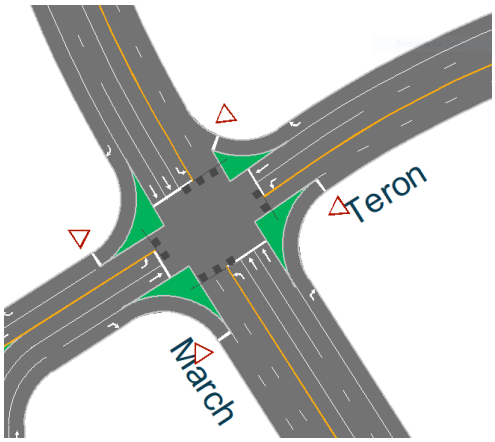
Beaverbrook Road is an east-west collector roadway which extends from Weslock Way in the west to Teron Road in the east and then continues as Penfield Drive which functions as a large crescent collector for a local neighbourhood. The cross section west of Teron Road consists of one travel lane per direction with no residential driveways, while the cross section east of Teron Road (Penfield Drive) consists of a one travel lane per direction with multiple residential driveway accesses. The posted speed limit is 40km/h.

Steacie Drive is an east-west local roadway extending west of Teron Rd and finishing in a cul-de-sac. The cross section consists of a single travel lane in each direction with a multi-use pathway on the south side. The unposted speed limit is assumed to be 50 km/h.

Existing Study Area Intersections

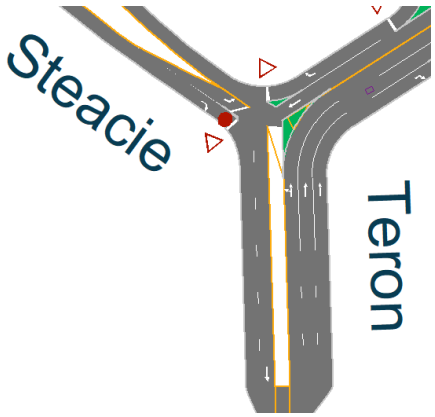
March/Teron

The March/Teron intersection is a signalized four-legged intersection. The eastbound and westbound approaches both consist of a left-turn lane, a through lane and a channelized right-turn lane. The north and southbound approaches both consist of a left-turn lane, two through lanes and a channelized right-turn lane. All movements are permitted at this location.



Steacie/Teron

The Steacie/Teron intersection is a non-signalized three-legged intersection. The eastbound approach consists of a single left-turn lane controlled by a stop sign and a channelized right-turn lane controlled by a yield sign. The northbound approach consists of a left-turn lane and right-turn lane that extends past this intersection into the following March/Teron intersection. The northbound approach also has a through lane. The southbound approach consists of a channelized right-turn and a through lane. All movements are permitted at this location.



Beaverbrook/Teron

The Beaverbrook/Teron intersection is a signalized four-legged intersection. All approaches consist of a single left-turn lane and a shared through/right-turn lane. The south approach has a pedestrian crossing prohibition. All vehicular movements are permitted at this location.

Existing Driveways to Adjacent Developments

There are no private driveways located on March Road near the site. There are two existing driveways on Teron Road between March Road and Bethune Way on the northeast side which belong to a single house located on the future development site. There are no driveways on the southwest side of Teron Road between March Road and Bethune Way. The existing driveways adjacent to the proposed site are shown as red boxes in **Figure 3.**

Figure 3: Existing Driveways Adjacent to Development

Existing Area Traffic Management Measures

There are no existing traffic management measures along Teron Road and March Road in the vicinity of the proposed development.

Pedestrian/Cycling Network

Sidewalk facilities in the vicinity of the site are provided along both sides of Teron Road from Beaverbrook Road to Bethune Way, but discontinued on the east side of Teron Road between Bethune Way and March Road (site frontage). March Road and Steacie Drive only provide sidewalk on the south side, and Beaverbrook Road only provides sidewalks on the north side of the roadway.

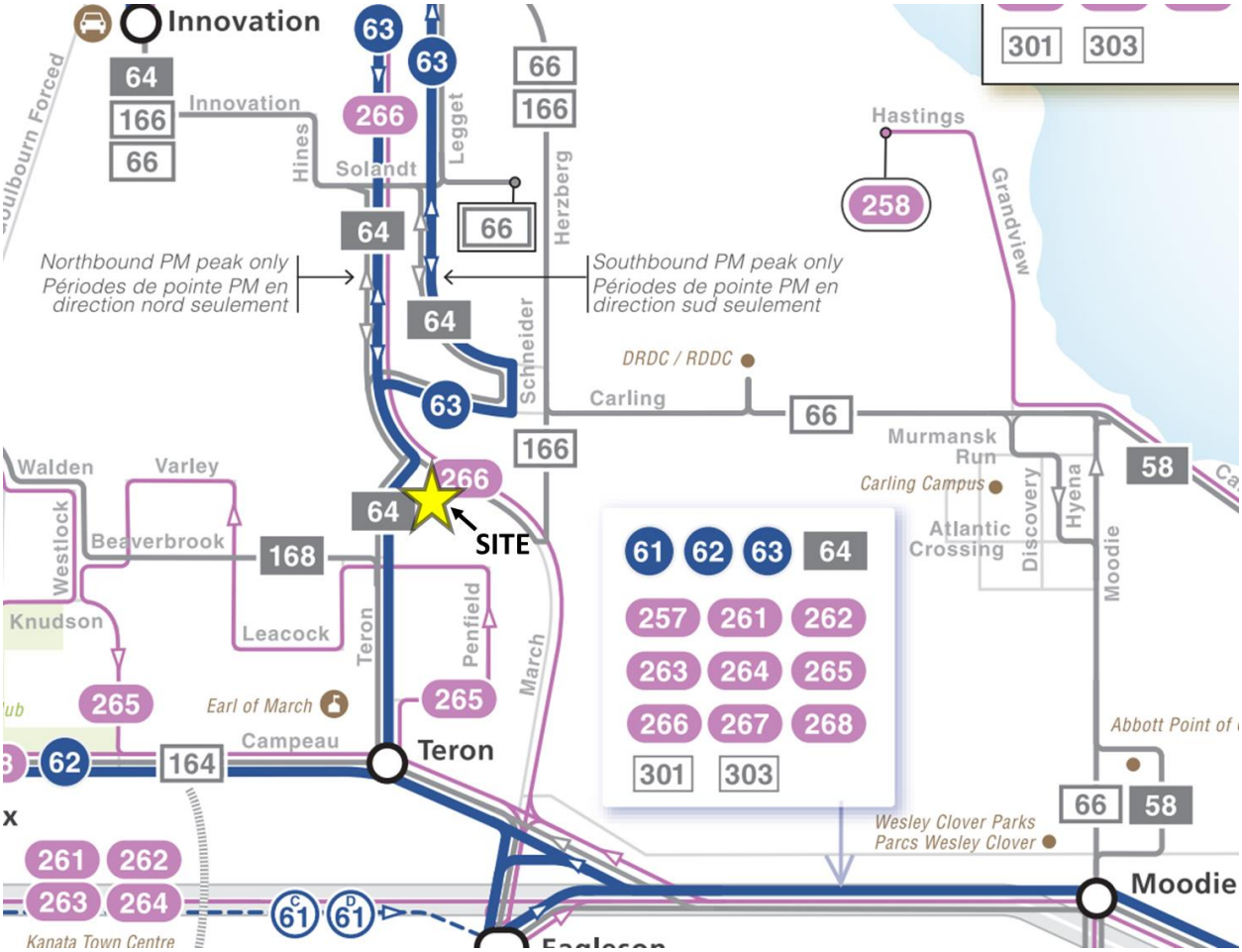
According to the City's Cycling Plan, March Road and nearby Herzberg Road are classified as "Spine Routes." On the west side of March Road, there are major separated pathway which lead to the proposed site but are not continued past this point. Steacie Drive has a major separated pathway on the south side of the road which begins at Teron Road adjacent to the site. Teron Road has a paved shoulder on both sides of the roadway. **Section 2.1.3.** discusses the future Ultimate Cycling Network.

Transit Network

The transit network for the study area is illustrated in **Figure 4**. The following OC Transpo routes currently operate within 600-meter radius of the site frontage:

- **Route #63 (Briarbrook <-> Tunney's Pasture)**: identified by OC Transpo as a "Rapid Route", this route operates at all time periods with high frequency, 7 days a week. Route #63 provides quick connection to the Confederation LRT Line at Tunney's Pasture and provides connection to Bayshore Shopping Center. Bus stops for this route are available on both sides of Teron Road, fronting the site.
- **Route #64 (Morgan's Grant <-> Tunney's Pasture)**: identified by OC Transpo as a "Local Route", this route operates on customized routing and schedules, to serve local destinations with connection to the Confederation LRT Line at Tunney's Pasture, Innovation Complex and provides connection to Bayshore Shopping Center. Bus stops for this route are available on both sides of Teron Road, fronting the site.
- **Route #166 (Innovation <-> Eagleson)**: identified by OC Transpo as a "Local Route", this route operates on customized routing and schedules, to serve local destinations such as Eagleson Station and Innovation Complex. Bus stops for this route are available on both sides of Teron Road, fronting the site.
- **Route #266 (Maxwell Bridge<-> Tunney's Pasture)**: identified by OC Transpo as a "Connection Route", this route provides convenient connection to the Confederation LRT Line at Tunney's Pasture during weekday peak periods only and provides connection to Bayshore Shopping Center. Bus stops for this route are available on both sides of March Road, approximately 150 meters from the site.
- **Routes #660 & 674 (Various)**: identified by OC Transpo as a "Local Custom Route", these routes operate on customized routing and schedules, to serve local destinations such as Bell High School and All Saints High School. Bus stops for these routes are available on both sides of Teron Road, fronting the site.

Figure 4: Area Transit Network



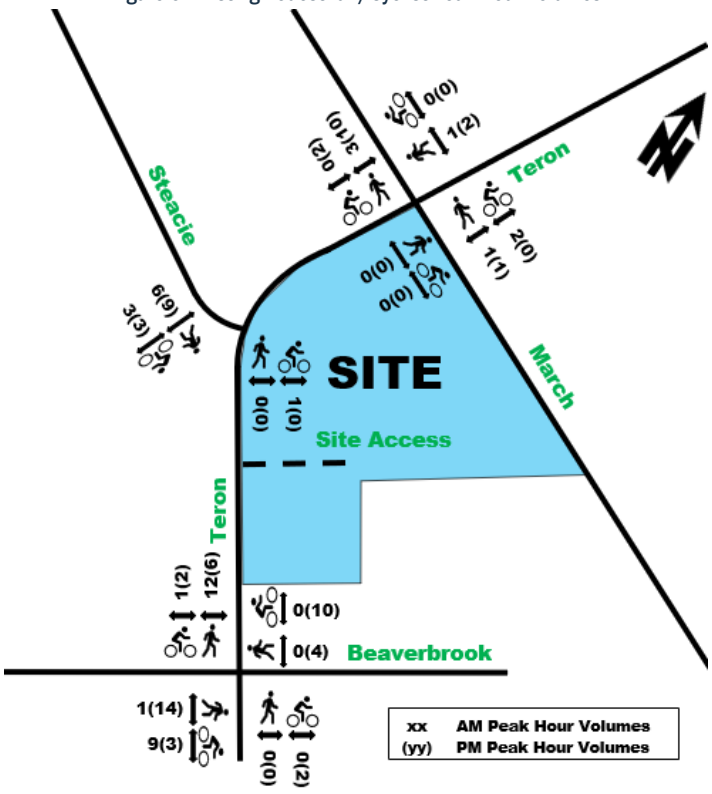
Source: https://www.octranspo.com/images/files/maps/systemmap.pdf

Peak Hour Travel Demands

The existing peak hour traffic volumes within the study area are illustrated in **Figure 5** and pedestrian/cyclist volumes are illustrated in **Figure 6,** obtained from the City of Ottawa. The peak hour traffic volume count data has been provided in **Appendix B**.

Figure 5: Existing Peak Hour Traffic Volumes

Figure 6: Existing Pedestrian/Cyclist Peak Hour Volumes



Existing Road Safety Conditions

Collision history for study area intersections and roads (2013 to 2017, inclusive) was obtained from the City of Ottawa with 76 reported collisions within the 5-year time period. Most collisions 57 (75%) involved property damage only, indicating likely low impact speeds, and 19 (25%) involved personal injuries. The reported collisions by classification include: 28 (37%) rear end, 16 (21%) single vehicle, 12 (16%) angle, 12 (16%) turning movement, 7 (9%) sideswipe and 1 (1%) approaching type collisions.

To help quantify the relative safety risk at intersections within the study area, an industry standard unit of measure for assessing collisions at an intersection was used based on the number of collisions per million entering vehicles (MEV). An MEV value greater than 1.00 indicates a relatively high frequency of collisions; however, it does not explain the type or severity of collision. A secondary analysis is done to determine the severity of collision by representing the number of personal injuries as a percentage of the total number of collisions at a given intersection.

A high propensity (MEV > 1.00 or %PIR > 30%) would signal a potential intersection design deficiency or other contributing factor, such as poor intersection geometry, blind spots, poor lighting, excessive speeds, high amount of entry/exit driveways etc.

At intersections within the study area, reported collisions have historically taken place at a rate of:

- 0.36/MEV at the March/Teron intersection with a total of 27 collisions, 26% causing non-fatal injuries. The most common types of collisions involved rear end with 10 (37%) of the total collisions and turning movement with 8 (30%) of all collisions. The medium to high %PIR is likely due to the high operating speeds, including the south approach which enters from a long straightaway on a wide multi-lane cross-section arterial and high turning movements at this intersection. Turning movement type of collisions tend to yield higher %PIR;
- 0.05/MEV at the Steacie/Teron intersection with a total of 1 collision; and,
- 0.31/MEV at the Beaverbrook/Teron intersection with a total of 6 collisions and 50% causing non-fatal injury. The high %PIR is linked with 3 of 6 (50%) of the collisions involving pedestrians or cyclists.

All study intersections displayed a low to mid MEV value indicating that collisions happen at a low rate compared to other intersections around the City. Within the five-years of recorded collision data there were two collisions involving pedestrians and one involving a cyclist at Beaverbrook/Teron, all resulting in non-fatal injuries. These three collisions involving the active modes represent one half of all collisions at this intersection. There was one collision involving a pedestrian at March/Teron.

The source collision data as provided by the City of Ottawa and related analysis is provided as **Appendix C**.

2.1.3. Planned Conditions

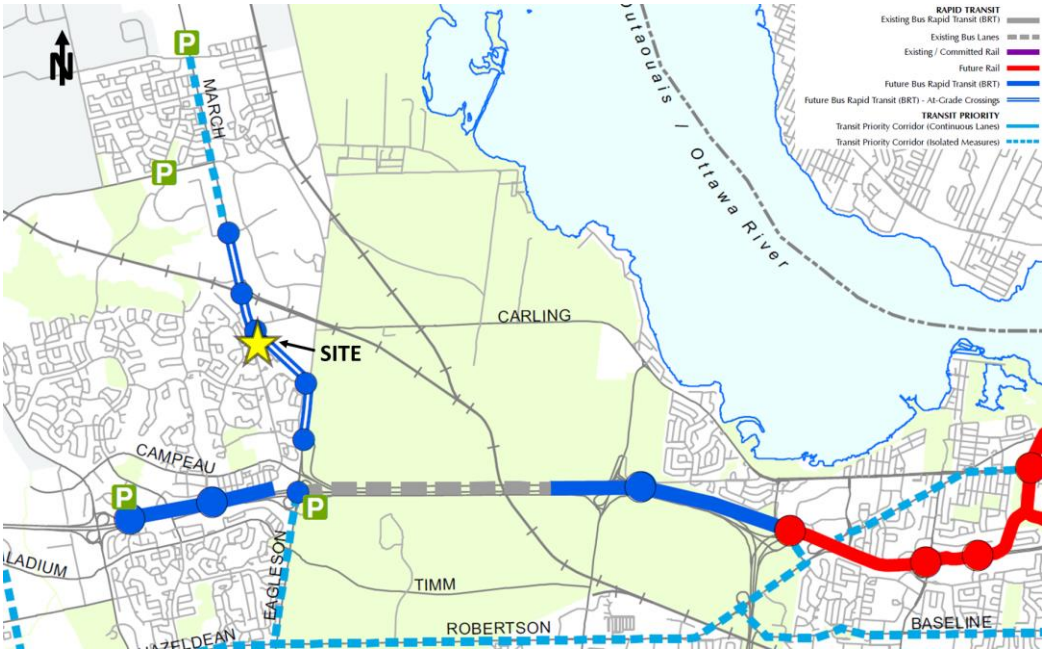
Planned Study Area Transportation Network Changes

Transit Network

Based on the City of Ottawa's Transportation Master Plan (TMP), a future bus rapid transit (BRT) corridor is proposed on March Road, between Eagleson Rd and Solandt Rd. The BRT would have a major station near the subject development's site, which would be located at the March/Teron intersection. Further north along March Rd, between Solandt Road and Maxwell Bridge Road, the TMP's affordable network illustrates transit priority (isolated measures).

The improved transit priority corridor is anticipated to improve transit travel times between the proposed site and the Confederation Line as displayed in **Figure 7.** While these changes are illustrated in the TMP's 2031 Affordable Network, City of Ottawa staff have confirmed that construction of the BRT and transit priority measures will likely take place beyond 2031.

Figure 7: 2031 Affordable Network



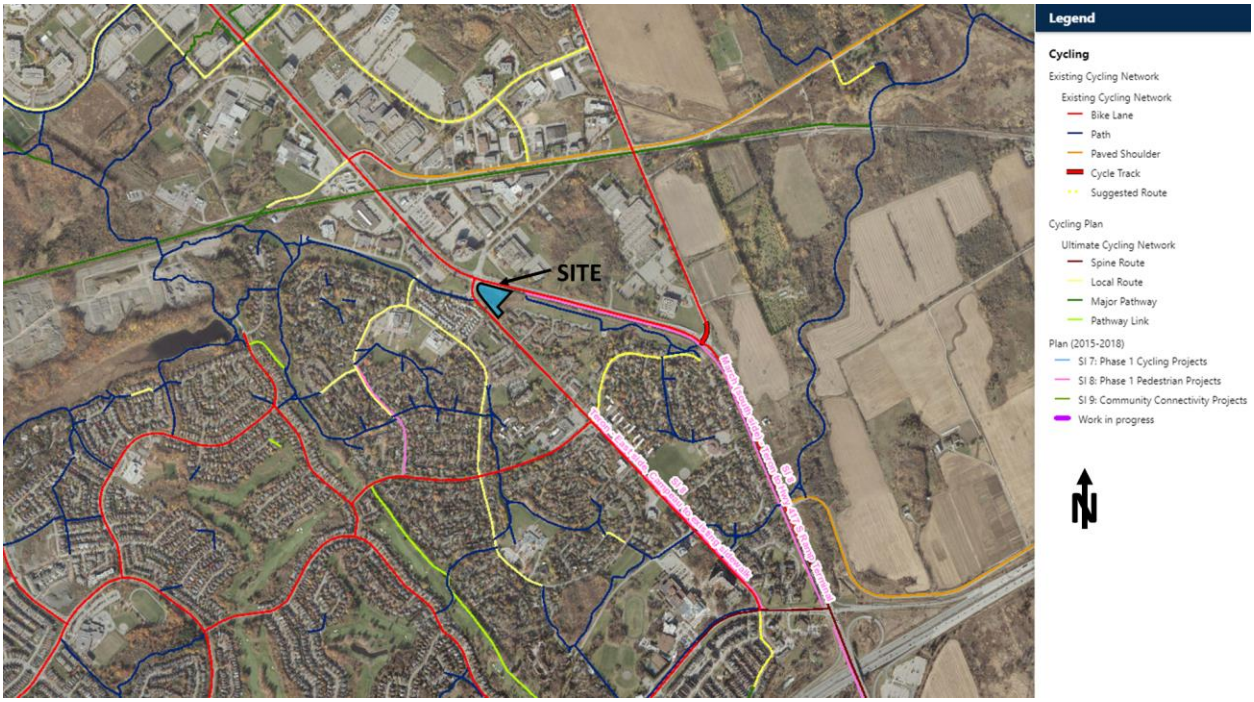
Source: Transportation Master Plan 2013 – 2031 Affordable Network

Cycling Network

Within the City of Ottawa Ultimate Cycling Plan, cycling facilities are proposed for Teron Road between Campeau Drive and Beaverbrook Road. Cycling improvements are also proposed at Beaverbrook Road between Weslock Way and Teron Road and from Teron Road to March Road via the continuation of Beaverbrook Road (Penfield Drive) to the east.

Figure 8 depicts the existing and future Ultimate Cycling Network.

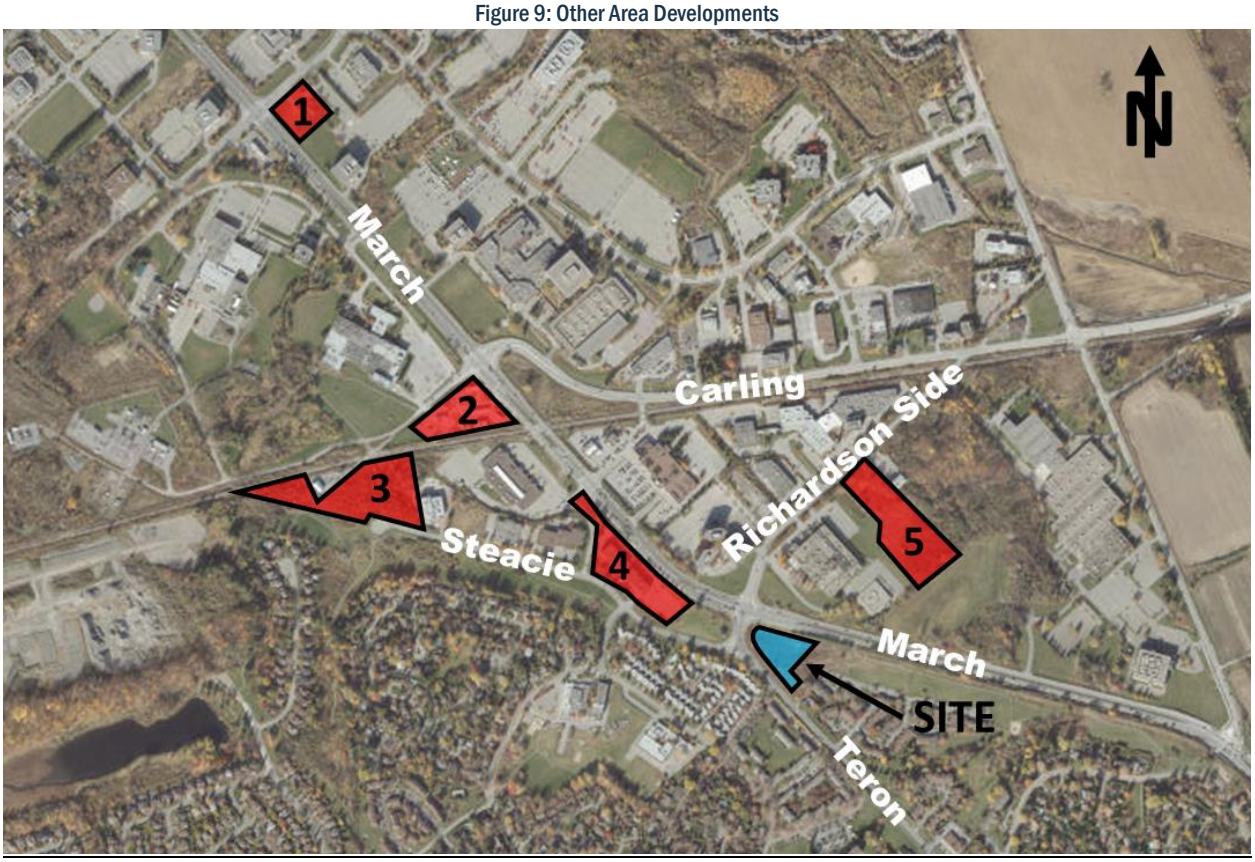
Figure 8: Existing and Future 'Ultimate Cycling Network"



Other Area Developments

The following section outlines adjacent developments in the general area that were considered in the TIA. The criteria for inclusion of other area developments are either approved developments or developments that have an active planning application in the City. **Figure 9** illustrates the location and relative size of relevant other area developments. Note that no nearby developments south of the proposed development were found.

Figure 9: Other Area Developments



1 - 3026 Solandt Road

An office building is proposed by Colonnade Bridgeport consisting of approximately 100,000 ft² of total floor area. The anticipated buildout year of the development is 2021. Based on the TIA prepared by CIMA+ on March, 2020, the development is expected to generate 101 and 95 veh/h during the morning and afternoon peak hours, respectively.

2 - 401 March Road

Proposed one storey commercial plaza containing a gas bar, car wash, two restaurants with drive-thru facilities and a commercial building that would contain a medical facility. The Transportation Impact Assessment (prepared by Burnside) projected vehicle trip generation of approximately 265 and 190 veh/h during both the morning and afternoon peak hours. *Note: Development Apps status date Oct. 13, 2016 identifies agreement registered; however, this development has been open since as early as May 2016. Therefore, trips generated by this development are assumed to already be accounted for in the traffic count data.*

3 - 100 Steacie Drive

Brigil is proposing the construction of two 4-storey apartment buildings with a total of 258 residential units. A TIA is currently being developed by Parsons. The projected volumes will be individually layered to background volumes

4 - 329 March Road

Proposed 4,102 ft² of commercial, including a restaurant and a coffee shop. The Transportation Brief (prepared by McIntosh Perry) projects vehicle trip generation of approximately 40 to 100 veh/h during peak hours.

5 - 1243 Teron Road

An industrial building is proposed at 1243 Teron Rd and will consist of a total area of 9,281 m². The estimated year of occupancy for the development is 2020. Based on the TIA prepared by BT Engineering in January 2020, the volumes generated by the development at study area intersections are minimal. Therefore, the volumes will be accounted for in the projected background traffic growth.

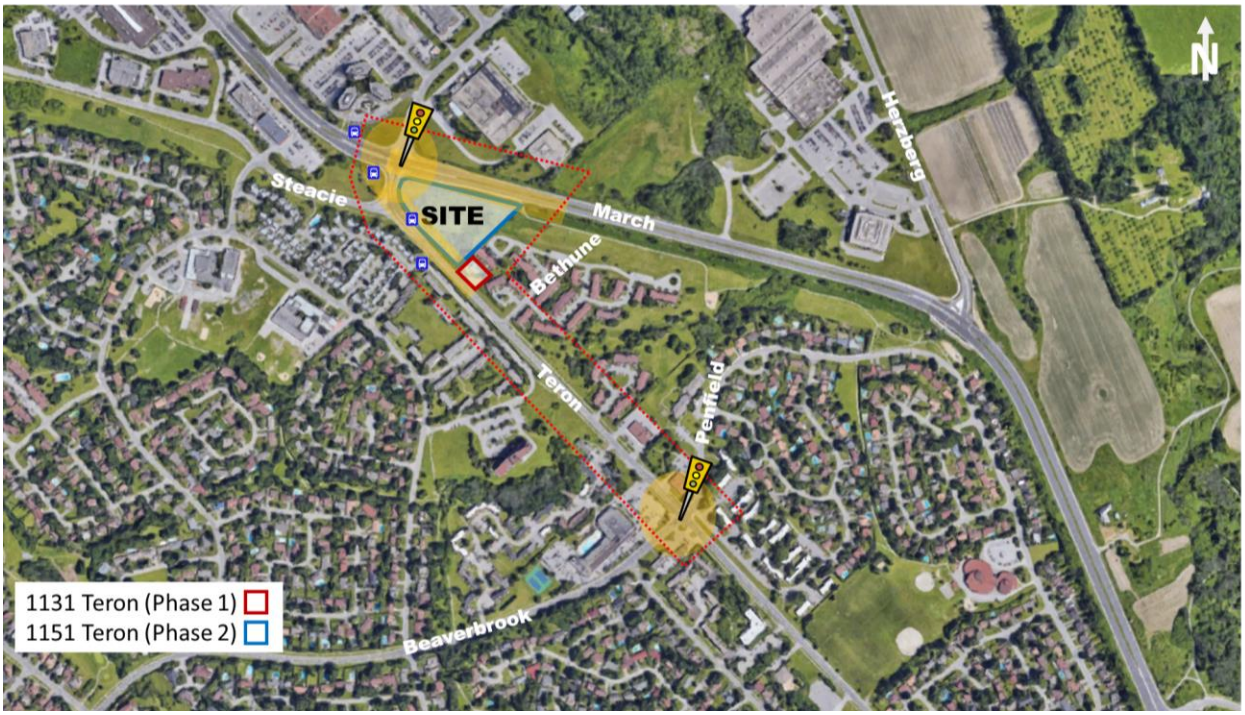
2.2. Study Area and Time Periods

Although the development is proposed as a 2-phased development with phase 1 being built by 2022 and phase 2 prior to 2026, for the purpose of this development a single full is assumed for 2022. Given that the network for full buildout and full buildout plus 5 years are anticipated to be the same the horizon years being analyzed in this report are the more critical full buildout plus 5, 2027, using the weekday morning and afternoon peak hour time periods.

Proposed study area intersections and boundary roads are outlined below and highlighted in **Figure 10**.

- March/Teron intersection;
- Steacie/Teron intersection;
- Beaverbrook/Teron intersection;
- Site/Teron intersection;
- Along Teron Road adjacent to the site; and,
- Along March Road adjacent to the site.

Figure 10: Study Area Boundaries and Intersections



2.3. Exemption Review

The following modules/elements of the TIA process recommended to be exempt in the subsequent steps of the TIA process, based on the City's TIA guidelines and the subject site:

Table 1: Exemptions Review Summary

Module	Element	Exemption Consideration
4.1 Development Design	4.1.3 New Streets Networks	Not required for applications involving site plans
4.2 Parking	4.2.2 Spillover Parking	Development anticipated to provide sufficient parking. This will be verified in Section 4.2.
4.6 Neighborhood Traffic Management	4.6.1 Adjacent Neighborhoods	Only required when development relies on local or collector streets for access. Driveway will have direct access to Teron Road (arterial)
4.8 Review of Network Concept	All elements	The site is not expected to generate 200 trips more than the established zoning.

3. FORECASTING REPORT

3.1. Development-Generated Travel Demand

3.1.1. Trip Generation and Mode Shares

Appropriate trip generation rates for the proposed development consisting of approximately 131 mid-rise apartment units were obtained from the City's 2009 TRANS Trip Generation – Residential Trip Rates Report. These rates are summarized in **Table 2**.

Table 2: 2009 TRANS Residential Trip Generation Rates

Land Use	Data Source	Trip Rates	
		AM Peak	PM Peak
Mid-Rise Apartments	223	T = 0.29(du)	T = 0.37(du)
Note: T = Average Vehicle Trip Ends; du = dwelling units			

Using the TRANS Trip Generation rates, the total amount of vehicle trips generated by the proposed 131 residential units was calculated. The results are summarized in **Table 3**.

Table 3: Projected Site Vehicle Trip Generation – TRANS Model

Land Use	Area	AM Peak (Veh/h)			PM Peak (Veh/h)		
		In	Out	Total	In	Out	Total
Mid-Rise Apartments	131 units	9	29	38	29	19	48

As shown in **Table 3**, a total of 40 to 50 veh/h two-way are projected to travel to/from the proposed development during the weekday morning and afternoon commuter peak hours. Using the TRANS Auto Trips projected in **Table 3** and the mode share percentages in the TRANS Trip Generation Report (Table 3.13), the total projected number of person trips by mode for the residential development were calculated and are summarized in **Table 4**. The 'person trip generation' for the development was then converted to 'vehicle trip generation' using mode shares extrapolated from the 2011 OD-Survey for Kanata District Area and are summarized in **Table 5**.

Table 4: Site Person Trip Generation

Travel Mode	Mode Share	AM Peak (Person Trips/h)			Mode Share	PM Peak (Person Trips/h)		
		In	Out	Total		In	Out	Total
Auto Driver	44%	9	29	38	44%	29	19	48
Auto Passenger	9%	2	5	7	14%	10	5	15
Transit	34%	8	22	30	33%	22	14	36
Non-motorized	13%	3	8	11	9%	7	3	10
Total Person Trips	**100%**	**22**	**64**	**86**	**100%**	**68**	**41**	**109**

Table 5: Site Vehicle Trip Generation with Kanata Mode Shares

Travel Mode	Mode Share	AM Peak (veh/h)			Mode Share	PM Peak (veh/h)		
		In	Out	Total		In	Out	Total
Auto Driver	60%	12	40	52	60%	40	25	65
Auto Passenger	15%	4	9	13	15%	9	7	16
Transit	15%	2	10	12	15%	10	7	17
Non-motorized	10%	2	7	9	10%	6	5	11
Total People Trips	**100%**	**20**	**66**	**86**	**100%**	**65**	**44**	**109**
Total 'New' Auto Trips		**12**	**40**	**52**	-	**40**	**25**	**65**

As shown in **Table 5**, based on the TRANS Trip Generation method and 2011 OD-Survey modal shares, the proposed site is projected to generate approximately 50 to 65 new auto-trips per hour during the weekday commuter peak hours. The increase in two-way transit trips is estimated to be approximately 10 to 15 persons per hour, and the increase in bike/walk trips is approximately 10 persons per hour for the and afternoon peak hours.

3.1.2. Mode Shares

Given the location of the site, within close proximity to existing rapid route #63 and 4 other OC-Transpo existing transit routes, plus future proposed BRT transit priority with isolated measures proposed along March Road adjacent to the site a higher transit modal share is appropriate. **Table 6** illustrates future modal shares which reflect the site's location within close proximity to the existing bus stations and future BRT.

Table 6: Future Mode Share Targets for the Development

Travel Mode	Mode Share Target	Rationale
Auto Driver	35%	Given the close proximity to transit and commercial services, the driver and passenger mode splits are forecasted to be lower than other areas of the City.
Auto Passenger	5%	
Transit	45%	Development is located in close proximity to future rapid transit station at March/Teron. March Road is in the TMP's affordable network for transit priority with major updates in transit services.
Walking	10%	This is consistent with the City's TMP and existing mode shares.
Biking	5%	

The future mode shares summarized in **Table 6** were applied to the total person-trips for residential uses outlined in **Table 5**, to estimate future trip generation at ultimate buildout, as shown in **Table 7**.

Table 7: Future Projected Site Generated Traffic Based on TOD Mode Shares

Travel Mode	Mode Share	AM Peak (veh/h)			Mode Share	PM Peak (veh/h)		
		In	Out	Total		In	Out	Total
Auto Driver	35%	8	23	31	35%	23	15	38
Auto Passenger	5%	2	3	5	5%	3	2	5
Transit	45%	9	29	38	45%	31	18	49
Walk	10%	2	6	8	10%	8	4	12
Bike	5%	1	3	4	5%	3	2	5
Total People Trips	**100%**	**22**	**64**	**86**	**100%**	**68**	**41**	**109**
Total 'New' Auto Trips		**8**	**23**	**31**	-	**23**	**15**	**38**

Based on **Table 7**, it is anticipated that the proposed development will generate approximately 30 to 40 'new' vehicles trips, 40 to 50 'new' transit trips, 10 'new' walk trips and 5 'new' bike trips, two-way during the weekday morning and afternoon peak hours.

3.1.3. Trip Distribution

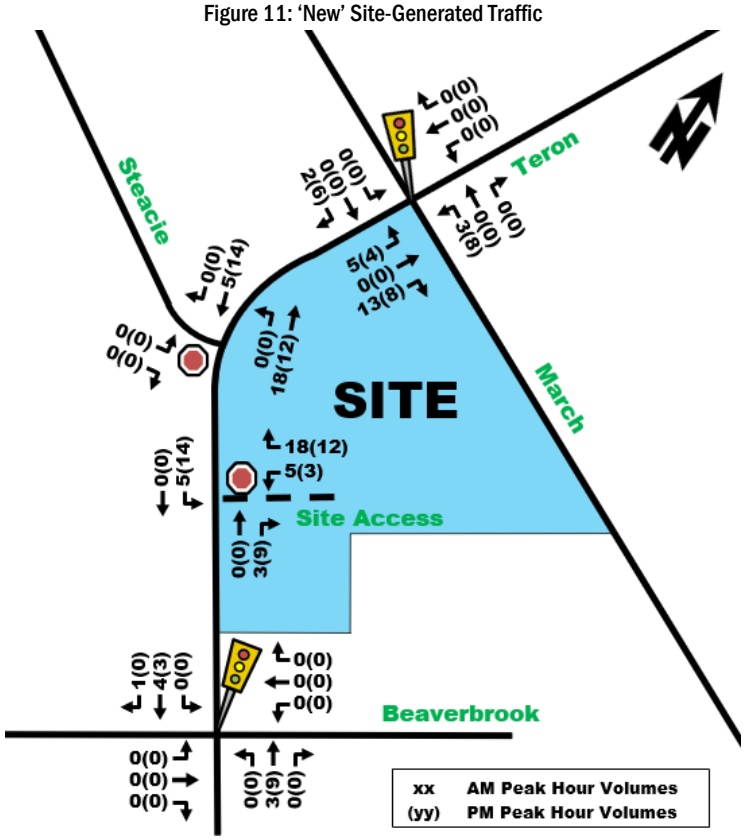
Based on the OD Mode Share Survey, existing traffic volume counts and the location of adjacent arterial roadways and neighborhoods, the distribution of site-generated traffic volumes is as follows:

- (From/To) the North: 25%;
- (From/To) the East: 60%;
- (From/To) the South: 10%; and,
- (From/To) the West: 5%.

3.1.4. Trip Assignment

A full movement driveway on to Teron Road is proposed. The new driveway will be approximately 145 meters south of the intersection of Steacie/Teron and approximately 120 meters north of Bethune Way. The 'new' site-generated vehicle trips outlined in **Table 7** were assigned to the study area network and are illustrated as **Figure 11**.

Figure 11: 'New' Site-Generated Traffic



3.2. Background Network Travel Demands

3.2.1. Transportation Network Plans

Refer to section 2.1.3 Planned Conditions – Planned Study Area Transportation Network Changes.

3.2.2. Background Growth

The background traffic growth through the immediate study area (summarized in **Table 8**) was calculated based on historical traffic count data (years 2009, 2010, 2011, and 2017) provided by the City of Ottawa at the March/Teron intersection. Detailed analysis of the background growth is included in **Appendix D**.

Table 8: March/Teron Historical Background Growth (2009 – 2017)

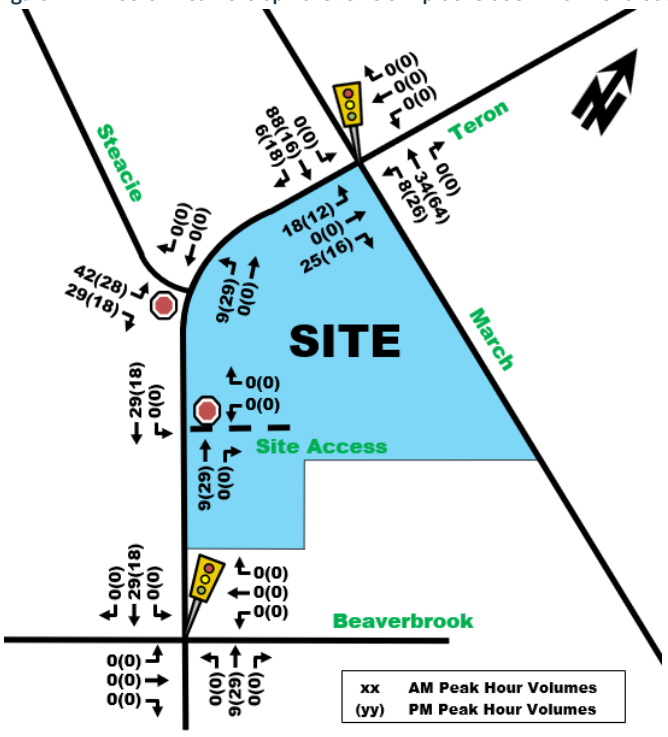
Time Period	Percent Annual Change				
	North Leg	South Leg	East Leg	West Leg	Overall
8 hrs	-0.62%	-1.11%	1.06%	0.39%	**-0.58%**
AM Peak	-1.30%	-3.16%	2.04%	3.13%	**-1.08%**
PM Peak	-1.05%	-0.92%	-1.55%	-1.39%	**-1.07%**

As shown in **Table 8**, in past years March Road and Teron Road have experienced an average annual decrease in traffic volumes ranging from -0.6% to -1.1%. It is important to note however, that a positive growth trend was evident between 2009 to 2011, indicating that data from 2017 could have been abnormally low due to many possible factors such as construction, area road closures, nearby events detouring traffic, etc. It is also possible that network changes such as the expansion of Terry Fox Drive between 2011 and 2017 or changes in mode shares has reduced traffic volumes. For the purpose of this study, a very conservative +2% annual growth rate for vehicle traffic on March Road and Teron Road 'through' movements will be applied in the future analysis.

3.2.3. Other Area Developments

Other area developments were outlined in **Section 2.1.3**. Traffic volumes generated by the following future adjacent area developments will be taken into account with regards to the analysis, with their respective traffic volume figures obtained directly from approved TIA Reports Some developments were not included and are captured within the 2% annual growth as either their location was not likely to influence this study area or vehicle trip generations was less than a vehicle per minute thus making them have negligible impacts to the study area. **Figure 12** illustrates the projected traffic volumes for all other area development vehicle trips at full build-out, obtained from their respective TIA Reports.

Figure 12: All Other Area Development Vehicle Trip Generation– Full Build Out



The future background traffic volumes were then generated by summing all the other area developments to existing volumes and including a 2% growth factor on through movements as described in **Section 3.2.2.** The resulting 2022 background volumes is illustrated in **Figure 13** and the 2027 background volumes in **Figure 14**.

Figure 13: 2022 - Future Background Traffic Volumes

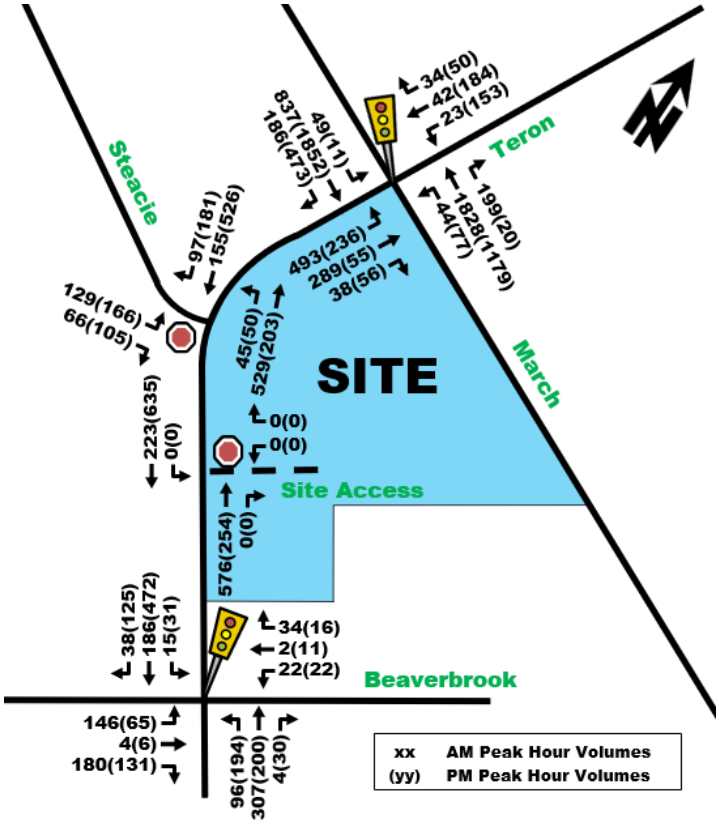
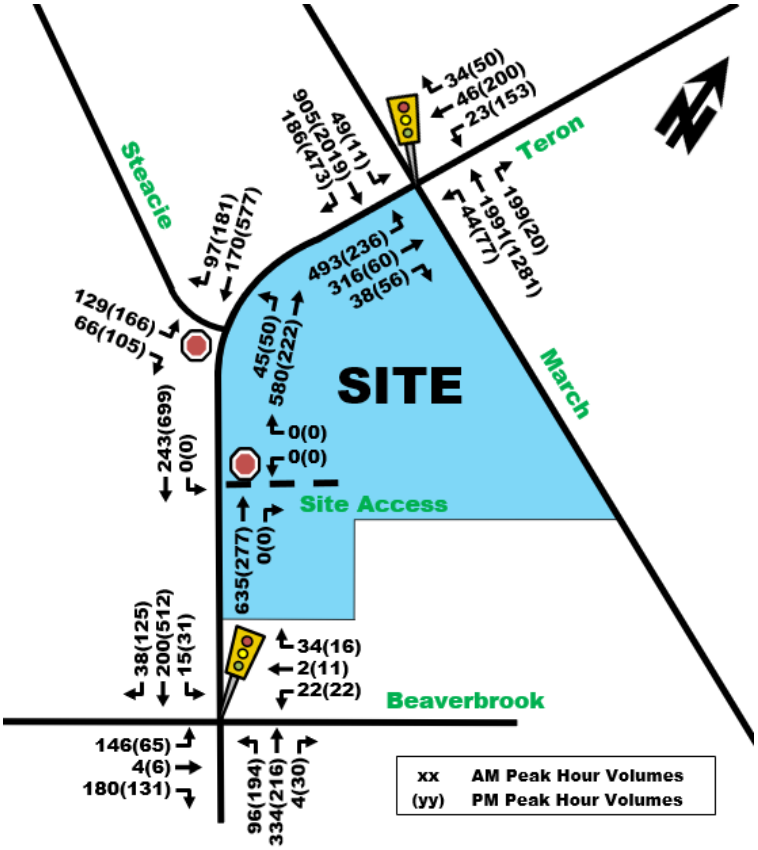


Figure 14: 2027 - Future Background Traffic Volumes



3.3. Demand Rationalization

Capacity of the study area intersections in existing and future conditions will be examined in detail in the proceeding sections of the TIA Report. As an initial review, the total project future traffic volumes can be determined by superimposing the site-generated traffic volumes in **Figure 11** onto the respective total future background traffic volumes in **Figure 13** and **Figure 14**.

The purpose of the Demand Rationalization module is to provide an initial review of future traffic volumes, to determine the future capacity limitations of the transportation network. Looking at the above total projected traffic volume figures, along with the existing conditions volumes in **Figure 5,** capacity limitations may be experienced at the intersection of March/Teron due to the following reasons:

- The volume of through traffic on March Road is expected to increase from approximately 1,650 veh/h at the peak times of both directions in existing conditions to approximately 2,000 veh/h by horizon year 2027. At the intersection of March/Teron, March Road is an arterial road intersected by a major collector road Teron, both of which service a high number of traffic volumes during peak hours. Therefore, providing sufficient green times to service the high number of traffic on March Road during peak hours may not be possible. By extent, the two through lanes of the NB and SB approaches at March/Teron would have capacity limitations.
- The EBL from Teron Road onto March Road experiences a high traffic volume that ranges from 475 veh/h in existing conditions to 500 veh/h by horizon year 2027, during the AM peak hour. Typically, this volume would require two left-turn lanes to operate within acceptable standards. However, only a single left-turn lane is currently available.

To address these potential capacity limitations, the following modifications may be considered to increase capacity or reduce vehicular demand along March Road.

Widening March Road to Six-Lane Cross-Section through Teron Road

March Road already consists of a six-lane cross-section from Campeau Drive to Herzberg Road, approximately 1km east of Teron Road. At the intersection of March/Teron, March Road consists of two-through lanes in each direction, as well as auxiliary left and right-turn lanes. A third through lane may be feasible to increase capacity by converting the north and southbound right-turn lanes to through/right-turn lane. The receiving lanes may need to be extended to allow enough distance for through traffic to safely merge.

There would be significant financial and geometric implications of this modification. There may also be safety concerns with the existing on-street bike lanes, which may trigger even further modifications to segregate cyclists through the intersection. Therefore, this modification to the intersection may not be appropriate from a traffic operations improvement perspective.

There is also the concern with induced demand, whereby increasing supply/capacity of a corridor triggers higher long-term demand, and the bottleneck simply shifts downstream and causes even larger capacity constraints.

Teron Road Double Left-Turn Lane

The EB approach of Teron Road currently consists of a through lane, a channelized auxiliary right-turn lane and an auxiliary left-turn lane. However, less than 60 vehicles are projected for the EBR movement at any peak hour, compared to over 450 vehicles on the EBL today. Therefore, there may be reason to reallocate lane assignments to have two EB left-turn lanes and a shared through/right-turn lane.

However, this sort of modification is expected to increase the amount of traffic along Teron Road, which already acts as a bypass to March Road through Kanata. Therefore, there are community and traffic management implications. to proposing this option.

March Road BRT

The March Road conversion to BRT was cited in the 2013 City TMP within the 2031 affordable network. City staff recently confirmed this project has been delayed and is no longer within the affordable network plan. Although we have adjusted the TIA to reflect this new information, it is important to stress the importance of this infrastructure to the Kanata North community, particularly as it relates to March Road adjacent to the site. As discussed in Section 3.2.2. Background Growth, the Carling Avenue Transit Priority Study estimated transit lanes could reduce vehicle traffic volumes by up to 20%, which is a significant result if applied to March Road. Therefore, of all the options that could be implemented to improve capacity along March Road at Teron Road, the BRT would be the most impactful as it provides long-term benefits for the entire corridor and region, rather than a short-term ease to a single intersection.

4. STRATEGY REPORT

4.1. Development Design

4.1.1. Design for Sustainable Modes

Location of Transit Facilities

There are existing OC-Transpo bus stops located adjacent to the development site on Teron Road with service for bus routes #63, #64 and #166. Additional connection bus route #266 has a bus stop located approximately 150 meters walk on March Road. A bus rapid transit (BRT) route is proposed for March Road, which when complete, will provide a major rapid transit station less than 200 meters from the site located at the intersection of March/Teron. Note that the exact timing for the BRT has not been determined yet.

Pedestrian/Cycling Routes and Facilities

Existing sidewalks are provided along the site's frontage on March Road. There are currently no sidewalks built on the site's Teron Road frontage. It is anticipated that when the development is built, that a sidewalk will be provided along the site's frontage of Teron Road.

A multi-use pathway (MUP) is proposed on the north side of the subject property, which would connect the existing MUP east of the site to the MUP south of Steacie Drive. Internal surface sidewalks within the site are proposed, which would offer pedestrian connectivity between both 1131 and 1151 Teron Road as well as connection to March/Teron intersection via a pathway through the parking lot.

Bicycle Parking

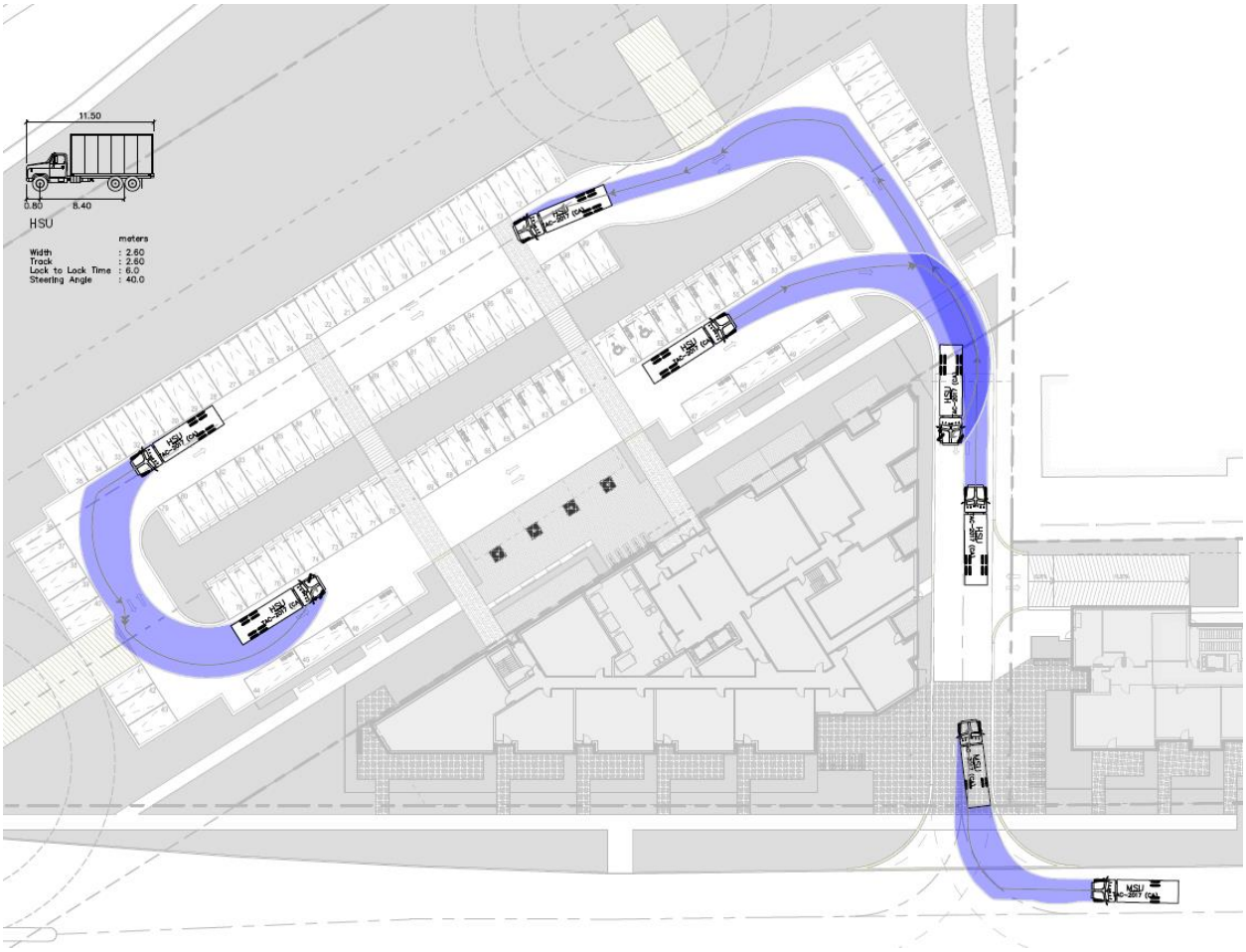
Bicycle parking is anticipated to meet and exceed the minimum City By-Law requirements of 0.5 spaces per units by providing a rate of approximately 0.69 spaces per unit. 82 of the Bicycle parking spaces are proposed indoors in a secure, well-lit area located within the underground parking lot and are proposed to be horizontal parking spaces. The remaining 14 bike parking spaces are proposed outdoors at ground level.

4.1.2. Circulation and Access

The proposed development driveway will provide two-way vehicular access to Teron Road via a 6.7-meter-wide driveway, which follows City By-Law requirements. The ramp for the underground parking lot is located approximately 30m north of Teron Road, is approximately 6 meters wide and provides access to the underground parking structure that is underneath both buildings.

The surface parking lot has a road loop is proposed to two-way circulation along the north, east-west drive aisle and have two-way travel until the T-intersection with the main driveway connection, where it becomes an exit only. The circuitous design makes it convenient for garbage trucks to access the garbage bins without the need of turning around within the lot. Garbage pick-up is proposed to take place on site along the backside of both buildings within the drive aisles. **Figure 15** displays the circulation of an HSU (emergency vehicle) circulating the site.

Figure 15: Emergency Vehicle Maneuvering



4.1.3. New Streets Network

Exempt. See **Table 1**.

4.2. Parking

4.2.1. Parking Supply

According to Part 4 – Parking, Queueing and Loading Provisions for the City of Ottawa By-Laws, the site is located within Area C according to Schedule 1, Area C in Schedule 1A and is not within Rapid Transit Stations within Schedule 2A and 2B. **Table 9** summarizes the vehicle parking minimum and maximums allowed within the parking by-law. **Table 10** summarizes the bicycle parking requirements as per City of Ottawa Zoning By-Law-Part 4, sections 100-114.

Table 9: Vehicle Parking Space Supply

Land Use		Rate per Unit		Required Vehicle Spaces			Proposed Spaces
		Base	Visitor	Base	Visitor	Min Req.	
Residential Phase 1	18 units	1.2	0.2	22	4	26	32
Residential Phase 2	113 units	1.2	0.2	136	23	159	168
			Totals	158	27	185	200

Table 10: Bicycle Parking Requirements

Land Use		Rate	Required Bicycle Spaces	Proposed Spaces
			Required	
Residential Phase 1	18 units	0.5 per unit	9	29
Residential Phase 2	113 units	0.5 per unit	57	67
		Totals	66	96

The latest site plan suggests a grand total of 200 parking spaces, with 98 being above ground including 27 catered to visitors while the remaining 71 surface lots for residents. Additionally, 102 parking spots are proposed underground for residents. The underground lot is shared between both buildings and has a vehicular ramp to the south of the site access, behind 1131 Teron Road building. The proposed number of parking spaces meets City of Ottawa Parking Guidelines.

The bicycle parking spaces proposed meet and exceed the by-laws, with 96 bicycle parking spaces proposed and 66-minimum required. A total of 14 spots will be provided outdoors on ground level and 82 located in the underground parking lot in three secure, well-lit storage rooms.

4.2.2. Spillover Parking

Exempt. See table **Table 1**.

4.3. Boundary Street Design

4.3.1. Existing Conditions

The boundary streets for the development are March Road and Teron Road. The existing roadway geometry consists of the following features:

- March Road
  - 2 vehicle travel lanes in each direction;
  - 2m sidewalk with no boulevard on south side of the roadway only; and,
  - More than 3,000 vehicles per day.
- Teron Road
  - 1 vehicle travel lane in each direction;
  - 2m multi-use pathway with boulevard on west side of the roadway – east side of the roadway proposed; and,
  - More than 3,000 vehicles per day.

The multi-modal level of service analysis for the subject road segments adjacent to the site is summarized in **Table 11** with detail analysis provided in **Appendix E**.

Table 11: MMLOS – Boundary Street Segment Existing

Road Segment	Level of Service							
	Pedestrian		Bicycle (BLoS)		Transit (TLoS)		Truck (TkLoS)	
	PLoS	Target	BLoS	Target	TLoS	Target	TkLoS	Target
March Road adjacent to development	F	A	E	C	D	A	A	D
Teron Road west side across from development	B	A	A	B	D	D	-	n/a
Teron Road east side adjacent to development	F	A	C	B	D	D	-	n/a
Teron Road east side Future	B	A	C	B	D	D	-	n/a

Pedestrian

- ***All road segments*** do not meet pedestrian PLoS due fast operating speeds and number of daily traffic volumes. The proposed construction of the east sidewalk on Teron Road improves PLoS from 'F' to 'B'.

Bicycle

- *Teron Road* east side does not meet cyclist BLoS given the local route higher targets and the lack of cycling facilities. The west side meets the BLoS target given the physically separated MUP
- *March Road* does not meet cyclist BLoS given the high operation speeds and number of travel lanes

Transit

- *Teron Road* meets transit TLoS on both sides
- *March Road* does not meet transit TLoS given that March Road is a proposed rapid transit corridor

Truck

- *Teron Road* is not a truck route
- *March Road* meets truck TkLoS targets

4.4. Access Intersection Design

4.4.1. Location and Design of Access

The proposed access to the site includes a main driveway connection to Teron Road which has a small branch into the underground parking structure directly behind 1131 Teron Road structure and access to surface parking behind 1151 Teron Road structure. The access will create a new driveway on to Teron Road, located approximately 150 meters south of Steacie/Teron and 115 meters north of Bethune Way. This distance adheres to the By-law (No. 2003-447) Section 24(m)(ii), which suggests a separation between the site access and nearest intersection of 45 meters for a site with 200 to 299 parking spaces. There are no nearby private approaches.

4.4.2. Intersection Control

A traffic signal warrant and an all-way stop control warrant was completed at Site Access/Teron and neither were warranted due to the very low traffic volumes. All warrant analysis has been provided in **Appendix F**.

The proposed stop control on the side street is therefore acceptable. The access driveway is proposed as a full-movement intersection.

4.4.3. Intersection Design

The access driveway will compose of a single northbound through-right and a southbound through-left on Teron Road, and a single left-right shared lane on the westbound site egress. The driveway access consists of a single lane per direction. Auxiliary turn lanes were not warranted at the access driveway based on queue lengths from Synchro (V10). With approximately 30 meters of driveway length to the first conflict point, where the underground parking garage ramp is located, the site meets the minimum clear throat length requirements for this location.

4.5. Transportation Demand Management

4.5.1. Context for TDM

Based on the type of development, it is assumed that most trips generated by the proposed site will be residents leaving the site in the AM peak to go to work and returning from work to the proposed site in the PM peak. Sections 3.1.1 and 3.1.2 describe how many trips are anticipated per travel mode and anticipates the likely locations that they will travel to and from based on the OD-Survey 2011 for Ottawa. The site is not located within 600 meters of existing rapid transit; however, it is located within 600 meters of a future proposed transit priority corridor with a BRT on March Road.

4.5.2. Need and Opportunity

Since the development is located near a future transit priority corridor with BRT on March Road, measures to provide sustainable active mode shares are encouraged. Such measures are described in more detail in Section 4.5.3 below, but can include reduced parking, more aggressive Multi-Modal Levels of Service (MMLOS) as described in Section 4.3 and 4.9 and safe and efficient connectivity to public transit as described in Section 4.7, to name a few.

4.5.3. TDM Program

The TDM infrastructure checklist and TDM Measures are attached as **Appendix G**, but some examples include

- The development proposes to construct a sidewalk fronting the site and extending it past their site to create an integrated sidewalk network
- Development will exceed minimum bicycle parking spots
- Proposed multi-use pathway on the north side of the site fronting March Road

4.6. Neighborhood Traffic Management

4.6.1. Adjacent Neighborhoods

Exempt. See table **Table 1**.

4.7. Transit

4.7.1. Route Capacity

With less than 40 to 50 'new' two-way transit passenger trips per hour generated for the AM and PM peak hours, it is not anticipated that this development will place buses at capacity. Given the transit priority with BRT measures are planned for March Road, it is anticipated that the future transit network will have additional capacity to accommodate the subject development transit demand. Additionally, added capacity is available on local bus routes on Teron Road and March Road.

4.7.2. Transit Priority

Minor delays may occur on Teron Road transit routes occasionally as through busses on Teron Road may have to wait for turning vehicles to and from the site access, however, delays are anticipated to be minor. Once the March Road BRT is built, it is anticipated that the site will have negligible impacts on routes using the BRT given that the site does not have an access on to March Road and forecasted vehicle volumes are minimal.

4.8. Review of Network Concept

Exempt. See table **Table 1**.

4.9. Intersection Design

4.9.1. Intersection Control

Refer to **Section 4.4.2**.

4.9.2. Intersection Design

Multi-Modal Level of Service

As stated in the MMLOS Guidelines, only signalized intersections are considered for the intersection Level of Service measures. The March/Teron and Beaverbrook/Teron intersections are signalized intersections within the study area. The MMLOS analysis is summarized in **Table 12**, with detailed analyses provided in **Appendix H**.

Table 12: MMLOS – Intersections

Intersection	Level of Service							
	Pedestrian		Bicycle (BLoS)		Transit (TLoS)		Truck (TkLoS)	
	PLoS	Target	BLoS	Target	TLoS	Target	TkLoS	Target
March/Teron	F	A	F	C	F	A	A	D
Beaverbrook/Teron	E	A	D	B	E	D	-	n/a

Pedestrian

- For both intersections, pedestrians must cross at least 5 lanes of traffic based on the distance from curb to curb divided by 3.5 meters. There are no options that can help improve the PLoS significantly enough to come anywhere near the target PLoS 'A'

Bicycle

- For both intersections, the bicycle BLoS target was not met given the absence of bicycle facilities and number of lanes needed to cross to perform a left turn. Providing cycling facilities and lowering the speed limit to 40 km/h on Teron Road would meet the cyclist BLoS targets

Transit

- Transit TLoS targets were not met for either intersection as it relies on average signal delay. To reach the target goal for Beaverbook/Teron, buses must wait no longer than 30 seconds at the intersection

Truck

- Truck target level of service was met for March/Teron intersection. Beaverbrook nor Teron Road are classified as truck routes

Existing Intersection Performance

The following **Table 13** provides a summary of the existing traffic operations at the study area intersection based on the Synchro (V10) traffic analysis software. The subject intersections were assessed in terms of the volume-to-capacity (v/c) ratio and the corresponding Level of Service (LoS) for the critical movement(s). The Synchro model outputs of existing conditions are provided within **Appendix I** and the volumes used were obtained from **Figure 5**.

Table 13: Existing Intersection Performance

Intersection	Weekday AM Peak (PM Peak)					
	Critical Movement			Intersection		
	LoS	max. v/c or avg. delay (s)	Movement	Delay (s)	LoS	v/c
Signalized Intersections						
March/Teron	F(F)	1.88(1.01)	EBL(SBT)	84.7(39.1)	F(E)	1.12(0.96)
Beaverbrook/Teron	A(D)	0.47(0.83)	NBT(SBT)	9.7(19.9)	A(B)	0.40(0.67)
Unsignalized Intersections						
Steacie/Teron	B(C)	12(17)	EB(EB)	2(4)	A(A)	-
Note: Analysis of signalized intersections assumes a PHF of 0.9 and a saturation flow rate of 1800 veh/h/lane.						

As seen in **Table 13,** all intersections operate overall at good LoS 'B' or better with critical movements operating at LoS 'D' or better during the existing conditions with the exception of March/Teron which is operating at capacity in the AM and near capacity in the PM. The critical movements at capacity for March/Teron include EBL which is well over capacity in the AM given that it has 475 left-turns from Teron Road to March Road using a single turn lane. The critical movement for the PM is the southbound through on March Road.

Background Conditions 2027

The future background 2027 conditions are anticipated to operate worse than 2022 as more developments were accounted for and the future background volumes have been increased by 2% annually for a longer period. Since 2027 background has the same intersection layouts as 2022 and is the more critical of the two scenarios, only 2027 will be analyzed. The future projected 2027 background volumes are illustrated in **Figure 14** with projected operation outputs in **Table 14**. The detailed Synchro results can be found in **Appendix J**.

Table 14: 2027 Background Intersection Performance

Intersection	Weekday AM Peak (PM Peak)					
	Critical Movement			Intersection		
	LoS	max. v/c or avg. delay (s)	Movement	Delay (s)	LoS	v/c
Signalized Intersections						
March/Teron	F(F)	1.68(1.17)	EBL(SBT)	80.4(64.4)	F(F)	1.14(1.09)
Beaverbrook/Teron	A(D)	0.50(0.84)	NBT(SBT)	10.0(19.9)	A(B)	0.42(0.68)
Unsignalized Intersections						
Steacie/Teron	B(C)	13(20)	EB(EB)	3(4)	A(A)	-
Note: Analysis of signalized intersections assumes a PHF of 1.0 and a saturation flow rate of 1800 veh/h/lane.						

As seen in **Table 14**, all intersections operate overall similar with to existing intersection performance with the exception of March/Teron which continues to deteriorate in performance due to very conservative background growths of 2% assumed.

Future Conditions 2022

The future full build-out 2022 volumes were derived by superimposing background 2022 volumes which include other area developments and background growth, with future site-generated volumes. The future projected 2022 volumes are illustrated in **Figure 16** with projected operation outputs in **Table 15**. The detailed Synchro results can be found in **Appendix K**.

Figure 16: 2022 Total Projected Volumes

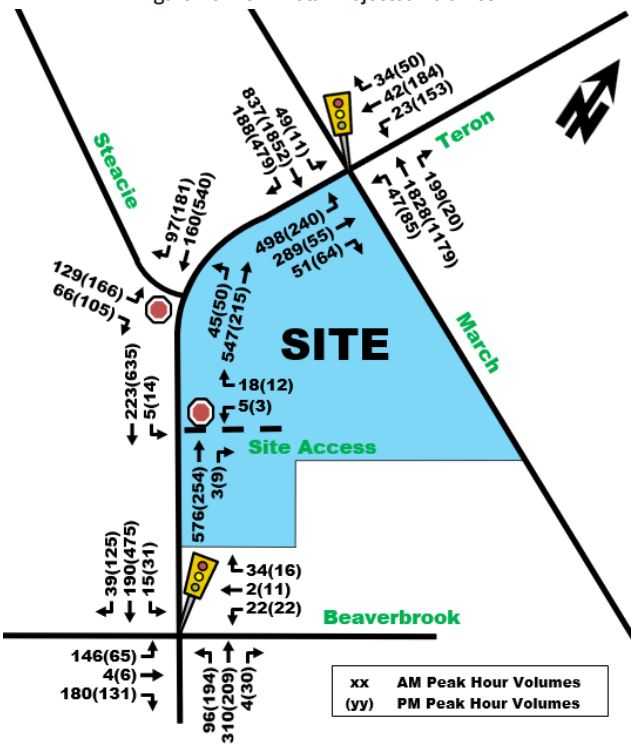


Table 15: 2022 Full Build-out Intersection Performance

Intersection	Weekday AM Peak (PM Peak)					
	Critical Movement			Intersection		
	LoS	max. v/c or avg. delay (s)	Movement	Delay (s)	LoS	v/c
Signalized Intersections						
March/Teron	F(F)	1.77(1.06)	EBL(SBT)	75.7(45.5)	F(E)	1.09(1.00)
Beaverbrook/Teron	A(D)	0.48(0.84)	NBT(SBT)	9.8(19.7)	A(B)	0.41(0.67)
Unsignalized Intersections						
Steacie/Teron	B(C)	12(18)	EB(EB)	3(4)	A(A)	-
Site Access/Teron	B(C)	13(11)	WB(WB)	1(1)	A(A)	-
Note: Analysis of signalized intersections assumes a PHF of 1.0 and a saturation flow rate of 1800 veh/h/lane.						

As seen in **Table 15**, all study area intersections are expected to operate similarly to existing conditions.

Future Conditions 2027

The future full build-out 2027 volumes were derived by superimposing background 2027 volumes which include other area developments and background growth, with future site-generated volumes. The future projected 2027 volumes are illustrated in **Figure 17** with projected operation outputs in **Table 16.** The detailed Synchro results can be found in **Appendix K**.

Figure 17: 2027 Total Projected Volumes

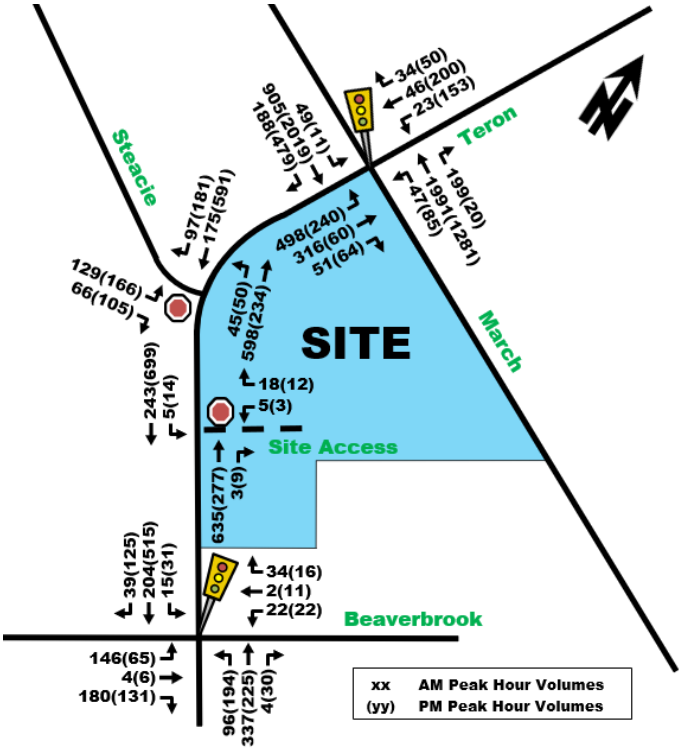


Table 16: 2027 Full Build-out Intersection Performance

Intersection	Weekday AM Peak (PM Peak)					
	Critical Movement			Intersection		
	LoS	max. v/c or avg. delay (s)	Movement	Delay (s)	LoS	v/c
Signalized Intersections						
March/Teron	F(F)	1.70(1.17)	EBL(SBT)	81.2(65.6)	F(F)	1.15(1.09)
March/Teron Improvements[1]	*E(D)*	*0.99(0.84)*	*EBL(EBL)*	*36.4(27.9)*	*D(D)*	*0.88(0.81)*
Beaverbrook/Teron	A(D)	0.51(0.84)	NBT(SBT)	10.0(20.0)	A(B)	0.43(0.69)
Unsignalized Intersections						
Steacie/Teron	B(C)	13(20)	EB(EB)	3(4)	A(A)	-
Site Access/Teron	B(C)	14(12)	WB(WB)	1(1)	A(A)	-

Note: Analysis of signalized intersections assumes a PHF of 1.0 and a saturation flow rate of 1800 veh/h/lane.
1.) Improvements include addition of a southbound and northbound through lane on March Road

As seen in **Table 16**, all study area intersections are expected to operate similarly to background 2027 conditions with acceptable delays on all intersections except for March/Teron which is operating at capacity, similarly to existing and 2027 background. A large factor into worsening conditions at March/Teron include aggressive future background growths. A sensitivity test was done by extending the 6-lane cross-section from March/Herzburg intersection to March/Teron which is located approximately 1-kilometer further north on March Road. The addition of the March Road through lanes yields acceptable levels of service but would require large investments. Twinning the eastbound left from Teron Road to March Road would significantly improve the critical movement in the AM but would likely lead to additional traffic choosing Teron Road as their primary route and would eventually lead to new capacity issues at this intersection and at other Teron Road intersections.

The transit improvements proposed on March Road, including the BRT corridor are anticipated to change commuter habits by increasing transit ridership and decreasing vehicle dependency, thus, reducing vehicles in the network and improving intersection performance.

Future Conditions if Custom Mode Share not Met

The trips generated based on Kanata mode share are shown in **Figure 18** in the event that the custom mode shares are not met. The projected intersection performance for the critical scenario 2027 with Kanata mode shares is shown in **Table 17** with detailed output in **Appendix L**.

Figure 18: 2027 Total if Custom Mode Share Not Met Projected Volumes

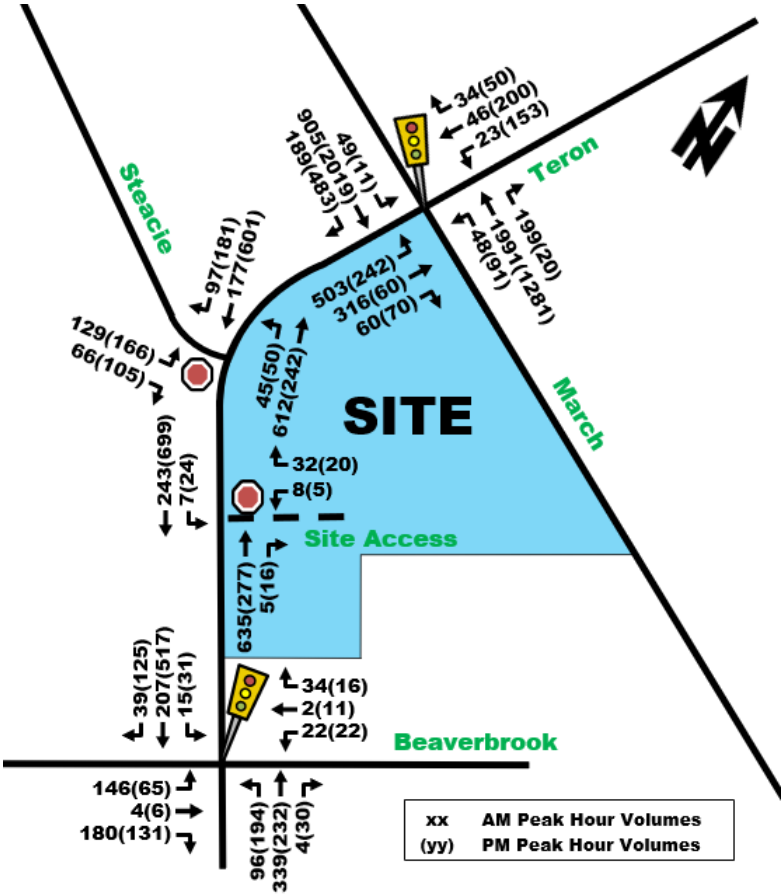


Table 17: Intersection Performance if TOD Mode Shares Not Met

Intersection	Weekday AM Peak (PM Peak)					
	Critical Movement			Intersection		
	LoS	max. v/c or avg. delay (s)	Movement	Delay (s)	LoS	v/c
Signalized Intersections						
March/Teron	F(F)	1.72(1.18)	EBL(SBT)	82.2(66.5)	F(F)	1.15(1.10)
Beaverbrook/Teron	A(D)	0.51(0.84)	NBT(SBT)	10.0(20.0)	A(B)	0.43(0.69)
Unsignalized Intersections						
Steacie/Teron	B(C)	13(21)	EB(EB)	3(5)	A(A)	-
Site Access/Teron	B(C)	14(12)	WB(WB)	1(1)	A(A)	-
Note: Analysis of signalized intersections assumes a PHF of 1.0 and a saturation flow rate of 1800 veh/h/lane.						

As seen in **Table 17**, intersections are expected to perform very similarly to 2027 with TOD mode shares, meaning that this development does not have a big impact on worsening traffic conditions.

5. FINDINGS AND RECOMMENDATIONS

Based on the results summarized herein the following findings and recommendations are provided:

Existing Conditions

- The site is currently an empty field with overhead hydro wires and is zoned as O1[2143] and R5A[2144] S327

- The site is located in a future transit priority corridor with a BRT on March Road
- Overall, there are no existing safety concerns along the proposed development frontage and study area intersections. Therefore, no mitigation measures were considered
- Existing intersections operate at good overall LoS 'B' or better with critical movements of 'D' or better during the weekday peak hours, with the exception of March/Teron which is performing overall at or near capacity and with critical movements surpassing capacity for AM and PM peak hours

Proposed Development

- The proposed development will have 131 residential units combined in a 3-storey and a 9-storey building located at 1131 and 1151 Teron Road respectively
- The proposed development is projected to generate 'new' vehicle volumes of approximately 30 to 40 veh/h two-way total during the weekday morning and afternoon peak hours respectively
- The proposed development is projected to generate approximately 40 to 50 'new' transit trips during the AM and PM peak hour periods, which can be accommodated by rapid route #63 and other local bus routes. Additional capacity will be available once March Road becomes a BRT corridor
- A total of 200 parking spaces are proposed which meet the City's minimum and maximum parking requirements for this development
- The development will be accessed by a single two-way driveway on to Teron Road

Future Conditions

- Other nearby developments and a 2% growth rate to through movements were applied to existing volumes to estimate 2027 background conditions, which operated worse than existing conditions, predominantly to do with the high annual growth rate assumed
- Future conditions with the addition of site generated traffic performs similar to background 2027 volumes, implying that the development does not play a large role in worsening future conditions
- If the TOD modal shares are not met, the study area intersection performance is anticipated to operate similarly to 2027 future conditions
- The MMLOS road segment analysis shows that existing and future conditions on boundary streets do not meet MMLOS area targets for pedestrians due to high vehicular volumes and vehicle travel speeds. The bike, transit and truck targets are met for some segments but fail in others. The addition of cycling facilities would improve the BLoS to target levels
- The MMLOS intersection analysis shows that only truck target goals are met. All other targets including pedestrian, cyclist and transit targets were not met due to the number of lanes required to be crossed, operating speeds or delays at certain approaches
- The development proposes to construct a multi-use pathway on the north side of the site fronting March Road and connecting to existing MUP network
- The development is proposing to provide 96 bicycle parking spaces which is higher than the minimum required of 67
- The development proposes to construct a sidewalk fronting the site on Teron Road. In addition to the site frontage, the developer plans to extend the sidewalk south past their site to the existing sidewalk starting at Bethune Way. This sidewalk extension would create an integrated sidewalk network

Based on the foregoing findings, the proposed development located at 1131 and 1151 Teron Road is recommended from a transportation perspective.

Prepared By:

Juan Lavin, E.I.T.

Reviewed By:

Matthew Mantle, P.Eng.
Transportation Engineer

APPENDIX A

SCREENING FORM & CITY CORRESPONDANCE

PARSONS

1223 Michael Street, Suite 100, Ottawa, Ontario, K1J 7T2
P: +1 613.738.4160 l F: +1 613.739.7105 l www.parsons.com

City of Ottawa 2017 TIA Guidelines

TIA Screening Form

Date	24-Feb-21
Project	1131 & 1151 Teron Road
Project Number	477778 - 01000

Results of Screening	Yes/No
Development Satisfies the Trip Generation Trigger	Yes
Development Satisfies the Location Trigger	Yes
Development Satisfies the Safety Trigger	Yes

Module 1.1 - Description of Proposed Development	
Municipal Address	1131 & 1151 Teron Road
Description of location	Currently a vacant lot, located between Teron Road to the southwest and March Road to the north.
Land Use	Proposed 3-storey and 9-storey Residential
Development Size	131 Residential Apartments
Number of Accesses and Locations	Single 2-way access to Teron Road, approximately 150 m south of Steacie/Teron
Development Phasing	2 Phases
Buildout Year	2022 and before 2026
Sketch Plan / Site Plan	See attached

Module 1.2 - Trip Generation Trigger		
Land Use Type	Townhomes or Apartments	
Development Size	131	Units
Trip Generation Trigger Met?	Yes	

Module 1.3 - Location Triggers		
Development Proposes a new driveway to a boundary street that is designated as part of the City's Transit Priority, Rapid Transit, or Spine Bicycle Networks (See Sheet 3)	Yes	Teron Road and March Road are both Spine Bicycle Network according to TMP Map1
Development is in a Design Priority Area (DPA) or Transit-oriented Development (TOD) zone. (See Sheet 3)	Yes	Property parcel within March Road Transit Oriented Development
Location Trigger Met?	Yes	

Module 1.4 - Safety Triggers		
Posted Speed Limit on any boundary road	<80	km/h
Horizontal / Vertical Curvature on a boundary street limits sight lines at a proposed driveway	Yes	Sight triangles on March/Teron required for final plan
A proposed driveway is 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) or within auxiliary lanes of an intersection;	Yes	The access on Teron Road is less than 150m from the Teron Road/Steacie Drive intersection
A proposed driveway makes use of an existing median break that serves an existing site	No	
There is a documented history of traffic operations or safety concerns on the boundary streets within 500 m of the development	No	
The development includes a drive-thru facility	No	
Safety Trigger Met?	Yes	

1223 Michael Street North, Suite 100 | Ottawa, ON K1J 7T2
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25 August 2021

City of Ottawa
Development Review Services
110 Laurier Avenue West
Ottawa, ON K1P 1J1

Attention: Josiane Gervais, P.Eng.

Dear Josiane:

Re: 1131 & 1151 Teron Road TIA
Step 4 – Response to City Comments

The following response has been prepared in response to City of Ottawa comments received on July 15, 2021. City comments have been noted in black with the corresponding responses from Parsons in Green.

Transportation Engineering Services

1. Confirm that sidewalk will be provided along the entire frontage of the site and that the missing link to Bethune Way will also be constructed as part of the site development (as indicated in previous circulations and indicated in section 4.5.3). This sidewalk extension will require an RMA as it is outside the property limits. The sidewalk is planned to extend to the southern property limit along Teron Road.
2. The TIA Strategy report has been updated to remove the commercial component of the strategy report submitted for the zoning application. Staff clarified that the timing for the March Road BRT from Corkstown to Solandt is tentatively scheduled for funding in 2027/2028. Review this information and modify the Demand Rationalization module as required. Indicate if the modal shares (Table 6) used to forecast trips by mode require adjustment to reflect this information. An adjustment may also be required for the background growth. Resubmission of the report is not required if the change does not impact the recommendations. Our background growth is not impacted by the change in BRT construction, in fact, a very conservative 2% annual growth rate was assumed. The change in site generated vehicle trips forecasted before and after mode share assumptions is less than 30 new vehicles which will have a negligible impact on the network.
3. Transit Services should be contacted with regard to facilities to support transit modal share. Noted

Traffic Signal Operations

4. The eastbound left-turn queues from Teron Road onto March Road stretch beyond the site access. Review how this will impact the level of service at the access during peak periods. Eastbound left-turn queues from Teron/March are anticipated to queue beyond the site access. This will cause longer delays, however, vehicles exiting and entering the site will likely have breaks in the queues when northbound vehicles are stopped or slowly moving allowing them access to or from Teron Road/site.

Traffic Signal Design

5. No comments. Noted

Street Lighting

6. No comments with initial TIA for this circulation. Street Lighting reserves the right to make future comments based on subsequent submissions. Noted
7. Future considerations are as follows:
   a) If there are any proposed changes to the existing roadway geometry, the City of Ottawa Street Light Asset Management Group is required to provide a full street light design. Upon completion of proposed roadway geometry design changes, please submit digital Micro Station drawings with proposed roadway geometry changes to the Street Lighting Department, so that we may proceed with the detailed street light design and coordination with the Street Light maintenance provider and all necessary parties. Be advised that the applicant will be 100% responsible for all costs associated with any Street Light design as a result of the roadway geometry change. Noted
   b) Alterations and/or repairs are required where the existing street light plant is directly, indirectly, or adversely affected by the scope of work under this circulation, due to the proposed road reconstruction process. All street light plant alterations and/or repairs must be performed by the City of Ottawa's Street Light maintenance provider. Noted
   c) Be advised that the applicant will be 100% responsible for all costs associated with any relocations/modifications to the existing street light plant. Should a conflict arise or if you have any questions please contact Barrie Forrester at (613) 580-2424 ext 23332 or Barrie.Forrester@ottawa.ca. Noted

Transit Services

8. Comments were not provided at the time of this letter. Comments have been requested and will be forwarded directly to Parsons once received. Noted

Development Review – Transportation

9. Please address the above comments and re-submit the TIA and digital files of ICA outputs (Synchro/Sidra/Rodel, if applicable), as per comment # 2 above. Alternative, please address the above comments and proceed to submitting the Step 5: Final TIA (remove draft watermark, sign and include Certification Form). See attached

APPENDIX B

TRAFFIC COUNT DATA

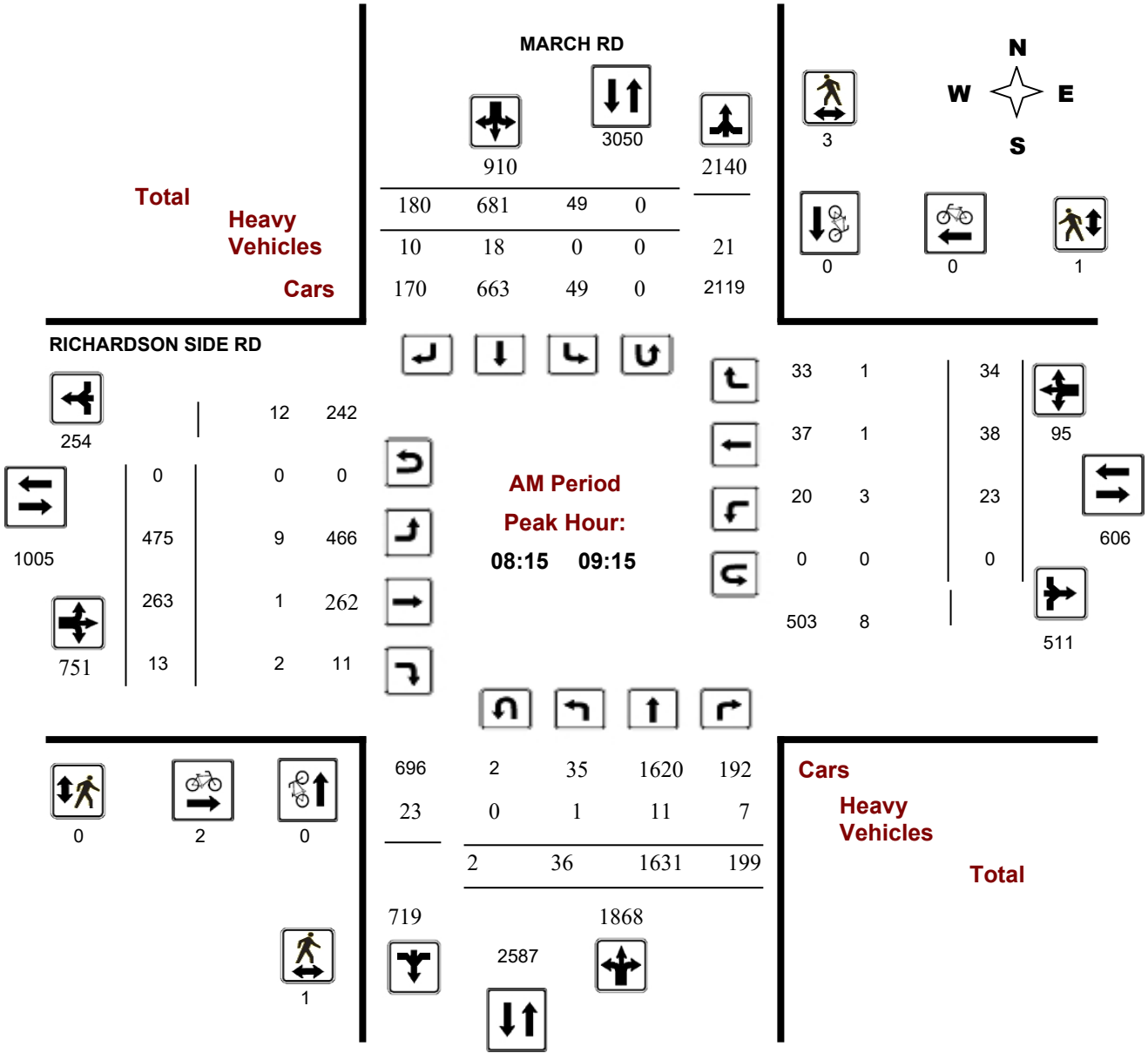
Transportation Services - Traffic Services

Turning Movement Count - Full Study Peak Hour Diagram

MARCH RD @ RICHARDSON SIDE RD

Survey Date: Thursday, November 02, 2017 **WO No:** 37345

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



Comments

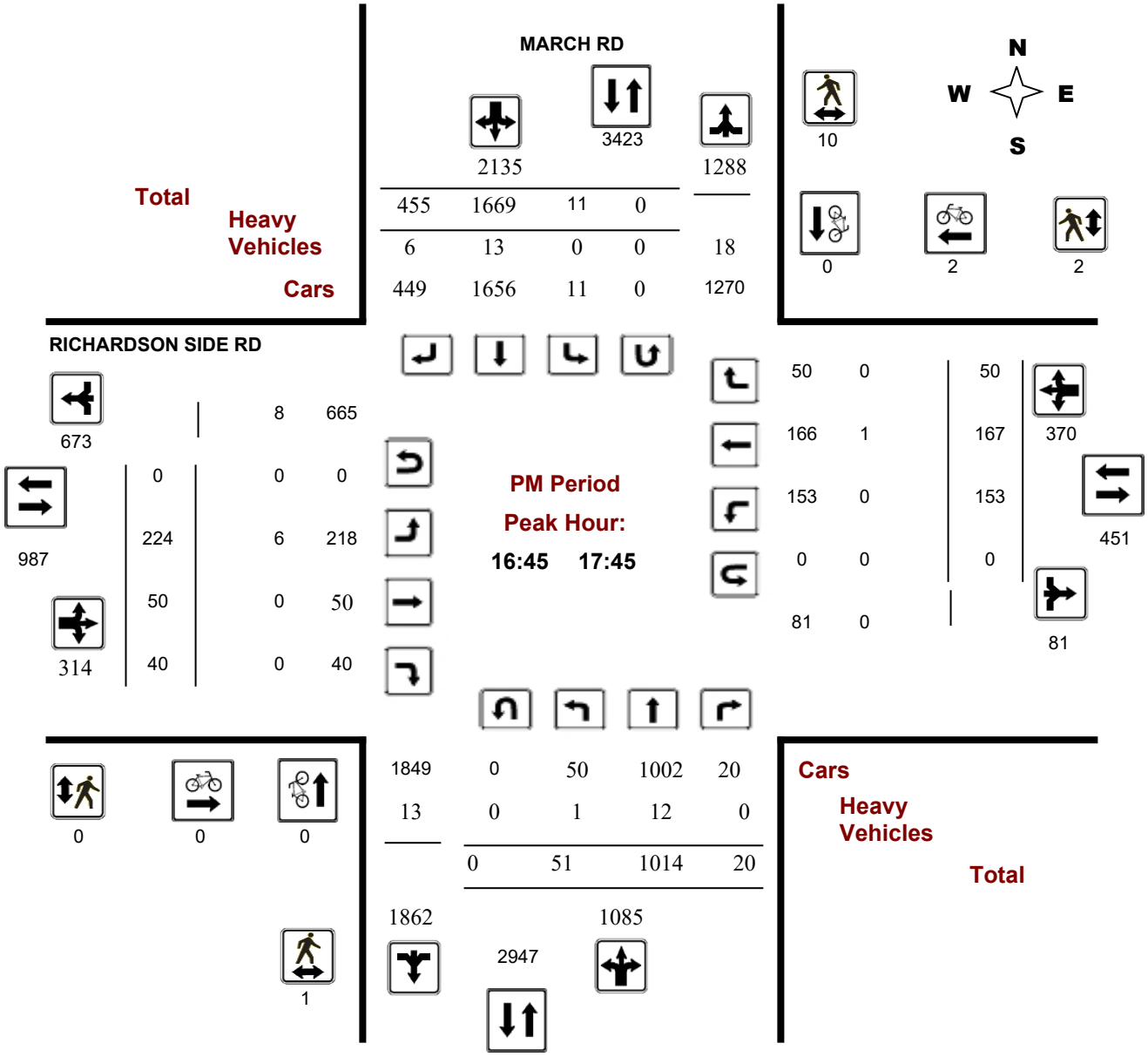
Transportation Services - Traffic Services

Turning Movement Count - Full Study Peak Hour Diagram

MARCH RD @ RICHARDSON SIDE RD

Survey Date: Thursday, November 02, 2017 **WO No:** 37345

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



Comments

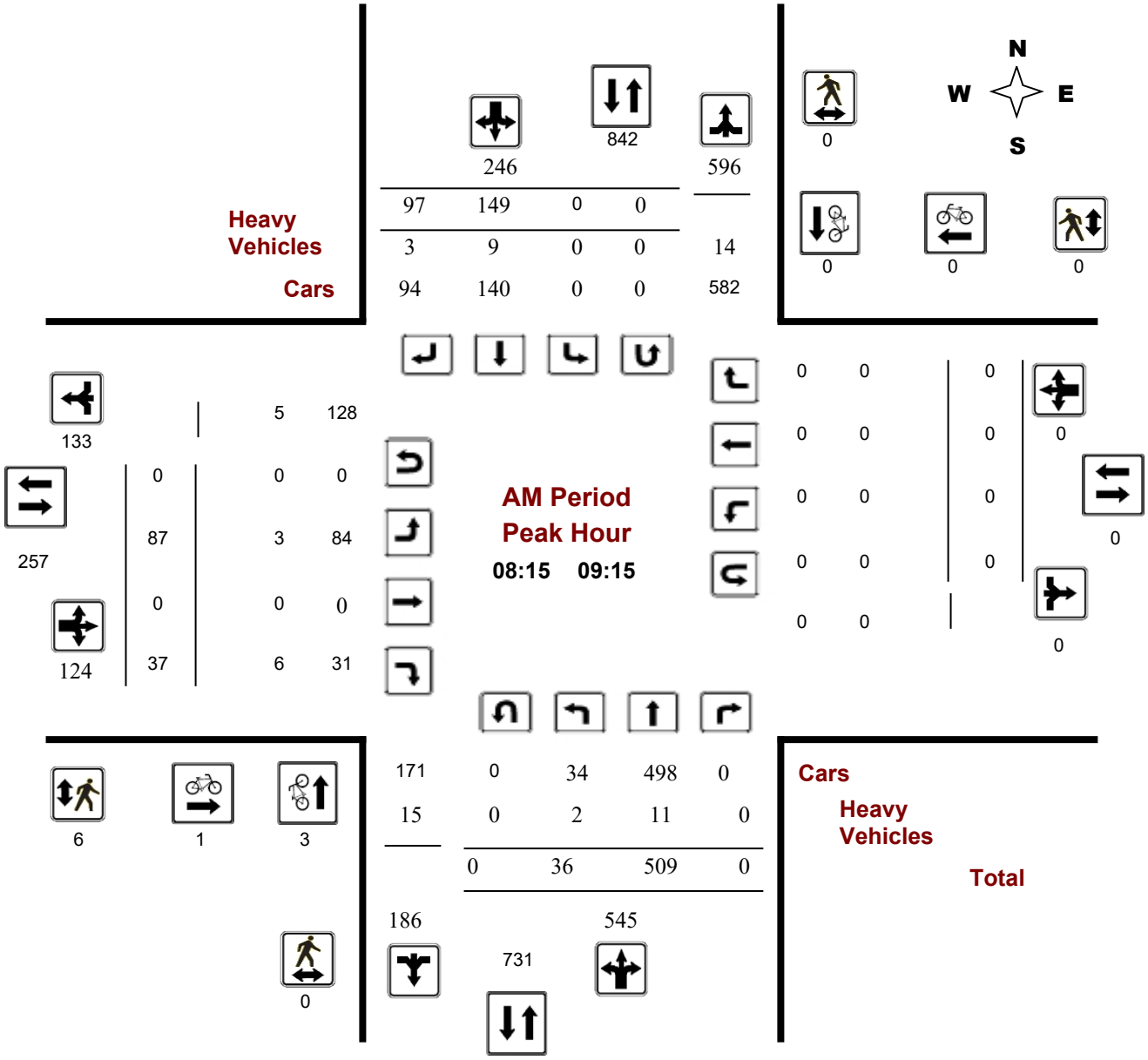
Transportation Services - Traffic Services

Turning Movement Count - Peak Hour Diagram

RICHARDSON SIDE RD/TERON RD @ STEACIE DR

Survey Date: Tuesday, February 25, 2020 **WO No:** 39534

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



Comments 5476125 - FEB 25, 2020 - 8HRS - CHRIS MORRIS

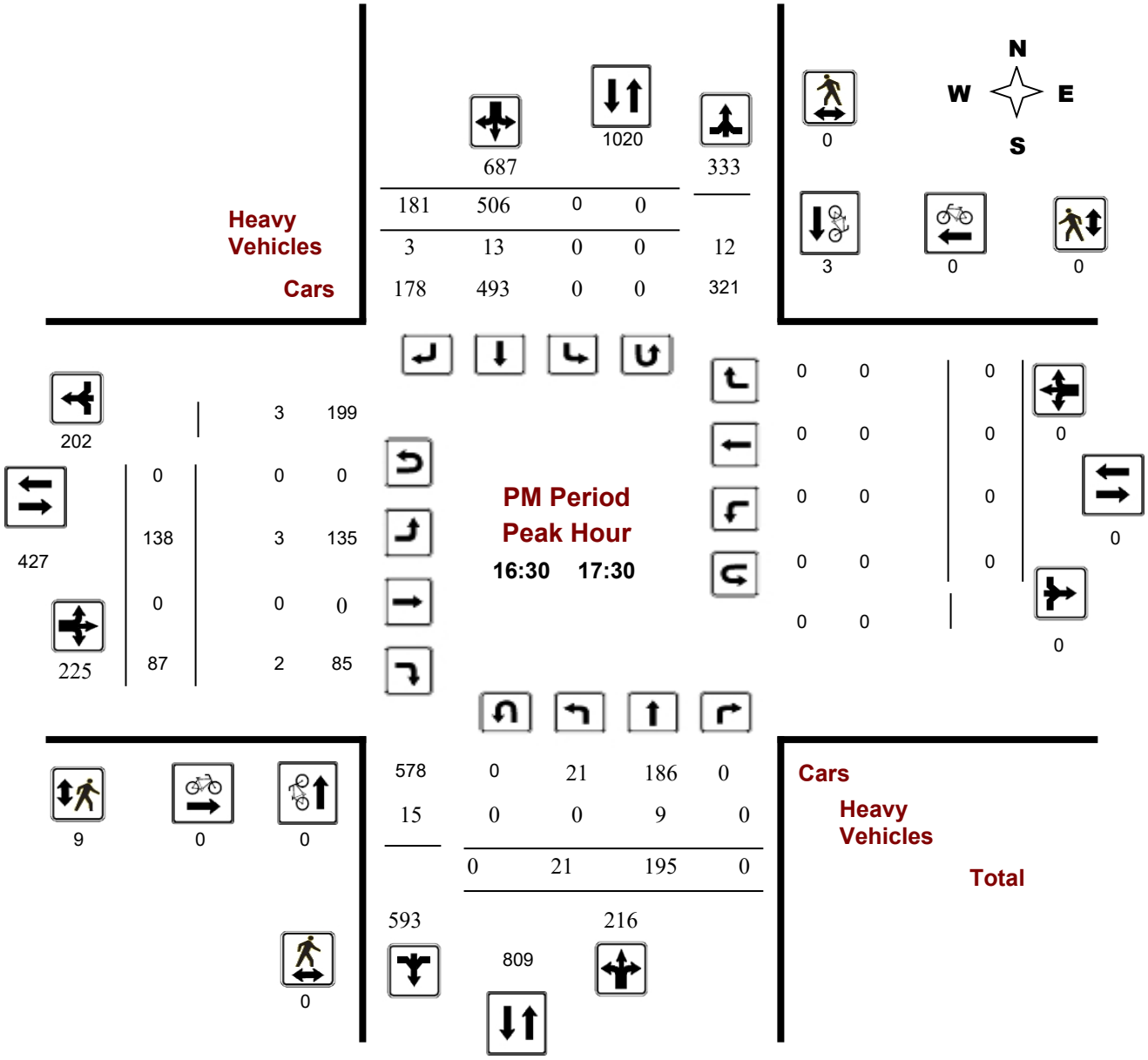
Transportation Services - Traffic Services

Turning Movement Count - Peak Hour Diagram

RICHARDSON SIDE RD/TERON RD @ STEACIE DR

Survey Date: Tuesday, February 25, 2020 **WO No:** 39534

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



Comments 5476125 - FEB 25, 2020 - 8HRS - CHRIS MORRIS

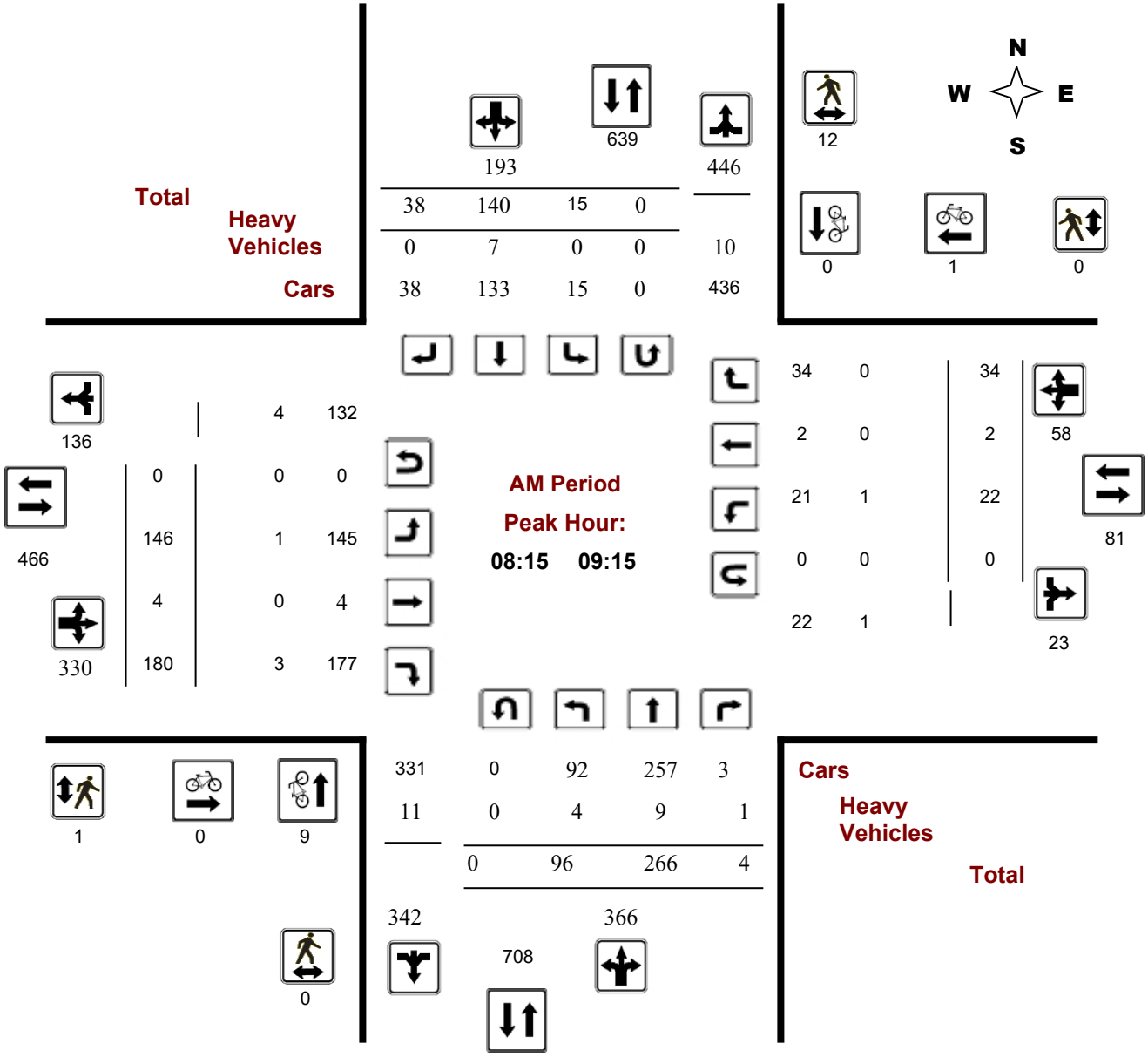
Transportation Services - Traffic Services

Turning Movement Count - Full Study Peak Hour Diagram

TERON RD @ BEAVERBROOK RD/PENFIELD DR N

Survey Date: Wednesday, August 10, 2016 **WO No:** 36159

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



Comments

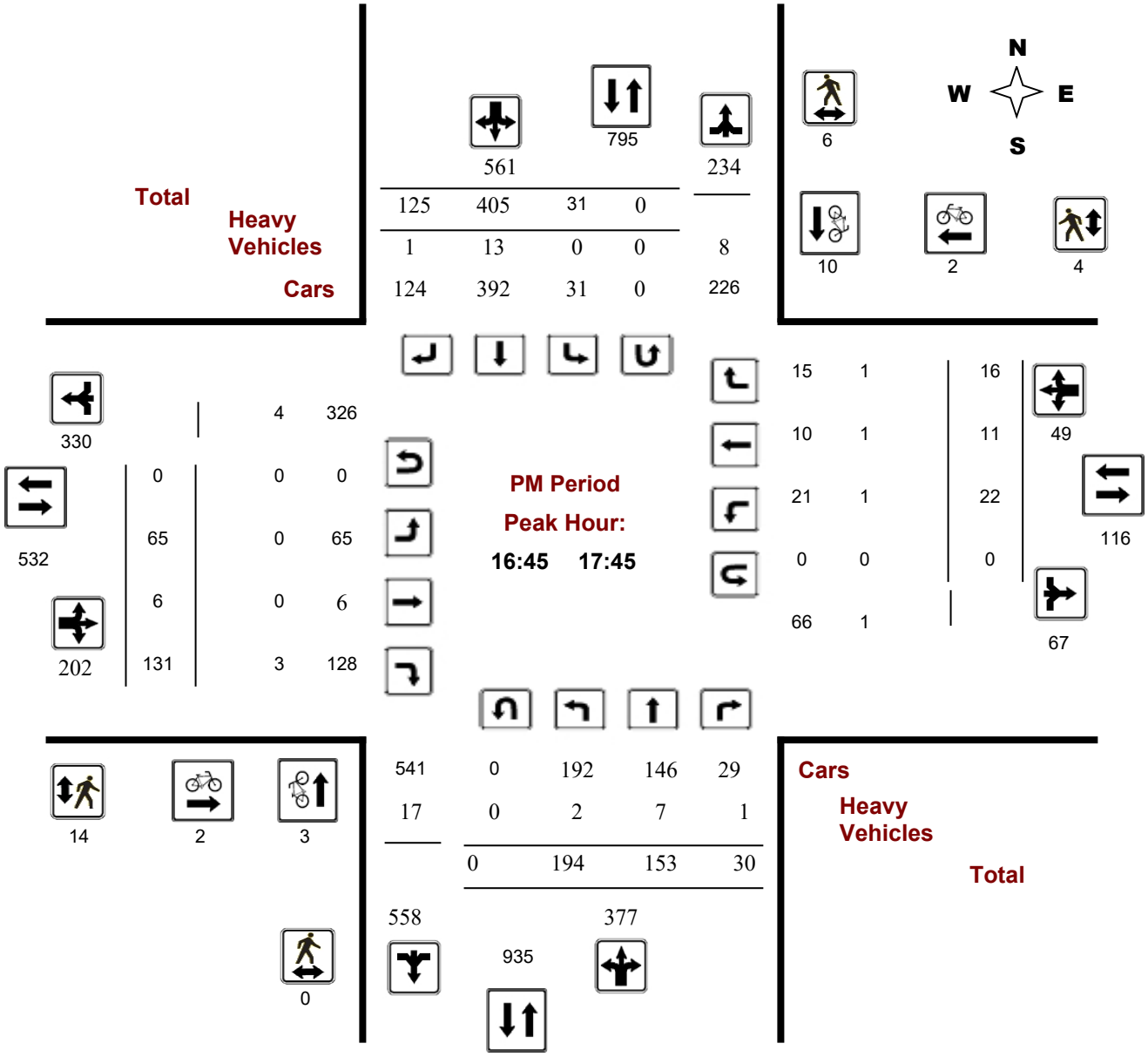
Transportation Services - Traffic Services

Turning Movement Count - Full Study Peak Hour Diagram

TERON RD @ BEAVERBROOK RD/PENFIELD DR N

Survey Date: Wednesday, August 10, 2016
Start Time: 07:00

WO No: 36159
Device: Miovision



Comments

APPENDIX C

COLLISION DATA

Total Area

Classification of Accident	Rear End	Turning Movement	Sideswipe	Angle	Approaching	Single Vehicle (other)	Single vehicle (Unattended vehicle)	Other	Total	
P.D. only	23	6	6	11	0	11	0	0	57	75%
Non-fatal injury	5	6	1	1	1	5	0	0	19	25%
Fatal Injury	0	0	0	0	0	0	0	0	0	0%
Non reportable	0	0	0	0	0	0	0	0	0	0%
Total	**28**	**12**	**7**	**12**	**1**	**16**	**0**	**0**	**76**	100%
	#1 or 37%	#3 or 16%	#5 or 9%	#3 or 16%	#6 or 1%	#2 or 21%	#7 or 0%	#7 or 0%		

MARCH RD / RICHARDSON SIDE RD

Years	Total # Collisions	24 Hr AADT Veh Volume	Days	Collisions/MEV
5	27	40,617	1825	**0.36**

Classification of Accident	Rear End	Turning Movement	Sideswipe	Angle	Approaching	Single Vehicle (other)	Single vehicle (Unattended vehicle)	Other	Total	
P.D. only	8	5	4	2	0	1	0	0	20	74%
Non-fatal injury	2	3	0	1	0	1	0	0	7	26%
Non reportable	0	0	0	0	0	0	0	0	0	0%
Total	**10**	**8**	**4**	**3**	**0**	**2**	**0**	**0**	**27**	100%
	37%	30%	15%	11%	0%	7%	0%	0%		

HERZBERG RD / MARCH RD

Years	Total # Collisions	24 Hr AADT Veh Volume	Days	Collisions/MEV
5	32	41,897	1825	**0.42**

Classification of Accident	Rear End	Turning Movement	Sideswipe	Angle	Approaching	Single Vehicle (other)	Single vehicle (Unattended vehicle)	Other	Total	
P.D. only	12	0	2	5	0	6	0	0	25	78%
Non-fatal injury	2	2	1	0	0	2	0	0	7	22%
Non reportable	0	0	0	0	0	0	0	0	0	0%
Total	**14**	**2**	**3**	**5**	**0**	**8**	**0**	**0**	**32**	100%
	44%	6%	9%	16%	0%	25%	0%	0%		

TERON RD / BEAVERBROOK RD/PENFIELD DR N

Years	Total # Collisions	24 Hr AADT Veh Volume	Days	Collisions/MEV
5	6	10,559	1825	**0.31**

Classification of Accident	Rear End	Turning Movement	Sideswipe	Angle	Approaching	Single Vehicle (other)	Single vehicle (Unattended vehicle)	Other	Total	
P.D. only	0	0	0	2	0	1	0	0	3	50%
Non-fatal injury	0	1	0	0	0	2	0	0	3	50%
Non reportable	0	0	0	0	0	0	0	0	0	0%
Total	**0**	**1**	**0**	**2**	**0**	**3**	**0**	**0**	**6**	100%
	0%	17%	0%	33%	0%	50%	0%	0%		

BETHUNE CRT / TERON RD

Years	Total # Collisions	24 Hr AADT Veh Volume	Days	Collisions/MEV
5	1	10,200	1825	**0.05**

Classification of Accident	Rear End	Turning Movement	Sideswipe	Angle	Approaching	Single Vehicle (other)	Single vehicle (Unattended vehicle)	Other	Total	
P.D. only	1	0	0	0	0	0	0	0	1	100%
Non-fatal injury	0	0	0	0	0	0	0	0	0	0%
Non reportable	0	0	0	0	0	0	0	0	0	0%
Total	**1**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**1**	100%
	100%	0%	0%	0%	0%	0%	0%	0%		

RICHARDSON SIDE RD/TERON RD / STEACIE DR

Years	Total # Collisions	24 Hr AADT Veh Volume	Days	Collisions/MEV
5	1	12,074	1825	**0.05**

Classification of Accident	Rear End	Turning Movement	Sideswipe	Angle	Approaching	Single Vehicle (other)	Single vehicle (Unattended vehicle)	Other	Total	
P.D. only	0	1	0	0	0	0	0	0	1	100%
Non-fatal injury	0	0	0	0	0	0	0	0	0	0%
Non reportable	0	0	0	0	0	0	0	0	0	0%
Total	**0**	**1**	**0**	**0**	**0**	**0**	**0**	**0**	**1**	100%
	0%	100%	0%	0%	0%	0%	0%	0%		

Segments

MARCH RD /twn RICHARDSON SIDE RD & HERZBERG RD

Years	Total # Collisions	24 Hr AADT Veh Volume	Days	Collisions/MEV
5	6	n/a	1825	**n/a**

Classification of Accident	Rear End	Turning Movement	Sideswipe	Angle	Approaching	Single Vehicle (other)	Single vehicle (Unattended vehicle)	Other	Total	
P.D. only	1	0	0	0	0	3	0	0	4	67%
Non-fatal injury	1	0	0	0	1	0	0	0	2	33%
Non reportable	0	0	0	0	0	0	0	0	0	0%
Total	**2**	**0**	**0**	**0**	**1**	**3**	**0**	**0**	**6**	100%
	33%	0%	0%	0%	17%	50%	0%	0%		

TERON RD /twn CHISHOLM CRT & BEAVERBROOK LANE

Years	Total # Collisions	24 Hr AADT Veh Volume	Days	Collisions/MEV
5	1	n/a	1825	**n/a**

Classification of Accident	Rear End	Turning Movement	Sideswipe	Angle	Approaching	Single Vehicle (other)	Single vehicle (Unattended vehicle)	Other	Total	
P.D. only	1	0	0	0	0	0	0	0	1	100%
Non-fatal injury	0	0	0	0	0	0	0	0	0	0%
Non reportable	0	0	0	0	0	0	0	0	0	0%
Total	**1**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**1**	100%
	100%	0%	0%	0%	0%	0%	0%	0%		

TERON RD /twn BEAVERBROOK LANE & BEAVERBROOK RD

Years	Total # Collisions	24 Hr AADT Veh Volume	Days	Collisions/MEV
5	1	n/a	1825	**n/a**

Classification of Accident	Rear End	Turning Movement	Sideswipe	Angle	Approaching	Single Vehicle (other)	Single vehicle (Unattended vehicle)	Other	Total	
P.D. only	0	0	0	1	0	0	0	0	1	100%
Non-fatal injury	0	0	0	0	0	0	0	0	0	0%
Non reportable	0	0	0	0	0	0	0	0	0	0%
Total	**0**	**0**	**0**	**1**	**0**	**0**	**0**	**0**	**1**	100%
	0%	0%	0%	100%	0%	0%	0%	0%		

APPENDIX D

TRAFFIC GROWTH DATA

Teron/March
8 hrs

Year	Date	North Leg		South Leg		East Leg		West Leg		Total
		SB	NB	NB	SB	WB	EB	EB	WB	
2009	Tues July 14	10195	10467	9220	9616	1221	1559	3011	2405	47694
2010	Thurs Aug 12	11632	12297	10911	10631	1446	1611	3432	2882	54842
2011	Tues June 21	11215	14819	13681	10670	1798	2154	3514	2565	60416
2017	Thurs Nov 2	10160	11305	9977	8851	1563	1734	3085	2895	49570

North Leg

Year	Counts				% Change			
	NB	*SB*	*NB+SB*	*INT*	*NB*	*SB*	*NB+SB*	*INT*
2009	10467	10195	20662	47694				
2010	12297	11632	23929	54842	17.5%	14.1%	15.8%	15.0%
2011	14819	11215	26034	60416	20.5%	-3.6%	8.8%	10.2%
2017	11305	10160	21465	49570	-23.7%	-9.4%	-17.6%	-18.0%

Regression Estimate	2009	12369	11046	23415
Regression Estimate	2017	11942	10331	22273
Average Annual Change		**-0.44%**	**-0.83%**	**-0.62%**

West Leg

Year	Counts				% Change			
	EB	*WB*	*EB+WB*	*INT*	*EB*	*WB*	*EB+WB*	*INT*
2009	3011	2405	5416	47694				
2010	3432	2882	6314	54842	14.0%	19.8%	16.6%	15.0%
2011	3514	2565	6079	60416	2.4%	-11.0%	-3.7%	10.2%
2017	3085	2895	5980	49570	-12.2%	12.9%	-1.6%	-18.0%

Regression Estimate	2009	3312	2572	5884
Regression Estimate	2017	3162	2906	6068
Average Annual Change		**-0.58%**	**1.54%**	**0.39%**

East Leg

Year	Counts				% Change			
	EB	*WB*	*EB+WB*	*INT*	*EB*	*WB*	*EB+WB*	*INT*
2009	1559	1221	2780	47694				
2010	1611	1446	3057	54842	3.3%	18.4%	10.0%	15.0%
2011	2154	1798	3952	60416	33.7%	24.3%	29.3%	10.2%
2017	1734	1563	3297	49570	-19.5%	-13.1%	-16.6%	-18.0%

Regression Estimate	2009	1737	1438	3176
Regression Estimate	2017	1816	1638	3454
Average Annual Change		**0.56%**	**1.64%**	**1.06%**

South Leg

Year	Counts				% Change			
	NB	*SB*	*NB+SB*	*INT*	*NB*	*SB*	*NB+SB*	*INT*
2009	9220	9616	18836	47694				
2010	10911	10631	21542	54842	18.3%	10.6%	14.4%	15.0%
2011	13681	10670	24351	60416	25.4%	0.4%	13.0%	10.2%
2017	9977	8851	18828	49570	-27.1%	-17.0%	-22.7%	-18.0%

Regression Estimate	2009	11113	10409	21522
Regression Estimate	2017	10631	9050	19682
Average Annual Change		**-0.55%**	**-1.73%**	**-1.11%**

Teron/March
AM Peak

Year	Date	North Leg		South Leg		East Leg		West Leg		Total
		SB	NB	NB	SB	WB	EB	EB	WB	
2009	Tues July 14	1123	1902	1990	1084	32	412	580	157	7280
2010	Thurs Aug 12	1366	2324	2242	1274	99	418	579	270	8572
2011	Tues June 21	1220	2707	2672	1102	78	702	726	185	9392
2017	Thurs Nov 2	910	2140	1868	719	95	511	751	254	7248

North Leg

Year	Counts				% Change			
	NB	*SB*	*NB+SB*	*INT*	*NB*	*SB*	*NB+SB*	*INT*
2009	1902	1123	3025	7280				
2010	2324	1366	3690	8572	22.2%	21.6%	22.0%	17.7%
2011	2707	1220	3927	9392	16.5%	-10.7%	6.4%	9.6%
2017	2140	910	3050	7248	-20.9%	-25.4%	-22.3%	-22.8%

Regression Estimate	2009	2275	1269	3544
Regression Estimate	2017	2256	936	3191
Average Annual Change		**-0.11%**	**-3.74%**	**-1.30%**

West Leg

Year	Counts				% Change			
	EB	*WB*	*EB+WB*	*INT*	*EB*	*WB*	*EB+WB*	*INT*
2009	580	157	737	7280				
2010	579	270	849	8572	-0.2%	72.0%	15.2%	17.7%
2011	726	185	911	9392	25.4%	-31.5%	7.3%	9.6%
2017	751	254	1005	7248	3.4%	37.3%	10.3%	-22.8%

Regression Estimate	2009	603	196	799
Regression Estimate	2017	766	256	1022
Average Annual Change		**3.04%**	**3.40%**	**3.13%**

East Leg

Year	Counts				% Change			
	EB	*WB*	*EB+WB*	*INT*	*EB*	*WB*	*EB+WB*	*INT*
2009	412	32	444	7280				
2010	418	99	517	8572	1.5%	209.4%	16.4%	17.7%
2011	702	78	780	9392	67.9%	-21.2%	50.9%	9.6%
2017	511	95	606	7248	-27.2%	21.8%	-22.3%	-22.8%

Regression Estimate	2009	490	63	553
Regression Estimate	2017	550	100	651
Average Annual Change		**1.46%**	**5.92%**	**2.04%**

South Leg

Year	Counts				% Change			
	NB	*SB*	*NB+SB*	*INT*	*NB*	*SB*	*NB+SB*	*INT*
2009	1990	1084	3074	7280				
2010	2242	1274	3516	8572	12.7%	17.5%	14.4%	17.7%
2011	2672	1102	3774	9392	19.2%	-13.5%	7.3%	9.6%
2017	1868	719	2587	7248	-30.1%	-34.8%	-31.5%	-22.8%

Regression Estimate	2009	2306	1205	3511
Regression Estimate	2017	1977	738	2715
Average Annual Change		**-1.90%**	**-5.94%**	**-3.16%**

Teron/March
PM Peak

Year	Date	North Leg		South Leg		East Leg		West Leg		Total
		SB	NB	NB	SB	WB	EB	EB	WB	
2009	Tues July 14	2043	1398	1180	1625	329	80	370	602	7627
2010	Thurs Aug 12	2164	1848	1505	1995	420	165	585	666	9348
2011	Tues June 21	1989	1992	1820	1884	569	150	429	781	9614
2017	Thurs Nov 2	2135	1288	1085	1862	370	81	314	673	7808

North Leg

Year	Counts				% Change			
	NB	*SB*	*NB+SB*	*INT*	*NB*	*SB*	*NB+SB*	*INT*
2009	1398	2043	3441	7627				
2010	1848	2164	4012	9348	32.2%	5.9%	16.6%	22.6%
2011	1992	1989	3981	9614	7.8%	-8.1%	-0.8%	2.8%
2017	1288	2135	3423	7808	-35.3%	7.3%	-14.0%	-18.8%

Regression Estimate	2009	1760	2061	3821
Regression Estimate	2017	1386	2125	3511
Average Annual Change		**-2.94%**	**0.39%**	**-1.05%**

West Leg

Year	Counts				% Change			
	EB	*WB*	*EB+WB*	*INT*	*EB*	*WB*	*EB+WB*	*INT*
2009	370	602	972	7627				
2010	585	666	1251	9348	58.1%	10.6%	28.7%	22.6%
2011	429	781	1210	9614	-26.7%	17.3%	-3.3%	2.8%
2017	314	673	987	7808	-26.8%	-13.8%	-18.4%	-18.8%

Regression Estimate	2009	475	672	1147
Regression Estimate	2017	328	698	1025
Average Annual Change		**-4.54%**	**0.48%**	**-1.39%**

East Leg

Year	Counts				% Change			
	EB	*WB*	*EB+WB*	*INT*	*EB*	*WB*	*EB+WB*	*INT*
2009	80	329	409	7627				
2010	165	420	585	9348	106.3%	27.7%	43.0%	22.6%
2011	150	569	719	9614	-9.1%	35.5%	22.9%	2.8%
2017	81	370	451	7808	-46.0%	-35.0%	-37.3%	-18.8%

Regression Estimate	2009	133	431	564
Regression Estimate	2017	92	405	498
Average Annual Change		**-4.44%**	**-0.76%**	**-1.55%**

South Leg

Year	Counts				% Change			
	NB	*SB*	*NB+SB*	*INT*	*NB*	*SB*	*NB+SB*	*INT*
2009	1180	1625	2805	7627				
2010	1505	1995	3500	9348	27.5%	22.8%	24.8%	22.6%
2011	1820	1884	3704	9614	20.9%	-5.6%	5.8%	2.8%
2017	1085	1862	2947	7808	-40.4%	-1.2%	-20.4%	-18.8%

Regression Estimate	2009	1507	1813	3320
Regression Estimate	2017	1188	1896	3084
Average Annual Change		**-2.93%**	**0.56%**	**-0.92%**

APPENDIX E

MMLOS: ROAD SEGMENTS

Multi-Modal Level of Service - Segments Form

Consultant	Parsons	**Project**	L131 Teron
Scenario	Segments	**Date**	31-Jul-19
Comments			

SEGMENTS		Street A	Existing	Existing	Existing	Future	Section	Section	Section	Section	Section
			March	Teron East	Teron West	Teron East	5	6	7	8	9
Pedestrian	Sidewalk Width Boulevard Width	F	≥ 2 m < 0.5	no sidewalk n/a	≥ 2 m > 2 m	≥ 2 m > 2 m					
	Avg Daily Curb Lane Traffic Volume		> 3000	> 3000	> 3000	> 3000					
	Operating Speed On-Street Parking		> 60 km/h no	> 30 to 50 km/h no	> 30 to 50 km/h no	> 30 to 50 km/h no					
	Exposure to Traffic PLoS		**F**	**F**	**B**	**B**	-	-	-	-	-
	Effective Sidewalk Width		2.0 m		2.0 m	2.0 m					
	Pedestrian Volume		250 ped/hr		250 ped/hr	250 ped/hr					
	Crowding PLoS		**B**	-	**B**	**B**	-	-	-	-	-
	Level of Service		**F**	**-**	**B**	**B**	**-**	**-**	**-**	**-**	**-**
Bicycle	Type of Cycling Facility	E	Curbside Bike Lane	Curbside Bike Lane	Physically Separated	Curbside Bike Lane					
	Number of Travel Lanes		2 ea. dir. (w median)	2 ea. dir. (no median)		2 ea. dir. (no median)					
	Operating Speed		> 70 km/h	>50 to 70 km/h		>50 to 70 km/h					
	# of Lanes & Operating Speed LoS		**E**	**C**	**-**	**C**	**-**	**-**	**-**	**-**	**-**
	Bike Lane (+ Parking Lane) Width		≥ 1.8 m	≥1.5 to <1.8 m		≥1.5 to <1.8 m					
	Bike Lane Width LoS		**A**	**B**	**-**	**B**	**-**	**-**	**-**	**-**	**-**
	Bike Lane Blockages		Rare	Rare		Rare					
	Blockage LoS		**A**	**A**	**-**	**A**	**-**	**-**	**-**	**-**	**-**
	Median Refuge Width (no median = < 1.8 m)		< 1.8 m refuge	< 1.8 m refuge		< 1.8 m refuge					
	No. of Lanes at Unsignalized Crossing		≤ 3 lanes	≤ 3 lanes		≤ 3 lanes					
	Sidestreet Operating Speed		≤ 40 km/h	≤ 40 km/h		≤ 40 km/h					
	Unsignalized Crossing - Lowest LoS		**A**	**A**	**A**	**A**	**-**	**-**	**-**	**-**	**-**
	Level of Service		**E**	**C**	**A**	**C**	**-**	**-**	**-**	**-**	**-**
Transit	Facility Type	D	Mixed Traffic	Mixed Traffic	Mixed Traffic						
	Friction or Ratio Transit:Posted Speed		Vt/Vp ≥ 0.8	Vt/Vp ≥ 0.8	Vt/Vp ≥ 0.8						
	Level of Service		**D**	**D**	**D**	**-**	**-**	**-**	**-**	**-**	**-**
Truck	Truck Lane Width	A	≤ 3.5 m								
	Travel Lanes per Direction		> 1								
	Level of Service		**A**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**

APPENDIX F

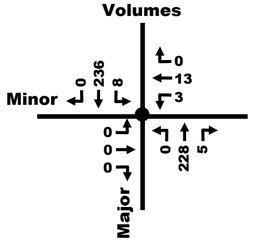
WARRANT ANALYSIS

Teron/Site - AWSC Warrant for Kanata mode share (most critical)

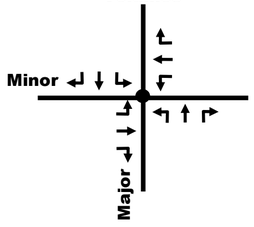
AWSC Warrant			Description	Minimum Requirement for a 'T' intersection	Compliance		
					Sectional %	Entire %	Warrant
Intersection	1. Minimum Volume Criterion	A	Vehicle Volume, All Approaches for Each of the Heaviest 8 Hours of on Average Day, or	200	247%	10%	**No**
		B	Vehicle Volume, All Approaches for the Heaviest Peak Hour, and	350	0%		
		C	Vehicle and pedestrian Volume, Along Minor Streets for Each of the Same 8 Hours, and	80	20%		
		D	The volume split between the major and minor streets	75/25	10%		
	2. Minimum Collision Criterion	A	Vehicle Volume, Along Major Street for Each of the Heaviest 8 Hours of an Average Day, and	9	0%	0%	

Note: ***0*** *preventable by AWSC collisions (i.e. right angle and turning movement collisions) were reported during a 3 year time period*

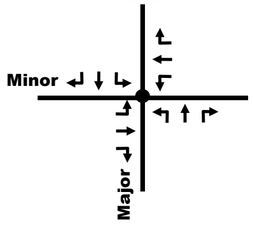
Average 8 Hour Volumes



AM Peak Hour Volumes



PM Peak Hour Volumes



		Major Teron						Minor Site					
	Peak	NBL	NBT	NBR	SBL	SBT	SBR	EBL	EBT	EBR	WBL	WBT	WBR
Existing	8 hr												
	AM												
	PM												
Site Generated	AM		635	5	7	243					8	32	
	PM		277	16	24	699					5	20	
	Avg. 8 hr	0	228	5	8	236	0	0	0	0	3	13	0

Teron/Site - (peak hour signal warrant using Kanata mode share, most critical)

Signal Warrant		Description		Minimum Requirement for Two-Lane Roadways	Compliance		
				Restricted Flow - Operating Speed Less Than 70 km/h	Sectional %	Entire %	Warrant
Intersection	1. Minimum Vehicular Volume	(1) A	Vehicle Volume, All Approaches for Each of the Heaviest 8 Hours of on Average Day, and	720	68%	6%	**21% No**
		(4) B	Vehicle Volume, Along Minor Streets for Each of the Same 8 Hours	255	6%		
	2. Delay to Cross Traffic	(1) A	Vehicle Volume, Along Major Street for Each of the Heaviest 8 Hours of an Average Day, and	720	66%	21%	
		(2) B	Combined Vehicle and Pedestrian Volume Crossing the Major Street for Each of the Same 8 Hours	75	21%		

Notes

1 *Vehicle Volume Warrants (1A), (2A) and (5B) for Roadways Having Two or More Moving Lanes in one Direction Should Be 25% Higher Than Values Given Above*

2 *For Definition of Crossing Volume Refer to Note 4 on the Signal Warrant Analysis Form B2.03.08*

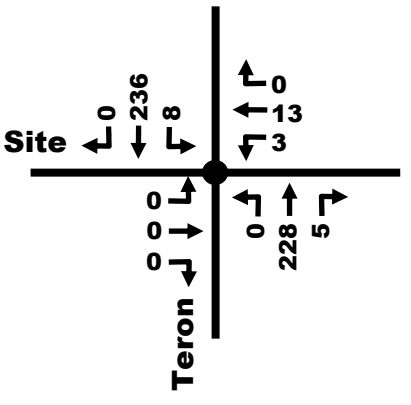
3 *The Lowest Sectional Percentage Governs the Entire Warrant*

4 *For "T" Intersections the Warrant Values for Minor Street Should be Increased by 50% (Warrant 1B only)*

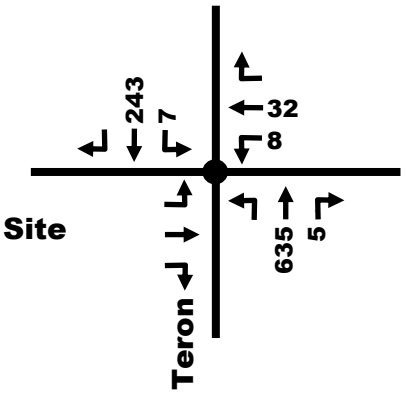
No

Yes

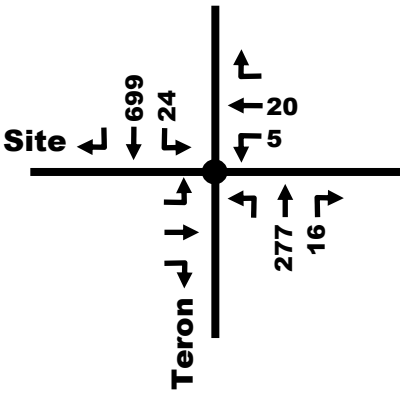
Average 8 Hour Volumes



AM Peak Hour Volumes



PM Peak Hour Volumes



APPENDIX G

TDM PROGRAM

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

Legend ✓

REQUIRED	The Official Plan or Zoning By-law provides related guidance that must be followed
BASIC	The measure is generally feasible and effective, and in most cases would benefit the development and its users
BETTER	The measure could maximize support for users of sustainable modes, and optimize development performance

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

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

		TDM-supportive design & infrastructure measures: *Residential developments*	Check if completed & add descriptions, explanations or plan/drawing references
	2.	**WALKING & CYCLING: END-OF-TRIP FACILITIES**	
	2.1	**Bicycle parking**	
REQUIRED	2.1.1	Provide bicycle parking in highly visible and lighted areas, sheltered from the weather wherever possible *(see Official Plan policy 4.3.6)*	☑ *Bike parking proposed predominantly within the underground parking structure*
REQUIRED	2.1.2	Provide the number of bicycle parking spaces specified for various land uses in different parts of Ottawa; provide convenient access to main entrances or well-used areas *(see Zoning By-law Section 111)*	☑ *Exceeds minimum parking, rate of approximately 0.69 spots per units*
REQUIRED	2.1.3	Ensure that bicycle parking spaces and access aisles meet minimum dimensions; that no more than 50% of spaces are vertical spaces; and that parking racks are securely anchored *(see Zoning By-law Section 111)*	☑ *Majority of spots are horizontal*
BASIC	2.1.4	Provide bicycle parking spaces equivalent to the expected number of resident-owned bicycles, plus the expected peak number of visitor cyclists	☐
	2.2	**Secure bicycle parking**	
REQUIRED	2.2.1	Where more than 50 bicycle parking spaces are provided for a single residential building, locate at least 25% of spaces within a building/structure, a secure area (e.g. supervised parking lot or enclosure) or bicycle lockers *(see Zoning By-law Section 111)*	☑ *Bike parking proposed predominantly within the underground parking structure*
BETTER	2.2.2	Provide secure bicycle parking spaces equivalent to at least the number of units at condominiums or multi-family residential developments	☐
	2.3	**Bicycle repair station**	
BETTER	2.3.1	Provide a permanent bike repair station, with commonly used tools and an air pump, adjacent to the main bicycle parking area (or secure bicycle parking area, if provided)	☐
	3.	**TRANSIT**	
	3.1	**Customer amenities**	
BASIC	3.1.1	Provide shelters, lighting and benches at any on-site transit stops	☐
BASIC	3.1.2	Where the site abuts an off-site transit stop and insufficient space exists for a transit shelter in the public right-of-way, protect land for a shelter and/or install a shelter	☐
BETTER	3.1.3	Provide a secure and comfortable interior waiting area by integrating any on-site transit stops into the building	☐

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

APPENDIX H

MMLOS: INTERSECTIONS

Multi-Modal Level of Service - Intersections Form

Consultant	**Parsons**	**Project**	**1131 Teron**
Scenario	**March/Teron Intersection**	**Date**	**31-Jul-19**
Comments			

Unlocked Rows for Replicating

INTERSECTIONS		March/Teron				Beaverbrook/Teron				Intersection C			
	Crossing Side	NORTH	SOUTH	EAST	WEST	NORTH	SOUTH	EAST	WEST	NORTH	SOUTH	EAST	WEST
Pedestrian	Lanes	5	5	7	7	5	4	4	4				
	Median	No Median - 2.4 m	No Median - 2.4 m	No Median - 2.4 m	No Median - 2.4 m	No Median - 2.4 m	No Median - 2.4 m	No Median - 2.4 m	No Median - 2.4 m				
	Conflicting Left Turns	Protected/ Permissive	Protected/ Permissive	Protected/ Permissive	Protected/ Permissive	Permissive	Permissive	Permissive	Protected/ Permissive				
	Conflicting Right Turns	Permissive or yield control	Permissive or yield control	Permissive or yield control	Permissive or yield control	Permissive or yield control	Permissive or yield control	Permissive or yield control	Permissive or yield control				
	Right Turns on Red (RToR) ?	RTOR allowed	RTOR allowed	RTOR allowed	RTOR allowed	RTOR allowed	RTOR allowed	RTOR allowed	RTOR allowed				
	Ped Signal Leading Interval?	No	No	No	No	No	No	No	No				
	Right Turn Channel	Conventional with Receiving Lane	Conventional with Receiving Lane	Conventional with Receiving Lane	Conventional with Receiving Lane	No Channel	No Channel	No Channel	No Channel				
	Corner Radius	>25m	>25m	15-25m	15-25m	5-10m	5-10m	5-10m	10-15m				
	Crosswalk Type	Std transverse markings	Std transverse markings	Std transverse markings	Std transverse markings	Std transverse markings		Std transverse markings	Std transverse markings				
	PETSI Score	**35**	**35**	**3**	**3**	**38**		**54**	**53**				
	Ped. Exposure to Traffic LoS	**E**	**E**	**F**	**F**	**E**	**-**	**D**	**D**	**-**	**-**	**-**	**-**
	Cycle Length	35	35	66	66	36		51	51				
	Effective Walk Time	28	28	19	19	17		19	19				
	Average Pedestrian Delay	**1**	**1**	**17**	**17**	**5**		**10**	**10**				
	Pedestrian Delay LoS	**A**	**A**	**B**	**B**	**A**	**-**	**B**	**B**	**-**	**-**	**-**	**-**
	Level of Service	**E**	**E**	**F**	**F**	**E**	**-**	**D**	**D**	**-**	**-**	**-**	**-**
		F				**E**				**-**			
	Approach From	NORTH	SOUTH	EAST	WEST	NORTH	SOUTH	EAST	WEST	NORTH	SOUTH	EAST	WEST
Bicycle	Bicycle Lane Arrangement on Approach	Mixed Traffic	Mixed Traffic	Pocket Bike Lane	Pocket Bike Lane	Mixed Traffic	Mixed Traffic	Mixed Traffic	Mixed Traffic				
	Right Turn Lane Configuration	≤ 50 m	≤ 50 m	> 50 m Introduced right turn lane	> 50 m Introduced right turn lane	≤ 50 m	≤ 50 m	≤ 50 m	≤ 50 m				
	Right Turning Speed	≤ 25 km/h	≤ 25 km/h	>25 to 30 km/h	>25 to 30 km/h	≤ 25 km/h	≤ 25 km/h	≤ 25 km/h	≤ 25 km/h				
	Cyclist relative to RT motorists	**D**	**D**	**D**	**D**	**D**	**D**	**D**	**D**	**-**	**-**	**-**	**-**
	Separated or Mixed Traffic	**Mixed Traffic**	**Mixed Traffic**	**Separated**	**Separated**	**Mixed Traffic**	**Mixed Traffic**	**Mixed Traffic**	**Mixed Traffic**	**-**	**-**	**-**	**-**
	Left Turn Approach	One lane crossed	One lane crossed	≥ 2 lanes crossed	≥ 2 lanes crossed	One lane crossed	One lane crossed	One lane crossed	One lane crossed				
	Operating Speed	> 40 to ≤ 50 km/h	> 40 to ≤ 50 km/h	≥ 60 km/h	≥ 60 km/h	≤ 40 km/h	≤ 40 km/h	≤ 40 km/h	≤ 40 km/h				
	Left Turning Cyclist	**D**	**D**	**F**	**F**	**B**	**B**	**B**	**B**	**-**	**-**	**-**	**-**
	Level of Service	**D**	**D**	**F**	**F**	**D**	**D**	**D**	**D**	**-**	**-**	**-**	**-**
		F				**D**				**-**			
Transit	Average Signal Delay	> 40 sec	≤ 30 sec	> 40 sec	≤ 20 sec	≤ 10 sec	≤ 30 sec	≤ 40 sec	≤ 40 sec				
	Level of Service	**F**	**D**	**F**	**C**	**B**	**D**	**E**	**E**	**-**	**-**	**-**	**-**
		F				**E**				**-**			
Truck	Effective Corner Radius	> 15 m	> 15 m	> 15 m	> 15 m								
	Number of Receiving Lanes on Departure from Intersection	≥ 2	≥ 2	≥ 2	≥ 2								
	Level of Service	**A**	**A**	**A**	**A**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
		A				**-**				**-**			
Auto	Volume to Capacity Ratio												
	Level of Service	**-**				**-**				**-**			

APPENDIX I

SYNCHRO ANALYSIS: EXISTING CONDITIONS

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	475	263	13	23	38	34	36	1631	199	49	681	180
Future Volume (vph)	475	263	13	23	38	34	36	1631	199	49	681	180
Satd. Flow (prot)	1695	1784	1517	1695	1784	1517	1695	3390	1517	1695	3390	1517
Flt Permitted	0.588			0.342			0.309			0.057		
Satd. Flow (perm)	1045	1784	1498	610	1784	1497	551	3390	1498	102	3390	1517
Satd. Flow (RTOR)			188			188			188			188
Lane Group Flow (vph)	528	292	14	26	42	38	40	1812	221	54	757	200
Turn Type	pm+pt	NA	Free	pm+pt	NA	Free	pm+pt	NA	Free	pm+pt	NA	Free
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases	4		Free	8		Free	2		Free	6		Free
Detector Phase	7	4		3	8		5	2		1	6	
Switch Phase												
Minimum Initial (s)	5.0	10.0		5.0	10.0		5.0	10.0		5.0	10.0	
Minimum Split (s)	11.1	34.6		11.1	34.6		11.4	25.3		11.4	25.3	
Total Split (s)	12.0	38.0		12.0	38.0		12.0	68.0		12.0	68.0	
Total Split (%)	9.2%	29.2%		9.2%	29.2%		9.2%	52.3%		9.2%	52.3%	
Yellow Time (s)	3.3	3.3		3.3	3.3		4.6	4.6		4.6	4.6	
All-Red Time (s)	2.8	3.3		2.8	3.3		1.8	1.7		1.8	1.7	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)	6.1	6.6		6.1	6.6		6.4	6.3		6.4	6.3	
Lead/Lag	Lead	Lag		Lead	Lag		Lead	Lag		Lead	Lag	
Lead-Lag Optimize?	Yes	Yes		Yes	Yes		Yes	Yes		Yes	Yes	
Recall Mode	None	None		None	None		None	C-Min		None	C-Min	
Act Effct Green (s)	29.8	25.8	130.0	25.9	21.7	130.0	78.8	73.8	130.0	79.1	73.9	130.0
Actuated g/C Ratio	0.23	0.20	1.00	0.20	0.17	1.00	0.61	0.57	1.00	0.61	0.57	1.00
v/c Ratio	1.88	0.83	0.01	0.15	0.14	0.03	0.10	0.94	0.15	0.39	0.39	0.13
Control Delay	436.0	69.0	0.0	33.6	42.8	0.0	11.9	39.6	0.2	22.0	18.8	0.2
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	436.0	69.0	0.0	33.6	42.8	0.0	11.9	39.6	0.2	22.0	18.8	0.2
LOS	F	E	A	C	D	A	B	D	A	C	B	A
Approach Delay		300.2			25.2			34.9			15.3	
Approach LOS		F			C			C			B	
Queue Length 50th (m)	~203.0	71.9	0.0	4.8	8.9	0.0	3.9	~269.4	0.0	5.3	63.3	0.0
Queue Length 95th (m)	#259.4	99.5	0.0	11.1	18.1	0.0	9.7	#324.2	0.0	14.1	84.3	0.0
Internal Link Dist (m)		42.6			349.6			93.8			234.3	
Turn Bay Length (m)	66.0		66.0			80.0	80.0		90.0	80.0		85.0
Base Capacity (vph)	281	430	1498	171	430	1497	388	1923	1498	139	1927	1517
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	1.88	0.68	0.01	0.15	0.10	0.03	0.10	0.94	0.15	0.39	0.39	0.13

Intersection Summary

Cycle Length: 130
Actuated Cycle Length: 130
Offset: 36 (28%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green
Natural Cycle: 115
Control Type: Actuated-Coordinated

Maximum v/c Ratio: 1.88

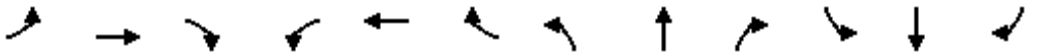
Intersection Signal Delay: 84.7	Intersection LOS: F
Intersection Capacity Utilization 92.8%	ICU Level of Service F
Analysis Period (min) 15	

Description: NOTE: March Road treated as north-south

~ 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: 1: March & Teron



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	146	4	180	22	2	34	96	266	4	15	140	38
Future Volume (vph)	146	4	180	22	2	34	96	266	4	15	140	38
Satd. Flow (prot)	1695	1522	0	1695	1450	0	1695	1781	0	1695	1717	0
Flt Permitted	0.731			0.630			0.633			0.577		
Satd. Flow (perm)	1263	1522	0	1124	1450	0	1127	1781	0	1030	1717	0
Satd. Flow (RTOR)		200			38			1			27	
Lane Group Flow (vph)	162	204	0	24	40	0	107	300	0	17	198	0
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)	10.0	10.0		10.0	10.0		10.0	10.0		10.0	10.0	
Minimum Split (s)	22.8	22.8		22.8	22.8		65.6	65.6		65.6	65.6	
Total Split (s)	29.8	29.8		29.8	29.8		65.6	65.6		65.6	65.6	
Total Split (%)	31.2%	31.2%		31.2%	31.2%		68.8%	68.8%		68.8%	68.8%	
Yellow Time (s)	3.0	3.0		3.0	3.0		3.3	3.3		3.3	3.3	
All-Red Time (s)	2.8	2.8		2.8	2.8		2.3	2.3		2.3	2.3	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)	5.8	5.8		5.8	5.8		5.6	5.6		5.6	5.6	
Lead/Lag												
Lead-Lag Optimize?												
Recall Mode	None	None		None	None		Min	Min		Min	Min	
Act Effct Green (s)	11.7	11.7		11.7	11.7		12.9	12.9		12.9	12.9	
Actuated g/C Ratio	0.32	0.32		0.32	0.32		0.36	0.36		0.36	0.36	
v/c Ratio	0.40	0.33		0.07	0.08		0.27	0.47		0.05	0.32	
Control Delay	13.8	3.9		10.1	4.9		10.7	12.2		8.5	9.1	
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay	13.8	3.9		10.1	4.9		10.7	12.2		8.5	9.1	
LOS	B	A		B	A		B	B		A	A	
Approach Delay		8.3			6.9			11.8			9.1	
Approach LOS		A			A			B			A	
Queue Length 50th (m)	6.6	0.2		0.9	0.1		3.9	11.7		0.6	6.2	
Queue Length 95th (m)	21.2	9.7		4.7	4.4		13.7	32.2		3.5	19.5	
Internal Link Dist (m)		594.0			268.4			124.5			613.0	
Turn Bay Length (m)	60.0			15.0			40.0			45.0		
Base Capacity (vph)	855	1095		761	994		1127	1781		1030	1717	
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	0.19	0.19		0.03	0.04		0.09	0.17		0.02	0.12	

Intersection Summary
Cycle Length: 95.4
Actuated Cycle Length: 36.3
Natural Cycle: 90
Control Type: Semi Act-Uncoord
Maximum v/c Ratio: 0.47

Intersection Signal Delay: 9.7 Intersection LOS: A
Intersection Capacity Utilization 56.8% ICU Level of Service B
Analysis Period (min) 15

Splits and Phases: 3: Teron & Beaverbrook

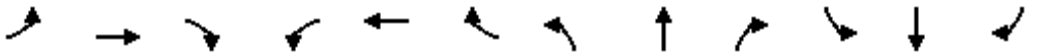
Intersection	
Int Delay, s/veh	2

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	87	37	36	509	149	97
Future Vol, veh/h	87	37	36	509	149	97
Conflicting Peds, #/hr	4	4	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	Yield	-	Free	-	Yield
Storage Length	50	0	-	-	-	0
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	90	90	90	90	90	90
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	97	41	40	566	166	108

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	476	170	166	0	-	0
Stage 1	166	-	-	-	-	-
Stage 2	310	-	-	-	-	-
Critical Hdwy	6.08	6.23	4.13	-	-	-
Critical Hdwy Stg 1	5.43	-	-	-	-	-
Critical Hdwy Stg 2	6.03	-	-	-	-	-
Follow-up Hdwy	3.669	3.319	2.219	-	-	-
Pot Cap-1 Maneuver	554	873	1411	-	-	-
Stage 1	830	-	-	-	-	-
Stage 2	681	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	531	870	1411	-	-	-
Mov Cap-2 Maneuver	531	-	-	-	-	-
Stage 1	796	-	-	-	-	-
Stage 2	681	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	12.1	0.6	0
HCM LOS	B		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	EBLn2	SBT	SBR
Capacity (veh/h)	1411	-	531	870	-	-
HCM Lane V/C Ratio	0.028	-	0.182	0.047	-	-
HCM Control Delay (s)	7.6	0.1	13.3	9.3	-	-
HCM Lane LOS	A	A	B	A	-	-
HCM 95th %tile Q(veh)	0.1	-	0.7	0.1	-	-



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	224	50	40	153	167	50	51	1014	20	11	1669	455
Future Volume (vph)	224	50	40	153	167	50	51	1014	20	11	1669	455
Satd. Flow (prot)	1695	1784	1517	1695	1784	1517	1695	3390	1517	1695	3390	1517
Flt Permitted	0.557			0.588			0.057			0.178		
Satd. Flow (perm)	984	1784	1498	1048	1784	1493	102	3390	1498	318	3390	1517
Satd. Flow (RTOR)			188			188			188			188
Lane Group Flow (vph)	249	56	44	170	186	56	57	1127	22	12	1854	506
Turn Type	pm+pt	NA	Free	pm+pt	NA	Free	pm+pt	NA	Free	pm+pt	NA	Free
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases	4		Free	8		Free	2		Free	6		Free
Detector Phase	7	4		3	8		5	2		1	6	
Switch Phase												
Minimum Initial (s)	5.0	10.0		5.0	10.0		5.0	10.0		5.0	10.0	
Minimum Split (s)	11.1	34.6		11.1	34.6		11.4	25.3		11.4	25.3	
Total Split (s)	17.0	35.0		17.0	35.0		12.0	66.0		12.0	66.0	
Total Split (%)	13.1%	26.9%		13.1%	26.9%		9.2%	50.8%		9.2%	50.8%	
Yellow Time (s)	3.3	3.3		3.3	3.3		4.6	4.6		4.6	4.6	
All-Red Time (s)	2.8	3.3		2.8	3.3		1.8	1.7		1.8	1.7	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)	6.1	6.6		6.1	6.6		6.4	6.3		6.4	6.3	
Lead/Lag	Lead	Lag		Lead	Lag		Lead	Lag		Lead	Lag	
Lead-Lag Optimize?	Yes	Yes		Yes	Yes		Yes	Yes		Yes	Yes	
Recall Mode	None	None		None	None		None	C-Min		None	C-Min	
Act Effct Green (s)	28.2	18.9	130.0	31.9	19.3	130.0	78.5	75.8	130.0	74.7	70.2	130.0
Actuated g/C Ratio	0.22	0.15	1.00	0.25	0.15	1.00	0.60	0.58	1.00	0.57	0.54	1.00
v/c Ratio	0.92	0.22	0.03	0.52	0.70	0.04	0.40	0.57	0.01	0.05	1.01	0.33
Control Delay	80.0	48.4	0.0	42.7	66.1	0.0	22.8	20.5	0.0	12.1	55.3	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	80.0	48.4	0.0	42.7	66.1	0.0	22.8	20.5	0.0	12.1	55.3	0.6
LOS	E	D	A	D	E	A	C	C	A	B	E	A
Approach Delay		64.8			47.5			20.2			43.4	
Approach LOS		E			D			C			D	
Queue Length 50th (m)	54.1	12.9	0.0	35.0	46.1	0.0	5.3	80.2	0.0	1.1	~271.6	0.0
Queue Length 95th (m)	72.3	23.5	0.0	49.8	65.6	0.0	15.6	146.2	0.0	4.3	#343.3	0.0
Internal Link Dist (m)		42.6			349.6			93.8			234.3	
Turn Bay Length (m)	66.0		66.0			80.0	80.0		90.0	80.0		85.0
Base Capacity (vph)	272	389	1498	330	389	1493	142	1976	1498	244	1829	1517
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	0.92	0.14	0.03	0.52	0.48	0.04	0.40	0.57	0.01	0.05	1.01	0.33

Intersection Summary
Cycle Length: 130
Actuated Cycle Length: 130
Offset: 121 (93%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green
Natural Cycle: 115
Control Type: Actuated-Coordinated

Maximum v/c Ratio: 1.01

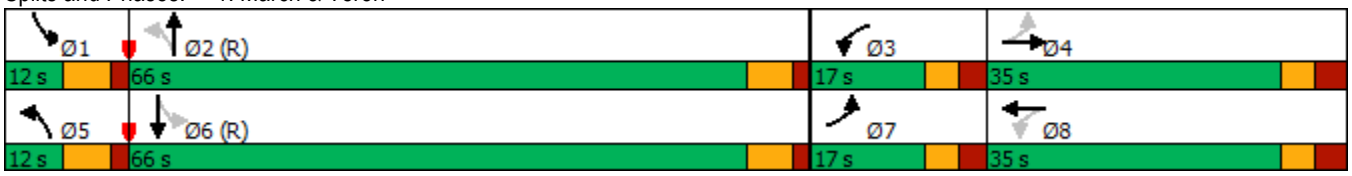
Intersection Signal Delay: 39.1	Intersection LOS: D
Intersection Capacity Utilization 90.9%	ICU Level of Service E
Analysis Period (min) 15	

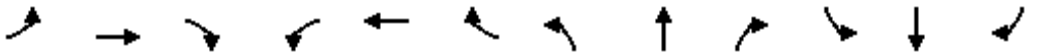
Description: NOTE: March Road Treated as north-south

~ 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: 1: March & Teron





Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	65	6	131	22	11	16	194	153	30	31	405	125
Future Volume (vph)	65	6	131	22	11	16	194	153	30	31	405	125
Satd. Flow (prot)	1695	1496	0	1695	1584	0	1695	1731	0	1695	1697	0
Flt Permitted	0.738			0.660			0.185			0.630		
Satd. Flow (perm)	1293	1496	0	1178	1584	0	330	1731	0	1115	1697	0
Satd. Flow (RTOR)		146			18			17			18	
Lane Group Flow (vph)	72	153	0	24	30	0	216	203	0	34	589	0
Turn Type	Perm	NA		Perm	NA		pm+pt	NA		Perm	NA	
Protected Phases		4			8		5	2			6	
Permitted Phases	4			8			2			6		
Detector Phase	4	4		8	8		5	2		6	6	
Switch Phase												
Minimum Initial (s)	10.0	10.0		10.0	10.0		5.0	10.0		10.0	10.0	
Minimum Split (s)	22.8	22.8		22.8	22.8		11.0	71.2		50.6	50.6	
Total Split (s)	35.8	35.8		35.8	35.8		20.6	71.2		50.6	50.6	
Total Split (%)	33.5%	33.5%		33.5%	33.5%		19.3%	66.5%		47.3%	47.3%	
Yellow Time (s)	3.0	3.0		3.0	3.0		4.0	3.3		3.3	3.3	
All-Red Time (s)	2.8	2.8		2.8	2.8		2.0	2.3		2.3	2.3	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)	5.8	5.8		5.8	5.8		6.0	5.6		5.6	5.6	
Lead/Lag							Lead			Lag	Lag	
Lead-Lag Optimize?							Yes			Yes	Yes	
Recall Mode	None	None		None	None		None	Min		Min	Min	
Act Effct Green (s)	11.8	11.8		11.8	11.8		48.8	49.2		29.9	29.9	
Actuated g/C Ratio	0.16	0.16		0.16	0.16		0.67	0.68		0.41	0.41	
v/c Ratio	0.35	0.42		0.13	0.11		0.46	0.17		0.07	0.83	
Control Delay	35.9	10.8		32.2	19.9		7.9	4.2		13.4	30.1	
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay	35.9	10.8		32.2	19.9		7.9	4.2		13.4	30.1	
LOS	D	B		C	B		A	A		B	C	
Approach Delay		18.8			25.3			6.1			29.1	
Approach LOS		B			C			A			C	
Queue Length 50th (m)	8.9	0.8		2.9	1.4		8.3	6.8		2.7	66.2	
Queue Length 95th (m)	23.9	16.9		10.7	9.2		19.7	16.9		8.2	119.4	
Internal Link Dist (m)		594.0			268.4			124.5			613.0	
Turn Bay Length (m)	60.0			15.0			40.0			45.0		
Base Capacity (vph)	551	721		502	685		504	1538		713	1092	
Starvation Cap Reductn	0	0		0	0		0	0		0	0	
Spillback Cap Reductn	0	0		0	0		0	0		0	0	
Storage Cap Reductn	0	0		0	0		0	0		0	0	
Reduced v/c Ratio	0.13	0.21		0.05	0.04		0.43	0.13		0.05	0.54	

Intersection Summary
Cycle Length: 107
Actuated Cycle Length: 72.8
Natural Cycle: 95
Control Type: Actuated-Uncoordinated
Maximum v/c Ratio: 0.83

Intersection Signal Delay: 19.9 Intersection LOS: B
Intersection Capacity Utilization 76.0% ICU Level of Service D
Analysis Period (min) 15

Splits and Phases: 3: Teron & Beaverbrook

Intersection	
Int Delay, s/veh	3.5

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	138	87	21	195	506	181
Future Vol, veh/h	138	87	21	195	506	181
Conflicting Peds, #/hr	7	7	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	Yield	-	Free	-	Yield
Storage Length	50	0	-	-	-	0
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	90	90	90	90	90	90
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	153	97	23	217	562	201

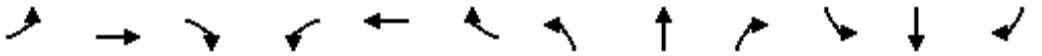
Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	702	569	562	0	-	0
Stage 1	562	-	-	-	-	-
Stage 2	140	-	-	-	-	-
Critical Hdwy	6.08	6.23	4.13	-	-	-
Critical Hdwy Stg 1	5.43	-	-	-	-	-
Critical Hdwy Stg 2	6.03	-	-	-	-	-
Follow-up Hdwy	3.669	3.319	2.219	-	-	-
Pot Cap-1 Maneuver	420	521	1007	-	-	-
Stage 1	552	-	-	-	-	-
Stage 2	833	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	409	518	1007	-	-	-
Mov Cap-2 Maneuver	409	-	-	-	-	-
Stage 1	538	-	-	-	-	-
Stage 2	833	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	16.9	0.9	0
HCM LOS	C		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	EBLn2	SBT	SBR
Capacity (veh/h)	1007	-	409	518	-	-
HCM Lane V/C Ratio	0.023	-	0.375	0.187	-	-
HCM Control Delay (s)	8.7	0.1	19	13.5	-	-
HCM Lane LOS	A	A	C	B	-	-
HCM 95th %tile Q(veh)	0.1	-	1.7	0.7	-	-

APPENDIX J

SYNCHRO ANALYSIS: BACKGROUND CONDITIONS



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	493	316	38	23	46	34	44	1991	199	49	905	186
Future Volume (vph)	493	316	38	23	46	34	44	1991	199	49	905	186
Satd. Flow (prot)	1695	1784	1517	1695	1784	1517	1695	3390	1517	1695	3390	1517
Flt Permitted	0.585			0.308			0.244			0.058		
Satd. Flow (perm)	1040	1784	1498	549	1784	1497	435	3390	1498	103	3390	1517
Satd. Flow (RTOR)			188			188			188			188
Lane Group Flow (vph)	493	316	38	23	46	34	44	1991	199	49	905	186
Turn Type	pm+pt	NA	Free	pm+pt	NA	Free	pm+pt	NA	Free	pm+pt	NA	Free
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases	4		Free	8		Free	2		Free	6		Free
Detector Phase	7	4		3	8		5	2		1	6	
Switch Phase												
Minimum Initial (s)	5.0	10.0		5.0	10.0		5.0	10.0		5.0	10.0	
Minimum Split (s)	11.1	34.6		11.1	34.6		11.4	25.3		11.4	25.3	
Total Split (s)	12.0	38.0		12.0	38.0		12.0	68.0		12.0	68.0	
Total Split (%)	9.2%	29.2%		9.2%	29.2%		9.2%	52.3%		9.2%	52.3%	
Yellow Time (s)	3.3	3.3		3.3	3.3		4.6	4.6		4.6	4.6	
All-Red Time (s)	2.8	3.3		2.8	3.3		1.8	1.7		1.8	1.7	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)	6.1	6.6		6.1	6.6		6.4	6.3		6.4	6.3	
Lead/Lag	Lead	Lag		Lead	Lag		Lead	Lag		Lead	Lag	
Lead-Lag Optimize?	Yes	Yes		Yes	Yes		Yes	Yes		Yes	Yes	
Recall Mode	None	None		None	None		None	C-Min		None	C-Min	
Act Effct Green (s)	31.1	27.1	130.0	27.0	22.8	130.0	77.5	72.8	130.0	77.6	72.9	130.0
Actuated g/C Ratio	0.24	0.21	1.00	0.21	0.18	1.00	0.60	0.56	1.00	0.60	0.56	1.00
v/c Ratio	1.68	0.85	0.03	0.14	0.15	0.02	0.14	1.05	0.13	0.37	0.48	0.12
Control Delay	352.7	70.3	0.0	32.6	42.2	0.0	12.7	64.6	0.2	20.5	20.6	0.2
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	352.7	70.3	0.0	32.6	42.2	0.0	12.7	64.6	0.2	20.5	20.6	0.2
LOS	F	E	A	C	D	A	B	E	A	C	C	A
Approach Delay		231.5			26.1			57.8			17.3	
Approach LOS		F			C			E			B	
Queue Length 50th (m)	~180.8	77.7	0.0	4.1	9.5	0.0	4.5	~325.7	0.0	5.0	82.8	0.0
Queue Length 95th (m)	#240.0	108.5	0.0	10.3	19.6	0.0	10.2	#373.8	0.0	12.0	105.2	0.0
Internal Link Dist (m)		42.6			349.6			93.8			234.3	
Turn Bay Length (m)	66.0		66.0			80.0	80.0		90.0	80.0		85.0
Base Capacity (vph)	293	430	1498	166	430	1497	317	1898	1498	134	1899	1517
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	1.68	0.73	0.03	0.14	0.11	0.02	0.14	1.05	0.13	0.37	0.48	0.12

Intersection Summary
Cycle Length: 130
Actuated Cycle Length: 130
Offset: 36 (28%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green
Natural Cycle: 115
Control Type: Actuated-Coordinated

Maximum v/c Ratio: 1.68

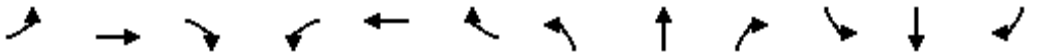
Intersection Signal Delay: 80.4	Intersection LOS: F
Intersection Capacity Utilization 104.3%	ICU Level of Service G
Analysis Period (min) 15	

Description: NOTE: March Road treated as north-south

~ 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: 1: March & Teron



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	146	4	180	22	2	34	96	334	4	15	200	38
Future Volume (vph)	146	4	180	22	2	34	96	334	4	15	200	38
Satd. Flow (prot)	1695	1522	0	1695	1452	0	1695	1781	0	1695	1734	0
Flt Permitted	0.734			0.641			0.611			0.557		
Satd. Flow (perm)	1268	1522	0	1144	1452	0	1088	1781	0	994	1734	0
Satd. Flow (RTOR)		180			34			1			19	
Lane Group Flow (vph)	146	184	0	22	36	0	96	338	0	15	238	0
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)	10.0	10.0		10.0	10.0		10.0	10.0		10.0	10.0	
Minimum Split (s)	22.8	22.8		22.8	22.8		65.6	65.6		65.6	65.6	
Total Split (s)	29.8	29.8		29.8	29.8		65.6	65.6		65.6	65.6	
Total Split (%)	31.2%	31.2%		31.2%	31.2%		68.8%	68.8%		68.8%	68.8%	
Yellow Time (s)	3.0	3.0		3.0	3.0		3.3	3.3		3.3	3.3	
All-Red Time (s)	2.8	2.8		2.8	2.8		2.3	2.3		2.3	2.3	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)	5.8	5.8		5.8	5.8		5.6	5.6		5.6	5.6	
Lead/Lag												
Lead-Lag Optimize?												
Recall Mode	None	None		None	None		Min	Min		Min	Min	
Act Effct Green (s)	11.5	11.5		11.5	11.5		14.0	14.0		14.0	14.0	
Actuated g/C Ratio	0.31	0.31		0.31	0.31		0.38	0.38		0.38	0.38	
v/c Ratio	0.37	0.31		0.06	0.08		0.23	0.50		0.04	0.36	
Control Delay	14.3	4.2		10.9	5.5		9.9	12.1		7.9	9.5	
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay	14.3	4.2		10.9	5.5		9.9	12.1		7.9	9.5	
LOS	B	A		B	A		A	B		A	A	
Approach Delay		8.7			7.6			11.6			9.5	
Approach LOS		A			A			B			A	
Queue Length 50th (m)	6.1	0.2		0.8	0.1		3.4	13.5		0.5	8.2	
Queue Length 95th (m)	20.7	9.9		4.8	4.4		12.3	36.2		3.1	23.9	
Internal Link Dist (m)		594.0			268.4			124.5			613.0	
Turn Bay Length (m)	60.0			15.0			40.0			45.0		
Base Capacity (vph)	840	1069		758	973		1088	1781		994	1734	
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	0.17	0.17		0.03	0.04		0.09	0.19		0.02	0.14	

Intersection Summary
Cycle Length: 95.4
Actuated Cycle Length: 37.2
Natural Cycle: 90
Control Type: Semi Act-Uncoord
Maximum v/c Ratio: 0.50

Intersection Signal Delay: 10.0 | Intersection LOS: A
Intersection Capacity Utilization 60.6% | ICU Level of Service B
Analysis Period (min) 15

Splits and Phases: 3: Teron & Beaverbrook

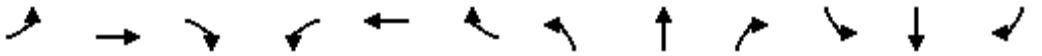
Intersection	
Int Delay, s/veh	2.6

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	129	66	45	580	170	97
Future Vol, veh/h	129	66	45	580	170	97
Conflicting Peds, #/hr	4	4	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	Yield	-	Free	-	Yield
Storage Length	50	0	-	-	-	0
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	100	100	100	100	100	100
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	129	66	45	580	170	97

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	496	174	170	0	-	0
Stage 1	170	-	-	-	-	-
Stage 2	326	-	-	-	-	-
Critical Hdwy	6.08	6.23	4.13	-	-	-
Critical Hdwy Stg 1	5.43	-	-	-	-	-
Critical Hdwy Stg 2	6.03	-	-	-	-	-
Follow-up Hdwy	3.669	3.319	2.219	-	-	-
Pot Cap-1 Maneuver	541	869	1406	-	-	-
Stage 1	827	-	-	-	-	-
Stage 2	668	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	516	866	1406	-	-	-
Mov Cap-2 Maneuver	516	-	-	-	-	-
Stage 1	788	-	-	-	-	-
Stage 2	668	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	12.7	0.6	0
HCM LOS	B		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	EBLn2	SBT	SBR
Capacity (veh/h)	1406	-	516	866	-	-
HCM Lane V/C Ratio	0.032	-	0.25	0.076	-	-
HCM Control Delay (s)	7.6	0.1	14.3	9.5	-	-
HCM Lane LOS	A	A	B	A	-	-
HCM 95th %tile Q(veh)	0.1	-	1	0.2	-	-



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	236	60	56	153	200	50	77	1281	20	11	2019	473
Future Volume (vph)	236	60	56	153	200	50	77	1281	20	11	2019	473
Satd. Flow (prot)	1695	1784	1517	1695	1784	1517	1695	3390	1517	1695	3390	1517
Flt Permitted	0.521			0.587			0.057			0.134		
Satd. Flow (perm)	921	1784	1498	1046	1784	1493	102	3390	1498	239	3390	1517
Satd. Flow (RTOR)			188			188			188			188
Lane Group Flow (vph)	236	60	56	153	200	50	77	1281	20	11	2019	473
Turn Type	pm+pt	NA	Free	pm+pt	NA	Free	pm+pt	NA	Free	pm+pt	NA	Free
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases	4		Free	8		Free	2		Free	6		Free
Detector Phase	7	4		3	8		5	2		1	6	
Switch Phase												
Minimum Initial (s)	5.0	10.0		5.0	10.0		5.0	10.0		5.0	10.0	
Minimum Split (s)	11.1	34.6		11.1	34.6		11.4	25.3		11.4	25.3	
Total Split (s)	17.0	35.0		17.0	35.0		12.0	66.0		12.0	66.0	
Total Split (%)	13.1%	26.9%		13.1%	26.9%		9.2%	50.8%		9.2%	50.8%	
Yellow Time (s)	3.3	3.3		3.3	3.3		4.6	4.6		4.6	4.6	
All-Red Time (s)	2.8	3.3		2.8	3.3		1.8	1.7		1.8	1.7	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)	6.1	6.6		6.1	6.6		6.4	6.3		6.4	6.3	
Lead/Lag	Lead	Lag		Lead	Lag		Lead	Lag		Lead	Lag	
Lead-Lag Optimize?	Yes	Yes		Yes	Yes		Yes	Yes		Yes	Yes	
Recall Mode	None	None		None	None		None	C-Min		None	C-Min	
Act Effct Green (s)	28.8	19.5	130.0	32.7	20.1	130.0	77.9	75.0	130.0	72.1	66.4	130.0
Actuated g/C Ratio	0.22	0.15	1.00	0.25	0.15	1.00	0.60	0.58	1.00	0.55	0.51	1.00
v/c Ratio	0.88	0.22	0.04	0.46	0.73	0.03	0.52	0.65	0.01	0.06	1.17	0.31
Control Delay	73.5	48.1	0.1	40.1	66.9	0.0	30.3	22.9	0.0	12.5	112.2	0.5
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	73.5	48.1	0.1	40.1	66.9	0.0	30.3	22.9	0.0	12.5	112.2	0.5
LOS	E	D	A	D	E	A	C	C	A	B	F	A
Approach Delay		57.5			48.4			23.0			90.7	
Approach LOS		E			D			C			F	
Queue Length 50th (m)	50.2	13.7	0.0	30.8	49.5	0.0	7.5	100.0	0.0	1.0	~324.8	0.0
Queue Length 95th (m)	68.4	24.7	0.0	45.0	70.2	0.0	#27.5	177.1	0.0	4.1	#388.9	0.0
Internal Link Dist (m)		42.6			349.6			93.8			234.3	
Turn Bay Length (m)	66.0		66.0			80.0	80.0		90.0	80.0		85.0
Base Capacity (vph)	268	389	1498	336	389	1493	149	1956	1498	197	1731	1517
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	0.88	0.15	0.04	0.46	0.51	0.03	0.52	0.65	0.01	0.06	1.17	0.31

Intersection Summary
Cycle Length: 130
Actuated Cycle Length: 130
Offset: 121 (93%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green
Natural Cycle: 115
Control Type: Actuated-Coordinated

Maximum v/c Ratio: 1.17

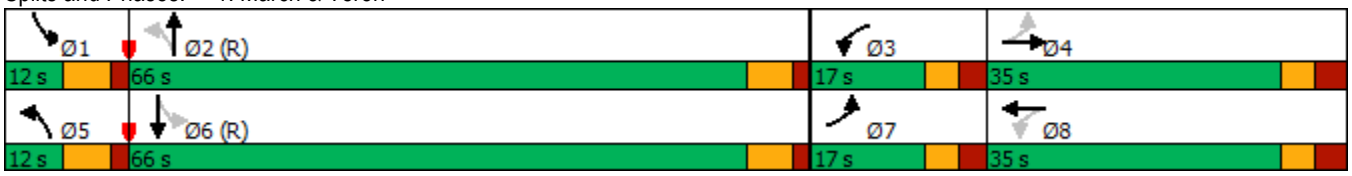
Intersection Signal Delay: 64.4	Intersection LOS: E
Intersection Capacity Utilization 111.8%	ICU Level of Service H
Analysis Period (min) 15	

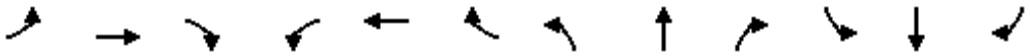
Description: NOTE: March Road Treated as north-south

~ 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: 1: March & Teron





Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	65	6	131	22	11	16	194	216	30	31	512	125
Future Volume (vph)	65	6	131	22	11	16	194	216	30	31	512	125
Satd. Flow (prot)	1695	1496	0	1695	1586	0	1695	1744	0	1695	1712	0
Flt Permitted	0.740			0.669			0.174			0.606		
Satd. Flow (perm)	1296	1496	0	1194	1586	0	310	1744	0	1073	1712	0
Satd. Flow (RTOR)		131			16			12			14	
Lane Group Flow (vph)	65	137	0	22	27	0	194	246	0	31	637	0
Turn Type	Perm	NA		Perm	NA		pm+pt	NA		Perm	NA	
Protected Phases		4			8		5	2			6	
Permitted Phases	4			8			2			6		
Detector Phase	4	4		8	8		5	2		6	6	
Switch Phase												
Minimum Initial (s)	10.0	10.0		10.0	10.0		5.0	10.0		10.0	10.0	
Minimum Split (s)	22.8	22.8		22.8	22.8		11.0	71.2		50.6	50.6	
Total Split (s)	35.8	35.8		35.8	35.8		20.6	71.2		50.6	50.6	
Total Split (%)	33.5%	33.5%		33.5%	33.5%		19.3%	66.5%		47.3%	47.3%	
Yellow Time (s)	3.0	3.0		3.0	3.0		4.0	3.3		3.3	3.3	
All-Red Time (s)	2.8	2.8		2.8	2.8		2.0	2.3		2.3	2.3	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)	5.8	5.8		5.8	5.8		6.0	5.6		5.6	5.6	
Lead/Lag							Lead			Lag	Lag	
Lead-Lag Optimize?							Yes			Yes	Yes	
Recall Mode	None	None		None	None		None	Min		Min	Min	
Act Effct Green (s)	11.7	11.7		11.7	11.7		52.2	52.6		33.5	33.5	
Actuated g/C Ratio	0.15	0.15		0.15	0.15		0.69	0.69		0.44	0.44	
v/c Ratio	0.33	0.40		0.12	0.11		0.43	0.20		0.07	0.84	
Control Delay	37.3	11.3		33.6	21.0		7.3	4.4		12.8	29.6	
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay	37.3	11.3		33.6	21.0		7.3	4.4		12.8	29.6	
LOS	D	B		C	C		A	A		B	C	
Approach Delay		19.6			26.7			5.7			28.8	
Approach LOS		B			C			A			C	
Queue Length 50th (m)	8.8	0.8		2.9	1.4		7.3	8.8		2.4	75.2	
Queue Length 95th (m)	22.0	15.9		10.0	8.7		17.7	20.9		7.7	135.3	
Internal Link Dist (m)		594.0			268.4			124.5			613.0	
Turn Bay Length (m)	60.0			15.0			40.0			45.0		
Base Capacity (vph)	527	686		485	654		487	1499		654	1050	
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	0.12	0.20		0.05	0.04		0.40	0.16		0.05	0.61	

Intersection Summary
Cycle Length: 107
Actuated Cycle Length: 76.1
Natural Cycle: 95
Control Type: Actuated-Uncoordinated
Maximum v/c Ratio: 0.84

Intersection Signal Delay: 19.9	Intersection LOS: B
Intersection Capacity Utilization 81.9%	ICU Level of Service D
Analysis Period (min) 15	

Splits and Phases: 3: Teron & Beaverbrook

Intersection	
Int Delay, s/veh	4.4

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	166	105	50	222	577	181
Future Vol, veh/h	166	105	50	222	577	181
Conflicting Peds, #/hr	7	7	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	Yield	-	Free	-	Yield
Storage Length	50	0	-	-	-	0
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	100	100	100	100	100	100
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	166	105	50	222	577	181

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	773	584	577	0	-	0
Stage 1	577	-	-	-	-	-
Stage 2	196	-	-	-	-	-
Critical Hdwy	6.08	6.23	4.13	-	-	-
Critical Hdwy Stg 1	5.43	-	-	-	-	-
Critical Hdwy Stg 2	6.03	-	-	-	-	-
Follow-up Hdwy	3.669	3.319	2.219	-	-	-
Pot Cap-1 Maneuver	384	511	995	-	-	-
Stage 1	544	-	-	-	-	-
Stage 2	780	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	362	508	995	-	-	-
Mov Cap-2 Maneuver	362	-	-	-	-	-
Stage 1	513	-	-	-	-	-
Stage 2	780	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	19.5	1.7	0
HCM LOS	C		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	EBLn2	SBT	SBR
Capacity (veh/h)	995	-	362	508	-	-
HCM Lane V/C Ratio	0.05	-	0.459	0.207	-	-
HCM Control Delay (s)	8.8	0.1	23.1	13.9	-	-
HCM Lane LOS	A	A	C	B	-	-
HCM 95th %tile Q(veh)	0.2	-	2.3	0.8	-	-

APPENDIX K

SYNCHRO ANALYSIS: FUTURE CONDITIONS

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	498	289	51	23	42	34	47	1828	199	49	837	188
Future Volume (vph)	498	289	51	23	42	34	47	1828	199	49	837	188
Satd. Flow (prot)	1695	1784	1517	1695	1784	1517	1695	3390	1517	1695	3390	1517
Flt Permitted	0.590			0.344			0.274			0.057		
Satd. Flow (perm)	1049	1784	1498	613	1784	1497	489	3390	1498	102	3390	1517
Satd. Flow (RTOR)			188			188			188			188
Lane Group Flow (vph)	498	289	51	23	42	34	47	1828	199	49	837	188
Turn Type	pm+pt	NA	Free	pm+pt	NA	Free	pm+pt	NA	Free	pm+pt	NA	Free
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases	4		Free	8		Free	2		Free	6		Free
Detector Phase	7	4		3	8		5	2		1	6	
Switch Phase												
Minimum Initial (s)	5.0	10.0		5.0	10.0		5.0	10.0		5.0	10.0	
Minimum Split (s)	11.1	34.6		11.1	34.6		11.4	25.3		11.4	25.3	
Total Split (s)	12.0	38.0		12.0	38.0		12.0	68.0		12.0	68.0	
Total Split (%)	9.2%	29.2%		9.2%	29.2%		9.2%	52.3%		9.2%	52.3%	
Yellow Time (s)	3.3	3.3		3.3	3.3		4.6	4.6		4.6	4.6	
All-Red Time (s)	2.8	3.3		2.8	3.3		1.8	1.7		1.8	1.7	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)	6.1	6.6		6.1	6.6		6.4	6.3		6.4	6.3	
Lead/Lag	Lead	Lag		Lead	Lag		Lead	Lag		Lead	Lag	
Lead-Lag Optimize?	Yes	Yes		Yes	Yes		Yes	Yes		Yes	Yes	
Recall Mode	None	None		None	None		None	C-Min		None	C-Min	
Act Effct Green (s)	29.6	25.6	130.0	25.8	21.6	130.0	79.1	73.9	130.0	79.1	74.0	130.0
Actuated g/C Ratio	0.23	0.20	1.00	0.20	0.17	1.00	0.61	0.57	1.00	0.61	0.57	1.00
v/c Ratio	1.77	0.82	0.03	0.14	0.14	0.02	0.13	0.95	0.13	0.35	0.43	0.12
Control Delay	392.1	68.8	0.0	33.3	43.0	0.0	12.1	40.4	0.2	19.5	19.5	0.2
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	392.1	68.8	0.0	33.3	43.0	0.0	12.1	40.4	0.2	19.5	19.5	0.2
LOS	F	E	A	C	D	A	B	D	A	B	B	A
Approach Delay		256.7			26.0			35.9			16.1	
Approach LOS		F			C			D			B	
Queue Length 50th (m)	~187.3	71.2	0.0	4.2	8.9	0.0	4.6	~272.8	0.0	4.8	72.2	0.0
Queue Length 95th (m)	#242.1	98.2	0.0	10.3	18.1	0.0	10.7	#328.7	0.0	12.1	95.1	0.0
Internal Link Dist (m)		42.6			349.6			93.8			234.3	
Turn Bay Length (m)	66.0		66.0			80.0	80.0		90.0	80.0		85.0
Base Capacity (vph)	281	430	1498	171	430	1497	356	1928	1498	140	1928	1517
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	1.77	0.67	0.03	0.13	0.10	0.02	0.13	0.95	0.13	0.35	0.43	0.12

Intersection Summary

Cycle Length: 130
Actuated Cycle Length: 130
Offset: 36 (28%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green
Natural Cycle: 115
Control Type: Actuated-Coordinated

Maximum v/c Ratio: 1.77

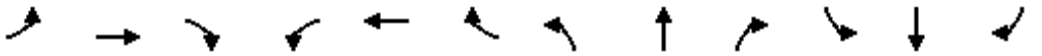
Intersection Signal Delay: 75.7	Intersection LOS: E
Intersection Capacity Utilization 99.9%	ICU Level of Service F
Analysis Period (min) 15	

Description: NOTE: March Road treated as north-south

~ 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: 1: March & Teron



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	146	4	180	22	2	34	96	310	4	15	190	39
Future Volume (vph)	146	4	180	22	2	34	96	310	4	15	190	39
Satd. Flow (prot)	1695	1522	0	1695	1452	0	1695	1781	0	1695	1730	0
Flt Permitted	0.734			0.641			0.616			0.570		
Satd. Flow (perm)	1268	1522	0	1144	1452	0	1097	1781	0	1017	1730	0
Satd. Flow (RTOR)		180			34			1			21	
Lane Group Flow (vph)	146	184	0	22	36	0	96	314	0	15	229	0
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)	10.0	10.0		10.0	10.0		10.0	10.0		10.0	10.0	
Minimum Split (s)	22.8	22.8		22.8	22.8		65.6	65.6		65.6	65.6	
Total Split (s)	29.8	29.8		29.8	29.8		65.6	65.6		65.6	65.6	
Total Split (%)	31.2%	31.2%		31.2%	31.2%		68.8%	68.8%		68.8%	68.8%	
Yellow Time (s)	3.0	3.0		3.0	3.0		3.3	3.3		3.3	3.3	
All-Red Time (s)	2.8	2.8		2.8	2.8		2.3	2.3		2.3	2.3	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)	5.8	5.8		5.8	5.8		5.6	5.6		5.6	5.6	
Lead/Lag												
Lead-Lag Optimize?												
Recall Mode	None	None		None	None		Min	Min		Min	Min	
Act Effct Green (s)	11.4	11.4		11.4	11.4		13.3	13.3		13.3	13.3	
Actuated g/C Ratio	0.31	0.31		0.31	0.31		0.37	0.37		0.37	0.37	
v/c Ratio	0.37	0.31		0.06	0.08		0.24	0.48		0.04	0.35	
Control Delay	13.5	4.0		10.2	5.2		10.2	12.0		8.2	9.6	
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay	13.5	4.0		10.2	5.2		10.2	12.0		8.2	9.6	
LOS	B	A		B	A		B	B		A	A	
Approach Delay		8.2			7.1			11.6			9.5	
Approach LOS		A			A			B			A	
Queue Length 50th (m)	5.9	0.2		0.8	0.1		3.4	12.4		0.5	7.7	
Queue Length 95th (m)	19.4	9.3		4.5	4.2		12.5	33.7		3.2	23.1	
Internal Link Dist (m)		594.0			268.4			124.5			518.6	
Turn Bay Length (m)	60.0			15.0			40.0			45.0		
Base Capacity (vph)	855	1085		771	990		1097	1781		1017	1730	
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	0.17	0.17		0.03	0.04		0.09	0.18		0.01	0.13	

Intersection Summary
Cycle Length: 95.4
Actuated Cycle Length: 36.4
Natural Cycle: 90
Control Type: Semi Act-Uncoord
Maximum v/c Ratio: 0.48

Intersection Signal Delay: 9.8 Intersection LOS: A
Intersection Capacity Utilization 59.3% ICU Level of Service B
Analysis Period (min) 15

Splits and Phases: 3: Teron & Beaverbrook

Intersection	
Int Delay, s/veh	2.7

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	129	66	45	547	160	97
Future Vol, veh/h	129	66	45	547	160	97
Conflicting Peds, #/hr	4	4	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	Yield	-	Free	-	Yield
Storage Length	50	0	-	-	-	0
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	100	100	100	100	100	100
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	129	66	45	547	160	97

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	473	164	160	0	-	0
Stage 1	160	-	-	-	-	-
Stage 2	313	-	-	-	-	-
Critical Hdwy	6.08	6.23	4.13	-	-	-
Critical Hdwy Stg 1	5.43	-	-	-	-	-
Critical Hdwy Stg 2	6.03	-	-	-	-	-
Follow-up Hdwy	3.669	3.319	2.219	-	-	-
Pot Cap-1 Maneuver	556	880	1418	-	-	-
Stage 1	835	-	-	-	-	-
Stage 2	678	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	530	877	1418	-	-	-
Mov Cap-2 Maneuver	530	-	-	-	-	-
Stage 1	797	-	-	-	-	-
Stage 2	678	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	12.4	0.7	0
HCM LOS	B		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	EBLn2	SBT	SBR
Capacity (veh/h)	1418	-	530	877	-	-
HCM Lane V/C Ratio	0.032	-	0.243	0.075	-	-
HCM Control Delay (s)	7.6	0.1	14	9.4	-	-
HCM Lane LOS	A	A	B	A	-	-
HCM 95th %tile Q(veh)	0.1	-	0.9	0.2	-	-

Intersection	
Int Delay, s/veh	0.4

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	5	18	576	3	5	223
Future Vol, veh/h	5	18	576	3	5	223
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	100	100	100	100	100	100
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	5	18	576	3	5	223

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	811	578	0	0	579	0
Stage 1	578	-	-	-	-	-
Stage 2	233	-	-	-	-	-
Critical Hdwy	6.42	6.22	-	-	4.12	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	-	-	2.218	-
Pot Cap-1 Maneuver	349	516	-	-	995	-
Stage 1	561	-	-	-	-	-
Stage 2	806	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	347	516	-	-	995	-
Mov Cap-2 Maneuver	347	-	-	-	-	-
Stage 1	561	-	-	-	-	-
Stage 2	801	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	13.1	0	0.2
HCM LOS	B		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	467	995	-
HCM Lane V/C Ratio	-	-	0.049	0.005	-
HCM Control Delay (s)	-	-	13.1	8.6	0
HCM Lane LOS	-	-	B	A	A
HCM 95th %tile Q(veh)	-	-	0.2	0	-

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	240	55	64	153	184	50	85	1179	20	11	1852	479
Future Volume (vph)	240	55	64	153	184	50	85	1179	20	11	1852	479
Satd. Flow (prot)	1695	1784	1517	1695	1784	1517	1695	3390	1517	1695	3390	1517
Flt Permitted	0.559			0.591			0.056			0.168		
Satd. Flow (perm)	988	1784	1498	1053	1784	1493	100	3390	1498	300	3390	1517
Satd. Flow (RTOR)			188			188			188			188
Lane Group Flow (vph)	240	55	64	153	184	50	85	1179	20	11	1852	479
Turn Type	pm+pt	NA	Free	pm+pt	NA	Free	pm+pt	NA	Free	pm+pt	NA	Free
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases	4		Free	8		Free	2		Free	6		Free
Detector Phase	7	4		3	8		5	2		1	6	
Switch Phase												
Minimum Initial (s)	5.0	10.0		5.0	10.0		5.0	10.0		5.0	10.0	
Minimum Split (s)	11.1	34.6		11.1	34.6		11.4	25.3		11.4	25.3	
Total Split (s)	17.0	35.0		17.0	35.0		12.0	66.0		12.0	66.0	
Total Split (%)	13.1%	26.9%		13.1%	26.9%		9.2%	50.8%		9.2%	50.8%	
Yellow Time (s)	3.3	3.3		3.3	3.3		4.6	4.6		4.6	4.6	
All-Red Time (s)	2.8	3.3		2.8	3.3		1.8	1.7		1.8	1.7	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)	6.1	6.6		6.1	6.6		6.4	6.3		6.4	6.3	
Lead/Lag	Lead	Lag		Lead	Lag		Lead	Lag		Lead	Lag	
Lead-Lag Optimize?	Yes	Yes		Yes	Yes		Yes	Yes		Yes	Yes	
Recall Mode	None	None		None	None		None	C-Min		None	C-Min	
Act Effct Green (s)	28.1	18.8	130.0	31.8	19.2	130.0	78.9	75.9	130.0	72.6	66.9	130.0
Actuated g/C Ratio	0.22	0.14	1.00	0.24	0.15	1.00	0.61	0.58	1.00	0.56	0.51	1.00
v/c Ratio	0.88	0.21	0.04	0.47	0.70	0.03	0.56	0.60	0.01	0.05	1.06	0.32
Control Delay	74.2	48.4	0.0	41.0	65.9	0.0	33.4	21.0	0.0	12.1	71.4	0.5
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	74.2	48.4	0.0	41.0	65.9	0.0	33.4	21.0	0.0	12.1	71.4	0.5
LOS	E	D	A	D	E	A	C	C	A	B	E	A
Approach Delay		57.0			47.5			21.5			56.6	
Approach LOS		E			D			C			E	
Queue Length 50th (m)	51.8	12.6	0.0	31.2	45.6	0.0	8.1	85.6	0.0	1.0	~275.5	0.0
Queue Length 95th (m)	69.7	23.1	0.0	45.0	64.7	0.0	#33.9	156.0	0.0	4.1	#343.0	0.0
Internal Link Dist (m)		42.6			349.6			93.8			234.3	
Turn Bay Length (m)	66.0		66.0			80.0	80.0		90.0	80.0		85.0
Base Capacity (vph)	272	389	1498	329	389	1493	153	1979	1498	230	1745	1517
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	0.88	0.14	0.04	0.47	0.47	0.03	0.56	0.60	0.01	0.05	1.06	0.32

Intersection Summary
Cycle Length: 130
Actuated Cycle Length: 130
Offset: 121 (93%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green
Natural Cycle: 115
Control Type: Actuated-Coordinated

Maximum v/c Ratio: 1.06

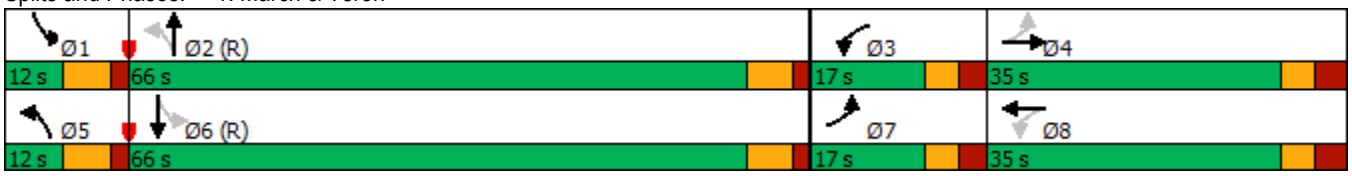
Intersection Signal Delay: 45.5	Intersection LOS: D
Intersection Capacity Utilization 108.1%	ICU Level of Service G
Analysis Period (min) 15	

Description: NOTE: March Road Treated as north-south

~ 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: 1: March & Teron



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	65	6	131	22	11	16	194	209	30	31	475	125
Future Volume (vph)	65	6	131	22	11	16	194	209	30	31	475	125
Satd. Flow (prot)	1695	1496	0	1695	1586	0	1695	1742	0	1695	1707	0
Flt Permitted	0.740			0.669			0.181			0.610		
Satd. Flow (perm)	1296	1496	0	1194	1586	0	323	1742	0	1080	1707	0
Satd. Flow (RTOR)		131			16			12			15	
Lane Group Flow (vph)	65	137	0	22	27	0	194	239	0	31	600	0
Turn Type	Perm	NA		Perm	NA		pm+pt	NA		Perm	NA	
Protected Phases		4			8		5	2			6	
Permitted Phases	4			8			2			6		
Detector Phase	4	4		8	8		5	2		6	6	
Switch Phase												
Minimum Initial (s)	10.0	10.0		10.0	10.0		5.0	10.0		10.0	10.0	
Minimum Split (s)	22.8	22.8		22.8	22.8		11.0	71.2		50.6	50.6	
Total Split (s)	35.8	35.8		35.8	35.8		20.6	71.2		50.6	50.6	
Total Split (%)	33.5%	33.5%		33.5%	33.5%		19.3%	66.5%		47.3%	47.3%	
Yellow Time (s)	3.0	3.0		3.0	3.0		4.0	3.3		3.3	3.3	
All-Red Time (s)	2.8	2.8		2.8	2.8		2.0	2.3		2.3	2.3	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)	5.8	5.8		5.8	5.8		6.0	5.6		5.6	5.6	
Lead/Lag							Lead			Lag	Lag	
Lead-Lag Optimize?							Yes			Yes	Yes	
Recall Mode	None	None		None	None		None	Min		Min	Min	
Act Effct Green (s)	11.7	11.7		11.7	11.7		48.8	49.2		30.2	30.2	
Actuated g/C Ratio	0.16	0.16		0.16	0.16		0.67	0.68		0.42	0.42	
v/c Ratio	0.31	0.39		0.12	0.10		0.42	0.20		0.07	0.84	
Control Delay	35.3	10.9		32.1	20.2		7.3	4.5		13.3	30.0	
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay	35.3	10.9		32.1	20.2		7.3	4.5		13.3	30.0	
LOS	D	B		C	C		A	A		B	C	
Approach Delay		18.8			25.5			5.7			29.2	
Approach LOS		B			C			A			C	
Queue Length 50th (m)	8.0	0.7		2.6	1.3		7.3	8.5		2.4	68.3	
Queue Length 95th (m)	22.0	15.9		10.0	8.7		17.7	20.3		7.7	122.9	
Internal Link Dist (m)		594.0			268.4			124.5			518.6	
Turn Bay Length (m)	60.0			15.0			40.0			45.0		
Base Capacity (vph)	554	714		510	687		502	1547		692	1100	
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	0.12	0.19		0.04	0.04		0.39	0.15		0.04	0.55	

Intersection Summary
Cycle Length: 107
Actuated Cycle Length: 72.7
Natural Cycle: 95
Control Type: Actuated-Uncoordinated
Maximum v/c Ratio: 0.84

Intersection Signal Delay: 19.7 | Intersection LOS: B
Intersection Capacity Utilization 79.8% | ICU Level of Service D
Analysis Period (min) 15

Splits and Phases: 3: Teron & Beaverbrook

Intersection	
Int Delay, s/veh	4.3

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	166	105	50	215	540	181
Future Vol, veh/h	166	105	50	215	540	181
Conflicting Peds, #/hr	7	7	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	Yield	-	Free	-	Yield
Storage Length	50	0	-	-	-	0
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	100	100	100	100	100	100
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	166	105	50	215	540	181

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	733	547	540	0	-	0
Stage 1	540	-	-	-	-	-
Stage 2	193	-	-	-	-	-
Critical Hdwy	6.08	6.23	4.13	-	-	-
Critical Hdwy Stg 1	5.43	-	-	-	-	-
Critical Hdwy Stg 2	6.03	-	-	-	-	-
Follow-up Hdwy	3.669	3.319	2.219	-	-	-
Pot Cap-1 Maneuver	404	536	1027	-	-	-
Stage 1	565	-	-	-	-	-
Stage 2	782	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	382	533	1027	-	-	-
Mov Cap-2 Maneuver	382	-	-	-	-	-
Stage 1	534	-	-	-	-	-
Stage 2	782	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	18.4	1.7	0
HCM LOS	C		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	EBLn2	SBT	SBR
Capacity (veh/h)	1027	-	382	533	-	-
HCM Lane V/C Ratio	0.049	-	0.435	0.197	-	-
HCM Control Delay (s)	8.7	0.1	21.5	13.4	-	-
HCM Lane LOS	A	A	C	B	-	-
HCM 95th %tile Q(veh)	0.2	-	2.1	0.7	-	-

Intersection	
Int Delay, s/veh	0.3

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	3	12	254	9	14	635
Future Vol, veh/h	3	12	254	9	14	635
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	100	100	100	100	100	100
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	3	12	254	9	14	635

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	922	259	0	0	263	0
Stage 1	259	-	-	-	-	-
Stage 2	663	-	-	-	-	-
Critical Hdwy	6.42	6.22	-	-	4.12	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	-	-	2.218	-
Pot Cap-1 Maneuver	300	780	-	-	1301	-
Stage 1	784	-	-	-	-	-
Stage 2	512	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	295	780	-	-	1301	-
Mov Cap-2 Maneuver	295	-	-	-	-	-
Stage 1	784	-	-	-	-	-
Stage 2	503	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	11.3	0	0.2
HCM LOS	B		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	587	1301	-
HCM Lane V/C Ratio	-	-	0.026	0.011	-
HCM Control Delay (s)	-	-	11.3	7.8	0
HCM Lane LOS	-	-	B	A	A
HCM 95th %tile Q(veh)	-	-	0.1	0	-

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	498	316	51	23	46	34	47	1991	199	49	905	188
Future Volume (vph)	498	316	51	23	46	34	47	1991	199	49	905	188
Satd. Flow (prot)	1695	1784	1517	1695	1784	1517	1695	3390	1517	1695	3390	1517
Flt Permitted	0.585			0.308			0.244			0.058		
Satd. Flow (perm)	1040	1784	1498	549	1784	1497	435	3390	1498	103	3390	1517
Satd. Flow (RTOR)			188			188			188			188
Lane Group Flow (vph)	498	316	51	23	46	34	47	1991	199	49	905	188
Turn Type	pm+pt	NA	Free	pm+pt	NA	Free	pm+pt	NA	Free	pm+pt	NA	Free
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases	4		Free	8		Free	2		Free	6		Free
Detector Phase	7	4		3	8		5	2		1	6	
Switch Phase												
Minimum Initial (s)	5.0	10.0		5.0	10.0		5.0	10.0		5.0	10.0	
Minimum Split (s)	11.1	34.6		11.1	34.6		11.4	25.3		11.4	25.3	
Total Split (s)	12.0	38.0		12.0	38.0		12.0	68.0		12.0	68.0	
Total Split (%)	9.2%	29.2%		9.2%	29.2%		9.2%	52.3%		9.2%	52.3%	
Yellow Time (s)	3.3	3.3		3.3	3.3		4.6	4.6		4.6	4.6	
All-Red Time (s)	2.8	3.3		2.8	3.3		1.8	1.7		1.8	1.7	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)	6.1	6.6		6.1	6.6		6.4	6.3		6.4	6.3	
Lead/Lag	Lead	Lag		Lead	Lag		Lead	Lag		Lead	Lag	
Lead-Lag Optimize?	Yes	Yes		Yes	Yes		Yes	Yes		Yes	Yes	
Recall Mode	None	None		None	None		None	C-Min		None	C-Min	
Act Effct Green (s)	31.1	27.1	130.0	27.0	22.8	130.0	77.6	72.8	130.0	77.6	72.8	130.0
Actuated g/C Ratio	0.24	0.21	1.00	0.21	0.18	1.00	0.60	0.56	1.00	0.60	0.56	1.00
v/c Ratio	1.70	0.85	0.03	0.14	0.15	0.02	0.15	1.05	0.13	0.37	0.48	0.12
Control Delay	359.9	70.3	0.0	32.6	42.2	0.0	12.8	64.6	0.2	20.5	20.7	0.2
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	359.9	70.3	0.0	32.6	42.2	0.0	12.8	64.6	0.2	20.5	20.7	0.2
LOS	F	E	A	C	D	A	B	E	A	C	C	A
Approach Delay		232.9			26.1			57.8			17.3	
Approach LOS		F			C			E			B	
Queue Length 50th (m)	~183.5	77.7	0.0	4.1	9.5	0.0	4.8	~325.7	0.0	5.0	83.0	0.0
Queue Length 95th (m)	#242.7	108.5	0.0	10.3	19.6	0.0	10.7	#373.8	0.0	12.0	105.2	0.0
Internal Link Dist (m)		42.6			349.6			93.8			234.3	
Turn Bay Length (m)	66.0		66.0			80.0	80.0		90.0	80.0		85.0
Base Capacity (vph)	293	430	1498	166	430	1497	317	1898	1498	134	1898	1517
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	1.70	0.73	0.03	0.14	0.11	0.02	0.15	1.05	0.13	0.37	0.48	0.12

Intersection Summary
Cycle Length: 130
Actuated Cycle Length: 130
Offset: 36 (28%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green
Natural Cycle: 115
Control Type: Actuated-Coordinated

Maximum v/c Ratio: 1.70

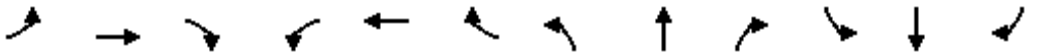
Intersection Signal Delay: 81.2	Intersection LOS: F
Intersection Capacity Utilization 104.6%	ICU Level of Service G
Analysis Period (min) 15	

Description: NOTE: March Road treated as north-south

~ 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: 1: March & Teron



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	146	4	180	22	2	34	96	337	4	15	204	39
Future Volume (vph)	146	4	180	22	2	34	96	337	4	15	204	39
Satd. Flow (prot)	1695	1522	0	1695	1452	0	1695	1781	0	1695	1734	0
Flt Permitted	0.734			0.641			0.608			0.556		
Satd. Flow (perm)	1268	1522	0	1144	1452	0	1083	1781	0	992	1734	0
Satd. Flow (RTOR)		180			34			1			19	
Lane Group Flow (vph)	146	184	0	22	36	0	96	341	0	15	243	0
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)	10.0	10.0		10.0	10.0		10.0	10.0		10.0	10.0	
Minimum Split (s)	22.8	22.8		22.8	22.8		65.6	65.6		65.6	65.6	
Total Split (s)	29.8	29.8		29.8	29.8		65.6	65.6		65.6	65.6	
Total Split (%)	31.2%	31.2%		31.2%	31.2%		68.8%	68.8%		68.8%	68.8%	
Yellow Time (s)	3.0	3.0		3.0	3.0		3.3	3.3		3.3	3.3	
All-Red Time (s)	2.8	2.8		2.8	2.8		2.3	2.3		2.3	2.3	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)	5.8	5.8		5.8	5.8		5.6	5.6		5.6	5.6	
Lead/Lag												
Lead-Lag Optimize?												
Recall Mode	None	None		None	None		Min	Min		Min	Min	
Act Effct Green (s)	11.5	11.5		11.5	11.5		14.1	14.1		14.1	14.1	
Actuated g/C Ratio	0.31	0.31		0.31	0.31		0.38	0.38		0.38	0.38	
v/c Ratio	0.37	0.31		0.06	0.08		0.23	0.51		0.04	0.36	
Control Delay	14.3	4.3		11.0	5.6		9.8	12.1		7.9	9.6	
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay	14.3	4.3		11.0	5.6		9.8	12.1		7.9	9.6	
LOS	B	A		B	A		A	B		A	A	
Approach Delay		8.7			7.6			11.6			9.5	
Approach LOS		A			A			B			A	
Queue Length 50th (m)	6.2	0.2		0.8	0.1		3.4	13.7		0.5	8.4	
Queue Length 95th (m)	20.9	9.9		4.8	4.4		12.4	36.5		3.1	24.3	
Internal Link Dist (m)		594.0			268.4			124.5			518.6	
Turn Bay Length (m)	60.0			15.0			40.0			45.0		
Base Capacity (vph)	838	1067		756	971		1083	1781		992	1734	
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	0.17	0.17		0.03	0.04		0.09	0.19		0.02	0.14	

Intersection Summary
Cycle Length: 95.4
Actuated Cycle Length: 37.3
Natural Cycle: 90
Control Type: Semi Act-Uncoord
Maximum v/c Ratio: 0.51

Intersection Signal Delay: 10.0 Intersection LOS: B
Intersection Capacity Utilization 60.8% ICU Level of Service B
Analysis Period (min) 15

Splits and Phases: 3: Teron & Beaverbrook

Intersection	
Int Delay, s/veh	2.6

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	129	66	45	598	175	97
Future Vol, veh/h	129	66	45	598	175	97
Conflicting Peds, #/hr	4	4	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	Yield	-	Free	-	Yield
Storage Length	50	0	-	-	-	0
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	100	100	100	100	100	100
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	129	66	45	598	175	97

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	508	179	175	0	-	0
Stage 1	175	-	-	-	-	-
Stage 2	333	-	-	-	-	-
Critical Hdwy	6.08	6.23	4.13	-	-	-
Critical Hdwy Stg 1	5.43	-	-	-	-	-
Critical Hdwy Stg 2	6.03	-	-	-	-	-
Follow-up Hdwy	3.669	3.319	2.219	-	-	-
Pot Cap-1 Maneuver	533	863	1400	-	-	-
Stage 1	823	-	-	-	-	-
Stage 2	662	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	507	860	1400	-	-	-
Mov Cap-2 Maneuver	507	-	-	-	-	-
Stage 1	783	-	-	-	-	-
Stage 2	662	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	12.8	0.6	0
HCM LOS	B		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	EBLn2	SBT	SBR
Capacity (veh/h)	1400	-	507	860	-	-
HCM Lane V/C Ratio	0.032	-	0.254	0.077	-	-
HCM Control Delay (s)	7.7	0.1	14.5	9.5	-	-
HCM Lane LOS	A	A	B	A	-	-
HCM 95th %tile Q(veh)	0.1	-	1	0.2	-	-

Intersection	
Int Delay, s/veh	0.4

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	5	18	635	3	5	243
Future Vol, veh/h	5	18	635	3	5	243
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	100	100	100	100	100	100
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	5	18	635	3	5	243

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	890	637	0	0	638	0
Stage 1	637	-	-	-	-	-
Stage 2	253	-	-	-	-	-
Critical Hdwy	6.42	6.22	-	-	4.12	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	-	-	2.218	-
Pot Cap-1 Maneuver	313	477	-	-	946	-
Stage 1	527	-	-	-	-	-
Stage 2	789	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	311	477	-	-	946	-
Mov Cap-2 Maneuver	311	-	-	-	-	-
Stage 1	527	-	-	-	-	-
Stage 2	784	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	13.9	0	0.2
HCM LOS	B		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	427	946	-
HCM Lane V/C Ratio	-	-	0.054	0.005	-
HCM Control Delay (s)	-	-	13.9	8.8	0
HCM Lane LOS	-	-	B	A	A
HCM 95th %tile Q(veh)	-	-	0.2	0	-

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	240	60	64	153	200	50	85	1281	20	11	2019	479
Future Volume (vph)	240	60	64	153	200	50	85	1281	20	11	2019	479
Satd. Flow (prot)	1695	1784	1517	1695	1784	1517	1695	3390	1517	1695	3390	1517
Flt Permitted	0.521			0.587			0.057			0.134		
Satd. Flow (perm)	921	1784	1498	1046	1784	1493	102	3390	1498	239	3390	1517
Satd. Flow (RTOR)			188			188			188			188
Lane Group Flow (vph)	240	60	64	153	200	50	85	1281	20	11	2019	479
Turn Type	pm+pt	NA	Free	pm+pt	NA	Free	pm+pt	NA	Free	pm+pt	NA	Free
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases	4		Free	8		Free	2		Free	6		Free
Detector Phase	7	4		3	8		5	2		1	6	
Switch Phase												
Minimum Initial (s)	5.0	10.0		5.0	10.0		5.0	10.0		5.0	10.0	
Minimum Split (s)	11.1	34.6		11.1	34.6		11.4	25.3		11.4	25.3	
Total Split (s)	17.0	35.0		17.0	35.0		12.0	66.0		12.0	66.0	
Total Split (%)	13.1%	26.9%		13.1%	26.9%		9.2%	50.8%		9.2%	50.8%	
Yellow Time (s)	3.3	3.3		3.3	3.3		4.6	4.6		4.6	4.6	
All-Red Time (s)	2.8	3.3		2.8	3.3		1.8	1.7		1.8	1.7	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)	6.1	6.6		6.1	6.6		6.4	6.3		6.4	6.3	
Lead/Lag	Lead	Lag		Lead	Lag		Lead	Lag		Lead	Lag	
Lead-Lag Optimize?	Yes	Yes		Yes	Yes		Yes	Yes		Yes	Yes	
Recall Mode	None	None		None	None		None	C-Min		None	C-Min	
Act Effct Green (s)	28.8	19.5	130.0	32.7	20.1	130.0	78.0	75.0	130.0	71.7	66.0	130.0
Actuated g/C Ratio	0.22	0.15	1.00	0.25	0.15	1.00	0.60	0.58	1.00	0.55	0.51	1.00
v/c Ratio	0.90	0.22	0.04	0.46	0.73	0.03	0.55	0.65	0.01	0.06	1.17	0.32
Control Delay	76.1	48.1	0.0	40.1	66.9	0.0	33.0	22.9	0.0	12.5	115.1	0.5
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	76.1	48.1	0.0	40.1	66.9	0.0	33.0	22.9	0.0	12.5	115.1	0.5
LOS	E	D	A	D	E	A	C	C	A	B	F	A
Approach Delay		58.1			48.4			23.2			92.8	
Approach LOS		E			D			C			F	
Queue Length 50th (m)	51.2	13.7	0.0	30.8	49.5	0.0	8.3	100.0	0.0	1.0	~326.6	0.0
Queue Length 95th (m)	69.7	24.7	0.0	45.0	70.2	0.0	#33.4	177.1	0.0	4.1	#388.9	0.0
Internal Link Dist (m)		42.6			349.6			93.8			234.3	
Turn Bay Length (m)	66.0		66.0			80.0	80.0		90.0	80.0		85.0
Base Capacity (vph)	268	389	1498	336	389	1493	154	1956	1498	196	1721	1517
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	0.90	0.15	0.04	0.46	0.51	0.03	0.55	0.65	0.01	0.06	1.17	0.32

Intersection Summary
Cycle Length: 130
Actuated Cycle Length: 130
Offset: 121 (93%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green
Natural Cycle: 115
Control Type: Actuated-Coordinated

Maximum v/c Ratio: 1.17

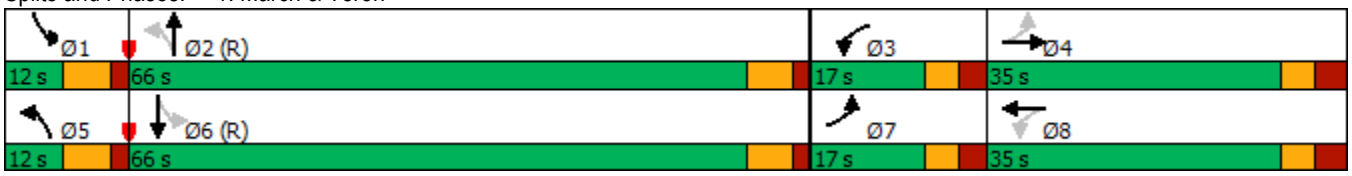
Intersection Signal Delay: 65.6	Intersection LOS: E
Intersection Capacity Utilization 113.7%	ICU Level of Service H
Analysis Period (min) 15	

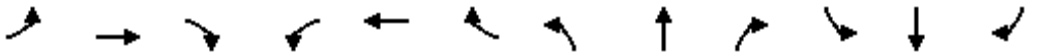
Description: NOTE: March Road Treated as north-south

~ 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: 1: March & Teron





Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	65	6	131	22	11	16	194	225	30	31	515	125
Future Volume (vph)	65	6	131	22	11	16	194	225	30	31	515	125
Satd. Flow (prot)	1695	1496	0	1695	1586	0	1695	1745	0	1695	1712	0
Flt Permitted	0.740			0.669			0.171			0.601		
Satd. Flow (perm)	1296	1496	0	1194	1586	0	305	1745	0	1064	1712	0
Satd. Flow (RTOR)		131			16			12			14	
Lane Group Flow (vph)	65	137	0	22	27	0	194	255	0	31	640	0
Turn Type	Perm	NA		Perm	NA		pm+pt	NA		Perm	NA	
Protected Phases		4			8		5	2			6	
Permitted Phases	4			8			2			6		
Detector Phase	4	4		8	8		5	2		6	6	
Switch Phase												
Minimum Initial (s)	10.0	10.0		10.0	10.0		5.0	10.0		10.0	10.0	
Minimum Split (s)	22.8	22.8		22.8	22.8		11.0	71.2		50.6	50.6	
Total Split (s)	35.8	35.8		35.8	35.8		20.6	71.2		50.6	50.6	
Total Split (%)	33.5%	33.5%		33.5%	33.5%		19.3%	66.5%		47.3%	47.3%	
Yellow Time (s)	3.0	3.0		3.0	3.0		4.0	3.3		3.3	3.3	
All-Red Time (s)	2.8	2.8		2.8	2.8		2.0	2.3		2.3	2.3	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)	5.8	5.8		5.8	5.8		6.0	5.6		5.6	5.6	
Lead/Lag							Lead			Lag	Lag	
Lead-Lag Optimize?							Yes			Yes	Yes	
Recall Mode	None	None		None	None		None	Min		Min	Min	
Act Effct Green (s)	11.6	11.6		11.6	11.6		52.0	52.4		33.3	33.3	
Actuated g/C Ratio	0.15	0.15		0.15	0.15		0.69	0.69		0.44	0.44	
v/c Ratio	0.33	0.40		0.12	0.11		0.44	0.21		0.07	0.84	
Control Delay	37.1	11.2		33.4	20.9		7.3	4.4		12.9	30.1	
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay	37.1	11.2		33.4	20.9		7.3	4.4		12.9	30.1	
LOS	D	B		C	C		A	A		B	C	
Approach Delay		19.5			26.5			5.7			29.3	
Approach LOS		B			C			A			C	
Queue Length 50th (m)	8.7	0.8		2.9	1.4		7.3	9.2		2.4	75.9	
Queue Length 95th (m)	22.0	15.9		10.0	8.7		17.7	21.8		7.8	136.3	
Internal Link Dist (m)		594.0			268.4			124.5			518.6	
Turn Bay Length (m)	60.0			15.0			40.0			45.0		
Base Capacity (vph)	528	687		486	656		484	1505		650	1052	
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	0.12	0.20		0.05	0.04		0.40	0.17		0.05	0.61	

Intersection Summary
Cycle Length: 107
Actuated Cycle Length: 75.8
Natural Cycle: 95
Control Type: Actuated-Uncoordinated
Maximum v/c Ratio: 0.84

Intersection Signal Delay: 20.0 | Intersection LOS: C
Intersection Capacity Utilization 82.0% | ICU Level of Service E
Analysis Period (min) 15

Splits and Phases: 3: Teron & Beaverbrook

Intersection	
Int Delay, s/veh	4.4

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	166	105	50	234	591	181
Future Vol, veh/h	166	105	50	234	591	181
Conflicting Peds, #/hr	7	7	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	Yield	-	Free	-	Yield
Storage Length	50	0	-	-	-	0
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	100	100	100	100	100	100
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	166	105	50	234	591	181

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	792	598	591	0	-	0
Stage 1	591	-	-	-	-	-
Stage 2	201	-	-	-	-	-
Critical Hdwy	6.08	6.23	4.13	-	-	-
Critical Hdwy Stg 1	5.43	-	-	-	-	-
Critical Hdwy Stg 2	6.03	-	-	-	-	-
Follow-up Hdwy	3.669	3.319	2.219	-	-	-
Pot Cap-1 Maneuver	375	501	983	-	-	-
Stage 1	536	-	-	-	-	-
Stage 2	775	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	353	498	983	-	-	-
Mov Cap-2 Maneuver	353	-	-	-	-	-
Stage 1	505	-	-	-	-	-
Stage 2	775	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	20.1	1.6	0
HCM LOS	C		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	EBLn2	SBT	SBR
Capacity (veh/h)	983	-	353	498	-	-
HCM Lane V/C Ratio	0.051	-	0.47	0.211	-	-
HCM Control Delay (s)	8.9	0.1	23.9	14.2	-	-
HCM Lane LOS	A	A	C	B	-	-
HCM 95th %tile Q(veh)	0.2	-	2.4	0.8	-	-

Intersection	
Int Delay, s/veh	0.3

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	3	12	277	9	14	699
Future Vol, veh/h	3	12	277	9	14	699
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	100	100	100	100	100	100
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	3	12	277	9	14	699

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	1009	282	0	0	286	0
Stage 1	282	-	-	-	-	-
Stage 2	727	-	-	-	-	-
Critical Hdwy	6.42	6.22	-	-	4.12	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	-	-	2.218	-
Pot Cap-1 Maneuver	266	757	-	-	1276	-
Stage 1	766	-	-	-	-	-
Stage 2	478	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	261	757	-	-	1276	-
Mov Cap-2 Maneuver	261	-	-	-	-	-
Stage 1	766	-	-	-	-	-
Stage 2	469	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	11.7	0	0.2
HCM LOS	B		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	549	1276	-
HCM Lane V/C Ratio	-	-	0.027	0.011	-
HCM Control Delay (s)	-	-	11.7	7.9	0
HCM Lane LOS	-	-	B	A	A
HCM 95th %tile Q(veh)	-	-	0.1	0	-

APPENDIX L

SYNCHRO ANALYSIS: TOD NOT MET CONDITIONS

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	503	316	60	23	46	34	48	1991	199	49	905	189
Future Volume (vph)	503	316	60	23	46	34	48	1991	199	49	905	189
Satd. Flow (prot)	1695	1784	1517	1695	1784	1517	1695	3390	1517	1695	3390	1517
Flt Permitted	0.585			0.308			0.244			0.058		
Satd. Flow (perm)	1040	1784	1498	549	1784	1497	435	3390	1498	103	3390	1517
Satd. Flow (RTOR)			188			188			188			188
Lane Group Flow (vph)	503	316	60	23	46	34	48	1991	199	49	905	189
Turn Type	pm+pt	NA	Free	pm+pt	NA	Free	pm+pt	NA	Free	pm+pt	NA	Free
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases	4		Free	8		Free	2		Free	6		Free
Detector Phase	7	4		3	8		5	2		1	6	
Switch Phase												
Minimum Initial (s)	5.0	10.0		5.0	10.0		5.0	10.0		5.0	10.0	
Minimum Split (s)	11.1	34.6		11.1	34.6		11.4	25.3		11.4	25.3	
Total Split (s)	12.0	38.0		12.0	38.0		12.0	68.0		12.0	68.0	
Total Split (%)	9.2%	29.2%		9.2%	29.2%		9.2%	52.3%		9.2%	52.3%	
Yellow Time (s)	3.3	3.3		3.3	3.3		4.6	4.6		4.6	4.6	
All-Red Time (s)	2.8	3.3		2.8	3.3		1.8	1.7		1.8	1.7	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)	6.1	6.6		6.1	6.6		6.4	6.3		6.4	6.3	
Lead/Lag	Lead	Lag		Lead	Lag		Lead	Lag		Lead	Lag	
Lead-Lag Optimize?	Yes	Yes		Yes	Yes		Yes	Yes		Yes	Yes	
Recall Mode	None	None		None	None		None	C-Min		None	C-Min	
Act Effct Green (s)	31.1	27.1	130.0	27.0	22.8	130.0	77.6	72.8	130.0	77.6	72.8	130.0
Actuated g/C Ratio	0.24	0.21	1.00	0.21	0.18	1.00	0.60	0.56	1.00	0.60	0.56	1.00
v/c Ratio	1.72	0.85	0.04	0.14	0.15	0.02	0.15	1.05	0.13	0.37	0.48	0.12
Control Delay	367.1	70.3	0.1	32.6	42.2	0.0	12.8	64.6	0.2	20.5	20.7	0.2
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	367.1	70.3	0.1	32.6	42.2	0.0	12.8	64.6	0.2	20.5	20.7	0.2
LOS	F	E	A	C	D	A	B	E	A	C	C	A
Approach Delay		235.3			26.1			57.8			17.3	
Approach LOS		F			C			E			B	
Queue Length 50th (m)	~186.1	77.7	0.0	4.1	9.5	0.0	4.9	~325.7	0.0	5.0	83.0	0.0
Queue Length 95th (m)	#245.3	108.5	0.0	10.3	19.6	0.0	11.0	#373.8	0.0	12.0	105.2	0.0
Internal Link Dist (m)		42.6			349.6			93.8			234.3	
Turn Bay Length (m)	66.0		66.0			80.0	80.0		90.0	80.0		85.0
Base Capacity (vph)	293	430	1498	166	430	1497	317	1898	1498	134	1898	1517
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	1.72	0.73	0.04	0.14	0.11	0.02	0.15	1.05	0.13	0.37	0.48	0.12

Intersection Summary
Cycle Length: 130
Actuated Cycle Length: 130
Offset: 36 (28%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green
Natural Cycle: 115
Control Type: Actuated-Coordinated

Maximum v/c Ratio: 1.72

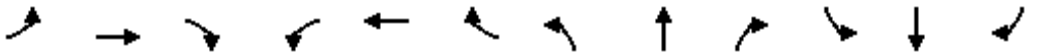
Intersection Signal Delay: 82.2	Intersection LOS: F
Intersection Capacity Utilization 104.9%	ICU Level of Service G
Analysis Period (min) 15	

Description: NOTE: March Road treated as north-south

~ 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: 1: March & Teron



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	146	4	180	22	2	34	96	339	4	15	207	39
Future Volume (vph)	146	4	180	22	2	34	96	339	4	15	207	39
Satd. Flow (prot)	1695	1522	0	1695	1452	0	1695	1781	0	1695	1734	0
Flt Permitted	0.734			0.641			0.606			0.555		
Satd. Flow (perm)	1268	1522	0	1144	1452	0	1079	1781	0	990	1734	0
Satd. Flow (RTOR)		180			34			1			19	
Lane Group Flow (vph)	146	184	0	22	36	0	96	343	0	15	246	0
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)	10.0	10.0		10.0	10.0		10.0	10.0		10.0	10.0	
Minimum Split (s)	22.8	22.8		22.8	22.8		65.6	65.6		65.6	65.6	
Total Split (s)	29.8	29.8		29.8	29.8		65.6	65.6		65.6	65.6	
Total Split (%)	31.2%	31.2%		31.2%	31.2%		68.8%	68.8%		68.8%	68.8%	
Yellow Time (s)	3.0	3.0		3.0	3.0		3.3	3.3		3.3	3.3	
All-Red Time (s)	2.8	2.8		2.8	2.8		2.3	2.3		2.3	2.3	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)	5.8	5.8		5.8	5.8		5.6	5.6		5.6	5.6	
Lead/Lag												
Lead-Lag Optimize?												
Recall Mode	None	None		None	None		Min	Min		Min	Min	
Act Effct Green (s)	11.5	11.5		11.5	11.5		14.1	14.1		14.1	14.1	
Actuated g/C Ratio	0.31	0.31		0.31	0.31		0.38	0.38		0.38	0.38	
v/c Ratio	0.38	0.31		0.06	0.08		0.24	0.51		0.04	0.37	
Control Delay	14.4	4.3		11.0	5.6		9.8	12.1		7.9	9.6	
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay	14.4	4.3		11.0	5.6		9.8	12.1		7.9	9.6	
LOS	B	A		B	A		A	B		A	A	
Approach Delay		8.7			7.6			11.6			9.5	
Approach LOS		A			A			B			A	
Queue Length 50th (m)	6.2	0.2		0.8	0.1		3.4	13.8		0.5	8.5	
Queue Length 95th (m)	20.9	10.0		4.8	4.5		12.4	36.7		3.1	24.7	
Internal Link Dist (m)		594.0			268.4			124.5			518.6	
Turn Bay Length (m)	60.0			15.0			40.0			45.0		
Base Capacity (vph)	837	1066		755	970		1079	1781		990	1734	
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	0.17	0.17		0.03	0.04		0.09	0.19		0.02	0.14	

Intersection Summary
Cycle Length: 95.4
Actuated Cycle Length: 37.3
Natural Cycle: 90
Control Type: Semi Act-Uncoord
Maximum v/c Ratio: 0.51

Intersection Signal Delay: 10.0 | Intersection LOS: B
Intersection Capacity Utilization 60.9% | ICU Level of Service B
Analysis Period (min) 15

Splits and Phases: 3: Teron & Beaverbrook

Intersection	
Int Delay, s/veh	2.6

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	129	66	45	612	177	97
Future Vol, veh/h	129	66	45	612	177	97
Conflicting Peds, #/hr	4	4	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	Yield	-	Free	-	Yield
Storage Length	50	0	-	-	-	0
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	100	100	100	100	100	100
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	129	66	45	612	177	97

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	516	181	177	0	-	0
Stage 1	177	-	-	-	-	-
Stage 2	339	-	-	-	-	-
Critical Hdwy	6.08	6.23	4.13	-	-	-
Critical Hdwy Stg 1	5.43	-	-	-	-	-
Critical Hdwy Stg 2	6.03	-	-	-	-	-
Follow-up Hdwy	3.669	3.319	2.219	-	-	-
Pot Cap-1 Maneuver	528	861	1398	-	-	-
Stage 1	821	-	-	-	-	-
Stage 2	658	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	502	858	1398	-	-	-
Mov Cap-2 Maneuver	502	-	-	-	-	-
Stage 1	781	-	-	-	-	-
Stage 2	658	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	12.9	0.6	0
HCM LOS	B		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	EBLn2	SBT	SBR
Capacity (veh/h)	1398	-	502	858	-	-
HCM Lane V/C Ratio	0.032	-	0.257	0.077	-	-
HCM Control Delay (s)	7.7	0.1	14.6	9.5	-	-
HCM Lane LOS	A	A	B	A	-	-
HCM 95th %tile Q(veh)	0.1	-	1	0.2	-	-

Intersection	
Int Delay, s/veh	0.7

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	8	32	635	5	7	243
Future Vol, veh/h	8	32	635	5	7	243
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	100	100	100	100	100	100
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	8	32	635	5	7	243

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	895	638	0	0	640	0
Stage 1	638	-	-	-	-	-
Stage 2	257	-	-	-	-	-
Critical Hdwy	6.42	6.22	-	-	4.12	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	-	-	2.218	-
Pot Cap-1 Maneuver	311	477	-	-	944	-
Stage 1	526	-	-	-	-	-
Stage 2	786	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	308	477	-	-	944	-
Mov Cap-2 Maneuver	308	-	-	-	-	-
Stage 1	526	-	-	-	-	-
Stage 2	779	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	14.2	0	0.2
HCM LOS	B		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	430	944	-
HCM Lane V/C Ratio	-	-	0.093	0.007	-
HCM Control Delay (s)	-	-	14.2	8.8	0
HCM Lane LOS	-	-	B	A	A
HCM 95th %tile Q(veh)	-	-	0.3	0	-

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	242	60	70	153	200	50	91	1281	20	11	2019	483
Future Volume (vph)	242	60	70	153	200	50	91	1281	20	11	2019	483
Satd. Flow (prot)	1695	1784	1517	1695	1784	1517	1695	3390	1517	1695	3390	1517
Flt Permitted	0.521			0.587			0.057			0.135		
Satd. Flow (perm)	921	1784	1498	1046	1784	1493	102	3390	1498	241	3390	1517
Satd. Flow (RTOR)			188			188			188			188
Lane Group Flow (vph)	242	60	70	153	200	50	91	1281	20	11	2019	483
Turn Type	pm+pt	NA	Free	pm+pt	NA	Free	pm+pt	NA	Free	pm+pt	NA	Free
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases	4		Free	8		Free	2		Free	6		Free
Detector Phase	7	4		3	8		5	2		1	6	
Switch Phase												
Minimum Initial (s)	5.0	10.0		5.0	10.0		5.0	10.0		5.0	10.0	
Minimum Split (s)	11.1	34.6		11.1	34.6		11.4	25.3		11.4	25.3	
Total Split (s)	17.0	35.0		17.0	35.0		12.0	66.0		12.0	66.0	
Total Split (%)	13.1%	26.9%		13.1%	26.9%		9.2%	50.8%		9.2%	50.8%	
Yellow Time (s)	3.3	3.3		3.3	3.3		4.6	4.6		4.6	4.6	
All-Red Time (s)	2.8	3.3		2.8	3.3		1.8	1.7		1.8	1.7	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)	6.1	6.6		6.1	6.6		6.4	6.3		6.4	6.3	
Lead/Lag	Lead	Lag		Lead	Lag		Lead	Lag		Lead	Lag	
Lead-Lag Optimize?	Yes	Yes		Yes	Yes		Yes	Yes		Yes	Yes	
Recall Mode	None	None		None	None		None	C-Min		None	C-Min	
Act Effct Green (s)	28.8	19.5	130.0	32.7	20.1	130.0	78.2	75.0	130.0	71.4	65.7	130.0
Actuated g/C Ratio	0.22	0.15	1.00	0.25	0.15	1.00	0.60	0.58	1.00	0.55	0.51	1.00
v/c Ratio	0.90	0.22	0.05	0.46	0.73	0.03	0.58	0.65	0.01	0.06	1.18	0.32
Control Delay	77.4	48.1	0.1	40.1	66.9	0.0	34.9	22.9	0.0	12.5	117.5	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	77.4	48.1	0.1	40.1	66.9	0.0	34.9	22.9	0.0	12.5	117.5	0.6
LOS	E	D	A	D	E	A	C	C	A	B	F	A
Approach Delay		58.1			48.4			23.4			94.6	
Approach LOS		E			D			C			F	
Queue Length 50th (m)	51.7	13.7	0.0	30.8	49.5	0.0	8.9	100.0	0.0	1.0	~327.7	0.0
Queue Length 95th (m)	70.2	24.7	0.0	45.0	70.2	0.0	#37.7	177.1	0.0	4.1	#388.9	0.0
Internal Link Dist (m)		42.6			349.6			93.8			234.3	
Turn Bay Length (m)	66.0		66.0			80.0	80.0		90.0	80.0		85.0
Base Capacity (vph)	268	389	1498	336	389	1493	157	1956	1498	197	1713	1517
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	0.90	0.15	0.05	0.46	0.51	0.03	0.58	0.65	0.01	0.06	1.18	0.32

Intersection Summary
Cycle Length: 130
Actuated Cycle Length: 130
Offset: 121 (93%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green
Natural Cycle: 115
Control Type: Actuated-Coordinated

Maximum v/c Ratio: 1.18

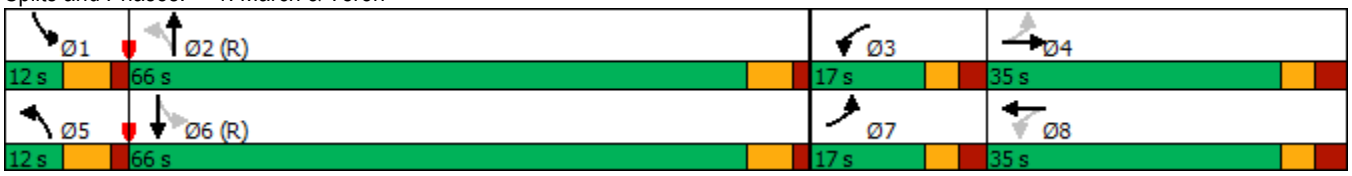
Intersection Signal Delay: 66.5	Intersection LOS: E
Intersection Capacity Utilization 114.1%	ICU Level of Service H
Analysis Period (min) 15	

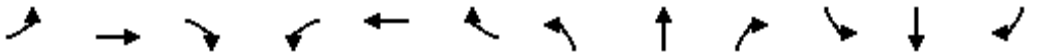
Description: NOTE: March Road Treated as north-south

~ 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: 1: March & Teron





Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	65	6	131	22	11	16	194	232	30	31	517	125
Future Volume (vph)	65	6	131	22	11	16	194	232	30	31	517	125
Satd. Flow (prot)	1695	1496	0	1695	1586	0	1695	1747	0	1695	1712	0
Flt Permitted	0.740			0.669			0.170			0.597		
Satd. Flow (perm)	1296	1496	0	1194	1586	0	303	1747	0	1057	1712	0
Satd. Flow (RTOR)		131			16			11			14	
Lane Group Flow (vph)	65	137	0	22	27	0	194	262	0	31	642	0
Turn Type	Perm	NA		Perm	NA		pm+pt	NA		Perm	NA	
Protected Phases		4			8		5	2			6	
Permitted Phases	4			8			2			6		
Detector Phase	4	4		8	8		5	2		6	6	
Switch Phase												
Minimum Initial (s)	10.0	10.0		10.0	10.0		5.0	10.0		10.0	10.0	
Minimum Split (s)	22.8	22.8		22.8	22.8		11.0	71.2		50.6	50.6	
Total Split (s)	35.8	35.8		35.8	35.8		20.6	71.2		50.6	50.6	
Total Split (%)	33.5%	33.5%		33.5%	33.5%		19.3%	66.5%		47.3%	47.3%	
Yellow Time (s)	3.0	3.0		3.0	3.0		4.0	3.3		3.3	3.3	
All-Red Time (s)	2.8	2.8		2.8	2.8		2.0	2.3		2.3	2.3	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)	5.8	5.8		5.8	5.8		6.0	5.6		5.6	5.6	
Lead/Lag							Lead			Lag	Lag	
Lead-Lag Optimize?							Yes			Yes	Yes	
Recall Mode	None	None		None	None		None	Min		Min	Min	
Act Effct Green (s)	11.6	11.6		11.6	11.6		52.2	52.6		33.5	33.5	
Actuated g/C Ratio	0.15	0.15		0.15	0.15		0.69	0.69		0.44	0.44	
v/c Ratio	0.33	0.40		0.12	0.11		0.44	0.22		0.07	0.84	
Control Delay	37.2	11.2		33.5	20.9		7.4	4.5		12.9	30.1	
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay	37.2	11.2		33.5	20.9		7.4	4.5		12.9	30.1	
LOS	D	B		C	C		A	A		B	C	
Approach Delay		19.6			26.5			5.7			29.3	
Approach LOS		B			C			A			C	
Queue Length 50th (m)	8.8	0.8		2.9	1.4		7.3	9.6		2.4	76.1	
Queue Length 95th (m)	22.0	15.9		10.0	8.7		17.7	22.5		7.8	137.0	
Internal Link Dist (m)		594.0			268.4			124.5			518.6	
Turn Bay Length (m)	60.0			15.0			40.0			45.0		
Base Capacity (vph)	527	685		485	654		483	1504		644	1049	
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	0.12	0.20		0.05	0.04		0.40	0.17		0.05	0.61	

Intersection Summary
Cycle Length: 107
Actuated Cycle Length: 76
Natural Cycle: 95
Control Type: Actuated-Uncoordinated
Maximum v/c Ratio: 0.84

Intersection Signal Delay: 20.0 | Intersection LOS: B
Intersection Capacity Utilization 82.2% | ICU Level of Service E
Analysis Period (min) 15

Splits and Phases: 3: Teron & Beaverbrook

Intersection	
Int Delay, s/veh	4.5

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	166	105	50	242	601	181
Future Vol, veh/h	166	105	50	242	601	181
Conflicting Peds, #/hr	7	7	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	Yield	-	Free	-	Yield
Storage Length	50	0	-	-	-	0
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	100	100	100	100	100	100
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	166	105	50	242	601	181

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	805	608	601	0	-	0
Stage 1	601	-	-	-	-	-
Stage 2	204	-	-	-	-	-
Critical Hdwy	6.08	6.23	4.13	-	-	-
Critical Hdwy Stg 1	5.43	-	-	-	-	-
Critical Hdwy Stg 2	6.03	-	-	-	-	-
Follow-up Hdwy	3.669	3.319	2.219	-	-	-
Pot Cap-1 Maneuver	369	495	974	-	-	-
Stage 1	530	-	-	-	-	-
Stage 2	772	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	347	492	974	-	-	-
Mov Cap-2 Maneuver	347	-	-	-	-	-
Stage 1	499	-	-	-	-	-
Stage 2	772	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	20.5	1.6	0
HCM LOS	C		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	EBLn2	SBT	SBR
Capacity (veh/h)	974	-	347	492	-	-
HCM Lane V/C Ratio	0.051	-	0.478	0.213	-	-
HCM Control Delay (s)	8.9	0.1	24.5	14.3	-	-
HCM Lane LOS	A	A	C	B	-	-
HCM 95th %tile Q(veh)	0.2	-	2.5	0.8	-	-

Intersection	
Int Delay, s/veh	0.5

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	5	20	277	16	24	699
Future Vol, veh/h	5	20	277	16	24	699
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	100	100	100	100	100	100
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	5	20	277	16	24	699

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	1032	285	0	0	293	0
Stage 1	285	-	-	-	-	-
Stage 2	747	-	-	-	-	-
Critical Hdwy	6.42	6.22	-	-	4.12	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	-	-	2.218	-
Pot Cap-1 Maneuver	258	754	-	-	1269	-
Stage 1	763	-	-	-	-	-
Stage 2	468	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	250	754	-	-	1269	-
Mov Cap-2 Maneuver	250	-	-	-	-	-
Stage 1	763	-	-	-	-	-
Stage 2	453	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	12	0	0.3
HCM LOS	B		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	537	1269	-
HCM Lane V/C Ratio	-	-	0.047	0.019	-
HCM Control Delay (s)	-	-	12	7.9	0
HCM Lane LOS	-	-	B	A	A
HCM 95th %tile Q(veh)	-	-	0.1	0.1	-