December 2019

OTTAWA-CARLETON
DISTRICT SCHOOL BOARD

TIA Report

OCDSB - Stittsville High School
700 Cope Drive

PARSONS

TIA Plan Reports

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

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

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

CERTIFICATION

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

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

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Dated at _________Ottawa_______ this ___04___ day of _____December ___, 201_9__.
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Signature of Individual certifier that s/he meets the above four criteria

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OCDSB – Stittsville High School
700 Cope Drive

Transportation Impact Assessment Report

prepared for:
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December 4, 2019

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Transportation Impact Assessment Report

1. SCREENING

The Screening Form was prepared for the subject development and included as part of the subsequent report. The screening form confirmed the need for a Transportation Impact Assessment (TIA) based on the Trip Generation Trigger (approximately 1,460 projected students at full build-out), the Location Trigger (development proposes access to Cope Drive which is a designated Spine Route), and the Safety Trigger (proposed driveway is within 150m of the Cope/Robert Grant roundabout). The Screening Form and City comments/responses are provided in Appendix A.

2. SCOPING

2.1. EXISTING AND PLANNED CONDITIONS

2.1.1. PROPOSED DEVELOPMENT

Based on the proposed Site Plan provided by OCDSB, it is our understanding that the proponent is proposing a two-phase High School (grades 7-12) development with an initial date of occupancy by 2022 and full build-out by 2024. The school will initially be opened to grades 7-10 with upper grades added each year. Students will be transported using a combination of school buses and OC Transpo buses, as well as walk, bicycle and private vehicle pick-up/drop-off. Currently, 123 vehicle parking spaces are provided, and 180 bicycle parking spaces are provided. The site is currently vacant and zoned as I1 – Minor Institutional Zone. The local context of the site is provided as Figure 1 and the proposed site is provided as Figure 2.

All vehicular traffic to/from the proposed development is envisioned via three driveway connections at Cope Drive with no access to Robert Grant Avenue. There are three proposed accesses to the site. The west access is proposed as inbound-only and accesses the main parking lot. The middle access is proposed as all-movement and also accesses the main parking lot and bus loop. The east access is outbound-only and only services a small parking lot mainly providing access to handicap spaces.

Figure 1: Local Context

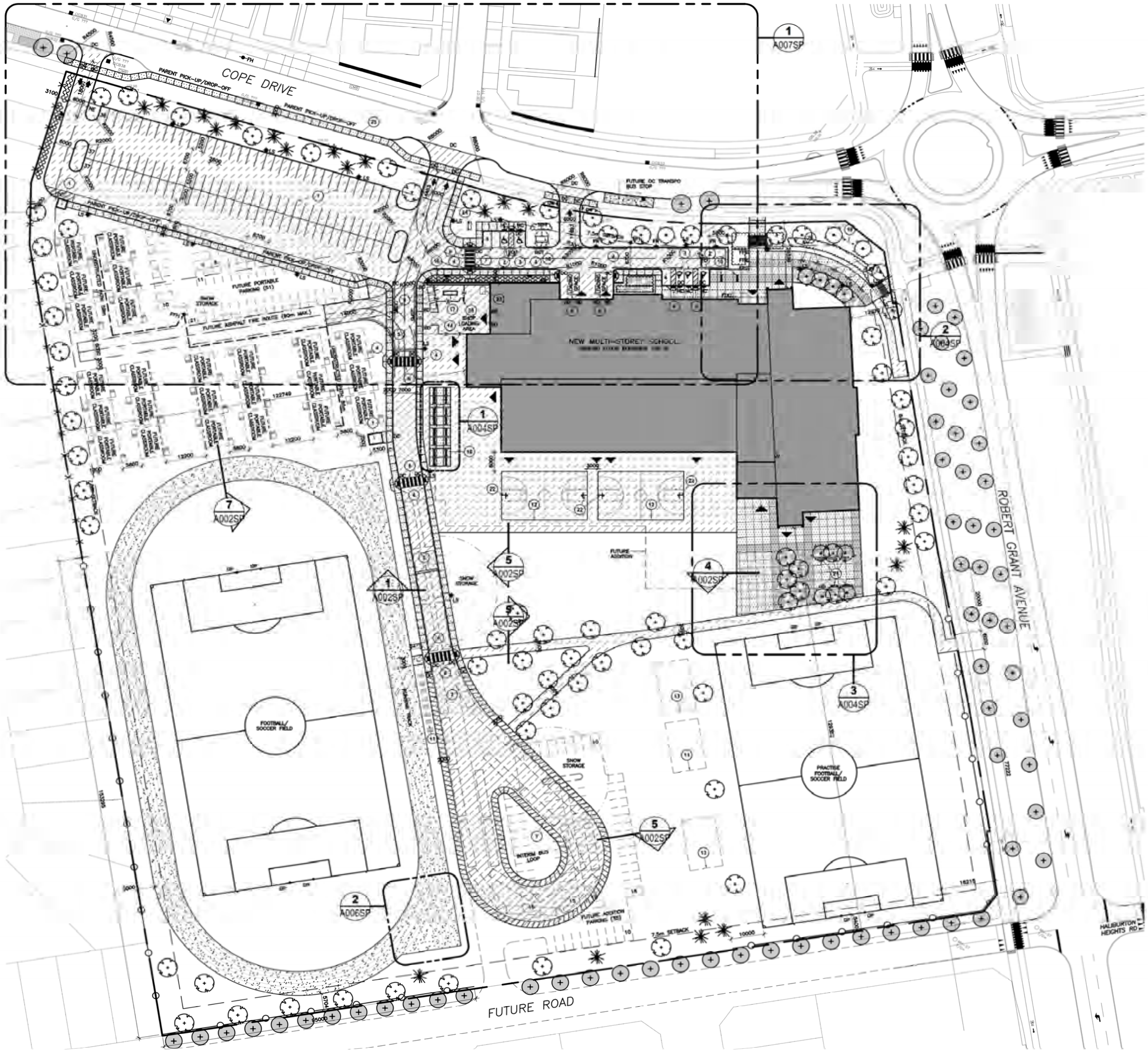

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Figure 2: Proposed Site Plan

2.1.2. EXISTING CONDITIONS

Area Road Network

Fernbank Road is a city-owned 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. The posted speed limit is 60km/h east of Hartsmere Drive and 40km/h west of Hartsmere Drive.

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

Abbott Street E is a city-owned 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.

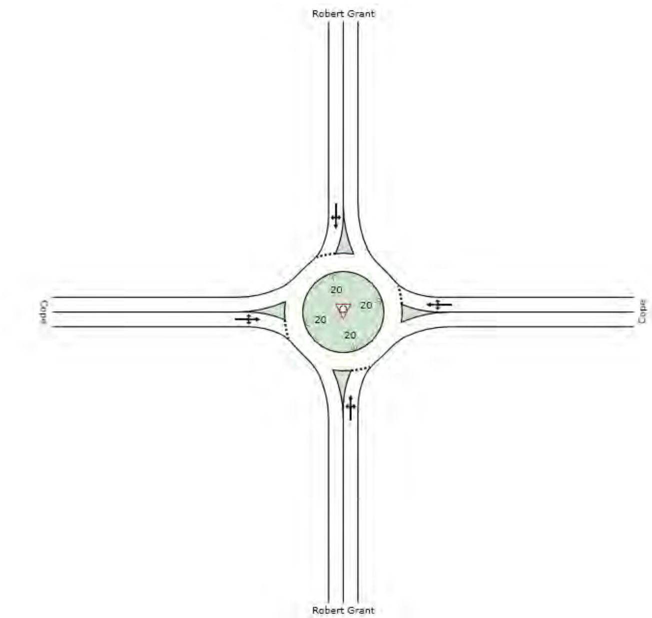
Cope Road west of Robert Grant Avenue is proposed as a city-owned east-west major collector roadway with a two-lane cross-section and parking on the south side. Figure 3 below shows the proposed concept of Cope Drive west of Robert Grant Avenue. East of Robert Grant Avenue, Cope Drive is a city-owned roadway with a two-lane cross-section with parking provided on the south side. The unposted speed limit is understood to be 50km/h.

Figure 3: Proposed Cope Drive

Existing Study Area Intersections

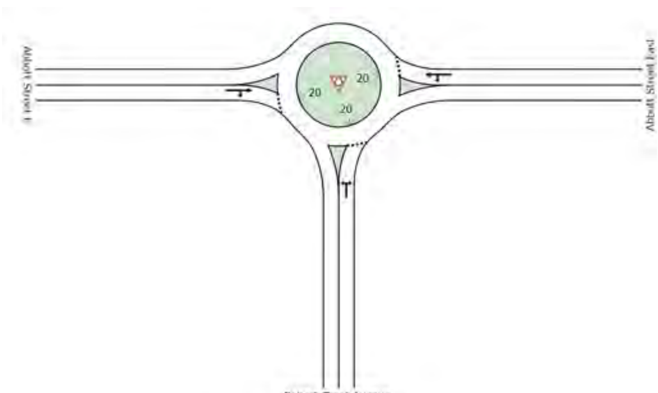
Cope/Robert Grant

The Cope/Robert Grant intersection is a four-legged roundabout intersection. All approaches consist of a single approach lane. It should be noted that the west leg of the Cope/Robert Grant intersection is closed to the public as a new subdivision is under construction west of Robert Grant Avenue.



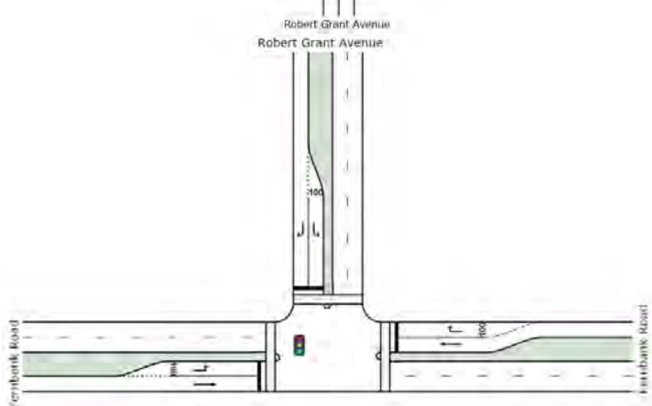
Abbott E/Robert Grant

The Abbott 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.



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.



Existing Driveways to Adjacent Developments

There are no existing driveways within 200m of the proposed school accesses. There will be a residential driveway providing access to the future subdivision on the north side of Cope Drive.

Existing Area Traffic Management Measures

There are no existing area traffic management measures along the site frontage as this section of Cope Drive has not been built yet.

Pedestrian/Cycling Network

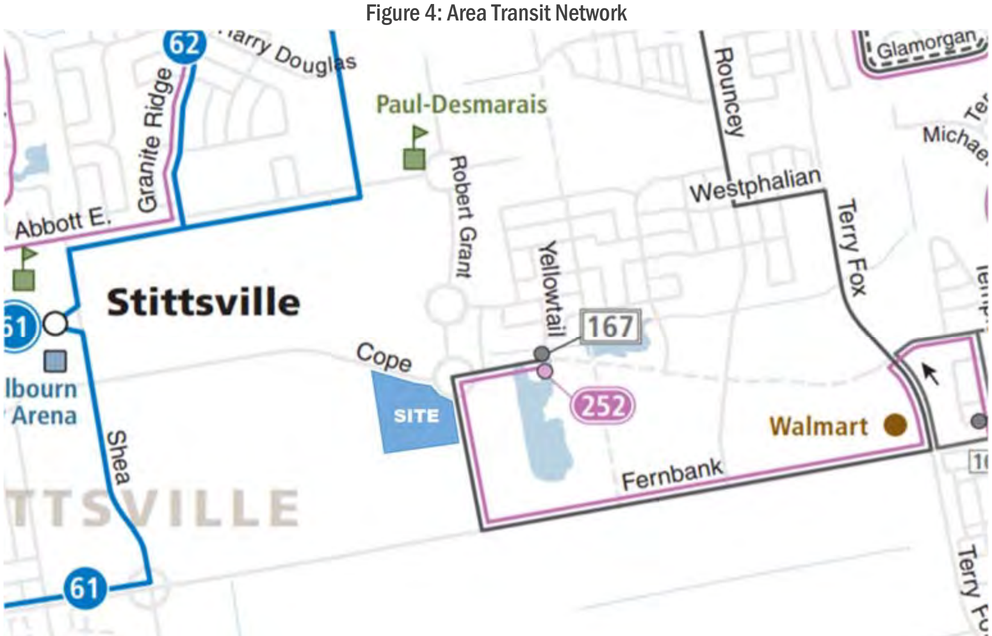
Sidewalks are provided on both sides of Robert Grant Avenue, on the north side of Abbott Street E. There are no existing sidewalks on Fernbank Road. A multi-use pathway exists on the south side of Abbott Street E. The Ottawa Pedestrian Plan (2013) does not identify any future projects within the study 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 however a multi-use pathway (MUP) is planned along the north side of Cope Drive.

Transit Network and Bus Services

Transit in the area include transit routes are OC Transpo Routes #61, 167, and 252. Bus stops for Local Route #61 are located on Abbott Street E at Iber Road and all-day service is provided. Bus stops for Connexion Route #167 and Local Route #252 are located on Robert Grant Avenue at Haliburton Heights. All-day service is provided for Route #167 and peak-hour service is provided for Route #252. The current transit area network is provided as Figure 4.

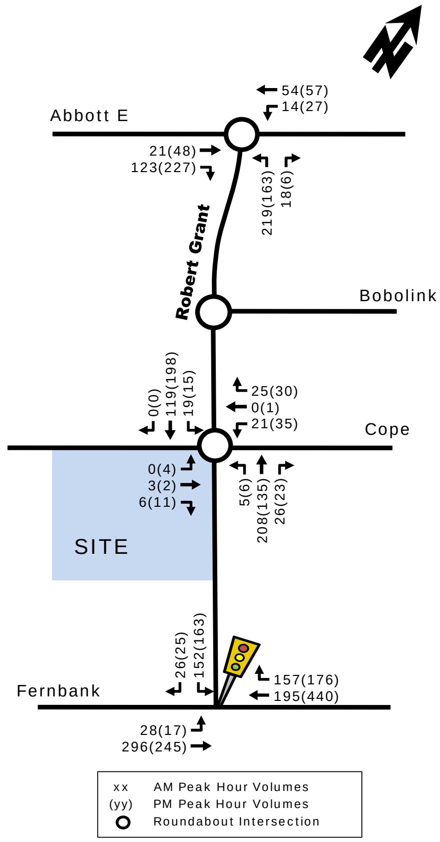
Figure 4: Area Transit Network



Peak Hour Travel Demands

The existing peak hour traffic volumes within the study area, obtained from the City of Ottawa and Parsons count, are illustrated in Figure 5. The peak hour traffic volume count data is included as Appendix B.

Figure 5: Existing Peak Hour Traffic Volumes



Existing Road Safety Conditions

As the study area is relatively new, the five-year collision history on boundary streets does not exist. 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 source collision data as provided by the City of Ottawa and related analysis is provided as Appendix C.

2.1.3. PLANNED CONDITIONS

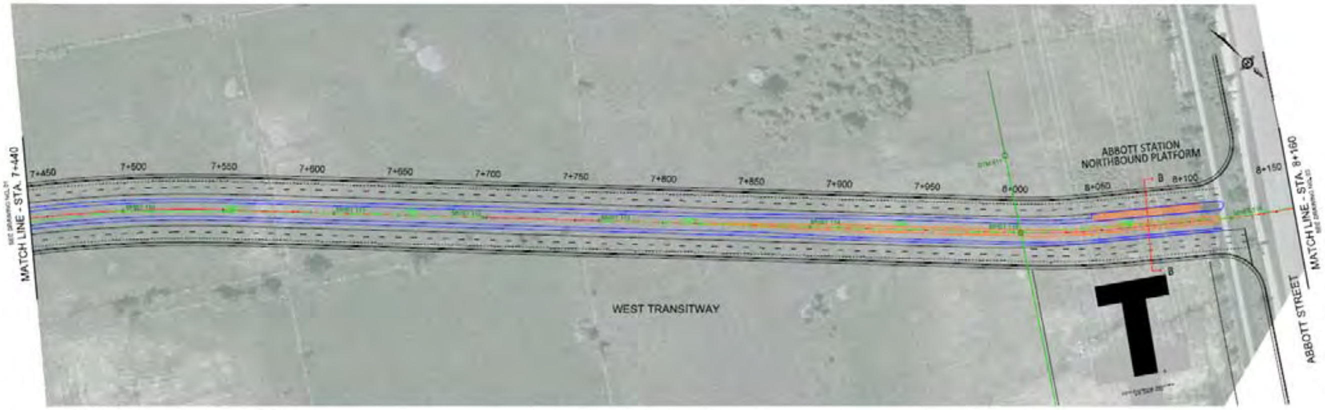
Planned Study Area Transportation Network Changes

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.

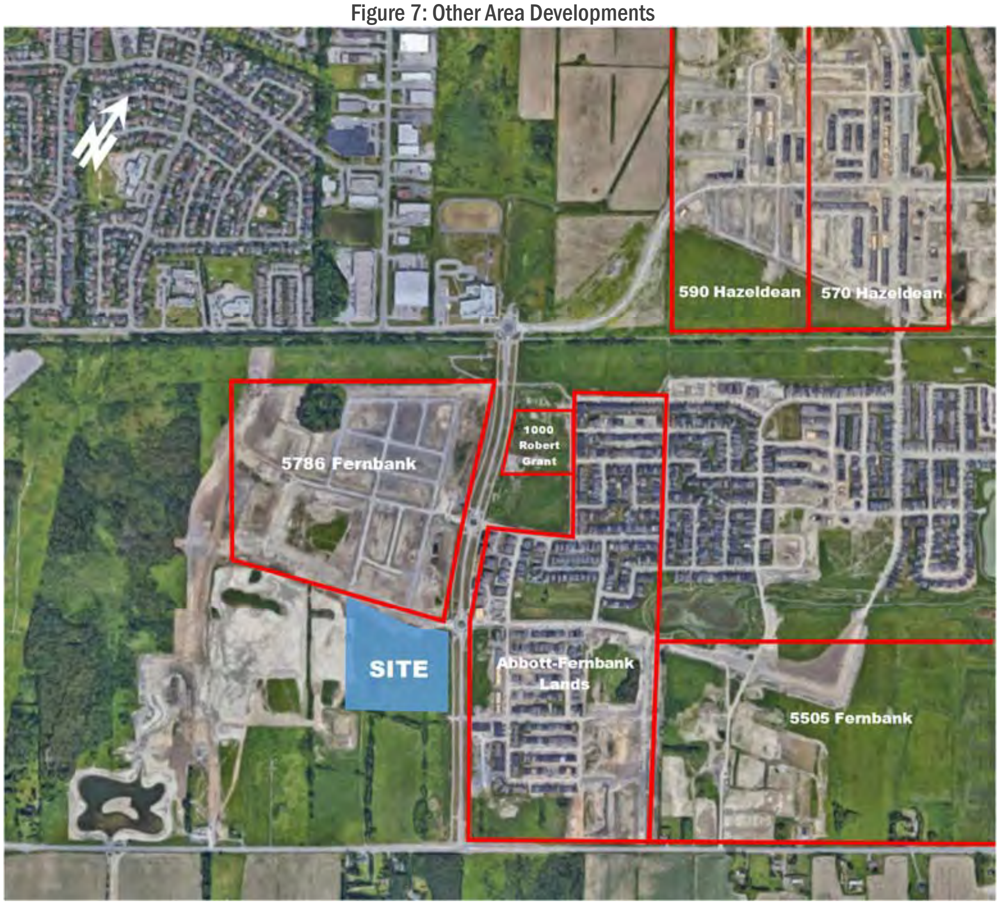
Figure 6: Future Robert Grant Ave Concept



Other Area Developments

The following developments are planned near the subject site based on the latest information from the City. The location of the site and the adjacent future developments are shown below in Figure 7.

Figure 7: Other Area Developments



1000 Robert Grant Avenue

Lépine Corps. is proposing a residential development consisting three towers ranging from five to fourteen storeys with 566 units in total, located 600m north of the subject development. The Transportation Impact Assessment (prepared by Parsons) projected approximately 164 veh/h during the morning peak hour and 205 veh/h during the afternoon peak hour.

365 Haliburton Heights (Abbott-Fernbank Lands)
Eight two-storey buildings comprised of 96 apartments are proposed at the above noted address, located adjacent to 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, adjacent to 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 700m east 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 consisting of an elementary school, high school and housing, taking place west of Robert Grant Avenue. The Transportation Overview projected approximately 700 veh/h during the morning and afternoon peak hours.

2.2. STUDY AREA AND TIME PERIODS

Given that the proposed site is that of a secondary school, the time periods being assessed will be based on the school's peak periods, as opposed to regular commuter peak hours. As such, the weekday morning and afternoon peak periods to be analyzed are 7:00 am – 9:00 am, which may include the regular commuter morning peak hour, and 2:00 pm – 4:00 pm, which is in advance of regular commuter afternoon peak hours. The proposed study area to be used in analysis is outlined below and highlighted in Figure 8. Note that Robert Grant Avenue adjacent to the site has not been included as there are no proposed accesses to this roadway.

The estimated date of initial occupancy is projected to be 2022, when the school is only offering grades 7-10. Full occupancy is projected to be 2024 when the school is offering all grades (7-12). The year 2029 will be analyzed as the five-year horizon beyond build-out year.

Figure 8: Study Area

- Abbott E/Robert Grant intersection;
- Cope/Robert Grant intersection;
- Fernbank/Robert Grant intersection;
- Access 1/Cope intersection;
- Access 2/Cope intersection; and,
- Cope Drive 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
4.1 Development Design	4.1.3 New Streets Network	Not required for applications involving site plans.
4.2 Parking	4.2.2 Spillover Parking	The parking is expected to meet By-Law requirements.
4.8 Review of Network Concept	All elements	The site is not expected to generate 200 trips more than the established zoning. This will be confirmed in Step 3.

3. FORECASTING

3.1.1. TRIP GENERATION AND MODE SHARES

The proposed high school is expected to accommodate up to 875 students at the time of opening in 2022 with enrollment increasing each year. OCDSB's preliminary projected enrollment for the following years is provided in Appendix D. Traffic from the high school land use will be generated using the ITE Trip Generation Manual 10th Edition. Table 2 summarizes the vehicle trip generation rates for a high school land-use and the person trip generation for the proposed site is summarized in Table 3.

Table 2: ITE Trip Generation Rates (10th Edition)

Land Use	ITE Land Use Code	Trip Rates	
		AM Peak	PM Peak
High School	ITE 530	T = 0.55(X) Ln(T) = 0.67Ln(X) + 1.72	T = 0.33(X) Ln(T) = 0.69Ln(X) + 1.07
Notes: T = Average Vehicle Trip Ends X = Number of Students			

Table 3: Projected Person-Trip Generation

Phase	Horizon Year	Students	AM Peak (person/h)			PM Peak (person/h)		
			In	Out	Total	In	Out	Total
High School (Gr. 7-10)	2022	875	454	215	669	128	272	400
High School (Gr. 7-12)	2024	1,460	641	302	943	182	387	569
High School (Future Addition)	2029	1,800	737	347	1,084	210	448	658

Mode Shares

The expected mode share percentages for the 2022 horizon year were provided by OCDSB and have been summarized in Table 4. As the surrounding area develops and matures, the percentage of non-motorized trips is expected to increase, and the percentage of school bus trips expected to decrease. The school is expecting to use OC Transpo only on a small scale as it is more cost effective to use traditional school buses. Additionally, OCDSB had indicated that there will be 20 yellow school buses initially. With regard to auto driver, note that at 2022 there are no eligible student drivers (highest student age is 15-16).

Table 4: Projected Mode Shares

Travel Mode	Mode Share		
	2022	2024	2029
Auto-Driver	5%	10%	10%
Drop-Off	10%	10%	15%
School Bus	80%	60%	45%
Transit and Non-Motorized (Bike/Walk)	5%	20%	30%

Using the mode shares presented in Table 4 above, the person trips by mode for the 2022, 2024, and 2029 horizon years were estimated and summarized below in Table 5, Table 6, and Table 7, respectively.

Table 5: 2022 Site Trip Generation

Travel Mode	Mode Share	AM Peak (Person Trips/hr)			PM Peak (Person Trips/hr)		
		In	Out	Total	In	Out	Total
Auto-Driver	5%	23	11	34	7	14	21
Drop-Off	10%	46	22	68	13	28	41
School Bus	80%	363	172	535	102	217	319
School Bus Equivalent		*20*	*20*	*40*	*20*	*20*	*40*
Non-Motorized (Bike/Walk)	5%	22	10	32	6	13	19
Total Person Trips	100%	454	215	669	128	272	400
Total 'New' Auto Trips		**89**	**53**	**142**	**40**	**62**	**102**

Table 6: 2024 Site Trip Generation

Travel Mode	Mode Share	AM Peak (Person Trips/hr)			PM Peak (Person Trips/hr)		
		In	Out	Total	In	Out	Total
Auto-Driver	10%	65	31	96	19	39	58
Drop-Off	10%	64	30	94	18	39	57
School Bus	60%	384	181	565	109	232	341
School Bus Equivalent		*20*	*20*	*40*	*20*	*20*	*40*
Transit and Non-Motorized (Bike/Walk)	20%	128	60	188	36	77	113
Total Person Trips	100%	641	302	943	182	387	569
Total 'New' Auto Trips		**149**	**81**	**230**	**57**	**98**	**155**

Table 7: 2029 Site Trip Generation

Travel Mode	Mode Share	AM Peak (Person Trips/hr)			PM Peak (Person Trips/hr)		
		In	Out	Total	In	Out	Total
Auto-Driver	10%	74	35	109	21	45	66
Drop-Off	15%	111	52	163	32	68	100
School Bus	45%	331	156	487	94	201	295
School Bus Equivalent		*20*	*20*	*40*	*20*	*20*	*40*
Transit and Non-Motorized (Bike/Walk)	30%	221	104	325	63	134	197
Total Person Trips	100%	737	347	1,084	210	448	658
Total 'New' Auto Trips		**205**	**107**	**312**	**73**	**133**	**206**

At initial build-out in 2022, the total number of person trips expected to be generated is approximately 669 and 400 persons/h during weekday school peak hours. This will increase to approximately 943 and 569 persons/h by 2024 and approximately 1,084 and 658 persons/h by 2029.

The estimated total two-way vehicle trips generated by this site are approximately 142 and 102 veh/h during weekday school peak hours. This will increase to approximately 230 and 155 veh/h by 2024 and approximately 312 and 206 veh/h by 2029.

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:

- 45% to/from the north;
- 25% to/from the east; and,
- 30% to/from the west.

Based on these distributions, 'new' site-generated trips were assigned to the study area intersections, which are illustrated as Figure 9 for the 2022 initial build-out, Figure 10 for the 2024 full build-out, and Figure 11 for the 2029 full build-out plus 5 years.

There are three proposed accesses to the site. The west access is proposed as inbound-only and accesses the main parking lot. The middle access is proposed as all-movement and also accesses the main parking lot and bus loop. The east access is outbound-only and only services a small parking lot mainly providing access to handicap spaces. As such, no traffic has been assigned to this driveway. Also note that drop-offs are assumed to be entering the site to remain conservative.

3.2. BACKGROUND NETWORK TRAVEL DEMANDS

3.2.1. TRANSPORTATION NETWORK PLANS

See Section 2.1.3.

3.2.2. BACKGROUND GROWTH

The following background traffic growth (summarized in Table 8) was calculated based on historical traffic count data (years 2010, 2012, 2014, and 2017) provided by the City of Ottawa at the Fernbank/Eagleson intersection east of the site. Detailed background traffic growth analysis is included as Appendix E.

Table 8: Fernbank/Eagleson Historical Traffic Growth (2009-2017)

Time Period	Percent Annual Change			
	North Leg	South Leg	West Leg	Overall
8 hrs	1.03%	2.16%	0.43%	**1.41%**
AM Peak	1.25%	3.41%	-3.12%	**1.56%**
PM Peak	1.14%	1.90%	1.46%	**1.52%**

As shown in Table 8, the Fernbank/Eagleson intersection has experienced an overall increase in traffic of approximately 1.5% annually within recent years (calculated as a weighted average). Accounting for future developments, which are expected to reach full build-out by 2025, a 2% background growth rate per annum on Fernbank Road and Robert Grant Avenue was considered appropriate to estimate interim traffic growth along existing roadways within the study area for the 2022 and 2024 horizon years. As the Robert Grant Avenue extension north of Abbott Street E to Hazeldean Road is projected to be completed by 2025, a 4% background growth rate per annum has been applied to Robert Grant Avenue for the 2029 horizon year.

Figure 12, Figure 13, and Figure 14 show the estimated future background peak hour traffic volumes in the 2022, 2024, and 2029 horizons, respectively.

Figure 9: 'New' 2022 Site Trip Generation

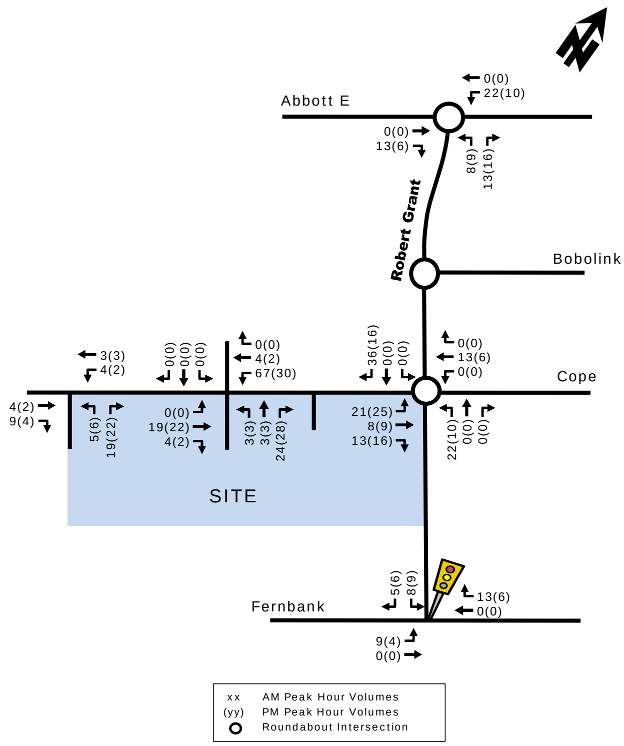


Figure 10: 'New' 2024 Site Trip Generation

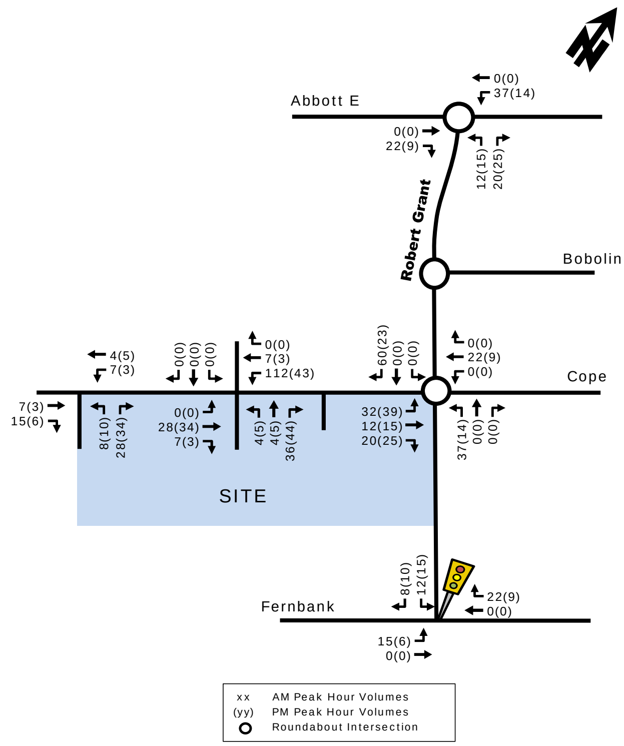


Figure 11: 'New' 2029 Site Trip Generation

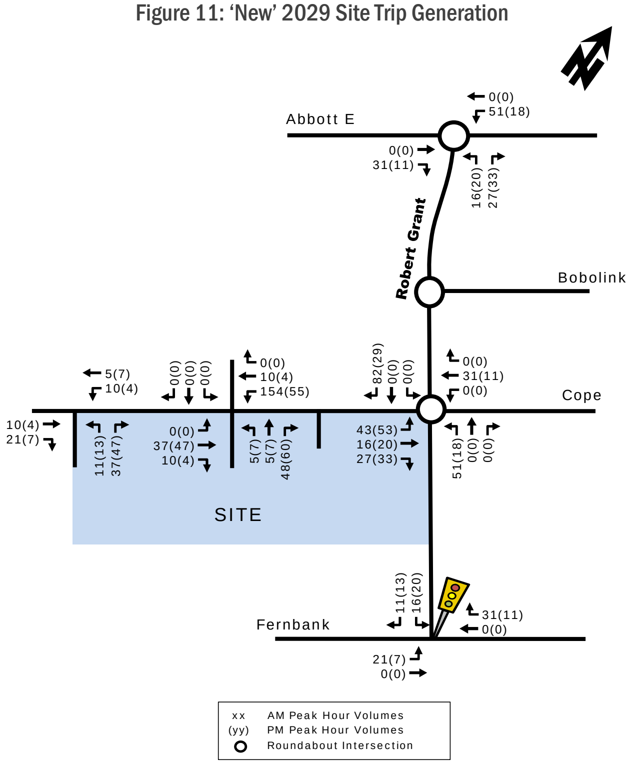


Figure 12: Future Background 2022

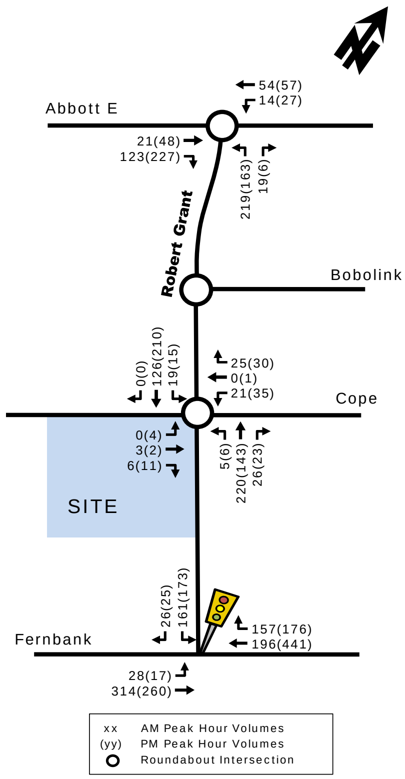


Figure 13: Future Background 2024

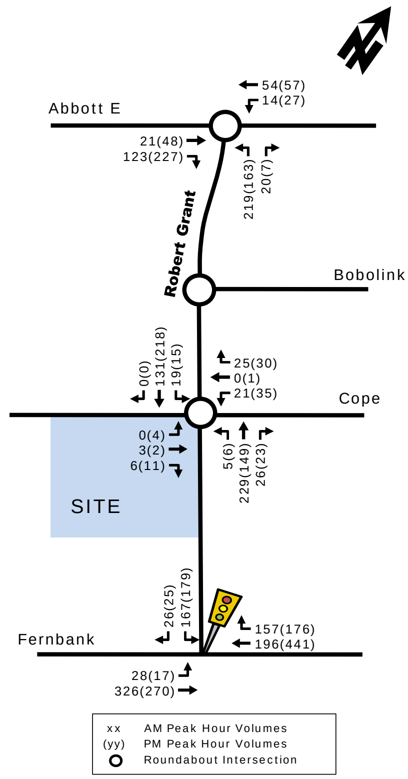
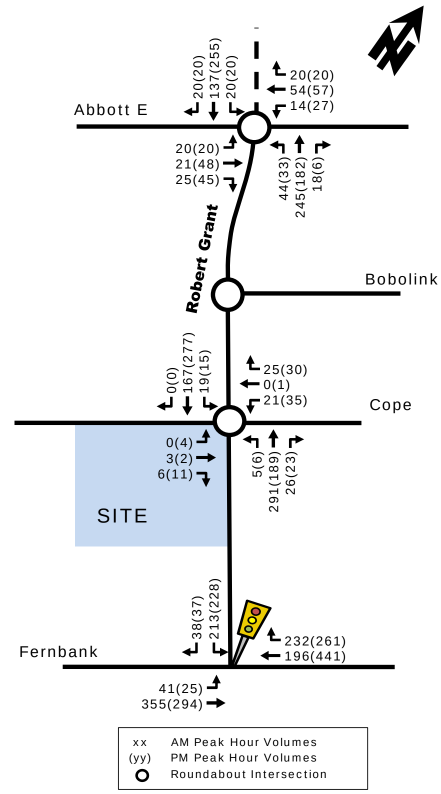


Figure 14: Future Background 2029



3.2.3. OTHER DEVELOPMENTS

The additional traffic associated with the surrounding developments mentioned above in Section 2.1.3 is shown below in Figure 15, Figure 16, Figure 17, and Figure 18. These trips will be included in the foregoing traffic analysis. As a conservative estimate of the build-out of the area it has been assumed that all of the developments would occur by the 2022 horizon. See Appendix F for the trip distribution analysis for Figure 15, Figure 16, and Figure 17 and Appendix G for the trip distribution analysis for Figure 18.

3.2.4. TOTAL BACKGROUND TRAFFIC

With the addition of the 2% background traffic growth rate and the other area development traffic, the resultant 2022, 2024, and 2029 background traffic volumes are depicted in Figure 19, Figure 20, and Figure 21 respectively.

3.3. DEMAND RATIONALIZATION

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

Figure 15: Fernbank Crossing, Phases 3 and 4

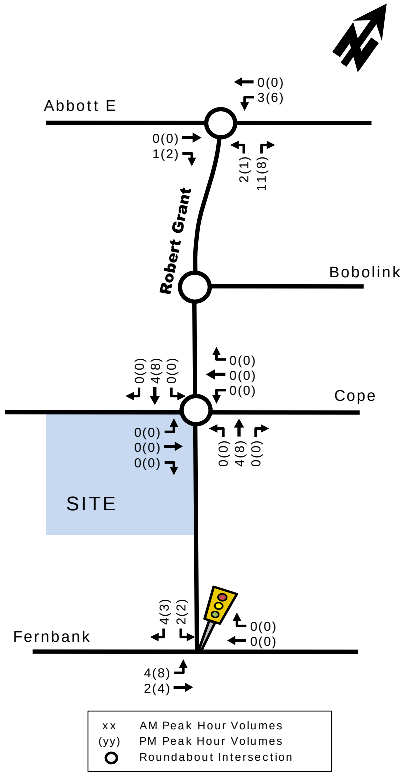


Figure 16: Blackstone Subdivision, Phases 4-8

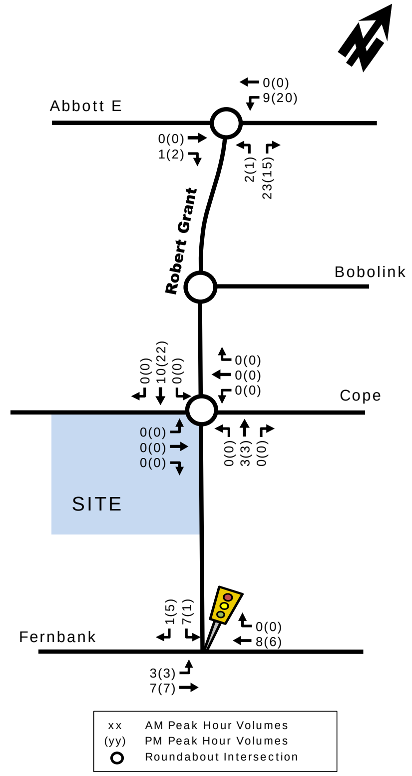


Figure 17: Lépine Fernbank, 1000 Robert Grant Ave

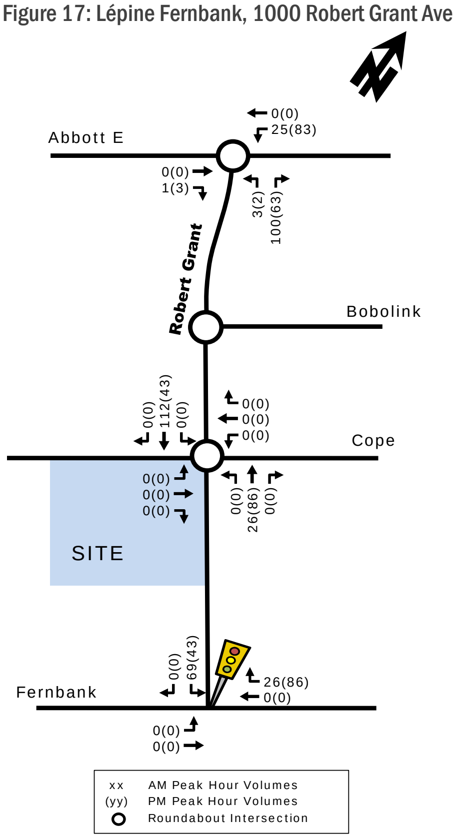
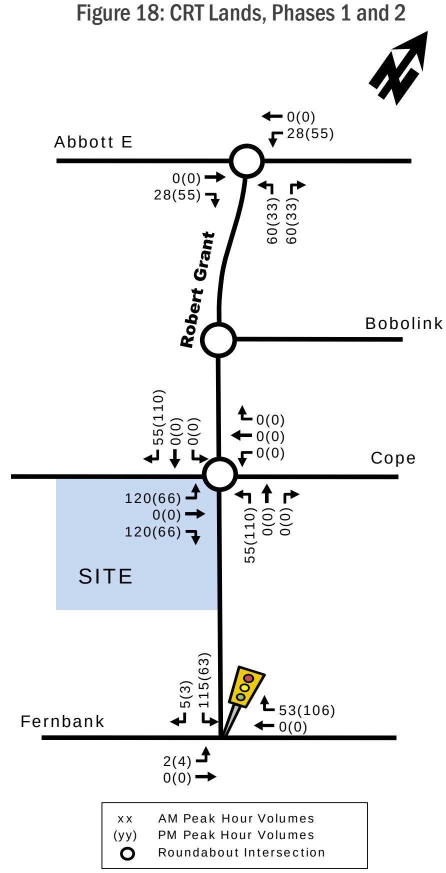


Figure 18: CRT Lands, Phases 1 and 2



Source: CRT Lands Phase 1 and 2 Fernbank Community Transportation Letter, IBI Group

Figure 19: 2022 Total Background Traffic Volume

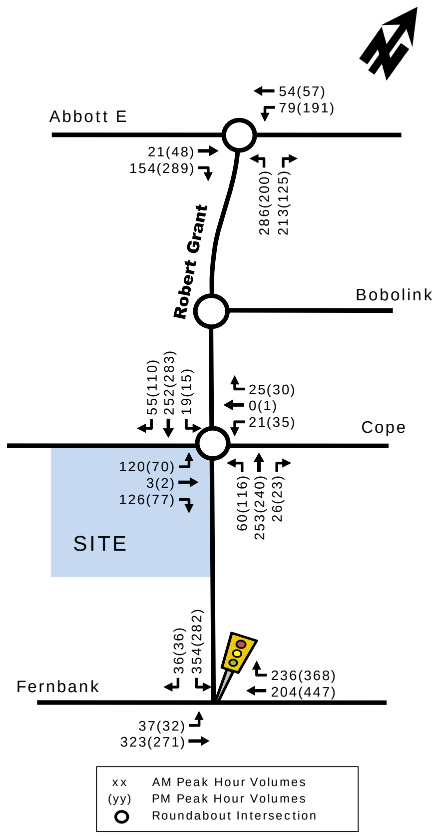


Figure 20: 2024 Total Background Traffic Volume

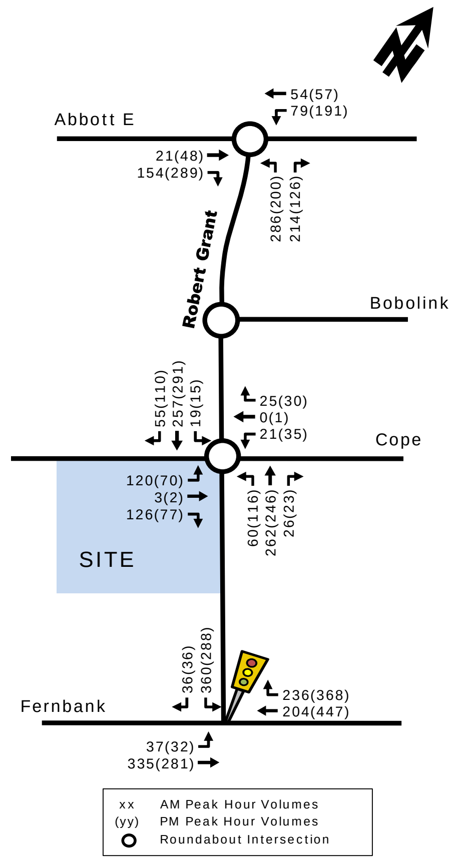
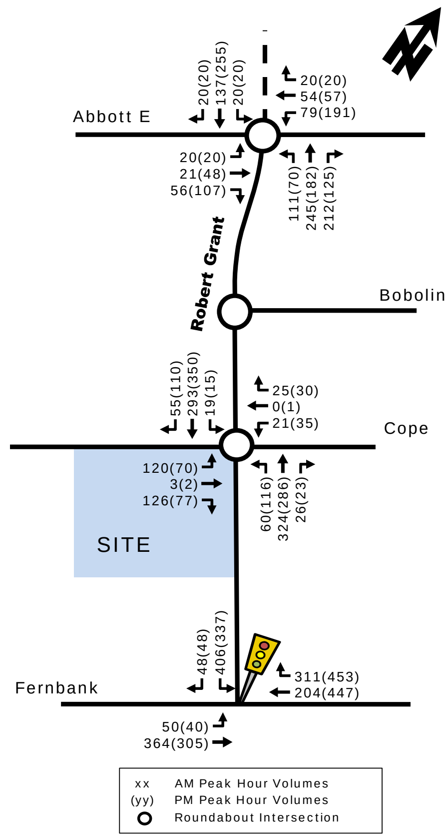


Figure 21: 2029 Total Background Traffic Volume



4. ANALYSIS

4.1. DEVELOPMENT DESIGN

Vehicle parking is proposed in a surface parking lot and bicycle parking is proposed in exterior bike racks. A total of 118 parking spaces will be provided at the initial build-out, meeting the minimum of spaces required outlined in the Parking By-Law. With regard to bicycle parking, 180 spaces will be provided which meets the City's Bylaw Requirements. Additionally, an interim bus loop has been provided for school buses to pick-up/drop-off students and turn around on-site. Should the school expand and the road along the south frontage be built, the bus loop will be replaced with a through-roadway and additional parking lot.

Existing sidewalk facilities are provided along the Robert Grant Avenue frontage. The Cope Drive extension west of Robert Grant Avenue will include a sidewalk on the south side of the roadway and a MUP on the north side of the roadway.

Transit service within the area is provided by OC Transpo. Additional service and/or stop locations may be required as the school increases in size.

4.1.1. DESIGN FOR SUSTAINABLE MODES

Vehicle and Bicycle Parking
Refer to Section 4.2.1

Transit and Pedestrians
Refer to Section 2.1.2 for the Pedestrian/Cycling Network.
Refer to Section 4.7 for Transit.

4.1.2. CIRCULATION AND ACCESS

There are three proposed accesses to the Stittsville High School site: two all-movement accesses and an outbound-only access. According to the City's Private Approach By-law, the number of accesses and location are appropriate. Section 4.4 will go into further detail regarding the design, location, and control of these driveways.

4.2. PARKING

4.2.1. PARKING SUPPLY

Vehicle Parking
As mentioned previously, vehicle parking is proposed in a surface parking lot and bicycle parking is proposed in exterior bike racks. A total of 118 parking spaces will be provided at the initial build-out, meeting the minimum of spaces required outlined in the Parking By-Law. With regard to bicycle parking, 180 spaces will be provided which meets the City's By-law Requirements. Parking space dimensions are noted to be 2.6m by 5.2m and drive aisles are noted to be 6.7m which meets By-law requirements.

In the event that the future portables are constructed, 58 additional parking spaces will be provided to serve the expansion.

Bicycle Parking
A total of 180 bicycle parking spaces are proposed to serve the proposed development, meeting the minimum outlined in City By-laws.

4.3. BOUNDARY STREET DESIGN

The boundary street for the proposed development is the future Cope Drive extension west of Robert Grant Avenue. While Robert Grant Avenue is along the east frontage of the site, there are no accesses to it and as such is not included as a boundary street.

A complete street design has been completed for the Cope Drive extension. Elements included in the design include a MUP on the north side of the roadway and a sidewalk on the south side of the roadway. The projected multi-modal level of service (MMLoS) for the boundary street is provided in Table 9, with detailed analyses provided in Appendix H.

Table 9: MMLOS – Future Cope Drive

Road Segment	Level of Service							
	Pedestrian (PLoS)		Bicycle (BLoS)		Transit (TLoS)		Truck (TkLoS)	
	PLoS	Target	BLoS	Target	TLoS	Target	TkLoS	Target
Cope Drive	A	A	B	A	D	No Target	B	No Target

Given the development is a school, the target levels of service for pedestrians and cyclists is high (PLoS 'A' and BLoS 'A'). There are no transit priority plans for the boundary street identified within the City's Affordable Network and as such there is no TLoS target. There is no truck level of service target for Cope Drive as it is not a designated truck route and as shown in Table 9, the target level of service for pedestrians is met. The BLoS is not met as there are no cycling facilities on the south side of the proposed Cope Road. However, there is a MUP proposed on the north side which should be sufficient for cyclists.

4.4. ACCESS INTERSECTION DESIGN

4.4.1. LOCATION AND DESIGN OF ACCESS

There are three proposed accesses to the site:

- West Access – This access is proposed as an all-movement "T" access. It is located approximately 225m from the Cope/Robert Grant intersection;
- Middle Access – This access is proposed as an all-movement four-legged intersection, with the north leg providing access to the future subdivision. It is located approximately 110m from the Cope/Robert Grant intersection; and,
    - A left-turn lane warrant was completed for the westbound left-turn using the 2029 total projected volumes and it was determined that the left-turn lane warrant was not met. It is provided in Appendix I.
- East Access – This access is proposed as an out-bound only "T" access. It is located approximately 75m from the Cope/Robert Grant intersection.

4.4.2. INTERSECTION CONTROL

Based on the roadway design and project vehicle volumes, the planned driveways would likely be proposed with STOP control on the minor approaches only.

An All-Way-Stop-Control (AWSC) warrant was completed using the 2029 total projected volumes for the Middle Access and an AWSC is only 71% warranted and as such, it is not recommended. The AWSC warrant is provided in Appendix I.

4.5. TRANSPORTATION DEMAND MANAGEMENT

The TDM checklist is provided as Appendix J. Some of the TDM measures that the proponent is providing/considering are as follows:

- Sidewalks provided om the north and east frontages;
- Marked crosswalks provided at designated areas on-site crossing internal laneways;
- Direct and attractive walking routes provided from building entrances to adjacent future transit stop on Cope Drive;
- On-site bicycle parking provided according to the City's By-Law requirements;
- Landscaping and benches provided along walking and cycling routes; and,
- Designated drop-off/pick-up areas provided on-site for carpool drivers/parents.

4.6. NEIGHBOURHOOD TRAFFIC MANAGEMENT

The following section discusses the development's impact on the surrounding neighbourhood and local and collector access routes. Table 10 summarizes each roadway's classification, the TIA Guideline's roadway threshold, and the approximate existing and projected traffic on main access routes to the site.

Table 10: Roadway Classification Analysis of Site Access Route

Roadway	Classification	Daily Threshold (veh/day)	Peak Hour Peak Direction Threshold (veh/h)	Peak Hour Peak Direction Volumes AM Peak (PM Peak)	
				Background 2029	Projected 2029
Cope Drive (adjacent to site)	Major Collector	5,000	600	250 (150)	335 (255)

As shown in Table 10, the addition of development related traffic does not increase the peak hour volume in the peak direction such that it would exceed the roadway threshold of a major collector.

4.7. TRANSIT

See Section 2.1.2 for a description of existing transit within the study area. At the time if initial build-out, there is expected to be minimal students using transit facilities as the majority of students are expected to take a school bus. As the school population increases and the Robert Grant Avenue Transitway is completed, it is anticipated that there will be a modal shift for students to use OC Transpo. However, the construction of this transitway is not expected to occur within the horizon years of this development.

4.8. REVIEW OF NETWORK CONCEPT

Exempt – See Section 2.3.

4.9. INTERSECTION DESIGN

4.9.1. BACKGROUND CONDITIONS

The following Table 11 provides a summary of the background traffic operations for all horizon years (2022, 2024, and 2029) at study area intersections based on the Synchro (V10) and SIDRA traffic analysis software and the background traffic volumes (Figure 19, Figure 20, and Figure 21). The subject signalized intersections were assessed in terms of the volume-to-capacity (v/c) ratio and the corresponding Level of Service (LoS) for the critical movement(s). The subject signalized intersections 'as a whole' were assessed based on weighted v/c ratio. The unsignalized intersections were assessed based on delay and the corresponding level of service. The Synchro and SIDRA model output of background conditions are provided within Appendix K.

Table 11: 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
2022 Horizon Year						
Fernbank/Robert Grant (S)	A(A)	0.57(0.60)	SBL(WBT)	14.5(15.4)	A(A)	0.50(0.56)
Abbott E/Robert Grant (R)	A(A)	8.9(9.0)	NBL(NBL)	6.0(6.0)	A(A)	-
Cope/Robert Grant (R)	B(B)	11.0(11.0)	EBL(EBL)	6.1(6.1)	A(A)	-
2024 Horizon Year						
Fernbank/Robert Grant (S)	A(B)	0.58(0.61)	SBL(WBT)	14.6(15.5)	A(A)	0.51(0.57)
Abbott E/Robert Grant (R)	A(A)	8.9(9.0)	NBL(NBL)	6.0(6.0)	A(A)	-
Cope/Robert Grant (R)	B(B)	11.0(11.0)	EBL(EBL)	6.1(6.1)	A(A)	-
2029 Horizon Year						
Fernbank/Robert Grant (S)	A(B)	0.58(0.62)	SBL(SBL)	15.6(16.3)	A(A)	0.54(0.59)
Abbott E/Robert Grant (R)	B(B)	10.0(10.2)	SBL(SBL)	6.1(6.3)	A(A)	-
Cope/Robert Grant (R)	B(B)	11.4(11.3)	WBL(WBL)	6.1(6.1)	A(A)	-
Note:	Analysis of signalized intersections assumes a PHF of 0.95 and a saturation flow rate of 1800 veh/h/lane. S – Signalized Intersection R – Roundabout Intersection					

As shown in Table 11, all study area intersections 'as a whole' are projected to operate at an acceptable LoS 'A' during the morning and afternoon peak hours for all horizon years. Regarding critical movements, the study area intersections are projected to operate at an acceptable LoS 'B' or better during morning and afternoon peak hours for all horizon years.

Multi-Modal Level of Service – Background Conditions

The MMLOS analysis for the signalized intersection identified in Section 2.2.1 is summarized in Table 20. The background detailed MMLoS analysis is provided as Appendix H. It should be noted that while the Fernbank/Robert Grant intersection is not within 300m of the proposed school, the MMLoS targets still reflect such as per the City's request.

Table 12: MMLOS – Signalized Fernbank/Robert Grant Intersection, Background Conditions

Intersection	Level of Service									
	Pedestrian (PLoS)		Bicycle (BLoS)		Transit (TLoS)		Truck (TkLoS)		Vehicle (LoS)	
	PLoS	Target	BLoS	Target	TLoS	TLoS	TkLoS	Target	LoS	Target
Fernbank/Robert Grant	E	A	A	C	C	No Target	E	No Target	A	E

The letters identified in red text in Table 12 do not meet the MMLoS Targets for their designated area (within 300m of a school). While there are plans for transit priority measures identified in the TMP along Robert Grant Avenue, there is currently no build-out date and, as such, there is no target TLoS. Fernbank Road and Robert Grant Avenue do not form part of the truck route and, as such, there is no TkLoS target for this intersection.

With regard to pedestrians, the low effective walk time for pedestrians and permissive turns across crosswalks result in a PLoS 'E'. As this intersection is comprised of two arterial roadways, it would be very difficult to raise the PLoS to an 'A' without significant changes to the existing signal timing plan.

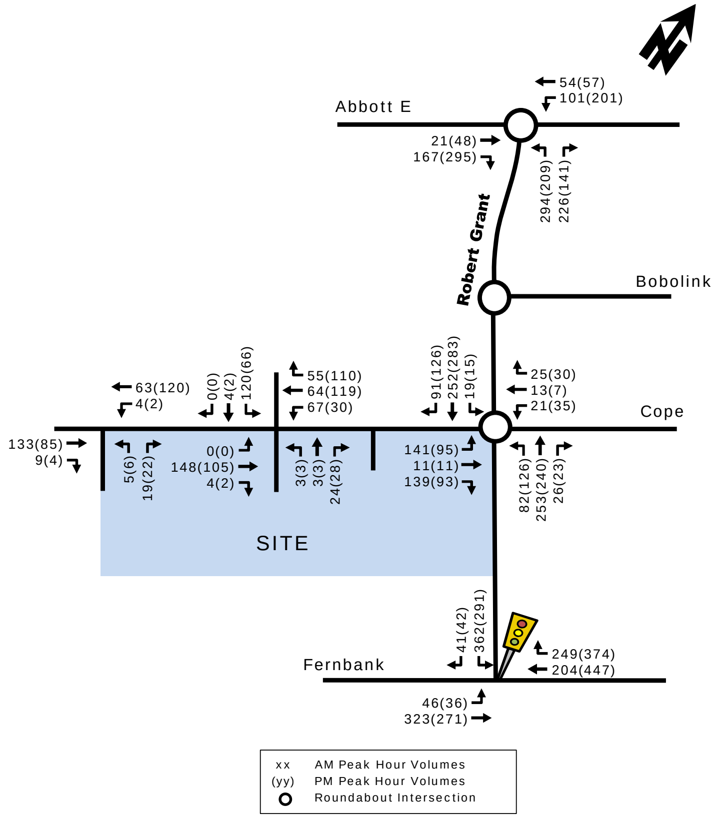
As there is no expected completion date for the Robert Grant Transitway, the existing geometry of Fernbank Road and Robert Grant Avenue was assumed to be the same for all horizon years. As such, the projected background MMLoS analysis will remain the same for all horizon years (2022, 2024, and 2029).

4.9.2. TOTAL PROJECTED CONDITIONS

2022 Horizon Year

The total projected traffic volumes for the 2022 horizon year were derived by superimposing the 2022 site-generated traffic volumes (Figure 9) onto the total 2022 background traffic volumes (Figure 19). The resulting total projected traffic volumes for the 2022 horizon year is illustrated in Figure 22.

Figure 22: Total Projected 2022 Traffic Volumes



The following Table 13 provides a summary of the total 2022 projected operations at the study area intersections based on the Synchro (V10) and SIDRA traffic analysis software. The Synchro and SIDRA model output of total 2022 projected conditions is provided within Appendix L.

Table 13: Total Projected 2022 Performance at Study Area Intersections

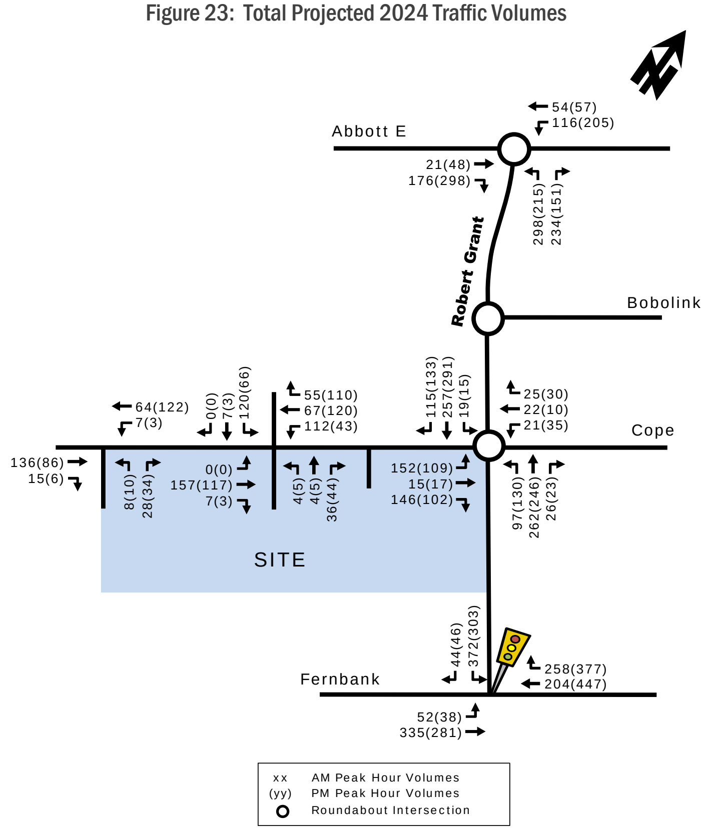
Intersection	Weekday AM Peak (PM Peak)					
	Critical Movement			Intersection 'as a whole'		
	LoS	max. v/c or avg. delay (s)	Movement	Delay (s)	LoS	v/c
Fernbank/Robert Grant (S)	A(B)	0.57(0.61)	SBL(WBT)	14.7(15.7)	A(A)	0.50(0.57)
Abbott E/Robert Grant (R)	A(A)	8.9(9.0)	NBL(NBL)	6.1(6.1)	A(A)	-
Cope/Robert Grant (R)	B(B)	11.3(11.2)	EBL(EBL)	6.4(6.4)	A(A)	-
West Access/Cope (U)	A(A)	9.3(9.1)	NBR(NBR)	1.1(1.1)	A(A)	-
Middle Access/Cope (U)	B(B)	14.4(12.5)	SBL(SBL)	5.3(3.0)	A(A)	-
Note:	Analysis of signalized intersections assumes a PHF of 0.95 and a saturation flow rate of 1800 veh/h/lane. S – Signalized Intersection R – Roundabout Intersection U – Unsignalized Intersection					

As shown in Table 13, study area intersections are projected to operate similar to 2022 background conditions with slight increases to v/c ratios and delay. Study area intersections 'as a whole' are projected to operate at an acceptable LoS 'A' during the morning and afternoon peak hours for all horizon years. Regarding critical movements, the study area intersections are projected to operate at an acceptable LoS 'B' or better during morning and afternoon peak hours for all horizon years.

2024 Horizon Year

The total projected traffic volumes for the 2024 horizon year were derived by superimposing the 2024 site-generated traffic volumes (Figure 10) onto the total 2024 background traffic volumes (Figure 20). The resulting total projected traffic volumes for the 2024 horizon year is illustrated in Figure 23.

Figure 23: Total Projected 2024 Traffic Volumes



The following Table 14 provides a summary of the total 2024 projected operations at the study area intersections based on the Synchro (V10) and SIDRA traffic analysis software. The Synchro and SIDRA model output of total projected conditions is provided within Appendix L.

Table 14: Total Projected 2024 Performance at Study Area Intersections

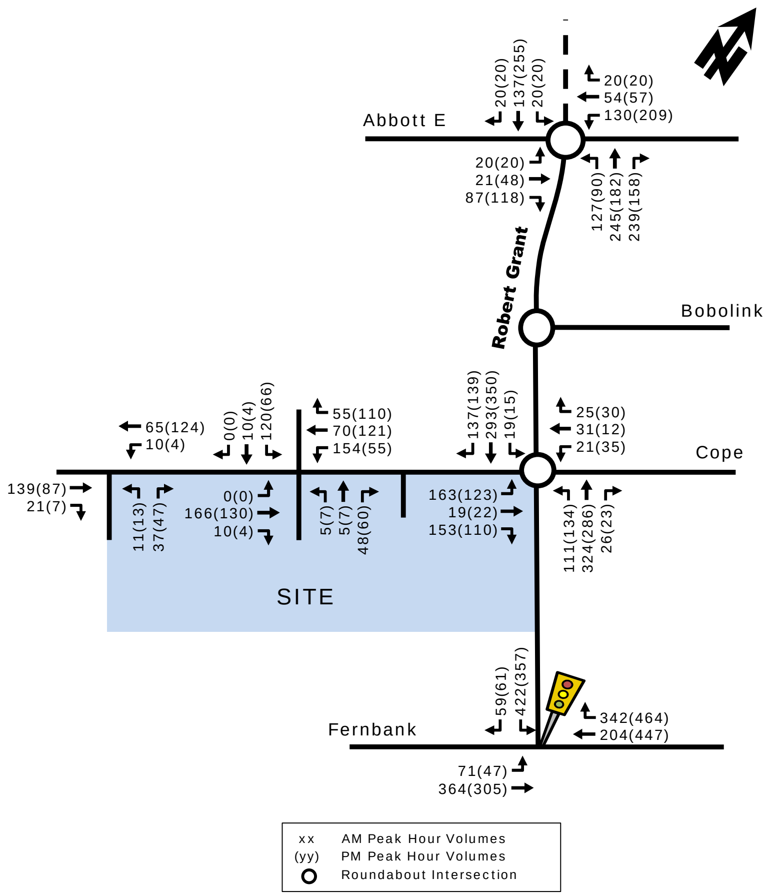
Intersection	Weekday AM Peak (PM Peak)					
	Critical Movement			Intersection 'as a whole'		
	LoS	max. v/c or avg. delay (s)	Movement	Delay (s)	LoS	v/c
Fernbank/Robert Grant (S)	A(B)	0.58(0.61)	SBL(WBT)	15.1(15.9)	A(A)	0.51(0.58)
Abbott E/Robert Grant (R)	A(A)	8.9(9.0)	NBL(NBL)	6.2(6.1)	A(A)	-
Cope/Robert Grant (R)	B(B)	11.5(11.4)	EBL(EBL)	6.6(6.6)	A(A)	-
West Access/Cope (U)	A(A)	9.4(9.2)	NBR(NBR)	1.5(1.6)	A(A)	-
Middle Access/Cope (U)	C(B)	18(13.5)	SBL(SBL)	6.3(3.5)	A(A)	-
East Access/Cope (U)	A(A)	0(0)	-	0(0)	A(A)	-
Note:	Analysis of signalized intersections assumes a PHF of 0.95 and a saturation flow rate of 1800 veh/h/lane. S – Signalized Intersection R – Roundabout Intersection U – Unsignalized Intersection					

As shown in Table 14, study area intersections are projected to operate similar to 2024 background conditions with slight increases to v/c ratios and delay. Study area intersections ‘as a whole’ are projected to operate at an acceptable LoS ‘A’ during the morning and afternoon peak hours for all horizon years. Regarding critical movements, the study area intersections are projected to operate at an acceptable LoS ‘B’ or better during morning and afternoon peak hours for all horizon years.

2029 Horizon Year

The total projected traffic volumes for the 2029 horizon year were derived by superimposing the 2029 site-generated traffic volumes (Figure 11) onto the total 2029 background traffic volumes (Figure 21). The resulting total 2024 projected traffic volumes for the 2029 horizon year is illustrated in Figure 24.

Figure 24: Total Projected 2029 Traffic Volumes



The following Table 15 provides a summary of the total 2029 projected operations at the study area intersections based on the Synchro (V10) and SIDRA traffic analysis software. The Synchro and SIDRA model output of total2029 projected conditions is provided within Appendix L

Table 15: Total Projected 2029 Performance at Study Area Intersections

Intersection	Weekday AM Peak (PM Peak)					
	Critical Movement			Intersection 'as a whole'		
	LoS	max. v/c or avg. delay (s)	Movement	Delay (s)	LoS	v/c
Fernbank/Robert Grant (S)	A(B)	0.60(0.64)	SBL(SBL)	16.7(17.0)	A(B)	0.57(0.61)
Abbott E/Robert Grant (R)	B(B)	10.4(11.0)	SBL(SBL)	6.0(6.5)	A(A)	-
Cope/Robert Grant (R)	B(B)	12.3(11.8)	WBL(WBL)	6.7(6.7)	A(A)	-
West Access/Cope (U)	A(A)	9.5(9.3)	NBR(NBR)	1.9(2.1)	A(A)	-
Middle Access/Cope (U)	C(B)	23.4(14.7)	SBL(SBL)	7.6(3.9)	A(A)	-
East Access/Cope (U)	A(A)	0(0)	-	0(0)	A(A)	-
Note:	Analysis of signalized intersections assumes a PHF of 0.95 and a saturation flow rate of 1800 veh/h/lane. S – Signalized Intersection R – Roundabout Intersection U – Unsignalized Intersection					

As shown in Table 14, study area intersections are projected to operate similar to 2029 background conditions with slight increases to v/c ratios and delay. Study area intersections 'as a whole' are projected to operate at an acceptable LoS 'B' or better during the morning and afternoon peak hours for all horizon years. Regarding critical movements, the study area intersections are projected to operate at an acceptable LoS 'B' or better during morning and afternoon peak hours for all horizon years.

Multi-Modal Level of Service – Projected Conditions

As there is no expected completion date for the Robert Grant Transitway, the existing geometry of Fernbank Road and Robert Grant Avenue was assumed to be the same for all horizon years. As such, the projected background MMLoS analysis will remain constant for all horizon years (2022, 2024, and 2029).

5. FINDINGS, CONCLUSIONS AND RECOMMENDATIONS

Based on the results summarized herein, the following transportation related conclusions are offered for each travel mode:

Proposed Site

- OCDSB is proposing a new high school accommodating grades 7-12 at 700 Cope Drive with the initial date of occupancy in 2022. The school will initially be opened to grades 7-10 with upper grades added each year;
- A surface parking lot is provided a total of 123 parking spaces are proposed. Additionally, a total of 180 bicycle parking spaces are proposed;
- The proposed development is projected to generate 'new' two-way vehicle volumes of approximately 145 veh/h and 102 veh/h during the weekday morning and afternoon peak hours, respectively, in the 2022 build-out year. This will increase to approximately 230 and 155 veh/h by 2024 and approximately 312 and 206 veh/h by 2029; and,
- Vehicle access to the development is proposed via three new driveway connections to Cope Drive: two all-movement accesses and one outbound-only access.

Background and Projected Conditions

- The study area intersections are projected to operate 'as a whole' with a LoS 'B' or better during peak hours for the background conditions for all horizon years. The total projected conditions are expected to continue operating similar to background conditions for all horizon years;
- The boundary street segment MMLoS and intersection MMLoS targets are met with the exception of the PLoS at the Fernbank/Robert Grant intersection;
    - The pedestrian level of service 'A' is not achieved due to low effective walk time for pedestrians crossing on the east and west legs at the intersection.

Site Plan

- Cycling facilities are provided on Robert Grant Avenue in the form of cycle tracks and on Cope Drive in the form of a MUP on the north side of the roadway;
- Pedestrian facilities include pathways connecting the building entrances/exits to the public sidewalks along Cope Drive and Robert Grant Avenue; and,
- The number of vehicle and bicycle parking spaces meets the City's minimum By-Law requirement for residents.

Based on the foregoing, the proposed development fits well into the context of the surrounding area, and its location and design serve to promote use of walking, cycling, and transit modes, thus supporting City of Ottawa policies, goals and objectives with respect to redevelopment, intensification and modal share. Therefore, approval from a transportation perspective of the proposed high school development is recommended.

Prepared By:	Reviewed by:
	LICENSED PROFESSIONAL ENGINEER A. SHIH 100163132 2019-12-04 PROVINCE OF ONTARIO
Rani Nahas, E.I.T. Transportation Analyst	Austin Shih, M.A.Sc., P.Eng. Senior Transportation Engineer

Appendix A

Screening Form and City Comments/Responses

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

City of Ottawa 2017 TIA Guidelines

TIA Screening Form

Date	6/10/2019
Project	OCDSB Stittsville TIA
Project Number	908489-50054

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	700 Cope Drive
Description of location	Located in the southwest quadrant of the Cope/Robert Grant roundabout intersection (vacant lot currently). Cope Drive west of Robert Grant is not built as of yet.
Land Use	Instituional (High School, grades 7-12)
Development Size	Approximately 1,300 students
Number of Accesses and Locations	Two new full-movement driveways proposed to Cope Drive
Development Phasing	Two phases (Grade 7-9 only opening year)
Buildout Year	Inital occupancy by 2021; full build-out 2024
Sketch Plan / Site Plan	See attached

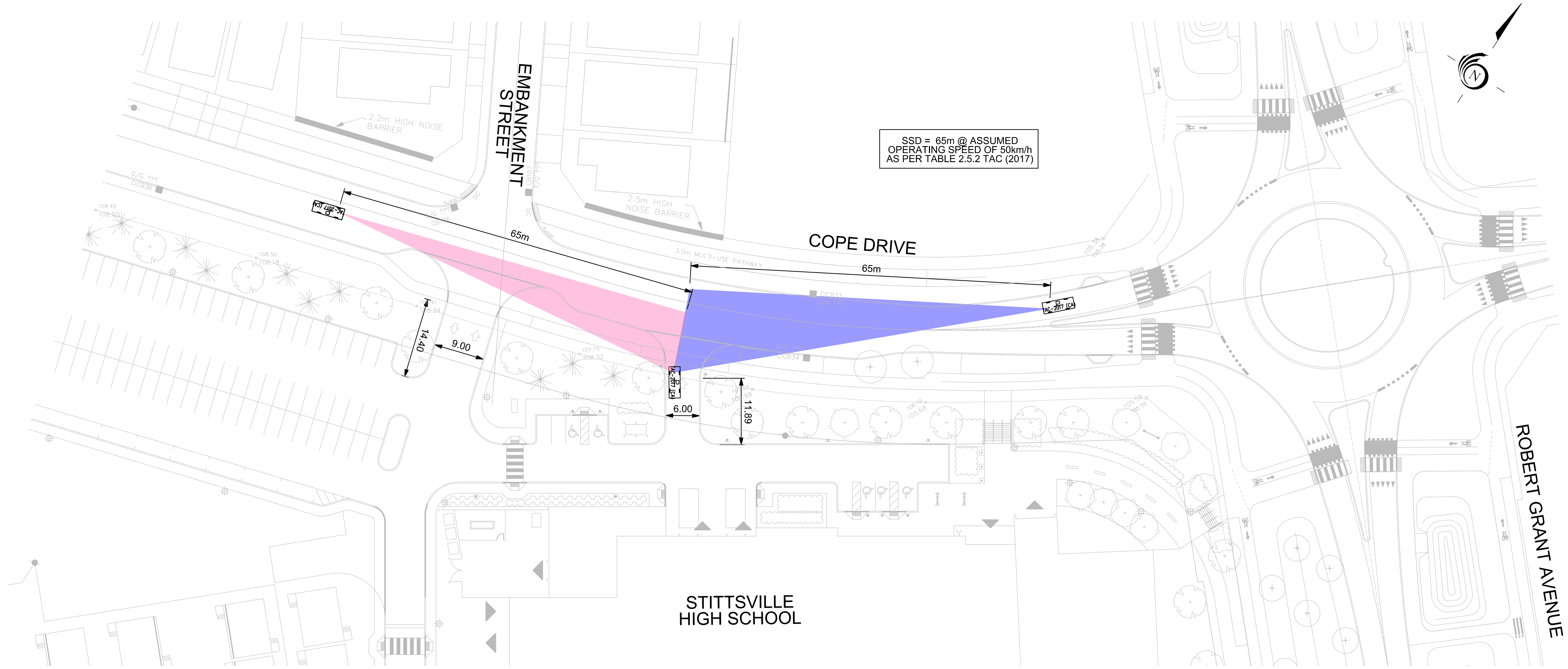
Module 1.2 - Trip Generation Trigger		
Land Use Type	Institutional (High School)	
Development Size	1,300	students
Trip Generation Trigger Met?	Yes	

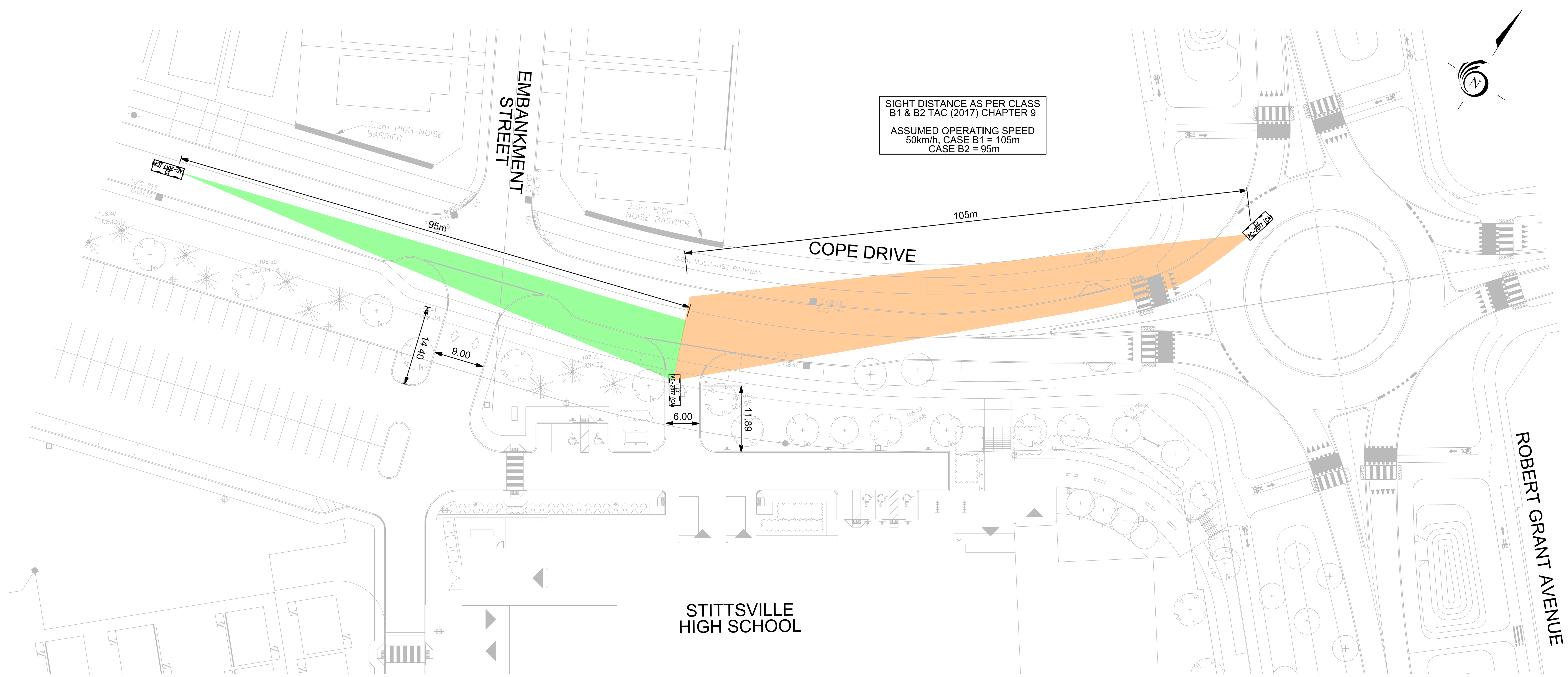
Module 1.3 - Location Triggers		
Development Proposes a new driveway to a boundary street that is designated as part of the City's Transit Priority, Rapid Transit, or Spine Bicycle Networks (See Sheet 3)	Yes	Cope Drive is designated as a Spine Route. No access to Robert Grant.
Development is in a Design Priority Area (DPA) or Transit-oriented Development (TOD) zone. (See Sheet 3)	No	
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	

TRANSPORTATION COMMENTS (October 11, 2019)	PARSONS RESPONSE
Transportation Engineering	
Please revise BLOS and PLOS using correct operating speeds.	Operating speeds have been revised and BLoS and PLoS have been updated accordingly.
Please revise BLOS and PLOS targets for Robert Grant Avenue / Fernbank Road given the development is a school.	While the Robert Grant/Fernbank intersection is not within 300m of the proposed school, the MMLoS targets have been updated to reflect that.
Provide access design details such as access width, clear throat length, access grade, sight distances, etc.	Please see attached drawings in Appendix A.
Provide turning template movements for the City Servicing vehicles.	Please see attached drawings in Appendix A.
The pavement marking shown on the Site Plan at Robert Grant Avenue / Fernbank Road does not seem to match existing.	The roadway along the south frontage has been updated to reflect the future name. The Robert Grant/Fernbank intersection is not shown on the site plan.
The access must follow City of Ottawa standard detail SC 7.1 for an unsignalized intersection.	This has been completed.
Traffic Signal Operations	
No comments.	Noted.
Traffic Signal Design	
No comments.	Noted.
Street Lighting	
No comments with initial TIS for this circulation. Street Lighting reserves the right to make future comments based on subsequent submissions.	Noted.
Future considerations are as follows: a) If there are any proposed changes to the existing roadway geometry, the City of Ottawa Street Light Asset Management Group is required to provide a full street light design. Upon completion of proposed roadway geometry design changes, please submit digital Micro Station drawings with proposed roadway geometry changes to the Street Lighting Department, so that we may proceed with the detailed street light design and coordination with the Street Light maintenance provider and all necessary parties. Be advised that the applicant will be 100% responsible for all costs associated with any Street Light design as a result of the roadway geometry change. b) Alterations and/or repairs are required where the existing street light plant is directly, indirectly or adversely affected by the scope of work under this circulation, due to the proposed road reconstruction process. All street light plant alterations and/or repairs must be performed by the City of Ottawa's Street Light maintenance provider. c) Be advised that the applicant will be 100% responsible for all costs associated with any relocations/modifications to the existing street light plant.	Noted.
Transit Services	
No comments for this circulation of the Site Plan and TIA. Transportation Services reserves the right to make future comments based on subsequent submissions.	Noted.
Development Review - Transportation Engineering Services	
Remove DRAFT water mark.	DRAFT watermark removed.
TWSIs required at the two southern crossing on the bus loop, see attached.	These have been included.
An accessible route is required at the southern stair way on Robert Grant.	An accessible ramp has been included.
Clarify what the concrete pad on Cope is near side the RAB, see attached. If this is a bus stop Shelter will be required.	The concrete pad has been labeled.
Are the Lay-bys being constructed as per Geometric Road Design Drawings for the subdivision? If not provide details. The sidewalk is required to be up against the curb to provide a solid surface for the kids being dropped off.	A sidewalk has been included along the lay-by.

Where does the cycle facilities drop onto the road? See attached.	Eastbound cyclists currently can access the MUP network at the crosswalk on the west leg of the Cope/Robert Grant roundabout. Accessing the MUP in this fashion is not ideal as it will create a conflict area as cyclists and vehicles meet at the interface of the roundabout.
Ensure that the approved detailed design drawings and Geometric Road Design Drawings are used for Cope and RG.	Noted.





STITTSVILLE HIGH SCHOOL

700 COPE DRIVE

DEPARTURE AND STOPPING DISTANCE SIGHTLINES

Ottawa

Contract No. 477180 | Dwg. No. 001

Sheet 1 of 4

Asset No.

Asset Group

Director | Project Manager

PARSONS

Des.	Chk'd.
Dwn. MJP	Chk'd.
Utility Circ. No.	Index No.

Const. Inspector

Scale: HORIZONTAL 0m 5 10 20

NOTE: The location of utilities is approximate only, the exact location should be determined by consulting the municipal authorities and utility companies concerned. The contractor shall prove the location of utilities and shall be responsible for adequate protection from damage.

REVISIONS

No.	Description	By	Date (dd/mm/yy)

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477180-01-SIGHT.dgn 12/3/2019 12:07:10 PM

STITTSVILLE HIGH SCHOOL
700 COPE DRIVE

DEPARTURE AND STOPPING DISTANCE SIGHTLINES

Director	Project Manager

PARSONS

Ottawa

Contract No. 477180	Dwg. No. 002
Sheet 2 of 4	
Asset No.	
Asset Group	
Des.	Chk'd.
Dwn. MJP	Chk'd.
Utility Circ. No.	Index No.
Const. Inspector	
Scale: HORIZONTAL 0m 5 10 20	

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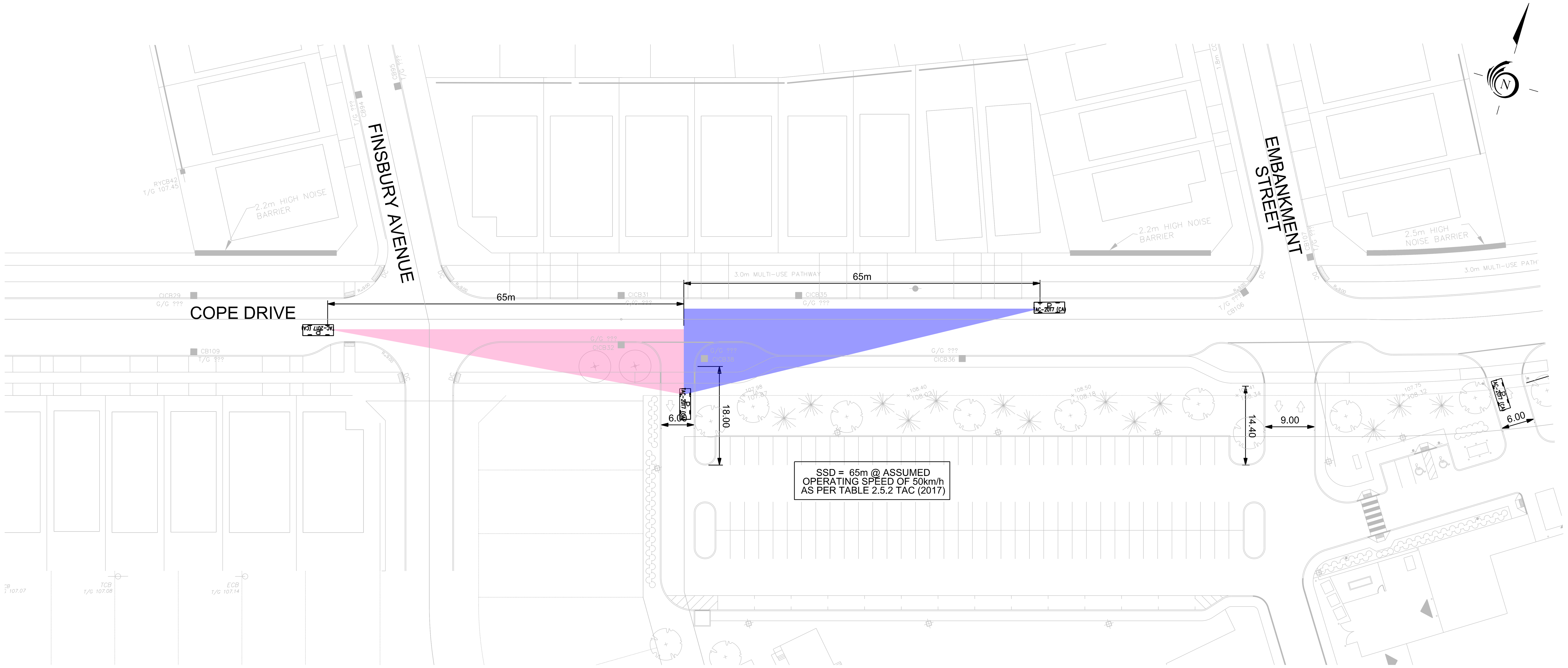
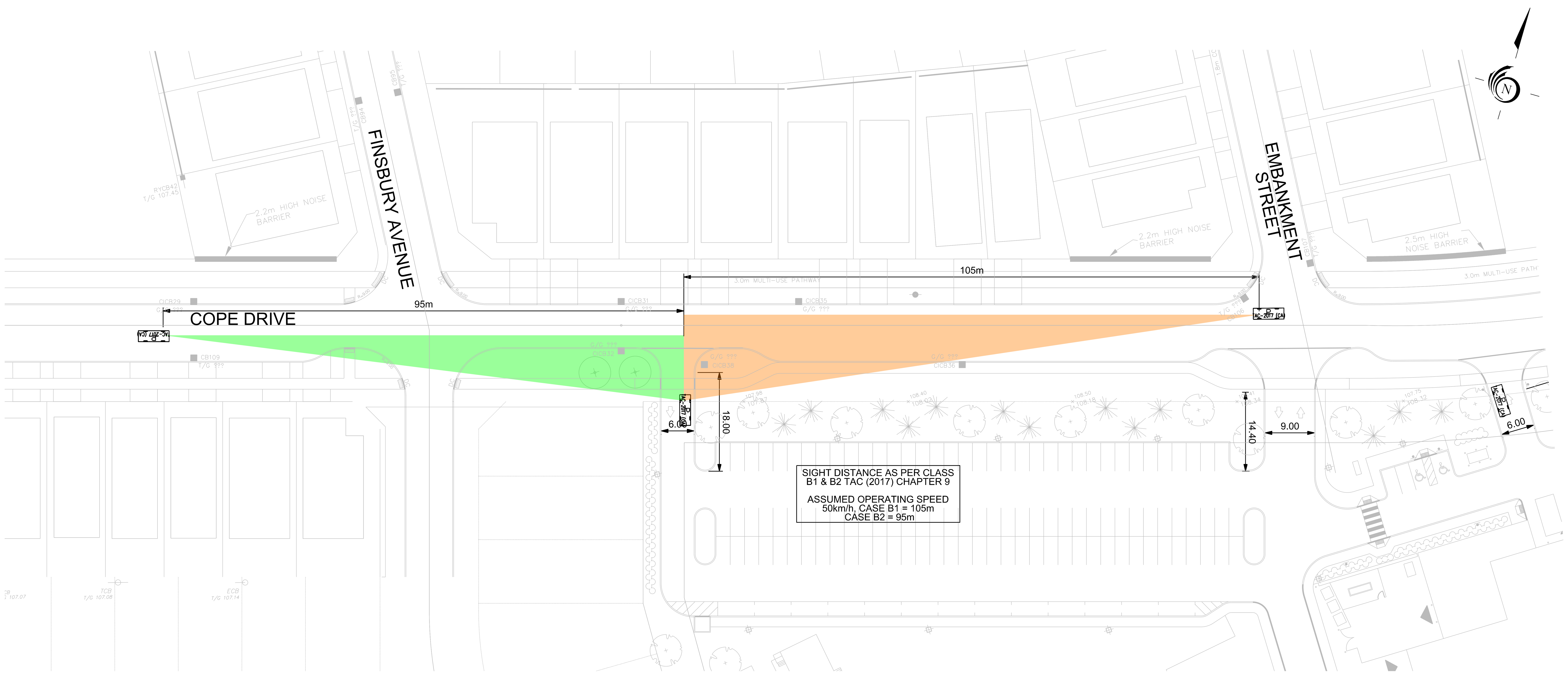
REVISIONS

No.	Description	By	Date (dd/mm/yy)





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STITTSVILLE HIGH SCHOOL
700 COPE DRIVE

TURNING MOVEMENTS I

Director | Project Manager

PARSONS

Contract No. 477180	Dwg. No. 003
Sheet 3 of 4	
Asset No. --------	
Asset Group ---	
Des. —	Chk'd. —
Dwn. MJP	Chk'd. —
Utility Circ. No. ——	Index No. ——
Const. Inspector	
Scale: HORIZONTAL 0m 5 10 20	

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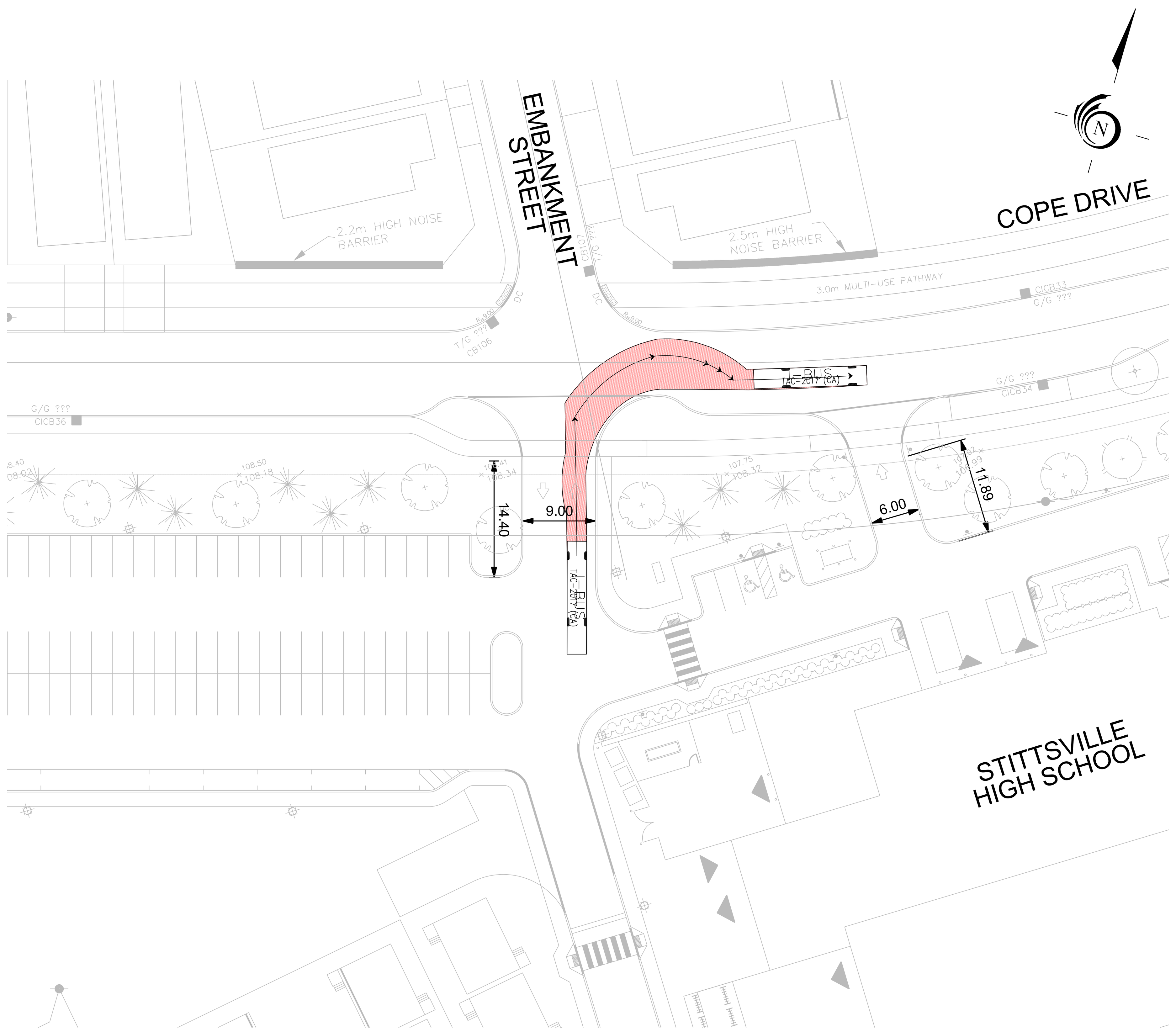
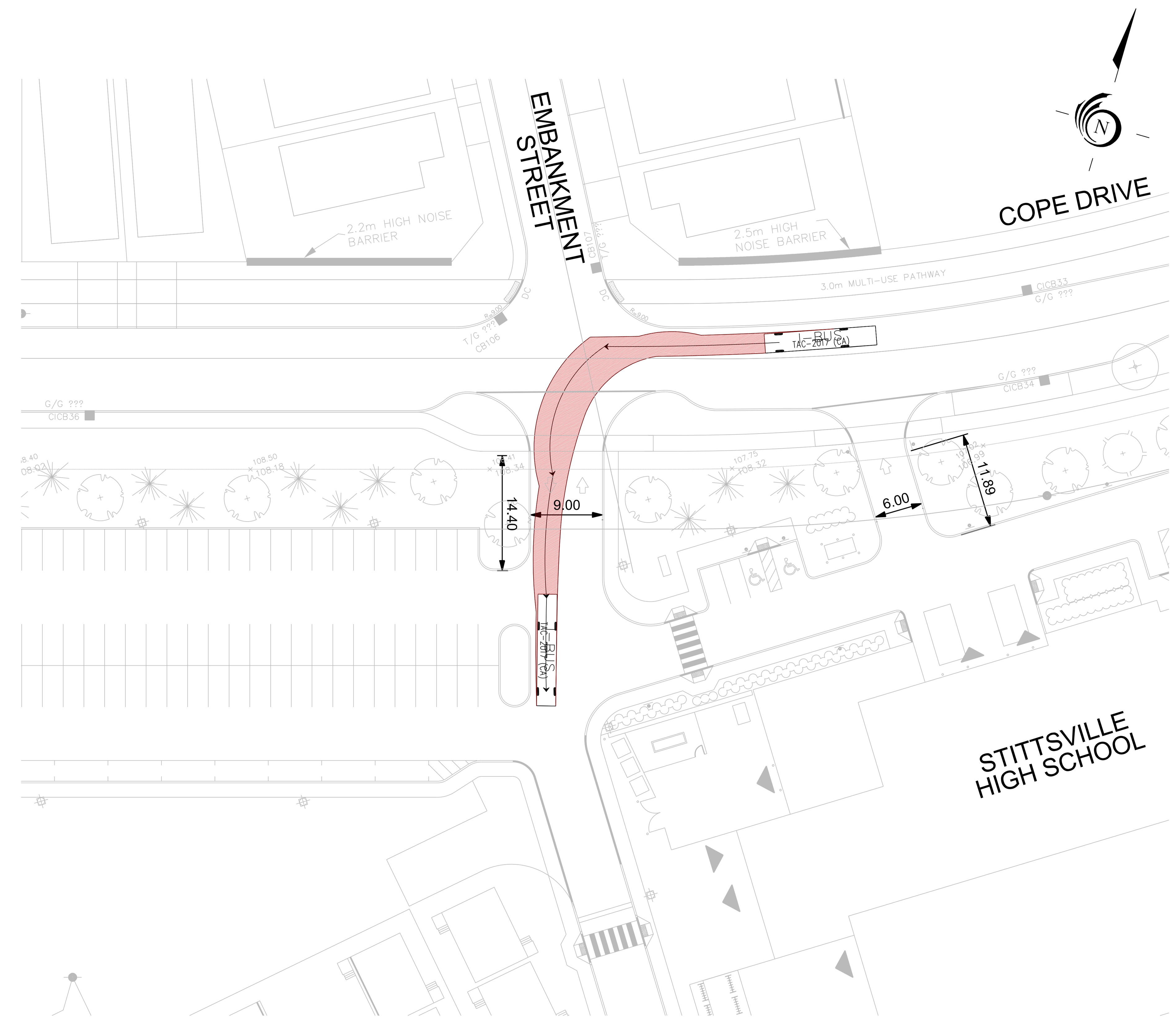
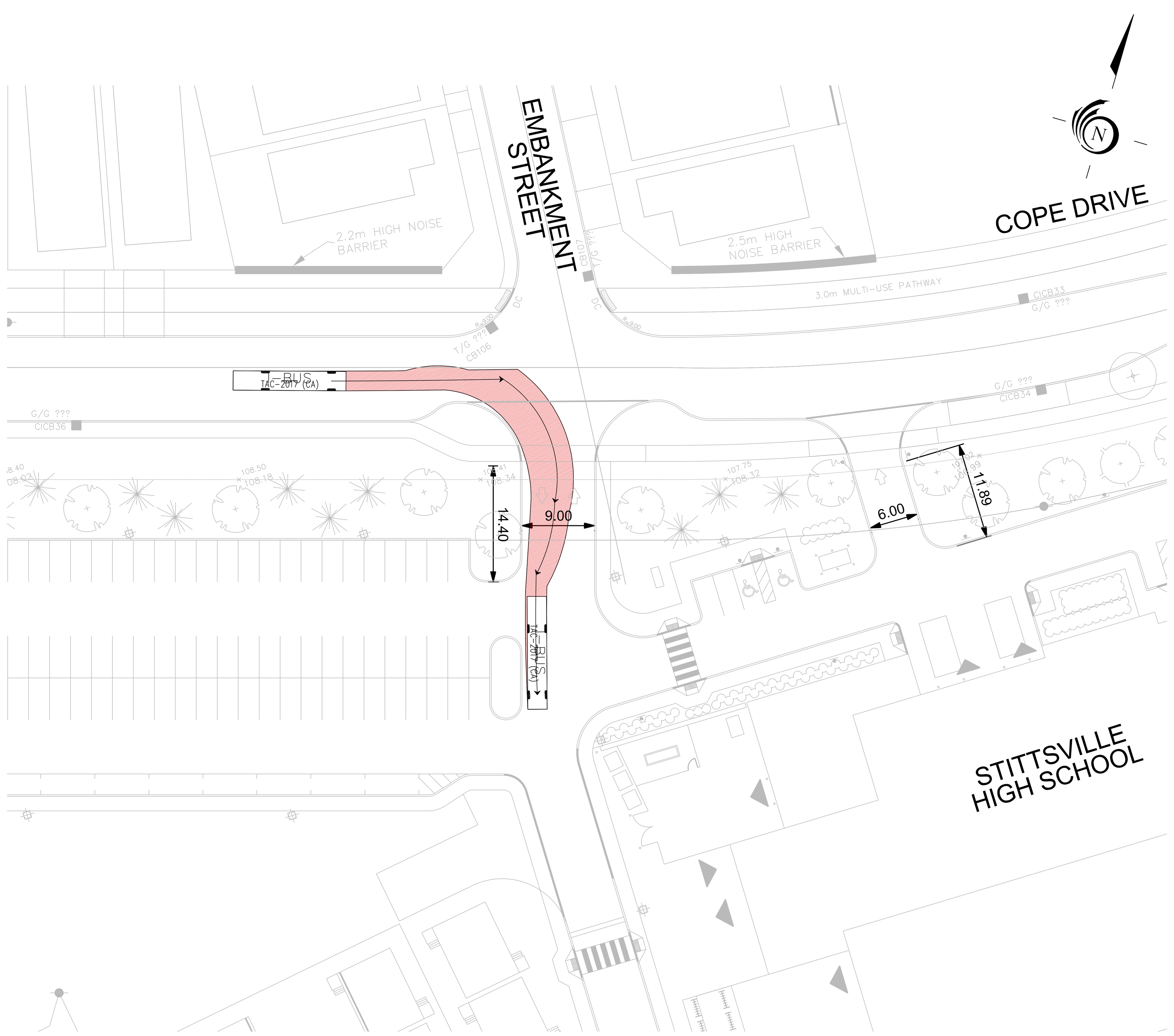
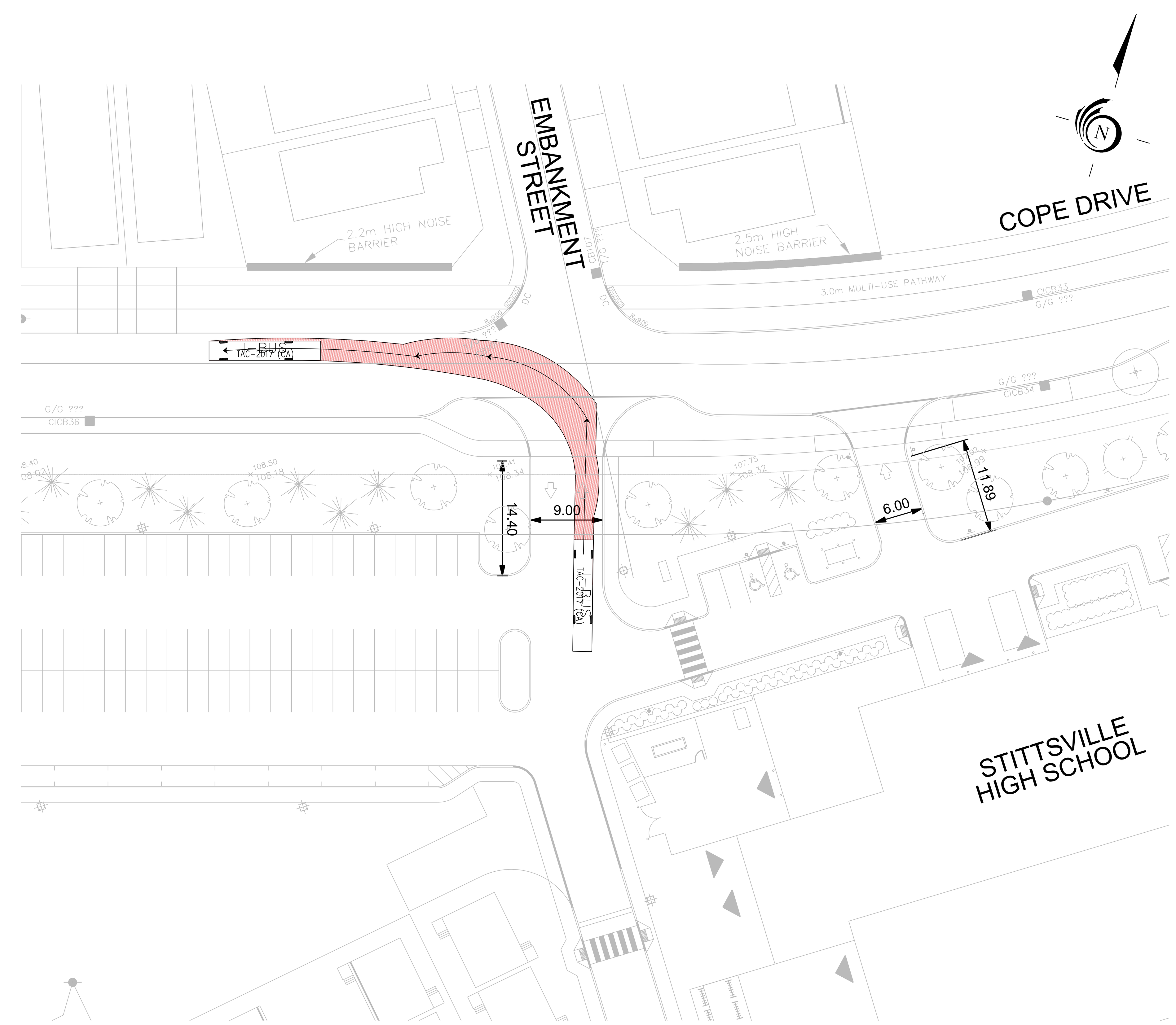
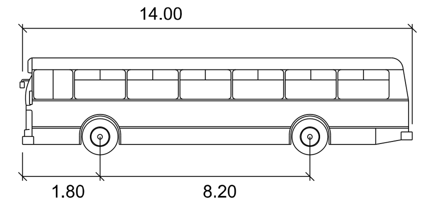
REVISIONS No.	Description	By	Date (dd/mm/yy)
—		——	——











I-BUS
meters

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Track	: 2.40
Lock to Lock Time	: 6.0
Steering Angle	: 39.3

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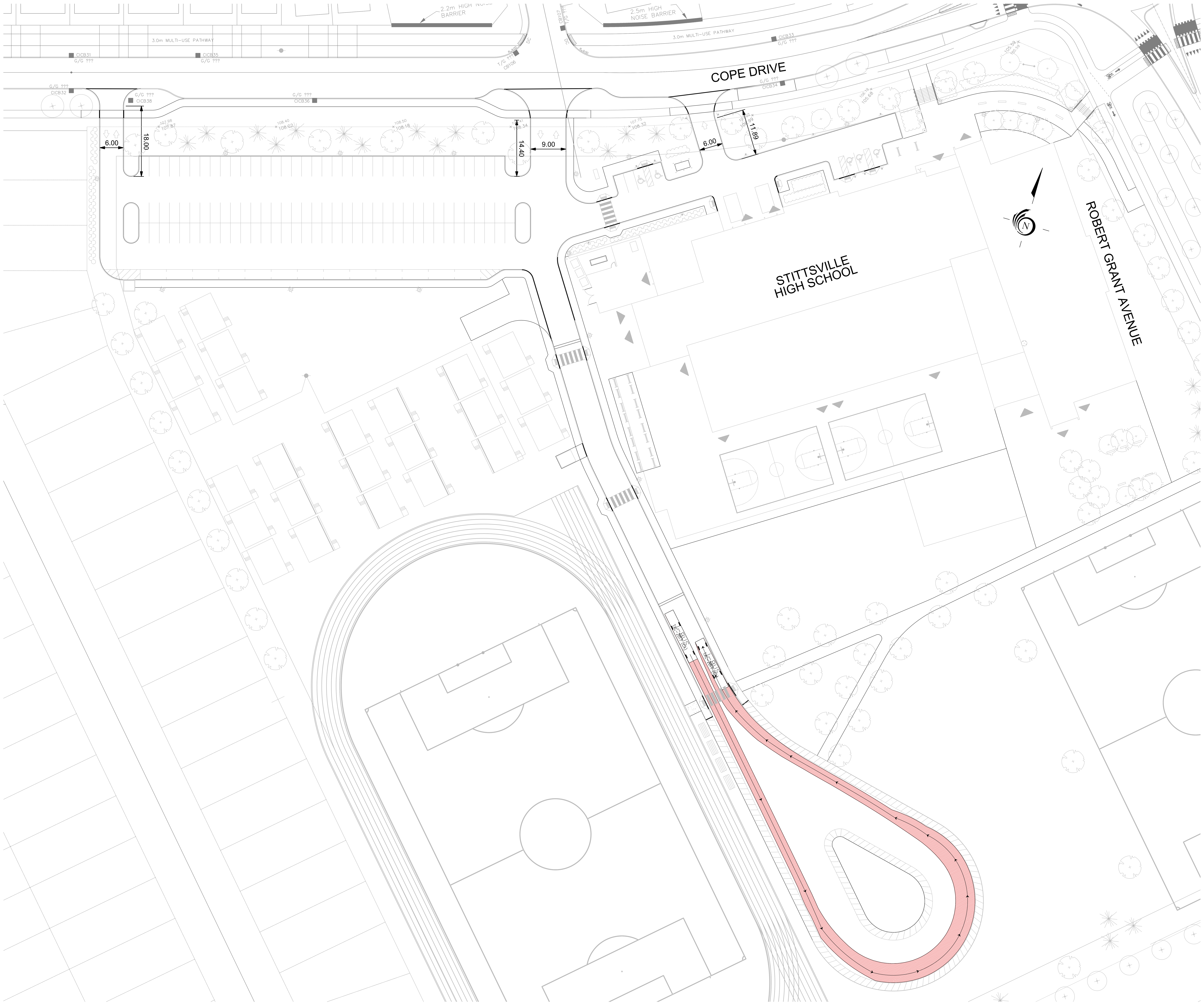

STITTSVILLE HIGH SCHOOL
700 COPE DRIVE

TURNING MOVEMENTS II

Contract No.	477180
Dwg. No.	004
Sheet	4 of 4
Asset No.	--------
Asset Group	---
Des.	--
Chk'd.	--
Dwn.	MJP
Chk'd.	--
Utility Circ. No.	
Index No.	
Const. Inspector	
Scale:	HORIZONTAL 0m 5 10 20

Director

Project Manager

PARSONS

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REVISIONS

No.	Description	By	Date (dd/mm/yy)
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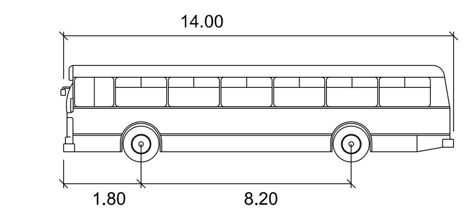

I-BUS
meters

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Track	: 2.40
Lock to Lock Time	: 6.0
Steering Angle	: 39.3

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Appendix B

Traffic Counts

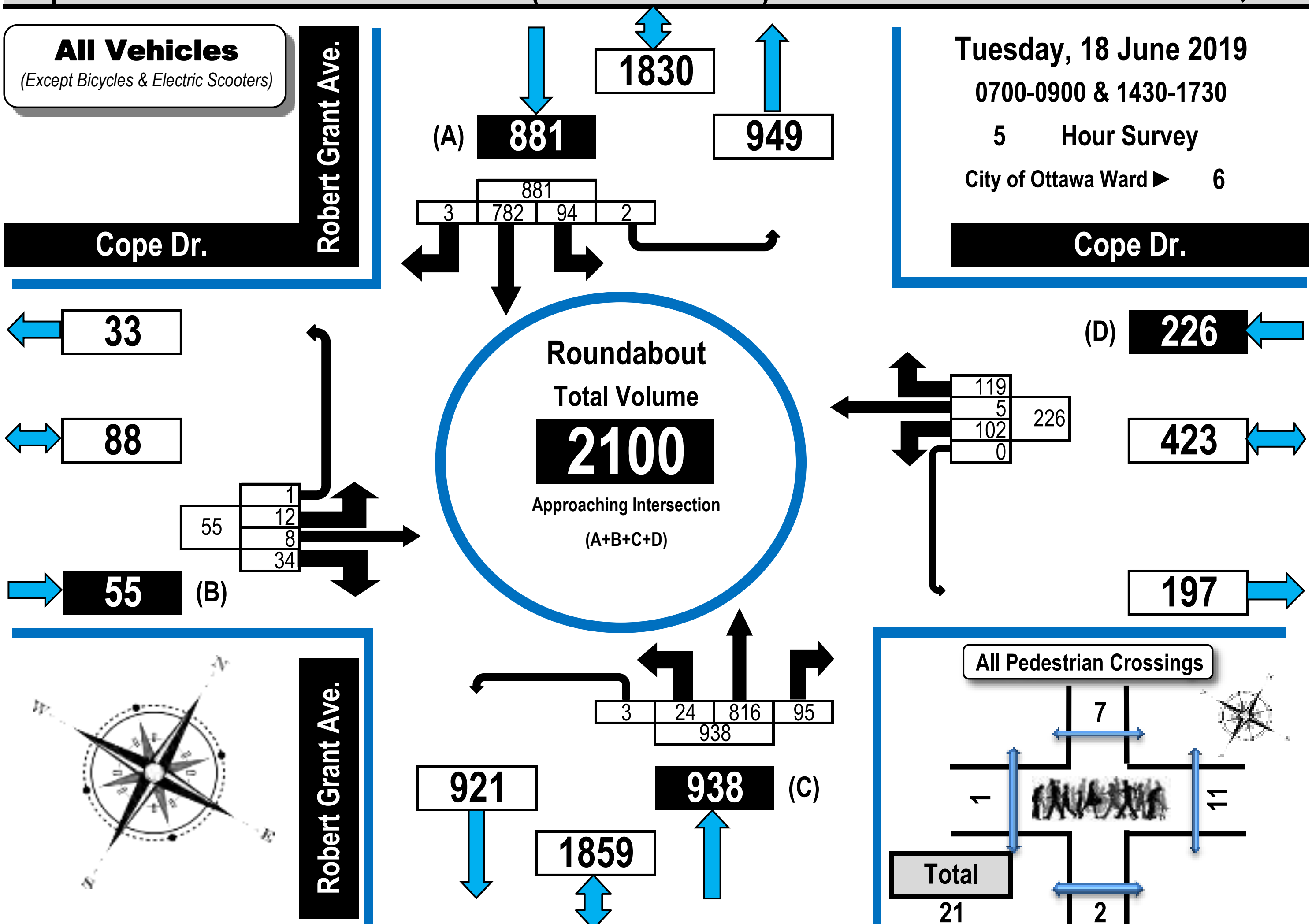
Turning Movement Count
Summary, AM and PM Peak Hour Flow Diagrams

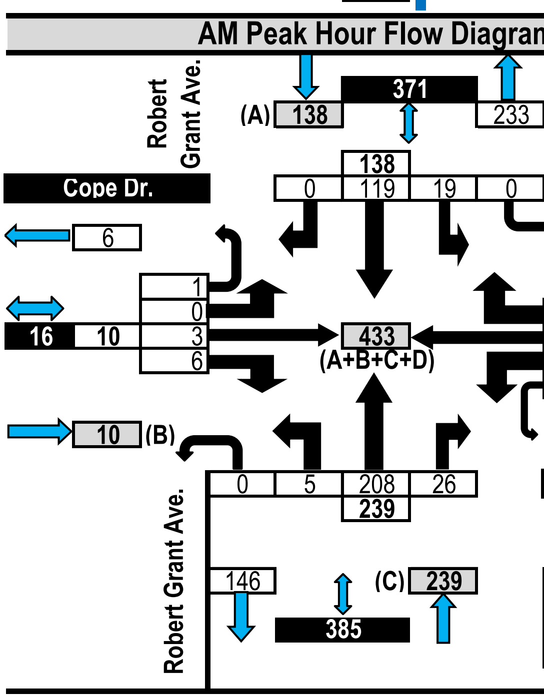
Automobiles, Taxis, Light Trucks, Vans, SUV's, Motorcycles, Heavy Trucks, Buses, and School Buses

Cope Drive & Robert Grant Avenue (ROUNDABOUT) — Stittsville, ON

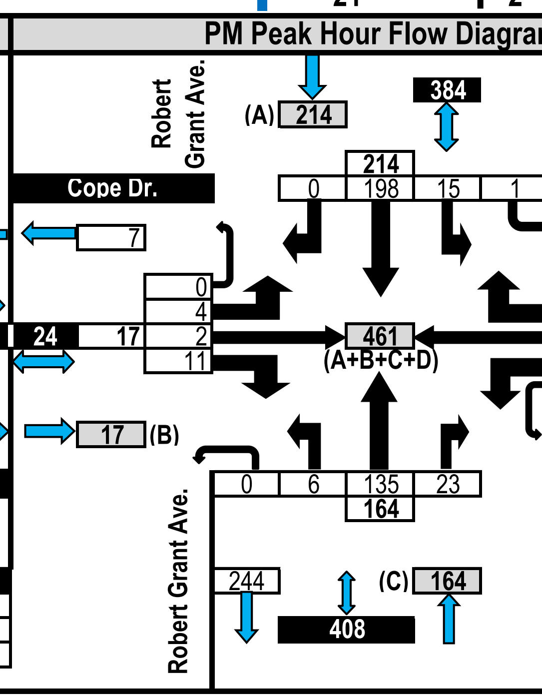
All Vehicles
(Except Bicycles & Electric Scooters)

Tuesday, 18 June 2019
0700-0900 & 1430-1730
5 Hour Survey
City of Ottawa Ward ▶ 6





Summary - AM Peak Hr.	
Peak Hr.	0715-0815
Volume	433
PHF	0.86



Summary - PM Peak Hr.	
Peak Hr.	1530-1630
Volume	461
PHF	0.85

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

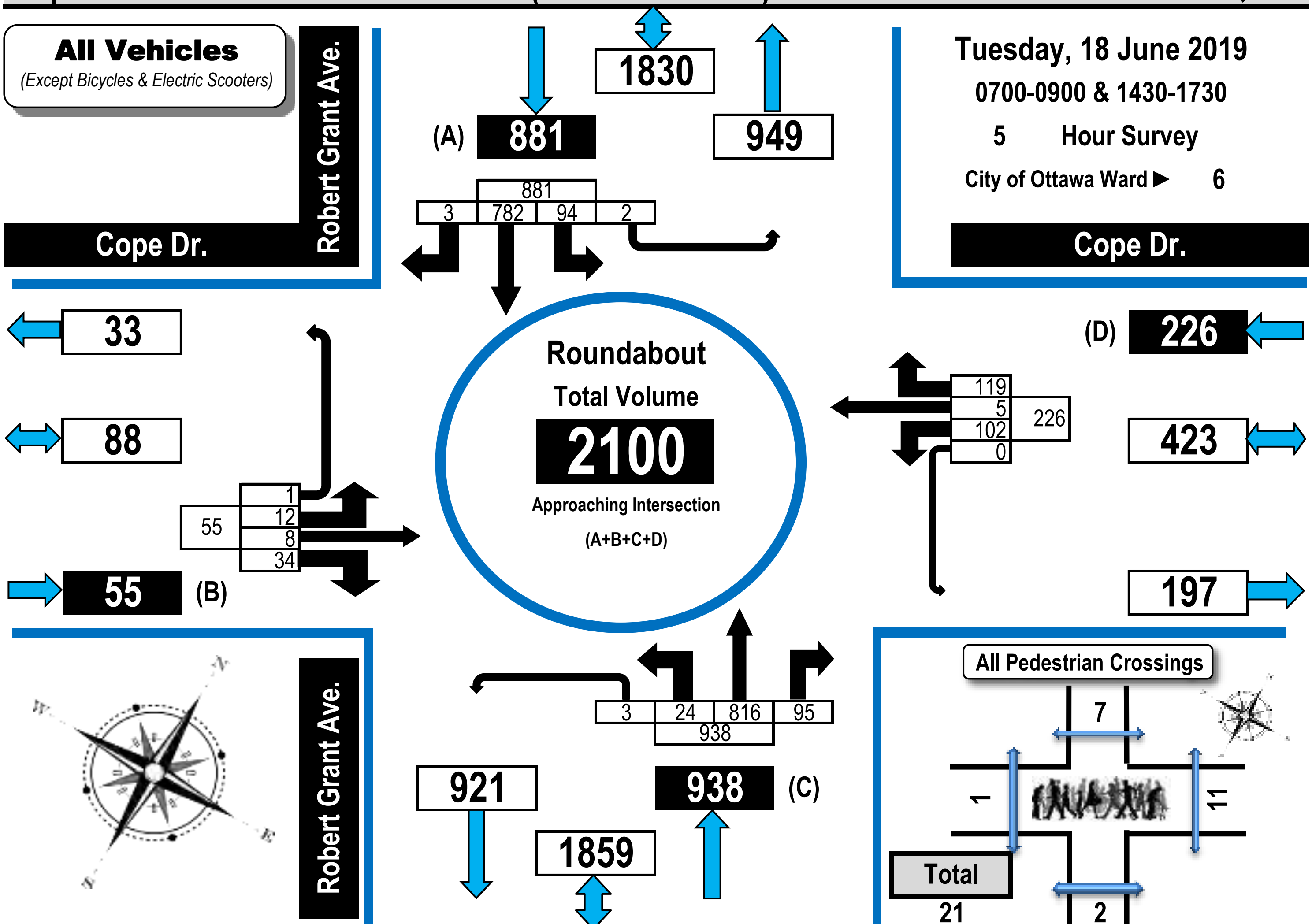
Cope Drive & Robert Grant Avenue (ROUNDABOUT) — Stittsville, ON

Tuesday, 18 June 2019

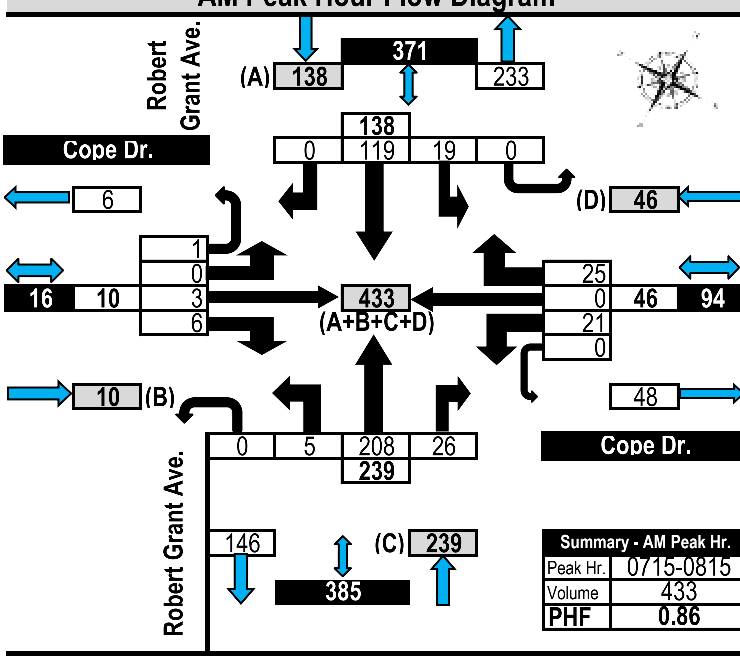
0700-0900 & 1430-1730

5 Hour Survey

City of Ottawa Ward ▶ 6

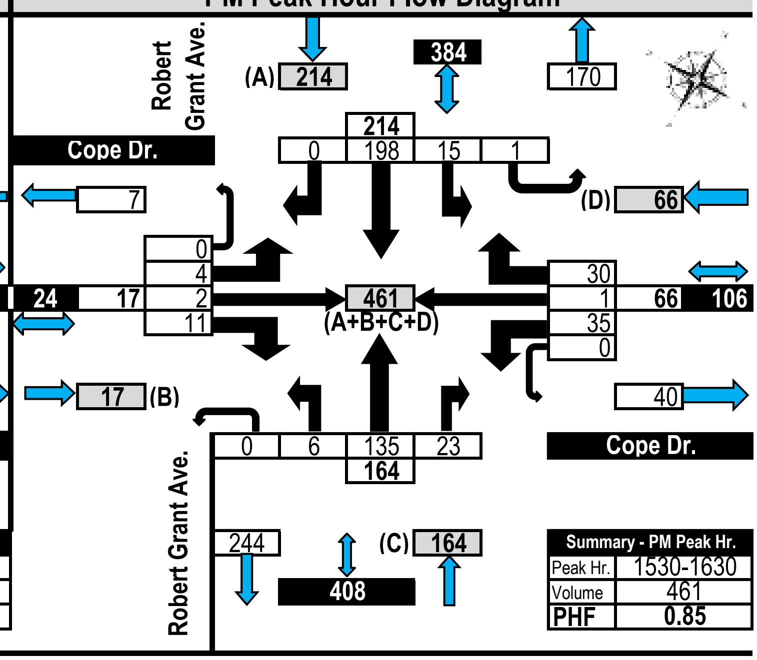


AM Peak Hour Flow Diagram



Summary - AM Peak Hr.	
Peak Hr.	0715-0815
Volume	433
PHF	0.86

PM Peak Hour Flow Diagram



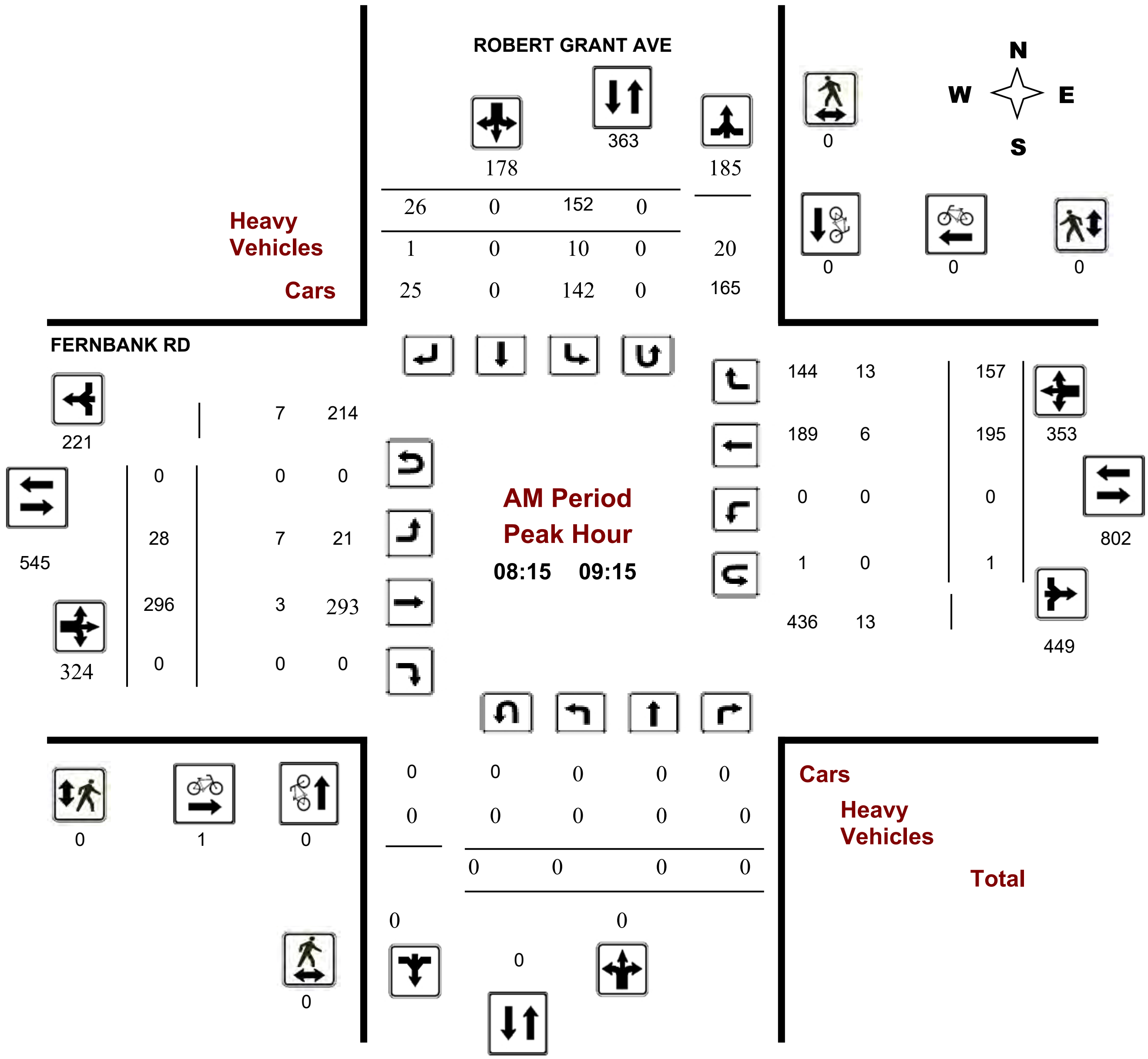
Summary - PM Peak Hr.	
Peak Hr.	1530-1630
Volume	461
PHF	0.85

Turning Movement Count - Peak Hour Diagram

FERNBANK RD @ ROBERT GRANT AVE

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

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



Comments

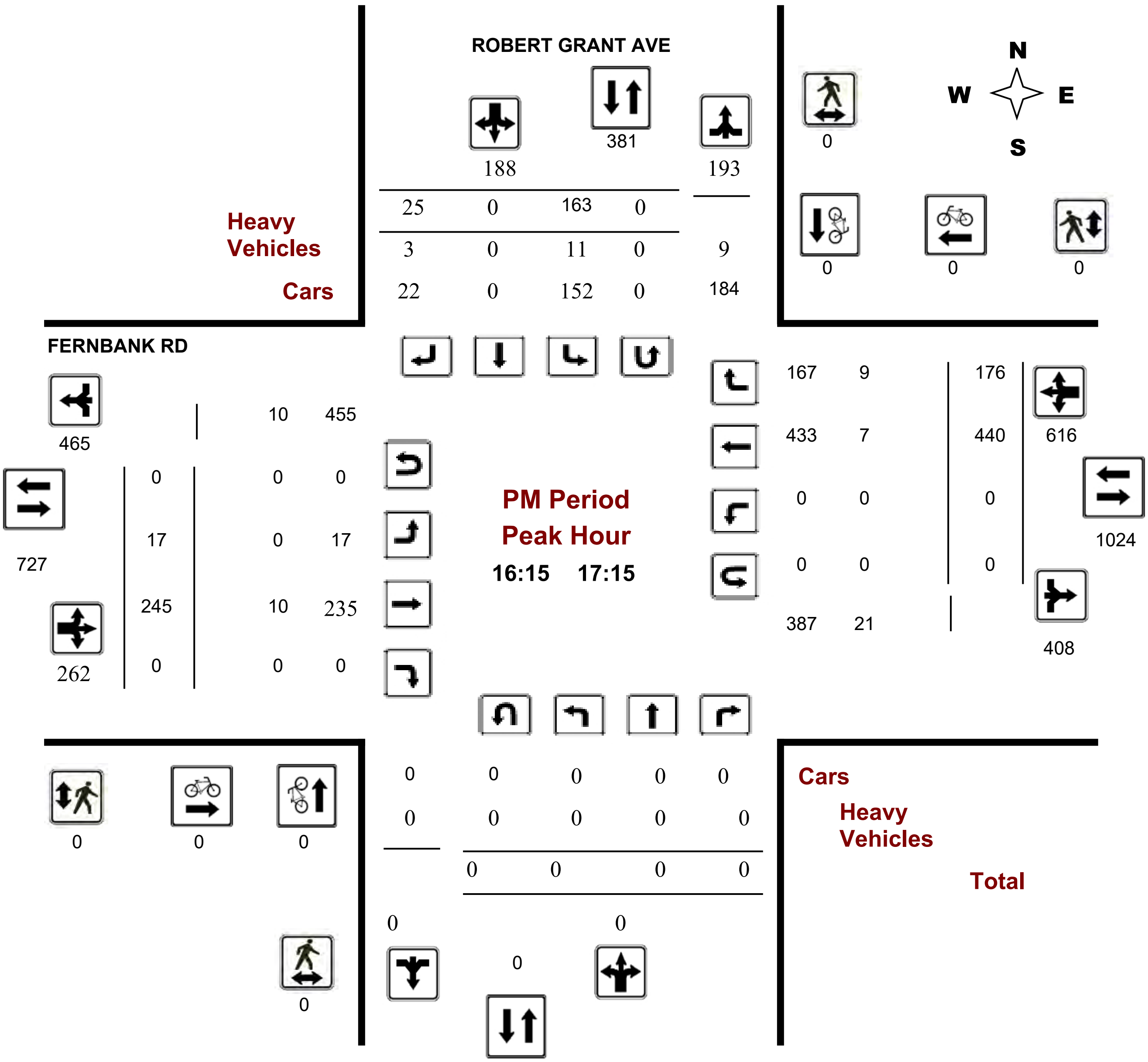
Transportation Services - Traffic Services

Turning Movement Count - Peak Hour Diagram

FERNBANK RD @ ROBERT GRANT AVE

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

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



Comments

Appendix C

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 D

OCDSB Preliminary Projected Enrollment

PRELIMINARY STITTSVILLE SS ENROLMENT PROJECTIONS

without market share increase

School Year	7	8	9	10	11	12	Total
2022-2023	242	255	180	195	0	0	**873**
2023-2024	254	242	260	191	201	0	**1148**
2024-2025	249	255	249	275	197	235	**1460**
2025-2026	252	250	256	263	284	230	**1535**
2026-2027	302	253	249	272	271	332	**1679**

INTERMEDIATE ENROLMENT by PROGRAM - GRADE 7 & 8

ENGLISH

School Year	7	8	SE	7-8
2022-2023	91	83	0	**174**
2023-2024	92	91	0	**183**
2024-2025	87	92	0	**179**
2025-2026	88	87	0	**175**
2026-2027	107	88	0	**195**

EFI

School Year	7	8	SE	7-8
2022-2023	136	147	0	**283**
2023-2024	148	136	0	**284**
2024-2025	148	148	0	**296**
2025-2026	147	148	0	**295**
2026-2027	176	147	0	**323**

MFI

School Year	7	8	SE	7-8
2022-2023	15	25	0	**40**
2023-2024	14	15	0	**29**
2024-2025	14	15	0	**29**
2025-2026	17	15	0	**32**
2026-2027	19	18	0	**37**

ALL Programs

School Year	7	8	SE	7-8
2022-2023	242	255	0	**497**
2023-2024	254	242	0	**496**
2024-2025	249	255	0	**504**
2025-2026	252	250	0	**502**
2026-2027	302	253	0	**555**

Source: Planning Department - 6 June 2019

Appendix E

Background Traffic Growth

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

- Lépine Fernbank (2019)
- Fernbank Crossing, Phase 3 (2015)
- Fernbank Crossing, Phase 4 (2017)
- Blackstone Subdivision, Phases 4-8 (2017) – 5505 Fernbank Rd

Lépine Fernbank

The proposed development will consist of 566 apartment dwelling units, housed within one mid-rise and two high-rise buildings. Appropriate trip generation rates were obtained from the 2009 TRANS Trip Generation Residential Trip Rates report, **Table 6.3**, which have been summarized in **Table 1**.

Table 1: 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 1**, the number of vehicles per hour were determined as shown in **Table 2** below.

Table 2: Apartment Units Vehicle Trip Generation

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

The total vehicle trips shown in **Table 2** 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 3** provides the resulting person trips/h values for each of the travel modes.

Table 3: Mode Shares for the Residential Buildings Development

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

As shown in **Table 3**, the resulting number of total person trips expected to be generated by the proposed development are approximately 370 and 465 in the morning and afternoon peak hours respectively. The projected 'new' vehicle trips are approximately 225 and 280 in the weekday morning and afternoon peak hours respectively.

To produce the most accurate analysis results, the estimated trips generated by the Fernbank Crossing and Blackstone Subdivision were recalculated and redistributed according to the current (2017) TIA requirements from the City. These 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 as the Lépine development. Additionally, the trip distribution applied to the adjacent developments was assumed to be the same as the percentages applied to the Lépine development.

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 4** below provides the expected number of auto trips generated by Phases 3 and 4.

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

Blackstone South, Phase 4-8

The Blackstone South development is expected to reach full build-out by 2025 and features a total of 376 Townhouses, 423 Single-Detached Houses, a Residential Condominium Block, a Public High School and a Public Elementary School. Since this future development will connect to Fernbank Rd, Terry Fox Dr and the future extensions of Cope Dr and Rouncey Rd, it was assumed the majority of this development traffic will use those access points. For the following analysis, it was assumed approximately 10% of Townhouse units (45 Units) and 10% of Single-Detached units (40 Units) would utilize Robert Grant Ave. **Table 5** below provides the expected number of auto trips generated by the Blackstone South Development.

Table 5: 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 2**, 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.

Appendix F

Trip Generation Analysis for Fernbank Crossing, Blackstone Subdivision, and Lépine Fernbank

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

- Lépine Fernbank (2019)
- Fernbank Crossing, Phase 3 (2015)
- Fernbank Crossing, Phase 4 (2017)
- Blackstone Subdivision, Phases 4-8 (2017) – 5505 Fernbank Rd

Lépine Fernbank

The proposed development will consist of 566 apartment dwelling units, housed within one mid-rise and two high-rise buildings. Appropriate trip generation rates were obtained from the 2009 TRANS Trip Generation Residential Trip Rates report, **Table 6.3**, which have been summarized in **Table 1**.

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Appendix G

Trip Generation Analysis for CRT Lands

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).

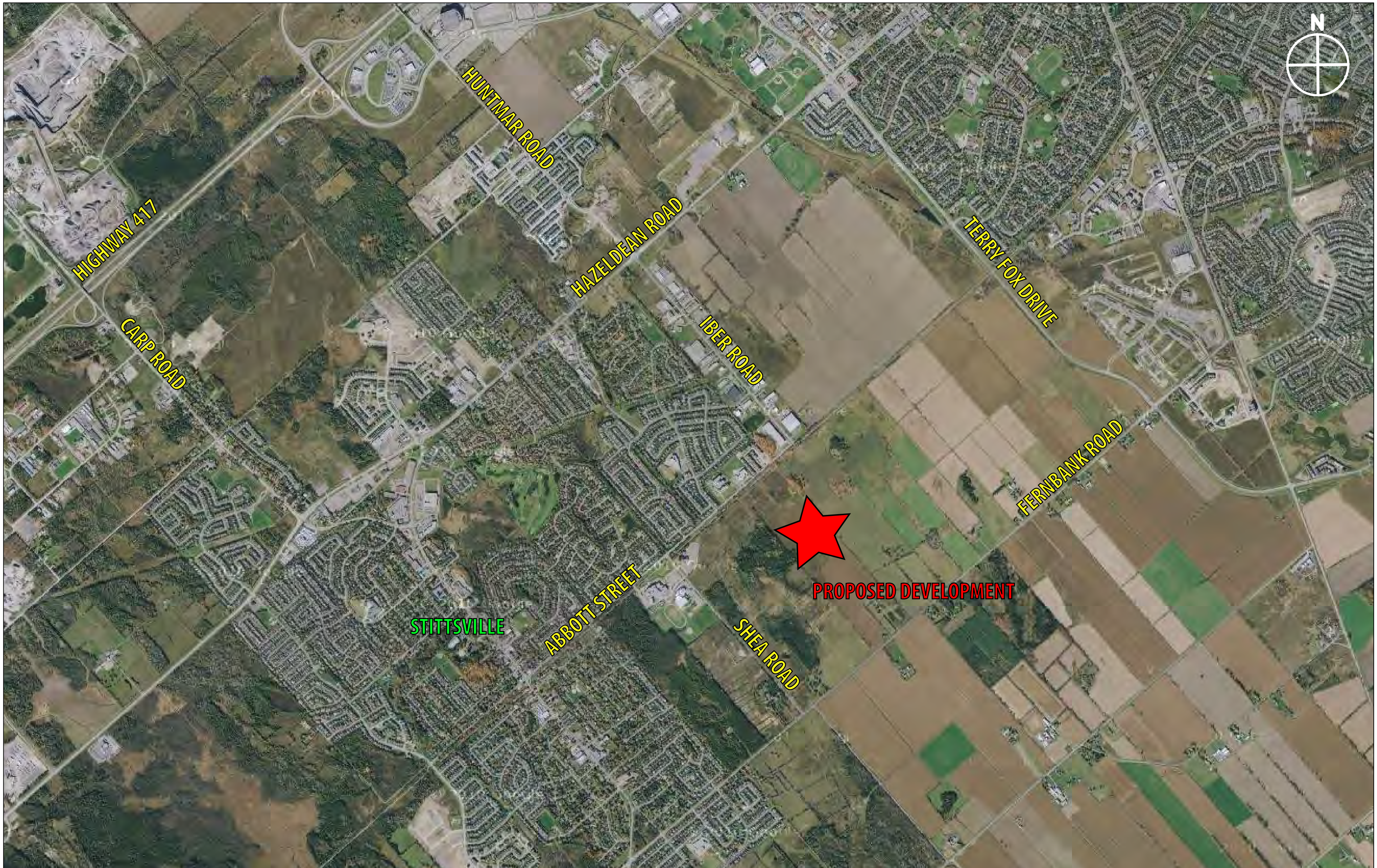
REPORT CONTEXT

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.



IBI GROUP

Claridge Homes - Fernbank Subdivision
Transportation Impact Study

EXHIBIT 1
Site Location

PROJECT No. 27970
DATE: JANUARY 2011
SCALE:
-100m 0 500m

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.

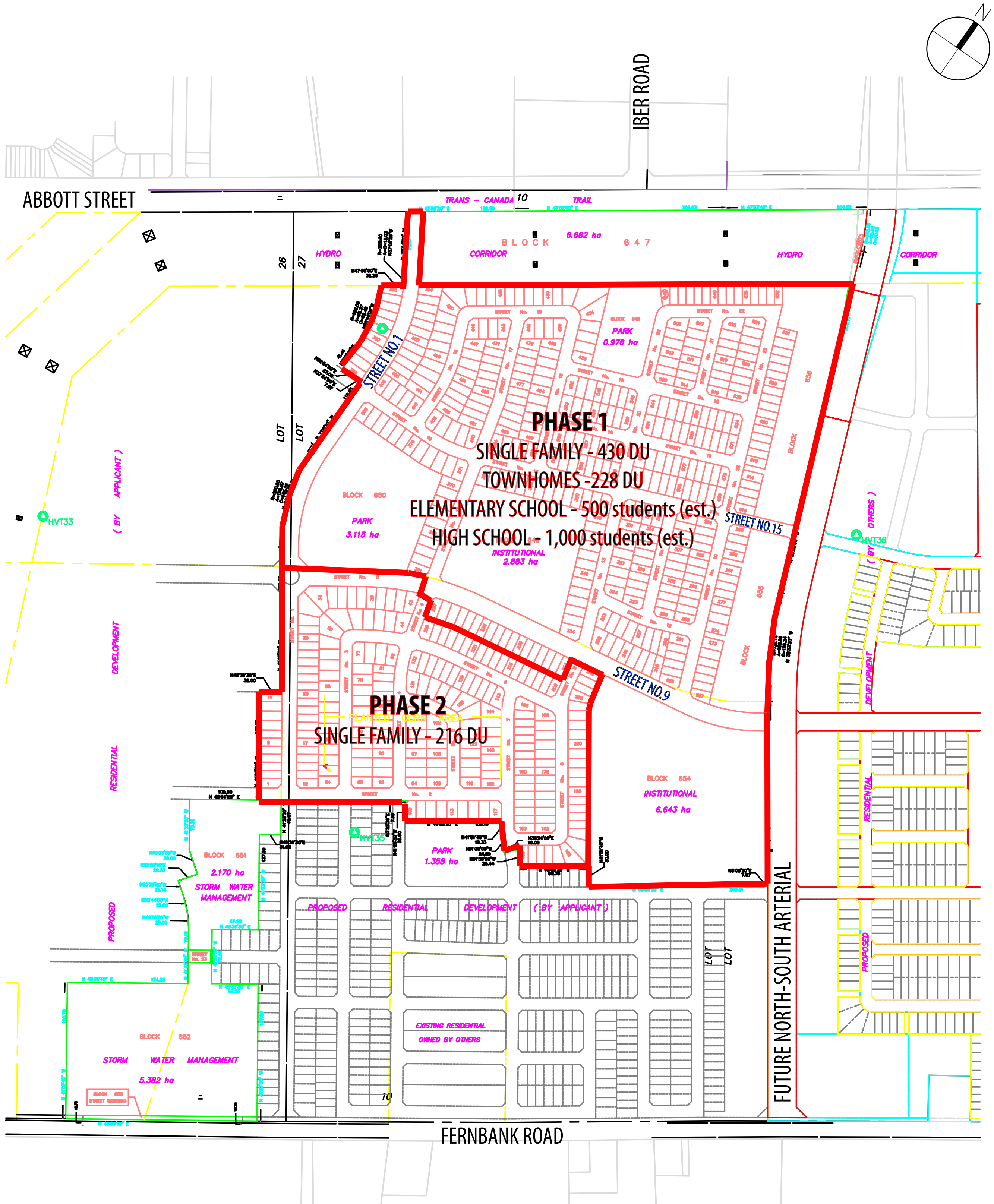
OVERALL DEVELOPMENT CONTEXT.

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



IBI GROUP

Claridge Homes - Fernbank Subdivision
Transportation Impact Study

EXHIBIT 2
Proposed Development

PROJECT No. 27970
DATE: JANUARY 2011
SCALE:

-50m 0 100m

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:	Townhouse:	Elementary School	High School
AM	T = 0.70(X) + 9.74	T = e^(0.80*LN(X)+0.26	T=e^(1.14*LN*(X)-1.86)	T=0.42(X)
PM	T = e^(0.90Ln(X) + 0.51)	T = e^(0.82*LN(X)+0.32)	T=0.15*(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 provided 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 teh 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, MASc., 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.

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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

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.

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Single-Family Detached Housing
(210)

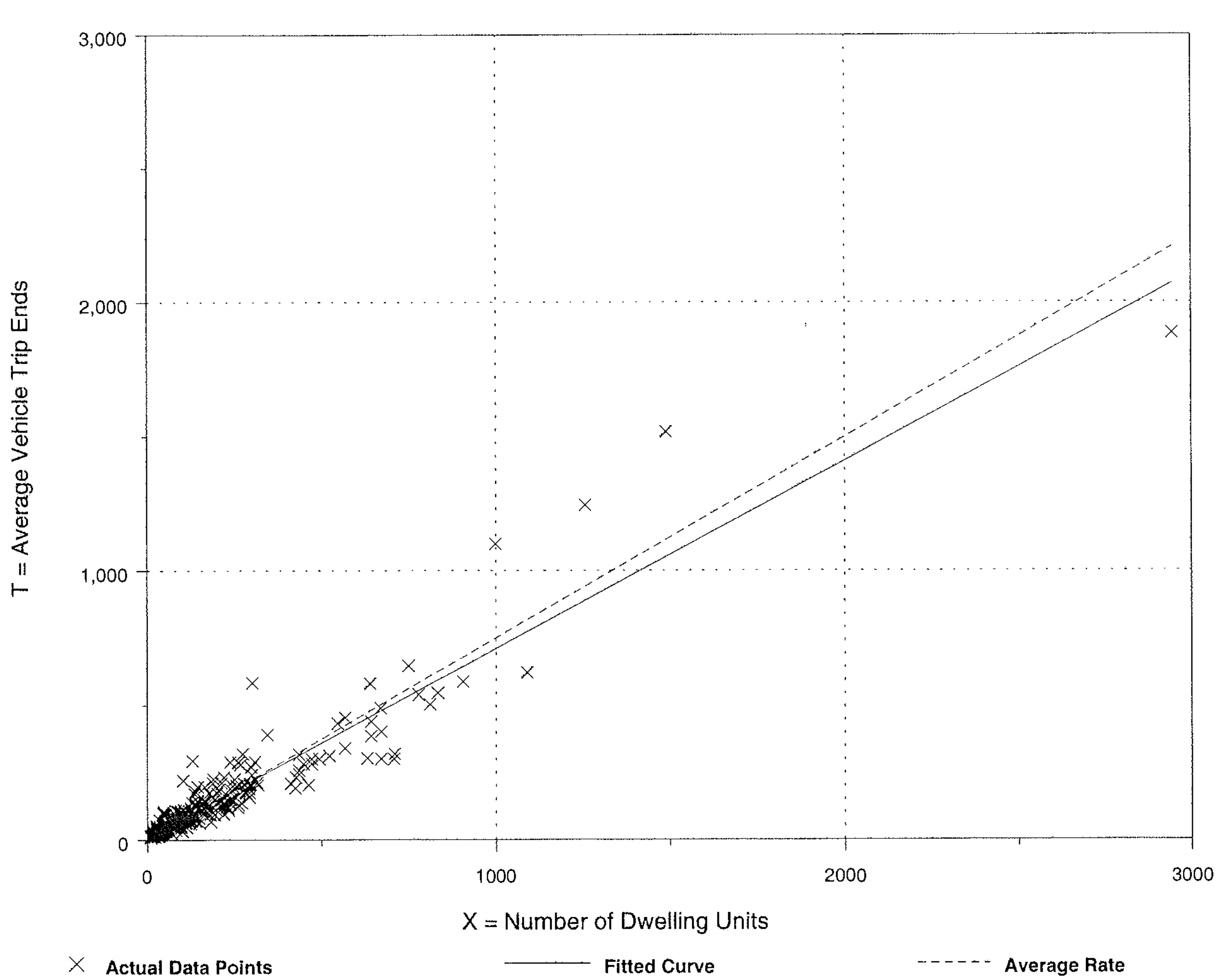
Average Vehicle Trip Ends vs:	**Dwelling Units**
On a:	**Weekday, Peak Hour of Adjacent Street Traffic, One Hour Between 7 and 9 a.m.**

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



Fitted Curve Equation: $T = 0.70(X) + 9.74$ **$R^2 = 0.89$**

Single-Family Detached Housing
(210)

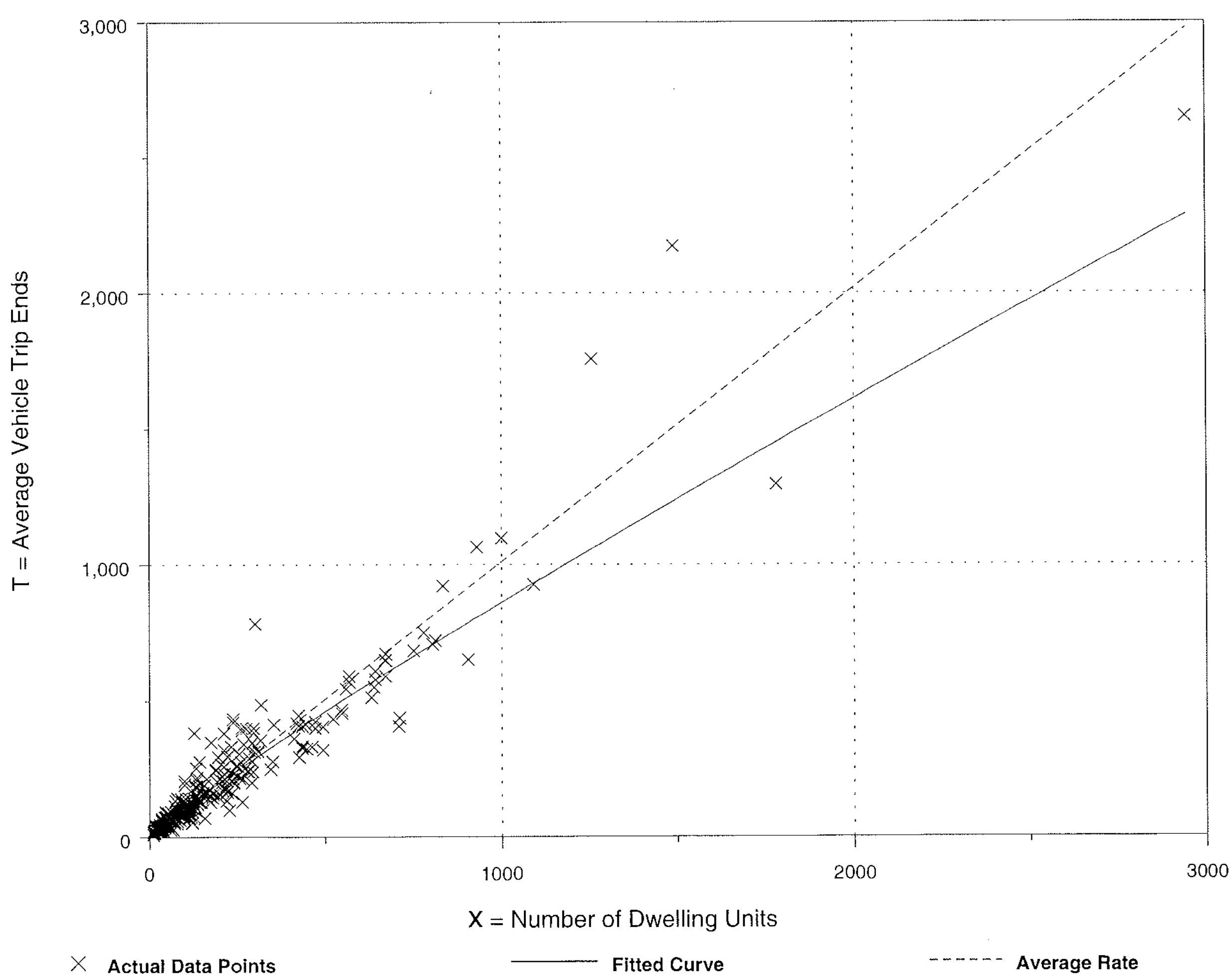
Average Vehicle Trip Ends vs: Dwelling Units
On a: Weekday, Peak Hour of Adjacent Street Traffic, One Hour Between 4 and 6 p.m.

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



Fitted Curve Equation: $Ln(T) = 0.90\ Ln(X) + 0.51$

$R^2 = 0.91$

Residential Condominium/Townhouse
(230)

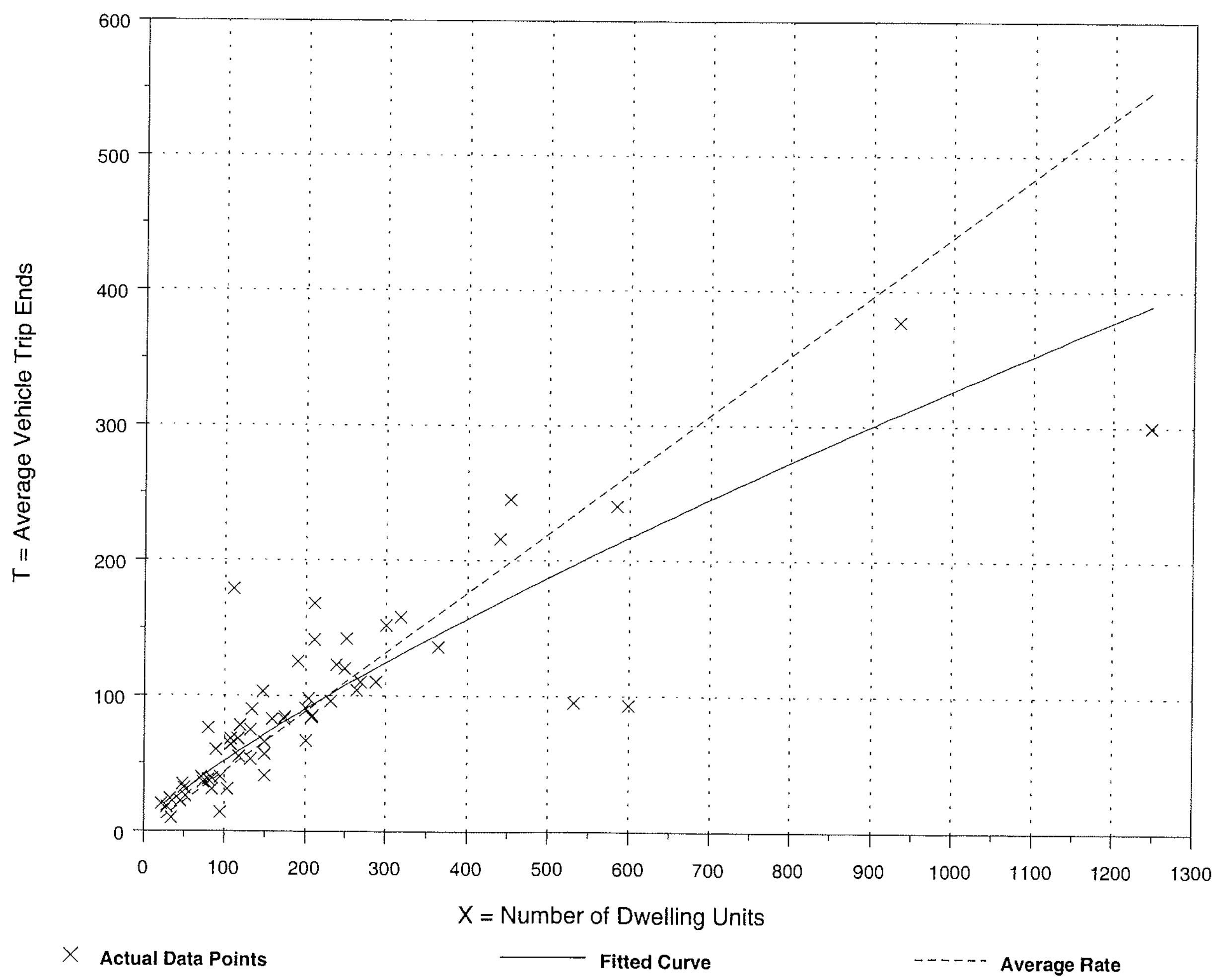
Average Vehicle Trip Ends vs: Dwelling Units
On a: Weekday,
Peak Hour of Adjacent Street Traffic,
One Hour Between 7 and 9 a.m.

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



Fitted Curve Equation: $Ln(T) = 0.80\ Ln(X) + 0.26$ **$R^2 = 0.76$**

Residential Condominium/Townhouse
(230)

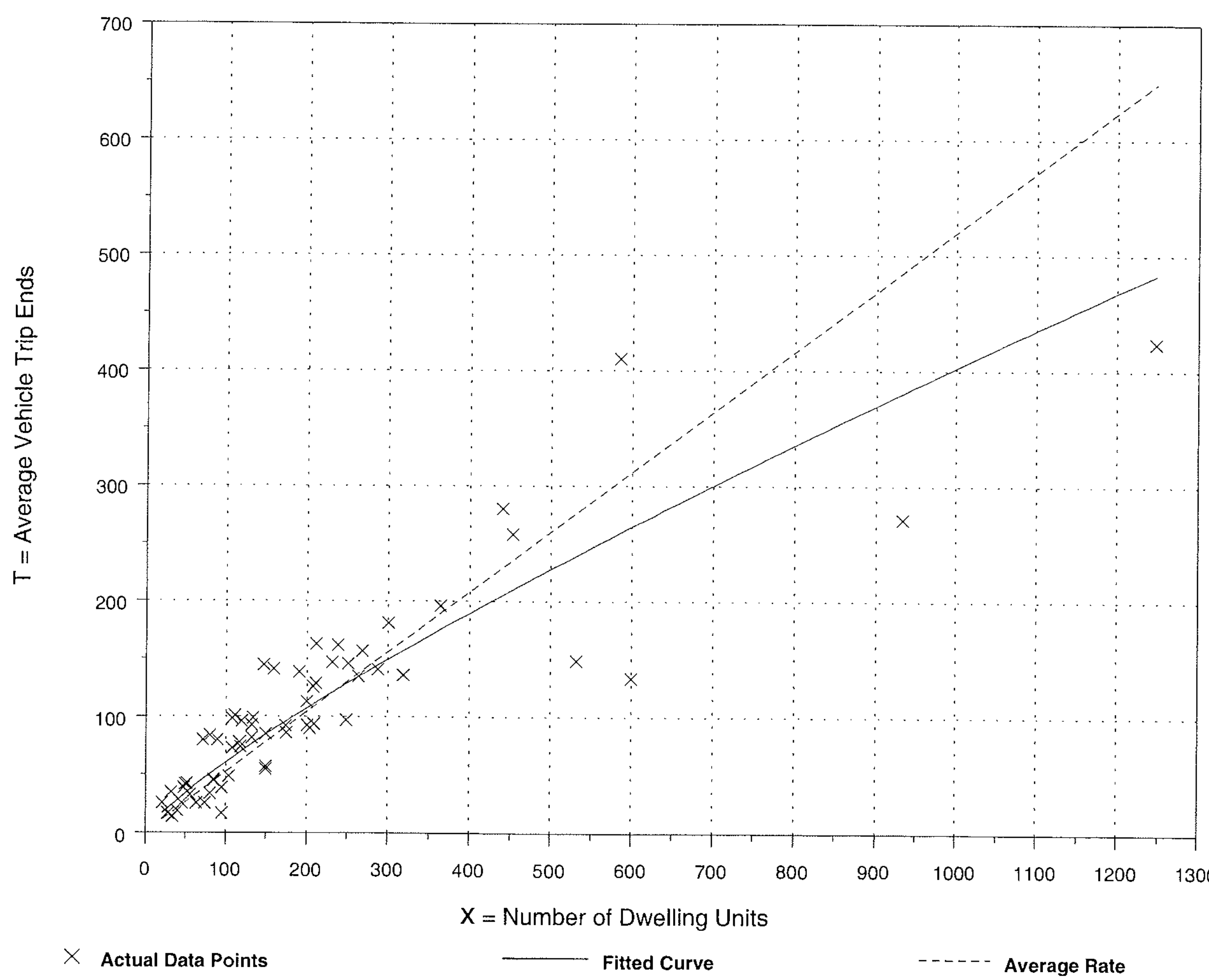
Average Vehicle Trip Ends vs:	**Dwelling Units**
On a:	**Weekday, Peak Hour of Adjacent Street Traffic, One Hour Between 4 and 6 p.m.**

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



Fitted Curve Equation: $Ln(T) = 0.82\ Ln(X) + 0.32$ **$R^2 = 0.80$**

Elementary School
(520)

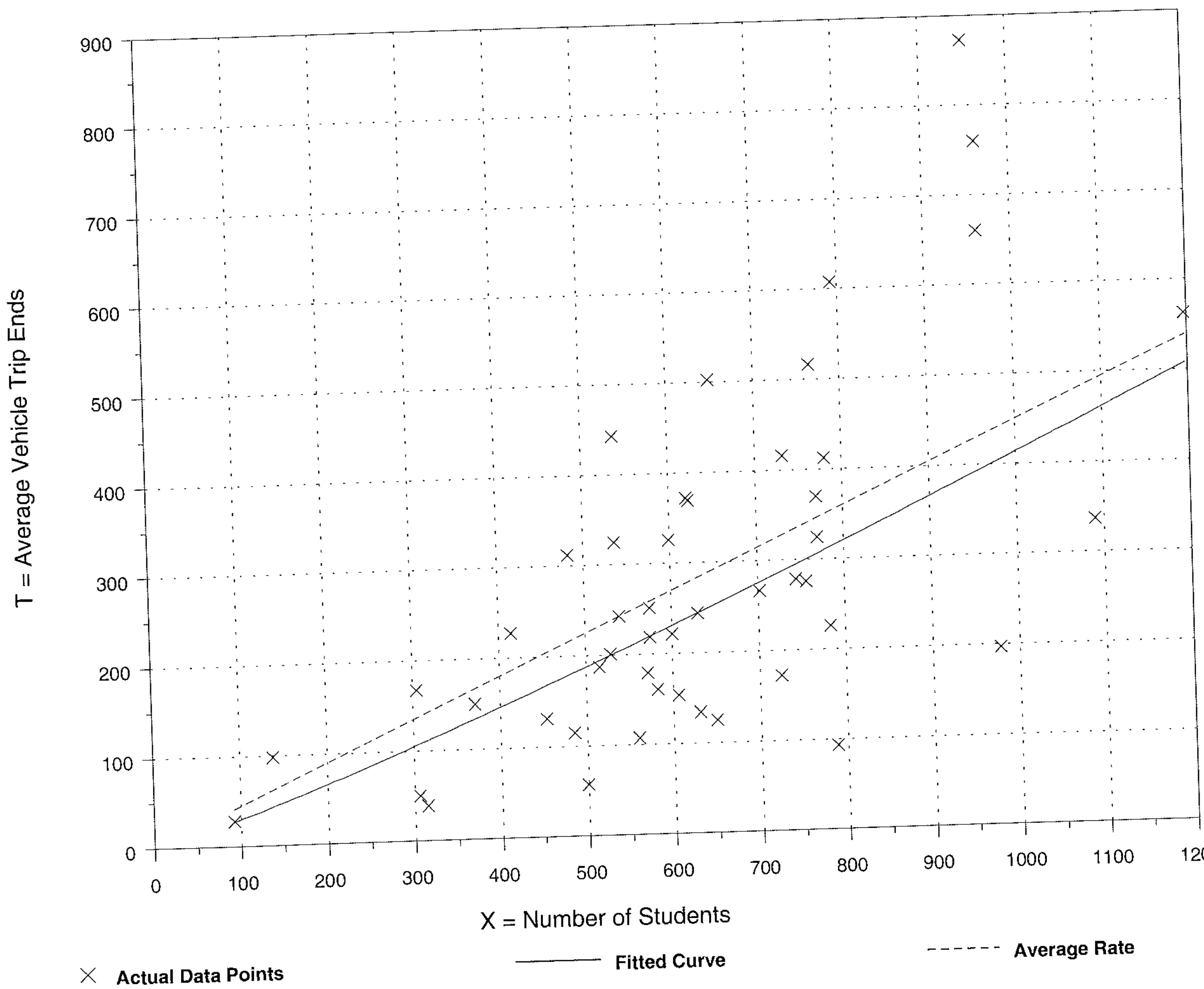
Average Vehicle Trip Ends vs: **Students**
On a: **Weekday,**
A.M. Peak Hour

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



Fitted Curve Equation: Ln(T) = 1.14 Ln(X) - 1.86

R^2 = 0.50

Elementary School
(520)

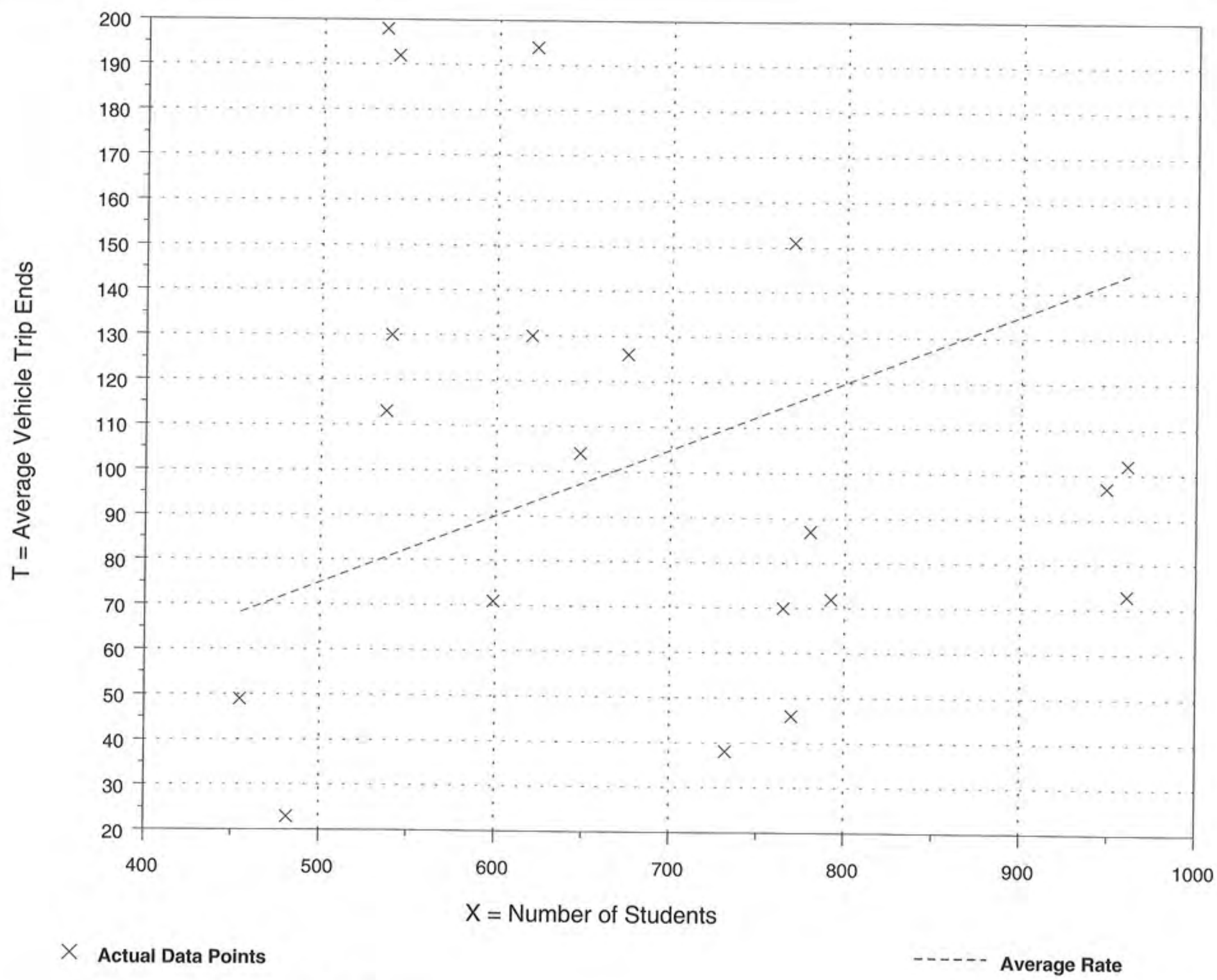
Average Vehicle Trip Ends vs: Students
On a: Weekday,
Peak Hour of Adjacent Street Traffic,
One Hour Between 4 and 6 p.m.

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



Fitted Curve Equation: Not given R^2 = ****

High School
(530)

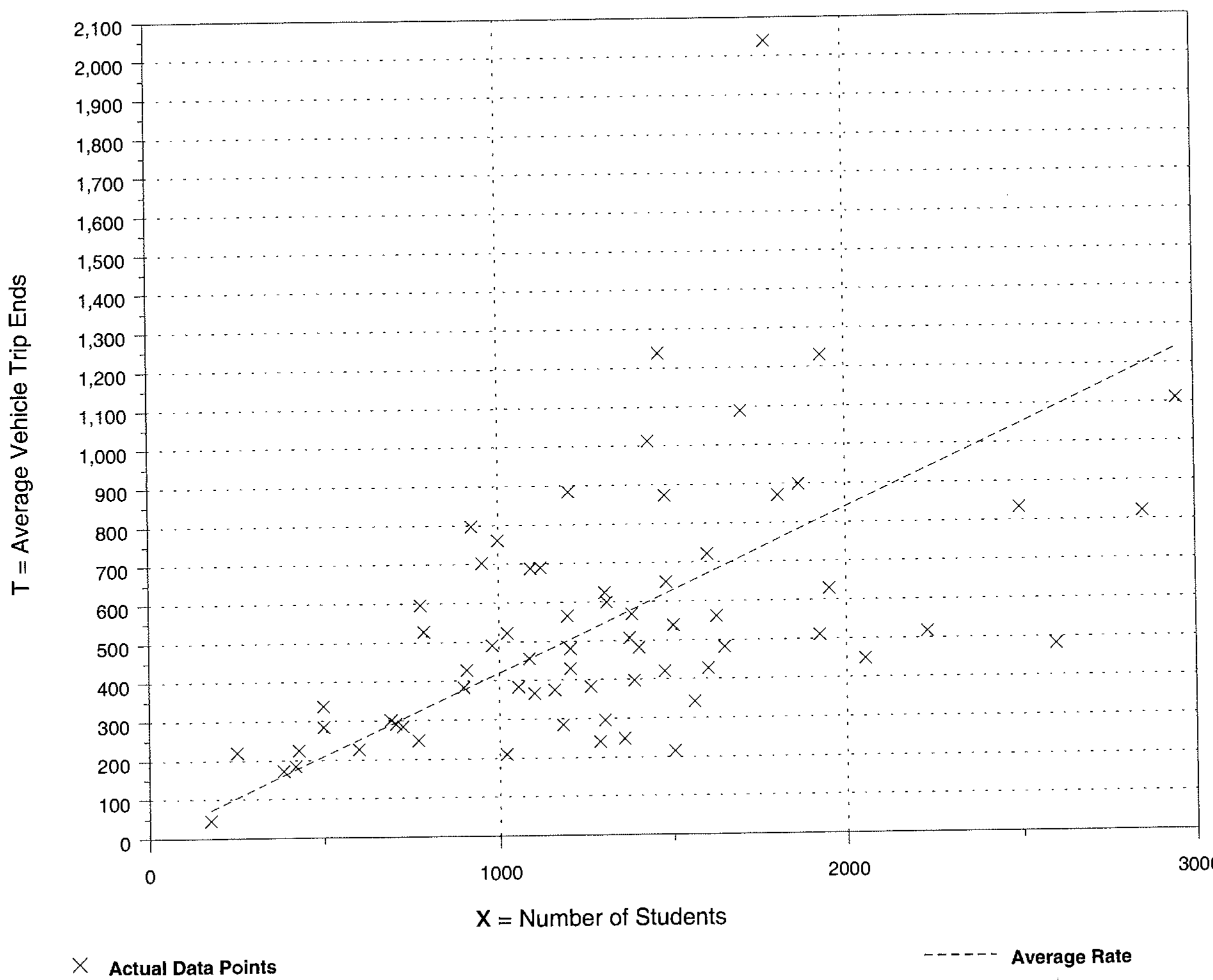
Average Vehicle Trip Ends vs: Students
On a: Weekday,
A.M. Peak Hour

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



Fitted Curve Equation: Not given

R^2 = ****

High School
(530)

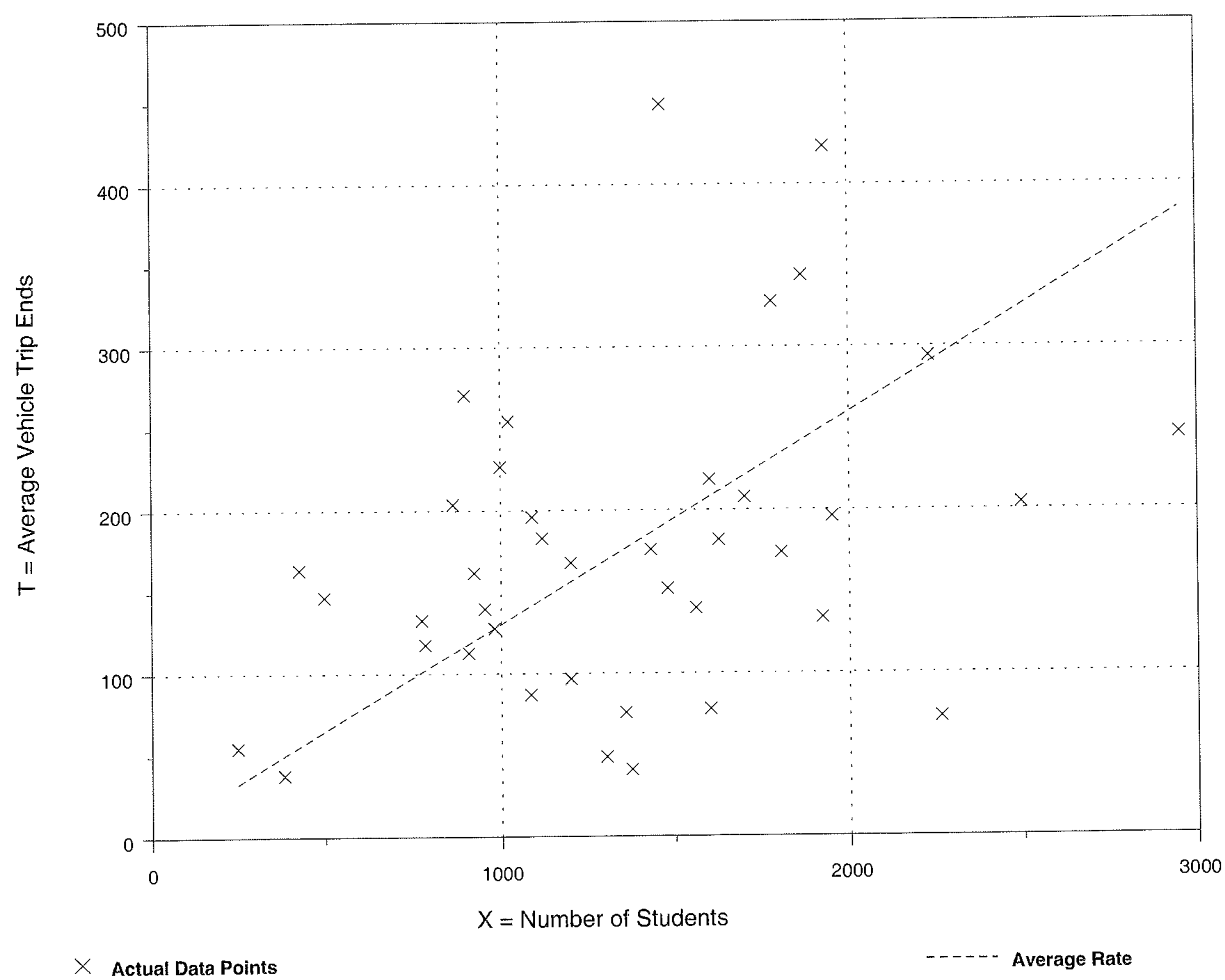
Average Vehicle Trip Ends vs:	**Students**
On a:	**Weekday, Peak Hour of Adjacent Street Traffic, One Hour Between 4 and 6 p.m.**

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



Fitted Curve Equation: Not given R^2 = ****

NOVATECH ENGINEERING CONSULTANTS LTD.

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

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Consulting Engineers & Planners

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.

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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 (8^{th} 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.

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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;

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- 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.

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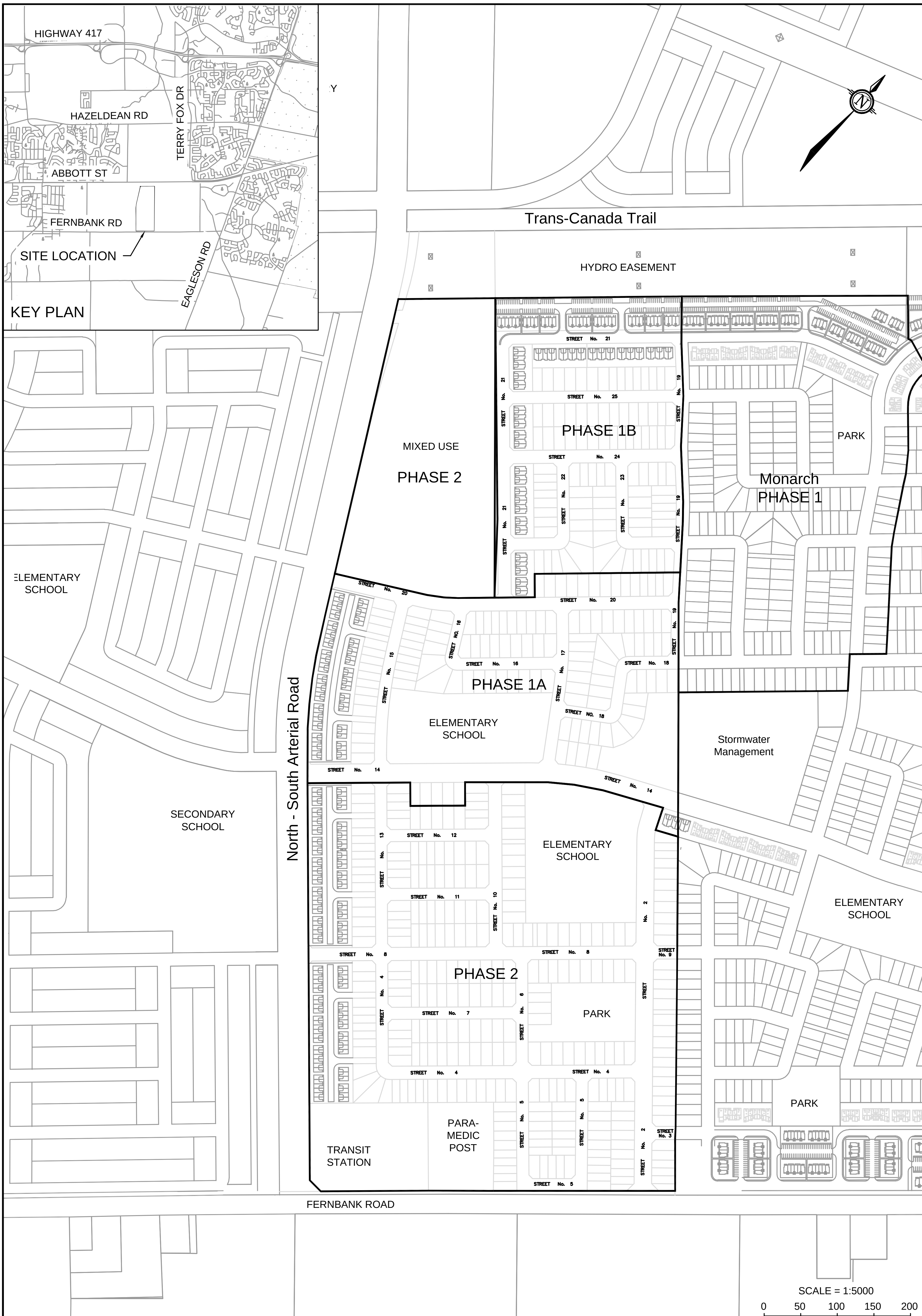

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ABBOTT-FERNBANK LANDS

DRAFT PLAN

NOV 2009 108180 FIGURE 1

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Appendix H

MMLoS Analysis

Multi-Modal Level of Service - Intersections Form

Consultant	**PARSONS**	**Project**	**477180-01000**
Scenario	**Stittsville HS TIA**	**Date**	**July-19**
Comments			

INTERSECTIONS		Fernbank/Robert Grant			
	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		Permissive or yield control	Permissive or yield control
	Right Turns on Red (RToR) ?	RTOR allowed		RTOR allowed	RTOR allowed
	Ped Signal Leading Interval?	No		No	No
	Right Turn Channel	No Channel		No Channel	No Channel
	Corner Radius	10-15m		10-15m	10-15m
	Crosswalk Type	Std transverse markings		Std transverse markings	Std transverse markings
	PETSI Score	**78**		**70**	**78**
	Ped. Exposure to Traffic LoS	**B**	**-**	**C**	**B**
	Cycle Length	119		119	119
	Effective Walk Time	41		13	13
	Average Pedestrian Delay	**26**		**47**	**47**
	Pedestrian Delay LoS	**C**	**-**	**E**	**E**
	Level of Service	**C**	**-**	**E**	**E**
		E			
	Direction of Travel	**NORTHBOUND**	**SOUTHBOUND**	**EASTBOUND**	**WESTBOUND**
Bicycle	Bicycle Lane Arrangement on Approach		Curb Bike Lane, Cycletrack or MUP	Curb Bike Lane, Cycletrack or MUP	Curb Bike Lane, Cycletrack or MUP
	Right Turn Lane Configuration		Not Applicable	Not Applicable	Not Applicable
	Right Turning Speed		Not Applicable	Not Applicable	Not Applicable
	Cyclist relative to RT motorists	**-**	**Not Applicable**	**Not Applicable**	**Not Applicable**
	Separated or Mixed Traffic	**-**	**Separated**	**Separated**	**Separated**
	Left Turn Approach		2-stage, LT box	2-stage, LT box	2-stage, LT box
	Operating Speed		≥ 60 km/h	≥ 60 km/h	≥ 60 km/h
	Left Turning Cyclist	**-**	**A**	**A**	**A**
	Level of Service	**-**	**A**	**A**	**A**
		A			
Transit	Average Signal Delay		≤ 30 sec		≤ 10 sec
	Level of Service	**-**	**D**	**-**	**B**
		D			
Truck	Effective Corner Radius		10 - 15 m	10 - 15 m	10 - 15 m
	Number of Receiving Lanes on Departure from Intersection		1	1	1
	Level of Service	**-**	**E**	**E**	**E**
		E			
Auto	Volume to Capacity Ratio	0.0 - 0.60			
	Level of Service	**A**			

Multi-Modal Level of Service - Segments Form

Consultant	**PARSONS**	**Project**	**477180-01000**
Scenario	**Stittsvile HS TIA**	**Date**	**July-19**
Comments			

SEGMENTS		**Street A**	Cope Drive South Side	Cope Drive North Side	Section 3
Pedestrian	Sidewalk Width Boulevard Width	**-**	≥ 2 m > 2 m	≥ 2 m > 2 m	
	Avg Daily Curb Lane Traffic Volume		≤ 3000	≤ 3000	
	Operating Speed On-Street Parking		> 30 to 50 km/h yes	> 30 to 50 km/h no	
	Exposure to Traffic PLoS		**A**	**A**	**-**
	Effective Sidewalk Width				
	Pedestrian Volume				
	Crowding PLoS		**-**	**-**	**-**
	Level of Service		**-**	**-**	**-**
Bicycle	Type of Cycling Facility	**B**	Mixed Traffic	Physically Separated	
	Number of Travel Lanes		≤ 2 (no centreline)		
	Operating Speed		>40 to <50 km/h		
	# of Lanes & Operating Speed LoS		**B**	**-**	**-**
	Bike Lane (+ Parking Lane) Width				
	Bike Lane Width LoS		**-**	**-**	**-**
	Bike Lane Blockages				
	Blockage LoS		**-**	**-**	**-**
	Median Refuge Width (no median = < 1.8 m)		< 1.8 m refuge		
	No. of Lanes at Unsignalized Crossing		≤ 3 lanes		
	Sidestreet Operating Speed		≤ 40 km/h		
	Unsignalized Crossing - Lowest LoS		**A**	**A**	**-**
	Level of Service		**B**	**A**	**-**
Transit	Facility Type	**D**	Mixed Traffic	Mixed Traffic	
	Friction or Ratio Transit:Posted Speed		Vt/Vp ≥ 0.8	Vt/Vp ≥ 0.8	
	Level of Service		**D**	**D**	**-**
Truck	Truck Lane Width	**B**	> 3.7 m	> 3.7 m	
	Travel Lanes per Direction		1	1	
	Level of Service		**B**	**B**	**-**

Appendix I

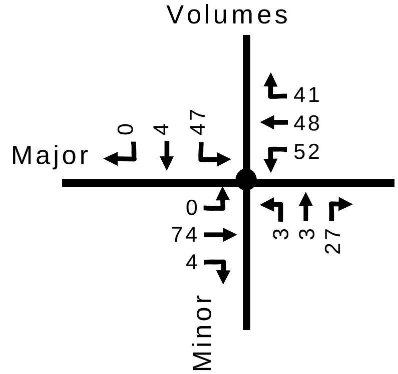
Warrant Analysis

Cope / Middle Access - Future Conditions

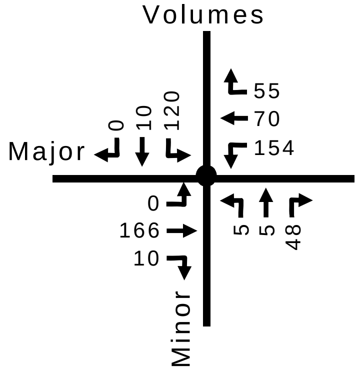
AWSC Warrant		Description		Minimum Requirement for a four-leg intersection	Compliance		
					Sectional %	Entire %	Warrant
Intersection	1. Minimum Volume Criterion	A	Vehicle Volume, All Approaches for Each of the Heaviest 8 Hours of on Average Day, or	200	152%	71%	No
		B	Vehicle Volume, All Approaches for the Heaviest Peak Hour, and	350	184%		
		C	Vehicle and pedestrian Volume, Along Minor Streets for Each of the Same 8 Hours, and	80	105%		
		D	The volume split between the major and minor streets	65/35	71%		
	2. Minimum Collision Criterion	A	Vehicle Volume, Along Major Street for Each of the Heaviest 8 Hours of an Average Day, and	9	0%	0%	

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

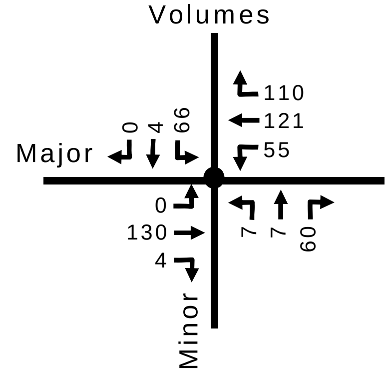
Average 8 Hour Volumes



AM Peak Hour Volumes

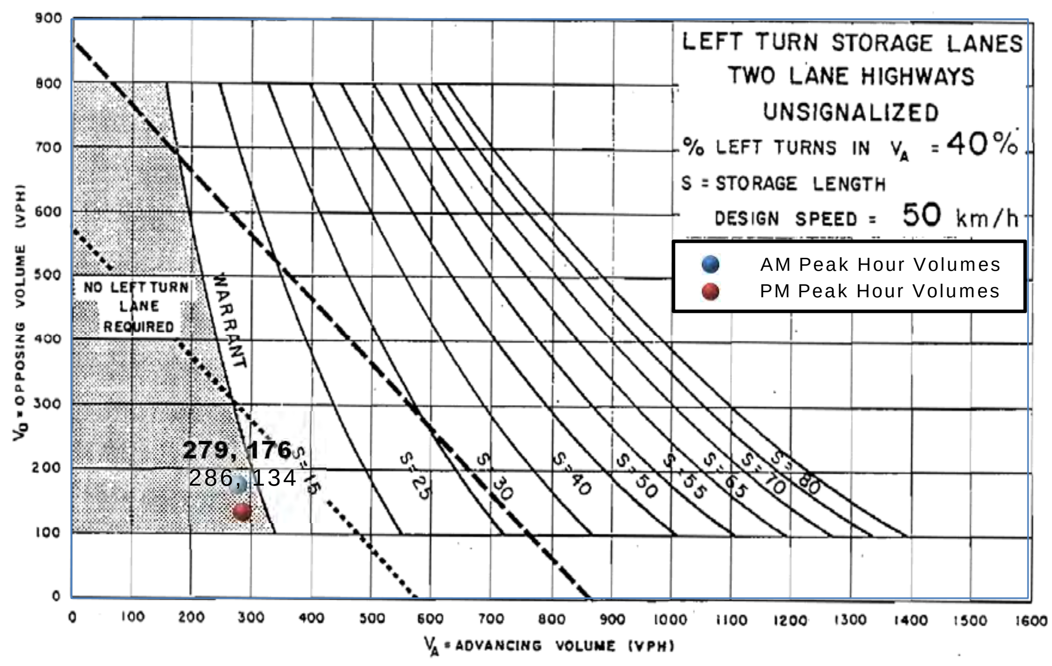


PM Peak Hour Volumes



	Design Speed	Advancing Traffic Volume (V_A)		Opposing Traffic Volume (V_O)		Left Turn Traffic Volume (V_L)		% of Left Turning Traffic		Warrant Left Turn Lane
		AM	PM	AM	PM	AM	PM	AM	PM	
Existing										
Cope/Middle Access	50	279	286	176	134	154	55	55%	19%	No

Peak	NBL	NBT	NBR	SBL	SBT	SBR	EBL	EBT	EBR	WBL	WBT	WBR
										Warrant?		
AM	5	5	48	120	0	0	0	166	10	154	70	55
PM	7	7	60	66	0	0	0	130	4	55	121	110



Appendix J

TDM Checklist

TDM-Supportive Development Design and Infrastructure Checklist:
Non-Residential Developments (office, institutional, retail or industrial)

Legend

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

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

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

		TDM-supportive design & infrastructure measures: *Non-residential developments*	Check if completed & add descriptions, explanations or plan/drawing references
	2.	**WALKING & CYCLING: END-OF-TRIP FACILITIES**	
	2.1	**Bicycle parking**	
REQUIRED	2.1.1	Provide bicycle parking in highly visible and lighted areas, sheltered from the weather wherever possible *(see Official Plan policy 4.3.6)*	☑
REQUIRED	2.1.2	Provide the number of bicycle parking spaces specified for various land uses in different parts of Ottawa; provide convenient access to main entrances or well-used areas *(see Zoning By-law Section 111)*	☑
REQUIRED	2.1.3	Ensure that bicycle parking spaces and access aisles meet minimum dimensions; that no more than 50% of spaces are vertical spaces; and that parking racks are securely anchored *(see Zoning By-law Section 111)*	☑
BASIC	2.1.4	Provide bicycle parking spaces equivalent to the expected number of commuter cyclists (assuming the cycling mode share target is met), plus the expected peak number of customer/visitor cyclists	☐
BETTER	2.1.5	Provide bicycle parking spaces equivalent to the expected number of commuter and customer/visitor cyclists, plus an additional buffer (e.g. 25 percent extra) to encourage other cyclists and ensure adequate capacity in peak cycling season	☐
	2.2	**Secure bicycle parking**	
REQUIRED	2.2.1	Where more than 50 bicycle parking spaces are provided for a single office building, locate at least 25% of spaces within a building/structure, a secure area (e.g. supervised parking lot or enclosure) or bicycle lockers *(see Zoning By-law Section 111)*	☐
BETTER	2.2.2	Provide secure bicycle parking spaces equivalent to the expected number of commuter cyclists (assuming the cycling mode share target is met)	☐
	2.3	**Shower & change facilities**	
BASIC	2.3.1	Provide shower and change facilities for the use of active commuters	☐
BETTER	2.3.2	In addition to shower and change facilities, provide dedicated lockers, grooming stations, drying racks and laundry facilities for the use of active commuters	☐
	2.4	**Bicycle repair station**	
BETTER	2.4.1	Provide a permanent bike repair station, with commonly used tools and an air pump, adjacent to the main bicycle parking area (or secure bicycle parking area, if provided)	☐

		TDM-supportive design & infrastructure measures: *Non-residential developments*	Check if completed & add descriptions, explanations or plan/drawing references
	3.	**TRANSIT**	
	3.1	**Customer amenities**	
BASIC	3.1.1	Provide shelters, lighting and benches at any on-site transit stops	☐
BASIC	3.1.2	Where the site abuts an off-site transit stop and insufficient space exists for a transit shelter in the public right-of-way, protect land for a shelter and/or install a shelter	☐
BETTER	3.1.3	Provide a secure and comfortable interior waiting area by integrating any on-site transit stops into the building	☐
	4.	**RIDESHARING**	
	4.1	**Pick-up & drop-off facilities**	
BASIC	4.1.1	Provide a designated area for carpool drivers (plus taxis and ride-hailing services) to drop off or pick up passengers without using fire lanes or other no-stopping zones	☑
	4.2	**Carpool parking**	
BASIC	4.2.1	Provide signed parking spaces for carpools in a priority location close to a major building entrance, sufficient in number to accommodate the mode share target for carpools	☐
BETTER	4.2.2	At large developments, provide spaces for carpools in a separate, access-controlled parking area to simplify enforcement	☐
	5.	**CARSHARING & BIKESHARING**	
	5.1	**Carshare parking spaces**	
BETTER	5.1.1	Provide carshare parking spaces in permitted non-residential zones, occupying either required or provided parking spaces *(see Zoning By-law Section 94)*	☐
	5.2	**Bikeshare station location**	
BETTER	5.2.1	Provide a designated bikeshare station area near a major building entrance, preferably lighted and sheltered with a direct walkway connection	☐

	TDM-supportive design & infrastructure measures: *Non-residential developments*		**Check if completed & add descriptions, explanations or plan/drawing references**
	6.	**PARKING**	
	6.1	**Number of parking spaces**	
REQUIRED	6.1.1	Do not provide more parking than permitted by zoning, nor less than required by zoning, unless a variance is being applied for	☑
BASIC	6.1.2	Provide parking for long-term and short-term users that is consistent with mode share targets, considering the potential for visitors to use off-site public parking	☐
BASIC	6.1.3	Where a site features more than one use, provide shared parking and reduce the cumulative number of parking spaces accordingly *(see Zoning By-law Section 104)*	☐
BETTER	6.1.4	Reduce the minimum number of parking spaces required by zoning by one space for each 13 square metres of gross floor area provided as shower rooms, change rooms, locker rooms and other facilities for cyclists in conjunction with bicycle parking *(see Zoning By-law Section 111)*	☐
	6.2	**Separate long-term & short-term parking areas**	
BETTER	6.2.1	Separate short-term and long-term parking areas using signage or physical barriers, to permit access controls and simplify enforcement (i.e. to discourage employees from parking in visitor spaces, and vice versa)	☐
	7.	**OTHER**	
	7.1	**On-site amenities to minimize off-site trips**	
BETTER	7.1.1	Provide on-site amenities to minimize mid-day or mid-commute errands	☐

Appendix K

Synchro and SIDRA Background Analysis

Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	37	323	204	236	354	36
Future Volume (vph)	37	323	204	236	354	36
Lane Group Flow (vph)	39	340	215	248	373	38
Turn Type	Prot	NA	NA	Perm	Prot	Perm
Protected Phases	5	2	6		4	
Permitted Phases				6		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)	11.2	24.6	24.6	24.6	24.0	24.0
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)	-2.2	-2.2	-2.2	-2.2	-2.0	-2.0
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Lead/Lag	Lead		Lag	Lag		
Lead-Lag Optimize?	Yes		Yes	Yes		
Recall Mode	None	None	None	None	None	None
Act Effct Green (s)	9.9	24.7	17.7	17.7	20.9	20.9
Actuated g/C Ratio	0.18	0.45	0.33	0.33	0.38	0.38
v/c Ratio	0.13	0.42	0.37	0.38	0.57	0.06
Control Delay	26.2	12.2	20.3	5.1	19.1	5.6
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	26.2	12.2	20.3	5.1	19.1	5.6
LOS	C	B	C	A	B	A
Approach Delay		13.6	12.1		17.9	
Approach LOS		B	B		B	
Queue Length 50th (m)	3.6	20.5	18.7	0.0	31.2	0.0
Queue Length 95th (m)	13.0	46.8	42.9	15.1	64.8	5.1
Internal Link Dist (m)		137.3	306.8		567.1	
Turn Bay Length (m)	100.0			115.0	95.0	
Base Capacity (vph)	762	1784	1579	1371	1098	996
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.05	0.19	0.14	0.18	0.34	0.04

Intersection Summary	
Cycle Length: 119.4	
Actuated Cycle Length: 54.4	
Natural Cycle: 60	
Control Type: Actuated-Uncoordinated	
Maximum v/c Ratio: 0.57	
Intersection Signal Delay: 14.5	Intersection LOS: B
Intersection Capacity Utilization 46.2%	ICU Level of Service A
Analysis Period (min) 15	

Splits and Phases: 2: Fernbank & Robert Grant

Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	32	271	447	368	282	36
Future Volume (vph)	32	271	447	368	282	36
Lane Group Flow (vph)	34	285	471	387	297	38
Turn Type	Prot	NA	NA	Perm	Prot	Perm
Protected Phases	5	2	6		4	
Permitted Phases				6		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)	11.2	24.6	24.6	24.6	24.0	24.0
Total Split (s)	26.2	78.4	52.2	52.2	36.0	36.0
Total Split (%)	22.9%	68.5%	45.6%	45.6%	31.5%	31.5%
Yellow Time (s)	4.6	4.6	4.6	4.6	3.3	3.3
All-Red Time (s)	1.6	1.6	1.6	1.6	2.7	2.7
Lost Time Adjust (s)	-2.2	-2.2	-2.2	-2.2	-2.0	-2.0
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Lead/Lag	Lead		Lag	Lag		
Lead-Lag Optimize?	Yes		Yes	Yes		
Recall Mode	None	None	None	None	None	None
Act Effct Green (s)	10.5	35.9	29.0	29.0	21.2	21.2
Actuated g/C Ratio	0.16	0.54	0.44	0.44	0.32	0.32
v/c Ratio	0.13	0.30	0.61	0.44	0.55	0.07
Control Delay	35.8	9.0	20.6	3.6	27.1	8.6
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	35.8	9.0	20.6	3.6	27.1	8.6
LOS	D	A	C	A	C	A
Approach Delay		11.8	13.0		25.0	
Approach LOS		B	B		C	
Queue Length 50th (m)	4.0	16.2	48.3	0.0	33.1	0.0
Queue Length 95th (m)	15.2	37.7	99.5	15.6	75.2	7.0
Internal Link Dist (m)		137.3	306.8		567.1	
Turn Bay Length (m)	100.0			115.0	95.0	
Base Capacity (vph)	662	1652	1335	1233	954	871
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.05	0.17	0.35	0.31	0.31	0.04

Intersection Summary

Cycle Length: 114.4
Actuated Cycle Length: 66.5
Natural Cycle: 60
Control Type: Actuated-Uncoordinated
Maximum v/c Ratio: 0.61
Intersection Signal Delay: 15.4 Intersection LOS: B
Intersection Capacity Utilization 51.2% ICU Level of Service A
Analysis Period (min) 15

Splits and Phases: 2: Fernbank & Robert Grant

Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	37	335	204	236	360	36
Future Volume (vph)	37	335	204	236	360	36
Lane Group Flow (vph)	39	353	215	248	379	38
Turn Type	Prot	NA	NA	Perm	Prot	Perm
Protected Phases	5	2	6		4	
Permitted Phases				6		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)	11.2	24.6	24.6	24.6	24.0	24.0
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)	-2.2	-2.2	-2.2	-2.2	-2.0	-2.0
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Lead/Lag	Lead		Lag	Lag		
Lead-Lag Optimize?	Yes		Yes	Yes		
Recall Mode	None	None	None	None	None	None
Act Effct Green (s)	9.8	24.9	17.9	17.9	21.3	21.3
Actuated g/C Ratio	0.18	0.45	0.33	0.33	0.39	0.39
v/c Ratio	0.13	0.44	0.37	0.38	0.58	0.06
Control Delay	26.5	12.6	20.5	5.1	19.1	5.5
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	26.5	12.6	20.5	5.1	19.1	5.5
LOS	C	B	C	A	B	A
Approach Delay		14.0	12.3		17.9	
Approach LOS		B	B		B	
Queue Length 50th (m)	3.7	21.9	19.0	0.0	31.9	0.0
Queue Length 95th (m)	13.1	49.4	43.3	15.1	65.7	5.1
Internal Link Dist (m)		137.3	306.8		567.1	
Turn Bay Length (m)	100.0			115.0	95.0	
Base Capacity (vph)	751	1784	1573	1367	1082	982
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.05	0.20	0.14	0.18	0.35	0.04

Intersection Summary	
Cycle Length: 119.4	
Actuated Cycle Length: 55	
Natural Cycle: 60	
Control Type: Actuated-Uncoordinated	
Maximum v/c Ratio: 0.58	
Intersection Signal Delay: 14.6	Intersection LOS: B
Intersection Capacity Utilization 46.6%	ICU Level of Service A
Analysis Period (min) 15	

Splits and Phases: 2: Fernbank & Robert Grant

Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	32	281	447	368	288	36
Future Volume (vph)	32	281	447	368	288	36
Lane Group Flow (vph)	34	296	471	387	303	38
Turn Type	Prot	NA	NA	Perm	Prot	Perm
Protected Phases	5	2	6		4	
Permitted Phases				6		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)	11.2	24.6	24.6	24.6	24.0	24.0
Total Split (s)	26.2	78.4	52.2	52.2	36.0	36.0
Total Split (%)	22.9%	68.5%	45.6%	45.6%	31.5%	31.5%
Yellow Time (s)	4.6	4.6	4.6	4.6	3.3	3.3
All-Red Time (s)	1.6	1.6	1.6	1.6	2.7	2.7
Lost Time Adjust (s)	-2.2	-2.2	-2.2	-2.2	-2.0	-2.0
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Lead/Lag	Lead		Lag	Lag		
Lead-Lag Optimize?	Yes		Yes	Yes		
Recall Mode	None	None	None	None	None	None
Act Effct Green (s)	10.5	36.0	29.1	29.1	21.4	21.4
Actuated g/C Ratio	0.16	0.54	0.44	0.44	0.32	0.32
v/c Ratio	0.13	0.31	0.61	0.44	0.56	0.07
Control Delay	35.9	9.2	20.7	3.6	27.4	8.6
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	35.9	9.2	20.7	3.6	27.4	8.6
LOS	D	A	C	A	C	A
Approach Delay		11.9	13.0		25.3	
Approach LOS		B	B		C	
Queue Length 50th (m)	4.1	17.1	48.9	0.0	34.2	0.0
Queue Length 95th (m)	15.2	39.2	99.5	15.6	76.8	7.0
Internal Link Dist (m)		137.3	306.8		567.1	
Turn Bay Length (m)	100.0			115.0	95.0	
Base Capacity (vph)	659	1649	1332	1230	951	867
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.05	0.18	0.35	0.31	0.32	0.04

Intersection Summary	
Cycle Length: 114.4	
Actuated Cycle Length: 66.8	
Natural Cycle: 60	
Control Type: Actuated-Uncoordinated	
Maximum v/c Ratio: 0.61	
Intersection Signal Delay: 15.5	Intersection LOS: B
Intersection Capacity Utilization 51.6%	ICU Level of Service A
Analysis Period (min) 15	

Splits and Phases: 2: Fernbank & Robert Grant

Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	50	364	204	311	406	48
Future Volume (vph)	50	364	204	311	406	48
Lane Group Flow (vph)	53	383	215	327	427	51
Turn Type	Prot	NA	NA	Perm	Prot	Perm
Protected Phases	5	2	6		4	
Permitted Phases				6		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)	11.2	24.6	24.6	24.6	24.0	24.0
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)	-2.2	-2.2	-2.2	-2.2	-2.0	-2.0
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Lead/Lag	Lead		Lag	Lag		
Lead-Lag Optimize?	Yes		Yes	Yes		
Recall Mode	None	None	None	None	None	None
Act Effct Green (s)	10.1	26.5	18.8	18.8	26.8	26.8
Actuated g/C Ratio	0.16	0.43	0.30	0.30	0.43	0.43
v/c Ratio	0.19	0.50	0.40	0.48	0.58	0.07
Control Delay	28.9	15.4	23.1	5.5	19.2	5.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	28.9	15.4	23.1	5.5	19.2	5.0
LOS	C	B	C	A	B	A
Approach Delay		17.1	12.5		17.7	
Approach LOS		B	B		B	
Queue Length 50th (m)	5.8	30.5	22.4	0.0	39.3	0.0
Queue Length 95th (m)	16.7	55.5	44.6	17.4	79.9	6.1
Internal Link Dist (m)		137.3	306.8		567.1	
Turn Bay Length (m)	100.0			115.0	95.0	
Base Capacity (vph)	647	1782	1502	1329	933	857
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.08	0.21	0.14	0.25	0.46	0.06

Intersection Summary

Cycle Length: 119.4
Actuated Cycle Length: 61.8
Natural Cycle: 60
Control Type: Actuated-Uncoordinated
Maximum v/c Ratio: 0.58
Intersection Signal Delay: 15.6 Intersection LOS: B
Intersection Capacity Utilization 50.6% ICU Level of Service A
Analysis Period (min) 15

Splits and Phases: 2: Fernbank & Robert Grant

Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	40	305	447	453	337	48
Future Volume (vph)	40	305	447	453	337	48
Lane Group Flow (vph)	42	321	471	477	355	51
Turn Type	Prot	NA	NA	Perm	Prot	Perm
Protected Phases	5	2	6		4	
Permitted Phases				6		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)	11.2	24.6	24.6	24.6	24.0	24.0
Total Split (s)	26.2	78.4	52.2	52.2	36.0	36.0
Total Split (%)	22.9%	68.5%	45.6%	45.6%	31.5%	31.5%
Yellow Time (s)	4.6	4.6	4.6	4.6	3.3	3.3
All-Red Time (s)	1.6	1.6	1.6	1.6	2.7	2.7
Lost Time Adjust (s)	-2.2	-2.2	-2.2	-2.2	-2.0	-2.0
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Lead/Lag	Lead		Lag	Lag		
Lead-Lag Optimize?	Yes		Yes	Yes		
Recall Mode	None	None	None	None	None	None
Act Effct Green (s)	10.9	37.8	30.6	30.6	23.9	23.9
Actuated g/C Ratio	0.15	0.53	0.43	0.43	0.34	0.34
v/c Ratio	0.16	0.34	0.61	0.52	0.62	0.09
Control Delay	37.8	10.1	22.0	3.9	29.6	7.9
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	37.8	10.1	22.0	3.9	29.6	7.9
LOS	D	B	C	A	C	A
Approach Delay		13.3	12.9		26.9	
Approach LOS		B	B		C	
Queue Length 50th (m)	5.6	21.9	54.3	0.0	44.6	0.0
Queue Length 95th (m)	18.1	42.5	100.6	16.9	94.3	8.3
Internal Link Dist (m)		137.3	306.8		567.1	
Turn Bay Length (m)	100.0			115.0	95.0	
Base Capacity (vph)	618	1604	1291	1229	891	822
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	0.07	0.20	0.36	0.39	0.40	0.06

Intersection Summary

Cycle Length: 114.4
Actuated Cycle Length: 71.1
Natural Cycle: 60
Control Type: Actuated-Uncoordinated
Maximum v/c Ratio: 0.62
Intersection Signal Delay: 16.3 Intersection LOS: B
Intersection Capacity Utilization 58.7% ICU Level of Service B
Analysis Period (min) 15

Splits and Phases: 2: Fernbank & Robert Grant

MOVEMENT SUMMARY

Site: [B2022 AM - Abbott/Robert Grant]

Roundabout

Movement Performance - Vehicles											
Mov ID	OD Mov	Demand Flows Total veh/h	Demand Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Robert Grant Avenue											
1	L2	301	2.0	0.331	8.9	LOS A	2.2	15.9	0.13	0.56	54.3
3	R2	224	2.0	0.331	4.0	LOS A	2.2	15.9	0.13	0.56	53.1
Approach		525	2.0	0.331	6.8	LOS A	2.2	15.9	0.13	0.56	53.8
East: Abbott Street East											
4	L2	83	2.0	0.129	8.8	LOS A	0.7	4.8	0.45	0.60	46.7
5	T1	57	2.0	0.129	4.3	LOS A	0.7	4.8	0.45	0.60	46.5
Approach		140	2.0	0.129	7.0	LOS A	0.7	4.8	0.45	0.60	46.6
West: Abbott Street E											
11	T1	22	2.0	0.140	3.2	LOS A	0.8	5.6	0.25	0.41	48.6
12	R2	162	2.0	0.140	3.2	LOS A	0.8	5.6	0.25	0.41	47.4
Approach		184	2.0	0.140	3.2	LOS A	0.8	5.6	0.25	0.41	47.6
All Vehicles		849	2.0	0.331	6.0	LOS A	2.2	15.9	0.21	0.53	51.0

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

MOVEMENT SUMMARY

Site: [B2022 AM - Cope/Robert Grant]

Roundabout

Movement Performance - Vehicles											
Mov ID	OD Mov	Demand Flows Total veh/h	Demand Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Robert Grant											
1	L2	63	2.0	0.286	9.6	LOS A	1.8	13.0	0.39	0.51	54.5
2	T1	266	2.0	0.286	5.0	LOS A	1.8	13.0	0.39	0.51	54.5
3	R2	27	2.0	0.286	4.7	LOS A	1.8	13.0	0.39	0.51	53.2
Approach		357	2.0	0.286	5.8	LOS A	1.8	13.0	0.39	0.51	54.4
East: Cope											
4	L2	22	2.0	0.052	11.0	LOS B	0.3	2.0	0.54	0.64	53.4
5	T1	1	2.0	0.052	6.3	LOS A	0.3	2.0	0.54	0.64	53.4
6	R2	26	2.0	0.052	6.1	LOS A	0.3	2.0	0.54	0.64	52.2
Approach		49	2.0	0.052	8.3	LOS A	0.3	2.0	0.54	0.64	52.7
North: Robert Grant											
7	L2	20	2.0	0.252	9.2	LOS A	1.5	10.8	0.27	0.45	55.4
8	T1	265	2.0	0.252	4.6	LOS A	1.5	10.8	0.27	0.45	55.4
9	R2	58	2.0	0.252	4.3	LOS A	1.5	10.8	0.27	0.45	54.1
Approach		343	2.0	0.252	4.8	LOS A	1.5	10.8	0.27	0.45	55.2
West: Cope											
10	L2	126	2.0	0.246	10.5	LOS B	1.4	10.2	0.51	0.66	53.5
11	T1	3	2.0	0.246	5.9	LOS A	1.4	10.2	0.51	0.66	53.5
12	R2	133	2.0	0.246	5.6	LOS A	1.4	10.2	0.51	0.66	52.3
Approach		262	2.0	0.246	8.0	LOS A	1.4	10.2	0.51	0.66	52.9
All Vehicles		1012	2.0	0.286	6.1	LOS A	1.8	13.0	0.39	0.53	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.

MOVEMENT SUMMARY

Site: [B2022 PM - Cope/Robert Grant]

Roundabout

Movement Performance - Vehicles											
Mov ID	OD Mov	Demand Flows Total veh/h	Demand Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Robert Grant											
1	L2	122	2.0	0.294	9.2	LOS A	1.9	13.7	0.30	0.51	54.4
2	T1	253	2.0	0.294	4.6	LOS A	1.9	13.7	0.30	0.51	54.5
3	R2	24	2.0	0.294	4.4	LOS A	1.9	13.7	0.30	0.51	53.2
Approach		399	2.0	0.294	6.0	LOS A	1.9	13.7	0.30	0.51	54.4
East: Cope											
4	L2	37	2.0	0.073	11.0	LOS B	0.4	2.7	0.54	0.66	53.1
5	T1	1	2.0	0.073	6.3	LOS A	0.4	2.7	0.54	0.66	53.2
6	R2	32	2.0	0.073	6.1	LOS A	0.4	2.7	0.54	0.66	51.9
Approach		69	2.0	0.073	8.7	LOS A	0.4	2.7	0.54	0.66	52.6
North: Robert Grant											
7	L2	16	2.0	0.342	9.7	LOS A	2.2	15.7	0.40	0.50	54.9
8	T1	298	2.0	0.342	5.1	LOS A	2.2	15.7	0.40	0.50	55.0
9	R2	116	2.0	0.342	4.8	LOS A	2.2	15.7	0.40	0.50	53.6
Approach		429	2.0	0.342	5.2	LOS A	2.2	15.7	0.40	0.50	54.6
West: Cope											
10	L2	74	2.0	0.153	10.6	LOS B	0.9	6.1	0.52	0.65	53.5
11	T1	2	2.0	0.153	5.9	LOS A	0.9	6.1	0.52	0.65	53.5
12	R2	81	2.0	0.153	5.7	LOS A	0.9	6.1	0.52	0.65	52.3
Approach		157	2.0	0.153	8.0	LOS A	0.9	6.1	0.52	0.65	52.9
All Vehicles		1055	2.0	0.342	6.1	LOS A	2.2	15.7	0.39	0.54	54.1

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

MOVEMENT SUMMARY

Site: [B2022 PM - Abbott/Robert Grant]

Roundabout

Movement Performance - Vehicles											
Mov ID	OD Mov	Demand Flows Total veh/h	Demand Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Robert Grant Avenue											
1	L2	211	2.0	0.237	9.0	LOS A	1.5	10.7	0.21	0.56	53.9
3	R2	132	2.0	0.237	4.1	LOS A	1.5	10.7	0.21	0.56	52.7
Approach		342	2.0	0.237	7.1	LOS A	1.5	10.7	0.21	0.56	53.4
East: Abbott Street East											
4	L2	201	2.0	0.225	8.5	LOS A	1.3	9.1	0.42	0.60	46.3
5	T1	60	2.0	0.225	3.9	LOS A	1.3	9.1	0.42	0.60	46.2
Approach		261	2.0	0.225	7.4	LOS A	1.3	9.1	0.42	0.60	46.3
West: Abbott Street E											
11	T1	51	2.0	0.302	4.0	LOS A	1.9	13.7	0.45	0.50	48.0
12	R2	304	2.0	0.302	4.0	LOS A	1.9	13.7	0.45	0.50	46.9
Approach		355	2.0	0.302	4.0	LOS A	1.9	13.7	0.45	0.50	47.1
All Vehicles		958	2.0	0.302	6.0	LOS A	1.9	13.7	0.36	0.55	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.

MOVEMENT SUMMARY

Site: [B2024 AM - Cope/Robert Grant]

Roundabout

Movement Performance - Vehicles											
Mov ID	OD Mov	Demand Flows Total veh/h	Demand Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Robert Grant											
1	L2	63	2.0	0.293	9.6	LOS A	1.9	13.4	0.39	0.51	54.5
2	T1	276	2.0	0.293	5.0	LOS A	1.9	13.4	0.39	0.51	54.5
3	R2	27	2.0	0.293	4.7	LOS A	1.9	13.4	0.39	0.51	53.2
Approach		366	2.0	0.293	5.7	LOS A	1.9	13.4	0.39	0.51	54.4
East: Cope											
4	L2	22	2.0	0.053	11.0	LOS B	0.3	2.0	0.55	0.64	53.3
5	T1	1	2.0	0.053	6.4	LOS A	0.3	2.0	0.55	0.64	53.4
6	R2	26	2.0	0.053	6.2	LOS A	0.3	2.0	0.55	0.64	52.2
Approach		49	2.0	0.053	8.3	LOS A	0.3	2.0	0.55	0.64	52.7
North: Robert Grant											
7	L2	20	2.0	0.255	9.2	LOS A	1.6	11.1	0.27	0.45	55.4
8	T1	271	2.0	0.255	4.6	LOS A	1.6	11.1	0.27	0.45	55.4
9	R2	58	2.0	0.255	4.3	LOS A	1.6	11.1	0.27	0.45	54.1
Approach		348	2.0	0.255	4.8	LOS A	1.6	11.1	0.27	0.45	55.2
West: Cope											
10	L2	126	2.0	0.247	10.5	LOS B	1.4	10.2	0.51	0.66	53.4
11	T1	3	2.0	0.247	5.9	LOS A	1.4	10.2	0.51	0.66	53.5
12	R2	133	2.0	0.247	5.7	LOS A	1.4	10.2	0.51	0.66	52.3
Approach		262	2.0	0.247	8.0	LOS A	1.4	10.2	0.51	0.66	52.8
All Vehicles		1026	2.0	0.293	6.1	LOS A	1.9	13.4	0.39	0.53	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.

MOVEMENT SUMMARY

Site: [B2024 AM - Abbott/Robert Grant]

Roundabout

Movement Performance - Vehicles											
Mov ID	OD Mov	Demand Flows Total veh/h	Demand Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Robert Grant Avenue											
1	L2	301	2.0	0.332	8.9	LOS A	2.2	15.9	0.13	0.56	54.3
3	R2	225	2.0	0.332	4.0	LOS A	2.2	15.9	0.13	0.56	53.1
Approach		526	2.0	0.332	6.8	LOS A	2.2	15.9	0.13	0.56	53.8
East: Abbott Street East											
4	L2	83	2.0	0.129	8.8	LOS A	0.7	4.8	0.45	0.60	46.7
5	T1	57	2.0	0.129	4.3	LOS A	0.7	4.8	0.45	0.60	46.5
Approach		140	2.0	0.129	7.0	LOS A	0.7	4.8	0.45	0.60	46.6
West: Abbott Street E											
11	T1	22	2.0	0.140	3.2	LOS A	0.8	5.6	0.25	0.41	48.6
12	R2	162	2.0	0.140	3.2	LOS A	0.8	5.6	0.25	0.41	47.4
Approach		184	2.0	0.140	3.2	LOS A	0.8	5.6	0.25	0.41	47.6
All Vehicles		851	2.0	0.332	6.0	LOS A	2.2	15.9	0.21	0.53	51.0

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

MOVEMENT SUMMARY

Site: [B2024 PM - Cope/Robert Grant]

Roundabout

Movement Performance - Vehicles											
Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Robert Grant											
1	L2	122	2.0	0.301	9.3	LOS A	2.0	14.2	0.32	0.51	54.4
2	T1	259	2.0	0.301	4.6	LOS A	2.0	14.2	0.32	0.51	54.5
3	R2	24	2.0	0.301	4.4	LOS A	2.0	14.2	0.32	0.51	53.2
Approach		405	2.0	0.301	6.0	LOS A	2.0	14.2	0.32	0.51	54.4
East: Cope											
4	L2	37	2.0	0.073	11.0	LOS B	0.4	2.8	0.55	0.66	53.1
5	T1	1	2.0	0.073	6.4	LOS A	0.4	2.8	0.55	0.66	53.1
6	R2	32	2.0	0.073	6.1	LOS A	0.4	2.8	0.55	0.66	51.9
Approach		69	2.0	0.073	8.7	LOS A	0.4	2.8	0.55	0.66	52.5
North: Robert Grant											
7	L2	16	2.0	0.348	9.7	LOS A	2.3	16.1	0.41	0.51	54.9
8	T1	306	2.0	0.348	5.1	LOS A	2.3	16.1	0.41	0.51	54.9
9	R2	116	2.0	0.348	4.8	LOS A	2.3	16.1	0.41	0.51	53.6
Approach		438	2.0	0.348	5.2	LOS A	2.3	16.1	0.41	0.51	54.6
West: Cope											
10	L2	74	2.0	0.160	10.6	LOS B	0.9	6.4	0.52	0.66	53.5
11	T1	7	2.0	0.160	6.0	LOS A	0.9	6.4	0.52	0.66	53.5
12	R2	81	2.0	0.160	5.8	LOS A	0.9	6.4	0.52	0.66	52.3
Approach		162	2.0	0.160	8.0	LOS A	0.9	6.4	0.52	0.66	52.9
All Vehicles		1075	2.0	0.348	6.2	LOS A	2.3	16.1	0.40	0.54	54.1

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

MOVEMENT SUMMARY

Site: [B2024 PM - Abbott/Robert Grant]

Roundabout

Movement Performance - Vehicles											
Mov ID	OD Mov	Demand Flows Total veh/h	Demand Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Robert Grant Avenue											
1	L2	211	2.0	0.238	9.0	LOS A	1.5	10.7	0.21	0.56	53.9
3	R2	133	2.0	0.238	4.1	LOS A	1.5	10.7	0.21	0.56	52.7
Approach		343	2.0	0.238	7.1	LOS A	1.5	10.7	0.21	0.56	53.4
East: Abbott Street East											
4	L2	201	2.0	0.225	8.5	LOS A	1.3	9.1	0.42	0.60	46.3
5	T1	60	2.0	0.225	3.9	LOS A	1.3	9.1	0.42	0.60	46.2
Approach		261	2.0	0.225	7.4	LOS A	1.3	9.1	0.42	0.60	46.3
West: Abbott Street E											
11	T1	51	2.0	0.302	4.0	LOS A	1.9	13.7	0.45	0.50	48.0
12	R2	304	2.0	0.302	4.0	LOS A	1.9	13.7	0.45	0.50	46.9
Approach		355	2.0	0.302	4.0	LOS A	1.9	13.7	0.45	0.50	47.1
All Vehicles		959	2.0	0.302	6.0	LOS A	1.9	13.7	0.36	0.55	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.

MOVEMENT SUMMARY

Site: [B2029 AM - Cope/Robert Grant]

Roundabout

Movement Performance - Vehicles											
Mov ID	OD Mov	Demand Flows Total veh/h	Demand Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Robert Grant											
1	L2	63	2.0	0.343	9.6	LOS A	2.3	16.7	0.41	0.51	54.4
2	T1	341	2.0	0.343	5.0	LOS A	2.3	16.7	0.41	0.51	54.5
3	R2	27	2.0	0.343	4.8	LOS A	2.3	16.7	0.41	0.51	53.2
Approach		432	2.0	0.343	5.7	LOS A	2.3	16.7	0.41	0.51	54.4
East: Cope											
4	L2	22	2.0	0.056	11.4	LOS B	0.3	2.2	0.59	0.66	53.0
5	T1	1	2.0	0.056	6.8	LOS A	0.3	2.2	0.59	0.66	53.1
6	R2	26	2.0	0.056	6.6	LOS A	0.3	2.2	0.59	0.66	51.9
Approach		49	2.0	0.056	8.7	LOS A	0.3	2.2	0.59	0.66	52.4
North: Robert Grant											
7	L2	20	2.0	0.282	9.2	LOS A	1.8	12.6	0.28	0.45	55.3
8	T1	308	2.0	0.282	4.6	LOS A	1.8	12.6	0.28	0.45	55.4
9	R2	58	2.0	0.282	4.3	LOS A	1.8	12.6	0.28	0.45	54.1
Approach		386	2.0	0.282	4.8	LOS A	1.8	12.6	0.28	0.45	55.2
West: Cope											
10	L2	126	2.0	0.254	10.8	LOS B	1.5	10.6	0.54	0.68	53.3
11	T1	3	2.0	0.254	6.1	LOS A	1.5	10.6	0.54	0.68	53.4
12	R2	133	2.0	0.254	5.9	LOS A	1.5	10.6	0.54	0.68	52.2
Approach		262	2.0	0.254	8.2	LOS A	1.5	10.6	0.54	0.68	52.7
All Vehicles		1129	2.0	0.343	6.1	LOS A	2.3	16.7	0.41	0.54	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.

MOVEMENT SUMMARY

Site: [B2029 AM - Abbott/Robert Grant]

Roundabout

Movement Performance - Vehicles											
Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Robert Grant Avenue											
1	L2	117	2.0	0.409	9.1	LOS A	3.0	21.2	0.27	0.48	55.1
2	T1	258	0.0	0.409	4.5	LOS A	3.0	21.2	0.27	0.48	55.2
3	R2	223	2.0	0.409	4.3	LOS A	3.0	21.2	0.27	0.48	53.8
Approach		598	1.1	0.409	5.3	LOS A	3.0	21.2	0.27	0.48	54.6
East: Abbott Street East											
4	L2	83	2.0	0.161	9.6	LOS A	0.9	6.3	0.54	0.64	47.0
5	T1	57	2.0	0.161	5.1	LOS A	0.9	6.3	0.54	0.64	46.9
6	R2	21	0.0	0.161	5.0	LOS A	0.9	6.3	0.54	0.64	48.9
Approach		161	1.7	0.161	7.4	LOS A	0.9	6.3	0.54	0.64	47.2
North: RoadName											
7	L2	21	0.0	0.166	10.0	LOS B	0.9	6.4	0.44	0.55	54.5
8	T1	144	0.0	0.166	5.4	LOS A	0.9	6.4	0.44	0.55	54.5
9	R2	21	0.0	0.166	5.2	LOS A	0.9	6.4	0.44	0.55	53.2
Approach		186	0.0	0.166	5.9	LOS A	0.9	6.4	0.44	0.55	54.4
West: Abbott Street E											
10	L2	21	0.0	0.091	8.8	LOS A	0.5	3.4	0.41	0.53	51.7
11	T1	22	2.0	0.091	4.3	LOS A	0.5	3.4	0.41	0.53	48.4
12	R2	59	2.0	0.091	4.2	LOS A	0.5	3.4	0.41	0.53	47.2
Approach		102	1.6	0.091	5.2	LOS A	0.5	3.4	0.41	0.53	48.3
All Vehicles		1047	1.1	0.409	5.7	LOS A	3.0	21.2	0.35	0.52	52.6

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

MOVEMENT SUMMARY

Site: [B2029 PM - Cope/Robert Grant]

Roundabout

Movement Performance - Vehicles											
Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Robert Grant											
1	L2	122	2.0	0.328	9.3	LOS A	2.3	16.1	0.32	0.50	54.5
2	T1	301	2.0	0.328	4.6	LOS A	2.3	16.1	0.32	0.50	54.5
3	R2	24	2.0	0.328	4.4	LOS A	2.3	16.1	0.32	0.50	53.3
Approach		447	2.0	0.328	5.9	LOS A	2.3	16.1	0.32	0.50	54.5
East: Cope											
4	L2	37	2.0	0.076	11.3	LOS B	0.4	2.9	0.57	0.67	52.9
5	T1	1	2.0	0.076	6.6	LOS A	0.4	2.9	0.57	0.67	52.9
6	R2	32	2.0	0.076	6.4	LOS A	0.4	2.9	0.57	0.67	51.7
Approach		69	2.0	0.076	9.0	LOS A	0.4	2.9	0.57	0.67	52.4
North: Robert Grant											
7	L2	16	2.0	0.395	9.8	LOS A	2.7	19.2	0.43	0.51	54.8
8	T1	368	2.0	0.395	5.1	LOS A	2.7	19.2	0.43	0.51	54.9
9	R2	116	2.0	0.395	4.9	LOS A	2.7	19.2	0.43	0.51	53.5
Approach		500	2.0	0.395	5.2	LOS A	2.7	19.2	0.43	0.51	54.5
West: Cope											
10	L2	74	2.0	0.163	11.0	LOS B	0.9	6.6	0.57	0.68	53.2
11	T1	2	2.0	0.163	6.4	LOS A	0.9	6.6	0.57	0.68	53.3
12	R2	81	2.0	0.163	6.1	LOS A	0.9	6.6	0.57	0.68	52.1
Approach		157	2.0	0.163	8.4	LOS A	0.9	6.6	0.57	0.68	52.6
All Vehicles		1174	2.0	0.395	6.1	LOS A	2.7	19.2	0.41	0.54	54.1

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

MOVEMENT SUMMARY

Site: [B2029 PM - Abbott/Robert Grant]

Roundabout

Movement Performance - Vehicles											
Mov ID	OD Mov	Demand Flows Total veh/h	Demand Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Robert Grant Avenue											
1	L2	74	2.0	0.292	9.2	LOS A	1.9	13.7	0.31	0.49	54.9
2	T1	192	0.0	0.292	4.6	LOS A	1.9	13.7	0.31	0.49	55.0
3	R2	132	2.0	0.292	4.4	LOS A	1.9	13.7	0.31	0.49	53.7
Approach		397	1.0	0.292	5.4	LOS A	1.9	13.7	0.31	0.49	54.6
East: Abbott Street East											
4	L2	201	2.0	0.260	9.1	LOS A	1.5	10.9	0.50	0.64	46.6
5	T1	60	2.0	0.260	4.5	LOS A	1.5	10.9	0.50	0.64	46.4
6	R2	21	0.0	0.260	4.5	LOS A	1.5	10.9	0.50	0.64	48.4
Approach		282	1.9	0.260	7.8	LOS A	1.5	10.9	0.50	0.64	46.7
North: RoadName											
7	L2	21	0.0	0.297	10.7	LOS B	1.9	13.0	0.56	0.61	54.0
8	T1	268	0.0	0.297	6.1	LOS A	1.9	13.0	0.56	0.61	54.1
9	R2	21	0.0	0.297	5.8	LOS A	1.9	13.0	0.56	0.61	52.8
Approach		311	0.0	0.297	6.4	LOS A	1.9	13.0	0.56	0.61	54.0
West: Abbott Street E											
10	L2	21	0.0	0.200	10.2	LOS B	1.2	8.3	0.62	0.66	50.7
11	T1	51	2.0	0.200	5.7	LOS A	1.2	8.3	0.62	0.66	47.5
12	R2	113	2.0	0.200	5.7	LOS A	1.2	8.3	0.62	0.66	46.4
Approach		184	1.8	0.200	6.2	LOS A	1.2	8.3	0.62	0.66	47.2
All Vehicles		1174	1.1	0.297	6.3	LOS A	1.9	13.7	0.47	0.58	51.1

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

Appendix L

Synchro and SIDRA Total Projected Analysis

Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	37	323	204	236	354	36
Future Volume (vph)	37	323	204	236	354	36
Lane Group Flow (vph)	39	340	215	248	373	38
Turn Type	Prot	NA	NA	Perm	Prot	Perm
Protected Phases	5	2	6		4	
Permitted Phases				6		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)	11.2	24.6	24.6	24.6	24.0	24.0
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)	-2.2	-2.2	-2.2	-2.2	-2.0	-2.0
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Lead/Lag	Lead		Lag	Lag		
Lead-Lag Optimize?	Yes		Yes	Yes		
Recall Mode	None	None	None	None	None	None
Act Effct Green (s)	9.9	24.7	17.7	17.7	20.9	20.9
Actuated g/C Ratio	0.18	0.45	0.33	0.33	0.38	0.38
v/c Ratio	0.13	0.42	0.37	0.38	0.57	0.06
Control Delay	26.2	12.2	20.3	5.1	19.1	5.6
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	26.2	12.2	20.3	5.1	19.1	5.6
LOS	C	B	C	A	B	A
Approach Delay		13.6	12.1		17.9	
Approach LOS		B	B		B	
Queue Length 50th (m)	3.6	20.5	18.7	0.0	31.2	0.0
Queue Length 95th (m)	13.0	46.8	42.9	15.1	64.8	5.1
Internal Link Dist (m)		137.3	306.8		567.1	
Turn Bay Length (m)	100.0			115.0	95.0	
Base Capacity (vph)	762	1784	1579	1371	1098	996
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.05	0.19	0.14	0.18	0.34	0.04

Intersection Summary

Cycle Length: 119.4
Actuated Cycle Length: 54.4
Natural Cycle: 60
Control Type: Actuated-Uncoordinated
Maximum v/c Ratio: 0.57
Intersection Signal Delay: 14.5 Intersection LOS: B
Intersection Capacity Utilization 46.2% ICU Level of Service A
Analysis Period (min) 15

Splits and Phases: 2: Fernbank & Robert Grant

Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	32	271	447	368	282	36
Future Volume (vph)	32	271	447	368	282	36
Lane Group Flow (vph)	34	285	471	387	297	38
Turn Type	Prot	NA	NA	Perm	Prot	Perm
Protected Phases	5	2	6		4	
Permitted Phases				6		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)	11.2	24.6	24.6	24.6	24.0	24.0
Total Split (s)	26.2	78.4	52.2	52.2	36.0	36.0
Total Split (%)	22.9%	68.5%	45.6%	45.6%	31.5%	31.5%
Yellow Time (s)	4.6	4.6	4.6	4.6	3.3	3.3
All-Red Time (s)	1.6	1.6	1.6	1.6	2.7	2.7
Lost Time Adjust (s)	-2.2	-2.2	-2.2	-2.2	-2.0	-2.0
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Lead/Lag	Lead		Lag	Lag		
Lead-Lag Optimize?	Yes		Yes	Yes		
Recall Mode	None	None	None	None	None	None
Act Effct Green (s)	10.5	35.9	29.0	29.0	21.2	21.2
Actuated g/C Ratio	0.16	0.54	0.44	0.44	0.32	0.32
v/c Ratio	0.13	0.30	0.61	0.44	0.55	0.07
Control Delay	35.8	9.0	20.6	3.6	27.1	8.6
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	35.8	9.0	20.6	3.6	27.1	8.6
LOS	D	A	C	A	C	A
Approach Delay		11.8	13.0		25.0	
Approach LOS		B	B		C	
Queue Length 50th (m)	4.0	16.2	48.3	0.0	33.1	0.0
Queue Length 95th (m)	15.2	37.7	99.5	15.6	75.2	7.0
Internal Link Dist (m)		137.3	306.8		567.1	
Turn Bay Length (m)	100.0			115.0	95.0	
Base Capacity (vph)	662	1652	1335	1233	954	871
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.05	0.17	0.35	0.31	0.31	0.04

Intersection Summary

Cycle Length: 114.4
Actuated Cycle Length: 66.5
Natural Cycle: 60
Control Type: Actuated-Uncoordinated
Maximum v/c Ratio: 0.61
Intersection Signal Delay: 15.4 — Intersection LOS: B
Intersection Capacity Utilization 51.2% — ICU Level of Service A
Analysis Period (min) 15

Splits and Phases: 2: Fernbank & Robert Grant

Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	37	335	204	236	360	36
Future Volume (vph)	37	335	204	236	360	36
Lane Group Flow (vph)	39	353	215	248	379	38
Turn Type	Prot	NA	NA	Perm	Prot	Perm
Protected Phases	5	2	6		4	
Permitted Phases				6		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)	11.2	24.6	24.6	24.6	24.0	24.0
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)	-2.2	-2.2	-2.2	-2.2	-2.0	-2.0
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Lead/Lag	Lead		Lag	Lag		
Lead-Lag Optimize?	Yes		Yes	Yes		
Recall Mode	None	None	None	None	None	None
Act Effct Green (s)	9.8	24.9	17.9	17.9	21.3	21.3
Actuated g/C Ratio	0.18	0.45	0.33	0.33	0.39	0.39
v/c Ratio	0.13	0.44	0.37	0.38	0.58	0.06
Control Delay	26.5	12.6	20.5	5.1	19.1	5.5
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	26.5	12.6	20.5	5.1	19.1	5.5
LOS	C	B	C	A	B	A
Approach Delay		14.0	12.3		17.9	
Approach LOS		B	B		B	
Queue Length 50th (m)	3.7	21.9	19.0	0.0	31.9	0.0
Queue Length 95th (m)	13.1	49.4	43.3	15.1	65.7	5.1
Internal Link Dist (m)		137.3	306.8		567.1	
Turn Bay Length (m)	100.0			115.0	95.0	
Base Capacity (vph)	751	1784	1573	1367	1082	982
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.05	0.20	0.14	0.18	0.35	0.04

Intersection Summary	
Cycle Length: 119.4	
Actuated Cycle Length: 55	
Natural Cycle: 60	
Control Type: Actuated-Uncoordinated	
Maximum v/c Ratio: 0.58	
Intersection Signal Delay: 14.6	Intersection LOS: B
Intersection Capacity Utilization 46.6%	ICU Level of Service A
Analysis Period (min) 15	

Splits and Phases: 2: Fernbank & Robert Grant

Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	32	281	447	368	288	36
Future Volume (vph)	32	281	447	368	288	36
Lane Group Flow (vph)	34	296	471	387	303	38
Turn Type	Prot	NA	NA	Perm	Prot	Perm
Protected Phases	5	2	6		4	
Permitted Phases				6		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)	11.2	24.6	24.6	24.6	24.0	24.0
Total Split (s)	26.2	78.4	52.2	52.2	36.0	36.0
Total Split (%)	22.9%	68.5%	45.6%	45.6%	31.5%	31.5%
Yellow Time (s)	4.6	4.6	4.6	4.6	3.3	3.3
All-Red Time (s)	1.6	1.6	1.6	1.6	2.7	2.7
Lost Time Adjust (s)	-2.2	-2.2	-2.2	-2.2	-2.0	-2.0
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Lead/Lag	Lead		Lag	Lag		
Lead-Lag Optimize?	Yes		Yes	Yes		
Recall Mode	None	None	None	None	None	None
Act Effct Green (s)	10.5	36.0	29.1	29.1	21.4	21.4
Actuated g/C Ratio	0.16	0.54	0.44	0.44	0.32	0.32
v/c Ratio	0.13	0.31	0.61	0.44	0.56	0.07
Control Delay	35.9	9.2	20.7	3.6	27.4	8.6
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	35.9	9.2	20.7	3.6	27.4	8.6
LOS	D	A	C	A	C	A
Approach Delay		11.9	13.0		25.3	
Approach LOS		B	B		C	
Queue Length 50th (m)	4.1	17.1	48.9	0.0	34.2	0.0
Queue Length 95th (m)	15.2	39.2	99.5	15.6	76.8	7.0
Internal Link Dist (m)		137.3	306.8		567.1	
Turn Bay Length (m)	100.0			115.0	95.0	
Base Capacity (vph)	659	1649	1332	1230	951	867
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.05	0.18	0.35	0.31	0.32	0.04

Intersection Summary	
Cycle Length: 114.4	
Actuated Cycle Length: 66.8	
Natural Cycle: 60	
Control Type: Actuated-Uncoordinated	
Maximum v/c Ratio: 0.61	
Intersection Signal Delay: 15.5	Intersection LOS: B
Intersection Capacity Utilization 51.6%	ICU Level of Service A
Analysis Period (min) 15	

Splits and Phases: 2: Fernbank & Robert Grant

Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	50	364	204	311	406	48
Future Volume (vph)	50	364	204	311	406	48
Lane Group Flow (vph)	53	383	215	327	427	51
Turn Type	Prot	NA	NA	Perm	Prot	Perm
Protected Phases	5	2	6		4	
Permitted Phases				6		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)	11.2	24.6	24.6	24.6	24.0	24.0
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)	-2.2	-2.2	-2.2	-2.2	-2.0	-2.0
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Lead/Lag	Lead		Lag	Lag		
Lead-Lag Optimize?	Yes		Yes	Yes		
Recall Mode	None	None	None	None	None	None
Act Effct Green (s)	10.1	26.5	18.8	18.8	26.8	26.8
Actuated g/C Ratio	0.16	0.43	0.30	0.30	0.43	0.43
v/c Ratio	0.19	0.50	0.40	0.48	0.58	0.07
Control Delay	28.9	15.4	23.1	5.5	19.2	5.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	28.9	15.4	23.1	5.5	19.2	5.0
LOS	C	B	C	A	B	A
Approach Delay		17.1	12.5		17.7	
Approach LOS		B	B		B	
Queue Length 50th (m)	5.8	30.5	22.4	0.0	39.3	0.0
Queue Length 95th (m)	16.7	55.5	44.6	17.4	79.9	6.1
Internal Link Dist (m)		137.3	306.8		567.1	
Turn Bay Length (m)	100.0			115.0	95.0	
Base Capacity (vph)	647	1782	1502	1329	933	857
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.08	0.21	0.14	0.25	0.46	0.06

Intersection Summary

Cycle Length: 119.4
Actuated Cycle Length: 61.8
Natural Cycle: 60
Control Type: Actuated-Uncoordinated
Maximum v/c Ratio: 0.58
Intersection Signal Delay: 15.6 Intersection LOS: B
Intersection Capacity Utilization 50.6% ICU Level of Service A
Analysis Period (min) 15

Splits and Phases: 2: Fernbank & Robert Grant

Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	40	305	447	453	337	48
Future Volume (vph)	40	305	447	453	337	48
Lane Group Flow (vph)	42	321	471	477	355	51
Turn Type	Prot	NA	NA	Perm	Prot	Perm
Protected Phases	5	2	6		4	
Permitted Phases				6		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)	11.2	24.6	24.6	24.6	24.0	24.0
Total Split (s)	26.2	78.4	52.2	52.2	36.0	36.0
Total Split (%)	22.9%	68.5%	45.6%	45.6%	31.5%	31.5%
Yellow Time (s)	4.6	4.6	4.6	4.6	3.3	3.3
All-Red Time (s)	1.6	1.6	1.6	1.6	2.7	2.7
Lost Time Adjust (s)	-2.2	-2.2	-2.2	-2.2	-2.0	-2.0
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Lead/Lag	Lead		Lag	Lag		
Lead-Lag Optimize?	Yes		Yes	Yes		
Recall Mode	None	None	None	None	None	None
Act Effct Green (s)	10.9	37.8	30.6	30.6	23.9	23.9
Actuated g/C Ratio	0.15	0.53	0.43	0.43	0.34	0.34
v/c Ratio	0.16	0.34	0.61	0.52	0.62	0.09
Control Delay	37.8	10.1	22.0	3.9	29.6	7.9
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	37.8	10.1	22.0	3.9	29.6	7.9
LOS	D	B	C	A	C	A
Approach Delay		13.3	12.9		26.9	
Approach LOS		B	B		C	
Queue Length 50th (m)	5.6	21.9	54.3	0.0	44.6	0.0
Queue Length 95th (m)	18.1	42.5	100.6	16.9	94.3	8.3
Internal Link Dist (m)		137.3	306.8		567.1	
Turn Bay Length (m)	100.0			115.0	95.0	
Base Capacity (vph)	618	1604	1291	1229	891	822
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	0.07	0.20	0.36	0.39	0.40	0.06

Intersection Summary

Cycle Length: 114.4
Actuated Cycle Length: 71.1
Natural Cycle: 60
Control Type: Actuated-Uncoordinated
Maximum v/c Ratio: 0.62
Intersection Signal Delay: 16.3 Intersection LOS: B
Intersection Capacity Utilization 58.7% ICU Level of Service B
Analysis Period (min) 15

Splits and Phases: 2: Fernbank & Robert Grant

MOVEMENT SUMMARY

Site: [B2022 AM - Abbott/Robert Grant]

Roundabout

Movement Performance - Vehicles											
Mov ID	OD Mov	Demand Flows Total veh/h	Demand Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Robert Grant Avenue											
1	L2	301	2.0	0.331	8.9	LOS A	2.2	15.9	0.13	0.56	54.3
3	R2	224	2.0	0.331	4.0	LOS A	2.2	15.9	0.13	0.56	53.1
Approach		525	2.0	0.331	6.8	LOS A	2.2	15.9	0.13	0.56	53.8
East: Abbott Street East											
4	L2	83	2.0	0.129	8.8	LOS A	0.7	4.8	0.45	0.60	46.7
5	T1	57	2.0	0.129	4.3	LOS A	0.7	4.8	0.45	0.60	46.5
Approach		140	2.0	0.129	7.0	LOS A	0.7	4.8	0.45	0.60	46.6
West: Abbott Street E											
11	T1	22	2.0	0.140	3.2	LOS A	0.8	5.6	0.25	0.41	48.6
12	R2	162	2.0	0.140	3.2	LOS A	0.8	5.6	0.25	0.41	47.4
Approach		184	2.0	0.140	3.2	LOS A	0.8	5.6	0.25	0.41	47.6
All Vehicles		849	2.0	0.331	6.0	LOS A	2.2	15.9	0.21	0.53	51.0

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

MOVEMENT SUMMARY

Site: [B2022 AM - Cope/Robert Grant]

Roundabout

Movement Performance - Vehicles											
Mov ID	OD Mov	Demand Flows Total veh/h	Demand Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Robert Grant											
1	L2	63	2.0	0.286	9.6	LOS A	1.8	13.0	0.39	0.51	54.5
2	T1	266	2.0	0.286	5.0	LOS A	1.8	13.0	0.39	0.51	54.5
3	R2	27	2.0	0.286	4.7	LOS A	1.8	13.0	0.39	0.51	53.2
Approach		357	2.0	0.286	5.8	LOS A	1.8	13.0	0.39	0.51	54.4
East: Cope											
4	L2	22	2.0	0.052	11.0	LOS B	0.3	2.0	0.54	0.64	53.4
5	T1	1	2.0	0.052	6.3	LOS A	0.3	2.0	0.54	0.64	53.4
6	R2	26	2.0	0.052	6.1	LOS A	0.3	2.0	0.54	0.64	52.2
Approach		49	2.0	0.052	8.3	LOS A	0.3	2.0	0.54	0.64	52.7
North: Robert Grant											
7	L2	20	2.0	0.252	9.2	LOS A	1.5	10.8	0.27	0.45	55.4
8	T1	265	2.0	0.252	4.6	LOS A	1.5	10.8	0.27	0.45	55.4
9	R2	58	2.0	0.252	4.3	LOS A	1.5	10.8	0.27	0.45	54.1
Approach		343	2.0	0.252	4.8	LOS A	1.5	10.8	0.27	0.45	55.2
West: Cope											
10	L2	126	2.0	0.246	10.5	LOS B	1.4	10.2	0.51	0.66	53.5
11	T1	3	2.0	0.246	5.9	LOS A	1.4	10.2	0.51	0.66	53.5
12	R2	133	2.0	0.246	5.6	LOS A	1.4	10.2	0.51	0.66	52.3
Approach		262	2.0	0.246	8.0	LOS A	1.4	10.2	0.51	0.66	52.9
All Vehicles		1012	2.0	0.286	6.1	LOS A	1.8	13.0	0.39	0.53	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.

MOVEMENT SUMMARY

Site: [B2022 PM - Cope/Robert Grant]

Roundabout

Movement Performance - Vehicles											
Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Robert Grant											
1	L2	122	2.0	0.294	9.2	LOS A	1.9	13.7	0.30	0.51	54.4
2	T1	253	2.0	0.294	4.6	LOS A	1.9	13.7	0.30	0.51	54.5
3	R2	24	2.0	0.294	4.4	LOS A	1.9	13.7	0.30	0.51	53.2
Approach		399	2.0	0.294	6.0	LOS A	1.9	13.7	0.30	0.51	54.4
East: Cope											
4	L2	37	2.0	0.073	11.0	LOS B	0.4	2.7	0.54	0.66	53.1
5	T1	1	2.0	0.073	6.3	LOS A	0.4	2.7	0.54	0.66	53.2
6	R2	32	2.0	0.073	6.1	LOS A	0.4	2.7	0.54	0.66	51.9
Approach		69	2.0	0.073	8.7	LOS A	0.4	2.7	0.54	0.66	52.6
North: Robert Grant											
7	L2	16	2.0	0.342	9.7	LOS A	2.2	15.7	0.40	0.50	54.9
8	T1	298	2.0	0.342	5.1	LOS A	2.2	15.7	0.40	0.50	55.0
9	R2	116	2.0	0.342	4.8	LOS A	2.2	15.7	0.40	0.50	53.6
Approach		429	2.0	0.342	5.2	LOS A	2.2	15.7	0.40	0.50	54.6
West: Cope											
10	L2	74	2.0	0.153	10.6	LOS B	0.9	6.1	0.52	0.65	53.5
11	T1	2	2.0	0.153	5.9	LOS A	0.9	6.1	0.52	0.65	53.5
12	R2	81	2.0	0.153	5.7	LOS A	0.9	6.1	0.52	0.65	52.3
Approach		157	2.0	0.153	8.0	LOS A	0.9	6.1	0.52	0.65	52.9
All Vehicles		1055	2.0	0.342	6.1	LOS A	2.2	15.7	0.39	0.54	54.1

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

MOVEMENT SUMMARY

Site: [B2022 PM - Abbott/Robert Grant]

Roundabout

Movement Performance - Vehicles											
Mov ID	OD Mov	Demand Flows Total veh/h	Demand Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Robert Grant Avenue											
1	L2	211	2.0	0.237	9.0	LOS A	1.5	10.7	0.21	0.56	53.9
3	R2	132	2.0	0.237	4.1	LOS A	1.5	10.7	0.21	0.56	52.7
Approach		342	2.0	0.237	7.1	LOS A	1.5	10.7	0.21	0.56	53.4
East: Abbott Street East											
4	L2	201	2.0	0.225	8.5	LOS A	1.3	9.1	0.42	0.60	46.3
5	T1	60	2.0	0.225	3.9	LOS A	1.3	9.1	0.42	0.60	46.2
Approach		261	2.0	0.225	7.4	LOS A	1.3	9.1	0.42	0.60	46.3
West: Abbott Street E											
11	T1	51	2.0	0.302	4.0	LOS A	1.9	13.7	0.45	0.50	48.0
12	R2	304	2.0	0.302	4.0	LOS A	1.9	13.7	0.45	0.50	46.9
Approach		355	2.0	0.302	4.0	LOS A	1.9	13.7	0.45	0.50	47.1
All Vehicles		958	2.0	0.302	6.0	LOS A	1.9	13.7	0.36	0.55	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.

MOVEMENT SUMMARY

Site: [B2024 AM - Cope/Robert Grant]

Roundabout

Movement Performance - Vehicles											
Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Robert Grant											
1	L2	63	2.0	0.293	9.6	LOS A	1.9	13.4	0.39	0.51	54.5
2	T1	276	2.0	0.293	5.0	LOS A	1.9	13.4	0.39	0.51	54.5
3	R2	27	2.0	0.293	4.7	LOS A	1.9	13.4	0.39	0.51	53.2
Approach		366	2.0	0.293	5.7	LOS A	1.9	13.4	0.39	0.51	54.4
East: Cope											
4	L2	22	2.0	0.053	11.0	LOS B	0.3	2.0	0.55	0.64	53.3
5	T1	1	2.0	0.053	6.4	LOS A	0.3	2.0	0.55	0.64	53.4
6	R2	26	2.0	0.053	6.2	LOS A	0.3	2.0	0.55	0.64	52.2
Approach		49	2.0	0.053	8.3	LOS A	0.3	2.0	0.55	0.64	52.7
North: Robert Grant											
7	L2	20	2.0	0.255	9.2	LOS A	1.6	11.1	0.27	0.45	55.4
8	T1	271	2.0	0.255	4.6	LOS A	1.6	11.1	0.27	0.45	55.4
9	R2	58	2.0	0.255	4.3	LOS A	1.6	11.1	0.27	0.45	54.1
Approach		348	2.0	0.255	4.8	LOS A	1.6	11.1	0.27	0.45	55.2
West: Cope											
10	L2	126	2.0	0.247	10.5	LOS B	1.4	10.2	0.51	0.66	53.4
11	T1	3	2.0	0.247	5.9	LOS A	1.4	10.2	0.51	0.66	53.5
12	R2	133	2.0	0.247	5.7	LOS A	1.4	10.2	0.51	0.66	52.3
Approach		262	2.0	0.247	8.0	LOS A	1.4	10.2	0.51	0.66	52.8
All Vehicles		1026	2.0	0.293	6.1	LOS A	1.9	13.4	0.39	0.53	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.

MOVEMENT SUMMARY

Site: [B2024 AM - Abbott/Robert Grant]

Roundabout

Movement Performance - Vehicles											
Mov ID	OD Mov	Demand Flows Total veh/h	Demand Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Robert Grant Avenue											
1	L2	301	2.0	0.332	8.9	LOS A	2.2	15.9	0.13	0.56	54.3
3	R2	225	2.0	0.332	4.0	LOS A	2.2	15.9	0.13	0.56	53.1
Approach		526	2.0	0.332	6.8	LOS A	2.2	15.9	0.13	0.56	53.8
East: Abbott Street East											
4	L2	83	2.0	0.129	8.8	LOS A	0.7	4.8	0.45	0.60	46.7
5	T1	57	2.0	0.129	4.3	LOS A	0.7	4.8	0.45	0.60	46.5
Approach		140	2.0	0.129	7.0	LOS A	0.7	4.8	0.45	0.60	46.6
West: Abbott Street E											
11	T1	22	2.0	0.140	3.2	LOS A	0.8	5.6	0.25	0.41	48.6
12	R2	162	2.0	0.140	3.2	LOS A	0.8	5.6	0.25	0.41	47.4
Approach		184	2.0	0.140	3.2	LOS A	0.8	5.6	0.25	0.41	47.6
All Vehicles		851	2.0	0.332	6.0	LOS A	2.2	15.9	0.21	0.53	51.0

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

MOVEMENT SUMMARY

Site: [B2024 PM - Cope/Robert Grant]

Roundabout

Movement Performance - Vehicles											
Mov ID	OD Mov	Demand Flows Total veh/h	Demand Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Robert Grant											
1	L2	122	2.0	0.301	9.3	LOS A	2.0	14.2	0.32	0.51	54.4
2	T1	259	2.0	0.301	4.6	LOS A	2.0	14.2	0.32	0.51	54.5
3	R2	24	2.0	0.301	4.4	LOS A	2.0	14.2	0.32	0.51	53.2
Approach		405	2.0	0.301	6.0	LOS A	2.0	14.2	0.32	0.51	54.4
East: Cope											
4	L2	37	2.0	0.073	11.0	LOS B	0.4	2.8	0.55	0.66	53.1
5	T1	1	2.0	0.073	6.4	LOS A	0.4	2.8	0.55	0.66	53.1
6	R2	32	2.0	0.073	6.1	LOS A	0.4	2.8	0.55	0.66	51.9
Approach		69	2.0	0.073	8.7	LOS A	0.4	2.8	0.55	0.66	52.5
North: Robert Grant											
7	L2	16	2.0	0.348	9.7	LOS A	2.3	16.1	0.41	0.51	54.9
8	T1	306	2.0	0.348	5.1	LOS A	2.3	16.1	0.41	0.51	54.9
9	R2	116	2.0	0.348	4.8	LOS A	2.3	16.1	0.41	0.51	53.6
Approach		438	2.0	0.348	5.2	LOS A	2.3	16.1	0.41	0.51	54.6
West: Cope											
10	L2	74	2.0	0.160	10.6	LOS B	0.9	6.4	0.52	0.66	53.5
11	T1	7	2.0	0.160	6.0	LOS A	0.9	6.4	0.52	0.66	53.5
12	R2	81	2.0	0.160	5.8	LOS A	0.9	6.4	0.52	0.66	52.3
Approach		162	2.0	0.160	8.0	LOS A	0.9	6.4	0.52	0.66	52.9
All Vehicles		1075	2.0	0.348	6.2	LOS A	2.3	16.1	0.40	0.54	54.1

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

MOVEMENT SUMMARY

Site: [B2024 PM - Abbott/Robert Grant]

Roundabout

Movement Performance - Vehicles											
Mov ID	OD Mov	Demand Flows Total veh/h	Demand Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Robert Grant Avenue											
1	L2	211	2.0	0.238	9.0	LOS A	1.5	10.7	0.21	0.56	53.9
3	R2	133	2.0	0.238	4.1	LOS A	1.5	10.7	0.21	0.56	52.7
Approach		343	2.0	0.238	7.1	LOS A	1.5	10.7	0.21	0.56	53.4
East: Abbott Street East											
4	L2	201	2.0	0.225	8.5	LOS A	1.3	9.1	0.42	0.60	46.3
5	T1	60	2.0	0.225	3.9	LOS A	1.3	9.1	0.42	0.60	46.2
Approach		261	2.0	0.225	7.4	LOS A	1.3	9.1	0.42	0.60	46.3
West: Abbott Street E											
11	T1	51	2.0	0.302	4.0	LOS A	1.9	13.7	0.45	0.50	48.0
12	R2	304	2.0	0.302	4.0	LOS A	1.9	13.7	0.45	0.50	46.9
Approach		355	2.0	0.302	4.0	LOS A	1.9	13.7	0.45	0.50	47.1
All Vehicles		959	2.0	0.302	6.0	LOS A	1.9	13.7	0.36	0.55	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.

MOVEMENT SUMMARY

Site: [B2029 AM - Cope/Robert Grant]

Roundabout

Movement Performance - Vehicles											
Mov ID	OD Mov	Demand Flows Total veh/h	Demand Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Robert Grant											
1	L2	63	2.0	0.343	9.6	LOS A	2.3	16.7	0.41	0.51	54.4
2	T1	341	2.0	0.343	5.0	LOS A	2.3	16.7	0.41	0.51	54.5
3	R2	27	2.0	0.343	4.8	LOS A	2.3	16.7	0.41	0.51	53.2
Approach		432	2.0	0.343	5.7	LOS A	2.3	16.7	0.41	0.51	54.4
East: Cope											
4	L2	22	2.0	0.056	11.4	LOS B	0.3	2.2	0.59	0.66	53.0
5	T1	1	2.0	0.056	6.8	LOS A	0.3	2.2	0.59	0.66	53.1
6	R2	26	2.0	0.056	6.6	LOS A	0.3	2.2	0.59	0.66	51.9
Approach		49	2.0	0.056	8.7	LOS A	0.3	2.2	0.59	0.66	52.4
North: Robert Grant											
7	L2	20	2.0	0.282	9.2	LOS A	1.8	12.6	0.28	0.45	55.3
8	T1	308	2.0	0.282	4.6	LOS A	1.8	12.6	0.28	0.45	55.4
9	R2	58	2.0	0.282	4.3	LOS A	1.8	12.6	0.28	0.45	54.1
Approach		386	2.0	0.282	4.8	LOS A	1.8	12.6	0.28	0.45	55.2
West: Cope											
10	L2	126	2.0	0.254	10.8	LOS B	1.5	10.6	0.54	0.68	53.3
11	T1	3	2.0	0.254	6.1	LOS A	1.5	10.6	0.54	0.68	53.4
12	R2	133	2.0	0.254	5.9	LOS A	1.5	10.6	0.54	0.68	52.2
Approach		262	2.0	0.254	8.2	LOS A	1.5	10.6	0.54	0.68	52.7
All Vehicles		1129	2.0	0.343	6.1	LOS A	2.3	16.7	0.41	0.54	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.

MOVEMENT SUMMARY

Site: [B2029 AM - Abbott/Robert Grant]

Roundabout

Mov ID	OD Mov	Demand Flows Total veh/h	Demand Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
Movement Performance - Vehicles											
South: Robert Grant Avenue											
1	L2	117	2.0	0.409	9.1	LOS A	3.0	21.2	0.27	0.48	55.1
2	T1	258	0.0	0.409	4.5	LOS A	3.0	21.2	0.27	0.48	55.2
3	R2	223	2.0	0.409	4.3	LOS A	3.0	21.2	0.27	0.48	53.8
Approach		598	1.1	0.409	5.3	LOS A	3.0	21.2	0.27	0.48	54.6
East: Abbott Street East											
4	L2	83	2.0	0.161	9.6	LOS A	0.9	6.3	0.54	0.64	47.0
5	T1	57	2.0	0.161	5.1	LOS A	0.9	6.3	0.54	0.64	46.9
6	R2	21	0.0	0.161	5.0	LOS A	0.9	6.3	0.54	0.64	48.9
Approach		161	1.7	0.161	7.4	LOS A	0.9	6.3	0.54	0.64	47.2
North: RoadName											
7	L2	21	0.0	0.166	10.0	LOS B	0.9	6.4	0.44	0.55	54.5
8	T1	144	0.0	0.166	5.4	LOS A	0.9	6.4	0.44	0.55	54.5
9	R2	21	0.0	0.166	5.2	LOS A	0.9	6.4	0.44	0.55	53.2
Approach		186	0.0	0.166	5.9	LOS A	0.9	6.4	0.44	0.55	54.4
West: Abbott Street E											
10	L2	21	0.0	0.091	8.8	LOS A	0.5	3.4	0.41	0.53	51.7
11	T1	22	2.0	0.091	4.3	LOS A	0.5	3.4	0.41	0.53	48.4
12	R2	59	2.0	0.091	4.2	LOS A	0.5	3.4	0.41	0.53	47.2
Approach		102	1.6	0.091	5.2	LOS A	0.5	3.4	0.41	0.53	48.3
All Vehicles		1047	1.1	0.409	5.7	LOS A	3.0	21.2	0.35	0.52	52.6

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

MOVEMENT SUMMARY

Site: [B2029 PM - Cope/Robert Grant]

Roundabout

Movement Performance - Vehicles											
Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Robert Grant											
1	L2	122	2.0	0.328	9.3	LOS A	2.3	16.1	0.32	0.50	54.5
2	T1	301	2.0	0.328	4.6	LOS A	2.3	16.1	0.32	0.50	54.5
3	R2	24	2.0	0.328	4.4	LOS A	2.3	16.1	0.32	0.50	53.3
Approach		447	2.0	0.328	5.9	LOS A	2.3	16.1	0.32	0.50	54.5
East: Cope											
4	L2	37	2.0	0.076	11.3	LOS B	0.4	2.9	0.57	0.67	52.9
5	T1	1	2.0	0.076	6.6	LOS A	0.4	2.9	0.57	0.67	52.9
6	R2	32	2.0	0.076	6.4	LOS A	0.4	2.9	0.57	0.67	51.7
Approach		69	2.0	0.076	9.0	LOS A	0.4	2.9	0.57	0.67	52.4
North: Robert Grant											
7	L2	16	2.0	0.395	9.8	LOS A	2.7	19.2	0.43	0.51	54.8
8	T1	368	2.0	0.395	5.1	LOS A	2.7	19.2	0.43	0.51	54.9
9	R2	116	2.0	0.395	4.9	LOS A	2.7	19.2	0.43	0.51	53.5
Approach		500	2.0	0.395	5.2	LOS A	2.7	19.2	0.43	0.51	54.5
West: Cope											
10	L2	74	2.0	0.163	11.0	LOS B	0.9	6.6	0.57	0.68	53.2
11	T1	2	2.0	0.163	6.4	LOS A	0.9	6.6	0.57	0.68	53.3
12	R2	81	2.0	0.163	6.1	LOS A	0.9	6.6	0.57	0.68	52.1
Approach		157	2.0	0.163	8.4	LOS A	0.9	6.6	0.57	0.68	52.6
All Vehicles		1174	2.0	0.395	6.1	LOS A	2.7	19.2	0.41	0.54	54.1

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

MOVEMENT SUMMARY

Site: [B2029 PM - Abbott/Robert Grant]

Roundabout

Movement Performance - Vehicles											
Mov ID	OD Mov	Demand Flows Total veh/h	Demand Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Robert Grant Avenue											
1	L2	74	2.0	0.292	9.2	LOS A	1.9	13.7	0.31	0.49	54.9
2	T1	192	0.0	0.292	4.6	LOS A	1.9	13.7	0.31	0.49	55.0
3	R2	132	2.0	0.292	4.4	LOS A	1.9	13.7	0.31	0.49	53.7
Approach		397	1.0	0.292	5.4	LOS A	1.9	13.7	0.31	0.49	54.6
East: Abbott Street East											
4	L2	201	2.0	0.260	9.1	LOS A	1.5	10.9	0.50	0.64	46.6
5	T1	60	2.0	0.260	4.5	LOS A	1.5	10.9	0.50	0.64	46.4
6	R2	21	0.0	0.260	4.5	LOS A	1.5	10.9	0.50	0.64	48.4
Approach		282	1.9	0.260	7.8	LOS A	1.5	10.9	0.50	0.64	46.7
North: RoadName											
7	L2	21	0.0	0.297	10.7	LOS B	1.9	13.0	0.56	0.61	54.0
8	T1	268	0.0	0.297	6.1	LOS A	1.9	13.0	0.56	0.61	54.1
9	R2	21	0.0	0.297	5.8	LOS A	1.9	13.0	0.56	0.61	52.8
Approach		311	0.0	0.297	6.4	LOS A	1.9	13.0	0.56	0.61	54.0
West: Abbott Street E											
10	L2	21	0.0	0.200	10.2	LOS B	1.2	8.3	0.62	0.66	50.7
11	T1	51	2.0	0.200	5.7	LOS A	1.2	8.3	0.62	0.66	47.5
12	R2	113	2.0	0.200	5.7	LOS A	1.2	8.3	0.62	0.66	46.4
Approach		184	1.8	0.200	6.2	LOS A	1.2	8.3	0.62	0.66	47.2
All Vehicles		1174	1.1	0.297	6.3	LOS A	1.9	13.7	0.47	0.58	51.1

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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.