



June 2020

René's Court 1000 Robert Grant Ave

Transportation Impact Assessment Report



PARSONS

René's Court
1000 Robert Grant Ave

TIA Report

prepared for:
Lépine Corporation
206-555 Legget Drive, Tower A
Ottawa, ON K2K 2X3

prepared by:
PARSONS
1223 Michael Street North
Suite 100
Ottawa, ON K1J 7T2

June 22, 2020

476799 - 01000

Document Control Page

CLIENT:	Lépine Corporation
PROJECT NAME:	Transportation Impact Assessment – René’s Court
REPORT TITLE:	René’s Court (1000 Robert Grant Ave) – TIA Report
PARSONS PROJECT NO:	476799 - 01000
VERSION:	Final
DIGITAL MASTER:	H:\ISO\476799\1000\DOCS\Step_5_TIA_Report - Submission #2\476799-LepineRenesCourt_TIA_06.19.20.docx
ORIGINATOR	Basel Ansari, E.I.T.
REVIEWER:	Austin Shih, M.A.Sc., P.Eng.
AUTHORIZATION:	City of Ottawa
CIRCULATION LIST:	Josiane Gervais, P.Eng.
HISTORY:	TIA Step 4 Submission – June 21, 2019 TIA Step 5 Submission – November 11, 2019 TIA Step 5 Re-submission – June 22, 2020





TIA Plan Reports

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

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

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

CERTIFICATION

1. I have reviewed and have a sound understanding of the objectives, needs and requirements of the City of Ottawa's Official Plan, Transportation Master Plan and the Transportation Impact Assessment (2017) Guidelines;
2. I have a sound knowledge of industry standard practice with respect to the preparation of transportation impact assessment reports, including multi modal level of service review;
3. I have substantial experience (more than 5 years) in undertaking and delivering transportation impact studies (analysis, reporting and geometric design) with strong background knowledge in transportation planning, engineering or traffic operations; and
4. I am either a licensed¹ or registered² 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.

City Of Ottawa
Infrastructure Services and Community
Sustainability
Planning and Growth Management
110 Laurier Avenue West, 4th fl.
Ottawa, ON K1P 1J1
Tel. : 613-580-2424
Fax: 613-560-6006

Ville d'Ottawa
Services d'infrastructure et Viabilité des
collectivités
Urbanisme et Gestion de la croissance
110, avenue Laurier Ouest
Ottawa (Ontario) K1P 1J1
Tél. : 613-580-2424
Télécopieur: 613-560-6006

Dated at Ottawa this 22 day of June 2020.
(City)

Name: Austin Shih
(Please Print)

Professional Title: Senior Project Manager



Signature of Individual certifier that s/he meets the above four criteria

Office Contact Information (Please Print)
Address: 1223 Michael Street North, Suite 100
City / Postal Code: Ottawa, Ontario, K1J 7T2
Telephone / Extension: 613-219-6836
E-Mail Address: austin.shih@parsons.com

Table of Contents

1. SCREENING FORM.....	1
2. SCOPING REPORT.....	1
2.1. EXISTING AND PLANNED CONDITIONS.....	1
2.1.1. Proposed Development	1
2.1.2. Existing Conditions.....	2
2.1.3. Planned Conditions.....	6
2.2. STUDY AREA AND TIME PERIODS	9
2.3. EXEMPTION REVIEW	10
3. FORECASTING	11
3.1. DEVELOPMENT GENERATED TRAVEL DEMAND.....	11
3.1.1. Trip Generation and Mode Shares	11
3.1.2. Trip Distribution and Assignment.....	11
3.2. BACKGROUND NETWORK TRAFFIC	12
3.2.1. Transportation Network Plans.....	12
3.2.2. Background Growth	12
3.2.3. Other Developments	13
3.2.4. Total background traffic.....	17
3.3. DEMAND RATIONALIZATION	19
4. ANALYSIS	19
4.1. DEVELOPMENT DESIGN	19
4.2. PARKING.....	19
4.3. BOUNDARY STREET DESIGN	20
4.4. ACCESS INTERSECTION DESIGN.....	20
4.5. TRANSPORTATION DEMAND MANAGEMENT	20
4.6. NEIGHBOURHOOD TRAFFIC MANAGEMENT.....	20
4.7. TRANSIT.....	22
4.8. REVIEW OF NETWORK CONCEPT	22
4.9. INTERSECTION DESIGN	22
4.9.1. INTERSECTION CONTROL	22
4.9.2. INTERSECTION DESIGN	22
5. CONCLUSIONS AND RECOMMENDATIONS	26

List of Figures

Figure 1: Local Context	1
Figure 2: Concept Plan.....	2
Figure 3: Area Transit Network.....	5
Figure 4: Bus Stop Locations.....	5
Figure 5: Existing Peak Hour Traffic Volumes.....	6

Figure 6: Future Robert Grant Ave Concept.....	7
Figure 7: Other Area Developments.....	9
Figure 8: Study Area.....	10
Figure 9: Lépine Residential Development Site-Generated Traffic.....	12
Figure 10: Future Background 2023.....	13
Figure 11: Future Background 2028.....	13
Figure 12: 2023 Total Adjacent Development Traffic Volumes.....	16
Figure 13: 2028 Total Adjacent Development Traffic Volumes.....	17
Figure 14: Future 2023 Total Background Traffic Volumes.....	18
Figure 15: Future 2028 Total Background Traffic Volumes.....	19
Figure 16: Bobolink Cross-section.....	21
Figure 17: Future 2023 Total Projected Traffic Volumes.....	24
Figure 18: Future 2028 Total Projected Traffic Volumes.....	25

List of Tables

Table 1: Exemptions Review Summary.....	10
Table 2: TRANS Trip Generation Residential Trip Rates.....	11
Table 3: Apartment Units Vehicle Trip Generation.....	11
Table 4: Mode Shares for the Lépine Residential Buildings Development.....	11
Table 5: Fernbank/Eagleson Historical Traffic Growth (2009-2017).....	13
Table 6: Fernbank Crossing Total New Auto Trips Generated.....	14
Table 7: Blackstone South Total New Auto Trips Generated.....	14
Table 8: CRT Lands Total New Auto Trips Generated.....	15
Table 9: Existing Conditions Intersection Performance.....	23
Table 10: Future 2023 Total Background Intersection Performance.....	23
Table 11: Future 2028 Total Background Intersection Performance.....	24
Table 12: Future 2023 Total Projected Performance at Study Area Intersections.....	25
Table 13: Future 2028 Total Projected Performance at Study Area Intersections.....	26
Table 14: MMLOS Analysis at the Intersection of Fernbank/Robert Grant.....	26

List of Appendices

APPENDIX A – Screening Form and Correspondence
APPENDIX B – Transit Route Maps
APPENDIX C – City of Ottawa Traffic Data
APPENDIX D – City of Ottawa Collision Data
APPENDIX E – Background Growth Analysis
APPENDIX F – 5786 Fernbank Development
APPENDIX G – TDM Checklist
APPENDIX H – SYNCHRO and SIDRA Capacity Analysis
APPENDIX I – MMLOS Analysis for Signalized Intersections

TIA 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 City of Ottawa comments and responses 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 four to eighteen storeys with 504 units in total. Buildout has been assumed in a single phase, by 2023 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 concept plan is shown in **Figure 2**.

Figure 1: Local Context



Figure 2: Concept Plan



Building A consists of a 4-6 storey building housing 107 apartment units. Building B consists of a 9-storey building, housing 150 apartment units. Building C consists of an 18-storey building, housing 247 apartment units. Building AM is a 1 storey amenity space.

Two accesses are proposed to serve the development site. The main access is proposed via Robert Grant Avenue, which leads to an internal roundabout, a ramp to the underground parking garage (south of Building B) and sixteen surface parking spaces. The main access intersection with Robert Grant Ave is expected to permit right-in/right-out only vehicular movements only. It is expected the majority of site generated traffic will use this access.

A secondary access is proposed as a full movement driveway connection to Livery Street, which leads directly to the underground parking garage. This secondary access takes a more circuitous route but provides redundancy if the primary access off Robert Grant is ever unavailable.

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.

PARSONS

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. The Abbott St E connection to Terry Fox Drive was recently completed.

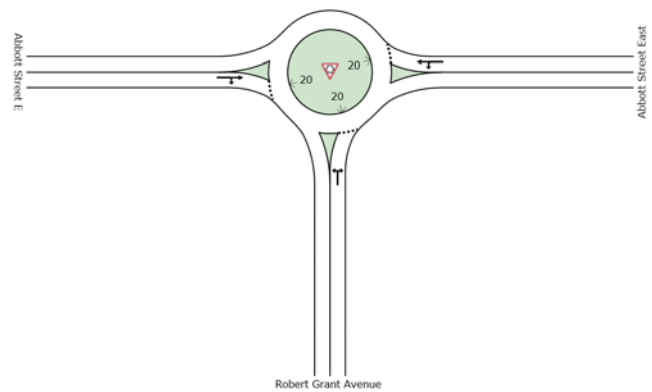
Bobolink Ridge is an east-west local roadway that extends from Robert Grant Avenue in the west and terminates at Asturcon Street in the east. It has a two-lane cross-section and an unposted speed understood to be 50 km/h.

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

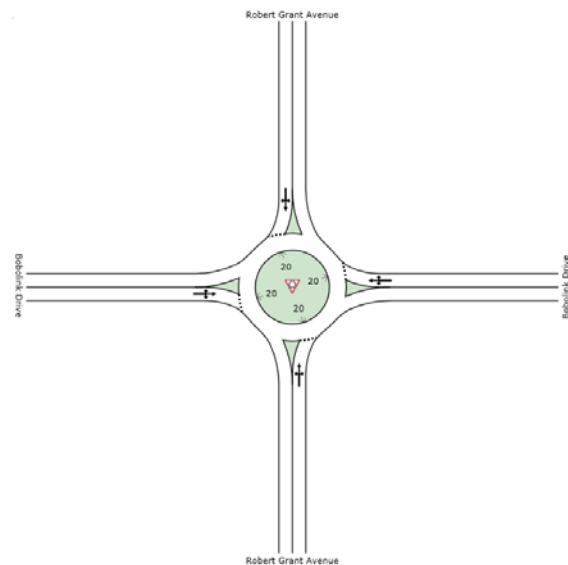
Abbott Street E/Robert Grant

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.



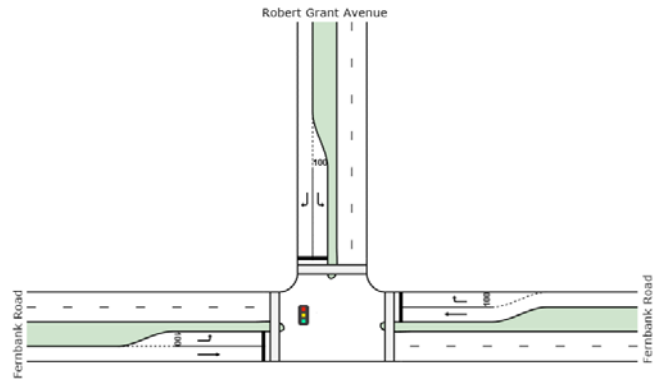
Bobolink/Robert Grant

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.



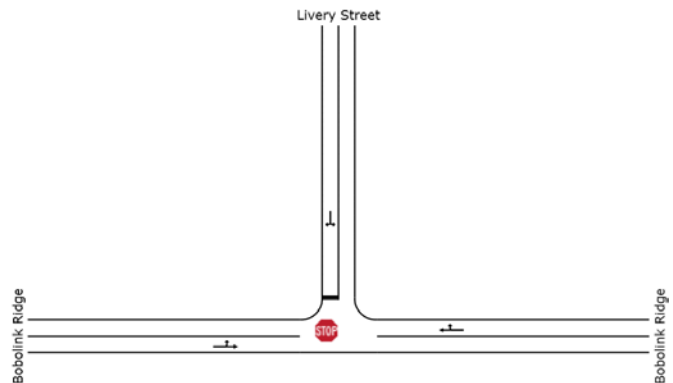
Fernbank/Robert Grant

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.



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.

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

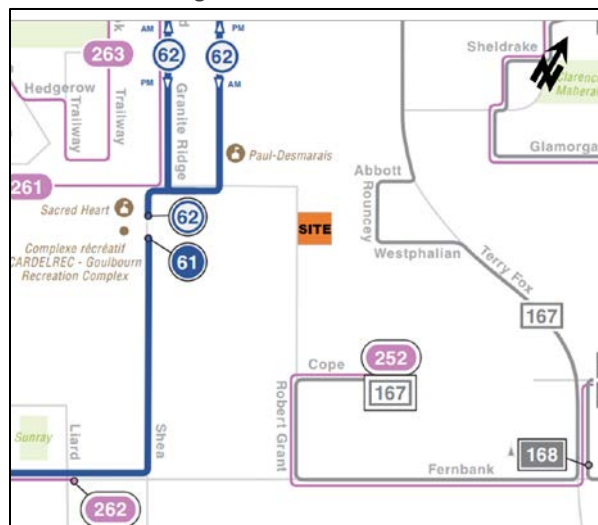
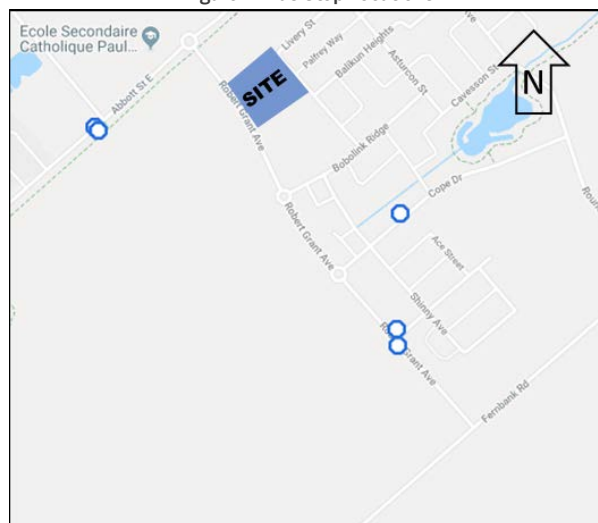


Figure 4: Bus Stop Locations

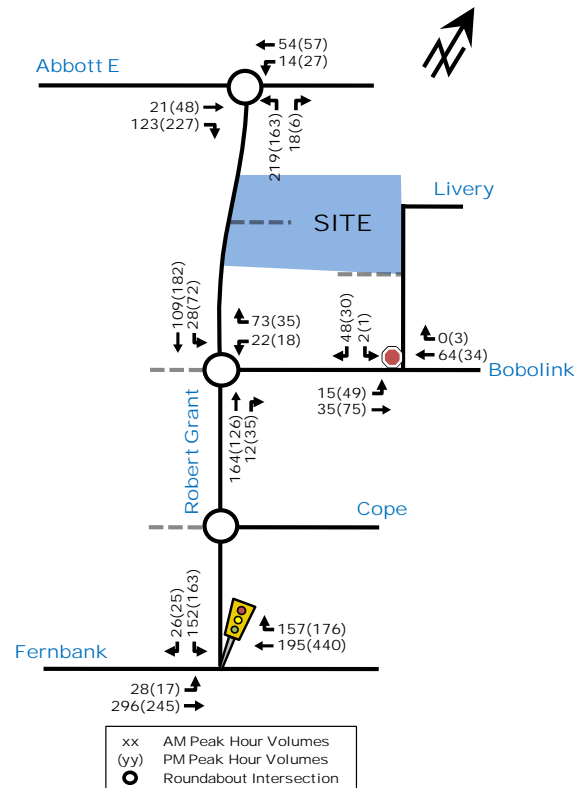


Peak Hour Travel Demand

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

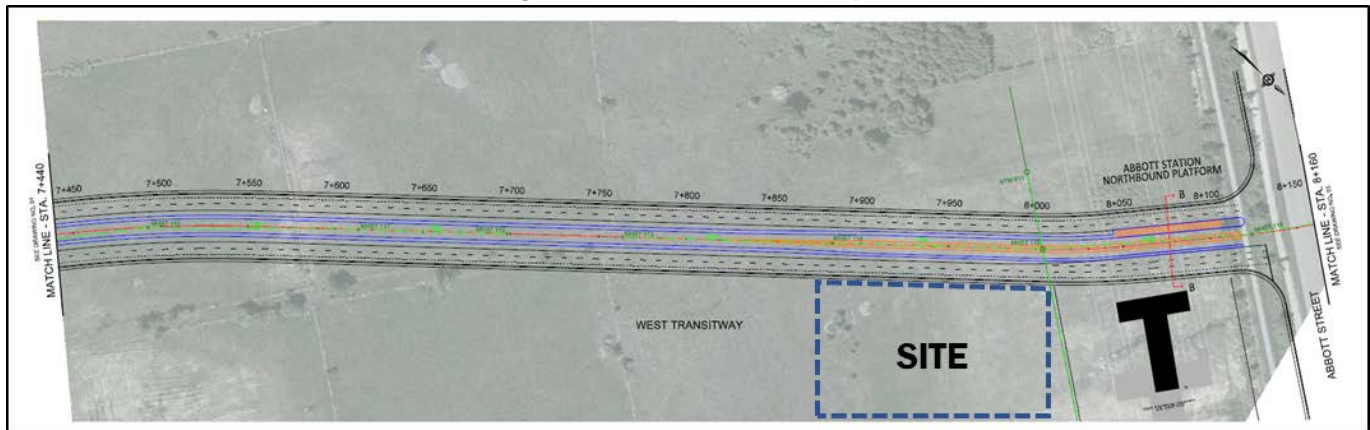
Planned Study Area Transportation Network Changes

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.

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, located west of Robert Grant Ave, across from the future Lépine Development. The City has confirmed phase 1 of this development will be built-out in the next five-years, with 311 single-family homes and 265 townhome units built (see attached plan in **Appendix F**). Trip generation estimates for phase 1 were completed and incorporated in the future traffic analysis.

700 Cope Dr (Stittsville High School)

A two-phase construction of a high school (grades 7-12) is proposed by OCDSB at 700 Cope Dr, with an initial date of occupancy of 2022 and full buildout at 2024. Based on a recent TIA Report by Parsons, the school is expected to generate a total of 230 and 155 veh/h at full buildout during the morning and afternoon peak hours, respectively. These volumes were included in the future traffic analysis.

240 Livery Street

Cardel Homes is proposing to build eleven residential buildings, each containing twelve residential units (112 total). The development site is located approximately 400m east of Robert Grant Ave and is expected to generate less than 60 veh/h. As such, vehicle trips generated by this development were accounted for in the future traffic analysis.

306 Livery Street

Construction is near completion for 8 low-rise apartment blocks consisting of 12 apartment units each (96 total), that was proposed by Abbott Fernbank Holdings Inc. and Phoenix Properties Inc. The development is located at the northwest corner of Livery St/Tapadero Ave and is expected to generate less than 60 veh/h. As such, vehicle trips generated by this development were accounted for in the future traffic analysis.

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. As identified by the TIA Guidelines (2017), the horizon years analyzed are the buildout date 2023 and five-years after buildout, 2028. 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, 4.3, 4.4)	All elements	Not required for rezoning applications.
4.8 Review of Network Concept	All elements	The purpose of this Zoning By-Law Amendment Application is to make changes to the existing zoning by increasing the permitted building height, seek an exception to Section 101(6)(c) in the City of Ottawa Parking Provisions, and providing an additional building setback to the south side of the property. The maximum allowed residential unit density of the development is no different for the proposed zoning than the existing zoning. As such, section 4.8 is exempt.

Typically, Module 4.2. Parking is exempt from the TIA since the application is only seeking a zoning by-law amendment. However, the City of Ottawa has requested Module 4.2 Parking be included to discuss parking implications.

3. FORECASTING

3.1. DEVELOPMENT GENERATED TRAVEL DEMAND

3.1.1. TRIP GENERATION AND MODE SHARES

The proposed development will consist of 504 apartment dwelling units, housed within two mid-rise and one 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)	257	18	57	75	58	37	95
High-Rise Apartments (10+ floors)	247	17	55	72	55	34	89

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 Lépine 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%	47	154	201	155	96	251
Auto Passenger	15%	12	37	49	37	25	62
Transit	15%	11	39	50	38	25	63
Walking	10%	8	26	34	26	16	42
Cycling	0%	0	0	0	0	0	0
Total Person Trips	100%	78	256	334	256	162	418
Total 'New' Auto Trips		47	154	201	155	96	251

As shown in **Table 4**, the resulting number of total person trips expected to be generated by the proposed development are approximately 335 and 420 in the morning and afternoon peak hours respectively. The projected 'new' vehicle trips are approximately 200 and 250 in the weekday morning and afternoon peak hours respectively.

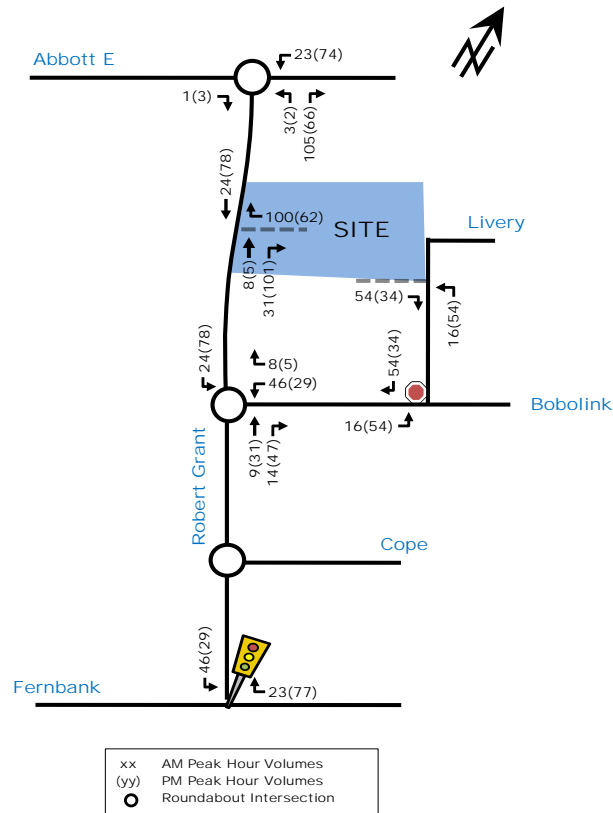
3.1.2. TRIP DISTRIBUTION AND ASSIGNMENT

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.

Figure 9: Lépine 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 (RIRO) 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 2023 and 2028 horizons.

Figure 10: Future Background 2023

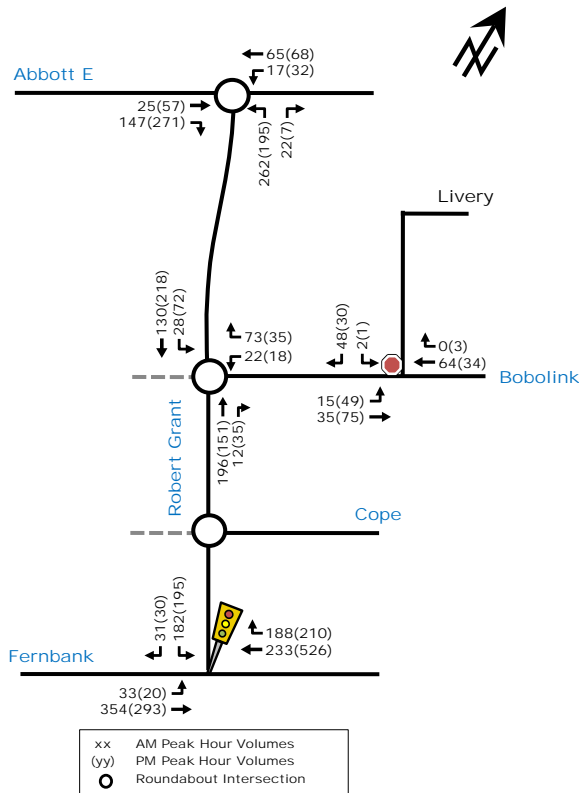
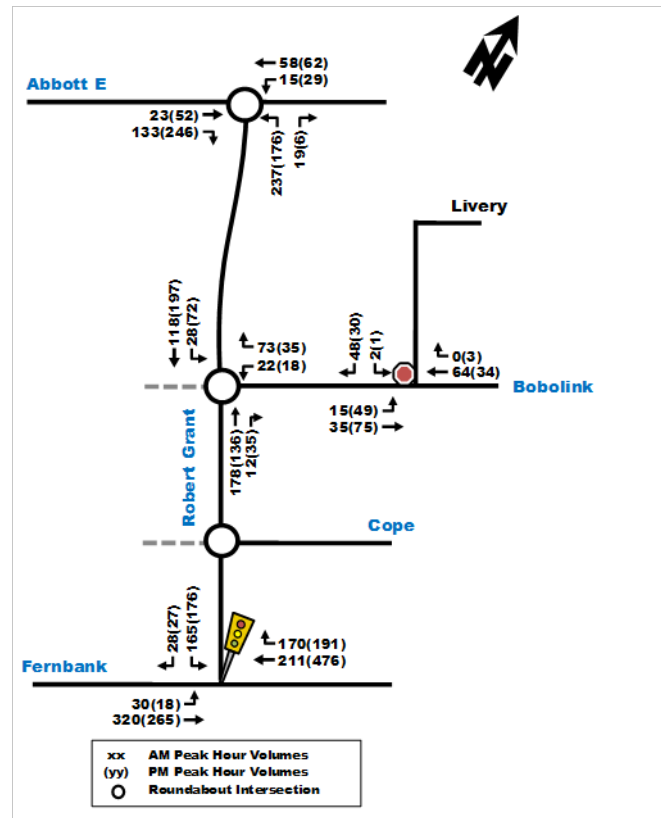


Figure 11: Future Background 2028



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 and have an impact on the study area of the proposed Lépine 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, Phase 1 – 5786 Fernbank Rd
- Stittsville High School - 700 Cope Dr

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 vehicle 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.

CRT Lands, Phase 1

The most recent traffic information available for this development is a Transportation Brief, submitted by the IBI Group in 2011. However, the City provided more recent information regarding the development which reveals that construction of phase 1 of the CRT Lands is currently underway and is expected to reach full build-out within the next five years, with a total of 311 single-family homes and 265 townhomes constructed. See **Appendix F** for the transportation brief and the plan sent by the City. **Table 8** below provides the expected number of auto trips generated by phase 1 of the CRT Lands development.

Table 8: CRT Lands 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	311	69	169	238	162	100	262
Townhouse Units	265	56	100	156	97	87	184
Total	576	125	269	394	259	187	446

As shown in **Table 8**, the total number of trips anticipated to be generated by phase 1 of the CRT Lands development is 394 and 446 veh/h during the morning and afternoon peak hour periods, respectively. The auto trips were distributed based on the distribution provided in the IBI Transportation Brief, as follows:

- 50% to/from Cope Dr;
- 35% to/from Bobolink Ridge; and
- 15% to/from a future access on Abbott Street East.

Stittsville High School

Trip generation and traffic volumes assignment and distribution for Stittsville High School were obtained from the report that was recently submitted by Parsons. At initial occupancy in 2022, the high school is estimated to generate a total of 142 and 102 veh/h during the morning and afternoon peak hours, respectively. At full buildout in 2024, the high school is estimated to generate a total of 230 and 155 veh/h during the morning and afternoon peak hours, respectively.

Total Adjacent Development Traffic

Some of the identified other area development are not expected to be fully constructed by horizon year 2023, but will be accounted for in horizon year 2028. The other area developments to be accounted for in each horizon year are listed below.

Horizon Year 2023
Fernbank Crossing
Stittsville High School Initial Occupancy

Horizon Year 2028
Fernbank Crossing
Blackstone South
CRT Lands
Stittsville High School Full Buildout

Figure 12 and **Figure 13** illustrate the traffic volumes expected to be generated by adjacent developments at horizon years 2023 and 2028.

Figure 12: 2023 Total Adjacent Development Traffic Volumes

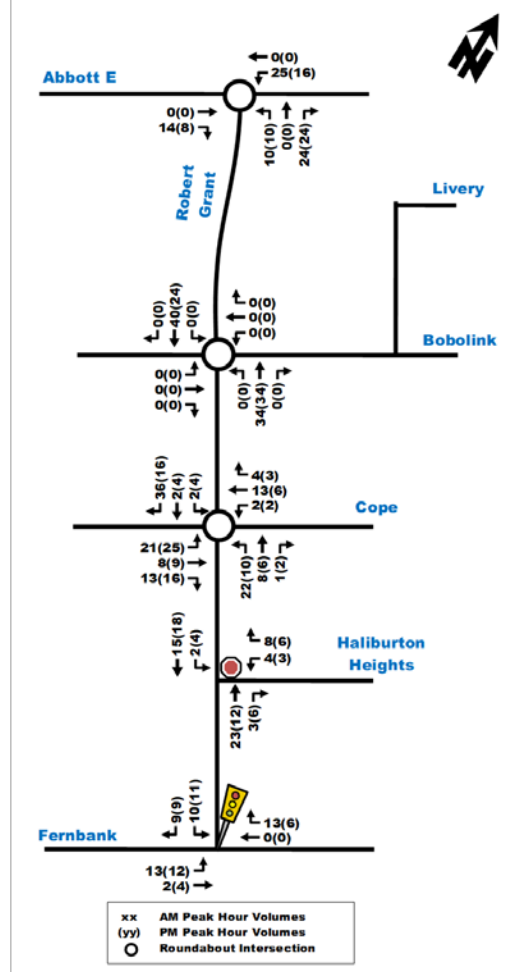
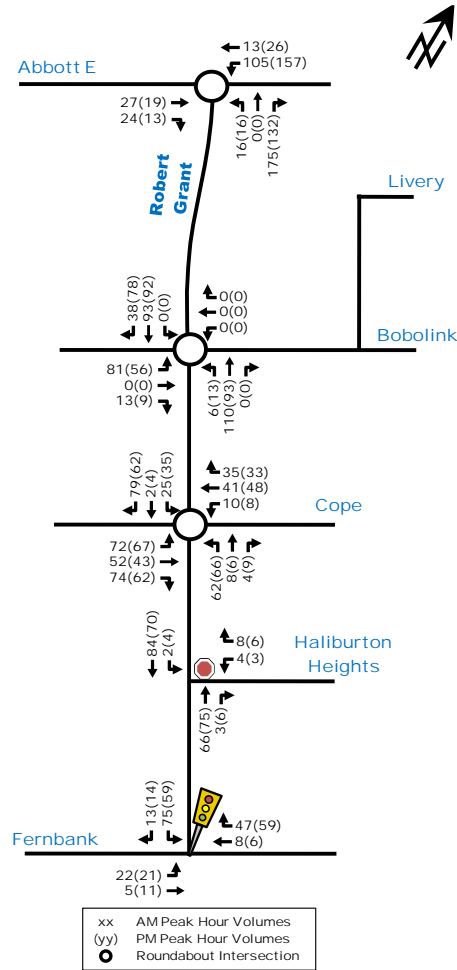


Figure 13: 2028 Total Adjacent Development Traffic Volumes



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.

By 2028, 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 2028.

The Future 2023 Total Background traffic volumes is illustrated in **Figure 14**, which is the sum of the future 2023 background traffic volumes in **Figure 10** and the 2023 total adjacent development volumes in **Figure 12**. The Future 2028 Total Background traffic volumes is illustrated in **Figure 15**, which is the sum of the Future 2028 background traffic volumes from **Figure 11** and 2028 total adjacent development volumes from **Figure 13**.

Figure 14: Future 2023 Total Background Traffic Volumes

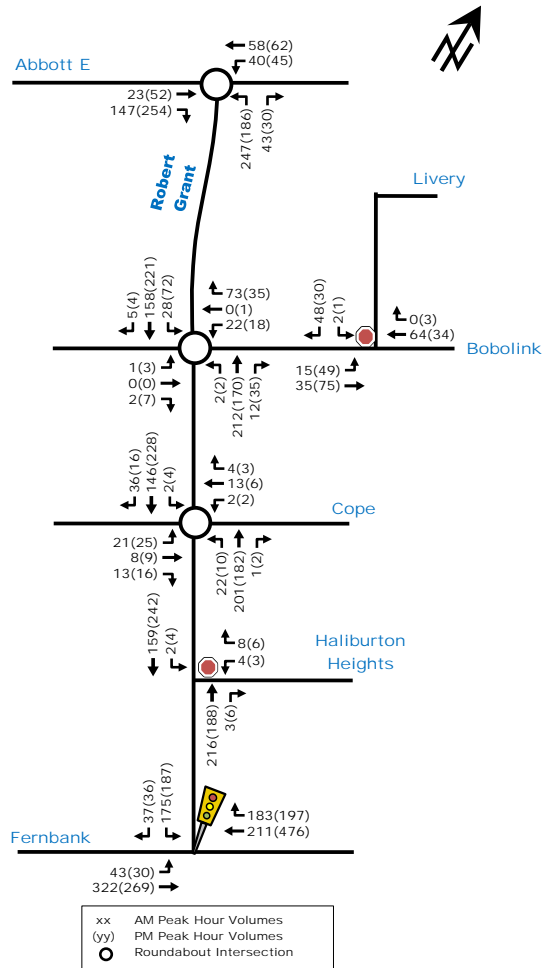
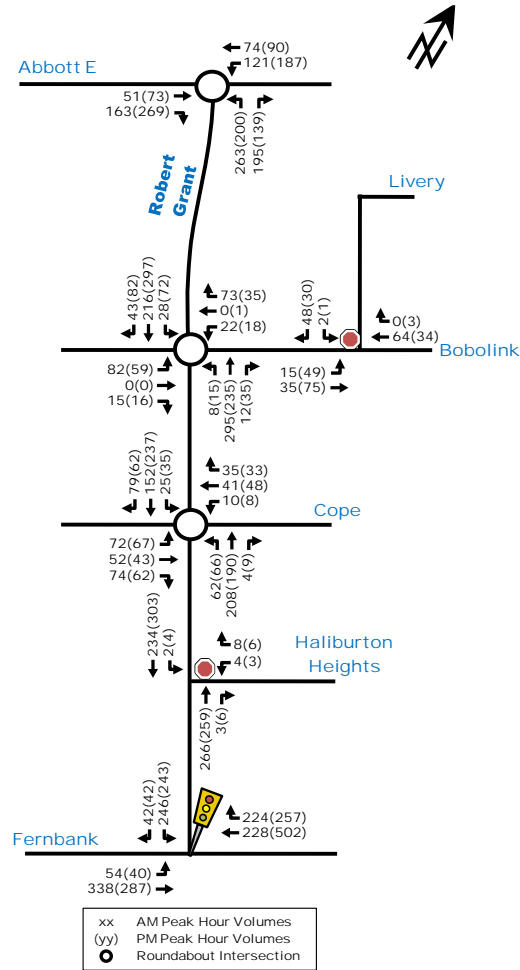


Figure 15: Future 2028 Total Background Traffic Volumes



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 following analysis section.

4. ANALYSIS

4.1. DEVELOPMENT DESIGN

Exempt – see Section 2.3.

4.2. PARKING

The subject site is located in “Area C” according to Schedule 1A within Part 4 – Parking, Queuing and Loading Provisions (Sections 100 to 112) of the City of Ottawa Zoning By-Law.

Auto Parking

The development is proposing to provide 666 auto parking spaces, with 650 spaces provided in an underground parking garage and 16 provided for visitors along the internal driveway of the site. Of the 650 underground parking spaces, 133 are allocated for Building A, 191 are allocated for Building B and 326 are allocated for Building C.

Based on the City of Ottawa Parking Provisions, auto parking is required at a rate of 1.2 for the residential units, with an added visitor parking rate of 0.2. As such, a parking rate of 1.4 is required for the proposed development, which equates to approximately 706 parking spaces for the 504 residential units.

However, Section 101(6)(c) of the Parking Provisions states that parking spaces may be reduced by 20 spaces, if all parking spaces provided for a land use are located below grade (i.e. the underground parking garage). Building B and Building C parking spaces were each reduced by 20 spaces, thus resulting in a total of 666 proposed parking spaces. Although some parking spaces are proposed above ground, an exemption has been requested by the proponent to allow the reduction to take place. The premise of the exemption request is that, given that the proposed development is located in a suburban context (Area C), providing surface parking is more common than providing underground parking.

Bicycle Parking

The City of Ottawa Zoning By-Law-Part 4, sections 100-114 Table 111A states that a minimum rate of 0.5 bicycle parking stalls be provided per dwelling unit for low, mid- and high-rise apartment buildings. The future development proposes to provide 252 bicycle parking spaces for the 504 residential units, thereby meeting the bicycle parking requirements.

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 Measures checklist is attached in **Appendix G**.

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.

Livery Street is classified as a Local Road; as per the City of Ottawa's TIA Guidelines (2017). The City recommends one-way traffic volumes on local roads to be in the vicinity of 120 veh/h. The highest observed existing one-way traffic volume along Livery Street, north of Robert Grant Ave, was 52 veh/h in the afternoon peak hour. By the 2028 horizon year, with full buildout of proposed development and noted adjacent developments, the estimated one-way traffic volume at the same location was 106 veh/h in the afternoon peak hour. Therefore, no changes are recommended for the classification of Livery Street.

In response to community concerns with the Livery Street access, it is important to reiterate the operation of the proposed Livery Street driveway as a secondary entrance. The owners have similar experience with a secondary driveway entrance at a similar high-density residential development in the Kanata Town Centre called William's Court. The underground parking was designed so that the principal access is the most convenient and frequently used by the residents,

approximately 80% of all trips in and out of the underground garage. Similar design considerations will be proposed for the subject site, which will be reviewed in detail by City staff during the Site Plan Application process.

Bobolink Ridge is also 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 2028 horizon year, with full buildout of proposed development and noted adjacent developments, the estimated one-way traffic volume at the same location was 230 veh/h in the afternoon peak hour. However, this volume drops to approximately 180 veh/h approaching Livery Street.

In this case, no changes were recommended to the classification of Bobolink Ridge for the following reasons (refer to **Figure 16**):

1. Although Bobolink is classified as a local road, the section between Elfin Grove and Robert Grant Ave has been constructed to a collector road standard, which the City recommends a one-way traffic volume in the vicinity 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 classification of Bobolink was considered appropriate in this context.

It is noteworthy that field observations at the intersection of Bobolink/Livery showed some vehicles exceeded the 50km/h speed limit of Bobolink Ridge. As such, a neighbourhood traffic management study may need to be conducted by the City of Ottawa to determine if there are requirements for traffic calming measures, such as signage, bulb-outs or vertical deflections (speed humps/tables, etc.).

Figure 16: Bobolink Cross-section



Finally, it is important to note that this is still a developing community and the area road network has yet to fully mature. Abbott St E was only recently connected to Terry Fox Drive and other gaps in the area road network, once filled, will help draw traffic away from local streets. Furthermore, transit service and active mode facilities will be constructed to help provide alternative travel choices for local residents.

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. STOP Control is expected to be implemented for vehicles exiting the site at the two proposed site access.

4.9.2. INTERSECTION DESIGN

Synchro 10 Trafficware was used to assess the intersection performance of signalized and unsignalized intersections within the study area. At signalized intersections, critical movements were assessed based on the movement at the intersection with the highest volume-to-capacity (v/c) ratio and the corresponding Level of Service (LOS). The signalized intersections ‘as a whole’ were based on the weighted v/c ratio of all the movements at the intersection and the corresponding Level of Service (LOS). Unsignalized intersection was assessed based on the movement with the highest average delay at the intersection and its corresponding LOS.

Roundabouts within the study area were assessed using Sidra software and results are based on the average delay of the critical movement and the overall delay.

Note that, as per TIA standards, the Peak Hour Factor (PHF) was set to 0.90 in existing conditions and 1.0 in all future background and total projected conditions.

The Synchro and Sidra detailed analysis results for existing and future conditions have been provided in **Appendix H**.

Existing Conditions

Table 9 below provides a summary of intersection performance within the study area based on existing traffic volumes, previously shown in **Figure 5**.

Table 9: 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(D)	0.66(0.84)	WBT(WBT)	21.1(27.9)	A(B)	0.46(0.70)
Bobolink/Livery (U)	A(A)	9.0(8.8)	SB(SB)	3.4(3.3)	-	-
Bobolink/Robert Grant (R)	A(A)	9.6(9.4)	WBL(WBL)	5.0(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 0.90 and a saturation flow rate of 1800 veh/h/lane. (S) – Signalized intersection. (U) – Unsignalized intersection. (R) – Roundabout intersection.						

As shown in **Table 9**, the signalized intersection of Fernbank/Robert Grant 'as a whole' operates at a LOS 'B' in the critical afternoon peak hour. The critical movement operates at a LOS 'D' in the afternoon peak hours. Critical movements of the unsignalized intersection of Bobolink/Livery operates at a LOS 'A' during both the morning and afternoon peak hour periods.

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

Future 2023 Total Background Conditions

The Future 2023 Background traffic volumes were shown in **Figure 14**. **Table 10** below provides a summary of the critical Synchro analysis results at intersections within the study area, based on the future background 2023 traffic volumes.

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 10: Future 2023 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)	0.66(0.83)	WBT(WBT)	20.9(27.5)	A(B)	0.46(0.68)
Bobolink/Livery (U)	A(A)	8.9(8.7)	SB(SB)	3.4(3.3)	-	-
Bobolink/Robert Grant (R)	A(A)	9.7(9.5)	WBL(WBL)	4.8(5.1)	A(A)	-
Abbott/Robert Grant (R)	A(A)	8.8(9.0)	NBL(NBL)	6.2(5.3)	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. (U) – Unsignalized intersection. (R) – Roundabout intersection.						

As shown in **Table 10**, 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 'D' or better during peak hours.

Future 2028 Total Background Conditions

The Future 2028 Total Background traffic volumes were shown in **Figure 15**. Synchro analysis results are summarized in **Table 11** for critical movements and the intersection 'as a whole'.

Table 11: Future 2028 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)	0.69(0.84)	WBT(WBT)	21.5(27.6)	A(B)	0.52(0.70)
Bobolink/Livery (U)	A(A)	8.9(8.7)	SB(SB)	3.4(3.3)	-	-
Bobolink/Robert Grant (R)	B(B)	10.7(10.7)	WBL(EBL)	5.5(5.5)	A(A)	-
Abbott/Robert Grant (R)	A(A)	9.0(9.1)	NBL(NBL)	6.1(6.0)	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.
 (U) – Unsignalized 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 'D' or better during peak hours.

Future 2023 Total Projected Conditions – Full Build-Out

The total projected 2023 traffic volumes were based on the site-generated traffic volumes (**Figure 9**) projected onto 2023 background traffic volumes (**Figure 14**). The resulting total projected traffic volumes are illustrated in **Figure 17**.

Figure 17: Future 2023 Total Projected Traffic Volumes

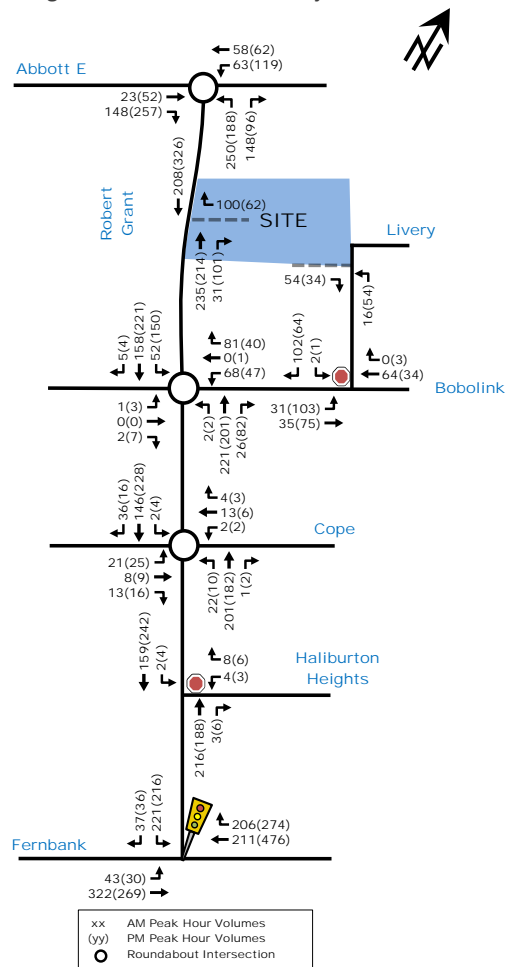


Table 12 below provides a summary of the critical Synchro analysis results at intersections within the study area, based on Future 2023 Total Projected traffic volumes.

Table 12: Future 2023 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)	0.66(0.83)	WBT(WBT)	20.9(26.4)	A(B)	0.48(0.69)
Bobolink/Livery (U)	A(A)	9.1(8.8)	SB(SB)	5.0(4.8)	-	-
Bobolink/Robert Grant (R)	A(A)	9.9(9.7)	WBL(WBL)	5.5(5.9)	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. (U) – Unsignalized 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.

Future 2028 Total Projected Conditions –Build-Out plus Five Years

The Future 2028 Total Projected traffic volumes, shown in **Figure 18**, were derived by superimposing the site-generated traffic volumes (**Figure 9**) onto Future 2028 Total Background traffic volumes (**Figure 15**).

Figure 18: Future 2028 Total Projected Traffic Volumes

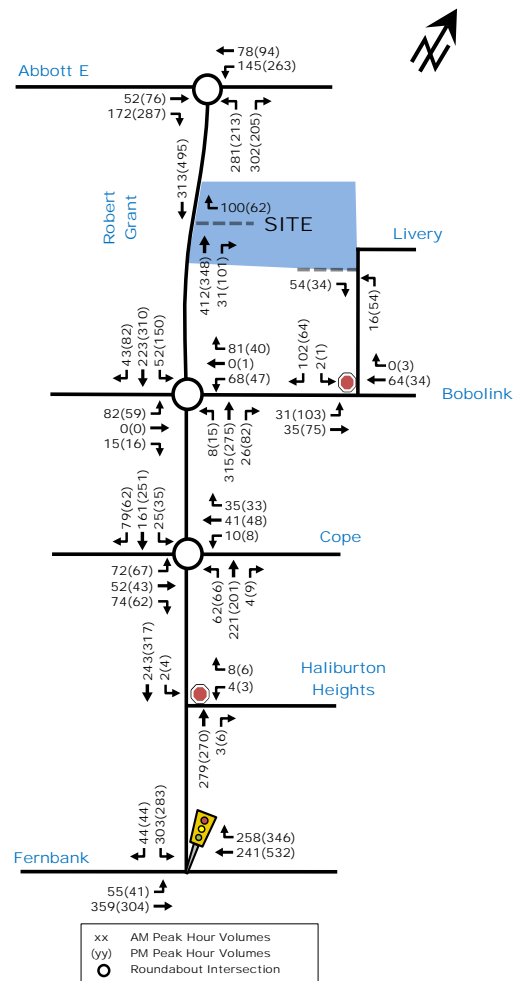


Table 13 below provides a summary of the critical Synchro analysis results at intersections within the study area, based on Future 2028 Total Projected traffic volumes.

Table 13: Future 2028 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)	0.69(0.84)	WBT(WBT)	21.8(27.4)	A(C)	0.56(0.73)
Bobolink/Livery (U)	A(A)	9.1(8.8)	SB(SB)	5.0(4.8)	-	-
Bobolink/Robert Grant (R)	B(B)	10.9(11.3)	WBL(EBL)	6.1(6.2)	A(A)	-
Abbott/Robert Grant (R)	A(A)	9.0(9.1)	NBL(NBL)	6.0(6.2)	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. (U) – Unsignalized intersection. (R) – Roundabout intersection.						

As shown in **Table 13**, the study area intersection 'as a whole' were shown to operate at a LOS 'C' or better during peak hours. The critical movements were shown to operate at a LOS 'D' or better during peak hours.

MMLOS Analysis for Signalized Intersections

A Multi-Modal Level of Service (MMLOS) analysis was conducted at the signalized intersection of Fernbank/Robert Grant. Since no changes are anticipated at this intersection in future horizon years, the analysis was conducted for existing conditions. **Table 14** below provides a summary of the analysis results along with the respective targets provided in the City of Ottawa MMLOS Guidelines (Exhibit 22). The detailed MMLOS analysis sheet is provided in **Appendix I**. Red font indicates that the target LOS was not met.

Table 14: MMLOS Analysis at the Intersection of Fernbank/Robert Grant

Signalized Intersection	Level of Service (LOS)									
	Pedestrian		Bicycle		Transit		Truck		Auto	
	PLOS	Target	BLOS	Target	TLOS	Target	TkLOS	Target	VLOS	Target
Fernbank / Robert Grant	B	C	F	C	E	D	E	E	D	D

The target Levels of Service in **Table 14** are based on a General Urban Area with an arterial road classification, spine route designation, transit priority (isolated measures) designation and no truck route. At the intersection of Fernbank/Robert Grant, the pedestrian, truck and auto LOS met their respective targets. However, the bicycle and transit LOS do not meet their respective targets.

With regards to cyclists, although cycle tracks are currently provided along both sides of Robert Grant Ave and a multi-use pathway along the north side of Fernbank Rd, the intersection does not meet the target LOS due to the high operating speeds along both Fernbank Rd and Robert Grant Ave, as well as the lack of a dedicated bike lane on the south side of Fernbank Rd. It should be noted that, based on the TIA Guidelines, the paved shoulders on the south side of Fernbank Rd do not count as a substitute for a dedicated bike lane in an urban setting.

With regards to transit, the target LOS is not met due to high delays to the SBL movement during the afternoon peak hour period only.

5. CONCLUSIONS AND RECOMMENDATIONS

The general findings, conclusions and recommendations from the preceding traffic analysis has been summarized below.

In response to feedback received during the Public Open House on March 3rd, 2020, the following updates, as relevant to the TIA, were made to the proposal:

- The total number of apartment units was reduced to 504 total units.
- Construction of the tower portion (superstructure) of the 18-storey building is subject to a holding provision until the extension of Robert Grant Ave from Abbott St to Hazeldean Rd is constructed.
- The request to reduce the parking ratios has been withdrawn by the proponent and replaced with a request to allow 16 surface parking spaces, while also allowing a reduction in the underground parking spaces based on Section 101(6)(c) in the City of Ottawa Parking Provisions.

Proposed Development

- The proposed single-phase development will consist of 504 residential units, within one high-rise and two mid-rise apartment buildings and is expected to reach full build-out by 2023.
- Primary vehicle access is proposed via Robert Grant Avenue, which leads to an internal roundabout, a ramp to the underground parking garage and sixteen surface parking spaces.
- 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 201 veh/h and 251 veh/h during the weekday morning and afternoon peak hours respectively.

Existing and Background Conditions

- In existing conditions, all study area intersections operate at a LOS 'B' or better during morning and afternoon peak hours, with the exceptions of Fernbank/Robert Grant, which operates at LOS 'D' during the afternoon peak hour.
- Multi-Modal Level of Service (MMLOS) analysis was conducted at the signalized intersection of Fernbank/Robert Grant. The analysis indicated that Bicycle LOS were not met due to the lack of a dedicated bike lane on the south side of Fernbank Rd, as well as the high operating speeds of Fernbank Rd and Robert Grant Ave. Transit LOS was also not met due to high delays in the SBL movement of the intersection. Pedestrian, Truck and Auto LOS all meet their respective MMLOS targets.
- Background traffic growth rate was assumed to be 2% at study area intersections.
- In future background 2023 and 2028 conditions, study area intersections are expected to operate similar to existing conditions, with slight variations in v/c ratios and average delays.

Projected Conditions

- In total projected 2023 and 2028 conditions, study area intersections operate similar to future background 2023 and 2028 conditions, with slight variations in v/c ratios and average delays.
- The study area intersections are expected to operate within City standards through to the 2028 horizon year.
- The adjacent road network classifications were shown to be appropriate based on the local context and projected traffic volumes.
- New road network modifications are not required to support this development based on the assumptions and results of this analysis.
- A total of 666 auto and 252 bicycle parking spaces are proposed. The parking proposed meets the parking provision requirements of the City of Ottawa, with an exemption applied for to permit 16 surface auto parking spaces.

Community Impacts

- Livery Street is a local road and projected traffic volumes are not expected to exceed the recommended thresholds.
- Bobolink is also classified as a local road, but transitions down from a collector road design at Robert Grant. The projected volumes reflect this transition, which was considered appropriate since Robert Grant is an arterial road, intended to accommodate higher traffic.
- It is important to remember that the surrounding community is still developing, and the area road network has yet to fully mature. Gaps in the neighbouring arterial/collector road network will be filled in, drawing traffic away from local streets, while transit service and active mode facilities will be constructed to help provide alternative travel choices for local residents.

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

Prepared By:



Basel Ansari, EIT.
Transportation Planner

Reviewed By:



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

Appendix A

Screening Form and Correspondence

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	

19 June 2020

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

Attention: Josiane Gervais, P.Eng.

Dear Josiane:

**Re: Rene's Court – 1000 Robert Grant Avenue
Step 5 – Comment and Response Form**

The following response form has been prepared to address City of Ottawa comments received on November 27th, 2019. City comments are noted in black with the corresponding responses from Parsons in blue.

DEVELOPMENT REVIEW – TRANSPORTATION SECTION

Comment 1: *Re Comment 1 above: Assuming a mode share target of 0% for cycling does not reflect the City's vision as outlined within the Ottawa Cycling Plan.*

Response 1: Noted. A 0% cycling value reflects a theoretical worst-case scenario (most conservative scenario).

Comment 2: *At the preconsultation, there was no mention of a requested reduction of parking to be included within the re-zoning application. Since a reduction in parking is now sought, the applicant is to provide justification for the reduction in parking proposed. Module 4.2 – Parking is to be included within the TIA.*

Response 2: The applicant has withdrawn the request to reduce the parking ratios of the proposed development. Instead, a new request is being made to allow 16 surface parking spaces to be provided, while also permitting the reduction in underground parking spaces based on Section 101(6)(C) of the City of Ottawa Parking Provisions. Further description is provided in Section 4.2 in the TIA report.

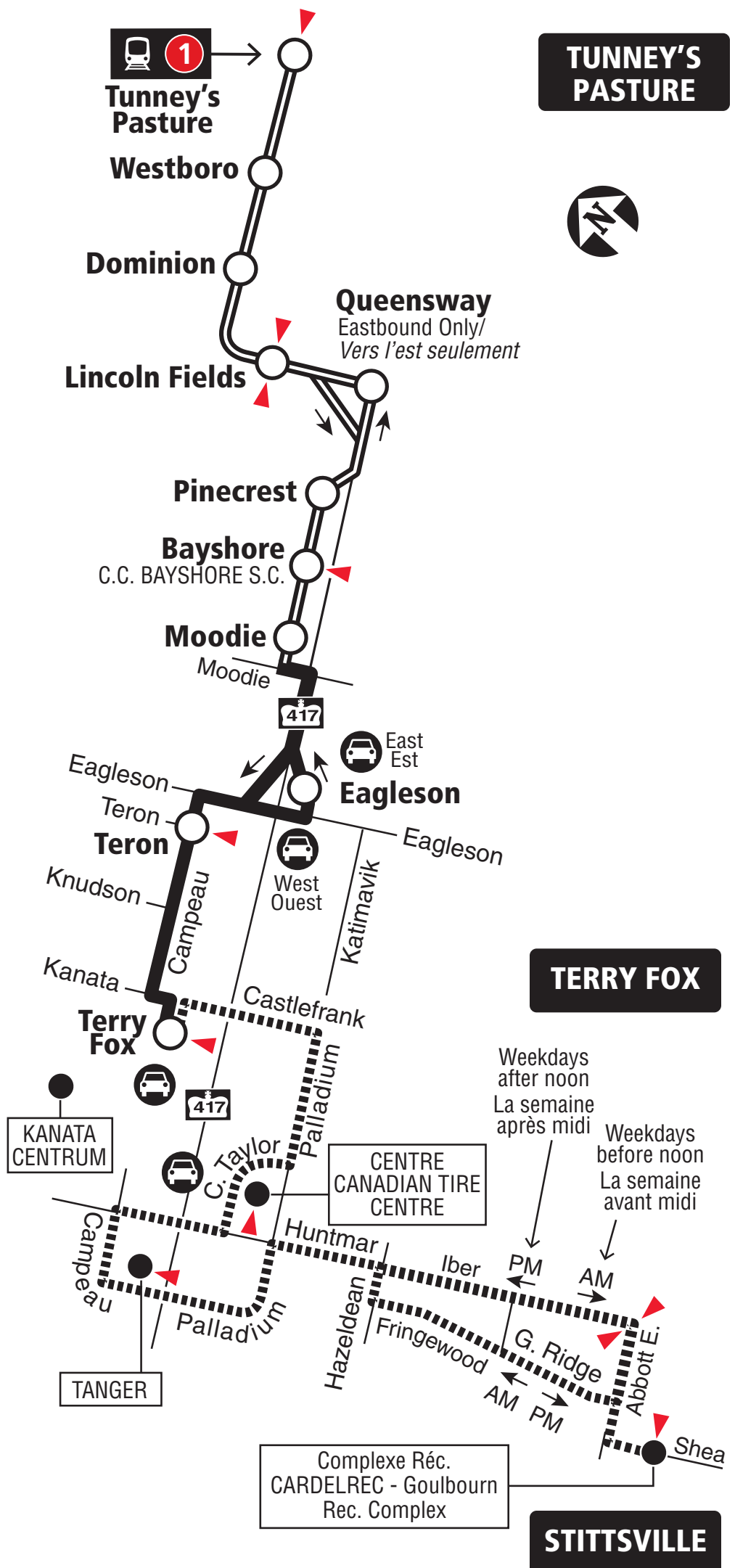
Appendix B

Transit Route Maps



TERRY FOX STITTVILLE TUNNEY'S PASTURE

7 days a week / 7 jours par semaine
All day service
Service toute la journée



2019.07



Starting July 14, 2019
À partir du 14 juillet 2019

Lost and Found / Objets perdus..... **613-563-4011**
Security / Sécurité **613-741-2478**

Transpo

INFO 613-741-4390
octranspo.com



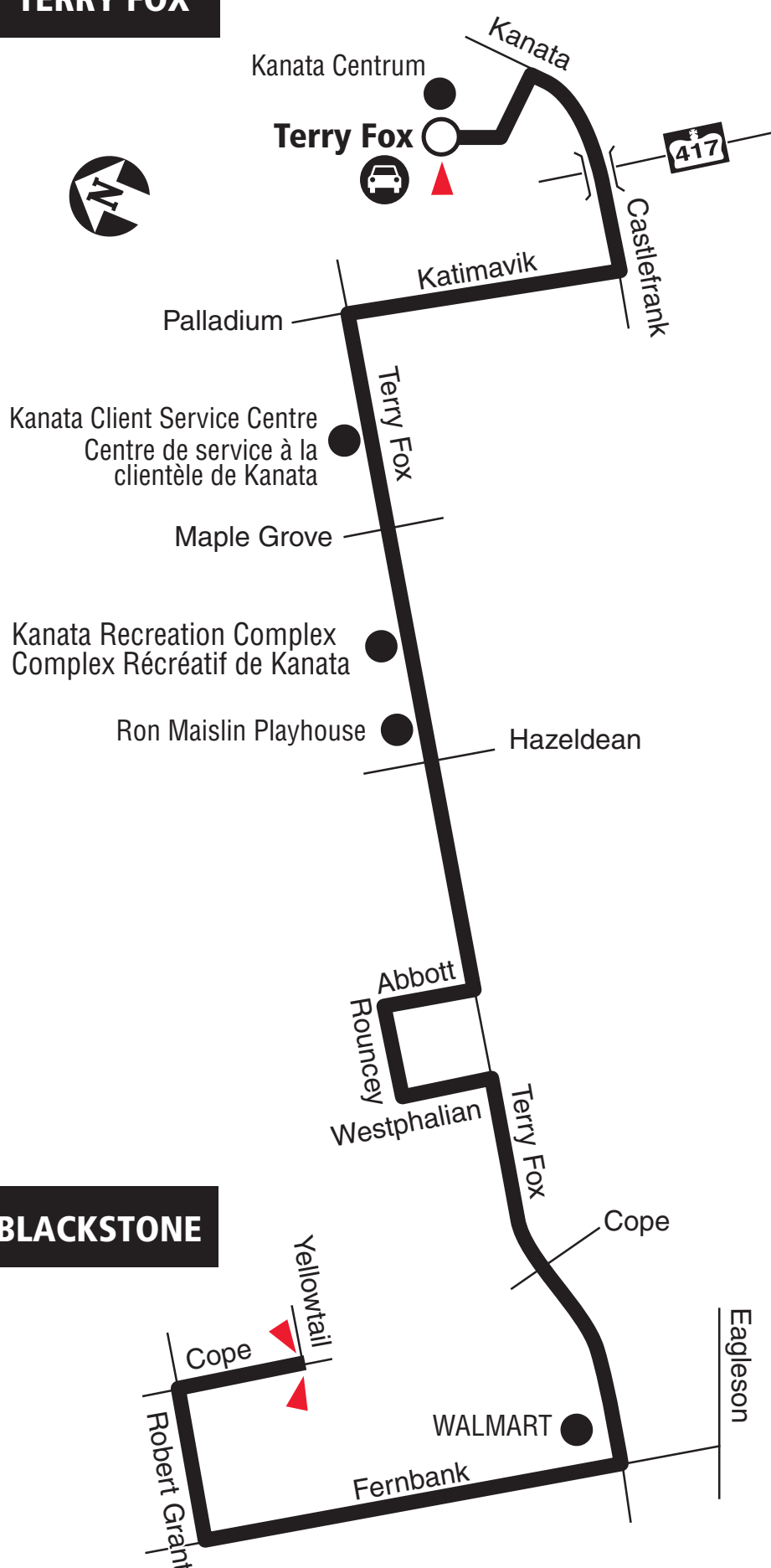
Local

Monday to Friday/ Lundi au vendredi

Selected time periods

Périodes sélectionnées

TERRY FOX



BLACKSTONE



Transitway Station / Station du Transitway



Park & Ride / Parc-o-bus



Timepoint / Heures de passage

2019.06



Schedule / Horaire.....613-560-1000

Text / Texto560560

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

Customer Service
Service à la clientèle **613-741-4390**

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

Security / Sécurité **613-741-2478**

Effective December 24, 2017

En vigueur 24 décembre 2017



INFO 613-741-4390
octranspo.com



252

FERNBANK

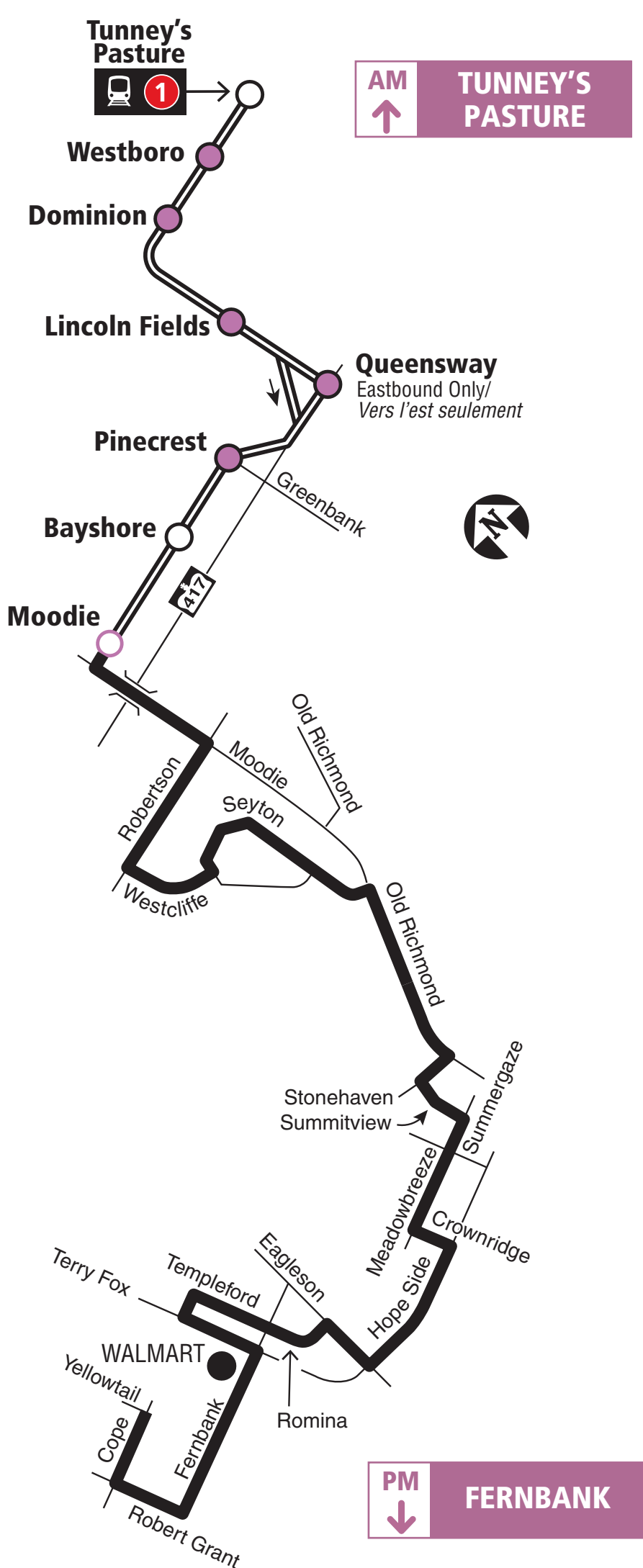
TUNNEY'S PASTURE

Connexion

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 seul. /
Aucun arrêt en PM



AM: Off only - PM: Full Service
AM: Débarquement seul. - PM: Service complet

2019.07



1



Future route after O-Train Line 1 is open Trajet du circuit après l'ouverture de la Ligne 1 de l'O-Train

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

Security / Sécurité **613-741-2478**

OC Transpo

INFO 613-741-4390
octranspo.com

Appendix C

Traffic Data



Turning Movement Count Heavy Vehicle Summary Flow Diagram

Heavy Trucks, Buses,
and School Buses

Abbott Street (East) & Robert Grant Avenue (Roundabout)

Stittsville, ON

Heavy Vehicles

(Construction Vehicles, Heavy Trucks, Buses & School Buses).
Heavy vehicle totals ARE included in the all vehicles summary and flow diagrams.

N/A

Abbott St. (E)

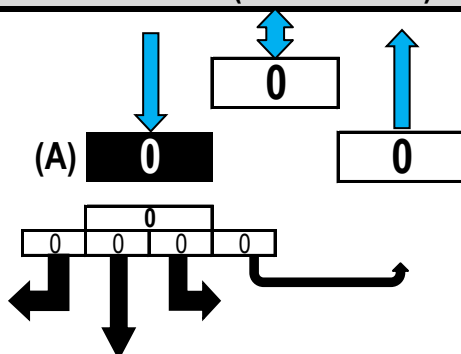
Tuesday, 8 January 2019

0700-1000, 1130-1330 & 1500-1800

8 Hour Survey

City of Ottawa Ward ► 6

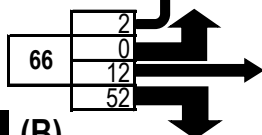
Abbott St. (E)



73

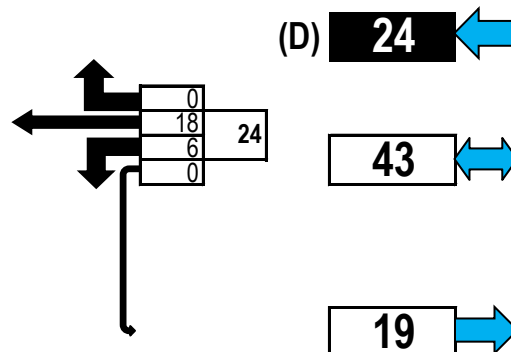
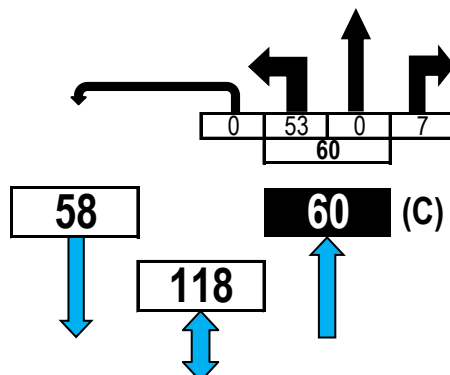
139

66 (B)

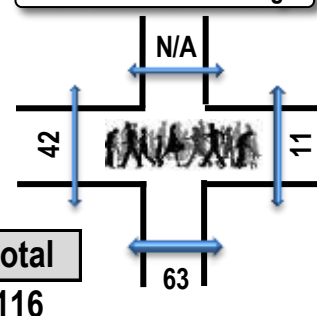


Robert Grant Ave.

Roundabout
Total Heavy Vehicles
150
Approaching Intersection
(A+B+C+D)
Roundabout



All Pedestrian Crossings



Abbott Street (East) & Robert Grant Avenue (Roundabout)

Stittsville, ON

Survey Date: Tuesday, 8 January 2019

Weather - AM: Overcast -10°C

Weather - PM: Overcast +4°C

Survey Duration: 8 Hrs.

Start Time: 0700

Survey Hours:

0700

0700-1000, 1130-1330 & 1500-1800

Abbott St. (E)						Abbott St. (E)					Robert Grant Ave.					N/A					
Eastbound						Westbound					Northbound					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

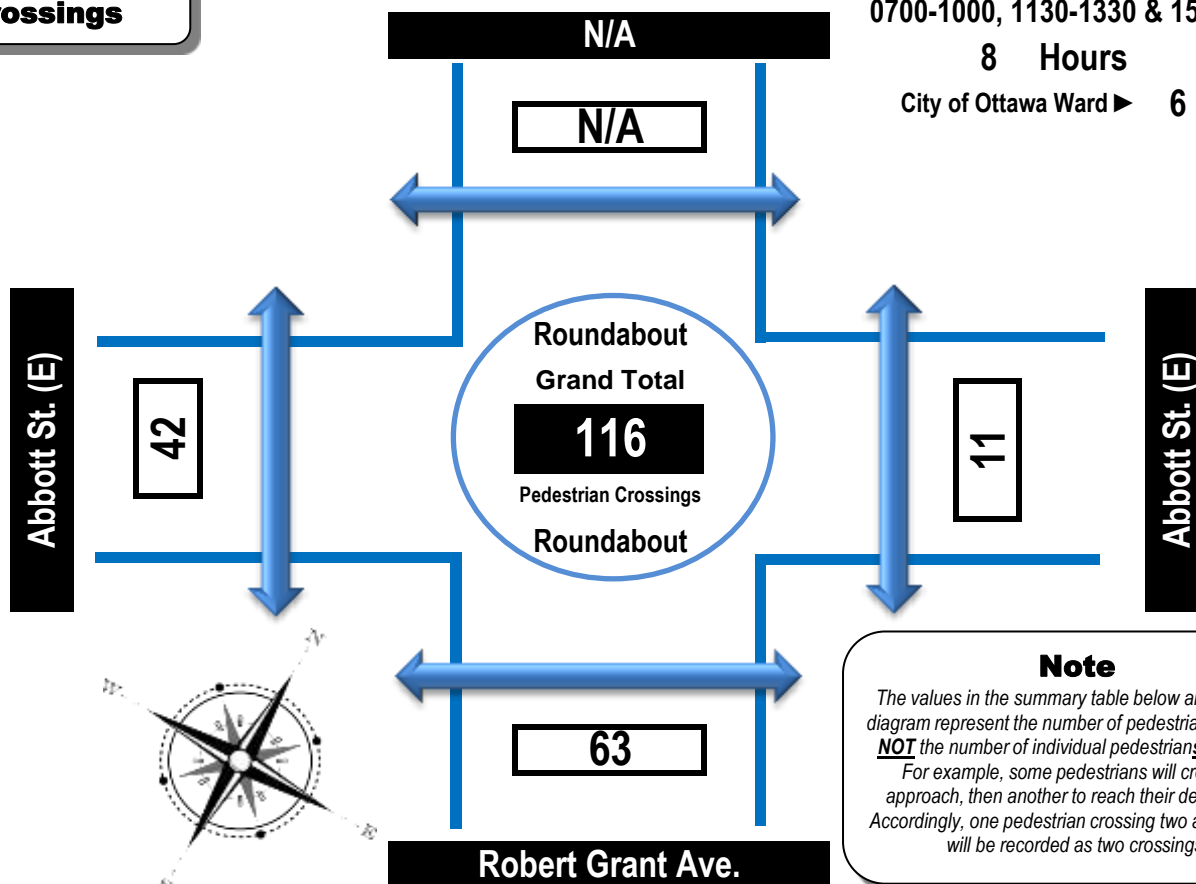


Abbott Street (East) & Robert Grant Avenue (Roundabout)

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 -10°C

Weather - PM: Overcast +4°C

Survey Duration: 8 Hrs.

Start Time: 0700

Survey Hours:

0700

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



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 -10°C

Survey Duration: 8 Hrs.

Survey Hours: 0700-1000, 1130-1330 & 1500-1800

Weather - PM: Overcast +4°C

Surveyor(s): Carmody

Abbott St. (E)						Abbott St. (E)						Robert Grant Ave.						N/A					
Eastbound						Westbound						Northbound						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 in 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.



Turning Movement Count Bicycle Summary Flow Diagram



Bobolink Ridge & Livery Street

Stittsville, ON

Bicycles

(Including electric bicycles and electric scooters)

Note:

Bicycle volumes are **NOT** included in vehicle totals.

Bobolink Ridge

Livery St.

Tuesday, 5 November 2019

0700-1000, 1130-1330 & 1500-1800

8 Hour Survey

City of Ottawa Ward 6

Bobolink Ridge

2

4

2 (B)

(A) 0

0 0 0 0

Bicycles represent
0.36%
of total traffic

Total Bicycle Volume

4

Approaching Intersection
(A+B+C+D)

(D) 2

4

2

Includes all bicycles
travelling on sidewalks.

N/A

0

0

0 (C)

All Pedestrian Crossings

35

Total

40

Bobolink Ridge

Eastbound

Bobolink Ridge

Westbound

N/A

Northbound

Livery St.

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	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0800-0900	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	1
0900-1000	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	1
1130-1230	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
1230-1330	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1500-1600	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
1600-1700	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1700-1800	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	0	2	0	0	2	0	2	0	0	2	0	0	0	0	0	0	0	0	0	0	4

Comments:

The majority of southbound drivers on Livery Street - either left turns or right turns do a rolling stop.



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 & Livery Street

Stittsville, ON

All Vehicles

(Except Bicycles & Electric Scooters)

Tuesday, 5 November 2019

0700-1000, 1130-1330 & 1500-1800

8 Hour Survey

City of Ottawa Ward 6

Bobolink Ridge

Bobolink Ridge

555

1088

533 (B)

(A)

262

501

239

Total Volume

1112

Approaching Intersection

(A+B+C+D)

(D)

317

635

318

All Pedestrian Crossings

35

Total

40

N/A

AM Peak Hour Flow Diagram

PM Peak Hour Flow Diagram

Livery St.

(A)

50

65

15

Pedestrian Crossings
During AM Peak Hour

8

0

+

1

N/A

Bobolink Ridge

50

48

0

2

0

112

162

50

15

35

0

164

(A+B+C+D)

64

64

101

50 (B)

0

0

0

0

0

0

0

0

0

0

0

0

0

0

0

0

0

0

0

0

0

0

0

0

0

0

0

0

N/A

0

0

0

0

0

0

0

0

0

0

0

0

0

0

0

0

0

0

0

0

0

0

0

0

0

0

Summary - AM Peak Hr.	
Peak Hr.	0745-0845
Volume	164
PHF	0.95

N/A

0

0

0

0

0

0

0

0

0

0

0

Summary - PM Peak Hr.	
Peak Hr.	1700-1800
Volume	193
PHF	0.91



Turning Movement Count Pedestrian Crossings Summary and Flow Diagram



Bobolink Ridge & Livery Street

Stittsville, ON

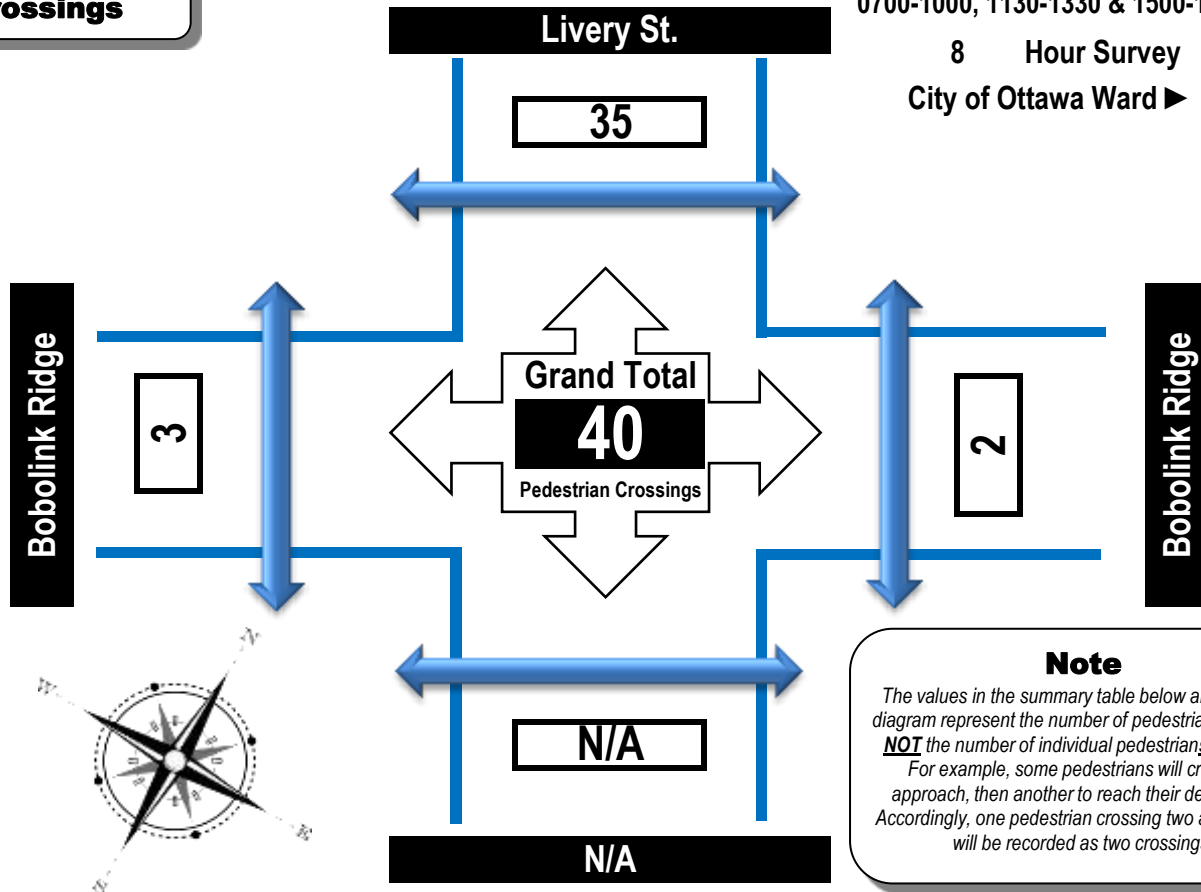
Pedestrian Crossings

Tuesday, 5 November 2019

0700-1000, 1130-1330 & 1500-1800

8 Hour Survey

City of Ottawa Ward ► 6



Time Period	West Side Crossing Bobolink Ridge	East Side Crossing Bobolink Ridge	Street Total	South Side Crossing N/A	North Side Crossing Livery St.	Street Total	Grand Total
0700-0800	0	0	0	0	1	1	1
0800-0900	0	1	1	0	10	10	11
0900-1000	1	1	2	0	1	1	3
1130-1230	0	0	0	0	2	2	2
1230-1330	0	0	0	0	2	2	2
1500-1600	0	0	0	0	3	3	3
1600-1700	1	0	1	0	5	5	6
1700-1800	1	0	1	0	11	11	12
Totals	3	2	5	0	35	35	40

Comments:

The majority of southbound drivers on Livery Street - either left turns or right turns do a rolling stop.



Turning Movement Count Summary Report AADT and Expansion Factors

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

Bobolink Ridge & Livery Street

Stittsville, ON

Survey Date: Tuesday, 5 November 2019

Start Time: 0700

AADT Factor: 1.0

Weather AM: Cloudy +8°C

Survey Duration: 8 Hrs.

Survey Hours: 0700-1000, 1130-1330 & 1500-1800

Weather PM: Cloudy +6°C

Surveyor(s): Mousseau

Bobolink Ridge

Bobolink Ridge

N/A

Livery St.

Eastbound

Westbound

Northbound

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	10	16	0	0	26	0	57	0	0	57	83	0	0	0	0	0	0	0	36	0	36	36	119
0800-0900	20	39	0	0	59	0	51	1	0	52	111	0	0	0	0	0	2	0	49	0	51	51	162
0900-1000	22	23	0	0	45	0	39	1	0	40	85	0	0	0	0	0	0	0	28	0	28	28	113
1130-1230	24	38	0	0	62	0	29	0	0	29	91	0	0	0	0	0	3	0	23	0	26	26	117
1230-1330	19	29	0	0	48	0	25	5	0	30	78	0	0	0	0	0	5	0	18	0	23	23	101
1500-1600	43	32	0	0	75	0	37	3	0	40	115	0	0	0	0	0	2	0	43	0	45	45	160
1600-1700	39	53	0	1	93	0	32	0	0	32	125	0	0	0	0	0	0	0	22	0	22	22	147
1700-1800	49	75	0	1	125	0	34	3	0	37	162	0	0	0	0	0	1	0	30	0	31	31	193
Totals	226	305	0	2	533	0	304	13	0	317	850	0	0	0	0	0	13	0	249	0	262	262	1112

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 conducted during the hours of 0700h - 1000h, 1130h - 1330h and 1500h - 1800h

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	314	424	0	3	741	0	423	18	0	441	1182	0	0	0	0	0	18	0	346	0	364	364	1546
------------	-----	-----	---	---	-----	---	-----	----	---	-----	------	---	---	---	---	---	----	---	-----	---	-----	-----	------

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	314	424	0	3	741	0	423	18	0	441	1182	0	0	0	0	0	18	0	346	0	364	364	1546
------------	-----	-----	---	---	-----	---	-----	----	---	-----	------	---	---	---	---	---	----	---	-----	---	-----	-----	------

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	412	555	0	4	971	0	554	24	0	577	1548	0	0	0	0	0	24	0	453	0	477	477	2025
------------	-----	-----	---	---	-----	---	-----	----	---	-----	------	---	---	---	---	---	----	---	-----	---	-----	-----	------

AADT and expansion factors provided by the City of Ottawa

AM Peak Hour Factor → 0.95

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	15	35	0	0	50	0	64	0	0	64	114	0	0	0	0	0	2	0	48	0	50	50	164

OFF Peak Hour Factor → 0.89

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
1130-1230	24	38	0	0	62	0	29	0	0	29	91	0	0	0	0	0	3	0	23	0	26	26	117

PM Peak Hour Factor → 0.91

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
1700-1800	49	75	0	1	125	0	34	3	0	37	162	0	0	0	0	0	1	0	30	0	31	31	193

Comments:

The majority of southbound drivers on Livery Street - either left turns or right turns do a rolling stop.

Notes:

1. Includes all vehicle types except bicycles, electric bicycles, and electric scooters.
2. When expansion and AADT factors are applied, the results will differ slightly due to rounding.

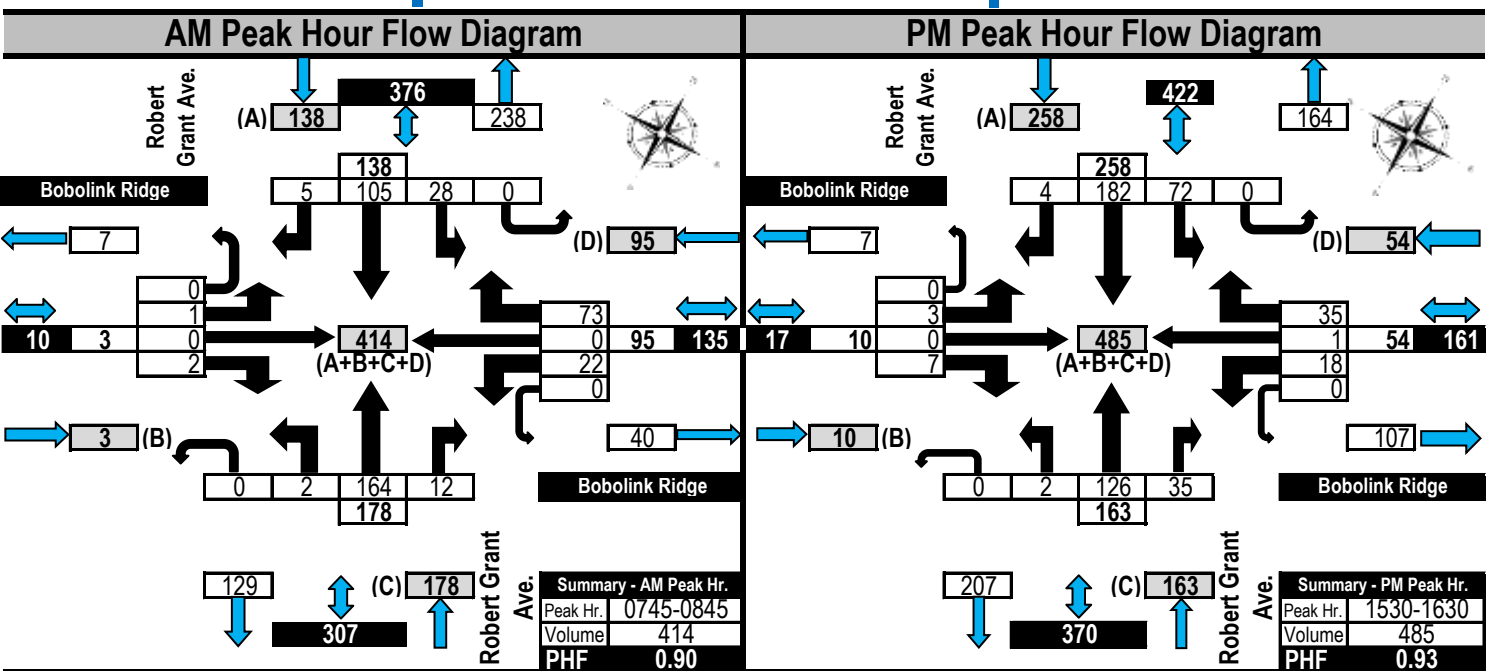
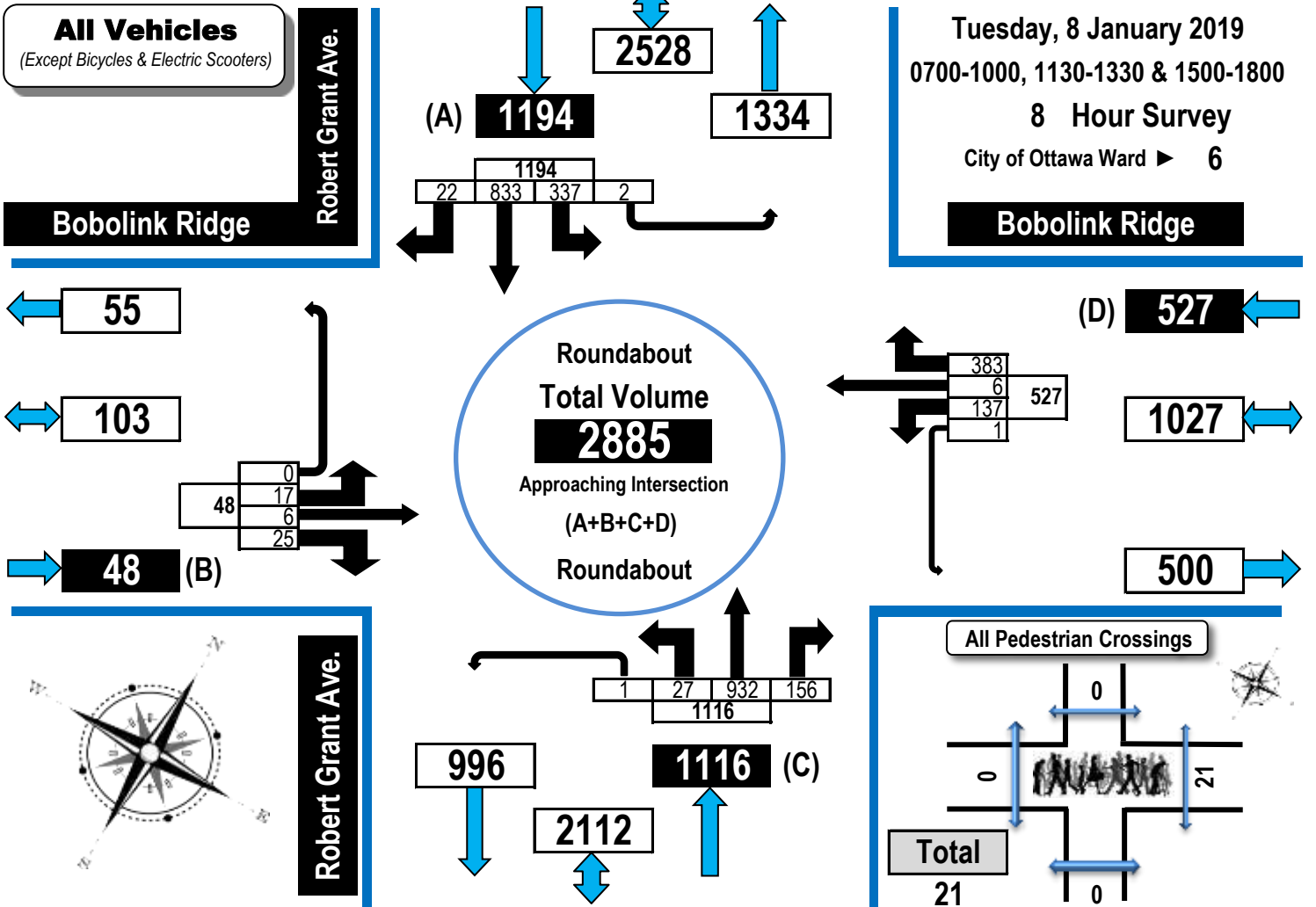


Turning Movement Count Summary, AM and PM Peak Hour Flow Diagrams

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

Bobolink Ridge & Robert Grant Avenue (Roundabout)

Stittsville, ON





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

Bobolink Ridge

Robert Grant Ave.

Bobolink Ridge

Roundabout

Total Volume

2885

Approaching Intersection
(A+B+C+D)
Roundabout

(D) 527

1027

500

55

103

48 (B)



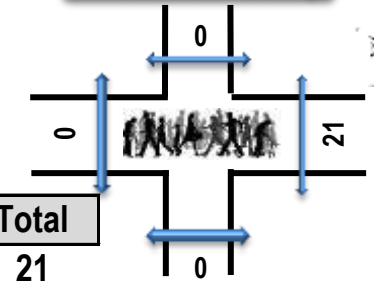
Robert Grant Ave.

996

1116 (C)

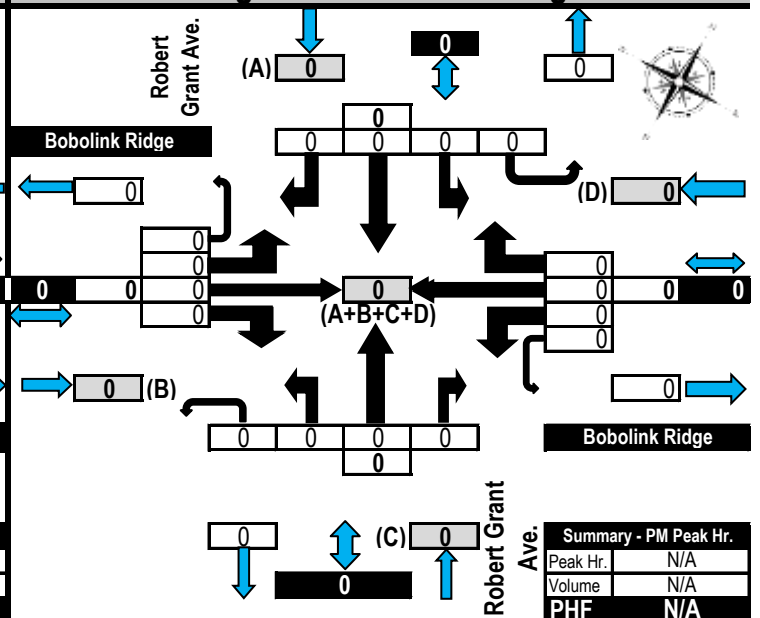
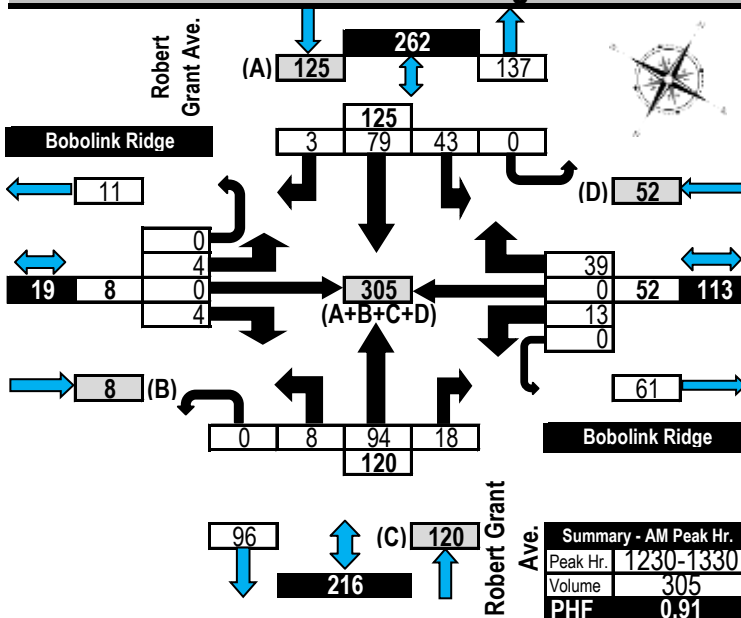
2112

All Pedestrian Crossings



Off Peak Hour Flow Diagram

Evening Peak Hour Flow Diagram





Turning Movement Count Heavy Vehicle Summary Flow Diagram

Heavy Trucks, Buses,
and School Buses

Bobolink Ridge & Robert Grant Avenue (Roundabout)

Stittsville, ON

Heavy Vehicles

(Construction Vehicles, Heavy Trucks, Buses & School Buses).
Heavy vehicle totals ARE included in the all vehicles summary and flow diagrams.

Bobolink Ridge

Robert Grant Ave.

Tuesday, 8 January 2019

0700-1000, 1130-1330 & 1500-1800

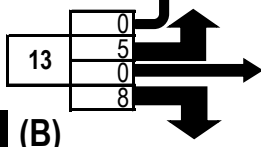
8 Hour Survey

City of Ottawa Ward 6

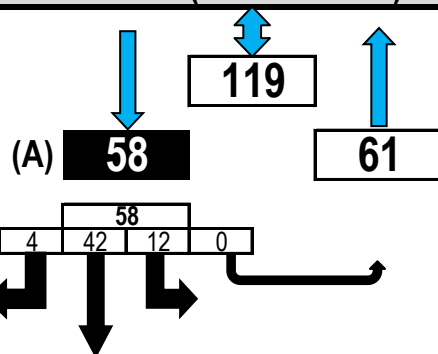
Bobolink Ridge

15

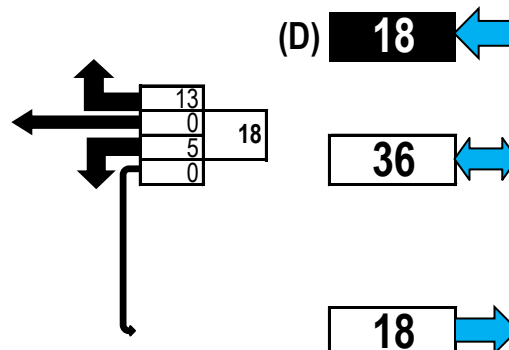
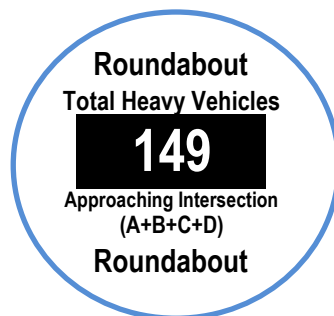
28



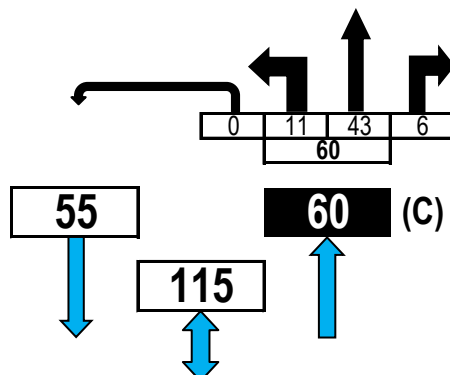
(B)



(A)



(D)

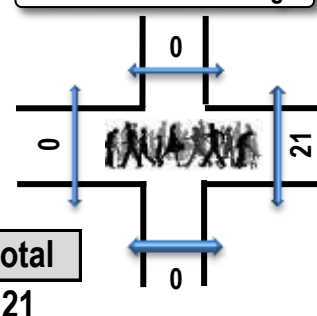


55

115

60

All Pedestrian Crossings



Total
21

Bobolink Ridge & Robert Grant Avenue (Roundabout)

Stittsville, ON

Survey Date: Tuesday, 8 January 2019

Weather - AM: Overcast -10°C

Survey Duration: 8 Hrs.

Start Time: 0700

Survey Hours:

0700

0700-1000, 1130-1330 & 1500-1800

Weather - PM: Overcast +4°C

Bobolink Ridge						Bobolink Ridge					Robert Grant Ave.						Robert Grant Ave.					
Eastbound						Westbound					Northbound						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	



Turning Movement Count

Pedestrian Crossings Summary and Flow Diagram

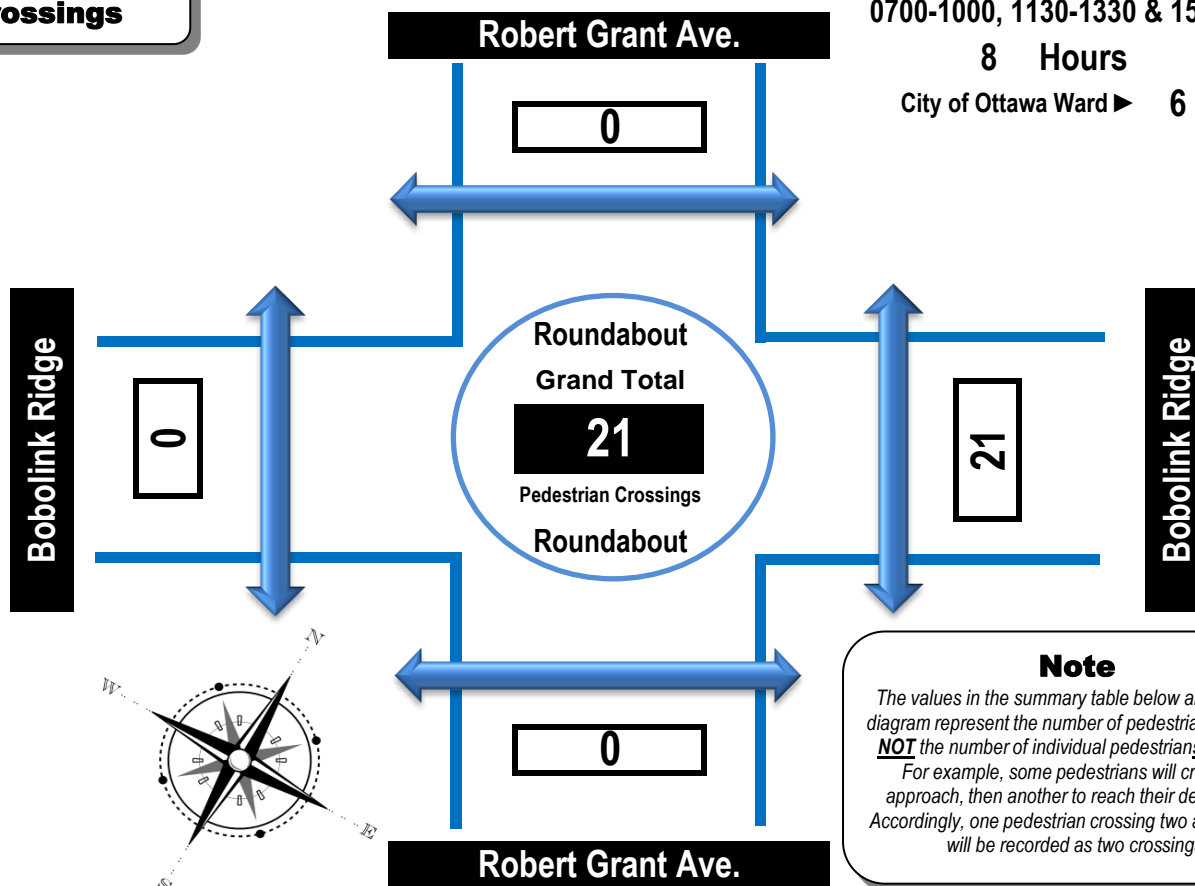


Bobolink Ridge & Robert Grant Avenue (Roundabout)

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 -10°C

Weather - PM: Overcast +4°C

Survey Duration: 8 Hrs.

Start Time: 0700

Survey Hours:

0700

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



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 -10°C

Survey Duration: 8 Hrs.

Survey Hours: 0700-1000, 1130-1330 & 1500-1800

Weather - PM: Overcast +4°C

Surveyor(s): Carmody

Bobolink Ridge

Bobolink Ridge

Robert Grant Ave.

Robert Grant Ave.

Eastbound

Westbound

Northbound

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:

- Includes all vehicle types except bicycles and electric scooters.
- Expansion factors are not applied to turning movement counts if they are less than 8-hours in duration.
- 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.

Turning Movement Count - Peak Hour Diagram

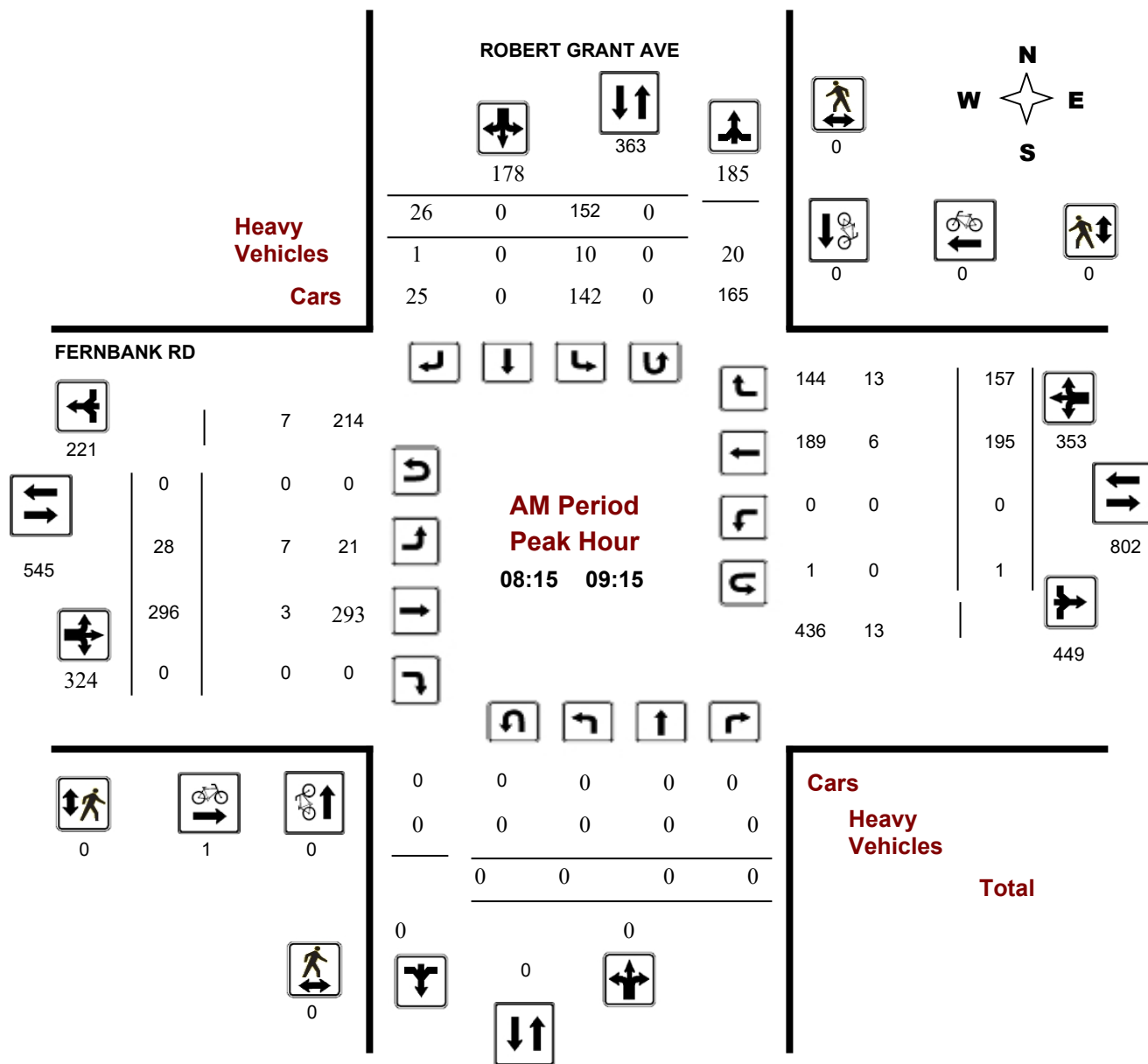
FERNBANK RD @ ROBERT GRANT AVE

Survey Date: Thursday, August 30, 2018

Start Time: 07:00

WO No: 38041

Device: Miovision



Turning Movement Count - Peak Hour Diagram

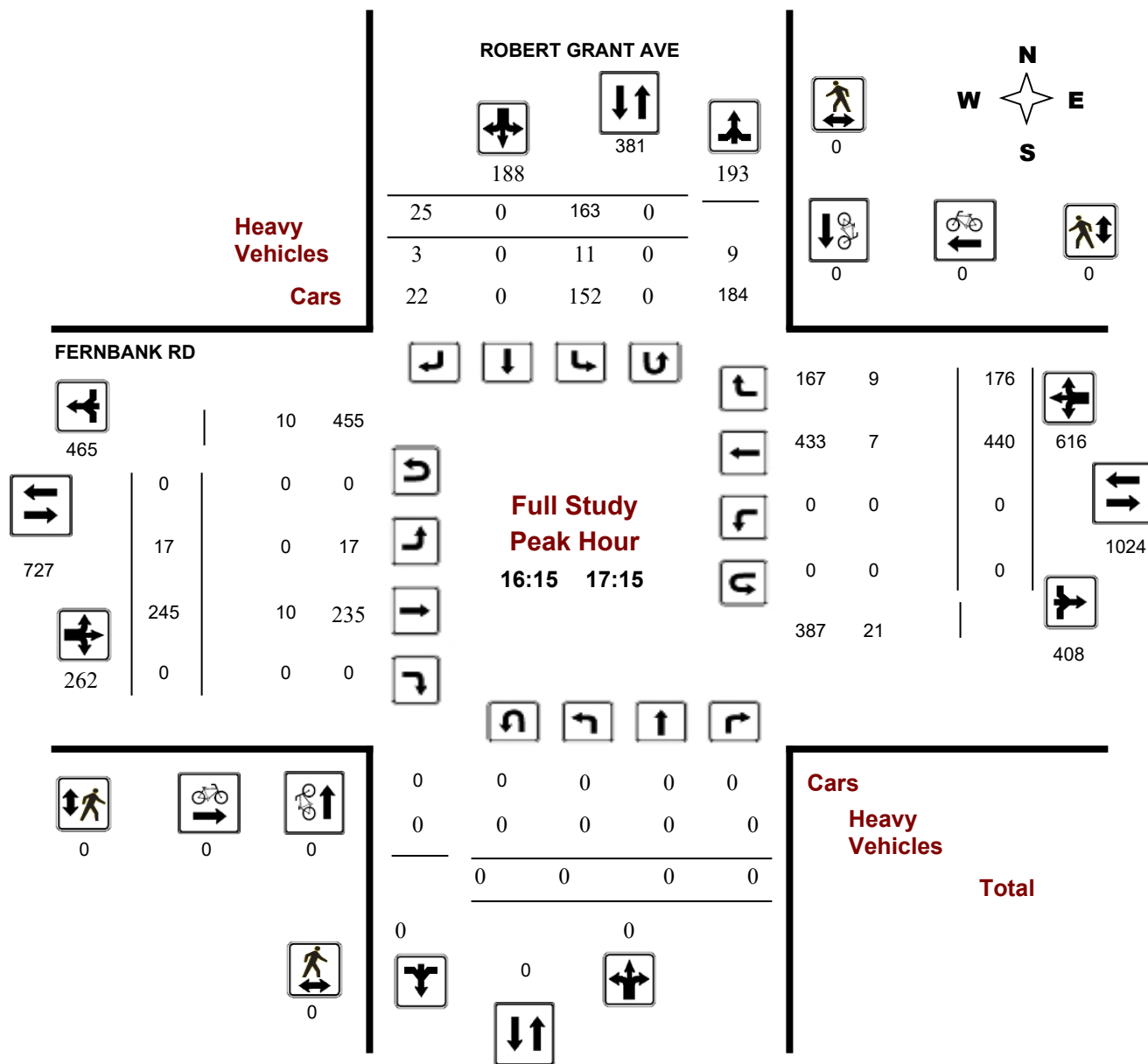
FERNBANK RD @ ROBERT GRANT AVE

Survey Date: Thursday, August 30, 2018

Start Time: 07:00

WO No: 38041

Device: Miovision



Turning Movement Count - Peak Hour Diagram

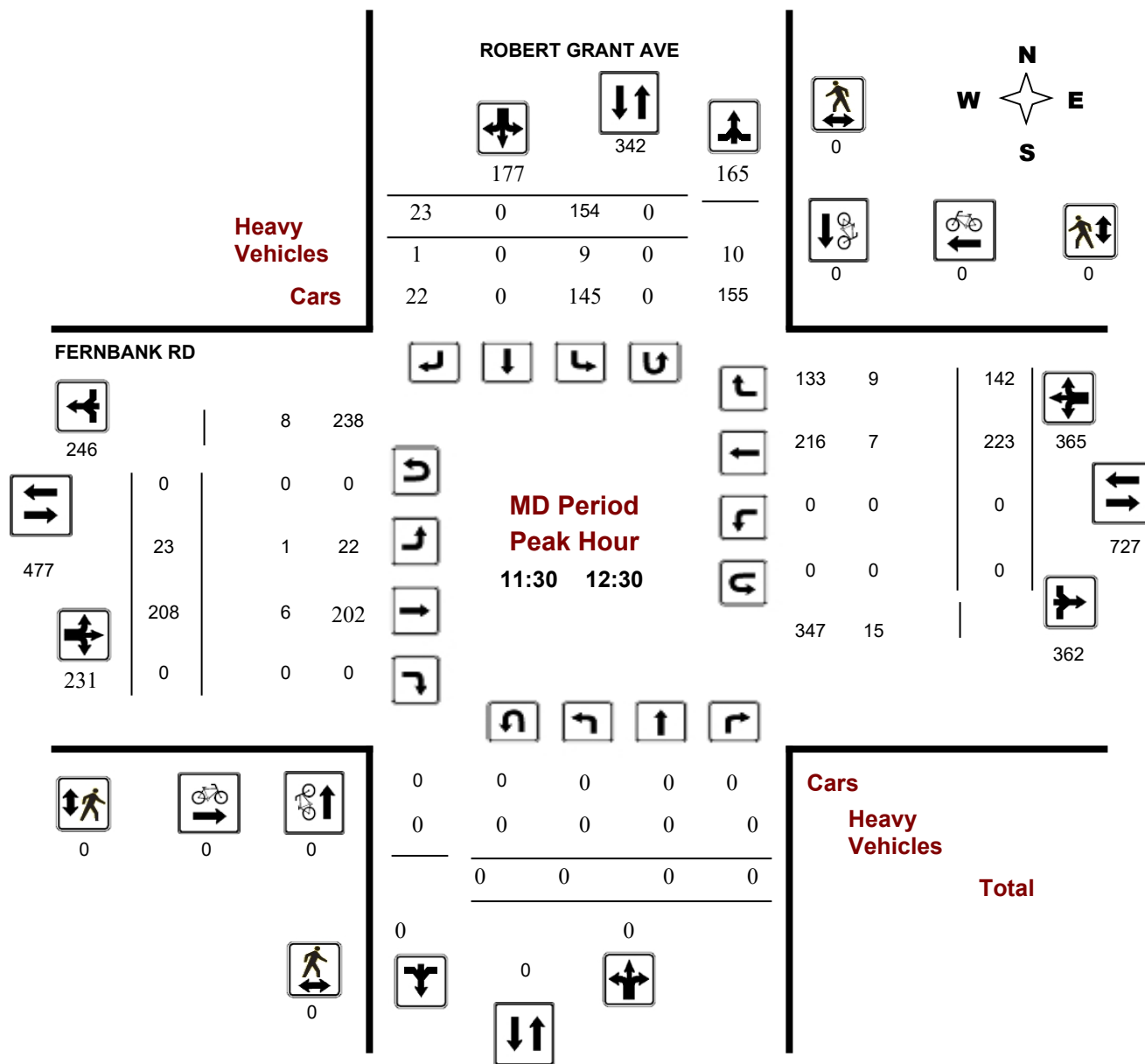
FERNBANK RD @ ROBERT GRANT AVE

Survey Date: Thursday, August 30, 2018

Start Time: 07:00

WO No: 38041

Device: Miovision



Turning Movement Count - Peak Hour Diagram

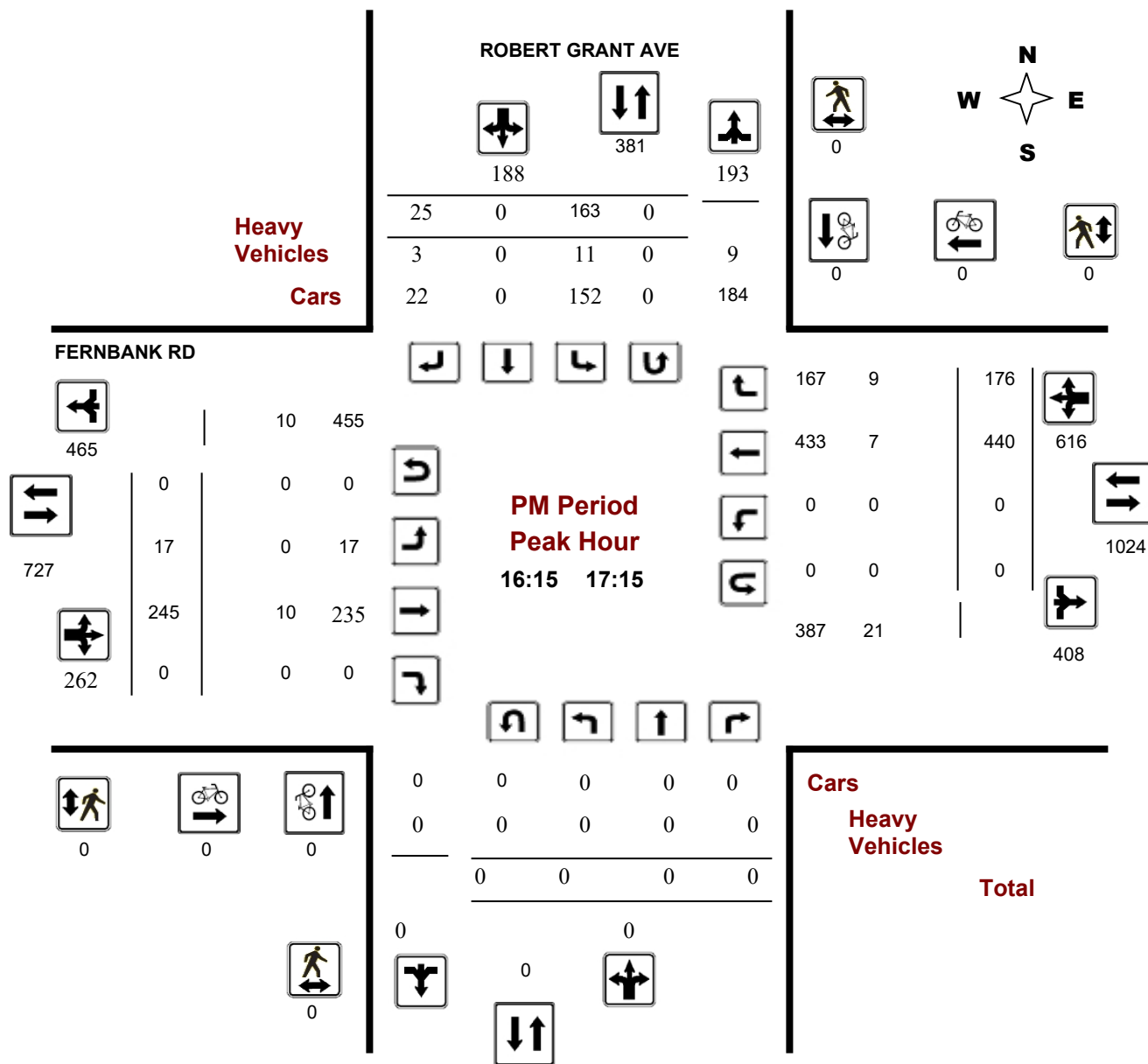
FERNBANK RD @ ROBERT GRANT AVE

Survey Date: Thursday, August 30, 2018

Start Time: 07:00

WO No: 38041

Device: Miovision



Transportation Services - Traffic Services

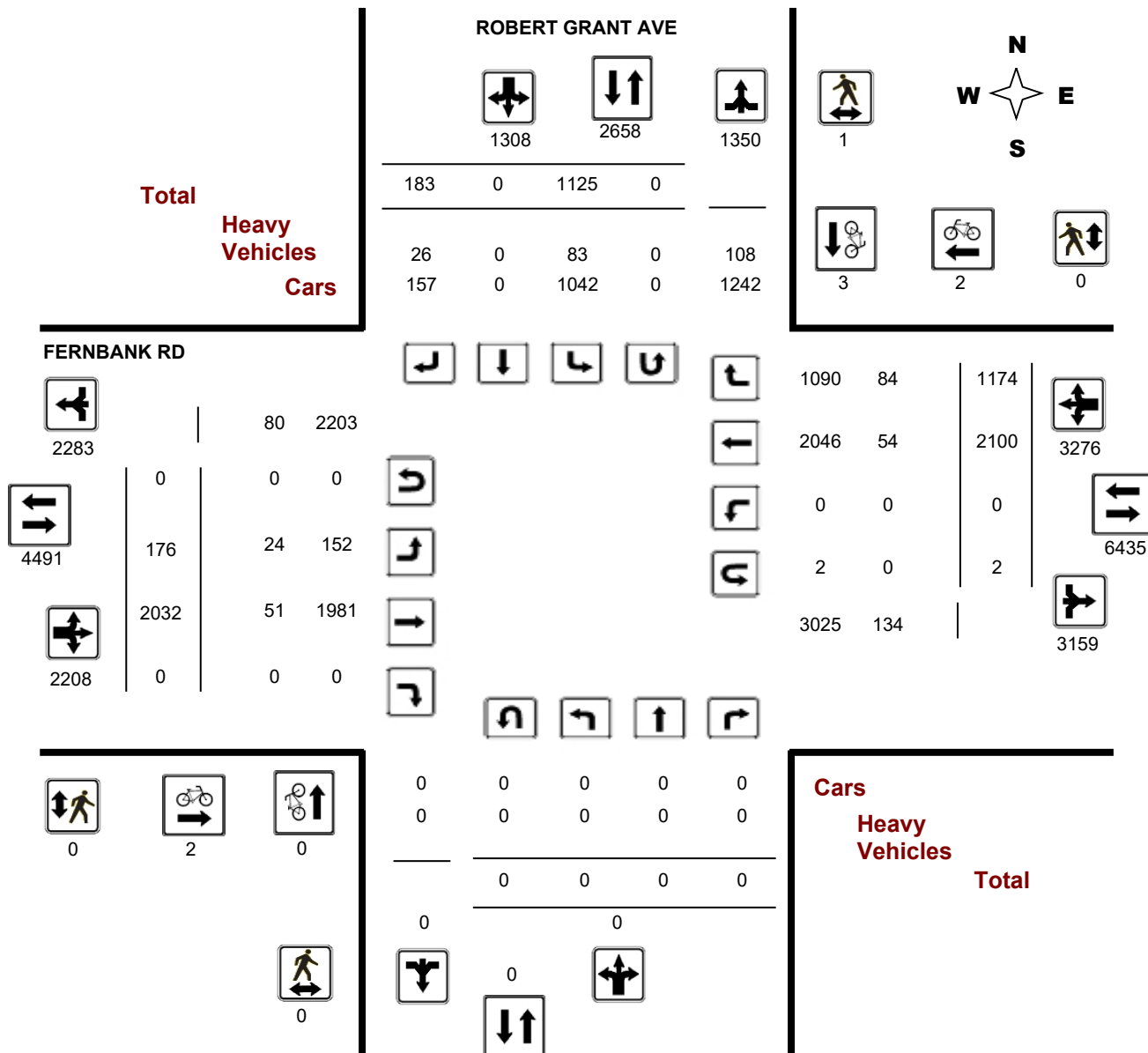
Turning Movement Count - Full Study Diagram

FERNBANK RD @ ROBERT GRANT AVE

Survey Date: Thursday, August 30, 2018

WO#: 38041

Device: Miovision



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											
Period	Northbound				Southbound				STR TOT	Eastbound				Westbound				STR TOT	Grand Total		
	LT	ST	RT	NB TOT	LT	ST	RT	SB TOT		LT	ST	RT	EB TOT	LT	ST	RT	WB TOT				
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.



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										Grand Total
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		
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

Time Period	ROBERT GRANT AVE			FERNBANK RD			Grand Total
	Northbound	Southbound	Street Total	Eastbound	Westbound	Street 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									
Time Period		Northbound			Southbound			Eastbound			Westbound									Grand Total
		LT	ST	RT	N TOT	LT	ST	RT	S TOT	STR TOT	LT	ST	RT	E TOT	LT	ST	RT	W TOT	STR TOT	
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:

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



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

Fernbank/Egleson
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/Egleson
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

5786 Fernbank Development



January 28, 2011

Amira Shetata, M. Eng., P.Eng.
Project Manager, Infrastructure Approvals

Planning and Growth Management Department
City of Ottawa
110 Laurier Avenue West
Ottawa, ON
K1P 1J1

Dear Ms. Shetata:

*Re: CRT Lands Phase 1 and 2
Fernbank Community
Transportation Letter*

CRT Development Inc. (CRT) wishes to proceed with the urban development of the subject lands in accordance with the policies set out by the Planning Department of the City of Ottawa. Part of the Plan of Subdivision process for the City includes provision of several documents in support of the subject development. IBI Group was retained by the Owners to complete a Transportation Letter in support of the application. The proposed development is located within the Fernbank Community in Stittsville Ward, as shown in Exhibit 1. The land-use policy is governed by the Fernbank Community Design Plan (FCDP).

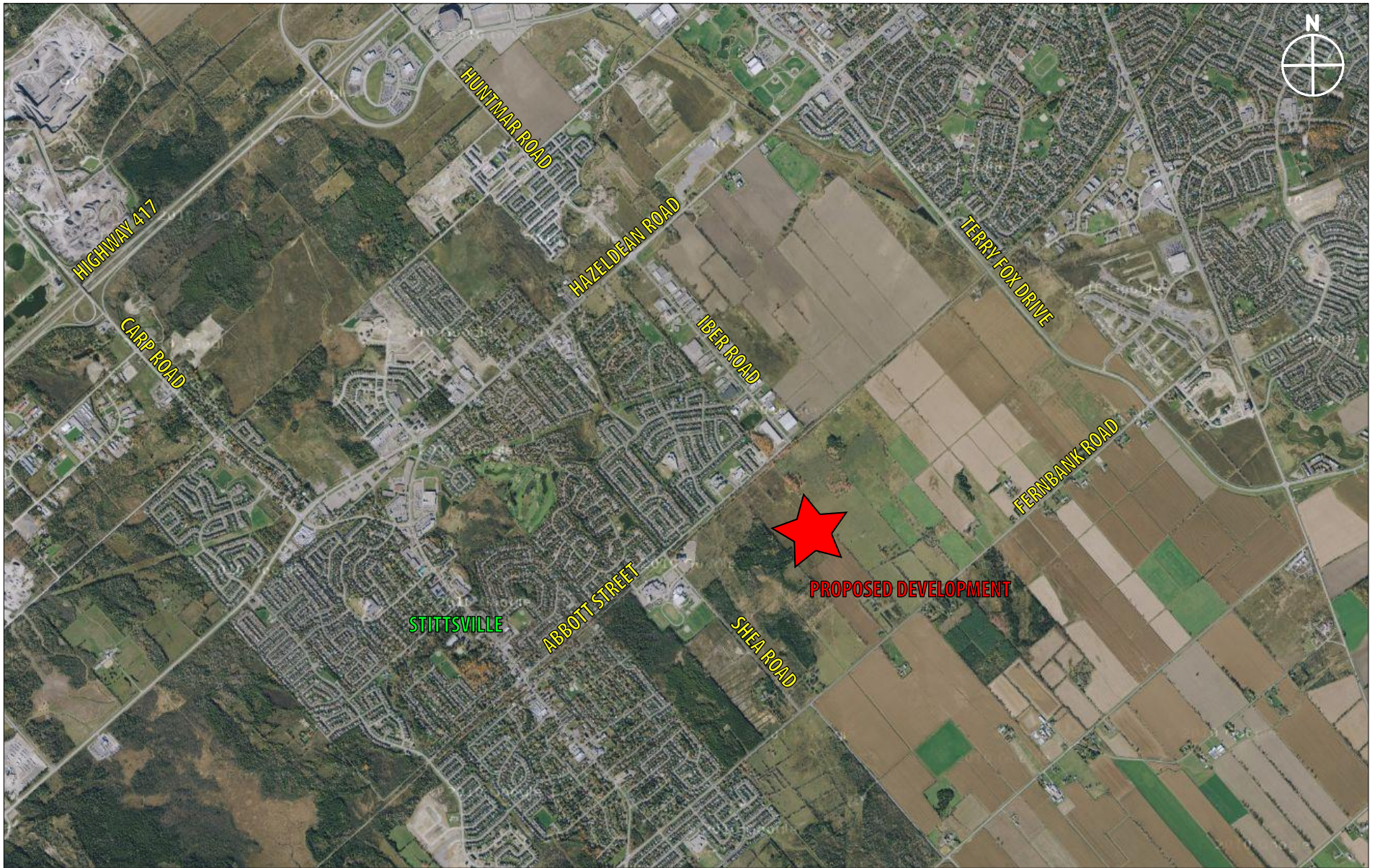
REPORT CONTEXT

Based on the City of Ottawa Transportation Impact Assessment Guidelines (2006), a Transportation Impact Study (TIS) would normally be required to support a draft plan application for a subdivision of this size. However, the location of the proposed development is currently undeveloped, with no existing intersections in the vicinity. The primary access intersections are proposed along the future North-South Arterial Road. The detailed design, including required intersection capacity analysis, of this roadway is currently underway, which is expected to account for traffic generated by the proposed development as well as adjacent residential developments in the Fernbank Community. As a result, it was agreed by City staff that a traditional TIS was not required; a modified Transportation Brief Letter was considered acceptable.

Based on the pre-consultation discussions with the City, the following objectives were formulated:

- Summarize the nature and extent of Phase 1 and 2 of the Claridge Fernbank Subdivision, and demonstrate how it is coherent with the transportation objectives and recommendations outlined in the Fernbank Community Design Plan (CDP);
- Review/ comment on the proposed site design with respect to infrastructure, geometrics, internal operation and active transportation; and,
- Analyze the trip generation and traffic distribution for Phase 1 and 2 of the Claridge Fernbank Subdivision.

All relevant support information and data have been attached.



Claridge Homes - Fernbank Subdivision
Transportation Impact Study

EXHIBIT 1
Site Location

PROJECT No. 27970
DATE: JANUARY 2011
SCALE:



PROPOSED DEVELOPMENT

The current draft plan for the subject property is located in the Fernbank Community and is identified on Exhibit 2. The property covers a total area of about 60 ha and is bounded by Fernbank Road to the south, Abbott Street and the Trans Canada Trail to the north, Shea Road to the east and the North-South Collector Road in the FCDP to the east. The proposed land use for the subject property, which is in general conformance with the FCDP, will include a residential mix of single family units, townhouses and stacked townhouses. The draft plan also provides land for both an elementary and secondary school and both a neighbourhood and community park. Phase 1 and 2 of the CRT Lands are expected to be developed by the 2014 horizon year.

It is the Owners intent to develop the subject lands in at least two phases; Phase 1 immediately upon receipt of approvals, while the development timing of Phase 2 will be market determined.

In accordance with the FCDP, the draft plan proposes two new collector roads; one major collector road with a 26m right-of-way (designated Street No.9 on the draft plan) and one minor collector road with an 22m right-of-way (designated Street No.1). Street No.15 will be classified a local road with an 18m right-of-way. All remaining streets will be local roads with 16.5m rights-of-way. In all, three new community accesses will be provided to the adjacent network. Two accesses will be provided off the future North-South Arterial Road via Street No.9 and Street No.15. The specific geometry and operation of these intersections are being examined as part of the detailed design of the North-South Arterial Road, along with intersection capacity analysis. At this time, it is our understanding that two lanes of the North-South Arterial between the Trans Canada Trail and Fernbank Road, and the extension of Abbott Street between the North-South Arterial and Iber Road will be constructed by an adjacent developer (for the Abbott-Fernbank Lands) as a condition of approval. The initial phase of the Abbott-Fernbank Lands is scheduled to be occupied by the 2014 horizon year, which coincides with the development schedule of the CRT Lands. A copy of the Transportation Brief for the Abbott-Fernbank Lands, completed by Novatech Engineering Consulting Ltd. (Novatech), is attached to this letter. A third access to the CRT Lands will be provided off Abbott Street via Street No.1.

The access intersections off the North-South Arterial Road (at Street No.9 and Street No.15) are spaced approximately 270m apart, which should be sufficient for signalization and arterial traffic progression should future signalization warrants be met.

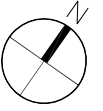
OVERALL DEVELOPMENT CONTEXT.

The proposed CRT Lands is contained within the Fernbank Community, and is subject to the policies and recommendations outlined in the FCDP. One of the major supporting documents for the FCDP is the Fernbank Transportation Master Plan (FTMP). This document outlines the projects and initiatives that will be required to meet the specific transportation needs of the Fernbank Community, and help to service future growth in the surrounding region.

A major element in the FTMP is the North-South Arterial Road, which will bisect the Fernbank Community and provide it with links to the existing major arterial corridors in the area, such as Hazeldean Road and Fernbank Road. The City of Ottawa TMP outlines the need for this arterial link in the updated City of Ottawa TMP, 2008. The FTMP states a 2-lane cross-section is required for the North-South Arterial Road in order to accommodate estimated future demand by the 2031 horizon year. A right-of-way of 41.5m has been provisioned to facilitate widening the roadway to a 4-lane urban cross-section when traffic volumes warrant it beyond the 2031 horizon year. The building setbacks within the CRT Lands will be set appropriately to provide for the future right-of-way.

ACTIVE TRANSPORTATION

The FTMP established a transit modal split of 20% as a reasonable minimum target for the Hazeldean South Screenline. However, the level of transit ridership required to achieve this goal is only expected closer to the 2031 horizon year. As such, it is anticipated that the transit modal split for the CRT Lands will be low initially, but will increase over time as new transit facilities



and services (such as the extension of bus rapid transit on the North-South Arterial Road) are implemented in the Fernbank Community.

In the short term, transit facilities such as bus stops may be provided within the subject lands. Strategic placement of stops along Street No.9 and Street No.1 should ensure all units within the development are within 400m of a bus stop, which is considered to be the maximum ideal walking distance for mobility impaired commuters using public transit. Existing transit service routes operating on Abbott Street may be diverted to accommodate the proposed development. The diverted route only impacts the section of Abbott Street between Iber Road and the proposed development access.

Concrete sidewalks should be provided along both sides of Street No.9 and Street No.1. The location of sidewalks and pedestrian walkways will be determined at the detailed design stage. All streets shall conform to City of Ottawa standards. The FTMP identifies the requirement to provide on-road cycling facilities along the North-South Arterial Road. This will provide the Fernbank Community with a link to nearby cycle routes in the area that are proposed in the City of Ottawa's Primary Urban Cycling Network. On-site bicycle racks and storage areas should be provided at the proposed elementary school and high school as per the City of Ottawa Zoning By-law. These locations should be located near entrances.

TRIP GENERATION

The updated site generated trips were calculated using the ITE Trip Generation Manual, 8th Edition. The results are shown in Table 1 below.

TABLE 1 – Claridge Fernbank Subdivision Phase 1 and 2 Traffic Generation

Land Use	Size (DU or students)	Land Use Code	Peak Hour	Directional Split		Traffic Generated (veh/h)		
				In	Out	In	Out	Total
Single Family Detached	510	210	AM	25%	75%	92	275	367
			PM	63%	37%	287	168	455
Townhome	364	230	AM	17%	83%	25	120	145
			PM	67%	33%	116	57	173
Elementary School	500	520	AM	55%	45%	102	84	186
			PM	49%	51%	37	38	75
High School	1000	530	AM	68%	32%	286	134	420
			PM	47%	53%	61	69	130
SUBTOTAL			AM			504	614	1,118
			PM			501	333	834
Internal (Elementary School: 50%)			AM			-194	-109	-303
			PM			-49	-54	-103
Transit Modal Split (TMS 5%)			AM			-16	-25	-41
			PM			-23	-14	-27
TOTAL NEW TRIPS			AM			295	479	774
			PM			429	265	695

Notes:

veh/h = vehicles per hour; DU = dwelling units

Formula for Land Uses:

Single Family:

$$AM \quad T = 0.70(X) + 9.74$$

$$PM \quad T = e^{(0.90 \ln(X) + 0.51)}$$

Townhouse:

$$T = e^{(0.80 \ln(X) + 0.26)}$$

$$T = e^{(0.82 \ln(X) + 0.32)}$$

Elementary School

$$T = e^{(1.14 \ln(X) - 1.86)}$$

$$T = 0.15(X)$$

High School

$$T = 0.42(X)$$

$$T = 0.13(X)$$

At the time of the report, no information was available pertaining to the size of each school proposed onsite. As a result, it was assumed the elementary school and high school would have 500 and 1,000 enrolled students respectively. Based on these assumptions, the total traffic generation analysis results for the subject site are shown in Table 1. The CRT Lands is expected to generate approximately 770 vehicles and 700 vehicles in the morning and afternoon peak hours respectively. It is worth noting the afternoon peak hour of generation for the elementary school and high school occur well before the peak hour of generation for residential development, which is reflected in the lower trip generation results in Table 1.

Subsequent adjustment factors were applied to these results to account for the mixed-use nature and overall design of the proposed site. These adjustments are summarized below.

Internalization - A 50% internal reduction factor was applied to the elementary school trip generation results; accounting for alternate modes. This factor also reflects the likelihood that many trips may travel within the development and never venture onto the adjacent road network.

Transit Modal Split (TMS) Reduction - Trip generation data in the ITE Manual was derived from local surveys, where the locations often have limited transit use. As noted previously, based on existing transit ridership levels and the lack of significant transit facilities in the immediate area, a lower TMS was assumed in the analysis than the 20% minimum threshold established in the FTMP. In this case, a 5% transit modal split was considered reasonable and relatively conservative to apply in all horizon years.

TRIP DISTRIBUTION

The external trip distribution was based on the Novatech Study, since the adjacent site possesses very similar land use characteristics. The assumed external trip distribution from the Novatech Study was summarized as follows:

- 85% to/ from the east and north (Hazeldean Road, Palladium Drive, Highway 417)
- 10% to/ from the south (Fernbank Road, Terry Fox Drive, Eagleson Road)
- 5% to/ from the west (Abbott Road, Fernbnak Road and Stittsville Main Street)

Based on the external trip distribution assumptions above and the design characteristics of the internal road network, the distribution of site generated traffic between the proposed access intersections was assumed to be as follows:

- 50% to/ from Street No.9
- 35% to/from Street No.15
- 15% from Street No.1

The North-South Arterial Road is expected to be the primary route for residents of the CRT Lands to enter and exit the development, as per the FTMP. As a result, the majority of trips (85%) are expected to use these access intersections.

SUMMARY

The key findings of this Transportation may be summarized as follows:

- The proposed land use for the subject property will include a residential mix of single family units, townhouses and stacked townhouses. The draft plan also provides land for both an elementary and secondary school and both a neighbourhood and community park.

- The subject site will be developed in two phases. Phase 1 and 2 of the CRT Lands are expected to be developed by the 2014 horizon year.
- The draft plan proposes three access intersections, two off the future North-South Arterial Road and one off Abbott Street.
- The detailed design of the North-South Arterial Road between Fernbank Road and Iber Road is currently underway, which is being completed as part of the conditions of approval for the adjacent Abbott-Fernbank Lands. The specific geometry and assessment of operation of intersections along the North-South Arterial Road are being reviewed during this process.
- The subject site is estimated to generate approximately 770 vehicles and 700 vehicles in the morning and afternoon peak hours respectively.
- The majority of site generated trips are expected to originate and depart to and from the north and east, where the North-South Arterial Road will provide the most direct connection to commercial and industrial centres, as well as the adjacent arterial network.
- The FTMP target transit modal split at the Hazeldean South Screenline is 20%. This target is considered achievable if appropriate transit facilities and services (as outlined in the FTMP) are provided to the area.
- The exact location and design of on-site transit, pedestrian and bicycle facilities (such as bus stops and sidewalks) shall be determined at the site plan stage.
- Coordination and communication between adjacent developers should be encouraged to achieve a final design of the North-South Arterial Road, and the associated intersections.

Should you have any questions or require clarification regarding the above letter, please do not hesitate to contact me at (613)-225-1311.

Yours Truly,

IBI Group



Austin Shih, M.A.Sc., P.Eng.
Project Engineer

ATTACHMENTS

Austin Shih

From: Shehata, Amira [Amira.Shehata@ottawa.ca]
Sent: January 19, 2011 2:10 PM
To: Austin Shih
Subject: RE: Claridge Fernbank Residential Subdivision

Austin,

I assume that the analysis would be completed sometime in the near future. If the Claridge Lands Development is incorporated into the analysis you may need to refer to it in your report, no need for repetition. It should be noted that coordination and communication between each developer and consultants is required to achieve a final intersection design.

It would be acceptable to present a brief similar to that of the Regional Transportation Impact Brief.

Amira Shehata, P.Eng, M. Eng. | Project Manager, Infrastructure Approvals
Development Review - Rural Services
T. 613.580.2424 x 27737 | Fax: 613-580-2576
Amira.Shehata@ottawa.ca

CITY OF OTTAWA - Planning and Growth Management
City Hall 110 Laurier Avenue West Ottawa, ON K1P 1J1 Canada

From: Austin Shih [mailto:austin.shih@IBIGroup.com]
Sent: January 19, 2011 12:30 PM
To: Shehata, Amira
Subject: RE: Claridge Fernbank Residential Subdivision

Thanks Amira. I hope you had a wonderful vacation.

Your direction on the scope of work would be appreciated. If analysis on the NS arterial intersections is still ongoing, I assume they would be incorporating Claridge's lands. Do we require repeating this work? Would it be acceptable to present a letter, similar to the Regional Traffic Letter attached, that outlines the characteristics of the development and confirms trip generation/assignment? I've attached the proposed draft plan w/ phasing for your information. Note the enrolment numbers for the schools are estimates, no data on the size is currently available.

I would like to reduce the amount of throw-away work involved with this project, but at the same time provide you with the level of comfort that the development can be accommodated on the network.

Regards,

Austin Shih M.A.Sc., P.Eng.
IBI Group

NOTE: This e-mail message and attachments may contain privileged and confidential information. If you have received this message in error, please immediately notify the sender and delete this e-mail message.

NOTE: Ce courriel peut contenir de l'information privilégiée et confidentielle. Si vous avez reçu ce message par erreur, veuillez le mentionner immédiatement à l'expéditeur et effacer ce courriel.

From: Shehata, Amira [mailto:Amira.Shehata@ottawa.ca]
Sent: January 19, 2011 11:56 AM
To: Austin Shih
Subject: RE: Claridge Fernbank Residential Subdivision

Hi Austin,
Thank you for your message, I look forward to working on this project.
Analysis for the NS arterial intersections is not available yet.

Please note that I was away on vacation and just got back this week hence the delay in my response.

Contact me should you have questions.

Amira Shehata, P.Eng, M. Eng. | Project Manager, Infrastructure Approvals
Development Review - Rural Services
T. 613.580.2424 x 27737 | Fax: 613-580-2576
Amira.Shehata@ottawa.ca

CITY OF OTTAWA - Planning and Growth Management
City Hall 110 Laurier Avenue West Ottawa, ON K1P 1J1 Canada

From: Austin Shih [mailto:austin.shih@IBIGroup.com]
Sent: January 10, 2011 4:07 PM
To: Shehata, Amira
Subject: Claridge Fernbank Residential Subdivision

Hi Amira,
I wanted to let you know that I will be work for on behalf of Claridge to assist in their draft plan application for residential lands in the Fernbank Community. I've attached a site plan showing the phases Claridge is planning to register. When I have more details, I will prepare a terms of reference.

I've also attached a brief completed by Novatech for the adjacent Regional Lands. It states that intersection analysis will be completed for hte NS arterial intersections during design. I was wondering if this information was available since I would need to include that in my analysis as background traffic. I would like to ensure my study is consistent with established approved studies.

Best regards,

Austin Shih M.A.Sc., P.Eng.

IBI Group
400-333 Preston Street
Ottawa ON K1S 5N4 Canada

tel 613 225 1311 **ext** 564
fax 613 225 9868
email austin.shih@IBIGroup.com
web www.ibigroup.com

Single-Family Detached Housing (210)

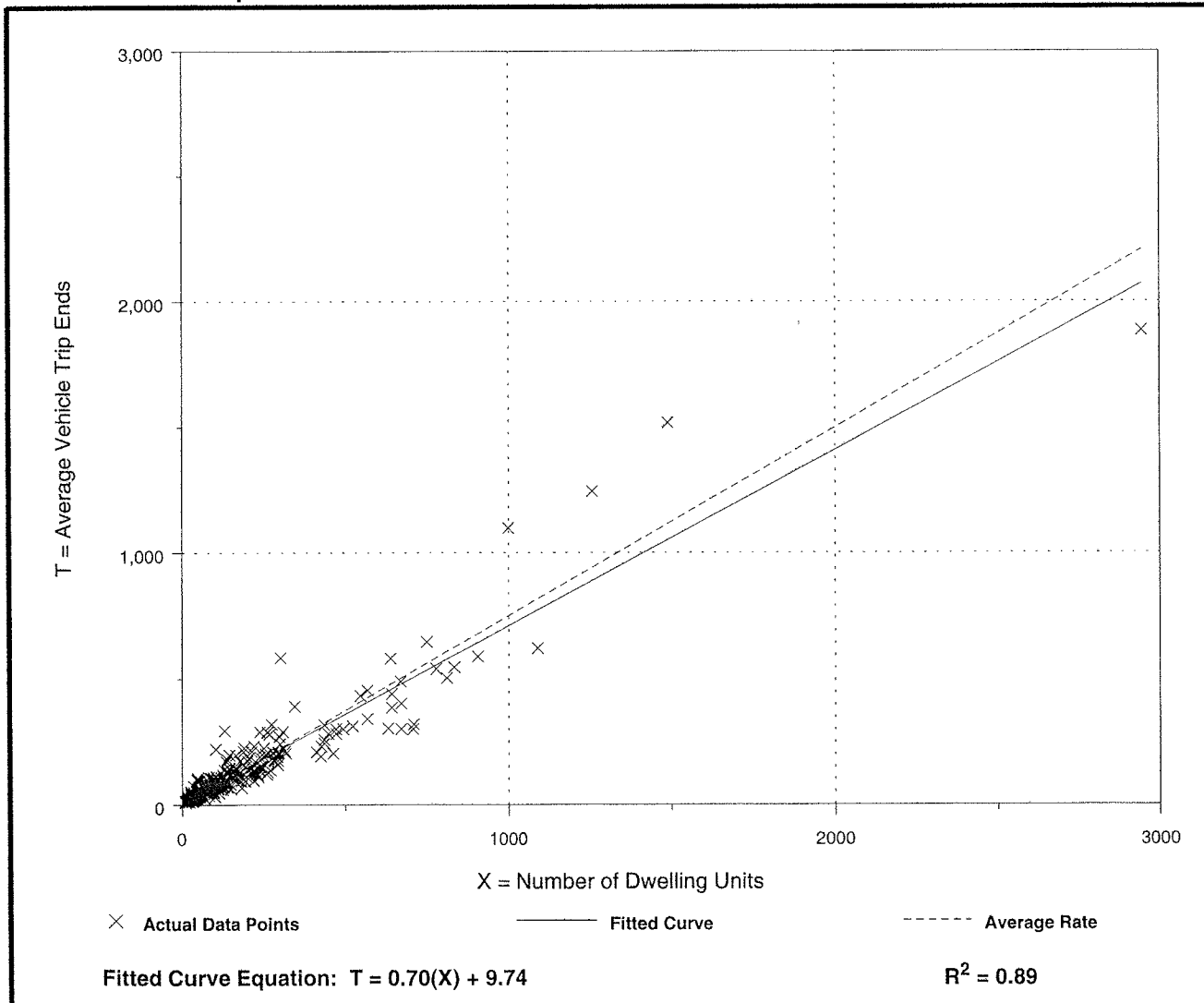
Average Vehicle Trip Ends vs: Dwelling Units
On a: Weekday,
Peak Hour of Adjacent Street Traffic,
One Hour Between 7 and 9 a.m.

Number of Studies: 286
Avg. Number of Dwelling Units: 194
Directional Distribution: 25% entering, 75% exiting

Trip Generation per Dwelling Unit

Average Rate	Range of Rates	Standard Deviation
0.75	0.33 - 2.27	0.90

Data Plot and Equation



Single-Family Detached Housing (210)

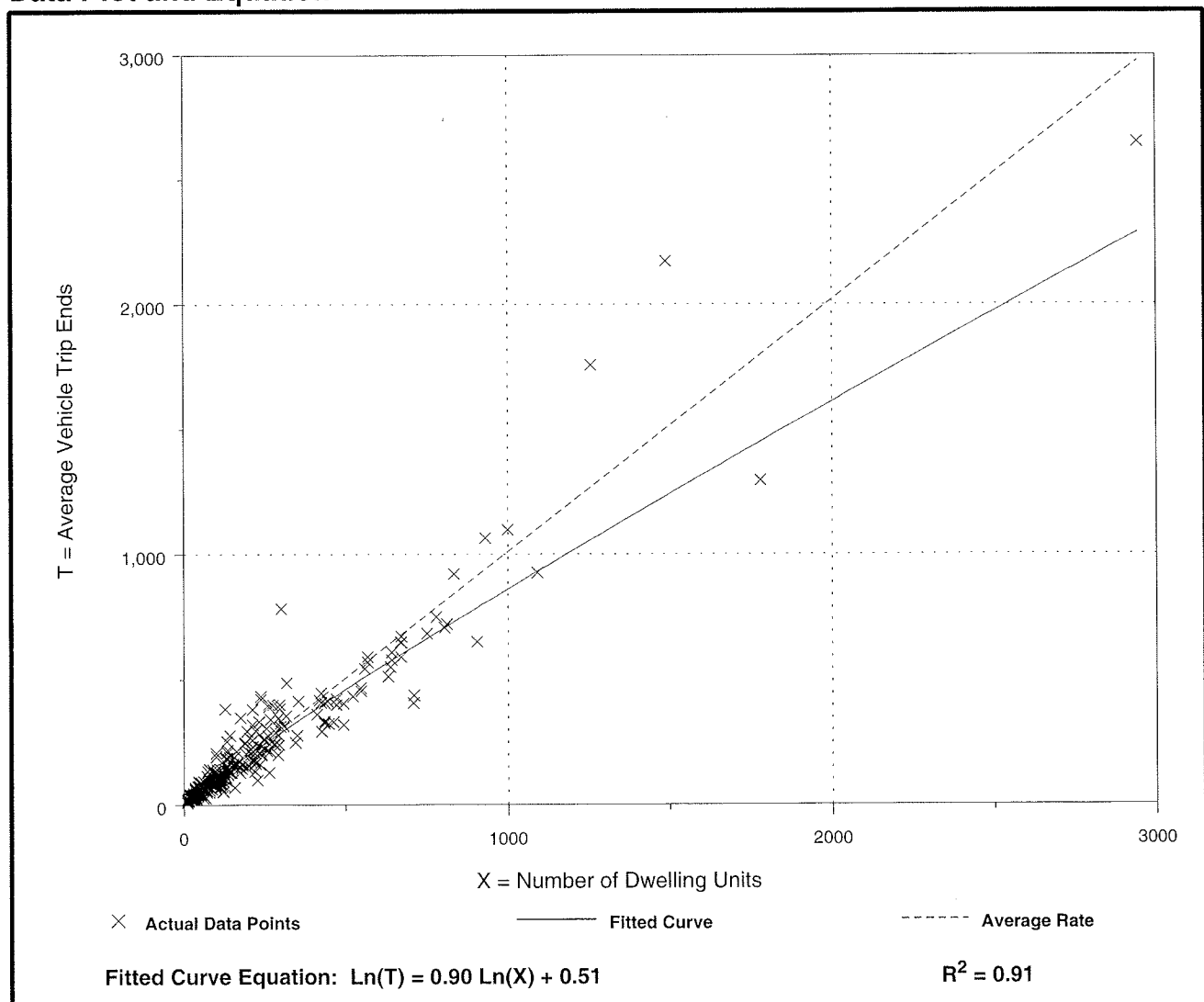
Average Vehicle Trip Ends vs: Dwelling Units
On a: Weekday,
Peak Hour of Adjacent Street Traffic,
One Hour Between 4 and 6 p.m.

Number of Studies: 314
Avg. Number of Dwelling Units: 208
Directional Distribution: 63% entering, 37% exiting

Trip Generation per Dwelling Unit

Average Rate	Range of Rates	Standard Deviation
1.01	0.42 - 2.98	1.05

Data Plot and Equation



Residential Condominium/Townhouse (230)

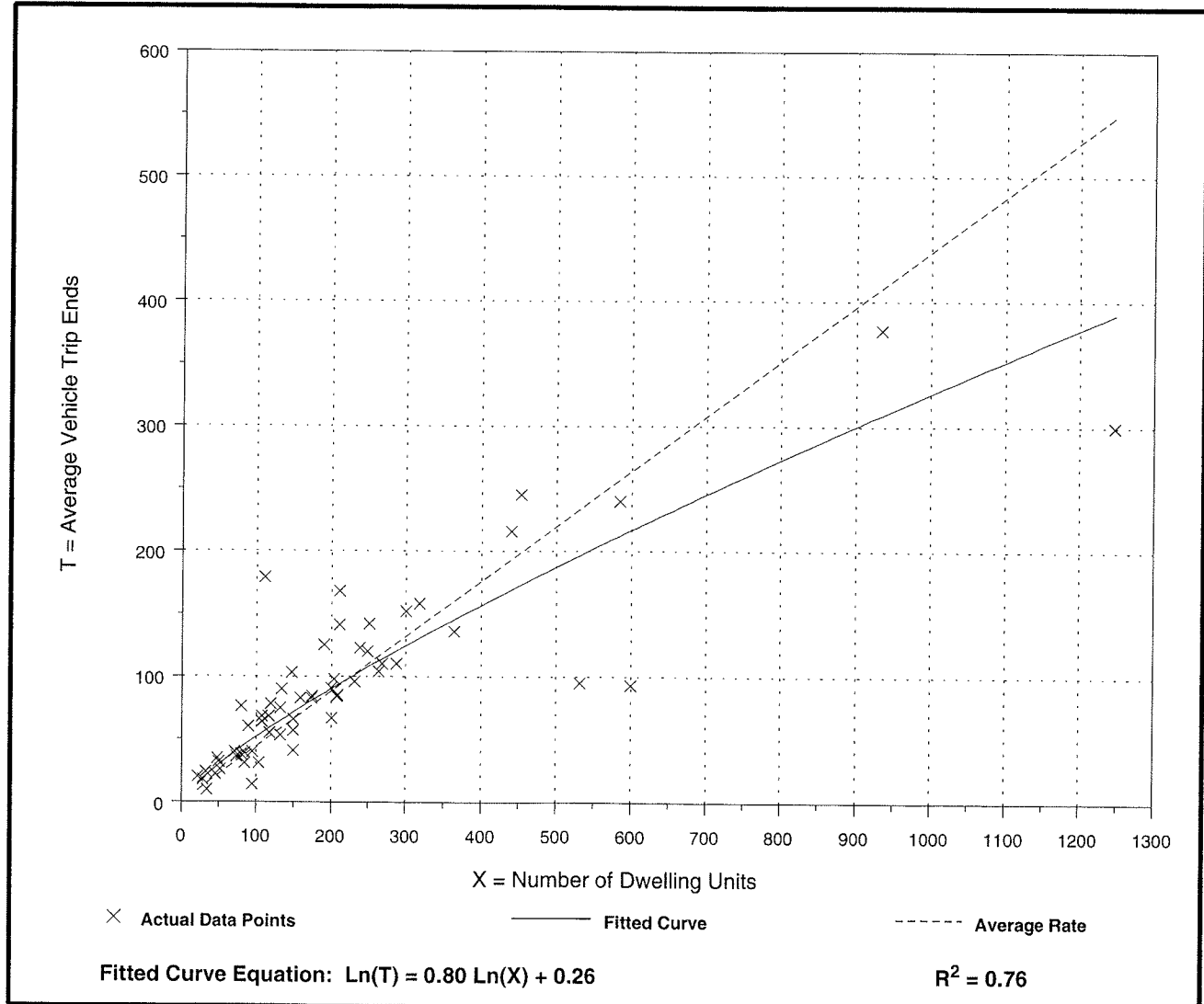
Average Vehicle Trip Ends vs: Dwelling Units
On a: Weekday,
Peak Hour of Adjacent Street Traffic,
One Hour Between 7 and 9 a.m.

Number of Studies: 59
 Avg. Number of Dwelling Units: 213
 Directional Distribution: 17% entering, 83% exiting

Trip Generation per Dwelling Unit

Average Rate	Range of Rates	Standard Deviation
0.44	0.15 - 1.61	0.69

Data Plot and Equation



Residential Condominium/Townhouse (230)

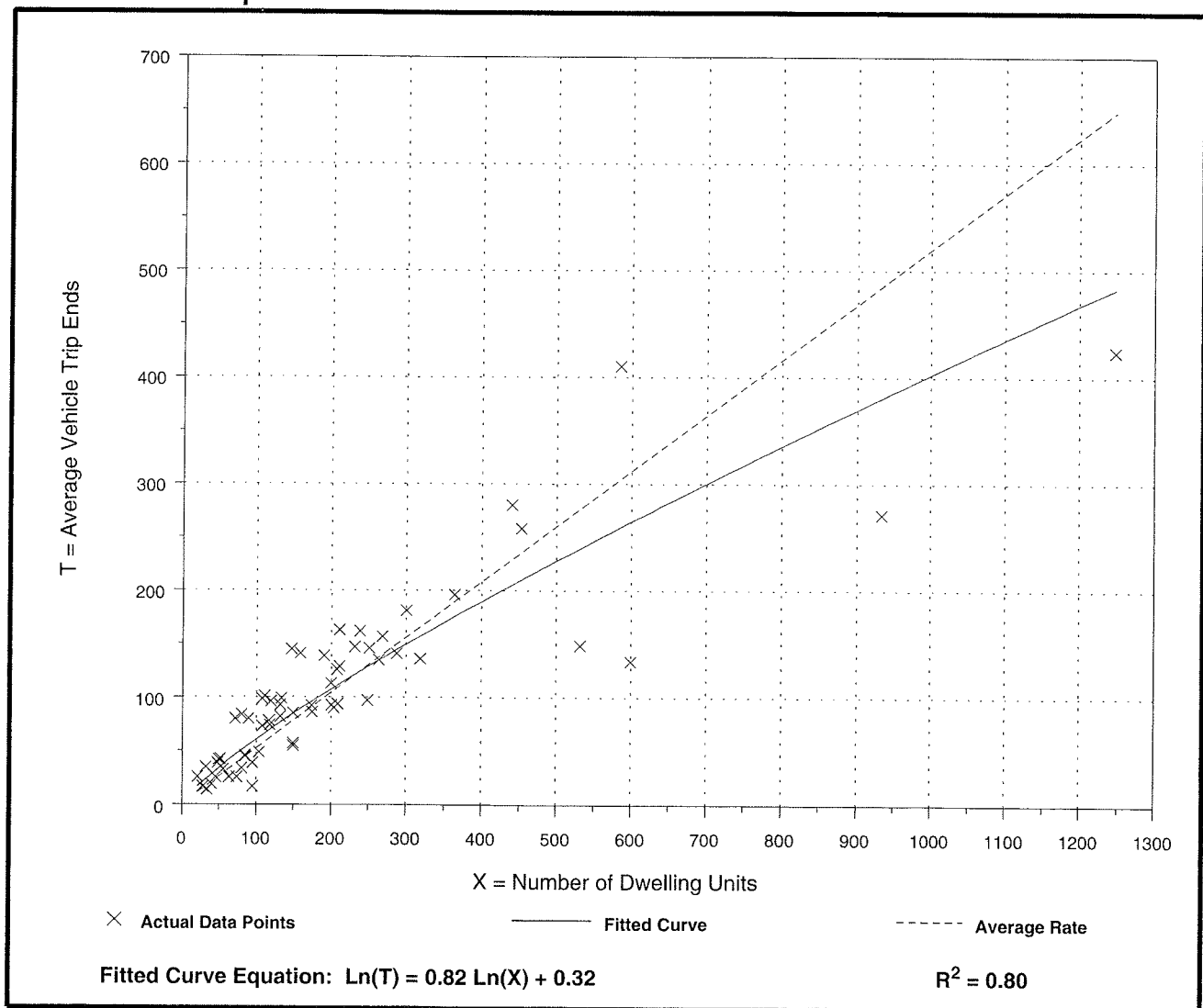
Average Vehicle Trip Ends vs: Dwelling Units
On a: Weekday,
Peak Hour of Adjacent Street Traffic,
One Hour Between 4 and 6 p.m.

Number of Studies: 62
Avg. Number of Dwelling Units: 205
Directional Distribution: 67% entering, 33% exiting

Trip Generation per Dwelling Unit

Average Rate	Range of Rates	Standard Deviation
0.52	0.18 - 1.24	0.75

Data Plot and Equation



Elementary School (520)

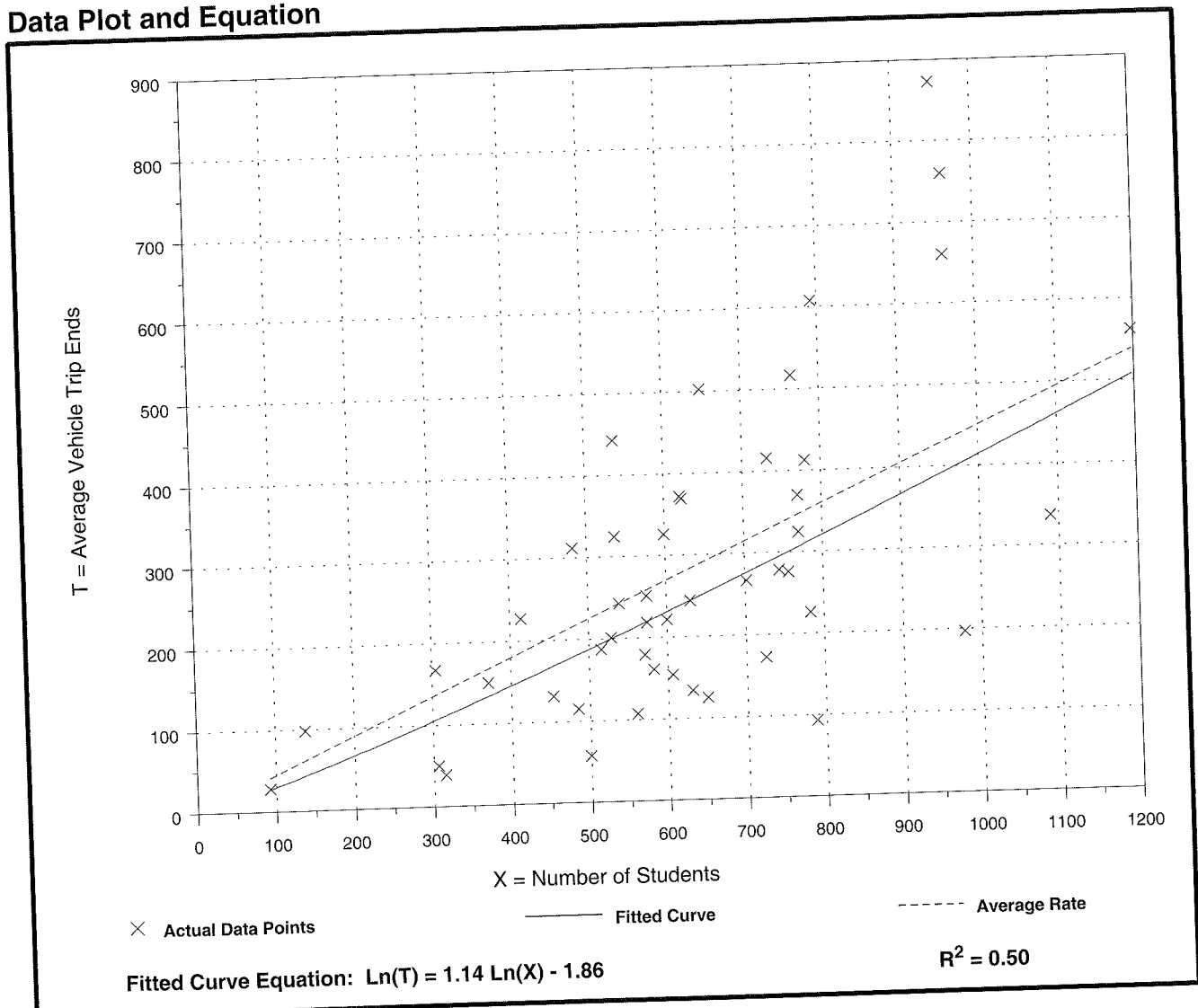
Average Vehicle Trip Ends vs: Students
On a: Weekday,
A.M. Peak Hour

Number of Studies: 48
Average Number of Students: 630
Directional Distribution: 55% entering, 45% exiting

Trip Generation per Student

Average Rate	Range of Rates	Standard Deviation
0.45	0.11 - 0.92	0.70

Data Plot and Equation



Elementary School (520)

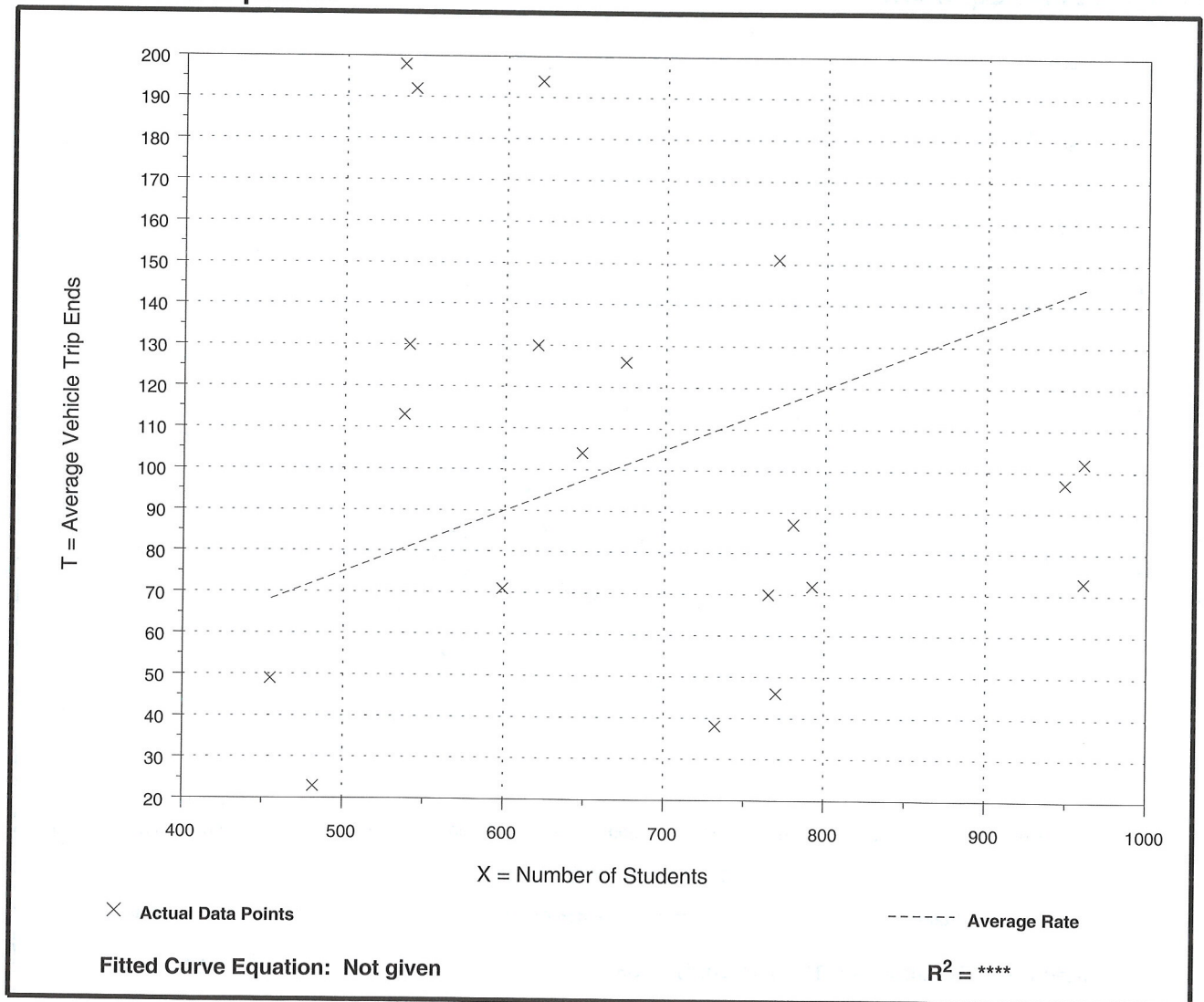
Average Vehicle Trip Ends vs: Students
On a: Weekday,
Peak Hour of Adjacent Street Traffic,
One Hour Between 4 and 6 p.m.

Number of Studies: 20
 Average Number of Students: 687
 Directional Distribution: 49% entering, 51% exiting

Trip Generation per Student

Average Rate	Range of Rates	Standard Deviation
0.15	0.05 - 0.37	0.40

Data Plot and Equation



High School (530)

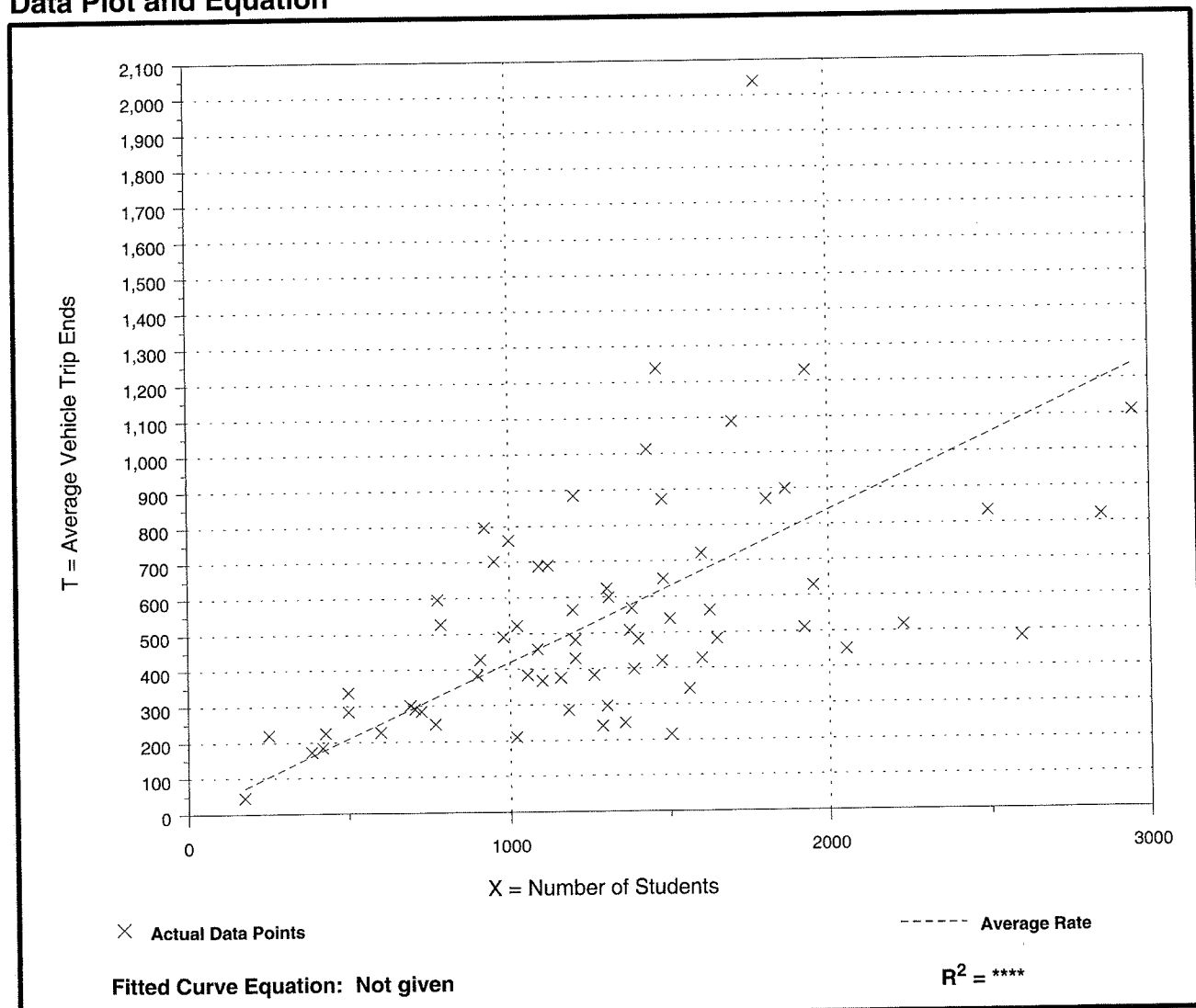
Average Vehicle Trip Ends vs: Students
On a: Weekday,
A.M. Peak Hour

Number of Studies: 68
 Average Number of Students: 1,292
 Directional Distribution: 68% entering, 32% exiting

Trip Generation per Student

Average Rate	Range of Rates	Standard Deviation
0.42	0.14 - 1.15	0.68

Data Plot and Equation



High School (530)

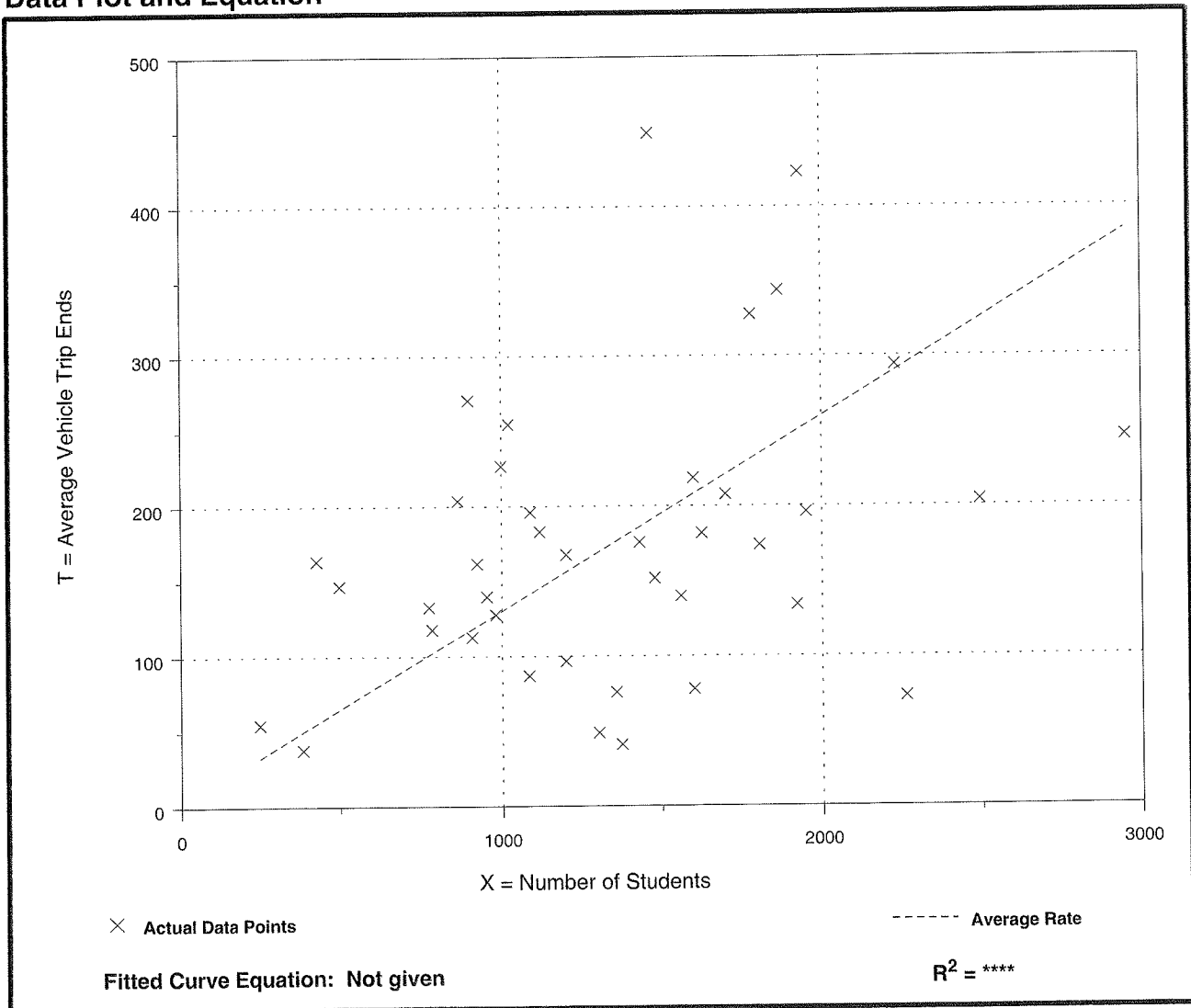
Average Vehicle Trip Ends vs: Students
On a: Weekday,
Peak Hour of Adjacent Street Traffic,
One Hour Between 4 and 6 p.m.

Number of Studies: 40
 Average Number of Students: 1,352
 Directional Distribution: 47% entering, 53% exiting

Trip Generation per Student

Average Rate	Range of Rates	Standard Deviation
0.13	0.03 - 0.38	0.37

Data Plot and Equation





November 11, 2009

BY E-MAIL

Planning and Growth Management Department
110 Laurier Avenue West, 4th Floor
Ottawa, Ontario
K1P 1J1

Attention: Mr. Don Herweyer

Dear Mr. Herweyer:

**Reference: Abbott-Fernbank Holdings – Fernbank Community Lands
Transportation Brief (R-2009-139)
Our File No: 108180**

This Transportation Brief is prepared in support of a Draft Plan application to develop Phase 1A of the development of lands located between Abbott Street and Fernbank Road (henceforth referred to as the Abbott-Fernbank Lands).

1.0 Report Context

The objective of this report is to summarise the nature and extent of this phase of the Abbott-Fernbank Lands, and demonstrate how it is coherent with the transport-related objectives and recommendations as stated in the prevailing Fernbank Community Design Plan (CDP). A trip generation analysis and traffic distribution has been performed as part of this brief. Intersection analysis will be completed as part of the draft plan process, during the preliminary design of the North-South Arterial road.

2.0 Proposed Development

The location of the Abbott-Fernbank Lands is Lot 28, Concession 10 in the geographic township of Goulbourn, now in the City of Ottawa. The site is bounded by Fernbank Road to the south, the Trans Canada Trail to the north, the proposed North-South Arterial road to the west, and future residential development to the east as identified in the Fernbank CDP.

Phase 1A of the Abbott-Fernbank Lands will consist of the following:

- 126 single dwelling units,
- 63 private road townhouse units,
- 3 street townhouse units,
- An elementary school.

Phase 1A includes seven public roadways. Street 14 will be a major collector road with a 26m right-of-way, Street 20 will be a local road with an 18m right-of-way, and the remaining streets will have 16.5m rights-of-way. The proposed access configuration for Phase 1A consists of two roadway intersections along the proposed North-South Arterial Road. The specific geometry and operation

M:\2008\108180\DATA\REPORTS\TRAFFIC\20091111_TB_FINAL.DOCX

of each intersection is not being examined at this time; this will be completed as part of the preliminary design of the North-South Arterial Road, along with the intersection capacity analysis. The locations of the proposed intersections are shown on the attached draft plan. Two lanes of the North-South Arterial Road between the Trans Canada Trail and Fernbank Road, and the extension of Abbott Street between the North-South Arterial and Iber Road will be constructed for the Phase 1A development.

The site area for Phase 1A is approximately 14.04 hectares. The site area for the entire Abbott-Fernbank Lands is approximately 67.31 hectares. The remainder of the site will be developed later in Phases 1B and 2, which will add another 640 residential units, a second elementary school, and a mixed-use development. Phase 1A is located centrally within the Abbott-Fernbank Lands as shown in the attached site plan.

The lands to the east of the Abbott-Fernbank Lands are to be developed by the Monarch Corporation on a phased basis. Phase 1A of the Abbott-Fernbank Lands and Phase 1 of Monarch's development are scheduled for 2014. Phase 1 of the Monarch development will consist of 359 residential units. The remainder of the Monarch development will be completed in up to six additional phases, with the full development totalling approximately 1280 residential units. Phase 1 of the Monarch development is located adjacent to Phase 1A of the Abbott-Fernbank Lands, with full road connectivity to be provided between them.

The effect of the traffic generated by Phase 1 of the Monarch development has been acknowledged and accounted for in this study. The study parameters of the IBI Group's Transportation Impact Study for Phase 1 of the Monarch development have been used for assistance in this regard, to ensure that the respective analyses for both developments are consistent and coherent.

3.0 Overall Development Context

The Abbott-Fernbank Lands form a part of a larger area that is to become the Fernbank Community, and is subject to the objectives and recommendations of the Fernbank CDP. One of the major supporting documents for the CDP is the Fernbank Transportation Master Plan (TMP). This document outlines the projects and initiatives that will be required to meet the specific transport needs of the fully built-out Fernbank Community, and help to service future growth of the West Urban Community.

A major element of this transportation plan is the North-South Arterial road, which will bisect the Fernbank Community and provide it with links to the existing major arterial links in the area. The need to provide this road has been identified in the City of Ottawa's 2008 update to their Transportation Master Plan.

The Fernbank TMP concludes that a 2-lane cross-section will be required for the North-South Arterial, in order to accommodate estimated future transport needs up to and including 2031. A right-of-way of 41.5m is identified to ensure that this road can be widened to a divided four-lane roadway when the traffic volumes warrant it in the years beyond 2031. The building setbacks of the proposed Phase 1A development along the North-South Arterial road shall be sufficient so as to provide this recommended right-of-way.

M:\2008\108180\DATA\REPORTS\TRAFFIC\20091111_TB_FINAL.DOCX

4.0 Provisions for Non-Auto Modes

A transit modal split of 20% is identified in the Fernbank TMP as the reasonable minimum target for the Hazeldean South Screenline. However, it is stated that the level of transit ridership required to achieve this split is unlikely to be achieved until towards the end of the planning period. As such, it is anticipated that the transit modal split for Phase 1A of the Abbott-Fernbank Lands will be quite low initially, but will increase over time as the extent and quality of the public transit service improves in line with the overall development of the Fernbank Community. In order to achieve the target modal split for transit, an exclusive rapid transit corridor along the North-South Arterial has been identified as a viable transit solution.

Due to the proximity of the Phase 1A site to the North-South Arterial road, the implementation of such a project is expected to have a significant effect on the future transit modal split of trips generated by the development within Phase 1A. To assist in meeting the modal split targets outlined in the Fernbank TMP, it is recommended that OC Transpo bus stops are provided midway along Street 14 such that all Phase 1A development will be within 400m of a bus stop – this is considered to be the maximum ideal walking distance for mobility impaired commuters using public transit. Future bus stop locations should be reviewed and determined by OC Transpo.

Concrete sidewalks should be provided along both sides of Street 14 and along one side of Street 20. The location of sidewalks and pedestrian walkways will be determined at the detailed design stage. The streets will be consistent with the ideal roadway cross-sections shown in the Fernbank CDP, and sufficient right-of-way widths will be provided to allow for their construction.

The Fernbank TMP identifies the requirement to provide on-road cycling facilities along the North-South Arterial. This will provide the Fernbank Community with a link to nearby cycle routes in the Kanata area that are proposed as part of the City of Ottawa's Primary Urban Cycling Network.

It is recommended that on-site bicycle parking should be provided for the proposed elementary school as per the bicycle parking requirements identified in the City of Ottawa's Zoning By-law. The bicycle parking spaces should be located as near as is practicable to the main entrances to the proposed school. Exact locations should be determined at the detailed design stage.

5.0 Trip Generation and Distribution

Trips generated by Phase 1A of the development have been calculated for the weekday AM and PM peak hours using the Institute of Transportation Engineers (ITE) Trip Generation Manual (8th Edition).

It should be noted that the peak hours of generation for the school and the residential development are not necessarily coincidental. The AM peak hours of generation for a school and residential development are comparable, and the summation of their respective trip volumes is considered to represent an accurate estimation of the volume of trips likely to be generated by the entire development during the AM peak. However, during the afternoon the peak hour of generation for an elementary school generally occurs well before the peak hour of generation for residential development. Nevertheless, in the interest of providing a robust assessment no reduction factor has been applied to the 'critical' PM trip volumes.

M:\2008\108180\DATA\REPORTS\TRAFFIC\20091111_TB_FINAL.DOCX

It has been assumed that the school will generate 20 two-way external trips during each of the peak hours, with the remaining trips attributable to the school assumed to be generated internally throughout the adjacent residential development. The internal trips will not be added onto the external road network when the intersection capacity analysis is performed. The following table outlines the trip generation based on the aforementioned draft plan.

Table 1: Trip Generation of Phase 1A

Land Use	ITE Code	# of units	AM Peak			PM Peak		
			In	Out	Total	In	Out	Total
Single Residential Units	210	126	25	72	97	82	46	129
Private Road Townhouses	230	63	5	22	28	21	12	33
Public Street Townhouses	230	3	0	1	1	1	1	2
Elementary School	520	-	20	20	40	20	20	40
Total			51	115	166	124	79	203

As shown in Table 1, all elements of the Phase 1A development are expected to generate a total of 166 trips during the weekday AM peak hour of generation, and 203 trips in the PM peak hour of generation. This is consistent with the Fernbank TMP's assumption that the trip rate for residential development within the Fernbank Community will be 1.1 trips per dwelling unit during the PM peak hour.

Based on the above table, the arrival-departure split is approximately 70/30 in favour of departures in the AM, and 65/35 in favour of arrivals in the PM. This is consistent with the findings of the Fernbank TMP, which states that residential trips will be split 65/35 in the AM and PM peak hours of generation.

External trip distribution has been estimated based on a number of factors. These include:

- the objectives and recommendations of the Fernbank TMP;
- the nature of the proposed development within Phase 1A of the Abbott-Fernbank Lands;
- the existing and proposed transport infrastructure in the vicinity of the site and its current capacity;
- the demographic characteristics of the surrounding area and the likely location of future development sites that will generate transport demand.

The assumed external trip distribution can be summarized thus:

- 85% to/from the east and north (Hazeldean Rd, Palladium Drive, Hwy 417)
- 10% to/from the south (Fernbank Rd, Terry Fox Drive, Eagleson Rd)
- 5% to/from the west (Abbott Rd, Fernbank Rd, Stittsville Main St)

This distribution of development generated traffic is considered to be consistent with the findings of the Fernbank TMP, and is also broadly comparable to the trip distribution assumptions for the aforementioned Phase 1 Monarch development. Approximately 10% of all trips generated by Phase 1 of the Monarch development are expected to originate from or depart to the west and south. These trips will likely pass through Phase 1A of the Abbott-Fernbank Lands to reach the North-South Arterial road, and should be accounted for at each of the proposed intersections when the intersection capacity analysis is performed.

By applying the same relevant trip generation rates to the Monarch development as those used for the Abbott-Fernbank Lands, it has been determined that Phase 1 of the Monarch development is expected to generate 221 and 283 trips in the AM and PM peak hours respectively. Assuming that 10% of these trips will be to/from the west/south, the number of trips generated by this development that will pass through the Abbott-Fernbank Lands in the AM and PM peak hours will be 22 and 28 respectively.

The distribution of site generated traffic between each of the proposed intersections (including the extra through trips generated by the Monarch development) is assumed to be 50/50.

6.0 Conclusions

In summary, the findings of our assessment of the proposed development are as follows:

- the total area of the Phase 1A development makes up approximately 20% of the area of the entire Abbott-Fernbank Lands, and it consists of 192 residential units and a school;
- the proposed access configuration consists of two intersections with the proposed North-South Arterial road;
- the development of Phase 1A is forecast to generate 166 trips during the weekday AM peak, and 203 trips during the weekday PM peak;
- the construction of Phase 1 of the adjacent Monarch development will result in 22 and 28 trips passing through the Abbott-Fernbank Lands during the AM and PM peak hours respectively;
- most of the generated trips are expected to originate and depart to and from the north and east, where the North-South Arterial road will provide the quickest connection to commercial and industrial centres in the Kanata area, as well as other major arterial routes;



- the Fernbank TMP's target modal split for public transit for the Hazeldean South Screenline is 20%, and this is considered achievable if public transit facilities of sufficient quality and coverage are provided throughout the area;
- bus stops, sidewalks, and locations for on-site bicycle parking will be determined at the detailed design stage.

We trust this letter adequately addresses the transportation characteristics of the proposed development. Please contact the undersigned if you have any questions or comments.

Yours truly,

NOVATECH ENGINEERING CONSULTANTS LTD.

Prepared by:

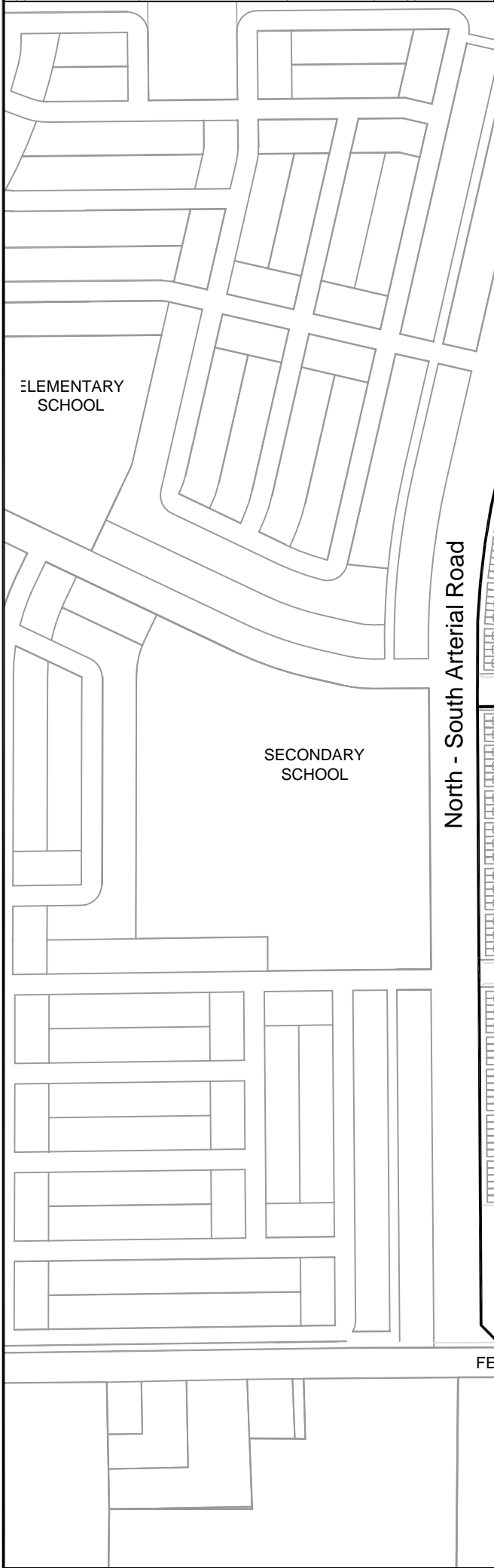
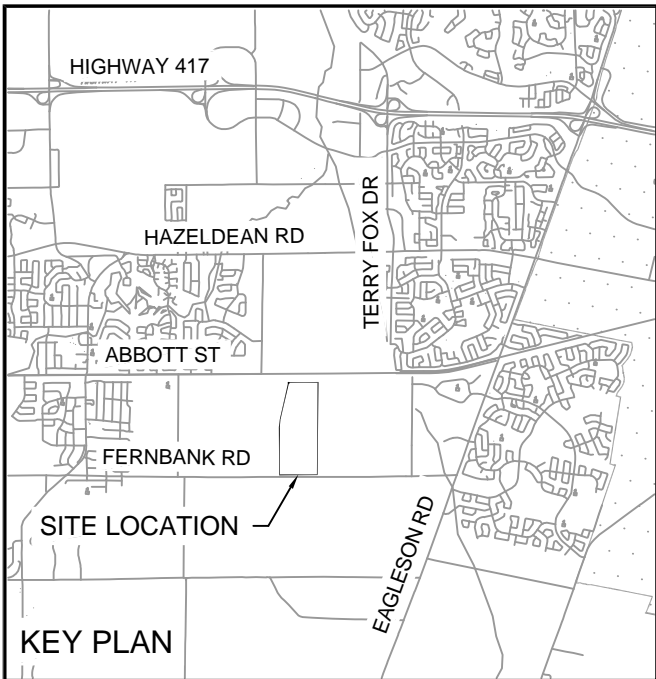
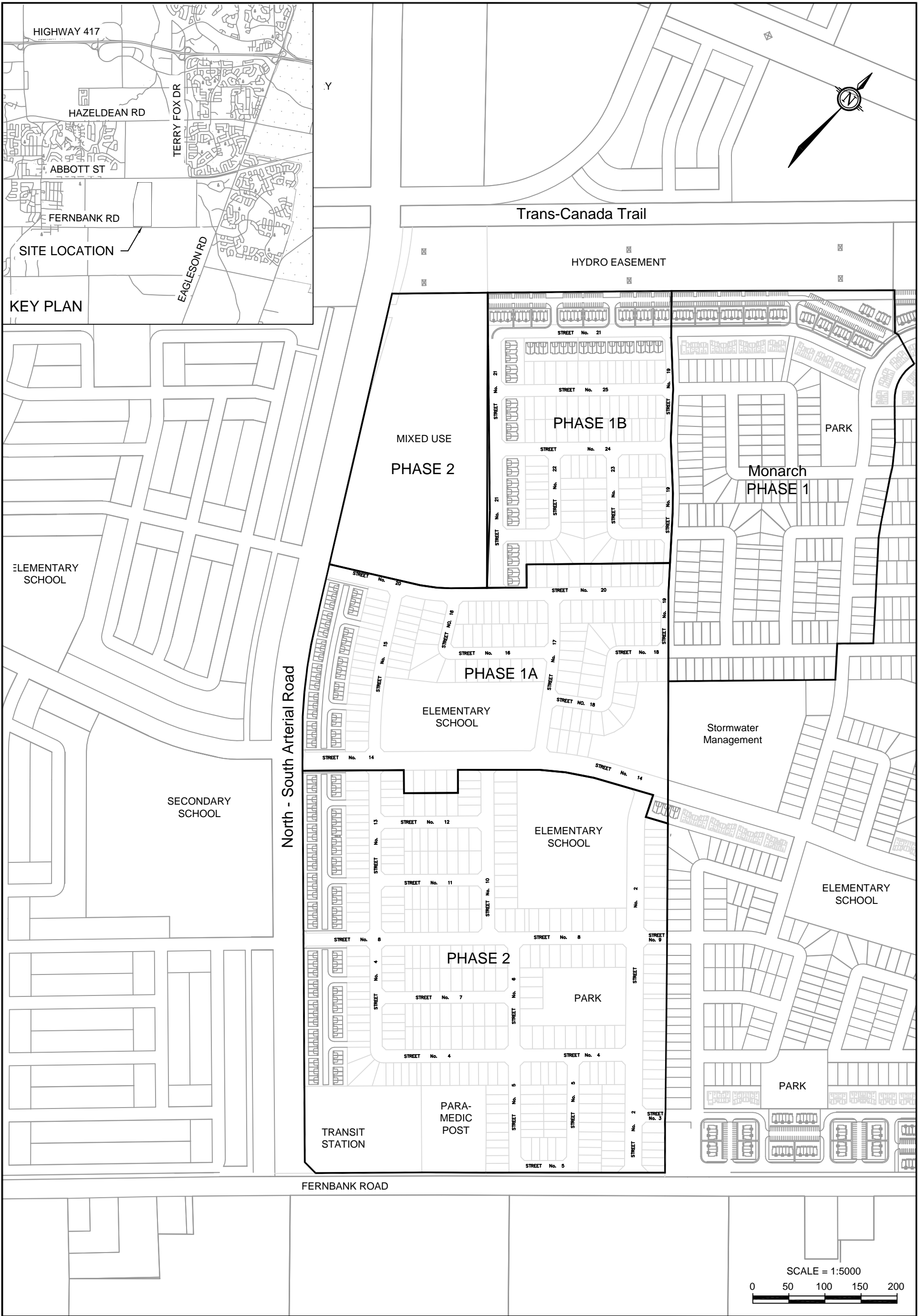
A handwritten signature in blue ink that reads "Graham O'Neill".

Graham O'Neill, BE
E.I.T.

Reviewed by:

A handwritten signature in blue ink that reads "Jennifer Luong".

Jennifer Luong, P.Eng.
Project Manager



NOVATECH
ENGINEERING
CONSULTANTS LTD.
ENGINEERS & PLANNERS

Suite 200, 240 Michael Cowpland Drive
Ottawa, Ontario, Canada
K2M 1P6

Telephone (613) 254-9643
Facsimile (613) 254-5867
Email: novainfo@novatech-eng.com

ABBOTT-FERNBANK LANDS

DRAFT PLAN

NOV 2009 108180 FIGURE 1

Appendix G

TDM Checklist

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

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

TDM measures: <i>Residential developments</i>		Check if proposed & add descriptions
1. TDM PROGRAM MANAGEMENT		
1.1 Program coordinator		
BASIC	★ 1.1.1 Designate an internal coordinator, or contract with an external coordinator	✓ Property Management staff of rental apartment building to serve as coordinator
1.2 Travel surveys		
BETTER	1.2.1 Conduct periodic surveys to identify travel-related behaviours, attitudes, challenges and solutions, and to track progress	<input type="checkbox"/>
2. WALKING AND CYCLING		
2.1 Information on walking/cycling routes & destinations		
BASIC	2.1.1 Display local area maps with walking/cycling access routes and key destinations at major entrances (<i>multi-family, condominium</i>)	✓ Display City of Ottawa maps and have on hand at Security Desk and Property Management Office
2.2 Bicycle skills training		
BETTER	2.2.1 Offer on-site cycling courses for residents, or subsidize off-site courses	<input type="checkbox"/>

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

TDM measures: <i>Residential developments</i>		Check if proposed & add descriptions
6. TDM MARKETING & COMMUNICATIONS		
6.1 Multimodal travel information		
BASIC	★ 6.1.1 Provide a multimodal travel option information package to new residents	✓ Provide multimodal travel option information in standard Welcome Manual for new residents (tenants)
6.2 Personalized trip planning		
BETTER	★ 6.2.1 Offer personalized trip planning to new residents	<input type="checkbox"/>

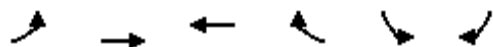
Appendix H

SYNCHRO and SIDRA Capacity Analysis

Existing Conditions

Existing AM

3: Fernbank Road & Robert Grant Avenue



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)	31	329	217	174	169	29
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)	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	6.2	6.2	6.2	6.2	6.0	6.0
Lead/Lag	Lead		Lag	Lag		
Lead-Lag Optimize?	Yes		Yes	Yes		
Recall Mode	Max	Min	Min	Min	Max	Max
Act Effct Green (s)	20.0	41.8	15.6	15.6	30.1	30.1
Actuated g/C Ratio	0.24	0.50	0.19	0.19	0.36	0.36
v/c Ratio	0.09	0.37	0.66	0.43	0.28	0.05
Control Delay	27.6	14.3	42.0	8.2	22.0	8.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	27.6	14.3	42.0	8.2	22.0	8.1
LOS	C	B	D	A	C	A
Approach Delay		15.4	27.0		20.0	
Approach LOS		B	C		B	
Queue Length 50th (m)	3.9	30.9	32.6	0.0	19.0	0.0
Queue Length 95th (m)	11.6	48.1	54.0	15.1	37.8	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)	329	1640	1073	938	593	539
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	0.20	0.20	0.19	0.28	0.05

Intersection Summary

Cycle Length: 119.4

Actuated Cycle Length: 84.1

Natural Cycle: 100

Control Type: Semi Act-Uncoord

Maximum v/c Ratio: 0.66

Intersection Signal Delay: 21.1

Intersection LOS: C

Intersection Capacity Utilization 39.2%

ICU Level of Service A

Analysis Period (min) 15

Existing AM
3: Fernbank Road & Robert Grant Avenue

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



Existing AM
8: Bobolink Ridge & Livery Street






Lane Group	EBT	WBT	SBL
Lane Configurations			
Traffic Volume (vph)	35	64	2
Future Volume (vph)	35	64	2
Lane Group Flow (vph)	56	71	55
Sign Control	Free	Free	Stop

Intersection Summary		
Control Type: Unsignalized		
Intersection Capacity Utilization 19.5%		ICU Level of Service A
Analysis Period (min) 15		

Existing AM
8: Bobolink Ridge & Livery Street

Intersection

Int Delay, s/veh 3.4

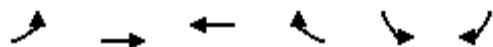
Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	15	35	64	0	2	48
Future Vol, veh/h	15	35	64	0	2	48
Conflicting Peds, #/hr	8	0	0	8	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	90	90	90	90	90	90
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	17	39	71	0	2	53

Major/Minor	Major1	Major2	Minor2
Conflicting Flow All	79	0	0 152 79
Stage 1	-	-	- 79 -
Stage 2	-	-	- 73 -
Critical Hdwy	4.12	-	- 6.42 6.22
Critical Hdwy Stg 1	-	-	- 5.42 -
Critical Hdwy Stg 2	-	-	- 5.42 -
Follow-up Hdwy	2.218	-	- 3.518 3.318
Pot Cap-1 Maneuver	1519	-	- 840 981
Stage 1	-	-	- 944 -
Stage 2	-	-	- 950 -
Platoon blocked, %	-	-	-
Mov Cap-1 Maneuver	1509	-	- 818 974
Mov Cap-2 Maneuver	-	-	- 818 -
Stage 1	-	-	- 926 -
Stage 2	-	-	- 943 -

Approach	EB	WB	SB
HCM Control Delay, s	2.2	0	9
HCM LOS			A

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1509	-	-	-	967
HCM Lane V/C Ratio	0.011	-	-	-	0.057
HCM Control Delay (s)	7.4	0	-	-	9
HCM Lane LOS	A	A	-	-	A
HCM 95th %tile Q(veh)	0	-	-	-	0.2

Existing PM
3: Fernbank Road & Robert Grant Avenue



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)	19	272	489	196	181	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)	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)	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	6.2	6.2	6.2	6.2	6.0	6.0
Lead/Lag	Lead		Lag	Lag		
Lead-Lag Optimize?	Yes		Yes	Yes		
Recall Mode	Max	Min	Min	Min	Max	Max
Act Effect Green (s)	20.1	59.9	33.5	33.5	30.2	30.2
Actuated g/C Ratio	0.20	0.58	0.33	0.33	0.29	0.29
v/c Ratio	0.06	0.27	0.84	0.32	0.38	0.07
Control Delay	37.8	10.9	45.1	4.7	33.6	11.6
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	37.8	10.9	45.1	4.7	33.6	11.6
LOS	D	B	D	A	C	B
Approach Delay		12.6	33.5		30.7	
Approach LOS		B	C		C	
Queue Length 50th (m)	3.1	24.6	88.8	0.0	28.3	0.0
Queue Length 95th (m)	10.3	37.4	126.2	13.7	55.5	7.1
Internal Link Dist (m)		217.9	258.1		237.6	
Turn Bay Length (m)	100.0			100.0	80.0	
Base Capacity (vph)	339	1517	1087	974	476	427
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	0.06	0.18	0.45	0.20	0.38	0.07

Intersection Summary

Cycle Length: 130.4

Actuated Cycle Length: 102.4

Natural Cycle: 100

Control Type: Semi Act-Uncoord

Maximum v/c Ratio: 0.84

Intersection Signal Delay: 27.9

Intersection LOS: C

Intersection Capacity Utilization 44.1%

ICU Level of Service A

Analysis Period (min) 15

Existing PM
3: Fernbank Road & Robert Grant Avenue

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



Existing PM
8: Bobolink Ridge & Livery Street






Lane Group	EBT	WBT	SBL
Lane Configurations			
Traffic Volume (vph)	75	34	1
Future Volume (vph)	75	34	1
Lane Group Flow (vph)	137	41	34
Sign Control	Free	Free	Stop

Intersection Summary		
Control Type: Unsignalized		
Intersection Capacity Utilization 23.7%		ICU Level of Service A
Analysis Period (min) 15		

Existing PM
8: Bobolink Ridge & Livery Street

Intersection

Int Delay, s/veh 3.3

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	49	75	34	3	1	30
Future Vol, veh/h	49	75	34	3	1	30
Conflicting Peds, #/hr	11	0	0	11	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	90	90	90	90	90	90
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	54	83	38	3	1	33

Major/Minor	Major1	Major2	Minor2
Conflicting Flow All	52	0	0 242 51
Stage 1	-	-	- 51 -
Stage 2	-	-	- 191 -
Critical Hdwy	4.12	-	- 6.42 6.22
Critical Hdwy Stg 1	-	-	- 5.42 -
Critical Hdwy Stg 2	-	-	- 5.42 -
Follow-up Hdwy	2.218	-	- 3.518 3.318
Pot Cap-1 Maneuver	1554	-	- 746 1017
Stage 1	-	-	- 971 -
Stage 2	-	-	- 841 -
Platoon blocked, %	-	-	-
Mov Cap-1 Maneuver	1540	-	- 706 1008
Mov Cap-2 Maneuver	-	-	- 706 -
Stage 1	-	-	- 926 -
Stage 2	-	-	- 833 -

Approach	EB	WB	SB
HCM Control Delay, s	2.9	0	8.8
HCM LOS			A

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1540	-	-	-	994
HCM Lane V/C Ratio	0.035	-	-	-	0.035
HCM Control Delay (s)	7.4	0	-	-	8.8
HCM Lane LOS	A	A	-	-	A
HCM 95th %tile Q(veh)	0.1	-	-	-	0.1

MOVEMENT SUMMARY

 **Site:** [Existing - Abbott/Robert Grant]

AM Peak
Site Category: (None)
Roundabout

Movement Performance - Vehicles												
Mov ID	Turn	Demand Total veh/h	Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
South: Robert Grant Avenue												
1	L2	243	2.0	0.172	8.8	LOS A	0.9	6.5	0.11	0.61	0.11	53.1
3	R2	20	2.0	0.172	4.0	LOS A	0.9	6.5	0.11	0.61	0.11	51.9
Approach		263	2.0	0.172	8.5	LOS A	0.9	6.5	0.11	0.61	0.11	53.0
East: Abbott Street East												
4	L2	16	2.0	0.067	8.4	LOS A	0.3	2.3	0.39	0.47	0.39	47.6
5	T1	60	2.0	0.067	3.9	LOS A	0.3	2.3	0.39	0.47	0.39	47.5
Approach		76	2.0	0.067	4.8	LOS A	0.3	2.3	0.39	0.47	0.39	47.5
West: Abbott Street E												
11	T1	23	2.0	0.104	2.9	LOS A	0.6	4.1	0.09	0.38	0.09	49.0
12	R2	137	2.0	0.104	2.9	LOS A	0.6	4.1	0.09	0.38	0.09	47.9
Approach		160	2.0	0.104	2.9	LOS A	0.6	4.1	0.09	0.38	0.09	48.1
All Vehicles		499	2.0	0.172	6.1	LOS A	0.9	6.5	0.15	0.52	0.15	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.

SIDRA INTERSECTION 8.0 | Copyright © 2000-2018 Akcelik and Associates Pty Ltd | sidrasolutions.com

Organisation: PARSONS | Processed: Monday, June 15, 2020 3:49:22 PM

Project: C:\Home Work\476799 - LepineFernbank\1000\DATA\SIDRA\AM Peak.sip8

MOVEMENT SUMMARY

 **Site:** [Existing - Abbott/Robert Grant]

PM Peak
Site Category: (None)
Roundabout

Movement Performance - Vehicles												
Mov ID	Turn	Demand Total veh/h	Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
South: Robert Grant Avenue												
1	L2	181	2.0	0.134	9.0	LOS A	0.7	4.9	0.18	0.61	0.18	52.7
3	R2	7	2.0	0.134	4.1	LOS A	0.7	4.9	0.18	0.61	0.18	51.6
Approach		188	2.0	0.134	8.8	LOS A	0.7	4.9	0.18	0.61	0.18	52.7
East: Abbott Street East												
4	L2	30	2.0	0.079	8.1	LOS A	0.4	2.8	0.34	0.48	0.34	47.6
5	T1	63	2.0	0.079	3.6	LOS A	0.4	2.8	0.34	0.48	0.34	47.4
Approach		93	2.0	0.079	5.1	LOS A	0.4	2.8	0.34	0.48	0.34	47.4
West: Abbott Street E												
11	T1	53	2.0	0.202	2.9	LOS A	1.2	8.6	0.14	0.38	0.14	48.9
12	R2	252	2.0	0.202	3.0	LOS A	1.2	8.6	0.14	0.38	0.14	47.7
Approach		306	2.0	0.202	3.0	LOS A	1.2	8.6	0.14	0.38	0.14	47.9
All Vehicles		587	2.0	0.202	5.2	LOS A	1.2	8.6	0.19	0.47	0.19	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.

SIDRA INTERSECTION 8.0 | Copyright © 2000-2018 Akcelik and Associates Pty Ltd | sidrasolutions.com

Organisation: PARSONS | Processed: Monday, June 15, 2020 4:17:48 PM

Project: C:\Home Work\476799 - LepineFernbank\1000\DATA\SIDRA\PM Peak.sip8

MOVEMENT SUMMARY

 Site: [Existing - Bobolink/Robert Grant]

AM Peak
Site Category: (None)
Roundabout

Movement Performance - Vehicles												
Mov ID	Turn	Demand Total veh/h	Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
South: Robert Grant Avenue												
1	L2	1	2.0	0.134	8.9	LOS A	0.7	4.9	0.13	0.40	0.13	56.1
2	T1	182	2.0	0.134	4.3	LOS A	0.7	4.9	0.13	0.40	0.13	56.2
3	R2	13	2.0	0.134	4.0	LOS A	0.7	4.9	0.13	0.40	0.13	54.8
Approach		197	2.0	0.134	4.3	LOS A	0.7	4.9	0.13	0.40	0.13	56.1
East: Bobolink Drive												
4	L2	24	2.0	0.090	9.6	LOS A	0.4	3.2	0.34	0.54	0.34	54.9
5	T1	1	2.0	0.090	5.0	LOS A	0.4	3.2	0.34	0.54	0.34	54.9
6	R2	81	2.0	0.090	4.8	LOS A	0.4	3.2	0.34	0.54	0.34	53.6
Approach		107	2.0	0.090	5.9	LOS A	0.4	3.2	0.34	0.54	0.34	53.9
North: Robert Grant Avenue												
7	L2	31	2.0	0.104	8.9	LOS A	0.6	4.0	0.12	0.45	0.12	55.5
8	T1	121	2.0	0.104	4.2	LOS A	0.6	4.0	0.12	0.45	0.12	55.6
9	R2	1	2.0	0.104	4.0	LOS A	0.6	4.0	0.12	0.45	0.12	54.2
Approach		153	2.0	0.104	5.2	LOS A	0.6	4.0	0.12	0.45	0.12	55.5
West: Bobolink Drive												
10	L2	1	2.0	0.003	9.5	LOS A	0.0	0.1	0.31	0.49	0.31	54.4
11	T1	1	2.0	0.003	4.8	LOS A	0.0	0.1	0.31	0.49	0.31	54.5
12	R2	1	2.0	0.003	4.6	LOS A	0.0	0.1	0.31	0.49	0.31	53.2
Approach		3	2.0	0.003	6.3	LOS A	0.0	0.1	0.31	0.49	0.31	54.1
All Vehicles		460	2.0	0.134	5.0	LOS A	0.7	4.9	0.18	0.45	0.18	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.

SIDRA INTERSECTION 8.0 | Copyright © 2000-2018 Akcelik and Associates Pty Ltd | sidrasolutions.com

Organisation: PARSONS | Processed: Monday, June 15, 2020 3:49:24 PM

Project: C:\Home Work\476799 - LepineFernbank\1000\DATA\SIDRA\AM Peak.sip8

MOVEMENT SUMMARY

 Site: [Existing - Bobolink/Robert Grant]

PM Peak
Site Category: (None)
Roundabout

Movement Performance - Vehicles												
Mov ID	Turn	Demand Total veh/h	Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
South: Robert Grant Avenue												
1	L2	1	2.0	0.135	9.1	LOS A	0.7	4.9	0.23	0.43	0.23	55.7
2	T1	140	2.0	0.135	4.5	LOS A	0.7	4.9	0.23	0.43	0.23	55.8
3	R2	39	2.0	0.135	4.3	LOS A	0.7	4.9	0.23	0.43	0.23	54.5
Approach		180	2.0	0.135	4.5	LOS A	0.7	4.9	0.23	0.43	0.23	55.5
East: Bobolink Drive												
4	L2	20	2.0	0.049	9.4	LOS A	0.2	1.7	0.30	0.54	0.30	54.6
5	T1	1	2.0	0.049	4.7	LOS A	0.2	1.7	0.30	0.54	0.30	54.7
6	R2	39	2.0	0.049	4.5	LOS A	0.2	1.7	0.30	0.54	0.30	53.4
Approach		60	2.0	0.049	6.1	LOS A	0.2	1.7	0.30	0.54	0.30	53.8
North: Robert Grant Avenue												
7	L2	80	2.0	0.184	8.8	LOS A	1.1	7.5	0.11	0.48	0.11	55.2
8	T1	202	2.0	0.184	4.2	LOS A	1.1	7.5	0.11	0.48	0.11	55.3
9	R2	1	2.0	0.184	4.0	LOS A	1.1	7.5	0.11	0.48	0.11	54.0
Approach		283	2.0	0.184	5.5	LOS A	1.1	7.5	0.11	0.48	0.11	55.3
West: Bobolink Drive												
10	L2	1	2.0	0.003	10.0	LOS B	0.0	0.1	0.41	0.51	0.41	54.1
11	T1	1	2.0	0.003	5.4	LOS A	0.0	0.1	0.41	0.51	0.41	54.2
12	R2	1	2.0	0.003	5.2	LOS A	0.0	0.1	0.41	0.51	0.41	52.9
Approach		3	2.0	0.003	6.8	LOS A	0.0	0.1	0.41	0.51	0.41	53.7
All Vehicles		527	2.0	0.184	5.2	LOS A	1.1	7.5	0.18	0.47	0.18	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.

SIDRA INTERSECTION 8.0 | Copyright © 2000-2018 Akcelik and Associates Pty Ltd | sidrasolutions.com

Organisation: PARSONS | Processed: Monday, June 15, 2020 4:17:49 PM

Project: C:\Home Work\476799 - LepineFernbank\1000\DATA\SIDRA\PM Peak.sip8

Future Background 2023

Future Background 2023 AM
3: Fernbank Road & Robert Grant Avenue

06/15/2020



Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	43	322	211	183	175	37
Future Volume (vph)	43	322	211	183	175	37
Lane Group Flow (vph)	43	322	211	183	175	37
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)	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	6.2	6.2	6.2	6.2	6.0	6.0
Lead/Lag	Lead		Lag	Lag		
Lead-Lag Optimize?	Yes		Yes	Yes		
Recall Mode	Max	Min	Min	Min	Max	Max
Act Effct Green (s)	20.0	41.5	15.3	15.3	30.1	30.1
Actuated g/C Ratio	0.24	0.50	0.18	0.18	0.36	0.36
v/c Ratio	0.13	0.36	0.66	0.45	0.29	0.07
Control Delay	27.9	14.2	41.9	8.4	21.9	7.4
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	27.9	14.2	41.9	8.4	21.9	7.4
LOS	C	B	D	A	C	A
Approach Delay		15.8	26.3		19.4	
Approach LOS		B	C		B	
Queue Length 50th (m)	5.4	30.0	31.6	0.0	19.6	0.0
Queue Length 95th (m)	14.6	47.1	52.7	15.5	38.8	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)	330	1646	1077	944	596	546
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	0.20	0.20	0.19	0.29	0.07

Intersection Summary

Cycle Length: 119.4

Actuated Cycle Length: 83.8

Natural Cycle: 100

Control Type: Semi Act-Uncoord

Maximum v/c Ratio: 0.66

Intersection Signal Delay: 20.9

Intersection LOS: C

Intersection Capacity Utilization 41.5%

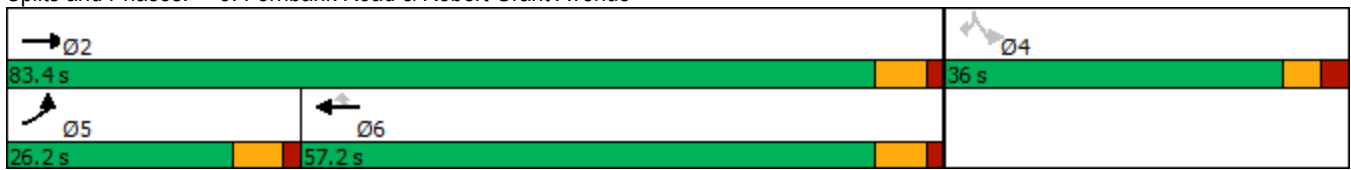
ICU Level of Service A

Analysis Period (min) 15

Future Background 2023 AM
3: Fernbank Road & Robert Grant Avenue

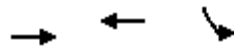
06/15/2020




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



Future Background 2023 AM
8: Bobolink Ridge & Livery Street

06/15/2020



Lane Group	EBT	WBT	SBL
Lane Configurations			
Traffic Volume (vph)	35	64	2
Future Volume (vph)	35	64	2
Lane Group Flow (vph)	50	64	50
Sign Control	Free	Free	Stop

Intersection Summary

Control Type: Unsignalized

Intersection Capacity Utilization 19.5% ICU Level of Service A

Analysis Period (min) 15




Future Background 2023 AM
8: Bobolink Ridge & Livery Street

06/15/2020

Intersection

Int Delay, s/veh 3.4

Movement EBL EBT WBT WBR SBL SBR

Lane Configurations						
Traffic Vol, veh/h	15	35	64	0	2	48
Future Vol, veh/h	15	35	64	0	2	48
Conflicting Peds, #/hr	8	0	0	8	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	100	100	100	100	100	100
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	15	35	64	0	2	48

Major/Minor Major1 Major2 Minor2

Conflicting Flow All	72	0	-	0	137	72
Stage 1	-	-	-	-	72	-
Stage 2	-	-	-	-	65	-
Critical Hdwy	4.12	-	-	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	2.218	-	-	-	3.518	3.318
Pot Cap-1 Maneuver	1528	-	-	-	856	990
Stage 1	-	-	-	-	951	-
Stage 2	-	-	-	-	958	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1518	-	-	-	835	983
Mov Cap-2 Maneuver	-	-	-	-	835	-
Stage 1	-	-	-	-	935	-
Stage 2	-	-	-	-	951	-

Approach EB WB SB

HCM Control Delay, s	2.2	0	8.9
HCM LOS			A

Minor Lane/Major Mvmt EBL EBT WBT WBR SBLn1

Capacity (veh/h)	1518	-	-	-	976
HCM Lane V/C Ratio	0.01	-	-	-	0.051
HCM Control Delay (s)	7.4	0	-	-	8.9
HCM Lane LOS	A	A	-	-	A
HCM 95th %tile Q(veh)	0	-	-	-	0.2

Future Background 2023 PM
3: Fernbank Road & Robert Grant Avenue

06/15/2020



Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	30	269	476	197	187	36
Future Volume (vph)	30	269	476	197	187	36
Lane Group Flow (vph)	30	269	476	197	187	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)	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)	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	6.2	6.2	6.2	6.2	6.0	6.0
Lead/Lag	Lead		Lag	Lag		
Lead-Lag Optimize?	Yes		Yes	Yes		
Recall Mode	Max	Min	Min	Min	Max	Max
Act Effct Green (s)	20.1	58.9	32.6	32.6	30.2	30.2
Actuated g/C Ratio	0.20	0.58	0.32	0.32	0.30	0.30
v/c Ratio	0.09	0.26	0.83	0.33	0.39	0.08
Control Delay	37.4	10.9	44.8	4.8	33.3	10.4
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	37.4	10.9	44.8	4.8	33.3	10.4
LOS	D	B	D	A	C	B
Approach Delay		13.6	33.1		29.6	
Approach LOS		B	C		C	
Queue Length 50th (m)	4.8	24.3	85.5	0.0	28.9	0.0
Queue Length 95th (m)	14.2	37.0	122.1	13.7	56.2	7.8
Internal Link Dist (m)		217.9	258.1		237.6	
Turn Bay Length (m)	100.0			100.0	80.0	
Base Capacity (vph)	343	1531	1097	982	481	436
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	0.43	0.20	0.39	0.08

Intersection Summary

Cycle Length: 130.4

Actuated Cycle Length: 101.4

Natural Cycle: 100

Control Type: Semi Act-Uncoord

Maximum v/c Ratio: 0.83

Intersection Signal Delay: 27.5

Intersection LOS: C

Intersection Capacity Utilization 47.5%

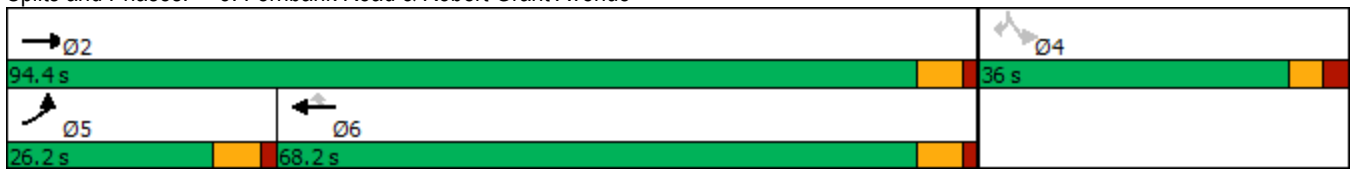
ICU Level of Service A

Analysis Period (min) 15

Future Background 2023 PM
3: Fernbank Road & Robert Grant Avenue

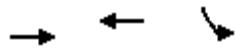
06/15/2020

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



Future Background 2023 PM
8: Bobolink Ridge & Livery Street

06/15/2020



Lane Group	EBT	WBT	SBL
Lane Configurations			
Traffic Volume (vph)	75	34	1
Future Volume (vph)	75	34	1
Lane Group Flow (vph)	124	37	31
Sign Control	Free	Free	Stop

Intersection Summary

Control Type: Unsignalized

Intersection Capacity Utilization 23.7% ICU Level of Service A

Analysis Period (min) 15




Future Background 2023 PM
8: Bobolink Ridge & Livery Street

06/15/2020

Intersection

Int Delay, s/veh 3.3

Movement EBL EBT WBT WBR SBL SBR

Lane Configurations						
Traffic Vol, veh/h	49	75	34	3	1	30
Future Vol, veh/h	49	75	34	3	1	30
Conflicting Peds, #/hr	11	0	0	11	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	100	100	100	100	100	100
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	49	75	34	3	1	30

Major/Minor Major1 Major2 Minor2

Conflicting Flow All	48	0	-	0	220	47
Stage 1	-	-	-	-	47	-
Stage 2	-	-	-	-	173	-
Critical Hdwy	4.12	-	-	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	2.218	-	-	-	3.518	3.318
Pot Cap-1 Maneuver	1559	-	-	-	768	1022
Stage 1	-	-	-	-	975	-
Stage 2	-	-	-	-	857	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1544	-	-	-	730	1012
Mov Cap-2 Maneuver	-	-	-	-	730	-
Stage 1	-	-	-	-	934	-
Stage 2	-	-	-	-	849	-

Approach EB WB SB

HCM Control Delay, s	2.9	0	8.7
HCM LOS			A

Minor Lane/Major Mvmt EBL EBT WBT WBR SBLn1

Capacity (veh/h)	1544	-	-	-	1000
HCM Lane V/C Ratio	0.032	-	-	-	0.031
HCM Control Delay (s)	7.4	0	-	-	8.7
HCM Lane LOS	A	A	-	-	A
HCM 95th %tile Q(veh)	0.1	-	-	-	0.1

MOVEMENT SUMMARY

 Site: [BG2023 - Abbott/Robert Grant]

AM Peak
Site Category: (None)
Roundabout

Movement Performance - Vehicles												
Mov ID	Turn	Demand Total veh/h	Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
South: Robert Grant Avenue												
1	L2	247	2.0	0.188	8.8	LOS A	1.0	7.4	0.11	0.60	0.11	53.3
3	R2	43	2.0	0.188	4.0	LOS A	1.0	7.4	0.11	0.60	0.11	52.2
Approach		290	2.0	0.188	8.1	LOS A	1.0	7.4	0.11	0.60	0.11	53.2
East: Abbott Street East												
4	L2	40	2.0	0.087	8.5	LOS A	0.4	3.1	0.40	0.53	0.40	47.2
5	T1	58	2.0	0.087	4.0	LOS A	0.4	3.1	0.40	0.53	0.40	47.0
Approach		98	2.0	0.087	5.8	LOS A	0.4	3.1	0.40	0.53	0.40	47.1
West: Abbott Street E												
11	T1	23	2.0	0.119	3.0	LOS A	0.7	4.7	0.16	0.38	0.16	48.8
12	R2	147	2.0	0.119	3.0	LOS A	0.7	4.7	0.16	0.38	0.16	47.7
Approach		170	2.0	0.119	3.0	LOS A	0.7	4.7	0.16	0.38	0.16	47.8
All Vehicles		558	2.0	0.188	6.2	LOS A	1.0	7.4	0.18	0.52	0.18	50.3

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.

SIDRA INTERSECTION 8.0 | Copyright © 2000-2018 Akcelik and Associates Pty Ltd | sidrasolutions.com

Organisation: PARSONS | Processed: Monday, June 15, 2020 3:49:22 PM

Project: C:\Home Work\476799 - LepineFernbank\1000\DATA\SIDRA\AM Peak.sip8

MOVEMENT SUMMARY

 Site: [BG2023 - Abbott/Robert Grant]

PM Peak
Site Category: (None)
Roundabout

Movement Performance - Vehicles												
Mov ID	Turn	Demand Total veh/h	Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
South: Robert Grant Avenue												
1	L2	186	2.0	0.153	9.0	LOS A	0.8	5.8	0.18	0.60	0.18	53.1
3	R2	30	2.0	0.153	4.1	LOS A	0.8	5.8	0.18	0.60	0.18	51.9
Approach		216	2.0	0.153	8.3	LOS A	0.8	5.8	0.18	0.60	0.18	52.9
East: Abbott Street East												
4	L2	45	2.0	0.090	8.2	LOS A	0.5	3.2	0.35	0.51	0.35	47.3
5	T1	62	2.0	0.090	3.7	LOS A	0.5	3.2	0.35	0.51	0.35	47.1
Approach		107	2.0	0.090	5.6	LOS A	0.5	3.2	0.35	0.51	0.35	47.2
West: Abbott Street E												
11	T1	52	2.0	0.210	3.0	LOS A	1.3	8.9	0.18	0.38	0.18	48.8
12	R2	254	2.0	0.210	3.1	LOS A	1.3	8.9	0.18	0.38	0.18	47.6
Approach		306	2.0	0.210	3.0	LOS A	1.3	8.9	0.18	0.38	0.18	47.8
All Vehicles		629	2.0	0.210	5.3	LOS A	1.3	8.9	0.21	0.48	0.21	49.4

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.

SIDRA INTERSECTION 8.0 | Copyright © 2000-2018 Akcelik and Associates Pty Ltd | sidrasolutions.com

Organisation: PARSONS | Processed: Monday, June 15, 2020 4:17:48 PM

Project: C:\Home Work\476799 - LepineFernbank\1000\DATA\SIDRA\PM Peak.sip8

MOVEMENT SUMMARY

 Site: [BG2023 - Bobolink/Robert Grant]

AM Peak
Site Category: (None)
Roundabout

Movement Performance - Vehicles												
Mov ID	Turn	Demand Total veh/h	Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
South: Robert Grant Avenue												
1	L2	1	2.0	0.151	8.9	LOS A	0.8	5.6	0.13	0.40	0.13	56.2
2	T1	212	2.0	0.151	4.2	LOS A	0.8	5.6	0.13	0.40	0.13	56.2
3	R2	12	2.0	0.151	4.0	LOS A	0.8	5.6	0.13	0.40	0.13	54.9
Approach		225	2.0	0.151	4.3	LOS A	0.8	5.6	0.13	0.40	0.13	56.2
East: Bobolink Drive												
4	L2	22	2.0	0.083	9.7	LOS A	0.4	2.9	0.37	0.55	0.37	54.8
5	T1	1	2.0	0.083	5.1	LOS A	0.4	2.9	0.37	0.55	0.37	54.9
6	R2	73	2.0	0.083	4.9	LOS A	0.4	2.9	0.37	0.55	0.37	53.5
Approach		96	2.0	0.083	6.0	LOS A	0.4	2.9	0.37	0.55	0.37	53.8
North: Robert Grant Avenue												
7	L2	28	2.0	0.125	8.8	LOS A	0.7	4.9	0.12	0.44	0.12	55.7
8	T1	158	2.0	0.125	4.2	LOS A	0.7	4.9	0.12	0.44	0.12	55.8
9	R2	1	2.0	0.125	4.0	LOS A	0.7	4.9	0.12	0.44	0.12	54.4
Approach		187	2.0	0.125	4.9	LOS A	0.7	4.9	0.12	0.44	0.12	55.7
West: Bobolink Drive												
10	L2	1	2.0	0.003	9.6	LOS A	0.0	0.1	0.34	0.49	0.34	54.3
11	T1	1	2.0	0.003	5.0	LOS A	0.0	0.1	0.34	0.49	0.34	54.4
12	R2	1	2.0	0.003	4.7	LOS A	0.0	0.1	0.34	0.49	0.34	53.1
Approach		3	2.0	0.003	6.4	LOS A	0.0	0.1	0.34	0.49	0.34	54.0
All Vehicles		511	2.0	0.151	4.8	LOS A	0.8	5.6	0.17	0.44	0.17	55.6

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.

SIDRA INTERSECTION 8.0 | Copyright © 2000-2018 Akcelik and Associates Pty Ltd | sidrasolutions.com

Organisation: PARSONS | Processed: Monday, June 15, 2020 3:49:24 PM

Project: C:\Home Work\476799 - LepineFernbank\1000\DATA\SIDRA\AM Peak.sip8

MOVEMENT SUMMARY

 Site: [BG2023 - Bobolink/Robert Grant]

PM Peak
Site Category: (None)
Roundabout

Movement Performance - Vehicles												
Mov ID	Turn	Demand Total veh/h	Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
South: Robert Grant Avenue												
1	L2	1	2.0	0.151	9.1	LOS A	0.8	5.6	0.22	0.42	0.22	55.8
2	T1	170	2.0	0.151	4.5	LOS A	0.8	5.6	0.22	0.42	0.22	55.8
3	R2	35	2.0	0.151	4.2	LOS A	0.8	5.6	0.22	0.42	0.22	54.5
Approach		206	2.0	0.151	4.4	LOS A	0.8	5.6	0.22	0.42	0.22	55.6
East: Bobolink Drive												
4	L2	18	2.0	0.045	9.5	LOS A	0.2	1.6	0.33	0.54	0.33	54.5
5	T1	1	2.0	0.045	4.9	LOS A	0.2	1.6	0.33	0.54	0.33	54.6
6	R2	35	2.0	0.045	4.7	LOS A	0.2	1.6	0.33	0.54	0.33	53.3
Approach		54	2.0	0.045	6.3	LOS A	0.2	1.6	0.33	0.54	0.33	53.7
North: Robert Grant Avenue												
7	L2	72	2.0	0.189	8.8	LOS A	1.1	7.9	0.11	0.47	0.11	55.4
8	T1	221	2.0	0.189	4.2	LOS A	1.1	7.9	0.11	0.47	0.11	55.5
9	R2	1	2.0	0.189	4.0	LOS A	1.1	7.9	0.11	0.47	0.11	54.1
Approach		294	2.0	0.189	5.3	LOS A	1.1	7.9	0.11	0.47	0.11	55.4
West: Bobolink Drive												
10	L2	1	2.0	0.003	10.0	LOS B	0.0	0.1	0.42	0.51	0.42	54.1
11	T1	1	2.0	0.003	5.4	LOS A	0.0	0.1	0.42	0.51	0.42	54.1
12	R2	1	2.0	0.003	5.2	LOS A	0.0	0.1	0.42	0.51	0.42	52.9
Approach		3	2.0	0.003	6.9	LOS A	0.0	0.1	0.42	0.51	0.42	53.7
All Vehicles		557	2.0	0.189	5.1	LOS A	1.1	7.9	0.17	0.46	0.17	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.

SIDRA INTERSECTION 8.0 | Copyright © 2000-2018 Akcelik and Associates Pty Ltd | sidrasolutions.com

Organisation: PARSONS | Processed: Monday, June 15, 2020 4:17:50 PM

Project: C:\Home Work\476799 - LepineFernbank\1000\DATA\SIDRA\PM Peak.sip8

Future Background 2028

Total Future Background 2028 AM
3: Fernbank Road & Robert Grant Avenue

06/15/2020



Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	55	359	241	235	257	44
Future Volume (vph)	55	359	241	235	257	44
Lane Group Flow (vph)	55	359	241	235	257	44
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)	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	6.2	6.2	6.2	6.2	6.0	6.0
Lead/Lag	Lead		Lag	Lag		
Lead-Lag Optimize?	Yes		Yes	Yes		
Recall Mode	Max	Min	Min	Min	Max	Max
Act Effect Green (s)	20.0	43.3	17.0	17.0	30.1	30.1
Actuated g/C Ratio	0.23	0.51	0.20	0.20	0.35	0.35
v/c Ratio	0.17	0.40	0.69	0.50	0.44	0.08
Control Delay	29.6	14.4	42.1	7.9	25.3	7.3
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	29.6	14.4	42.1	7.9	25.3	7.3
LOS	C	B	D	A	C	A
Approach Delay		16.5	25.2		22.7	
Approach LOS		B	C		C	
Queue Length 50th (m)	7.2	34.4	36.8	0.0	31.4	0.0
Queue Length 95th (m)	18.1	52.9	59.6	17.0	58.7	7.1
Internal Link Dist (m)		217.9	258.1		237.6	
Turn Bay Length (m)	100.0			100.0	80.0	
Base Capacity (vph)	323	1612	1055	949	583	541
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	0.22	0.23	0.25	0.44	0.08

Intersection Summary

Cycle Length: 119.4

Actuated Cycle Length: 85.6

Natural Cycle: 100

Control Type: Semi Act-Uncoord

Maximum v/c Ratio: 0.69

Intersection Signal Delay: 21.5

Intersection LOS: C

Intersection Capacity Utilization 47.9%

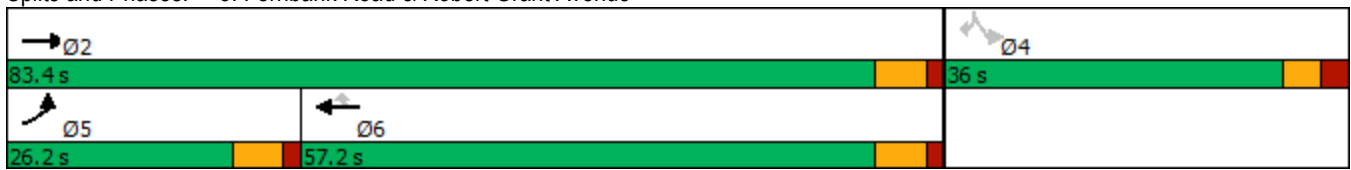
ICU Level of Service A

Analysis Period (min) 15

Total Future Background 2028 AM
3: Fernbank Road & Robert Grant Avenue

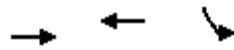
06/15/2020

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



Total Future Background 2028 AM
8: Bobolink Ridge & Livery Street

06/15/2020



Lane Group	EBT	WBT	SBL
Lane Configurations			
Traffic Volume (vph)	35	64	2
Future Volume (vph)	35	64	2
Lane Group Flow (vph)	50	64	50
Sign Control	Free	Free	Stop

Intersection Summary

Control Type: Unsignalized

Intersection Capacity Utilization 19.5% ICU Level of Service A




Analysis Period (min) 15

Total Future Background 2028 AM
8: Bobolink Ridge & Livery Street

06/15/2020

Intersection

Int Delay, s/veh 3.4

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	15	35	64	0	2	48
Future Vol, veh/h	15	35	64	0	2	48
Conflicting Peds, #/hr	8	0	0	8	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	100	100	100	100	100	100
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	15	35	64	0	2	48

Major/Minor	Major1	Major2	Minor2
Conflicting Flow All	72	0	0 137 72
Stage 1	-	-	- 72 -
Stage 2	-	-	- 65 -
Critical Hdwy	4.12	-	- 6.42 6.22
Critical Hdwy Stg 1	-	-	- 5.42 -
Critical Hdwy Stg 2	-	-	- 5.42 -
Follow-up Hdwy	2.218	-	- 3.518 3.318
Pot Cap-1 Maneuver	1528	-	- 856 990
Stage 1	-	-	- 951 -
Stage 2	-	-	- 958 -
Platoon blocked, %	-	-	-
Mov Cap-1 Maneuver	1518	-	- 835 983
Mov Cap-2 Maneuver	-	-	- 835 -
Stage 1	-	-	- 935 -
Stage 2	-	-	- 951 -

Approach	EB	WB	SB
HCM Control Delay, s	2.2	0	8.9
HCM LOS			A

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1518	-	-	-	976
HCM Lane V/C Ratio	0.01	-	-	-	0.051
HCM Control Delay (s)	7.4	0	-	-	8.9
HCM Lane LOS	A	A	-	-	A
HCM 95th %tile Q(veh)	0	-	-	-	0.2

Total Future Background 2028 PM
3: Fernbank Road & Robert Grant Avenue

06/15/2020



Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	41	304	532	269	254	44
Future Volume (vph)	41	304	532	269	254	44
Lane Group Flow (vph)	41	304	532	269	254	44
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)	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	6.2	6.2	6.2	6.2	6.0	6.0
Lead/Lag	Lead		Lag	Lag		
Lead-Lag Optimize?	Yes		Yes	Yes		
Recall Mode	Max	Min	Min	Min	Max	Max
Act Effect Green (s)	20.2	63.8	37.3	37.3	30.2	30.2
Actuated g/C Ratio	0.19	0.60	0.35	0.35	0.28	0.28
v/c Ratio	0.12	0.29	0.85	0.39	0.55	0.10
Control Delay	40.7	10.8	45.0	4.3	40.0	10.6
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	40.7	10.8	45.0	4.3	40.0	10.6
LOS	D	B	D	A	D	B
Approach Delay		14.3	31.3		35.6	
Approach LOS		B	C		D	
Queue Length 50th (m)	7.1	28.1	99.9	0.0	44.5	0.0
Queue Length 95th (m)	18.7	41.5	139.8	14.9	82.5	9.2
Internal Link Dist (m)		217.9	258.1		237.6	
Turn Bay Length (m)	100.0			100.0	80.0	
Base Capacity (vph)	328	1463	1048	977	459	424
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	0.21	0.51	0.28	0.55	0.10

Intersection Summary

Cycle Length: 130.4

Actuated Cycle Length: 106.3

Natural Cycle: 100

Control Type: Semi Act-Uncoord

Maximum v/c Ratio: 0.85

Intersection Signal Delay: 28.2

Intersection LOS: C

Intersection Capacity Utilization 61.0%

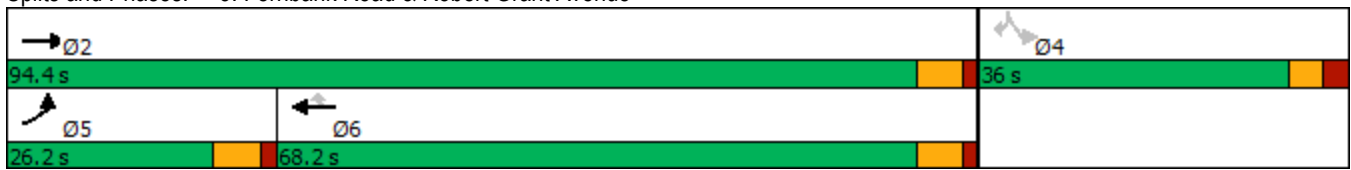
ICU Level of Service B

Analysis Period (min) 15

Total Future Background 2028 PM
3: Fernbank Road & Robert Grant Avenue

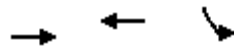
06/15/2020




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



Total Future Background 2028 PM
8: Bobolink Ridge & Livery Street

06/15/2020



Lane Group	EBT	WBT	SBL
Lane Configurations			
Traffic Volume (vph)	75	34	1
Future Volume (vph)	75	34	1
Lane Group Flow (vph)	124	37	31
Sign Control	Free	Free	Stop

Intersection Summary

Control Type: Unsignalized

Intersection Capacity Utilization 23.7% ICU Level of Service A




Analysis Period (min) 15

Total Future Background 2028 PM
8: Bobolink Ridge & Livery Street

06/15/2020

Intersection

Int Delay, s/veh 3.3

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	49	75	34	3	1	30
Future Vol, veh/h	49	75	34	3	1	30
Conflicting Peds, #/hr	11	0	0	11	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	100	100	100	100	100	100
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	49	75	34	3	1	30

Major/Minor	Major1	Major2	Minor2
Conflicting Flow All	48	0	0 220 47
Stage 1	-	-	- 47 -
Stage 2	-	-	- 173 -
Critical Hdwy	4.12	-	- 6.42 6.22
Critical Hdwy Stg 1	-	-	- 5.42 -
Critical Hdwy Stg 2	-	-	- 5.42 -
Follow-up Hdwy	2.218	-	- 3.518 3.318
Pot Cap-1 Maneuver	1559	-	- 768 1022
Stage 1	-	-	- 975 -
Stage 2	-	-	- 857 -
Platoon blocked, %	-	-	-
Mov Cap-1 Maneuver	1544	-	- 730 1012
Mov Cap-2 Maneuver	-	-	- 730 -
Stage 1	-	-	- 934 -
Stage 2	-	-	- 849 -

Approach	EB	WB	SB
HCM Control Delay, s	2.9	0	8.7
HCM LOS			A

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1544	-	-	-	1000
HCM Lane V/C Ratio	0.032	-	-	-	0.031
HCM Control Delay (s)	7.4	0	-	-	8.7
HCM Lane LOS	A	A	-	-	A
HCM 95th %tile Q(veh)	0.1	-	-	-	0.1

MOVEMENT SUMMARY

 Site: [BG2028 - Abbott/Robert Grant]

AM Peak
Site Category: (None)
Roundabout

Movement Performance - Vehicles												
Mov ID	Turn	Demand Total veh/h	Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
South: Robert Grant Avenue												
1	L2	278	2.0	0.322	9.0	LOS A	2.1	15.3	0.22	0.56	0.22	54.0
3	R2	197	2.0	0.322	4.2	LOS A	2.1	15.3	0.22	0.56	0.22	52.8
Approach		475	2.0	0.322	7.0	LOS A	2.1	15.3	0.22	0.56	0.22	53.5
East: Abbott Street East												
4	L2	122	2.0	0.181	8.8	LOS A	1.0	7.1	0.46	0.60	0.46	46.6
5	T1	78	2.0	0.181	4.3	LOS A	1.0	7.1	0.46	0.60	0.46	46.4
Approach		200	2.0	0.181	7.0	LOS A	1.0	7.1	0.46	0.60	0.46	46.5
West: Abbott Street E												
11	T1	52	2.0	0.176	3.4	LOS A	1.0	7.3	0.32	0.43	0.32	48.4
12	R2	171	2.0	0.176	3.5	LOS A	1.0	7.3	0.32	0.43	0.32	47.2
Approach		223	2.0	0.176	3.4	LOS A	1.0	7.3	0.32	0.43	0.32	47.5
All Vehicles		898	2.0	0.322	6.1	LOS A	2.1	15.3	0.30	0.54	0.30	50.2

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.

SIDRA INTERSECTION 8.0 | Copyright © 2000-2018 Akcelik and Associates Pty Ltd | sidrasolutions.com

Organisation: PARSONS | Processed: Monday, June 15, 2020 3:49:23 PM

Project: C:\Home Work\476799 - LepineFernbank\1000\DATA\SIDRA\AM Peak.sip8

MOVEMENT SUMMARY

 Site: [BG2028 - Abbott/Robert Grant]

PM Peak
Site Category: (None)
Roundabout

Movement Performance - Vehicles												
Mov ID	Turn	Demand Total veh/h	Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
South: Robert Grant Avenue												
1	L2	211	2.0	0.253	9.1	LOS A	1.6	11.5	0.26	0.57	0.26	53.8
3	R2	139	2.0	0.253	4.3	LOS A	1.6	11.5	0.26	0.57	0.26	52.6
Approach		350	2.0	0.253	7.2	LOS A	1.6	11.5	0.26	0.57	0.26	53.3
East: Abbott Street East												
4	L2	189	2.0	0.243	8.5	LOS A	1.4	10.1	0.43	0.59	0.43	46.6
5	T1	94	2.0	0.243	4.0	LOS A	1.4	10.1	0.43	0.59	0.43	46.4
Approach		283	2.0	0.243	7.0	LOS A	1.4	10.1	0.43	0.59	0.43	46.5
West: Abbott Street E												
11	T1	76	2.0	0.300	3.9	LOS A	1.9	13.8	0.44	0.49	0.44	48.0
12	R2	284	2.0	0.300	3.9	LOS A	1.9	13.8	0.44	0.49	0.44	46.9
Approach		360	2.0	0.300	3.9	LOS A	1.9	13.8	0.44	0.49	0.44	47.1
All Vehicles		993	2.0	0.300	6.0	LOS A	1.9	13.8	0.37	0.55	0.37	48.9

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.

SIDRA INTERSECTION 8.0 | Copyright © 2000-2018 Akcelik and Associates Pty Ltd | sidrasolutions.com

Organisation: PARSONS | Processed: Monday, June 15, 2020 4:17:49 PM

Project: C:\Home Work\476799 - LepineFernbank\1000\DATA\SIDRA\PM Peak.sip8

MOVEMENT SUMMARY

 Site: [BG2028 - Bobolink/Robert Grant]

AM Peak
Site Category: (None)
Roundabout

Movement Performance - Vehicles												
Mov ID	Turn	Demand Total veh/h	Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
South: Robert Grant Avenue												
1	L2	8	2.0	0.248	9.3	LOS A	1.5	10.7	0.31	0.45	0.31	55.2
2	T1	306	2.0	0.248	4.7	LOS A	1.5	10.7	0.31	0.45	0.31	55.3
3	R2	12	2.0	0.248	4.5	LOS A	1.5	10.7	0.31	0.45	0.31	53.9
Approach		326	2.0	0.248	4.8	LOS A	1.5	10.7	0.31	0.45	0.31	55.2
East: Bobolink Drive												
4	L2	22	2.0	0.096	10.7	LOS B	0.5	3.6	0.52	0.62	0.52	54.3
5	T1	1	2.0	0.096	6.1	LOS A	0.5	3.6	0.52	0.62	0.52	54.3
6	R2	73	2.0	0.096	5.9	LOS A	0.5	3.6	0.52	0.62	0.52	53.0
Approach		96	2.0	0.096	7.0	LOS A	0.5	3.6	0.52	0.62	0.52	53.3
North: Robert Grant Avenue												
7	L2	28	2.0	0.196	8.9	LOS A	1.2	8.4	0.15	0.43	0.15	55.8
8	T1	223	2.0	0.196	4.3	LOS A	1.2	8.4	0.15	0.43	0.15	55.9
9	R2	43	2.0	0.196	4.0	LOS A	1.2	8.4	0.15	0.43	0.15	54.5
Approach		294	2.0	0.196	4.7	LOS A	1.2	8.4	0.15	0.43	0.15	55.7
West: Bobolink Drive												
10	L2	82	2.0	0.088	10.0	LOS B	0.4	3.2	0.42	0.64	0.42	52.4
11	T1	1	2.0	0.088	5.4	LOS A	0.4	3.2	0.42	0.64	0.42	52.5
12	R2	15	2.0	0.088	5.2	LOS A	0.4	3.2	0.42	0.64	0.42	51.3
Approach		98	2.0	0.088	9.3	LOS A	0.4	3.2	0.42	0.64	0.42	52.3
All Vehicles		814	2.0	0.248	5.5	LOS A	1.5	10.7	0.29	0.48	0.29	54.8

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.

SIDRA INTERSECTION 8.0 | Copyright © 2000-2018 Akcelik and Associates Pty Ltd | sidrasolutions.com

Organisation: PARSONS | Processed: Monday, June 15, 2020 3:49:24 PM

Project: C:\Home Work\476799 - LepineFernbank\1000\DATA\SIDRA\AM Peak.sip8

MOVEMENT SUMMARY

 Site: [BG2028 - Bobolink/Robert Grant]

PM Peak
Site Category: (None)
Roundabout

Movement Performance - Vehicles												
Mov ID	Turn	Demand Total veh/h	Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
South: Robert Grant Avenue												
1	L2	15	2.0	0.230	9.4	LOS A	1.3	9.5	0.33	0.47	0.33	55.1
2	T1	244	2.0	0.230	4.8	LOS A	1.3	9.5	0.33	0.47	0.33	55.2
3	R2	35	2.0	0.230	4.6	LOS A	1.3	9.5	0.33	0.47	0.33	53.8
Approach		294	2.0	0.230	5.0	LOS A	1.3	9.5	0.33	0.47	0.33	55.0
East: Bobolink Drive												
4	L2	18	2.0	0.051	10.2	LOS B	0.3	1.8	0.45	0.59	0.45	54.1
5	T1	1	2.0	0.051	5.6	LOS A	0.3	1.8	0.45	0.59	0.45	54.2
6	R2	35	2.0	0.051	5.4	LOS A	0.3	1.8	0.45	0.59	0.45	52.9
Approach		54	2.0	0.051	7.0	LOS A	0.3	1.8	0.45	0.59	0.45	53.4
North: Robert Grant Avenue												
7	L2	72	2.0	0.304	8.9	LOS A	2.0	14.0	0.17	0.45	0.17	55.5
8	T1	310	2.0	0.304	4.3	LOS A	2.0	14.0	0.17	0.45	0.17	55.6
9	R2	82	2.0	0.304	4.1	LOS A	2.0	14.0	0.17	0.45	0.17	54.2
Approach		464	2.0	0.304	5.0	LOS A	2.0	14.0	0.17	0.45	0.17	55.3
West: Bobolink Drive												
10	L2	59	2.0	0.075	10.7	LOS B	0.4	2.8	0.50	0.66	0.50	52.4
11	T1	1	2.0	0.075	6.1	LOS A	0.4	2.8	0.50	0.66	0.50	52.5
12	R2	16	2.0	0.075	5.8	LOS A	0.4	2.8	0.50	0.66	0.50	51.3
Approach		76	2.0	0.075	9.6	LOS A	0.4	2.8	0.50	0.66	0.50	52.2
All Vehicles		888	2.0	0.304	5.5	LOS A	2.0	14.0	0.27	0.48	0.27	54.8

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.

SIDRA INTERSECTION 8.0 | Copyright © 2000-2018 Akcelik and Associates Pty Ltd | sidrasolutions.com

Organisation: PARSONS | Processed: Monday, June 15, 2020 4:17:50 PM

Project: C:\Home Work\476799 - LepineFernbank\1000\DATA\SIDRA\PM Peak.sip8

Total Projected 2023

Total Projected 2023 AM
3: Fernbank Road & Robert Grant Avenue

06/15/2020



Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	43	322	211	206	221	37
Future Volume (vph)	43	322	211	206	221	37
Lane Group Flow (vph)	43	322	211	206	221	37
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)	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	6.2	6.2	6.2	6.2	6.0	6.0
Lead/Lag	Lead		Lag	Lag		
Lead-Lag Optimize?	Yes		Yes	Yes		
Recall Mode	Max	Min	Min	Min	Max	Max
Act Effct Green (s)	20.0	41.5	15.3	15.3	30.1	30.1
Actuated g/C Ratio	0.24	0.50	0.18	0.18	0.36	0.36
v/c Ratio	0.13	0.36	0.66	0.48	0.37	0.07
Control Delay	27.9	14.2	41.9	8.4	23.1	7.4
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	27.9	14.2	41.9	8.4	23.1	7.4
LOS	C	B	D	A	C	A
Approach Delay		15.8	25.4		20.8	
Approach LOS		B	C		C	
Queue Length 50th (m)	5.4	30.0	31.6	0.0	25.6	0.0
Queue Length 95th (m)	14.6	47.1	52.7	16.3	48.5	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)	330	1646	1077	953	596	546
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	0.20	0.20	0.22	0.37	0.07

Intersection Summary

Cycle Length: 119.4

Actuated Cycle Length: 83.8

Natural Cycle: 100

Control Type: Semi Act-Uncoord

Maximum v/c Ratio: 0.66

Intersection Signal Delay: 20.9

Intersection LOS: C

Intersection Capacity Utilization 44.1%

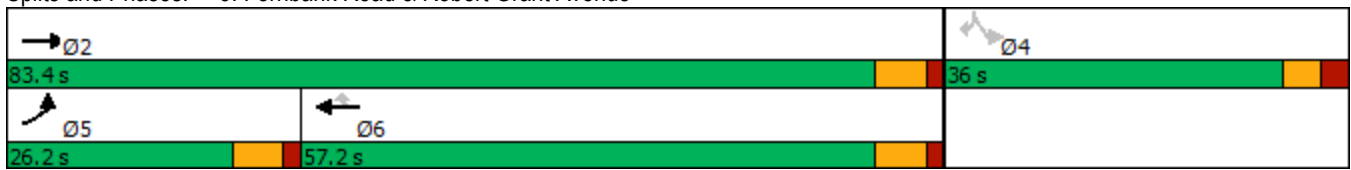
ICU Level of Service A

Analysis Period (min) 15

Total Projected 2023 AM
 3: Fernbank Road & Robert Grant Avenue

06/15/2020

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



Total Projected 2023 AM
8: Bobolink Ridge & Livery Street

06/15/2020



Lane Group	EBT	WBT	SBL
Lane Configurations			
Traffic Volume (vph)	35	64	2
Future Volume (vph)	35	64	2
Lane Group Flow (vph)	66	64	104
Sign Control	Free	Free	Stop

Intersection Summary

Control Type: Unsignalized

Intersection Capacity Utilization 23.9% ICU Level of Service A




Analysis Period (min) 15

Total Projected 2023 AM
8: Bobolink Ridge & Livery Street

06/15/2020

Intersection

Int Delay, s/veh 5

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	31	35	64	0	2	102
Future Vol, veh/h	31	35	64	0	2	102
Conflicting Peds, #/hr	8	0	0	8	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	100	100	100	100	100	100
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	31	35	64	0	2	102

Major/Minor	Major1	Major2	Minor2
Conflicting Flow All	72	0	0 169 72
Stage 1	-	-	- 72 -
Stage 2	-	-	- 97 -
Critical Hdwy	4.12	-	- 6.42 6.22
Critical Hdwy Stg 1	-	-	- 5.42 -
Critical Hdwy Stg 2	-	-	- 5.42 -
Follow-up Hdwy	2.218	-	- 3.518 3.318
Pot Cap-1 Maneuver	1528	-	- 821 990
Stage 1	-	-	- 951 -
Stage 2	-	-	- 927 -
Platoon blocked, %	-	-	-
Mov Cap-1 Maneuver	1518	-	- 792 983
Mov Cap-2 Maneuver	-	-	- 792 -
Stage 1	-	-	- 924 -
Stage 2	-	-	- 921 -

Approach	EB	WB	SB
HCM Control Delay, s	3.5	0	9.1
HCM LOS			A

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1518	-	-	-	978
HCM Lane V/C Ratio	0.02	-	-	-	0.106
HCM Control Delay (s)	7.4	0	-	-	9.1
HCM Lane LOS	A	A	-	-	A
HCM 95th %tile Q(veh)	0.1	-	-	-	0.4

Total Projected 2023 PM
3: Fernbank Road & Robert Grant Avenue

06/15/2020



Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	30	269	476	274	216	36
Future Volume (vph)	30	269	476	274	216	36
Lane Group Flow (vph)	30	269	476	274	216	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)	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)	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	6.2	6.2	6.2	6.2	6.0	6.0
Lead/Lag	Lead		Lag	Lag		
Lead-Lag Optimize?	Yes		Yes	Yes		
Recall Mode	Max	Min	Min	Min	Max	Max
Act Effect Green (s)	20.1	59.1	32.7	32.7	30.2	30.2
Actuated g/C Ratio	0.20	0.58	0.32	0.32	0.30	0.30
v/c Ratio	0.09	0.26	0.83	0.42	0.45	0.08
Control Delay	37.6	10.9	44.5	4.8	34.6	10.6
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	37.6	10.9	44.5	4.8	34.6	10.6
LOS	D	B	D	A	C	B
Approach Delay		13.6	30.0		31.2	
Approach LOS		B	C		C	
Queue Length 50th (m)	4.8	24.3	85.5	0.0	34.1	0.0
Queue Length 95th (m)	14.1	36.9	121.8	15.5	65.4	7.9
Internal Link Dist (m)		217.9	258.1		237.6	
Turn Bay Length (m)	100.0			100.0	80.0	
Base Capacity (vph)	342	1529	1095	1010	480	435
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	0.43	0.27	0.45	0.08

Intersection Summary

Cycle Length: 130.4

Actuated Cycle Length: 101.6

Natural Cycle: 100

Control Type: Semi Act-Uncoord

Maximum v/c Ratio: 0.83

Intersection Signal Delay: 26.4

Intersection LOS: C

Intersection Capacity Utilization 49.2%

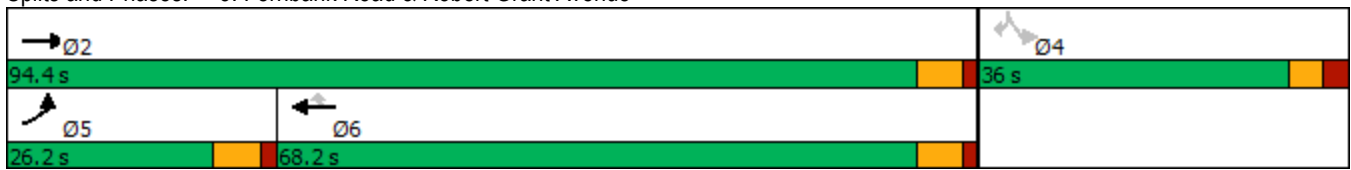
ICU Level of Service A

Analysis Period (min) 15

Total Projected 2023 PM
3: Fernbank Road & Robert Grant Avenue

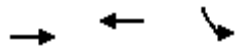
06/15/2020




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



Total Projected 2023 PM
8: Bobolink Ridge & Livery Street

06/15/2020



Lane Group	EBT	WBT	SBL
Lane Configurations			
Traffic Volume (vph)	75	34	1
Future Volume (vph)	75	34	1
Lane Group Flow (vph)	178	37	65
Sign Control	Free	Free	Stop

Intersection Summary

Control Type: Unsignalized

Intersection Capacity Utilization 27.8% ICU Level of Service A

Analysis Period (min) 15




Total Projected 2023 PM
8: Bobolink Ridge & Livery Street

06/15/2020

Intersection

Int Delay, s/veh 4.8

Movement EBL EBT WBT WBR SBL SBR

Lane Configurations						
Traffic Vol, veh/h	103	75	34	3	1	64
Future Vol, veh/h	103	75	34	3	1	64
Conflicting Peds, #/hr	11	0	0	11	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	100	100	100	100	100	100
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	103	75	34	3	1	64

Major/Minor Major1 Major2 Minor2

Conflicting Flow All	48	0	-	0	328	47
Stage 1	-	-	-	-	47	-
Stage 2	-	-	-	-	281	-
Critical Hdwy	4.12	-	-	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	2.218	-	-	-	3.518	3.318
Pot Cap-1 Maneuver	1559	-	-	-	666	1022
Stage 1	-	-	-	-	975	-
Stage 2	-	-	-	-	767	-
Platoon blocked, %	-	-	-	-	-	-
Mov Cap-1 Maneuver	1544	-	-	-	608	1012
Mov Cap-2 Maneuver	-	-	-	-	608	-
Stage 1	-	-	-	-	899	-
Stage 2	-	-	-	-	760	-

Approach EB WB SB

HCM Control Delay, s	4.3	0	8.8
HCM LOS			A

Minor Lane/Major Mvmt EBL EBT WBT WBR SBLn1

Capacity (veh/h)	1544	-	-	-	1002
HCM Lane V/C Ratio	0.067	-	-	-	0.065
HCM Control Delay (s)	7.5	0	-	-	8.8
HCM Lane LOS	A	A	-	-	A
HCM 95th %tile Q(veh)	0.2	-	-	-	0.2

MOVEMENT SUMMARY

 **Site: [FT2023 - Abbott/Robert Grant]**

AM Peak
Site Category: (None)
Roundabout

Movement Performance - Vehicles												
Mov ID	Turn	Demand Total veh/h	Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
South: Robert Grant Avenue												
1	L2	250	2.0	0.255	8.8	LOS A	1.5	10.9	0.12	0.57	0.12	54.1
3	R2	148	2.0	0.255	4.0	LOS A	1.5	10.9	0.12	0.57	0.12	52.9
Approach		398	2.0	0.255	7.0	LOS A	1.5	10.9	0.12	0.57	0.12	53.7
East: Abbott Street East												
4	L2	63	2.0	0.107	8.5	LOS A	0.5	3.9	0.40	0.56	0.40	46.9
5	T1	58	2.0	0.107	4.0	LOS A	0.5	3.9	0.40	0.56	0.40	46.8
Approach		121	2.0	0.107	6.4	LOS A	0.5	3.9	0.40	0.56	0.40	46.9
West: Abbott Street E												
11	T1	23	2.0	0.125	3.1	LOS A	0.7	4.9	0.21	0.39	0.21	48.7
12	R2	148	2.0	0.125	3.1	LOS A	0.7	4.9	0.21	0.39	0.21	47.6
Approach		171	2.0	0.125	3.1	LOS A	0.7	4.9	0.21	0.39	0.21	47.7
All Vehicles		690	2.0	0.255	5.9	LOS A	1.5	10.9	0.19	0.52	0.19	50.8

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.

SIDRA INTERSECTION 8.0 | Copyright © 2000-2018 Akcelik and Associates Pty Ltd | sidrasolutions.com

Organisation: PARSONS | Processed: Monday, June 15, 2020 3:49:23 PM

Project: C:\Home Work\476799 - LepineFernbank\1000\DATA\SIDRA\AM Peak.sip8

MOVEMENT SUMMARY

 **Site: [FT2023 - Abbott/Robert Grant]**

PM Peak
Site Category: (None)
Roundabout

Movement Performance - Vehicles												
Mov ID	Turn	Demand Total veh/h	Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
South: Robert Grant Avenue												
1	L2	188	2.0	0.198	9.0	LOS A	1.2	8.2	0.19	0.57	0.19	53.8
3	R2	96	2.0	0.198	4.1	LOS A	1.2	8.2	0.19	0.57	0.19	52.6
Approach		284	2.0	0.198	7.3	LOS A	1.2	8.2	0.19	0.57	0.19	53.4
East: Abbott Street East												
4	L2	119	2.0	0.153	8.3	LOS A	0.8	5.8	0.37	0.57	0.37	46.7
5	T1	62	2.0	0.153	3.7	LOS A	0.8	5.8	0.37	0.57	0.37	46.6
Approach		181	2.0	0.153	6.7	LOS A	0.8	5.8	0.37	0.57	0.37	46.7
West: Abbott Street E												
11	T1	52	2.0	0.238	3.4	LOS A	1.4	10.3	0.33	0.43	0.33	48.4
12	R2	257	2.0	0.238	3.5	LOS A	1.4	10.3	0.33	0.43	0.33	47.2
Approach		309	2.0	0.238	3.5	LOS A	1.4	10.3	0.33	0.43	0.33	47.4
All Vehicles		774	2.0	0.238	5.6	LOS A	1.4	10.3	0.29	0.51	0.29	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.

SIDRA INTERSECTION 8.0 | Copyright © 2000-2018 Akcelik and Associates Pty Ltd | sidrasolutions.com

Organisation: PARSONS | Processed: Monday, June 15, 2020 4:17:49 PM

Project: C:\Home Work\476799 - LepineFernbank\1000\DATA\SIDRA\PM Peak.sip8

MOVEMENT SUMMARY

 Site: [FT2023 - Bobolink/Robert Grant]

AM Peak
Site Category: (None)
Roundabout

Movement Performance - Vehicles												
Mov ID	Turn	Demand Total veh/h	Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
South: Robert Grant Avenue												
1	L2	1	2.0	0.175	9.0	LOS A	1.0	6.8	0.19	0.41	0.19	55.9
2	T1	221	2.0	0.175	4.4	LOS A	1.0	6.8	0.19	0.41	0.19	56.0
3	R2	26	2.0	0.175	4.1	LOS A	1.0	6.8	0.19	0.41	0.19	54.6
Approach		248	2.0	0.175	4.4	LOS A	1.0	6.8	0.19	0.41	0.19	55.8
East: Bobolink Drive												
4	L2	68	2.0	0.130	9.9	LOS A	0.7	4.9	0.39	0.60	0.39	53.9
5	T1	1	2.0	0.130	5.2	LOS A	0.7	4.9	0.39	0.60	0.39	54.0
6	R2	81	2.0	0.130	5.0	LOS A	0.7	4.9	0.39	0.60	0.39	52.7
Approach		150	2.0	0.130	7.2	LOS A	0.7	4.9	0.39	0.60	0.39	53.3
North: Robert Grant Avenue												
7	L2	52	2.0	0.154	9.1	LOS A	0.9	6.2	0.23	0.47	0.23	54.9
8	T1	158	2.0	0.154	4.4	LOS A	0.9	6.2	0.23	0.47	0.23	55.0
9	R2	1	2.0	0.154	4.2	LOS A	0.9	6.2	0.23	0.47	0.23	53.7
Approach		211	2.0	0.154	5.6	LOS A	0.9	6.2	0.23	0.47	0.23	54.9
West: Bobolink Drive												
10	L2	1	2.0	0.003	9.9	LOS A	0.0	0.1	0.40	0.50	0.40	54.1
11	T1	1	2.0	0.003	5.3	LOS A	0.0	0.1	0.40	0.50	0.40	54.2
12	R2	1	2.0	0.003	5.0	LOS A	0.0	0.1	0.40	0.50	0.40	52.9
Approach		3	2.0	0.003	6.7	LOS A	0.0	0.1	0.40	0.50	0.40	53.7
All Vehicles		612	2.0	0.175	5.5	LOS A	1.0	6.8	0.25	0.48	0.25	54.9

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.

SIDRA INTERSECTION 8.0 | Copyright © 2000-2018 Akcelik and Associates Pty Ltd | sidrasolutions.com

Organisation: PARSONS | Processed: Monday, June 15, 2020 3:49:25 PM

Project: C:\Home Work\476799 - LepineFernbank\1000\DATA\SIDRA\AM Peak.sip8

MOVEMENT SUMMARY

 Site: [FT2023 - Bobolink/Robert Grant]

PM Peak
Site Category: (None)
Roundabout

Movement Performance - Vehicles												
Mov ID	Turn	Demand Total veh/h	Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
South: Robert Grant Avenue												
1	L2	1	2.0	0.228	9.6	LOS A	1.3	9.2	0.35	0.48	0.35	55.2
2	T1	201	2.0	0.228	4.9	LOS A	1.3	9.2	0.35	0.48	0.35	55.3
3	R2	82	2.0	0.228	4.7	LOS A	1.3	9.2	0.35	0.48	0.35	54.0
Approach		284	2.0	0.228	4.9	LOS A	1.3	9.2	0.35	0.48	0.35	54.9
East: Bobolink Drive												
4	L2	47	2.0	0.076	9.7	LOS A	0.4	2.8	0.37	0.59	0.37	53.7
5	T1	1	2.0	0.076	5.1	LOS A	0.4	2.8	0.37	0.59	0.37	53.7
6	R2	40	2.0	0.076	4.8	LOS A	0.4	2.8	0.37	0.59	0.37	52.5
Approach		88	2.0	0.076	7.4	LOS A	0.4	2.8	0.37	0.59	0.37	53.1
North: Robert Grant Avenue												
7	L2	150	2.0	0.254	9.0	LOS A	1.6	11.4	0.20	0.51	0.20	54.5
8	T1	221	2.0	0.254	4.4	LOS A	1.6	11.4	0.20	0.51	0.20	54.6
9	R2	1	2.0	0.254	4.1	LOS A	1.6	11.4	0.20	0.51	0.20	53.3
Approach		372	2.0	0.254	6.2	LOS A	1.6	11.4	0.20	0.51	0.20	54.5
West: Bobolink Drive												
10	L2	1	2.0	0.003	10.6	LOS B	0.0	0.1	0.49	0.52	0.49	53.8
11	T1	1	2.0	0.003	5.9	LOS A	0.0	0.1	0.49	0.52	0.49	53.8
12	R2	1	2.0	0.003	5.7	LOS A	0.0	0.1	0.49	0.52	0.49	52.6
Approach		3	2.0	0.003	7.4	LOS A	0.0	0.1	0.49	0.52	0.49	53.4
All Vehicles		747	2.0	0.254	5.9	LOS A	1.6	11.4	0.28	0.51	0.28	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.

SIDRA INTERSECTION 8.0 | Copyright © 2000-2018 Akcelik and Associates Pty Ltd | sidrasolutions.com

Organisation: PARSONS | Processed: Monday, June 15, 2020 4:17:50 PM

Project: C:\Home Work\476799 - LepineFernbank\1000\DATA\SIDRA\PM Peak.sip8

Total Projected 2028

Total Projected 2028 AM
3: Fernbank Road & Robert Grant Avenue

06/15/2020



Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	55	359	241	258	303	44
Future Volume (vph)	55	359	241	258	303	44
Lane Group Flow (vph)	55	359	241	258	303	44
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)	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	6.2	6.2	6.2	6.2	6.0	6.0
Lead/Lag	Lead		Lag	Lag		
Lead-Lag Optimize?	Yes		Yes	Yes		
Recall Mode	Max	Min	Min	Min	Max	Max
Act Effect Green (s)	20.0	43.3	17.0	17.0	30.1	30.1
Actuated g/C Ratio	0.23	0.51	0.20	0.20	0.35	0.35
v/c Ratio	0.17	0.40	0.69	0.53	0.52	0.08
Control Delay	29.6	14.4	42.1	8.0	27.0	7.3
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	29.6	14.4	42.1	8.0	27.0	7.3
LOS	C	B	D	A	C	A
Approach Delay		16.5	24.5		24.5	
Approach LOS		B	C		C	
Queue Length 50th (m)	7.2	34.4	36.8	0.0	38.4	0.0
Queue Length 95th (m)	18.1	52.9	59.6	17.8	70.0	7.1
Internal Link Dist (m)		217.9	258.1		237.6	
Turn Bay Length (m)	100.0			100.0	80.0	
Base Capacity (vph)	323	1612	1055	958	583	541
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	0.22	0.23	0.27	0.52	0.08

Intersection Summary

Cycle Length: 119.4

Actuated Cycle Length: 85.6

Natural Cycle: 100

Control Type: Semi Act-Uncoord

Maximum v/c Ratio: 0.69

Intersection Signal Delay: 21.8

Intersection LOS: C

Intersection Capacity Utilization 50.6%

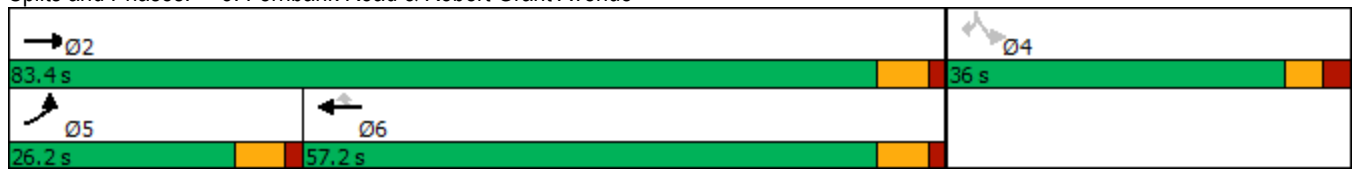
ICU Level of Service A

Analysis Period (min) 15

Total Projected 2028 AM
3: Fernbank Road & Robert Grant Avenue

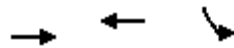
06/15/2020

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



Total Projected 2028 AM
8: Bobolink Ridge & Livery Street

06/15/2020



Lane Group	EBT	WBT	SBL
Lane Configurations	↗	↖	↖
Traffic Volume (vph)	35	64	2
Future Volume (vph)	35	64	2
Lane Group Flow (vph)	66	64	104
Sign Control	Free	Free	Stop

Intersection Summary

Control Type: Unsignalized

Intersection Capacity Utilization 23.9% ICU Level of Service A




Analysis Period (min) 15

Total Projected 2028 AM
8: Bobolink Ridge & Livery Street

06/15/2020

Intersection

Int Delay, s/veh 5

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	31	35	64	0	2	102
Future Vol, veh/h	31	35	64	0	2	102
Conflicting Peds, #/hr	8	0	0	8	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	100	100	100	100	100	100
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	31	35	64	0	2	102

Major/Minor	Major1	Major2	Minor2
Conflicting Flow All	72	0	0 169 72
Stage 1	-	-	- 72 -
Stage 2	-	-	- 97 -
Critical Hdwy	4.12	-	- 6.42 6.22
Critical Hdwy Stg 1	-	-	- 5.42 -
Critical Hdwy Stg 2	-	-	- 5.42 -
Follow-up Hdwy	2.218	-	- 3.518 3.318
Pot Cap-1 Maneuver	1528	-	- 821 990
Stage 1	-	-	- 951 -
Stage 2	-	-	- 927 -
Platoon blocked, %	-	-	-
Mov Cap-1 Maneuver	1518	-	- 792 983
Mov Cap-2 Maneuver	-	-	- 792 -
Stage 1	-	-	- 924 -
Stage 2	-	-	- 921 -

Approach	EB	WB	SB
HCM Control Delay, s	3.5	0	9.1
HCM LOS			A

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1518	-	-	-	978
HCM Lane V/C Ratio	0.02	-	-	-	0.106
HCM Control Delay (s)	7.4	0	-	-	9.1
HCM Lane LOS	A	A	-	-	A
HCM 95th %tile Q(veh)	0.1	-	-	-	0.4

Total Projected 2028 PM
3: Fernbank Road & Robert Grant Avenue

06/15/2020



Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	41	304	532	346	283	44
Future Volume (vph)	41	304	532	346	283	44
Lane Group Flow (vph)	41	304	532	346	283	44
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)	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	6.2	6.2	6.2	6.2	6.0	6.0
Lead/Lag	Lead		Lag	Lag		
Lead-Lag Optimize?	Yes		Yes	Yes		
Recall Mode	Max	Min	Min	Min	Max	Max
Act Effect Green (s)	20.2	64.4	37.9	37.9	30.2	30.2
Actuated g/C Ratio	0.19	0.60	0.35	0.35	0.28	0.28
v/c Ratio	0.13	0.29	0.84	0.46	0.62	0.10
Control Delay	41.0	10.7	44.1	4.4	42.5	10.8
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	41.0	10.7	44.1	4.4	42.5	10.8
LOS	D	B	D	A	D	B
Approach Delay		14.3	28.4		38.2	
Approach LOS		B	C		D	
Queue Length 50th (m)	7.1	28.1	99.9	0.0	50.7	0.0
Queue Length 95th (m)	18.9	41.5	139.4	16.5	93.7	9.3
Internal Link Dist (m)		217.9	258.1		237.6	
Turn Bay Length (m)	100.0			100.0	80.0	
Base Capacity (vph)	326	1455	1043	1005	457	422
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	0.21	0.51	0.34	0.62	0.10

Intersection Summary

Cycle Length: 130.4

Actuated Cycle Length: 106.9

Natural Cycle: 100

Control Type: Semi Act-Uncoord

Maximum v/c Ratio: 0.84

Intersection Signal Delay: 27.4

Intersection LOS: C

Intersection Capacity Utilization 62.7%

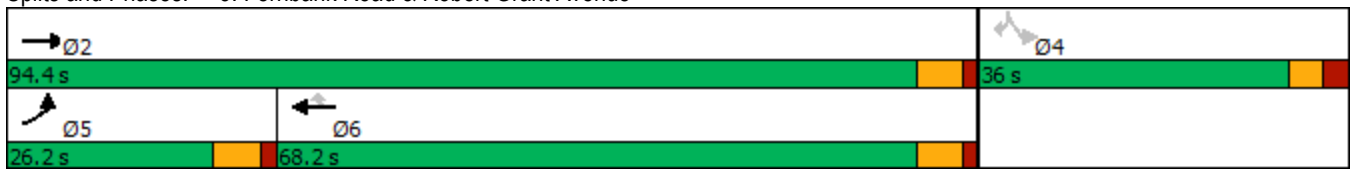
ICU Level of Service B

Analysis Period (min) 15

Total Projected 2028 PM
3: Fernbank Road & Robert Grant Avenue

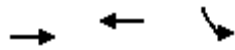
06/15/2020

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



Total Projected 2028 PM
8: Bobolink Ridge & Livery Street

06/15/2020



Lane Group	EBT	WBT	SBL
Lane Configurations			
Traffic Volume (vph)	75	34	1
Future Volume (vph)	75	34	1
Lane Group Flow (vph)	178	37	65
Sign Control	Free	Free	Stop

Intersection Summary

Control Type: Unsignalized

Intersection Capacity Utilization 27.8% ICU Level of Service A




Analysis Period (min) 15

Total Projected 2028 PM
8: Bobolink Ridge & Livery Street

06/15/2020

Intersection

Int Delay, s/veh 4.8

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	103	75	34	3	1	64
Future Vol, veh/h	103	75	34	3	1	64
Conflicting Peds, #/hr	11	0	0	11	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	100	100	100	100	100	100
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	103	75	34	3	1	64

Major/Minor	Major1	Major2	Minor2
Conflicting Flow All	48	0	0 328 47
Stage 1	-	-	- 47 -
Stage 2	-	-	- 281 -
Critical Hdwy	4.12	-	- 6.42 6.22
Critical Hdwy Stg 1	-	-	- 5.42 -
Critical Hdwy Stg 2	-	-	- 5.42 -
Follow-up Hdwy	2.218	-	- 3.518 3.318
Pot Cap-1 Maneuver	1559	-	- 666 1022
Stage 1	-	-	- 975 -
Stage 2	-	-	- 767 -
Platoon blocked, %	-	-	-
Mov Cap-1 Maneuver	1544	-	- 608 1012
Mov Cap-2 Maneuver	-	-	- 608 -
Stage 1	-	-	- 899 -
Stage 2	-	-	- 760 -

Approach	EB	WB	SB
HCM Control Delay, s	4.3	0	8.8
HCM LOS			A

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1544	-	-	-	1002
HCM Lane V/C Ratio	0.067	-	-	-	0.065
HCM Control Delay (s)	7.5	0	-	-	8.8
HCM Lane LOS	A	A	-	-	A
HCM 95th %tile Q(veh)	0.2	-	-	-	0.2

MOVEMENT SUMMARY

 Site: [FT2028 - Abbott/Robert Grant]

AM Peak
Site Category: (None)
Roundabout

Movement Performance - Vehicles												
Mov ID	Turn	Demand Total veh/h	Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
South: Robert Grant Avenue												
1	L2	281	2.0	0.391	9.0	LOS A	2.9	20.4	0.24	0.54	0.24	54.3
3	R2	302	2.0	0.391	4.2	LOS A	2.9	20.4	0.24	0.54	0.24	53.1
Approach		583	2.0	0.391	6.5	LOS A	2.9	20.4	0.24	0.54	0.24	53.7
East: Abbott Street East												
4	L2	145	2.0	0.203	8.8	LOS A	1.1	8.1	0.47	0.61	0.47	46.5
5	T1	78	2.0	0.203	4.3	LOS A	1.1	8.1	0.47	0.61	0.47	46.3
Approach		223	2.0	0.203	7.2	LOS A	1.1	8.1	0.47	0.61	0.47	46.4
West: Abbott Street E												
11	T1	52	2.0	0.181	3.5	LOS A	1.1	7.6	0.35	0.44	0.35	48.3
12	R2	172	2.0	0.181	3.6	LOS A	1.1	7.6	0.35	0.44	0.35	47.1
Approach		224	2.0	0.181	3.6	LOS A	1.1	7.6	0.35	0.44	0.35	47.4
All Vehicles		1030	2.0	0.391	6.0	LOS A	2.9	20.4	0.31	0.54	0.31	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.

SIDRA INTERSECTION 8.0 | Copyright © 2000-2018 Akcelik and Associates Pty Ltd | sidrasolutions.com

Organisation: PARSONS | Processed: Monday, June 15, 2020 3:49:23 PM

Project: C:\Home Work\476799 - LepineFernbank\1000\DATA\SIDRA\AM Peak.sip8

MOVEMENT SUMMARY

 **Site: [FT2028 - Abbott/Robert Grant]**

PM Peak
Site Category: (None)
Roundabout

Movement Performance - Vehicles												
Mov ID	Turn	Demand Total veh/h	Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
South: Robert Grant Avenue												
1	L2	213	2.0	0.299	9.1	LOS A	2.1	14.6	0.28	0.55	0.28	54.0
3	R2	205	2.0	0.299	4.3	LOS A	2.1	14.6	0.28	0.55	0.28	52.8
Approach		418	2.0	0.299	6.8	LOS A	2.1	14.6	0.28	0.55	0.28	53.5
East: Abbott Street East												
4	L2	263	2.0	0.304	8.6	LOS A	1.9	13.5	0.45	0.61	0.45	46.3
5	T1	94	2.0	0.304	4.0	LOS A	1.9	13.5	0.45	0.61	0.45	46.2
Approach		357	2.0	0.304	7.4	LOS A	1.9	13.5	0.45	0.61	0.45	46.3
West: Abbott Street E												
11	T1	76	2.0	0.328	4.4	LOS A	2.2	15.3	0.53	0.55	0.53	47.8
12	R2	287	2.0	0.328	4.4	LOS A	2.2	15.3	0.53	0.55	0.53	46.7
Approach		363	2.0	0.328	4.4	LOS A	2.2	15.3	0.53	0.55	0.53	46.9
All Vehicles		1138	2.0	0.328	6.2	LOS A	2.2	15.3	0.41	0.57	0.41	48.9

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.

SIDRA INTERSECTION 8.0 | Copyright © 2000-2018 Akcelik and Associates Pty Ltd | sidrasolutions.com

Organisation: PARSONS | Processed: Monday, June 15, 2020 4:17:49 PM

Project: C:\Home Work\476799 - LepineFernbank\1000\DATA\SIDRA\PM Peak.sip8

MOVEMENT SUMMARY

 Site: [FT2028 - Bobolink/Robert Grant]

AM Peak
Site Category: (None)
Roundabout

Movement Performance - Vehicles												
Mov ID	Turn	Demand Total veh/h	Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
South: Robert Grant Avenue												
1	L2	8	2.0	0.273	9.5	LOS A	1.7	11.9	0.35	0.47	0.35	55.0
2	T1	315	2.0	0.273	4.9	LOS A	1.7	11.9	0.35	0.47	0.35	55.1
3	R2	26	2.0	0.273	4.6	LOS A	1.7	11.9	0.35	0.47	0.35	53.8
Approach		349	2.0	0.273	4.9	LOS A	1.7	11.9	0.35	0.47	0.35	55.0
East: Bobolink Drive												
4	L2	68	2.0	0.151	10.9	LOS B	0.8	6.0	0.54	0.67	0.54	53.4
5	T1	1	2.0	0.151	6.3	LOS A	0.8	6.0	0.54	0.67	0.54	53.5
6	R2	81	2.0	0.151	6.0	LOS A	0.8	6.0	0.54	0.67	0.54	52.2
Approach		150	2.0	0.151	8.2	LOS A	0.8	6.0	0.54	0.67	0.54	52.8
North: Robert Grant Avenue												
7	L2	52	2.0	0.231	9.1	LOS A	1.5	10.4	0.26	0.47	0.26	55.1
8	T1	223	2.0	0.231	4.5	LOS A	1.5	10.4	0.26	0.47	0.26	55.1
9	R2	43	2.0	0.231	4.3	LOS A	1.5	10.4	0.26	0.47	0.26	53.8
Approach		318	2.0	0.231	5.2	LOS A	1.5	10.4	0.26	0.47	0.26	54.9
West: Bobolink Drive												
10	L2	82	2.0	0.094	10.4	LOS B	0.5	3.5	0.48	0.66	0.48	52.3
11	T1	1	2.0	0.094	5.8	LOS A	0.5	3.5	0.48	0.66	0.48	52.3
12	R2	15	2.0	0.094	5.6	LOS A	0.5	3.5	0.48	0.66	0.48	51.1
Approach		98	2.0	0.094	9.6	LOS A	0.5	3.5	0.48	0.66	0.48	52.1
All Vehicles		915	2.0	0.273	6.1	LOS A	1.7	11.9	0.37	0.52	0.37	54.3

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.

SIDRA INTERSECTION 8.0 | Copyright © 2000-2018 Akcelik and Associates Pty Ltd | sidrasolutions.com

Organisation: PARSONS | Processed: Monday, June 15, 2020 3:49:25 PM

Project: C:\Home Work\476799 - LepineFernbank\1000\DATA\SIDRA\AM Peak.sip8

MOVEMENT SUMMARY

 Site: [FT2028 - Bobolink/Robert Grant]

PM Peak
Site Category: (None)
Roundabout

Movement Performance - Vehicles												
Mov ID	Turn	Demand Total veh/h	Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
South: Robert Grant Avenue												
1	L2	15	2.0	0.314	10.0	LOS A	1.9	13.7	0.44	0.53	0.44	54.7
2	T1	275	2.0	0.314	5.4	LOS A	1.9	13.7	0.44	0.53	0.44	54.7
3	R2	82	2.0	0.314	5.1	LOS A	1.9	13.7	0.44	0.53	0.44	53.4
Approach		372	2.0	0.314	5.5	LOS A	1.9	13.7	0.44	0.53	0.44	54.4
East: Bobolink Drive												
4	L2	47	2.0	0.085	10.4	LOS B	0.5	3.3	0.49	0.64	0.49	53.3
5	T1	1	2.0	0.085	5.8	LOS A	0.5	3.3	0.49	0.64	0.49	53.4
6	R2	40	2.0	0.085	5.6	LOS A	0.5	3.3	0.49	0.64	0.49	52.1
Approach		88	2.0	0.085	8.2	LOS A	0.5	3.3	0.49	0.64	0.49	52.8
North: Robert Grant Avenue												
7	L2	150	2.0	0.374	9.1	LOS A	2.7	19.3	0.26	0.49	0.26	54.7
8	T1	310	2.0	0.374	4.5	LOS A	2.7	19.3	0.26	0.49	0.26	54.8
9	R2	82	2.0	0.374	4.3	LOS A	2.7	19.3	0.26	0.49	0.26	53.5
Approach		542	2.0	0.374	5.7	LOS A	2.7	19.3	0.26	0.49	0.26	54.6
West: Bobolink Drive												
10	L2	59	2.0	0.082	11.3	LOS B	0.4	3.2	0.58	0.70	0.58	52.0
11	T1	1	2.0	0.082	6.7	LOS A	0.4	3.2	0.58	0.70	0.58	52.1
12	R2	16	2.0	0.082	6.5	LOS A	0.4	3.2	0.58	0.70	0.58	50.9
Approach		76	2.0	0.082	10.3	LOS B	0.4	3.2	0.58	0.70	0.58	51.8
All Vehicles		1078	2.0	0.374	6.2	LOS A	2.7	19.3	0.37	0.53	0.37	54.2

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.

SIDRA INTERSECTION 8.0 | Copyright © 2000-2018 Akcelik and Associates Pty Ltd | sidrasolutions.com

Organisation: PARSONS | Processed: Monday, June 15, 2020 4:17:51 PM

Project: C:\Home Work\476799 - LepineFernbank\1000\DATA\SIDRA\PM Peak.sip8

Appendix I

MMLOS Analysis for Signalized Intersections

Multi-Modal Level of Service - Intersections Form

Consultant	Parsons	Project	476799 - 01000
Scenario	Existing	Date	November 4th, 2019
Comments			

INTERSECTIONS		Fernbank Road / Robert Grant Avenue									
Crossing Side		NORTH		SOUTH		EAST		WEST			
Pedestrian	Lanes	3			3			3			
	Median	No Median - 2.4 m			No Median - 2.4 m			No Median - 2.4 m			
	Conflicting Left Turns	Protected			Permissive			No left turn / Prohib			
	Conflicting Right Turns	Permissive or yield control			No right turn			Permissive or yield control			
	Right Turns on Red (RTor) ?	RTOR allowed			RTOR allowed			RTOR prohibited			
	Ped Signal Leading Interval?	No			No			No			
	Right Turn Channel	No Channel			No Channel			No Right Turn			
	Corner Radius	15-25m			10-15m			No Right Turn			
	Crosswalk Type	Std transverse markings			Std transverse markings			Std transverse markings			
	PETS <i>I</i> Score		76			75			91		
	Ped. Exposure to Traffic LoS		B		-		B		A		
	Cycle Length										
Effective Walk Time											
Average Pedestrian Delay											
Pedestrian Delay LoS		-		-		-		-			
Level of Service		B		-		B		A			
		B									
Approach From		NORTH		SOUTH		EAST		WEST			
Bicycle	Bicycle Lane Arrangement on Approach	Curb Bike Lane, Cycletrack or MUP			Curb Bike Lane, Cycletrack or MUP			Mixed Traffic			
	Right Turn Lane Configuration	Not Applicable			Not Applicable			≤ 50 m			
	Right Turning Speed	Not Applicable			Not Applicable			≤ 25 km/h			
	Cyclist relative to RT motorists	Not Applicable		-		Not Applicable		D			
	Separated or Mixed Traffic	Separated		-		Separated		Mixed Traffic			
	Left Turn Approach	1 lane crossed						One lane crossed			
	Operating Speed	> 50 to < 60 km/h						≥ 60 km/h			
	Left Turning Cyclist	D		-		-		F			
Level of Service		D		-		-		F			
		F									
Transit	Average Signal Delay	≤ 40 sec			≤ 10 sec						
	Level of Service		E		-		B		-		
		E									
Truck	Effective Corner Radius	> 15 m			10 - 15 m						
	Number of Receiving Lanes on Departure from Intersection	1			1						
	Level of Service		C		-		E		-		
		E									
Auto	Volume to Capacity Ratio	0.81 - 0.90									
	Level of Service		D								