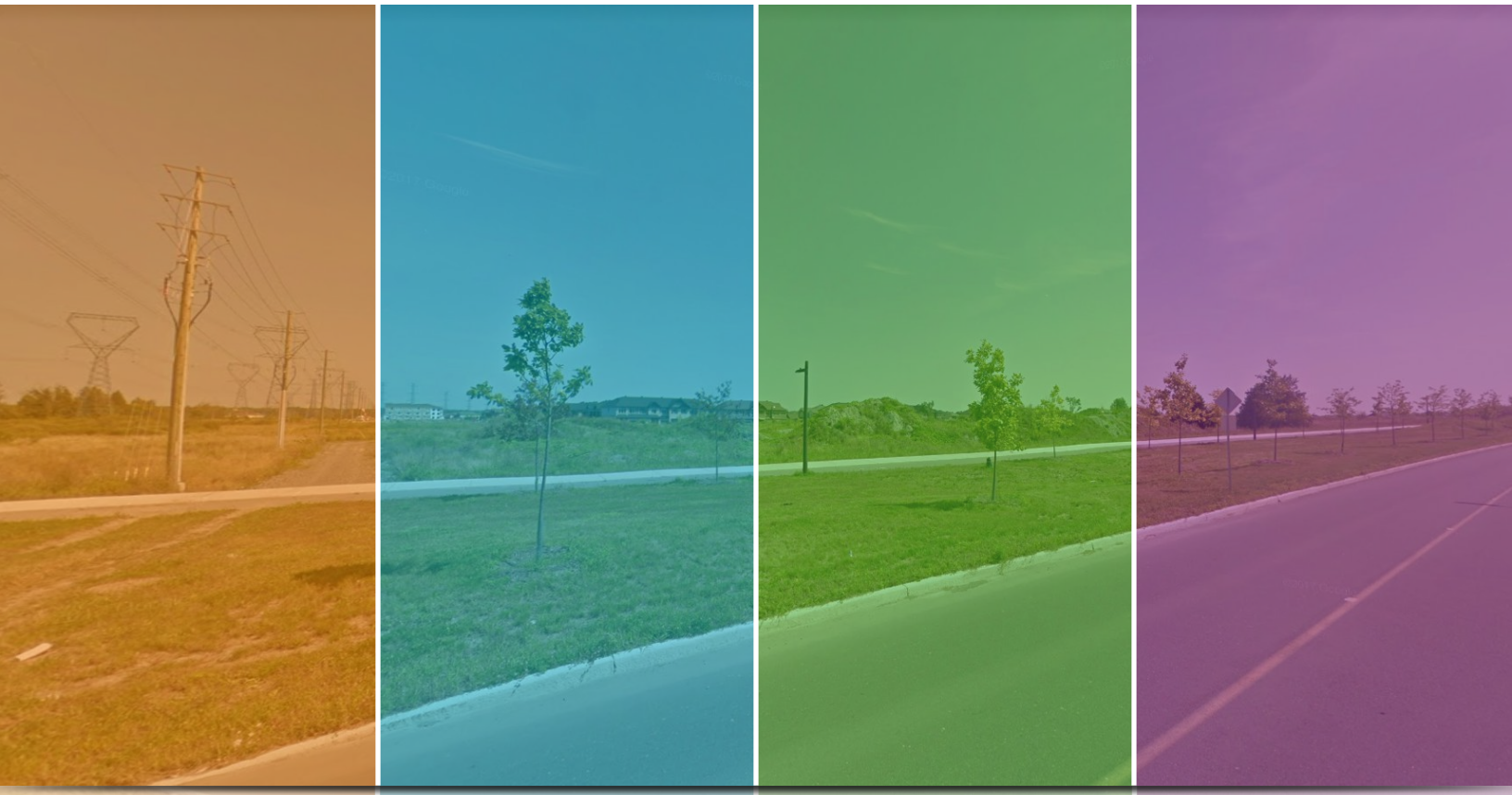
LEPINE

June 2019

René's Court
1000 Robert Grant Ave

TIA Strategy Report



PARSONS

René's Court
1000 Robert Grant Ave

TIA Strategy Report

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June 20, 2019

476799 - 01000

TIA Plan Reports

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

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

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

CERTIFICATION

1. I have reviewed and have a sound understanding of the objectives, needs and requirements of the City of Ottawa's Official Plan, Transportation Master Plan and the Transportation Impact Assessment (2017) Guidelines;
2. I have a sound knowledge of industry standard practice with respect to the preparation of transportation impact assessment reports, including multi modal level of service review;
3. I have substantial experience (more than 5 years) in undertaking and delivering transportation impact studies (analysis, reporting and geometric design) with strong background knowledge in transportation planning, engineering or traffic operations; and
4. I am either a 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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Signature of Individual certifier that s/he meets the above four criteria

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Strategy Report

1. SCREENING FORM

The screening form was submitted in conjunction with the Scoping Report for review and confirmation of the need for a Transportation Impact Assessment (TIA). The Trip Generation, Location, and Safety triggers were met based on the unit count, proposed new driveway on a "Spine" cycling route and proximity to the Robert Grant/Bobolink and Robert Grant/Abbott roundabouts. The Screening Form and Correspondence are provided in **Appendix A.**

2. SCOPING REPORT

2.1. EXISTING AND PLANNED CONDITIONS

2.1.1. PROPOSED DEVELOPMENT

Lépine Corporation has retained Parsons to complete the following TIA Report in support of a Zoning By-Law amendment application for a proposed residential development in Ward 6: Stittsville West. The proposed development is located at 1000 Robert Grant Ave and is expected to consist of three residential towers ranging from five to fifteen storeys with 566 units in total. Buildout has been assumed in a single phase, with full occupancy achieved by 2020 based on current estimates. The subject site is currently vacant and zoned as AM – Arterial Mainstreet. The local context is provided in **Figure 1** and the current site plan is shown in **Figure 2**.

Figure 1: Local Context

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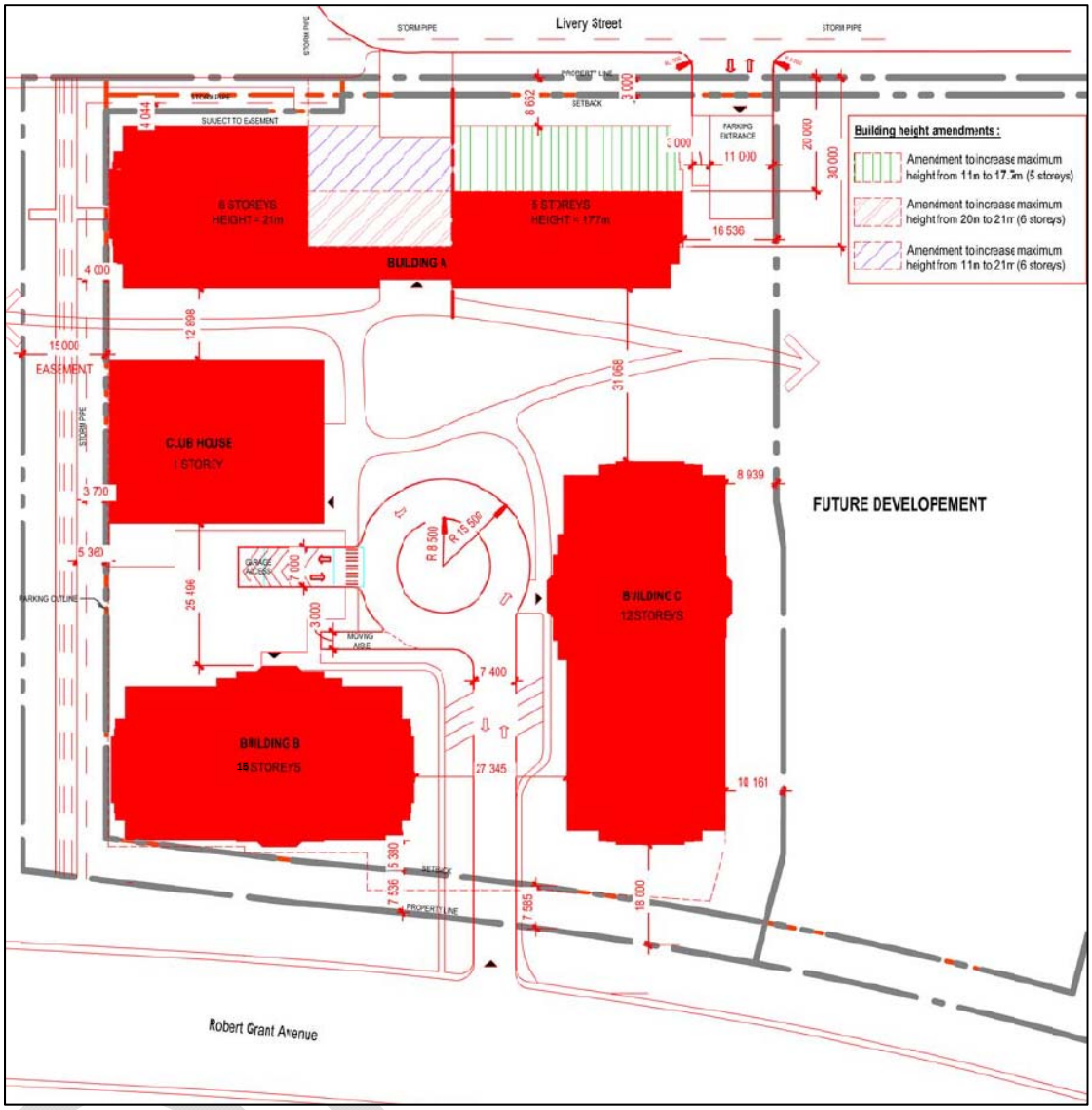
Figure 2: Site Plan



The main access is proposed via Robert Grant Avenue, which leads to an internal roundabout, a ramp to the underground parking garage and six surface parking spaces for visitors. The main access intersection with Robert Grant Ave is expected to permit right-in/right-out only vehicular movements only.

A second access is proposed as a full movement driveway connection to Livery Street, which leads directly to the underground parking garage.

2.1.2. EXISTING CONDITIONS

Area Road Network

Fernbank Road is an east-west arterial road that runs between Dwyer Hill Road and Eagleson Road. Fernbank Road has a two-lane undivided rural cross section with paved shoulders. Within the study area, the posted speed limit is 80km/h.

Robert Grant Avenue is a north-south arterial roadway that extends from Fernbank Road in the south to Abbott St E in the north. The roadway has a two-lane cross-section and the posted speed limit is 60 km/h.

Abbott Street E is an east-west major collector roadway east of Stittsville Main Street and a collector roadway west of Stittsville Main Street. Within the study area, it has a two-lane cross-section with auxiliary turn lanes provided at major intersections. The posted speed limit is 50 km/h.

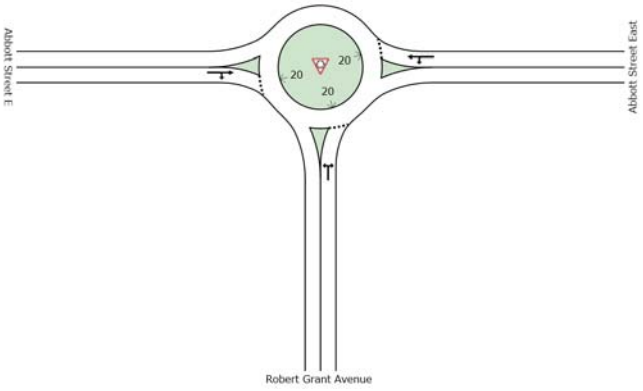
Bobolink Ridge is an east-west local roadway that extends from Robert Grant Avenue in the west and terminates at Asturcon Street in the east. It has a two-lane cross-section and an unposted speed understood to be 50 km/h.

Livery Street is a north-south local roadway that extends north from Bobolink Ridge, turns east and terminates at Tapadero Avenue. It has a two-lane cross-section and an unposted speed understood to be 50 km/h.

Existing Study Area Intersections

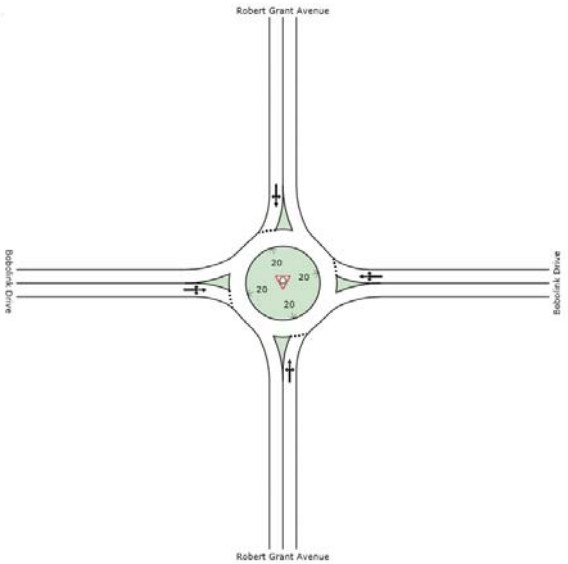
Abbott Street E/Robert Grant

The Abbott Street E/Robert Grant intersection is a three-legged, single lane roundabout intersection. All approaches consist of a single approach lane. All movements are permitted at this location.



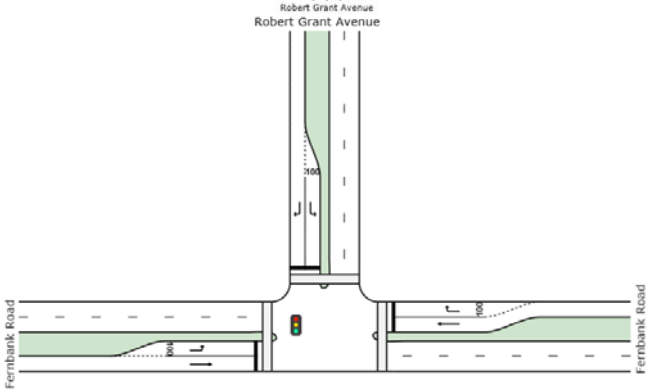
Bobolink/Robert Grant

The Bobolink/Robert Grant intersection is a four-legged roundabout intersection. All approaches consist of a single approach lane. All movements are permitted at this location.



Fernbank/Robert Grant

The Fernbank/Robert Grant intersection is a signalized 'T' intersection. The southbound approach consists of a left-turn lane and a right-turn lane. The eastbound approach consists of a left-turn lane and a through lane. The westbound approach consists of a through lane and a right-turn lane. All movements are permitted at this location.



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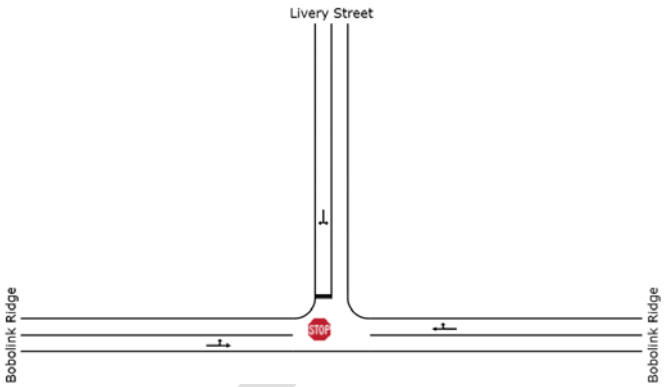
Bobolink/Livery
The Bobolink/Livery intersection is an unsignalized 'T' intersection with STOP control in Livery Street. All approaches consist of a single all-movement lane. All movements are permitted at this location.



Existing Driveways to Adjacent Developments

There are no existing driveways on either side of Robert Grant Avenue within 200m of the proposed site access. On the east side of Livery Street there are approximately 17 private residential driveways within 200m of the proposed site access.

Existing Area Traffic Management Measures

Below are the existing area traffic management measures on the boundary streets:

Robert Grant Avenue

- Medians;
- Sidewalks;
- Streetscaping

Bobolink Ridge

- Sidewalks

Livery Street

- Sidewalks

Pedestrian/Cycling Network

Sidewalks are provided on both sides of Robert Grant Avenue, on the north side of Abbott Street E, the north side of Bobolink Drive and the west side of Livery Street. There are no existing sidewalks on Fernbank Road. A multi-use pathway is provided on the south side of Abbott Street E. The Ottawa Pedestrian Plan (2013) does not identify any future projects within the study area.

The City of Ottawa's 2013 Cycling Plan identifies Robert Grant Avenue and Fernbank Road as Spine Routes, and Abbott Street E as a major pathway. Cycling facilities include cycle tracks on Robert Grant Avenue and a pathway on the south side of Abbott Street E. There are no existing cycling facilities on Fernbank Road.

Transit Network

There is currently no transit service provided north of Cope Dr along Robert Grant Ave. The OC Transpo routes that currently operate within the study area are as follows:

- **Route #62 (St-Laurent, Hurdman <-> Terry Fox, Stittsville)**: identified by OC Transpo as a "Rapid Route", Route #62 operates at an average rate of every 30 minutes during weekday peak hour periods. The nearest bus stops to the site are available along Abbott St, as well as Iber Rd.
- **Route #167 (Terry Fox <-> Blackstone)**: identified by OC Transpo as a "Local Route", this route operates at a rate of every 30-or-60 minutes during weekday morning and afternoon peak hour periods. The nearest bus stops to the development site are available along Robert Grant Ave, as well as Cope Dr.
- **Route #252 (Mackenzie King <-> Fernbank)**: identified by OC Transpo as a "Connexion Route", this route operates during weekday rush-hours only at an average rate of every 10-to-15 minutes. The nearest bus stops to the site are available along Robert Grant Ave, as well as Cope Dr.

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The noted OC Transpo route maps have been provided in **Appendix B**. **Figure 3** below illustrates the area transit network, while **Figure 4** provides the nearest bus stop locations to the development site.

Figure 3: Area Transit Network

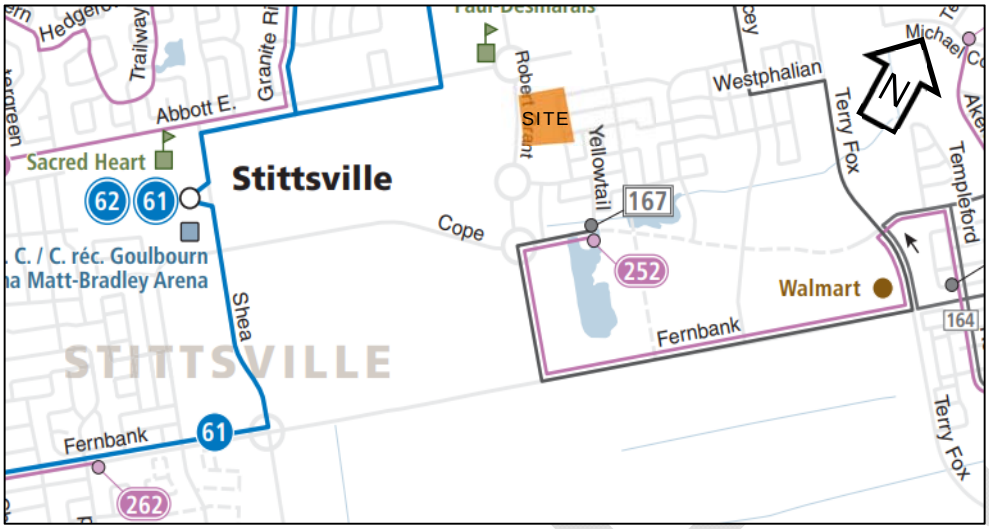
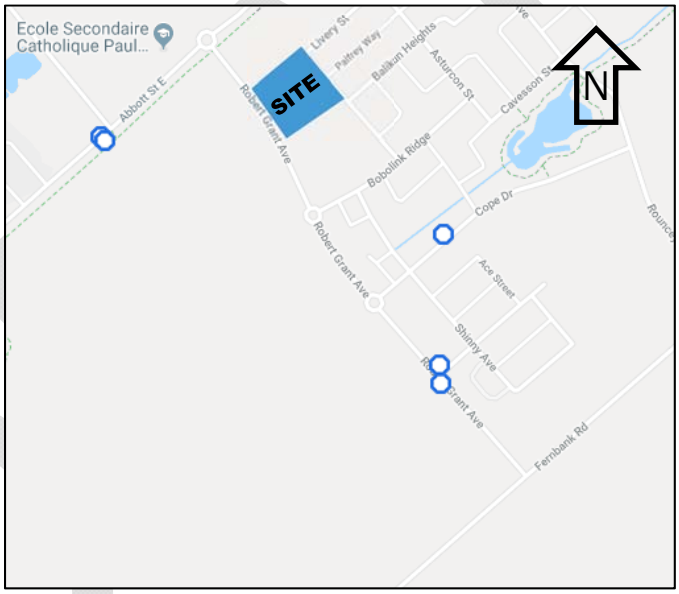


Figure 4: Bus Stop Locations

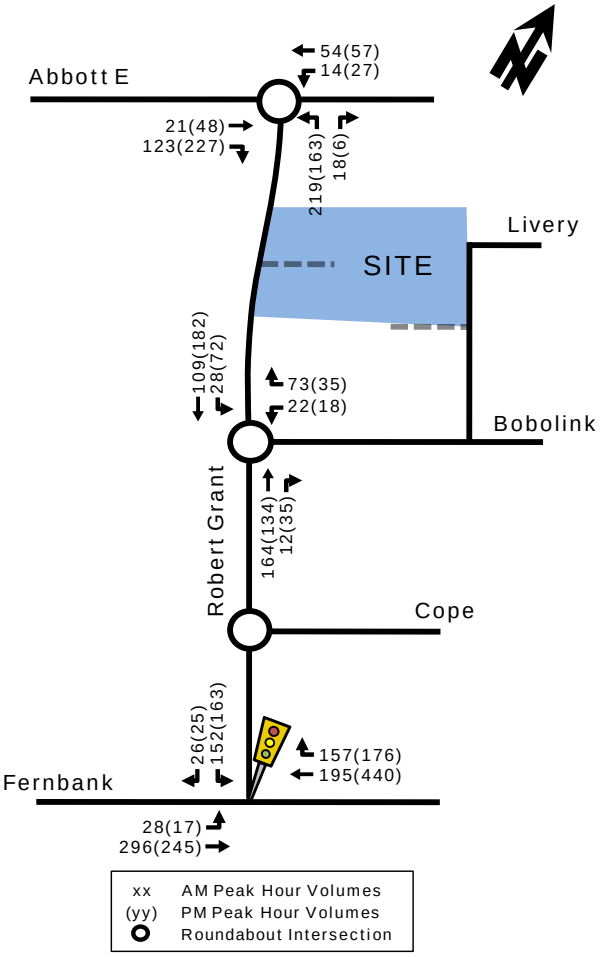


Peak Hour Travel Demand

The existing peak hour traffic volumes within the study area, as illustrated in Figure 5, were obtained from the City of Ottawa or conducted by Parsons. The peak hour traffic volume count data has been provided in **Appendix C**.

Note, the traffic volumes on Robert Grant between Bobolink and Abbott E were balanced to the higher approach volume to represent the worst-case scenario. Furthermore, vehicles using the west leg of the Bobolink/Robert Grant roundabout were not included in the traffic volume figures as they represent a small number of vehicles accessing the construction site west of Robert Grant Ave.

Figure 5: Existing Peak Hour Traffic Volumes



Existing Road Safety Conditions

The local road network is relatively new, hence there is limited history of collisions along the boundary streets. The collision data available for Robert Grant Avenue indicates that there were two collisions since the road was built: a sideswipe collision in July 2016 and an angle collision in October 2017. Both collisions resulted in property damage only and no pedestrians and cyclists were involved. The collision data as provided by the City of Ottawa and related analysis has been provided in Appendix D.

2.1.3. PLANNED CONDITIONS

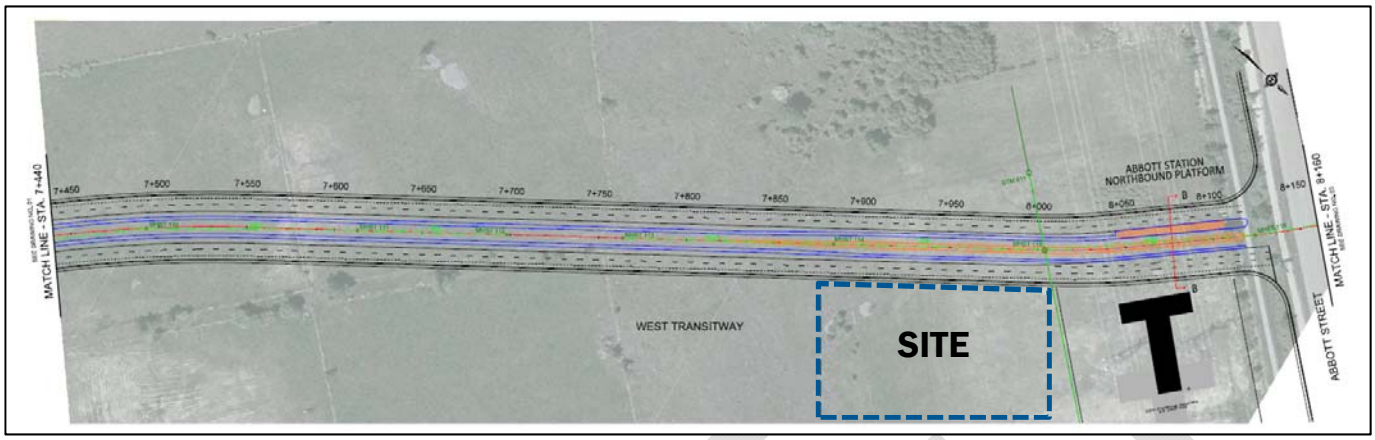
Planned Study Area Transportation Network Changes

Fernbank Road is identified as a transit priority corridor with isolated measures (City of Ottawa Transportation Master Plan (TMP) 2013, Ultimate Network) and widening has been proposed in the Network Concept Map 10 (TMP).

Robert Grant Avenue is identified as a transit priority corridor with isolated measures in the Affordable Network Plan and a future Bus Rapid Transit (BRT) corridor in the Network Concept Plan. Additionally, Park and Rides have been proposed at the Abbot E/Robert Grant and Fernbank/Robert Grant intersections in the Affordable Network Plan, the Network Concept Plan and the Fernbank Community Design Plan.

A high-level design for Robert Grant Ave was completed as part of the West Transit Way Connections (Terry Fox Dr. to Fernbank Rd) EA study. The section of this design, along the proposed development frontage is shown in **Figure 6**. This section includes exclusive bus lanes along the roadway centreline, the future Abbott BRT station, and park and ride location.

Figure 6: Future Robert Grant Ave Concept



Other Area Developments

The following developments are planned near the subject site based on the latest information from the City:

365 Haliburton Heights (Abbott-Fernbank Lands)
Eight two-storey buildings comprised of 96 apartments are proposed at the above noted address, located 750m south of the subject development. The Transportation Impact Assessment (prepared by Novatech) projected approximately 45 to 50 veh/h during peak hours.

5611 Fernbank Road (Abbott-Fernbank Lands)
eQHomes is proposing a residential development, also in the Abbott-Fernbank Lands, located at the above address, directly south of the subject development. Based on a site visit completed January 14th, 2019, it was determined that this development has almost reached full build-out. As such, it is reasonable to assume the majority of traffic generated by this development has been captured by the traffic counts completed in January 2019 and will not be accounted for in background traffic.

570 Hazeldean Road
Mattamy Homes is proposing a subdivision development consisting of approximately 227 single homes and 518 townhomes, located 1km north of the subject development. The Transportation Brief (prepared by Stantec) projected approximately 230 veh/h during the morning peak hour and 360 veh/h during the afternoon peak hour.

590 Hazeldean Road
Richcraft Homes is proposing a subdivision development consisting of approximately 600 units, located 1km north of the subject development. The Transportation Impact Study (prepared by Stantec) projected approximately 300 veh/h during the morning peak hour and 375 veh/h during the afternoon peak hour.

5505 Fernbank Road (Blackstone South)
Mattamy Homes is proposing a subdivision development consisting of approximately 609 units, located 1.2km southeast of the subject development. The Transportation Impact Assessment (prepared by Parsons) projected approximately 264 veh/h during the morning peak hour and 327 veh/h during the afternoon peak hour.

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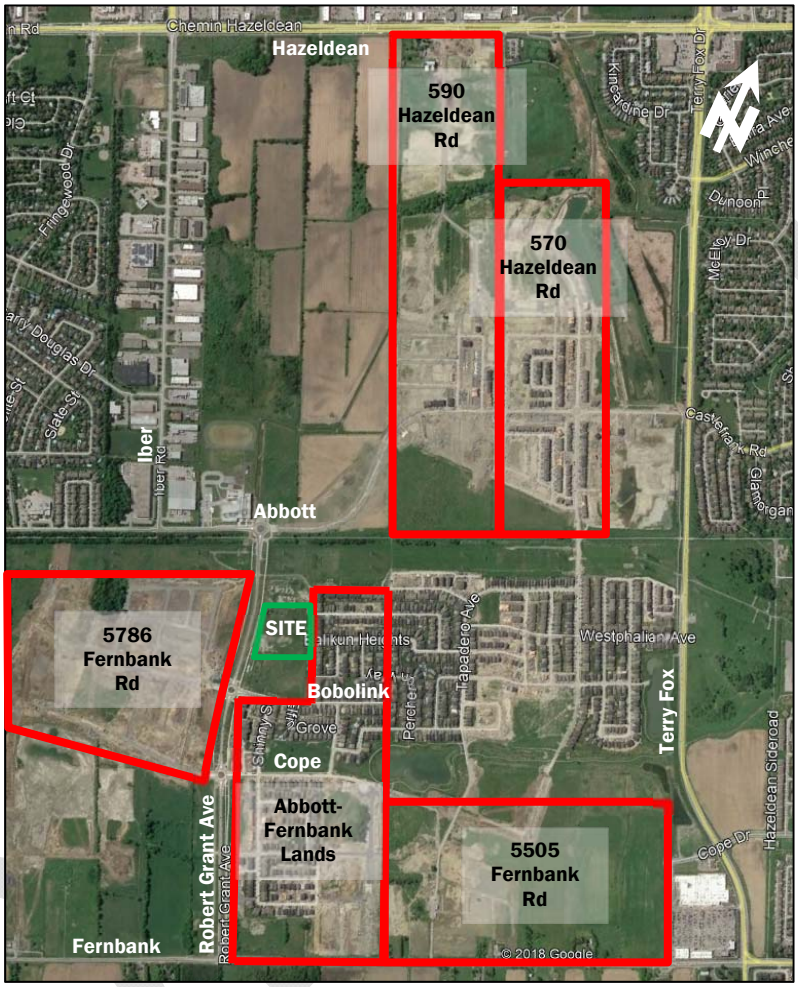
5786 Fernbank Road (CRT Lands)

In 2011, the IBI Group submitted a Transportation Letter to the City of Ottawa for the development known as Claridge Homes – Fernbank Subdivision, taking place west of Robert Grant Ave, across from the future Lépine Development. It is to our understanding that the development has been put on hold since then.

The location of the site and the adjacent future developments are shown below in **Figure 7**.

Figure 7: Other Area Developments



2.2. STUDY AREA AND TIME PERIODS

As the proposed site is largely a residential development, the time periods assessed will be the weekday morning and afternoon peak hours. The proposed study area is outlined below and highlighted in **Figure 8**.

Figure 8: Study Area

- Abbott E/Robert Grant intersection;
- Bobolink/Robert Grant intersection;
- Fernbank/Robert Grant intersection;
- Bobolink/Livery intersection;
- Site Access/Robert Grant intersection;
- Site Access/Livery intersection;
- Robert Grant Avenue adjacent to the site; and,
- Livery Street adjacent to the site.

2.3. EXEMPTION REVIEW

Based on the City's TIA guidelines and the subject site, the following modules/elements of the TIA process, summarized in **Table 1**, are recommended to be exempt in the subsequent steps of the TIA process:

Table 1: Exemptions Review Summary

Module	Element	Exemption Consideration
Design Review Component (4.1 – 4.4)	All elements	Not required for rezoning applications.
4.8 Review of Network Concept	All elements	The site is not expected to generate 200 trips more than the established zoning. This will be confirmed in Step 3.

3. FORECASTING

3.1. DEVELOPMENT GENERATED TRAVEL DEMAND

3.1.1. TRIP GENERATION AND MODE SHARES

The proposed development will consist of 566 apartment dwelling units, housed within one mid-rise and two high-rise buildings. Appropriate trip generation rates were obtained from the 2009 TRANS Trip Generation Residential Trip Rates report, **Table 6.3**, which have been summarized in **Table 2**.

Table 2: TRANS Trip Generation Residential Trip Rates

Land Use	Data Source	Trip Rates	
		AM Peak	PM Peak
Mid-Rise Apartments (3-10 floors)	TRANS	T = 0.29(du);	T = 0.37(du);
High-Rise Apartments (10+ floors)	TRANS	T = 0.29(du);	T = 0.36(du);
Notes: T = Average Vehicle Trip Ends du = Dwelling unit			

Using the trip rates shown in **Table 2**, the number of vehicles per hour were determined as shown in **Table 3** below.

Table 3: Apartment Units Vehicle Trip Generation

Land Use	Dwelling Units	AM Peak (Vehicles/h)			PM Peak (Vehicles/h)		
		In	Out	Total	In	Out	Total
Mid-Rise Apartments (3-10 floors)	146	10	32	42	33	21	54
High-Rise Apartments (10+ floors)	420	29	93	122	93	58	151

The total vehicle trips shown in **Table 3** for the apartment units were then converted to total person trips using the auto mode share values in Table 3.13 of the TRANS report. New mode share percentages were then applied to the resulting total person trips values, based on the 2011 NCR Household Origin-Destination (OD) Survey and the Kanata/Stittsville district. **Table 4** provides the resulting person trips/h values for each of the travel modes.

Table 4: Mode Shares for the Residential Buildings Development

Travel Mode	Mode Share	AM Peak (Person Trips/h)			PM Peak (Person Trips/h)		
		In	Out	Total	In	Out	Total
Auto Driver	60%	53	171	224	172	107	279
Auto Passenger	15%	14	41	55	42	27	69
Transit	15%	12	44	56	43	28	71
Non-motorized	10%	8	29	37	28	19	47
Total Person Trips	100%	87	285	372	285	181	466
Total 'New' Auto Trips		**53**	**171**	**224**	**172**	**107**	**279**

As shown in **Table 4**, the resulting number of total person trips expected to be generated by the proposed development are approximately 370 and 465 in the morning and afternoon peak hours respectively. The projected 'new' vehicle trips are approximately 225 and 280 in the weekday morning and afternoon peak hours respectively.

3.1.2. TRIP DISTRIBUTION AND ASSIGNMENT

Based on the 2011 NCR Household Origin-Destination Survey (Kanata – Stittsville district) and the location of adjacent arterial roadways and neighbourhoods, the distribution of site-generated traffic volumes was estimated as follows:

- 5% to/from the north;
- 40% to/from the south;
- 50% to/from the east; and,
- 5% to/from the west.

The expected site-generated auto trips in **Table 4** were then assigned to the road networks as shown in **Figure 9** below.

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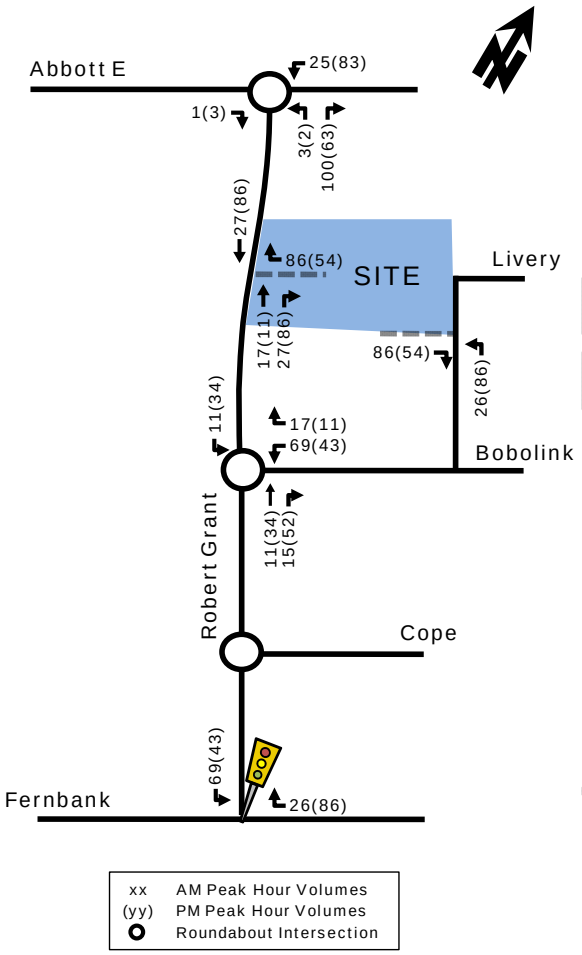
Figure 9: Residential Development Site-Generated Traffic



The development is proposing two access points, one on Robert Grant Ave and one on Livery St. The Robert Grant access is expected to be a right-in/right-out access only. As such, traffic coming from the north may either turn left at the Bobolink/Robert Grant roundabout and access the development from Livery St or make a U-turn at the roundabout to access the RIRO from the south.

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

Historically, Fernbank Rd has experienced a decline in background growth, as observed by historical traffic counts data (years 2009, 2010, 2012, 2014 and 2017) on the West Leg of Fernbank/Eagleson. The percent change from 2009 has been summarized in **Table 5**. Detailed background traffic growth analysis is provided in **Appendix E**.

Table 5: Fernbank/Eagleson Historical Traffic Growth (2009-2017)

Time Period	Percent Change
	West Leg
8 hrs	-1.51%
AM Peak	-4.91%
PM Peak	-1.17%

Accounting for future developments, which are expected to reach full build-out by 2025, a 2% background growth rate per year was considered appropriate to estimate interim traffic growth along existing roadways within the study area. **Figure 10** and **Figure 11** show the estimated future background peak hour traffic volumes in the 2020 and 2025 horizons.

Figure 10: Future Background 2020

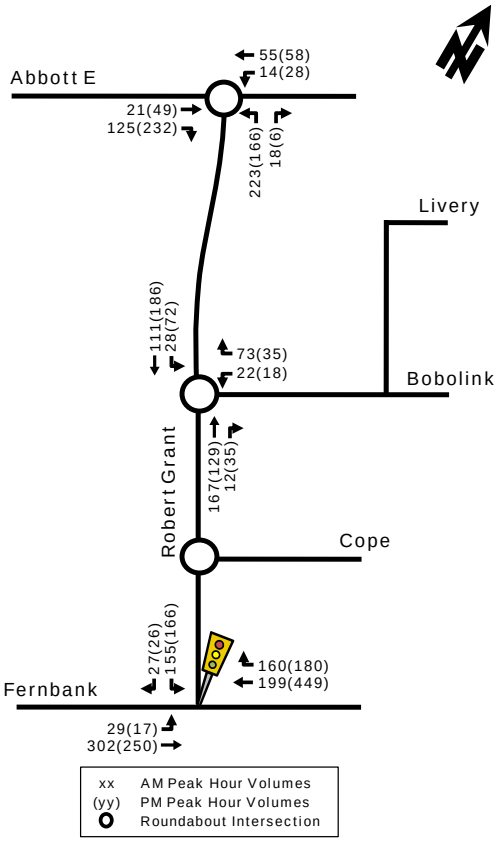
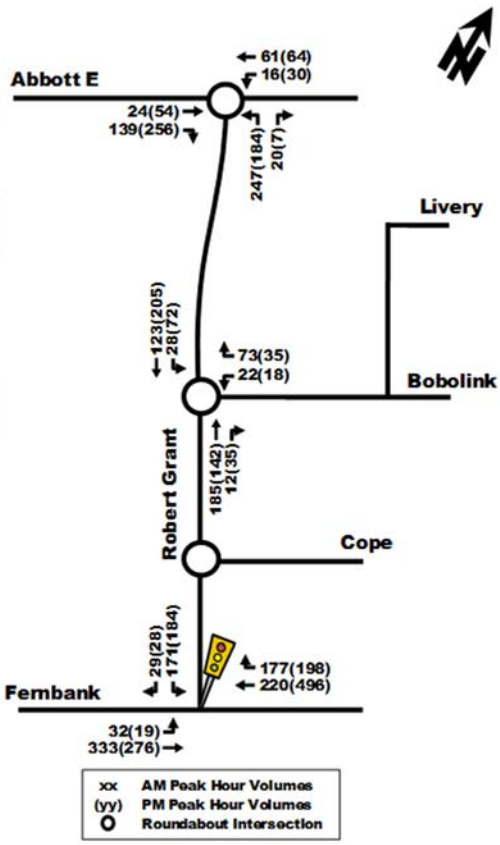


Figure 11: Future Background 2025



3.2.3. OTHER DEVELOPMENTS

Descriptions of the adjacent developments in the surrounding area that have initiated the development application process with the City were provided in **Section 2.1.3: Other Area Developments**.

The following surrounding developments were expected to be fully constructed within the analysis periods of the proposed development, based on the latest information available from the City.

- Fernbank Crossing, Phase 3 (2015)
- Fernbank Crossing, Phase 4 (2017)
- Blackstone Subdivision, Phases 4-8 (2017) – 5505 Fernbank Rd
- CRT Lands, Phases 1-2 (2011) – 5786 Fernbank Rd

To produce the most accurate analysis results, the estimated trips generated by adjacent developments were recalculated and redistributed according to the current (2017) TIA requirements from the City. Many of the traffic studies supporting these developments were completed using the previous 2006 TIA requirements.

The most relevant changes were the trip generation rates and the mode share percentages; both were updated to follow the same trip generation process discussed in **Section 3.1.1**. The trip distribution applied to the adjacent developments was assumed to be the same as the percentages applied to the Lépine Development (see **Section 3.1.2**).

Fernbank Crossing, Phases 3 and 4

A site visit confirmed the majority of Phase 3 was already constructed by the time traffic counts were conducted at intersections within the study area in January of 2019. However, it was assumed approximately 10% (20 Single-Detached Units) of Phase 3 have yet to be constructed, as a conservative estimate. These remaining residential units were added to the trip generation calculations of Phase 4, which has not begun construction at the time of the report. Phase 4 proposes 100 Single-Detached units and 46 Townhouse units. **Table 6** below provides the expected number of auto trips generated by Phases 3 and 4.

Table 6: Fernbank Crossing Total New Auto Trips Generated

Land Use	Dwelling Units	AM Peak (Vehicles/h)			PM Peak (Vehicles/h)		
		In	Out	Total	In	Out	Total
Single-Detached Units	120	26	66	92	62	39	101
Townhouse Units	46	9	18	27	16	16	32
Total	**166**	**35**	**84**	**119**	**78**	**55**	**133**

As shown in **Table 6** the expected number of trips generated by the remainder of Phase 3 and the entirety of Phase 4 are 119 and 133 veh/h in the morning and afternoon peak hours of travel. These auto trips are then distributed at Haliburton Heights, future Defense St and future Cope Dr extension. The majority of the trips would use the future Cope Dr to access eastern and northern regions of Ottawa. The remaining trips would access Defense St via Fernbank Rd (or vice-versa) and a small percentage would utilize Robert Grant Ave.

Blackstone South, Phase 4-8

The Blackstone South development is expected to reach full build-out by 2025 and features a total of 376 Townhouses, 423 Single-Detached Houses, a Residential Condominium Block, a Public High School and a Public Elementary School. Since this future development will connect to Fernbank Rd, Terry Fox Dr and the future extensions of Cope Dr and Rouncey Rd, it was assumed the majority of this development traffic will use those access points. For the following analysis, it was assumed approximately 10% of Townhouse units (45 Units) and 10% of Single-Detached units (40 Units) would utilize Robert Grant Ave. **Table 7** below provides the expected number of auto trips generated by the Blackstone South Development.

Table 7: Blackstone South Total New Auto Trips Generated

Land Use	Dwelling Units	AM Peak (Vehicles/h)			PM Peak (Vehicles/h)		
		In	Out	Total	In	Out	Total
Single-Detached Units	40	8	23	31	20	13	33
Townhouse Units	45	9	18	27	16	15	31
Total	**166**	**17**	**41**	**58**	**36**	**28**	**64**

As shown in **Table 7**, the expected number of auto trips generated by the Blackstone South Development within the vicinity of the Lépine Development study area are 58 and 64 veh/h during the morning and afternoon peak hours of travel. The auto trips were then distributed reasonably at intersections within the study area.

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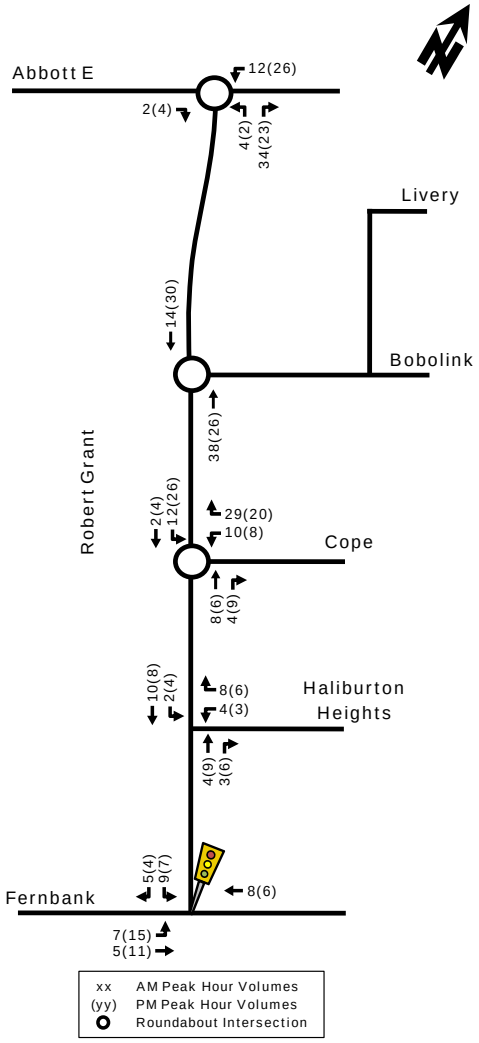
CRT Lands, Phases 1-2

The most recent traffic information regarding this development is a Transportation Brief, submitted by the IBI Group in 2011. The City confirmed the CRT Lands development application has been put on hold and no recent TIA reports have been officially submitted. Due to the uncertainty of the future of this development, the CRT Lands Development was not included in this report.

Total Adjacent Development Traffic

Figure 12 illustrates the traffic volumes expected to be generated by adjacent developments within the study area.

Figure 12: Total Adjacent Development Traffic Volumes



3.2.4. TOTAL BACKGROUND TRAFFIC

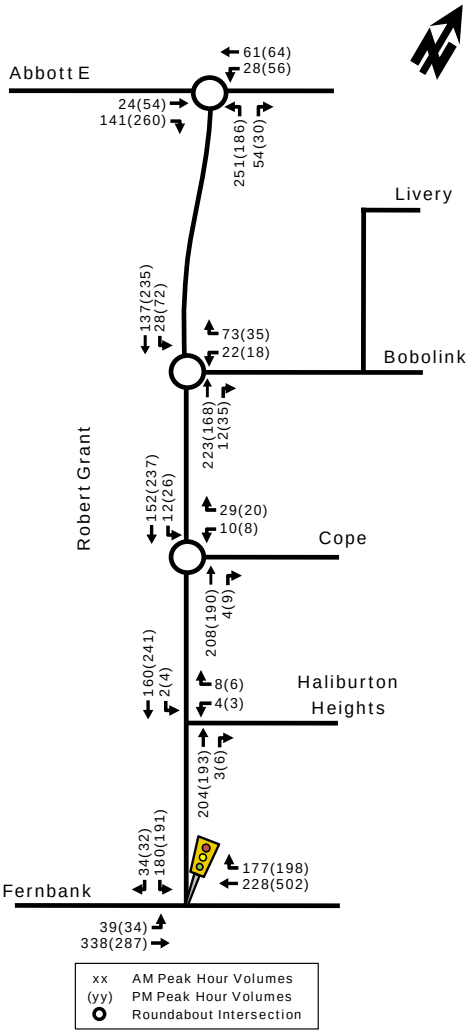
Total background traffic represents the summation of background traffic growth (based on the 2% growth rate) and adjacent development traffic.

It was assumed that all adjacent development units would be constructed after 2020. Any construction completed over the course of 2019 was expected to be accounted for in the 2% growth rate noted in the Future Background 2020 traffic

projections. Therefore, the estimated Total Background 2020 traffic volumes were the same as the Future Background 2020 traffic volumes shown in **Figure 8**.
By 2025, all adjacent development traffic was accounted for. This assumption represents the worst-case scenario, since the rate of development is highly dependent on future market conditions and its probable 100% buildout of all adjacent developments noted in this study will not be achieved by 2025.

The Future 2025 Total Background traffic volumes are shown in **Figure 13**, which is the sum of the Future 2025 Background traffic volumes from **Figure 11** and Total Adjacent Development traffic volumes from **Figure 12**.

Figure 13: Future 2025 Total Background



3.3. DEMAND RATIONALIZATION

The study area road network is expected to accommodate projected volumes. There are currently no anticipated capacity issues. The capacity of the roadways will be further explored in a more detailed review of the total projected traffic volumes and intersection design in the ensuing Strategy Report.

4. ANALYSIS

4.1. DEVELOPMENT DESIGN

Exempt – see **Section 2.3**.

4.2. PARKING

Exempt – see **Section 2.3**.

4.3. BOUNDARY STREET DESIGN

Exempt – see **Section 2.3**.

4.4. ACCESS INTERSECTION DESIGN

Exempt – see **Section 2.3**.

4.5. TRANSPORTATION DEMAND MANAGEMENT

The TDM checklist is attached in **Appendix F**.

4.6. NEIGHBOURHOOD TRAFFIC MANAGEMENT

The following section discusses the development's impact on local or collector roads of the surrounding neighbourhoods. Robert Grant Ave is classified as an arterial, which means it can be excluded from this analysis.

Bobolink Ridge is classified as a Local Road; the highest observed existing one-way traffic volume east of Robert Grant Ave was 107 veh/h in the afternoon peak hour. By the 2025 horizon year, with full buildout of proposed development and noted adjacent developments, the estimated one-way traffic volume at the same location was 193 veh/h in the afternoon peak hour. As per the City of Ottawa's TIA Guidelines (2017), the one-way traffic volume threshold of a Local Road is 120 veh/h.

In this case, no changes were recommended in the road network for the following reasons (refer to **Figure 14**):

1. Although Bobolink is classified as a local road, the section between Elfin Grove and Robert Grant Ave has been constructed as a collector road, which has a threshold of 300 veh/h. The pavement width is approximately 11.5m and there is no direct frontage. This transition is necessary when connecting a local road to an arterial road;
2. There are three intersecting streets along the collector road section, Janka, Shinny and Elfin, which will reduce traffic volumes as Bobolink transitions to a local road; and,
3. It is anticipated that once the Rouncey Rd and Cope Dr roadways are fully built further east, more adjacent development traffic will divert away from Robert Grant, thereby relieving traffic pressure on Bobolink as it transitions to a local road.

Overall, the design of Bobolink was considered appropriate in this context.

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Figure 14: Bobolink Cross-section

4.7. TRANSIT

Refer to **Section 2.1.2: Transit Network**, for a description of the existing bus services within the study area. For future conditions, the "Rapid Transit and Transit Priority Network – 2031 Affordable Network" map of the City of Ottawa's Transportation Master Plan, identifies Robert Grant Ave as a future Transit Priority Corridor (Isolated Measures), with three Park and Ride areas located at Robert Grant/Hazeldean, Robert Grant/Abbott (immediately north of the Lépine Development) and Robert Grant/Fernbank. As such, transit services are expected to be able to accommodate the future transit demand of the Lépine Development and other developments along Robert Grant Ave.

4.8. REVIEW OF NETWORK CONCEPT

Exempt – see **Section 2.3**.

4.9. INTERSECTION DESIGN

4.9.1. INTERSECTION CONTROL

Bobolink/Robert Grant and Abbott/Robert Grant are both roundabouts, while the Fernbank/Robert Grant intersection is controlled by traffic signals. These are appropriate designs based on approved studies for Robert Grant completed by the City.

4.9.2. INTERSECTION DESIGN

Existing Conditions

Table 8 below provides a summary of intersection and roundabout operational results within the study area based on existing traffic volumes, previously shown in **Figure 5.** At signalized intersections, movements were assessed based on the volume-to-capacity (v/c) ratio and the corresponding Level of Service (LOS) for the most critical movement as per City standards. The intersection 'as a whole' for signal-controlled intersections was based on the weighted v/c ratio for all the

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movements at the intersection and the corresponding Level of Service (LOS) for critical movements that showed a LOS 'E' or worse.

Roundabouts within the study area were assessed using Sidra, results were based on the average delay of the critical movement and the overall delay. The Synchro and Sidra model outputs for existing conditions have been provided in **Appendix G**.

Table 8: Existing Conditions Intersection Performance

Intersection	Weekday AM Peak (PM Peak)					
	Critical Movement			Intersection 'As a Whole'		
	LOS	max. v/c or avg. delay (s)	Movement	Delay (s)	LOS	v/c
Fernbank/Robert Grant (S)	B(C)	0.61(0.80)	WBT(WBT)	20.6(26.6)	A(B)	0.43(0.66)
Bobolink/Robert Grant (R)	A(A)	9.6(9.4)	WBL(WBL)	4.9(5.3)	A(A)	-
Abbott/Robert Grant (R)	A(A)	8.8(9.0)	NBL(NBL)	6.1(5.2)	A(A)	-

Note: Analysis of signalized intersections assumes a PHF of 0.95 and a saturation flow rate of 1800 veh/h/lane.
(S) - Signalized intersection.
(R) – Roundabout intersection.

As shown in **Table 8**, the signalized intersection of Fernbank/Robert Grant 'as a whole' operates at a LOS 'B' in the critical afternoon peak hour. The critical movement operating at a LOS 'C' in the afternoon peak hours.

The roundabout intersections operate 'as a whole' with a LOS 'A' during both peak hours and the critical movements are also operating at a LOS 'A' during both peak hours.

Future 2020 Total Background Conditions

The Future 2020 Background traffic volumes were shown in **Figure 10**. **Table 9** below provides a summary of the critical Synchro analysis results at intersections within the study area, based on the future background 2020 traffic volumes. The Synchro and Sidra model outputs for Future 2020 Background conditions are provided in **Appendix H**.

It should be noted that the Fernbank/Robert Grant intersection signal timing was optimized in all future scenarios to ensure the most efficient operations.

Table 9: Future 2020 Total Background Intersection Performance

Intersection	Weekday AM Peak (PM Peak)					
	Critical Movement			Intersection 'As a Whole'		
	LOS	max. v/c or avg. delay (s)	Movement	Delay (s)	LOS	v/c
Fernbank/Robert Grant (S)	A(C)	0.60(0.80)	WBT(WBT)	20.3(24.9)	A(B)	0.42(0.65)
Bobolink/Robert Grant (R)	A(A)	9.6(9.4)	WBL(WBL)	4.9(5.2)	A(A)	-
Abbott/Robert Grant (R)	A(A)	8.8(9.0)	NBL(NBL)	6.1(5.2)	A(A)	-

Note: Analysis of signalized intersections assumes a PHF of 1.00 and a saturation flow rate of 1800 veh/h/lane.
(S) - Signalized intersection.
(R) – Roundabout intersection.

As shown in **Table 9**, the study area intersections 'as a whole' were shown to operate at a LOS 'B' or better during peak hours. The critical movements were shown to operate at a LOS 'C' or better during peak hours.

Future 2025 Total Background Conditions

The Future 2025 Total Background traffic volumes were shown in **Figure 13**. Synchro analysis results are summarized in **Table 10** for critical movements and the intersection 'as a whole'. The Synchro and Sidra model outputs for Future 2025 Total Background conditions are provided in **Appendix I**.

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Table 10: Future 2025 Total Background Intersection Performance

Intersection	Weekday AM Peak (PM Peak)					
	Critical Movement			Intersection 'As a Whole'		
	LOS	max. v/c or avg. delay (s)	Movement	Delay (s)	LOS	v/c
Fernbank/Robert Grant (S)	B(D)	0.63(0.82)	WBT(WBT)	20.8(26.0)	A(B)	0.45(0.67)
Bobolink/Robert Grant (R)	A(A)	9.9(9.6)	WBL(WBL)	4.9(5.1)	A(A)	-
Abbott/Robert Grant (R)	A(A)	8.9(9.0)	NBL(NBL)	6.1(5.4)	A(A)	-
Note: Analysis of signalized intersections assumes a PHF of 1.00 and a saturation flow rate of 1800 veh/h/lane. (S) - Signalized intersection. (R) – Roundabout intersection.						

As shown in **Table 10**, the study area intersection 'as a whole' were shown to operate at a LOS 'B' or better during peak hours. The critical movements were shown to operate at a LOS 'D' or better during peak hours.

Future 2020 Total Projected Conditions – Full Build-Out

The total projected 2020 traffic volumes were derived by superimposing the site-generated traffic volumes (**Figure 9**) onto projected 2020 background traffic volumes (**Figure 10**). The resulting total projected traffic volumes are illustrated in **Figure 15**.

Figure 15: Future 2020 Total Projected Traffic Volumes

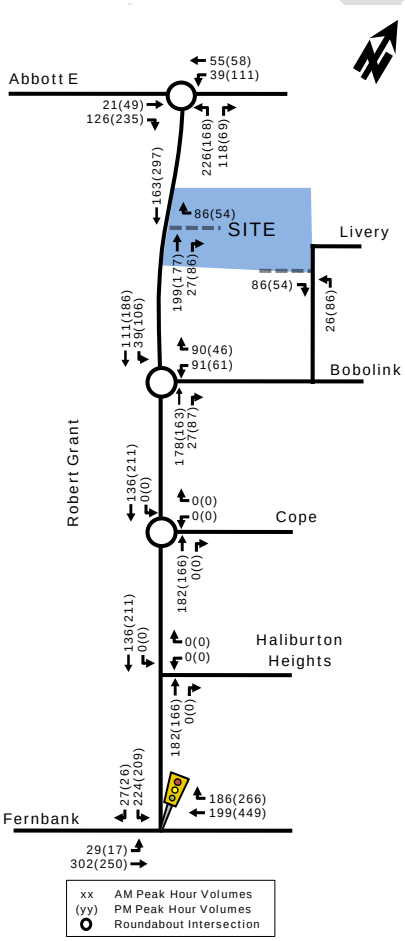

Table 11 below provides a summary of the critical Synchro analysis results at intersections within the study area, based on Future 2020 Total Projected traffic volumes. The Synchro and Sidra model outputs for 2020 Future Total Projected conditions are provided in **Appendix J**.

Table 11: Future 2020 Total Projected Performance at Study Area Intersections

Intersection	Weekday AM Peak (PM Peak)					
	Critical Movement			Intersection 'As a Whole'		
	LOS	max. v/c or avg. delay (s)	Movement	Delay (s)	LOS	v/c
Fernbank/Robert Grant (S)	A(C)	0.60(0.80)	WBT(WBT)	20.6(24.8)	A(B)	0.45(0.65)
Bobolink/Robert Grant (R)	A(A)	9.7(9.6)	WBL(WBL)	5.7(5.8)	A(A)	-
Abbott/Robert Grant (R)	A(A)	8.8(9.0)	NBL(NBL)	5.9(5.6)	A(A)	-
Note: Analysis of signalized intersections assumes a PHF of 1.00 and a saturation flow rate of 1800 veh/h/lane. (S) - Signalized intersection. (R) – Roundabout intersection.						

As shown in **Table 11**, the study area intersection 'as a whole' were shown to operate at a LOS 'B' or better during peak hours. The critical movements were shown to operate at a LOS 'C' or better during peak hours.

Future 2025 Total Projected Conditions –Build-Out plus Five Years

The Future 2025 Total Projected traffic volumes, shown in **Figure 16**, were derived by superimposing the site-generated traffic volumes (**Figure 9**) onto Future 2025 Total Background traffic volumes (**Figure 13**).

Figure 16: Future 2025 Total Projected Traffic Volumes

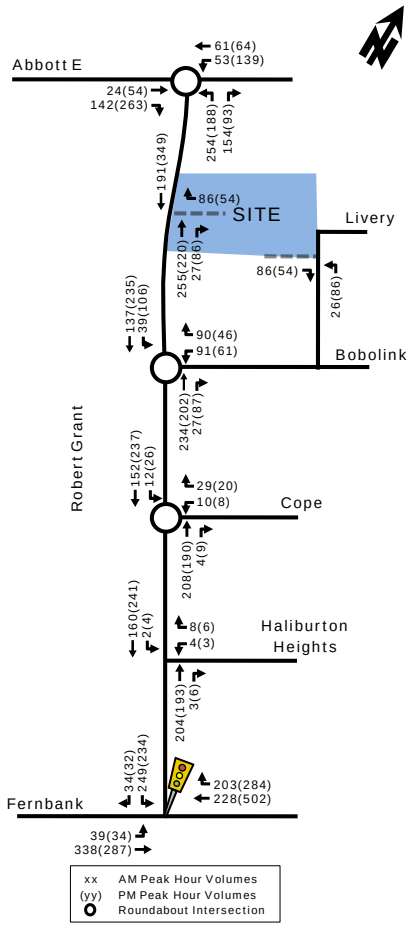

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Table 12 below provides a summary of the critical Synchro analysis results at intersections within the study area, based on Future 2025 Total Projected traffic volumes. The Synchro and Sidra model outputs for Future 2025 Total Projected conditions is provided in Appendix K.

Table 12: Future 2025 Total Projected Performance at Study Area Intersections

Intersection	Weekday AM Peak (PM Peak)					
	Critical Movement			Intersection 'As a Whole'		
	LOS	max. v/c or avg. delay (s)	Movement	Delay (s)	LOS	v/c
Fernbank/Robert Grant (S)	B(D)	0.64(0.82)	WBT(WBT)	21.4(25.8)	A(B)	0.48(0.67)
Bobolink/Robert Grant (R)	B(A)	10.0(9.8)	WBL(WBL)	5.7(5.7)	A(A)	-
Abbott/Robert Grant (R)	A(A)	8.9(9.0)	NBL(NBL)	5.9(5.8)	A(A)	-
Note: Analysis of signalized intersections assumes a PHF of 1.00 and a saturation flow rate of 1800 veh/h/lane. (S) - Signalized intersection. (R) – Roundabout intersection.						

As shown in Table 12, the study area intersection 'as a whole' were shown to operate at a LOS 'B' or better during peak hours. The critical movements were shown to operate at a LOS 'D' or better during peak hours.

5. FINDINGS, CONCLUSIONS AND RECOMMENDATIONS

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

Proposed Development

- The proposed single-phase development will consist of 566 residential units, within two high-rise and one mid-rise apartment buildings and is expected to reach full build-out by 2020.
- Primary vehicle access is proposed via Robert Grant Avenue, which leads to an internal roundabout, a ramp to the underground parking garage and six surface parking spaces for visitors.
- The main access intersection with Robert Grant Ave is expected to permit right-in/right-out only vehicular movements only.
- Secondary vehicular access is proposed via a full-movement driveway connection to Livery St, which leads directly to the underground parking garage.
- The proposed development is projected to generate 'new' two-way vehicle volumes of approximately 160 veh/h and 205 veh/h during the weekday morning and afternoon peak hours respectively.

Existing and Background Conditions

- The existing signalized intersection at Fernbank/Robert Grant 'as a whole' currently operates at a LOS 'B' or better during peak hours, while the existing roundabout intersections Bobolink/Robert Grant and Abbott/Robert Grant currently operate at a LOS 'A' during peak hours.
- Background traffic growth rate was assumed to be 2% at all study area intersections.
- The operational analysis of Future 2020 and 2025 Total Background conditions indicated the following:
    - The signalized intersection at Fernbank/Robert Grant 'as a whole' is expected to operate at a LOS 'B' or better during peak hours, which is within City standards; and,
    - The roundabout intersections Bobolink/Robert Grant and Abbott/Robert Grant are expected to operate at a LOS 'A' during peak hours.

Projected Conditions

- The operational analysis of Future 2020 and 2025 Total Projected conditions indicated the following:

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  - The signalized intersection at Fernbank/Robert Grant 'as a whole' is expected to operate at a LOS 'B' or better during peak hours; and,
  - The roundabout intersections Bobolink/Robert Grant and Abbott/Robert Grant are expected to operate at a LOS 'A' during peak hours.
- The study area intersections are expected to operate within City standards through to the 2025 horizon year. No modifications to the adjacent transportation network will be required to support this development.

Based on the foregoing, the proposed Lépine Development can be accommodated by the adjacent transportation network and is recommended to proceed from a transportation perspective.

Prepared By:

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Transportation Planner

Reviewed By:

Austin Shih, M.A.Sc., P.Eng.
Senior Transportation Engineer

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Appendix A

Screening Form and Correspondence

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PARSONS

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

City of Ottawa 2017 TIA Guidelines

TIA Screening Form

Date	12/12/2018
Project	Lépine - Fernbank TIA
Project Number	476799-01000

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

Module 1.1 - Description of Proposed Development	
Municipal Address	1000 Robert Grant
Description of location	Midblock between Fernbernak Road and Abbott Street East, located on the east side of Robert Grant Avenue. Currently vacant lots.
Land Use	Residential - Apartment
Development Size	566 units
Number of Accesses and Locations	2 Total: 1 off Robert Grant/ 1 off Livery St
Development Phasing	Assume Single Phase for Zoning
Buildout Year	2024 (5 year horizon)
Sketch Plan / Site Plan	See Figure 2

Module 1.2 - Trip Generation Trigger		
Land Use Type	Townhomes or Apartments	
Development Size	566	Units
Trip Generation Trigger Met?	Yes	

Module 1.3 - Location Triggers	
Development Proposes a new driveway to a boundary street that is designated as part of the City's Transit Priority, Rapid Transit, or Spine Bicycle Networks (See Sheet 3)	Yes
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;	Yes	
A proposed driveway makes use of an existing median break that serves an existing site	No	
There is a documented history of traffic operations or safety concerns on the boundary streets within 500 m of the development	No	
The development includes a drive-thru facility	No	
Safety Trigger Met?	Yes	

Appendix B

Transit Route Maps

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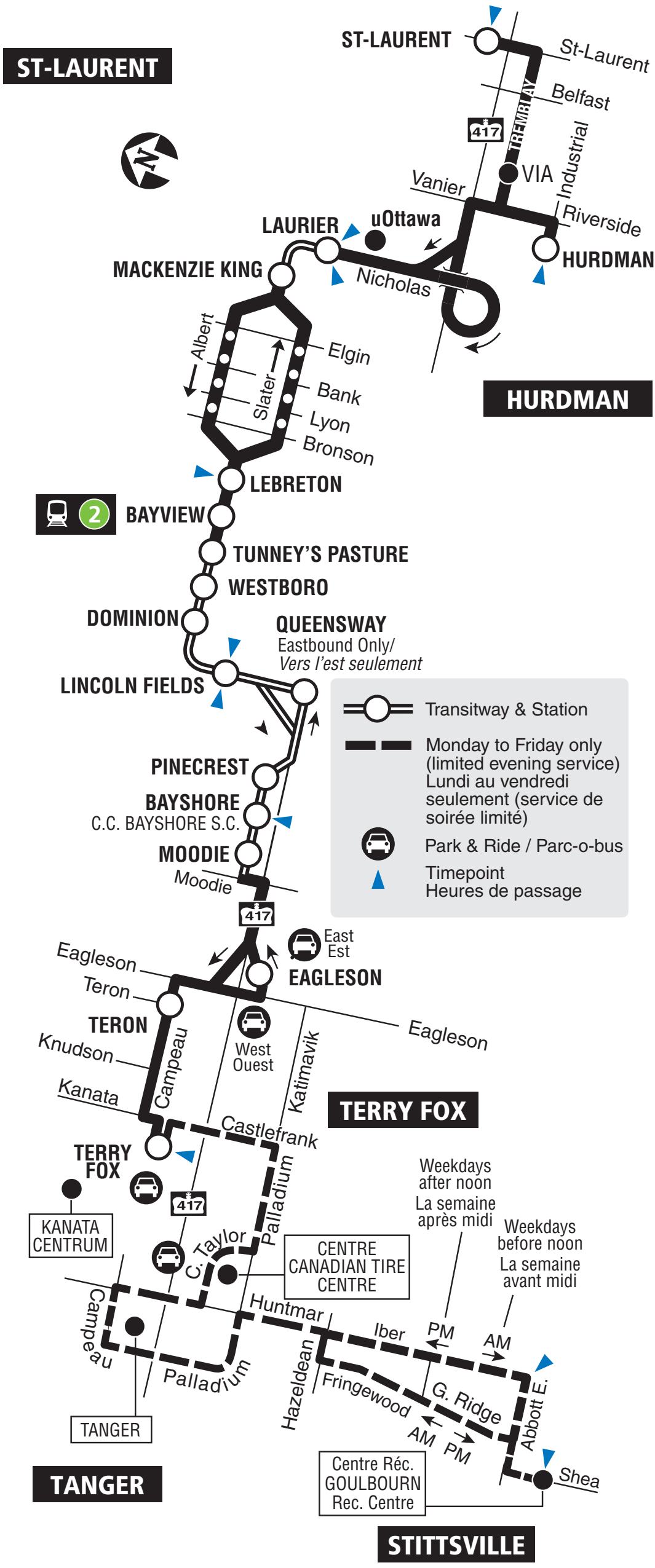
62 Rapide

ST-LAURENT HURDMAN
TERRY FOX STITTSVILLE

7 days a week / 7 jours par semaine

All day service
Service toute la journée



2017.12

Schedule / Horaire.....613-560-1000
Text / Texto 560560

plus your four digit bus stop number / *plus* votre numéro d'arrêt à quatre chiffres

Customer Relations
Service à la clientèle **613-842-3600**

Lost and Found / Objets perdus..... **613-563-4011**

Security / Sécurité **613-741-2478**

Effective December 24, 2017
En vigueur 24 décembre 2017

OC Transpo

INFO 613-741-4390
octranspo.com

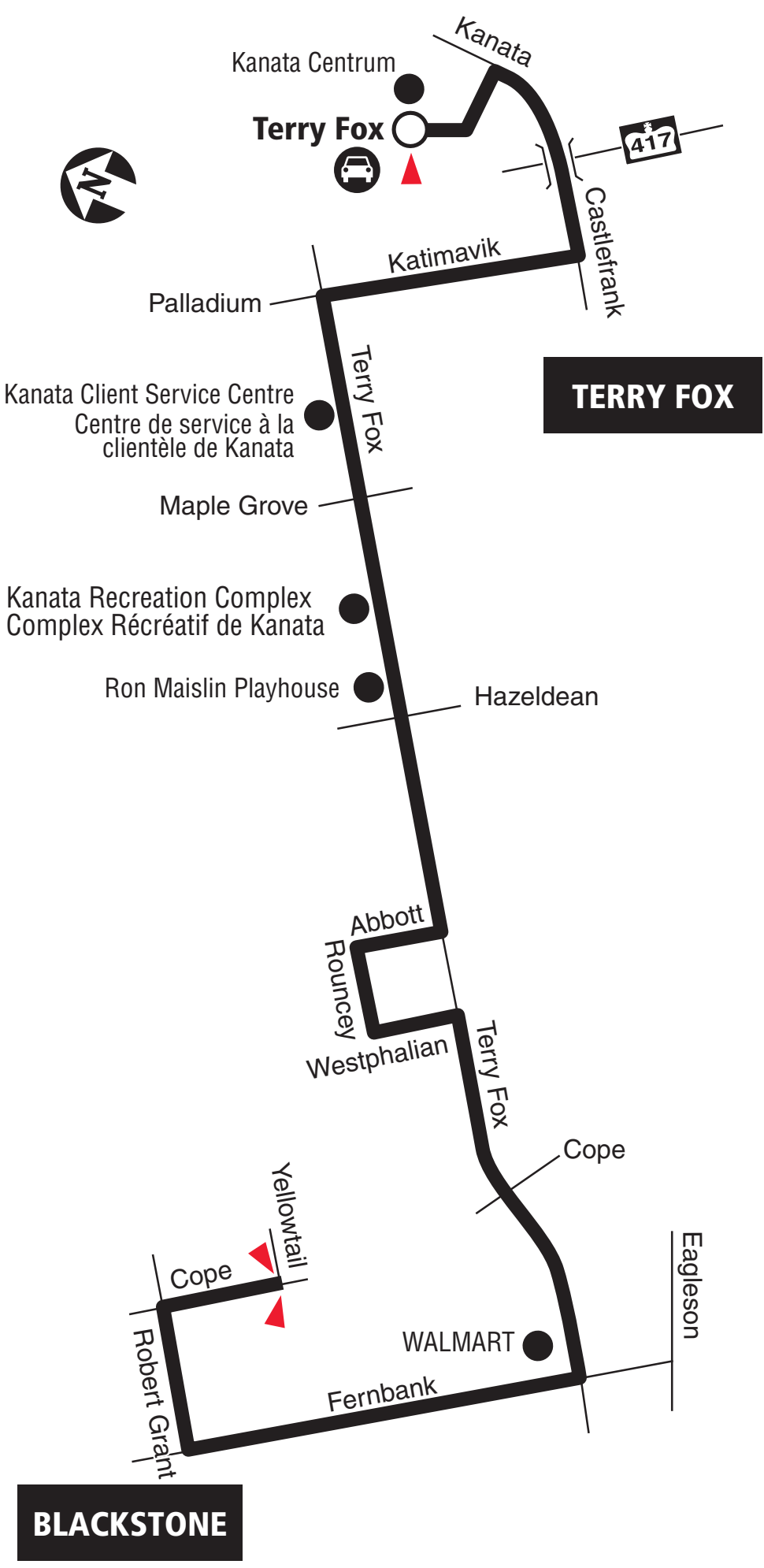
167

Local

TERRY FOX

BLACKSTONE

Monday to Friday/ Lundi au vendredi



○	Transitway Station / Station du Transitway
	Park & Ride / Parc-o-bus
▲	Timepoint / Heures de passage

2017.12

Schedule / Horaire.....613-560-1000
Text / Texto 560560

plus your four digit bus stop number / *plus* votre numéro d'arrêt à quatre chiffres

Customer Relations
Service à la clientèle **613-842-3600**

Lost and Found / Objets perdus..... **613-563-4011**

Security / Sécurité **613-741-2478**

Effective December 24, 2017
En vigueur 24 décembre 2017

OC Transpo

INFO 613-741-4390
octranspo.com

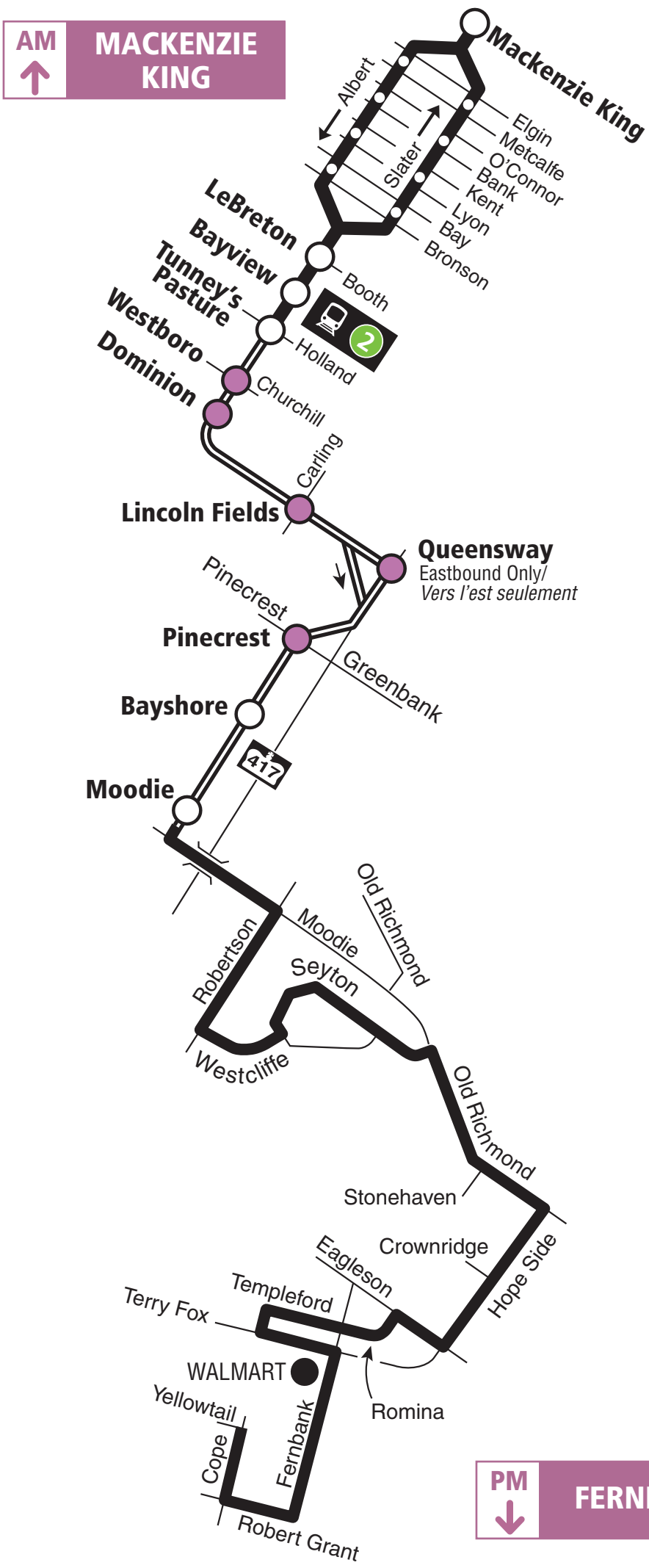
252 Connexion

MACKENZIE KING
FERNBANK

Monday to Friday / Lundi au vendredi

Peak periods only

Périodes de pointe seulement



Transitway & Station

Limited stops: Off only in AM / No stop in PM
Arrêts limités : Débarquement en AM seulement / Aucun arrêt en PM

2017.12

Schedule / Horaire.....613-560-1000
Text / Texto 560560

plus your four digit bus stop number / *plus* votre numéro d'arrêt à quatre chiffres

Customer Relations
Service à la clientèle **613-842-3600**

Lost and Found / Objets perdus..... **613-563-4011**

Security / Sécurité **613-741-2478**

Effective December 24, 2017
En vigueur 24 décembre 2017

OC Transpo

INFO 613-741-4390
octranspo.com

Appendix C

Traffic Data

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ACCURATE TRUSTED TRAFFIC DATA

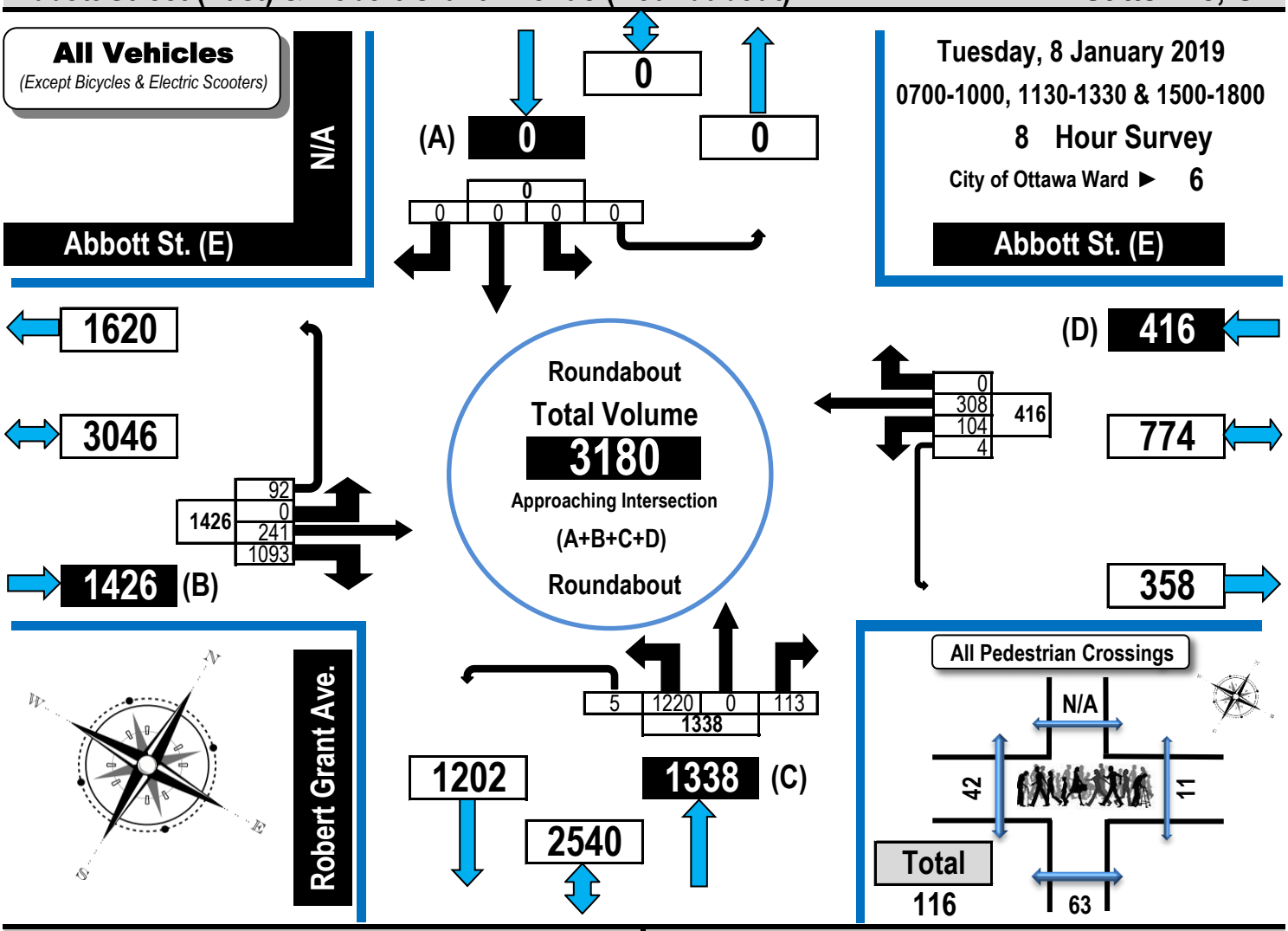
Turning Movement Count
Summary, AM and PM Peak Hour Flow Diagrams

Automobiles, Taxis, Light Trucks, Vans, SUV's, Motorcycles, Heavy Trucks, Buses, and School Buses

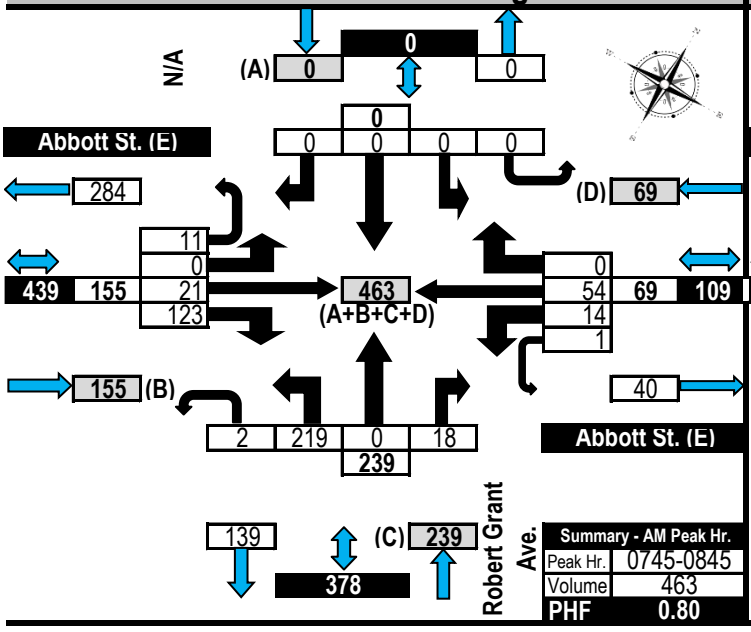
Abbott Street (East) & Robert Grant Avenue (Roundabout) — Stittsville, ON

All Vehicles
(Except Bicycles & Electric Scooters)

Tuesday, 8 January 2019
0700-1000, 1130-1330 & 1500-1800
8 Hour Survey
City of Ottawa Ward ► 6

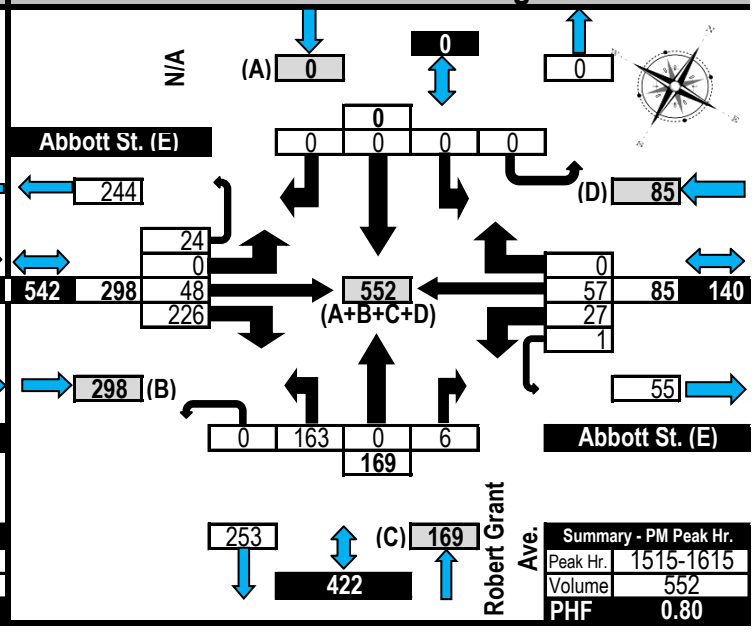


AM Peak Hour Flow Diagram



Summary - AM Peak Hr.	
Peak Hr.	0745-0845
Volume	463
PHF	0.80

PM Peak Hour Flow Diagram



Summary - PM Peak Hr.	
Peak Hr.	1515-1615
Volume	552
PHF	0.80

ACCURATE TRUSTED TRAFFIC DATA

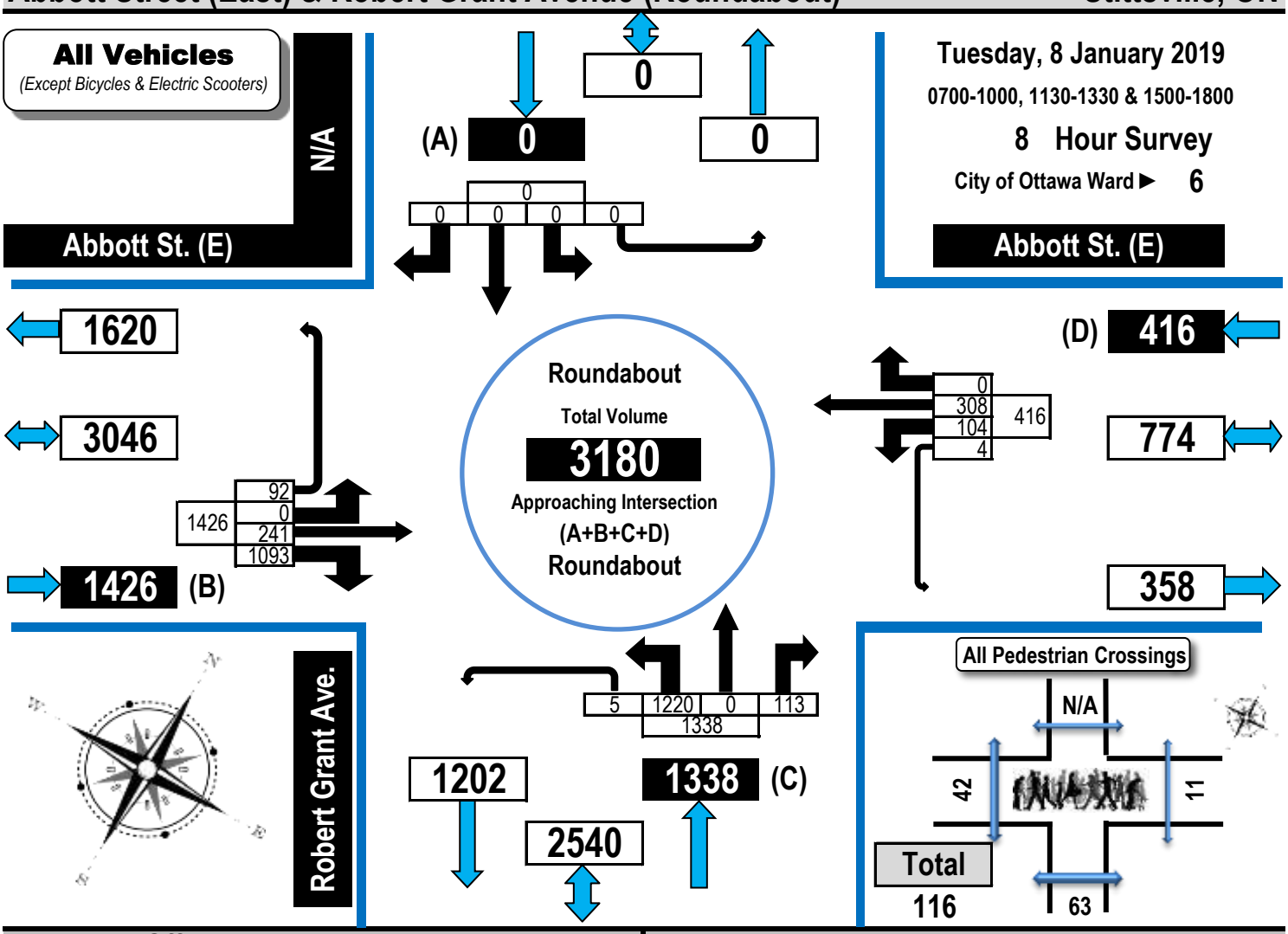
Turning Movement Count
Summary, OFF and EVENING PEAK Hour Flow Diagrams

Automobiles, Taxis, Light Trucks, Vans, SUV's, Motorcycles, Heavy Trucks, Buses, and School Buses

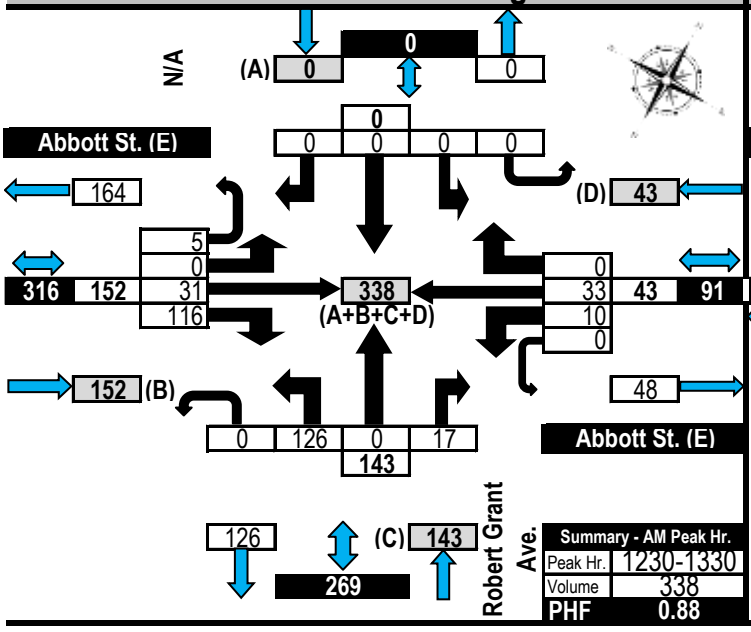
Abbott Street (East) & Robert Grant Avenue (Roundabout) — Stittsville, ON

All Vehicles
(Except Bicycles & Electric Scooters)

Tuesday, 8 January 2019
0700-1000, 1130-1330 & 1500-1800
8 Hour Survey
City of Ottawa Ward ► 6

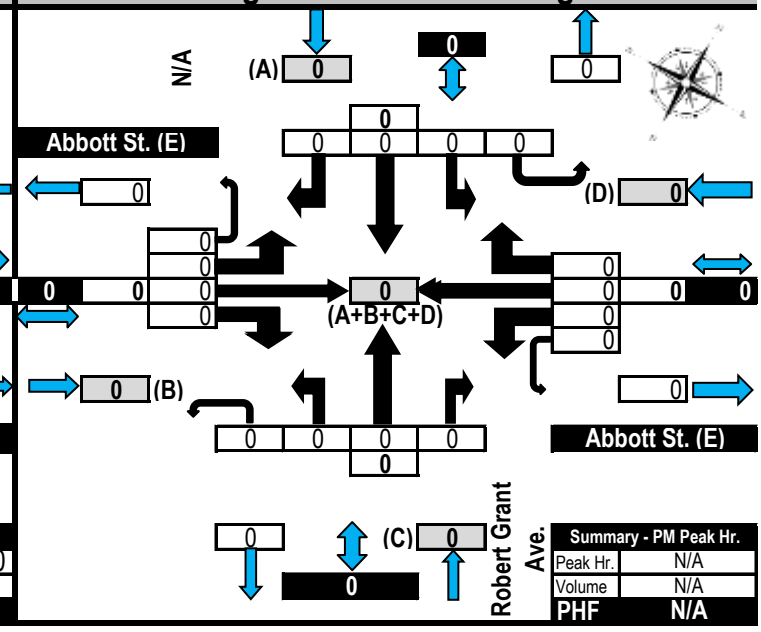


Off Peak Hour Flow Diagram



Summary - AM Peak Hr.	
Peak Hr.	1230-1330
Volume	338
PHF	0.88

Evening Peak Hour Flow Diagram

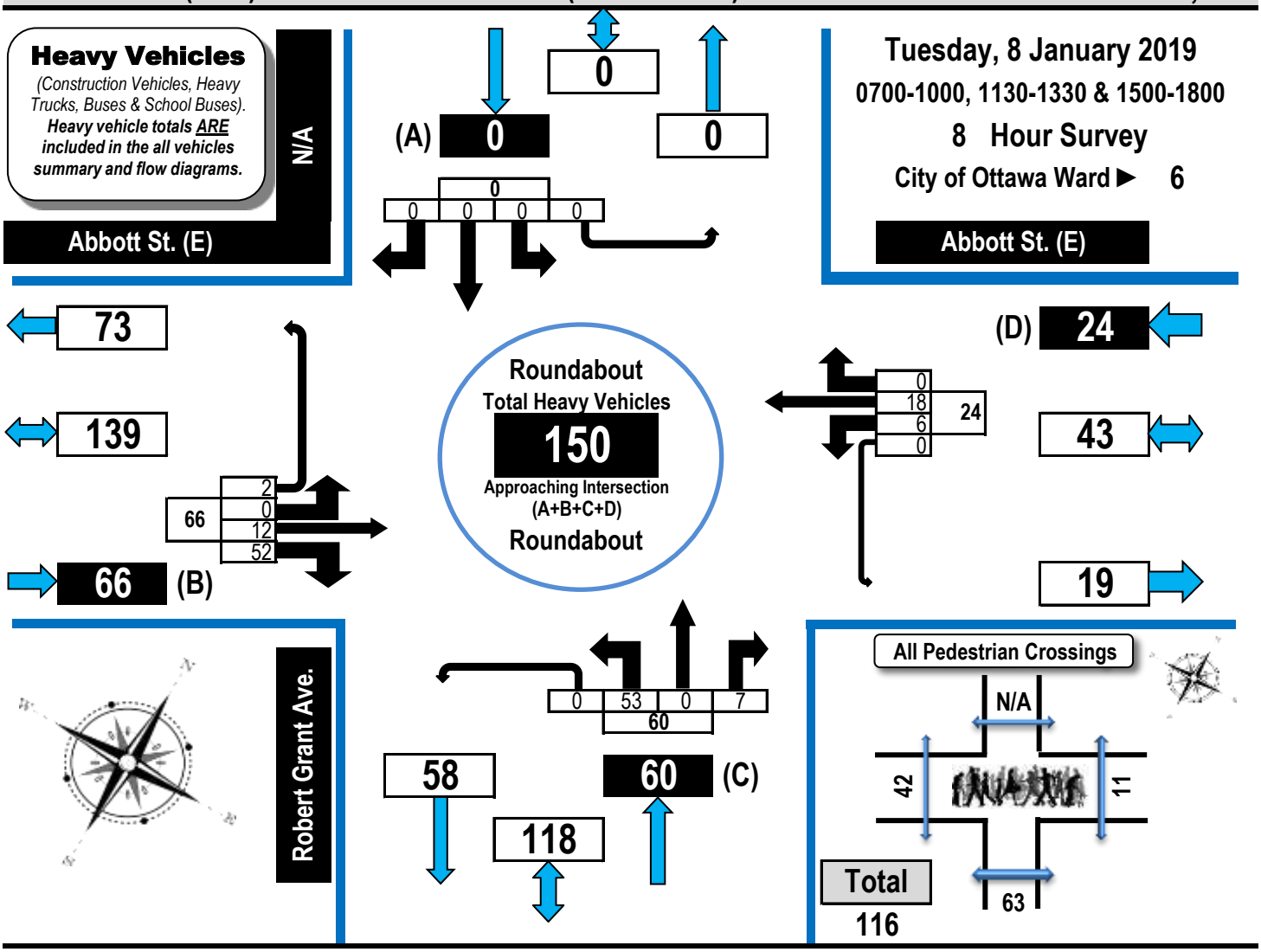


Summary - PM Peak Hr.	
Peak Hr.	N/A
Volume	N/A
PHF	N/A

Turning Movement Count
Heavy Vehicle Summary
Flow Diagram

Heavy Trucks, Buses, and School Buses

Abbott Street (East) & Robert Grant Avenue (Roundabout) — Stittsville, ON



Abbott Street (East) & Robert Grant Avenue (Roundabout) — Stittsville, ON

Survey Date: Tuesday, 8 January 2019 **Start Time:** 0700
Weather - AM: Overcast -10°C **Survey Duration:** 8 Hrs. **Survey Hours:** 0700-1000, 1130-1330 & 1500-1800
Weather - PM: Overcast +4°C

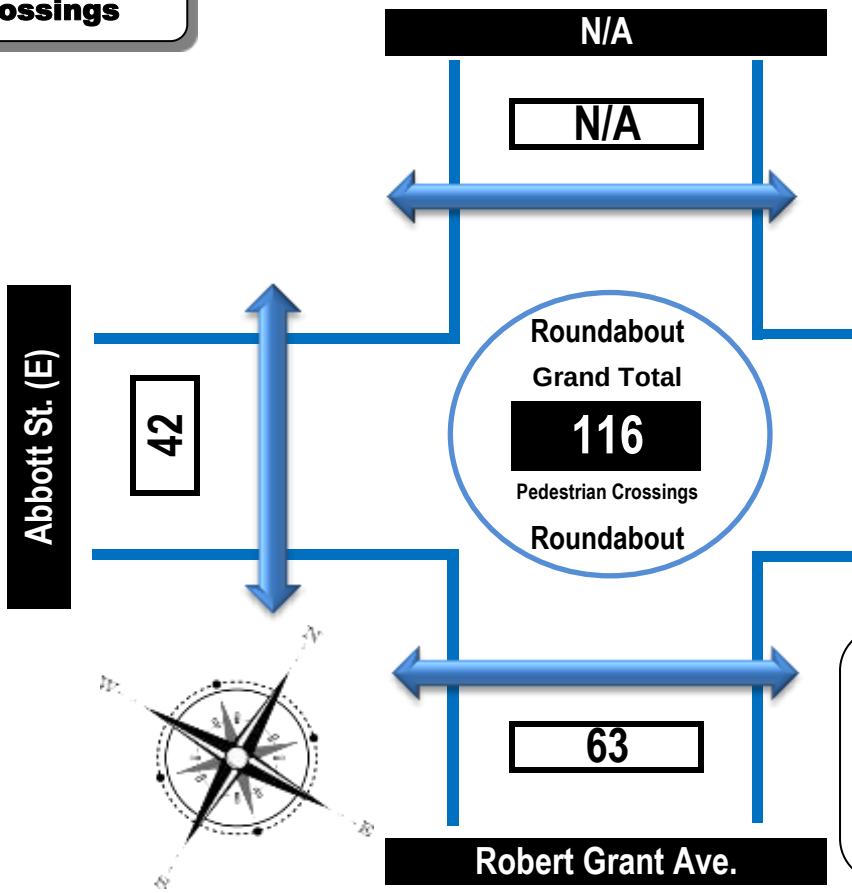
	Abbott St. (E) Eastbound					Abbott St. (E) Westbound					Robert Grant Ave. Northbound					N/A Southbound					
Time Period	LT	ST	RT	UT	S. Tot	LT	ST	RT	UT	S. Tot	LT	ST	RT	UT	S. Tot	LT	ST	RT	UT	S. Tot	G.Tot.
0700-0800	0	3	5	1	9	2	3	0	0	5	4	0	1	0	5	0	0	0	0	0	19
0800-0900	0	2	14	0	16	3	5	0	0	8	8	0	1	0	9	0	0	0	0	0	33
0900-1000	0	1	6	1	8	0	1	0	0	1	11	0	0	0	11	0	0	0	0	0	20
1130-1230	0	1	2	0	3	1	1	0	0	2	4	0	3	0	7	0	0	0	0	0	12
1230-1330	0	3	9	0	12	0	3	0	0	3	5	0	0	0	5	0	0	0	0	0	20
1500-1600	0	2	11	0	13	0	3	0	0	3	8	0	0	0	8	0	0	0	0	0	24
1600-1700	0	0	4	0	4	0	2	0	0	2	11	0	2	0	13	0	0	0	0	0	19
1700-1800	0	0	1	0	1	0	0	0	0	0	2	0	0	0	2	0	0	0	0	0	3
Totals	0	12	52	2	66	6	18	0	0	24	53	0	7	0	60	0	0	0	0	0	150

Turning Movement Count
Pedestrian Crossings Summary and Flow Diagram

Abbott Street (East) & Robert Grant Avenue (Roundabout) — Stittsville, ON

Pedestrian Crossings

Tuesday, 8 January 2019
0700-1000, 1130-1330 & 1500-1800
8 Hours
City of Ottawa Ward ► 6



Note
*The values in the summary table below and the flow diagram represent the number of pedestrian crossings **NOT** the number of individual pedestrians crossing. For example, some pedestrians will cross one approach, then another to reach their destination. Accordingly, one pedestrian crossing two approaches will be recorded as two crossings.*

Abbott Street (East) & Robert Grant Avenue (Roundabout) — Stittsville, ON

Survey Date: Tuesday, 8 January 2019
Weather - AM Overcast -10ºC
Weather - PM: Overcast +4ºC
Survey Duration: 8 Hrs.
Start Time: 0700
Survey Hours: 0700-1000, 1130-1330 & 1500-1800

Time Period	West Side Crossing Abbott St. (E)	East Side Crossing Abbott St. (E)	Street Total	South Side Crossing Robert Grant Ave.	North Side Crossing N/A	Street Total	Grand Total
0700-0800	0	1	1	4	0	4	5
0800-0900	2	2	4	2	0	2	6
0900-1000	5	1	6	5	0	5	11
1130-1230	2	0	2	6	0	6	8
1230-1330	10	5	15	8	0	8	23
1500-1600	20	0	20	29	0	29	49
1600-1700	3	2	5	8	0	8	13
1700-1800	0	0	0	1	0	1	1
Totals	42	11	53	63	0	63	116

ACCURATE TRUSTED TRAFFIC DATA

Turning Movement Count

Summary Report Including AM/PM Peak Hours, PHF, AADT and Expansion Factors

Automobiles, Taxis, Light Trucks, Vans, SUV's, Motorcycles, Heavy Trucks, Buses, and School Buses

Abbott Street (East) & Robert Grant Avenue (Roundabout) — Stittsville, ON

Survey Date: Tuesday, 8 January 2019 **Start Time:** 0700 **AADT Factor:** 1.1

Weather - AM: Overcast -10ºC **Survey Duration:** 8 Hrs. **Survey Hours:** 0700-1000, 1130-1330 & 1500-1800

Weather - PM: Overcast +4ºC **Surveyor(s):** Carmody

	Abbott St. (E) Eastbound					Abbott St. (E) Westbound						Robert Grant Ave. Northbound					N/A Southbound						
Time Period	LT	ST	RT	UT	E/B Tot	LT	ST	RT	UT	W/B Tot	Street Total	LT	ST	RT	UT	N/B Tot	LT	ST	RT	UT	S/B Tot	Street Total	Grand Total
0700-0800	0	25	81	6	**112**	7	31	0	0	**38**	**150**	176	0	15	1	**192**	0	0	0	0	**0**	**192**	**342**
0800-0900	0	22	117	16	**155**	14	52	0	2	**68**	**223**	204	0	21	1	**226**	0	0	0	0	**0**	**226**	**449**
0900-1000	0	32	81	27	**140**	14	30	0	1	**45**	**185**	164	0	14	2	**180**	0	0	0	0	**0**	**180**	**365**
1130-1230	0	22	101	6	**129**	11	25	0	0	**36**	**165**	89	0	26	0	**115**	0	0	0	0	**0**	**115**	**280**
1230-1330	0	31	116	5	**152**	10	33	0	0	**43**	**195**	126	0	17	0	**143**	0	0	0	0	**0**	**143**	**338**
1500-1600	0	52	194	28	**274**	24	54	0	1	**79**	**353**	156	0	8	0	**164**	0	0	0	0	**0**	**164**	**517**
1600-1700	0	19	210	2	**231**	13	43	0	0	**56**	**287**	154	0	8	0	**162**	0	0	0	0	**0**	**162**	**449**
1700-1800	0	38	193	2	**233**	11	40	0	0	**51**	**284**	151	0	4	1	**156**	0	0	0	0	**0**	**156**	**440**
Totals	**0**	**241**	**1093**	**92**	**1426**	**104**	**308**	**0**	**4**	**416**	**1842**	**1220**	**0**	**113**	**5**	**1338**	**0**	**0**	**0**	**0**	**0**	**1338**	**3180**

Equivalent 12 & 24-hour Vehicle Volumes Including the Annual Average Daily Traffic (AADT) Factor Applicable to the Day and Month of the Turning Movement Count

➡ Expansion factors are applied exclusively to standard weekday 8-hour turning movement counts ⬅

Equivalent 12-hour vehicle volumes. These volumes are calculated by multiplying the 8-hour totals by the 8 ➡12 expansion factor of 1.39

Equ. 12 Hr	0	335	1519	128	**1982**	145	428	0	6	**578**	**2560**	1696	0	157	7	**1860**	0	0	0	0	**0**	**1860**	**4420**

Average daily 12-hour vehicle volumes. These volumes are calculated by multiplying the equivalent 12-hour totals by the AADT factor of: 1.1

AADT 12-hr	0	368	1671	141	**2180**	159	471	0	6	**636**	**2816**	1865	0	173	8	**2046**	0	0	0	0	**0**	**2046**	**4862**

24-Hour AADT. These volumes are calculated by multiplying the average daily 12-hour vehicle volumes by the 12 ➡24 expansion factor of 1.31

AADT 24 Hr	0	483	2189	184	**2856**	208	617	0	8	**833**	**3690**	2444	0	226	10	**2680**	0	0	0	0	**0**	**2680**	**6370**

AM Peak Hour Factor ➡ 0.80 — Highest Hourly Vehicle Volume between 0700h & 1000h

AM Peak Hr	LT	ST	RT	UT	TOT	LT	ST	RT	UT	TOT	S.TOT	LT	ST	RT	UT	TOT	LT	ST	RT	UT	TOT	S.TOT	G.TOT
0745-0845	0	21	123	11	**155**	14	54	0	1	**69**	**224**	219	0	18	2	**239**	0	0	0	0	**0**	**239**	**463**

OFF Peak Hour Factor ➡ 0.88 — Highest Hourly Vehicle Volume between 1130h & 1330h

Off Peak Hr	LT	ST	RT	UT	TOT	LT	ST	RT	UT	TOT	S.TOT	LT	ST	RT	UT	TOT	LT	ST	RT	UT	TOT	S.TOT	G.TOT
1230-1330	0	31	116	5	**152**	10	33	0	0	**43**	**195**	126	0	17	0	**143**	0	0	0	0	**0**	**143**	**338**

PM Peak Hour Factor ➡ 0.80 — Highest Hourly Vehicle Volume between 1500h & 1800h

PM Peak Hr	LT	ST	RT	UT	TOT	LT	ST	RT	UT	TOT	S.TOT	LT	ST	RT	UT	TOT	LT	ST	RT	UT	TOT	S.TOT	G.TOT
1515-1615	0	48	226	24	**298**	27	57	0	1	**85**	**383**	163	0	6	0	**169**	0	0	0	0	**0**	**169**	**552**

Comments

Robert Grant Avenue not constructed north of Abbott Street. The majority of the eastbound U-Turns are associated with school related activity. There are quite a few homes under construction is this area with more land to be developed.

Notes:

1. Includes all vehicle types except bicycles and electric scooters.
2. Expansion factors are not applied to turning movement counts if they are less than 8-hours in duration.
3. When expansion and AADT factors are applied, the results will differ slightly due to rounding.

Disclaimer:

The information contained in this data summary is for information purposes only, and may not apply to your situation. Every effort is made to ensure the traffic count information is accurate for the survey date provided on the summary and flow diagram forms. The author, publisher, and distributor provide no warranty about the content or accuracy of either the data summary or flow diagrams. Information provided is subjective. The author, publisher, and distributor shall not be liable for any loss of profit or any other commercial damages resulting from use of this data.

ACCURATE TRUSTED TRAFFIC DATA

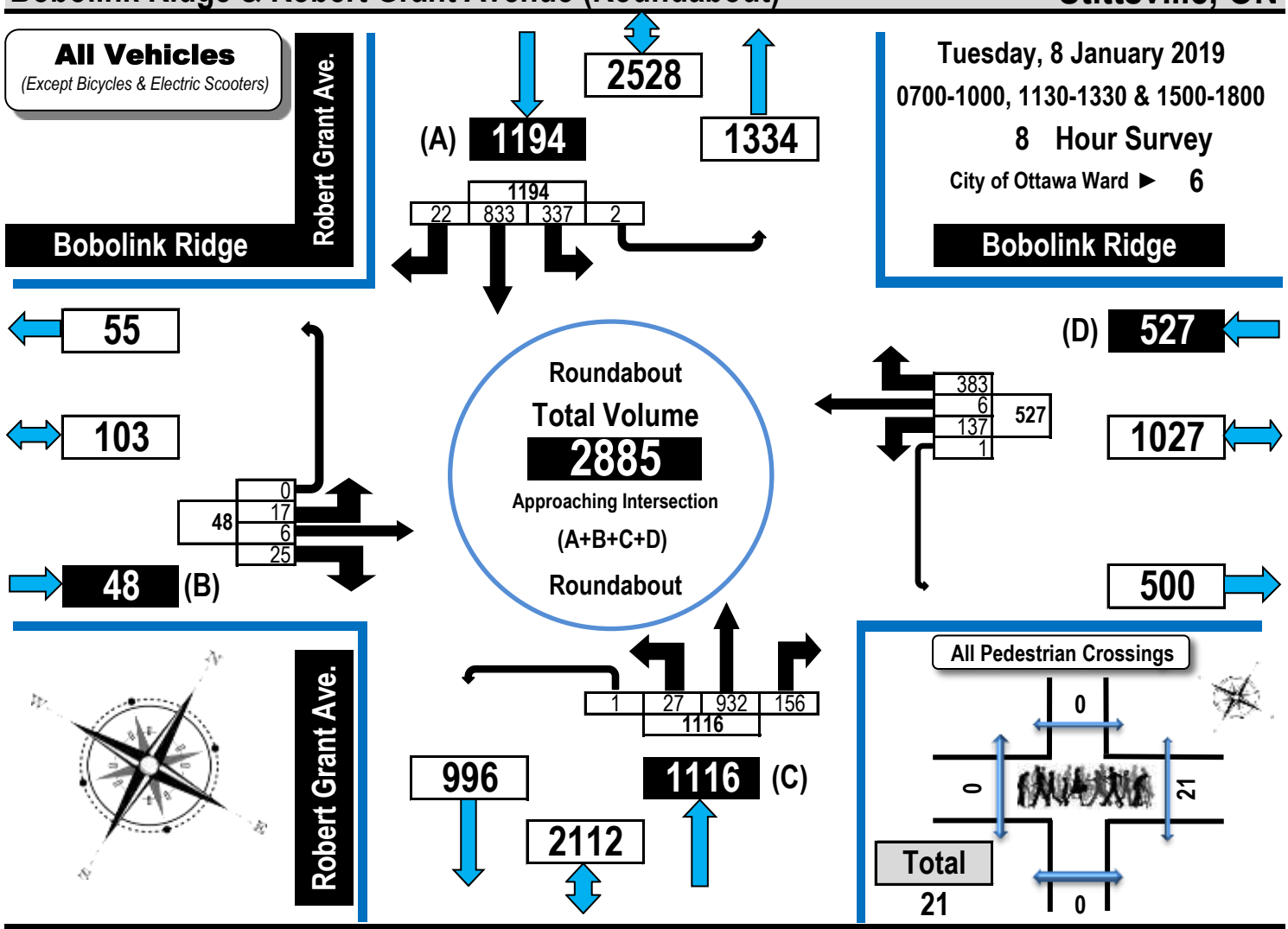
Turning Movement Count
Summary, AM and PM Peak Hour Flow Diagrams

Automobiles, Taxis, Light Trucks, Vans, SUV's, Motorcycles, Heavy Trucks, Buses, and School Buses

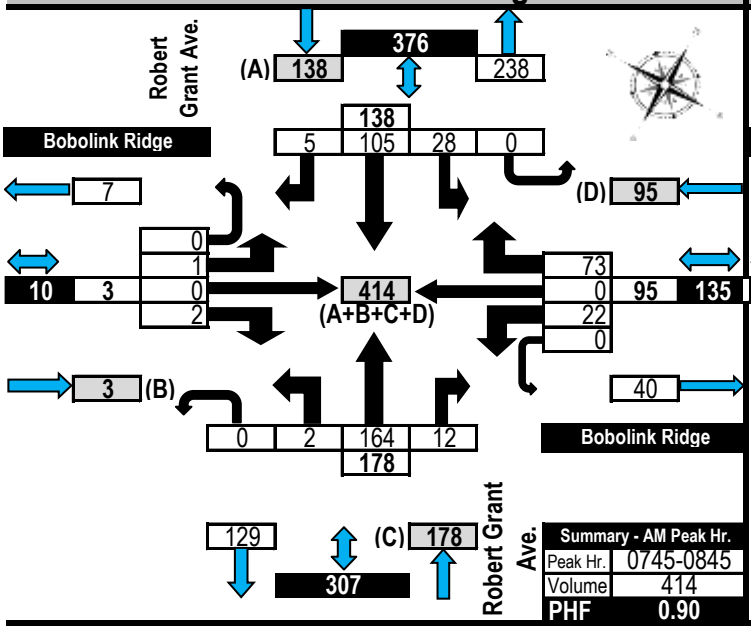
Bobolink Ridge & Robert Grant Avenue (Roundabout) — Stittsville, ON

All Vehicles
(Except Bicycles & Electric Scooters)

Tuesday, 8 January 2019
0700-1000, 1130-1330 & 1500-1800
8 Hour Survey
City of Ottawa Ward ► 6

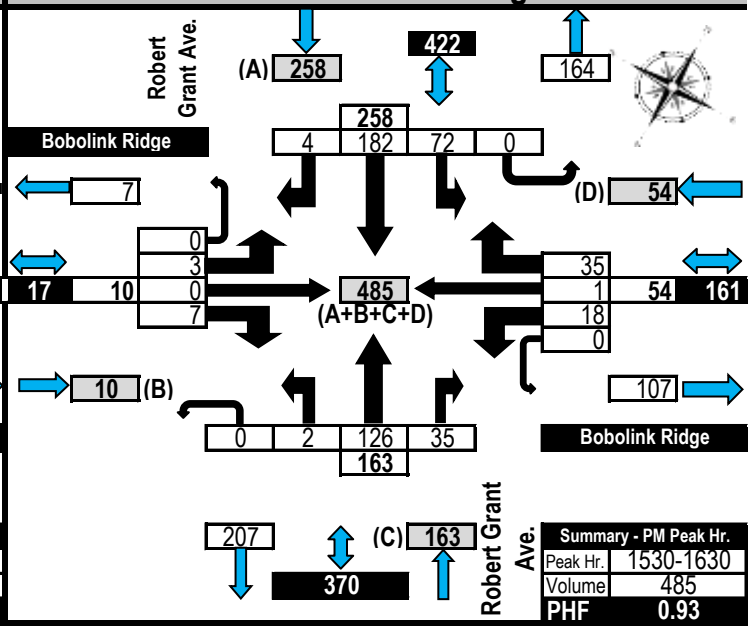


AM Peak Hour Flow Diagram



Summary - AM Peak Hr.	
Peak Hr.	0745-0845
Volume	414
PHF	0.90

PM Peak Hour Flow Diagram



Summary - PM Peak Hr.	
Peak Hr.	1530-1630
Volume	485
PHF	0.93

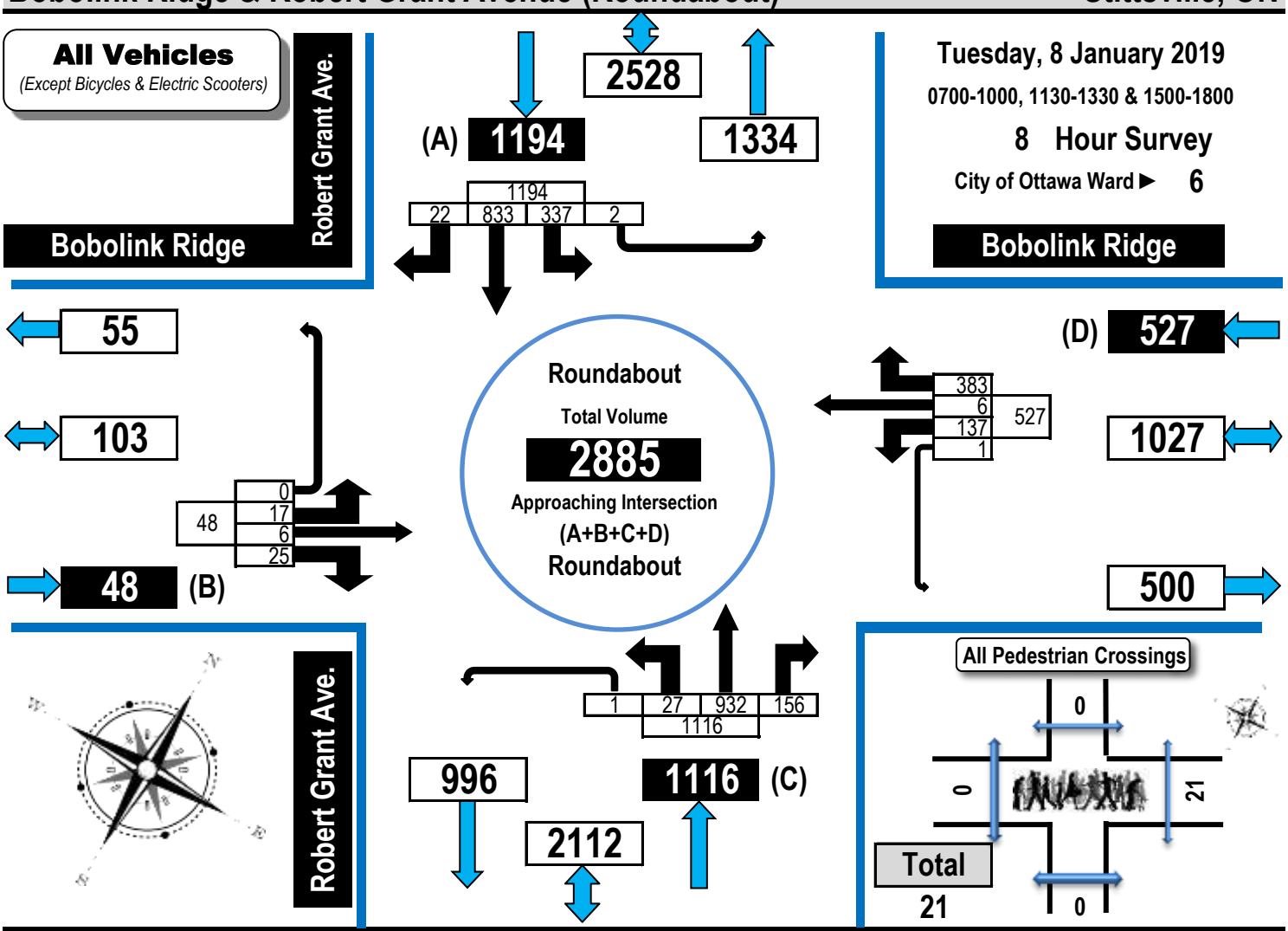
Turning Movement Count
Summary, OFF and EVENING PEAK Hour Flow Diagrams

Automobiles, Taxis, Light Trucks, Vans, SUV's, Motorcycles, Heavy Trucks, Buses, and School Buses

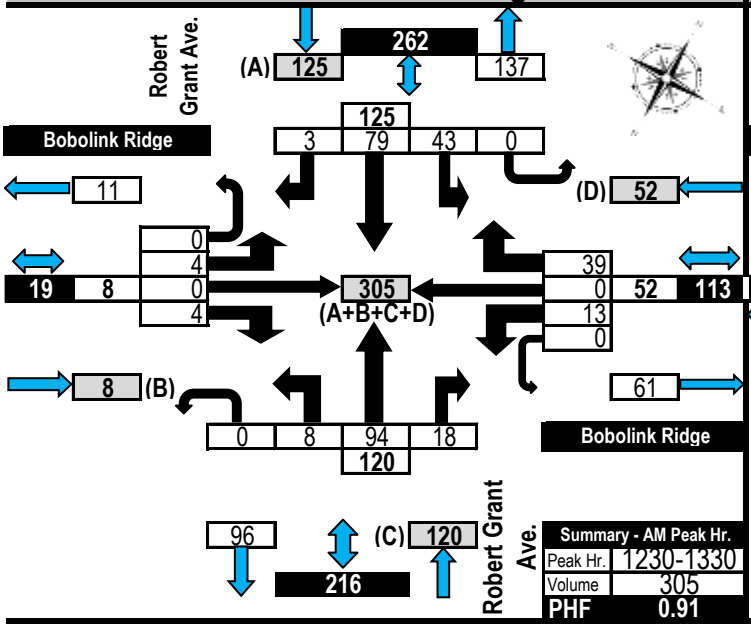
Bobolink Ridge & Robert Grant Avenue (Roundabout) — Stittsville, ON

All Vehicles
(Except Bicycles & Electric Scooters)

Tuesday, 8 January 2019
0700-1000, 1130-1330 & 1500-1800
8 Hour Survey
City of Ottawa Ward ► 6

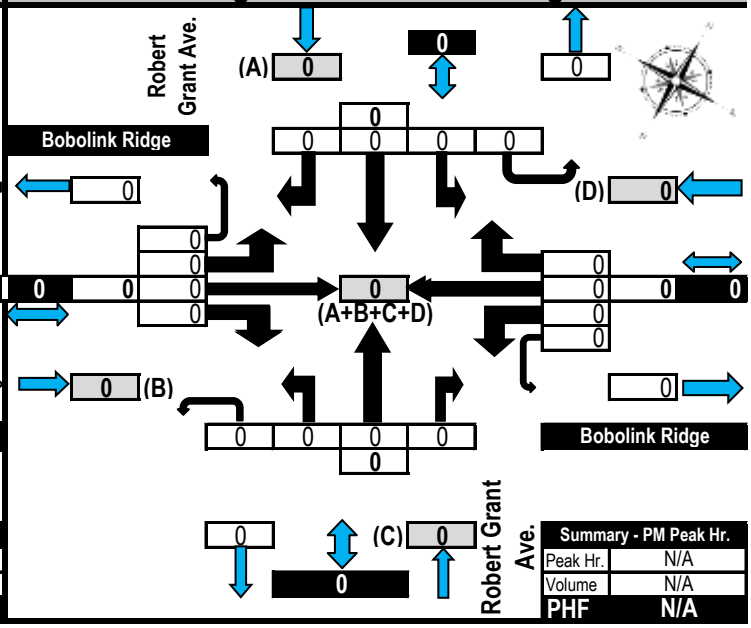


Off Peak Hour Flow Diagram



Summary - AM Peak Hr.	
Peak Hr.	1230-1330
Volume	305
PHF	0.91

Evening Peak Hour Flow Diagram

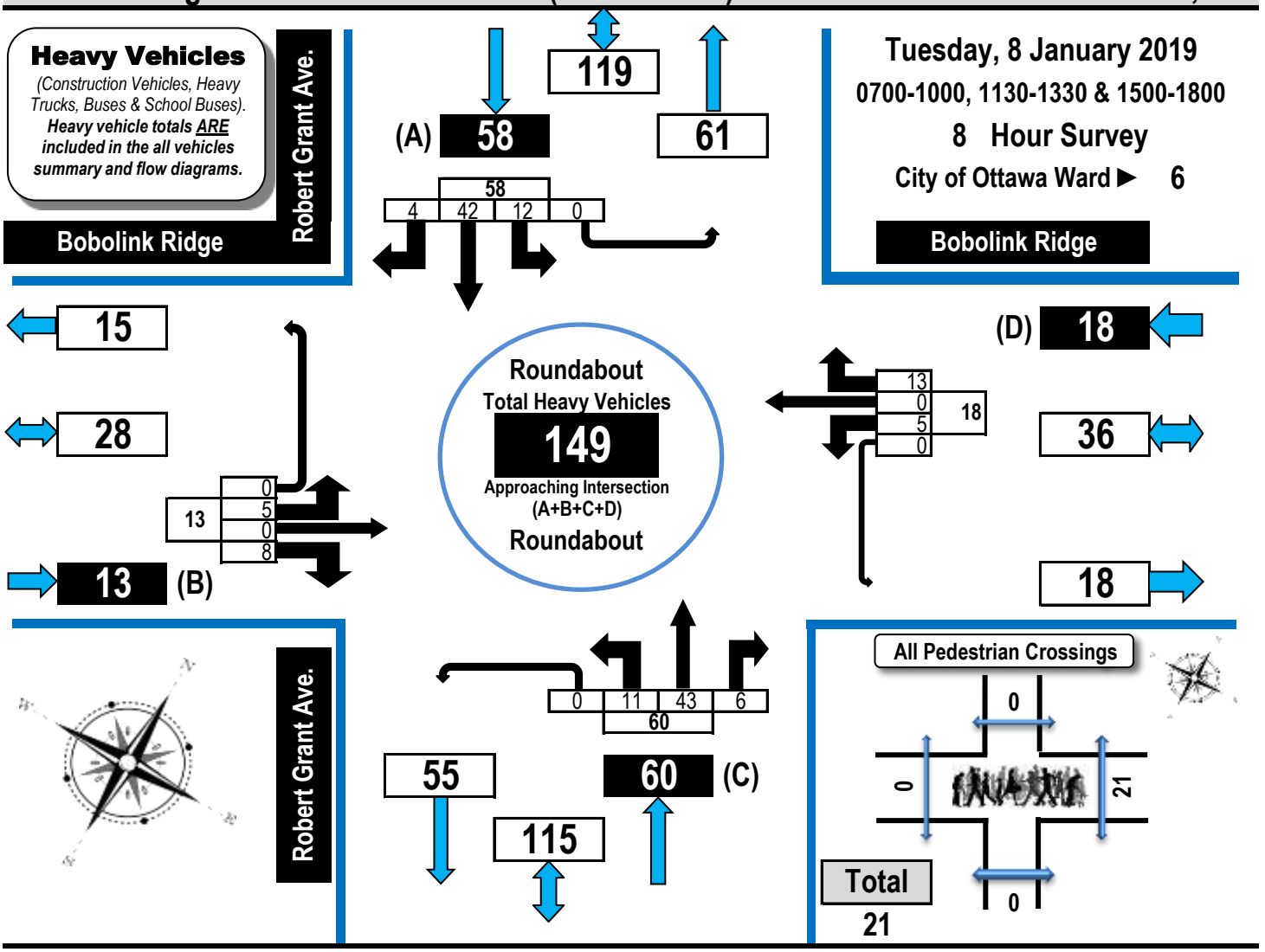


Summary - PM Peak Hr.	
Peak Hr.	N/A
Volume	N/A
PHF	N/A

Turning Movement Count
Heavy Vehicle Summary
Flow Diagram

Heavy Trucks, Buses, and School Buses

Bobolink Ridge & Robert Grant Avenue (Roundabout) — Stittsville, ON



Bobolink Ridge & Robert Grant Avenue (Roundabout) — Stittsville, ON

Survey Date: Tuesday, 8 January 2019 **Start Time:** 0700
Weather - AM: Overcast -10°C **Survey Duration:** 8 Hrs. **Survey Hours:** 0700-1000, 1130-1330 & 1500-1800
Weather - PM: Overcast +4°C

	Bobolink Ridge Eastbound					Bobolink Ridge Westbound					Robert Grant Ave. Northbound					Robert Grant Ave. Southbound					
Time Period	LT	ST	RT	UT	S. Tot	LT	ST	RT	UT	S. Tot	LT	ST	RT	UT	S. Tot	LT	ST	RT	UT	S. Tot	G.Tot.
0700-0800	1	0	0	0	1	0	0	2	0	2	1	1	2	0	4	1	5	1	0	7	14
0800-0900	0	0	1	0	1	0	0	1	0	1	1	9	2	0	12	5	8	1	0	14	28
0900-1000	0	0	0	0	0	0	0	1	0	1	3	10	0	0	13	1	6	0	0	7	21
1130-1230	1	0	3	0	4	1	0	2	0	3	2	4	0	0	6	0	4	0	0	4	17
1230-1330	0	0	0	0	0	0	0	2	0	2	2	4	1	0	7	2	5	1	0	8	17
1500-1600	1	0	1	0	2	2	0	1	0	3	1	6	1	0	8	1	10	1	0	12	25
1600-1700	2	0	3	0	5	2	0	3	0	5	1	8	0	0	9	1	3	0	0	4	23
1700-1800	0	0	0	0	0	0	0	1	0	1	0	1	0	0	1	1	1	0	0	2	4
Totals	5	0	8	0	13	5	0	13	0	18	11	43	6	0	60	12	42	4	0	58	149

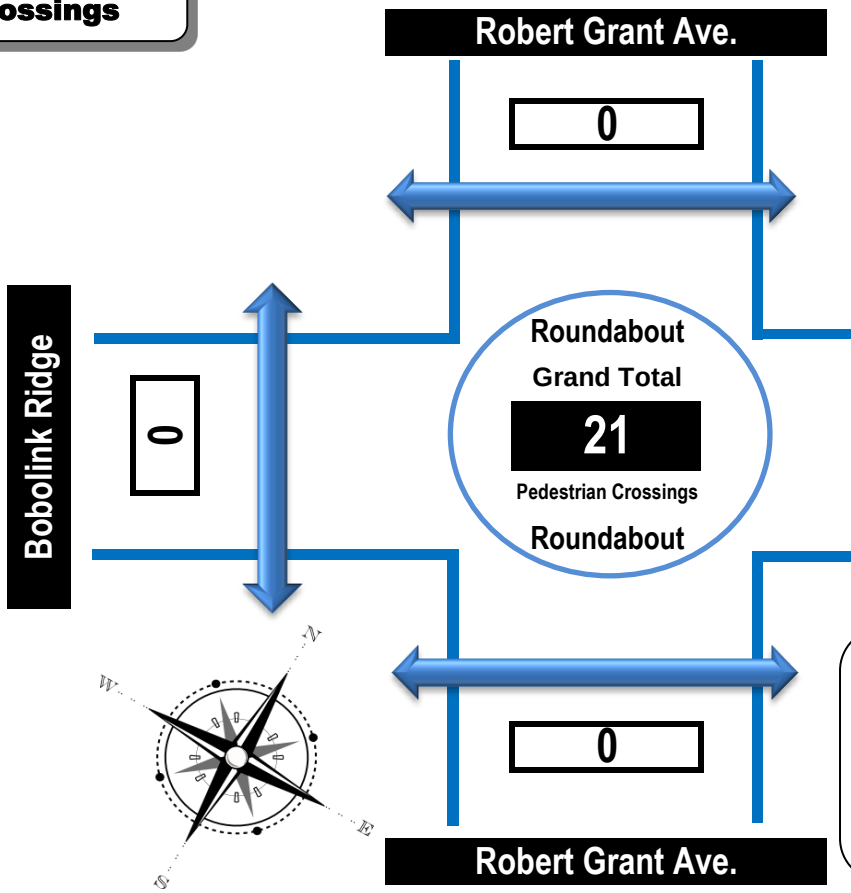
ACCURATE TRUSTED TRAFFIC DATA

Turning Movement Count
Pedestrian Crossings Summary and Flow Diagram

Bobolink Ridge & Robert Grant Avenue (Roundabout) — Stittsville, ON

Pedestrian Crossings

Tuesday, 8 January 2019
0700-1000, 1130-1330 & 1500-1800
8 Hours
City of Ottawa Ward ► 6



Note

*The values in the summary table below and the flow diagram represent the number of pedestrian crossings **NOT** the number of individual pedestrians crossing. For example, some pedestrians will cross one approach, then another to reach their destination. Accordingly, one pedestrian crossing two approaches will be recorded as two crossings.*

Bobolink Ridge & Robert Grant Avenue (Roundabout) — Stittsville, ON

Survey Date: Tuesday, 8 January 2019
Weather - AM Overcast -10ºC
Weather - PM: Overcast +4ºC
Survey Duration: 8 Hrs.
Start Time: 0700
Survey Hours: 0700-1000, 1130-1330 & 1500-1800

Time Period	West Side Crossing Bobolink Ridge	East Side Crossing Bobolink Ridge	Street Total	South Side Crossing Robert Grant Ave.	North Side Crossing Robert Grant Ave.	Street Total	Grand Total
0700-0800	0	0	0	0	0	0	0
0800-0900	0	2	2	0	0	0	2
0900-1000	0	1	1	0	0	0	1
1130-1230	0	2	2	0	0	0	2
1230-1330	0	5	5	0	0	0	5
1500-1600	0	4	4	0	0	0	4
1600-1700	0	7	7	0	0	0	7
1700-1800	0	0	0	0	0	0	0
Totals	0	21	21	0	0	0	21

ACCURATE TRUSTED TRAFFIC DATA

Turning Movement Count

Summary Report Including AM/PM Peak Hours, PHF, AADT and Expansion Factors

Automobiles, Taxis, Light Trucks, Vans, SUV's, Motorcycles, Heavy Trucks, Buses, and School Buses

Bobolink Ridge & Robert Grant Avenue (Roundabout) — Stittsville, ON

Survey Date: Tuesday, 8 January 2019 **Start Time:** 0700 **AADT Factor:** 1.0

Weather - AM: Overcast -10ºC **Survey Duration:** 8 Hrs. **Survey Hours:** 0700-1000, 1130-1330 & 1500-1800

Weather - PM: Overcast +4ºC **Surveyor(s):** Carmody

	Bobolink Ridge Eastbound					Bobolink Ridge Westbound						Robert Grant Ave. Northbound					Robert Grant Ave. Southbound						
Time Period	LT	ST	RT	UT	E/B Tot	LT	ST	RT	UT	W/B Tot	Street Total	LT	ST	RT	UT	N/B Tot	LT	ST	RT	UT	S/B Tot	Street Total	Grand Total
0700-0800	1	0	0	0	1	20	0	57	0	77	78	5	138	7	0	150	12	70	4	0	86	236	314
0800-0900	0	0	3	0	3	23	0	73	0	96	99	2	163	16	0	181	28	99	3	0	130	311	410
0900-1000	0	1	2	0	3	19	1	60	1	81	84	6	105	14	0	125	20	70	4	0	94	219	303
1130-1230	3	1	6	0	10	11	4	38	0	53	63	4	67	15	0	86	36	77	2	1	116	202	265
1230-1330	4	0	4	0	8	13	0	39	0	52	60	8	94	18	0	120	43	79	3	0	125	245	305
1500-1600	4	1	3	0	8	17	1	42	0	60	68	1	120	22	0	143	65	148	2	1	216	359	427
1600-1700	3	2	4	0	9	21	0	35	0	56	65	1	128	34	1	164	61	158	3	0	222	386	451
1700-1800	2	1	3	0	6	13	0	39	0	52	58	0	117	30	0	147	72	132	1	0	205	352	410
Totals	17	6	25	0	48	137	6	383	1	527	575	27	932	156	1	1116	337	833	22	2	1194	2310	2885

Equivalent 12 & 24-hour Vehicle Volumes Including the Annual Average Daily Traffic (AADT) Factor Applicable to the Day and Month of the Turning Movement Count

➡ Expansion factors are applied exclusively to standard weekday 8-hour turning movement counts ⬅

Equivalent 12-hour vehicle volumes. These volumes are calculated by multiplying the 8-hour totals by the 8 ➡12 expansion factor of 1.39

Equ. 12 Hr	24	8	35	0	67	190	8	532	1	733	799	38	1295	217	1	1551	468	1158	31	3	1660	3211	4010

Average daily 12-hour vehicle volumes. These volumes are calculated by multiplying the equivalent 12-hour totals by the AADT factor of: 1.0

AADT 12-hr	24	8	35	0	67	190	8	532	1	733	799	38	1295	217	1	1551	468	1158	31	3	1660	3211	4010

24-Hour AADT. These volumes are calculated by multiplying the average daily 12-hour vehicle volumes by the 12 ➡24 expansion factor of 1.31

AADT 24 Hr	31	11	46	0	87	249	11	697	2	960	1047	49	1697	284	2	2032	614	1517	40	4	2174	4206	5253

AM Peak Hour Factor ➡ 0.90 — Highest Hourly Vehicle Volume between 0700h & 1000h

AM Peak Hr	LT	ST	RT	UT	TOT	LT	ST	RT	UT	TOT	S.TOT	LT	ST	RT	UT	TOT	LT	ST	RT	UT	TOT	S.TOT	G.TOT
0745-0845	1	0	2	0	3	22	0	73	0	95	98	2	164	12	0	178	28	105	5	0	138	316	414

OFF Peak Hour Factor ➡ 0.91 — Highest Hourly Vehicle Volume between 1130h & 1330h

Off Peak Hr	LT	ST	RT	UT	TOT	LT	ST	RT	UT	TOT	S.TOT	LT	ST	RT	UT	TOT	LT	ST	RT	UT	TOT	S.TOT	G.TOT
1230-1330	4	0	4	0	8	13	0	39	0	52	60	8	94	18	0	120	43	79	3	0	125	245	305

PM Peak Hour Factor ➡ 0.93 — Highest Hourly Vehicle Volume between 1500h & 1800h

PM Peak Hr	LT	ST	RT	UT	TOT	LT	ST	RT	UT	TOT	S.TOT	LT	ST	RT	UT	TOT	LT	ST	RT	UT	TOT	S.TOT	G.TOT
1530-1630	3	0	7	0	10	18	1	35	0	54	64	2	126	35	0	163	72	182	4	0	258	421	485

Comments

Bobolink Ridge, west of Robert Grant Avenue, is not yet open to traffic. It is currently a construction access only.

Notes:

1. Includes all vehicle types except bicycles and electric scooters.
2. Expansion factors are not applied to turning movement counts if they are less than 8-hours in duration.
3. When expansion and AADT factors are applied, the results will differ slightly due to rounding.

Disclaimer:

The information contained in this data summary is for information purposes only, and may not apply to your situation. Every effort is made to ensure the traffic count information is accurate for the survey date provided on the summary and flow diagram forms. The author, publisher, and distributor provide no warranty about the content or accuracy of either the data summary or flow diagrams. Information provided is subjective. The author, publisher, and distributor shall not be liable for any loss of profit or any other commercial damages resulting from use of this data.

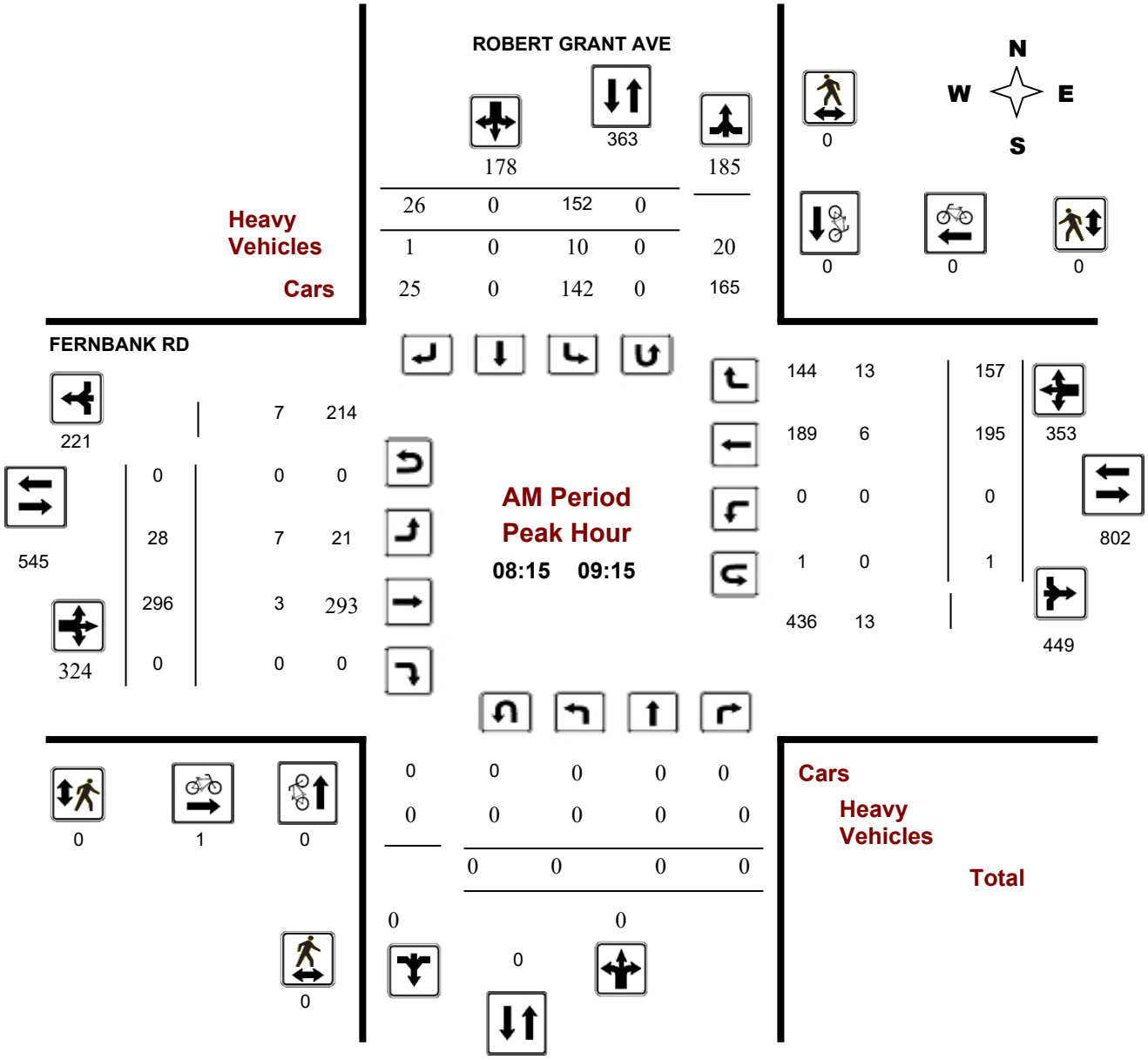
Transportation Services - Traffic Services

Turning Movement Count - Peak Hour Diagram

FERNBANK RD @ ROBERT GRANT AVE

Survey Date: Thursday, August 30, 2018
Start Time: 07:00

WO No: 38041
Device: Miovision



Comments

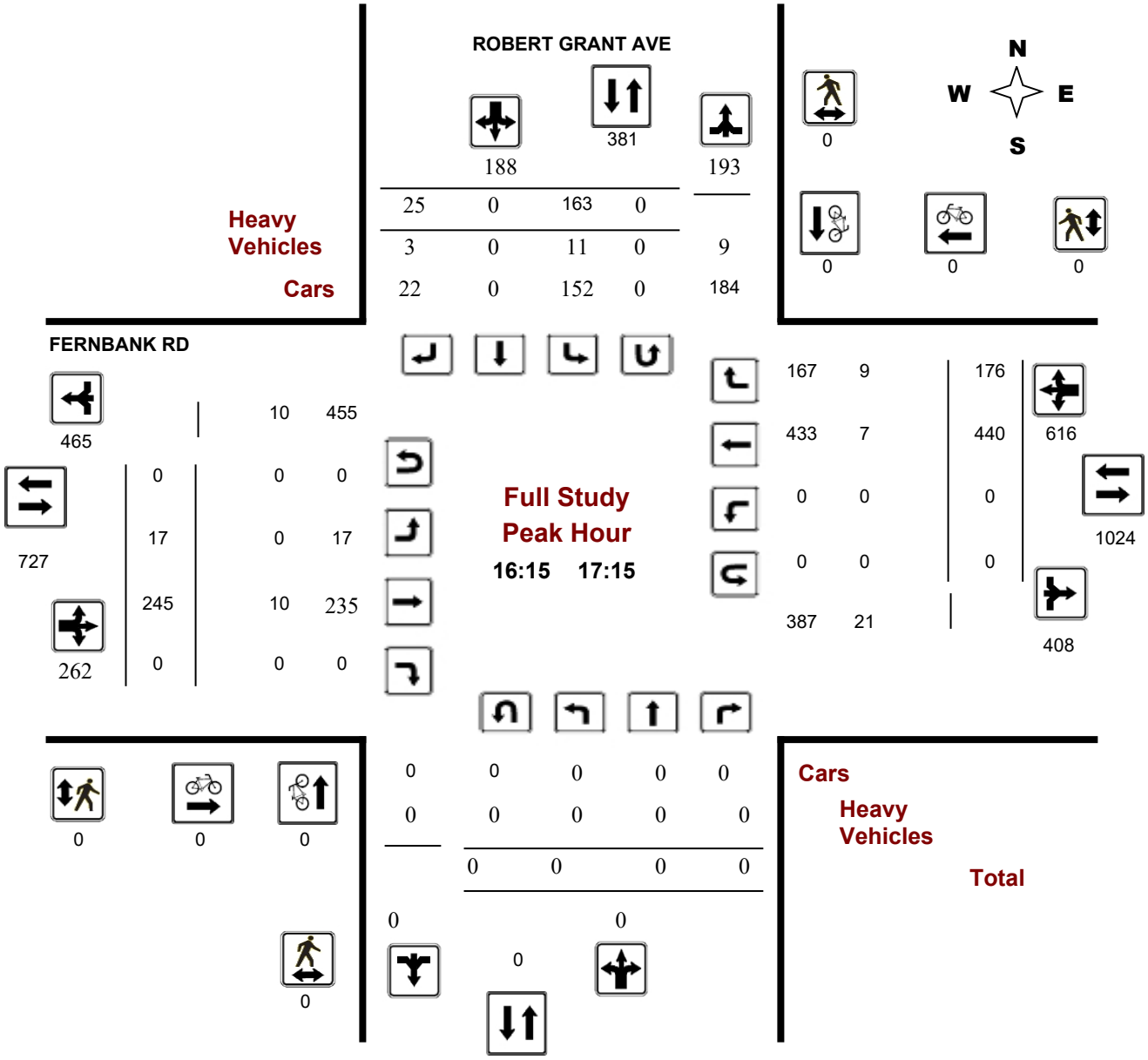
Transportation Services - Traffic Services

Turning Movement Count - Peak Hour Diagram

FERNBANK RD @ ROBERT GRANT AVE

Survey Date: Thursday, August 30, 2018 **WO No:** 38041

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



Comments

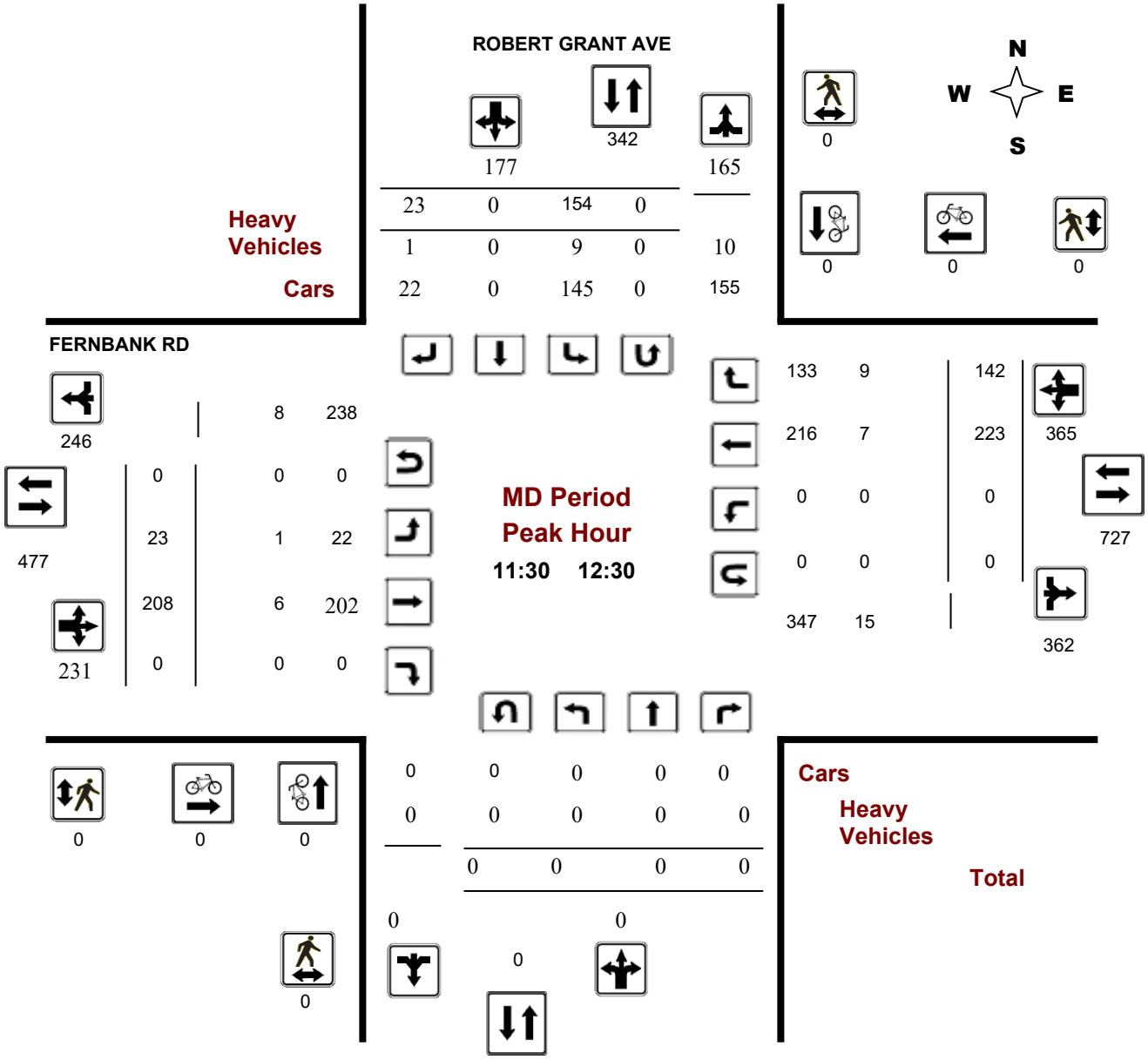
Transportation Services - Traffic Services

Turning Movement Count - Peak Hour Diagram

FERNBANK RD @ ROBERT GRANT AVE

Survey Date: Thursday, August 30, 2018 **WO No:** 38041

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



Comments

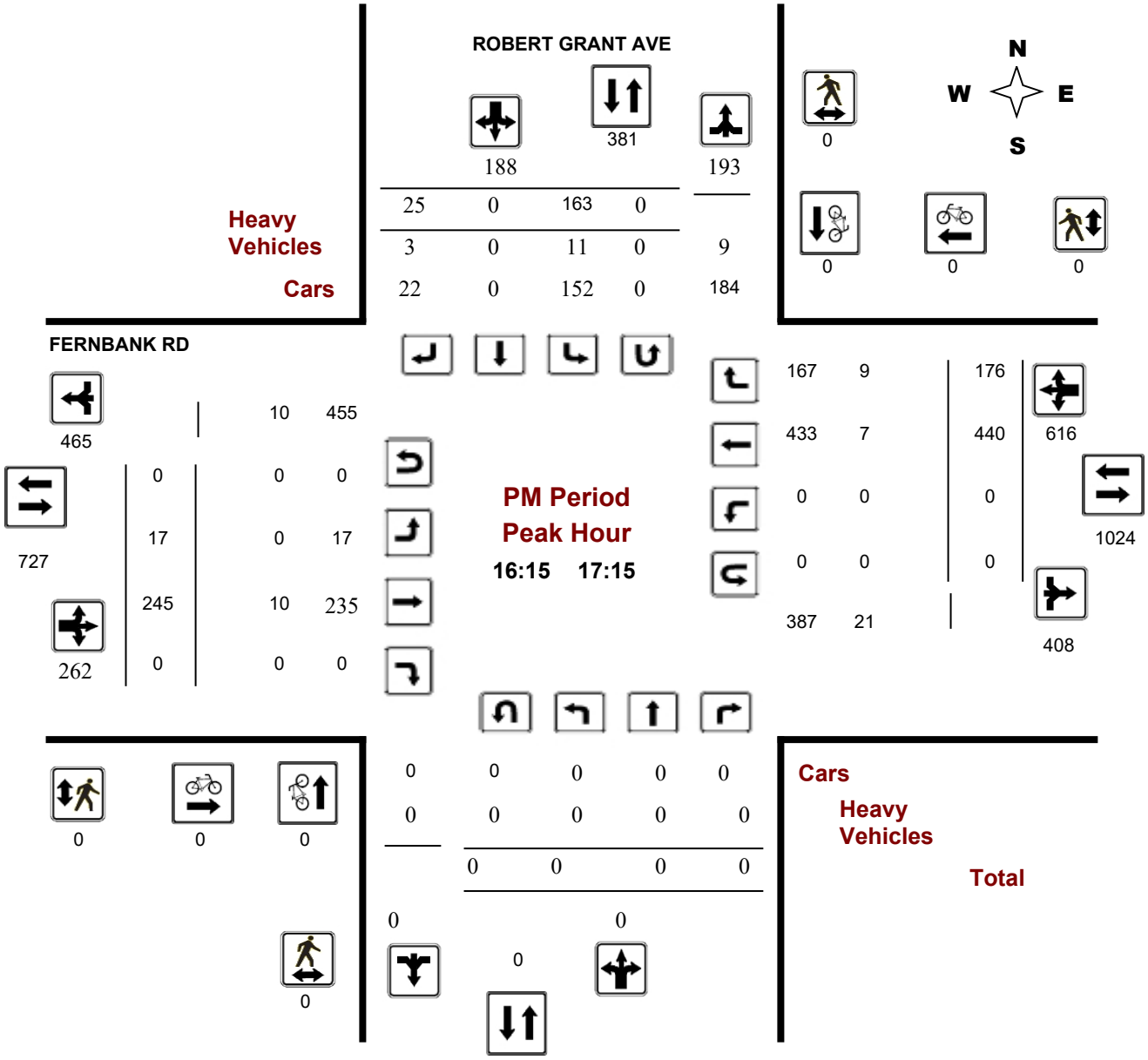
Transportation Services - Traffic Services

Turning Movement Count - Peak Hour Diagram

FERNBANK RD @ ROBERT GRANT AVE

Survey Date: Thursday, August 30, 2018 **WO No:** 38041

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



Comments

Transportation Services - Traffic Services

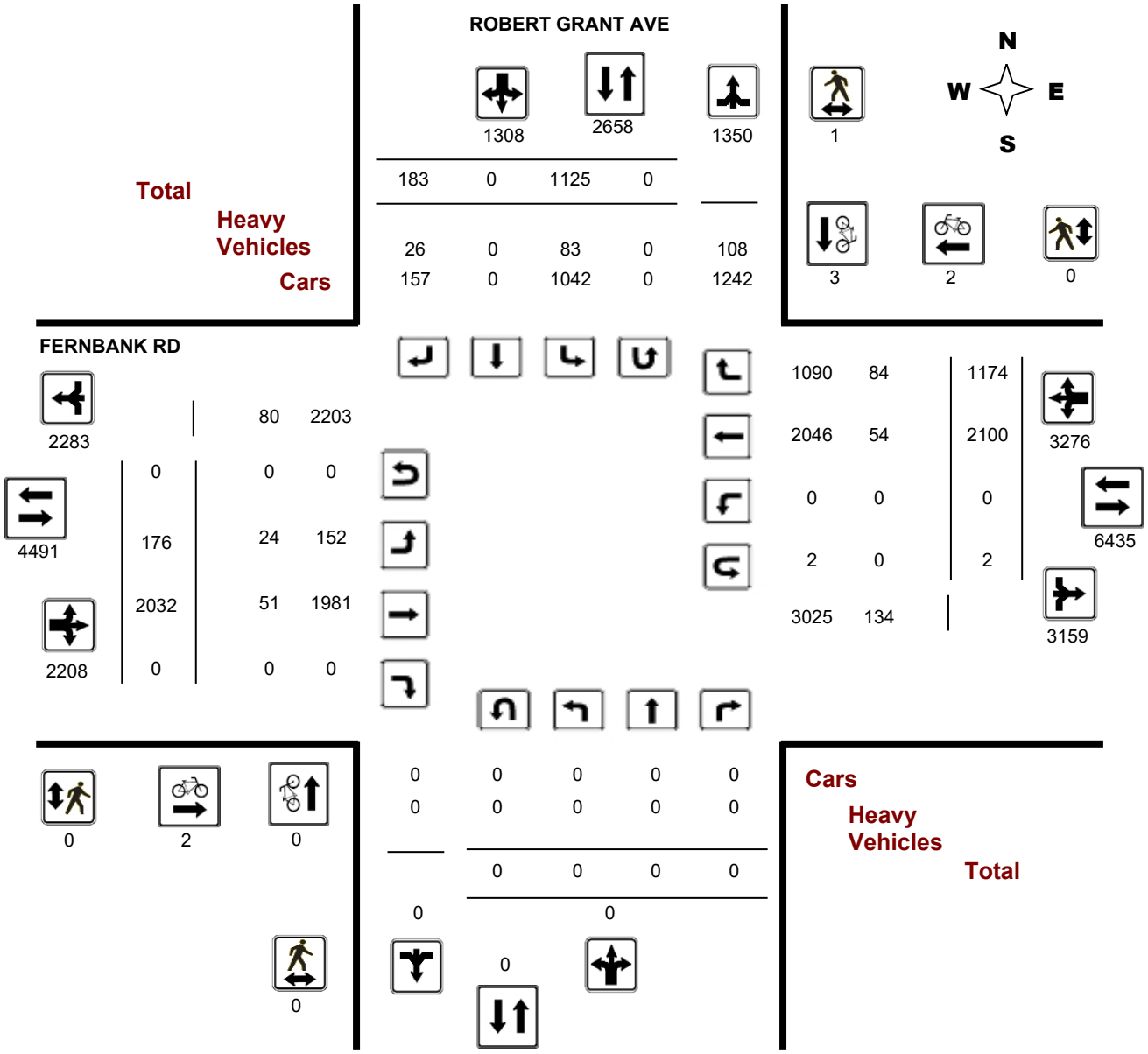
Turning Movement Count - Full Study Diagram

FERNBANK RD @ ROBERT GRANT AVE

Survey Date: Thursday, August 30, 2018

WO#: 38041

Device: Miovision



Comments

Transportation Services - Traffic Services

Work Order 38041

Turning Movement Count - Full Study Summary Report

FERNBANK RD @ ROBERT GRANT AVE

Survey Date: Thursday, August 30, 2018

Total Observed U-Turns

Northbound: 0 Southbound: 0

Eastbound: 0 Westbound: 2

AADT Factor .90

Full Study

	ROBERT GRANT AVE									FERNBANK RD									
	Northbound				Southbound					Eastbound				Westbound					
Period	LT	ST	RT	**NB TOT**	LT	ST	RT	**SB TOT**	**STR TOT**	LT	ST	RT	**EB TOT**	LT	ST	RT	**WB TOT**	**STR TOT**	**Grand Total**
07:00 08:00	0	0	0	**0**	114	0	13	**127**	**127**	25	302	0	**327**	0	122	128	**250**	**577**	**704**
08:00 09:00	0	0	0	**0**	125	0	27	**152**	**152**	28	329	0	**357**	0	179	152	**331**	**688**	**840**
09:00 10:00	0	0	0	**0**	114	0	18	**132**	**132**	27	246	0	**273**	0	187	126	**313**	**586**	**718**
11:30 12:30	0	0	0	**0**	154	0	23	**177**	**177**	23	208	0	**231**	0	223	142	**365**	**596**	**773**
12:30 13:30	0	0	0	**0**	102	0	17	**119**	**119**	20	211	0	**231**	0	227	118	**345**	**576**	**695**
15:00 16:00	0	0	0	**0**	200	0	41	**241**	**241**	26	260	0	**286**	0	332	161	**493**	**779**	**1020**
16:00 17:00	0	0	0	**0**	153	0	27	**180**	**180**	13	235	0	**248**	0	428	172	**600**	**848**	**1028**
17:00 18:00	0	0	0	**0**	163	0	17	**180**	**180**	14	241	0	**255**	0	402	175	**577**	**832**	**1012**
Sub Total	0	0	0	**0**	1125	0	183	**1308**	**1308**	176	2032	0	**2208**	0	2100	1174	**3274**	**5482**	**6790**
U Turns				**0**				**0**	**0**				**0**				**2**	**2**	**2**
Total	0	0	0	**0**	1125	0	183	**1308**	**1308**	176	2032	0	**2208**	0	2100	1174	**3276**	**5484**	**6792**
EQ 12Hr	0	0	0	**0**	1564	0	254	**1818**	**1818**	245	2824	0	**3069**	0	2919	1632	**4554**	**7623**	**9441**
Note: These values are calculated by multiplying the totals by the appropriate expansion factor.													**1.39**						
AVG 12Hr	0	0	0	**0**	1407	0	229	**1636**	**1636**	220	2542	0	**2762**	0	2627	1469	**4098**	**6860**	**8496**
Note: These volumes are calculated by multiplying the Equivalent 12 hr. totals by the AADT factor.													**.90**						
AVG 24Hr	0	0	0	**0**	1844	0	300	**2144**	**2144**	288	3330	0	**3618**	0	3442	1924	**5369**	**8987**	**11131**
Note: These volumes are calculated by multiplying the Average Daily 12 hr. totals by 12 to 24 expansion factor.													**1.31**						

Comments:

Note: U-Turns provided for approach totals. Refer to 'U-Turn' Report for specific breakdown.

Transportation Services - Traffic Services

W.O. 38041

Turning Movement Count - 15 Minute Summary Report

FERNBANK RD @ ROBERT GRANT AVE

Survey Date: Thursday, August 30, 2018

Total Observed U-Turns

Northbound: 0 Southbound: 0

Eastbound: 0 Westbound: 2

		ROBERT GRANT AVE									FERNBANK RD									
		Northbound				Southbound					Eastbound				Westbound					
Time Period		LT	ST	RT	N TOT	LT	ST	RT	S TOT	STR TOT	LT	ST	RT	E TOT	LT	ST	RT	W TOT	STR TOT	Grand Total
07:00	07:15	0	0	0	**0**	25	0	2	**27**	**27**	11	75	0	**86**	0	21	26	**47**	**133**	**160**
07:15	07:30	0	0	0	**0**	28	0	3	**31**	**31**	3	58	0	**61**	0	28	29	**57**	**118**	**149**
07:30	07:45	0	0	0	**0**	30	0	4	**34**	**34**	5	90	0	**95**	0	27	32	**59**	**154**	**188**
07:45	08:00	0	0	0	**0**	31	0	4	**35**	**35**	6	79	0	**85**	0	46	41	**87**	**172**	**207**
08:00	08:15	0	0	0	**0**	23	0	8	**31**	**31**	7	91	0	**98**	0	35	34	**69**	**167**	**198**
08:15	08:30	0	0	0	**0**	30	0	10	**40**	**40**	5	81	0	**86**	0	48	35	**83**	**169**	**209**
08:30	08:45	0	0	0	**0**	24	0	4	**28**	**28**	11	89	0	**100**	0	50	34	**85**	**185**	**213**
08:45	09:00	0	0	0	**0**	48	0	5	**53**	**53**	5	68	0	**73**	0	46	49	**95**	**168**	**221**
09:00	09:15	0	0	0	**0**	50	0	7	**57**	**57**	7	58	0	**65**	0	51	39	**90**	**155**	**212**
09:15	09:30	0	0	0	**0**	22	0	2	**24**	**24**	6	68	0	**74**	0	42	34	**77**	**151**	**175**
09:30	09:45	0	0	0	**0**	21	0	6	**27**	**27**	3	65	0	**68**	0	45	26	**71**	**139**	**166**
09:45	10:00	0	0	0	**0**	21	0	3	**24**	**24**	11	55	0	**66**	0	49	27	**76**	**142**	**166**
11:30	11:45	0	0	0	**0**	22	0	7	**29**	**29**	2	49	0	**51**	0	58	45	**103**	**154**	**183**
11:45	12:00	0	0	0	**0**	33	0	5	**38**	**38**	8	53	0	**61**	0	50	29	**79**	**140**	**178**
12:00	12:15	0	0	0	**0**	52	0	6	**58**	**58**	5	48	0	**53**	0	58	31	**89**	**142**	**200**
12:15	12:30	0	0	0	**0**	47	0	5	**52**	**52**	8	58	0	**66**	0	57	37	**94**	**160**	**212**
12:30	12:45	0	0	0	**0**	26	0	2	**28**	**28**	6	56	0	**62**	0	44	34	**78**	**140**	**168**
12:45	13:00	0	0	0	**0**	25	0	5	**30**	**30**	5	59	0	**64**	0	62	34	**96**	**160**	**190**
13:00	13:15	0	0	0	**0**	24	0	4	**28**	**28**	5	46	0	**51**	0	61	25	**86**	**137**	**165**
13:15	13:30	0	0	0	**0**	27	0	6	**33**	**33**	4	50	0	**54**	0	60	25	**85**	**139**	**172**
15:00	15:15	0	0	0	**0**	45	0	11	**56**	**56**	8	60	0	**68**	0	75	36	**111**	**179**	**235**
15:15	15:30	0	0	0	**0**	45	0	11	**56**	**56**	7	66	0	**73**	0	82	51	**133**	**206**	**262**
15:30	15:45	0	0	0	**0**	65	0	11	**76**	**76**	5	74	0	**79**	0	80	46	**126**	**205**	**281**
15:45	16:00	0	0	0	**0**	45	0	8	**53**	**53**	6	60	0	**66**	0	95	28	**123**	**189**	**242**
16:00	16:15	0	0	0	**0**	41	0	9	**50**	**50**	1	46	0	**47**	0	89	41	**130**	**177**	**227**
16:15	16:30	0	0	0	**0**	32	0	7	**39**	**39**	2	54	0	**56**	0	128	48	**176**	**232**	**271**
16:30	16:45	0	0	0	**0**	49	0	8	**57**	**57**	4	52	0	**56**	0	114	40	**154**	**210**	**267**
16:45	17:00	0	0	0	**0**	31	0	3	**34**	**34**	6	83	0	**89**	0	97	43	**140**	**229**	**263**
17:00	17:15	0	0	0	**0**	51	0	7	**58**	**58**	5	56	0	**61**	0	101	45	**146**	**207**	**265**
17:15	17:30	0	0	0	**0**	40	0	1	**41**	**41**	2	56	0	**58**	0	94	44	**138**	**196**	**237**
17:30	17:45	0	0	0	**0**	26	0	5	**31**	**31**	4	62	0	**66**	0	109	47	**156**	**222**	**253**
17:45	18:00	0	0	0	**0**	46	0	4	**50**	**50**	3	67	0	**70**	0	98	39	**137**	**207**	**257**
TOTAL:		0	0	0	**0**	1125	0	183	**1308**	**1308**	176	2032	0	**2208**	0	2100	1174	**3276**	**5484**	**6792**

Note: U-Turns are included in Totals.

Comment:

Transportation Services - Traffic Services

Turning Movement Count - Cyclist Volume Report

Work Order
38041

FERNBANK RD @ ROBERT GRANT AVE

Count Date: Thursday, August 30, 2018 **Start Time:** 07:00

	ROBERT GRANT AVE			FERNBANK RD			
Time Period	Northbound	Southbound	**Street Total**	Eastbound	Westbound	**Street Total**	**Grand Total**
07:00 08:00	0	0	**0**	0	0	**0**	**0**
08:00 09:00	0	0	**0**	1	1	**2**	**2**
09:00 10:00	0	0	**0**	1	0	**1**	**1**
11:30 12:30	0	0	**0**	0	0	**0**	**0**
12:30 13:30	0	0	**0**	0	0	**0**	**0**
15:00 16:00	0	3	**3**	0	0	**0**	**3**
16:00 17:00	0	0	**0**	0	0	**0**	**0**
17:00 18:00	0	0	**0**	0	1	**1**	**1**
Total	0	3	**3**	2	2	**4**	**7**

Comment:

Note: These volumes consists of bicycles only (no mopeds or motorcycles) and ARE NOT included in the Turning Movement Count Summary.

Transportation Services - Traffic Services

W.O. 38041

Turning Movement Count - Heavy Vehicle Report

FERNBANK RD @ ROBERT GRANT AVE

Survey Date: Thursday, August 30, 2018

		ROBERT GRANT AVE									FERNBANK RD									
		Northbound				Southbound					Eastbound				Westbound					
Time Period		LT	ST	RT	N TOT	LT	ST	RT	S TOT	STR TOT	LT	ST	RT	E TOT	LT	ST	RT	W TOT	STR TOT	Grand Total
07:00	08:00	0	0	0	**0**	14	0	2	**16**	**16**	5	3	0	**8**	0	7	12	**19**	**27**	**43**
08:00	09:00	0	0	0	**0**	6	0	4	**10**	**10**	7	4	0	**11**	0	8	15	**23**	**34**	**44**
09:00	10:00	0	0	0	**0**	9	0	1	**10**	**10**	3	4	0	**7**	0	6	8	**14**	**21**	**31**
11:30	12:30	0	0	0	**0**	9	0	1	**10**	**10**	1	6	0	**7**	0	7	9	**16**	**23**	**33**
12:30	13:30	0	0	0	**0**	6	0	4	**10**	**10**	4	9	0	**13**	0	7	5	**12**	**25**	**35**
15:00	16:00	0	0	0	**0**	18	0	6	**24**	**24**	3	9	0	**12**	0	6	15	**21**	**33**	**57**
16:00	17:00	0	0	0	**0**	12	0	6	**18**	**18**	0	8	0	**8**	0	10	12	**22**	**30**	**48**
17:00	18:00	0	0	0	**0**	9	0	2	**11**	**11**	1	8	0	**9**	0	3	8	**11**	**20**	**31**
Sub Total		0	0	0	**0**	83	0	26	**109**	**109**	24	51	0	**75**	0	54	84	**138**	**213**	**322**
U-Turns (Heavy Vehicles)					**0**				**0**	**0**				**0**				**0**	**0**	**0**
Total		0	0	0	**0**	83	0	26	**109**	**109**	24	51	0	**75**	0	54	84	**138**	**213**	**322**

Heavy Vehicles include Buses, Single-Unit Trucks and Articulated Trucks. Further, they ARE included in the Turning Movement Count Summary.

Transportation Services - Traffic Services

Work Order
38041

Turning Movement Count - Pedestrian Volume Report

FERNBANK RD @ ROBERT GRANT AVE

Count Date: Thursday, August 30, 2018 **Start Time:** 07:00

Time Period	NB Approach (E or W Crossing)	SB Approach (E or W Crossing)	Total	EB Approach (N or S Crossing)	WB Approach (N or S Crossing)	Total	Grand Total
07:00 07:15	0	0	**0**	0	0	**0**	**0**
07:15 07:30	0	0	**0**	0	0	**0**	**0**
07:30 07:45	0	0	**0**	0	0	**0**	**0**
07:45 08:00	0	0	**0**	0	0	**0**	**0**
07:00 08:00	0	0	**0**	0	0	**0**	**0**
08:00 08:15	0	0	**0**	0	0	**0**	**0**
08:15 08:30	0	0	**0**	0	0	**0**	**0**
08:30 08:45	0	0	**0**	0	0	**0**	**0**
08:45 09:00	0	0	**0**	0	0	**0**	**0**
08:00 09:00	0	0	**0**	0	0	**0**	**0**
09:00 09:15	0	0	**0**	0	0	**0**	**0**
09:15 09:30	0	0	**0**	0	0	**0**	**0**
09:30 09:45	0	0	**0**	0	0	**0**	**0**
09:45 10:00	0	0	**0**	0	0	**0**	**0**
09:00 10:00	0	0	**0**	0	0	**0**	**0**
11:30 11:45	0	0	**0**	0	0	**0**	**0**
11:45 12:00	0	0	**0**	0	0	**0**	**0**
12:00 12:15	0	0	**0**	0	0	**0**	**0**
12:15 12:30	0	0	**0**	0	0	**0**	**0**
11:30 12:30	0	0	**0**	0	0	**0**	**0**
12:30 12:45	0	0	**0**	0	0	**0**	**0**
12:45 13:00	0	0	**0**	0	0	**0**	**0**
13:00 13:15	0	0	**0**	0	0	**0**	**0**
13:15 13:30	0	0	**0**	0	0	**0**	**0**
12:30 13:30	0	0	**0**	0	0	**0**	**0**
15:00 15:15	0	1	**1**	0	0	**0**	**1**
15:15 15:30	0	0	**0**	0	0	**0**	**0**
15:30 15:45	0	0	**0**	0	0	**0**	**0**
15:45 16:00	0	0	**0**	0	0	**0**	**0**
15:00 16:00	0	1	**1**	0	0	**0**	**1**
16:00 16:15	0	0	**0**	0	0	**0**	**0**
16:15 16:30	0	0	**0**	0	0	**0**	**0**
16:30 16:45	0	0	**0**	0	0	**0**	**0**
16:45 17:00	0	0	**0**	0	0	**0**	**0**
16:00 17:00	0	0	**0**	0	0	**0**	**0**
17:00 17:15	0	0	**0**	0	0	**0**	**0**
17:15 17:30	0	0	**0**	0	0	**0**	**0**
17:30 17:45	0	0	**0**	0	0	**0**	**0**
17:45 18:00	0	0	**0**	0	0	**0**	**0**
17:00 18:00	0	0	**0**	0	0	**0**	**0**
Total	0	1	**1**	0	0	**0**	**1**

Comment:

Transportation Services - Traffic Services

Work Order
38041

Turning Movement Count - 15 Min U-Turn Total Report

FERNBANK RD @ ROBERT GRANT AVE

Survey Date: Thursday, August 30, 2018

Time Period		Northbound U-Turn Total	Southbound U-Turn Total	Eastbound U-Turn Total	Westbound U-Turn Total	Total
07:00	07:15	0	0	0	0	0
07:15	07:30	0	0	0	0	0
07:30	07:45	0	0	0	0	0
07:45	08:00	0	0	0	0	0
08:00	08:15	0	0	0	0	0
08:15	08:30	0	0	0	0	0
08:30	08:45	0	0	0	1	1
08:45	09:00	0	0	0	0	0
09:00	09:15	0	0	0	0	0
09:15	09:30	0	0	0	1	1
09:30	09:45	0	0	0	0	0
09:45	10:00	0	0	0	0	0
11:30	11:45	0	0	0	0	0
11:45	12:00	0	0	0	0	0
12:00	12:15	0	0	0	0	0
12:15	12:30	0	0	0	0	0
12:30	12:45	0	0	0	0	0
12:45	13:00	0	0	0	0	0
13:00	13:15	0	0	0	0	0
13:15	13:30	0	0	0	0	0
15:00	15:15	0	0	0	0	0
15:15	15:30	0	0	0	0	0
15:30	15:45	0	0	0	0	0
15:45	16:00	0	0	0	0	0
16:00	16:15	0	0	0	0	0
16:15	16:30	0	0	0	0	0
16:30	16:45	0	0	0	0	0
16:45	17:00	0	0	0	0	0
17:00	17:15	0	0	0	0	0
17:15	17:30	0	0	0	0	0
17:30	17:45	0	0	0	0	0
17:45	18:00	0	0	0	0	0
Total		0	0	0	2	2

Appendix D

City of Ottawa Collision Data

DRAFT

City Operations - Transportation Services

Collision Details Report - Public Version

From: January 1, 2013 **To:** December 31, 2017

Location: BOBOLINK RDG @ ROBERT GRANT AVE

Traffic Control: Roundabout **Total Collisions:** 1

Date/Day/Time	Environment	Impact Type	Classification	Surface Cond'n	Veh. Dir	Vehicle Manoeuver	Vehicle type	First Event	No. Ped
2017-Oct-05, Thu,12:40	Clear	Angle	P.D. only	Dry	West	Going ahead	Automobile, station wagon	Other motor vehicle	
					North	Going ahead	Automobile, station wagon	Other motor vehicle	

Location: FERNBANK RD @ ROBERT GRANT AVE

Traffic Control: Traffic signal **Total Collisions:** 1

Date/Day/Time	Environment	Impact Type	Classification	Surface Cond'n	Veh. Dir	Vehicle Manoeuver	Vehicle type	First Event	No. Ped
2016-Jun-23, Thu,20:08	Clear	Sideswipe	P.D. only	Dry	West	Changing lanes	Automobile, station wagon	Other motor vehicle	
					West	Going ahead	Automobile, station wagon	Other motor vehicle	

Appendix E

Background Growth Analysis

DRAFT

Fernbank / Eagleson
8 hrs

Year	Date	North Leg		South Leg		East Leg		West Leg		Total
		SB	NB	NB	SB	WB	EB	EB	WB	
2009	Wednesday 17 June							2148	2108	4256
2010	Monday 17 May							2139	1912	4051
2012	Thursday 23 August							1620	1242	2862
2014	Friday 27 June							1577	1442	3019
2017	Tuesday 11 April							1984	1984	3968

North Leg

Year	Counts				% Change			
	NB	*SB*	*NB+SB*	*INT*	*NB*	*SB*	*NB+SB*	*INT*
2009				4256				
2010				4051				-4.8%
2012				2862				-29.4%
2014				3019				5.5%
2017				3968				31.4%

Regression Estimate 2009
Regression Estimate 2017
Average Annual Change

West Leg

Year	Counts				% Change			
	EB	*WB*	*EB+WB*	*INT*	*EB*	*WB*	*EB+WB*	*INT*
2009	2148	2108	4256	4256				
2010	2139	1912	4051	4051	-0.4%	-9.3%	-4.8%	-4.8%
2012	1620	1242	2862	2862	-24.3%	-35.0%	-29.4%	-29.4%
2014	1577	1442	3019	3019	-2.7%	16.1%	5.5%	5.5%
2017	1984	1984	3968	3968	25.8%	37.6%	31.4%	31.4%

Regression Estimate	2009	2012	1805	3817
Regression Estimate	2017	1733	1646	3379
Average Annual Change		**-1.85%**	**-1.15%**	**-1.51%**

East Leg

Year	Counts				% Change			
	EB	*WB*	*EB+WB*	*INT*	*EB*	*WB*	*EB+WB*	*INT*
2009				4256				
2010				4051				-4.8%
2012				2862				-29.4%
2014				3019				5.5%
2017				3968				31.4%

Regression Estimate 2009
Regression Estimate 2017
Average Annual Change

South Leg

Year	Counts				% Change			
	NB	*SB*	*NB+SB*	*INT*	*NB*	*SB*	*NB+SB*	*INT*
2009				4256				
2010				4051				-4.8%
2012				2862				-29.4%
2014				3019				5.5%
2017				3968				31.4%

Regression Estimate 2009
Regression Estimate 2017
Average Annual Change

Fernbank / Eagleson
AM Peak

Year	Date	North Leg		South Leg		East Leg		West Leg		Total
		SB	NB	NB	SB	WB	EB	EB	WB	
2009	Wednesday 17 June							315	309	624
2010	Monday 17 May							380	261	641
2012	Thursday 23 August							229	114	343
2014	Friday 27 June							158	157	315
2017	Tuesday 11 April							258	248	506

North Leg

Year	Counts				% Change			
	NB	*SB*	*NB+SB*	*INT*	*NB*	*SB*	*NB+SB*	*INT*
2009				624				
2010				641				2.7%
2012				343				-46.5%
2014				315				-8.2%
2017				506				60.6%

Regression Estimate 2009
Regression Estimate 2017
Average Annual Change

West Leg

Year	Counts				% Change			
	EB	*WB*	*EB+WB*	*INT*	*EB*	*WB*	*EB+WB*	*INT*
2009	315	309	624	624				
2010	380	261	641	641	20.6%	-15.5%	2.7%	2.7%
2012	229	114	343	343	-39.7%	-56.3%	-46.5%	-46.5%
2014	158	157	315	315	-31.0%	37.7%	-8.2%	-8.2%
2017	258	248	506	506	63.3%	58.0%	60.6%	60.6%

Regression Estimate	2009	320	245	565	
Regression Estimate	2017	197	181	378	
Average Annual Change		**-5.89%**	**-3.73%**	**-4.91%**	

East Leg

Year	Counts				% Change			
	EB	*WB*	*EB+WB*	*INT*	*EB*	*WB*	*EB+WB*	*INT*
2009				624				
2010				641				2.7%
2012				343				-46.5%
2014				315				-8.2%
2017				506				60.6%

Regression Estimate 2009
Regression Estimate 2017
Average Annual Change

South Leg

Year	Counts				% Change			
	NB	*SB*	*NB+SB*	*INT*	*NB*	*SB*	*NB+SB*	*INT*
2009				624				
2010				641				2.7%
2012				343				-46.5%
2014				315				-8.2%
2017				506				60.6%

Regression Estimate 2009
Regression Estimate 2017
Average Annual Change

Fernbank / Eagleson
PM Peak

Year	Date	North Leg		South Leg		East Leg		West Leg		Total
		SB	NB	NB	SB	WB	EB	EB	WB	
2009	Wednesday 17 June							356	398	754
2010	Monday 17 May							283	369	652
2012	Thursday 23 August							284	213	497
2014	Friday 27 June							317	241	558
2017	Tuesday 11 April							307	374	681

North Leg

Year	Counts				% Change			
	NB	*SB*	*NB+SB*	*INT*	*NB*	*SB*	*NB+SB*	*INT*
2009				754				
2010				652				-13.5%
2012				497				-23.8%
2014				558				12.3%
2017				681				22.0%

Regression Estimate 2009
Regression Estimate 2017
Average Annual Change

West Leg

Year	Counts				% Change			
	EB	*WB*	*EB+WB*	*INT*	*EB*	*WB*	*EB+WB*	*INT*
2009	356	398	754	754				
2010	283	369	652	652	-20.5%	-7.3%	-13.5%	-13.5%
2012	284	213	497	497	0.4%	-42.3%	-23.8%	-23.8%
2014	317	241	558	558	11.6%	13.1%	12.3%	12.3%
2017	307	374	681	681	-3.2%	55.2%	22.0%	22.0%

Regression Estimate	2009	316	337	653
Regression Estimate	2017	300	295	595
Average Annual Change		**-0.66%**	**-1.66%**	**-1.17%**

East Leg

Year	Counts				% Change			
	EB	*WB*	*EB+WB*	*INT*	*EB*	*WB*	*EB+WB*	*INT*
2009				754				
2010				652				-13.5%
2012				497				-23.8%
2014				558				12.3%
2017				681				22.0%

Regression Estimate 2009
Regression Estimate 2017
Average Annual Change

South Leg

Year	Counts				% Change			
	NB	*SB*	*NB+SB*	*INT*	*NB*	*SB*	*NB+SB*	*INT*
2009				754				
2010				652				-13.5%
2012				497				-23.8%
2014				558				12.3%
2017				681				22.0%

Regression Estimate 2009
Regression Estimate 2017
Average Annual Change

Appendix F

TDM Checklist

DRAFT

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)*	☑
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	☐
BASIC	1.2.7	Ensure that walking routes to transit stops are secure, visible, lighted, shaded and wind-protected wherever possible	☐
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)*	☑
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	☐
BASIC	3.1.2	Where the site abuts an off-site transit stop and insufficient space exists for a transit shelter in the public right-of-way, protect land for a shelter and/or install a shelter	☐
BETTER	3.1.3	Provide a secure and comfortable interior waiting area by integrating any on-site transit stops into the building	☐

		TDM-supportive design & infrastructure measures: *Residential developments*	Check if completed & add descriptions, explanations or plan/drawing references
	4.	**RIDESHARING**	
	4.1	**Pick-up & drop-off facilities**	
BASIC	4.1.1	Provide a designated area for carpool drivers (plus taxis and ride-hailing services) to drop off or pick up passengers without using fire lanes or other no-stopping zones	☐
	5.	**CARSHARING & BIKESHARING**	
	5.1	**Carshare parking spaces**	
BETTER	5.1.1	Provide up to three carshare parking spaces in an R3, R4 or R5 Zone for specified residential uses *(see Zoning By-law Section 94)*	☐
	5.2	**Bikeshare station location**	
BETTER	5.2.1	Provide a designated bikeshare station area near a major building entrance, preferably lighted and sheltered with a direct walkway connection	☐
	6.	**PARKING**	
	6.1	**Number of parking spaces**	
REQUIRED	6.1.1	Do not provide more parking than permitted by zoning, nor less than required by zoning, unless a variance is being applied for	☑
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)	☐

Appendix G

SYNCHRO and SIDRA Capacity Analysis: Existing Conditions

DRAFT

MOVEMENT SUMMARY

Site: [Existing - Abbott/Robert Grant]

AM Peak
Roundabout

Movement Performance - Vehicles											
Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Robert Grant Avenue											
1	L2	231	2.0	0.163	8.8	LOS A	0.9	6.1	0.11	0.61	53.1
3	R2	19	2.0	0.163	4.0	LOS A	0.9	6.1	0.11	0.61	52.0
Approach		249	2.0	0.163	8.5	LOS A	0.9	6.1	0.11	0.61	53.0
East: Abbott Street East											
4	L2	15	2.0	0.063	8.4	LOS A	0.3	2.2	0.38	0.47	47.7
5	T1	57	2.0	0.063	3.8	LOS A	0.3	2.2	0.38	0.47	47.5
Approach		72	2.0	0.063	4.8	LOS A	0.3	2.2	0.38	0.47	47.6
West: Abbott Street E											
11	T1	22	2.0	0.099	2.8	LOS A	0.5	3.9	0.09	0.38	49.1
12	R2	129	2.0	0.099	2.9	LOS A	0.5	3.9	0.09	0.38	47.9
Approach		152	2.0	0.099	2.9	LOS A	0.5	3.9	0.09	0.38	48.1
All Vehicles		473	2.0	0.163	6.1	LOS A	0.9	6.1	0.14	0.51	50.5

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Roundabout LOS Method: SIDRA Roundabout LOS.
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
Roundabout Capacity Model: SIDRA Standard.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

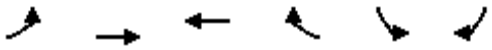
MOVEMENT SUMMARY

Site: [Existing - Bobolink/Robert Grant]

AM Peak
Roundabout

Movement Performance - Vehicles											
Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Robert Grant Avenue											
1	L2	2	2.0	0.128	8.9	LOS A	0.7	4.7	0.13	0.40	56.1
2	T1	173	2.0	0.128	4.2	LOS A	0.7	4.7	0.13	0.40	56.2
3	R2	13	2.0	0.128	4.0	LOS A	0.7	4.7	0.13	0.40	54.8
Approach		187	2.0	0.128	4.3	LOS A	0.7	4.7	0.13	0.40	56.1
East: Bobolink Drive											
4	L2	23	2.0	0.085	9.6	LOS A	0.4	3.0	0.33	0.54	54.9
5	T1	1	2.0	0.085	4.9	LOS A	0.4	3.0	0.33	0.54	55.0
6	R2	77	2.0	0.085	4.7	LOS A	0.4	3.0	0.33	0.54	53.7
Approach		101	2.0	0.085	5.8	LOS A	0.4	3.0	0.33	0.54	53.9
North: Robert Grant Avenue											
7	L2	29	2.0	0.099	8.9	LOS A	0.5	3.8	0.12	0.46	55.5
8	T1	111	2.0	0.099	4.2	LOS A	0.5	3.8	0.12	0.46	55.6
9	R2	5	2.0	0.099	4.0	LOS A	0.5	3.8	0.12	0.46	54.2
Approach		145	2.0	0.099	5.2	LOS A	0.5	3.8	0.12	0.46	55.5
West: Bobolink Drive											
10	L2	1	2.0	0.003	9.4	LOS A	0.0	0.1	0.30	0.48	54.8
11	T1	1	2.0	0.003	4.8	LOS A	0.0	0.1	0.30	0.48	54.9
12	R2	2	2.0	0.003	4.6	LOS A	0.0	0.1	0.30	0.48	53.6
Approach		4	2.0	0.003	5.8	LOS A	0.0	0.1	0.30	0.48	54.2
All Vehicles		438	2.0	0.128	4.9	LOS A	0.7	4.7	0.18	0.45	55.4

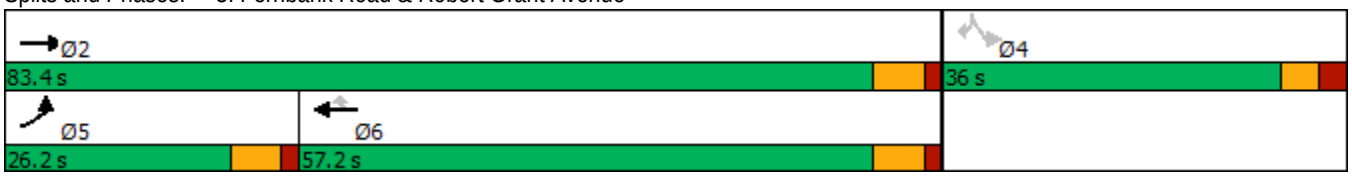
Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Roundabout LOS Method: SIDRA Roundabout LOS.
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
Roundabout Capacity Model: SIDRA Standard.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.



Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	28	296	195	157	152	26
Future Volume (vph)	28	296	195	157	152	26
Lane Group Flow (vph)	29	312	205	165	160	27
Turn Type	Prot	NA	NA	Perm	Perm	Perm
Protected Phases	5	2	6			
Permitted Phases				6	4	4
Detector Phase	5	2	6	6	4	4
Switch Phase						
Minimum Initial (s)	5.0	10.0	10.0	10.0	10.0	10.0
Minimum Split (s)	16.2	52.2	52.2	52.2	30.0	30.0
Total Split (s)	26.2	83.4	57.2	57.2	36.0	36.0
Total Split (%)	21.9%	69.8%	47.9%	47.9%	30.2%	30.2%
Yellow Time (s)	4.6	4.6	4.6	4.6	3.3	3.3
All-Red Time (s)	1.6	1.6	1.6	1.6	2.7	2.7
Lost Time Adjust (s)	0.9	0.9	-1.1	-1.1	0.7	0.7
Total Lost Time (s)	7.1	7.1	5.1	5.1	6.7	6.7
Lead/Lag	Lead		Lag	Lag		
Lead-Lag Optimize?	Yes		Yes	Yes		
Recall Mode	Max	Min	Min	Min	Max	Max
Act Effct Green (s)	19.1	40.1	15.9	15.9	29.3	29.3
Actuated g/C Ratio	0.23	0.48	0.19	0.19	0.35	0.35
v/c Ratio	0.09	0.36	0.61	0.41	0.27	0.05
Control Delay	27.8	14.8	38.8	8.2	21.9	8.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	27.8	14.8	38.8	8.2	21.9	8.2
LOS	C	B	D	A	C	A
Approach Delay		15.9	25.2		19.9	
Approach LOS		B	C		B	
Queue Length 50th (m)	3.6	29.6	30.0	0.0	17.9	0.0
Queue Length 95th (m)	11.0	46.8	50.6	14.7	35.4	5.4
Internal Link Dist (m)		217.9	258.1		237.6	
Turn Bay Length (m)	100.0			100.0	80.0	
Base Capacity (vph)	317	1636	1106	940	585	531
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.09	0.19	0.19	0.18	0.27	0.05

Intersection Summary			
Cycle Length: 119.4			
Actuated Cycle Length: 83.3			
Natural Cycle: 100			
Control Type: Semi Act-Uncoord			
Maximum v/c Ratio: 0.61			
Intersection Signal Delay: 20.6		Intersection LOS: C	
Intersection Capacity Utilization 39.6%		ICU Level of Service A	
Analysis Period (min) 15			

Splits and Phases: 3: Fernbank Road & Robert Grant Avenue



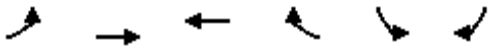
MOVEMENT SUMMARY

Site: [Existing - Bobolink/Robert Grant]

PM Peak
Roundabout

Movement Performance - Vehicles											
Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Robert Grant Avenue											
1	L2	2	2.0	0.129	9.1	LOS A	0.7	4.7	0.22	0.43	55.7
2	T1	133	2.0	0.129	4.5	LOS A	0.7	4.7	0.22	0.43	55.8
3	R2	37	2.0	0.129	4.3	LOS A	0.7	4.7	0.22	0.43	54.5
Approach		172	2.0	0.129	4.5	LOS A	0.7	4.7	0.22	0.43	55.5
East: Bobolink Drive											
4	L2	19	2.0	0.046	9.4	LOS A	0.2	1.6	0.29	0.53	54.7
5	T1	1	2.0	0.046	4.7	LOS A	0.2	1.6	0.29	0.53	54.7
6	R2	37	2.0	0.046	4.5	LOS A	0.2	1.6	0.29	0.53	53.4
Approach		57	2.0	0.046	6.1	LOS A	0.2	1.6	0.29	0.53	53.8
North: Robert Grant Avenue											
7	L2	76	2.0	0.177	8.8	LOS A	1.0	7.2	0.11	0.48	55.3
8	T1	192	2.0	0.177	4.2	LOS A	1.0	7.2	0.11	0.48	55.3
9	R2	5	2.0	0.177	4.0	LOS A	1.0	7.2	0.11	0.48	54.0
Approach		273	2.0	0.177	5.5	LOS A	1.0	7.2	0.11	0.48	55.3
West: Bobolink Drive											
10	L2	3	2.0	0.011	10.0	LOS A	0.0	0.4	0.40	0.53	54.5
11	T1	1	2.0	0.011	5.3	LOS A	0.0	0.4	0.40	0.53	54.5
12	R2	7	2.0	0.011	5.1	LOS A	0.0	0.4	0.40	0.53	53.2
Approach		12	2.0	0.011	6.5	LOS A	0.0	0.4	0.40	0.53	53.7
All Vehicles		513	2.0	0.177	5.3	LOS A	1.0	7.2	0.18	0.47	55.2

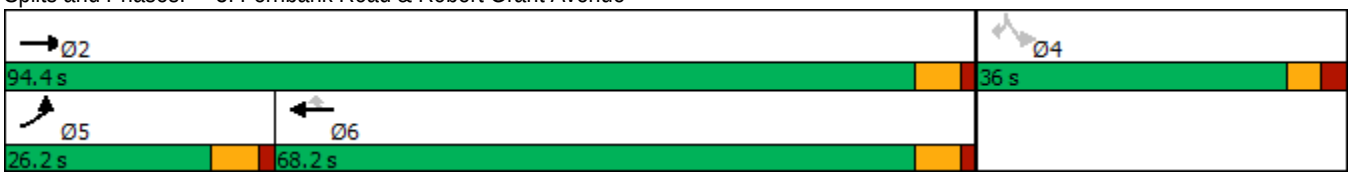
Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Roundabout LOS Method: SIDRA Roundabout LOS.
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
Roundabout Capacity Model: SIDRA Standard.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.



Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	17	245	440	176	163	25
Future Volume (vph)	17	245	440	176	163	25
Lane Group Flow (vph)	18	258	463	185	172	26
Turn Type	Prot	NA	NA	Perm	Perm	Perm
Protected Phases	5	2	6			
Permitted Phases				6	4	4
Detector Phase	5	2	6	6	4	4
Switch Phase						
Minimum Initial (s)	5.0	10.0	10.0	10.0	10.0	10.0
Minimum Split (s)	16.2	52.2	52.2	52.2	30.0	30.0
Total Split (s)	26.2	94.4	68.2	68.2	36.0	36.0
Total Split (%)	20.1%	72.4%	52.3%	52.3%	27.6%	27.6%
Yellow Time (s)	4.6	4.6	4.6	4.6	3.3	3.3
All-Red Time (s)	1.6	1.6	1.6	1.6	2.7	2.7
Lost Time Adjust (s)	0.9	0.9	-1.1	-1.1	0.7	0.7
Total Lost Time (s)	7.1	7.1	5.1	5.1	6.7	6.7
Lead/Lag	Lead		Lag	Lag		
Lead-Lag Optimize?	Yes		Yes	Yes		
Recall Mode	Max	Min	Min	Min	Max	Max
Act Effct Green (s)	19.2	56.6	32.3	32.3	29.5	29.5
Actuated g/C Ratio	0.19	0.57	0.32	0.32	0.30	0.30
v/c Ratio	0.05	0.26	0.80	0.31	0.36	0.06
Control Delay	37.2	11.5	42.1	4.7	32.5	11.8
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	37.2	11.5	42.1	4.7	32.5	11.8
LOS	D	B	D	A	C	B
Approach Delay		13.1	31.4		29.8	
Approach LOS		B	C		C	
Queue Length 50th (m)	2.9	23.7	80.9	0.0	26.2	0.0
Queue Length 95th (m)	9.7	36.2	116.1	13.3	51.7	6.7
Internal Link Dist (m)		217.9	258.1		237.6	
Turn Bay Length (m)	100.0			100.0	80.0	
Base Capacity (vph)	332	1536	1132	1002	476	425
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.05	0.17	0.41	0.18	0.36	0.06

Intersection Summary			
Cycle Length: 130.4			
Actuated Cycle Length: 100			
Natural Cycle: 100			
Control Type: Semi Act-Uncoord			
Maximum v/c Ratio: 0.80			
Intersection Signal Delay: 26.6		Intersection LOS: C	
Intersection Capacity Utilization 43.8%		ICU Level of Service A	
Analysis Period (min) 15			

Splits and Phases: 3: Fernbank Road & Robert Grant Avenue



MOVEMENT SUMMARY

Site: [Existing - Abbott/Robert Grant]

PM Peak
Roundabout

Movement Performance - Vehicles											
Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Robert Grant Avenue											
1	L2	172	2.0	0.127	9.0	LOS A	0.7	4.6	0.17	0.61	52.7
3	R2	6	2.0	0.127	4.1	LOS A	0.7	4.6	0.17	0.61	51.6
Approach		178	2.0	0.127	8.8	LOS A	0.7	4.6	0.17	0.61	52.7
East: Abbott Street East											
4	L2	28	2.0	0.074	8.1	LOS A	0.4	2.6	0.33	0.47	47.6
5	T1	60	2.0	0.074	3.6	LOS A	0.4	2.6	0.33	0.47	47.4
Approach		88	2.0	0.074	5.0	LOS A	0.4	2.6	0.33	0.47	47.5
West: Abbott Street E											
11	T1	51	2.0	0.192	2.9	LOS A	1.1	8.0	0.14	0.38	48.9
12	R2	239	2.0	0.192	3.0	LOS A	1.1	8.0	0.14	0.38	47.8
Approach		289	2.0	0.192	3.0	LOS A	1.1	8.0	0.14	0.38	48.0
All Vehicles		556	2.0	0.192	5.2	LOS A	1.1	8.0	0.18	0.47	49.3

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Roundabout LOS Method: SIDRA Roundabout LOS.
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
Roundabout Capacity Model: SIDRA Standard.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Appendix H

SYNCHRO and SIDRA Capacity Analysis: Future Background 2020 Conditions

DRAFT

MOVEMENT SUMMARY

Site: [BG2020 - Abbott/Robert Grant]

AM Peak
Roundabout

Movement Performance - Vehicles											
Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Robert Grant Avenue											
1	L2	235	2.0	0.166	8.8	LOS A	0.9	6.2	0.11	0.61	53.1
3	R2	19	2.0	0.166	4.0	LOS A	0.9	6.2	0.11	0.61	51.9
Approach		254	2.0	0.166	8.5	LOS A	0.9	6.2	0.11	0.61	53.0
East: Abbott Street East											
4	L2	15	2.0	0.064	8.4	LOS A	0.3	2.2	0.38	0.47	47.7
5	T1	58	2.0	0.064	3.9	LOS A	0.3	2.2	0.38	0.47	47.5
Approach		73	2.0	0.064	4.8	LOS A	0.3	2.2	0.38	0.47	47.5
West: Abbott Street E											
11	T1	22	2.0	0.100	2.8	LOS A	0.6	3.9	0.09	0.38	49.1
12	R2	132	2.0	0.100	2.9	LOS A	0.6	3.9	0.09	0.38	47.9
Approach		154	2.0	0.100	2.9	LOS A	0.6	3.9	0.09	0.38	48.1
All Vehicles		480	2.0	0.166	6.1	LOS A	0.9	6.2	0.14	0.52	50.5

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Roundabout LOS Method: SIDRA Roundabout LOS.
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
Roundabout Capacity Model: SIDRA Standard.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: [BG2020 - Bobolink/Robert Grant]

AM Peak
Roundabout

Movement Performance - Vehicles											
Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Robert Grant Avenue											
1	L2	2	2.0	0.130	8.9	LOS A	0.7	4.7	0.13	0.40	56.1
2	T1	176	2.0	0.130	4.2	LOS A	0.7	4.7	0.13	0.40	56.2
3	R2	13	2.0	0.130	4.0	LOS A	0.7	4.7	0.13	0.40	54.8
Approach		191	2.0	0.130	4.3	LOS A	0.7	4.7	0.13	0.40	56.1
East: Bobolink Drive											
4	L2	23	2.0	0.085	9.6	LOS A	0.4	3.0	0.34	0.54	54.9
5	T1	1	2.0	0.085	5.0	LOS A	0.4	3.0	0.34	0.54	55.0
6	R2	77	2.0	0.085	4.7	LOS A	0.4	3.0	0.34	0.54	53.6
Approach		101	2.0	0.085	5.8	LOS A	0.4	3.0	0.34	0.54	53.9
North: Robert Grant Avenue											
7	L2	29	2.0	0.103	8.9	LOS A	0.6	3.9	0.12	0.45	55.5
8	T1	117	2.0	0.103	4.2	LOS A	0.6	3.9	0.12	0.45	55.6
9	R2	5	2.0	0.103	4.0	LOS A	0.6	3.9	0.12	0.45	54.3
Approach		152	2.0	0.103	5.1	LOS A	0.6	3.9	0.12	0.45	55.5
West: Bobolink Drive											
10	L2	1	2.0	0.004	9.4	LOS A	0.0	0.1	0.31	0.48	54.8
11	T1	1	2.0	0.004	4.8	LOS A	0.0	0.1	0.31	0.48	54.9
12	R2	2	2.0	0.004	4.6	LOS A	0.0	0.1	0.31	0.48	53.6
Approach		4	2.0	0.004	5.8	LOS A	0.0	0.1	0.31	0.48	54.2
All Vehicles		447	2.0	0.130	4.9	LOS A	0.7	4.7	0.18	0.45	55.4

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Roundabout LOS Method: SIDRA Roundabout LOS.
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
Roundabout Capacity Model: SIDRA Standard.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: [BG2020 - Abbott/Robert Grant]

PM Peak
Roundabout

Movement Performance - Vehicles											
Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Robert Grant Avenue											
1	L2	175	2.0	0.129	9.0	LOS A	0.7	4.7	0.18	0.61	52.7
3	R2	6	2.0	0.129	4.1	LOS A	0.7	4.7	0.18	0.61	51.6
Approach		181	2.0	0.129	8.8	LOS A	0.7	4.7	0.18	0.61	52.7
East: Abbott Street East											
4	L2	29	2.0	0.076	8.1	LOS A	0.4	2.7	0.33	0.48	47.6
5	T1	61	2.0	0.076	3.6	LOS A	0.4	2.7	0.33	0.48	47.4
Approach		91	2.0	0.076	5.1	LOS A	0.4	2.7	0.33	0.48	47.5
West: Abbott Street E											
11	T1	52	2.0	0.196	2.9	LOS A	1.2	8.3	0.14	0.38	48.9
12	R2	244	2.0	0.196	3.0	LOS A	1.2	8.3	0.14	0.38	47.7
Approach		296	2.0	0.196	3.0	LOS A	1.2	8.3	0.14	0.38	47.9
All Vehicles		567	2.0	0.196	5.2	LOS A	1.2	8.3	0.18	0.47	49.3

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Roundabout LOS Method: SIDRA Roundabout LOS.
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
Roundabout Capacity Model: SIDRA Standard.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

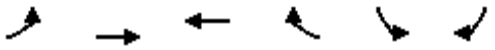
MOVEMENT SUMMARY

Site: [BG2020 - Bobolink/Robert Grant]

PM Peak
Roundabout

Movement Performance - Vehicles											
Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Robert Grant Avenue											
1	L2	2	2.0	0.131	9.1	LOS A	0.7	4.8	0.22	0.43	55.7
2	T1	136	2.0	0.131	4.5	LOS A	0.7	4.8	0.22	0.43	55.8
3	R2	37	2.0	0.131	4.3	LOS A	0.7	4.8	0.22	0.43	54.5
Approach		175	2.0	0.131	4.5	LOS A	0.7	4.8	0.22	0.43	55.5
East: Bobolink Drive											
4	L2	19	2.0	0.047	9.4	LOS A	0.2	1.6	0.30	0.53	54.6
5	T1	1	2.0	0.047	4.7	LOS A	0.2	1.6	0.30	0.53	54.7
6	R2	37	2.0	0.047	4.5	LOS A	0.2	1.6	0.30	0.53	53.4
Approach		57	2.0	0.047	6.1	LOS A	0.2	1.6	0.30	0.53	53.8
North: Robert Grant Avenue											
7	L2	76	2.0	0.180	8.8	LOS A	1.0	7.3	0.11	0.48	55.3
8	T1	196	2.0	0.180	4.2	LOS A	1.0	7.3	0.11	0.48	55.4
9	R2	5	2.0	0.180	4.0	LOS A	1.0	7.3	0.11	0.48	54.0
Approach		277	2.0	0.180	5.5	LOS A	1.0	7.3	0.11	0.48	55.3
West: Bobolink Drive											
10	L2	3	2.0	0.011	10.0	LOS A	0.1	0.4	0.41	0.53	54.5
11	T1	1	2.0	0.011	5.4	LOS A	0.1	0.4	0.41	0.53	54.5
12	R2	7	2.0	0.011	5.1	LOS A	0.1	0.4	0.41	0.53	53.2
Approach		12	2.0	0.011	6.5	LOS A	0.1	0.4	0.41	0.53	53.7
All Vehicles		520	2.0	0.180	5.2	LOS A	1.0	7.3	0.18	0.47	55.2

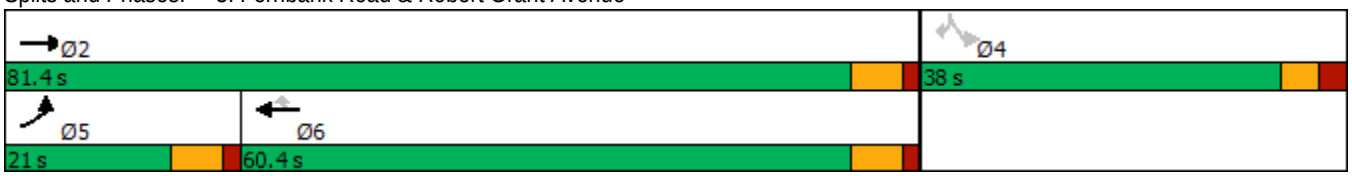
Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Roundabout LOS Method: SIDRA Roundabout LOS.
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
Roundabout Capacity Model: SIDRA Standard.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

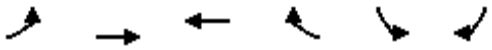


Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	29	302	199	160	155	27
Future Volume (vph)	29	302	199	160	155	27
Lane Group Flow (vph)	31	318	209	168	163	28
Turn Type	Prot	NA	NA	Perm	Perm	Perm
Protected Phases	5	2	6			
Permitted Phases				6	4	4
Detector Phase	5	2	6	6	4	4
Switch Phase						
Minimum Initial (s)	5.0	10.0	10.0	10.0	10.0	10.0
Minimum Split (s)	16.2	52.2	52.2	52.2	30.0	30.0
Total Split (s)	21.0	81.4	60.4	60.4	38.0	38.0
Total Split (%)	17.6%	68.2%	50.6%	50.6%	31.8%	31.8%
Yellow Time (s)	4.6	4.6	4.6	4.6	3.3	3.3
All-Red Time (s)	1.6	1.6	1.6	1.6	2.7	2.7
Lost Time Adjust (s)	0.9	0.9	-1.1	-1.1	0.7	0.7
Total Lost Time (s)	7.1	7.1	5.1	5.1	6.7	6.7
Lead/Lag	Lead		Lag	Lag		
Lead-Lag Optimize?	Yes		Yes	Yes		
Recall Mode	Max	Min	Min	Min	Max	Max
Act Effct Green (s)	13.9	34.9	15.9	15.9	31.4	31.4
Actuated g/C Ratio	0.17	0.44	0.20	0.20	0.39	0.39
v/c Ratio	0.13	0.41	0.60	0.41	0.25	0.05
Control Delay	31.2	17.2	36.5	7.7	18.7	7.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	31.2	17.2	36.5	7.7	18.7	7.1
LOS	C	B	D	A	B	A
Approach Delay		18.4	23.7		17.0	
Approach LOS		B	C		B	
Queue Length 50th (m)	4.0	31.9	29.1	0.0	16.2	0.0
Queue Length 95th (m)	12.0	50.8	49.2	14.2	33.1	5.1
Internal Link Dist (m)		217.9	258.1		237.6	
Turn Bay Length (m)	100.0			100.0	80.0	
Base Capacity (vph)	240	1657	1222	1022	650	588
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.13	0.19	0.17	0.16	0.25	0.05

Intersection Summary			
Cycle Length: 119.4			
Actuated Cycle Length: 80.1			
Natural Cycle: 100			
Control Type: Semi Act-Uncoord			
Maximum v/c Ratio: 0.60			
Intersection Signal Delay: 20.3		Intersection LOS: C	
Intersection Capacity Utilization 40.0%		ICU Level of Service A	
Analysis Period (min) 15			

Splits and Phases: 3: Fernbank Road & Robert Grant Avenue

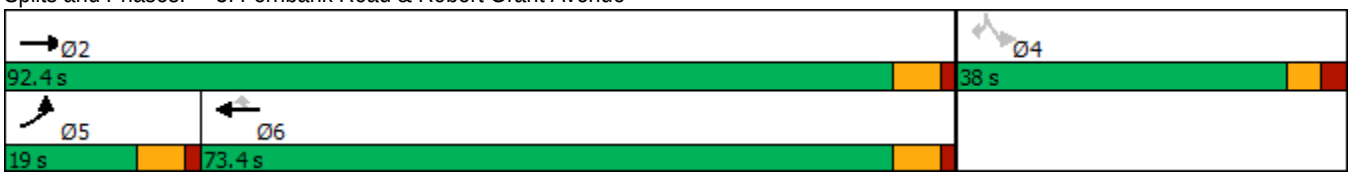




Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	17	250	449	180	166	26
Future Volume (vph)	17	250	449	180	166	26
Lane Group Flow (vph)	18	263	473	189	175	27
Turn Type	Prot	NA	NA	Perm	Perm	Perm
Protected Phases	5	2	6			
Permitted Phases				6	4	4
Detector Phase	5	2	6	6	4	4
Switch Phase						
Minimum Initial (s)	5.0	10.0	10.0	10.0	10.0	10.0
Minimum Split (s)	16.2	52.2	52.2	52.2	30.0	30.0
Total Split (s)	19.0	92.4	73.4	73.4	38.0	38.0
Total Split (%)	14.6%	70.9%	56.3%	56.3%	29.1%	29.1%
Yellow Time (s)	4.6	4.6	4.6	4.6	3.3	3.3
All-Red Time (s)	1.6	1.6	1.6	1.6	2.7	2.7
Lost Time Adjust (s)	0.9	0.9	-1.1	-1.1	0.7	0.7
Total Lost Time (s)	7.1	7.1	5.1	5.1	6.7	6.7
Lead/Lag	Lead		Lag	Lag		
Lead-Lag Optimize?	Yes		Yes	Yes		
Recall Mode	Max	Min	Min	Min	Max	Max
Act Effct Green (s)	12.0	48.3	31.2	31.2	31.5	31.5
Actuated g/C Ratio	0.13	0.52	0.33	0.33	0.34	0.34
v/c Ratio	0.08	0.29	0.80	0.31	0.32	0.06
Control Delay	40.6	13.5	38.9	4.5	27.1	10.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	40.6	13.5	38.9	4.5	27.1	10.0
LOS	D	B	D	A	C	A
Approach Delay		15.3	29.1		24.8	
Approach LOS		B	C		C	
Queue Length 50th (m)	2.9	25.6	76.2	0.0	23.3	0.0
Queue Length 95th (m)	10.1	39.7	110.9	12.7	47.2	6.3
Internal Link Dist (m)		217.9	258.1		237.6	
Turn Bay Length (m)	100.0			100.0	80.0	
Base Capacity (vph)	220	1596	1309	1131	543	482
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.08	0.16	0.36	0.17	0.32	0.06

Intersection Summary	
Cycle Length: 130.4	
Actuated Cycle Length: 93.7	
Natural Cycle: 100	
Control Type: Semi Act-Uncoord	
Maximum v/c Ratio: 0.80	
Intersection Signal Delay: 24.9	Intersection LOS: C
Intersection Capacity Utilization 44.5%	ICU Level of Service A
Analysis Period (min) 15	

Splits and Phases: 3: Fernbank Road & Robert Grant Avenue



Appendix I

SYNCHRO and SIDRA Capacity Analysis: Future Total Background 2025 Conditions

DRAFT

MOVEMENT SUMMARY

Site: [BG2025 - Abbott/Robert Grant]

AM Peak
Roundabout

Movement Performance - Vehicles											
Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Robert Grant Avenue											
1	L2	264	2.0	0.209	8.9	LOS A	1.2	8.4	0.12	0.60	53.4
3	R2	57	2.0	0.209	4.0	LOS A	1.2	8.4	0.12	0.60	52.2
Approach		321	2.0	0.209	8.0	LOS A	1.2	8.4	0.12	0.60	53.2
East: Abbott Street East											
4	L2	29	2.0	0.084	8.6	LOS A	0.4	3.0	0.41	0.52	47.4
5	T1	64	2.0	0.084	4.0	LOS A	0.4	3.0	0.41	0.52	47.2
Approach		94	2.0	0.084	5.5	LOS A	0.4	3.0	0.41	0.52	47.2
West: Abbott Street E											
11	T1	25	2.0	0.119	2.9	LOS A	0.7	4.7	0.14	0.38	48.9
12	R2	148	2.0	0.119	3.0	LOS A	0.7	4.7	0.14	0.38	47.8
Approach		174	2.0	0.119	3.0	LOS A	0.7	4.7	0.14	0.38	47.9
All Vehicles		588	2.0	0.209	6.1	LOS A	1.2	8.4	0.17	0.52	50.6

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Roundabout LOS Method: SIDRA Roundabout LOS.
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
Roundabout Capacity Model: SIDRA Standard.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: [BG2025 - Bobolink/Robert Grant]

AM Peak
Roundabout

Movement Performance - Vehicles											
Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Robert Grant Avenue											
1	L2	2	2.0	0.167	8.9	LOS A	0.9	6.4	0.13	0.40	56.1
2	T1	235	2.0	0.167	4.3	LOS A	0.9	6.4	0.13	0.40	56.2
3	R2	13	2.0	0.167	4.0	LOS A	0.9	6.4	0.13	0.40	54.8
Approach		249	2.0	0.167	4.3	LOS A	0.9	6.4	0.13	0.40	56.1
East: Bobolink Drive											
4	L2	23	2.0	0.089	9.9	LOS A	0.4	3.2	0.39	0.56	54.7
5	T1	1	2.0	0.089	5.2	LOS A	0.4	3.2	0.39	0.56	54.8
6	R2	77	2.0	0.089	5.0	LOS A	0.4	3.2	0.39	0.56	53.5
Approach		101	2.0	0.089	6.1	LOS A	0.4	3.2	0.39	0.56	53.8
North: Robert Grant Avenue											
7	L2	29	2.0	0.121	8.9	LOS A	0.7	4.8	0.12	0.44	55.6
8	T1	144	2.0	0.121	4.2	LOS A	0.7	4.8	0.12	0.44	55.7
9	R2	5	2.0	0.121	4.0	LOS A	0.7	4.8	0.12	0.44	54.3
Approach		179	2.0	0.121	5.0	LOS A	0.7	4.8	0.12	0.44	55.6
West: Bobolink Drive											
10	L2	1	2.0	0.004	9.5	LOS A	0.0	0.1	0.33	0.49	54.7
11	T1	1	2.0	0.004	4.9	LOS A	0.0	0.1	0.33	0.49	54.8
12	R2	2	2.0	0.004	4.7	LOS A	0.0	0.1	0.33	0.49	53.5
Approach		4	2.0	0.004	6.0	LOS A	0.0	0.1	0.33	0.49	54.1
All Vehicles		534	2.0	0.167	4.9	LOS A	0.9	6.4	0.18	0.45	55.5

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Roundabout LOS Method: SIDRA Roundabout LOS.
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
Roundabout Capacity Model: SIDRA Standard.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: [BG2025 - Abbott/Robert Grant]

PM Peak
Roundabout

Movement Performance - Vehicles											
Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Robert Grant Avenue											
1	L2	196	2.0	0.162	9.0	LOS A	0.9	6.3	0.19	0.59	53.0
3	R2	32	2.0	0.162	4.2	LOS A	0.9	6.3	0.19	0.59	51.9
Approach		227	2.0	0.162	8.3	LOS A	0.9	6.3	0.19	0.59	52.9
East: Abbott Street East											
4	L2	59	2.0	0.108	8.2	LOS A	0.6	3.9	0.36	0.52	47.2
5	T1	67	2.0	0.108	3.7	LOS A	0.6	3.9	0.36	0.52	47.0
Approach		126	2.0	0.108	5.8	LOS A	0.6	3.9	0.36	0.52	47.1
West: Abbott Street E											
11	T1	57	2.0	0.233	3.1	LOS A	1.4	10.2	0.22	0.39	48.7
12	R2	274	2.0	0.233	3.1	LOS A	1.4	10.2	0.22	0.39	47.5
Approach		331	2.0	0.233	3.1	LOS A	1.4	10.2	0.22	0.39	47.7
All Vehicles		684	2.0	0.233	5.4	LOS A	1.4	10.2	0.24	0.48	49.2

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Roundabout LOS Method: SIDRA Roundabout LOS.
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
Roundabout Capacity Model: SIDRA Standard.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

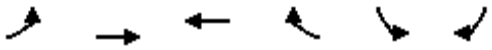
MOVEMENT SUMMARY

Site: [BG2025 - Bobolink/Robert Grant]

PM Peak
Roundabout

Movement Performance - Vehicles											
Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Robert Grant Avenue											
1	L2	2	2.0	0.160	9.1	LOS A	0.8	6.0	0.23	0.43	55.7
2	T1	177	2.0	0.160	4.5	LOS A	0.8	6.0	0.23	0.43	55.8
3	R2	37	2.0	0.160	4.3	LOS A	0.8	6.0	0.23	0.43	54.4
Approach		216	2.0	0.160	4.5	LOS A	0.8	6.0	0.23	0.43	55.5
East: Bobolink Drive											
4	L2	19	2.0	0.048	9.6	LOS A	0.2	1.7	0.34	0.55	54.5
5	T1	1	2.0	0.048	4.9	LOS A	0.2	1.7	0.34	0.55	54.6
6	R2	37	2.0	0.048	4.7	LOS A	0.2	1.7	0.34	0.55	53.3
Approach		57	2.0	0.048	6.3	LOS A	0.2	1.7	0.34	0.55	53.7
North: Robert Grant Avenue											
7	L2	76	2.0	0.212	8.8	LOS A	1.3	9.0	0.12	0.46	55.4
8	T1	247	2.0	0.212	4.2	LOS A	1.3	9.0	0.12	0.46	55.5
9	R2	5	2.0	0.212	4.0	LOS A	1.3	9.0	0.12	0.46	54.2
Approach		328	2.0	0.212	5.3	LOS A	1.3	9.0	0.12	0.46	55.4
West: Bobolink Drive											
10	L2	3	2.0	0.011	10.2	LOS B	0.1	0.4	0.44	0.54	54.3
11	T1	1	2.0	0.011	5.6	LOS A	0.1	0.4	0.44	0.54	54.4
12	R2	7	2.0	0.011	5.4	LOS A	0.1	0.4	0.44	0.54	53.1
Approach		12	2.0	0.011	6.7	LOS A	0.1	0.4	0.44	0.54	53.6
All Vehicles		613	2.0	0.212	5.1	LOS A	1.3	9.0	0.18	0.46	55.3

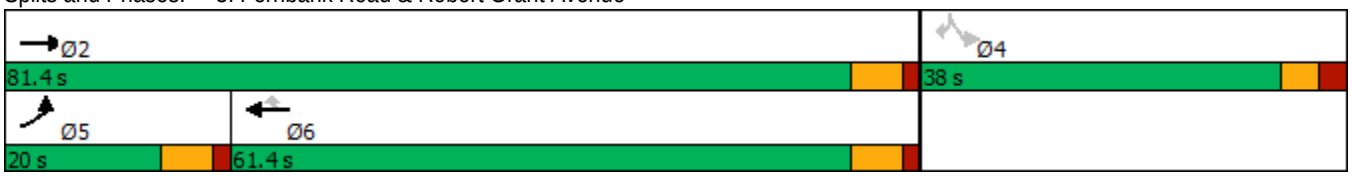
Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Roundabout LOS Method: SIDRA Roundabout LOS.
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
Roundabout Capacity Model: SIDRA Standard.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

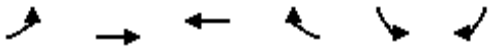


Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	39	338	228	177	180	34
Future Volume (vph)	39	338	228	177	180	34
Lane Group Flow (vph)	41	356	240	186	189	36
Turn Type	Prot	NA	NA	Perm	Perm	Perm
Protected Phases	5	2	6			
Permitted Phases				6	4	4
Detector Phase	5	2	6	6	4	4
Switch Phase						
Minimum Initial (s)	5.0	10.0	10.0	10.0	10.0	10.0
Minimum Split (s)	16.2	52.2	52.2	52.2	30.0	30.0
Total Split (s)	20.0	81.4	61.4	61.4	38.0	38.0
Total Split (%)	16.8%	68.2%	51.4%	51.4%	31.8%	31.8%
Yellow Time (s)	4.6	4.6	4.6	4.6	3.3	3.3
All-Red Time (s)	1.6	1.6	1.6	1.6	2.7	2.7
Lost Time Adjust (s)	0.9	0.9	-1.1	-1.1	0.7	0.7
Total Lost Time (s)	7.1	7.1	5.1	5.1	6.7	6.7
Lead/Lag	Lead		Lag	Lag		
Lead-Lag Optimize?	Yes		Yes	Yes		
Recall Mode	Max	Min	Min	Min	Max	Max
Act Effct Green (s)	12.9	35.3	17.3	17.3	31.4	31.4
Actuated g/C Ratio	0.16	0.44	0.21	0.21	0.39	0.39
v/c Ratio	0.18	0.46	0.63	0.42	0.29	0.06
Control Delay	33.4	17.9	36.6	7.2	19.5	6.6
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	33.4	17.9	36.6	7.2	19.5	6.6
LOS	C	B	D	A	B	A
Approach Delay		19.5	23.8		17.4	
Approach LOS		B	C		B	
Queue Length 50th (m)	5.5	36.7	33.5	0.0	19.3	0.0
Queue Length 95th (m)	15.2	57.4	55.3	14.6	38.7	5.8
Internal Link Dist (m)		217.9	258.1		237.6	
Turn Bay Length (m)	100.0			100.0	80.0	
Base Capacity (vph)	222	1650	1238	1039	647	590
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.18	0.22	0.19	0.18	0.29	0.06

Intersection Summary			
Cycle Length: 119.4			
Actuated Cycle Length: 80.5			
Natural Cycle: 100			
Control Type: Semi Act-Uncoord			
Maximum v/c Ratio: 0.63			
Intersection Signal Delay: 20.8		Intersection LOS: C	
Intersection Capacity Utilization 43.1%		ICU Level of Service A	
Analysis Period (min) 15			

Splits and Phases: 3: Fernbank Road & Robert Grant Avenue

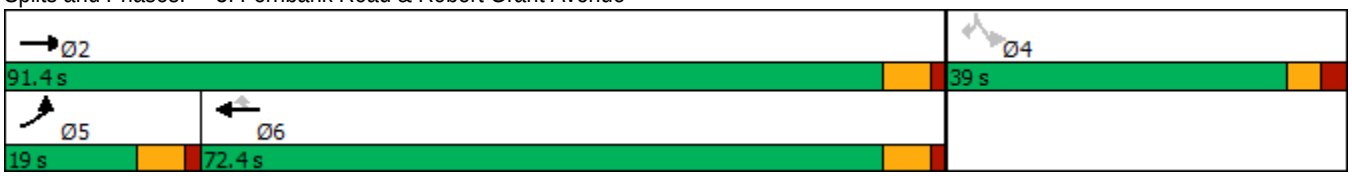




Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	34	287	502	198	191	32
Future Volume (vph)	34	287	502	198	191	32
Lane Group Flow (vph)	36	302	528	208	201	34
Turn Type	Prot	NA	NA	Perm	Perm	Perm
Protected Phases	5	2	6			
Permitted Phases				6	4	4
Detector Phase	5	2	6	6	4	4
Switch Phase						
Minimum Initial (s)	5.0	10.0	10.0	10.0	10.0	10.0
Minimum Split (s)	16.2	52.2	52.2	52.2	30.0	30.0
Total Split (s)	19.0	91.4	72.4	72.4	39.0	39.0
Total Split (%)	14.6%	70.1%	55.5%	55.5%	29.9%	29.9%
Yellow Time (s)	4.6	4.6	4.6	4.6	3.3	3.3
All-Red Time (s)	1.6	1.6	1.6	1.6	2.7	2.7
Lost Time Adjust (s)	0.9	0.9	-1.1	-1.1	0.7	0.7
Total Lost Time (s)	7.1	7.1	5.1	5.1	6.7	6.7
Lead/Lag	Lead		Lag	Lag		
Lead-Lag Optimize?	Yes		Yes	Yes		
Recall Mode	Max	Min	Min	Min	Max	Max
Act Effct Green (s)	12.0	53.3	36.2	36.2	32.6	32.6
Actuated g/C Ratio	0.12	0.53	0.36	0.36	0.33	0.33
v/c Ratio	0.17	0.32	0.82	0.31	0.38	0.07
Control Delay	45.3	13.7	39.5	4.0	30.7	10.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	45.3	13.7	39.5	4.0	30.7	10.0
LOS	D	B	D	A	C	B
Approach Delay		17.1	29.5		27.7	
Approach LOS		B	C		C	
Queue Length 50th (m)	6.3	31.0	90.5	0.0	29.3	0.0
Queue Length 95th (m)	17.5	46.4	128.2	12.8	58.7	7.4
Internal Link Dist (m)		217.9	258.1		237.6	
Turn Bay Length (m)	100.0			100.0	80.0	
Base Capacity (vph)	207	1490	1213	1068	527	473
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.17	0.20	0.44	0.19	0.38	0.07

Intersection Summary			
Cycle Length: 130.4			
Actuated Cycle Length: 99.8			
Natural Cycle: 100			
Control Type: Semi Act-Uncoord			
Maximum v/c Ratio: 0.82			
Intersection Signal Delay: 26.0		Intersection LOS: C	
Intersection Capacity Utilization 52.5%		ICU Level of Service A	
Analysis Period (min) 15			

Splits and Phases: 3: Fernbank Road & Robert Grant Avenue



Appendix J

SYNCHRO and SIDRA Capacity Analysis: Future Total Projected 2020 Conditions

DRAFT

MOVEMENT SUMMARY

Site: [FT2020 - Abbott/Robert Grant]

AM Peak
Roundabout

Movement Performance - Vehicles											
Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Robert Grant Avenue											
1	L2	238	2.0	0.232	8.8	LOS A	1.4	9.6	0.11	0.58	54.0
3	R2	124	2.0	0.232	4.0	LOS A	1.4	9.6	0.11	0.58	52.8
Approach		362	2.0	0.232	7.2	LOS A	1.4	9.6	0.11	0.58	53.6
East: Abbott Street East											
4	L2	41	2.0	0.087	8.4	LOS A	0.4	3.1	0.39	0.53	47.2
5	T1	58	2.0	0.087	3.9	LOS A	0.4	3.1	0.39	0.53	47.0
Approach		99	2.0	0.087	5.8	LOS A	0.4	3.1	0.39	0.53	47.1
West: Abbott Street E											
11	T1	22	2.0	0.109	3.0	LOS A	0.6	4.3	0.16	0.38	48.8
12	R2	133	2.0	0.109	3.0	LOS A	0.6	4.3	0.16	0.38	47.7
Approach		155	2.0	0.109	3.0	LOS A	0.6	4.3	0.16	0.38	47.8
All Vehicles		616	2.0	0.232	5.9	LOS A	1.4	9.6	0.17	0.52	51.0

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Roundabout LOS Method: SIDRA Roundabout LOS.
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
Roundabout Capacity Model: SIDRA Standard.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

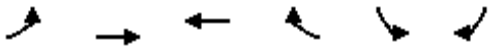
MOVEMENT SUMMARY

Site: [FT2020 - Bobolink/Robert Grant]

AM Peak
Roundabout

Movement Performance - Vehicles											
Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Robert Grant Avenue											
1	L2	2	2.0	0.152	8.9	LOS A	0.8	5.9	0.17	0.41	56.0
2	T1	187	2.0	0.152	4.3	LOS A	0.8	5.9	0.17	0.41	56.1
3	R2	28	2.0	0.152	4.1	LOS A	0.8	5.9	0.17	0.41	54.7
Approach		218	2.0	0.152	4.3	LOS A	0.8	5.9	0.17	0.41	55.9
East: Bobolink Drive											
4	L2	96	2.0	0.163	9.7	LOS A	0.9	6.2	0.37	0.59	53.8
5	T1	1	2.0	0.163	5.1	LOS A	0.9	6.2	0.37	0.59	53.9
6	R2	95	2.0	0.163	4.9	LOS A	0.9	6.2	0.37	0.59	52.6
Approach		192	2.0	0.163	7.3	LOS A	0.9	6.2	0.37	0.59	53.2
North: Robert Grant Avenue											
7	L2	41	2.0	0.127	9.2	LOS A	0.7	4.9	0.27	0.49	54.7
8	T1	117	2.0	0.127	4.6	LOS A	0.7	4.9	0.27	0.49	54.8
9	R2	5	2.0	0.127	4.4	LOS A	0.7	4.9	0.27	0.49	53.5
Approach		163	2.0	0.127	5.7	LOS A	0.7	4.9	0.27	0.49	54.7
West: Bobolink Drive											
10	L2	1	2.0	0.004	9.8	LOS A	0.0	0.1	0.38	0.50	54.5
11	T1	1	2.0	0.004	5.2	LOS A	0.0	0.1	0.38	0.50	54.6
12	R2	2	2.0	0.004	4.9	LOS A	0.0	0.1	0.38	0.50	53.3
Approach		4	2.0	0.004	6.2	LOS A	0.0	0.1	0.38	0.50	53.9
All Vehicles		577	2.0	0.163	5.7	LOS A	0.9	6.2	0.27	0.49	54.6

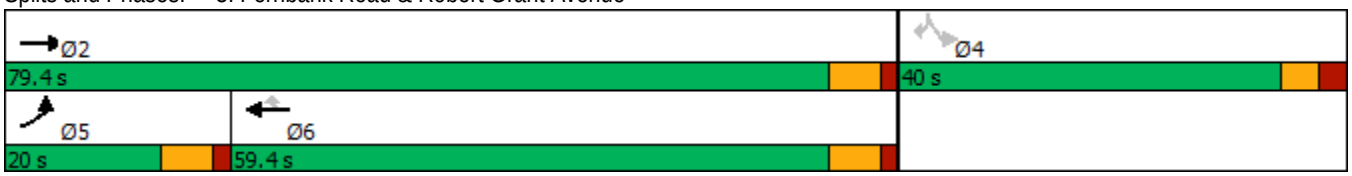
Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Roundabout LOS Method: SIDRA Roundabout LOS.
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
Roundabout Capacity Model: SIDRA Standard.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.



Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	29	302	199	186	224	27
Future Volume (vph)	29	302	199	186	224	27
Lane Group Flow (vph)	31	318	209	196	236	28
Turn Type	Prot	NA	NA	Perm	Perm	Perm
Protected Phases	5	2	6			
Permitted Phases				6	4	4
Detector Phase	5	2	6	6	4	4
Switch Phase						
Minimum Initial (s)	5.0	10.0	10.0	10.0	10.0	10.0
Minimum Split (s)	16.2	52.2	52.2	52.2	30.0	30.0
Total Split (s)	20.0	79.4	59.4	59.4	40.0	40.0
Total Split (%)	16.8%	66.5%	49.7%	49.7%	33.5%	33.5%
Yellow Time (s)	4.6	4.6	4.6	4.6	3.3	3.3
All-Red Time (s)	1.6	1.6	1.6	1.6	2.7	2.7
Lost Time Adjust (s)	0.9	0.9	-1.1	-1.1	0.7	0.7
Total Lost Time (s)	7.1	7.1	5.1	5.1	6.7	6.7
Lead/Lag	Lead		Lag	Lag		
Lead-Lag Optimize?	Yes		Yes	Yes		
Recall Mode	Max	Min	Min	Min	Max	Max
Act Effct Green (s)	12.9	34.0	16.0	16.0	33.4	33.4
Actuated g/C Ratio	0.16	0.42	0.20	0.20	0.41	0.41
v/c Ratio	0.14	0.43	0.60	0.45	0.35	0.05
Control Delay	32.9	18.6	37.2	7.9	19.1	6.8
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	32.9	18.6	37.2	7.9	19.1	6.8
LOS	C	B	D	A	B	A
Approach Delay		19.8	23.0		17.8	
Approach LOS		B	C		B	
Queue Length 50th (m)	4.2	33.6	29.6	0.0	24.1	0.0
Queue Length 95th (m)	12.4	53.1	49.9	15.5	46.3	5.0
Internal Link Dist (m)		217.9	258.1		237.6	
Turn Bay Length (m)	100.0			100.0	80.0	
Base Capacity (vph)	220	1591	1183	1004	682	615
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.14	0.20	0.18	0.20	0.35	0.05

Intersection Summary			
Cycle Length: 119.4			
Actuated Cycle Length: 81.2			
Natural Cycle: 100			
Control Type: Semi Act-Uncoord			
Maximum v/c Ratio: 0.60			
Intersection Signal Delay: 20.6		Intersection LOS: C	
Intersection Capacity Utilization 44.1%		ICU Level of Service A	
Analysis Period (min) 15			

Splits and Phases: 3: Fernbank Road & Robert Grant Avenue



MOVEMENT SUMMARY

Site: [FT2020 - Abbott/Robert Grant]

PM Peak
Roundabout

Movement Performance - Vehicles											
Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Robert Grant Avenue											
1	L2	177	2.0	0.176	9.0	LOS A	1.0	7.1	0.19	0.58	53.6
3	R2	73	2.0	0.176	4.1	LOS A	1.0	7.1	0.19	0.58	52.4
Approach		249	2.0	0.176	7.6	LOS A	1.0	7.1	0.19	0.58	53.3
East: Abbott Street East											
4	L2	117	2.0	0.150	8.2	LOS A	0.8	5.6	0.36	0.56	46.8
5	T1	61	2.0	0.150	3.7	LOS A	0.8	5.6	0.36	0.56	46.6
Approach		178	2.0	0.150	6.6	LOS A	0.8	5.6	0.36	0.56	46.7
West: Abbott Street E											
11	T1	52	2.0	0.231	3.4	LOS A	1.4	9.9	0.32	0.43	48.4
12	R2	247	2.0	0.231	3.5	LOS A	1.4	9.9	0.32	0.43	47.2
Approach		299	2.0	0.231	3.4	LOS A	1.4	9.9	0.32	0.43	47.4
All Vehicles		726	2.0	0.231	5.6	LOS A	1.4	9.9	0.29	0.51	49.1

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Roundabout LOS Method: SIDRA Roundabout LOS.
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
Roundabout Capacity Model: SIDRA Standard.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

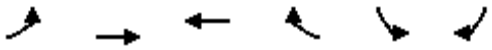
MOVEMENT SUMMARY

Site: [FT2020 - Bobolink/Robert Grant]

PM Peak
Roundabout

Movement Performance - Vehicles											
Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Robert Grant Avenue											
1	L2	2	2.0	0.205	9.3	LOS A	1.2	8.2	0.30	0.46	55.5
2	T1	172	2.0	0.205	4.7	LOS A	1.2	8.2	0.30	0.46	55.5
3	R2	92	2.0	0.205	4.5	LOS A	1.2	8.2	0.30	0.46	54.2
Approach		265	2.0	0.205	4.7	LOS A	1.2	8.2	0.30	0.46	55.1
East: Bobolink Drive											
4	L2	64	2.0	0.096	9.6	LOS A	0.5	3.6	0.35	0.59	53.6
5	T1	1	2.0	0.096	5.0	LOS A	0.5	3.6	0.35	0.59	53.7
6	R2	48	2.0	0.096	4.7	LOS A	0.5	3.6	0.35	0.59	52.4
Approach		114	2.0	0.096	7.5	LOS A	0.5	3.6	0.35	0.59	53.1
North: Robert Grant Avenue											
7	L2	112	2.0	0.224	9.1	LOS A	1.3	9.6	0.23	0.50	54.5
8	T1	196	2.0	0.224	4.4	LOS A	1.3	9.6	0.23	0.50	54.6
9	R2	5	2.0	0.224	4.2	LOS A	1.3	9.6	0.23	0.50	53.3
Approach		313	2.0	0.224	6.1	LOS A	1.3	9.6	0.23	0.50	54.5
West: Bobolink Drive											
10	L2	3	2.0	0.011	10.4	LOS B	0.1	0.4	0.47	0.55	54.2
11	T1	1	2.0	0.011	5.8	LOS A	0.1	0.4	0.47	0.55	54.3
12	R2	7	2.0	0.011	5.5	LOS A	0.1	0.4	0.47	0.55	53.0
Approach		12	2.0	0.011	6.9	LOS A	0.1	0.4	0.47	0.55	53.5
All Vehicles		703	2.0	0.224	5.8	LOS A	1.3	9.6	0.28	0.50	54.5

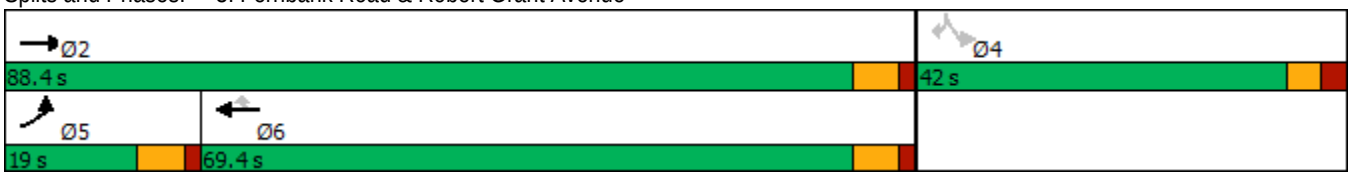
Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Roundabout LOS Method: SIDRA Roundabout LOS.
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
Roundabout Capacity Model: SIDRA Standard.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.



Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	17	250	449	266	209	26
Future Volume (vph)	17	250	449	266	209	26
Lane Group Flow (vph)	18	263	473	280	220	27
Turn Type	Prot	NA	NA	Perm	Perm	Perm
Protected Phases	5	2	6			
Permitted Phases				6	4	4
Detector Phase	5	2	6	6	4	4
Switch Phase						
Minimum Initial (s)	5.0	10.0	10.0	10.0	10.0	10.0
Minimum Split (s)	16.2	52.2	52.2	52.2	30.0	30.0
Total Split (s)	19.0	88.4	69.4	69.4	42.0	42.0
Total Split (%)	14.6%	67.8%	53.2%	53.2%	32.2%	32.2%
Yellow Time (s)	4.6	4.6	4.6	4.6	3.3	3.3
All-Red Time (s)	1.6	1.6	1.6	1.6	2.7	2.7
Lost Time Adjust (s)	0.9	0.9	-1.1	-1.1	0.7	0.7
Total Lost Time (s)	7.1	7.1	5.1	5.1	6.7	6.7
Lead/Lag	Lead		Lag	Lag		
Lead-Lag Optimize?	Yes		Yes	Yes		
Recall Mode	Max	Min	Min	Min	Max	Max
Act Effct Green (s)	12.0	50.3	33.2	33.2	35.5	35.5
Actuated g/C Ratio	0.12	0.50	0.33	0.33	0.36	0.36
v/c Ratio	0.09	0.30	0.80	0.41	0.38	0.05
Control Delay	44.0	15.0	40.6	4.6	28.3	9.9
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	44.0	15.0	40.6	4.6	28.3	9.9
LOS	D	B	D	A	C	A
Approach Delay		16.9	27.2		26.3	
Approach LOS		B	C		C	
Queue Length 50th (m)	3.1	28.2	81.6	0.0	31.0	0.0
Queue Length 95th (m)	10.5	43.1	117.0	15.4	60.6	6.4
Internal Link Dist (m)		217.9	258.1		237.6	
Turn Bay Length (m)	100.0			100.0	80.0	
Base Capacity (vph)	207	1436	1158	1054	576	509
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.09	0.18	0.41	0.27	0.38	0.05

Intersection Summary			
Cycle Length: 130.4			
Actuated Cycle Length: 99.7			
Natural Cycle: 100			
Control Type: Semi Act-Uncoord			
Maximum v/c Ratio: 0.80			
Intersection Signal Delay: 24.8		Intersection LOS: C	
Intersection Capacity Utilization 47.0%		ICU Level of Service A	
Analysis Period (min) 15			

Splits and Phases: 3: Fernbank Road & Robert Grant Avenue



Appendix K

SYNCHRO and SIDRA Capacity Analysis: Future Total Projected 2025 Conditions

DRAFT

MOVEMENT SUMMARY

Site: [FT2025 - Abbott/Robert Grant]

AM Peak
Roundabout

Movement Performance - Vehicles											
Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Robert Grant Avenue											
1	L2	267	2.0	0.276	8.9	LOS A	1.7	12.1	0.13	0.57	54.1
3	R2	162	2.0	0.276	4.0	LOS A	1.7	12.1	0.13	0.57	52.9
Approach		429	2.0	0.276	7.0	LOS A	1.7	12.1	0.13	0.57	53.6
East: Abbott Street East											
4	L2	56	2.0	0.108	8.6	LOS A	0.5	3.9	0.42	0.55	47.0
5	T1	64	2.0	0.108	4.1	LOS A	0.5	3.9	0.42	0.55	46.9
Approach		120	2.0	0.108	6.2	LOS A	0.5	3.9	0.42	0.55	46.9
West: Abbott Street E											
11	T1	25	2.0	0.127	3.0	LOS A	0.7	5.0	0.20	0.39	48.7
12	R2	149	2.0	0.127	3.1	LOS A	0.7	5.0	0.20	0.39	47.6
Approach		175	2.0	0.127	3.1	LOS A	0.7	5.0	0.20	0.39	47.7
All Vehicles		724	2.0	0.276	5.9	LOS A	1.7	12.1	0.20	0.52	50.9

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Roundabout LOS Method: SIDRA Roundabout LOS.
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
Roundabout Capacity Model: SIDRA Standard.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

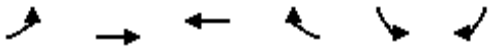
MOVEMENT SUMMARY

Site: [FT2025 - Bobolink/Robert Grant]

AM Peak
Roundabout

Movement Performance - Vehicles											
Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Robert Grant Avenue											
1	L2	2	2.0	0.190	8.9	LOS A	1.1	7.7	0.17	0.41	56.0
2	T1	246	2.0	0.190	4.3	LOS A	1.1	7.7	0.17	0.41	56.0
3	R2	28	2.0	0.190	4.1	LOS A	1.1	7.7	0.17	0.41	54.7
Approach		277	2.0	0.190	4.3	LOS A	1.1	7.7	0.17	0.41	55.9
East: Bobolink Drive											
4	L2	96	2.0	0.171	10.0	LOS B	0.9	6.5	0.43	0.62	53.6
5	T1	1	2.0	0.171	5.4	LOS A	0.9	6.5	0.43	0.62	53.7
6	R2	95	2.0	0.171	5.2	LOS A	0.9	6.5	0.43	0.62	52.4
Approach		192	2.0	0.171	7.6	LOS A	0.9	6.5	0.43	0.62	53.0
North: Robert Grant Avenue											
7	L2	41	2.0	0.147	9.2	LOS A	0.8	5.9	0.28	0.48	54.8
8	T1	144	2.0	0.147	4.6	LOS A	0.8	5.9	0.28	0.48	54.9
9	R2	5	2.0	0.147	4.4	LOS A	0.8	5.9	0.28	0.48	53.6
Approach		191	2.0	0.147	5.6	LOS A	0.8	5.9	0.28	0.48	54.8
West: Bobolink Drive											
10	L2	1	2.0	0.004	9.9	LOS A	0.0	0.1	0.41	0.50	54.5
11	T1	1	2.0	0.004	5.3	LOS A	0.0	0.1	0.41	0.50	54.5
12	R2	2	2.0	0.004	5.1	LOS A	0.0	0.1	0.41	0.50	53.2
Approach		4	2.0	0.004	6.3	LOS A	0.0	0.1	0.41	0.50	53.9
All Vehicles		663	2.0	0.190	5.7	LOS A	1.1	7.7	0.28	0.49	54.7

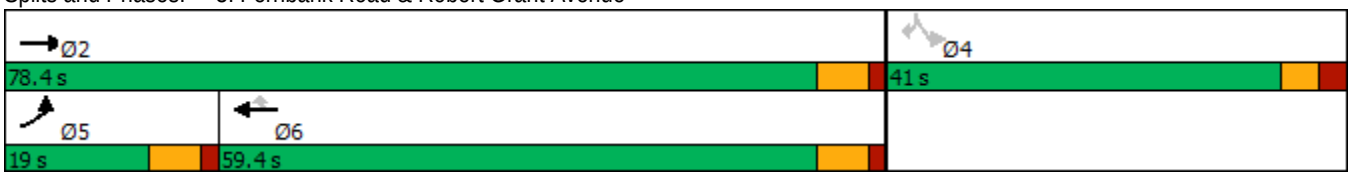
Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Roundabout LOS Method: SIDRA Roundabout LOS.
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
Roundabout Capacity Model: SIDRA Standard.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.



Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	39	338	228	203	249	34
Future Volume (vph)	39	338	228	203	249	34
Lane Group Flow (vph)	41	356	240	214	262	36
Turn Type	Prot	NA	NA	Perm	Perm	Perm
Protected Phases	5	2	6			
Permitted Phases				6	4	4
Detector Phase	5	2	6	6	4	4
Switch Phase						
Minimum Initial (s)	5.0	10.0	10.0	10.0	10.0	10.0
Minimum Split (s)	16.2	52.2	52.2	52.2	30.0	30.0
Total Split (s)	19.0	78.4	59.4	59.4	41.0	41.0
Total Split (%)	15.9%	65.7%	49.7%	49.7%	34.3%	34.3%
Yellow Time (s)	4.6	4.6	4.6	4.6	3.3	3.3
All-Red Time (s)	1.6	1.6	1.6	1.6	2.7	2.7
Lost Time Adjust (s)	0.9	0.9	-1.1	-1.1	0.7	0.7
Total Lost Time (s)	7.1	7.1	5.1	5.1	6.7	6.7
Lead/Lag	Lead		Lag	Lag		
Lead-Lag Optimize?	Yes		Yes	Yes		
Recall Mode	Max	Min	Min	Min	Max	Max
Act Effct Green (s)	11.9	34.7	17.6	17.6	34.4	34.4
Actuated g/C Ratio	0.14	0.42	0.21	0.21	0.41	0.41
v/c Ratio	0.21	0.48	0.64	0.46	0.38	0.06
Control Delay	36.0	19.8	37.9	7.4	19.8	6.3
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	36.0	19.8	37.9	7.4	19.8	6.3
LOS	D	B	D	A	B	A
Approach Delay		21.5	23.5		18.2	
Approach LOS		C	C		B	
Queue Length 50th (m)	5.8	39.5	34.7	0.0	27.7	0.0
Queue Length 95th (m)	15.8	61.5	56.8	15.8	52.7	5.7
Internal Link Dist (m)		217.9	258.1		237.6	
Turn Bay Length (m)	100.0			100.0	80.0	
Base Capacity (vph)	199	1539	1160	995	689	626
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.21	0.23	0.21	0.22	0.38	0.06

Intersection Summary			
Cycle Length: 119.4			
Actuated Cycle Length: 82.9			
Natural Cycle: 100			
Control Type: Semi Act-Uncoord			
Maximum v/c Ratio: 0.64			
Intersection Signal Delay: 21.4		Intersection LOS: C	
Intersection Capacity Utilization 47.1%		ICU Level of Service A	
Analysis Period (min) 15			

Splits and Phases: 3: Fernbank Road & Robert Grant Avenue



MOVEMENT SUMMARY

Site: [FT2025 - Abbott/Robert Grant]

PM Peak
Roundabout

Movement Performance - Vehicles											
Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Robert Grant Avenue											
1	L2	198	2.0	0.209	9.0	LOS A	1.3	8.9	0.21	0.57	53.7
3	R2	98	2.0	0.209	4.2	LOS A	1.3	8.9	0.21	0.57	52.5
Approach		296	2.0	0.209	7.4	LOS A	1.3	8.9	0.21	0.57	53.3
East: Abbott Street East											
4	L2	146	2.0	0.183	8.3	LOS A	1.0	7.1	0.39	0.58	46.6
5	T1	67	2.0	0.183	3.8	LOS A	1.0	7.1	0.39	0.58	46.4
Approach		214	2.0	0.183	6.9	LOS A	1.0	7.1	0.39	0.58	46.6
West: Abbott Street E											
11	T1	57	2.0	0.267	3.6	LOS A	1.7	11.8	0.37	0.46	48.2
12	R2	277	2.0	0.267	3.6	LOS A	1.7	11.8	0.37	0.46	47.1
Approach		334	2.0	0.267	3.6	LOS A	1.7	11.8	0.37	0.46	47.3
All Vehicles		843	2.0	0.267	5.8	LOS A	1.7	11.8	0.32	0.53	49.0

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Roundabout LOS Method: SIDRA Roundabout LOS.
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
Roundabout Capacity Model: SIDRA Standard.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

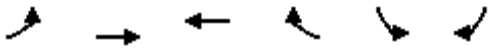
MOVEMENT SUMMARY

Site: [FT2025 - Bobolink/Robert Grant]

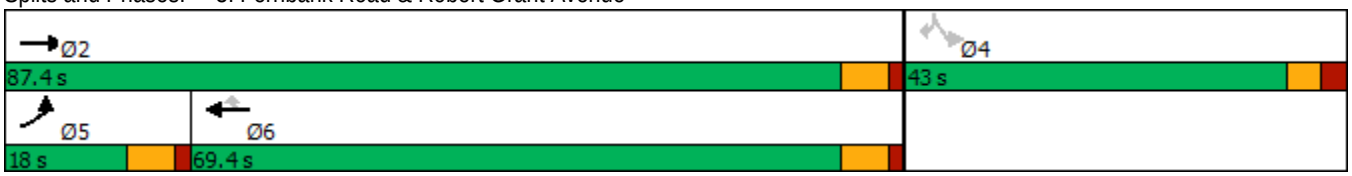
PM Peak
Roundabout

Movement Performance - Vehicles											
Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Robert Grant Avenue											
1	L2	2	2.0	0.235	9.3	LOS A	1.4	9.8	0.31	0.46	55.4
2	T1	213	2.0	0.235	4.7	LOS A	1.4	9.8	0.31	0.46	55.5
3	R2	92	2.0	0.235	4.5	LOS A	1.4	9.8	0.31	0.46	54.1
Approach		306	2.0	0.235	4.7	LOS A	1.4	9.8	0.31	0.46	55.1
East: Bobolink Drive											
4	L2	64	2.0	0.100	9.8	LOS A	0.5	3.7	0.39	0.60	53.5
5	T1	1	2.0	0.100	5.2	LOS A	0.5	3.7	0.39	0.60	53.6
6	R2	48	2.0	0.100	4.9	LOS A	0.5	3.7	0.39	0.60	52.3
Approach		114	2.0	0.100	7.7	LOS A	0.5	3.7	0.39	0.60	53.0
North: Robert Grant Avenue											
7	L2	112	2.0	0.259	9.1	LOS A	1.6	11.6	0.24	0.49	54.6
8	T1	247	2.0	0.259	4.5	LOS A	1.6	11.6	0.24	0.49	54.7
9	R2	5	2.0	0.259	4.2	LOS A	1.6	11.6	0.24	0.49	53.4
Approach		364	2.0	0.259	5.9	LOS A	1.6	11.6	0.24	0.49	54.7
West: Bobolink Drive											
10	L2	3	2.0	0.012	10.6	LOS B	0.1	0.4	0.50	0.56	54.1
11	T1	1	2.0	0.012	6.0	LOS A	0.1	0.4	0.50	0.56	54.2
12	R2	7	2.0	0.012	5.8	LOS A	0.1	0.4	0.50	0.56	52.9
Approach		12	2.0	0.012	7.1	LOS A	0.1	0.4	0.50	0.56	53.3
All Vehicles		796	2.0	0.259	5.7	LOS A	1.6	11.6	0.29	0.49	54.6

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Roundabout LOS Method: SIDRA Roundabout LOS.
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
Roundabout Capacity Model: SIDRA Standard.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.



Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	34	287	502	284	234	32
Future Volume (vph)	34	287	502	284	234	32
Lane Group Flow (vph)	36	302	528	299	246	34
Turn Type	Prot	NA	NA	Perm	Perm	Perm
Protected Phases	5	2	6			
Permitted Phases				6	4	4
Detector Phase	5	2	6	6	4	4
Switch Phase						
Minimum Initial (s)	5.0	10.0	10.0	10.0	10.0	10.0
Minimum Split (s)	16.2	52.2	52.2	52.2	30.0	30.0
Total Split (s)	18.0	87.4	69.4	69.4	43.0	43.0
Total Split (%)	13.8%	67.0%	53.2%	53.2%	33.0%	33.0%
Yellow Time (s)	4.6	4.6	4.6	4.6	3.3	3.3
All-Red Time (s)	1.6	1.6	1.6	1.6	2.7	2.7
Lost Time Adjust (s)	0.9	0.9	-1.1	-1.1	0.7	0.7
Total Lost Time (s)	7.1	7.1	5.1	5.1	6.7	6.7
Lead/Lag	Lead		Lag	Lag		
Lead-Lag Optimize?	Yes		Yes	Yes		
Recall Mode	Max	Min	Min	Min	Max	Max
Act Effct Green (s)	11.0	54.0	37.8	37.8	36.6	36.6
Actuated g/C Ratio	0.11	0.52	0.36	0.36	0.35	0.35
v/c Ratio	0.20	0.33	0.82	0.41	0.43	0.07
Control Delay	49.5	15.4	40.9	4.1	31.2	9.8
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	49.5	15.4	40.9	4.1	31.2	9.8
LOS	D	B	D	A	C	A
Approach Delay		19.1	27.6		28.6	
Approach LOS		B	C		C	
Queue Length 50th (m)	6.8	34.0	95.1	0.0	37.8	0.0
Queue Length 95th (m)	18.5	50.4	133.7	15.3	72.7	7.5
Internal Link Dist (m)		217.9	258.1		237.6	
Turn Bay Length (m)	100.0			100.0	80.0	
Base Capacity (vph)	181	1356	1107	1027	566	505
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.20	0.22	0.48	0.29	0.43	0.07

Intersection Summary	
Cycle Length: 130.4	
Actuated Cycle Length: 104.5	
Natural Cycle: 100	
Control Type: Semi Act-Uncoord	
Maximum v/c Ratio: 0.82	
Intersection Signal Delay: 25.8	Intersection LOS: C
Intersection Capacity Utilization 55.0%	ICU Level of Service B
Analysis Period (min) 15	

Splits and Phases: 3: Fernbank Road & Robert Grant Avenue