100 Steacie Drive

TIA Report

Prepared for:

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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 licensed[1] 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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TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

LIST OF APPENDICES

TIA Report

Parsons has been retained by Brigil Construction to prepare a TIA in support of a Site Plan Application (SPA) for a residential apartment building development located at 100 Steacie Dr. This document follows the new TIA process, as outlined in the City Transportation Impact Assessment (TIA) Guidelines (2017). The following report represents Step 3 of the TIA submission process.

1. Screening Form

The Screening Form confirmed the need for a TIA as the proposed development meets both the Trip Generation and Location triggers. The Trip Generation trigger is met based on the number of proposed units, while the Location trigger is based on the proximity of the development site to a future BRT station (within 600m radius) along March Rd, at the intersection of March/Carling/Station and identified as a Design Priority Area (DPA) within the New Official Plan. The Screening Form and City comment responses to the previous Zoning By-Law Amendment (ZBLA) Report have been provided in **Appendix A**.

2. Scoping Report

2.1. Existing and Planned Conditions

2.1.1. PROPOSED DEVELOPMENT

The proposed development site is located at 100 Steacie Dr and consists of two 4-storey apartment buildings housing a total of 214 residential units and providing 214 total parking spaces (171 resident and 43 visitor). The development is anticipated to be constructed in a single phase, by horizon year 2025. The site proposes a single driveway access leading to underground parking on the east quadrant of the site, serviced from the north side of the cul-de-sac at the west extremity of Steacie Dr. The property is currently zoned as R4Y[2809] S463-h which allows a development of this scale to be built there. The local context of the site with study boundary is displayed in **Figure 1** and the proposed Site Plan is illustrated in **Figure 2**.

Figure 1: Local Context

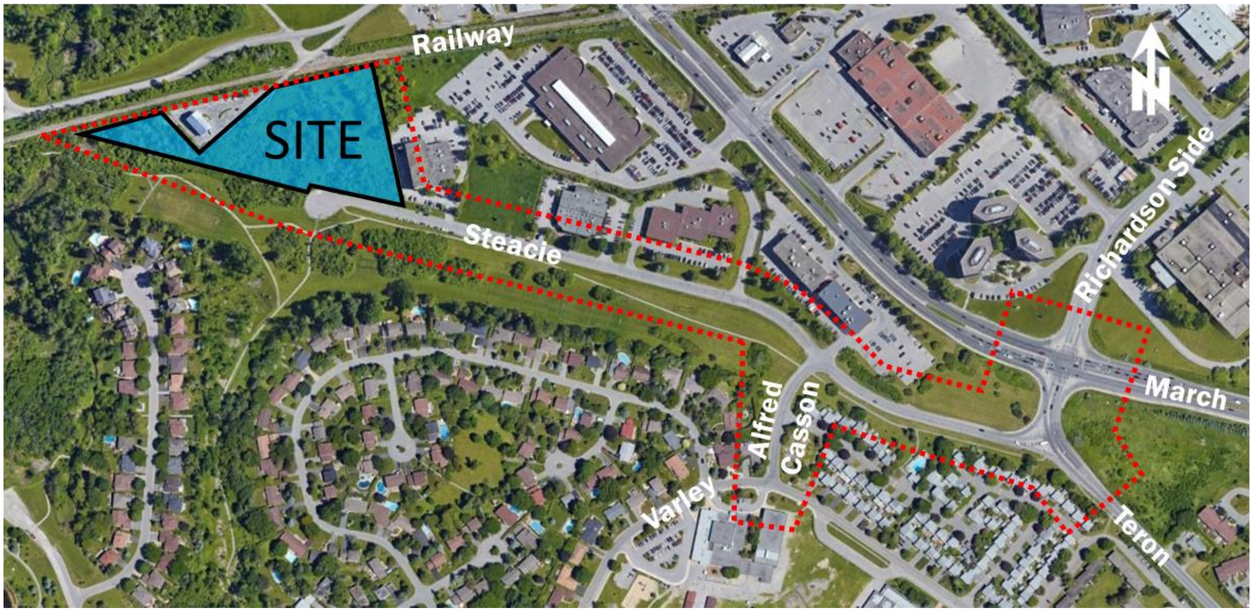


Figure 2: 100 Steacie Drive Site Plan

2.1.2. EXISTING CONDITIONS

Area Road Network

March Road is typically a north-south arterial roadway, which extends from the Highway 417 in the south (continues as Eagleson south of the highway) to Mississippi Mills in the north-west. The cross section within the study area consists of an east-west divided roadway with two travel lanes in each direction and auxiliary left-turn and right-turn lanes at main intersections. March Rd 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 Dr in the south to Carling Ave 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.

Varley Drive is a large crescent collector roadway extending from Beaverbrook Rd on both terminuses. The cross section consists of a single travel lane in each direction with a sidewalk on the south side only. The speed limit is posted 40 km/h.

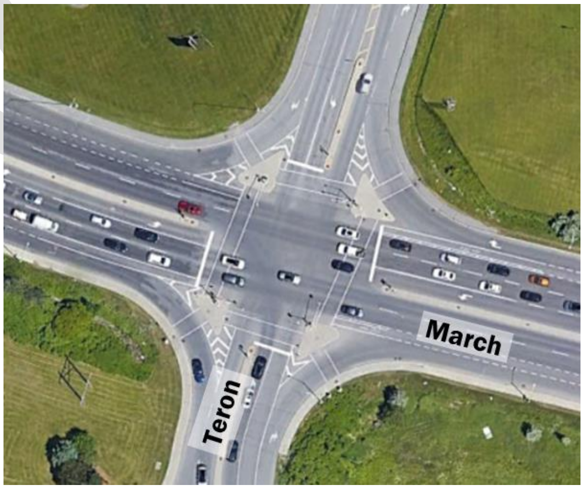
Steacie Drive is an east-west local roadway extending from Teron Rd in the east and terminating at a cul-de-sac in the west. The cross section consists of a single travel lane in each direction with a multi-use pathway on the south side. The speed limit is assumed to be 50 km/h.

Alfred Casson Way is a short north-south local roadway extending from Steacie Dr in the north to Varley Dr in the south. The cross section consists of a single travel lane in each direction with an asphalt pathway on the west side. The speed limit is posted 40 km/h.

Existing Study Area Intersections

March/Teron

The March/Teron intersection is a signalized four-legged intersection. The northbound and southbound (Teron) approaches both consist of a left-turn lane, a through lane and a channelized right-turn lane. The east and westbound (March) approaches both consist of a left-turn lane, two through lanes and a channelized right-turn lane. There are no restricted movements at this intersection.



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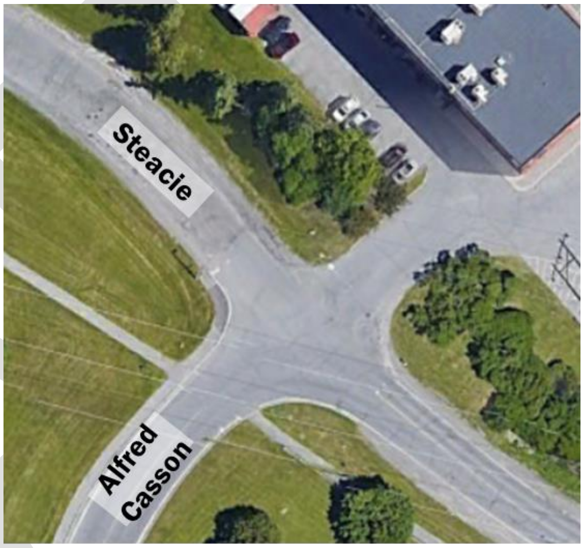
Steacie/Teron

The Steacie/Teron intersection is a non-signalized three-legged intersection. The eastbound (Steacie) approach consists of a single left-turn lane operating by a stop sign and a channelized right-turn lane operating by a yield sign. The northbound (Teron) approach consists of a left-turn lane, a through lane and a right-turn lane that extends from the March/Teron intersection. The southbound (Teron) approach consists of a channelized right-turn and a through lane. There are no restricted movements at this intersection.

Steacie/Alfred Casson

The Steacie/Alfred Casson intersection is an unsignalized four-legged intersection, with all-way STOP control provided. All approaches of the intersection consist of a single, all-movement lane. There are no restricted movements at this intersection.



Varley/Alfred Casson

The Varley/Alfred Casson intersection is an unsignalized four-legged intersection, with all-way STOP control provided. All approaches except for the south approach consist of a single, all-movement lane. The south approach is a one-way inbound only.

Existing Driveways to Adjacent Developments

As shown in **Figure 3**, there are five adjacent driveways (highlighted in red) within the proposed site's driveway and Alfred Casson Way. All driveways are located on the north side of Steacie Dr, with accesses from closest to furthest away from the proposed site's driveway being:

- 62 Steacie Dr: an access to a two-floor office building with approximately 96 parking spaces, located approximately 105m east of the proposed site access.
- 50 Steacie Dr: two accesses to a single floor child learning center with approximately 62 parking spaces, located approximately 190 and 260m east of the proposed site access.
- 36 Steacie Dr: an access to a single-floor office building with approximately 86 parking spaces, located approximately 280m east of the proposed site access.
- 365 March Rd: an access that is blocked off to Steacie Dr by a concrete barrier which used to provide access to 365 March Rd. This abandoned access is located approximately 340m east of the site.

Figure 3: Adjacent Driveways

Existing Area Traffic Management Measures

Below are the existing area traffic management measures within the study area:

- Speed display devices on Teron Rd, south of Steacie Dr.
- 40km/h neighbourhood south of Steacie Dr on Alfred Casson.

Pedestrian/Cycling Network

Figure 4 below illustrates the pedestrian and cycling networks as shown in GeoOttawa. Also, the "Existing Study Area Intersections" exhibits provide an up-close view of the facilities available at the study area intersections.

Pedestrian sidewalk facilities are provided within the entirety of the study area along both sides of March Rd, as well as the west side of Teron Rd. It is understood that a new sidewalk facility will be provided on the east side of Teron Rd as part of the 1131 and 1151 Teron Rd development. An approximate 2m wide pedestrian pathway runs on the south side, along the entire length of Steacie Dr. Given that the pathway is less than 3m wide, it does not meet multi-use pathway (MUP) standards and is not adequate for shared cycling and pedestrian use. The pathway forms internal connections between the surrounding residential areas, as well as provides a connection across the rail corridor to the north of the site. Alfred Casson Way has an asphalt pathway on the west side of the road and Varley Dr has a sidewalk on the south side of the road.

Curb-side bike lanes are currently available on both sides of March Rd, as well as both sides of Teron Rd south of Steacie Dr (although GeoOttawa illustrates the bike lanes on Teron Rd to reach up to March Rd). As shown in the "Existing Study Area Intersections" exhibits, the bike lanes on March Rd form pocket lanes at the intersection of March/Teron, where they move to the left of the right-turn lanes. Although not recommended given its width, the pathway on the south side of Steacie Dr can also be used by cyclists. Cyclists may also bike on Steacie Dr as it is a local road with cul-de-sac treatment.

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Figure 4: Existing Active Transportation

Transit Network

The transit network for the study area is illustrated in **Figure 5**, with **Figure 6** identifying the location of the bus stops relative to the site using blue circles. Transit route maps have been provided in **Appendix B**.

Transit service within the vicinity of the site is currently provided by OC Transpo rapid transit route #63, local routes #64, #110, #166 and #168 and special school service for students routes #660 and #674. Route #63 provides frequent all-day service. Bus stops for Routes #63, #64, #110, #660 and #674 are located at the Steacie/Teron intersection, as well as along March Rd.

Figure 5: Area Transit Network

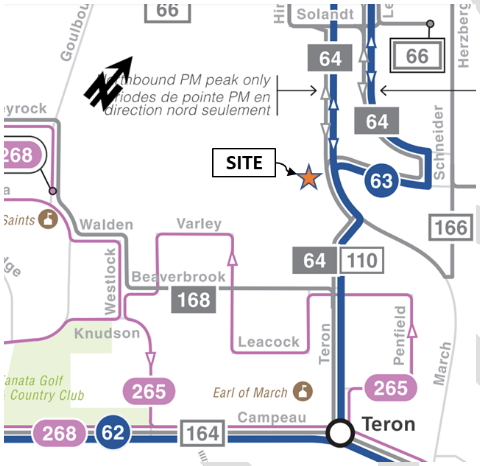
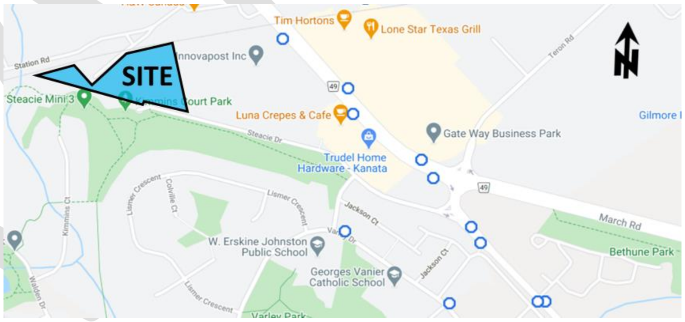


Figure 6: Bus Stop Locations



Peak Hour Travel Demands

The existing peak hour traffic volumes within the study area, as illustrated in **Figure 7** for vehicles and **Figure 8** for active transportation, were obtained from the City of Ottawa for the March/Teron (December 2023 count), Steacie/Teron (February 2020 count), and Varley/Alfred Casson (April 2019 count) intersections and conducted recently by Parsons at the Steacie/Alfred Casson (November 2023 count) intersection. The peak hour traffic volume count data has been provided in **Appendix C**.

It is noteworthy that the March/Teron count in 2023 is lower than 2017, likely to do with change in work habits post Covid-19 pandemic, with more work from home and flexible schedules. The latest counts at Steacie/Teron are from February 2020, pre-Covid-19 pandemic, and show volumes upwards of 150 to 200 higher than adjacent intersection count of March/Teron on the north-south movements on Teron Rd. To account for this reduction in

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commuter traffic patterns, the north-south movements (though on Teron Rd), have been balanced to the 2023 March/Teron count.

Figure 7: Existing Peak Hour Traffic Volumes - Vehicles

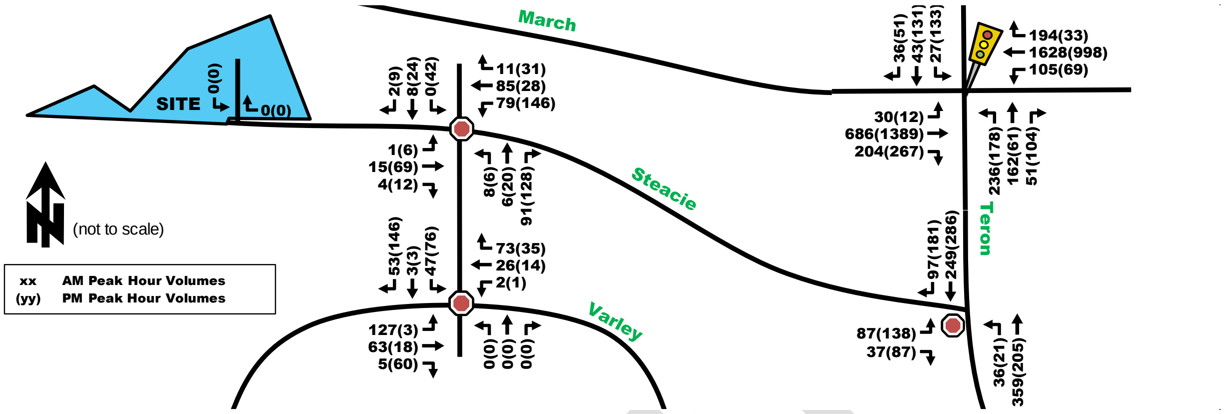
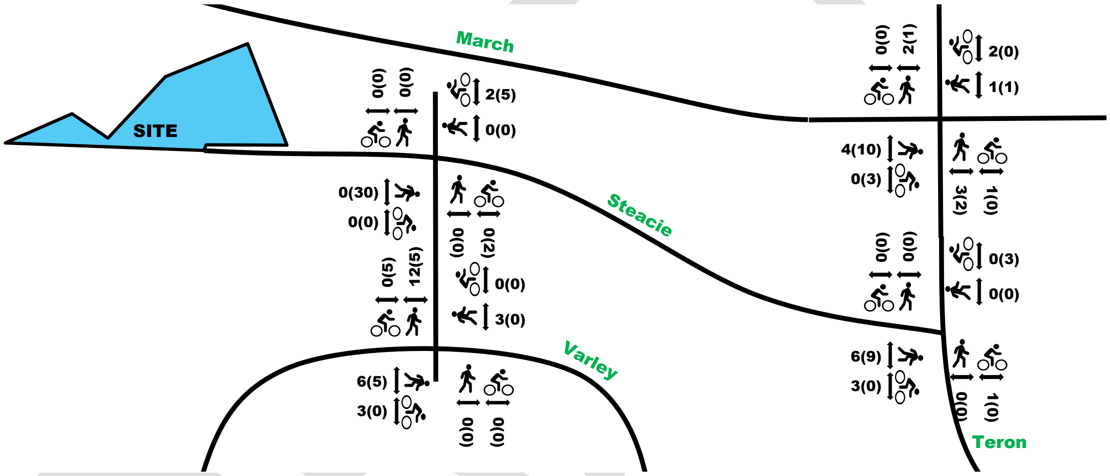


Figure 8: Existing Peak Hour Volumes – Active Transportation



Existing Road Safety Conditions

A five-year collision history data (2017-2021, inclusive) was obtained from the City of Ottawa Open Data for the study area intersections, as well as road segments within the study area. Detailed collision analysis has been provided in **Appendix D**.

Upon analyzing the collision data, the total number of collisions observed within the study area was determined to be 64 collisions within the past five-years. The majority of the collisions (53 or 82%) resulted in property damage only, 10 or 16% in non-fatal injury and 1 collision which resulted in a fatality. The fatal collision involved a single vehicle striking a pedestrian mid-block north of the March/Teron intersection. Exact details regarding the collision are not available; however, the pavement was wet, it was raining and dark, and the vehicle was reported "out of control". Within the study area, the type of impacts that were reported include: 34 (53%) rear end, 10 (16%) sideswipe, 8 (13%) turning movement, 8 (13%) single vehicle other, 3 (5%) angled and 1 (2%) approaching.

Within the study area, the quantity of collisions, collisions per million entering vehicles (MEV) and/or distance of mid-block at each location has occurred at a rate of:

- March/Teron: 39, MEV 0.53
- Steacie/Teron: 2, MEV 0.10
- Mid-block March N of Teron: 14 (350m)
- Mid-block March S of Teron: 7 (900m)

- Steacie/Alfred Casson: 0, MEV 0.00
- Varley/Alfred Casson: 0, MEV 0.00
- Mid-block Teron S of March: 2 (750m)
- Collisions with Pedestrians: 1 (2%)
- Collisions with Cyclists: 2 (3%)

Overall, the study area intersections do not show high frequency of collisions. Although March/Teron has a much higher number of collisions than the other study area intersections, its daily traffic volume is significantly higher compared to other study intersections and when averaged, does not show a significant number of collisions. Of note, a cyclist was hit at this intersection during a turning movement which resulted in property damage only.

The March Rd segment between Gateway Mall signalized intersection (approximately 350m northwest of Teron/March intersection) and Teron Rd showed a much higher frequency of collision than other mid-block segments per meter of segment. This short stretch of road features a curvature which may impede vision ahead as well as four driveway accesses which increases vehicle manouvers with drivers slowing down to turn, switching lanes, coming out of accesses, etc. The increased number of vehicles likely results in the higher count of collisions. A pedestrian fatality occurred in this section in 2021, approximately 200m northwest of the Teron/March intersection where the pedestrian attempted to cross March Rd at an unsignalized mid-block segment and was struck by a northbound vehicle. A cyclist was also hit within this section, resulting in non-fatal injury. Once the March BRT project begins, it is anticipated that a more in-depth review of collision patterns will be completed to address any potential deficiencies.

2.1.3. PLANNED CONDITIONS

Planned Study Area Transportation Network Changes

Based on the City of Ottawa's 2013 Transportation Master Plan (TMP), a future bus rapid transit (BRT) corridor is proposed on March Road, between Eagleson Rd and Solandt Rd based on the 2031 Affordable Network. The BRT would have two major stations near the subject development's site, which are located at the March/Carling/Station and the March/Teron intersections. Further north along March Rd, between Solandt Rd and Maxwell Bridge Rd, the TMP's affordable network illustrates transit priority (isolated measures). 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. An update of the TMP is currently ongoing, expected completion by 2025, and will confirm planned infrastructure projects along with their estimated implementation schedules. Within the 2013 TMP, March Rd is classified as a spine bike route, and within the Crosstown Bikeway Network (March 1, 2023), March Rd is classified as a crosstown bikeway.

The New Official Plan (2021) further expands the BRT to Kanata North based on Schedule A. The site is located within the Kanata North Economic District, with March Rd classified as a corridor mainstreet and Teron Rd a minor corridor in Schedule B5.

Other Area Developments

The following section outlines adjacent developments in the general area that were considered in the TIA. **Figure 9** illustrates the site context for other area developments near the subject site with a description of each development below:

1 – 2505 Solandt Road

An office building is proposed consisting of approximately 198,615 ft^2 of total floor area in an 8-storey building. The anticipated buildout year of the development was 2021, however it has not been built yet. Based on the TIA prepared by Novatech in October 2019, the development is expected to generate 165 and 170 veh/h during the morning and afternoon peak hours, respectively, which will be added to background volumes.

2 – 3026 Solandt Road

An office building is proposed by Colonnade Bridgeport consisting of approximately 100,000 ft^2 of total floor area. The anticipated buildout year of the development was 2021, however it has not been built yet. 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, which will be added to background volumes.

3 – 329 March Road

Proposed 4,102 ft^2 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, which will be added to background volumes.

4 – 1243 Teron Road

An industrial building is proposed at 1243 Teron Rd and will consist of a total area of 9,281 m^2. The estimated year of occupancy for the development was 2020 however it has not been built yet. 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.

5 – 1131 & 1151 Teron Road

TempBridge Inc proposes a mixed-use development consisting of 139 residential units, 7,600 ft^2 commercial space and 3,900 ft^2 of sit-down restaurant. The site is located in the southeast area of the March/Teron intersection and is expected to be constructed in two phases. Based on the TIA submitted by Parsons in November 2019, Phase 1 is expected to generate a negligible amount of traffic (less than 10 veh/h during peak hours), while Phase 2 is expected to generate 50 to 79 veh/h during both peak hours. Phase 2 is currently under construction, which will be added to background volumes.

6 – 100 Weeping Willow

Proposed increase in residential development from 85 units to 142 units. The TIA (prepared by GHD) projects vehicle trip generation of approximately 50 veh/h during peak hours, which will be added to background volumes.

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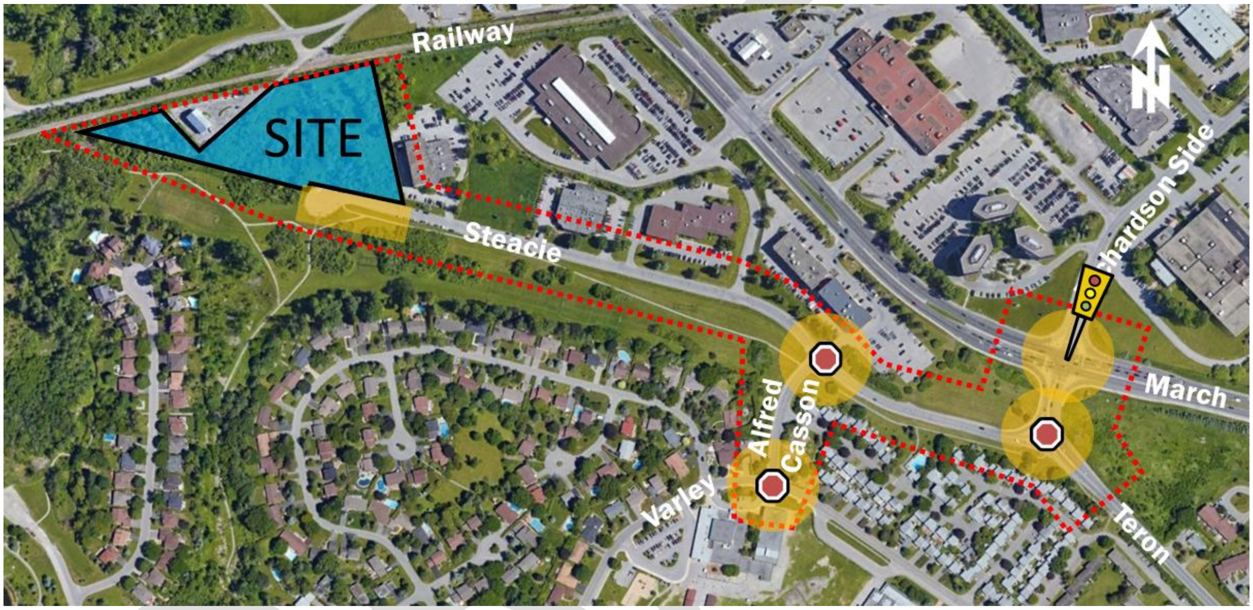
Figure 9: Adjacent Developments

2.2. Study Area and Time Periods

The proposed site is a residential development that is planned to be constructed in 2025. As such, the horizon years being analyzed in this report are the 2025 and 2030 (five-years after full buildout) horizon years, 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.
- Steacie/Alfred Casson intersection.
- Varley/Alfred Casson intersection.
- Along Steacie Dr adjacent to the site.

Figure 10: Study Area



2.3. Exemption Review

The following modules/elements of the TIA process are recommended to be exempt in the subsequent steps of the TIA process, based on the City's TIA guidelines and the application type as Site Plan Application:

Table 1: Exemptions Review Summary

Module	Element	Exemption Consideration
4.3 New Street Networks	All elements	Only required for plans of subdivisions.
4.8 Review of Network Concept	All elements	The site is not expected to generate 200 person trips more than the established zoning.

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3. Forecasting

3.1. Development Generated Travel Demand

3.1.1. TRIP GENERATION AND MODE SHARES

Trip Generation Rates

The proposed development will consist of two 4-storey apartment buildings containing 214 residential units. The appropriate trip generation rates for mid-rise apartment units were obtained from the 2020 TRANS Trip Generation Manual. The Manual provides person-trip rates during the peak AM and PM periods (i.e. 7am-9:30am and 3:30pm-6pm). The trip rates are summarized in **Table 2** below. Note that within the TRANS 2020, any building higher than 2-storeys is classified as "high-rise".

Table 2: Proposed Development Trip Rates

Land Use	ITE/TRANS Designation	Data Source	Trip Rates	
			AM Peak	PM Peak
Residential	"High-Rise Apartments"	TRANS	T = 0.80(du);	T = 0.90(du);
Note: T = Average Vehicle Trip Ends; du = Dwelling unit				

Using the TRANS Trip Generation rates from **Table 2**, the total amount of person trips generated by the proposed 183 residential units was calculated by multiplying the rate by the number of units, for the morning and afternoon peak periods, as shown in **Table 3**.

Table 3: Residential Units Peak Period Person Trip Generation

Land Use	Dwelling Units	AM Peak Period Person Trips	PM Peak Period Person Trips
High-Rise Apartments	214	171	193

The proposed development's residential land use is anticipated to generate a total of approximately 170 and 195 person trips during the morning and afternoon peak periods, respectively. The total peak period person trips in **Table 3** are then divided into different travel modes using mode share percentages obtained from the 2020 TRANS Manual for the "Kanata - Stittsville" district. **Table 4** provides the travel mode breakdown for the proposed high-rise apartments.

Table 4: High-Rise Apartments Peak Period Trips Mode Shares Breakdown

Travel Mode	Mode Share	AM Peak Period Person Trip	Mode Share	PM Peak Period Person Trips
Auto Driver	43%	73	55%	106
Auto Passenger	26%	44	19%	37
Transit	28%	47	21%	41
Cycling	0%	0	0%	0
Walking	4%	7	5%	9
Total Person Trips	**100%**	**171**	**100%**	**193**

Standard traffic analysis is usually conducted using the morning and afternoon peak hour trips as they represent a worst-case scenario. In the 2020 TRANS Manual, Table 4 provides conversions rates from peak period to peak hours for different mode shares. The conversion rates are provided in **Table 5** below.

Table 5: Peak Period to Peak Hour Conversion Factors (2020 TRANS Manual)

Travel Mode	Peak Period to Peak Hour Conversion Factors	
	AM	PM
Auto Driver and Passenger	0.48	0.44
Transit	0.55	0.47
Bike	0.58	0.48
Walk	0.58	0.52

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Using the conversion rates in **Table 5** and the peak period person trips for different travel modes in **Table 4**, the peak hour trips for different travel modes can be calculated as shown in **Table 6**.

Table 6: Residential Peak Hour Trips Generated - TRANS Mode Share

Travel Mode	Mode Share	AM Peak Hour (Trips/h)			Mode Share	PM Peak Hour (Trips/h)		
		In	Out	Total		In	Out	Total
Auto Driver	43%	11	24	35	55%	27	20	47
Auto Passenger	26%	7	14	21	19%	9	7	16
Transit	28%	8	18	26	21%	11	8	19
Cycling	0%	0	0	0	0%	0	0	0
Walking	4%	1	3	4	5%	3	2	5
Total Person Trips	100%	27	59	86	100%	50	36	87

As shown above, the proposed development is anticipated to generate approximately 85 total person trips, 35 to 45 total vehicle trips, 25 to 20 total transit trips and 5 walking trips during the AM and PM peak hours respectively.

Although a future rapid transit station (BRT) is proposed approximately 600m radius from the site at March/Teron Station within the TMP and Official Plan, City Staff have suggested that this transit priority expansion is not forecasted within the study horizon years. If and when it is built, it is anticipated that vehicular trips will decrease, and transit trips will increase. It will be assumed that no rapid transit corridor along March Road will be in place for all horizon years. However, the site is still approximately 900m walk to existing transit stops via public walking infrastructure (shorter via private property), including rapid route #63 with service every 15 minutes or less, which should promote further transit use compared to the TRANS mode share average for the entirety of Kanata-Stittsville. The site is also located near pathways, which may attract some cyclists. For this reason, a partial adjustment in mode shares as shown in **Table 7** is proposed.

Table 7: Future Mode Share Targets Assuming no BRT on March Road

Travel Mode	TRANS Residential Mode Shares		Future Target Mode Share (AM & PM)	Residential Modal Share Target Rationale
	AM	PM		
Auto Driver	43%	55%	45%	A reduction in driver mode share from TRANS is justifiable given the close proximity to various bus routes including rapid route #63.
Auto Pass.	26%	19%	15%	
Transit	28%	21%	30%	Development located within 900m of various active transit routes.
Cycling	0%	0%	5%	Development is located near pathways.
Walking	4%	5%	5%	

The resultant trip generation using the mode shares from **Table 7** have been summarized in **Table 8**.

Table 8: Residential Peak Hour Trip Generation – Custom Mode Share

Travel Mode	Mode Share	AM Peak Hour (Trips/h)			PM Peak Hour (Trips/h)		
		In	Out	Total	In	Out	Total
Auto Driver	45%	12	27	39	23	16	39
Auto Passenger	15%	4	9	13	8	5	13
Transit	30%	8	18	26	15	11	26
Cycling	5%	1	3	4	3	2	4
Walking	5%	1	3	4	3	2	4
Total Person Trips	100%	27	59	86	50	36	87

As shown in the table above, the proposed development is anticipated to generate approximately 85 total person trips, 40 vehicle trips two-way, 25 transit trips and 10 active travel trips during the AM and PM peak hours.

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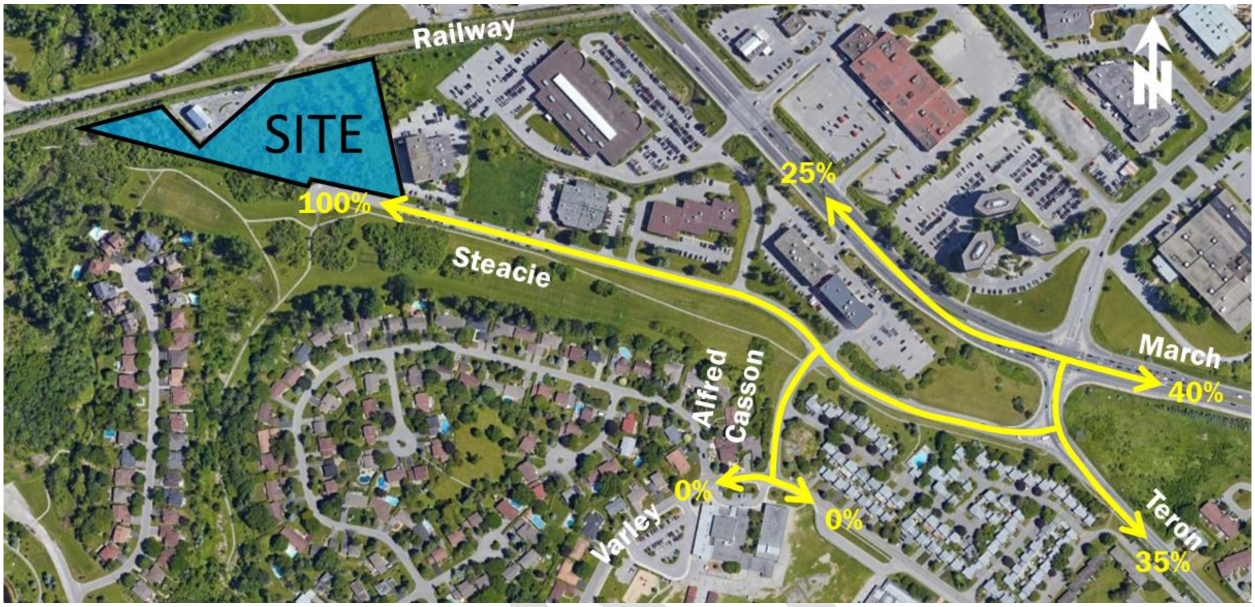
3.1.2. TRIP DISTRIBUTION AND ASSIGNMENT

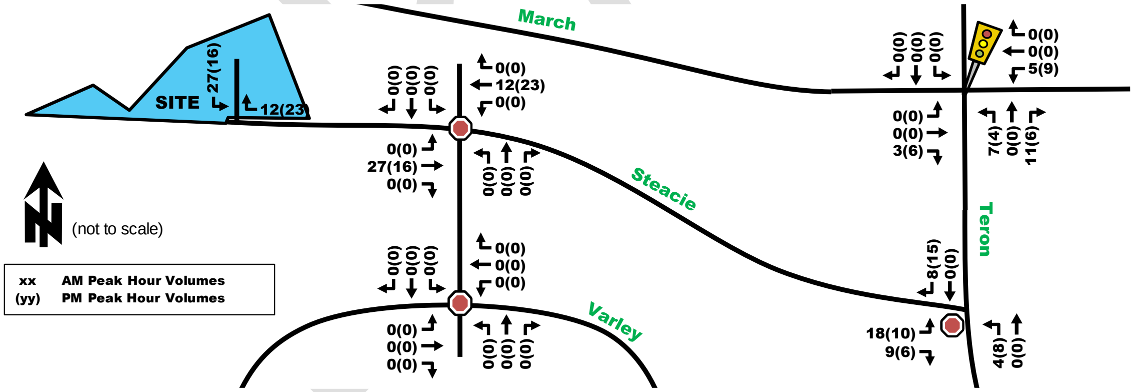
Based on the 2011 OD Survey (Kanata - Stittsville district) and the location of adjacent arterial roadways and neighbourhoods, the distribution of site-generated traffic volumes was estimated as shown in **Figure 11**. Note that no trips were added to Varley Dr, but it has been identified as a potential unlikely route.

Figure 11: Site Generated Traffic Percent Distribution



The anticipated 'new' auto trips for the proposed development from **Table 8** were then assigned to the road network with the distribution shown above, as shown in **Figure 12**, for the total site-generated traffic for custom mode share.

Figure 12: Site-Generated Traffic Using Custom Mode Shares



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3.2. Background Network Traffic

3.2.1. TRANSPORTATION NETWORK PLANS

Refer to Section 2.1.3: Planned Study Area Transportation Network Changes.

3.2.2. BACKGROUND GROWTH

The background traffic growth through the immediate study area (summarized in **Table 9**) was calculated based on historical traffic count data (years 2009, 2010, 2011, 2017 and 2023) provided by the City of Ottawa at the March/Teron intersection. Detailed analysis of the background growth is included in **Appendix E.**

Table 9: March/Teron Historical Background Growth (2009 – 2023)

Time Period	Percent Annual Change				
	North Leg	South Leg	East Leg	West Leg	Overall
8 hrs	-1.35%	-1.38%	-1.11%	-0.75%	**-1.28%**
AM Peak	-1.59%	-2.08%	-0.48%	0.34%	**-1.43%**
PM Peak	-1.84%	-1.34%	-2.01%	-2.31%	**-1.71%**

Overall, most movements have shown to decrease over the years, particularly post-Covid-19. The TRANS Regional Model, provided in **Appendix E** was also used to further estimate projected future volumes. Overall, the TRANS Model shows an increase per annum of approximately 1% for the northbound and 0% for the southbound movements on Teron Rd, 1% for the eastbound movement and 0.5% for the westbound movement on March Rd.

Based on the historic traffic count patterns and the TRANS Regional Model forecasts, a 0.5% in annual growth will be carried forward for future background volumes on Teron Rd and March Rd. It is acknowledged that if the BRT corridor along March Rd is built sooner, that background volumes are expected to decrease to below existing traffic counts.

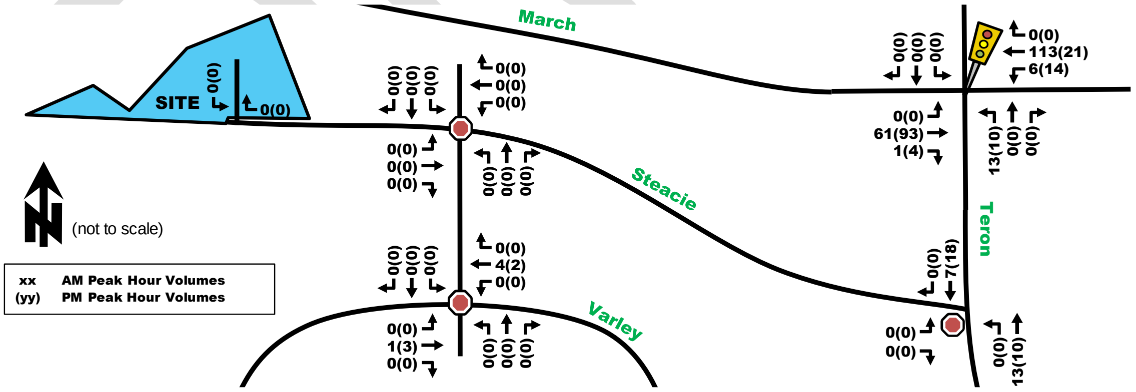
3.2.3. OTHER DEVELOPMENTS

Description of other area developments taking place within the study area was provided in **Section 2.1.3** - Other Area Developments. 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:

- 2505 Solandt Rd
- 3026 Solandt Rd
- 329 March Rd
- 1131 & 1151 Teron Rd
- 100 Weeping Willow Ln

All other area developments are assumed to be built prior to completion of this development and their volumes will be reflected in the 2025 and 2030 horizon background volumes.

Figure 13: Combined All Other Area Development Background Volumes



Layering the projected background growth rate and other area development volumes, then the 2025 and 2030 background volumes can be derived, as shown in **Figure 14** and **Figure 15** respectively.

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Figure 14: Future Background 2025 Traffic Volumes

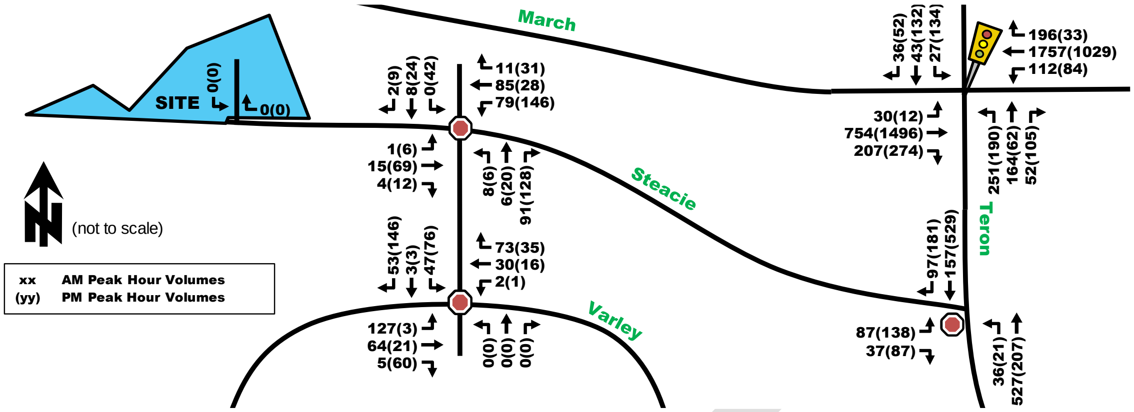
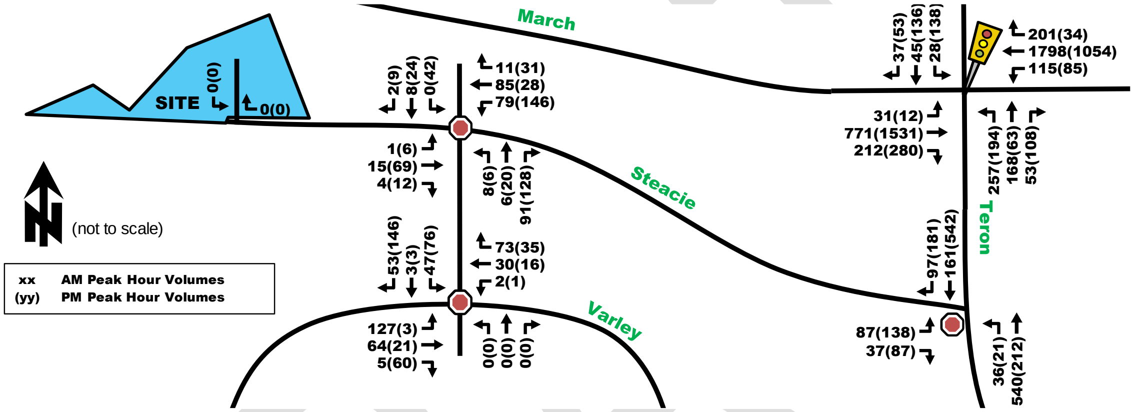


Figure 15: Future Background 2030 Traffic Volumes



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 12** onto the respective total future background traffic volumes in **Figure 14** and **Figure 15**. The resulting total projected traffic volumes of 2025 and 2030 are illustrated in **Figure 16** and **Figure 17**, respectively.

Figure 16: Total Projected 2025 Traffic Volumes

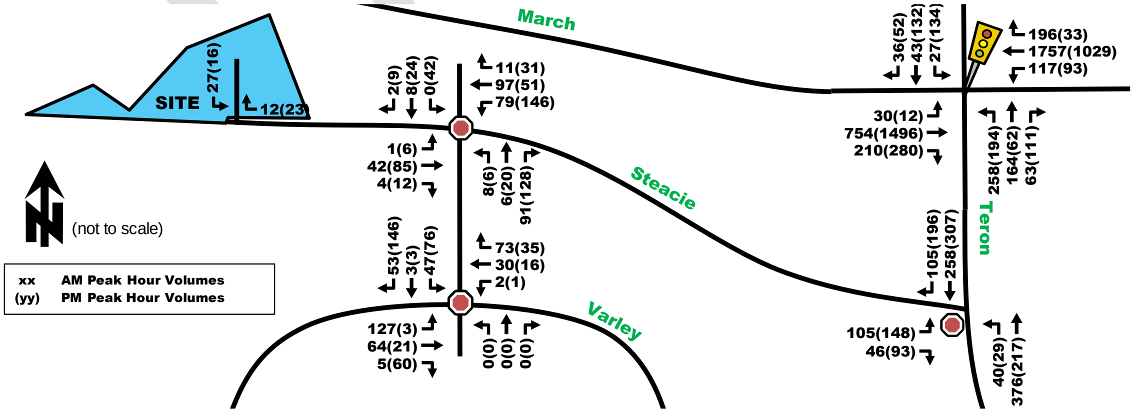


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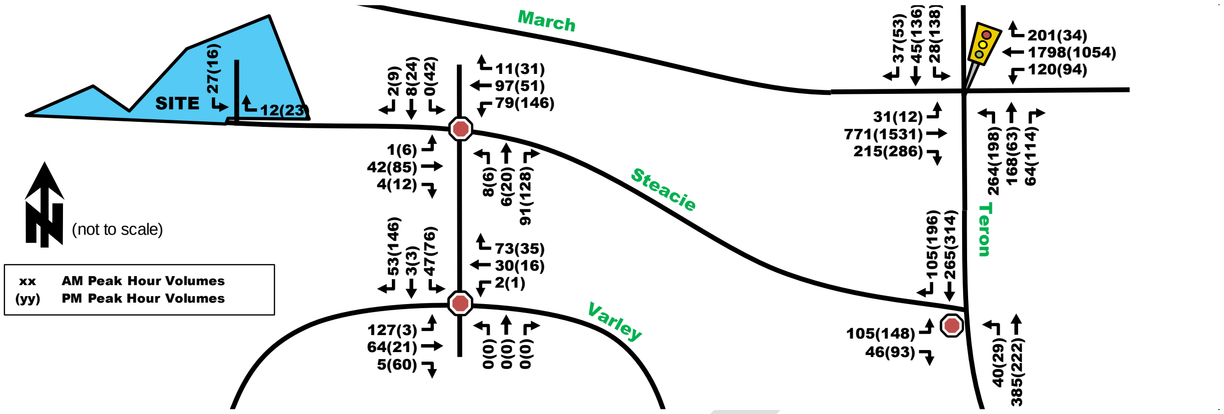
Figure 17: Total Projected 2030 Traffic Volumes



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 7**, capacity limitations may be experienced at the intersection of March/Teron due to the following reasons:

- The volume of through traffic on March Rd is expected to increase from a peak of approximately 1,650 veh/h in the westbound direction in the AM peak in existing conditions to approximately 1,800 veh/h by horizon year 2030. At the intersection of March/Teron, March Rd 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 Rd during peak hours may not be possible.
- The NBL from Teron Rd onto March Rd experiences a high traffic volume that ranges from approximately 235 veh/h in existing conditions to 265 veh/h by horizon year 2030, during the AM peak hour. Typically, this volume would be approaching two left-turn lanes to operate within acceptable standards. Currently, there is only a single left-turn lane available and it has to compete for green time with the much larger east-west traffic on March Rd.

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

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

March Rd already consists of a six-lane cross-section from Campeau Dr to Herzberg Rd, approximately 1km east of Teron Rd. At the intersection of March/Teron, March Rd 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 east and westbound 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 to 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. Increasing the vehicular capacity on this corridor would also compete against other future incentives such as the March Rd BRT. 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.

Therefore, this modification to the intersection may not be appropriate from a traffic operations improvement perspective.

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Teron Rd Double Left-Turn Lane

The NB approach of Teron Rd currently consists of a through lane, a channelized auxiliary right-turn lane and an auxiliary left-turn lane. To accommodate the high NBL turns, the city could rearrange the lane designations and provide a left-turn lane, a shared left-through lane and keep the channelized right-turn lane. March Rd already has two receiving lanes, so accommodating this effective double-left would not require modifications to March Rd. To accommodate this type of lane assignment, the northbound and southbound movements would need to be separated, creating two split phases. This modification would increase the capacity for the NBL movement but would reduce capacity on March Rd as more time would be required to be allotted to the north and southbound movements on Teron Rd.

Additionally, this modification is expected to increase the amount of traffic along Teron Rd, which already acts as a bypass to March Rd through Kanata. This option may be hard to implement as Teron Rd is situated in a more urban setting than March Rd and there is already sensitive community regarding traffic volumes on Teron Rd. It is noteworthy that Teron Rd is a major collector road and is designed to carry up to 5,000 vehicles per day or 600 vehicles per peak hour based on TIA Guideline Thresholds. The 2030 full buildout horizon anticipates volumes on Teron Rd approaching this threshold. **Section 4.6** will provide further detail into traffic volumes and road classification. **Section 4.9** will analyze the impacts of providing a split phase with dual northbound left-turns.

Convert Teron/Steacie to a Right-In Right-Out Only

The intersection of Teron/Steacie is located approximately 50m south of March/Teron intersection. The northbound left-turn storage lane extends past the intersection of Teron/Steacie (approximately 100m long) and provides a median break around 40m south of March Rd. If this median break were to be closed (intersection converted to right-in-right-out only), it would reduce the number of vehicles exiting from Steacie Dr towards March Rd and would likely deviate traffic heading to Steacie Dr from the south on Teron Rd, thus reducing the number of vehicles at the intersection of March/Teron or within influence of it. By closing the median, it would also reduce friction from left-turning vehicles and improve efficiency for the northbound left-turn at March/Teron. This would reduce queues for the northbound left-turn and improve overall intersection operations. This closure of the median break would however limit access to local residents.

March Rd BRT

The March Rd conversion to BRT was cited in the 2013 City TMP within the 2031 affordable network. City staff confirmed this project has been delayed and is no longer within the affordable network plan nor expected within the 2031 horizon. It is important to stress the importance of this infrastructure to the Kanata North community, particularly as it relates to March Rd. 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 Rd. Therefore, of all the options that could be implemented to improve capacity along March Rd at Teron Rd, 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. Analysis

4.1. Development Design

Pedestrian/Cycling Routes and Facilities

The site is located within 600m radius to a future BRT corridor on March Rd according to the Transportation Master Plan (TMP) and within the Official Plan, although these improvements are not anticipated within the horizon study years.

To give priority to active transportation users, either recreationally or to connect to the future transit facilities, the developer has proposed providing sidewalks along the entire site frontage and slightly beyond their southern

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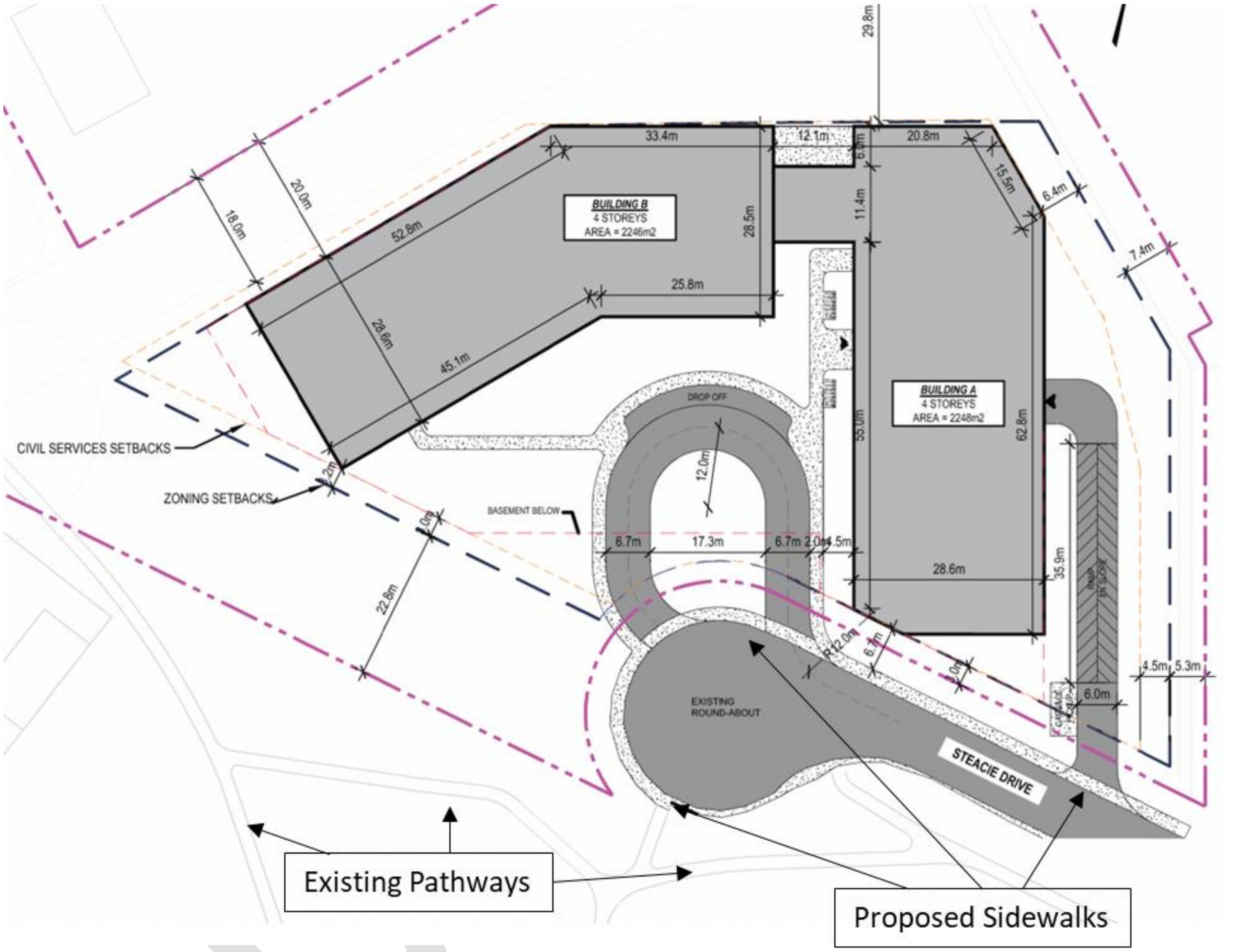
property limits to connect to the existing pathway facilities on the south side of Steacie Dr. The pathway on the south side of Steacie Dr is approximately 2m wide, which is subpar to contemporary standards. It is recommended that the City of Ottawa urbanize Steacie Dr and widen the pathway to a MUP with a minimum 3m cross-section. Additionally, the client has provided a sidewalk on the north side of Steacie Dr extending through the garage driveway (following SC37.1 specs) for a future sidewalk connection if the City were to add any beyond the site property limits. **Figure 18** below illustrates the proposed active transportation connectivity from the site to the existing pathway facilities on Steacie Dr.

Figure 18: Active Transportation Connectivity to City Facilities



The site proposes 107 bicycle parking spaces which will be conveniently provided indoors at ground level, adjacent to the building lobby and near active transportation facilities. The combination of easily accessible cycling facilities and convenient bicycle parking, plus integrated network of sidewalks and pathways provides a development design suitable for sustainable modes of transportation.

Location of Transit Facilities

Bus stops are located both on March Rd and Teron Rd. For the purpose of this analysis, it will be assumed that transit users must use public city owned facilities, although it is acknowledged that certain pedestrian shortcuts via private property to the north of Steacie Dr could reduce the walking distance by as much as 300m shorter walk. Using city owned facilities, the nearest transit stops would be located near March/Teron intersection, requiring people to walk approximately 900m to a transit stop.

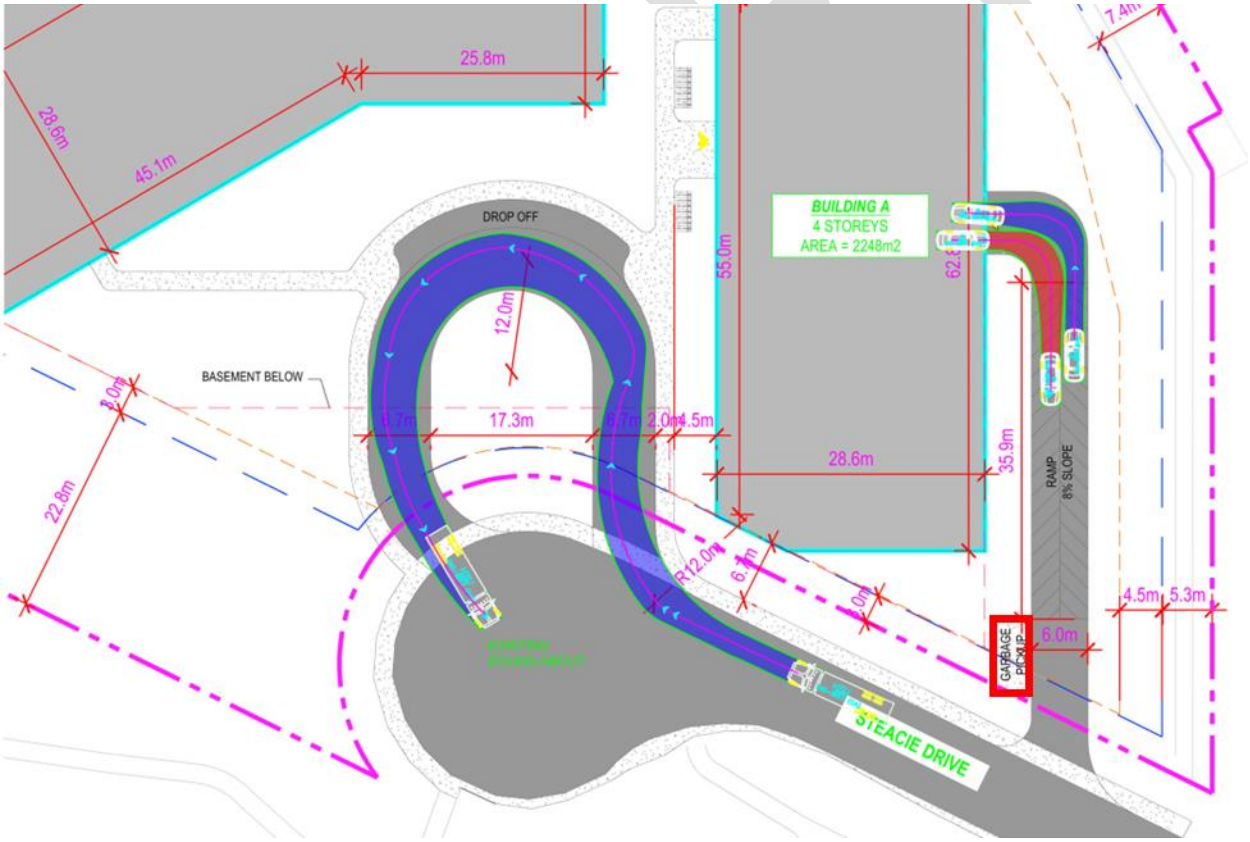
4.1.1. CIRCULATION AND ACCESS

The latest site plan proposes a single access to the underground parking garage located on the southeast quadrant of the site and a short loop providing at-grade drop off near the front door of the apartment buildings. The short loop connects to Steacie Dr at the cul-de-sac bulb-out, effectively elongating the bulb-out with a small center landscape patch. This drop off area at-grade will likely be used as a moving aisle as well.

The internal driveway widths within the parking garage are proposed at 6.0m which is equal to the minimum 6.0m wide required aisle width (Parking By-Law Section 107 1c ii) considered adequate for two-way travel and 90-degree parking stalls. The parking garage ramp is proposed at an 8% grade, located outdoors with a melting heated device, considered adequate. As per Private Approach Bylaw Section 25u, the grades between the highway line are less than 2% for the first 9m of private driveway.

Garbage pick-up will be facilitated by a private company and will be completed on Steacie Dr. There will be a proposed garbage pad on the southwest edge of the driveway ramp adjacent to Steacie Dr. **Figure 19** illustrates the proposed locations for the underground parking garage ramp, drop off bay, garbage pick-up location and vehicle turning movements including an HSU vehicle at the loop. **Section 4.4** will provide further details regarding the driveway accesses and connectivity to the adjacent road network.

Figure 19: Site Circulation and Vehicle Turning Movements



4.1.2. CIRCULATION AND ACCESS

Exempt, only required for Plans of Subdivision.

4.2. Parking

The following parking analysis reflects the minimum number of parking rates and spaces required based on the City of Ottawa Zoning By-Law for developments located in Area C: Suburban on Schedule 1A. **Table 7** summarizes the minimum vehicle and bicycle parking rates from Part 4, Parking, Queueing and Loading Provisions parking by-law, referenced from Tables 101, 102, and 111A.

Table 10: Required Vehicle and Bicycle Parking Spaces

Land Use	Size (unit or m^2)	Residential Vehicle		Visitor Vehicle		Bicycles	
		Base Rate	Min Required Spaces	Base Rate	Min Required Spaces	Base Rate	Min Required Spaces
Dwelling, Mid-High-Rise Apartments (R12)	214	1.2/unit	257	0.2/unit	43	0.5/unit	107
		Total Provided	**171**	-	**43**	-	**107**

As shown above in **Table 7**, the minimum required vehicle spaces are 257 for residents and 43 for visitors, for a combined total of 300 vehicle parking spaces. A total of 214 vehicle parking spaces are proposed, with 171 spaces proposed for residents and 43 spaces for visitors. Based on the proposed number of parking spaces, the minimum visitor parking rate is met (in order to mitigate short-term parking spillover), but the residential minimum rate was intentionally reduced below the minimum requirement. The applicant is an advocate of sustainability and intends to support alternate modes of transportation for its residents by leveraging the site's proximity to a transit priority corridor (March Rd) and regional cycling routes. Overall, the site will provide a parking rate of 1 space per unit. In the unlikely event of parking spillover, Steacie Dr has on-street parking supply available.

The minimum required bicycle spaces are 107, which will be conveniently provided indoors in a secure storage area on ground floor near the lobby and active transportation facilities connecting to the pathway on the south side of Steacie Dr. Of the bike parking spaces, 14 will be provided outdoors for visitors near the front entrance.

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4.3. Boundary Street Design

Multi-Modal Level of Service (MMLOS) analysis was conducted for the site frontage, Steacie Dr, based on the City of Ottawa's MMLOS Analysis Guidelines.
Steacie Dr is a local road that consists of the following features within the study area:

- 2 vehicle travel lanes in each direction.
- Approximately 2.0m wide pathway on south side and no active travel facility on east side. The pahtway has at least 2m or more boulevard separation from the road.
- Less than 3,000 average daily curb lane traffic.
- On-street parking on both sides of the road.
- No transit facilities.
- 50km/h assumed unposted speed.

The multi-modal level of service analysis for adjacent site roadway is summarized in **Table 11**, with detailed analysis provided in **Appendix F.** The table also identifies the target LOS, based on the land-use designation and road classification of the development site and the boundary streets. The Transportation Master Plan (TMP) of the City of Ottawa identifies the land-use designation of the development site as a General Urban Area. The road classifications of each of the boundary streets were noted in the descriptions of features above.

Table 11: MMLOS - Boundary Road Analysis

Road Segment	Multi-Modal Level of Service							
	Pedestrian		Bicycle		Transit		Truck	
	PLoS	Target	BLoS	Target	TLoS	Target	TkLoS	Target
Steacie (North) Existing & Future	F	C	D	D	-	N/A	-	N/A
Steacie (South) Existing & Future	A	C	D	D	-	N/A	-	N/A

Pedestrian

- Steacie: the pedestrian PLoS target was only met on the south side. To meet the target on the north side, a 1.8m or greater sidewalk would need to be built.

Bicycle

- The BLoS target is met at Steacie Dr.

Transit

- Steacie Dr does not have any transit routes.

Truck

- Steacie Dr is not part of truck routes.

4.4. Access Intersection Design

Note, former sections 4.4.2 (Access Control) and 4.4.3 (Access Design) have been moved to Section 4.9.1 and 4.9.2 as per the revised TIA Guidelines, June 2023.

4.4.1. LOCATION AND DESIGN OF ACCESS

The site plan proposes two vehicle accesses, one located on the southeast quadrant of the site, providing ramp access to the underground parking garage. The second access is located at the bulb-out dead-end of Steacie Dr, as a short loop which provides access to a drop off area near the front entrance. The accesses are separated by approximately 40m.

The garage ramp access will be 6.0m wide from the road to the first curvature, where it widens to 6.7m at the garage door to the indoors parking garage, providing two-way traffic. The corner radii at the site driveway are proposed 9m on the east side and 3m on the west side of the driveway. The drop-off lay-by will be approximately 3m wide.

The Transportation Association of Canada (TAC) Geometric Design Guide for Canadian Roads, Chapter 8 (Access) provides guidelines for clear throat length. Clear throat lengths are only recommended for arterial and collector roads; therefore, no clear throat length is required for this development.

Additionally, the Private Approach By-Law requirements for the City of Ottawa were reviewed, with the following observations:

- As required, the width of the proposed development drive aisles do not exceed 9m. The drive aisle will be 6.0m wide.
- The site frontage is approximately 85m which permits having up to two two-way private approaches.
- As required, given the proposed number of parking spaces, the minimum distance between the proposed access and the nearest adjacent intersecting street line is 30m. The nearest adjacent intersecting street is Alfred Casson Way which is located approximately 440m away and thus meets the requirements.
- The distance between the proposed accesses and the adjacent property line are approximately 15m and 63m, which is greater than the minimum separation requirement of 3m.
- The grade of the private approach is to not exceed 2% within the private property for a distance of 9.0m to the curb line.

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The ramp access will function as a full-movement access and the loop egress will also function as a full-movement access. Both accesses will be STOP controlled for vehicles exiting the site. There are no signalized intersections near the proposed development accesses, therefore the minimum separation to a signalized intersection is not applicable for this development.

The access designs are in conformance with the City of Ottawa Private Approach By-law 2003-447. The accesses are to be constructed as per City of Ottawa Standard Detail SC37.1.

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 hour to go to work and returning from work to the proposed site in the PM peak hour. Sections 3.1.1 and 3.1.2 describe how many trips are anticipated per travel mode. The site is located within 900m of future rapid transit, however funding for transit has not yet been approved.

4.5.2. TDM PROGRAM

The TDM infrastructure checklist and TDM Measures are attached as **Appendix G**.

<u>TDM Supportive Development Design and Infrastructure Checklist:</u>

- Nine (9) out of the ten (10) “required” measures have been satisfied. A minor parking variance has been proposed.
- At least ten (10) of fourteen (14) “basic” measures related to walking, cycling, transit and parking have been <u>satisfied</u> or are not applicable.
- Zero (0) of the of the seven (7) candidate “better” measures are also proposed or are non-applicable.

<u>TDM Measures Checklist:</u>

- Six (6) out of six (6) eligible “basic” measures related to walking, cycling, transit, parking and TDM marketing have been satisfied or are not applicable. Four (4) of those, which have been designated by an asterisk (*), are considered by the TDM Measures to be some of the most dependably effective tools to encourage sustainable travel modes. This includes:
    - Display walking and cycling information at major entrances.
    - Display transit information at major entrances.
    - *Provide 1 month Presto transit pass.
    - *Designate an internal coordinator or contract with external coordinator
    - * Unbundle parking costs from monthly rent.
    - * Provide multi-modal travel information package to new residents.
- Four (4) out of eleven (11) “better” measures related to walking, cycling, transit, parking and TDM marketing have been satisfied. One (1) of those, which have been designated by an asterisk (*), are considered by the TDM Measures to be some of the most dependably effective tools to encourage sustainable travel modes. This includes:
    - Client will investigate potential to add bike share and car share facilities, along with potential for carshare subsidies.
    - *Offer personalized trip planning to new residents.

4.5.3. NEED AND OPPORTUNITY

Since the development is located close to a future transit priority area within 800m radius of future March/Teron BRT Station, measures to provide sustainable active mode shares are encouraged.

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4.6. Neighbourhood Traffic Management

This section is exempt as it does not meet all criteria outlined in the June 14, 2023 revision. However, due to a community engagement, comments and sensitivity within the surrounding study area, a further discussion has been included.

Concerns regarding congestion and illegal school bus parking on Alfred Casson Way and Varley Dr were raised. The consultant completed on-site observations during the start time and finish time of W. Erskine Johnston Public School and Georges Vanier Catholic School (November 30th, 2023 – half an hour before start bell time and 30 minutes after release bell time) and there were no buses seen queued at the Alfred Casson Way and Varley Dr intersection.

The school boards were contacted, and they confirmed that buses are to use the school bus lay-bys, as was observed. It was noted at times however, that parents would temporarily stop within no-parking zones to off-load their children or pick them up, causing minor traffic delays. These occurrences may be mitigated with increased by-law enforcement during the school peak periods.

Another topic of concern noted by the community was Teron Rd having too many vehicles. Teron Rd is a major collector road according to the city's road classification system. Major collector roads are expected to accommodate a higher number of vehicles and carry them to arterial roads such as March Rd and Campeau Dr. Teron Rd has numerous design elements that support this function, such as no private residential accesses, transit service, and segregated pedestrian and cycling facilities. Future peak hour traffic volumes along Teron Rd south of Steacie Dr is expected to be roughly 20% higher than the city's ideal two-way threshold outlined in the TIA Guidelines (2017) but is still considered acceptable according to national standards when the local context and current design are accounted for.

As for the intersection of Teron/Steacie, **Section 4.9.3** will analyze the intersection level of service and general performance. If congestion or adverse operations are noted, then this TIA will look at alternatives to mitigate conflict, including the possible conversion of this intersection into a right-in-right-out (RIRO), which would limit the number of vehicles entering the community and reduce potential infiltration concerns that were noted. While a conversion to RIRO would limit access for existing residents heading to March Rd via Steacie Dr, access from March Rd would be maintained.

4.7. Transit

4.7.1. ROUTE CAPACITY

The future development is expected to generate approximately 20 'new' two-way transit trips for the AM and PM peak hours.

Given the very low number of anticipated transit trips and the plethora of bus routes with high frequency operating on Teron Rd and March Rd, the forecasted number of transit trips are expected to have a negligible impact on transit route capacity.

4.7.2. TRANSIT PRIORITY

March Rd is proposed a transit priority corridor as part of a future BRT corridor. Today, buses operate in mixed traffic conditions not favorable to transit priority. A future BRT on March Rd could include median segregated transit lanes or curbside bus lanes which would significantly improve transit operations and priority. No designs for the future March Rd BRT were found, and funding is not anticipated in the near future. The very minimal number of vehicle trips forecasted from this development will have a negligible effect on existing transit operations.

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4.8. Review of Network Concept

The site is zoned as R4Y[2809] S463-h which allows a development of this size and scale to be built at the proposed location, therefore this section can be exempt – see **Table 1**.

4.9. Intersection Design

4.9.1. INTERSECTION CONTROL

The site generated vehicle traffic is quite minimal and the existing intersection controls are anticipated to be kept as they are today. The new site accesses will not require traffic signals based on forecasted volumes.

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. March/Teron is the only signalized intersection within the study area. In the future, this intersection may be located adjacent to a rapid transit station if the BRT is built. The MMLOS analysis is summarized in **Table 12**, with detailed analyses provided in **Appendix H**.

Table 12: MMLOS – Existing and Future Adjacent Signalized Intersections

Road Segment	Multi-Modal Level of Service							
	Pedestrian		Bicycle		Transit		Truck	
	PLoS	Target	BLoS	Target	TLoS	Target	TkLoS	Target
March/Teron	F	C / A*	F	C	F	- / D*	A	-
*target if a rapid transit station is built near to the intersection.								

Pedestrian

- For existing and future conditions if a BRT is built, pedestrians must cross the equivalent of at least 7 lanes of traffic. There are no options that can help improve the PLoS significantly enough to come anywhere near achieving the target PLoS 'A or C' without majorly affecting vehicular operations.

Bicycle

- The bicycle BLoS target was not met for existing and future conditions. To achieve the BLoS targets, segregated cycletracks and 2-stage left-turns or protected corner crossings are required at all approaches.

Transit

- The Transit TLoS target was not met as delays >40s are expected for the northbound left-turn. A queue jump or traffic signal priority could reduce these delays to meet future targets if geometry allows.

Truck

- Only March Rd is a truck route, with no turning movements on to Teron Rd or Richardson Side St, and as such, there is no truck TKLoS targets.

Existing Conditions

The existing traffic volumes at study area intersections were assessed based on vehicle capacity v/c and delays (s) to determine their level of service. Synchro 11 software for signalized and unsignalized intersections was used with summarized results in **Table 13** and detailed output in **Appendix I.**

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Table 13: Existing Intersection Performance

Intersection	Weekday AM Peak (PM Peak)					
	Critical Movement			Overall Intersection Performance		
	LoS	max. v/c or avg. delay (s)	Movement	Delay (s)	LoS	v/c
Teron/March (S)	**F**(D)	1.16(0.85)	NBL(EBT)	32.1(28.5)	D(D)	0.86(0.81)
Teron/Steacie (U)	B(B)	13(13)	EB(EB)	2(4)	A(A)	-
Steacie/Alfred Casson (U)	A(B)	9(10)	WB(WB)	8(9)	A(A)	-
Varley/Alfred Casson (U)	A(A)	9(8)	EB(SB)	8(8)	A(A)	-
Note: Analysis of signalized intersections assumes a PHF of 0.9 and a saturation flow rate of 1800 veh/h/lane. (U) = Unsignalized; (S) = Signalized.						

As shown in **Table 13**, all study area intersections operate very well, with the exception of Teron/March intersection which as a whole operates well, but the northbound left-turn from Teron Rd to March Rd movement operates over capacity in the AM peak hour.

Background Conditions 2030

The future background 2030 conditions represent the impact of additional background developments along with forecasted arterial and collector growth in background volumes of 0.5% annually. Since 2030 background has the same intersection layouts as 2025 and is the more critical of the two scenarios as it has been grown for a longer time, then only 2030 will be analyzed. The future projected 2030 background volumes are illustrated in **Figure 15** with projected operation outputs in **Table 14**. The detailed Synchro results can be found in **Appendix J**.

Table 14: 2030 Background Intersection Performance

Intersection	Weekday AM Peak (PM Peak)					
	Critical Movement			Overall Intersection Performance		
	LoS	max. v/c or avg. delay (s)	Movement	Delay (s)	LoS	v/c
Teron/March (S)	**F**(D)	1.10(0.84)	NBL(EBT)	30.3(27.9)	D(C)	0.85(0.80)
Teron/Steacie (U)	B(B)	12(13)	EB(EB)	2(3)	A(A)	-
Steacie/Alfred Casson (U)	A(A)	8(9)	WB(WB)	8(9)	A(A)	-
Varley/Alfred Casson (U)	A(A)	9(8)	EB(SB)	8(8)	A(A)	-
Note: Analysis of signalized intersections assumes a PHF of 1.0 and a saturation flow rate of 1800 veh/h/lane. (U) = Unsignalized; (S) = Signalized.						

As seen in **Table 14**, the study area intersections are anticipated to perform slightly better than existing conditions given that a peak hour factor of 1.0 was used instead of 0.9 for existing, as guided by the TIA Guidelines. Overall, all intersections will continue to operate very well, with the exception of Teron/March which continues to have the northbound left-turn movement from Teron Rd operating above capacity.

Future Conditions 2030 – Full Buildout

Only the most critical future scenario 2030 will be analyzed, as it has the same road geometries and signal timing as 2025, but an additional 5 years of annual growth rate on March Rd and Teron Rd. The future full build-out 2030 volumes were derived by superimposing background 2030 volumes which include other area developments and background growth, with future site-generated volumes. The future projected 2030 volumes are illustrated in **Figure 17** with projected operation outputs in **Table 15**. The detailed Synchro results can be found in **Appendix K**.

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Table 15: 2030 Full Build-Out with Development Intersection Performance

Intersection	Weekday AM Peak (PM Peak)					
	Critical Movement			Overall Intersection Performance		
	LoS	max. v/c or avg. delay (s)	Movement	Delay (s)	LoS	v/c
Teron/March (S)	**F**(D)	1.13(0.85)	NBL(EBT)	31.0(28.5)	D(D)	0.85(0.81)
Teron/March Mitigation 1 (S)	E(E)	0.94(0.94)	WBT(EBT)	35.1(37.2)	D(D)	0.90(0.89)
Teron/March Mitigation 2 (S)	D(E)	0.89(0.92)	WBT(EBT)	32.2(35.0)	D(D)	0.86(0.86)
Teron/Steacie (U)	B(B)	13(13)	EB(EB)	2(3)	A(A)	-
Steacie/Alfred Casson (U)	A(B)	9(10)	WB(WB)	8(9)	A(A)	-
Varley/Alfred Casson (U)	A(A)	9(8)	EB(SB)	8(8)	A(A)	-

Note: Analysis of signalized intersections assumes a PHF of 1.0 and a saturation flow rate of 1800 veh/h/lane.
(U) = Unsignalized; (S) = Signalized.

As seen in **Table 15**, all study area intersections will continue to operate very well with the exception of Teron/March which will continue to exhibit congestion in the AM peak hour for the northbound left-turn movement. Two mitigation scenarios were analyzed, with “Mitigation 1” converting the northbound through lane into a shared through-left lane, effectively providing two northbound left-turn lanes. To accommodate this new lane arrangement, the northbound and southbound movements had to be separated, creating two split phases. The second sensitivity scenario, “Mitigation 2”, used the same lane arrangements as Mitigation 1, plus, it removed the west leg pedestrian crosswalk to allow for a shorter split phase for the lower volume southbound movement. The following section will assess queueing implications and compare the existing geometry plus the mitigation options for Teron/March intersection. Overall, the study area intersections are forecasted to operate very similarly to background forecasted conditions, with this development playing a negligible role on worsening conditions.

4.9.3. QUEUEING ASSESSMENT

The following **Table 16** summarizes queuing results based on Synchro and SimTraffic software for the Teron/March intersection, including the influence on to Steacie/Teron intersection.

Table 16: Queueing Analysis for Teron/March Intersection

Movement & Scenario		Storage	Queue AM (PM) (in meters)			
			Synchro[1]		SimTraffic[2]	
			50th Percentile	95th Percentile	50th Percentile	95th Percentile
Existing Geometry	EBT	350m	57(168)	84(#253)	37(117)	63(204)
	WBT	920m	209(66)	#300(119)	95(47)	183(75)
	NBL	100m[3]	~69(43)	**112**(63)	68(47)	**113**(80)
Mitigation 1 Split Phase NBL + NBTL	EBT	350m	69(189)	101(#305)	49(**380**)	77(**633**)
	WBT	920m	~268(77)	#341(149)	325(56)	638(87)
	NBTL	100m[3]	54(34)	79(53)	45(30)	71(53)
Mitigation 2 Shorter Split Phase	EBT	350m	71(196)	91(#253)	46(158)	70(279)
	WBT	920m	~276(80)	#325(133)	145(51)	258(78)
	NBTL	100m[3]	59(34)	86(53)	49(29)	75(54)

1. Synchro queues were only used for signalized intersections.
2. The NBL storage at Teron/March extends across the Teron/Steacie intersection. If the NBL queue extends beyond Teron/Steacie, the total value reflects the sum of NBL queues at both intersections in SimTraffic.
3. The NBL storage lane is 100m in total but has a median break at approximately 40m from the intersection to allow for EBL and NBL movements at the Teron/Steacie intersection.

As seen in **Table 16**, all scenarios show some level of queueing on the northbound left-turn which extends past Steacie/Teron and exceeds the lane storage capacity during the AM for the 95th percentile according to Synchro and SimTraffic. Although this is a phenomenon that exists today, the local community has raised concerns for this location. The City of Ottawa could consider prohibiting eastbound left-turns from the

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community to Teron Rd, though it is noteworthy that the 5-year collision history only reported 2 total collisions at Steacie/Teron which both resulted in property damage only.

The eastbound and westbound movements on March Rd were also analyzed. As previously shown in **Table 15**, the existing geometry has the northbound left-turn movement above capacity, with Mitigation 1 and 2 reducing congestion for that movement.

However, Mitigation 1 does significantly impact queueing on March Rd due to the two long split phases. To include adequate crossing time for pedestrians on both the east and west approaches, the split phases must account for approximately half of the total green time, causing delays and queues on March Rd.

Mitigation 2 reduces the length of the southbound split phase by eliminating the pedestrian phase on the west approach, which provides a big improvement to queues on March Rd and satisfies the City of Ottawa intersection performance threshold in terms of vehicle capacity, but it does impact pedestrians wanting to cross March Rd and being situated on the west side of Teron Rd.

Given that March Rd is planned as a future BRT with transit priority and the city's overall goals of improving active transportation, then Mitigation 2 which sacrifices pedestrian experience is not recommended. The City of Ottawa therefore has an option between keeping the existing geometry and signal plan with minor exceedance of intersection performance for the AM peak hour only and for the northbound left-turn movement only, or choosing Mitigation 1 which would improve overall intersection performance in terms of vehicle capacity but would cost further delays and queues for March Rd.

If queues significantly worsen along the NB approach over time, the City may consider converting the Teron/Steacie intersection to a right-in right-out only intersection. This would greatly reduce conflicts and improve efficiency on the NBL movement at Teron/March. While the drawback to local residents accessing March Road is notable (particularly for residents heading north on March Road), access from March Road would be maintained and there is a viable alternative route via Varley Drive, Beaverbrook Road and Teron Road to the south that residents may use to access March Road, which constitutes a less than 5-minute detour.

5. Findings, Conclusions and Recommendations

Based on the results summarized herein, the following transportation related conclusions are offered:

Proposed Development

- The proposed development will be located at 100 Steacie Dr and will consist of two mid-rise apartment buildings housing a total of 214 residential units.
- Construction will be complete in a single phase by horizon year 2025.
- Access will be provided via a two-way driveway along the north side of the Cul-de-Sac at the west end of Steacie Dr and the east edge of the property site. A drop-off and moving aisle are proposed on a loop functioning as an extension of the cut-de-sac bulb-out.
- A total of 214 parking spaces are proposed, all located in an underground parking garage. Of the spaces, 171 are proposed for residents and 43 for visitor parking, thus meeting the visitor parking requirements, but being short on residential parking spaces. Given the site's context near rapid bus routes and future BRT corridor, then the combined visitor and residential parking rate of 1.0 spaces per unit is considered appropriate. On-street parking is available on Steacie Dr in the event of overflow.
- A total of 107 bike parking spaces are proposed, which would meet the by-law requirements.
- The development is anticipated to generate approximately 40 two-way vehicle trips at full buildout in 2025, during the AM and PM peak hours.

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Existing Conditions and Observations

- Overall, all intersections are anticipated to operate very well, with the exception of Teron/March intersection which showed to have a critical movement operating at LoS ‘F’, for the northbound left-turn in the AM peak hour.
- Measures such as increasing the number of through lanes on March Rd to three lanes and providing two NBL lanes may improve intersection operations for the short-term. However, they are financial and geometric implications, as well as potential community impacts. Therefore, they are not recommended from a traffic operations improvement perspective.
- In the long-term, the incorporation of a BRT on March Rd should reduce vehicle travel demand and increase active transportation through the corridor and adjacent road network.
- The volumes on Teron Rd and Steacie Dr exceed their roadway classifications according to TIA Guidelines.
    - Teron Rd is a major collector road, however it has been built closer to an arterial design, with almost no private driveways leading to it, long mid-block sections, active transportation facilities separated by a boulevard and rapid bus routes operating on it. Teron Rd is therefore operating within its design capacities.
    - Steacie Dr is a local road by designation, however it does not have any direct driveways between Alfred Casson Way and Teron Rd. This segment of road also has a 2m wide pathway on the south side of the road. Due to the volumes operating on that segment of road and its function as a feeder from the adjacent community to Teron Rd, then it would be appropriate to designate that short segment of road as a minor collector road. There are no operational issues detected within this segment or intersections.
- Due to community concerns regarding school bus operations and congestion near Erskine Johnston Public School and Georges Vanier Catholic School, an on-site observation was carried out on Varley Dr. Overall, it was observed that buses used their lay-by lanes and did not interfere with traffic. Parents however were observed temporarily stopping or parking illegally to drop off their children. This behaviour is indifferent to the proposed development, and the addition of 100 Steacie Dr will not have any difference to observed conditions.
- A background growth rate of 0.5% per year was applied to the through movements of March Rd and Teron Rd, between existing conditions and horizon year 2030, despite historical traffic trends suggest negative growth along March Rd and future anticipated BRT.
- The future background conditions are anticipated to operate similarly to existing conditions.

Projected Conditions

- The site generated traffic showed to have negligible impacts to study area intersections as the total projected 2030 traffic operations including site generated traffic were similar to future background operations without the addition of this development. The northbound left-turn movement is anticipated to continue operating at capacity during the AM peak period, similar to existing conditions.
    - The northbound left-turn movement was shown to occasionally queue beyond the downstream intersection of Teron/Steacie. The City could consider extending the median island on Teron Rd to effectively convert the Teron/Steacie intersection into a right-in-right-out only; however, this would limit access to local residents, while not addressing any noticeable concern with shortcutting or collision patterns (none of the two determined to be an ongoing issue today).
    - A split phase was tested, which could re-assign lanes using paint and avoiding costly geometric changes. A split phase could allow a dual northbound left-turn by converting the existing through lane into a through-left lane. Although this alternative performs better in terms of vehicular

capacity, it does punish active users such as cyclists and pedestrians, and also increases queues and delays on March Rd.

- The development is proposing to urbanize the site frontage, including adding curbs and sidewalks on the north side of Steacie Dr to the property edge and extending a sidewalk beyond its property limits to provide a direct connection to the existing pathway on the south side of Steacie Dr. The existing pathways south of Steacie Dr are currently 2m wide, which is insufficient to be considered a Multi-Use Pathway (MUP). It is recommended that the city urbanize Steacie Dr and widen the pathway to become a proper 3m wide MUP to allow a diversity of users.

The proposed development site-generated traffic volumes are expected to contribute less than 40 veh/h to the study area network, a fraction of the total operating volumes on the study area, which has negligible impact on future operations. The subject development is located in proximity to an existing transit corridor that is expected to be upgraded to a BRT corridor in the future. The study area intersections are therefore anticipated to operate similar or better than existing conditions in the fullness of time. The development is there recommended to proceed from a transportation perspective.

Prepared By:

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Transportation Engineer

Reviewed By:

Austin Shih, P.Eng.
Senior Transportation Engineer

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APPENDIX A

Screening Form & City Comments

PARSONS

Office: +1 613.738.4160
1223 Michael Street, Suite 100|Ottawa, ON K1J 7T2

City of Ottawa 2017 TIA Guidelines

TIA Screening Form

Date 7-Oct-20
Project 100 Steacie Dr TIA
Project Number 908979-10035

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

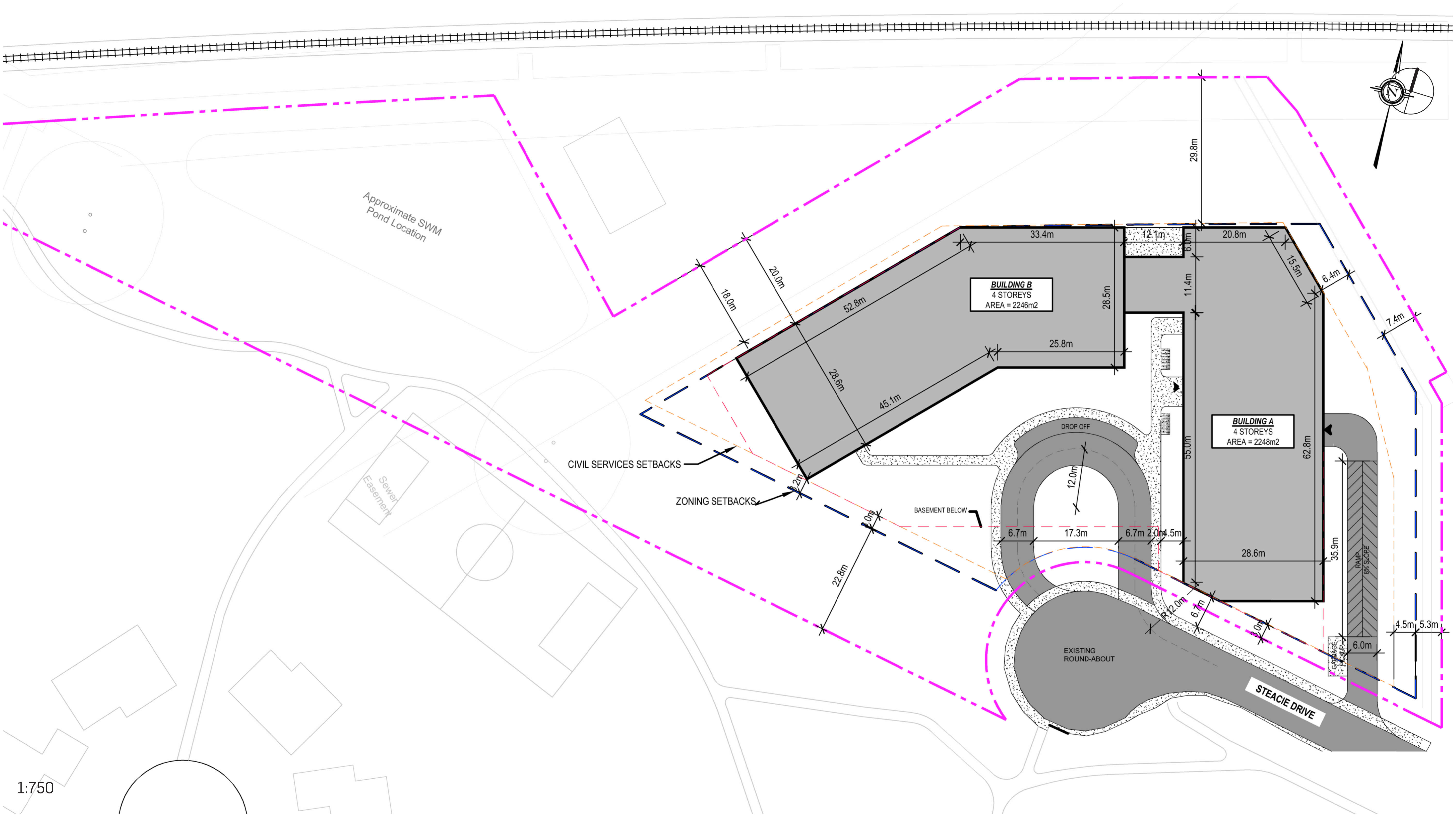
Module 1.1 - Description of Proposed Development	
Municipal Address	100 Steacie Dr, Kanata, ON K2K 2A9
Description of location	Between the cul-de-sac at the west end of Steacie and rail line
Land Use	Two residential apartment buildings
Development Size	214 apartment units and 214 parking spaces
Number of Accesses and Locations	One access along the west cul-de-sac of Steacie Dr
Development Phasing	Single Phase
Buildout Year	2025
Sketch Plan / Site Plan	See attached

Module 1.2 - Trip Generation Trigger		
Land Use Type	Townhomes or Apartments	
Development Size	214	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)	No
Development is in a Design Priority Area (DPA) or Transit-oriented Development (TOD) zone. (See Sheet 3)	Yes
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	No	
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;	No	
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?	No	

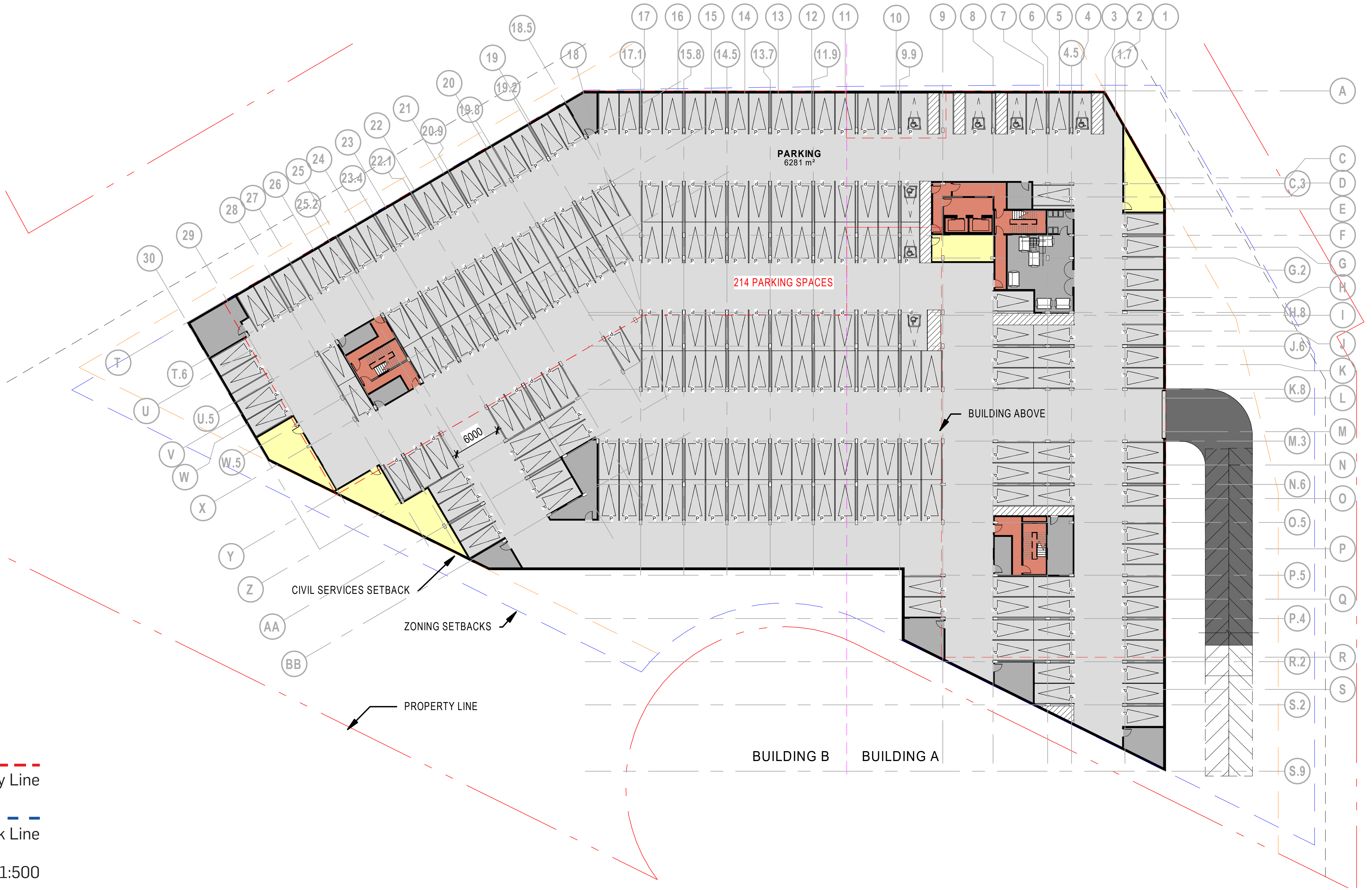
SITE PLAN



Approximate SWM Pond Location
Sewer Easement
CIVIL SERVICES SETBACKS
ZONING SETBACKS
BUILDING B
4 STOREYS
AREA = 2246m2
BUILDING A
4 STOREYS
AREA = 2248m2
DROP OFF
BASEMENT BELOW
EXISTING ROUND-ABOUT
STEACIE DRIVE
RAMP 8% SLOPE
GARBAGE
33.4m
12.1m
20.8m
29.8m
6.0m
11.4m
15.5m
6.4m
7.4m
20.0m
18.0m
52.8m
28.5m
25.8m
28.6m
45.1m
55.0m
62.8m
12.0m
6.7m
17.3m
6.7m
2.0m
4.5m
28.6m
35.9m
3.0m
22.8m
3.2m
12.0m
6.7m
3.0m
4.5m
5.3m
6.0m
1:750

BASEMENT FLOOR PLAN

Legend
- ■ Studio
- ■ 1 Bedroom
- ■ 1 Bedroom + Den
- ■ 2 Bedroom
- ■ 2 Bedroom + Den
- ■ 3 Bedroom
- ■ 3 Bedroom + Den
- ■ Services (M.E)
- ■ Green Space
- ■ Lobby
- ■ Commercial
- ■ Amenities
- ■ Exits
- ■ Parking
- ■ Bicycle Spaces
- ■ Lockers



Property Line

Setback Line

SCALE: 1:500

GROUND FLOOR PLAN

Legend
- ▨ Studio
- ▨ 1 Bedroom
- ▨ 1 Bedroom + Den
- ▨ 2 Bedroom
- ▨ 2 Bedroom + Den
- ▨ 3 Bedroom
- ▨ 3 Bedroom + Den
- ▨ Services (M.E)
- 🟩 Green Space
- ▨ Lobby
- ▨ Commercial
- ▨ Amenities
- 🟥 Exits
- ▨ Parking
- 🟩 Bicycle Spaces
- 🟨 Lockers

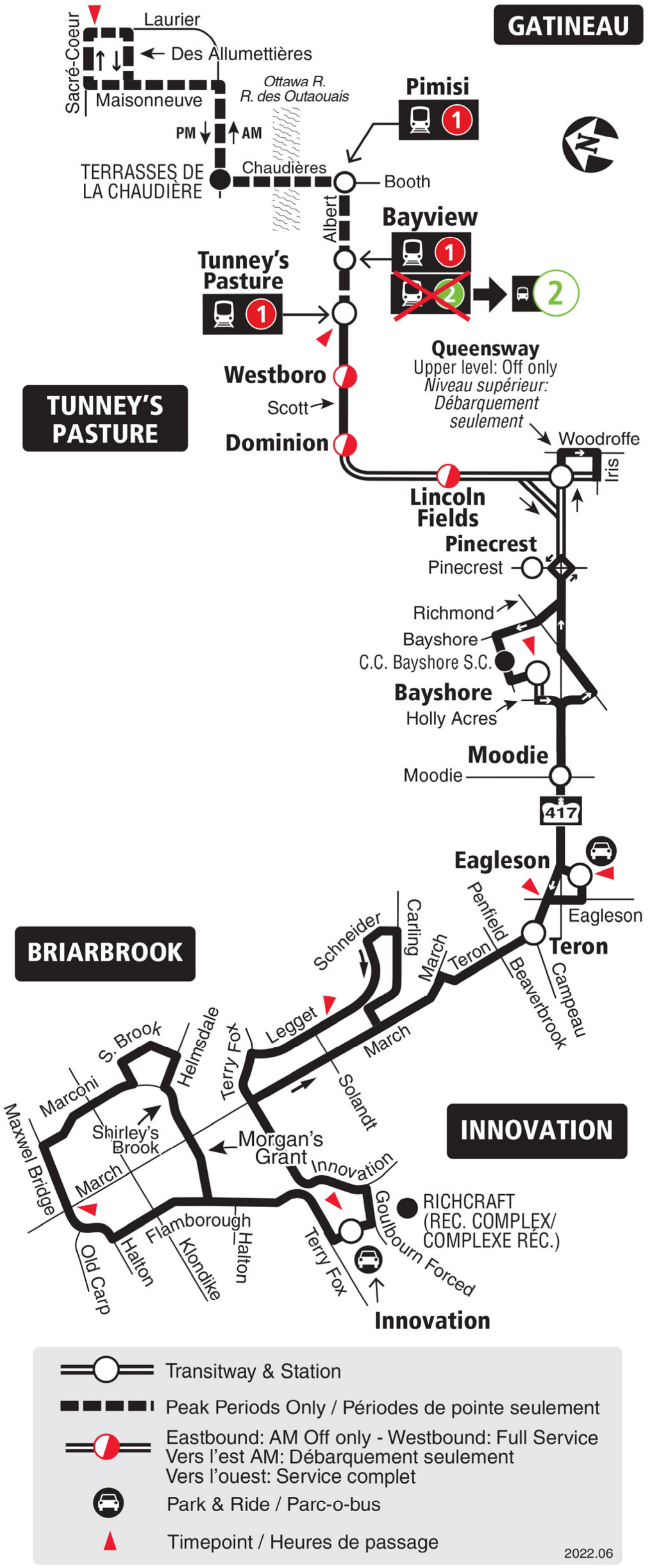
Property Line

Setback Line

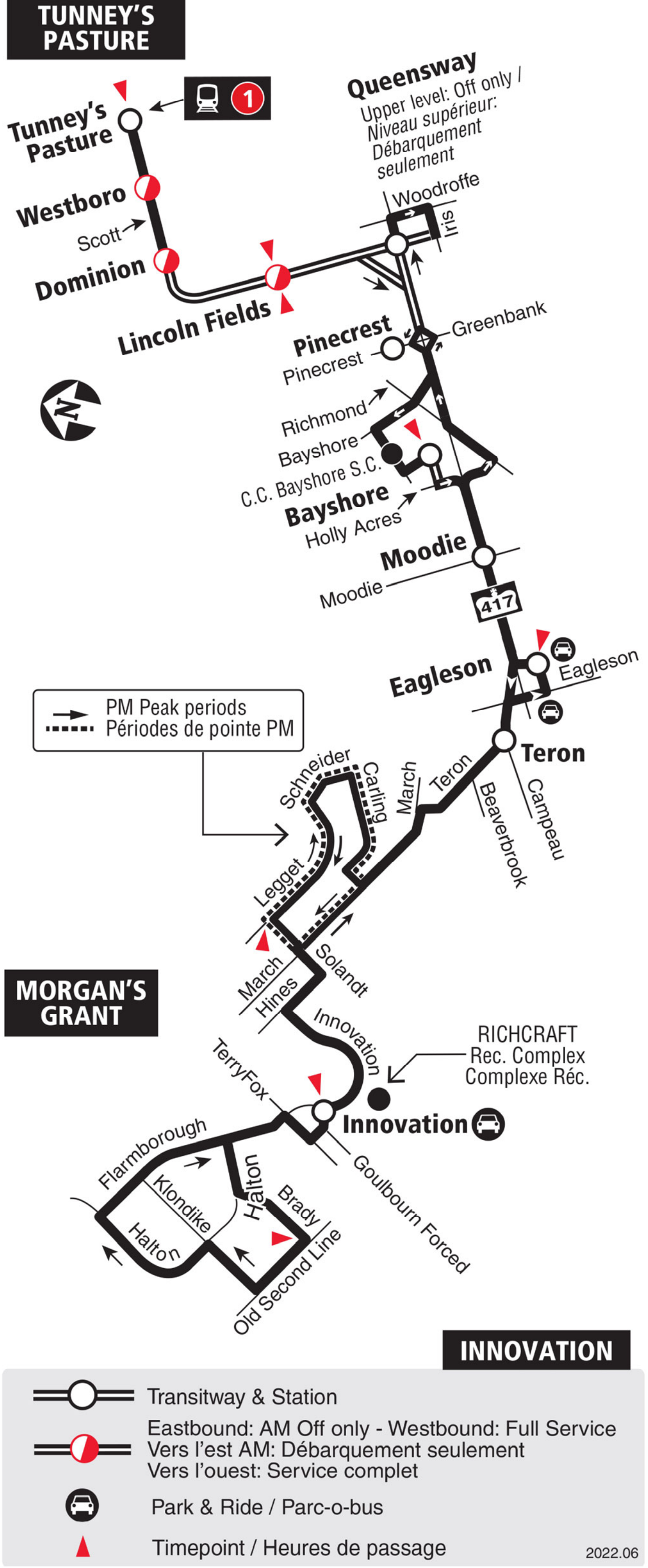
SCALE: 1:500

APPENDIX B

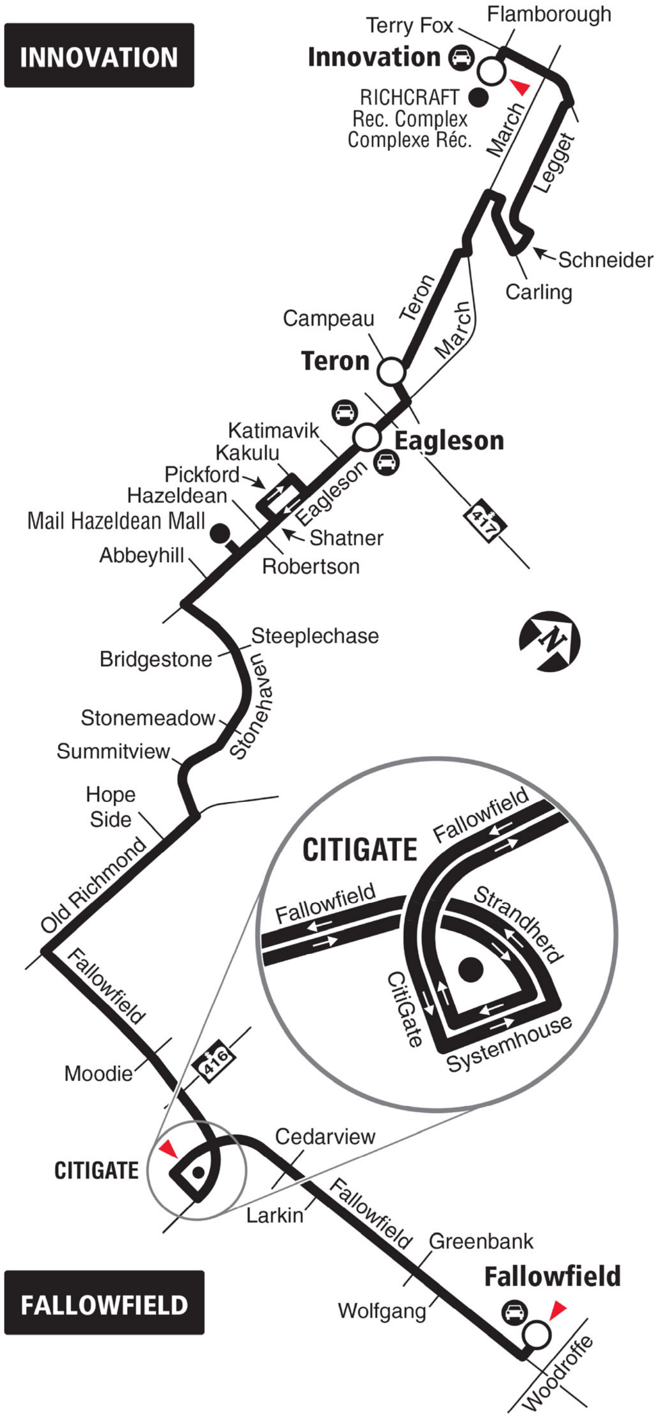
Transit Route Maps


GATINEAU
Laurier
Sacré-Coeur
Des Allumettières
Maisonneuve
Ottawa R.
R. des Outaouais
PM
AM
TERRASSES DE LA CHAUDIÈRE
Chaudières
Booth
Pimisi
1
Albert
Bayview
1
2
2
Tunney's Pasture
1
TUNNEY'S PASTURE
Westboro
Scott
Dominion
Queensway
Upper level: Off only
Niveau supérieur: Débarquement seulement
Woodroffe
Iris
Lincoln Fields
Pinecrest
Pinecrest
Richmond
Bayshore
C.C. Bayshore S.C.
Bayshore
Holly Acres
Moodie
Moodie
417
Eagleson
Eagleson
Teron
Penfield
Carling
Schneider
March
Teron
Beaverbrook
Campeau
BRIARBROOK
Legget
March
Terry Fox
Helmsdale
S. Brook
Marconi
Solandt
Shirley's Brook
Morgan's Grant
Innovation
INNOVATION
Maxwell Bridge
March
Flamborough
Halton
Old Carp
Halton
Klondike
Terry Fox
Goulbourn Forced
RICHCRAFT (REC. COMPLEX/ COMPLEXE RÉC.)
Innovation
Transitway & Station
Peak Periods Only / Périodes de pointe seulement
Eastbound: AM Off only - Westbound: Full Service
Vers l'est AM: Débarquement seulement
Vers l'ouest: Service complet
Park & Ride / Parc-o-bus
Timepoint / Heures de passage
2022.06

2022.06


TUNNEY'S PASTURE
Tunney's Pasture
1
Queensway
Upper level: Off only / Niveau supérieur: Débarquement seulement
Woodroffe
Iris
Westboro
Scott
Dominion
Lincoln Fields
Pinecrest
Pinecrest
Greenbank
N
Richmond
Bayshore
C.C. Bayshore S.C.
Bayshore
Holly Acres
Moodie
Moodie
417
Eagleson
Eagleson
PM Peak periods
Périodes de pointe PM
Teron
Schneider
Carling
March
Teron
Beaverbrook
Campeau
Legget
Solandt
March
Hines
MORGAN'S GRANT
Innovation
RICHCRAFT
Rec. Complex
Complexe Réc.
TerryFox
Innovation
Flamborough
Klondike
Halton
Brady
Halton
Goulbourn Forced
Old Second Line
INNOVATION
Transitway & Station
Eastbound: AM Off only - Westbound: Full Service
Vers l'est AM: Débarquement seulement
Vers l'ouest: Service complet
Park & Ride / Parc-o-bus
Timepoint / Heures de passage
2022.06

2022.06

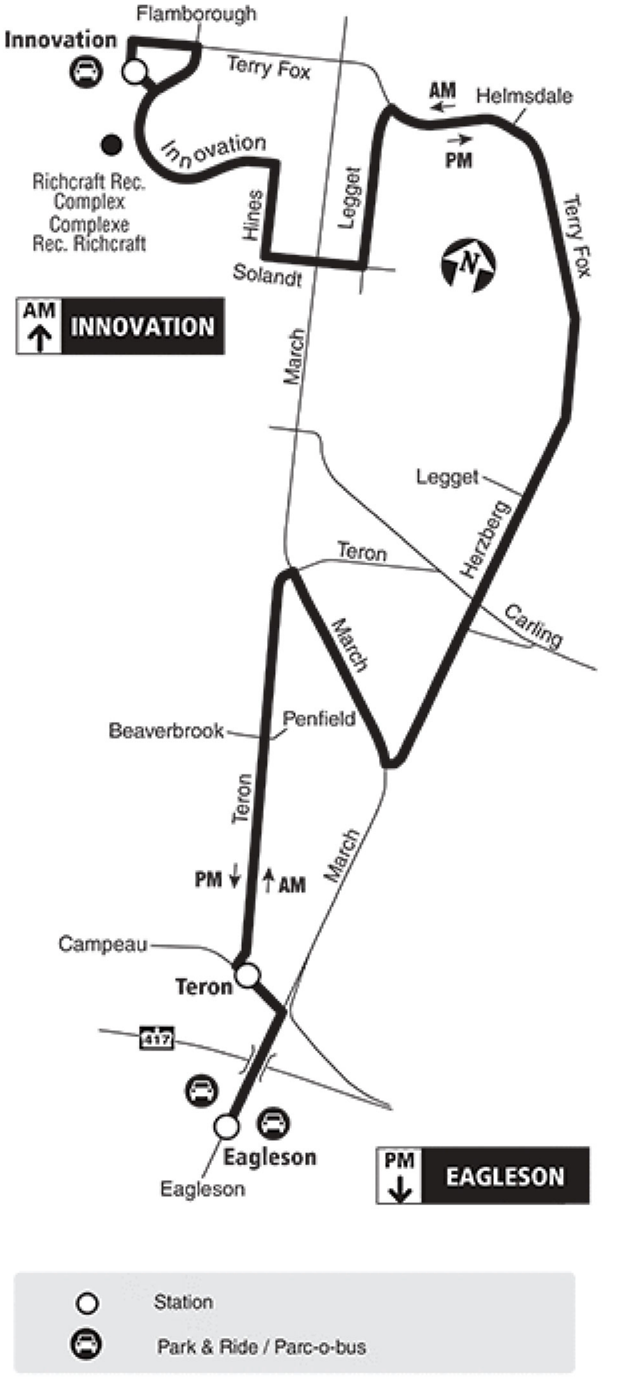


○ Stations

● Park & Ride / Parc-o-bus

▲ Timepoint / Heures de passage

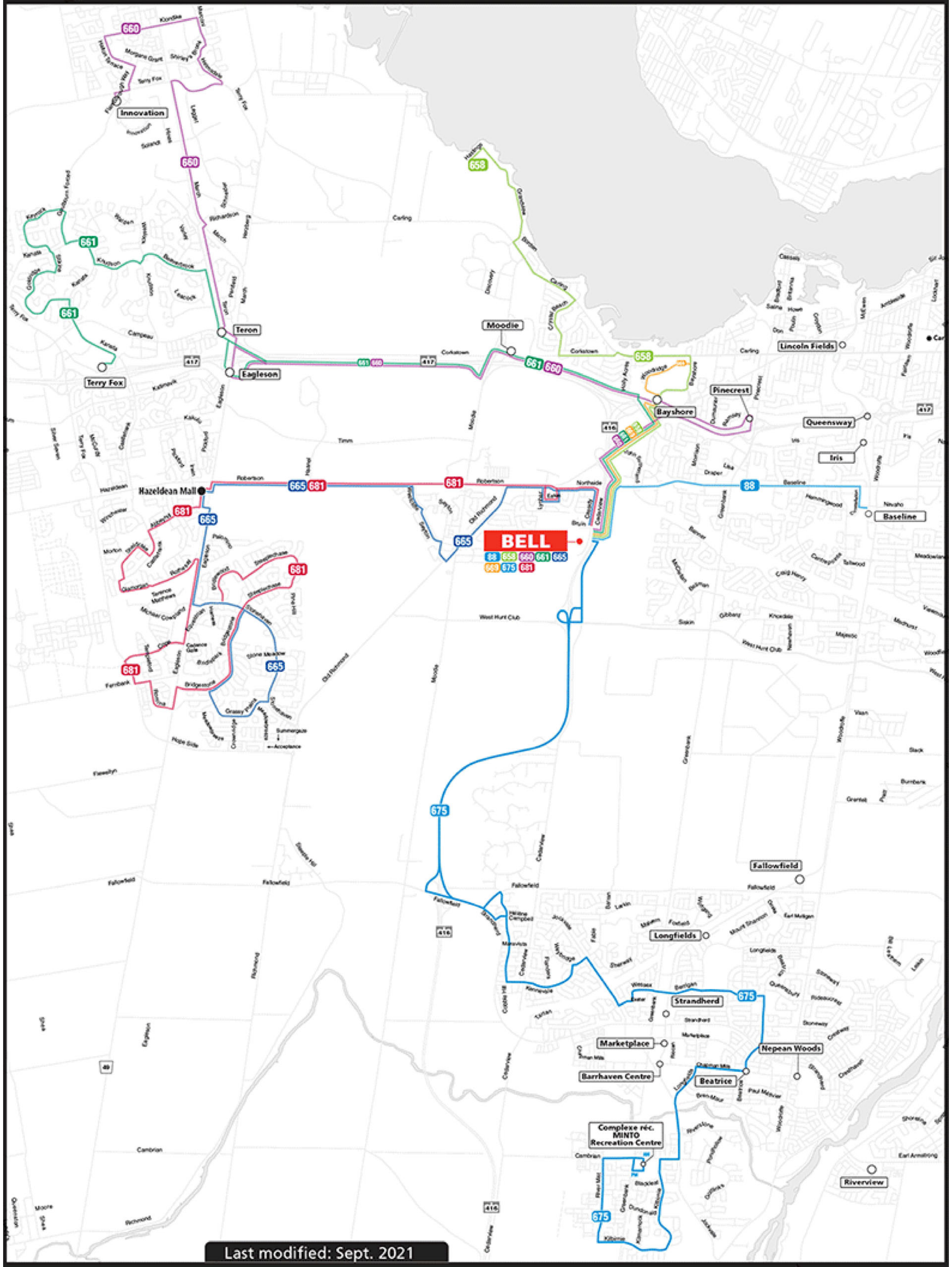
2023.07


Flamborough
Innovation
Terry Fox
AM
Helmsdale
PM
Innovation
Richcraft Rec. Complex
Complexe Rec. Richcraft
Hines
Legget
Terry Fox
Solandt
N
AM INNOVATION
March
Legget
Herzberg
Teron
Carling
March
Beaverbrook
Penfield
Teron
March
PM
AM
Campeau
Teron
417
Eagleson
Eagleson
PM EAGLESON
Station
Park & Ride / Parc-o-bus

2019.06

Keyrock
Goulbourn
Walden
Kanata
Goldridge
Stikine
Kanata
Knudson
Westlock
Varley
Beaverbrook
Leacock
Knudson
Kanata
Campeau
Kanata
Teron
March
KANATA CENTRUM
Terry Fox
Lord Byng
Teron
417
TERRY FOX
Katimavik
Kakulu
Eagleson
Pickford
Eagleson
Shatner
Hazeldean
Mall
HAZELDEAN
Mall
Robertson
Aréna
JACK CHARRON
Arena
Abbeyhill
Sheldrake
Castlefrank
Old Colony
Palomino
Rothesay
Palomino
Glamorgan
Bridlewood
Steeplechase
Terry Fox
Cope
Templeford
Eagleson
Stonehaven
WALMART
Fernbank
Bridgestone
Stone Meadow
Grassy Plains
BRIDLEWOOD
○ Transitway Station / Station du Transitway
Saturday and Sunday only
Samedi et dimanche seulement
No weekend service
Aucun service la fin de semaine
Park & Ride / Parc-o-bus
Timepoint / Heures de passage

2019.06



Last modified: Sept. 2021

APPENDIX C

Peak Hour Traffic Volumes

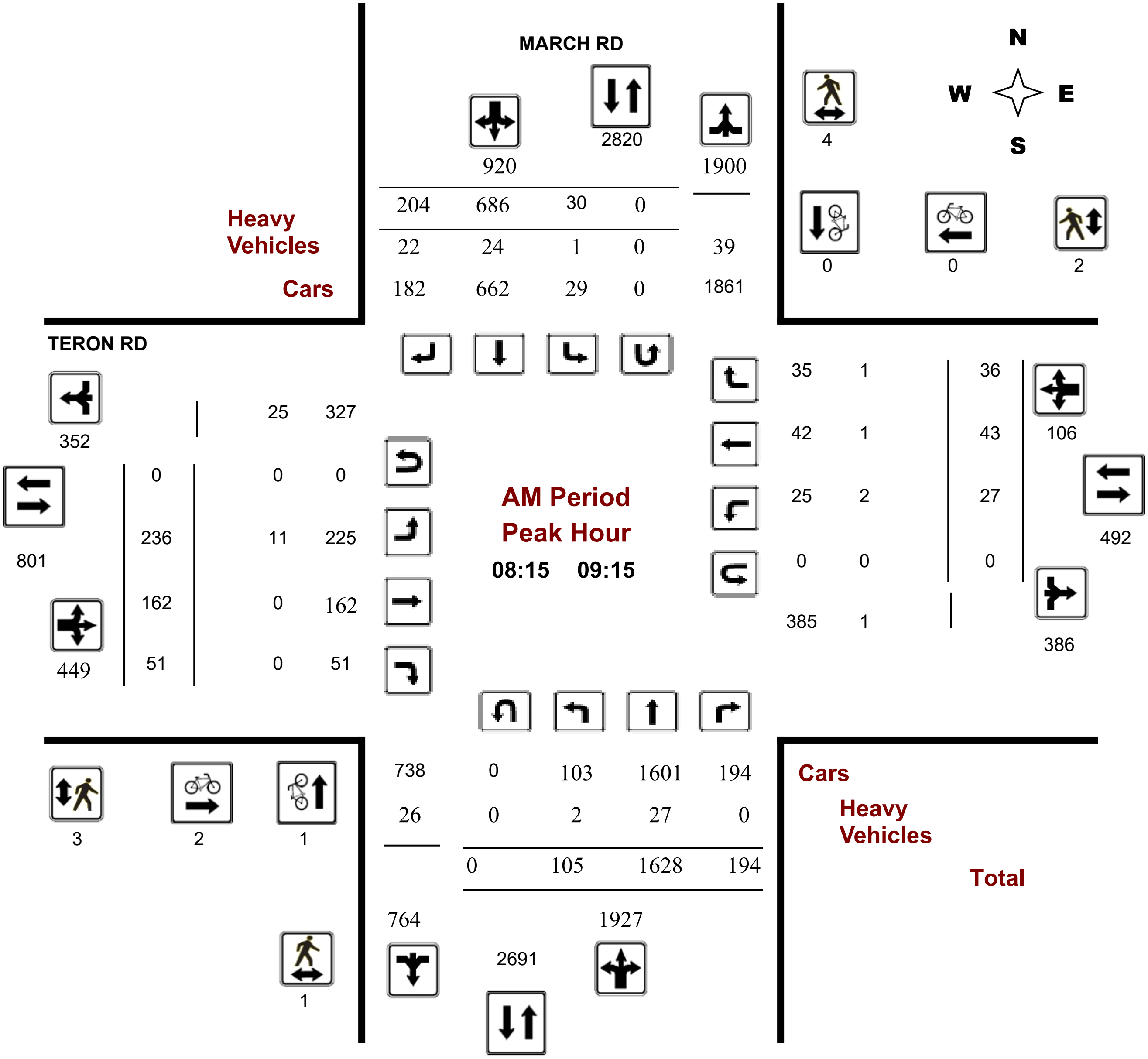
Transportation Services - Traffic Services

Turning Movement Count - Peak Hour Diagram

MARCH RD @ TERON RD

Survey Date: Wednesday, December 06, 2023 **WO No:** 41341

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



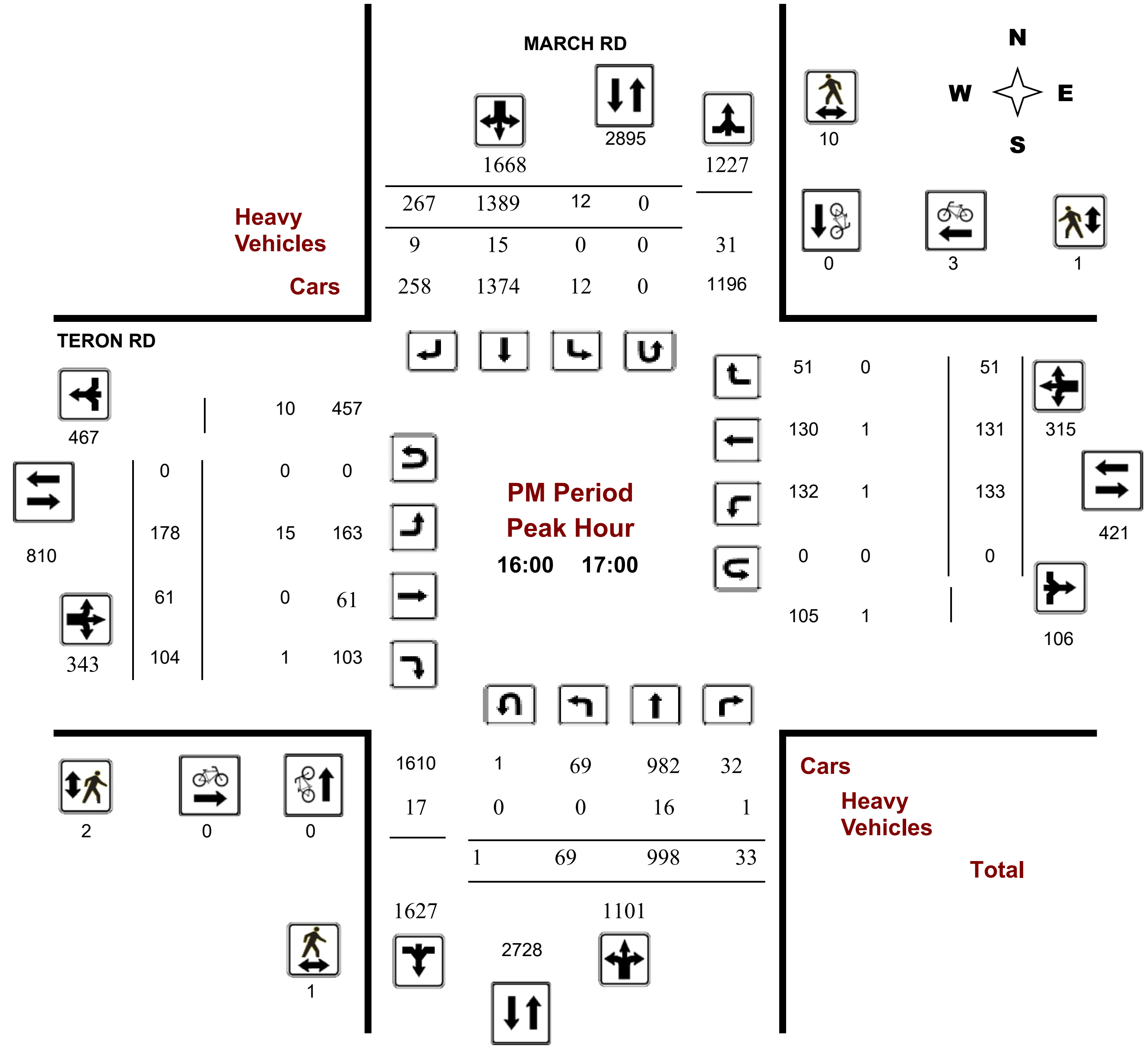
Comments

Transportation Services - Traffic Services

Turning Movement Count - Peak Hour Diagram

MARCH RD @ TERON RD

Survey Date: Wednesday, December 06, 2023 **WO No:** 41341
Start Time: 07:00 **Device:** Miovision



Comments

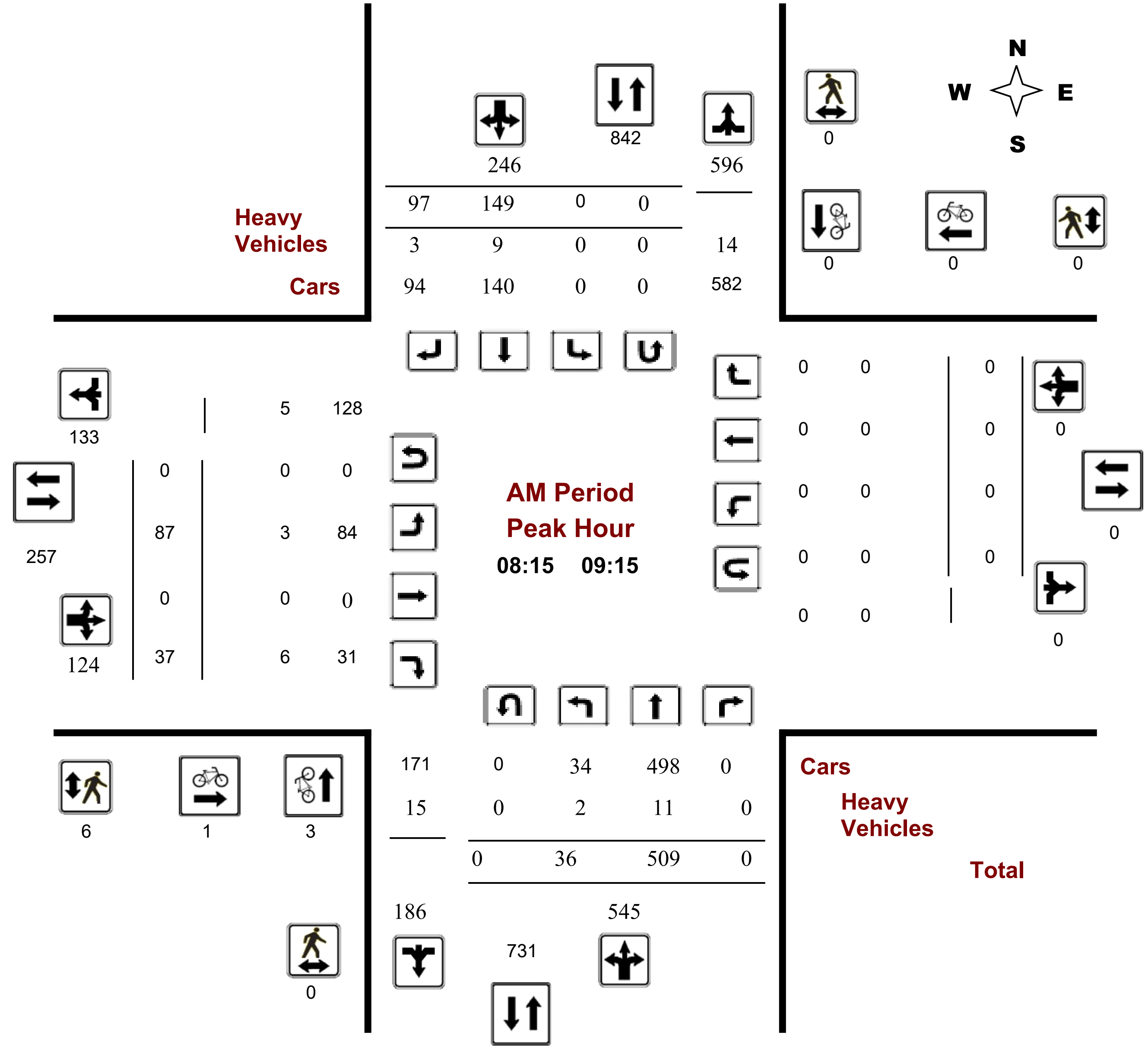
Transportation Services - Traffic Services

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

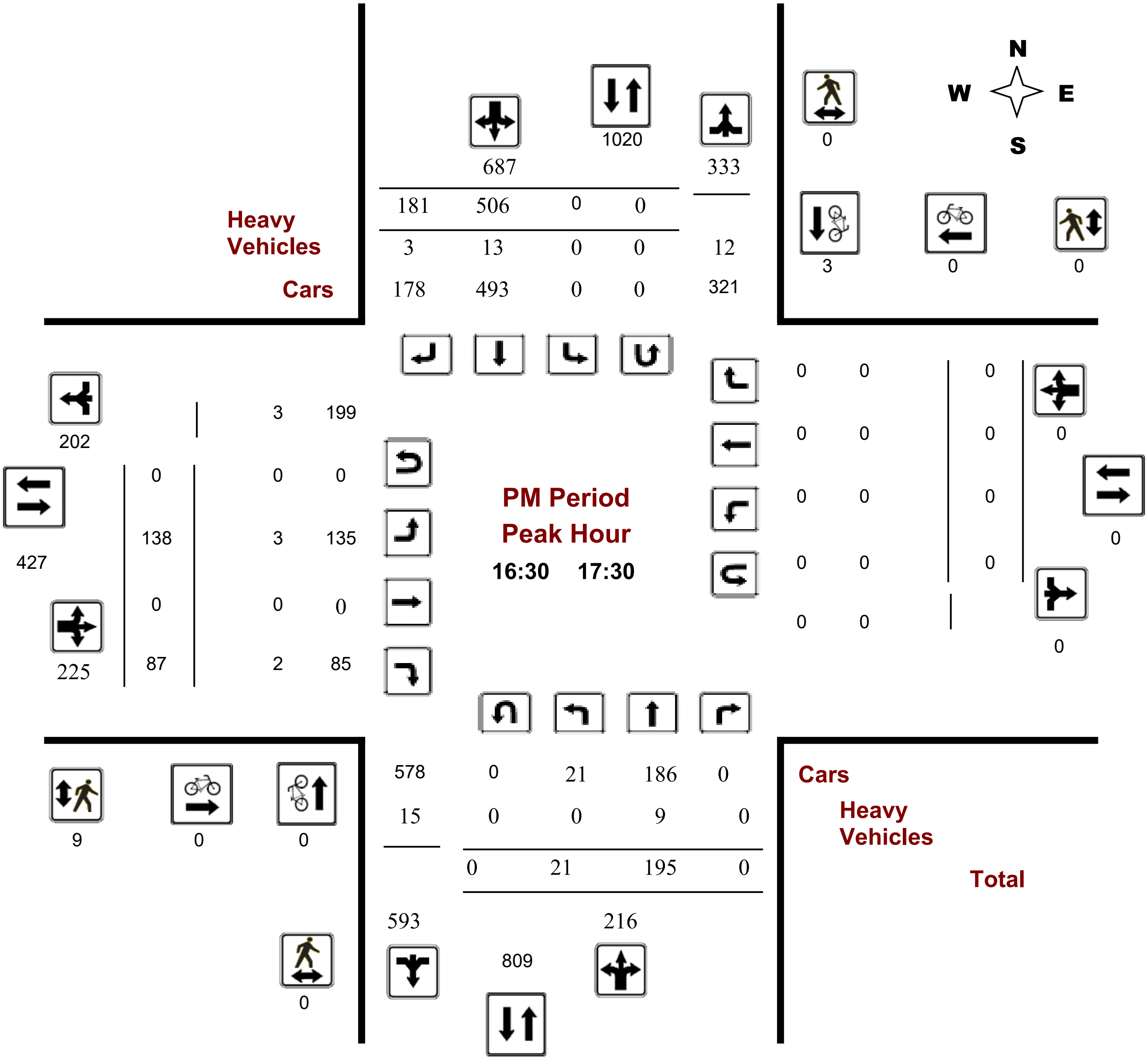
RICHARDSON SIDE RD/TERON RD @ STEACIE DR

Survey Date: Tuesday, February 25, 2020

Start Time: 07:00

WO No: 39534

Device: Miovision



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

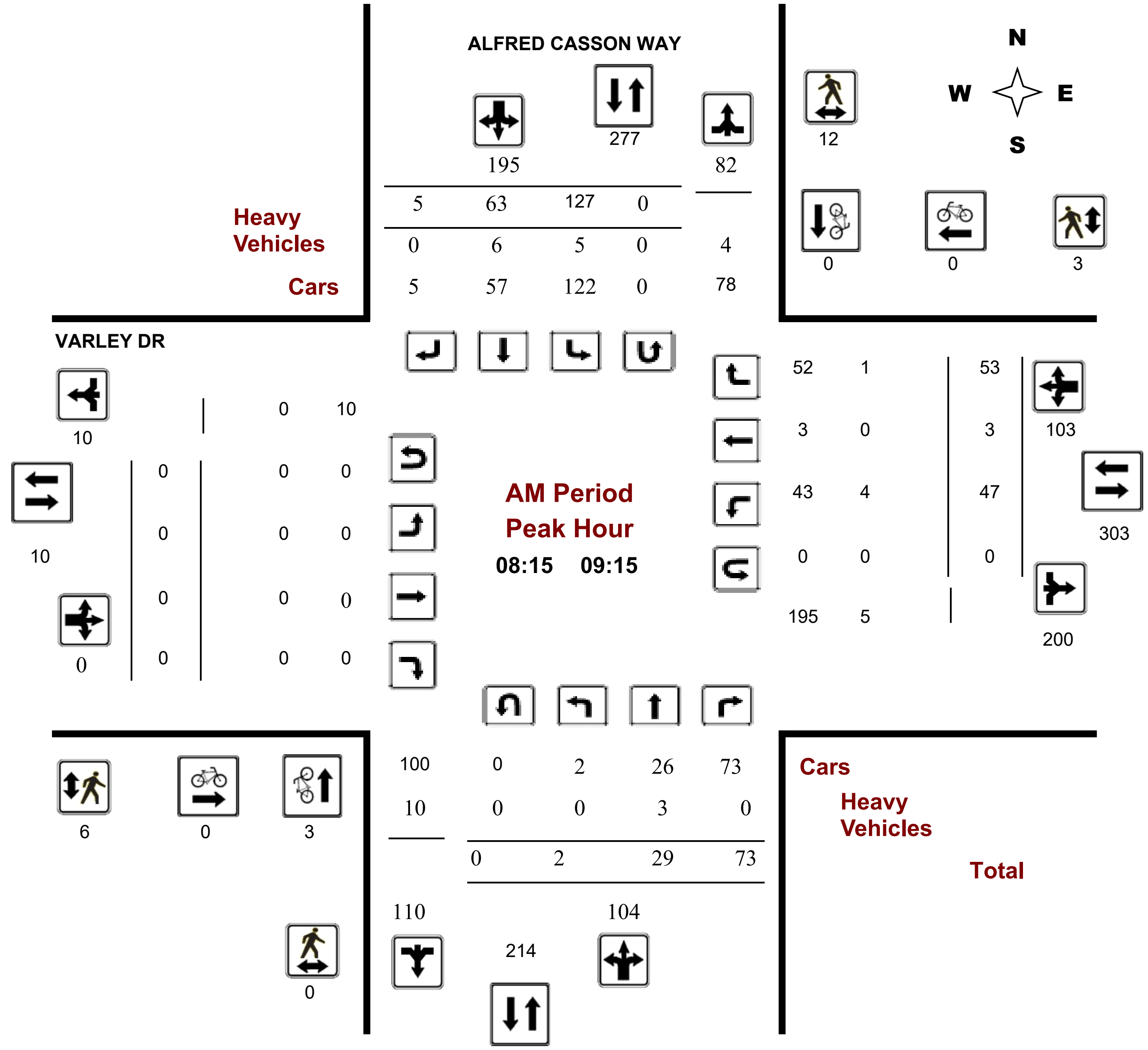
Transportation Services - Traffic Services

Turning Movement Count - Peak Hour Diagram

ALFRED CASSON WAY @ VARLEY DR

Survey Date: Wednesday, April 10, 2019 **WO No:** 38531

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



Comments

Transportation Services - Traffic Services

Turning Movement Count - Peak Hour Diagram

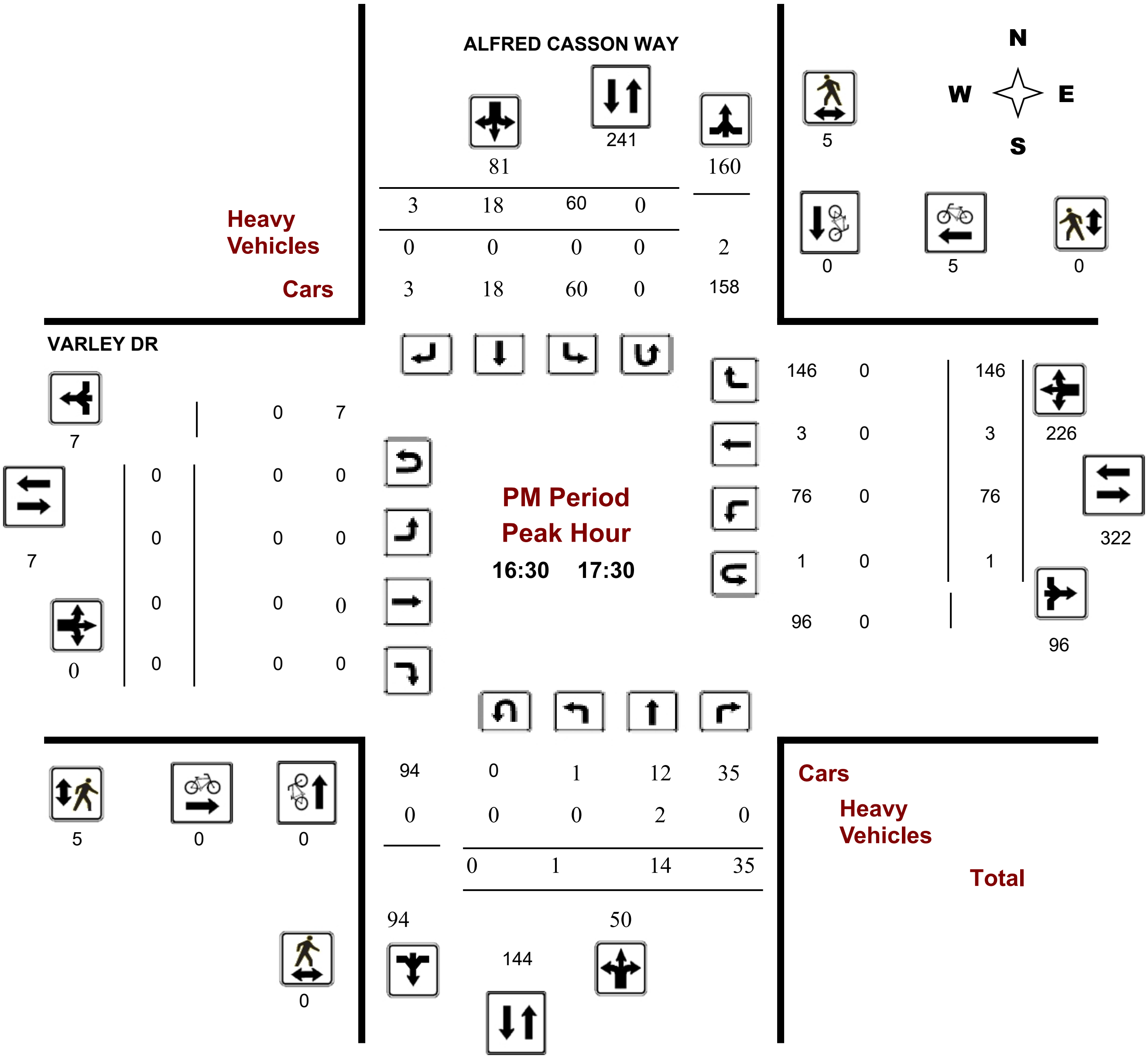
ALFRED CASSON WAY @ VARLEY DR

Survey Date: Wednesday, April 10, 2019

Start Time: 07:00

WO No: 38531

Device: Miovision



Comments

DIRECTIONAL TRAFFIC FLOW

Intersection: **Alfred Casson Way** at **Steacie Dr**

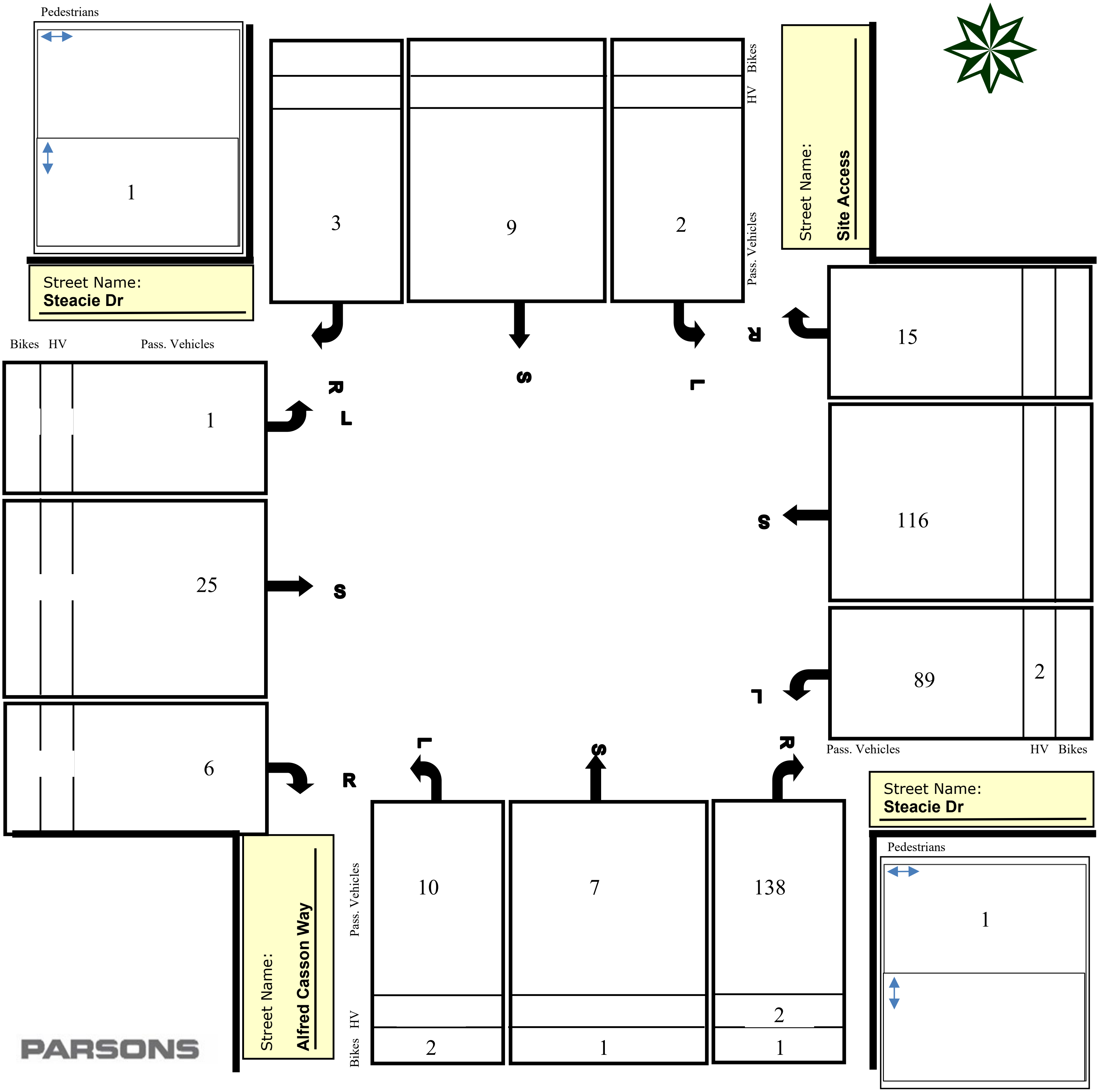
DATE: Day: **30th** Month: **November** Year: **2023** Day of Week: **Thursday**

Observer: **Jordan Terada** Weather: **Overcast**

Chkd by: ____________ Date: ____________

TIME PERIOD: From: **7:15am** To: **8:45am** **(Total Count)**

N



Street Name: **Site Access**

	R	S	L
Bikes			
HV			
Pass. Vehicles	3	9	2

Street Name: **Steacie Dr**

Pedestrians

↔	
↕	1

	Bikes	HV	Pass. Vehicles
L			1
S			25
R			6

Street Name: **Steacie Dr**

	Pass. Vehicles	HV	Bikes
R	15		
S	116		
L	89	2	

Street Name: **Alfred Casson Way**

	L	S	R
Pass. Vehicles	10	7	138
HV			2
Bikes	2	1	1

Street Name: **Steacie Dr**

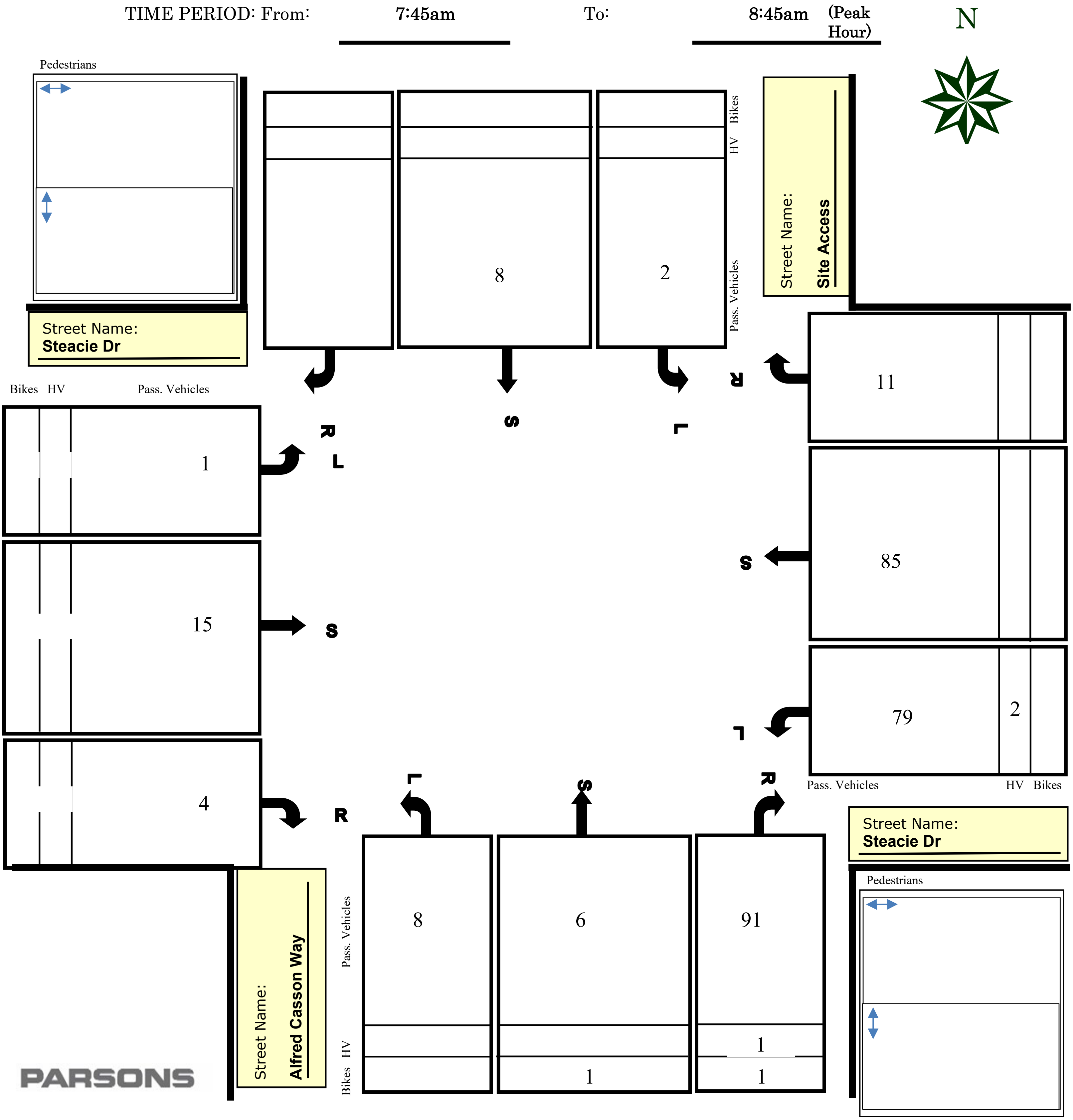
Pedestrians

↔	1
↕	

PARSONS

DIRECTIONAL TRAFFIC FLOW

TIME PERIOD: From: 7:45am To: 8:45am (Peak Hour)



DIRECTIONAL TRAFFIC FLOW

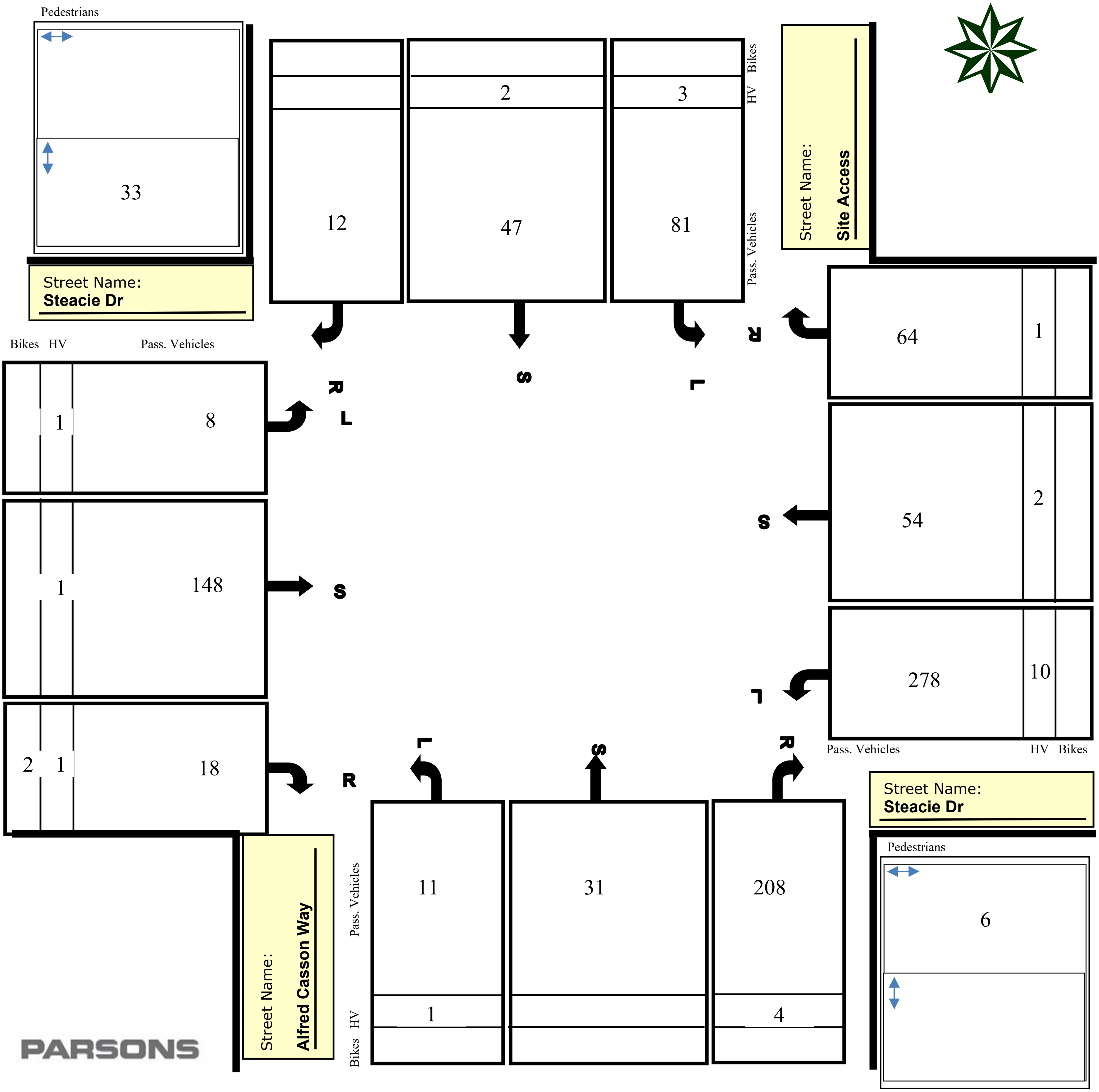
Intersection: Alfred Casson Way at Steacie Dr

DATE: Day: 30th Month: November Year: 2023 Day of Week: Thursday

Observer: Jordan Terada Weather: Overcast

Chkd by: ____________ Date: ____________

TIME PERIOD: From: 3:15pm To: 5:15pm (Total Count)



Street Name: **Site Access**

	R	S	L
Bikes			
HV		2	3
Pass. Vehicles	12	47	81

Street Name: **Steacie Dr**

	Bikes	HV	Pass. Vehicles
L		1	8
S		1	148
R	2	1	18

Pedestrians

↔	
↕	33

Street Name: **Steacie Dr**

	Pass. Vehicles	HV	Bikes
R	64	1	
S	54	2	
L	278	10	

Pedestrians

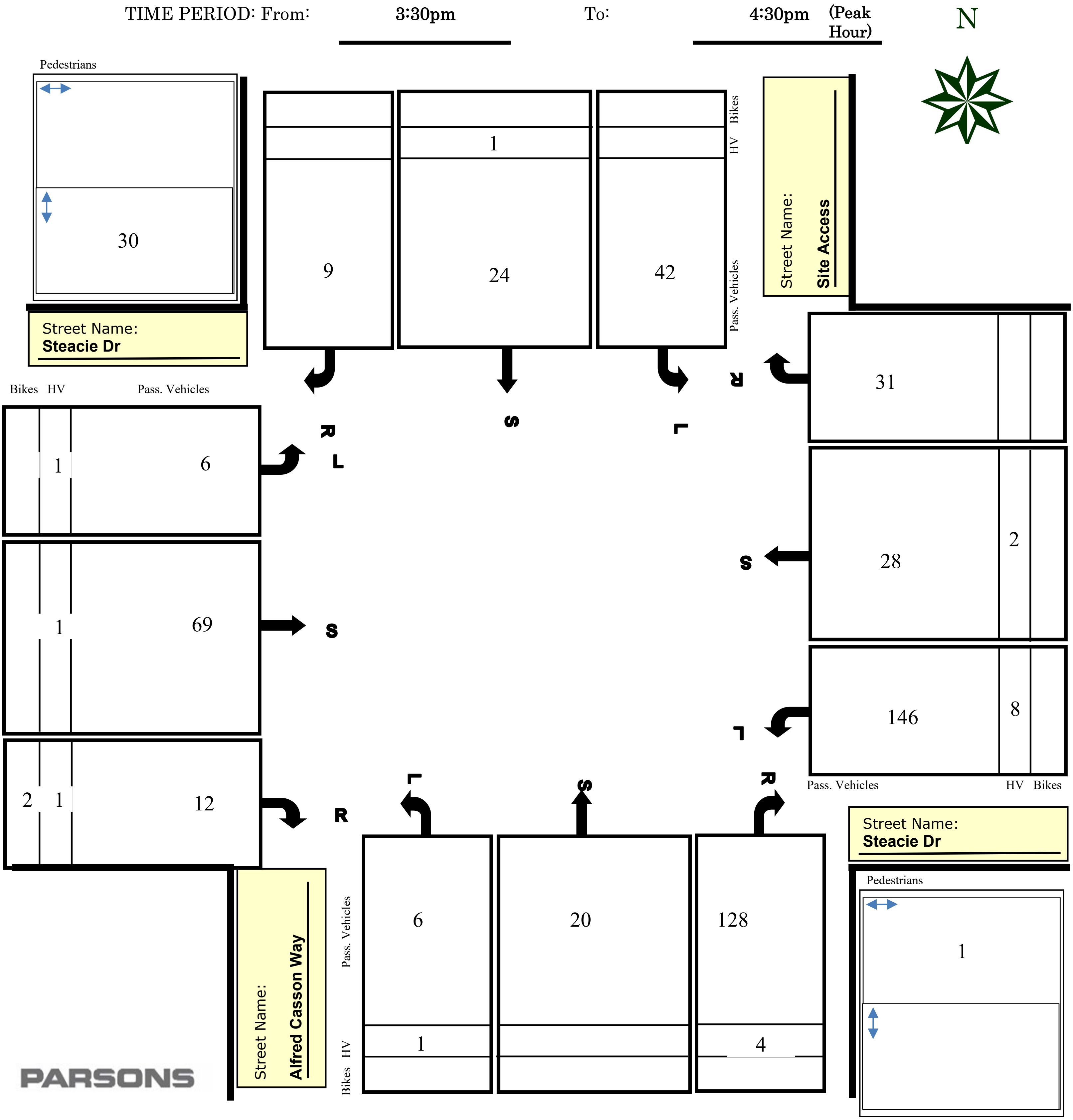
↔	6
↕	

Street Name: **Alfred Casson Way**

	L	S	R
Pass. Vehicles	11	31	208
HV	1		4
Bikes			

DIRECTIONAL TRAFFIC FLOW

TIME PERIOD: From: **3:30pm** To: **4:30pm** (Peak Hour)



APPENDIX D

Collision Data

Total Area

Classification of Accident	Rear End	Turning Movement	Sideswipe	Angle	Approaching	SMV other	SMV unattended vehicle	Other	Total	
P.D. only	31	5	9	1	1	6	0	0	53	83%
Non-fatal injury	3	3	1	2	0	1	0	0	10	16%
Fatal injury	0	0	0	0	0	1	0	0	1	2%
Non-reportable	0	0	0	0	0	0	0	0	0	0%
Total	**34**	**8**	**10**	**3**	**1**	**8**	**0**	**0**	**64**	100%
	#1 or 53%	#3 or 13%	#2 or 16%	#5 or 5%	#6 or 2%	#3 or 13%	#7 or 0%	#7 or 0%		

MARCH RD/TERON RD

Years	Total # Collisions	24 Hr AADT Veh Volume	Days	Collisions/MEV
2017-2021	39	40,617	1825	**0.53**

Peds	Cyclists
0	1

Classification of Accident	Rear End	Turning Movement	Sideswipe	Angle	Approaching	SMV other	SMV unattended vehicle	Other	Total	
P.D. only	22	3	7	1	0	1	0	0	34	87%
Non-fatal injury	1	2	1	0	0	1	0	0	5	13%
Non-reportable	0	0	0	0	0	0	0	0	0	0%
Total	**23**	**5**	**8**	**1**	**0**	**2**	**0**	**0**	**39**	100%
	59%	13%	21%	3%	0%	5%	0%	0%		

RICHARDSON SIDE RD/TERON RD/STEACIE DR

Years	Total # Collisions	24 Hr AADT Veh Volume	Days	Collisions/MEV
2017-2021	2	10,557	1825	**0.10**

Peds	Cyclists
0	0

Classification of Accident	Rear End	Turning Movement	Sideswipe	Angle	Approaching	SMV other	SMV unattended vehicle	Other	Total	
P.D. only	0	2	0	0	0	0	0	0	2	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**	**2**	**0**	**0**	**0**	**0**	**0**	**0**	**2**	100%
	0%	100%	0%	0%	0%	0%	0%	0%		

Road Segments

MARCH RD, 280 S OF CARLING AVE/GATEWAY MALL SC to TERON RD

Years	Total # Collisions	24 Hr AADT Veh Volume	Days	Collisions/MEV
2017-2021	14	n/a	1825	**n/a**

Peds	Cyclists
1	1

Classification of Accident	Rear End	Turning Movement	Sideswipe	Angle	Approaching	SMV other	SMV unattended vehicle	Other	Total	
P.D. only	6	0	2	0	0	2	0	0	10	71%
Non-fatal injury	0	1	0	2	0	0	0	0	3	21%
Fatal injury	0	0	0	0	0	1	0	0	1	7%
Non-reportable	0	0	0	0	0	0	0	0	0	0%
Total	**6**	**1**	**2**	**2**	**0**	**3**	**0**	**0**	**14**	100%
	43%	7%	14%	14%	0%	21%	0%	0%		

MARCH RD, HERZBERG RD to TERON RD

Years	Total # Collisions	24 Hr AADT Veh Volume	Days	Collisions/MEV
2017-2021	7	n/a	1825	**n/a**

Peds	Cyclists
0	0

Classification of Accident	Rear End	Turning Movement	Sideswipe	Angle	Approaching	SMV other	SMV unattended vehicle	Other	Total	
P.D. only	2	0	0	0	0	3	0	0	5	71%
Non-fatal injury	2	0	0	0	0	0	0	0	2	29%
Non-reportable	0	0	0	0	0	0	0	0	0	0%
Total	**4**	**0**	**0**	**0**	**0**	**3**	**0**	**0**	**7**	100%
	57%	0%	0%	0%	0%	43%	0%	0%		

TERON RD, BETHUNE CRT to STEACIE DR

Years	Total # Collisions	24 Hr AADT Veh Volume	Days	Collisions/MEV
2017-2021	2	n/a	1825	**n/a**

Peds	Cyclists
0	0

Classification of Accident	Rear End	Turning Movement	Sideswipe	Angle	Approaching	SMV other	SMV unattended vehicle	Other	Total	
P.D. only	1	0	0	0	1	0	0	0	2	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**	**1**	**0**	**0**	**0**	**2**	100%
	50%	0%	0%	0%	50%	0%	0%	0%		

APPENDIX E

Background Traffic Growth

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
2023	Wed, Dec 6	9150	9913	9305	8324	1203	1388	2573	2606	44462

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%
2023	9913	9150	19063	44462	-12.3%	-9.9%	-11.2%	-10.3%

Regression Estimate	2009	12576	11125	23701
Regression Estimate	2023	10291	9293	19584
Average Annual Change		**-1.42%**	**-1.28%**	**-1.35%**

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%
2023	2573	2606	5179	44462	-16.6%	-10.0%	-13.4%	-10.3%

Regression Estimate	2009	3370	2639	6009
Regression Estimate	2023	2679	2728	5406
Average Annual Change		**-1.63%**	**0.24%**	**-0.75%**

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%
2023	1388	1203	2591	44462	-20.0%	-23.0%	-21.4%	-10.3%

Regression Estimate	2009	1797	1509	3306
Regression Estimate	2023	1496	1333	2829
Average Annual Change		**-1.30%**	**-0.89%**	**-1.11%**

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%
2023	9305	8324	17629	44462	-6.7%	-6.0%	-6.4%	-10.3%

Regression Estimate	2009	11230	10374	21603
Regression Estimate	2023	9519	8259	17778
Average Annual Change		**-1.17%**	**-1.62%**	**-1.38%**

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
2023	Wed, Dec 6	920	1900	1927	764	106	386	449	352	6804

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%
2023	1900	920	2820	6804	-11.2%	1.1%	-7.5%	-6.1%

Regression Estimate	2009	2316	1241	3557
Regression Estimate	2023	1976	868	2844
Average Annual Change		**-1.13%**	**-2.52%**	**-1.59%**

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%
2023	449	352	801	6804	-40.2%	38.6%	-20.3%	-6.1%

Regression Estimate	2009	656	190	846
Regression Estimate	2023	546	341	887
Average Annual Change		**-1.30%**	**4.27%**	**0.34%**

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%
2023	386	106	492	6804	-24.5%	11.6%	-18.8%	-6.1%

Regression Estimate	2009	515	66	581
Regression Estimate	2023	432	111	543
Average Annual Change		**-1.25%**	**3.78%**	**-0.48%**

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%
2023	1927	764	2691	6804	3.2%	6.3%	4.0%	-6.1%

Regression Estimate	2009	2282	1160	3442
Regression Estimate	2023	1883	681	2564
Average Annual Change		**-1.36%**	**-3.73%**	**-2.08%**

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
2023	Wed, Dec 6	1668	1227	1101	1627	315	106	343	467	6854

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%
2023	1227	1668	2895	6854	-4.7%	-21.9%	-15.4%	-12.2%

Regression Estimate	2009	1745	2122	3867
Regression Estimate	2023	1200	1780	2980
Average Annual Change		**-2.64%**	**-1.25%**	**-1.84%**

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%
2023	343	467	810	6854	9.2%	-30.6%	-17.9%	-12.2%

Regression Estimate	2009	460	702	1162
Regression Estimate	2023	315	522	838
Average Annual Change		**-2.66%**	**-2.09%**	**-2.31%**

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%
2023	106	315	421	6854	30.9%	-14.9%	-6.7%	-12.2%

Regression Estimate	2009	128	439	567
Regression Estimate	2023	96	331	427
Average Annual Change		**-1.99%**	**-2.01%**	**-2.01%**

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%
2023	1101	1627	2728	6854	1.5%	-12.6%	-7.4%	-12.2%

Regression Estimate	2009	1489	1853	3342
Regression Estimate	2023	1067	1700	2768
Average Annual Change		**-2.35%**	**-0.61%**	**-1.34%**

TRANS Regional Model

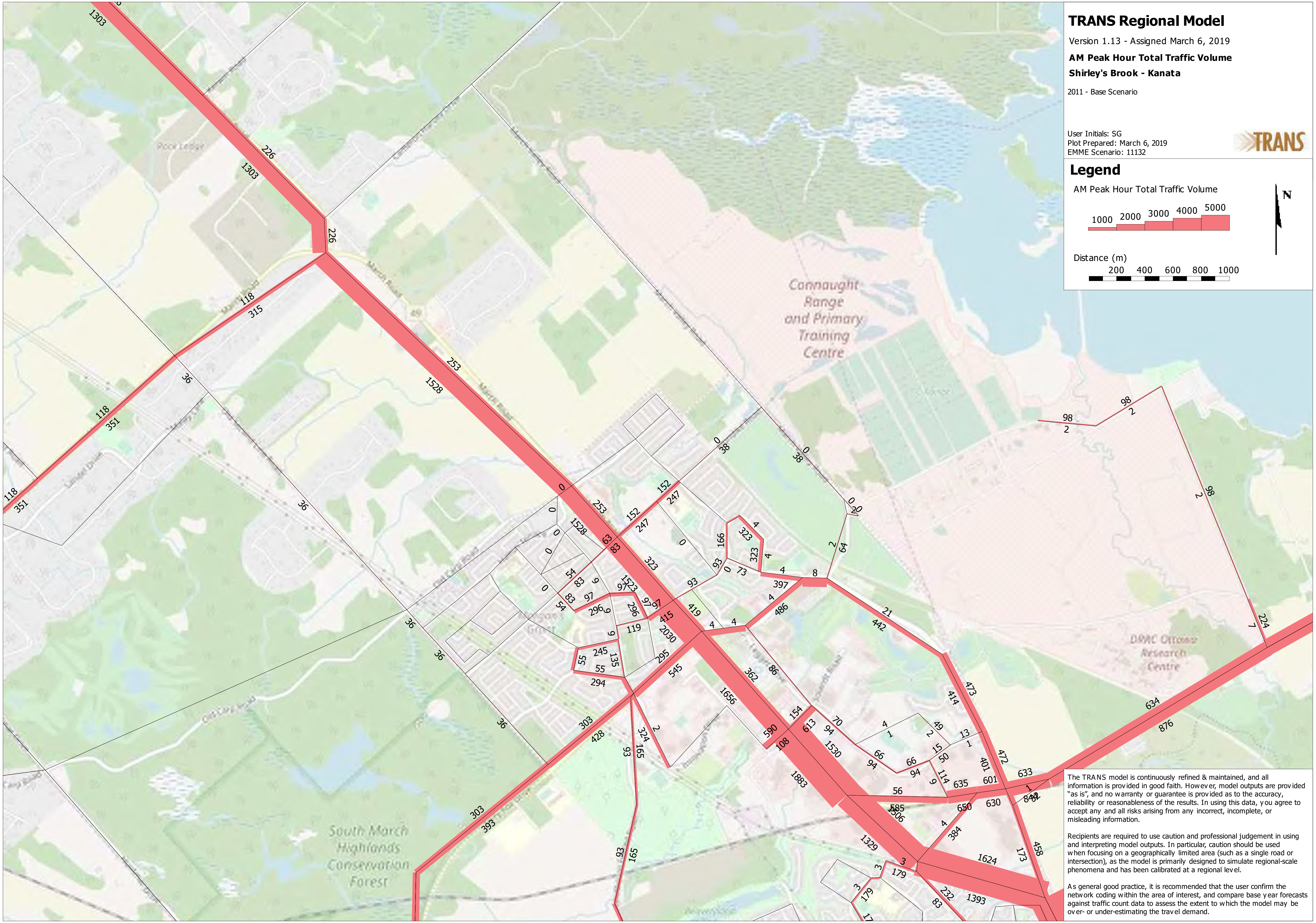
Version 1.13 - Assigned March 6, 2019

AM Peak Hour Total Traffic Volume

Shirley's Brook - Kanata

2011 - Base Scenario

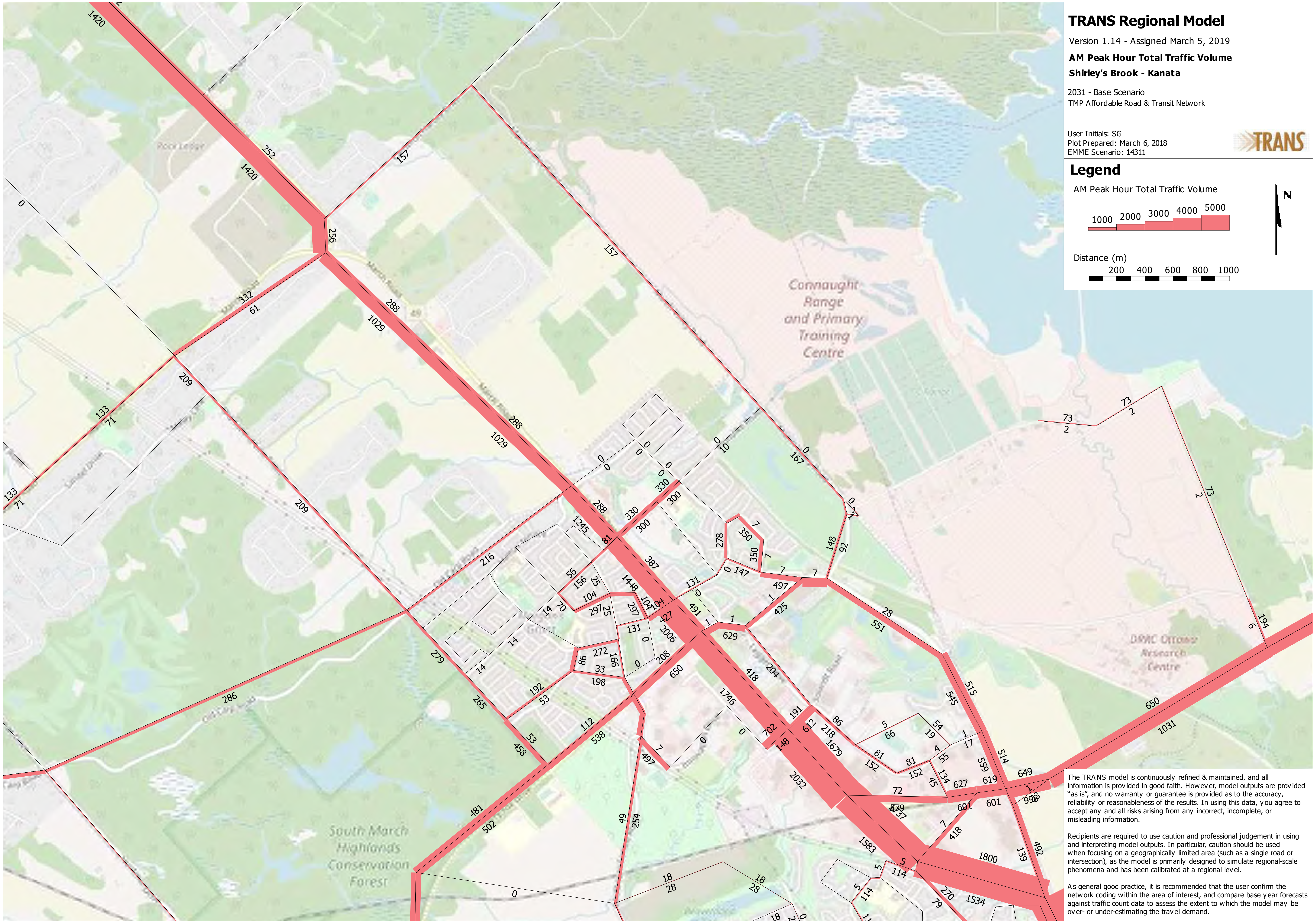
User Initials: SG
Plot Prepared: March 6, 2019
EMME Scenario: 11132



The TRANS model is continuously refined & maintained, and all information is provided in good faith. However, model outputs are provided "as is", and no warranty or guarantee is provided as to the accuracy, reliability or reasonableness of the results. In using this data, you agree to accept any and all risks arising from any incorrect, incomplete, or misleading information.

Recipients are required to use caution and professional judgement in using and interpreting model outputs. In particular, caution should be used when focusing on a geographically limited area (such as a single road or intersection), as the model is primarily designed to simulate regional-scale phenomena and has been calibrated at a regional level.

As general good practice, it is recommended that the user confirm the network coding within the area of interest, and compare base year forecasts against traffic count data to assess the extent to which the model may be over- or under-estimating the travel demand.



TRANS Regional Model

Version 1.14 - Assigned March 5, 2019

AM Peak Hour Total Traffic Volume

Shirley's Brook - Kanata

2031 - Base Scenario
TMP Affordable Road & Transit Network

User Initials: SG
Plot Prepared: March 6, 2018
EMME Scenario: 14311

Legend

AM Peak Hour Total Traffic Volume

1000 2000 3000 4000 5000

Distance (m)

200 400 600 800 1000

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TRANS Regional Model

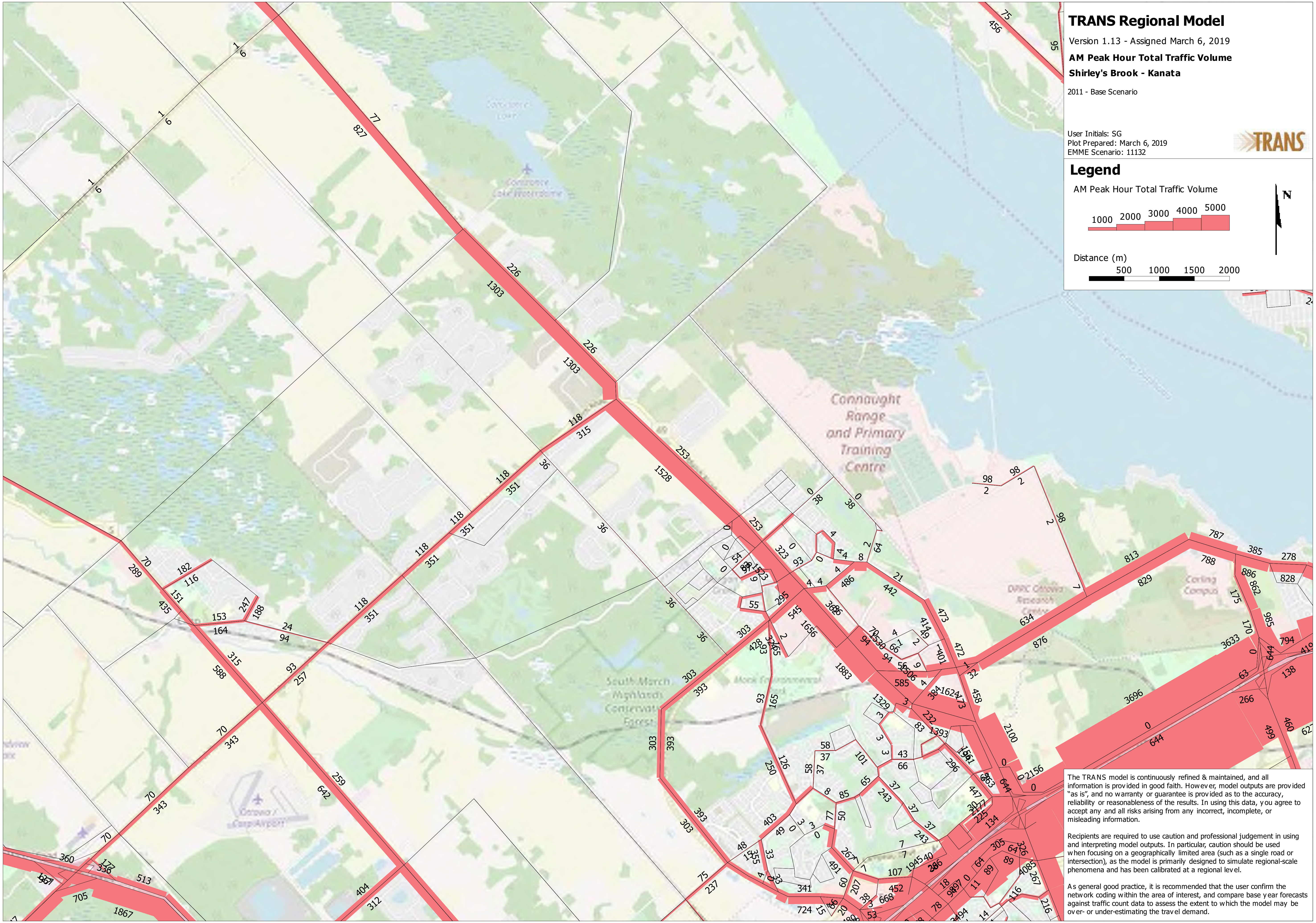
Version 1.13 - Assigned March 6, 2019

AM Peak Hour Total Traffic Volume

Shirley's Brook - Kanata

2011 - Base Scenario

User Initials: SG
Plot Prepared: March 6, 2019
EMME Scenario: 11132



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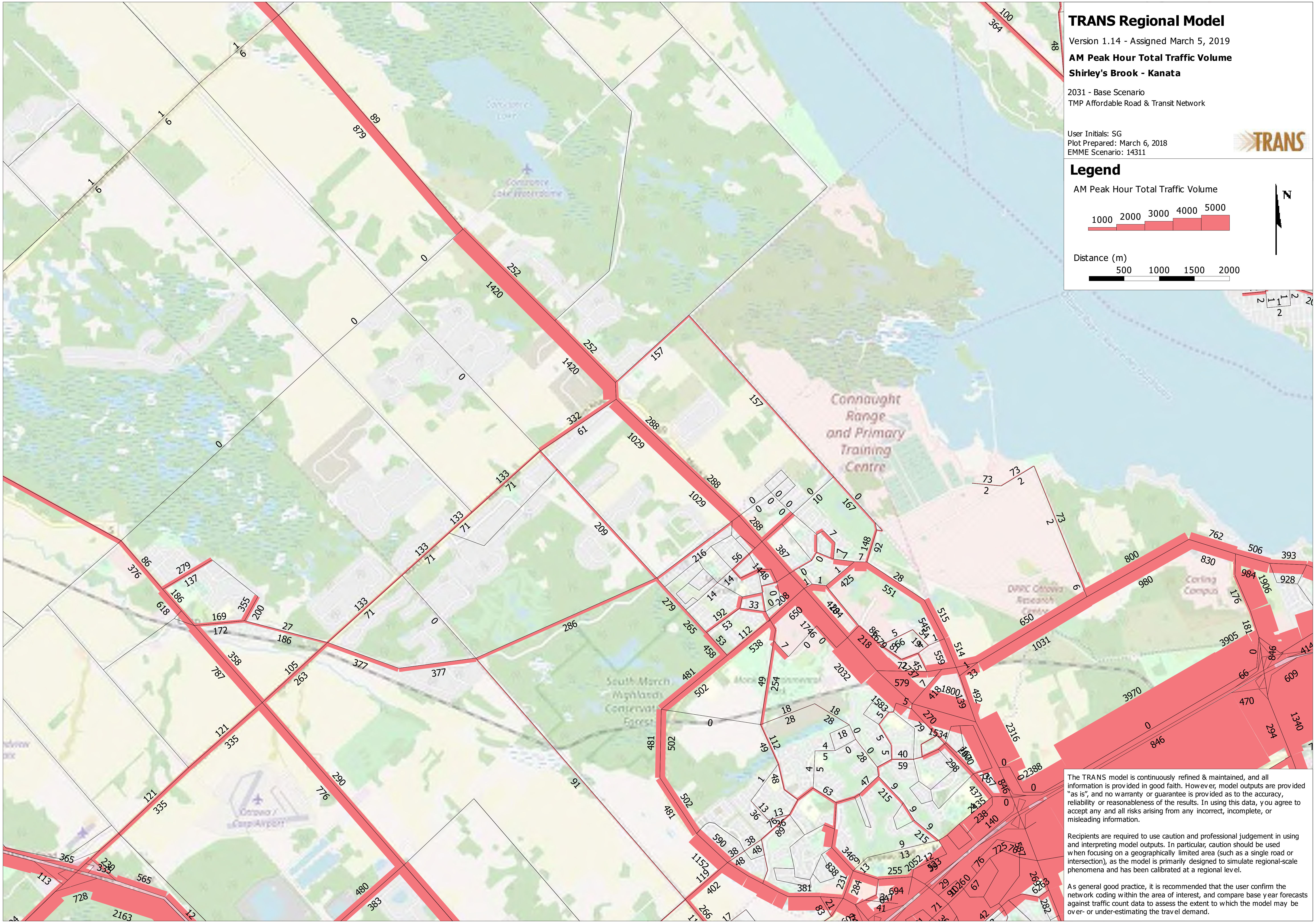

TRANS Regional Model

Version 1.14 - Assigned March 5, 2019

AM Peak Hour Total Traffic Volume

Shirley's Brook - Kanata

2031 - Base Scenario
TMP Affordable Road & Transit Network

User Initials: SG
Plot Prepared: March 6, 2018
EMME Scenario: 14311

TRANS

Legend

The TRANS model is continuously refined & maintained, and all information is provided in good faith. However, model outputs are provided "as is", and no warranty or guarantee is provided as to the accuracy, reliability or reasonableness of the results. In using this data, you agree to accept any and all risks arising from any incorrect, incomplete, or misleading information.

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APPENDIX F

MMLOS Analysis: Road Segments

Multi-Modal Level of Service - Segments Form

Consultant Parsons
Scenario 100 Steacie Dr
Comments
Project 478881 - 01000
Date 14-Dec-23

SEGMENTS		**Street A**	Steacie North Side	Steacie South Side	Section 3	Mitigation 4	Section 5	Section 6	Section 7	Section 8	Section 9
Pedestrian	Sidewalk Width	-	no sidewalk	≥ 2 m		1.8 m					
	Boulevard Width		n/a	> 2 m		< 0.5 m					
	Avg Daily Curb Lane Traffic Volume		≤ 3000	≤ 3000		≤ 3000					
	Operating Speed		> 50 to 60 km/h	> 50 to 60 km/h		> 50 to 60 km/h					
	On-Street Parking		yes	yes		yes					
	Exposure to Traffic PLoS		**F**	**A**	-	**C**	-	-	-	-	-
	Effective Sidewalk Width										
	Pedestrian Volume										
	Crowding PLoS		-	-	-	-	-	-	-	-	-
	Level of Service		-	-	-	-	-	-	-	-	-
Bicycle	Type of Cycling Facility	**D**	Mixed Traffic	Mixed Traffic							
	Number of Travel Lanes		≤ 2 (no centreline)	≤ 2 (no centreline)							
	Operating Speed		≥ 50 to 60 km/h	≥ 50 to 60 km/h							
	# of Lanes & Operating Speed LoS		**D**	**D**	-	-	-	-	-	-	-
	Bike Lane (+ Parking Lane) Width										
	Bike Lane Width LoS		-	-	-	-	-	-	-	-	-
	Bike Lane Blockages										
	Blockage LoS		-	-	-	-	-	-	-	-	-
	Median Refuge Width (no median = < 1.8 m)		< 1.8 m refuge	< 1.8 m refuge							
	No. of Lanes at Unsignalized Crossing		≤ 3 lanes	≤ 3 lanes							
	Sidestreet Operating Speed		>40 to 50 km/h	>40 to 50 km/h							
	Unsignalized Crossing - Lowest LoS		**B**	**B**	-	-	-	-	-	-	-
	Level of Service		**D**	**D**	-	-	-	-	-	-	-
Transit	Facility Type	-									
	Friction or Ratio Transit:Posted Speed										
	Level of Service		-	-	-	-	-	-	-	-	-
Truck	Truck Lane Width	-									
	Travel Lanes per Direction										
	Level of Service		-	-	-	-	-	-	-	-	-

APPENDIX G

TDM Checklist

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

Legend

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

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

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

			TDM-supportive design & infrastructure measures: *Residential developments*	Check if completed & add descriptions, explanations or plan/drawing references
	2.	**WALKING & CYCLING: END-OF-TRIP FACILITIES**		
	2.1	**Bicycle parking**		
REQUIRED	2.1.1	Provide bicycle parking in highly visible and lighted areas, sheltered from the weather wherever possible *(see Official Plan policy 4.3.6)*		☑ proposed indoors in secured area within parking garage.
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)*		☑
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)*		☑
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)*		☑
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		☐ n/a
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		☐ n/a
BETTER	3.1.3	Provide a secure and comfortable interior waiting area by integrating any on-site transit stops into the building		☐ n/a

		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	☑ drop off bay provided near front doors.
	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	☐ less parking proposed to encourage alternate modes.
BASIC	6.1.2	Provide parking for long-term and short-term users that is consistent with mode share targets, considering the potential for visitors to use off-site public parking	☐
BASIC	6.1.3	Where a site features more than one use, provide shared parking and reduce the cumulative number of parking spaces accordingly *(see Zoning By-law Section 104)*	☐
BETTER	6.1.4	Reduce the minimum number of parking spaces required by zoning by one space for each 13 square metres of gross floor area provided as shower rooms, change rooms, locker rooms and other facilities for cyclists in conjunction with bicycle parking *(see Zoning By-law Section 111)*	☐
	6.2	**Separate long-term & short-term parking areas**	
BETTER	6.2.1	Provide separate areas for short-term and long-term parking (using signage or physical barriers) to permit access controls and simplify enforcement (i.e. to discourage residents from parking in visitor spaces, and vice versa)	☐

TDM Measures Checklist:
Residential Developments (multi-family, condominium or subdivision)

Legend

BASIC	The measure is generally feasible and effective, and in most cases would benefit the development and its users
BETTER	The measure could maximize support for users of sustainable modes, and optimize development performance
★	The measure is one of the most dependably effective tools to encourage the use of sustainable modes

TDM measures: *Residential developments*				Check if proposed & add descriptions
		1.	**TDM PROGRAM MANAGEMENT**	
		1.1	**Program coordinator**	
BASIC	★	1.1.1	Designate an internal coordinator, or contract with an external coordinator	☑
		1.2	**Travel surveys**	
BETTER		1.2.1	Conduct periodic surveys to identify travel-related behaviours, attitudes, challenges and solutions, and to track progress	☐
		2.	**WALKING AND CYCLING**	
		2.1	**Information on walking/cycling routes & destinations**	
BASIC		2.1.1	Display local area maps with walking/cycling access routes and key destinations at major entrances *(multi-family, condominium)*	☑
		2.2	**Bicycle skills training**	
BETTER		2.2.1	Offer on-site cycling courses for residents, or subsidize off-site courses	☐

TDM measures: *Residential developments*				Check if proposed & add descriptions
		3.	**TRANSIT**	
		3.1	**Transit information**	
BASIC		3.1.1	Display relevant transit schedules and route maps at entrances *(multi-family, condominium)*	☑
BETTER		3.1.2	Provide real-time arrival information display at entrances *(multi-family, condominium)*	☐
		3.2	**Transit fare incentives**	
BASIC	★	3.2.1	Offer PRESTO cards preloaded with one monthly transit pass on residence purchase/move-in, to encourage residents to use transit	☑
BETTER		3.2.2	Offer at least one year of free monthly transit passes on residence purchase/move-in	☐
		3.3	**Enhanced public transit service**	
BETTER	★	3.3.1	Contract with OC Transpo to provide early transit services until regular services are warranted by occupancy levels *(subdivision)*	☐
		3.4	**Private transit service**	
BETTER		3.4.1	Provide shuttle service for seniors homes or lifestyle communities (e.g. scheduled mall or supermarket runs)	☐
		4.	**CARSHARING & BIKESHARING**	
		4.1	**Bikeshare stations & memberships**	
BETTER		4.1.1	Contract with provider to install on-site bikeshare station (*multi-family)*	☑
BETTER		4.1.2	Provide residents with bikeshare memberships, either free or subsidized *(multi-family)*	☐
		4.2	**Carshare vehicles & memberships**	
BETTER		4.2.1	Contract with provider to install on-site carshare vehicles and promote their use by residents	☑
BETTER		4.2.2	Provide residents with carshare memberships, either free or subsidized	☑
		5.	**PARKING**	
		5.1	**Priced parking**	
BASIC	★	5.1.1	Unbundle parking cost from purchase price *(condominium)*	☐
BASIC	★	5.1.2	Unbundle parking cost from monthly rent *(multi-family)*	☑

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

APPENDIX H

MMLOS Analysis: Intersections

Multi-Modal Level of Service - Intersections Form

Consultant Parsons
Scenario 100 Steacie Dr
Comments

Project 478881 - 01000
Date 24-Feb-24

Unlocked Rows for Replicating

INTERSECTIONS		March/Teron				Intersection B				Intersection C			
	Crossing Side	NORTH	SOUTH	EAST	WEST	NORTH	SOUTH	EAST	WEST	NORTH	SOUTH	EAST	WEST
Pedestrian	Lanes	7	7	9	9								
	Median	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								
	Conflicting Right Turns	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								
	Ped Signal Leading Interval?	No	No	No	No								
	Right Turn Channel	Conventional with Receiving Lane	Conventional with Receiving Lane	Conventional with Receiving Lane	Conventional with Receiving Lane								
	Corner Radius	15-25m	15-25m	15-25m	15-25m								
	Crosswalk Type	Std transverse markings	Std transverse markings	Std transverse markings	Std transverse markings								
	PETSI Score	3	3	-30	-30								
	Ped. Exposure to Traffic LoS	F	F	#N/A	#N/A	-	-	-	-	-	-	-	-
	Cycle Length												
	Effective Walk Time												
	Average Pedestrian Delay												
	Pedestrian Delay LoS	-	-	-	-	-	-	-	-	-	-	-	-
	Level of Service	F	F	#N/A	#N/A	-	-	-	-	-	-	-	-
		#N/A				-				-			
	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		Curb Bike Lane, Cycletrack or MUP	Curb Bike Lane, Cycletrack or MUP					
	Right Turn Lane Configuration	> 50 m	> 50 m	Bike lane shifts to the left of right turn	Bike lane shifts to the left of right turn		Not Applicable	Not Applicable					
	Right Turning Speed	>25 km/h	>25 km/h	>25 to 30 km/h	>25 to 30 km/h		Not Applicable	Not Applicable					
	Cyclist relative to RT motorists	F	F	F	F	-	Not Applicable	Not Applicable	-	-	-	-	-
	Separated or Mixed Traffic	Mixed Traffic	Mixed Traffic	Separated	Separated	-	Separated	Separated	-	-	-	-	-
	Left Turn Approach	One lane crossed	One lane crossed	≥ 2 lanes crossed	≥ 2 lanes crossed		2-stage, LT box	No lane crossed					
	Operating Speed	> 50 to < 60 km/h	> 50 to < 60 km/h	≥ 60 km/h	≥ 60 km/h		≥ 60 km/h	≥ 60 km/h					
	Left Turning Cyclist	E	E	F	F	-	A	C	-	-	-	-	-
	Level of Service	F	F	F	F	-	A	C	-	-	-	-	-
		F				C				-			
Transit	Average Signal Delay	> 40 sec		≤ 30 sec	≤ 40 sec								
	Level of Service	F	-	D	E	-	-	-	-	-	-	-	-
		F				-				-			
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)	30	686	204	105	1628	194	236	162	51	27	43	36
Future Volume (vph)	30	686	204	105	1628	194	236	162	51	27	43	36
Satd. Flow (prot)	1695	3390	1517	1695	3390	1517	1695	1784	1517	1695	1784	1517
Flt Permitted	0.055			0.294			0.589			0.565		
Satd. Flow (perm)	98	3390	1489	524	3390	1492	1045	1784	1494	1007	1784	1490
Satd. Flow (RTOR)			227			135			133			133
Lane Group Flow (vph)	33	762	227	117	1809	216	262	180	57	30	48	40
Turn Type	pm+pt	NA	Perm	pm+pt	NA	Perm	pm+pt	NA	Perm	pm+pt	NA	Perm
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases	4		4	8		8	2		2	6		6
Detector Phase	7	4	4	3	8	8	5	2	2	1	6	6
Switch Phase												
Minimum Initial (s)	5.0	10.0	10.0	5.0	10.0	10.0	5.0	10.0	10.0	5.0	10.0	10.0
Minimum Split (s)	11.4	25.3	25.3	11.4	25.3	25.3	11.1	34.6	34.6	11.1	34.6	34.6
Total Split (s)	12.0	68.0	68.0	12.0	68.0	68.0	12.0	38.0	38.0	12.0	38.0	38.0
Total Split (%)	9.2%	52.3%	52.3%	9.2%	52.3%	52.3%	9.2%	29.2%	29.2%	9.2%	29.2%	29.2%
Yellow Time (s)	4.6	4.6	4.6	4.6	4.6	4.6	3.3	3.3	3.3	3.3	3.3	3.3
All-Red Time (s)	1.8	1.7	1.7	1.8	1.7	1.7	2.8	3.3	3.3	2.8	3.3	3.3
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	6.4	6.3	6.3	6.4	6.3	6.3	6.1	6.6	6.6	6.1	6.6	6.6
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag	Lag
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Recall Mode	None	C-Max	C-Max	None	C-Max	C-Max	None	None	None	None	None	None
Act Effct Green (s)	81.4	75.1	75.1	88.2	82.2	82.2	23.7	19.7	19.7	21.1	16.9	16.9
Actuated g/C Ratio	0.63	0.58	0.58	0.68	0.63	0.63	0.18	0.15	0.15	0.16	0.13	0.13
v/c Ratio	0.24	0.39	0.24	0.27	0.84	0.22	1.16	0.67	0.17	0.15	0.21	0.13
Control Delay	13.5	17.5	2.9	9.8	27.1	6.3	154.4	64.0	1.1	38.6	49.8	0.9
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	13.5	17.5	2.9	9.8	27.1	6.3	154.4	64.0	1.1	38.6	49.8	0.9
LOS	B	B	A	A	C	A	F	E	A	D	D	A
Approach Delay		14.1			24.0			104.3			30.4	
Approach LOS		B			C			F			C	
Queue Length 50th (m)	2.7	57.2	0.0	9.9	215.5	9.0	~71.0	44.6	0.0	6.0	11.0	0.0
Queue Length 95th (m)	7.3	84.6	13.2	19.9	#307.6	24.8	#110.3	65.4	0.0	13.1	21.5	0.0
Internal Link Dist (m)		82.7			90.1			51.9			434.0	
Turn Bay Length (m)	70.0		60.0	70.0		65.0				35.0		60.0
Base Capacity (vph)	140	1958	956	434	2144	993	226	430	461	195	430	460
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	0.24	0.39	0.24	0.27	0.84	0.22	1.16	0.42	0.12	0.15	0.11	0.09

Intersection Summary

Cycle Length: 130
Actuated Cycle Length: 130
Offset: 121 (93%), Referenced to phase 4:EBTL and 8:WBTL, Start of Green
Natural Cycle: 135
Control Type: Actuated-Coordinated

Maximum v/c Ratio: 1.16

Intersection Signal Delay: 32.1 Intersection LOS: C

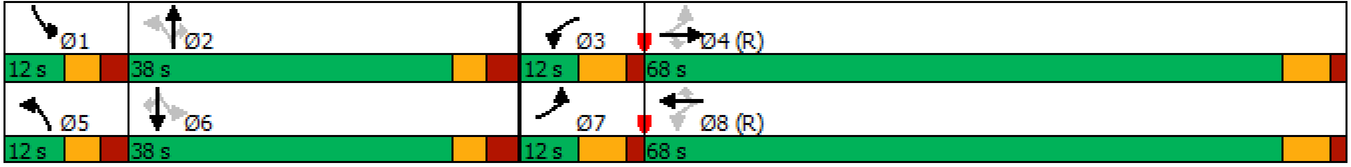
Intersection Capacity Utilization 91.4% ICU Level of Service F

Analysis Period (min) 15

~ 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: Teron Rd/Richardson Side Rd & March Rd



Intersection	
Int Delay, s/veh	2.2

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations	↰	↱		↰↑↑	↑	↱
Traffic Vol, veh/h	87	37	36	359	249	97
Future Vol, veh/h	87	37	36	359	249	97
Conflicting Peds, #/hr	0	0	6	0	0	6
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	Yield	-	None	-	Yield
Storage Length	0	20	-	-	-	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	399	277	108

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	523	283	283	0	-	0
Stage 1	283	-	-	-	-	-
Stage 2	240	-	-	-	-	-
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	523	755	1278	-	-	-
Stage 1	737	-	-	-	-	-
Stage 2	740	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	496	750	1270	-	-	-
Mov Cap-2 Maneuver	496	-	-	-	-	-
Stage 1	703	-	-	-	-	-
Stage 2	736	-	-	-	-	-

Approach	EB		NB		SB	
HCM Control Delay, s	12.8		0.8		0	
HCM LOS	B					

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	EBLn2	SBT	SBR
Capacity (veh/h)	1270	-	496	750	-	-
HCM Lane V/C Ratio	0.031	-	0.195	0.055	-	-
HCM Control Delay (s)	7.9	0.1	14	10.1	-	-
HCM Lane LOS	A	A	B	B	-	-
HCM 95th %tile Q(veh)	0.1	-	0.7	0.2	-	-

Intersection	
Intersection Delay, s/veh	8.1
Intersection LOS	A

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		✥			✥			✥			✥	
Traffic Vol, veh/h	1	15	4	79	85	11	8	6	91	0	8	2
Future Vol, veh/h	1	15	4	79	85	11	8	6	91	0	8	2
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	1	17	4	88	94	12	9	7	101	0	9	2
Number of Lanes	0	1	0	0	1	0	0	1	0	0	1	0

Approach	EB	WB	NB	SB
Opposing Approach	WB	EB	SB	NB
Opposing Lanes	1	1	1	1
Conflicting Approach Left	SB	NB	EB	WB
Conflicting Lanes Left	1	1	1	1
Conflicting Approach Right	NB	SB	WB	EB
Conflicting Lanes Right	1	1	1	1
HCM Control Delay	7.4	8.5	7.5	7.5
HCM LOS	A	A	A	A

Lane	NBLn1	EBLn1	WBLn1	SBLn1
Vol Left, %	8%	5%	45%	0%
Vol Thru, %	6%	75%	49%	80%
Vol Right, %	87%	20%	6%	20%
Sign Control	Stop	Stop	Stop	Stop
Traffic Vol by Lane	105	20	175	10
LT Vol	8	1	79	0
Through Vol	6	15	85	8
RT Vol	91	4	11	2
Lane Flow Rate	117	22	194	11
Geometry Grp	1	1	1	1
Degree of Util (X)	0.127	0.027	0.228	0.014
Departure Headway (Hd)	3.933	4.303	4.227	4.425
Convergence, Y/N	Yes	Yes	Yes	Yes
Cap	916	837	842	813
Service Time	1.936	2.303	2.286	2.43
HCM Lane V/C Ratio	0.128	0.026	0.23	0.014
HCM Control Delay	7.5	7.4	8.5	7.5
HCM Lane LOS	A	A	A	A
HCM 95th-tile Q	0.4	0.1	0.9	0

Intersection	
Intersection Delay, s/veh	8.4
Intersection LOS	A

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		✥			✥						✥	
Traffic Vol, veh/h	127	63	5	2	26	73	0	0	0	47	3	53
Future Vol, veh/h	127	63	5	2	26	73	0	0	0	47	3	53
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	141	70	6	2	29	81	0	0	0	52	3	59
Number of Lanes	0	1	0	0	1	0	0	0	0	0	1	0

Approach	EB	WB	SB
Opposing Approach	WB	EB	
Opposing Lanes	1	1	0
Conflicting Approach Left	SB		WB
Conflicting Lanes Left	1	0	1
Conflicting Approach Right		SB	EB
Conflicting Lanes Right	0	1	1
HCM Control Delay	9	7.6	8.2
HCM LOS	A	A	A

Lane	EBLn1	WBLn1	SBLn1
Vol Left, %	65%	2%	46%
Vol Thru, %	32%	26%	3%
Vol Right, %	3%	72%	51%
Sign Control	Stop	Stop	Stop
Traffic Vol by Lane	195	101	103
LT Vol	127	2	47
Through Vol	63	26	3
RT Vol	5	73	53
Lane Flow Rate	217	112	114
Geometry Grp	1	1	1
Degree of Util (X)	0.267	0.125	0.141
Departure Headway (Hd)	4.439	4.003	4.44
Convergence, Y/N	Yes	Yes	Yes
Cap	815	898	809
Service Time	2.439	2.019	2.458
HCM Lane V/C Ratio	0.266	0.125	0.141
HCM Control Delay	9	7.6	8.2
HCM Lane LOS	A	A	A
HCM 95th-tile Q	1.1	0.4	0.5

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↑↑	↱	↰	↑↑	↱	↰	↑	↱	↰	↑	↱
Traffic Volume (vph)	12	1389	267	69	998	33	178	61	104	133	131	51
Future Volume (vph)	12	1389	267	69	998	33	178	61	104	133	131	51
Satd. Flow (prot)	1695	3390	1517	1695	3390	1517	1695	1784	1517	1695	1784	1517
Flt Permitted	0.204			0.058			0.509			0.713		
Satd. Flow (perm)	364	3390	1492	103	3390	1495	898	1784	1496	1271	1784	1473
Satd. Flow (RTOR)			167			135			133			133
Lane Group Flow (vph)	13	1543	297	77	1109	37	198	68	116	148	146	57
Turn Type	pm+pt	NA	Perm	pm+pt	NA	Perm	pm+pt	NA	Perm	pm+pt	NA	Perm
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases	4		4	8		8	2		2	6		6
Detector Phase	7	4	4	3	8	8	5	2	2	1	6	6
Switch Phase												
Minimum Initial (s)	5.0	10.0	10.0	5.0	10.0	10.0	5.0	10.0	10.0	5.0	10.0	10.0
Minimum Split (s)	11.4	25.3	25.3	11.4	25.3	25.3	11.1	34.6	34.6	11.1	34.6	34.6
Total Split (s)	12.0	66.0	66.0	12.0	66.0	66.0	17.0	35.0	35.0	17.0	35.0	35.0
Total Split (%)	9.2%	50.8%	50.8%	9.2%	50.8%	50.8%	13.1%	26.9%	26.9%	13.1%	26.9%	26.9%
Yellow Time (s)	4.6	4.6	4.6	4.6	4.6	4.6	3.3	3.3	3.3	3.3	3.3	3.3
All-Red Time (s)	1.8	1.7	1.7	1.8	1.7	1.7	2.8	3.3	3.3	2.8	3.3	3.3
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	6.4	6.3	6.3	6.4	6.3	6.3	6.1	6.6	6.6	6.1	6.6	6.6
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag	Lag
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Recall Mode	None	C-Max	C-Max	None	C-Max	C-Max	None	None	None	None	None	None
Act Effct Green (s)	75.4	69.6	69.6	83.0	79.1	79.1	27.6	16.2	16.2	27.1	15.9	15.9
Actuated g/C Ratio	0.58	0.54	0.54	0.64	0.61	0.61	0.21	0.12	0.12	0.21	0.12	0.12
v/c Ratio	0.05	0.85	0.34	0.46	0.54	0.04	0.77	0.31	0.38	0.49	0.67	0.19
Control Delay	10.3	32.5	9.1	23.6	17.8	0.1	62.1	54.1	9.3	45.0	68.9	1.4
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	10.3	32.5	9.1	23.6	17.8	0.1	62.1	54.1	9.3	45.0	68.9	1.4
LOS	B	C	A	C	B	A	E	D	A	D	E	A
Approach Delay		28.6			17.6			44.6			47.9	
Approach LOS		C			B			D			D	
Queue Length 50th (m)	1.1	170.0	16.2	6.8	72.8	0.0	42.9	16.2	0.0	31.0	36.3	0.0
Queue Length 95th (m)	4.0	#253.8	40.1	20.3	130.3	0.0	62.1	29.0	12.3	47.1	55.8	0.0
Internal Link Dist (m)		82.7			90.1			51.9			434.0	
Turn Bay Length (m)	70.0		60.0	70.0		65.0				35.0		60.0
Base Capacity (vph)	272	1814	875	166	2062	962	257	389	430	302	389	425
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.05	0.85	0.34	0.46	0.54	0.04	0.77	0.17	0.27	0.49	0.38	0.13

Intersection Summary

Cycle Length: 130
Actuated Cycle Length: 130
Offset: 121 (93%), Referenced to phase 4:EBTL and 8:WBTL, Start of Green
Natural Cycle: 115
Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.85

Intersection Signal Delay: 28.5 Intersection LOS: C

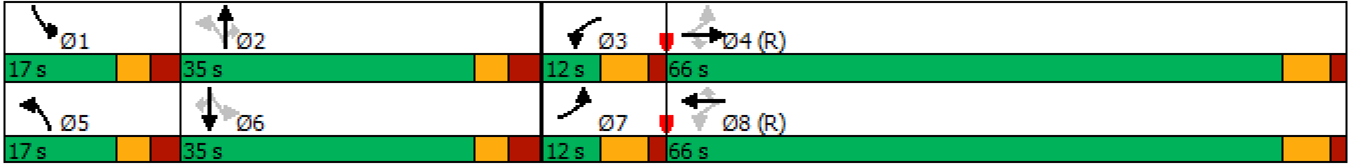
Intersection Capacity Utilization 88.9% ICU Level of Service E

Analysis Period (min) 15

\# 95th percentile volume exceeds capacity, queue may be longer.

Queue shown is maximum after two cycles.

Splits and Phases: 1: Teron Rd/Richardson Side Rd & March Rd



Intersection	
Int Delay, s/veh	3.4

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations	↰	↱		↰↑↑	↑	↱
Traffic Vol, veh/h	138	87	21	205	286	181
Future Vol, veh/h	138	87	21	205	286	181
Conflicting Peds, #/hr	0	0	9	0	0	9
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	Yield	-	None	-	Yield
Storage Length	0	20	-	-	-	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	228	318	201

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	464	327	327	0	-	0
Stage 1	327	-	-	-	-	-
Stage 2	137	-	-	-	-	-
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	562	713	1231	-	-	-
Stage 1	705	-	-	-	-	-
Stage 2	836	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	540	706	1220	-	-	-
Mov Cap-2 Maneuver	540	-	-	-	-	-
Stage 1	683	-	-	-	-	-
Stage 2	828	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	13	0.7	0
HCM LOS	B		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	EBLn2	SBT	SBR
Capacity (veh/h)	1220	-	540	706	-	-
HCM Lane V/C Ratio	0.019	-	0.284	0.137	-	-
HCM Control Delay (s)	8	0	14.3	10.9	-	-
HCM Lane LOS	A	A	B	B	-	-
HCM 95th %tile Q(veh)	0.1	-	1.2	0.5	-	-

Intersection	
Intersection Delay, s/veh	9
Intersection LOS	A

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		✥			✥			✥			✥	
Traffic Vol, veh/h	6	69	12	146	28	31	6	20	128	42	24	9
Future Vol, veh/h	6	69	12	146	28	31	6	20	128	42	24	9
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	7	77	13	162	31	34	7	22	142	47	27	10
Number of Lanes	0	1	0	0	1	0	0	1	0	0	1	0

Approach	EB	WB	NB	SB
Opposing Approach	WB	EB	SB	NB
Opposing Lanes	1	1	1	1
Conflicting Approach Left	SB	NB	EB	WB
Conflicting Lanes Left	1	1	1	1
Conflicting Approach Right	NB	SB	WB	EB
Conflicting Lanes Right	1	1	1	1
HCM Control Delay	8.5	9.7	8.5	8.6
HCM LOS	A	A	A	A

Lane	NBLn1	EBLn1	WBLn1	SBLn1
Vol Left, %	4%	7%	71%	56%
Vol Thru, %	13%	79%	14%	32%
Vol Right, %	83%	14%	15%	12%
Sign Control	Stop	Stop	Stop	Stop
Traffic Vol by Lane	154	87	205	75
LT Vol	6	6	146	42
Through Vol	20	69	28	24
RT Vol	128	12	31	9
Lane Flow Rate	171	97	228	83
Geometry Grp	1	1	1	1
Degree of Util (X)	0.206	0.127	0.296	0.115
Departure Headway (Hd)	4.324	4.721	4.681	4.948
Convergence, Y/N	Yes	Yes	Yes	Yes
Cap	828	756	765	722
Service Time	2.363	2.772	2.725	2.995
HCM Lane V/C Ratio	0.207	0.128	0.298	0.115
HCM Control Delay	8.5	8.5	9.7	8.6
HCM Lane LOS	A	A	A	A
HCM 95th-tile Q	0.8	0.4	1.2	0.4

Intersection	
Intersection Delay, s/veh	8.1
Intersection LOS	A

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		✥			✥						✥	
Traffic Vol, veh/h	3	18	60	1	14	35	0	0	0	76	3	146
Future Vol, veh/h	3	18	60	1	14	35	0	0	0	76	3	146
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	3	20	67	1	16	39	0	0	0	84	3	162
Number of Lanes	0	1	0	0	1	0	0	0	0	0	1	0

Approach	EB	WB	SB
Opposing Approach	WB	EB	
Opposing Lanes	1	1	0
Conflicting Approach Left	SB		WB
Conflicting Lanes Left	1	0	1
Conflicting Approach Right		SB	EB
Conflicting Lanes Right	0	1	1
HCM Control Delay	7.5	7.4	8.4
HCM LOS	A	A	A

Lane	EBLn1	WBLn1	SBLn1
Vol Left, %	4%	2%	34%
Vol Thru, %	22%	28%	1%
Vol Right, %	74%	70%	65%
Sign Control	Stop	Stop	Stop
Traffic Vol by Lane	81	50	225
LT Vol	3	1	76
Through Vol	18	14	3
RT Vol	60	35	146
Lane Flow Rate	90	56	250
Geometry Grp	1	1	1
Degree of Util (X)	0.102	0.064	0.268
Departure Headway (Hd)	4.082	4.138	3.861
Convergence, Y/N	Yes	Yes	Yes
Cap	883	870	920
Service Time	2.084	2.141	1.931
HCM Lane V/C Ratio	0.102	0.064	0.272
HCM Control Delay	7.5	7.4	8.4
HCM Lane LOS	A	A	A
HCM 95th-tile Q	0.3	0.2	1.1

APPENDIX J

Synchro Analysis: 2030 Background Conditions

	↗	→	↘	↙	←	↖	↖	↑	↗	↘	↓	↙
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↑↑	↱	↰	↑↑	↱	↰	↑	↱	↰	↑	↱
Traffic Volume (vph)	31	771	212	115	1798	201	257	168	53	28	45	37
Future Volume (vph)	31	771	212	115	1798	201	257	168	53	28	45	37
Satd. Flow (prot)	1695	3390	1517	1695	3390	1517	1695	1784	1517	1695	1784	1517
Flt Permitted	0.055			0.290			0.505			0.651		
Satd. Flow (perm)	98	3390	1489	517	3390	1492	897	1784	1494	1160	1784	1490
Satd. Flow (RTOR)			212			135			133			133
Lane Group Flow (vph)	31	771	212	115	1798	201	257	168	53	28	45	37
Turn Type	pm+pt	NA	Perm	pm+pt	NA	Perm	pm+pt	NA	Perm	pm+pt	NA	Perm
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases	4		4	8		8	2		2	6		6
Detector Phase	7	4	4	3	8	8	5	2	2	1	6	6
Switch Phase												
Minimum Initial (s)	5.0	10.0	10.0	5.0	10.0	10.0	5.0	10.0	10.0	5.0	10.0	10.0
Minimum Split (s)	11.4	25.3	25.3	11.4	25.3	25.3	11.1	34.6	34.6	11.1	34.6	34.6
Total Split (s)	12.0	68.0	68.0	12.0	68.0	68.0	15.0	38.0	38.0	12.0	35.0	35.0
Total Split (%)	9.2%	52.3%	52.3%	9.2%	52.3%	52.3%	11.5%	29.2%	29.2%	9.2%	26.9%	26.9%
Yellow Time (s)	4.6	4.6	4.6	4.6	4.6	4.6	3.3	3.3	3.3	3.3	3.3	3.3
All-Red Time (s)	1.8	1.7	1.7	1.8	1.7	1.7	2.8	3.3	3.3	2.8	3.3	3.3
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	6.4	6.3	6.3	6.4	6.3	6.3	6.1	6.6	6.6	6.1	6.6	6.6
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag	Lag
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Recall Mode	None	C-Max	C-Max	None	C-Max	C-Max	None	None	None	None	None	None
Act Effct Green (s)	81.5	75.2	75.2	88.3	82.4	82.4	25.4	19.6	19.6	18.7	14.5	14.5
Actuated g/C Ratio	0.63	0.58	0.58	0.68	0.63	0.63	0.20	0.15	0.15	0.14	0.11	0.11
v/c Ratio	0.22	0.39	0.22	0.27	0.84	0.20	1.10	0.63	0.16	0.15	0.23	0.13
Control Delay	12.8	17.3	2.8	9.6	26.4	5.6	134.7	62.0	1.0	39.1	53.4	0.9
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	12.8	17.3	2.8	9.6	26.4	5.6	134.7	62.0	1.0	39.1	53.4	0.9
LOS	B	B	A	A	C	A	F	E	A	D	D	A
Approach Delay		14.1			23.5			94.3			32.1	
Approach LOS		B			C			F			C	
Queue Length 50th (m)	2.5	57.2	0.0	9.6	209.0	7.2	~65.0	41.7	0.0	5.7	10.7	0.0
Queue Length 95th (m)	6.7	83.7	12.6	19.0	#299.7	21.2	#107.0	62.1	0.0	12.9	21.4	0.0
Internal Link Dist (m)		82.7			90.1			51.9			434.0	
Turn Bay Length (m)	70.0		60.0	70.0		65.0				35.0		60.0
Base Capacity (vph)	139	1962	951	429	2148	995	233	430	461	191	389	429
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	0.22	0.39	0.22	0.27	0.84	0.20	1.10	0.39	0.11	0.15	0.12	0.09

Intersection Summary

Cycle Length: 130

Actuated Cycle Length: 130

Offset: 121 (93%), Referenced to phase 4:EBTL and 8:WBTL, Start of Green

Natural Cycle: 135

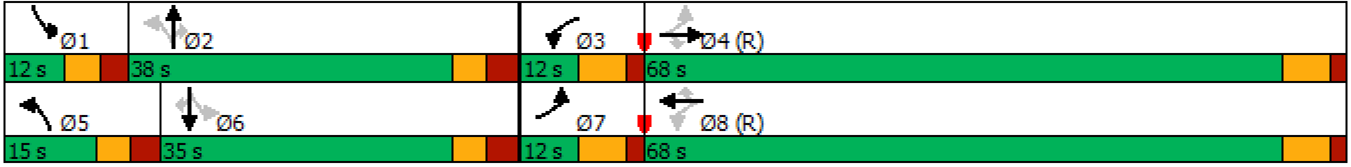
Control Type: Actuated-Coordinated

Maximum v/c Ratio: 1.10	
Intersection Signal Delay: 30.3	Intersection LOS: C
Intersection Capacity Utilization 97.3%	ICU Level of Service F
Analysis Period (min) 15	

~ 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: Teron Rd/Richardson Side Rd & March Rd



Intersection	
Int Delay, s/veh	2.1

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations	↰	↱		↰↑↑	↑	↱
Traffic Vol, veh/h	87	37	36	385	265	97
Future Vol, veh/h	87	37	36	385	265	97
Conflicting Peds, #/hr	0	0	6	0	0	6
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	Yield	-	None	-	Yield
Storage Length	0	20	-	-	-	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	87	37	36	385	265	97

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	497	271	271	0	-	0
Stage 1	271	-	-	-	-	-
Stage 2	226	-	-	-	-	-
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	540	767	1291	-	-	-
Stage 1	746	-	-	-	-	-
Stage 2	752	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	514	762	1283	-	-	-
Mov Cap-2 Maneuver	514	-	-	-	-	-
Stage 1	715	-	-	-	-	-
Stage 2	747	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	12.4	0.8	0
HCM LOS	B		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	EBLn2	SBT	SBR
Capacity (veh/h)	1283	-	514	762	-	-
HCM Lane V/C Ratio	0.028	-	0.169	0.049	-	-
HCM Control Delay (s)	7.9	0.1	13.4	10	-	-
HCM Lane LOS	A	A	B	B	-	-
HCM 95th %tile Q(veh)	0.1	-	0.6	0.2	-	-

Intersection	
Intersection Delay, s/veh	7.9
Intersection LOS	A

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		✣			✣			✣			✣	
Traffic Vol, veh/h	1	15	4	79	85	11	8	6	91	0	8	2
Future Vol, veh/h	1	15	4	79	85	11	8	6	91	0	8	2
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	1	15	4	79	85	11	8	6	91	0	8	2
Number of Lanes	0	1	0	0	1	0	0	1	0	0	1	0

Approach	EB	WB	NB	SB
Opposing Approach	WB	EB	SB	NB
Opposing Lanes	1	1	1	1
Conflicting Approach Left	SB	NB	EB	WB
Conflicting Lanes Left	1	1	1	1
Conflicting Approach Right	NB	SB	WB	EB
Conflicting Lanes Right	1	1	1	1
HCM Control Delay	7.3	8.3	7.4	7.4
HCM LOS	A	A	A	A

Lane	NBLn1	EBLn1	WBLn1	SBLn1
Vol Left, %	8%	5%	45%	0%
Vol Thru, %	6%	75%	49%	80%
Vol Right, %	87%	20%	6%	20%
Sign Control	Stop	Stop	Stop	Stop
Traffic Vol by Lane	105	20	175	10
LT Vol	8	1	79	0
Through Vol	6	15	85	8
RT Vol	91	4	11	2
Lane Flow Rate	105	20	175	10
Geometry Grp	1	1	1	1
Degree of Util (X)	0.113	0.023	0.204	0.012
Departure Headway (Hd)	3.88	4.16	4.202	4.358
Convergence, Y/N	Yes	Yes	Yes	Yes
Cap	929	848	849	826
Service Time	1.88	2.249	2.251	2.361
HCM Lane V/C Ratio	0.113	0.024	0.206	0.012
HCM Control Delay	7.4	7.3	8.3	7.4
HCM Lane LOS	A	A	A	A
HCM 95th-tile Q	0.4	0.1	0.8	0

Intersection	
Intersection Delay, s/veh	8.2
Intersection LOS	A

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		✥			✥						✥	
Traffic Vol, veh/h	127	64	5	2	30	73	0	0	0	47	3	53
Future Vol, veh/h	127	64	5	2	30	73	0	0	0	47	3	53
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	127	64	5	2	30	73	0	0	0	47	3	53
Number of Lanes	0	1	0	0	1	0	0	0	0	0	1	0

Approach	EB	WB	SB
Opposing Approach	WB	EB	
Opposing Lanes	1	1	0
Conflicting Approach Left	SB		WB
Conflicting Lanes Left	1	0	1
Conflicting Approach Right		SB	EB
Conflicting Lanes Right	0	1	1
HCM Control Delay	8.7	7.5	8
HCM LOS	A	A	A

Lane	EBLn1	WBLn1	SBLn1
Vol Left, %	65%	2%	46%
Vol Thru, %	33%	29%	3%
Vol Right, %	3%	70%	51%
Sign Control	Stop	Stop	Stop
Traffic Vol by Lane	196	105	103
LT Vol	127	2	47
Through Vol	64	30	3
RT Vol	5	73	53
Lane Flow Rate	196	105	103
Geometry Grp	1	1	1
Degree of Util (X)	0.235	0.116	0.125
Departure Headway (Hd)	4.311	3.965	4.375
Convergence, Y/N	Yes	Yes	Yes
Cap	821	907	823
Service Time	2.398	1.974	2.382
HCM Lane V/C Ratio	0.239	0.116	0.125
HCM Control Delay	8.7	7.5	8
HCM Lane LOS	A	A	A
HCM 95th-tile Q	0.9	0.4	0.4

1: Teron Rd/Richardson Side Rd & March Rd

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↑↑	↱	↰	↑↑	↱	↰	↑	↱	↰	↑	↱
Traffic Volume (vph)	12	1531	280	85	1054	34	194	63	108	138	136	53
Future Volume (vph)	12	1531	280	85	1054	34	194	63	108	138	136	53
Satd. Flow (prot)	1695	3390	1517	1695	3390	1517	1695	1784	1517	1695	1784	1517
Flt Permitted	0.227			0.060			0.538			0.716		
Satd. Flow (perm)	405	3390	1492	107	3390	1495	949	1784	1496	1276	1784	1473
Satd. Flow (RTOR)			158			135			133			133
Lane Group Flow (vph)	12	1531	280	85	1054	34	194	63	108	138	136	53
Turn Type	pm+pt	NA	Perm	pm+pt	NA	Perm	pm+pt	NA	Perm	pm+pt	NA	Perm
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases	4		4	8		8	2		2	6		6
Detector Phase	7	4	4	3	8	8	5	2	2	1	6	6
Switch Phase												
Minimum Initial (s)	5.0	10.0	10.0	5.0	10.0	10.0	5.0	10.0	10.0	5.0	10.0	10.0
Minimum Split (s)	11.4	25.3	25.3	11.4	25.3	25.3	11.1	34.6	34.6	11.1	34.6	34.6
Total Split (s)	12.0	66.0	66.0	12.0	66.0	66.0	17.0	35.0	35.0	17.0	35.0	35.0
Total Split (%)	9.2%	50.8%	50.8%	9.2%	50.8%	50.8%	13.1%	26.9%	26.9%	13.1%	26.9%	26.9%
Yellow Time (s)	4.6	4.6	4.6	4.6	4.6	4.6	3.3	3.3	3.3	3.3	3.3	3.3
All-Red Time (s)	1.8	1.7	1.7	1.8	1.7	1.7	2.8	3.3	3.3	2.8	3.3	3.3
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	6.4	6.3	6.3	6.4	6.3	6.3	6.1	6.6	6.6	6.1	6.6	6.6
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag	Lag
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Recall Mode	None	C-Max	C-Max	None	C-Max	C-Max	None	None	None	None	None	None
Act Effct Green (s)	75.4	69.6	69.6	84.0	79.7	79.7	27.0	15.6	15.6	26.4	15.3	15.3
Actuated g/C Ratio	0.58	0.54	0.54	0.65	0.61	0.61	0.21	0.12	0.12	0.20	0.12	0.12
v/c Ratio	0.04	0.84	0.32	0.48	0.51	0.04	0.75	0.29	0.36	0.47	0.65	0.18
Control Delay	10.0	32.1	9.0	23.9	16.8	0.1	60.3	54.5	7.7	44.8	68.6	1.4
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	10.0	32.1	9.0	23.9	16.8	0.1	60.3	54.5	7.7	44.8	68.6	1.4
LOS	A	C	A	C	B	A	E	D	A	D	E	A
Approach Delay		28.4			16.8			43.8			47.6	
Approach LOS		C			B			D			D	
Queue Length 50th (m)	1.0	166.6	15.1	7.4	66.4	0.0	42.2	15.0	0.0	29.0	33.8	0.0
Queue Length 95th (m)	3.7	#250.1	37.9	22.2	119.4	0.0	61.7	27.8	10.1	44.8	52.6	0.0
Internal Link Dist (m)		82.7			90.1			51.9			434.0	
Turn Bay Length (m)	70.0		60.0	70.0		65.0				35.0		60.0
Base Capacity (vph)	293	1815	872	176	2078	969	259	389	430	297	389	425
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.04	0.84	0.32	0.48	0.51	0.04	0.75	0.16	0.25	0.46	0.35	0.12

Intersection Summary

Cycle Length: 130

Actuated Cycle Length: 130

Offset: 121 (93%), Referenced to phase 4:EBTL and 8:WBTL, Start of Green

Natural Cycle: 115

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.84

Intersection Signal Delay: 27.9

Intersection LOS: C

Intersection Capacity Utilization 94.7%

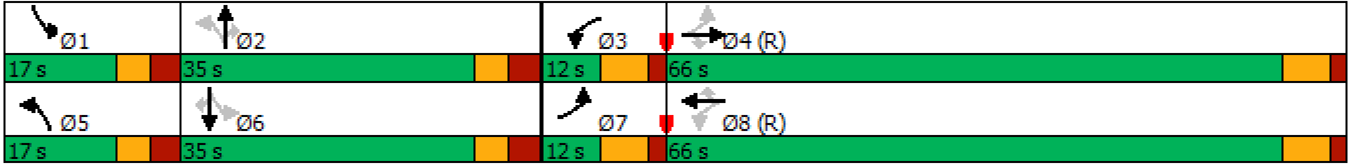
ICU Level of Service F

Analysis Period (min) 15

95th percentile volume exceeds capacity, queue may be longer.

Queue shown is maximum after two cycles.

Splits and Phases: 1: Teron Rd/Richardson Side Rd & March Rd



Intersection	
Int Delay, s/veh	3.1

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations	↰	↱		↰↑↑	↑	↱
Traffic Vol, veh/h	138	87	21	222	314	181
Future Vol, veh/h	138	87	21	222	314	181
Conflicting Peds, #/hr	0	0	9	0	0	9
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	Yield	-	None	-	Yield
Storage Length	0	20	-	-	-	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	138	87	21	222	314	181

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	454	323	323	0	-	0
Stage 1	323	-	-	-	-	-
Stage 2	131	-	-	-	-	-
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	569	717	1235	-	-	-
Stage 1	707	-	-	-	-	-
Stage 2	842	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	547	710	1224	-	-	-
Mov Cap-2 Maneuver	547	-	-	-	-	-
Stage 1	686	-	-	-	-	-
Stage 2	834	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	12.6	0.7	0
HCM LOS	B		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	EBLn2	SBT	SBR
Capacity (veh/h)	1224	-	547	710	-	-
HCM Lane V/C Ratio	0.017	-	0.252	0.123	-	-
HCM Control Delay (s)	8	0	13.8	10.8	-	-
HCM Lane LOS	A	A	B	B	-	-
HCM 95th %tile Q(veh)	0.1	-	1	0.4	-	-

Intersection	
Intersection Delay, s/veh	8.7
Intersection LOS	A

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		✣			✣			✣			✣	
Traffic Vol, veh/h	6	69	12	146	28	31	6	20	128	42	24	9
Future Vol, veh/h	6	69	12	146	28	31	6	20	128	42	24	9
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	6	69	12	146	28	31	6	20	128	42	24	9
Number of Lanes	0	1	0	0	1	0	0	1	0	0	1	0

Approach	EB	WB	NB	SB
Opposing Approach	WB	EB	SB	NB
Opposing Lanes	1	1	1	1
Conflicting Approach Left	SB	NB	EB	WB
Conflicting Lanes Left	1	1	1	1
Conflicting Approach Right	NB	SB	WB	EB
Conflicting Lanes Right	1	1	1	1
HCM Control Delay	8.2	9.3	8.2	8.4
HCM LOS	A	A	A	A

Lane	NBLn1	EBLn1	WBLn1	SBLn1
Vol Left, %	4%	7%	71%	56%
Vol Thru, %	13%	79%	14%	32%
Vol Right, %	83%	14%	15%	12%
Sign Control	Stop	Stop	Stop	Stop
Traffic Vol by Lane	154	87	205	75
LT Vol	6	6	146	42
Through Vol	20	69	28	24
RT Vol	128	12	31	9
Lane Flow Rate	154	87	205	75
Geometry Grp	1	1	1	1
Degree of Util (X)	0.181	0.112	0.262	0.101
Departure Headway (Hd)	4.224	4.621	4.601	4.835
Convergence, Y/N	Yes	Yes	Yes	Yes
Cap	849	773	779	740
Service Time	2.256	2.66	2.635	2.873
HCM Lane V/C Ratio	0.181	0.113	0.263	0.101
HCM Control Delay	8.2	8.2	9.3	8.4
HCM Lane LOS	A	A	A	A
HCM 95th-tile Q	0.7	0.4	1	0.3

Intersection	
Intersection Delay, s/veh	7.8
Intersection LOS	A

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		✥			✥						✥	
Traffic Vol, veh/h	3	21	60	1	16	35	0	0	0	76	3	146
Future Vol, veh/h	3	21	60	1	16	35	0	0	0	76	3	146
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	3	21	60	1	16	35	0	0	0	76	3	146
Number of Lanes	0	1	0	0	1	0	0	0	0	0	1	0

Approach	EB	WB	SB
Opposing Approach	WB	EB	
Opposing Lanes	1	1	0
Conflicting Approach Left	SB		WB
Conflicting Lanes Left	1	0	1
Conflicting Approach Right		SB	EB
Conflicting Lanes Right	0	1	1
HCM Control Delay	7.4	7.3	8.1
HCM LOS	A	A	A

Lane	EBLn1	WBLn1	SBLn1
Vol Left, %	4%	2%	34%
Vol Thru, %	25%	31%	1%
Vol Right, %	71%	67%	65%
Sign Control	Stop	Stop	Stop
Traffic Vol by Lane	84	52	225
LT Vol	3	1	76
Through Vol	21	16	3
RT Vol	60	35	146
Lane Flow Rate	84	52	225
Geometry Grp	1	1	1
Degree of Util (X)	0.092	0.058	0.24
Departure Headway (Hd)	3.948	3.996	3.846
Convergence, Y/N	Yes	Yes	Yes
Cap	893	881	927
Service Time	2.038	2.091	1.901
HCM Lane V/C Ratio	0.094	0.059	0.243
HCM Control Delay	7.4	7.3	8.1
HCM Lane LOS	A	A	A
HCM 95th-tile Q	0.3	0.2	0.9

APPENDIX K

Synchro Analysis: 2030 Future Conditions

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↑↑	↱	↰	↑↑	↱	↰	↑	↱	↰	↑	↱
Traffic Volume (vph)	31	771	215	119	1798	201	263	168	62	28	45	37
Future Volume (vph)	31	771	215	119	1798	201	263	168	62	28	45	37
Satd. Flow (prot)	1695	3390	1517	1695	3390	1517	1695	1784	1517	1695	1784	1517
Flt Permitted	0.055			0.289			0.505			0.651		
Satd. Flow (perm)	98	3390	1489	515	3390	1492	897	1784	1494	1160	1784	1490
Satd. Flow (RTOR)			215			135			133			133
Lane Group Flow (vph)	31	771	215	119	1798	201	263	168	62	28	45	37
Turn Type	pm+pt	NA	Perm	pm+pt	NA	Perm	pm+pt	NA	Perm	pm+pt	NA	Perm
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases	4		4	8		8	2		2	6		6
Detector Phase	7	4	4	3	8	8	5	2	2	1	6	6
Switch Phase												
Minimum Initial (s)	5.0	10.0	10.0	5.0	10.0	10.0	5.0	10.0	10.0	5.0	10.0	10.0
Minimum Split (s)	11.4	25.3	25.3	11.4	25.3	25.3	11.1	34.6	34.6	11.1	34.6	34.6
Total Split (s)	12.0	68.0	68.0	12.0	68.0	68.0	15.0	38.0	38.0	12.0	35.0	35.0
Total Split (%)	9.2%	52.3%	52.3%	9.2%	52.3%	52.3%	11.5%	29.2%	29.2%	9.2%	26.9%	26.9%
Yellow Time (s)	4.6	4.6	4.6	4.6	4.6	4.6	3.3	3.3	3.3	3.3	3.3	3.3
All-Red Time (s)	1.8	1.7	1.7	1.8	1.7	1.7	2.8	3.3	3.3	2.8	3.3	3.3
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	6.4	6.3	6.3	6.4	6.3	6.3	6.1	6.6	6.6	6.1	6.6	6.6
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag	Lag
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Recall Mode	None	C-Max	C-Max	None	C-Max	C-Max	None	None	None	None	None	None
Act Effct Green (s)	81.4	75.1	75.1	88.3	82.4	82.4	25.4	19.6	19.6	18.7	14.5	14.5
Actuated g/C Ratio	0.63	0.58	0.58	0.68	0.63	0.63	0.20	0.15	0.15	0.14	0.11	0.11
v/c Ratio	0.22	0.39	0.23	0.28	0.84	0.20	1.13	0.63	0.18	0.15	0.23	0.13
Control Delay	12.9	17.4	2.8	9.7	26.4	5.6	142.6	62.0	1.2	39.1	53.4	0.9
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	12.9	17.4	2.8	9.7	26.4	5.6	142.6	62.0	1.2	39.1	53.4	0.9
LOS	B	B	A	A	C	A	F	E	A	D	D	A
Approach Delay		14.2			23.5			97.4			32.1	
Approach LOS		B			C			F			C	
Queue Length 50th (m)	2.5	57.2	0.0	9.9	209.0	7.2	~68.5	41.7	0.0	5.7	10.7	0.0
Queue Length 95th (m)	6.7	84.1	12.7	19.6	#299.7	21.2	#111.5	62.1	0.0	12.9	21.4	0.0
Internal Link Dist (m)		82.7			90.1			51.9			434.0	
Turn Bay Length (m)	70.0		60.0	70.0		65.0				35.0		60.0
Base Capacity (vph)	139	1959	951	429	2148	995	233	430	461	191	389	429
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	0.22	0.39	0.23	0.28	0.84	0.20	1.13	0.39	0.13	0.15	0.12	0.09

Intersection Summary

Cycle Length: 130

Actuated Cycle Length: 130

Offset: 121 (93%), Referenced to phase 4:EBTL and 8:WBTL, Start of Green

Natural Cycle: 135

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 1.13

Intersection Signal Delay: 31.0 Intersection LOS: C

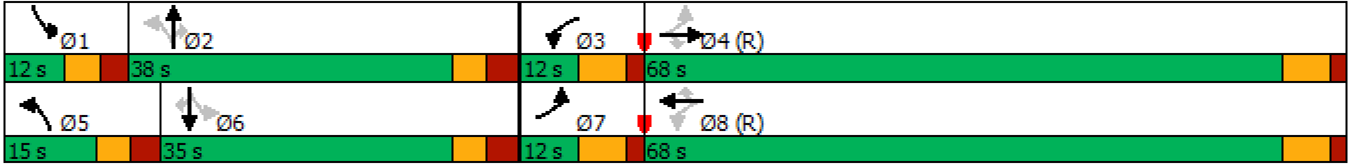
Intersection Capacity Utilization 97.3% ICU Level of Service F

Analysis Period (min) 15

~ 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: Teron Rd/Richardson Side Rd & March Rd



Intersection	
Int Delay, s/veh	2.3

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations	↰	↱		↰↑↑	↑	↱
Traffic Vol, veh/h	102	45	39	385	265	104
Future Vol, veh/h	102	45	39	385	265	104
Conflicting Peds, #/hr	0	0	6	0	0	6
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	Yield	-	None	-	Yield
Storage Length	0	20	-	-	-	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	102	45	39	385	265	104

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	503	271	271	0	-	0
Stage 1	271	-	-	-	-	-
Stage 2	232	-	-	-	-	-
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	536	767	1291	-	-	-
Stage 1	746	-	-	-	-	-
Stage 2	747	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	509	762	1283	-	-	-
Mov Cap-2 Maneuver	509	-	-	-	-	-
Stage 1	712	-	-	-	-	-
Stage 2	743	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	12.6	0.8	0
HCM LOS	B		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	EBLn2	SBT	SBR
Capacity (veh/h)	1283	-	509	762	-	-
HCM Lane V/C Ratio	0.03	-	0.2	0.059	-	-
HCM Control Delay (s)	7.9	0.1	13.8	10	-	-
HCM Lane LOS	A	A	B	B	-	-
HCM 95th %tile Q(veh)	0.1	-	0.7	0.2	-	-

Intersection	
Intersection Delay, s/veh	8.1
Intersection LOS	A

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		✣			✣			✣			✣	
Traffic Vol, veh/h	1	38	4	79	95	11	8	6	91	0	8	2
Future Vol, veh/h	1	38	4	79	95	11	8	6	91	0	8	2
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	1	38	4	79	95	11	8	6	91	0	8	2
Number of Lanes	0	1	0	0	1	0	0	1	0	0	1	0

Approach	EB	WB	NB	SB
Opposing Approach	WB	EB	SB	NB
Opposing Lanes	1	1	1	1
Conflicting Approach Left	SB	NB	EB	WB
Conflicting Lanes Left	1	1	1	1
Conflicting Approach Right	NB	SB	WB	EB
Conflicting Lanes Right	1	1	1	1
HCM Control Delay	7.6	8.5	7.5	7.5
HCM LOS	A	A	A	A

Lane	NBLn1	EBLn1	WBLn1	SBLn1
Vol Left, %	8%	2%	43%	0%
Vol Thru, %	6%	88%	51%	80%
Vol Right, %	87%	9%	6%	20%
Sign Control	Stop	Stop	Stop	Stop
Traffic Vol by Lane	105	43	185	10
LT Vol	8	1	79	0
Through Vol	6	38	95	8
RT Vol	91	4	11	2
Lane Flow Rate	105	43	185	10
Geometry Grp	1	1	1	1
Degree of Util (X)	0.115	0.05	0.217	0.012
Departure Headway (Hd)	3.954	4.226	4.217	4.437
Convergence, Y/N	Yes	Yes	Yes	Yes
Cap	912	833	845	811
Service Time	1.954	2.324	2.276	2.44
HCM Lane V/C Ratio	0.115	0.052	0.219	0.012
HCM Control Delay	7.5	7.6	8.5	7.5
HCM Lane LOS	A	A	A	A
HCM 95th-tile Q	0.4	0.2	0.8	0

Intersection	
Intersection Delay, s/veh	8.2
Intersection LOS	A

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		✣			✣						✣	
Traffic Vol, veh/h	127	64	5	2	30	73	0	0	0	47	3	53
Future Vol, veh/h	127	64	5	2	30	73	0	0	0	47	3	53
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	127	64	5	2	30	73	0	0	0	47	3	53
Number of Lanes	0	1	0	0	1	0	0	0	0	0	1	0

Approach	EB	WB	SB
Opposing Approach	WB	EB	
Opposing Lanes	1	1	0
Conflicting Approach Left	SB		WB
Conflicting Lanes Left	1	0	1
Conflicting Approach Right		SB	EB
Conflicting Lanes Right	0	1	1
HCM Control Delay	8.7	7.5	8
HCM LOS	A	A	A

Lane	EBLn1	WBLn1	SBLn1
Vol Left, %	65%	2%	46%
Vol Thru, %	33%	29%	3%
Vol Right, %	3%	70%	51%
Sign Control	Stop	Stop	Stop
Traffic Vol by Lane	196	105	103
LT Vol	127	2	47
Through Vol	64	30	3
RT Vol	5	73	53
Lane Flow Rate	196	105	103
Geometry Grp	1	1	1
Degree of Util (X)	0.235	0.116	0.125
Departure Headway (Hd)	4.311	3.965	4.375
Convergence, Y/N	Yes	Yes	Yes
Cap	821	907	823
Service Time	2.398	1.974	2.382
HCM Lane V/C Ratio	0.239	0.116	0.125
HCM Control Delay	8.7	7.5	8
HCM Lane LOS	A	A	A
HCM 95th-tile Q	0.9	0.4	0.4

1: Teron Rd/Richardson Side Rd & March Rd

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↑↑	↱	↰	↑↑	↱	↰	↑	↱	↰	↑	↱
Traffic Volume (vph)	12	1531	285	93	1054	34	198	63	114	138	136	53
Future Volume (vph)	12	1531	285	93	1054	34	198	63	114	138	136	53
Satd. Flow (prot)	1695	3390	1517	1695	3390	1517	1695	1784	1517	1695	1784	1517
Flt Permitted	0.229			0.058			0.535			0.716		
Satd. Flow (perm)	409	3390	1492	103	3390	1495	944	1784	1496	1276	1784	1473
Satd. Flow (RTOR)			161			135			133			133
Lane Group Flow (vph)	12	1531	285	93	1054	34	198	63	114	138	136	53
Turn Type	pm+pt	NA	Perm	pm+pt	NA	Perm	pm+pt	NA	Perm	pm+pt	NA	Perm
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases	4		4	8		8	2		2	6		6
Detector Phase	7	4	4	3	8	8	5	2	2	1	6	6
Switch Phase												
Minimum Initial (s)	5.0	10.0	10.0	5.0	10.0	10.0	5.0	10.0	10.0	5.0	10.0	10.0
Minimum Split (s)	11.4	25.3	25.3	11.4	25.3	25.3	11.1	34.6	34.6	11.1	34.6	34.6
Total Split (s)	12.0	66.0	66.0	12.0	66.0	66.0	17.0	35.0	35.0	17.0	35.0	35.0
Total Split (%)	9.2%	50.8%	50.8%	9.2%	50.8%	50.8%	13.1%	26.9%	26.9%	13.1%	26.9%	26.9%
Yellow Time (s)	4.6	4.6	4.6	4.6	4.6	4.6	3.3	3.3	3.3	3.3	3.3	3.3
All-Red Time (s)	1.8	1.7	1.7	1.8	1.7	1.7	2.8	3.3	3.3	2.8	3.3	3.3
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	6.4	6.3	6.3	6.4	6.3	6.3	6.1	6.6	6.6	6.1	6.6	6.6
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag	Lag
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Recall Mode	None	C-Max	C-Max	None	C-Max	C-Max	None	None	None	None	None	None
Act Effct Green (s)	74.8	69.0	69.0	84.4	79.7	79.7	27.1	15.7	15.7	26.3	15.3	15.3
Actuated g/C Ratio	0.58	0.53	0.53	0.65	0.61	0.61	0.21	0.12	0.12	0.20	0.12	0.12
v/c Ratio	0.04	0.85	0.33	0.51	0.51	0.04	0.76	0.29	0.38	0.47	0.65	0.18
Control Delay	10.1	32.9	9.2	26.7	16.8	0.1	61.9	54.5	9.0	44.8	68.6	1.4
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	10.1	32.9	9.2	26.7	16.8	0.1	61.9	54.5	9.0	44.8	68.6	1.4
LOS	B	C	A	C	B	A	E	D	A	D	E	A
Approach Delay		29.1			17.1			44.6			47.6	
Approach LOS		C			B			D			D	
Queue Length 50th (m)	1.0	168.4	15.5	8.2	66.4	0.0	43.2	15.0	0.0	29.0	33.8	0.0
Queue Length 95th (m)	3.7	#253.0	38.8	25.0	119.4	0.0	62.7	27.8	11.7	44.8	52.6	0.0
Internal Link Dist (m)		82.7			90.1			51.9			434.0	
Turn Bay Length (m)	70.0		60.0	70.0		65.0				35.0		60.0
Base Capacity (vph)	293	1798	867	182	2078	969	259	389	430	297	389	425
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.04	0.85	0.33	0.51	0.51	0.04	0.76	0.16	0.27	0.46	0.35	0.12

Intersection Summary

Cycle Length: 130

Actuated Cycle Length: 130

Offset: 121 (93%), Referenced to phase 4:EBTL and 8:WBTL, Start of Green

Natural Cycle: 115

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.85

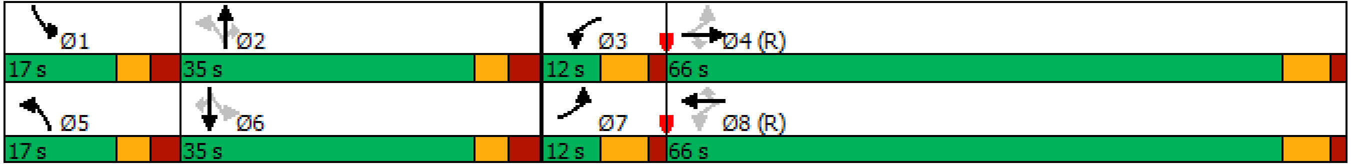
Intersection Signal Delay: 28.5 Intersection LOS: C

Intersection Capacity Utilization 95.4% ICU Level of Service F

Analysis Period (min) 15

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

Splits and Phases: 1: Teron Rd/Richardson Side Rd & March Rd



Intersection	
Int Delay, s/veh	3.3

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations	↰	↱		↰↑↑	↑	↱
Traffic Vol, veh/h	147	92	28	222	314	193
Future Vol, veh/h	147	92	28	222	314	193
Conflicting Peds, #/hr	0	0	9	0	0	9
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	Yield	-	None	-	Yield
Storage Length	0	20	-	-	-	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	147	92	28	222	314	193

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	468	323	323	0	-	0
Stage 1	323	-	-	-	-	-
Stage 2	145	-	-	-	-	-
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	560	717	1235	-	-	-
Stage 1	707	-	-	-	-	-
Stage 2	828	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	536	710	1224	-	-	-
Mov Cap-2 Maneuver	536	-	-	-	-	-
Stage 1	682	-	-	-	-	-
Stage 2	821	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	12.9	1	0
HCM LOS	B		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	EBLn2	SBT	SBR
Capacity (veh/h)	1224	-	536	710	-	-
HCM Lane V/C Ratio	0.023	-	0.274	0.13	-	-
HCM Control Delay (s)	8	0.1	14.2	10.8	-	-
HCM Lane LOS	A	A	B	B	-	-
HCM 95th %tile Q(veh)	0.1	-	1.1	0.4	-	-

Intersection	
Intersection Delay, s/veh	8.8
Intersection LOS	A

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		✣			✣			✣			✣	
Traffic Vol, veh/h	6	83	12	146	47	31	6	20	128	42	24	9
Future Vol, veh/h	6	83	12	146	47	31	6	20	128	42	24	9
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	6	83	12	146	47	31	6	20	128	42	24	9
Number of Lanes	0	1	0	0	1	0	0	1	0	0	1	0

Approach	EB	WB	NB	SB
Opposing Approach	WB	EB	SB	NB
Opposing Lanes	1	1	1	1
Conflicting Approach Left	SB	NB	EB	WB
Conflicting Lanes Left	1	1	1	1
Conflicting Approach Right	NB	SB	WB	EB
Conflicting Lanes Right	1	1	1	1
HCM Control Delay	8.4	9.5	8.3	8.5
HCM LOS	A	A	A	A

Lane	NBLn1	EBLn1	WBLn1	SBLn1
Vol Left, %	4%	6%	65%	56%
Vol Thru, %	13%	82%	21%	32%
Vol Right, %	83%	12%	14%	12%
Sign Control	Stop	Stop	Stop	Stop
Traffic Vol by Lane	154	101	224	75
LT Vol	6	6	146	42
Through Vol	20	83	47	24
RT Vol	128	12	31	9
Lane Flow Rate	154	101	224	75
Geometry Grp	1	1	1	1
Degree of Util (X)	0.184	0.131	0.288	0.103
Departure Headway (Hd)	4.304	4.662	4.622	4.92
Convergence, Y/N	Yes	Yes	Yes	Yes
Cap	832	767	775	727
Service Time	2.343	2.705	2.659	2.963
HCM Lane V/C Ratio	0.185	0.132	0.289	0.103
HCM Control Delay	8.3	8.4	9.5	8.5
HCM Lane LOS	A	A	A	A
HCM 95th-tile Q	0.7	0.4	1.2	0.3

Intersection	
Intersection Delay, s/veh	7.8
Intersection LOS	A

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		✥			✥						✥	
Traffic Vol, veh/h	3	21	60	1	16	35	0	0	0	76	3	146
Future Vol, veh/h	3	21	60	1	16	35	0	0	0	76	3	146
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	3	21	60	1	16	35	0	0	0	76	3	146
Number of Lanes	0	1	0	0	1	0	0	0	0	0	1	0

Approach	EB	WB	SB
Opposing Approach	WB	EB	
Opposing Lanes	1	1	0
Conflicting Approach Left	SB		WB
Conflicting Lanes Left	1	0	1
Conflicting Approach Right		SB	EB
Conflicting Lanes Right	0	1	1
HCM Control Delay	7.4	7.3	8.1
HCM LOS	A	A	A

Lane	EBLn1	WBLn1	SBLn1
Vol Left, %	4%	2%	34%
Vol Thru, %	25%	31%	1%
Vol Right, %	71%	67%	65%
Sign Control	Stop	Stop	Stop
Traffic Vol by Lane	84	52	225
LT Vol	3	1	76
Through Vol	21	16	3
RT Vol	60	35	146
Lane Flow Rate	84	52	225
Geometry Grp	1	1	1
Degree of Util (X)	0.092	0.058	0.24
Departure Headway (Hd)	3.948	3.996	3.846
Convergence, Y/N	Yes	Yes	Yes
Cap	893	881	927
Service Time	2.038	2.091	1.901
HCM Lane V/C Ratio	0.094	0.059	0.243
HCM Control Delay	7.4	7.3	8.1
HCM Lane LOS	A	A	A
HCM 95th-tile Q	0.3	0.2	0.9