KANATA-SUD ELEMENTARY SCHOOL TRANSPORTATION IMPACT ASSESSMENT

DECEMBER 12, 2022

FINAL

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FINAL

PROJECT NO.: NO. 219-00014-00

DATE: DECEMBER 12, 2022

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Certification Form for TIA Study PM

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

- ☑ 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;
- ☑ 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;
- ☑ 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
- ☑ I am either a licensed[1] or registered[2] professional in good standing, whose field of expertise
  - ☐ 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 (City) this 12 day of December, 20 22.

Name : Adam Howell, P.Eng.

Professional title: Project Manager, Transportation Planning

Signature of individual certifier that s/he meets the above criteria

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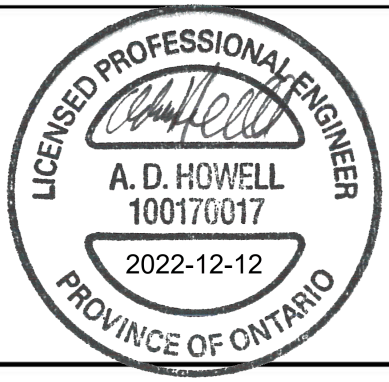

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1 SCREENING

This Transportation Impact Assessment (TIA) has been prepared to support the Site Plan Control application for the development at located at the northeast corner of Cope Drive and Dagenham Street municipally addressed as 755 Cope Drive in Ottawa. The TIA follows the City of Ottawa (the City) TIA Guidelines (2017) which include up to five steps:

1 Screening
2 Scoping
3 Forecasting
4 Analysis
5 TIA Submission

The Screening Step determines the need to continue with a Transportation Impact Assessment (TIA) Study. The development is assessed against three triggers: trip generation, location, and safety to identify the next step of the study. If one or more of the triggers is satisfied, the Scoping Step must be completed. If none of the triggers are satisfied, the TIA is deemed complete. If one or more triggers are satisfied, specific TIA components are required to be carried out depending on the combination of triggers (**Table 1-1**) that have been satisfied.

The proposed development at 755 Cope Drive **satisfies the Trip Generation and Location triggers** indicating that, as part of Steps Two through Five of the TIA process, the Design Review and Network Impact components should be completed. For reference, the completed Screening Form is provided in **Appendix A**.

Table 1-1. Transportation Impact Assessment (TIA) Screening Triggers

	TIA TRIGGERS SATISFIED		
Next Step of the TIA Process	**Trip Generation**	**Location**	**Safety**
Design Review and Network Impact	**Yes**	**Yes**	**No**

2 SCOPING

2.1 SCREENING FORM

The completed Screening Form is provided in **Appendix A**.

2.2 DESCRIPTION OF PROPOSED DEVELOPMENT

The Conseil des écoles publiques de l'Est Ontario (CEPEO) proposes to build a new elementary school located on the north side of Cope Drive and east of Dagenham Street on the property municipally addressed as 755 Cope Drive in Ottawa. The subject site is currently undeveloped greenfield with an area of approximately 2.88 hectares (28,889 m^2) and zoned as Minor Institutional Zone, Sub-zone B (I1B) and Residential First Density, Sub-zone Z (R1Z). As per the I1B zone, a school and a daycare are permitted uses. The subject site is bordered by Cope Drive along the south side, Dagenham Street on the west side, and low-density residential dwellings on both north and east sides. Residential developments are planned south of the subject site, while a community park is planned to the west of the site. The future Ottawa-Carleton District School Board (OCDSB) Stittsville High School, which is planned to open in 2022, will be located southeast of the subject development site at 700 Cope Drive.

The proposed school will include a two-storey building, with a Gross Floor Area (GFA) of approximately 4,781 m^2, providing capacity for 800 students and consisting of one (1) library, one (1) gymnasium, one (1) multi-purpose room, 12 portable classrooms, and 20 classrooms among which five (5) classrooms will be for daycare use. The most up-to-date draft site plan (December 1, 2022) is attached as **Appendix B.** The proposed vehicle accesses include:

- a passenger vehicle access from Dagenham Street to the 60-space surface parking lot and off-street drop-off area
- an access off Cope Drive for delivery and emergency vehicles
- school bus laybys along the north side of Cope Drive and east side of Dagenham Street with a portion of the layby area on Dagenham Street being dedicated for on-street passenger car drop-offs

Fifty parking spaces will be provided for bicycles within the subject site. **Figure 2-1** illustrates the Study Area Context. The development will be built as a single phase with an estimated date of completion in 2023.

Figure 2-1. Site Area Context

2.3 EXISTING CONDITIONS

2.3.1 ROADWAYS

The existing roadways in proximity to the subject development site that will be considered in the TIA include the following. The road classification for City of Ottawa roadways is defined in the City of Ottawa Official Plan, 2021, Volume 1, Section 7, Annex 1 Road Classifications and Rights-of-Way.

Robert Grant Avenue is an urban municipal arterial roadway running on a north-south alignment between Fernbank Road and Abbott Street E. Robert Grant Avenue currently features un undivided two-lane cross-section with wide buffer and sidewalk on both sides. The road right-of-way is approximately 44.5m and the posted speed limit is 60 km/h.

Abbott Street E. is identified as a city-owned major collector road running on an east-west alignment between Terry Fox Drive and Stittsville Main Street with a posted speed limit of 50 km/h. It is an undivided two-lane collector road with sidewalk on the north side and on-street bike lanes on both sides.

Bobolink Ridge is identified as an east-west local road between Goldhawk Drive and Asturcon Street with a posted speed limit of 40 km/h.

Cope Drive is designated as a city-owned major collector road on the section west of Terry Fox Drive. Cope Drive runs on an east-west alignment with a two-lane cross-section and currently terminates at Goldhawk Drive on the west end. The speed limit is unposted and assumed to be 50 km/h.

Fernbank Road is a city-owned arterial road currently remains with a two-lane rural arterial cross-section and paved shoulders on both sides. The section of Fernbank Road designated as arterial road runs east-west between Eagleson Road and Stittsville Main Street with a posted speed limit of 60 km/h.

2.3.2 INTERSECTIONS

The TIA will assess four (4) intersections as described in Table 2-1. The unconstructed intersection of Cope Drive and Dagenham Street is not described in Table 2-1 but will be assessed in the TIA.

Table 2-1. Description of Study Area Intersections

INTERSECTION (DESCRIPTION)	LANE CONFIGURATION
Robert Grant Avenue @ Abbott Street E. - Currently a three-leg roundabout with one travel lane for each direction - Level 2 Type D pedestrian crossover (PXO) installed over the south and west legs, and crosswalk over the east leg	

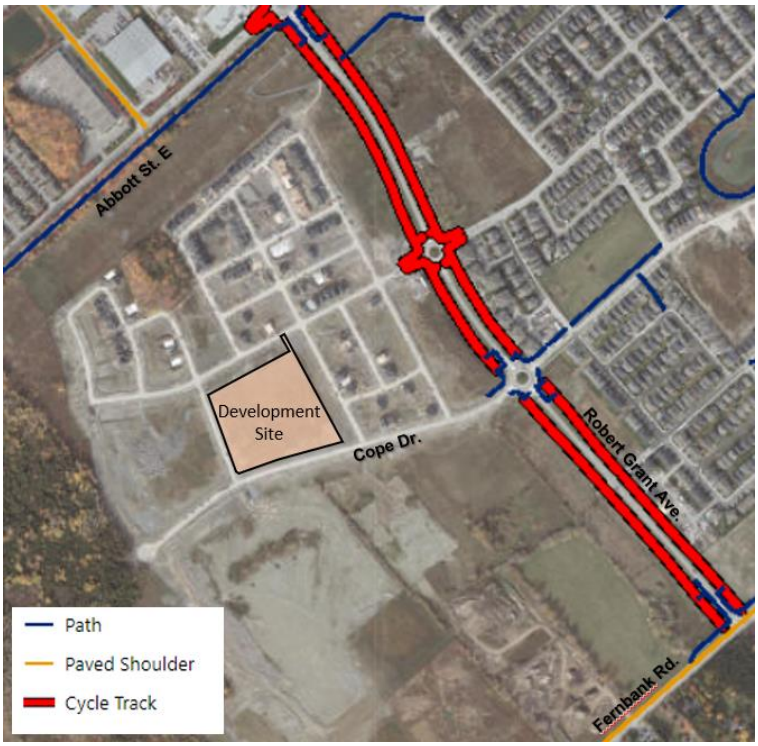
INTERSECTION (DESCRIPTION)	LANE CONFIGURATION
Robert Grant Avenue @ Bobolink Ridge - A four-leg roundabout with one travel lane for each direction - Level 2 Type D PXO over each leg	
Robert Grant Avenue @ Cope Drive - A four-leg roundabout with one travel lane for each direction - Level 2 Type D PXO over each leg	
Robert Grant Avenue @ Fernbank Road - Signalized T-intersection - One left-turn lane and one right-turn lane for southbound direction - One left turn lane and one through lane for eastbound direction - One through lane and one right-turn lane for westbound direction - Crosswalks on all approaches with bi-directional cross-ride on the north approach	

2.3.3 DRIVEWAYS

The area within 200m of the subject development site is under construction, thus there are no existing active driveways nearby.

There will be residential driveways on the west side of Dagenham Street, south side of Cope Drive in vicinity of the subject site, two sides on Finsbury Avenue and Bobolink Ridge. The future OCDSB Stittsville High School located at 700 Cope Drive will have a two-way access and a one-way access from Cope Drive.

2.3.4 PEDESTRIAN AND CYCLING FACILITIES



Pathways and unidirectional cycle tracks are in place along both sides of Robert Grant Avenue, and the Trans Canada Trail runs along the south side of Abbott Street E. There are existing paved shoulders on both sides of Fernbank Road.

Cope Drive will include a multi-use pathway (MUP) on the north side and a sidewalk on the south side based on the OCDSB Stittsville High School (700 Cope Drive) Traffic Plans approved on August 28, 2020, which is attached as **Appendix D**.

Figure 2-2 illustrates the existing cycling facilities in the vicinity of the subject development site.

Figure 2-2: Existing Cycling Facilities (Source: GeoOttawa)

2.3.5 TRANSIT FACILITIES

OC Transpo Route 167 and Route 252 provide transit service along Robert Grant Avenue and Cope Drive.

- Route 167 is a Local Route running between Terry Fox and Cope Drive and providing service only on weekdays with a 30-minute frequency during weekday peak hours and 60-minute frequency during off-peak hours.
- Route 252 is a Connexion Route providing connection to the O-Train via Tunney's Pasture Station. Route 252 operates during peak hours on weekdays only at a 30-min frequency.

The bus stop closest to the subject development site is Stop #5527 located approximately 350m from the development site at the southeast corner of Robert Grant Avenue and Cope Drive intersection servicing Route 167 and Route 252.

Figure 2-3 highlights the OC Transpo bus routes and bus stops on adjacent roadways in proximity of the proposed development site.

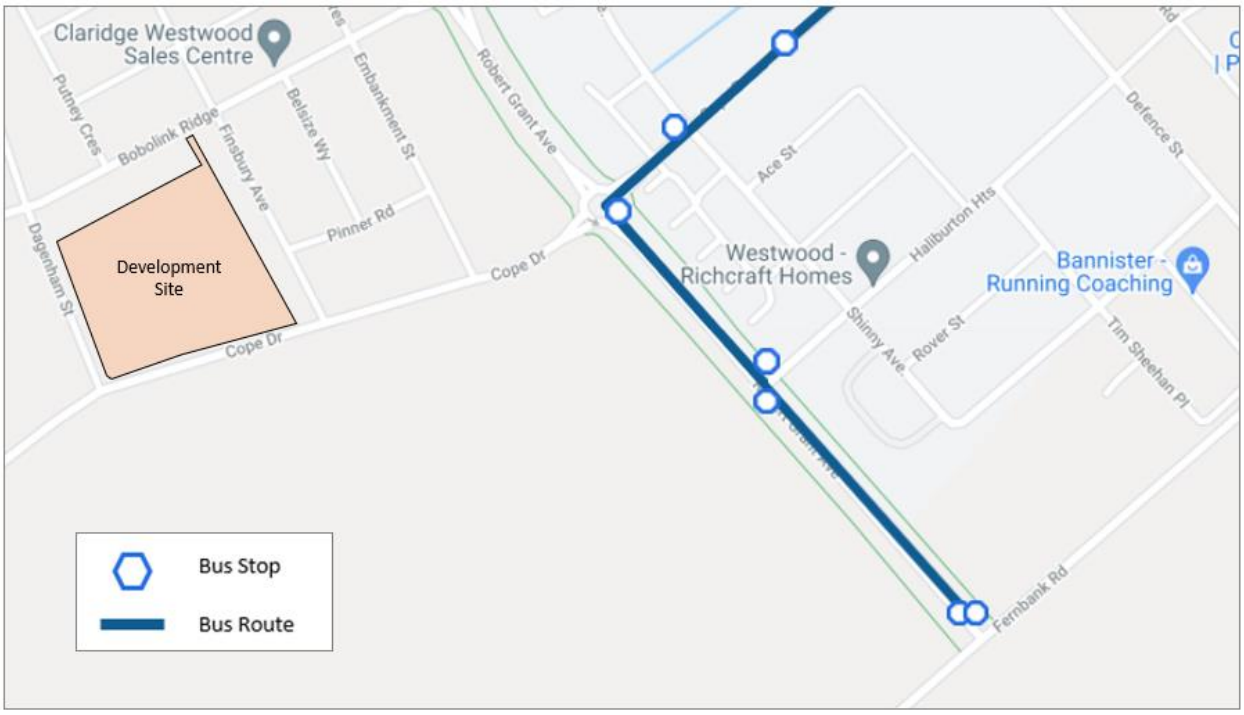


Figure 2-3: OC Transpo Bus Stops and Routes (Source: OC Transpo Website)

2.3.6 AREA TRAFFIC MANAGEMENT MEASURES

The subject site is within a subdivision area currently under construction. There are no existing traffic management measures being implemented in proximity of the subject site.

2.3.7 PEAK HOUR TRAVEL DEMANDS

The TRANS Committee was established to co-ordinate transportation planning efforts among various planning agencies located within the National Capital Region. The proposed development is located in Kanata/Stittsville. The complete TRANS O-D results (including a map of the district area) is provided in **Appendix C**. The most recent Origin-Destination (O-D) survey was completed by TRANS in the Fall of 2011. The TRANS trip data for South Nepean is summarized in **Table 2-2.**

Table 2-2. Peak Hour Trips by Primary Travel Mode – TRANS Kanata/Stittsville

TRAVEL MODE	AM PEAK PERIOD (6:30 A.M. – 8:59 A.M.)			PM PEAK PERIOD (3:30 P.M. – 5:59 P.M.)		
	FROM DISTRICT	TO DISTRICT	WITHIN DISTRICT	FROM DISTRICT	TO DISTRICT	WITHIN DISTRICT
Auto-Driver	59%	74%	45%	73%	61%	57%
Auto-Passenger	9%	7%	17%	17%	15%	23%
Transit	24%	8%	4%	7%	21%	2%
Bicycle	0%	1%	1%	0%	0%	1%
Walk	0%	0%	19%	0%	0%	12%
Other	7%	10%	15%	3%	3%	6%

TRAVEL MODE	AM PEAK PERIOD (6:30 A.M. – 8:59 A.M.)			PM PEAK PERIOD (3:30 P.M. – 5:59 P.M.)		
	FROM DISTRICT	TO DISTRICT	WITHIN DISTRICT	FROM DISTRICT	TO DISTRICT	WITHIN DISTRICT
Total Vehicles	**25,970**	**15,660**	**30,350**	**18,960**	**28,920**	**37,470**

Source: TRANS 2011 O-D Survey Report, Kanata/Stittsville

Reviewing the Trans 2011 O-D Survey, a majority of trips use personal vehicles as the main source of transport to and from the district. During both AM and PM peak hour periods, auto-driver and auto-passenger modes account for between 68% to 90% of the total vehicles that are travelling to and from the Kanata/Stittsville district. The remaining 10% to 22% are split between transit, bicycle, walk, or other unindicated modes of transportation.

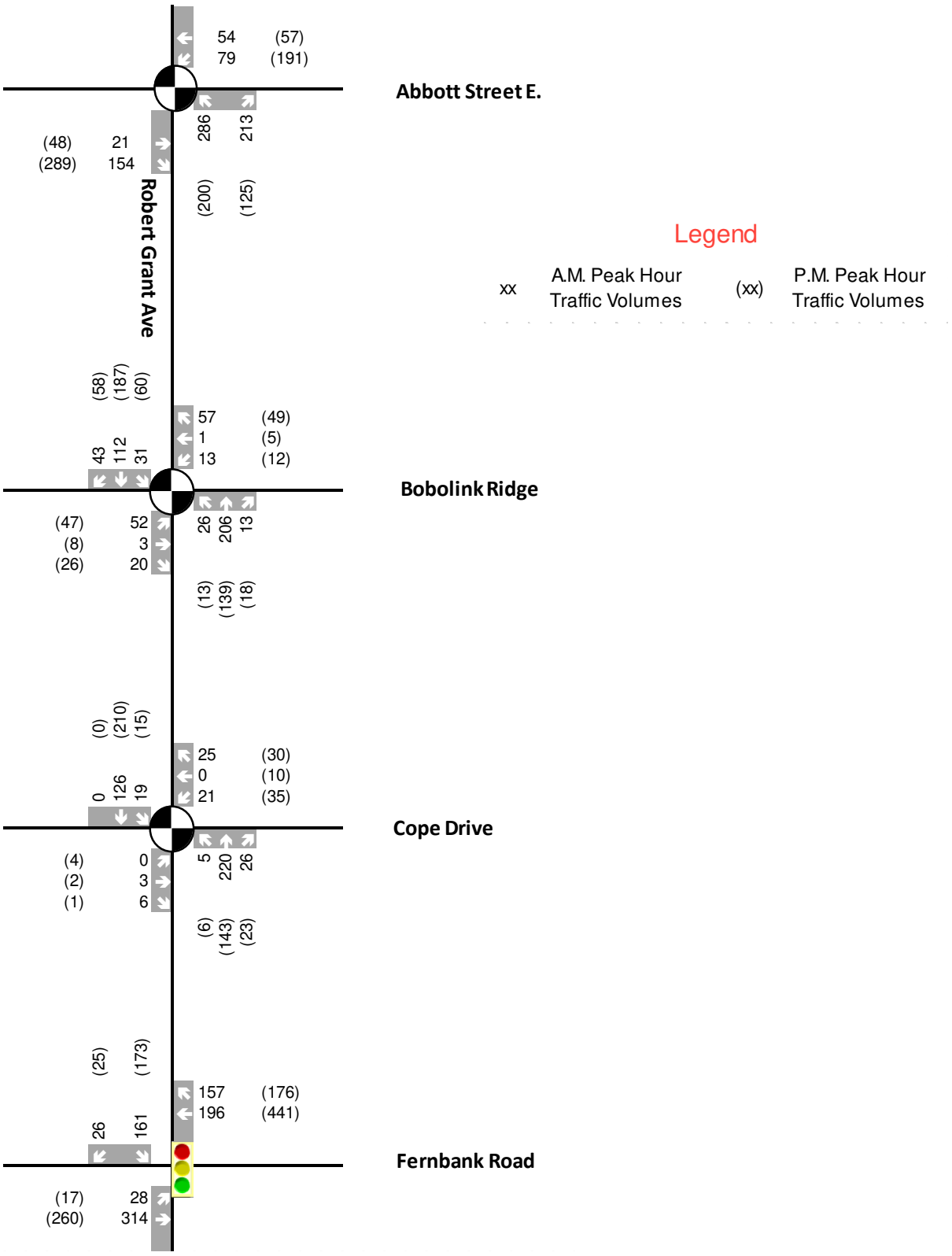
Within the district, travel modes are more diversified. Although auto trips still represent the majority (62% in AM peak, 80% in PM peak), more people tend to choose other modes especially by walking.

The existing peak hour turning movement counts of the intersections within the study area are illustrated in Figure 2-4. These were obtained from other approved TIAs for adjacent developments. The date and source of traffic counts are summarized in Table 2-3 and the relevant pages from other TIAs are included in **Appendix E.**

Table 2-3. Traffic Data Dates and Sources

INTERSECTION	DATE	SOURCE
Robert Grant Ave / Abbott St E	June 2019	700 Cope Drive TIA
Robert Grant Ave / Bobolink Ridge	March 2021	360 Bobolink Ridge TIA
Robert Grant Ave / Cope Dr	June 2019	700 Cope Drive TIA
Robert Grant Ave / Fernbank Rd	August 2018	City of Ottawa

Figure 2-4. Existing Peak Hour Traffic Volumes



2.3.8 FIVE-YEAR COLLISION HISTORY

The boundary road for the proposed development is Cope Drive and Dagenham Street, which either have not been constructed or have only been opened to public traffic for a short period.

The latest past five years (January 1, 2015 through December 31, 2019) collision history were reviewed. The collision history was obtained from the City of Ottawa Open Data website and provides yearly total collisions by locations. **Table 2-4** summarizes the five-year collision history for Robert Grant Avenue.

More detailed five-year collision data will be required to identify if any collision pattern and/or safety concern exists.

Table 2-4. Five-Year Collision History Summary (2015-2019)

Location		Pedestrian Collision	Cyclists Collision	Total Collisions by Year				
				2015	2016	2017	2018	2019
Segment:	Robert Grant Avenue [Fernbank Road – Abbott Street E.]	0	0	0	0	0	0	0
Intersection:	Robert Grant Avenue @ Fernbank Road	0	0	0	1	0	0	0
Intersection:	Robert Grant Avenue @ Bobolink Ridge	0	1	0	0	0	1	2
Intersection:	Robert Grant Avenue @ Abbott Street E.	0	0	0	0	1	0	1
Five-year Total Collisions				6				

2.4 PLANNED CONDITIONS

2.4.1 CHANGES TO THE STUDY AREA TRANSPORTATION NETWORK

The City of Ottawa Official Plan, Transportation Master Plan (TMP) (2013), and the Fernbank Community Design Plan (July 2006) were reviewed to identify potential future roadway upgrades in the vicinity of the subject development site.

Robert Grant Avenue is identified as a future Transit Priority Corridor with isolated measures and ultimately a BRT route with at-grade crossings based on the Rapid Transit and Transit Priority Network – 2031 Affordable Network and 2031 Network Concept Network (Map 5 and Map 4 of TMP). Park and Ride facilities are proposed near the intersection of Abbott Street E. and Robert Grant Avenue and the intersection of Fernbank Road and Robert Grant Avenue. A concept design was completed for Robert Grant Avenue as part of the West Transitway Connections EA study. The section of Robert Grant Avenue between Fernbank Road and Abbott Street East will ultimately be widened to four lanes and include dedicated bus lanes running in the middle of the road. Robert Grant Avenue currently terminates at Abbott Street E and will be extended northwards to connect to Hazeldean Road. The extension was planned to be part of Phase 2 (2022 – 2025) network improvements per the TMP, however the timeline has been postponed to beyond 2030 due to funding limitations. The City and area developers have worked collaboratively to explore alternative funding solutions and conducted a Development Charges Amendment Background Study in 2019. **Figure 2-5** shows the planned area transportation network.

Fernbank Road is identified on the Rapid Transit and Transit Priority Network – 2031 Network Concept Network (Map 4 of the TMP) as a future Transit Priority Corridor with isolated measures. Widening of Fernbank Road between Stittsville Main Street and Terry Fox Drive is anticipated in the future per the Road Network – 2031 Network Concept (Map 10 of TMP).

Cope Drive as an area collector road will be extended westwards to eventually connect to Shea Road. The extension is expected to be completed as part of Claridge Richcraft Tamarack (CRT) Westwood Phase 1 and Phase 2 subdivision. The approved pavement markings, signage, and geometry plan for Phase 1 of the subdivision indicates that a MUP on the north side of Cope Drive will continue along the frontage of the proposed development.

There are no other major changes expected to the study area transportation network.

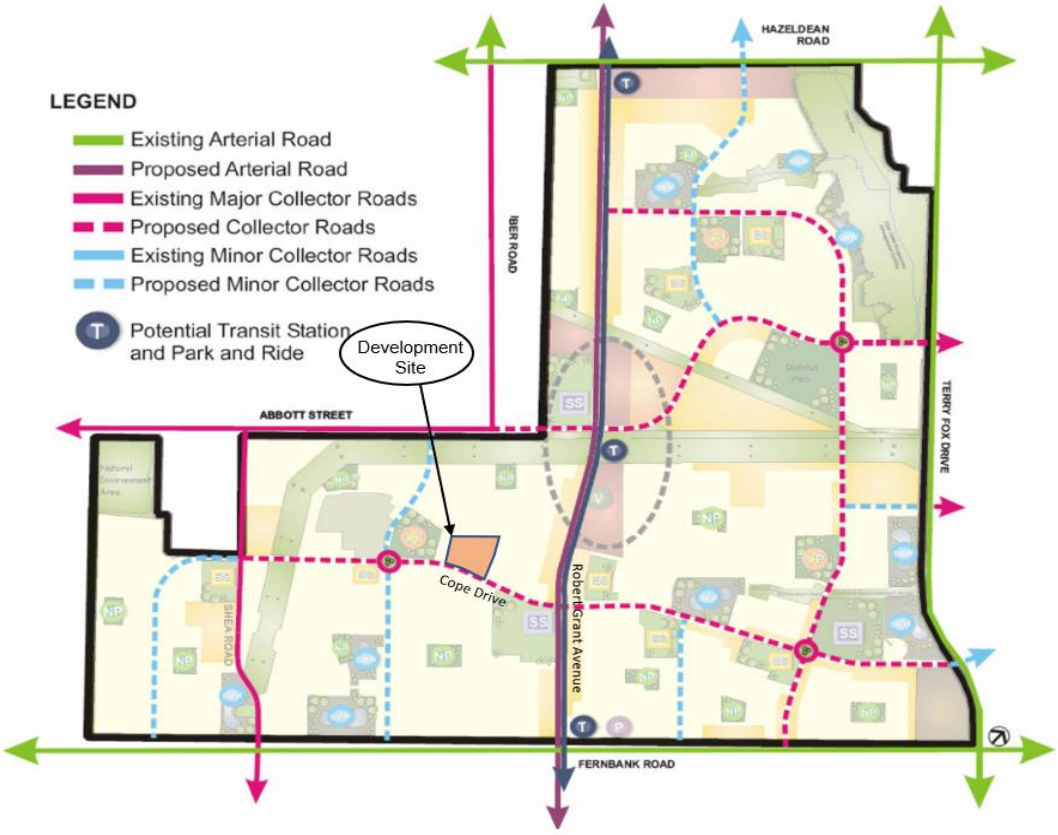


Figure 2-5: Planned Roadway Network (Source: Fernbank Community Design Plan (July 2006))

2.4.2 OTHER STUDY AREA DEVELOPMENTS

The subject school site is located within a new subdivision area where many new developments are occurring. Based on a search through the City of Ottawa's Development Application Search tool, developments that will likely occur within the proposed horizon years of the subject development and could have direct influences on the study area are noted below:

- 620 Bobolink Ridge (D07-12-21-0107): An ongoing Site Plan Control application for development of seven stacked townhouse blocks each containing 12 units for a total of 84 units. The development forms part of the Claridge Richcraft Tamarack (CRT) Westwood subdivision (CRT Phase 1 &2). Build out of the development is expected in 2023.
- 360 Bobolink Ridge (App# D07-12-21-0163): A Site Plan Control application for four six-storey apartment buildings consisting of 354 total rental units and a two-storey building providing office space, ground-floor commercial units and tenant amenity. Full built-out horizon is anticipated to be 2024. The supporting TIA (August 30, 2021) was prepared by J.L Richards.
- 5725 Fernbank Road, CRT Phase 3 (App# D07-16-20-0033): A Zoning By-law Amendment and Subdivision application for 600 residential units with mix of detached and townhome dwellings and a park. CRT Phase 3 is anticipated to be constructed in a single phase with full occupancy by end of 2025. The supporting TIA (April 8, 2021) was prepared by IBI Group.
- 700 Cope Drive (App# D07-12-19-0144): A Site Plan Control application for the development of a four-storey OCDSB secondary school with approximately 8,415 m^2 area and a capacity to accommodate 1,460 students at

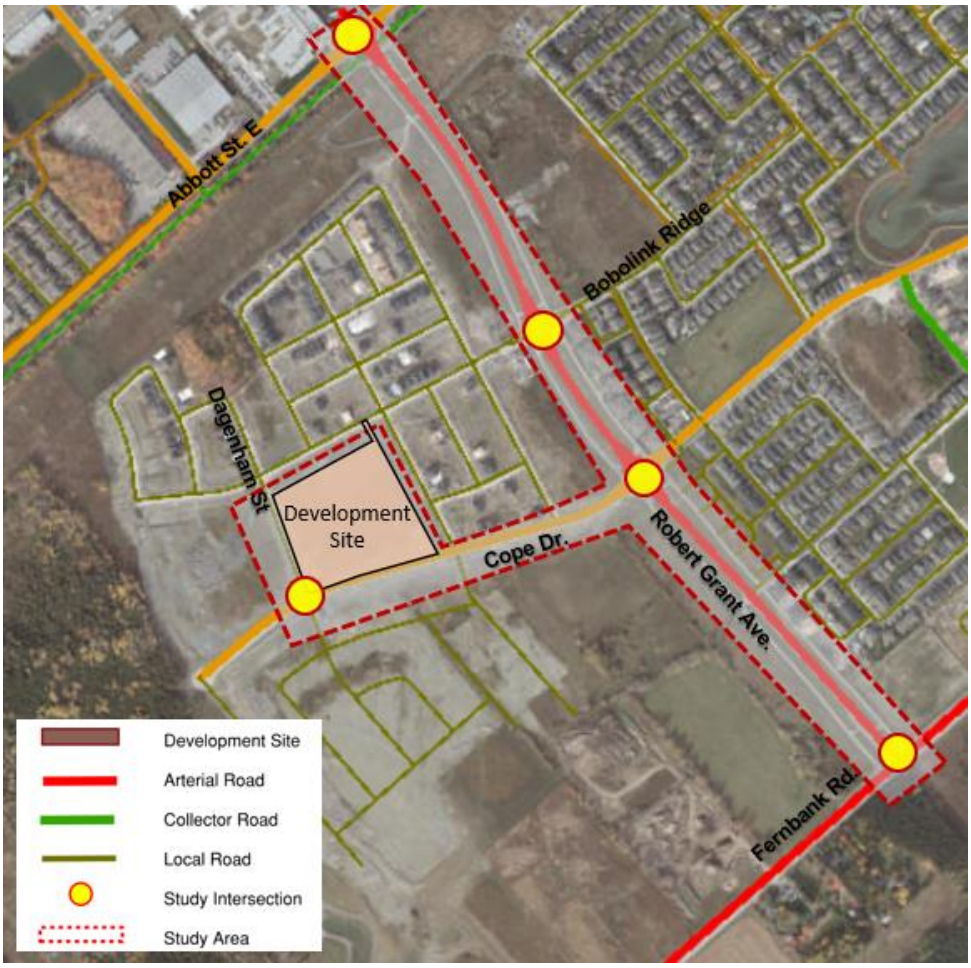
full built-out anticipated in 2024. The development proposes two accesses from Cope Drive. The supporting TIA (December 4, 2019) was prepared by Parsons.

- 60 Defence Street (App# D07-12-21-0120): A Site Plan Control application for an elementary school and daycare with capacity for 507 students and 36 staff. Anticipated built-out year is 2023. The supporting TIA (August 2021) was prepared by Dillon Consulting.
- 5786 Fernbank Road, CRT Phase 1&2 (App# D07-16-11-0003): A Subdivision application for low density residential, minimal amount of medium density residential, open space, parks, institutional, and stormwater management pond. The land being subdivided is the parent property of the subject development site. The supporting Transportation Study (January 28, 2021) was prepared by IBI Group.
- 360 Haliburton Heights, Fernbank Crossing, Block 135, Phase 3: A Subdivision application for 58 units of townhomes. Full built-out horizon was anticipated to be 2021. The supporting TIA (March 2019) was prepared by Novatech.

2.5 STUDY AREA AND TIME PERIOD

The limits for the Transportation Impact Assessment (TIA) study area and study intersections are shown in **Figure 2-6**. The boundary roads Cope Drive and Dagenham Street will be reviewed. Three roundabouts and two intersections will be analyzed including:

- Robert Grant Avenue and Abbott Street E.
- Robert Grant Avenue and Fernbank Road



- Robert Grant Avenue and Bobolink Ridge
- Robert Grant Avenue and Cope Drive
- Cope Drive and Dagenham Street

Figure 2-6: Study Area

It is noted that the afternoon peak of elementary schools is usually earlier than the regular PM peak hour of the roadway network, but the school's morning peak will generally align with the AM peak hour of the roadway traffic. The study time periods identified for the traffic analysis are weekday AM and PM peak hours as these represent the time periods with the highest traffic volumes that would govern the design of study area roadways and intersections.

CEPEO has indicated that operation hours of the elementary school will be from 7:30 AM to 4:00 PM, and the daycare will operate between 6:00 AM to 5:00 PM. The start and end time of the school and daycare service generally align with the peak hours of the adjacent street traffic, but it is noted that the provided school operating hours may include before and after care times and may not align with concentrated trip arrivals and departures around bell times. The identification of the alignment between commuter peak hours and school operations are assessed in more detail as part of the Forecasting analysis below.

2.6 HORIZON YEARS

The proposed facility is expected to be completed in one phase with a target build-out year of 2023. In accordance with the City of Ottawa TIA Guidelines (2017), the following horizons will be considered for analysis.

— 2023, which represents the anticipated buildout horizon,
— 2028, which represents the buildout year plus five years.

2.7 EXEMPTIONS REVIEW

Based on the review of the development and network conditions, the following elements shown in **Table 2-5** qualify for an exemption from this Transportation Impact Assessment.

Table 2-5. Exemptions Summary

MODULE	ELEMENT	EXEMPTIONS
DESIGN REVIEW COMPONENT		
4.1 Development Design	4.1.2 Circulation and Access	**Not Exempted.** This element is only required for site plans.
	4.1.3 New Street Networks	**Exempted** This element is only required for plans of subdivision.
4.2 Parking	4.2.1 Parking Supply	**Not Exempted.** This element is required for site plans.
	4.2.2 Spillover Parking	**Exempted** This element is only required for site plans where parking supply is 15% below unconstrained demand.
NETWORK IMPACT COMPONENT		
4.5 Transportation Demand Management	All Elements	**Not Exempted** Not required for site plans expected to have fewer than 60 employees and/or students on location at any given time.

4.6 Neighborhood Traffic Management	4.6.1 Adjacent Neighbourhoods	**Not Exempted** Required when the development relies on local or collector access and total volumes exceed ATM capacity threshold.
4.8 Network Concept		**Exempted** Required when proposed development generates more than 200 person-trips during the peak hour in excess of the equivalent volume permitted by established zoning.

Based on the above, the TIA report will include the following modules:

- Module 4.1: Development Design
- Module 4.2: Parking
- Module 4.3: Boundary Streets
- Module 4.4: Access Design
- Module 4.5: Transportation Demand Management
- Module 4.6: Neighbourhood Traffic Management
- Module 4.7: Transit
- Module 4.9: Intersection Design

3 FORECASTING

3.1 DEVELOPMENT GENERATED TRAFFIC

3.1.1 TRIP GENERATION

The proposed development consists of two primary trip generator land uses which are elementary school and daycare services. Trips generated by the elementary school and daycare service have been estimated based on the most up-to-date information provided by the school board. The elementary school is anticipated to provide capacity for 751 students, while the daycare service will provide capacity for 49 children. A total of 51 staff, including teachers, custodians, and office staff, are expected to work for the school and daycare. There is a plan for a future addition to the school providing extra capacity for 200 students, but this addition was not included in this TIA study as it is not part of the current Site Plan Application and no timeline has been defined.

SCHOOL PERSON TRIP GENERATION (STUDENTS)

Trip generation for the student population at the proposed school has been developed using first principles analysis based on information provided by CEPEO. The 2020 TRANS Trip Generation Manual does include mode share assumptions for elementary and high schools but recommends that mode shares be developed on a site-specific basis if additional information is available from the school or school board. Information from CEPEO indicates that approximately 85% of the student population is anticipated to arrive by school bus, with the remainder by other modes. These remaining trips have been split as 10% by auto and 5% by active transportation modes, recognizing a portion of the student population will be within walking distance of the school.

SCHOOL PERSON TRIP GENERATION (STAFF)

Staff trip generation to the proposed school is based on the anticipated 51 staff. The Mode share for these trips has been based on the Employment Generator Mode Shares from the 2020 TRANS Trip Generation Manual for the South Nepean District.

DAYCARE PERSON TRIP GENERATION

Daycare person Trip Generation is based on the capacity of 49 children provided by CEPEO. A 100% auto passenger mode share has been adopted for daycare children, assuming that all children will be dropped off by parents.

TOTAL PERSON TRIP GENERATION AND MODE SHARE

Table 3-1 provides a summary of the person trip generation for all of the uses on the site.

Table 3-1: Proposed School Site Person Trip Generation and Mode Share

	AUTO DRIVER	AUTO PASSENGER	SCHOOL BUS	PUBLIC TRANSIT	WALKING & CYCLING
	Mode Shares				
School Students	0%	10%	85%	0%	5%
Staff	80%	10%	0%	5%	5%
Daycare Children	0%	100%	0%	0%	0%
	Person Trips				
School Students	0	75	638	0	38
Staff	41	5	0	3	3
Daycare Children	0	49	0	0	0
TOTAL PERSON TRIPS	**41**	**129**	**638**	**3**	**41**

CONVERSION TO VEHICLE TRIPS

The person trip generation above represents the student and staff trip generation in terms of arrivals to the school site in the morning and departures in the afternoon but do not reflect the vehicle volumes added to the surrounding road network. The conversion of the person trips to vehicle trips is based on the following:

- Auto passenger trips for student and daycare drop-offs represent one auto arrival and one auto departure from the site during the AM and PM peak hours. Vehicle trips were calculated from the auto passenger person trips assuming a vehicle occupancy of 1.2, reflecting some families who will drop off multiple children in one trip.
- Auto driver trips by staff represent one vehicle arrival in the morning and one departure in the afternoon. Staff auto trips have been calculated based on a vehicle occupancy of 1.0. No additional vehicle trips have been added to reflect staff auto passenger trips as it is anticipated these will be combined with staff auto driver arrivals (carpooling).
- School bus capacity ranges from 48-72 students based on 2-3 students per seat. School bus volumes have been estimated based on an average of 60 students per bus.

PEAK HOUR DISTRIBUTION

The person trip generation above is based on total trips made by the students and staff to and from the site. CEPEO has indicated that operation hours of the elementary school will be from 7:30 AM to 4:00 PM, and the daycare will operate between 6:00 AM to 5:00 PM. It is anticipated that the school hours provided represent before and after care in addition to classes; most CEPEO schools in Ottawa operate with morning and afternoon bell times at approximately 8:30-9:00 AM and 3:00 PM. While school student arrivals will be concentrated just before and after the opening and closing bells, trips by staff, before and after care students and daycare children may be more distributed. Given the commuter peak hours of 7:15-8:15 AM and 4:45-5:45 PM from the provided traffic count, the

proportions of the site generated vehicle trips falling within the commuter peak hours have been estimated based on the following:

- 80% of auto trips arriving during the AM peak hour, reflecting a portion of the staff arrivals, before school care and daycare drop-offs that arrive earlier in the morning.
- 50% of auto trips departing the school during the PM peak hour, reflecting a wider distribution of parent pickup between the end of the school day and end of daycare and after school programs and a wider distribution in staff departure times at the end of the day.
- 100% of school bus arrivals during the AM peak hour, corresponding with a concentration in drop-offs just before the morning bell.
- 0% of bus departures during the PM peak hour, reflecting that bus departures will occur at the end of the school day before the commuter PM peak hour.

DAYCARE DIVERTED TRIP ESTIMATION

In many cases, school and daycare drop-offs by parents will be planned as part of a parent's commute; these diverted trips will be reflected in the background traffic volumes on the road network but will divert to the school before continuing on their original path. The ITE Trip Generation Manual 3rd Edition indicates an average diverted trip proportion of 56% specific to daycare centres; this proportion has been applied as diverted trips in the site generated traffic. The same handbook does not indicate a diverted trip proportion for the elementary school land use; to be conservative, this analysis is based on all auto trips generated by the school to be primary trips added to the road network.

TOTAL VEHICLE TRIPS

The total peak hour vehicle trips generated by the proposed school are summarized in Table 3-2.

Table 3-2: Total Site Vehicle Trip Generation

	AM PEAK HOUR		PM PEAK HOUR	
	IN	**OUT**	**IN**	**OUT**
Auto Trips	115	83	52	72
School Buses	11	11	0	0
Diverted Auto Trips (included in auto total above)	18	18	11	11

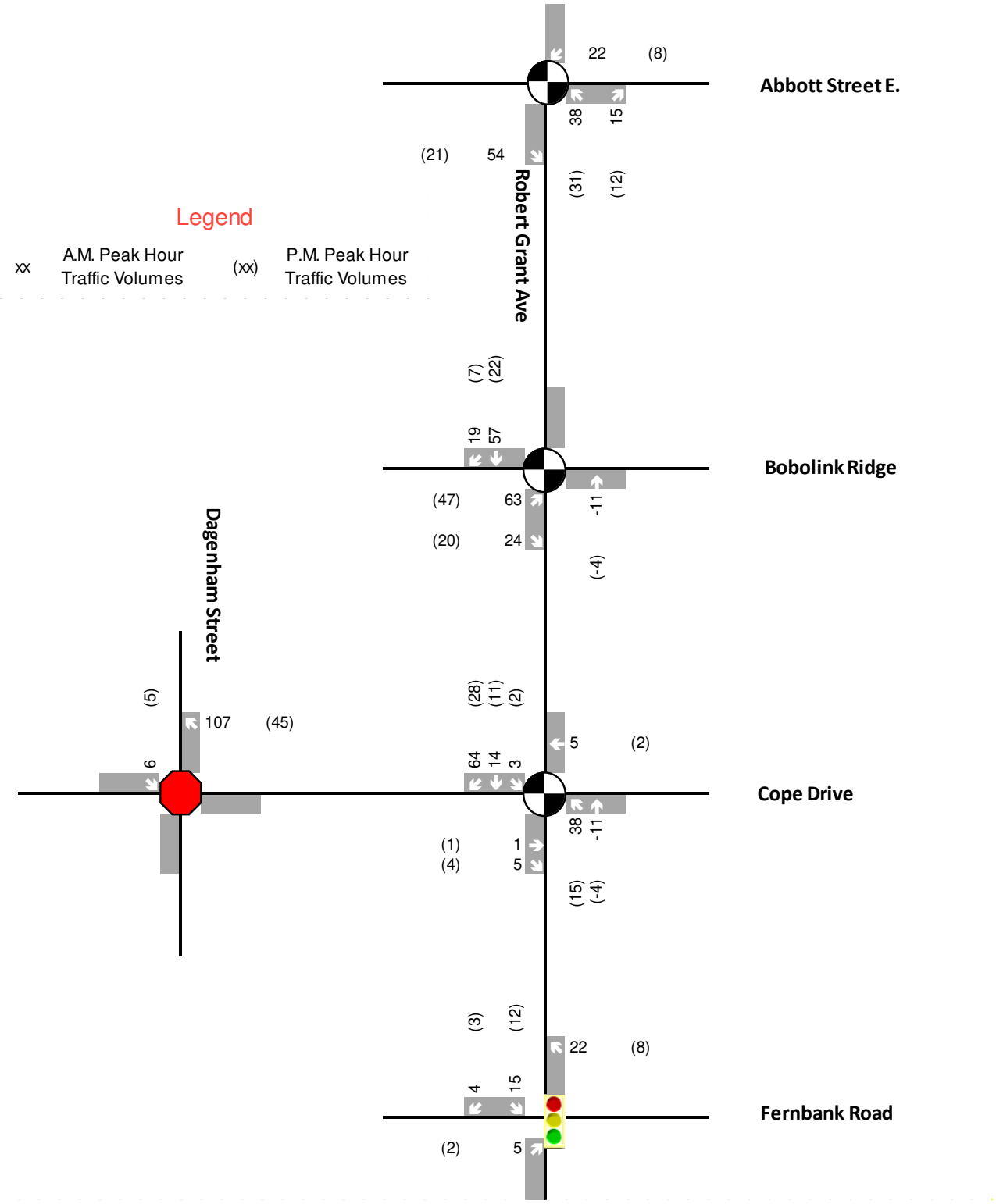
3.1.2 TRIP DISTRIBUTION AND ASSIGNMENT

The overall trip distribution of the site generated trips has been adopted from the TIA for the 700 Cope Road TIA immediately to the east of the subject site developed by Parsons, this trip generation is based on the TRANS 2011 travel survey distribution and is estimated at 45% of traffic to/from the north, 25% of traffic to/from the east, and 30% of traffic to/from the west. While the catchment of the proposed school was not provided, the prominence of students on school buses suggests that the catchment area will extend beyond the local neighbourhood, and thus trip distribution based on the TRANS district level distribution is an appropriate estimate. Based on the surrounding road network configuration and existing traffic patterns, the overall distribution has been assigned to the network as follows:

- 45% to/ from the North
    - 25% to/from Iber via Abbot
    - 20% to/from Terry Fox via Abbott
- 25% to/from the East
    - 5% to/from Cope
    - 20% to/from Fernbank
- 30% to/from the West
    - 25% to/from Abbott
    - 5% to/from Fernbank
- Site Access Distribution
    - Inbound trips from Robert Grant NB and Cope Drive WB 100% via Cope WB to Dagenham NB (to align with car drop off area on east side)
    - Inbound trips from north 75% via Cope Drive (to align with car drop off area on east side), 25% via Bobolink Ridge (destined to school parking access).
    - Outbound Trips towards Abbott Street 100% via Bobolink Ridge.
    - Outbound Trips towards Cope / Fernbank 75% via Bobolink Ridge, 25% via Cope Road (reflecting that many parents will continue NB after pickup/drop-off).

The site generated trip distribution is illustrated in Figure 3-1.

Figure 3-1: Development Generated Auto Trips



3.2 BACKGROUND NETWORK TRAFFIC

3.2.1 CHANGES TO THE BACKGROUND TRANSPORTATION NETWORK

The Robert Grant Avenue extension from Abbott Street E. to Palladium Drive was identified as one of the Phase 2 (2022-2025) projects in the City of Ottawa Transportation Master Plan (2013), this project is not part of the City affordable network and is not anticipated until after 2031.

Due to the interests expressed by the area developers in working with the City explore alternative funding solutions, the City conducted a 2019 Development Charges Amendment Background Study and introduced an area specific charge to accelerate improvements in the Stittsville area including the extension of Robert Grant Avenue. In this study, it was assumed that Robert Grant Avenue extension would not be completed by the 2028 horizon.

The existing Cope Drive ends at a cul-de-sac at the location of the future intersection with Angel Heights / Goldhawk Drive. These roads and resulting intersection will be developed as the buildout of CRT Phases 1 and 2 continue. This study is based on the cul-de-sac remaining in place for the 2023 horizon, and the full intersection and connections to CRT phase 2 to the south of Cope Drive being in place by the 2028 horizon.

3.2.2 GENERAL BACKGROUND GROWTH RATES

A 2.0% annual growth in traffic on study area roads was adopted to account for traffic generated by future developments that are not currently under the development application process (Section 2.4.2). The 2.0% increase was consistent with the growth assumptions used in the approved TIA studies prepared supporting the other area developments.

3.2.3 OTHER AREA DEVELOPMENTS

Other study area developments identified in Section 2.4.2 were accounted in the estimation of future background traffic of 2023 and 2028 study horizons. The TIA approved in April 2021 for the development of CRT Phase 3 captured traffic generated by most of the identified area developments, including the following:

- CRT Phase 1&2 (5786 Fernbank Road) and Phase 3 (5725 Fernbank Road)
- Fernbank Crossing Phase 3 Block 129 and Block 135 (*90% of Phase 3 was constructed in 2019 per Stantec's TIA, therefore associated development generated trips will be reflected in existing traffic counts)*
- Fernbank Crossing Phase 4.
- Blackstone Phases 4 – 8
- Development (René's Court) at 1000 Robert Grant Avenue
- New Stittsville High School at 700 Cope Drive

The Fernbank Crossing Phase 3 Block 129 and Block 135 was not explicitly counted in this TIA, but it is noted that 90% of Phase 3 was constructed in 2019 per Stantec's TIA, therefore associated development generated trips will be reflected in existing traffic counts.

It is noted that traffic volumes associated with the residential development at 360 Bobolink Ridge were not considered in the CRT Phase 3 TIA and have also been added to the background development traffic. The CRT Phase 3 TIA also did not include the intersection of Robert Grant Avenue and Abbott Street E, volumes at this intersection were based on the 700 Cope Drive (Stittsville High School) TIA. Volumes at the intersection of Bobolink Ridge and Robert Grant Avenue were based on a review of projected volumes in the 360 Bobolink Ridge TIA balanced to reflect the projected volumes at the adjacent intersections resulting from the projected development volumes in the area.

The proposed Stittsville High school is scheduled to begin classes in 2023, but the other area developments listed above are expected to be built-out either in or after 2023. For the purposes of this study, the 2023 background traffic volumes include the annual 2% background traffic growth and 700 Cope Drive developments only, while the 2028 background volumes consist of both the general annual growth and other developments generated traffic. 2023 background traffic is shown in Figure 3-2, and 2028 background traffic is shown in Figure 3-3.

Figure 3-2: 2023 Background Traffic Volumes

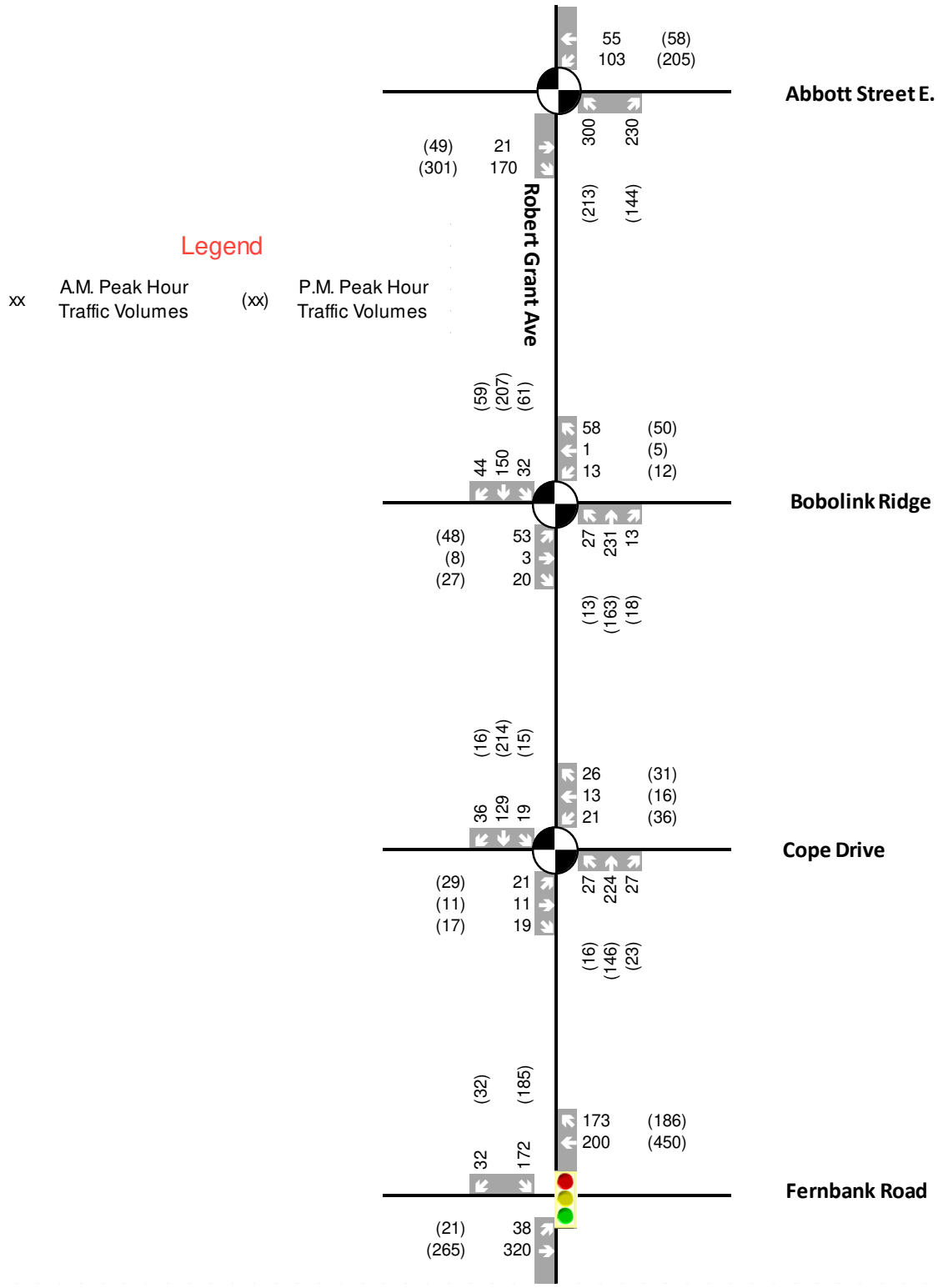
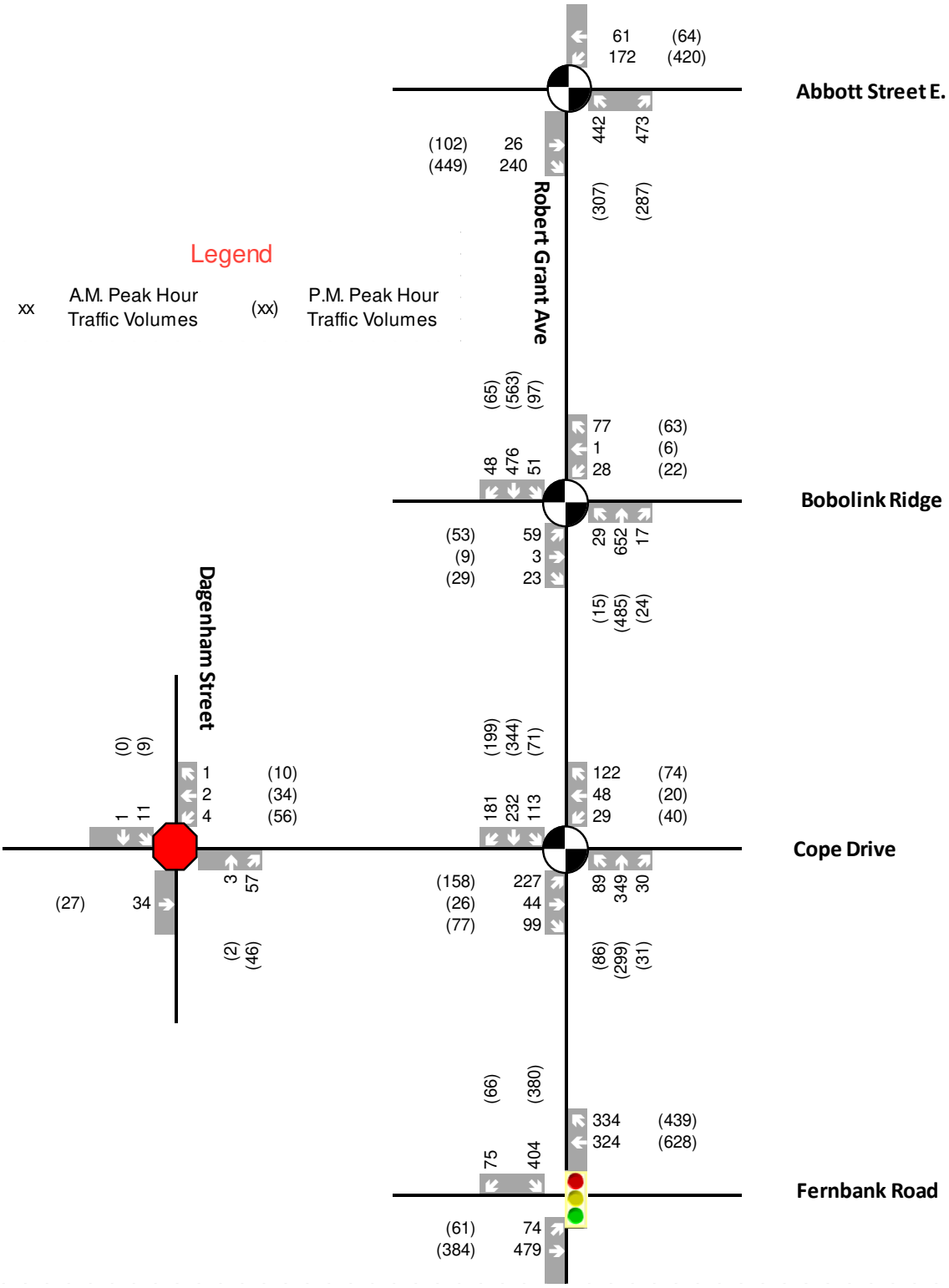


Figure 3-3: 2028 Background Traffic Volumes



3.3 DEMAND RATIONALIZATION

3.3.1 DESCRIPTION OF CAPACITY ISSUES

Total traffic volumes for the 2023 and 2028 study horizons were estimated by:

- Applying a 2% background annual growth to the existing traffic volumes.
- Adding trips generated by the proposed development on top of the general background growth to get 2023 total volumes
- Adding trips generated by other area developments and the proposed development on top of the general background growth to get 2028 total volumes

The estimated 2023 and 2028 total traffic volumes are presented in Figure 3-4 and Figure 3-5. A detailed assessment of intersection and roadway capacities by using Synchro (version 11) for 2023 and 2028 horizons have been carried out in Section 4.

3.3.2 ADJUSTMENT TO DEVELOPMENT GENERATED TRAVEL DEMANDS

The development generated trips are not anticipated to result in new over-capacity movements within the study area, therefore no adjustment to development generated traffic has been proposed yet. A detailed review will be carried out as part of the Strategy/Analysis Report and may include recommended adjustments as needed.

3.3.3 ADJUSTMENTS TO BACKGROUND NETWORK TRAVEL DEMANDS

Adjustments to background network demands have not been proposed since the projected future traffic are not expected to adversely impact the intersections and roadways within the study area. A detailed review will be carried out as part of the Strategy/Analysis stage and may include recommended adjustments as needed.

Figure 3-4: 2023 Total Traffic Volumes

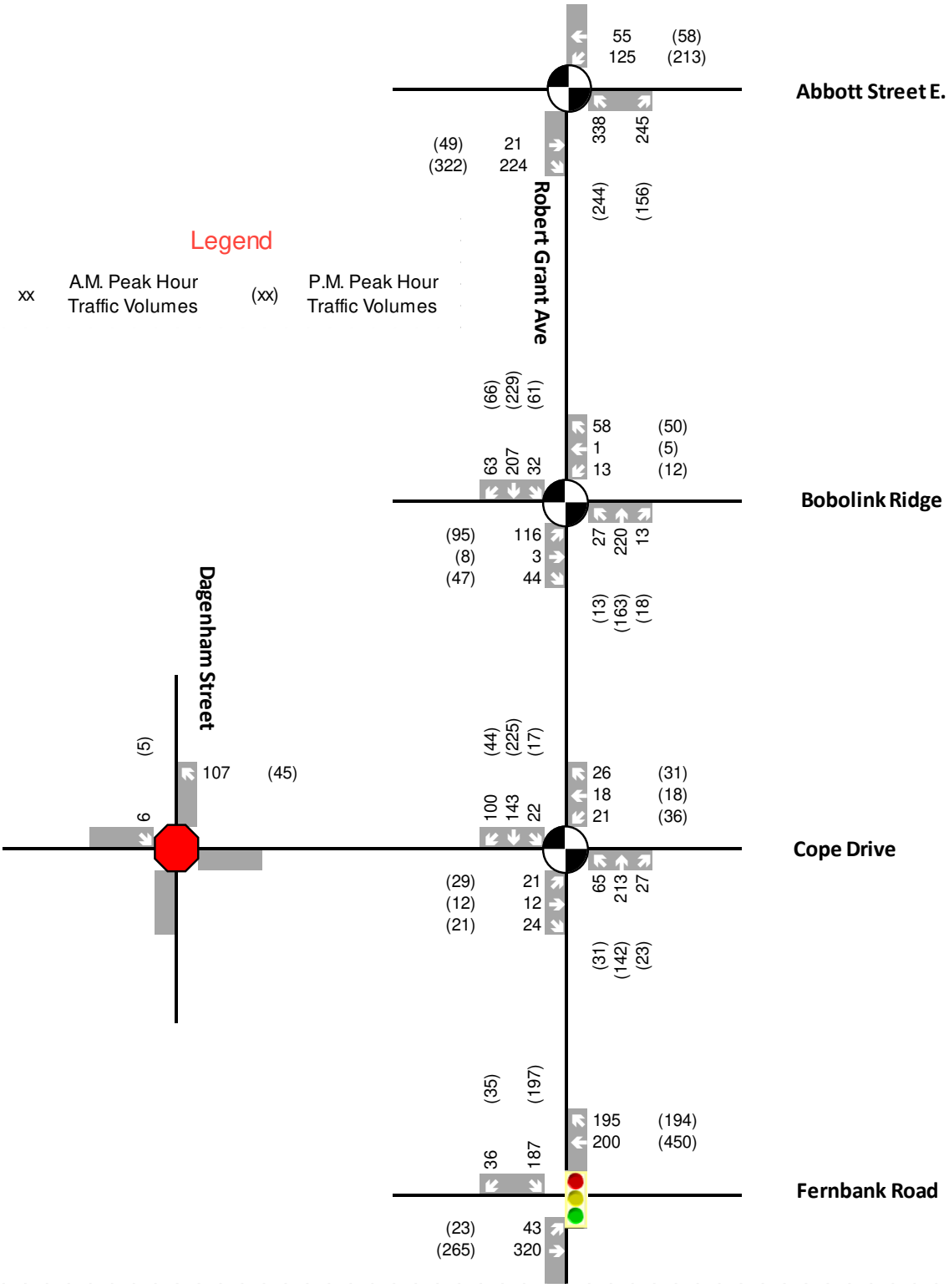
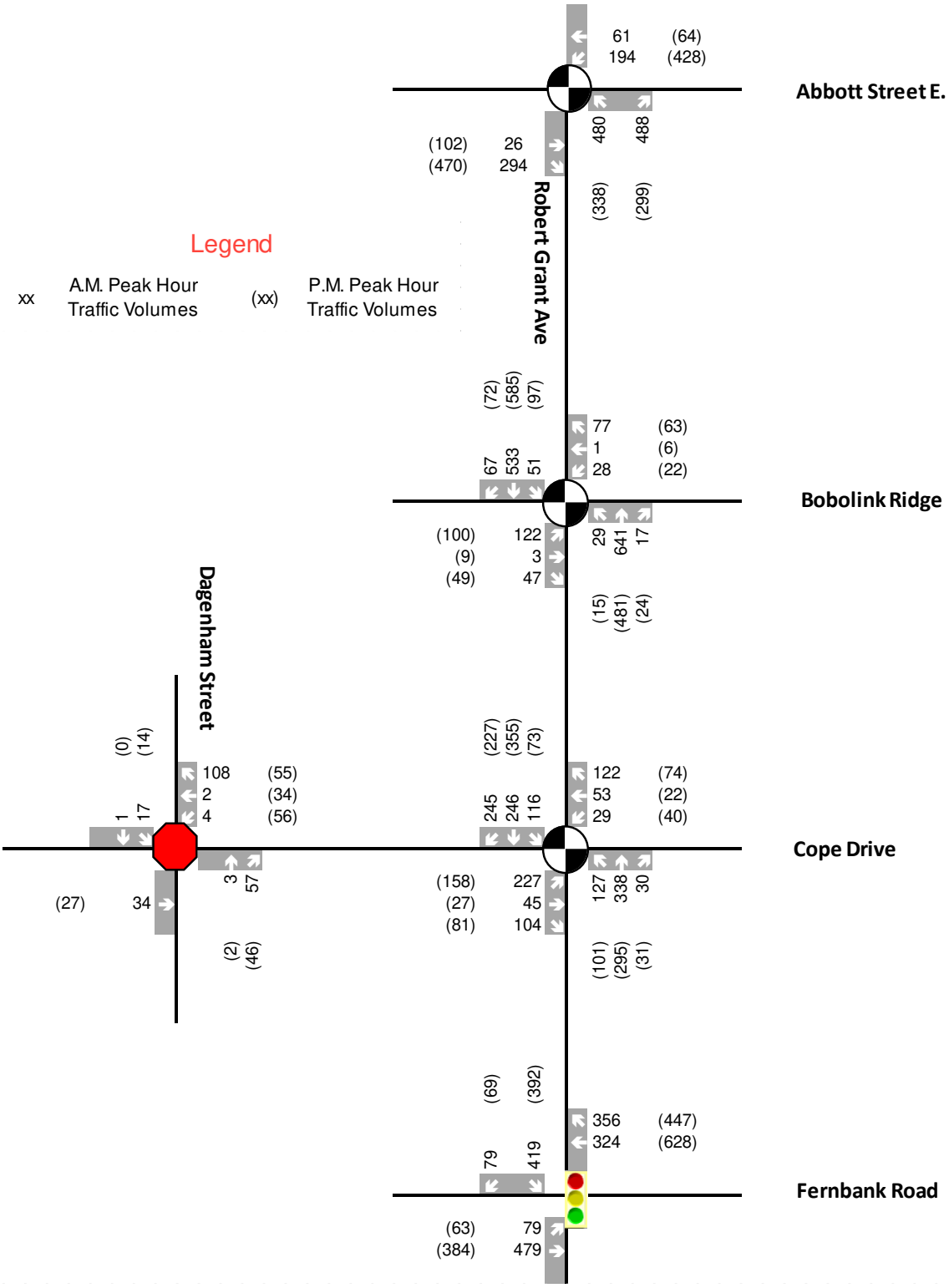


Figure 3-5: 2028 Total Traffic Volumes



4 STRATEGY

4.1 DEVELOPMENT DESIGN

4.1.1 DESIGN FOR SUSTAINABLE MODES

The City of Ottawa's TDM-Supportive Development Design and Infrastructure Checklist for Non-Residential Developments was completed to assess the opportunity to implement facilities that are supportive of sustainable modes, including cycling, walking and transit. The completed checklist is attached as **Appendix F**.

As indicated in the TDM checklist and shown on the site plan (**Appendix B**), the proposed site accommodates sustainable modes in the following ways:

- 50 dedicated bicycle parking spaces at the southwest corner of the site
- Walking distance between site and nearest transit stop is within 400m
- Depressed concrete sidewalk at the vehicle access on Dagenham Street and the provision of a pedestrian walkway crossing the drop-off area in the parking lot
- A MUP and sidewalk are expected to be constructed on Cope Drive and Dagenham Street fronting the school property, respectively
- Provision of internal walkways and concrete and asphalt surfaces throughout the school yard that interconnect the school building, portables, and parking lot, including a paved walkway extending to Bobolink Ridge at the northeast corner of the site. A chain link gate will separate the paved walkway between the school property line and the residences to the north of the site. Operation of the gate will be a function of school programming, but it is anticipated that the gate will be closed during school hours and opened by staff for pickup and drop-off.

The TDM checklist includes a recommendation for a bike repair station to encourage bike use, but it is noted that such a facility requires some technical knowledge is not likely to be a significant benefit for most school aged children of the site. It is anticipated that through bike programming on site, that school staff can provide many of the same capabilities for students and as such a formal bike repair station has not been recommended as part of the site plan. Similarly, CEPEO may consider offering on-site cycling courses for teachers, students, and parents through bike programming and can be supported by the City of Ottawa's cycling education programs. The school may also wish to consider reimbursement of transit passes for staff to encourage transit use.

Traffic calming measures are recommended in order to limit vehicle speeds and increase safety of vulnerable road users. Traffic calming through school zone signage have been included in the proposed site plan, but as the road network is being constructed as part of the subdivision, no additional physical traffic calming measures have been proposed. It is also recommended that the school continue to monitor traffic conditions once operational to determine the need for additional passive traffic calming measures.

As per the pavement marking and signal plans for the subdivision, the intersection of Cope Drive / Dagenham Street is proposed to be Two-Way Stop Controlled (TWSC) on Dagenham Street only and as shown in the site plan, a PXO would be located on the east leg. In addition, the school bus layby on Cope Drive has a 30m setback from the intersection of Cope Drive / Dagenham Street in accordance with Ontario Traffic Manual (OTM) Book 15 and the City of Ottawa Local Residential Streets 30 km/h Design Toolbox. While the type of PXO to be provided is not specified, a Type D PXO using regulatory signs, warning signs, and pavement markings as per OTM Book 15 would be suitable at this location given the low two-way traffic volumes along Cope Drive.

4.1.2 CIRCULATION AND SITE ACCESS

The proposed school drop-off area, which is situated in the parking lot, is designed to operate with traffic circulation in a counter-clockwise direction. Unidirectional vehicle movements are indicated in the site plan at the west and south sides of the drop-off area and bidirectional vehicle movements are permitted on the east side of the drop-off

area to access parking spaces. School staff and parents dropping off and picking up students will primarily utilize the site access off Dagenham Street and parking lot/drop-off area.

Site circulation at the proposed access and drop-off area was assessed using AutoTURN 11 to confirm the suitability of the layout for a variety of design vehicles. The results are provided in Table 4-1 and the AutoTURN swept paths are provided in **Appendix G**.

Table 4-1: Swept Path Assessment

DESIGN VEHICLE	VEHICLE REPRESENTING	FINDINGS
HSU (TAC 2017)	Municipal Services / Waste Removal	**Access:** The proposed access configuration on Dagenham Street can accommodate the inbound and outbound movements of an HSU design vehicle (rear loading) without impacting any built features but will require the vehicle to encroach on the opposing vehicle lane for inbound movements. **Circulation:** An HSU design vehicle will be able to maneuver to and from the waste containers located at the northeast corner of the drop-off area without conflicting with curbs upon reversing into the drop-off area. Parking spaces will not be impacted. However, it is recommended that the waste containers be angled for ease of movement.
2020 Blue Bird Vision (AutoTurn City-Transit)	School Bus	**Access:** The proposed access configuration on Dagenham Street can accommodate the movements of a school bus without impacting any built features but will require the vehicle to encroach on the opposing vehicle lane for inbound movements. **Circulation:** A school bus will be able to maneuver around the drop-off area without conflicting with curbs. In addition, parking spaces will not be impacted. School buses will be utilizing the laybys on the north side of Cope Drive and east side of Dagenham Street only, but in the event of additional school bus circulation measures in the future (ex. school expansion or changes to the transportation network), a school bus will be able to properly circulate around the drop-off area if necessary.
Fire Truck (Toronto Aerial)	Fire Truck	**Access:** The main school building will be served from Cope Drive and Dagenham Street and will not require fire trucks to enter the site. However, Fire truck access into the school site from the Cope Drive access will be required to serve the future portables as shown on the site plan. **Circulation:** The fire access from Cope Drive has been designed to conform with the Ontario Building Code and allow fire trucks to enter and circulate within the site as required. It is anticipated that the fire truck will use the adjacent basketball court area as a turnaround.

It is noted that parked school buses on the on-street layby may be considered an obstruction to the fire route or access to the fire hydrant in front of the school. School bus programming should include provision to have school move school buses out of the layby area in the event of an emergency.

4.2 PARKING

4.2.1 PARKING SUPPLY

Based on the location of the proposed development, the minimum parking space requirements will be assessed in accordance with the Suburban Area (Area 'C') as part of Schedule 1A to the City of Ottawa's Zoning By-Law 2008-250. The Zoning By-Law requires that a school and daycare in Area 'C' provide a minimum parking space rate of 1.5 per classroom (includes portables) and 2 per 100 sq. m. of gross floor area, respectively. In addition, the Zoning By-Law requires that bicycle parking is provided for a school and daycare at a bicycle parking space rate of 1 per 100 sq. m. of gross floor area and 1 per 250 sq. m. of gross floor area, respectively.

The minimum parking space rates can be found in Section 101 of the Zoning By-Law and off-street motor vehicle parking must be provided for any land use at the rate set out in Table 101. Bicycle parking spaces rates and provisions can be found in Section 111 of the Zoning By-Law and bicycle parking must be provided for the land uses and at the rate set out in Table 111A.

The minimum parking supply requirements for this development compared with the proposed parking supply are highlighted in Table 4-2 below.

Table 4-2: Minimum Zoning By-Law Requirements for Parking and Proposed Development Parking Supply

PARKING TYPE	LAND USE	SIZE	REQUIRED SPACES (ZONING BY-LAW)	PROVIDED SPACES (SITE PLAN)
Auto Parking	School	20 classrooms, 12 portables	48	58
	Daycare	360 GFA	7	
Bicycle Parking	School	4,421 GFA	44	50
	Daycare	327 GFA	1	

Based on the provided number of auto and bicycle parking spaces for the proposed development, the auto parking supply exceeds the minimum requirements of the Zoning By-Law by 5 parking spaces (including barrier-free parking spaces) and the bicycle parking supply exceeds the minimum requirements of the Zoning By-Law by 5 bicycle parking spaces. It is noted that the parking rate used for the site plan slightly differs from the Zoning By-Law rate such that the minimum required parking spaces determined within the site plan exceeds that of the Zoning By-Law.

4.3 BOUNDARY STREETS DESIGN

4.3.1 MOBILITY

The City of Ottawa's Multi-Modal Level of Service (MMLOS) targets consider road classification, adjacent land-use designation, and special policy areas and are intended to evaluate how the proposed school users will be accommodated by the boundary streets bordering the site to the south and west. It is acknowledged that Road Segments as defined in City of Ottawa's MMLOS Guidelines (2015) refers to a roadway link between signalized intersections. However, in the absence of signalized intersections in proximity to the school, segment analyses have

been adapted for Cope Drive and Dagenham Street between unsignalized intersections to evaluate the level of service of the planned multi-modal facilities.

4.3.1.1 *COPE DRIVE*

The segment of Cope Drive under evaluation is between Dagenham Street and Robert Grant Avenue. Cope Drive borders the school in the south and is a designated collector road. Therefore, the study segment of Cope Drive was evaluated as a collector within 300m of a school with the corresponding LOS targets taken from Exhibit 22 of the MMLOS Guidelines. The segment of Cope Drive being evaluated is the west leg of the intersection with Robert Grant Avenue and is currently under construction. Cope Drive is not a designated truck or transit route and therefore no targets have been assigned in this regard; only PLOS and BLOS have been evaluated for the segment analysis. An external bus stop will be located at the northwest corner of the intersection of Cope Drive / Finsbury Avenue per the CRT Westwood Phase 1 subdivision. However, future bus routes and schedules are unknown at the time of this report. The segment MMLOS results are summarized in Table 4-3 below and the detailed MMLOS spreadsheets are provided in **Appendix H**.

Table 4-3: Segment MMLOS along Cope Drive between Dagenham Street and Robert Grant Avenue

	PLOS	BLOS
Target	**A**	**C**
Cope Dr between Dagenham St and Robert Grant Ave (2022 Existing Conditions)	F	E
Cope Dr between Dagenham St and Robert Grant Ave (2028 Future Background Conditions)	B*	B**
Cope Dr between Dagenham St and Robert Grant Ave (2028 Horizon Conditions)	B*	B**

*North side MUP adjacent to school will meet a PLOS A under the proposed future configuration; the south side sidewalk configuration will result in a PLOS B, which governs the reported segment PLOS.

**North side MUP adjacent to school will be BLOS A under the proposed future configuration. No cycling facility on the south side will result in a BLOS B, which governs the reported segment BLOS and still meets the target of C.

The results of the segment analysis indicate that neither the PLOS nor the BLOS meets the target under existing conditions. This is because Cope Drive is currently under construction and has no pedestrian or bicycle facilities; only 50m has currently been developed adjacent to the roundabout. Under the future 2028 plans, the cross-section of Cope Drive will have a 2m sidewalk with a 3.1m boulevard in the eastbound direction and a 3m asphalt MUP and a 3m school bus layby in the westbound direction. This configuration will result in a PLOS of A for the north side MUP adjacent to the school which meets the target, and a PLOS of B for the opposite sidewalk on the south side. In order for the south sidewalk (and consequently the overall segment PLOS) to meet the target of A, this sidewalk would have to be increased from 2m to 3m in width.

The low posted speed limit and traffic calming through the implementation of school zone signage will ensure a BLOS B which exceeds the target of C.

The school bus loading area on Cope Drive has been set back 30m from the east side PXO at the intersection with Dagenham Street per the requirements of OTM Book 15 and the City of Ottawa Local Residential Streets 30 km/h Design Toolbox, and no parking signs will be implemented along the full length of the bus loading area.

4.3.1.2 *DAGENHAM STREET*

The segment of Dagenham Street under evaluation is between Bobolink Ridge and Cope Drive. Dagenham Street borders the school in the west and is a local street serving the neighbourhood. Hence, the study segment was evaluated as a local road within 300m of a school with the corresponding LOS targets taken from Exhibit 22 of the MMLOS Guidelines. The segment of Dagenham Street being evaluated is currently under construction; no general

traffic uses this road, only construction vehicles. Therefore, no MMLOS evaluation has been carried out for existing conditions. Like Cope Drive, Dagenham Street is neither a planned transit route nor a truck route; only PLOS and BLOS have been evaluated for the segment analysis based on the site plan provided. The segment MMLOS results for Dagenham Street are summarized in Table 4-4 below and the detailed MMLOS spreadsheets are provided in **Appendix H**.

Table 4-4: Segment MMLOS along Dagenham Street between Bobolink Ridge and Cope Drive

	PLOS	BLOS
Target	**A**	**B**
Dagenham St between Bobolink Ridge and Cope Dr (2022 Existing Conditions)	-	-
Dagenham St between Bobolink Ridge and Cope Dr (2028 Future Background Conditions)	B*	B
Dagenham St between Bobolink Ridge and Cope Dr (2028 Horizon Conditions)	B*	B
*East side sidewalk adjacent to school will meet a PLOS A under the proposed future configuration with the presence of on-street parking (i.e., school bus layby) and the implementation of school zone signage to achieve a target operating speed of 30 km/h or less. The west side sidewalk configuration will result in a PLOS B, which governs the reported segment PLOS.		

The results of the analysis indicate that the BLOS target will be met under future conditions. For the PLOS to meet the MMLOS target A for a local street within 300m of a school, the 2028 future conditions MMLOS analysis will require the provision of 3m sidewalks with a minimum of 0.5m boulevard for pedestrians on the west side of Dagenham Street.

4.3.2 ROAD SAFETY

4.3.2.1 COPE DRIVE

No collisions have been documented along Cope Drive between Dagenham Street and Robert Grant Avenue due to the underdeveloped nature of the road within the study area. Therefore, no collision reduction measures have been identified for this section of roadway.

4.3.2.2 DAGENHAM STREET

No collisions have been documented along Dagenham Street between Cope Drive and the proposed site access due to the underdeveloped nature of the road. Therefore, no collision reduction measures have been identified for this section of roadway.

4.4 ACCESS INTERSECTIONS DESIGN

4.4.1 LOCATION AND DESIGN OF ACCESS

There are two access points proposed for this development and are indicated in the site plan (**Appendix B**); one located off of Dagenham Street at the northwest corner of the site (main vehicle access) and the second one located off of Cope Drive at the southeast corner of the site (delivery access). The three-legged vehicle access is proposed as a two-way, full movement access with stop-control on the side approach (access) and free-flow for the north and south approaches along Dagenham Street.

A design compliance check was carried out for the proposed school's main vehicle access on Dagenham Street for a variety of interrelated design elements for driveways following the Transportation Association of Canada's Geometric Design Guidelines for Canadian Roads (2017). The design compliance check is summarized in Table 4-5.

Table 4-5: Access Intersection Design Elements

DESIGN ELEMENTS	MINIMUM REQUIRED	DAGENHAM STREET ACCESS
Access Type	-	Full Movement
One-way vs. Two-way Operation	>750 veh/d or >100 peak hour trips = high volume two-way driveway	>100 peak hour trips Two-way
Entrance Width* (Two-way)	Residential: 2.0m-7.3m Commercial: 7.2m-12.0m Industrial: 9.0m-15.0m 6.0m for a parking lot (City of Ottawa Zoning By-law)	8.0m
Right Turn Radius*	Residential: 3.0m-4.5m Commercial: 4.5m-12.0m Industrial: 9.0m-15.0m	6.0m
Corner Clearance	15m for Local Roads	>15m
Sight Distance (Intersections with Stop Control on Minor Road)	Case B1 – Left Turns from Minor Road = 105m Case B2 – Right Turns from Minor Road = 95m	No obstructions; be advised of parked vehicles on the east side of Dagenham Street. School buses will be parked on-street within curb extensions (bulb-outs) and the additional car drop off area on Dagenham Street adjacent to the site access is meant for short duration stops.
Throat Length	N/A	Located on a local road 18.5m
Angle of Intersection	At or near 90°	Access intersects Dagenham Street at 90°
Proximity to Adjacent Driveways	N/A	No private driveways along the east side of Dagenham Street between Cope Drive and the proposed school access
Pedestrian + Cycling Crossing Considerations	Small curb return radii (must be suitable for design turning vehicle) with narrow driveway to minimize crossing distance	8.0m pedestrian crossing (depressed and continuous concrete sidewalk through access) No cycling crossing

*Minimum requirements for institutional developments are the same as commercial developments as per the definition listed in TAC 2017 where the development primarily serves passenger vehicles but occasionally accommodates service trucks.

Overall, the design elements for the site access on Dagenham Street meet the minimum requirements of TAC 2017 to be considered as good design practice.

4.4.2 INTERSECTION CONTROL

Ontario Traffic Manual (OTM) Book 12 (2012) Justification 7 includes two warrants (1 and 2) for signalization with two evaluation criteria (A and B) for each:

- 1A – total volume entering the intersection from all approaches.
- 1B – total volume entering the intersection from the minor approaches only.
- 2A – total volume entering the intersection from the main road only.
- 2B – total volume crossing major road, calculated as the left turns from the minor approaches, pedestrian crossings, highest through volume from one of the minor approaches and 50% of the heavier left turn from the main road if it exceeds 120 vehicles/hr and the opposing traffic exceeds 720 veh/hr.

Signalization can be warranted based on Warrant 1 or 2, but only if both conditions A and B are 100% met.

Based on Section 3.1.1, the site is estimated to generate 115 and 83 auto vehicle trips in and out of the access during the AM Peak Hour, respectively. During the PM Peak Hour, the site is estimated to generate 52 and 72 auto vehicle trips in and out of the access, respectively.

Provided that the school access is considered a T-intersection with one vehicle travel lane in both directions and that it is a future intersection, thresholds are raised for the consideration of traffic signals as a result of using average hourly volumes instead of eight-hour volumes as they are unavailable.

In accordance with OTM Book 12, the site generated volumes listed above are below the minimum requirements for a traffic signal based on Justification 7 – Projected Volumes, as shown in Table 4-6. Therefore, the projected site generated volumes indicate that signalization at the access intersection is not warranted since the volumes fall below the minimum requirements when considering the adjusted volume thresholds for all evaluation criteria.

Table 4-6: OTM Book 12 Signal Warrant Justification 7 - Proposed School

	MINIMUM REQUIREMENT	
JUSTIFICATION 7	FLOW[1]	ADJ. FLOW[2]
1A - All Approaches	480	1080
1B - Minor Road	120	270
2A - Major Road	480	1080
2B - Crossing Major Road	50	115

Notes
[1]Base Volume Thresholds are based on a 1-lane major road with free flow conditions.
[2]Adjusted Volume Thresholds are based on the following requirements in the OTM Warrant Methodology:

- x1.5 for Justification 7, based on a new intersection
- x1.5 for a T-intersection

The proposed school access will be located on a low-volume local road such that stop-control on the minor road (site access) is sufficient.

4.4.3 INTERSECTION DESIGN

According to the City of Ottawa's MMLOS Guidelines (2015), only signalized intersections are evaluated against the LOS measures for intersections. As such, no formal MMLOS evaluation has been applied to the proposed site access due to its unsignalized traffic control.

4.5 TRANSPORTATION DEMAND MANAGEMENT

4.5.1 CONTEXT FOR TDM

The proposed elementary school is anticipated to have 751 students and the on-site daycare service will accommodate 49 children. In addition, a total of 51 staff, including teachers, custodians, and office staff, are expected to work for the school and daycare.

The development is not located within a Design Priority Area (DPA) or Transit-oriented Development (TOD) zone and the majority of staff (80%) will be auto drivers and the majority of students (85%) will arrive and depart by school bus. Between all school users, approximately 15% are anticipated to be auto passengers, 5% to use active modes (walking and cycling), and less than 1% to take public transit.

The school board (CEPEO) has indicated that operation hours of the elementary school will be from 7:30 AM to 4:00 PM, and the daycare will operate between 6:00 AM to 5:00 PM. It is anticipated that the school hours provided account for the daycare hours for before and after care, which are outside of morning and afternoon school bells. The start time of the school generally aligns with AM peak hour of the adjacent street traffic, whereas the school end time is before the PM peak hour of the adjacent street traffic such that there will be more variation in site generated vehicle trips coinciding with the commuter PM peak hour.

4.5.2 NEED AND OPPORTUNITY

The existing road network has available capacity should the mode share targets not be met, as indicated in Section 4.9.2.

4.5.3 TDM PROGRAM

The TDM Measures Checklist for non-residential developments was completed to allow and encourage travel by sustainable modes to and from the proposed development at the time of occupancy. The completed checklist is provided in **Appendix F**.

The following TDM measures are recommended for the proposed development:

- Display local area maps with walking/cycling access routes and key destinations at major entrances
- Offer on-site Cycling Education Courses through the City of Ottawa
- Display relevant transit schedules and route maps at entrances
- Subsidize or reimburse monthly transit pass purchases by employees

4.6 NEIGHBOURHOOD TRAFFIC MANAGEMENT

4.6.1 ADJACENT NEIGHBOURHOODS

The proposed school forms part of the Fernbank Community Design Plan and is located within the Claridge Richcraft Tamarack (CRT) Westwood Phase 1 and Phase 2 subdivision. The access routes to and from the proposed development contain local and collector roads, such that the boundary streets of Cope Drive and Dagenham Street have been identified as a major collector road and local road, respectively. As per the City of Ottawa Area Traffic Management (ATM) guidelines, the thresholds for local roads and major collector roads are a maximum of 1,000 vehicles per day or 120 vehicles during the peak hour and a maximum of 5,000 vehicles per day or 600 vehicles during the peak hour, respectively.

The 2023 and 2028 total traffic volumes, as shown in Figure 3-4 and Figure 3-5, indicate that the addition of development-related traffic to these access roads (Cope Drive and Dagenham Street) will be below their road classification threshold during the peak hour for the 2023 future total conditions, but the threshold for Cope Drive is exceeded during the peak hour for the 2028 future total conditions. However, the 2028 future background volumes, as shown in Figure 3-3, indicate that the threshold is exceeded for Cope Drive prior to adding development-generated trips as the volumes account for the other area developments identified in Section 3.2.3.

Despite the road classification vehicle thresholds being exceeded, the Multi-Modal Level of Service Analysis (MMLOS) and intersection capacity analysis provided in Section 4.9.2 indicate that the Vehicle LOS target for the study area is met and that the study area intersections operate at an acceptable LOS. Based on this, the proposed school is expected to have a minimal impact on the access roads. Therefore, no change to the existing road classification is required and a Neighbourhood Traffic Management plan is not required.

4.7 TRANSIT

Based on Section 3.1.1, the proposed school is anticipated to generate only 3 person trips from the 5% of staff expected to use public transit and the existing transit routes do not coincide with the boundary street segments bordering the proposed site. Therefore, transit service will not be impacted according to development-generated demand.

4.8 REVIEW OF NETWORK CONCEPT

This module has been exempted based on Section 2.7.

4.9 INTERSECTION DESIGN

4.9.1 INTERSECTION CONTROL

Of the four study area intersections analyzed, the intersection of Fernbank Road / Robert Grant Avenue is signalized, and the intersections of Robert Grant Avenue / Cope Drive, Robert Grant Avenue / Bobolink Ridge and Robert Grant Avenue / Abbott Street E are roundabouts. The detailed operational analysis provided in Section 4.8.2 below indicates that all four study area intersections and their associated vehicle movements operate at a LOS of B or better for both the AM and PM Peak Hours from existing conditions to the 2023 future total traffic scenario; no signal modification is required in 2023 since the traffic operations at all the intersections perform well below capacity. During the 2028 future background and future total scenarios, westbound through (WBT) and southbound left (SBL) movements at the Robert Grant Avenue / Fernbank Road signalized intersection start to operate at LOS C and D respectively during the PM peak period. Although these levels of service remain acceptable, particular attention should be paid to the signal timing plan to ensure the intersection continues to perform within capacity in the years beyond 2028 as traffic demand increases.

4.9.2 INTERSECTION DESIGN

4.9.2.1 *MULTI-MODAL LEVEL OF SERVICE ANALYSIS*

A Multi-Modal Level of Service (MMLOS) analysis was carried out in accordance with the methodology outlined in the City of Ottawa's MMLOS Guidelines (2015). The Guidelines state that intersection LOS measures are to be evaluated at signalized intersections. Within the study area, Robert Grant Avenue / Fernbank Road is the only intersection that is signalized. The MMLOS analysis evaluates the 2022 existing conditions, 2028 future background and 2028 future total time horizon to provide a comparison between the baseline and future conditions (beyond the

development period). The road configuration remains the same between 2023 opening year and 2028 horizon year and hence the ultimate year was considered in the MMLOS evaluation.

The intersection of Robert Grant Avenue / Fernbank Road was evaluated as an *Arterial in a Developing Community* with the corresponding LOS targets taken from Exhibit 22 of the MMLOS Guidelines. The targets for Fernbank Road / Robert Grant Avenue intersection includes Bicycle Level of Service (BLOS) target for a spine route and Transit Level of Service (TLOS) target for transit priority isolated measures; there are no truck routes in the study area and therefore no assigned targets. The intersection MMLOS results are summarized in Table 4-7 and the detailed MMLOS spreadsheets are provided in **Appendix H**.

Table 4-7: Summary of Intersection Multi-Modal Level of Service (MMLOS) Analysis – Robert Grant Avenue / Fernbank Road

	PLOS	BLOS	TLOS	TKLOS	VLOS
Target	**C**	**C**	**D**	**-**	**D**
2022 Existing Conditions	E	A	E	-	A
2028 Future Background	E	A	F	-	D
2028 Future Total	E	A	C	-	D

The MMLOS targets that were not met are highlighted in red test in Table 4-7 and explained below:

Pedestrian Level of Service (PLOS) for signalized intersections is based on the consideration of individual level of service related to the exposure to traffic and average pedestrian delay at the intersection. Pedestrian Exposure to Traffic at Signalized Intersections (PETSI) LOS considers number of lanes crossed, left and right turning conflicts, Right Turn On Red (RTOR) restrictions, corner radius and type, and crosswalk treatment type. Pedestrian Delay LOS considers the cycle length at the intersection and the effective walk time on the crossing side. The PLOS target C was not met because currently, pedestrian delay on all legs is greater than 30s. For the target C to be met, effective walk time will have to be increased without increasing cycle length so that pedestrian delay can be reduced to less than 30s.

The **Transit Level of Service** (TLOS) at signalized intersections is based on individual transit delay on intersection approaches that include transit routes. With no dedicated transit priority measures at the intersection, OC Transpo buses experience the same delays as general vehicles in the westbound right and southbound left directions. The TLOS target of D is not met under the 2022 and 2028 future background scenarios because the average signal delay in the southbound direction during PM peak is greater than 30s.

Under the 2028 future total scenario, the signal timing is modified to an actuated-coordinated signal with 100s of cycle time. EBL phase is maintained as a protected and permitted phase with all other movements proceeding as existing. The signal modification reduces the southbound left turning delays to less than 30s during AM and PM peak hour and therefore TLOS under 2028 future total conditions exceeds the target.

4.9.2.2 *DETAILED PERFORMANCE ANALYSIS*

The existing and future conditions were analyzed based upon the weekday peak hour traffic volumes presented in Sections 2.3.7, 3.2.3, and 3.3.3. The City of Ottawa's MMLOS Guidelines assigns the vehicle level of service (VLOS) based on ranges of volume to capacity ratio, as indicated in Table 4-8. The VLOS for the intersection of Robert Grant Avenue and Fernbank Road was evaluated using the volume to capacity ratio.

Table 4-8: City of Ottawa MMLOS Guidelines, LOS Criteria – Signalized Intersections

VLOS	VOLUME TO CAPACITY RATIO
A	0 – 0.60
B	0.61 – 0.70
C	0.71 – 0.80
D	0.80 – 0.90
E	0.91 – 1.00
F	> 1.00

For unsignalized intersections, VLOS is based on control delay, as indicated in Table 4-9. Unsignalized intersections include roundabouts and stop controlled intersections. All the intersections with the exception of Robert Grant Avenue / Fernbank Road were evaluated using the control delay.

Table 4-9: Highway Capacity Manual 2010, LOS Criteria – All-Way Stop Controlled or Two-Way Stop Controlled Intersections

VLOS	CONTROL DELAY (S)
A	0 – 10
B	> 10 – 15
C	> 15 – 25
D	> 25 – 35
E	> 35 – 50
F	> 50

The following tables present the results of the intersection capacity analysis. Robert Grant Avenue / Fernbank Road signalized and the proposed TWSC intersection at Cope Drive / Dagenham Street were analyzed using Synchro 11; the signalized intersection was analyzed following the analysis parameters in the TIA Guidelines while the TWSC intersection followed the HCM 2010 LOS criteria for stop controlled intersections. The roundabouts were analyzed with SIDRA 7 based on HCM 6 methodology.

The existing signal timing plan for the intersection of Fernbank Road and Robert Grant Avenue includes an advance green phase for the north side crossride; during this phase, the WB through movement is allowed to proceed during the crossride phase, but the WB right turn is required to wait until the termination of the crossride phase. This advance WB through arrow operation has been included in the Synchro analysis for this intersection, with the crossride phase conservatively modeled at max recall to operate every signal cycle.

Appendix I contains the detailed Synchro and SIDRA analysis sheets.

EXISTING CONDITIONS

The existing conditions (2022) intersection operations analysis results are summarized in Table 4-10.

Table 4-10: Summary of Traffic Operations Analysis – Existing Conditions (2022)

MOVEMENT	AM PEAK HOUR				PM PEAK HOUR			
	LOS	V/C	DELAY (S)	95TH %ILE QUEUE (M)	LOS	V/C	DELAY (S)	95TH %ILE QUEUE (M)
Robert Grant Avenue / Fernbank Road (Signalized)								
EBL	A	0.10	29.8	12.5	A	0.08	41.1	11.3
EBT	A	0.37	12.1	47.5	A	0.27	9.4	37.0
WBT	A	0.46	28.3	52.4	B	0.69	29.4	118.2
WBR	A	0.46	9.3	16.5	A	0.33	4.9	14.7
SBL	A	0.29	21.8	44.0	A	0.36	31.3	61.4
SBR	A	0.05	8.3	6.3	A	0.06	11.4	7.5
Intersection LOS	A				A			
Robert Grant Avenue / Cope Drive (Roundabout)								
EB	A	0.00	3.2	0.2	A	0.01	3.5	0.2
WB	A	0.04	3.7	1.3	A	0.06	3.6	2.0
NB	A	0.19	4.3	6.8	A	0.13	3.8	4.3
SB	A	0.11	3.6	3.6	A	0.17	4.2	6.1
Intersection LOS	A				A			
Robert Grant Avenue / Bobolink Ridge (Roundabout)								
EB	A	0.07	3.7	2.0	A	0.08	4.1	2.3
WB	A	0.07	4.1	2.0	A	0.06	3.7	1.8

MOVEMENT	AM PEAK HOUR				PM PEAK HOUR			
	LOS	V/C	DELAY (S)	95TH %ILE QUEUE (M)	LOS	V/C	DELAY (S)	95TH %ILE QUEUE (M)
NB	A	0.20	4.6	7.0	A	0.14	4.2	4.6
SB	A	0.14	3.9	4.8	A	0.23	4.7	8.7
Intersection LOS	A				A			
Robert Grant Avenue / Abbott Street E. (Roundabout)								
EB	A	0.14	4.0	4.7	A	0.30	6.1	11.4
WB	A	0.14	4.7	4.1	A	0.22	5.3	7.8
NB	A	0.38	6.2	17.2	A	0.25	5.0	9.6
Intersection LOS	A				A			

Notes:

1. Movement LOS at the signalized intersection is based on Synchro V/C ratios and the LOS thresholds in Section 6.1 of the City of Ottawa's Multi-Modal Level of Service (MMLOS) Guidelines for signalized intersections.
2. Movement LOS at the roundabouts is based on delay calculations from HCM 6 Roundabouts report that is generated in SIDRA.
3. The overall intersection LOS at the signalized intersection is based on the overall intersection V/C ratio which is derived from the volumes and capacities of the critical movement at the intersection.
4. The overall intersection LOS at the roundabouts is based on overall delay from HCM 6 Roundabouts report generated in SIDRA.

The results of the Synchro / Sidra analysis indicate that all study intersections operate at acceptable levels of service under existing conditions. All the roundabouts operate at LOS A with minimal delays and queues experienced on all approaches. All movements at the signalized intersection of Robert Grant Avenue / Fernbank Road operate at LOS B or better. Given the relatively large westbound through volumes (app. 440 vehicles) during the PM peak, this movement shows a v/c ratio of 0.69 (LOS B) with queues of approximately 120m. The westbound through queue does not block westbound right turning traffic as the adjacent westbound right storage lane is 130m long and provides enough space for turning vehicles to access this lane.

FUTURE BACKGROUND

The 2023 and 2028 future background intersection operations analysis results are summarized in Table 4-11 and Table 4-12, respectively.

Table 4-11: Summary of Traffic Operations Analysis – Future Background (2023)

MOVEMENT	AM PEAK HOUR				PM PEAK HOUR			
	LOS	V/C	DELAY (S)	95TH %ILE QUEUE (M)	LOS	V/C	DELAY (S)	95TH %ILE QUEUE (M)
Robert Grant Avenue / Fernbank Road								
EBL	A	0.13	29.9	14.4	A	0.10	39.6	11.8
EBT	A	0.35	12.1	43.5	A	0.26	9.6	34.0
WBT	A	0.43	27.6	47.6	B	0.66	28.6	105.1
WBR	A	0.47	9.7	16.5	A	0.33	5.3	14.6
SBL	A	0.27	20.4	40.3	A	0.34	28.6	55.9
SBR	A	0.05	7.8	6.3	A	0.06	10.2	7.7
Intersection LOS	A				A			
Robert Grant Avenue / Cope Drive								
EB	A	0.04	3.5	1.3	A	0.05	3.9	1.6
WB	A	0.06	4.0	1.7	A	0.07	3.8	2.3
NB	A	0.22	4.6	7.9	A	0.14	4.0	4.9
SB	A	0.14	4.0	4.8	A	0.19	4.5	6.8
Intersection LOS	A				A			
Robert Grant Avenue / Bobolink Ridge								
EB	A	0.07	3.8	2.1	A	0.08	4.3	2.4
WB	A	0.07	4.3	2.1	A	0.06	3.8	1.8

MOVEMENT	AM PEAK HOUR				PM PEAK HOUR			
	LOS	V/C	DELAY (S)	95TH %ILE QUEUE (M)	LOS	V/C	DELAY (S)	95TH %ILE QUEUE (M)
NB	A	0.22	4.8	7.9	A	0.16	4.4	5.4
SB	A	0.17	4.2	6.1	A	0.25	4.9	1.3
Intersection LOS	A				A			
Robert Grant Avenue / Abbott Street E.								
EB	A	0.16	4.3	5.3	A	0.32	6.4	12.2
WB	A	0.16	5.0	5.0	A	0.24	5.5	8.5
NB	A	0.40	6.5	19.0	A	0.27	5.2	10.9
Intersection LOS	A				A			

Notes:

1. Movement LOS at the signalized intersection is based on Synchro V/C ratios and the LOS thresholds in Section 6.1 of the City of Ottawa's Multi-Modal Level of Service (MMLOS) Guidelines for signalized intersections.
2. Movement LOS at the roundabouts is based on delay calculations from HCM 6 Roundabouts report that is generated in SIDRA.
3. The overall intersection LOS at the signalized intersection is based on the overall intersection V/C ratio which is derived from the volumes and capacities of the critical movement at the intersection.
4. The overall intersection LOS at the roundabouts is based on overall delay from HCM 6 Roundabouts report generated in SIDRA.

Table 4-12: Summary of Traffic Operations Analysis – Future Background (2028)

MOVEMENT	AM PEAK HOUR				PM PEAK HOUR			
	LOS	V/C	DELAY (S)	95TH %ILE QUEUE (M)	LOS	V/C	DELAY (S)	95TH %ILE QUEUE (M)
Robert Grant Avenue / Fernbank Road								
EBL	A	0.23	35.7	27.4	A	0.25	45.9	26.4
EBT	A	0.46	12.2	68.0	A	0.34	9.2	50.3
WBT	A	0.56	29.9	77.4	C	0.80	35.1	176.7
WBR	A	0.56	7.2	20.4	A	0.53	4.9	21.2
SBL	B	0.74	39.9	#135.8	D	0.82	54.3	#147.7
SBR	A	0.14	7.5	10.9	A	0.14	9.2	11.5
Intersection LOS	B				D			
Robert Grant Avenue / Cope Drive								
EB	A	0.39	8.3	14.9	A	0.30	7.5	10.2
WB	A	0.29	8.7	8.9	A	0.17	6.4	5.1
NB	A	0.51	10.6	27.6	A	0.40	7.7	16.1
SB	A	0.45	8.0	21.2	A	0.52	9.0	27.1
Intersection LOS	A				A			
Robert Grant Avenue / Bobolink Ridge								
EB	A	0.11	5.8	3.2	A	0.14	6.9	3.8
WB	A	0.17	7.6	4.7	A	0.12	5.8	3.4
NB	A	0.58	9.9	33.8	A	0.46	8.0	21.0

MOVEMENT	AM PEAK HOUR				PM PEAK HOUR			
	LOS	V/C	DELAY (S)	95TH %ILE QUEUE (M)	LOS	V/C	DELAY (S)	95TH %ILE QUEUE (M)
SB	A	0.45	7.4	22.5	A	0.56	9.1	34.4
Intersection LOS	A				A			
Robert Grant Avenue / Abbott Street E.								
EB	A	0.23	5.3	8.3	B	0.62	14.0	47.6
WB	A	0.27	7.0	8.9	A	0.49	9.5	22.5
NB	B	0.69	12.3	60.2	A	0.49	8.2	24.7
Intersection LOS	B				B			
Cope Drive / Dagenham Street								
EB	A	0.00	0.0	0.0	A	0.00	0.0	0.0
WB	A	0.00	4.2	0.1	A	0.04	4.2	0.9
NB	A	0.06	8.7	1.5	A	0.05	8.7	1.2
SB	A	0.01	9.4	0.4	B	0.01	10.4	0.3
Intersection LOS	A				A			

Notes:

1. Movement LOS at the signalized intersection is based on Synchro V/C ratios and the LOS thresholds in Section 6.1 of the City of Ottawa's Multi-Modal Level of Service (MMLOS) Guidelines for signalized intersections.
2. Movement LOS at the roundabouts is based on delay calculations from HCM 6 Roundabouts report that is generated in SIDRA.
3. The overall intersection LOS at the signalized intersection is based on the overall intersection V/C ratio which is derived from the volumes and capacities of the critical movement at the intersection.
4. The overall intersection LOS at the roundabouts is based on overall delay from HCM 6 Roundabouts report generated in SIDRA.

The results of the future background scenario analyses indicate that 2023 traffic operations remain similar to that of 2022 existing conditions. All intersections operate with all movements at optimum LOS A except WBT movements which operate at LOS B during the PM peak period.

With expected traffic growth in the area between the 2022 existing analysis period and the 2028 horizon analysis period and without this proposed development, traffic operations indicate an increase in delays and queues on the Robert Grant Avenue corridor. With the same cycle length maintained at Robert Grant Avenue / Fernbank Road signalized intersection, the LOS of WBT movements increase from LOS B to C during the PM peak period with a

175m queue in the 2028 future horizon analysis. WBT queues will extend past the adjacent WBR storage lanes, preventing right turning vehicles held up in the queues from accessing the 130m storage lane in the PM peak hour. Southbound left (SBL) movements at the intersection will increase from LOS A in the AM and PM peak hours to LOS B in the AM and LOS D in the PM. The 135m and 150m queues indicated during the AM and PM peak scenarios respectively, are longer than the 105m southbound right storage lane; southbound left movement queues will extend past the adjacent 105m southbound right storage lane blocking turning vehicles from accessing the storage lane in morning and evening peak periods in the 2028 future background scenario.

At the Robert Grant Avenue / Abbott Street East roundabout north of the site, traffic operations in the northbound (NB) direction will increase from LOS A to LOS B in the AM peak period as a result of the expected traffic growth in the 2028 future background scenario. NB traffic will experience a 12s delay with 60m queue queues forming on the approach in the AM peak period. Eastbound (EB) movements will increase from LOS A to LOS B in the PM peak hour with 14s delays and 50m queues on this approach. The roundabout will continue to operate at acceptable levels of service.

The full buildout of the Cope Drive / Dagenham Street intersection will see all movements at the intersection operating at LOS B or better during peak hours. Southbound movements will operate at LOS B during the PM peak hour with approximately 10s delays. No significant queues will be recorded at this intersection.

FUTURE TOTAL

The 2023 and 2028 future total intersection operations analysis results are summarized in Table 4-13 and Table 4-14, respectively.

Table 4-13: Summary of Traffic Operations Analysis – Future Total (2023)

MOVEMENT	AM PEAK HOUR				PM PEAK HOUR			
	LOS	V/C	DELAY (S)	95TH %ILE QUEUE (M)	LOS	V/C	DELAY (S)	95TH %ILE QUEUE (M)
Robert Grant Avenue / Fernbank Road (Signalized)								
EBL	A	0.15	30.2	15.7	A	0.10	39.6	12.4
EBT	A	0.35	12.1	43.5	A	0.26	9.6	34.0
WBT	A	0.43	27.6	47.6	B	0.66	28.6	105.1
WBR	A	0.50	9.7	17.5	A	0.34	5.3	14.9
SBL	A	0.29	20.7	43.7	A	0.36	28.9	59.3
SBR	A	0.06	7.4	6.6	A	0.07	9.9	8.0
Intersection LOS	A				A			
Robert Grant Avenue / Cope Drive (Roundabout)								
EB	A	0.05	3.6	1.5	A	0.06	4.0	1.8

MOVEMENT	AM PEAK HOUR				PM PEAK HOUR			
	LOS	V/C	DELAY (S)	95TH %ILE QUEUE (M)	LOS	V/C	DELAY (S)	95TH %ILE QUEUE (M)
WB	A	0.07	4.1	1.9	A	0.08	3.9	2.3
NB	A	0.24	4.9	8.9	A	0.15	4.1	5.2
SB	A	0.22	4.8	7.7	A	0.23	4.9	8.4
Intersection LOS	A				A			
Robert Grant Avenue / Bobolink Ridge (Roundabout)								
EB	A	0.16	4.9	5.0	A	0.15	5.0	4.7
WB	A	0.08	4.5	2.2	A	0.07	4.0	1.9
NB	A	0.22	5.1	7.9	A	0.17	4.6	5.6
SB	A	0.08	4.8	8.7	A	0.27	5.1	10.7
Intersection LOS	A				A			
Robert Grant Avenue / Abbott Street E. (Roundabout)								
EB	A	0.21	4.8	7.2	A	0.34	6.7	13.2
WB	A	0.19	5.5	6.0	A	0.25	5.7	8.9
NB	A	0.45	7.0	22.3	A	0.30	5.4	11.9
Intersection LOS	A				A			
Cope Drive / Dagenham Street (Stop-Controlled)								
EB	-	-	-	-	-	-	-	-
WB	A	0.06	0.0	0.0	A	0.03	0.0	0.0
SB	A	0.01	8.8	0.2	A	0.01	8.6	0.1

MOVEMENT	AM PEAK HOUR				PM PEAK HOUR			
	LOS	V/C	DELAY (S)	95TH %ILE QUEUE (M)	LOS	V/C	DELAY (S)	95TH %ILE QUEUE (M)
Intersection LOS	A				A			

Notes:

1. Movement LOS at the signalized intersection is based on Synchro V/C ratios and the LOS thresholds in Section 6.1 of the City of Ottawa's Multi-Modal Level of Service (MMLOS) Guidelines for signalized intersections.
2. Movement LOS at the roundabouts is based on delay calculations from HCM 6 Roundabouts report that is generated in SIDRA.
3. The overall intersection LOS at the signalized intersection is based on the overall intersection V/C ratio which is derived from the volumes and capacities of the critical movement at the intersection.
4. The overall intersection LOS at the roundabouts is based on overall delay from HCM 6 Roundabouts report generated in SIDRA.

Table 4-14: Summary of Traffic Operations Analysis – Future Total (2028)

MOVEMENT	AM PEAK HOUR				PM PEAK HOUR			
	LOS	V/C	DELAY (S)	95TH %ILE QUEUE (M)	LOS	V/C	DELAY (S)	95TH %ILE QUEUE (M)
Robert Grant Avenue / Fernbank Road (Signalized)								
EBL	A	0.51	54.7	30.5	A	0.27	13.0	11.3
EBT	C	0.71	31.6	100.2	A	0.46	18.6	67.3
WBT	C	0.73	44.4	85.8	D	0.90	44.8	#175.1
WBR	A	0.55	6.6	20.6	A	0.52	4.1	18.0
SBL	A	0.49	20.4	97.0	A	0.58	29.6	101.1
SBR	A	0.10	4.4	8.6	A	0.11	6.1	9.2
Intersection LOS	C				C			
Robert Grant Avenue / Cope Drive (Roundabout)								
EB	A	0.41	8.6	15.5	A	0.31	7.7	10.6
WB	A	0.30	9.2	9.4	A	0.18	6.5	5.3

MOVEMENT	AM PEAK HOUR				PM PEAK HOUR			
	LOS	V/C	DELAY (S)	95TH %ILE QUEUE (M)	LOS	V/C	DELAY (S)	95TH %ILE QUEUE (M)
NB	A	0.54	11.3	32.6	A	0.41	7.9	16.8
SB	A	0.55	9.9	28.0	A	0.57	9.9	31.0
Intersection LOS	A				A			
Robert Grant Avenue / Bobolink Ridge (Roundabout)								
EB	A	0.24	7.7	7.3	A	0.24	8.4	7.1
WB	A	0.16	8.1	4.9	A	0.12	6.1	3.5
NB	B	0.61	11.1	34.6	A	0.47	8.6	21.7
SB	A	0.51	8.3	28.1	A	0.58	9.5	37.4
Intersection LOS	A				A			
Robert Grant Avenue / Abbott Street E. (Roundabout)								
EB	A	0.29	6.0	10.7	C	0.66	15.1	54.0
WB	A	0.31	7.8	10.3	B	0.51	10.2	27.3
NB	B	0.73	13.7	71.9	A	0.52	8.8	28.0
Intersection LOS	B				B			
Cope Drive / Dagenham Street (Stop-Controlled)								
EB	A	0.00	0.0	0.0	A	0.00	0.0	0.0
WB	A	0.00	0.3	0.1	A	0.04	3.0	0.9
SB	A	0.06	8.8	1.5	A	0.05	8.7	1.2
NB	A	0.02	9.8	0.6	B	0.02	10.6	0.5

MOVEMENT	AM PEAK HOUR				PM PEAK HOUR			
	LOS	V/C	DELAY (S)	95TH %ILE QUEUE (M)	LOS	V/C	DELAY (S)	95TH %ILE QUEUE (M)
Intersection LOS	A				A			

Notes:

1. Movement LOS at the signalized intersection is based on Synchro V/C ratios and the LOS thresholds in Section 6.1 of the City of Ottawa's Multi-Modal Level of Service (MMLOS) Guidelines for signalized intersections.
2. Movement LOS at the roundabouts is based on delay calculations from HCM 6 Roundabouts report that is generated in SIDRA.
3. The overall intersection LOS at the signalized intersection is based on the overall intersection V/C ratio which is derived from the volumes and capacities of the critical movement at the intersection.
4. The overall intersection LOS at the roundabouts is based on overall delay from HCM 6 Roundabouts report generated in SIDRA.

The result of the future total analysis indicates an increase in traffic operations in comparison to the future background scenarios. 2023 future total traffic operations remain similar to 2023 future background scenario; all movements at all intersections operate at optimum LOS A except WBT movements at Robert Grant Avenue / Fernbank Road intersection which indicate LOS B because of the fairly large PM peak hour volume (app. 200 vehicles). The new 4-leg Cope Drive / Dagenham Street intersection will operate at LOS B with an intersection delay of 4.3s recorded at the intersection during the PM peak hour.

The addition of the site generated traffic to the projected 2028 traffic on the corridor is realized in the increase in vehicle delay and queuing at the signalized intersection and the roundabouts. The signal timing at Robert Grant Avenue / Fernbank Road has been modified from an actuated-uncoordinated signal to an actuated-coordinated one. All movements at the intersection operate at LOS D or better. At the Robert Grant Avenue / Fernbank Road signalized intersection, LOS increases from B to C in the SBL direction with the addition of the site generated traffic; these movements will experience 42s delays and 145m queues in the 2028 future total scenario. At the Robert Grant Avenue / Bobolink Ridge roundabout, LOS for NB traffic will increase from A to B during the AM peak hour with an associated 11s delay and 35m queues on this approach. At the Robert Grant Avenue / Abbott Street East intersection, LOS for EB traffic will increase from B to C during the PM peak hour; traffic in the EB direction will experience 15s delays and 55m queues. Westbound (WB) traffic will also experience an LOS increase from A to B during the PM peak period with 10s delays and 30m queues. The queues at the roundabouts do not spillover into accesses or intersections upstream. The TWSC Cope Drive / Dagenham Street intersection will continue to operate at optimum LOS in 2028 with the introduction of a south leg; a 7s intersection delay is recorded at this intersection. In general, all intersections will continue to operate at acceptable levels of service.

4.10 SUMMARY OF IMPROVEMENTS INDICATED AND MODIFICATION OPTIONS

A summary of transportation improvements proposed as part of this Transportation Impact Assessment carried out and the proposed modifications are presented as follows:

1. Development Design

- Sustainable modes have been accounted for on-site through the provision of internal walkways, bicycle parking, pedestrian infrastructure adjacent to the site, and direct connections and access to an existing adjacent transit stop.
- The site plan was assessed using AutoTurn 11 for various design vehicles (waste removal and school bus) accessing and circulating around the site. The AutoTurn swept paths indicate that the site access on Dagenham Street can accommodate the movements of these design vehicles entering and exiting the site without conflicting with built features but encroach on the opposing vehicle lane. The drop-off

area can accommodate the wide turning movements of these design vehicles when circulating without conflicting with the curb.

- While school buses will not be using the drop-off area in the parking lot and will instead be using the boundary street laybys, the drop-off area can accommodate school bus movements if circulation patterns change in the future.
- It is recommended that the waste containers be angled for ease of movement (rear loading) during waste removal.

2. Parking

- The 58 auto parking and 50 bicycle parking spaces provided in the site plan meet the minimum requirements of the City of Ottawa's Zoning By-Law.

3. Boundary Streets Design

- Cope Drive does not meet the PLOS target nor the BLOS target under existing conditions. The BLOS target of C will be met for the 2028 future conditions as well as the PLOS target of A for the north side MUP . The south side sidewalk not adjacent to the school will have a PLOS of B under the future configuration.
- Due to Dagenham Street currently being under construction, no MMLOS evaluation has been carried out for existing conditions. For the future 2028 conditions, the proposed sidewalk adjacent to the school will meet the PLOS target of A if an operating speed on Dagenham Street is achieved. The PLOS of the west sidewalk will reach PLOS B as a result of the narrower sidewalk width and lack of on-street parking. Dagenham Street will reach a BLOS of B, exceeding the target of C.

4. Access Intersections Design

- The site access on Dagenham Street meets the requirements set out for driveways in TAC 2017 to be considered as part of good design practice.
- In accordance with OTM Book 12, the site generated volumes are below the minimum requirements for a traffic signal to be warranted based on Justification 7 – Projected Volumes.
- Stop-control on the minor road (site access) is sufficient.

5. Transportation Demand Management

- The existing road network has available capacity should the mode share targets not be met.
- The TDM measures recommended for the proposed development include providing Cycling Education Programs in partnership with the City of Ottawa, displaying local area maps with walking/cycling access routes and transit schedules with route maps, as well as subsidizing or reimbursing monthly transit pass purchases by employees.

6. Neighbourhood Traffic Management

- Despite the future traffic volumes along the access routes being above the thresholds for local and major collector roads during the peak hour, the proposed school will have a minimal impact on the access roads since the traffic operations are below the capacity and within an acceptable LOS.

7. Transit

- Transit service along Cope Drive (east of Robert Grant Avenue) and Robert Grant Avenue (south of Cope Drive) will not be impacted according to the low projected development-generated demand.

8. Intersection Design

- Intersection of Fernbank Road / Robert Grant Avenue (signalized): No proposed modifications. Control type, configuration, and capacity are sufficient. Particular attention should be paid to the signal

timing plan to ensure the intersection continues to perform within capacity in the years beyond 2028 as traffic demand increases.

- Intersection of Robert Grant Avenue / Cope Drive (roundabout): No proposed modifications. Control type, configuration, and capacity are sufficient.
- Intersection of Robert Grant Avenue / Bobolink Ridge (roundabout): No proposed modifications. Control type, configuration, and capacity are sufficient.
- Intersection of Robert Grant Avenue / Abbott Street E. (roundabout): No proposed modifications. Control type, configuration, and capacity are sufficient.

Based on the results of this Transportation Impact Assessment, the transportation network surrounding the proposed elementary school by CEPEO located at 755 Cope Drive can accommodate the development without adverse impacts to future traffic operations during the 2023 built-out year and 2028 planning horizon.

APPENDIX

A SCREENING FORM

City of Ottawa 2017 TIA Guidelines Screening Form

1. Description of Proposed Development

Municipal Address	755 Cope Drive, Stittsville, Ontario, K2S 1S3
Description of Location	Located at the north-east corner of Cope Dr and Dagenham St.
Land Use Classification	Institutional - School
Development Size (units)	800 students and staff
Development Size (m^2)	5,455 (building area)
Number of Accesses and Locations	Access from Dagenham Street, service access from Cope Drive
Phase of Development	Single Phase
Buildout Year	2022

If available, please attach a sketch of the development or site plan to this form.

2. Trip Generation Trigger

Considering the Development's Land Use type and Size (as filled out in the previous section), please refer to the Trip Generation Trigger checks below.

Land Use Type	Minimum Development Size
Single-family homes	40 units
Townhomes or apartments	90 units
Office	3,500 m^2
Industrial	5,000 m^2
Fast-food restaurant or coffee shop	100 m^2
Destination retail	1,000 m^2
Gas station or convenience market	75 m^2

** If the development has a land use type other than what is presented in the table above, estimates of person-trip generation may be made based on average trip generation characteristics represented in the current edition of the Institute of Transportation Engineers (ITE) Trip Generation Manual.*

If the proposed development size is greater than the sizes identified above, the Trip Generation Trigger is satisfied.

800 students and staff will generate > 60 vehicle trips, Trip Generation trigger is satisfied.

3. Location Triggers

	Yes	No
Does the development propose a new driveway to a boundary street that is designated as part of the City's Transit Priority, Rapid Transit or Spine Bicycle Networks?	X	
Is the development in a Design Priority Area (DPA) or Transit-oriented Development (TOD) zone?*		X

**DPA and TOD are identified in the City of Ottawa Official Plan (DPA in Section 2.5.1 and Schedules A and B; TOD in Annex 6). See Chapter 4 for a list of City of Ottawa Planning and Engineering documents that support the completion of TIA).*

If any of the above questions were answered with 'Yes,' the Location Trigger is satisfied.

4. Safety Triggers

	Yes	No
Are posted speed limits on a boundary street are 80 km/hr or greater?		X
Are there any horizontal/vertical curvatures on a boundary street limits sight lines at a proposed driveway?		X
Is the proposed driveway 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)?		X
Is the proposed driveway within auxiliary lanes of an intersection?		X
Does the proposed driveway make use of an existing median break that serves an existing site?		X
Is there is a documented history of traffic operations or safety concerns on the boundary streets within 500 m of the development?		X
Does the development include a drive-thru facility?		X

If any of the above questions were answered with 'Yes,' the Safety Trigger is satisfied.

5. Summary

	Yes	No
Does the development satisfy the Trip Generation Trigger?	X	
Does the development satisfy the Location Trigger?	X	
Does the development satisfy the Safety Trigger?		X

If none of the triggers are satisfied, the TIA Study is complete. If one or more of the triggers is satisfied, the TIA Study must continue into the next stage (Screening and Scoping).

APPENDIX

B DRAFT SITE PLAN

R2013 - A49_M_ARCH_E_BLDG_VT_EN - v1

SITE PLAN SYMBOLS LEGEND

- ENTRANCE
- EXIT
- MANHOLE, CATCH BASIN, ETC, REFER TO CIVIL
- LS, LIGHT STANDARD, REFER TO ELECTRICAL AND STRUCTURAL
- DENOTES SLOPED GRADE, REFER TO CIVIL
- DENOTES FIRE TRUCK ACCESS ROUTE, REFER TO CIVIL DRAWINGS
- PROPERTY LINE
- SURVEY BAR
- UTILITY POLE
- FIRE HYDRANT
- BASKETBALL NET
- SIDEWALK/ CONCRETE SURFACE
- PEDESTRIAN WALKWAY
- SWALE. REFER TO CIVIL DRAWINGS
- SETBACK LINE
- FIRE ROUTE
- BOREHOLE LOCATION
- GRASS
- FENCE LINE
- LANDSCAPING
- NEW MANHOLE FOR PORTABLE
- PADMOUNT TRANSFORMER BY HYDRO OTTAWA. PROVIDE TRANSFORMER BASE TO HYDRO OTTAWA STANDARDS. PRECAST TRANSFORMER BASE AND BOLLARDS BY GENERAL CONTRACTOR. REFER TO HYDRO OTTAWA STANDARD DETAILS UFS0001, UGS0002 AND UTS0038.
- NO PARKING - FIRE ROUTE SIGN
- HEAVY DUTY ASPHALT
- LIGHT DUTY ASPHALT

GENERAL SITE PLAN NOTES

1. OBC 3.2.5.5.(1) LOCATION OF ACCESS ROUTES

   ACCESS ROUTES REQUIRED BY ARTICLE 3.2.5.4 SHALL BE LOCATED SO THAT THE PRINCIPLE ENTRANCE AND EVERY ACCESS OPENING REQUIRED BY ARTICLE 3.2.5.1 AND 3.2.5.2. ARE LOCATED NOT LESS THAN 3M AND NOT MORE THAN 15M FROM THE CLOSEST PORTION OF THE ACCESS ROUTE REQUIRED FOR FIRE DEPARTMENT USE, MEASURED HORIZONTALLY FROM THE FACE OF THE BUILDING.

2. OBC 3.2.5.6.(1) ACCESS ROUTE DESIGN

   A PORTION OF A ROADWAY OR YARD PROVIDED AS A REQUIRED ACCESS ROUTE FOR FIRE DEPARTMENT USE SHALL, (a) HAVE A CLEAR WIDTH OF NOT LESS THAN 6M, UNLESS IT CAN BE SHOWN THAT LESSER WIDTHS ARE SATISFACTORY, (b) HAVE A CENTERLINE RADIUS NOT LESS THEN 12M, (c) HAVE AN OVERHEAD CLEARANCE OF NOT LESS THAN 5M, (d) HAVE A CHANGE OF GRADIENT NOT MORE THAN 1 IN 12.5 OVER A MINIMUM DISTANCE OF 15M, (e) BE DESIGNED TO SUPPORT THE EXPECTED LOADS IMPOSED BY FIRE FIGHTING EQUIPMENT AND BE SURFACED WITH CONCRETE ASPHALT OR OTHER MATERIAL DESIGNED TO PERMIT ACCESSIBILITY UNDER ALL CLIMATIC CONDITIONS.

3. PROVIDE 75mm THK HI-40 UNDER ALL EXTERIOR CONCRETE SIDEWALK AT ALL ENTRANCES/EXITS. EXTEND RIGID INSULATION MIN 1220 PAST THE EDGE OF CONCRETE SIDEWALKS.

4. FOR CONCRETE SIDEWALK EXPANSION AND CONTRACTION JOINTS, REFER TO CIVIL DETAIL AND SPECIFICATIONS.

5. REFER TO LANDSCAPING PLAN AND CIVIL PLANS FOR LOCATION OF SOD. ALL REMAINING AREAS NOT SLATED FOR SOD TO RECEIVE TOPSOIL AND SEED.

6. REFER TO CIVIL DRAWINGS FOR LOCATIONS OF FIRE ROUTE SIGNAGE.

7. REFER TO CIVIL DRAWINGS FOR TACTILE INDICATORS.

8. ALL CURBS ADJACENT TO PARKING AREAS AND CURBS FORMING PART OF SIDWALKS ADJACENT TO PARKING AREAS TO BE PAINTED YELLOW.

9. ENSURE FINAL PLACEMENT OF FIRE DEPARTMENT CONNECTION IS NOT MORE THAN 45 m FROM THE NEAREST FIRE HYDRANT AS PER OBC 3.2.5.16.-(2).

10. LEGAL SURVEY BOUNDARIES TAKEN FROM REGISTERED PLAN 4M-1619, DATED MARCH 12, 2019, FROM THE OFFICE OF ANNIS, O'SULLIVAN, VOLLEBEKK LTD.(OLS), JOB NO. 14777-14.

11. TOPOGRAPHICAL INFORMATION TAKEN FROM TOPOGRAPHICAL PLAN OF SURVEY, BLOCKS 313 AND 314, REGISTERED PLAN 4M-1619, DATED MARCH 30, 2021, FROM THE OFFICE OF ANNIS, O'SULLIVAN, VOLLEBEKK LTD.(OLS), JOB NO. 21401-21.

SITE AND PARKING INFORMATION

TYPE OF BUILDING OR USE

SCHOOL (GROUP A-2 OCCUPANCY)

ZONING	REQUIREMENT (I1A)	PROPOSED
ZONING = I1A - MINOR INSTITUTIONAL ZONE, SUBZONE B/ R1Z RESIDENTIAL FIRST DENSITY, SUBZONE Z		
MINIMUM LOT AREA: SEC. 170, TABLE 170A (b)	400m²	28, 889m²
MINIMUM LOT WIDTH: SEC. 170, TABLE 170A (a)	15.0m	± 104.61m
MINIMUM FRONT YARD: SEC. 170, TABLE 170A (c)	3.0m	6.15m
MINIMUM REAR YARD: SEC. 170, TABLE 170A (d)	7.5m	± 55.54m
MINIMUM EXTERIOR SIDE YARD:	NO REQUIREMENT	-
MINIMUM INTERIOR SIDE YARD: SEC. 170, TABLE 170A (e)	7.5m	± 93.47m
MINIMUM CORNER SIDE YARD: SEC. 170, TABLE 170A (f)	4.5m	± 16.48m
MINIMUM LANDSCAPED OPEN SPACE	NO REQUIREMENT	5.3% WITH PARKING LOT
MAXIMUM LOT COVERAGE	NO REQUIREMENT	12.8% LOT COVERAGE
PERCENTAGE OF TOTAL SITE OCCUPIED BY VEGETATION AND LANDSCAPING	NO REQUIREMENT	77% SITE OCCUPIED
MAXIMUM BUILDING HEIGHT: SEC. 170, TABLE 170A (g) (BY-LAW 2017-303)	15.0m	8.7m
MINIMUM REQUIRED PARKING FOR NEW ELEMENTARY SCHOOL: SEC. 101, TABLE 101, N81	1.5 PER CLASSROOM (w/ PORTABLES); DAYCARE - 2 PER 100 m2 OF GFA = 55	58
MINIMUM REQ. WIDTH OF A LANDSCAPED BUFFER FOR PARKING LOT: SEC. 110, TABLE 110(a)	3.0m	3.6m
MINIMUM NUMBER OF BARRIER-FREE PARKING SPACES: BY-LAW NO. 2017-301, SECTION 111	NO. OF REGULAR PARKING SPACES - MIN. NO. OF ACCESSIBLE PARKING SPACES - 51 - 75 SPACES: 3	3, SEE CALCULATION ABOVE
MINIMUM NUMBER OF BICYCLE PARKING SPACES: SEC. 111, TABLE 111A (d)	SCHOOL: 1 PER 100m² OF GFA OFFICE: 4781 /100 = 47.81 ROUNDED TO 48 DAY CARE: 1 PER 250m² OF GFA = 360 /250 = 1.44 ROUNDED TO 2 **TOTAL: 50**	50
BICYCLE PARKING DIMENSIONS: SEC. 111, TABLE 11B	HORIZONTAL: 0.6m by 1.8m	HORIZONTAL: 0.6m by 1.8m

PARKING CALCULATION

20 CLASSROOMS X 1.5 = 30
2 PER 100m² OF DAYCARE GROSS FLOOR AREA (360m²) = 7
12 PORTABLES X 1.5 = 18
TOTAL PARKING REQUIRED = 55
TOTAL PARKING PROVIDED = 58
BARRIER-FREE PARKING SPACES **REQUIRED** = 3
BARRIER-FREE PARKING SPACES **PROVIDED** = 3
TOTAL SITE PARKING PROVIDED = 60

FIRE TRUCK ACCESS ROUTE IS FROM MUNICIPAL COPE DRIVE AND SHALL CONFORM TO OBC 2012 - 3.2.5.4, 3.2.5.5 AND 3.2.5.6

BUILDING AREA

THE GFA FOR THE SCHOOL IS AS FOLLOWS:

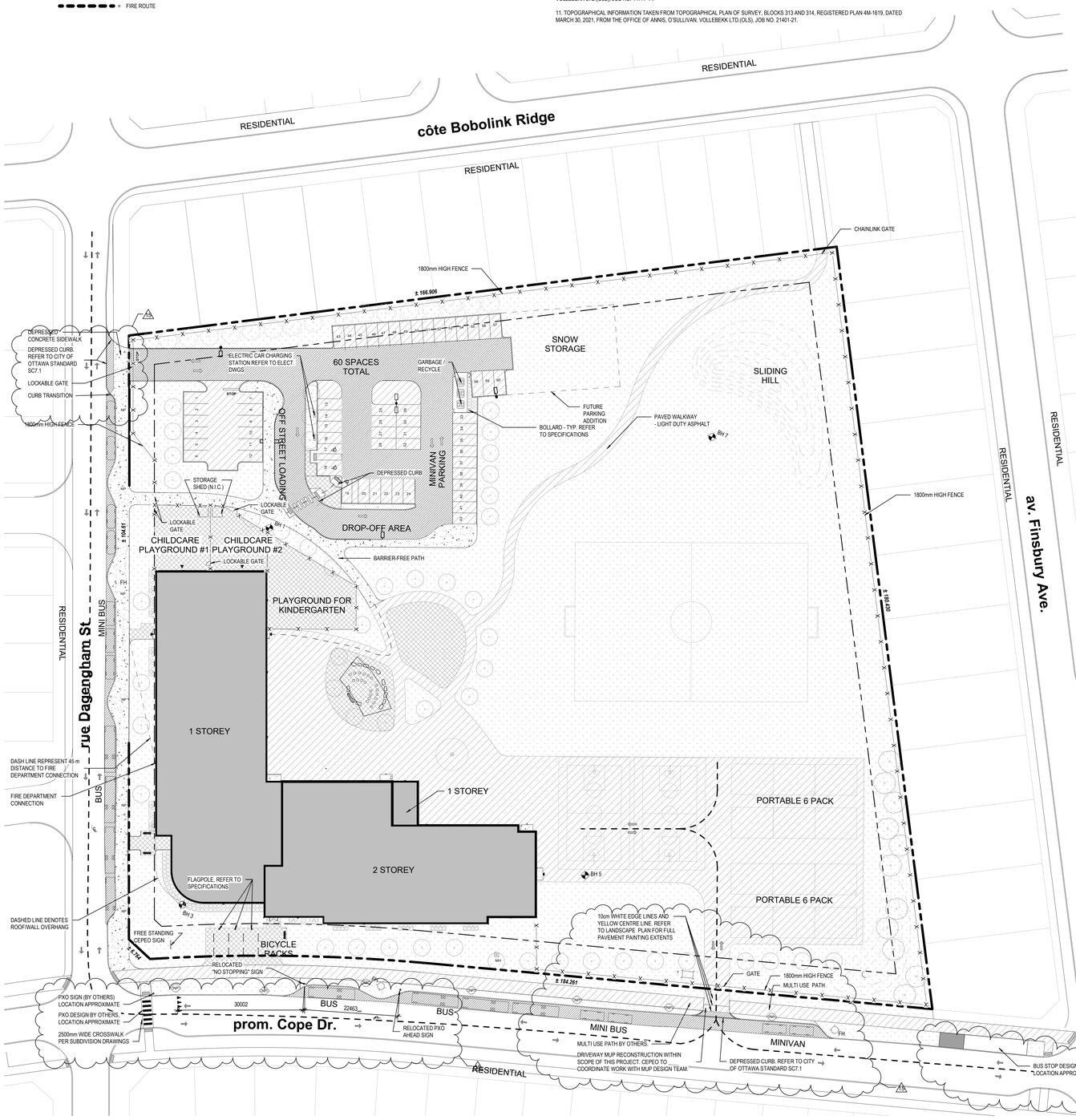
FIRST FLOOR = 3,329 m² (EXCLUDING DAYCARE)
DAYCARE = 360 m²
TOTAL BUILDING FOOTPRINT = 3,689m²
+ SECOND FLOOR = 1,092 m²
TOTAL AREA = 4,781 m²

SITE AREA

SITE AREA = 28,889 m²

PARCEL IDENTIFICATION NUMBER

PIN: 04450-1434



1 / A1.0 GENERAL SITE PLAN
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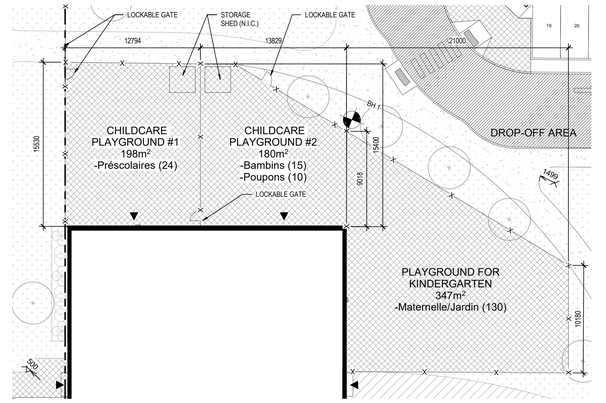

2 / A1.0 ENLARGED DAYCARE SITE PLAN
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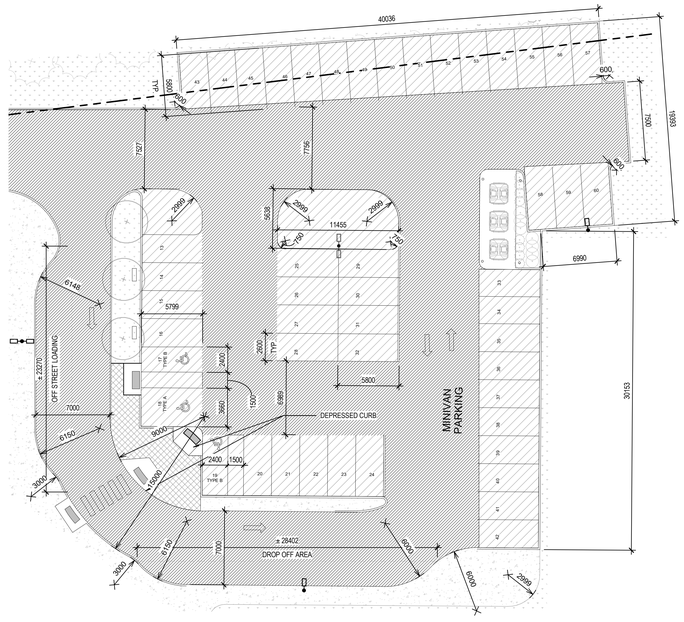


3 / A1.0 ENLARGED DROP OFF PLAN
1 : 200

D07-12-22-0058
Plan #18734

ARCHITECTURE 49
1345 ROSEMOUNT AVENUE
CORNWALL, ONTARIO, CANADA K6J 3E5
PHONE: 613-933-5604 | FAX: 613-936-0335 | WWW.ARCHITECTURE49.COM

CONSULTANT - SUB CONSULTANT:
wsp
300-2611 QUEENVIEW DRIVE
OTTAWA, ONTARIO, CANADA K2B 8K2
PHONE: 613-829-2800 | WWW.WSP.COM

CONSULTANT - SUB CONSULTANT:

SEAL:

CLIENT:
Conseil des écoles publiques de l'Est de l'Ontario
2445 Boul. St- Laurent, Ottawa, ON. K1G 6C3. Tel: 613-742-8960 Toll-free: 1-888-336DEPED

CLIENT REF. #:

PROJECT:
ÉCOLE ÉLÉMENTAIRE
KANATA - STITTSVILLE

KEY PLAN:

ISSUED FOR - REVISION:

NO.	DATE	DESCRIPTION
15	1 DEC 2022	ISSUED FOR SITE PLAN CONTROL
14	11 NOV 2022	UPDATED FOR CITY COMMENTS
13	26 SEP 2022	ISSUED FOR CONSTRUCTION
12	02 SEP 2022	UPDATED PER CITY COMMENTS
11	07 JUL 2022	ISSUED FOR SITE PLAN CONTROL
10	16 JUN 2022	A49 ADDENDUM 1
9	31 MAR 2022	ISSUED FOR SITE PLAN CONTROL
8	30 MAR 2022	ISSUED FOR SITE PLAN CONTROL
7	21 MAR 2022	ISSUED FOR BID AND PERMIT
6	14 JAN 2022	ISSUED FOR 99% CD REVIEW
5	19 NOV 2021	ISSUED FOR 80% CD REVIEW
4	29 SEP 2021	ISSUED FOR INFORMATION
3	24 SEP 2021	ISSUED FOR 60% CD REVIEW
2	27 AUG 2021	RE-ISSUED FOR 30% CD REVIEW
1	04 AUG 2021	30% CD REVIEW

PROJECT NO: 219-00014-00
DATE: NOV 2022
ORIGINAL SCALE: As indicated
DESIGNED BY: JC
DRAWN BY: NM/ SD/ AS
CHECKED BY: MHG
IF THIS BAR IS NOT 25mm LONG, ADJUST YOUR PLOTTING SCALE. 25mm
DISCIPLINE: ARCHITECTURAL
TITLE: GENERAL SITE PLAN
SHEET NUMBER: A1.0
SHEET #: OF
ISSUE: ISSUED FOR CONSTRUCTION
SEV.#: 15
DATE OF: 11 NOV 2022

BIM 360://219-00014-00 - CEPEO Schools - Kanata - RCH/Kanata Arch_R21.rvt
12/1/2022 10:55:13 AM

APPENDIX

C TRANS O-D SURVEY

Kanata - Stittsville

Demographic Characteristics

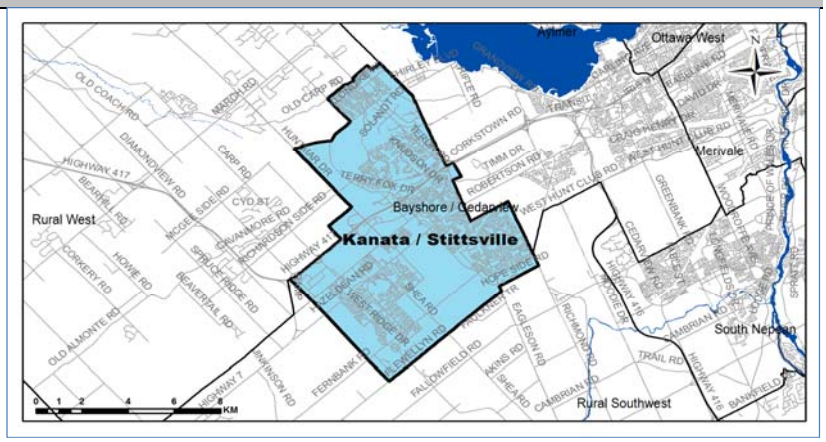
Population	105,210	Actively Travelled	83,460
Employed Population	49,640	Number of Vehicles	64,540
Households	38,010	Area (km^2)	82.6

Occupation

Status (age 5+)	Male	Female	Total
Full Time Employed	24,670	19,590	44,260
Part Time Employed	1,540	3,840	5,380
Student	13,630	13,410	27,040
Retiree	6,480	8,350	14,820
Unemployed	850	940	1,790
Homemaker	160	3,310	3,470
Other	350	1,010	1,360
Total:	47,690	50,440	98,120

Traveller Characteristics	Male	Female	Total
Transit Pass Holders	5,940	6,920	12,860
Licensed Drivers	36,280	36,790	73,070
Telecommuters	200	380	580
Trips made by residents	135,300	143,330	278,630

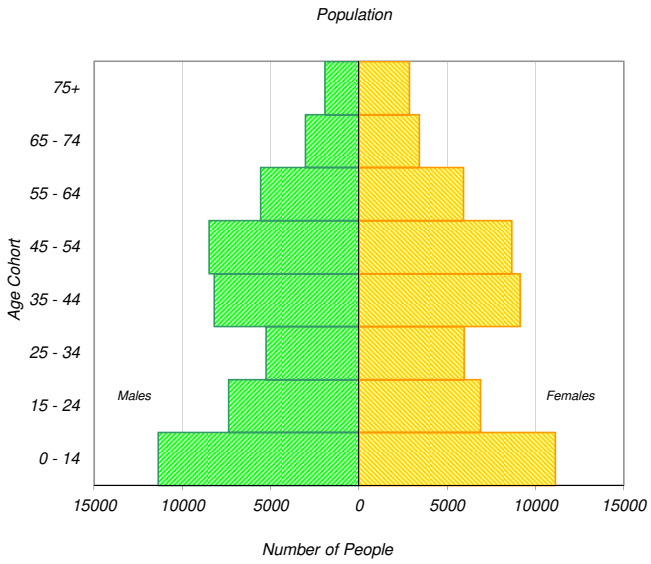
Selected Indicators	
Daily Trips per Person (age 5+)	2.84
Vehicles per Person	0.61
Number of Persons per Household	2.77
Daily Trips per Household	7.33
Vehicles per Household	1.70
Workers per Household	1.31
Population Density (Pop/km2)	1270

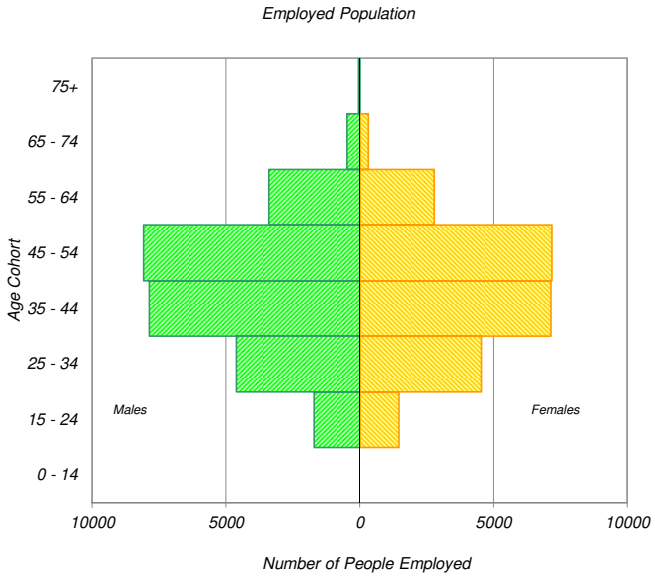


Household Size		
1 person	5,810	15%
2 persons	11,660	31%
3 persons	7,490	20%
4 persons	8,890	23%
5+ persons	4,160	11%
Total:	38,010	100%

Households by Vehicle Availability		
0 vehicles	1,050	3%
1 vehicle	14,090	37%
2 vehicles	19,110	50%
3 vehicles	3,000	8%
4+ vehicles	770	2%
Total:	38,010	100%

Households by Dwelling Type		
Single-detached	21,610	57%
Semi-detached	3,890	10%
Townhouse	10,550	28%
Apartment/Condo	1,960	5%
Total:	38,010	100%



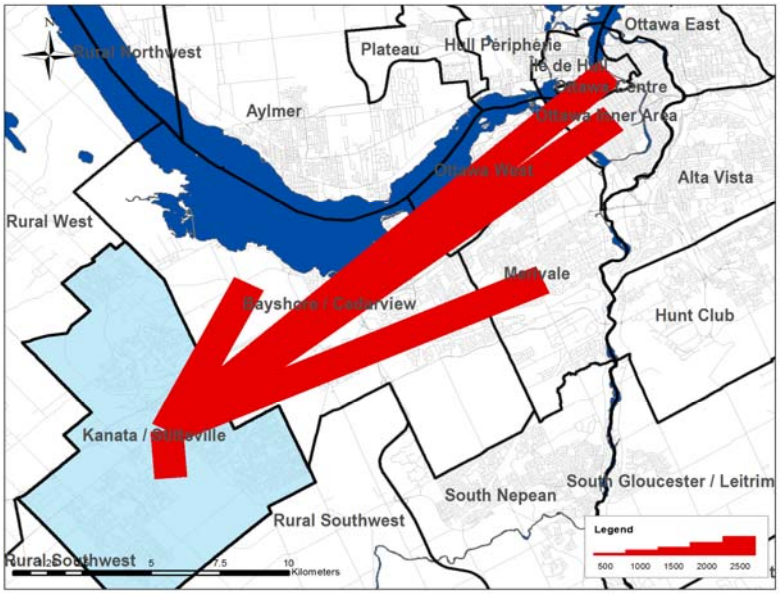


* In 2005 data was only collected for household members aged 11+ therefore these results cannot be compared to the 2011 data.

Travel Patterns

Top Five Destinations of Trips from Kanata - Stittsville

AM Peak Period



Summary of Trips to and from Kanata - Stittsville

AM Peak Period (6:30 - 8:59)	Destinations of Trips From		Origins of Trips To	
Districts	District	% Total	District	% Total
Ottawa Centre	4,560	8%	140	0%
Ottawa Inner Area	3,350	6%	970	2%
Ottawa East	660	1%	260	1%
Beacon Hill	280	0%	170	0%
Alta Vista	1,810	3%	660	1%
Hunt Club	490	1%	420	1%
Merivale	3,410	6%	1,200	3%
Ottawa West	2,020	4%	840	2%
Bayshore / Cedarview	5,010	9%	2,420	5%
Orléans	290	1%	500	1%
Rural East	100	0%	30	0%
Rural Southeast	50	0%	260	1%
South Gloucester / Leitrim	60	0%	140	0%
South Nepean	690	1%	1,800	4%
Rural Southwest	1,130	2%	1,850	4%
Kanata / Stittsvile	30,360	54%	30,360	66%
Rural West	1,050	2%	3,250	7%
Île de Hull	670	1%	30	0%
Hull Périphérie	160	0%	30	0%
Plateau	100	0%	230	0%
Aylmer	0	0%	190	0%
Rural Northwest	20	0%	60	0%
Pointe Gatineau	20	0%	80	0%
Gatineau Est	0	0%	60	0%
Rural Northeast	30	0%	50	0%
Buckingham / Masson-Angers	30	0%	10	0%
Ontario Sub-Total:	55,320	98%	45,270	98%
Québec Sub-Total:	1,030	2%	740	2%
Total:	56,350	100%	46,010	100%

Trips by Trip Purpose

24 Hours	From District		To District		Within District	
Work or related	27,180	29%	17,020	18%	14,550	9%
School	7,070	7%	2,500	3%	15,110	9%
Shopping	6,070	6%	9,150	10%	22,480	14%
Leisure	8,450	9%	10,590	11%	17,090	11%
Medical	2,520	3%	1,170	1%	2,660	2%
Pick-up / drive passenger	6,570	7%	5,470	6%	15,190	9%
Return Home	33,610	35%	45,620	48%	65,770	41%
Other	3,560	4%	3,590	4%	8,440	5%
Total:	95,030	100%	95,110	100%	161,290	100%

AM Peak (06:30 - 08:59)	From District		To District		Within District	
Work or related	18,030	69%	11,020	70%	7,430	24%
School	4,890	19%	2,280	15%	11,740	39%
Shopping	170	1%	320	2%	760	3%
Leisure	340	1%	400	3%	780	3%
Medical	330	1%	230	1%	350	1%
Pick-up / drive passenger	1,260	5%	580	4%	4,760	16%
Return Home	290	1%	380	2%	1,980	7%
Other	670	3%	430	3%	2,560	8%
Total:	25,980	100%	15,640	100%	30,360	100%

PM Peak (15:30 - 17:59)	From District		To District		Within District	
Work or related	390	2%	350	1%	930	2%
School	370	2%	0	0%	90	0%
Shopping	1,030	5%	1,910	7%	5,100	14%
Leisure	2,140	11%	3,080	11%	4,130	11%
Medical	230	1%	180	1%	400	1%
Pick-up / drive passenger	1,980	10%	1,980	7%	3,410	9%
Return Home	12,130	64%	20,550	71%	21,560	58%
Other	680	4%	860	3%	1,850	5%
Total:	18,950	100%	28,910	100%	37,470	100%

Peak Period (%)	Total:	% of 24 Hours	Within District (%)
24 Hours	351,430		46%
AM Peak Period	71,980	20%	42%
PM Peak Period	85,330	24%	44%

Trips by Primary Travel Mode

24 Hours	From District		To District		Within District	
Auto Driver	63,470	67%	63,830	67%	92,190	57%
Auto Passenger	15,220	16%	14,920	16%	31,880	20%
Transit	12,200	13%	12,270	13%	4,050	3%
Bicycle	360	0%	410	0%	960	1%
Walk	40	0%	50	0%	21,080	13%
Other	3,730	4%	3,660	4%	11,130	7%
Total:	95,020	100%	95,140	100%	161,290	100%

AM Peak (06:30 - 08:59)	From District		To District		Within District	
Auto Driver	15,360	59%	11,530	74%	13,630	45%
Auto Passenger	2,450	9%	1,160	7%	5,050	17%
Transit	6,230	24%	1,290	8%	1,210	4%
Bicycle	30	0%	80	1%	220	1%
Walk	0	0%	40	0%	5,730	19%
Other	1,900	7%	1,560	10%	4,510	15%
Total:	25,970	100%	15,660	100%	30,350	100%

PM Peak (15:30 - 17:59)	From District		To District		Within District	
Auto Driver	13,850	73%	17,660	61%	21,240	57%
Auto Passenger	3,240	17%	4,270	15%	8,570	23%
Transit	1,270	7%	5,980	21%	670	2%
Bicycle	40	0%	100	0%	260	1%
Walk	40	0%	0	0%	4,570	12%
Other	520	3%	910	3%	2,160	6%
Total:	18,960	100%	28,920	100%	37,470	100%

Avg Vehicle Occupancy	From District	To District	Within District
24 Hours	1.24	1.23	1.35
AM Peak Period	1.16	1.10	1.37
PM Peak Period	1.23	1.24	1.40

Transit Modal Split	From District	To District	Within District
24 Hours	13%	13%	3%
AM Peak Period	26%	9%	6%
PM Peak Period	7%	21%	2%

APPENDIX

D COPE DRIVE CROSS-SECTION

Plot Date: 12/3/2019 12:02:29 PM
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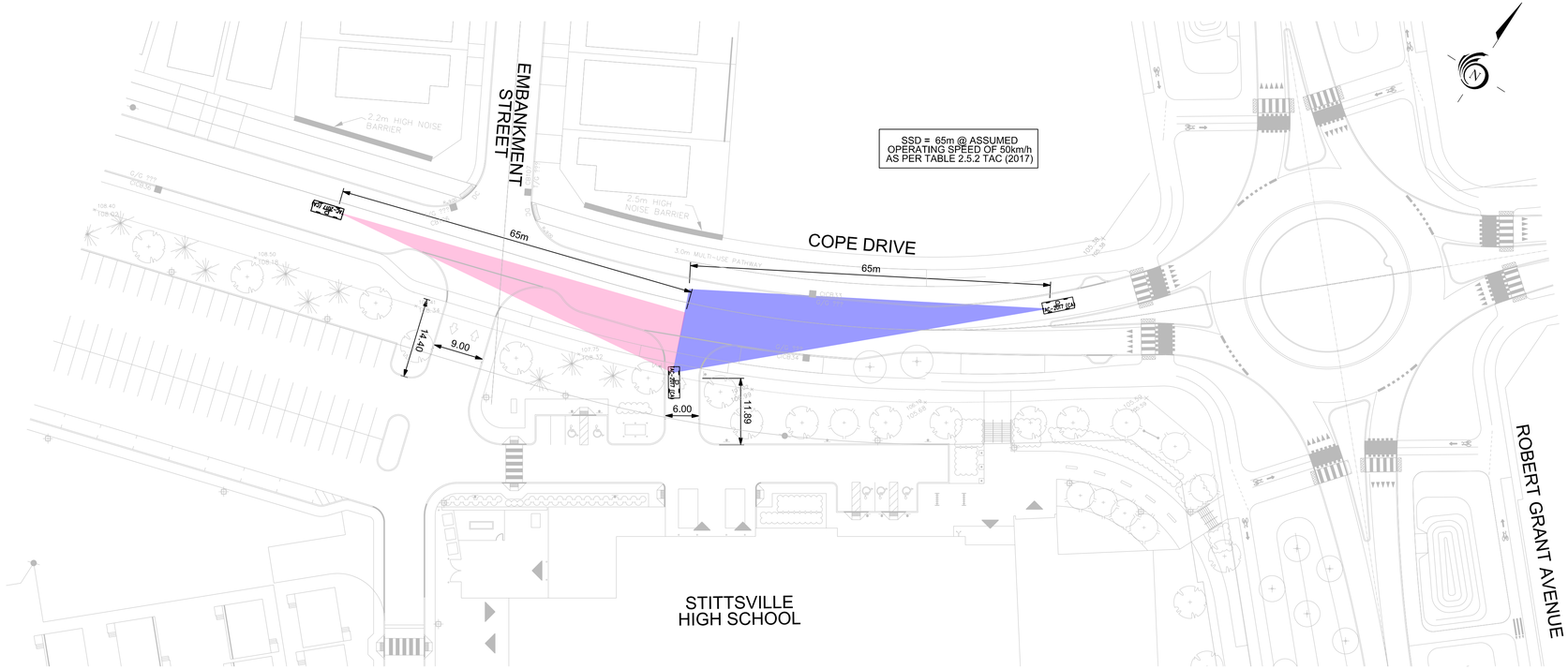
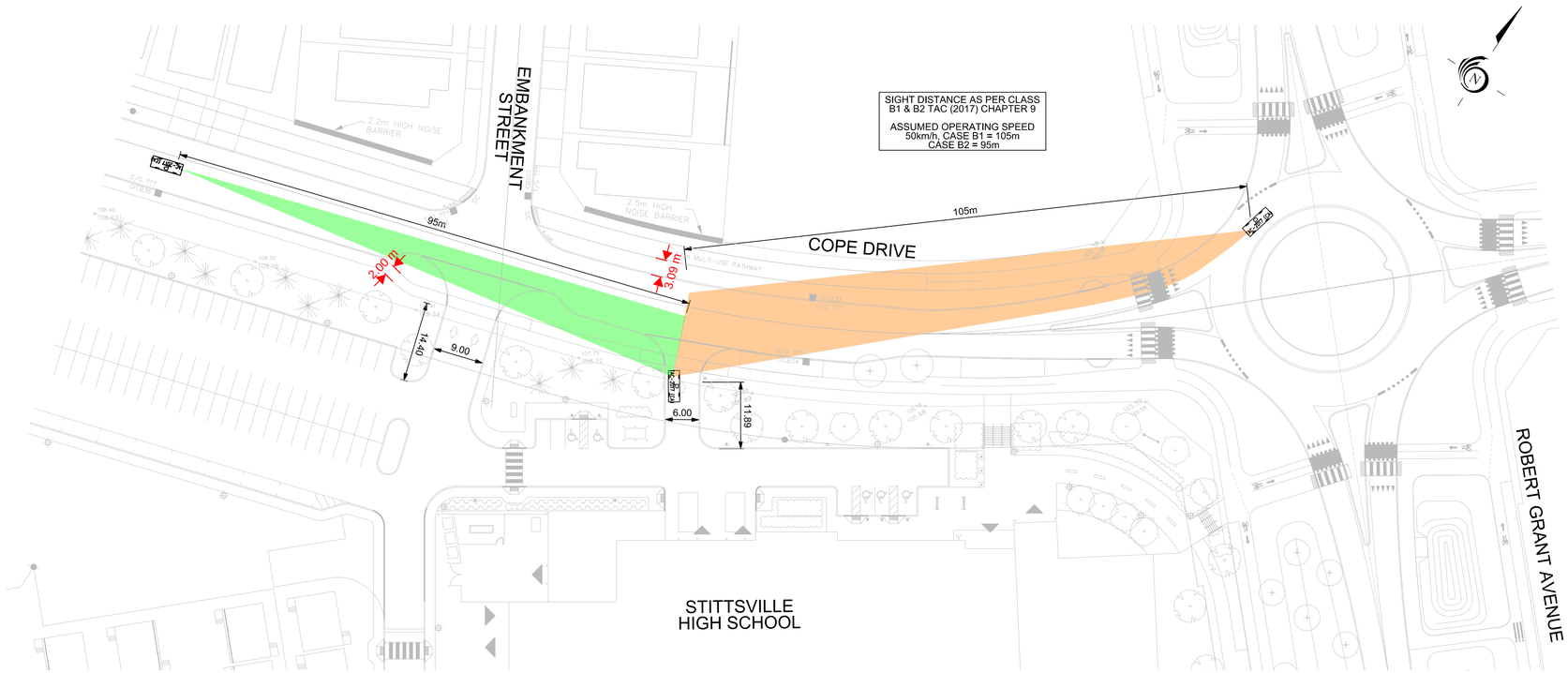




STITTSVILLE HIGH SCHOOL
700 COPE DRIVE

DEPARTURE AND STOPPING DISTANCE SIGHTLINES

Director | Project Manager

PARSONS

Ottawa

Contract No.	Dwg. No.
477180	001

Sheet 1 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

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

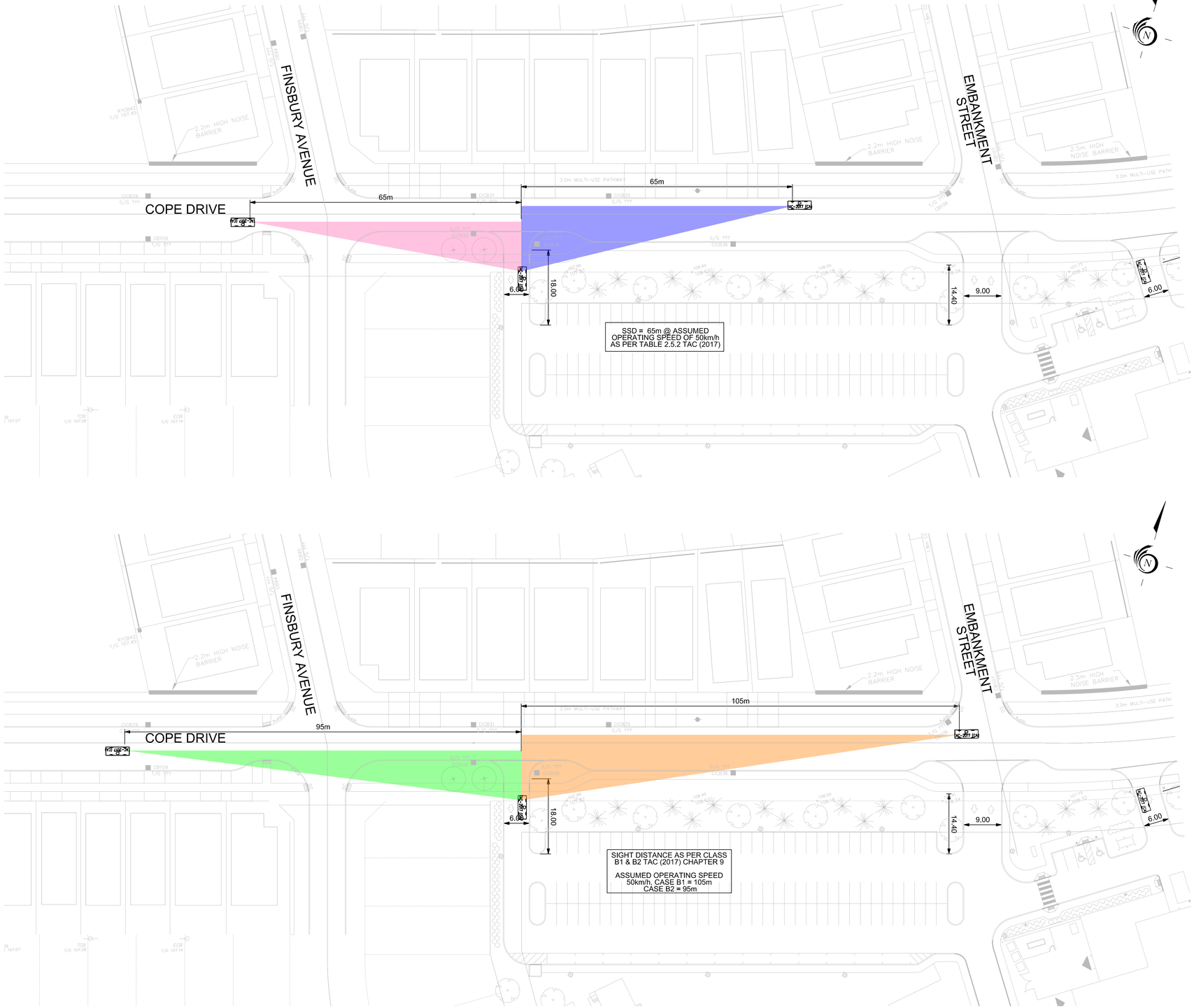
No.	Description	By	Date (dd/mm/yy)
–	----------	----	------

APPROVED ☑ **REFUSED** ☐

THIS _28_ DAY OF August, 2020

Erin O'Connell

ERIN O'CONNELL, MCIP, RPP, MANAGER (A)
DEVELOPMENT REVIEW, WEST
PLANNING, INFRASTRUCTURE AND ECONOMIC DEVELOPMENT DEPARTMENT, CITY OF OTTAWA



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

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)
--	----------	----	----

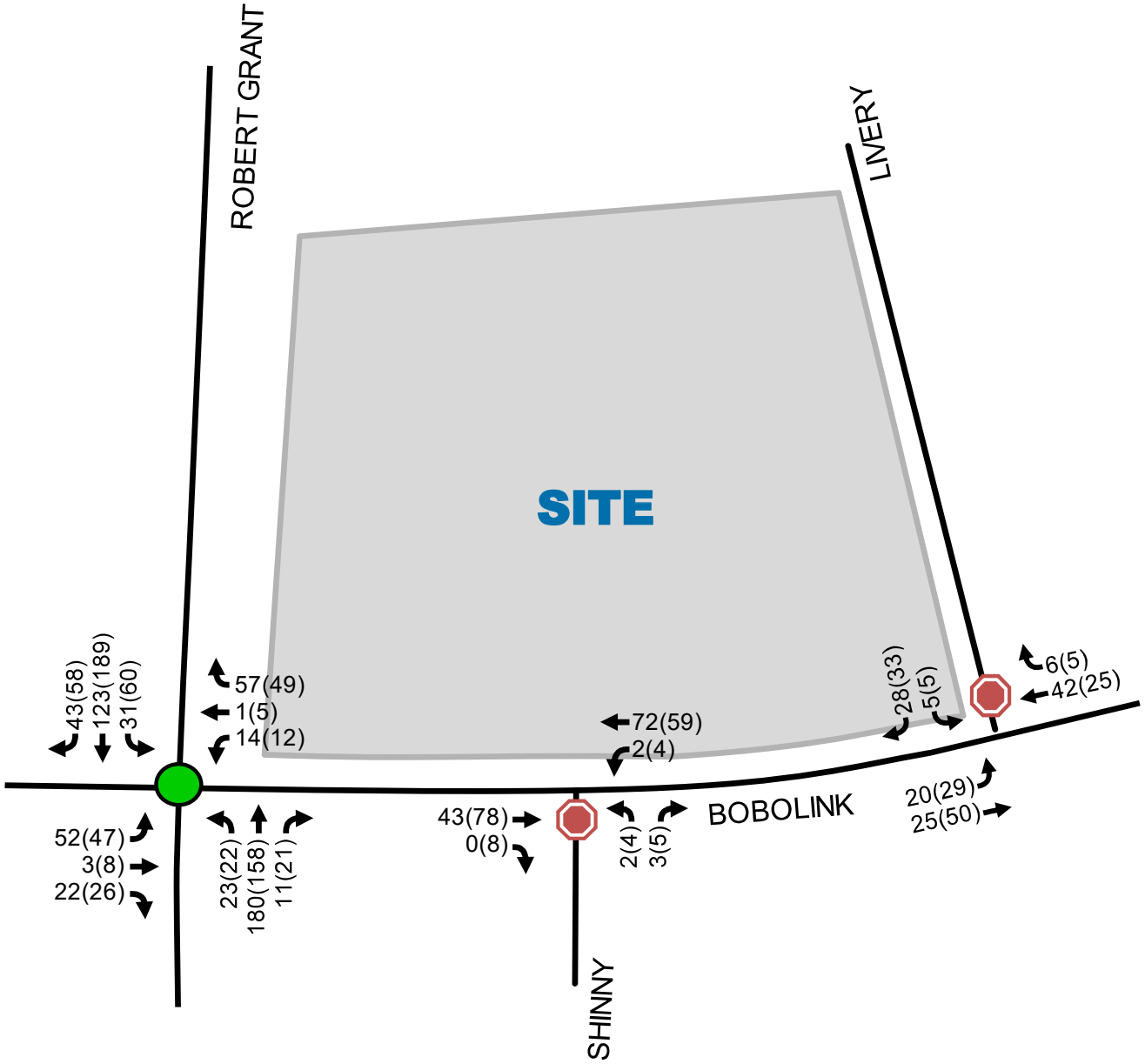
APPROVED ☑ REFUSED ☐

THIS _28_ DAY OF August, 2020

ERIN O'CONNELL, MCIP, RPP, MANAGER (A)
DEVELOPMENT REVIEW, WEST
PLANNING, INFRASTRUCTURE AND ECONOMIC DEVELOPMENT DEPARTMENT, CITY OF OTTAWA

APPENDIX

E RELATED TIA EXCERPTS



LEGEND

xx	AM Peak Hour veh/h
(yy)	PM Peak Hour veh/h

J.L.Richards
ENGINEERS · ARCHITECTS · PLANNERS

J.L. Richards
& Associates Limited
864 Lady Ellen Place
Ottawa, ON Canada
K1Z 5M2
Tel: 613 728 3571
Fax: 613 728 6012

Figure 8: Existing Vehicular Volumes AM(PM)

Figure 9: 'New' 2022 Site Trip Generation

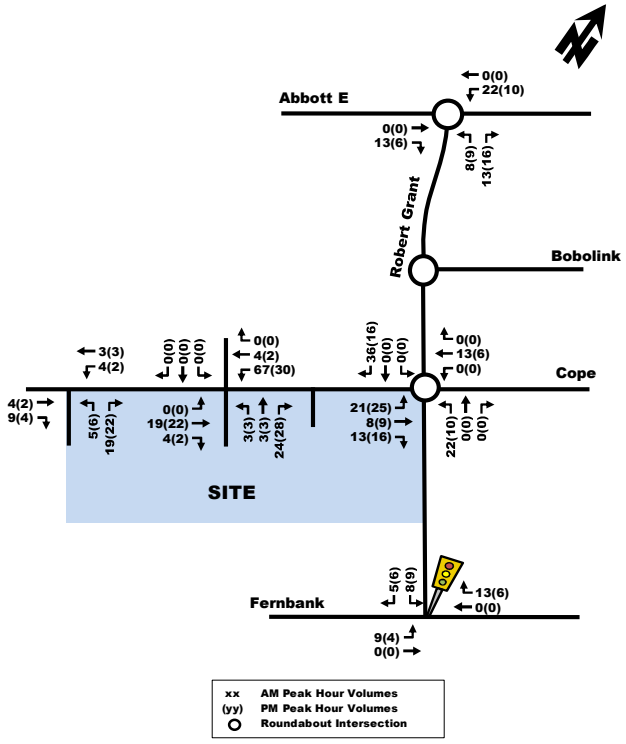


Figure 10: 'New' 2024 Site Trip Generation

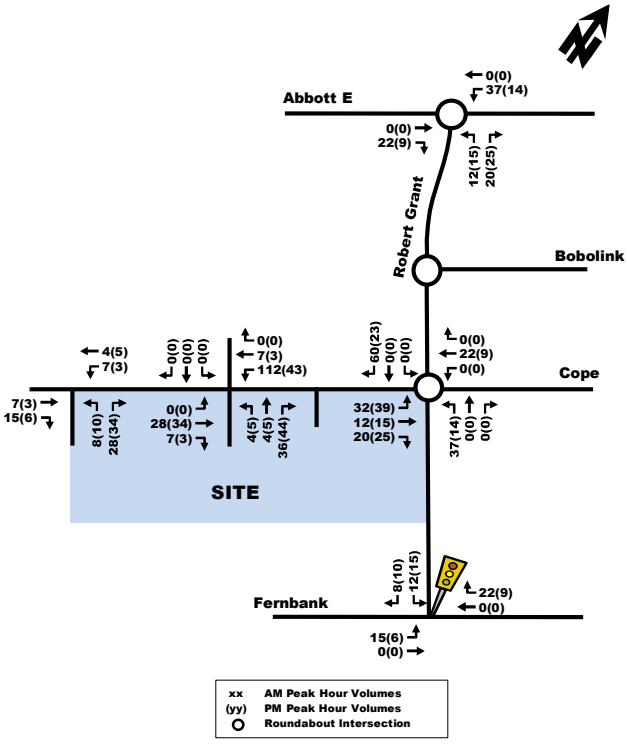


Figure 11: 'New' 2029 Site Trip Generation

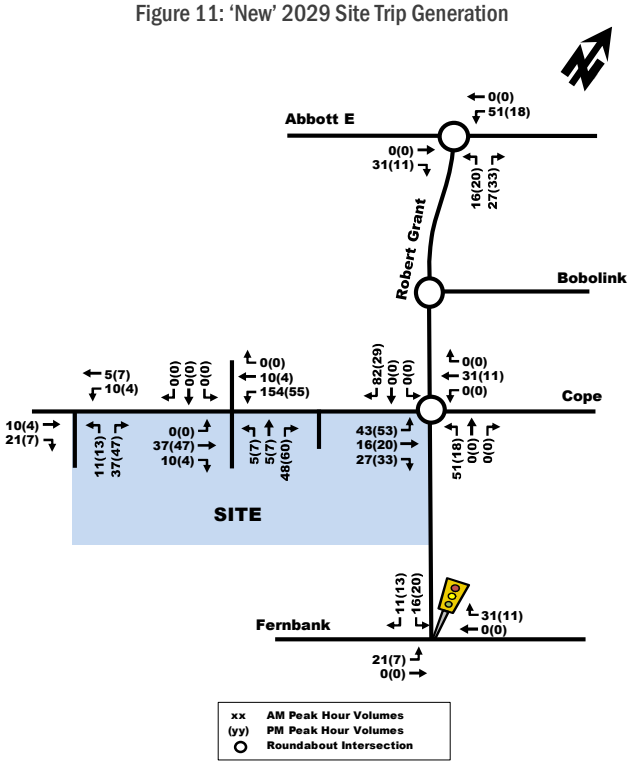


Figure 12: Future Background 2022

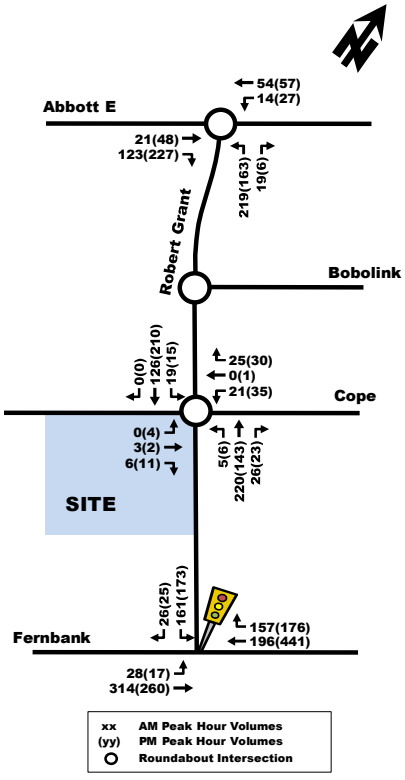


Figure 13: Future Background 2024

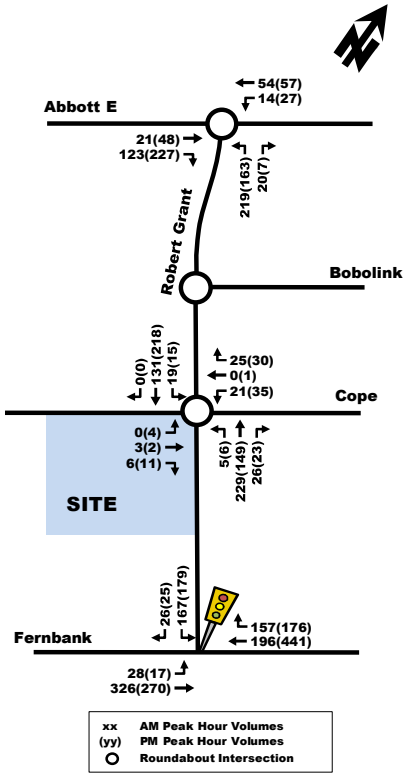
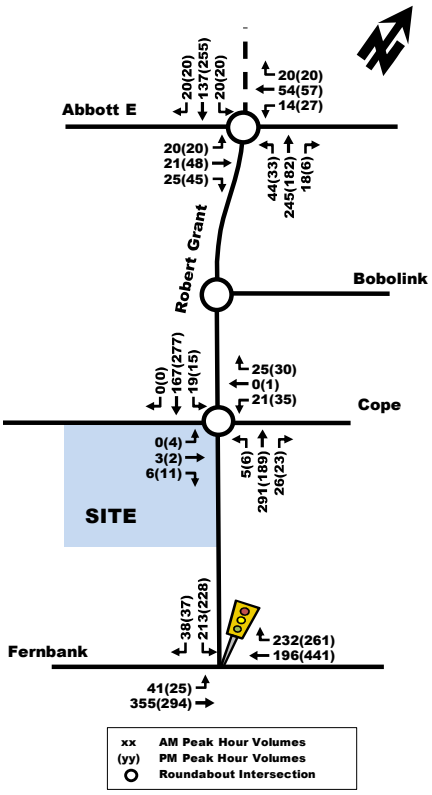


Figure 14: Future Background 2029



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

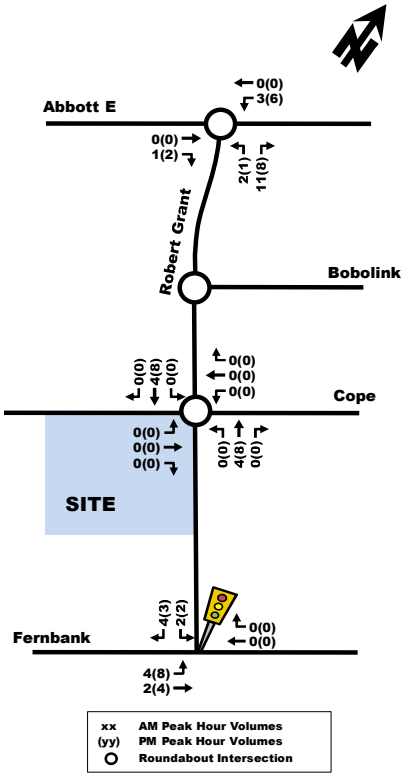


Figure 16: Blackstone Subdivision, Phases 4-8

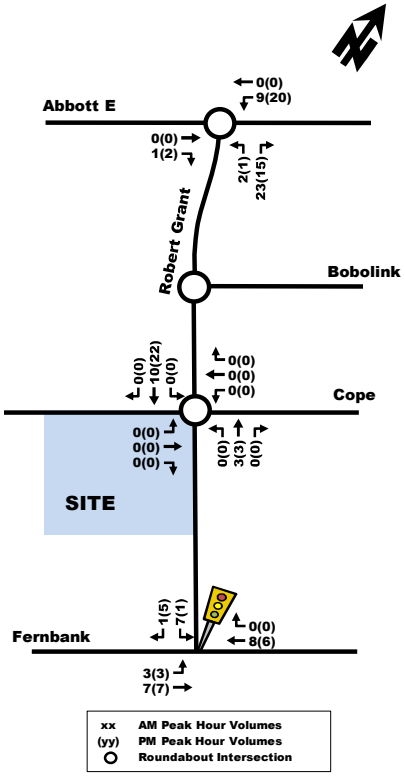


Figure 17: Lépine Fernbank, 1000 Robert Grant Ave

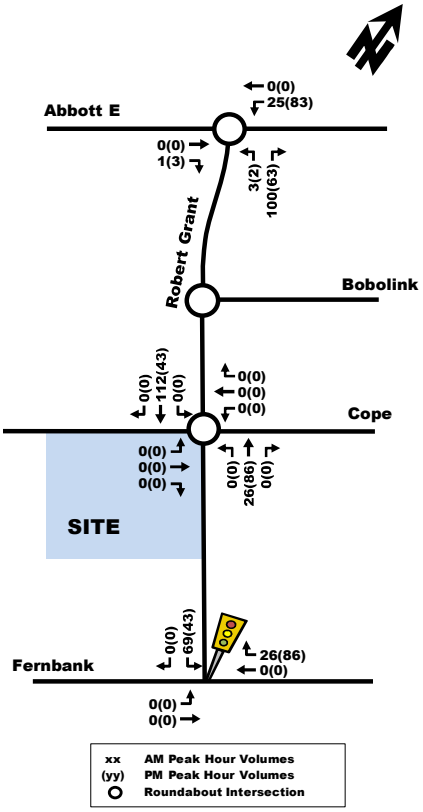
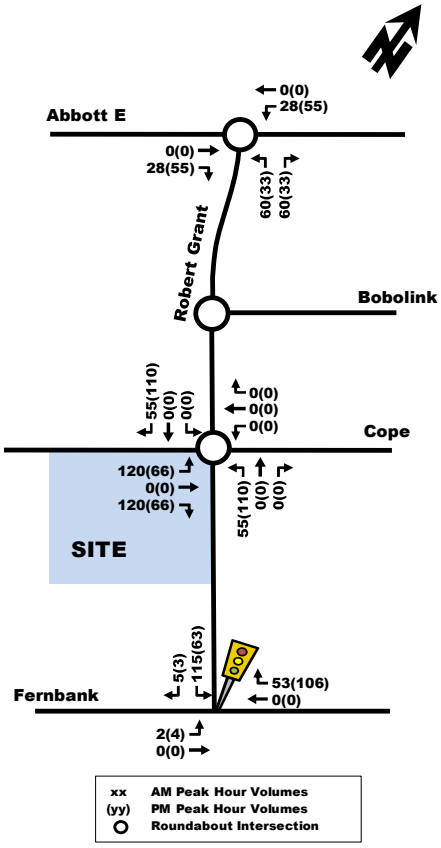


Figure 18: CRT Lands, Phases 1 and 2



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

Figure 19: 2022 Total Background Traffic Volume

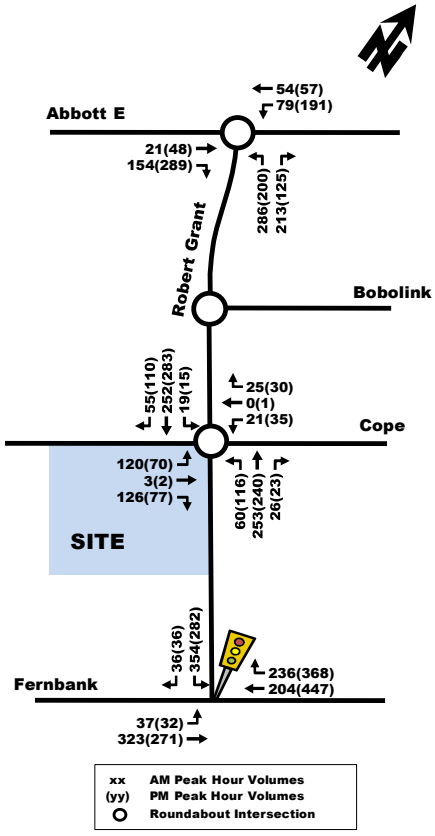


Figure 20: 2024 Total Background Traffic Volume

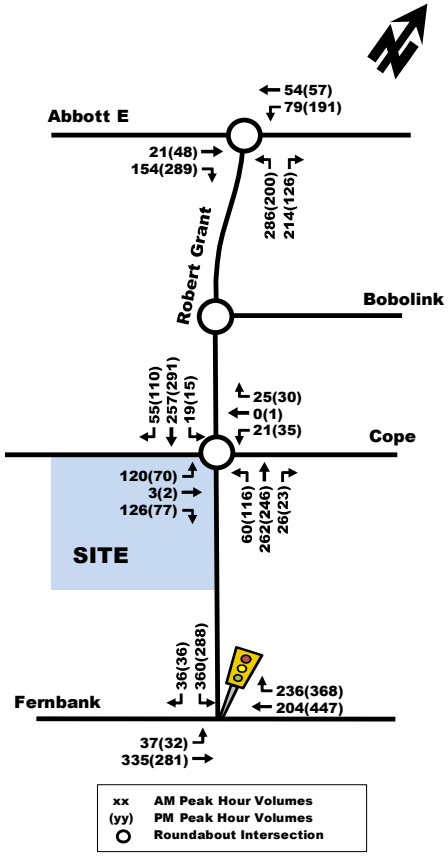
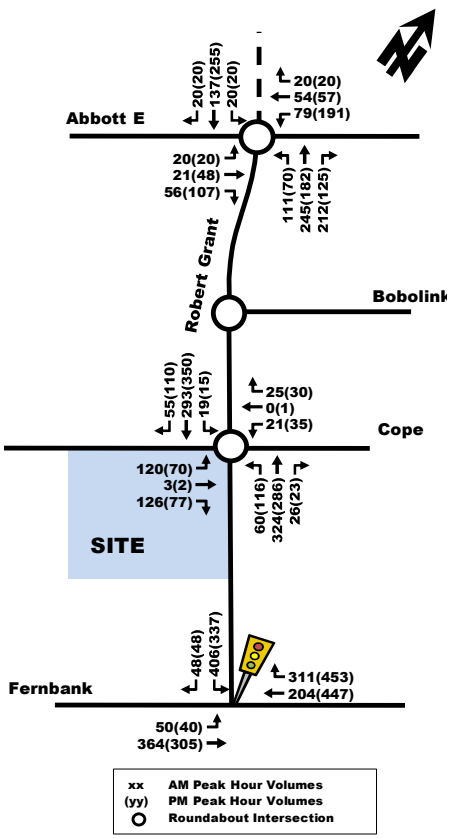


Figure 21: 2029 Total Background Traffic Volume



4. ANALYSIS

4.1. DEVELOPMENT DESIGN

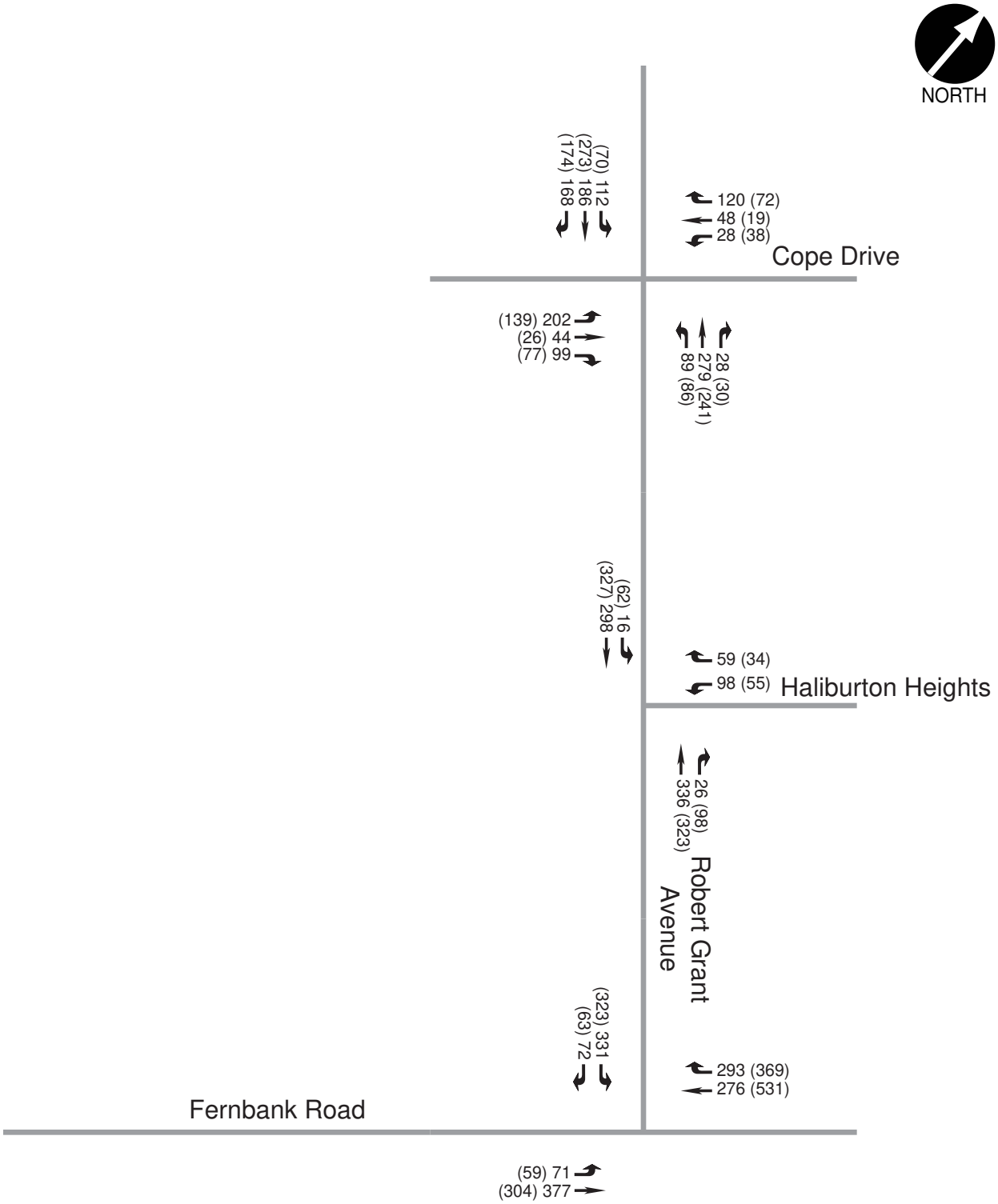
Vehicle parking is proposed in a surface parking lot and bicycle parking is proposed in exterior bike racks. A total of 118 parking spaces will be provided at the initial build-out, meeting the minimum of spaces required outlined in the Parking By-Law. With regard to bicycle parking, 180 spaces will 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



LEGEND

Permitted Movements

xx xx xx
(xx) (xx) (xxx)

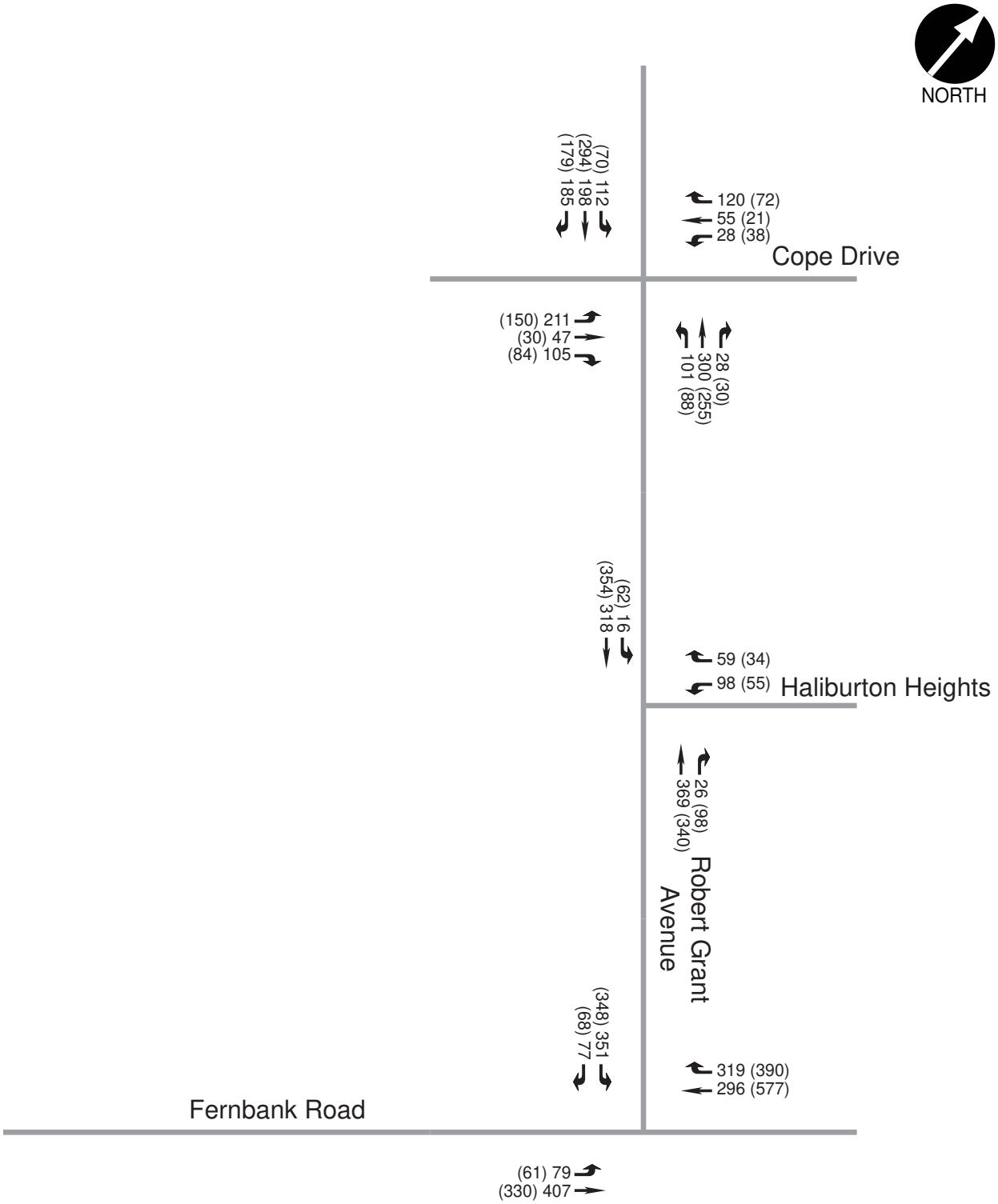
Weekday AM (PM) Peak Hour Vehicular Volume

CRT Phase 3
Transportation Impact Assessment

Exhibit 7:
Future (2025)
Background Traffic

PROJECT No. 126086

SCALE: N.T.S.



LEGEND

Permitted Movements

xxx xxx xxx
(xx) (xx) (xxx)

Weekday AM (PM) Peak Hour Vehicular Volume

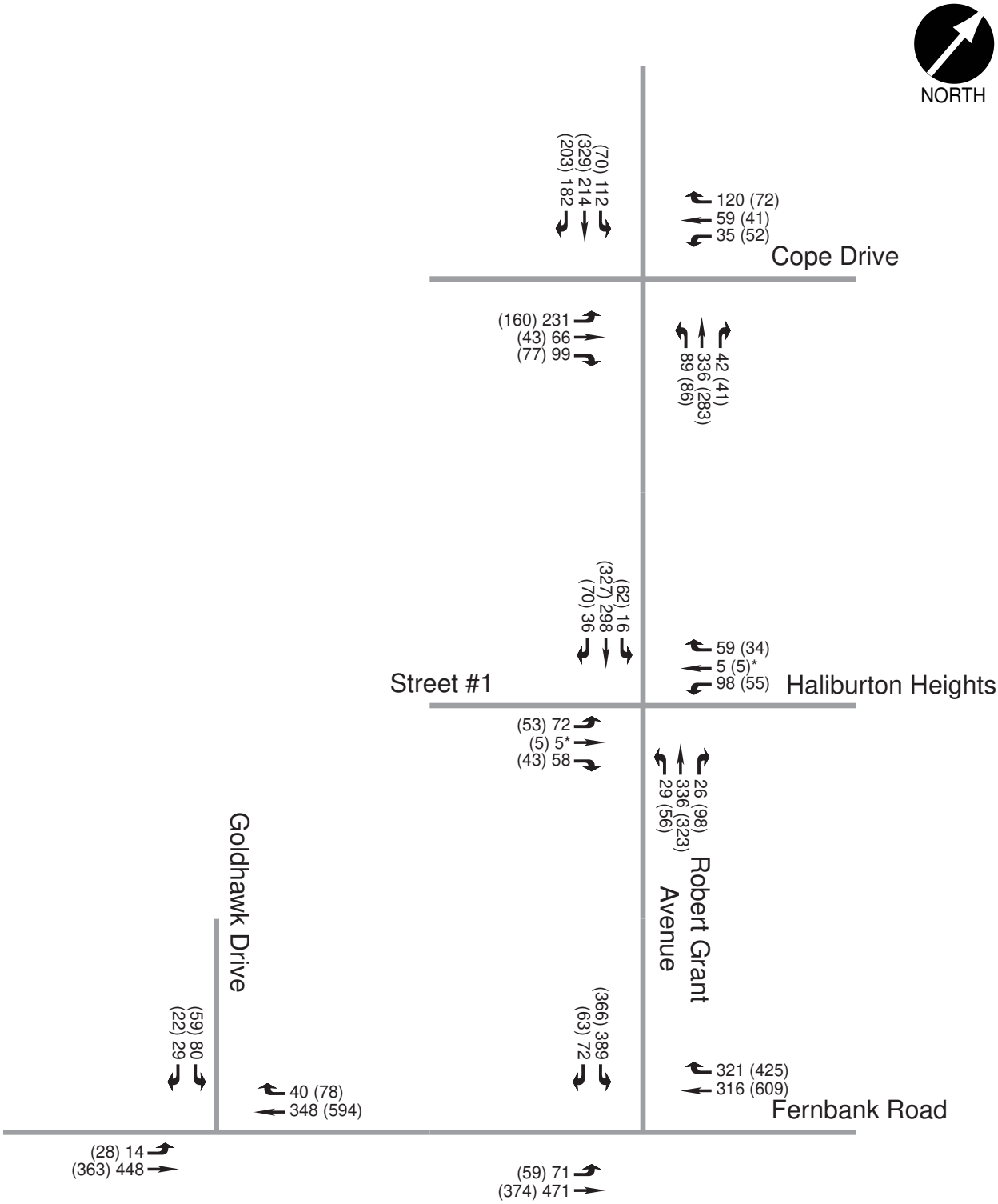
IBI

CRT Phase 3
Transportation Impact Assessment

Exhibit 8:
Future (2030)
Background Traffic

PROJECT No. 126086

SCALE: N.T.S.



LEGEND

Permitted Movements

xxx xxx xxx
(xx) (xx) (xx)

Weekday AM (PM) Peak Hour Vehicular Volume

* Nominal volumes

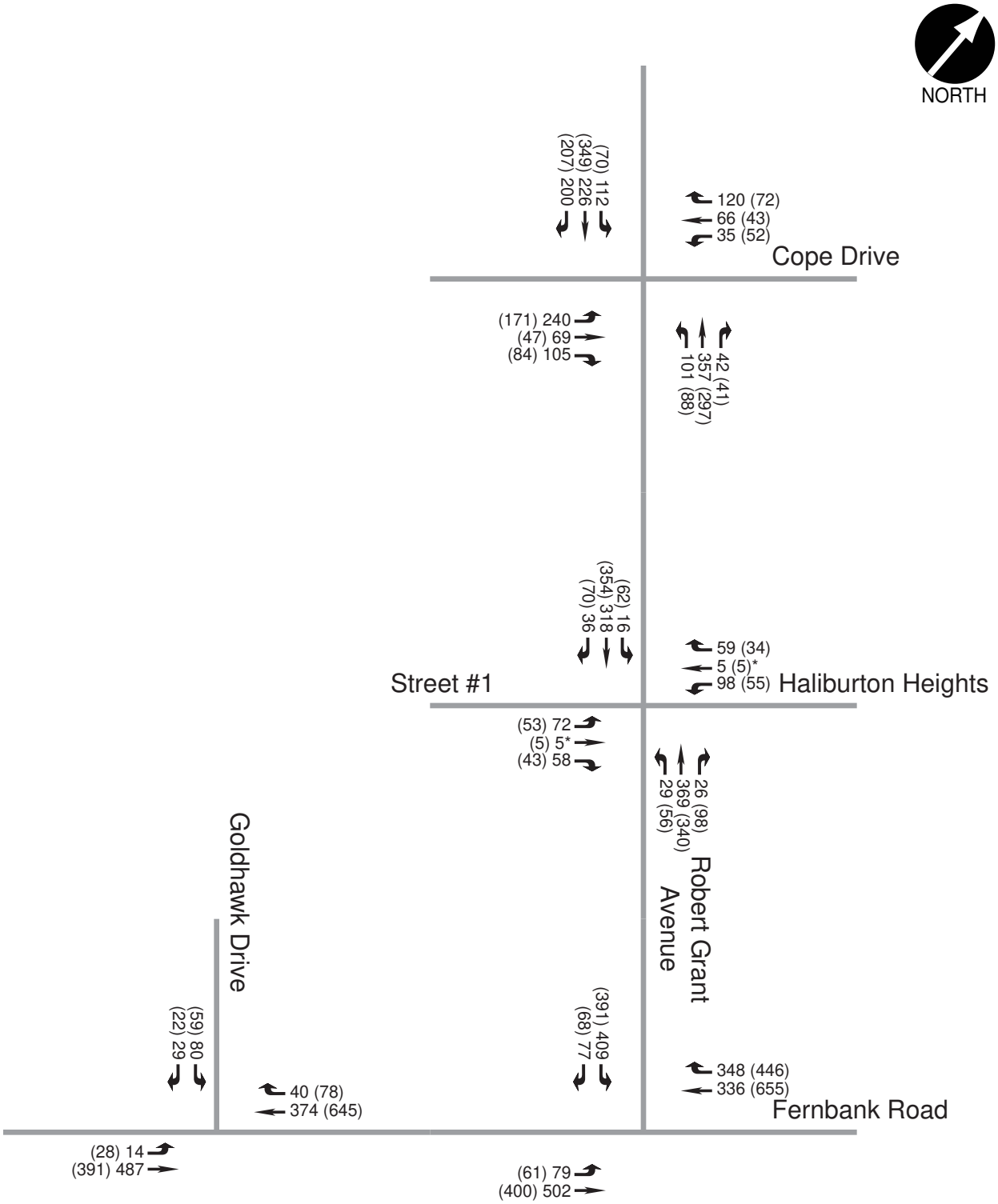
IBI

CRT Phase 3
Transportation Impact Assessment

Exhibit 9:
Future (2025)
Total Traffic

PROJECT No. 126086

SCALE: N.T.S.



LEGEND

Permitted Movements

xxx xxx xxx
(xx) (xx) (xx)

Weekday AM (PM) Peak Hour Vehicular Volume

* Nominal volumes

IBI

CRT Phase 3
Transportation Impact Assessment

Exhibit 10:
Future (2030)
Total Traffic

PROJECT No. 126086

SCALE: N.T.S.

APPENDIX

F TDM CHECKLISTS

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)*	☑ Bus Stop #5527 is located within 400m of site.
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	☐ Continue to monitor traffic conditions once school is operational to determine the need for additional traffic calming measures.
	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	☐ N/A
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)	☐ N/A

		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)*	☐ N/A
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)	☐ N/A
	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)	☐ To encourage bike usage, consider providing a bike repair station through bike programming.

		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	☐ Nearest transit stop located off-site
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	☐ N/A
	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	☐ N/A
BETTER	4.2.2	At large developments, provide spaces for carpools in a separate, access-controlled parking area to simplify enforcement	☐ N/A
	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)*	☐ N/A
	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	☐ N/A

		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	☐ Parking meets zoning requirements
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	☐ N/A
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)*	☐ N/A
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)*	☐ N/A
	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)	☐ N/A
	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	☐ N/A

TDM Measures Checklist:
Non-Residential Developments (office, institutional, retail or industrial)

Legend

BASIC — The measure is generally feasible and effective, and in most cases would benefit the development and its users

BETTER — The measure could maximize support for users of sustainable modes, and optimize development performance

★ — The measure is one of the most dependably effective tools to encourage the use of sustainable modes

		TDM measures: *Non-residential developments*	Check if proposed & add descriptions
	1.	**TDM PROGRAM MANAGEMENT**	
	1.1	**Program coordinator**	
BASIC ★	1.1.1	Designate an internal coordinator, or contract with an external coordinator	☐
	1.2	**Travel surveys**	
BETTER	1.2.1	Conduct periodic surveys to identify travel-related behaviours, attitudes, challenges and solutions, and to track progress	☐
	2.	**WALKING AND CYCLING**	
	2.1	**Information on walking/cycling routes & destinations**	
BASIC	2.1.1	Display local area maps with walking/cycling access routes and key destinations at major entrances	☑
	2.2	**Bicycle skills training**	
		Commuter travel	
BETTER ★	2.2.1	Offer on-site cycling courses for commuters, or subsidize off-site courses	☑ To encourage teachers, students, and parents to bike to school.
	2.3	**Valet bike parking**	
		Visitor travel	
BETTER	2.3.1	Offer secure valet bike parking during public events when demand exceeds fixed supply (e.g. for festivals, concerts, games)	☐

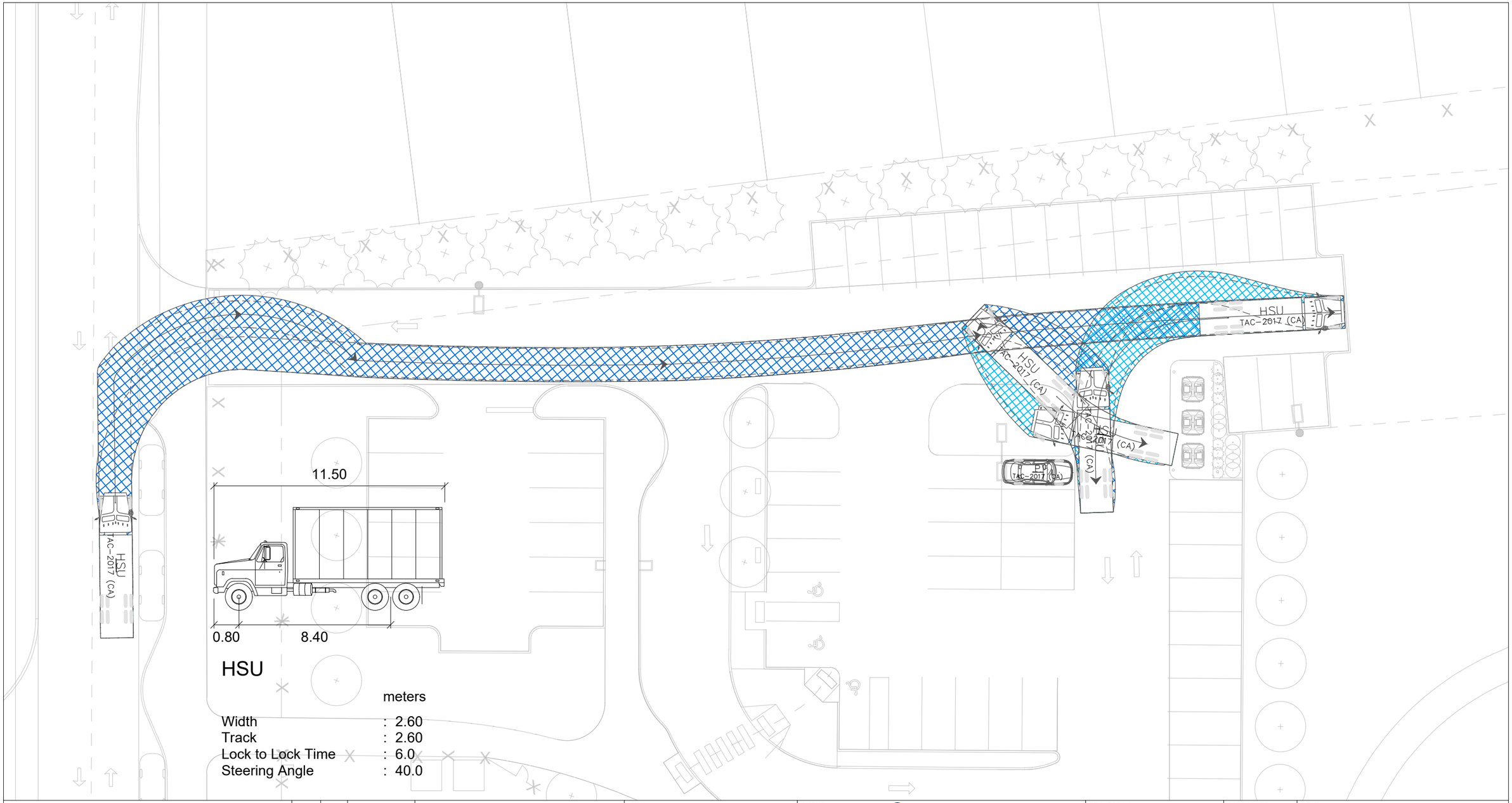
		TDM measures: *Non-residential developments*	Check if proposed & add descriptions
		3. TRANSIT	
		3.1 Transit information	
BASIC	3.1.1	Display relevant transit schedules and route maps at entrances	☑
BASIC	3.1.2	Provide online links to OC Transpo and STO information	☐
BETTER	3.1.3	Provide real-time arrival information display at entrances	☐
		3.2 Transit fare incentives	
		Commuter travel	
BETTER	3.2.1	Offer preloaded PRESTO cards to encourage commuters to use transit	☐
BETTER ★	3.2.2	Subsidize or reimburse monthly transit pass purchases by employees	☑
		Visitor travel	
BETTER	3.2.3	Arrange inclusion of same-day transit fare in price of tickets (e.g. for festivals, concerts, games)	☐
		3.3 Enhanced public transit service	
		Commuter travel	
BETTER	3.3.1	Contract with OC Transpo to provide enhanced transit services (e.g. for shift changes, weekends)	☐
		Visitor travel	
BETTER	3.3.2	Contract with OC Transpo to provide enhanced transit services (e.g. for festivals, concerts, games)	☐
		3.4 Private transit service	
		Commuter travel	
BETTER	3.4.1	Provide shuttle service when OC Transpo cannot offer sufficient quality or capacity to serve demand (e.g. for shift changes, weekends)	☐
		Visitor travel	
BETTER	3.4.2	Provide shuttle service when OC Transpo cannot offer sufficient quality or capacity to serve demand (e.g. for festivals, concerts, games)	☐

		TDM measures: *Non-residential developments*	Check if proposed & add descriptions
		4. RIDESHARING	
		4.1 Ridematching service	
		Commuter travel	
BASIC	★ 4.1.1	Provide a dedicated ridematching portal at OttawaRideMatch.com	☐
		4.2 Carpool parking price incentives	
		Commuter travel	
BETTER	4.2.1	Provide discounts on parking costs for registered carpools	☐
		4.3 Vanpool service	
		Commuter travel	
BETTER	4.3.1	Provide a vanpooling service for long-distance commuters	☐
		5. CARSHARING & BIKESHARING	
		5.1 Bikeshare stations & memberships	
BETTER	5.1.1	Contract with provider to install on-site bikeshare station for use by commuters and visitors	☐
		Commuter travel	
BETTER	5.1.2	Provide employees with bikeshare memberships for local business travel	☐
		5.2 Carshare vehicles & memberships	
		Commuter travel	
BETTER	5.2.1	Contract with provider to install on-site carshare vehicles and promote their use by tenants	☐
BETTER	5.2.2	Provide employees with carshare memberships for local business travel	☐
		6. PARKING	
		6.1 Priced parking	
		Commuter travel	
BASIC	★ 6.1.1	Charge for long-term parking (daily, weekly, monthly)	☐
BASIC	6.1.2	Unbundle parking cost from lease rates at multi-tenant sites	☐
		Visitor travel	
BETTER	6.1.3	Charge for short-term parking (hourly)	☐

		TDM measures: *Non-residential developments*	Check if proposed & add descriptions
		7. TDM MARKETING & COMMUNICATIONS	
		7.1 Multimodal travel information	
		Commuter travel	
BASIC	★	7.1.1 Provide a multimodal travel option information package to new/relocating employees and students	☐
		Visitor travel	
BETTER	★	7.1.2 Include multimodal travel option information in invitations or advertising that attract visitors or customers (e.g. for festivals, concerts, games)	☐
		7.2 Personalized trip planning	
		Commuter travel	
BETTER	★	7.2.1 Offer personalized trip planning to new/relocating employees	☐
		7.3 Promotions	
		Commuter travel	
BETTER		7.3.1 Deliver promotions and incentives to maintain awareness, build understanding, and encourage trial of sustainable modes	☐
		8. OTHER INCENTIVES & AMENITIES	
		8.1 Emergency ride home	
		Commuter travel	
BETTER	★	8.1.1 Provide emergency ride home service to non-driving commuters	☐
		8.2 Alternative work arrangements	
		Commuter travel	
BASIC	★	8.2.1 Encourage flexible work hours	☐
BETTER		8.2.2 Encourage compressed workweeks	☐
BETTER	★	8.2.3 Encourage telework	☐
		8.3 Local business travel options	
		Commuter travel	
BASIC	★	8.3.1 Provide local business travel options that minimize the need for employees to bring a personal car to work	☐
		8.4 Commuter incentives	
		Commuter travel	
BETTER		8.4.1 Offer employees a taxable, mode-neutral commuting allowance	☐
		8.5 On-site amenities	
		Commuter travel	
BETTER		8.5.1 Provide on-site amenities/services to minimize mid-day or mid-commute errands	☐

APPENDIX

G AUTOTURN SWEPT PATHS



HSU

	meters
Width	: 2.60
Track	: 2.60
Lock to Lock Time	: 6.0
Steering Angle	: 40.0

2611 QUEENSVIEW DRIVE
OTTAWA ONTARIO CANADA K2B 8K2
TEL.: 613-829-2800 | WWW.WSP.COM

IS.	RV.	DATE	DESCRIPTION
	--	--	--
--		--	--

SEAL:

CLIENT: Conseil des écoles publiques de l'Est de l'Ontario

CLIENT REF. #: --

PROJECT:

ÉCOLE ÉLÉMENTAIRE KANATA - STITTSVILLE

PROJECT NO: 219-00014-00	DATE / DATE: 2022-09-09
DESIGNED BY: NS/NT	
DRAWN BY: NS	
CHECKED BY: AH	
DRAWING NO: 01	SCALE: 1:300

TITLE:

TURNING MOVEMENT ANALYSIS GARBAGE TRUCK INBOUND

DISCIPLINE:

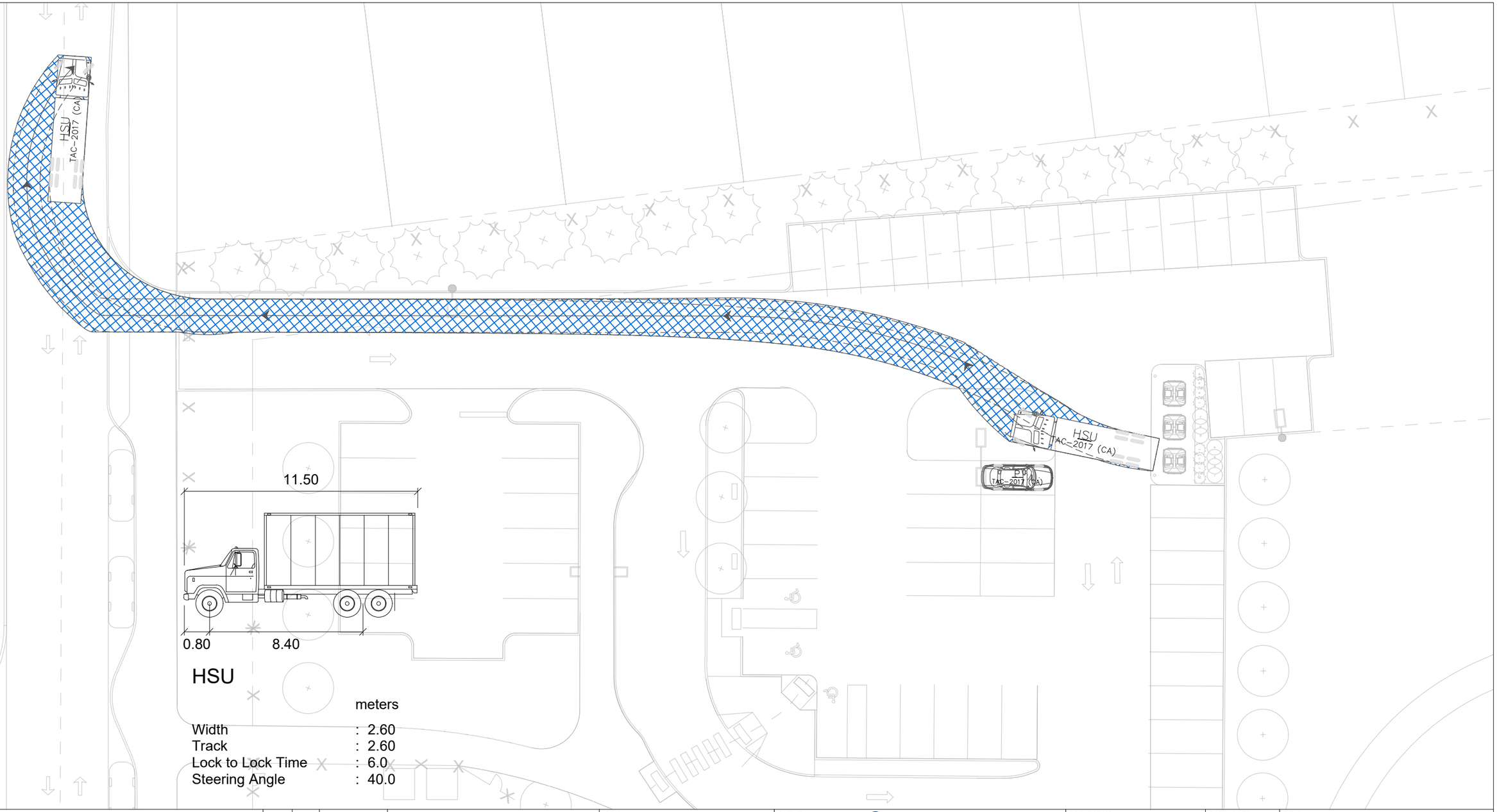
TRANSPORTATION PLANNING

ISSUE: --

DATE OF: **2022-12-08**

RV. # **4**

Ansi B-SCE, C:\Users\CANS077424\OneDrive - WSP O365_Projects\219-00014-00 01 CEPEO Kanata & Barrhaven\219-00014-00 Kanata AutoTurn Analysis.dwg, 2022-09-09 1:49:09 PM



2611 QUEENSVIEW DRIVE
OTTAWA ONTARIO CANADA K2B 8K2
TEL.: 613-829-2800 | WWW.WSP.COM

IS.	RV.	DATE	DESCRIPTION
	--	--	--
--		--	--

SEAL:

CLIENT: Conseil des écoles publiques de l'Est de l'Ontario

CLIENT REF. #: --

PROJECT:

ÉCOLE ÉLÉMENTAIRE KANATA - STITTSVILLE

PROJECT NO: 219-00014-00	DATE / DATE: 2022-09-09
DESIGNED BY: NS/NT	
DRAWN BY: NS	
CHECKED BY: AH	
DRAWING NO: 02	SCALE: 1:300

TITLE:

TURNING MOVEMENT ANALYSIS GARBAGE TRUCK OUTBOUND

DISCIPLINE:

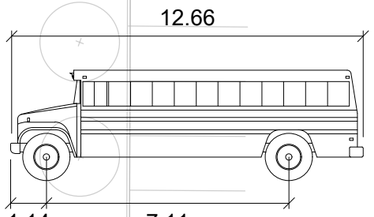
TRANSPORTATION PLANNING

ISSUE: --

DATE OF: **2022-12-08**

RV. # **4**

Ansi B-SCE, C:\Users\CANS077424\OneDrive - WSP O365_Projects\219-00014-00 01 CEPEO Kanata & Barrhaven\219-00014-00 Kanata AutoTurn Analysis.dwg, 2022-09-09 1:49:09 PM



2020 Blue Bird Vision

meters

Width	:	2.44
Track	:	2.44
Lock to Lock Time	:	6.0
Steering Angle	:	49.8

2611 QUEENSVIEW DRIVE
OTTAWA ONTARIO CANADA K2B 8K2
TEL.: 613-829-2800 | WWW.WSP.COM

IS.	RV.	DATE	DESCRIPTION
	--	--	--
--		--	--

SEAL:

CLIENT: Conseil des écoles publiques de l'Est de l'Ontario

CLIENT REF. #: --

PROJECT: **ÉCOLE ÉLÉMENTAIRE KANATA - STITTSVILLE**

PROJECT NO: 219-00014-00	DATE / DATE: 2022-09-09
DESIGNED BY: NS/NT	
DRAWN BY: NS	
CHECKED BY: AH	
DRAWING NO: 03	SCALE: 1:300

TITLE: **TURNING MOVEMENT ANALYSIS SCHOOL BUS**

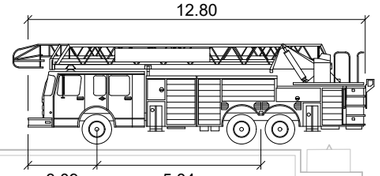
DISCIPLINE: **TRANSPORTATION PLANNING**

ISSUE: --

DATE OF: **2022-12-08**

RV. # **4**

Ansi B-SCE, C:\Users\CANS077424\OneDrive - WSP O365_Projects\219-00014-00 01 CEPEO Kanata & Barrhaven\219-00014-00 Kanata AutoTurn Analysis.dwg, 2022-09-09 1:49:09 PM



Aerial Fire

	meters
Width	: 2.54
Track	: 2.54
Lock to Lock Time	: 6.0
Steering Angle	: 37.0

wsp
2611 QUEENSVIEW DRIVE
OTTAWA ONTARIO CANADA K2B 8K2
TEL.: 613-829-2800 | WWW.WSP.COM

IS.	RV.	DATE	DESCRIPTION
	--	--	--
--		--	--

SEAL:

CLIENT: Conseil des écoles publiques de l'Est de l'Ontario

CLIENT REF. #: --

PROJECT:

ÉCOLE ÉLÉMENTAIRE KANATA - STITTSVILLE

PROJECT NO: 219-00014-00	DATE / DATE: 2022-09-09
DESIGNED BY: NS/NT	
DRAWN BY: NS	
CHECKED BY: AH	
DRAWING NO: 04	SCALE: 1:300

TITLE:

TURNING MOVEMENT ANALYSIS FIRE TRUCK

DISCIPLINE:

TRANSPORTATION PLANNING

ISSUE: --

DATE OF: **2022-12-08**

RV. # **4**

Ansi B-SCE, C:\Users\CANS077424\OneDrive - WSP O365_Projects\219-00014-00 01 CEPEO Kanata & Barrhaven\219-00014-00 Kanata AutoTurn Analysis.dwg, 2022-12-08 5:07:07 PM

APPENDIX

H MMLOS SHEETS

Multi-Modal Level of Service - Intersections Form

Consultant	WSP Canada Inc.	Project	Kanata-Sud School
Scenario	2022 Existing Conditions AM	Date	26-05-2022
Comments			

To add intersections
Select columns LMNO, right-click and *Copy;*
Then select column P, right-click and *Insert Copied Cells*

INTERSECTIONS		Fernbank Rd / Robert Grant Ave				Intersection B				Intersection C			
	Crossing Side	NORTH	SOUTH	EAST	WEST	NORTH	SOUTH	EAST	WEST	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	Protected/ Permissive		No right turn	Permissive or yield control								
	Right Turns on Red (RToR) ?	RTOR allowed		RTOR allowed	RTOR prohibited								
	Ped Signal Leading Interval?	No		Yes	Yes								
	Right Turn Channel	No Channel		No Channel	No Right Turn								
	Corner Radius	10-15m		10-15m	No Right Turn								
	Crosswalk Type	Std transverse markings		Std transverse markings	Std transverse markings								
	PETSI Score	**78**		**77**	**93**								
	Ped. Exposure to Traffic LoS	**B**	**-**	**B**	**A**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
	Cycle Length	119		119	119								
	Effective Walk Time	35		13	13								
	Average Pedestrian Delay	**30**		**47**	**47**								
	Pedestrian Delay LoS	**D**	**-**	**E**	**E**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
	Level of Service	**D**	**-**	**E**	**E**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
		E				**-**				**-**			
	Approach From	**NORTH**	**SOUTH**	**EAST**	**WEST**	**NORTH**	**SOUTH**	**EAST**	**WEST**	**NORTH**	**SOUTH**	**EAST**	**WEST**
Bicycle	Bicycle Lane Arrangement on Approach IF Dedicated Right Turn Lane, THEN Right Turn Configuration, ELSE <blank> Dedicated Right Turning Speed	Curb Bike Lane, Cycletrack or MUP		Curb Bike Lane, Cycletrack or MUP	Curb Bike Lane, Cycletrack or MUP								
	Cyclist Through Movement	**Not Applicable**	**-**	**Not Applicable**	**Not Applicable**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
	Separated or Mixed Traffic	**Separated**	**-**	**Separated**	**Separated**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
	Left Turn Approach	2-stage, LT box			2-stage, LT box								
	Operating Speed	≥ 60 km/h			≥ 60 km/h								
	Left Turning Cyclist	**A**	**-**	**-**	**A**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
	Level of Service	**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									
	Number of Receiving Lanes on Departure from Intersection	1		1									
	Level of Service	**E**	**-**	**E**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
		E				**-**				**-**			
Auto	Volume to Capacity Ratio	0.0 - 0.60											
	Level of Service	**A**				**-**				**-**			

Multi-Modal Level of Service - Intersections Form

Consultant	WSP Canada Inc.	Project	Kanata-Sud School
Scenario	2022 Existing Conditions PM	Date	26-05-2022
Comments			

To add intersections
Select columns LMNO, right-click and *Copy;*
Then select column P, right-click and *Insert Copied Cells*

INTERSECTIONS		Fernbank Rd / Robert Grant Ave				Intersection B				Intersection C			
	Crossing Side	NORTH	SOUTH	EAST	WEST	NORTH	SOUTH	EAST	WEST	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	Protected/ Permissive		No right turn	Permissive or yield control								
	Right Turns on Red (RToR) ?	RTOR allowed		RTOR allowed	RTOR prohibited								
	Ped Signal Leading Interval?	No		Yes	Yes								
	Right Turn Channel	No Channel		No Channel	No Right Turn								
	Corner Radius	10-15m		10-15m	No Right Turn								
	Crosswalk Type	Std transverse markings		Std transverse markings	Std transverse markings								
	PETSI Score	**78**		**77**	**93**								
	Ped. Exposure to Traffic LoS	**B**	**-**	**B**	**A**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
	Cycle Length	119		119	119								
	Effective Walk Time	35		13	13								
	Average Pedestrian Delay	**30**		**47**	**47**								
	Pedestrian Delay LoS	**D**	**-**	**E**	**E**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
	Level of Service	**D**	**-**	**E**	**E**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
		E				**-**				**-**			
	Approach From	**NORTH**	**SOUTH**	**EAST**	**WEST**	**NORTH**	**SOUTH**	**EAST**	**WEST**	**NORTH**	**SOUTH**	**EAST**	**WEST**
Bicycle	Bicycle Lane Arrangement on Approach IF Dedicated Right Turn Lane, THEN Right Turn Configuration, ELSE <blank> Dedicated Right Turning Speed	Curb Bike Lane, Cycletrack or MUP		Curb Bike Lane, Cycletrack or MUP	Curb Bike Lane, Cycletrack or MUP								
	Cyclist Through Movement	**Not Applicable**	**-**	**Not Applicable**	**Not Applicable**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
	Separated or Mixed Traffic	**Separated**	**-**	**Separated**	**Separated**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
	Left Turn Approach	2-stage, LT box			2-stage, LT box								
	Operating Speed	≥ 60 km/h			≥ 60 km/h								
	Left Turning Cyclist	**A**	**-**	**-**	**A**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
	Level of Service	**A**	**-**	**-**	**A**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
		A				**-**				**-**			
Transit	Average Signal Delay	≤ 40 sec		≤ 10 sec									
	Level of Service	**E**	**-**	**B**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
		E				**-**				**-**			
Truck	Effective Corner Radius	10 - 15 m		10 - 15 m									
	Number of Receiving Lanes on Departure from Intersection	1		1									
	Level of Service	**E**	**-**	**E**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
		E				**-**				**-**			
Auto	Volume to Capacity Ratio	0.0 - 0.60											
	Level of Service	**A**				**-**				**-**			

Multi-Modal Level of Service - Intersections Form

Consultant	WSP Canada Inc.	Project	Kanata-Sud School
Scenario	2028 Background Conditions AM	Date	26-05-2022
Comments			

To add intersections
Select columns LMNO, right-click and *Copy;*
Then select column P, right-click and *Insert Copied Cells*

INTERSECTIONS		Fernbank Rd / Robert Grant Ave				Intersection B				Intersection C			
	Crossing Side	NORTH	SOUTH	EAST	WEST	NORTH	SOUTH	EAST	WEST	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	Protected/ Permissive		No right turn	Permissive or yield control								
	Right Turns on Red (RToR) ?	RTOR allowed		RTOR allowed	RTOR prohibited								
	Ped Signal Leading Interval?	No		Yes	Yes								
	Right Turn Channel	No Channel		No Channel	No Right Turn								
	Corner Radius	10-15m		10-15m	No Right Turn								
	Crosswalk Type	Std transverse markings		Std transverse markings	Std transverse markings								
	PETSI Score	**78**		**77**	**93**								
	Ped. Exposure to Traffic LoS	**B**	**-**	**B**	**A**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
	Cycle Length	119		119	119								
	Effective Walk Time	35		13	13								
	Average Pedestrian Delay	**30**		**47**	**47**								
	Pedestrian Delay LoS	**D**	**-**	**E**	**E**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
	Level of Service	**D**	**-**	**E**	**E**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
		E				**-**				**-**			
	Approach From	**NORTH**	**SOUTH**	**EAST**	**WEST**	**NORTH**	**SOUTH**	**EAST**	**WEST**	**NORTH**	**SOUTH**	**EAST**	**WEST**
Bicycle	Bicycle Lane Arrangement on Approach IF Dedicated Right Turn Lane, THEN Right Turn Configuration, ELSE <blank> Dedicated Right Turning Speed	Curb Bike Lane, Cycletrack or MUP		Curb Bike Lane, Cycletrack or MUP	Curb Bike Lane, Cycletrack or MUP								
	Cyclist Through Movement	**Not Applicable**	**-**	**Not Applicable**	**Not Applicable**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
	Separated or Mixed Traffic	**Separated**	**-**	**Separated**	**Separated**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
	Left Turn Approach Operating Speed	2-stage, LT box ≥ 60 km/h			2-stage, LT box ≥ 60 km/h								
	Left Turning Cyclist	**A**	**-**	**-**	**A**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
	Level of Service	**A**	**-**	**-**	**A**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
		A				**-**				**-**			
Transit	Average Signal Delay	≤ 30 sec		≤ 10 sec									
	Level of Service	**D**	**-**	**B**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
		D				**-**				**-**			
Truck	Effective Corner Radius Number of Receiving Lanes on Departure from Intersection	10 - 15 m 1		10 - 15 m 1									
	Level of Service	**E**	**-**	**E**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
		E				**-**				**-**			
Auto	Volume to Capacity Ratio	0.71 - 0.80											
	Level of Service	**C**				**-**				**-**			

Multi-Modal Level of Service - Intersections Form

Consultant	WSP Canada Inc.	Project	Kanata-Sud School
Scenario	2028 Background Conditions PM	Date	26-05-2022
Comments			

To add intersections
Select columns LMNO, right-click and *Copy;*
Then select column P, right-click and *Insert Copied Cells*

	INTERSECTIONS	Fernbank Rd / Robert Grant Ave				Intersection B				Intersection C			
	Crossing Side	NORTH	SOUTH	EAST	WEST	NORTH	SOUTH	EAST	WEST	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	Protected/ Permissive		No right turn	Permissive or yield control								
	Right Turns on Red (RToR) ?	RTOR allowed		RTOR allowed	RTOR prohibited								
	Ped Signal Leading Interval?	No		Yes	Yes								
	Right Turn Channel	No Channel		No Channel	No Right Turn								
	Corner Radius	10-15m		10-15m	No Right Turn								
	Crosswalk Type	Std transverse markings		Std transverse markings	Std transverse markings								
	PETSI Score	**78**		**77**	**93**								
	Ped. Exposure to Traffic LoS	**B**	**-**	**B**	**A**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
	Cycle Length	119		119	119								
	Effective Walk Time	35		13	13								
	Average Pedestrian Delay	**30**		**47**	**47**								
	Pedestrian Delay LoS	**D**	**-**	**E**	**E**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
	Level of Service	**D**	**-**	**E**	**E**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
		E				**-**				**-**			
	Approach From	**NORTH**	**SOUTH**	**EAST**	**WEST**	**NORTH**	**SOUTH**	**EAST**	**WEST**	**NORTH**	**SOUTH**	**EAST**	**WEST**
Bicycle	Bicycle Lane Arrangement on Approach IF Dedicated Right Turn Lane, THEN Right Turn Configuration, ELSE <blank> Dedicated Right Turning Speed	Curb Bike Lane, Cycletrack or MUP		Curb Bike Lane, Cycletrack or MUP	Curb Bike Lane, Cycletrack or MUP								
	Cyclist Through Movement	**Not Applicable**	**-**	**Not Applicable**	**Not Applicable**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
	Separated or Mixed Traffic	**Separated**	**-**	**Separated**	**Separated**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
	Left Turn Approach Operating Speed	2-stage, LT box ≥ 60 km/h			2-stage, LT box ≥ 60 km/h								
	Left Turning Cyclist	**A**	**-**	**-**	**A**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
	Level of Service	**A**	**-**	**-**	**A**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
		A				**-**				**-**			
Transit	Average Signal Delay	> 40 sec		≤ 10 sec									
	Level of Service	**F**	**-**	**B**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
		F				**-**				**-**			
Truck	Effective Corner Radius	10 - 15 m		10 - 15 m									
	Number of Receiving Lanes on Departure from Intersection	1		1									
	Level of Service	**E**	**-**	**E**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
		E				**-**				**-**			
Auto	Volume to Capacity Ratio	0.81 - 0.90											
	Level of Service	**D**				**-**				**-**			

Multi-Modal Level of Service - Intersections Form

Consultant	WSP Canada Inc.	Project	Kanata-Sud School
Scenario	2028 Horizon Conditions AM	Date	26-05-2022
Comments			

To add intersections
Select columns LMNO, right-click and *Copy;*
Then select column P, right-click and *Insert Copied Cells*

INTERSECTIONS		Fernbank Rd / Robert Grant Ave				Intersection B				Intersection C			
	Crossing Side	NORTH	SOUTH	EAST	WEST	NORTH	SOUTH	EAST	WEST	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	Protected/ Permissive		No right turn	Permissive or yield control								
	Right Turns on Red (RToR) ?	RTOR allowed		RTOR allowed	RTOR prohibited								
	Ped Signal Leading Interval?	No		Yes	Yes								
	Right Turn Channel	No Channel		No Channel	No Right Turn								
	Corner Radius	10-15m		10-15m	No Right Turn								
	Crosswalk Type	Std transverse markings		Std transverse markings	Std transverse markings								
	PETSI Score	**78**		**77**	**93**								
	Ped. Exposure to Traffic LoS	**B**	**-**	**B**	**A**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
	Cycle Length	119		119	119								
	Effective Walk Time	29		13	13								
	Average Pedestrian Delay	**34**		**47**	**47**								
	Pedestrian Delay LoS	**D**	**-**	**E**	**E**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
	Level of Service	**D**	**-**	**E**	**E**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
		E				**-**				**-**			
	Approach From	**NORTH**	**SOUTH**	**EAST**	**WEST**	**NORTH**	**SOUTH**	**EAST**	**WEST**	**NORTH**	**SOUTH**	**EAST**	**WEST**
Bicycle	Bicycle Lane Arrangement on Approach IF Dedicated Right Turn Lane, THEN Right Turn Configuration, ELSE <blank> Dedicated Right Turning Speed	Curb Bike Lane, Cycletrack or MUP		Curb Bike Lane, Cycletrack or MUP	Curb Bike Lane, Cycletrack or MUP								
	Cyclist Through Movement	**Not Applicable**	**-**	**Not Applicable**	**Not Applicable**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
	Separated or Mixed Traffic	**Separated**	**-**	**Separated**	**Separated**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
	Left Turn Approach Operating Speed	2-stage, LT box ≥ 60 km/h			2-stage, LT box ≥ 60 km/h								
	Left Turning Cyclist	**A**	**-**	**-**	**A**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
	Level of Service	**A**	**-**	**-**	**A**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
		A				**-**				**-**			
Transit	Average Signal Delay	≤ 20 sec		≤ 10 sec									
	Level of Service	**C**	**-**	**B**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
		C				**-**				**-**			
Truck	Effective Corner Radius	10 - 15 m		10 - 15 m									
	Number of Receiving Lanes on Departure from Intersection	1		1									
	Level of Service	**E**	**-**	**E**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
		E				**-**				**-**			
Auto	Volume to Capacity Ratio	0.71 - 0.80											
	Level of Service	**C**				**-**				**-**			

Multi-Modal Level of Service - Intersections Form

Consultant	WSP Canada Inc.	Project	Kanata-Sud School
Scenario	2028 Horizon Conditions PM	Date	26-05-2022
Comments			

To add intersections
Select columns LMNO, right-click and *Copy;*
Then select column P, right-click and *Insert Copied Cells*

INTERSECTIONS		Fernbank Rd / Robert Grant Ave				Intersection B				Intersection C			
	Crossing Side	NORTH	SOUTH	EAST	WEST	NORTH	SOUTH	EAST	WEST	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	Protected/ Permissive		No right turn	Permissive or yield control								
	Right Turns on Red (RToR) ?	RTOR allowed		RTOR allowed	RTOR prohibited								
	Ped Signal Leading Interval?	No		Yes	Yes								
	Right Turn Channel	No Channel		No Channel	No Right Turn								
	Corner Radius	10-15m		10-15m	No Right Turn								
	Crosswalk Type	Std transverse markings		Std transverse markings	Std transverse markings								
	PETSI Score	**78**		**77**	**93**								
	Ped. Exposure to Traffic LoS	**B**	**-**	**B**	**A**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
	Cycle Length	119		119	119								
	Effective Walk Time	35		13	13								
	Average Pedestrian Delay	**30**		**47**	**47**								
	Pedestrian Delay LoS	**D**	**-**	**E**	**E**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
	Level of Service	**D**	**-**	**E**	**E**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
		E				**-**				**-**			
	Approach From	**NORTH**	**SOUTH**	**EAST**	**WEST**	**NORTH**	**SOUTH**	**EAST**	**WEST**	**NORTH**	**SOUTH**	**EAST**	**WEST**
Bicycle	Bicycle Lane Arrangement on Approach IF Dedicated Right Turn Lane, THEN Right Turn Configuration, ELSE <blank> Dedicated Right Turning Speed	Curb Bike Lane, Cycletrack or MUP		Curb Bike Lane, Cycletrack or MUP	Curb Bike Lane, Cycletrack or MUP								
	Cyclist Through Movement	**Not Applicable**	**-**	**Not Applicable**	**Not Applicable**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
	Separated or Mixed Traffic	**Separated**	**-**	**Separated**	**Separated**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
	Left Turn Approach Operating Speed	2-stage, LT box ≥ 60 km/h			2-stage, LT box ≥ 60 km/h								
	Left Turning Cyclist	**A**	**-**	**-**	**A**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
	Level of Service	**A**	**-**	**-**	**A**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
		A				**-**				**-**			
Transit	Average Signal Delay	≤ 20 sec		≤ 10 sec									
	Level of Service	**C**	**-**	**B**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
		C				**-**				**-**			
Truck	Effective Corner Radius Number of Receiving Lanes on Departure from Intersection	10 - 15 m 1		10 - 15 m 1									
	Level of Service	**E**	**-**	**E**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
		E				**-**				**-**			
Auto	Volume to Capacity Ratio	0.81 - 0.90											
	Level of Service	**D**				**-**				**-**			

Multi-Modal Level of Service - Segments Form

Consultant	**WSP Canada Inc.**	**Project**	**Kanata-Sud School**
Scenario	**2022 Existing Conditions**	**Date**	**26-05-2022**
Comments			

SEGMENTS		Cope Drive	Dagenham Street to Robert Grant Avenue			Section	Section	Section	Section	Section	Section
			EB	WB	-	4	5	6	7	8	9
Pedestrian	Sidewalk Width Boulevard Width	F	no sidewalk n/a	no sidewalk n/a							
	Avg Daily Curb Lane Traffic Volume		≤ 3000	≤ 3000							
	Operating Speed On-Street Parking		> 30 to 50 km/h no	> 30 to 50 km/h no							
	Exposure to Traffic PLoS		**F**	**F**	-	-	-	-	-	-	-
	Effective Sidewalk Width		1.2 m	1.2 m							
	Pedestrian Volume		250 ped/hr	250 ped/hr							
	Crowding PLoS		**B**	**B**	-	-	-	-	-	-	-
	Level of Service		**F**	**F**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
Bicycle	Type of Cycling Facility	E	Mixed Traffic	Mixed Traffic							
	Number of Travel Lanes		2-3 lanes total	2-3 lanes total							
	Operating Speed		≥ 50 to 60 km/h	≥ 50 to 60 km/h							
	# of Lanes & Operating Speed LoS		**E**	**E**	-	-	-	-	-	-	-
	Bike Lane (+ Parking Lane) Width										
	Bike Lane Width LoS		-	-	-	-	-	-	-	-	-
	Bike Lane Blockages										
	Blockage LoS		-	-	-	-	-	-	-	-	-
	Median Refuge Width (no median = < 1.8 m)		< 1.8 m refuge	< 1.8 m refuge							
	No. of Lanes at Unsignalized Crossing		≤ 3 lanes	≤ 3 lanes							
	Sidestreet Operating Speed		≤ 40 km/h	≤ 40 km/h							
	Unsignalized Crossing - Lowest LoS		**A**	**A**	-	-	-	-	-	-	-
	Level of Service		**E**	**E**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
Transit	Facility Type	-									
	Friction or Ratio Transit:Posted Speed										
	Level of Service		**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
Truck	Truck Lane Width	-									
	Travel Lanes per Direction										
	Level of Service		**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**

Multi-Modal Level of Service - Segments Form

Consultant	**WSP Canada Inc.**	**Project**	**Kanata-Sud School**
Scenario	**2028 Horizon Conditions**	**Date**	**26-05-2022**
Comments			

SEGMENTS		**Cope Drive**	Dagenham Street to Robert Grant Avenue			Section	Section	Section	Section	Section	Section
			EB	WB	-	4	5	6	7	8	9
Pedestrian	Sidewalk Width Boulevard Width	**B**	≥ 2 m > 2 m	≥ 2 m 0.5 - 2 m							
	Avg Daily Curb Lane Traffic Volume		≤ 3000	≤ 3000							
	Operating Speed On-Street Parking		> 30 to 50 km/h no	> 30 to 50 km/h yes							
	Exposure to Traffic PLoS		**A**	**A**	-	-	-	-	-	-	-
	Effective Sidewalk Width		2.0 m	3.0 m							
	Pedestrian Volume		250 ped/hr	250 ped/hr							
	Crowding PLoS		**B**	**A**	-	-	-	-	-	-	-
	Level of Service		**B**	**A**	-	-	-	-	-	-	-
Bicycle	Type of Cycling Facility	**B**	Mixed Traffic	Physically Separated							
	Number of Travel Lanes		2-3 lanes total								
	Operating Speed		≤ 40 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	-									
	Friction or Ratio Transit:Posted Speed										
	Level of Service		-	-	-	-	-	-	-	-	-
Truck	Truck Lane Width	-									
	Travel Lanes per Direction										
	Level of Service		-	-	-	-	-	-	-	-	-

Multi-Modal Level of Service - Segments Form

Consultant	**WSP Canada Inc.**	**Project**	**Kanata-Sud School**
Scenario	**2028 Horizon Conditions**	**Date**	**26-05-2022**
Comments			

SEGMENTS		Dagenham St	Bobolink Ridge to Cope Drive			Section	Section	Section	Section	Section	Section
			NB	SB	-	4	5	6	7	8	9
Pedestrian	Sidewalk Width Boulevard Width	B	≥ 2 m < 0.5	1.8 m < 0.5 m							
	Avg Daily Curb Lane Traffic Volume		≤ 3000	≤ 3000							
	Operating Speed On-Street Parking		≤ 30 km/h yes	≤ 30 km/h no							
	Exposure to Traffic PLoS		**A**	**A**	-	-	-	-	-	-	-
	Effective Sidewalk Width		3.0 m	1.5 m							
	Pedestrian Volume		250 ped/hr	250 ped/hr							
	Crowding PLoS		**A**	**B**	-	-	-	-	-	-	-
	Level of Service		**A**	**B**	-	-	-	-	-	-	-
Bicycle	Type of Cycling Facility	B	Mixed Traffic	Mixed Traffic							
	Number of Travel Lanes		2-3 lanes total	2-3 lanes total							
	Operating Speed		≤ 40 km/h	≤ 40 km/h							
	# of Lanes & Operating Speed LoS		**B**	**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	< 1.8 m refuge							
	No. of Lanes at Unsignalized Crossing		≤ 3 lanes	≤ 3 lanes							
	Sidestreet Operating Speed		≤ 40 km/h	≤ 40 km/h							
	Unsignalized Crossing - Lowest LoS		**A**	**A**	-	-	-	-	-	-	-
	Level of Service		**B**	**B**	-	-	-	-	-	-	-
Transit	Facility Type	-									
	Friction or Ratio Transit:Posted Speed										
	Level of Service		**-**	**-**	-	-	-	-	-	-	-
Truck	Truck Lane Width	-									
	Travel Lanes per Direction										
	Level of Service		**-**	**-**	-	-	-	-	-	-	-

APPENDIX

SYNCHRO AND SIDRA RESULTS

MOVEMENT SUMMARY

Site: 101 [Abbott Street East / Robert Grant Avenue AM]

Existing Conditions AM
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	286	2.0	0.376	6.2	LOS A	2.4	17.2	0.14	0.04	47.6
3	R2	213	2.0	0.376	6.2	LOS A	2.4	17.2	0.14	0.04	46.2
Approach		499	2.0	0.376	6.2	LOS A	2.4	17.2	0.14	0.04	47.0
East: Abott Street East											
4	L2	79	2.0	0.131	4.7	LOS A	0.6	4.1	0.43	0.31	48.2
5	T1	54	2.0	0.131	4.7	LOS A	0.6	4.1	0.43	0.31	45.3
Approach		133	2.0	0.131	4.7	LOS A	0.6	4.1	0.43	0.31	46.9
West: Abott Street East											
11	T1	21	2.0	0.140	4.0	LOS A	0.7	4.7	0.22	0.10	47.1
12	R2	154	2.0	0.140	4.0	LOS A	0.7	4.7	0.22	0.10	49.1
Approach		175	2.0	0.140	4.0	LOS A	0.7	4.7	0.22	0.10	48.9
All Vehicles		807	2.0	0.376	5.5	LOS A	2.4	17.2	0.20	0.10	47.4

Site Level of Service (LOS) Method: Delay & v/c (HCM 6). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Roundabout LOS Method: Same as Sign Control.
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement.
LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 6).
Roundabout Capacity Model: US HCM 6.
HCM Delay Formula option is used. Control Delay does not include Geometric Delay since Exclude Geometric Delay option applies.
Gap-Acceptance Capacity: Traditional M1.
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 101 [Abbott Street East / Robert Grant Avenue PM]

Existing Conditions PM
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	200	2.0	0.252	5.0	LOS A	1.3	9.6	0.19	0.07	48.3
3	R2	125	2.0	0.252	5.0	LOS A	1.3	9.6	0.19	0.07	46.8
Approach		325	2.0	0.252	5.0	LOS A	1.3	9.6	0.19	0.07	47.7
East: Abott Street East											
4	L2	191	2.0	0.223	5.3	LOS A	1.1	7.8	0.39	0.26	47.3
5	T1	57	2.0	0.223	5.3	LOS A	1.1	7.8	0.39	0.26	44.5
Approach		248	2.0	0.223	5.3	LOS A	1.1	7.8	0.39	0.26	46.6
West: Abott Street East											
11	T1	48	2.0	0.302	6.1	LOS A	1.6	11.4	0.42	0.28	45.9
12	R2	289	2.0	0.302	6.1	LOS A	1.6	11.4	0.42	0.28	47.8
Approach		337	2.0	0.302	6.1	LOS A	1.6	11.4	0.42	0.28	47.5
All Vehicles		910	2.0	0.302	5.5	LOS A	1.6	11.4	0.33	0.20	47.3

Site Level of Service (LOS) Method: Delay & v/c (HCM 6). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Roundabout LOS Method: Same as Sign Control.
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement.
LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 6).
Roundabout Capacity Model: US HCM 6.
HCM Delay Formula option is used. Control Delay does not include Geometric Delay since Exclude Geometric Delay option applies.
Gap-Acceptance Capacity: Traditional M1.
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 102 [Robert Grant Avenue / Bobolink Ridge AM]

Existing Conditions AM
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	26	2.0	0.197	4.6	LOS A	1.0	7.0	0.25	0.12	49.7
2	T1	206	2.0	0.197	4.6	LOS A	1.0	7.0	0.25	0.12	53.0
3	R2	13	2.0	0.197	4.6	LOS A	1.0	7.0	0.25	0.12	48.3
Approach		245	2.0	0.197	4.6	LOS A	1.0	7.0	0.25	0.12	52.3
East: Bobolink Ridge											
4	L2	13	0.0	0.069	4.1	LOS A	0.3	2.0	0.41	0.27	49.4
5	T1	1	0.0	0.069	4.1	LOS A	0.3	2.0	0.41	0.27	46.3
6	R2	57	0.0	0.069	4.1	LOS A	0.3	2.0	0.41	0.27	48.3
Approach		71	0.0	0.069	4.1	LOS A	0.3	2.0	0.41	0.27	48.5
North: Robert Grand Avenue											
7	L2	31	2.0	0.143	3.9	LOS A	0.7	4.8	0.15	0.05	49.9
8	T1	112	2.0	0.143	3.9	LOS A	0.7	4.8	0.15	0.05	53.2
9	R2	43	2.0	0.143	3.9	LOS A	0.7	4.8	0.15	0.05	48.5
Approach		186	2.0	0.143	3.9	LOS A	0.7	4.8	0.15	0.05	51.5
West: Bobolink Ridge											
10	L2	52	2.0	0.065	3.7	LOS A	0.3	2.0	0.30	0.16	48.1
11	T1	3	2.0	0.065	3.7	LOS A	0.3	2.0	0.30	0.16	45.3
12	R2	20	2.0	0.065	3.7	LOS A	0.3	2.0	0.30	0.16	47.2
Approach		75	2.0	0.065	3.7	LOS A	0.3	2.0	0.30	0.16	47.7
All Vehicles		577	1.8	0.197	4.2	LOS A	1.0	7.0	0.24	0.12	50.9

Site Level of Service (LOS) Method: Delay & v/c (HCM 6). 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 and v/c ratio (degree of saturation) per movement.
LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 6).
Roundabout Capacity Model: US HCM 6.
HCM Delay Formula option is used. Control Delay does not include Geometric Delay since Exclude Geometric Delay option applies.
Gap-Acceptance Capacity: Traditional M1.
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 102 [Robert Grant Avenue / Bobolink Ridge PM]

Existing Conditions PM
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	13	2.0	0.141	4.2	LOS A	0.7	4.6	0.27	0.14	50.1
2	T1	139	2.0	0.141	4.2	LOS A	0.7	4.6	0.27	0.14	53.4
3	R2	18	2.0	0.141	4.2	LOS A	0.7	4.6	0.27	0.14	48.7
Approach		170	2.0	0.141	4.2	LOS A	0.7	4.6	0.27	0.14	52.6
East: Bobolink Ridge											
4	L2	12	0.0	0.059	3.7	LOS A	0.3	1.8	0.34	0.20	49.6
5	T1	5	0.0	0.059	3.7	LOS A	0.3	1.8	0.34	0.20	46.5
6	R2	49	0.0	0.059	3.7	LOS A	0.3	1.8	0.34	0.20	48.6
Approach		66	0.0	0.059	3.7	LOS A	0.3	1.8	0.34	0.20	48.6
North: Robert Grand Avenue											
7	L2	60	2.0	0.232	4.7	LOS A	1.2	8.7	0.14	0.05	49.3
8	T1	187	2.0	0.232	4.7	LOS A	1.2	8.7	0.14	0.05	52.5
9	R2	58	2.0	0.232	4.7	LOS A	1.2	8.7	0.14	0.05	48.0
Approach		305	2.0	0.232	4.7	LOS A	1.2	8.7	0.14	0.05	51.0
West: Bobolink Ridge											
10	L2	47	2.0	0.078	4.1	LOS A	0.3	2.3	0.39	0.26	48.2
11	T1	8	2.0	0.078	4.1	LOS A	0.3	2.3	0.39	0.26	45.3
12	R2	26	2.0	0.078	4.1	LOS A	0.3	2.3	0.39	0.26	47.2
Approach		81	2.0	0.078	4.1	LOS A	0.3	2.3	0.39	0.26	47.5
All Vehicles		622	1.8	0.232	4.4	LOS A	1.2	8.7	0.23	0.12	50.6

Site Level of Service (LOS) Method: Delay & v/c (HCM 6). 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 and v/c ratio (degree of saturation) per movement.
LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 6).
Roundabout Capacity Model: US HCM 6.
HCM Delay Formula option is used. Control Delay does not include Geometric Delay since Exclude Geometric Delay option applies.
Gap-Acceptance Capacity: Traditional M1.
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 103 [Robert Grant Avenue / Cope Drive AM]

Existing Conditions AM
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	5	2.0	0.189	4.3	LOS A	1.0	6.8	0.11	0.03	50.0
2	T1	220	2.0	0.189	4.3	LOS A	1.0	6.8	0.11	0.03	53.3
3	R2	26	2.0	0.189	4.3	LOS A	1.0	6.8	0.11	0.03	48.6
Approach		251	2.0	0.189	4.3	LOS A	1.0	6.8	0.11	0.03	52.7
East: Cope Drive											
4	L2	21	2.0	0.043	3.7	LOS A	0.2	1.3	0.36	0.21	48.8
5	T1	1	0.0	0.043	3.7	LOS A	0.2	1.3	0.36	0.21	45.9
6	R2	25	2.0	0.043	3.7	LOS A	0.2	1.3	0.36	0.21	47.8
Approach		47	2.0	0.043	3.7	LOS A	0.2	1.3	0.36	0.21	48.2
North: Robert Grant Avenue											
7	L2	19	2.0	0.110	3.6	LOS A	0.5	3.6	0.12	0.03	50.1
8	T1	126	2.0	0.110	3.6	LOS A	0.5	3.6	0.12	0.03	53.5
9	R2	1	0.0	0.110	3.6	LOS A	0.5	3.6	0.12	0.03	48.8
Approach		146	2.0	0.110	3.6	LOS A	0.5	3.6	0.12	0.03	53.0
West: Cope Drive											
10	L2	1	0.0	0.009	3.2	LOS A	0.0	0.2	0.29	0.13	50.2
11	T1	3	0.0	0.009	3.2	LOS A	0.0	0.2	0.29	0.13	47.1
12	R2	6	0.0	0.009	3.2	LOS A	0.0	0.2	0.29	0.13	49.1
Approach		10	0.0	0.009	3.2	LOS A	0.0	0.2	0.29	0.13	48.6
All Vehicles		454	1.9	0.189	4.0	LOS A	1.0	6.8	0.14	0.05	52.2

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Roundabout LOS Method: Same as Sign Control.
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: US HCM 6.
HCM Delay Formula option is used. Control Delay does not include Geometric Delay since Exclude Geometric Delay option applies.
Gap-Acceptance Capacity: Traditional M1.
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 103 [Robert Grant Avenue / Cope Drive PM]

Existing Conditions PM
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	6	2.0	0.130	3.8	LOS A	0.6	4.3	0.10	0.03	50.3
2	T1	143	2.0	0.130	3.8	LOS A	0.6	4.3	0.10	0.03	53.7
3	R2	23	2.0	0.130	3.8	LOS A	0.6	4.3	0.10	0.03	48.9
Approach		172	2.0	0.130	3.8	LOS A	0.6	4.3	0.10	0.03	52.9
East: Cope Drive											
4	L2	35	2.0	0.064	3.6	LOS A	0.3	2.0	0.30	0.16	48.8
5	T1	10	0.0	0.064	3.6	LOS A	0.3	2.0	0.30	0.16	45.9
6	R2	30	2.0	0.064	3.6	LOS A	0.3	2.0	0.30	0.16	47.8
Approach		75	1.7	0.064	3.6	LOS A	0.3	2.0	0.30	0.16	48.0
North: Robert Grant Avenue											
7	L2	15	2.0	0.174	4.2	LOS A	0.9	6.1	0.18	0.07	49.9
8	T1	210	2.0	0.174	4.2	LOS A	0.9	6.1	0.18	0.07	53.2
9	R2	1	0.0	0.174	4.2	LOS A	0.9	6.1	0.18	0.07	48.6
Approach		226	2.0	0.174	4.2	LOS A	0.9	6.1	0.18	0.07	53.0
West: Cope Drive											
10	L2	4	0.0	0.007	3.5	LOS A	0.0	0.2	0.37	0.19	48.6
11	T1	2	0.0	0.007	3.5	LOS A	0.0	0.2	0.37	0.19	45.7
12	R2	1	0.0	0.007	3.5	LOS A	0.0	0.2	0.37	0.19	47.7
Approach		7	0.0	0.007	3.5	LOS A	0.0	0.2	0.37	0.19	47.6
All Vehicles		480	1.9	0.174	4.0	LOS A	0.9	6.1	0.17	0.07	52.0

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Roundabout LOS Method: Same as Sign Control.
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: US HCM 6.
HCM Delay Formula option is used. Control Delay does not include Geometric Delay since Exclude Geometric Delay option applies.
Gap-Acceptance Capacity: Traditional M1.
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 101 [Abbott Street East / Robert Grant Avenue AM]

2023 Future Background Conditions AM
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	300	2.0	0.399	6.5	LOS A	2.7	19.0	0.14	0.04	47.5
3	R2	230	2.0	0.399	6.5	LOS A	2.7	19.0	0.14	0.04	46.0
Approach		530	2.0	0.399	6.5	LOS A	2.7	19.0	0.14	0.04	46.8
East: Abott Street East											
4	L2	103	2.0	0.158	5.0	LOS A	0.7	5.0	0.45	0.33	47.8
5	T1	55	2.0	0.158	5.0	LOS A	0.7	5.0	0.45	0.33	44.9
Approach		158	2.0	0.158	5.0	LOS A	0.7	5.0	0.45	0.33	46.8
West: Abott Street East											
11	T1	21	2.0	0.157	4.3	LOS A	0.7	5.3	0.26	0.13	47.0
12	R2	170	2.0	0.157	4.3	LOS A	0.7	5.3	0.26	0.13	49.0
Approach		191	2.0	0.157	4.3	LOS A	0.7	5.3	0.26	0.13	48.7
All Vehicles		879	2.0	0.399	5.8	LOS A	2.7	19.0	0.22	0.11	47.2

Site Level of Service (LOS) Method: Delay & v/c (HCM 6). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Roundabout LOS Method: Same as Sign Control.
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement.
LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 6).
Roundabout Capacity Model: US HCM 6.
HCM Delay Formula option is used. Control Delay does not include Geometric Delay since Exclude Geometric Delay option applies.
Gap-Acceptance Capacity: Traditional M1.
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 101 [Abbott Street East / Robert Grant Avenue PM]

2023 Future Background Conditions PM
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	213	2.0	0.277	5.2	LOS A	1.5	10.9	0.20	0.08	48.2
3	R2	144	2.0	0.277	5.2	LOS A	1.5	10.9	0.20	0.08	46.7
Approach		357	2.0	0.277	5.2	LOS A	1.5	10.9	0.20	0.08	47.6
East: Abott Street East											
4	L2	205	2.0	0.240	5.5	LOS A	1.2	8.5	0.41	0.28	47.1
5	T1	58	2.0	0.240	5.5	LOS A	1.2	8.5	0.41	0.28	44.4
Approach		263	2.0	0.240	5.5	LOS A	1.2	8.5	0.41	0.28	46.5
West: Abott Street East											
11	T1	49	2.0	0.319	6.4	LOS A	1.7	12.2	0.44	0.31	45.7
12	R2	301	2.0	0.319	6.4	LOS A	1.7	12.2	0.44	0.31	47.6
Approach		350	2.0	0.319	6.4	LOS A	1.7	12.2	0.44	0.31	47.4
All Vehicles		970	2.0	0.319	5.7	LOS A	1.7	12.2	0.34	0.22	47.2

Site Level of Service (LOS) Method: Delay & v/c (HCM 6). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Roundabout LOS Method: Same as Sign Control.
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement.
LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 6).
Roundabout Capacity Model: US HCM 6.
HCM Delay Formula option is used. Control Delay does not include Geometric Delay since Exclude Geometric Delay option applies.
Gap-Acceptance Capacity: Traditional M1.
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 102 [Robert Grant Avenue / Bobolink Ridge AM]

2023 Future Background Conditions AM
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	27	2.0	0.219	4.8	LOS A	1.1	7.9	0.26	0.12	49.6
2	T1	231	2.0	0.219	4.8	LOS A	1.1	7.9	0.26	0.12	52.8
3	R2	13	2.0	0.219	4.8	LOS A	1.1	7.9	0.26	0.12	48.2
Approach		271	2.0	0.219	4.8	LOS A	1.1	7.9	0.26	0.12	52.2
East: Bobolink Ridge											
4	L2	13	0.0	0.072	4.3	LOS A	0.3	2.1	0.43	0.30	49.3
5	T1	1	0.0	0.072	4.3	LOS A	0.3	2.1	0.43	0.30	46.2
6	R2	58	0.0	0.072	4.3	LOS A	0.3	2.1	0.43	0.30	48.2
Approach		72	0.0	0.072	4.3	LOS A	0.3	2.1	0.43	0.30	48.4
North: Robert Grand Avenue											
7	L2	32	2.0	0.174	4.2	LOS A	0.9	6.1	0.16	0.06	49.8
8	T1	150	2.0	0.174	4.2	LOS A	0.9	6.1	0.16	0.06	53.1
9	R2	44	2.0	0.174	4.2	LOS A	0.9	6.1	0.16	0.06	48.4
Approach		226	2.0	0.174	4.2	LOS A	0.9	6.1	0.16	0.06	51.7
West: Bobolink Ridge											
10	L2	53	2.0	0.068	3.8	LOS A	0.3	2.1	0.34	0.20	48.0
11	T1	3	2.0	0.068	3.8	LOS A	0.3	2.1	0.34	0.20	45.2
12	R2	20	2.0	0.068	3.8	LOS A	0.3	2.1	0.34	0.20	47.0
Approach		76	2.0	0.068	3.8	LOS A	0.3	2.1	0.34	0.20	47.6
All Vehicles		645	1.8	0.219	4.4	LOS A	1.1	7.9	0.25	0.13	51.0

Site Level of Service (LOS) Method: Delay & v/c (HCM 6). 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 and v/c ratio (degree of saturation) per movement.
LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 6).
Roundabout Capacity Model: US HCM 6.
HCM Delay Formula option is used. Control Delay does not include Geometric Delay since Exclude Geometric Delay option applies.
Gap-Acceptance Capacity: Traditional M1.
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 102 [Robert Grant Avenue / Bobolink Ridge PM]

2023 Future Background Conditions PM
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	13	2.0	0.161	4.4	LOS A	0.8	5.4	0.28	0.15	50.0
2	T1	163	2.0	0.161	4.4	LOS A	0.8	5.4	0.28	0.15	53.3
3	R2	18	2.0	0.161	4.4	LOS A	0.8	5.4	0.28	0.15	48.6
Approach		194	2.0	0.161	4.4	LOS A	0.8	5.4	0.28	0.15	52.6
East: Bobolink Ridge											
4	L2	12	0.0	0.062	3.8	LOS A	0.3	1.8	0.36	0.22	49.6
5	T1	5	0.0	0.062	3.8	LOS A	0.3	1.8	0.36	0.22	46.4
6	R2	50	0.0	0.062	3.8	LOS A	0.3	1.8	0.36	0.22	48.5
Approach		67	0.0	0.062	3.8	LOS A	0.3	1.8	0.36	0.22	48.5
North: Robert Grand Avenue											
7	L2	61	2.0	0.248	4.9	LOS A	1.3	9.5	0.14	0.05	49.3
8	T1	207	2.0	0.248	4.9	LOS A	1.3	9.5	0.14	0.05	52.5
9	R2	59	2.0	0.248	4.9	LOS A	1.3	9.5	0.14	0.05	47.9
Approach		327	2.0	0.248	4.9	LOS A	1.3	9.5	0.14	0.05	51.0
West: Bobolink Ridge											
10	L2	48	2.0	0.082	4.3	LOS A	0.3	2.4	0.41	0.28	48.1
11	T1	8	2.0	0.082	4.3	LOS A	0.3	2.4	0.41	0.28	45.2
12	R2	27	2.0	0.082	4.3	LOS A	0.3	2.4	0.41	0.28	47.1
Approach		83	2.0	0.082	4.3	LOS A	0.3	2.4	0.41	0.28	47.5
All Vehicles		671	1.8	0.248	4.6	LOS A	1.3	9.5	0.24	0.12	50.7

Site Level of Service (LOS) Method: Delay & v/c (HCM 6). 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 and v/c ratio (degree of saturation) per movement.
LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 6).
Roundabout Capacity Model: US HCM 6.
HCM Delay Formula option is used. Control Delay does not include Geometric Delay since Exclude Geometric Delay option applies.
Gap-Acceptance Capacity: Traditional M1.
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 103 [Robert Grant Avenue / Cope Drive AM]

2023 Future Background Conditions AM
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	27	2.0	0.216	4.6	LOS A	1.1	7.9	0.19	0.07	49.5
2	T1	224	2.0	0.216	4.6	LOS A	1.1	7.9	0.19	0.07	52.8
3	R2	27	2.0	0.216	4.6	LOS A	1.1	7.9	0.19	0.07	48.2
Approach		278	2.0	0.216	4.6	LOS A	1.1	7.9	0.19	0.07	52.0
East: Cope Drive											
4	L2	21	2.0	0.058	4.0	LOS A	0.2	1.7	0.39	0.26	48.9
5	T1	13	0.0	0.058	4.0	LOS A	0.2	1.7	0.39	0.26	46.0
6	R2	26	2.0	0.058	4.0	LOS A	0.2	1.7	0.39	0.26	47.9
Approach		60	1.6	0.058	4.0	LOS A	0.2	1.7	0.39	0.26	47.8
North: Robert Grant Avenue											
7	L2	19	2.0	0.143	4.0	LOS A	0.7	4.8	0.19	0.08	50.0
8	T1	129	2.0	0.143	4.0	LOS A	0.7	4.8	0.19	0.08	53.3
9	R2	36	0.0	0.143	4.0	LOS A	0.7	4.8	0.19	0.08	48.6
Approach		184	1.6	0.143	4.0	LOS A	0.7	4.8	0.19	0.08	52.0
West: Cope Drive											
10	L2	21	0.0	0.044	3.5	LOS A	0.2	1.3	0.31	0.16	49.1
11	T1	11	0.0	0.044	3.5	LOS A	0.2	1.3	0.31	0.16	46.1
12	R2	19	0.0	0.044	3.5	LOS A	0.2	1.3	0.31	0.16	48.1
Approach		51	0.0	0.044	3.5	LOS A	0.2	1.3	0.31	0.16	48.0
All Vehicles		573	1.7	0.216	4.3	LOS A	1.1	7.9	0.22	0.10	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: Same as Sign Control.
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: US HCM 6.
HCM Delay Formula option is used. Control Delay does not include Geometric Delay since Exclude Geometric Delay option applies.
Gap-Acceptance Capacity: Traditional M1.
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 103 [Robert Grant Avenue / Cope Drive PM]

2023 Future Background Conditions PM
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	16	2.0	0.144	4.0	LOS A	0.7	4.9	0.18	0.07	50.0
2	T1	146	2.0	0.144	4.0	LOS A	0.7	4.9	0.18	0.07	53.3
3	R2	23	2.0	0.144	4.0	LOS A	0.7	4.9	0.18	0.07	48.6
Approach		185	2.0	0.144	4.0	LOS A	0.7	4.9	0.18	0.07	52.4
East: Cope Drive											
4	L2	36	2.0	0.074	3.8	LOS A	0.3	2.3	0.33	0.20	48.7
5	T1	16	0.0	0.074	3.8	LOS A	0.3	2.3	0.33	0.20	45.8
6	R2	31	2.0	0.074	3.8	LOS A	0.3	2.3	0.33	0.20	47.7
Approach		83	1.6	0.074	3.8	LOS A	0.3	2.3	0.33	0.20	47.8
North: Robert Grant Avenue											
7	L2	15	2.0	0.192	4.5	LOS A	1.0	6.8	0.21	0.09	49.8
8	T1	214	2.0	0.192	4.5	LOS A	1.0	6.8	0.21	0.09	53.1
9	R2	16	0.0	0.192	4.4	LOS A	1.0	6.8	0.21	0.09	48.4
Approach		245	1.9	0.192	4.5	LOS A	1.0	6.8	0.21	0.09	52.5
West: Cope Drive											
10	L2	29	0.0	0.054	3.9	LOS A	0.2	1.6	0.39	0.25	48.5
11	T1	11	0.0	0.054	3.9	LOS A	0.2	1.6	0.39	0.25	45.6
12	R2	17	0.0	0.054	3.9	LOS A	0.2	1.6	0.39	0.25	47.6
Approach		57	0.0	0.054	3.9	LOS A	0.2	1.6	0.39	0.25	47.7
All Vehicles		570	1.7	0.192	4.2	LOS A	1.0	6.8	0.24	0.12	51.2

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Roundabout LOS Method: Same as Sign Control.
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: US HCM 6.
HCM Delay Formula option is used. Control Delay does not include Geometric Delay since Exclude Geometric Delay option applies.
Gap-Acceptance Capacity: Traditional M1.
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 101 [Abbott Street East / Robert Grant Avenue AM]

2028 Future Background Conditions AM
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	442	2.0	0.693	12.3	LOS B	8.5	60.2	0.30	0.10	44.4
3	R2	473	2.0	0.693	12.3	LOS B	8.5	60.2	0.30	0.10	43.2
Approach		915	2.0	0.693	12.3	LOS B	8.5	60.2	0.30	0.10	43.8
East: Abott Street East											
4	L2	172	2.0	0.269	7.0	LOS A	1.3	8.9	0.57	0.52	46.4
5	T1	61	2.0	0.269	7.0	LOS A	1.3	8.9	0.57	0.52	43.7
Approach		233	2.0	0.269	7.0	LOS A	1.3	8.9	0.57	0.52	45.7
West: Abott Street East											
11	T1	26	2.0	0.234	5.3	LOS A	1.2	8.3	0.37	0.23	46.4
12	R2	240	2.0	0.234	5.3	LOS A	1.2	8.3	0.37	0.23	48.3
Approach		266	2.0	0.234	5.3	LOS A	1.2	8.3	0.37	0.23	48.1
All Vehicles		1414	2.0	0.693	10.1	LOS B	8.5	60.2	0.36	0.19	44.8

Site Level of Service (LOS) Method: Delay & v/c (HCM 6). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Roundabout LOS Method: Same as Sign Control.
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement.
LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 6).
Roundabout Capacity Model: US HCM 6.
HCM Delay Formula option is used. Control Delay does not include Geometric Delay since Exclude Geometric Delay option applies.
Gap-Acceptance Capacity: Traditional M1.
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 101 [Abbott Street East / Robert Grant Avenue PM]

2028 Future Background Conditions PM
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	307	2.0	0.486	8.2	LOS A	3.5	24.7	0.39	0.22	46.6
3	R2	287	2.0	0.486	8.2	LOS A	3.5	24.7	0.39	0.22	45.2
Approach		594	2.0	0.486	8.2	LOS A	3.5	24.7	0.39	0.22	45.9
East: Abott Street East											
4	L2	420	2.0	0.486	9.5	LOS A	3.2	22.5	0.62	0.54	44.7
5	T1	64	2.0	0.486	9.5	LOS A	3.2	22.5	0.62	0.54	42.2
Approach		484	2.0	0.486	9.5	LOS A	3.2	22.5	0.62	0.54	44.4
West: Abott Street East											
11	T1	102	2.0	0.626	14.0	LOS B	6.7	47.6	0.77	0.97	41.8
12	R2	449	2.0	0.626	14.0	LOS B	6.7	47.6	0.77	0.97	43.4
Approach		551	2.0	0.626	14.0	LOS B	6.7	47.6	0.77	0.97	43.1
All Vehicles		1629	2.0	0.626	10.5	LOS B	6.7	47.6	0.59	0.57	44.5

Site Level of Service (LOS) Method: Delay & v/c (HCM 6). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Roundabout LOS Method: Same as Sign Control.
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement.
LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 6).
Roundabout Capacity Model: US HCM 6.
HCM Delay Formula option is used. Control Delay does not include Geometric Delay since Exclude Geometric Delay option applies.
Gap-Acceptance Capacity: Traditional M1.
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 102 [Robert Grant Avenue / Bobolink Ridge AM]

2028 Future Background Conditions AM
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	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Robert Grant Avenue											
1	L2	29	2.0	0.578	9.9	LOS A	4.7	33.8	0.48	0.28	46.6
2	T1	652	2.0	0.578	9.9	LOS A	4.7	33.8	0.48	0.28	49.4
3	R2	17	2.0	0.578	9.9	LOS A	4.7	33.8	0.48	0.28	45.4
Approach		698	2.0	0.578	9.9	LOS A	4.7	33.8	0.48	0.28	49.2
East: Bobolink Ridge											
4	L2	28	0.0	0.166	7.6	LOS A	0.7	4.7	0.63	0.63	47.0
5	T1	1	0.0	0.166	7.6	LOS A	0.7	4.7	0.63	0.63	44.1
6	R2	77	0.0	0.166	7.6	LOS A	0.7	4.7	0.63	0.63	46.0
Approach		106	0.0	0.166	7.6	LOS A	0.7	4.7	0.63	0.63	46.2
North: Robert Grand Avenue											
7	L2	51	2.0	0.450	7.4	LOS A	3.2	22.5	0.28	0.12	48.0
8	T1	476	2.0	0.450	7.4	LOS A	3.2	22.5	0.28	0.12	51.0
9	R2	48	2.0	0.450	7.4	LOS A	3.2	22.5	0.28	0.12	46.7
Approach		575	2.0	0.450	7.4	LOS A	3.2	22.5	0.28	0.12	50.3
West: Bobolink Ridge											
10	L2	59	2.0	0.111	5.8	LOS A	0.4	3.2	0.56	0.50	46.8
11	T1	3	2.0	0.111	5.8	LOS A	0.4	3.2	0.56	0.50	44.1
12	R2	23	2.0	0.111	5.8	LOS A	0.4	3.2	0.56	0.50	45.9
Approach		85	2.0	0.111	5.8	LOS A	0.4	3.2	0.56	0.50	46.5
All Vehicles		1464	1.9	0.578	8.5	LOS A	4.7	33.8	0.41	0.26	49.2

Site Level of Service (LOS) Method: Delay & v/c (HCM 6). 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 and v/c ratio (degree of saturation) per movement.
LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 6).
Roundabout Capacity Model: US HCM 6.
HCM Delay Formula option is used. Control Delay does not include Geometric Delay since Exclude Geometric Delay option applies.
Gap-Acceptance Capacity: Traditional M1.
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 102 [Robert Grant Avenue / Bobolink Ridge PM]

2028 Future Background Conditions PM
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	15	2.0	0.455	8.0	LOS A	3.0	21.0	0.46	0.30	47.8
2	T1	485	2.0	0.455	8.0	LOS A	3.0	21.0	0.46	0.30	50.8
3	R2	24	2.0	0.455	8.0	LOS A	3.0	21.0	0.46	0.30	46.5
Approach		524	2.0	0.455	8.0	LOS A	3.0	21.0	0.46	0.30	50.5
East: Bobolink Ridge											
4	L2	22	0.0	0.117	5.8	LOS A	0.5	3.4	0.56	0.50	48.1
5	T1	6	0.0	0.117	5.8	LOS A	0.5	3.4	0.56	0.50	45.1
6	R2	63	0.0	0.117	5.8	LOS A	0.5	3.4	0.56	0.50	47.1
Approach		91	0.0	0.117	5.8	LOS A	0.5	3.4	0.56	0.50	47.2
North: Robert Grand Avenue											
7	L2	97	2.0	0.558	9.1	LOS A	4.8	34.4	0.28	0.11	46.8
8	T1	563	2.0	0.558	9.1	LOS A	4.8	34.4	0.28	0.11	49.7
9	R2	65	2.0	0.558	9.1	LOS A	4.8	34.4	0.28	0.11	45.6
Approach		725	2.0	0.558	9.1	LOS A	4.8	34.4	0.28	0.11	48.9
West: Bobolink Ridge											
10	L2	53	2.0	0.135	6.9	LOS A	0.5	3.8	0.61	0.59	46.5
11	T1	9	2.0	0.135	6.9	LOS A	0.5	3.8	0.61	0.59	43.8
12	R2	29	2.0	0.135	6.9	LOS A	0.5	3.8	0.61	0.59	45.6
Approach		91	2.0	0.135	6.9	LOS A	0.5	3.8	0.61	0.59	45.9
All Vehicles		1431	1.9	0.558	8.3	LOS A	4.8	34.4	0.39	0.24	49.1

Site Level of Service (LOS) Method: Delay & v/c (HCM 6). 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 and v/c ratio (degree of saturation) per movement.
LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 6).
Roundabout Capacity Model: US HCM 6.
HCM Delay Formula option is used. Control Delay does not include Geometric Delay since Exclude Geometric Delay option applies.
Gap-Acceptance Capacity: Traditional M1.
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 103 [Robert Grant Avenue / Cope Drive AM]

2028 Future Background Conditions AM
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	89	2.0	0.511	10.6	LOS B	3.9	27.6	0.67	0.69	45.7
2	T1	349	2.0	0.511	10.6	LOS B	3.9	27.6	0.67	0.69	48.4
3	R2	30	2.0	0.511	10.6	LOS B	3.9	27.6	0.67	0.69	44.6
Approach		468	2.0	0.511	10.6	LOS B	3.9	27.6	0.67	0.69	47.6
East: Cope Drive											
4	L2	29	2.0	0.288	8.8	LOS A	1.3	8.9	0.66	0.66	46.5
5	T1	48	0.0	0.288	8.7	LOS A	1.3	8.9	0.66	0.66	43.8
6	R2	122	2.0	0.288	8.8	LOS A	1.3	8.9	0.66	0.66	45.6
Approach		199	1.5	0.288	8.7	LOS A	1.3	8.9	0.66	0.66	45.3
North: Robert Grant Avenue											
7	L2	113	2.0	0.455	8.0	LOS A	3.0	21.2	0.47	0.31	47.1
8	T1	232	2.0	0.455	8.0	LOS A	3.0	21.2	0.47	0.31	50.1
9	R2	181	0.0	0.455	8.0	LOS A	3.0	21.2	0.47	0.31	45.9
Approach		526	1.3	0.455	8.0	LOS A	3.0	21.2	0.47	0.31	47.9
West: Cope Drive											
10	L2	227	0.0	0.394	8.3	LOS A	2.1	14.9	0.60	0.53	45.7
11	T1	44	0.0	0.394	8.3	LOS A	2.1	14.9	0.60	0.53	43.1
12	R2	99	0.0	0.394	8.3	LOS A	2.1	14.9	0.60	0.53	44.8
Approach		370	0.0	0.394	8.3	LOS A	2.1	14.9	0.60	0.53	45.1
All Vehicles		1563	1.2	0.511	8.9	LOS A	3.9	27.6	0.59	0.52	46.8

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Roundabout LOS Method: Same as Sign Control.
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: US HCM 6.
HCM Delay Formula option is used. Control Delay does not include Geometric Delay since Exclude Geometric Delay option applies.
Gap-Acceptance Capacity: Traditional M1.
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 103 [Robert Grant Avenue / Cope Drive PM]

2028 Future Background Conditions PM
Roundabout

Movement Performance - Vehicles

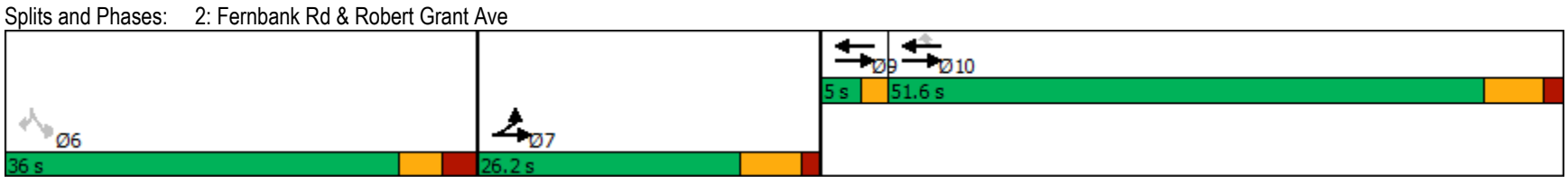
Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Robert Grant Avenue											
1	L2	86	2.0	0.398	7.7	LOS A	2.3	16.1	0.52	0.40	47.3
2	T1	299	2.0	0.398	7.7	LOS A	2.3	16.1	0.52	0.40	50.3
3	R2	31	2.0	0.398	7.7	LOS A	2.3	16.1	0.52	0.40	46.1
Approach		416	2.0	0.398	7.7	LOS A	2.3	16.1	0.52	0.40	49.3
East: Cope Drive											
4	L2	40	2.0	0.171	6.4	LOS A	0.7	5.1	0.57	0.53	47.5
5	T1	20	0.0	0.171	6.4	LOS A	0.7	5.1	0.57	0.53	44.7
6	R2	74	2.0	0.171	6.4	LOS A	0.7	5.1	0.57	0.53	46.5
Approach		134	1.7	0.171	6.4	LOS A	0.7	5.1	0.57	0.53	46.5
North: Robert Grant Avenue											
7	L2	71	2.0	0.521	9.0	LOS A	3.8	27.1	0.49	0.32	46.8
8	T1	344	2.0	0.521	9.0	LOS A	3.8	27.1	0.49	0.32	49.7
9	R2	199	0.0	0.521	8.9	LOS A	3.8	27.1	0.49	0.32	45.6
Approach		614	1.4	0.521	9.0	LOS A	3.8	27.1	0.49	0.32	48.0
West: Cope Drive											
10	L2	158	0.0	0.302	7.5	LOS A	1.5	10.2	0.59	0.55	46.1
11	T1	26	0.0	0.302	7.5	LOS A	1.5	10.2	0.59	0.55	43.5
12	R2	77	0.0	0.302	7.5	LOS A	1.5	10.2	0.59	0.55	45.2
Approach		261	0.0	0.302	7.5	LOS A	1.5	10.2	0.59	0.55	45.6
All Vehicles		1425	1.3	0.521	8.1	LOS A	3.8	27.1	0.53	0.40	47.7

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Roundabout LOS Method: Same as Sign Control.
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: US HCM 6.
HCM Delay Formula option is used. Control Delay does not include Geometric Delay since Exclude Geometric Delay option applies.
Gap-Acceptance Capacity: Traditional M1.
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Lane Group	EBL	EBT	WBT	WBR	SBL	SBR	Ø9
Lane Configurations							
Traffic Volume (vph)	28	314	196	157	161	26	
Future Volume (vph)	28	314	196	157	161	26	
Satd. Flow (prot)	1676	1765	1765	1500	1676	1500	
Flt Permitted	0.950				0.950		
Satd. Flow (perm)	1676	1765	1765	1500	1676	1500	
Satd. Flow (RTOR)				174		29	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	
Shared Lane Traffic (%)							
Lane Group Flow (vph)	31	349	218	174	179	29	
Turn Type	Prot	NA	NA	custom	Perm	Perm	
Protected Phases	7	9 7 10	9 10				9
Permitted Phases				10	6	6	
Minimum Initial (s)	5.0			5.0	5.0	5.0	2.0
Minimum Split (s)	11.2			23.2	30.2	30.2	5.0
Total Split (s)	26.2			51.6	36.0	36.0	5.0
Total Split (%)	22.1%			43.4%	30.3%	30.3%	4%
Maximum Green (s)	20.0			45.4	30.0	30.0	3.0
Yellow Time (s)	4.6			4.6	3.3	3.3	2.0
All-Red Time (s)	1.6			1.6	2.7	2.7	0.0
Total Lost Time (s)	6.2			6.2	6.0	6.0	
Lead/Lag				Lag			Lead
Lead-Lag Optimize?				Yes			Yes
Vehicle Extension (s)	3.0			3.0	3.0	3.0	3.0
Recall Mode	None			None	Max	Max	None
Walk Time (s)				7.0	7.0	7.0	
Flash Dont Walk (s)				10.0	17.0	17.0	
Pedestrian Calls (#/hr)				5	5	5	
Act Effct Green (s)	14.9	43.2	22.1	12.8	30.3	30.3	
Actuated g/C Ratio	0.18	0.53	0.27	0.16	0.37	0.37	
v/c Ratio	0.10	0.37	0.46	0.46	0.29	0.05	
Control Delay	29.8	12.1	28.3	9.3	21.8	8.3	
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	
Total Delay	29.8	12.1	28.3	9.3	21.8	8.3	
LOS	C	B	C	A	C	A	
Approach Delay		13.6	19.9		19.9		
Approach LOS		B	B		B		

Intersection Summary	
Cycle Length: 118.8	
Actuated Cycle Length: 81.6	
Control Type: Actuated-Uncoordinated	
Maximum v/c Ratio: 0.46	
Intersection Signal Delay: 17.4	Intersection LOS: B
Intersection Capacity Utilization 38.0%	ICU Level of Service A
Analysis Period (min) 15	

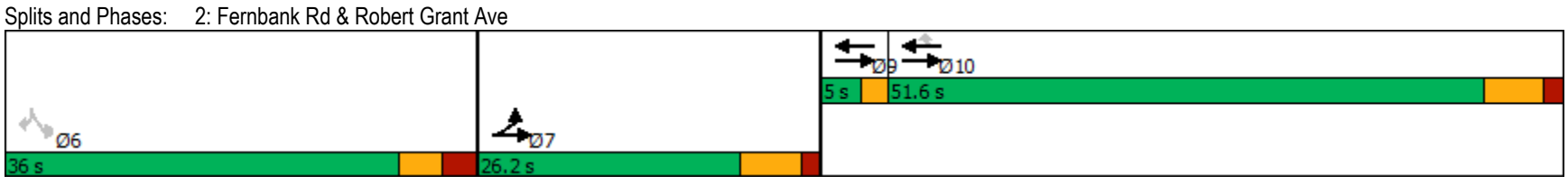
Splits and Phases: 2: Fernbank Rd & Robert Grant Ave



Lane Group	EBL	EBT	WBT	WBR	SBL	SBR	Ø9
Lane Configurations							
Traffic Volume (vph)	17	260	441	176	173	25	
Future Volume (vph)	17	260	441	176	173	25	
Satd. Flow (prot)	1676	1765	1765	1500	1676	1500	
Flt Permitted	0.950				0.950		
Satd. Flow (perm)	1676	1765	1765	1500	1676	1500	
Satd. Flow (RTOR)				196		28	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	
Shared Lane Traffic (%)							
Lane Group Flow (vph)	19	289	490	196	192	28	
Turn Type	Prot	NA	NA	custom	Perm	Perm	
Protected Phases	7	9 7 10	9 10				9
Permitted Phases				10	6	6	
Minimum Initial (s)	5.0			5.0	5.0	5.0	2.0
Minimum Split (s)	11.2			23.2	30.2	30.2	5.0
Total Split (s)	26.2			51.6	36.0	36.0	5.0
Total Split (%)	22.1%			43.4%	30.3%	30.3%	4%
Maximum Green (s)	20.0			45.4	30.0	30.0	3.0
Yellow Time (s)	4.6			4.6	3.3	3.3	2.0
All-Red Time (s)	1.6			1.6	2.7	2.7	0.0
Total Lost Time (s)	6.2			6.2	6.0	6.0	
Lead/Lag				Lag			Lead
Lead-Lag Optimize?				Yes			Yes
Vehicle Extension (s)	3.0			3.0	3.0	3.0	3.0
Recall Mode	None			None	Max	Max	None
Walk Time (s)				7.0	7.0	7.0	
Flash Dont Walk (s)				10.0	17.0	17.0	
Pedestrian Calls (#/hr)				5	5	5	
Act Effct Green (s)	12.9	58.1	38.9	29.5	30.5	30.5	
Actuated g/C Ratio	0.13	0.60	0.40	0.31	0.32	0.32	
v/c Ratio	0.08	0.27	0.69	0.33	0.36	0.06	
Control Delay	41.1	9.4	29.4	4.9	31.3	11.4	
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	
Total Delay	41.1	9.4	29.4	4.9	31.3	11.4	
LOS	D	A	C	A	C	B	
Approach Delay		11.4	22.4		28.7		
Approach LOS		B	C		C		

Intersection Summary	
Cycle Length: 118.8	
Actuated Cycle Length: 96.7	
Control Type: Actuated-Uncoordinated	
Maximum v/c Ratio: 0.69	
Intersection Signal Delay: 20.8	Intersection LOS: C
Intersection Capacity Utilization 43.0%	ICU Level of Service A
Analysis Period (min) 15	

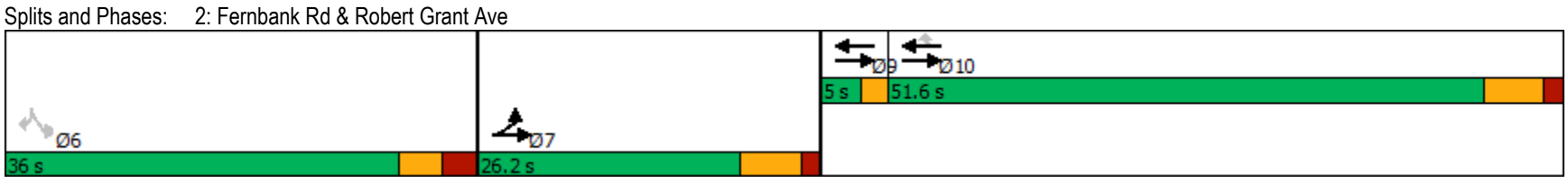
Splits and Phases: 2: Fernbank Rd & Robert Grant Ave



Lane Group	EBL	EBT	WBT	WBR	SBL	SBR	Ø9
Lane Configurations							
Traffic Volume (vph)	38	320	200	173	172	32	
Future Volume (vph)	38	320	200	173	172	32	
Satd. Flow (prot)	1676	1765	1765	1500	1676	1500	
Flt Permitted	0.950				0.950		
Satd. Flow (perm)	1676	1765	1765	1500	1676	1500	
Satd. Flow (RTOR)				173		32	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	
Shared Lane Traffic (%)							
Lane Group Flow (vph)	38	320	200	173	172	32	
Turn Type	Prot	NA	NA	custom	Perm	Perm	
Protected Phases	7	9 7 10	9 10				9
Permitted Phases				10	6	6	
Total Split (s)	26.2			51.6	36.0	36.0	5.0
Total Lost Time (s)	6.2			6.2	6.0	6.0	
Act Effct Green (s)	13.9	41.2	21.1	11.8	30.2	30.2	
Actuated g/C Ratio	0.17	0.52	0.27	0.15	0.38	0.38	
v/c Ratio	0.13	0.35	0.43	0.47	0.27	0.05	
Control Delay	29.9	12.1	27.6	9.7	20.4	7.8	
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	
Total Delay	29.9	12.1	27.6	9.7	20.4	7.8	
LOS	C	B	C	A	C	A	
Approach Delay		14.0	19.3		18.4		
Approach LOS		B	B		B		

Intersection Summary	
Cycle Length: 118.8	
Actuated Cycle Length: 79.5	
Control Type: Actuated-Uncoordinated	
Maximum v/c Ratio: 0.47	
Intersection Signal Delay: 17.1	Intersection LOS: B
Intersection Capacity Utilization 38.8%	ICU Level of Service A
Analysis Period (min) 15	

Splits and Phases: 2: Fernbank Rd & Robert Grant Ave



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Traffic Volume (vph)	0	3	6	21	0	25	5	220	26	19	126	0
Future Volume (vph)	0	3	6	21	0	25	5	220	26	19	126	0
Satd. Flow (prot)	0	1606	0	0	1600	0	0	1738	0	0	1752	0
Flt Permitted					0.978			0.999			0.993	
Satd. Flow (perm)	0	1606	0	0	1600	0	0	1738	0	0	1752	0
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	9	0	0	46	0	0	251	0	0	145	0
Sign Control		Yield			Yield			Yield			Yield	

Intersection Summary			
Control Type: Roundabout			
Intersection Capacity Utilization 34.3%		ICU Level of Service A	
Analysis Period (min) 15			

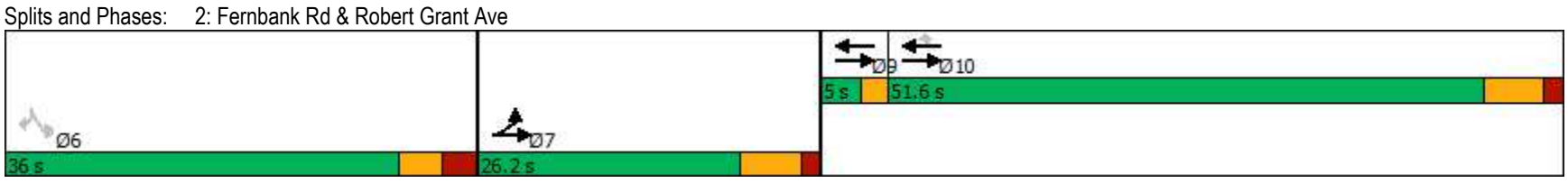
Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	0	0	0	0	0	0
Future Volume (vph)	0	0	0	0	0	0
Satd. Flow (prot)	0	1765	1765	0	1765	0
Flt Permitted						
Satd. Flow (perm)	0	1765	1765	0	1765	0
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Shared Lane Traffic (%)						
Lane Group Flow (vph)	0	0	0	0	0	0
Sign Control		Stop	Stop		Stop	

Intersection Summary			
Control Type: Unsignalized			
Intersection Capacity Utilization 0.0%		ICU Level of Service A	
Analysis Period (min) 15			

Lane Group	EBL	EBT	WBT	WBR	SBL	SBR	Ø9
Lane Configurations							
Traffic Volume (vph)	21	265	450	186	185	32	
Future Volume (vph)	21	265	450	186	185	32	
Satd. Flow (prot)	1676	1765	1765	1500	1676	1500	
Flt Permitted	0.950				0.950		
Satd. Flow (perm)	1676	1765	1765	1500	1676	1500	
Satd. Flow (RTOR)				186		32	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	
Shared Lane Traffic (%)							
Lane Group Flow (vph)	21	265	450	186	185	32	
Turn Type	Prot	NA	NA	custom	Perm	Perm	
Protected Phases	7	9 7 10	9 10				9
Permitted Phases				10	6	6	
Total Split (s)	26.2			51.6	36.0	36.0	5.0
Total Lost Time (s)	6.2			6.2	6.0	6.0	
Act Effct Green (s)	12.2	54.1	35.6	26.3	30.4	30.4	
Actuated g/C Ratio	0.13	0.58	0.38	0.28	0.33	0.33	
v/c Ratio	0.10	0.26	0.66	0.33	0.34	0.06	
Control Delay	39.6	9.6	28.6	5.3	28.6	10.2	
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	
Total Delay	39.6	9.6	28.6	5.3	28.6	10.2	
LOS	D	A	C	A	C	B	
Approach Delay		11.8	21.8		25.9		
Approach LOS		B	C		C		

Intersection Summary	
Cycle Length: 118.8	
Actuated Cycle Length: 92.6	
Control Type: Actuated-Uncoordinated	
Maximum v/c Ratio: 0.66	
Intersection Signal Delay: 20.1	Intersection LOS: C
Intersection Capacity Utilization 44.2%	ICU Level of Service A
Analysis Period (min) 15	

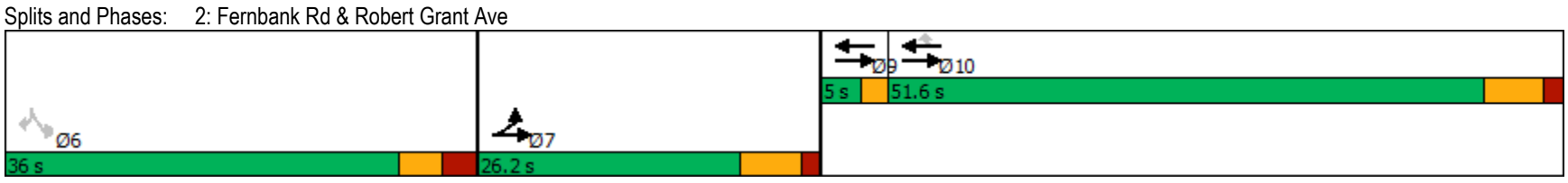
Splits and Phases: 2: Fernbank Rd & Robert Grant Ave



Lane Group	EBL	EBT	WBT	WBR	SBL	SBR	Ø9
Lane Configurations							
Traffic Volume (vph)	43	320	200	195	187	36	
Future Volume (vph)	43	320	200	195	187	36	
Satd. Flow (prot)	1676	1765	1765	1500	1676	1500	
Flt Permitted	0.950				0.950		
Satd. Flow (perm)	1676	1765	1765	1500	1676	1500	
Satd. Flow (RTOR)				195		36	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	
Shared Lane Traffic (%)							
Lane Group Flow (vph)	43	320	200	195	187	36	
Turn Type	Prot	NA	NA	custom	Perm	Perm	
Protected Phases	7	9 7 10	9 10				9
Permitted Phases				10	6	6	
Total Split (s)	26.2			51.6	36.0	36.0	5.0
Total Lost Time (s)	6.2			6.2	6.0	6.0	
Act Effct Green (s)	13.9	41.2	21.1	11.8	30.2	30.2	
Actuated g/C Ratio	0.17	0.52	0.27	0.15	0.38	0.38	
v/c Ratio	0.15	0.35	0.43	0.50	0.29	0.06	
Control Delay	30.2	12.1	27.6	9.7	20.7	7.4	
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	
Total Delay	30.2	12.1	27.6	9.7	20.7	7.4	
LOS	C	B	C	A	C	A	
Approach Delay		14.3	18.8		18.5		
Approach LOS		B	B		B		

Intersection Summary	
Cycle Length: 118.8	
Actuated Cycle Length: 79.5	
Control Type: Actuated-Uncoordinated	
Maximum v/c Ratio: 0.50	
Intersection Signal Delay: 17.0	Intersection LOS: B
Intersection Capacity Utilization 39.7%	ICU Level of Service A
Analysis Period (min) 15	

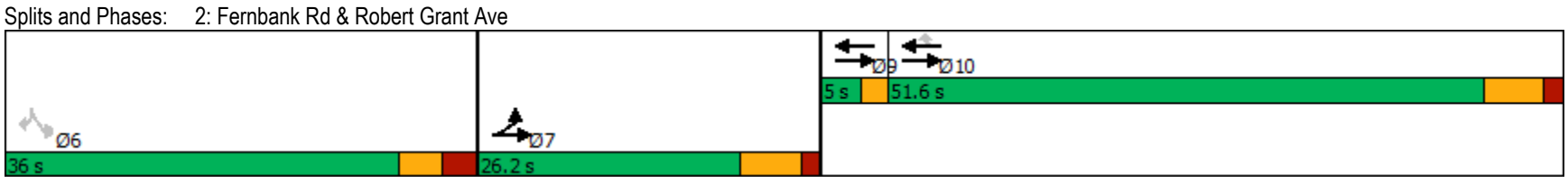
Splits and Phases: 2: Fernbank Rd & Robert Grant Ave

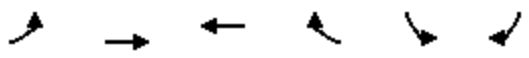


Lane Group	EBL	EBT	WBT	WBR	SBL	SBR	Ø9
Lane Configurations							
Traffic Volume (vph)	23	265	450	194	197	35	
Future Volume (vph)	23	265	450	194	197	35	
Satd. Flow (prot)	1676	1765	1765	1500	1676	1500	
Flt Permitted	0.950				0.950		
Satd. Flow (perm)	1676	1765	1765	1500	1676	1500	
Satd. Flow (RTOR)				194		35	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	
Shared Lane Traffic (%)							
Lane Group Flow (vph)	23	265	450	194	197	35	
Turn Type	Prot	NA	NA	custom	Perm	Perm	
Protected Phases	7	9 7 10	9 10				9
Permitted Phases				10	6	6	
Total Split (s)	26.2			51.6	36.0	36.0	5.0
Total Lost Time (s)	6.2			6.2	6.0	6.0	
Act Effct Green (s)	12.2	54.1	35.6	26.3	30.4	30.4	
Actuated g/C Ratio	0.13	0.58	0.38	0.28	0.33	0.33	
v/c Ratio	0.10	0.26	0.66	0.34	0.36	0.07	
Control Delay	39.6	9.6	28.6	5.3	28.9	9.9	
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	
Total Delay	39.6	9.6	28.6	5.3	28.9	9.9	
LOS	D	A	C	A	C	A	
Approach Delay		12.0	21.6		26.0		
Approach LOS		B	C		C		

Intersection Summary	
Cycle Length: 118.8	
Actuated Cycle Length: 92.6	
Control Type: Actuated-Uncoordinated	
Maximum v/c Ratio: 0.66	
Intersection Signal Delay: 20.1	Intersection LOS: C
Intersection Capacity Utilization 44.9%	ICU Level of Service A
Analysis Period (min) 15	

Splits and Phases: 2: Fernbank Rd & Robert Grant Ave

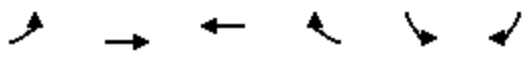




Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	0	0	0	107	6	0
Future Volume (Veh/h)	0	0	0	107	6	0
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	0	0	0	107	6	0
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	107				54	54
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	107				54	54
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	100				99	100
cM capacity (veh/h)	1484				955	1014

Direction, Lane #	EB 1	WB 1	SB 1
Volume Total	0	107	6
Volume Left	0	0	6
Volume Right	0	107	0
cSH	1700	1700	955
Volume to Capacity	0.00	0.06	0.01
Queue Length 95th (m)	0.0	0.0	0.2
Control Delay (s)	0.0	0.0	8.8
Lane LOS			A
Approach Delay (s)	0.0	0.0	8.8
Approach LOS			A

Intersection Summary			
Average Delay	0.5		
Intersection Capacity Utilization	17.0%	ICU Level of Service	A
Analysis Period (min)	15		



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	0	0	0	45	5	0
Future Volume (Veh/h)	0	0	0	45	5	0
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	0	0	0	45	5	0
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	45				22	22
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	45				22	22
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	100				99	100
cM capacity (veh/h)	1563				994	1054

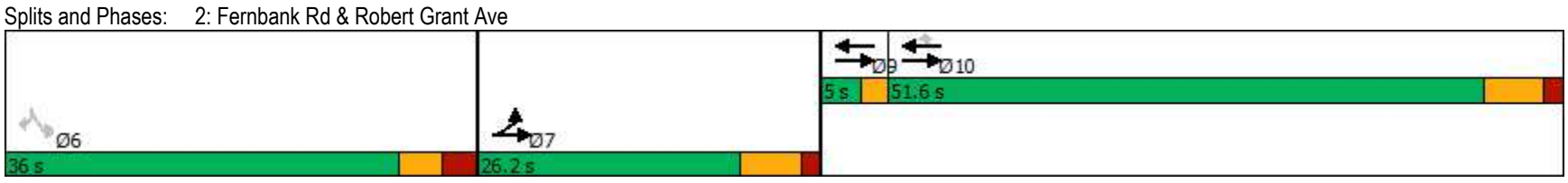
Direction, Lane #	EB 1	WB 1	SB 1
Volume Total	0	45	5
Volume Left	0	0	5
Volume Right	0	45	0
cSH	1700	1700	994
Volume to Capacity	0.00	0.03	0.01
Queue Length 95th (m)	0.0	0.0	0.1
Control Delay (s)	0.0	0.0	8.6
Lane LOS			A
Approach Delay (s)	0.0	0.0	8.6
Approach LOS			A

Intersection Summary			
Average Delay	0.9		
Intersection Capacity Utilization	13.3%	ICU Level of Service	A
Analysis Period (min)	15		

Lane Group	EBL	EBT	WBT	WBR	SBL	SBR	Ø9
Lane Configurations							
Traffic Volume (vph)	74	479	324	334	404	75	
Future Volume (vph)	74	479	324	334	404	75	
Satd. Flow (prot)	1676	1765	1765	1500	1676	1500	
Flt Permitted	0.950				0.950		
Satd. Flow (perm)	1676	1765	1765	1500	1676	1500	
Satd. Flow (RTOR)				334		75	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	
Shared Lane Traffic (%)							
Lane Group Flow (vph)	74	479	324	334	404	75	
Turn Type	Prot	NA	NA	custom	Perm	Perm	
Protected Phases	7	9 7 10	9 10				9
Permitted Phases				10	6	6	
Total Split (s)	26.2			51.6	36.0	36.0	5.0
Total Lost Time (s)	6.2			6.2	6.0	6.0	
Act Effct Green (s)	18.1	54.7	30.3	21.0	30.3	30.3	
Actuated g/C Ratio	0.19	0.59	0.33	0.23	0.33	0.33	
v/c Ratio	0.23	0.46	0.56	0.56	0.74	0.14	
Control Delay	35.7	12.2	29.9	7.2	39.9	7.5	
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	
Total Delay	35.7	12.2	29.9	7.2	39.9	7.5	
LOS	D	B	C	A	D	A	
Approach Delay		15.3	18.4		34.8		
Approach LOS		B	B		C		

Intersection Summary	
Cycle Length: 118.8	
Actuated Cycle Length: 93.1	
Control Type: Actuated-Uncoordinated	
Maximum v/c Ratio: 0.74	
Intersection Signal Delay: 22.0	Intersection LOS: C
Intersection Capacity Utilization 59.5%	ICU Level of Service B
Analysis Period (min) 15	

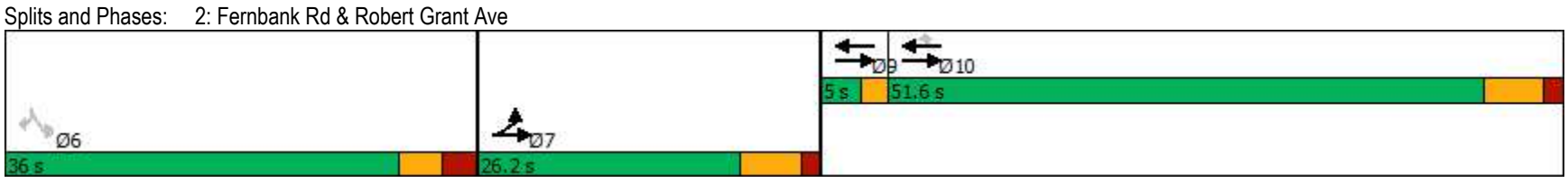
Splits and Phases: 2: Fernbank Rd & Robert Grant Ave



Lane Group	EBL	EBT	WBT	WBR	SBL	SBR	Ø9
Lane Configurations							
Traffic Volume (vph)	61	384	628	439	380	66	
Future Volume (vph)	61	384	628	439	380	66	
Satd. Flow (prot)	1676	1765	1765	1500	1676	1500	
Flt Permitted	0.950				0.950		
Satd. Flow (perm)	1676	1765	1765	1500	1676	1500	
Satd. Flow (RTOR)				439		66	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	
Shared Lane Traffic (%)							
Lane Group Flow (vph)	61	384	628	439	380	66	
Turn Type	Prot	NA	NA	custom	Perm	Perm	
Protected Phases	7	9 7 10	9 10				9
Permitted Phases				10	6	6	
Total Split (s)	26.2			51.6	36.0	36.0	5.0
Total Lost Time (s)	6.2			6.2	6.0	6.0	
Act Effct Green (s)	15.8	70.6	48.6	39.3	30.3	30.3	
Actuated g/C Ratio	0.14	0.65	0.45	0.36	0.28	0.28	
v/c Ratio	0.25	0.34	0.80	0.53	0.82	0.14	
Control Delay	45.9	9.2	35.1	4.9	54.3	9.2	
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	
Total Delay	45.9	9.2	35.1	4.9	54.3	9.2	
LOS	D	A	D	A	D	A	
Approach Delay		14.3	22.7		47.6		
Approach LOS		B	C		D		

Intersection Summary	
Cycle Length: 118.8	
Actuated Cycle Length: 109	
Control Type: Actuated-Uncoordinated	
Maximum v/c Ratio: 0.82	
Intersection Signal Delay: 26.4	Intersection LOS: C
Intersection Capacity Utilization 74.8%	ICU Level of Service D
Analysis Period (min) 15	

Splits and Phases: 2: Fernbank Rd & Robert Grant Ave



HCM Unsignalized Intersection Capacity Analysis
14: Cope Dr & Dagenham St

09-07-2022

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		✣			✣			✣			✣	
Traffic Volume (veh/h)	0	34	0	4	2	1	0	3	57	11	1	0
Future Volume (Veh/h)	0	34	0	4	2	1	0	3	57	11	1	0
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	0	34	0	4	2	1	0	3	57	11	1	0
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	3			34			45	45	34	103	44	2
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	3			34			45	45	34	103	44	2
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	100			100			100	100	95	99	100	100
cM capacity (veh/h)	1619			1578			954	845	1039	825	845	1082

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	34	7	60	12
Volume Left	0	4	0	11
Volume Right	0	1	57	0
cSH	1619	1578	1027	827
Volume to Capacity	0.00	0.00	0.06	0.01
Queue Length 95th (m)	0.0	0.1	1.5	0.4
Control Delay (s)	0.0	4.2	8.7	9.4
Lane LOS		A	A	A
Approach Delay (s)	0.0	4.2	8.7	9.4
Approach LOS			A	A

Intersection Summary			
Average Delay	5.9		
Intersection Capacity Utilization	18.0%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Traffic Volume (veh/h)	0	27	0	56	34	10	0	2	46	9	0	0
Future Volume (Veh/h)	0	27	0	56	34	10	0	2	46	9	0	0
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	0	27	0	56	34	10	0	2	46	9	0	0
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	44			27			178	183	27	225	178	39
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	44			27			178	183	27	225	178	39
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	100			96			100	100	96	99	100	100
cM capacity (veh/h)	1564			1587			763	686	1048	678	690	1033

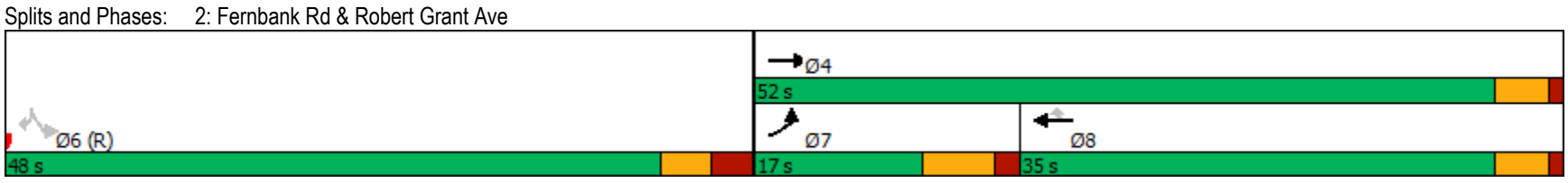
Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	27	100	48	9
Volume Left	0	56	0	9
Volume Right	0	10	46	0
cSH	1564	1587	1026	678
Volume to Capacity	0.00	0.04	0.05	0.01
Queue Length 95th (m)	0.0	0.9	1.2	0.3
Control Delay (s)	0.0	4.2	8.7	10.4
Lane LOS		A	A	B
Approach Delay (s)	0.0	4.2	8.7	10.4
Approach LOS			A	B

Intersection Summary			
Average Delay	5.1		
Intersection Capacity Utilization	26.3%	ICU Level of Service	A
Analysis Period (min)	15		

Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	79	479	324	356	419	79
Future Volume (vph)	79	479	324	356	419	79
Satd. Flow (prot)	1676	1765	1765	1500	1676	1500
Flt Permitted	0.950				0.950	
Satd. Flow (perm)	1676	1765	1765	1500	1676	1500
Satd. Flow (RTOR)				356		79
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Shared Lane Traffic (%)						
Lane Group Flow (vph)	79	479	324	356	419	79
Turn Type	Prot	NA	NA	Perm	Perm	Perm
Protected Phases	7	4	8			
Permitted Phases				8	6	6
Total Split (s)	17.0	52.0	35.0	35.0	48.0	48.0
Total Lost Time (s)	6.2	4.5	4.5	4.5	6.0	6.0
Act Effct Green (s)	9.2	38.1	25.1	25.1	51.4	51.4
Actuated g/C Ratio	0.09	0.38	0.25	0.25	0.51	0.51
v/c Ratio	0.51	0.71	0.73	0.55	0.49	0.10
Control Delay	54.7	31.6	44.4	6.6	20.4	4.4
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	54.7	31.6	44.4	6.6	20.4	4.4
LOS	D	C	D	A	C	A
Approach Delay		34.9	24.6		17.8	
Approach LOS		C	C		B	

Intersection Summary	
Cycle Length: 100	
Actuated Cycle Length: 100	
Offset: 0 (0%), Referenced to phase 2: and 6:SBL, Start of Green	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.73	
Intersection Signal Delay: 26.0	Intersection LOS: C
Intersection Capacity Utilization 61.0%	ICU Level of Service B
Analysis Period (min) 15	

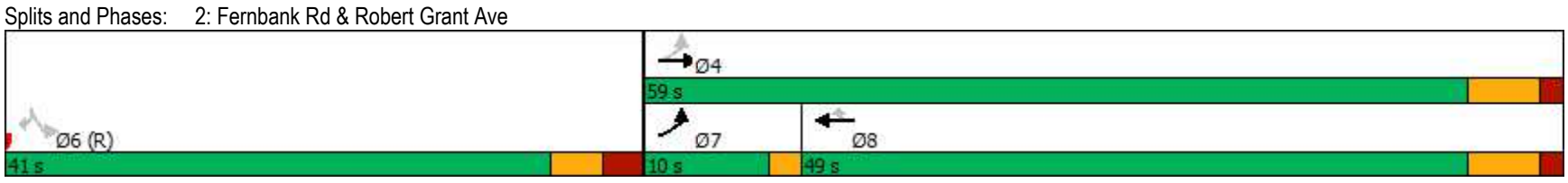
Splits and Phases: 2: Fernbank Rd & Robert Grant Ave



Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	63	384	628	447	392	69
Future Volume (vph)	63	384	628	447	392	69
Satd. Flow (prot)	1676	1765	1765	1500	1676	1500
Flt Permitted	0.139				0.950	
Satd. Flow (perm)	245	1765	1765	1500	1676	1500
Satd. Flow (RTOR)				447		69
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Shared Lane Traffic (%)						
Lane Group Flow (vph)	63	384	628	447	392	69
Turn Type	pm+pt	NA	NA	Perm	Perm	Perm
Protected Phases	7	4	8			
Permitted Phases	4			8	6	6
Total Split (s)	10.0	59.0	49.0	49.0	41.0	41.0
Total Lost Time (s)	2.0	6.2	6.2	6.2	6.0	6.0
Act Effct Green (s)	51.8	47.6	39.7	39.7	40.2	40.2
Actuated g/C Ratio	0.52	0.48	0.40	0.40	0.40	0.40
v/c Ratio	0.27	0.46	0.90	0.52	0.58	0.11
Control Delay	13.0	18.6	44.8	4.1	29.6	6.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	13.0	18.6	44.8	4.1	29.6	6.1
LOS	B	B	D	A	C	A
Approach Delay		17.8	27.9		26.1	
Approach LOS		B	C		C	

Intersection Summary	
Cycle Length: 100	
Actuated Cycle Length: 100	
Offset: 0 (0%), Referenced to phase 2: and 6:SBL, Start of Green	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.90	
Intersection Signal Delay: 25.2	Intersection LOS: C
Intersection Capacity Utilization 75.5%	ICU Level of Service D
Analysis Period (min) 15	

Splits and Phases: 2: Fernbank Rd & Robert Grant Ave



HCM Unsignalized Intersection Capacity Analysis
14: Cope Dr & Dagenham St

09-07-2022

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		✣			✣			✣			✣	
Traffic Volume (veh/h)	0	34	0	4	2	108	0	3	57	17	1	0
Future Volume (Veh/h)	0	34	0	4	2	108	0	3	57	17	1	0
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	0	34	0	4	2	108	0	3	57	17	1	0
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	110			34			98	152	34	156	98	56
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	110			34			98	152	34	156	98	56
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	100			100			100	100	95	98	100	100
cM capacity (veh/h)	1480			1578			881	738	1039	762	790	1011

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	34	114	60	18
Volume Left	0	4	0	17
Volume Right	0	108	57	0
cSH	1480	1578	1018	763
Volume to Capacity	0.00	0.00	0.06	0.02
Queue Length 95th (m)	0.0	0.1	1.5	0.6
Control Delay (s)	0.0	0.3	8.8	9.8
Lane LOS		A	A	A
Approach Delay (s)	0.0	0.3	8.8	9.8
Approach LOS			A	A

Intersection Summary			
Average Delay	3.2		
Intersection Capacity Utilization	25.5%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Traffic Volume (veh/h)	0	27	0	56	34	55	0	2	46	14	0	0
Future Volume (Veh/h)	0	27	0	56	34	55	0	2	46	14	0	0
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	0	27	0	56	34	55	0	2	46	14	0	0
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	89			27			200	228	27	248	200	62
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	89			27			200	228	27	248	200	62
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	100			96			100	100	96	98	100	100
cM capacity (veh/h)	1506			1587			738	648	1048	655	671	1004

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	27	145	48	14
Volume Left	0	56	0	14
Volume Right	0	55	46	0
cSH	1506	1587	1022	655
Volume to Capacity	0.00	0.04	0.05	0.02
Queue Length 95th (m)	0.0	0.9	1.2	0.5
Control Delay (s)	0.0	3.0	8.7	10.6
Lane LOS		A	A	B
Approach Delay (s)	0.0	3.0	8.7	10.6
Approach LOS			A	B

Intersection Summary			
Average Delay	4.3		
Intersection Capacity Utilization	29.5%	ICU Level of Service	A
Analysis Period (min)	15		