Fresh Towns Phase 3

2795 Baseline Road

Transportation Impact Assessment (TIA) Report

Presented to:

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APPENDIX MATERIAL

1.0 INTRODUCTION

The purpose of this *Transportation Impact Assessment (TIA)* report is to investigate the traffic impacts associated with the proposed Phase 3 Fresh Towns development located at the north-east corner of Baseline Road / Morrison Drive. This TIA report complied with the City of Ottawa Transportation Impact Assessment Guidelines (June 2017). The screening form assessment indicated that the development does not meet trip generation triggers.

2.0 SCOPING

2.1 EXISTING AND PLANNED CONDITIONS

2.1.1 Proposed Development

Exhibit 2.1 illustrates the proposed 32-unit townhome development located at the north-east corner of Baseline Road / Morrison Drive intersection. The number of units remain to be confirmed through the study process. In terms of site accesses, the current site plan illustrates:

- A right-in/right-out access from Baseline Road; and
- An exit access for emergency vehicles from Morrison Drive (~25 m from Baseline Road).

The following provides a brief description of the proposed development:

- **Existing Land Use Permitted**: The existing land is currently zoned as Residential Fifth Density Zone (R5A) Zone[1].
- **Relevant Planning Regulations**: The application will be submitted as a site plan control application.
- **Estimated Date of Occupancy**: The development is expected to be build-out by 2020 horizon year.
- **Planned Phasing of Development**: For the purpose of this traffic study, the site is anticipated to be build-out in a single phase.
- **Number of Parking Spaces**: Private garage parking for the 32 units for residents (32 spaces/garages).

1 City of Ottawa Zoning By-law 2008-250

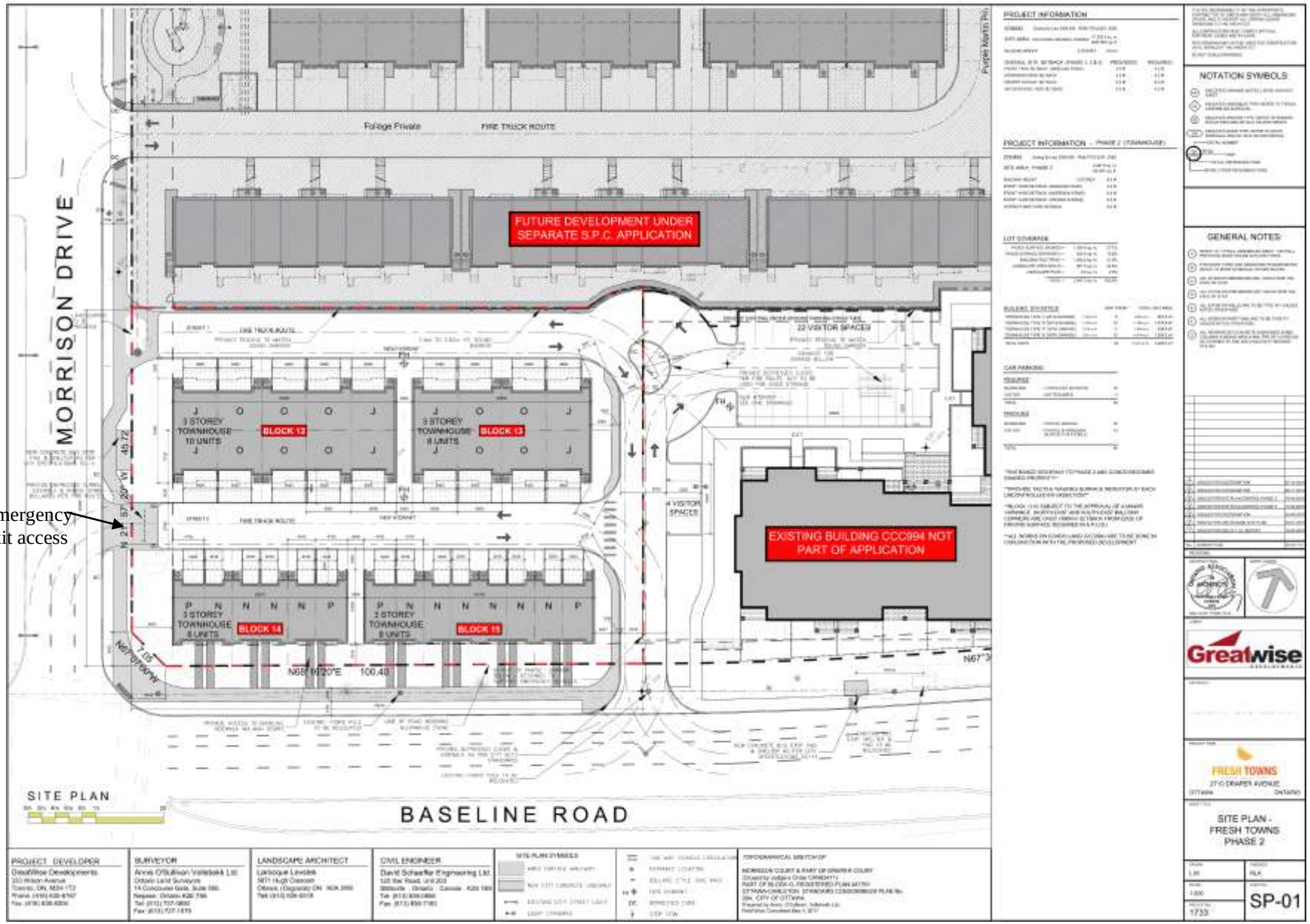


Exhibit 2.1: Proposed Site Plan (Updated: December 6th, 2019)

2.1.2 Existing Conditions

The area within the vicinity of the proposed site is characterized by a combination of residential, institutional, and business park development.

Study Area Roadways

The following provides an overview of the roadways supporting the proposed development:

- ***Baseline Road*** is an arterial roadway provides for 4 east-west through lanes (2 lanes per direction of travel separated by a median) within the City of Ottawa and is signed with a posted speed of 70 km/hr in the vicinity of the site. Baseline Road is defined as an *arterial* roadway within the City of Ottawa's Transportation Master Plan. Pedestrian facilities include both sidewalks and dedicated bike lanes on both sides of the roadway.
- ***Morrison Drive*** is a defined as a *collector* road within the City of Ottawa intersecting Baseline Road at its southern terminus and terminating at Greenbank Road. Morrison Drive does not have a posted speed within the vicinity of the site.
- ***Draper Avenue*** is a *local* road within the City of Ottawa jurisdiction, intersecting Morrison Drive approximately 150 m north of Baseline Road and intersecting (and terminating) again at the northern end of Morrison Drive approximately 180 m west of Greenbank Road. Draper Avenue provides access to the two schools in addition to the adjacent residential developments. Draper Avenue does not have a posted speed within the vicinity of the site.

Existing Intersections

Baseline Road / Morrison Drive: This traffic signal controlled intersections accomodates 2-lanes of through travel in each the west and east direction with auxiliary lanes (EB left-turn, WB right-turn). The north leg is configured as one lane of travel in each direction. The intersection accommodates bike lanes in the east and west direction.

Morrison Drive / Draper Avenue: This all-way stop controlled intersection accomodates single lane of travel in each direction with no auxiliary lanes.

Existing Driveways

The following lists the existing driveways within proposed site:

- *Existing Baseline Road Right-in/Right-out* located approximately 75m east of Morrison Drive. This access serves the visitor parking for the existing 2785 Baseline Road building (CCC 994).
- *Draper Avenue Access* located approximately 140m east of Morrison Drive. This access serves the tenants of 2785 Baseline Road building (CCC 994).

Existing Area Traffic Management Measures

- There are no traffic management measures observed along Morrison Drive and Draper Avenue (aside from the all-way stop control at Morrison/Draper) within the vicinity of the proposed development.

Existing Transit Provisions

Exhibit 2.2 illustrates the transit provision service routes within the study area. Bus stops with shelter are located along Baseline Road 120m east of Morrison Drive in the vicinity of Guthrie Street. Bus stops also exists along Morrison Drive north of Baseline Road. A review of the most recent route maps and timetables indicated the following:

- *Route 88* runs adjacent to the proposed site and connects to Hurdman and Terry Fox stations. (This route connects to Baseline Station, Confederation station and the Transitway at Billings Bridge Shopping Centre). The transit frequency is approximately every 10 minutes during the peak periods of travel demand; and
- *Route 152* provides service between Lincoln Fields and Moodie running through the study area adjacent to the proposed site along Morrison Drive. Frequencies of approximately 15 minutes and 30 minutes occur during the peak periods of travel demand.

Exhibit 2.2: Existing Transit Provisions

Existing Cycling Facilities

A review of the Summer cycling activity along Baseline Road indicated that:

- 15 *cyclists* were observed in the westbound direction during the morning period and;
- 22 cyclists were observed in the eastbound direction during the afternoon peak period.

The City of Ottawa's Transportation Master Plan indicates Baseline Road is a spine route. Currently, bicycle lanes are provided alongside the eastbound and westbound lanes of Baseline Road (west of Greenbank Road) to facilitate cycling activities.

Existing Pedestrian Facilities

Table 2.1 depicts the pedestrian activities within the study area during the peak periods of travel demand. The following provides a summary of the table:

- *Baseline Road / Morrison Drive*: The highest pedestrian activity was observed along the north leg of the intersection with 24 pedestrians crossing during the afternoon peak period.
- *Morrison Drive / Draper Avenue*: The highest pedestrian activity was observed along the west leg of the intersection with 24 pedestrians crossing during the afternoon peak period.

Table 2.1: Existing Pedestrian Activities

Intersections	***AM Peak Period***				***PM Peak Period***			
	North Leg	South Leg	East Leg	West Leg	North Leg	South Leg	East Leg	West Leg
Baseline/Morrison	10		7	7	**24**		4	11
Morrison/Draper	13	5	7	14	13	21	21	**24**

Sidewalks exists on both sides of Baseline Road and on the west side of Morrison Drive. A sidewalk is provided on the south side of Draper Avenue between Morrison Drive and the St. Paul High School east access. East of St. Paul High School, sidewalks are provided on both sides of the roadway.

Existing Collision Information

Five (5) year (January 1st, 2013 to December 31st, 2017) collision information were reviewed for the study area intersections:

- Baseline Road / Morrison Drive;
- Morrison Drive / Draper Avenue; and
- Mid-block along Morrison between Baseline Road and Draper Avenue.

The collision information provides the date and time of each collision, the environmental condition at the time of the collision, the type of collision (i.e. angle collision, rear-end), the level of damage involved, vehicle details (truck, passenger vehicle, etc.), vehicle path/maneuver characteristics and the number of pedestrians involved (in the collision).

The following provides a summary of the collisions:

- *Baseline Road / Morrison Drive*: A total of 11 collisions occurred at this intersection in the past 5 years and 55% (6) of collisions were rear-end collisions. Five out of the six rear end collisions occurred in the eastbound direction. Majority (91%) of the collisions resulted in property damage.
- *Morrison Drive / Draper Avenue*: A single collision occurred at this intersection in the past 5 years.
- *Mid-Block along Morrison Drive*: two mid-block collisions occurred in the past 5-years resulting in property damage.

None of the collisions reported in the past five years for the study area intersections involved pedestrians.

Existing Traffic Volumes

Recent traffic counts were obtained from the City of Ottawa for:

- Baseline Road / Morrison Drive (Wednesday October 26th, 2016).

Additional traffic counts were undertaken by Castleglenn staff at Morrison Drive and Draper Avenue intersection (Monday December 4th, 2017) during the morning and afternoon peak periods of travel demand.

Exhibit 2.3 illustrates the resulting existing traffic volumes at the study area intersections.

2.1.3 Planned Conditions

The City of Ottawa Transportation Master Plan (Map 5) was reviewed to get an understanding of the future transit provisions within the greater study area. The following transit provisions are anticipated to be implemented in the future:

- Baseline Road (from Robertson Road to Baseline Station) is anticipated to be a Transit Priority Corridor with isolated measures.

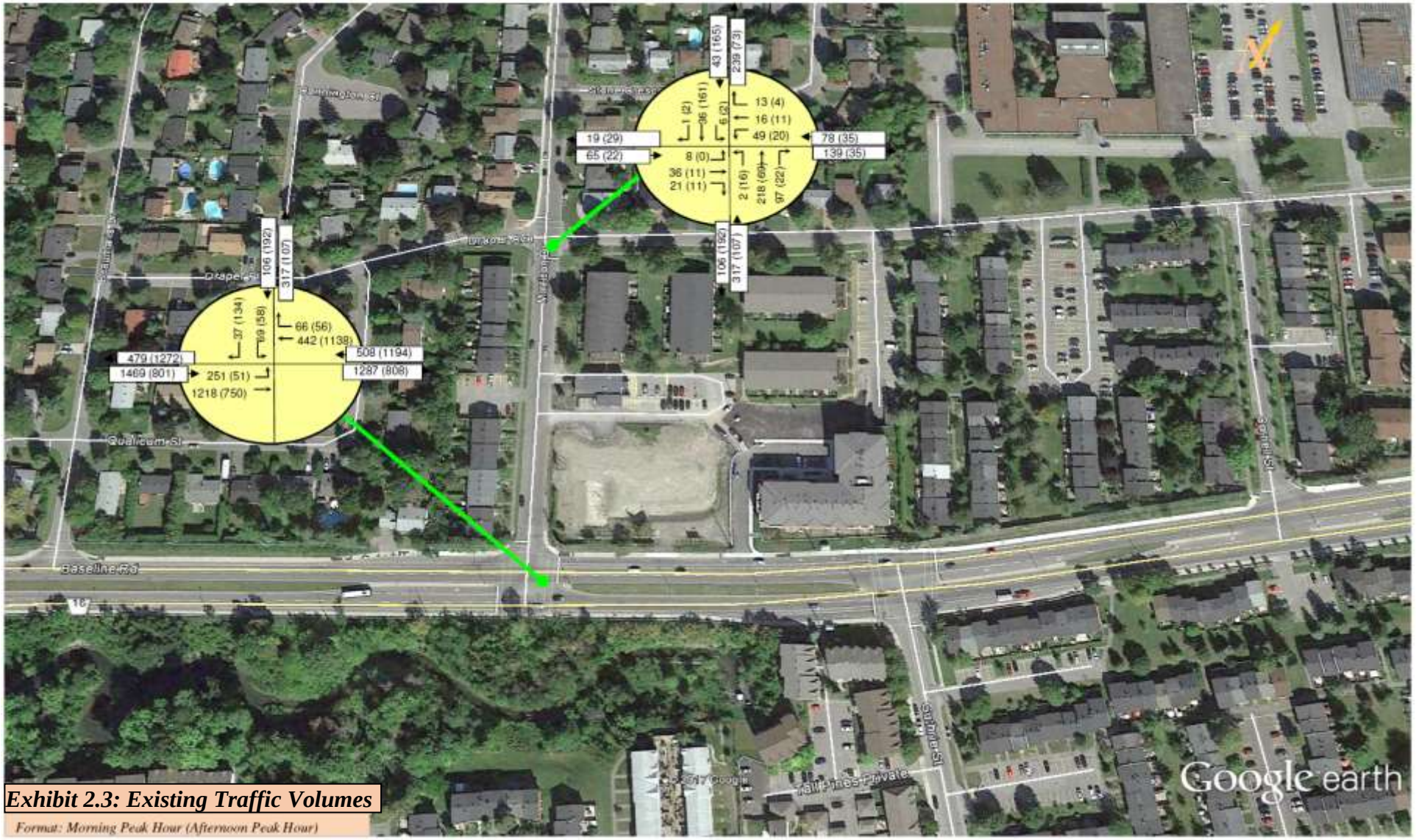


Exhibit 2.3: Existing Traffic Volumes

Format: Morning Peak Hour (Afternoon Peak Hour)

- A Bus Rapid Transit (BRT) line from Baseline to Heron Station Road is also anticipated to be implemented to serve commercial/employment lands along Baseline Road and also residents at major transit stations.
- Conversation of the West Transitway to LRT between Baseline Station to Tunney's Pasture.
- Conversation of West Transitway to LRT from Pinecrest to Bayshore station.

Other Adjacent Development Initiatives

A review of other adjacent developments planned within the greater study area was undertaken as part of this traffic study. The following summarizes the adjacent developments within the immediate study area:

- *2940 Baseline Road:* The proposed site would be re-developed to include four 8-to-18 storey high-rise condominium/apartment towers totaling approximately 440 dwelling units. The site will also include 10,000 ft^2 of office, a 26,500 ft^2 medical facility, 36,000 ft^2 of retail, a 20,000 ft^2 retail food store, 2,500 ft^2 bistro and a 2,700 ft^2 pharmacy. The development is located west of the proposed site and is anticipated to impact the through movement along Baseline Road.
- *2710 Draper Avenue:* This development includes Phases 1 and 2 of Fresh Towns that accommodates a total of 90 units.

2.2 Study Area and Time Periods

2.2.1 Study Area

Given that the trip generation trigger was not satisfied (number of units were below the threshold in the TIA guidelines); the traffic study will analyze the site accesses and immediate adjacent intersections (Baseline Road / Morrison Drive & Morrison Drive / Draper Avenue).

2.2.2 Time Periods

The study will analyze two-time periods (morning and afternoon peak hours) of travel demand as they were envisioned to represent the "worst-case" scenario in terms of traffic volumes.

2.2.3 Horizon Years

The traffic study will analyze build-out year and 5-year post development.

2.3 EXEMPTION REVIEW

Table 2.1 is an extract from the TIA Guidelines (2017) in regards to possible reduction in scope of work of the traffic study. We would request the City to exempt sections 4.1.3, 4.2.2 and 4.5-thru-4.9 (given Network Impact Component is not required for this TIA) from the TIA report.

Table 2.1: Extract from TIA Guidelines (2017)

Module	Element	Exemption Considerations	Include Module In TIA
Design Review Component			
4.1 Development Design	4.1.2 Circulation and Access	• Only required for site plans	Y
	4.1.3 New Street Networks	• Only required for plans of subdivision	N
4.2 Parking	4.2.1 Parking Supply	• Only required for site plans	Y
	4.2.2 Spillover Parking	• Only required for site plans where parking supply is 15% below unconstrained demand	N
Network Impact Component			
4.5 Transportation Demand Management	All elements	• Not required for site plans expected to have fewer than 60 employees and/or students on location at any given time	N
4.6 Neighbourhood Traffic Management	4.6.1 Adjacent Neighbourhoods	• Only required when the development relies on local or collector streets for access and total volumes exceed ATM capacity thresholds	N
4.8 Network Concept		• Only required when proposed development generates more than 200 person-trips during the peak hour in excess of the equivalent volume permitted by established zoning	N

3.0 FORECASTING

3.1 DEVELOPMENT-GENERATED TRAVEL DEMAND

The following sections represent the traffic forecasting methodology.

3.1.1 Trip Generation and Mode Shares

The TRANS Trip Generation Study (2009) was used to determine the site traffic volumes for the proposed development. Table below is an extract from the TRANS Trip Generation Study.

Table 6.3: Recommended Vehicle Trip Generation Rates for Residential Land Uses with Transit Bonus

Recommended Vehicle Trip Generation Rates with Transit Bonus AM and PM Peak Hours									
ITE Land Use Code	Dwelling Unit Type / Geographic Area		Vehicle Trip Rate						
			Core		Urban (Inside the Greenbelt)		Suburban (Outside the Greenbelt)		Rural
			Base Rate	< 600m to Rapid Transit	Base Rate	< 600m to Rapid Transit	Base Rate	< 600m to Rapid Transit	Base Rate
210	Single-detached dwellings	AM	0.40	0.31	0.67	0.50	0.70	0.49	0.62
		PM	0.60	0.33	0.76	0.57	0.90	0.63	0.92
224	Semi-detached dwellings, townhouses, rowhouses	AM	0.34	0.34	0.51	0.50	0.54	0.39	0.62
		PM	0.39	0.38	0.51	0.51	0.71	0.51	0.67
231	Low-rise condominiums (1 or 2 floors)	AM	0.34	0.34	0.50	0.50	0.60	0.60	0.71
		PM	0.29	0.29	0.49	0.49	0.66	0.66	0.72
232	High-rise condominiums (3+ floors)	AM	0.26	0.26	0.38	0.38	0.46	0.46	0.54
		PM	0.20	0.20	0.34	0.34	0.46	0.46	0.50
233	Luxury condominiums	AM	0.31	0.31	0.45	0.45	0.55	0.55	0.65
		PM	0.24	0.24	0.40	0.40	0.55	0.55	0.59
221	Low-rise apartments (2 floors)	AM	0.21	0.21	0.31	0.31	0.37	0.37	0.44
		PM	0.20	0.20	0.34	0.34	0.46	0.46	0.50
223	Mid-rise apartments (3-10 floors)	AM	0.17	0.17	0.24	0.24	0.29	0.29	0.35
		PM	0.16	0.16	0.28	0.28	0.37	0.37	0.41
222	High-rise apartments (10+ floors)	AM	0.17	0.17	0.24	0.24	0.29	0.29	0.35
		PM	0.16	0.16	0.27	0.27	0.36	0.36	0.39

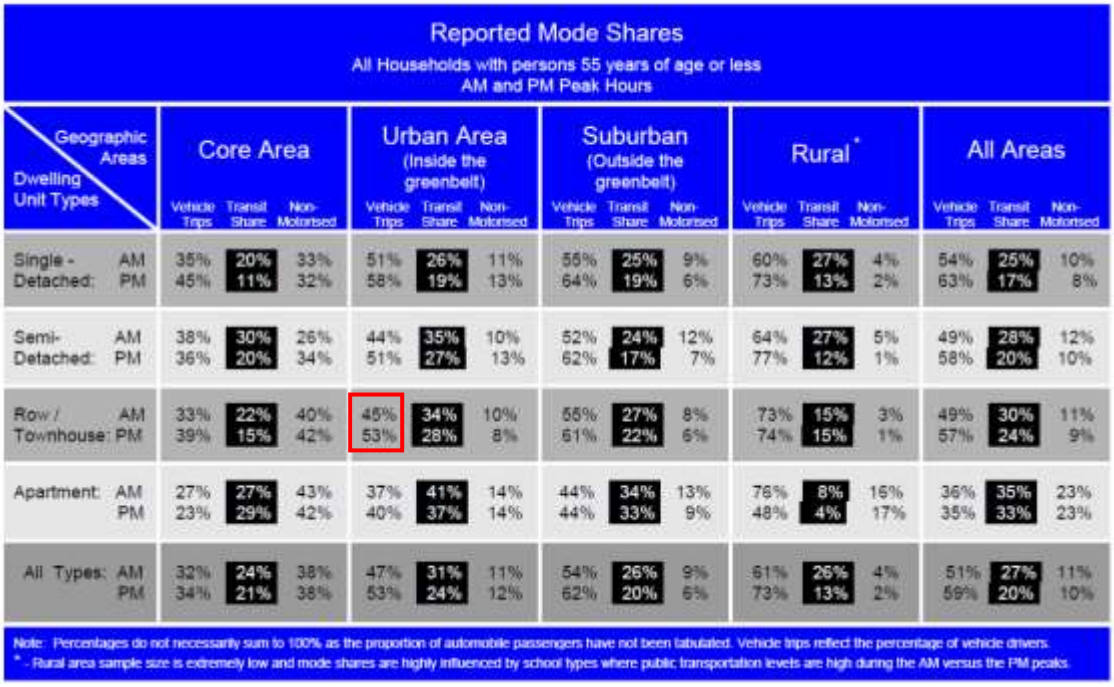
The proposed development falls within the Urban Area. The ITE land use code 224 was used to determine the automobile trip generation:

- 32 units x 0.51 = 16 vehicle trips during the AM and PM peak hours

Once the vehicle trip generations were determined, the vehicle trips were converted to persons-trip using the table below (Table 3.13 from 2009 Trans Trip Generation Study).

- *Townhomes*: 16 vehicle trips / 0.45 = 36 persons-trip during the morning peak hour and 16 vehicle trips / 0.53 = 30 persons-trip during the afternoon peak hour.

Table 3.13: Mode Shares - (all households with residents not older than 55 years of age)



Reported Mode Shares
All Households with persons 55 years of age or less
AM and PM Peak Hours

Geographic Areas / Dwelling Unit Types		Core Area			Urban Area (Inside the greenbelt)			Suburban (Outside the greenbelt)			Rural *			All Areas		
		Vehicle Trips	Transit Share	Non-Motorised	Vehicle Trips	Transit Share	Non-Motorised	Vehicle Trips	Transit Share	Non-Motorised	Vehicle Trips	Transit Share	Non-Motorised	Vehicle Trips	Transit Share	Non-Motorised
Single - Detached:	AM	35%	20%	33%	51%	26%	11%	55%	25%	9%	60%	27%	4%	54%	25%	10%
	PM	45%	11%	32%	58%	19%	13%	64%	19%	6%	73%	13%	2%	63%	17%	8%
Semi-Detached:	AM	38%	30%	26%	44%	35%	10%	52%	24%	12%	64%	27%	5%	49%	28%	12%
	PM	36%	20%	34%	51%	27%	13%	62%	17%	7%	77%	12%	1%	58%	20%	10%
Row / Townhouse:	AM	33%	22%	40%	46%	34%	10%	55%	27%	8%	73%	15%	3%	49%	30%	11%
	PM	39%	15%	42%	53%	28%	8%	61%	22%	6%	74%	15%	1%	57%	24%	9%
Apartment:	AM	27%	27%	43%	37%	41%	14%	44%	34%	13%	76%	8%	16%	36%	35%	23%
	PM	23%	29%	42%	40%	37%	14%	44%	33%	9%	48%	4%	17%	35%	33%	23%
All Types:	AM	32%	24%	38%	47%	31%	11%	54%	26%	9%	61%	26%	4%	51%	27%	11%
	PM	34%	21%	38%	53%	24%	12%	62%	20%	6%	73%	13%	2%	59%	20%	10%

Note: Percentages do not necessarily sum to 100% as the proportion of automobile passengers have not been tabulated. Vehicle trips reflect the percentage of vehicle drivers.
* - Rural area sample size is extremely low and mode shares are highly influenced by school types where public transportation levels are high during the AM versus the PM peaks.

The 2011 Trans OD Survey Report was reviewed to get an understanding of the existing travel mode shares for the area of Bayshore / Cedarview (within the location of the proposed development). Table 3.1 depicts the existing and future travel demand for the study area:

Table 3.1 Existing and Future Travel Mode Shares

Mode Share	Existing Mode Share		Future Mode Share	Rationale
	AM Peak	PM Peak	AM/PM	
Auto Driver	52%	56%	55%	
Auto Passenger	12%	16%	12%	
Transit	29%	23%	30%	**Immediate Study Area**: Baseline a Transit Priority Corridor **Larger Study Area**: Future BRT Baseline to Heron Station / conversion of west transitway to LRT (Baseline to Tunney's Pasture and Pinecrest to Bayshore)
Walking	1%	1%	1%	
Cycling	1%	1%	1%	
Other	5%	3%	1%	

The future travel mode share split was applied to the proposed Phase 3 townhomes. Table 3.2 below depicts the Phase 3 trips generated for each mode share:

Table 3.2: Site Traffic Volumes by Mode Share – Phase 3

Travel Mode	*Mode Share*	*AM*			*PM*		
		In	*Out*	*Total*	*In*	*Out*	*Total*
Auto Driver	55%	7	13	20	9	8	17
Auto Passenger	12%	1	3	4	2	2	4
Transit	30%	4	7	11	5	4	9
Non-Auto (Cycling/Walking)	3%	0	1	1	0	0	0
Total Person Trips	100%	12	24	36	16	14	30
New Auto Trips – [Phase 3 - 32 units]		***7***	***13***	***20***	***9***	***8***	***17***

The auto trips for Phase 3 results in 20 vehicles during the peak hours of travel demand.

3.1.2 Trip Distribution & Assignment

Exhibit 3.1 illustrates the site traffic distribution and assignment within the study area intersections.

3.2 BACKGROUND NETWORK TRAVEL DEMANDS

3.2.1 Transportation Network Plans

The City of Ottawa Transportation Master Plan (Map 5) was reviewed to get an understanding of the future transit provisions within the greater study area. The following transit provisions are anticipated to be implemented in the future:

- Baseline Road (from Robertson Road to Baseline Station) is anticipated to be a Transit Priority Corridor with isolated measures.
- A Bus Rapid Transit (BRT) line from Baseline to Heron Station Road is also anticipated to be implemented to serve commercial/employment lands along Baseline Road and also residents at major transit stations.
- Conversation of the West Transitway to LRT between Baseline Station to Tunney's Pasture.
- Conversation of West Transitway to LRT from Pinecrest to Bayshore station.

The new transit infrastructure is anticipated to increase transit share for the study area in the future.

3.2.2 Background Growth

The population growth for the Inner Suburbs was determined to grow less 1 percent annually. However, to be conservative and for the purpose of this traffic analysis, traffic on Baseline Road was assumed to increase at an annual rate of 1 percent. This background growth is above and beyond the adjacent development traffic.

3.2.3 Other Developments

See sections 2.1.3 for other adjacent developments within the study area.

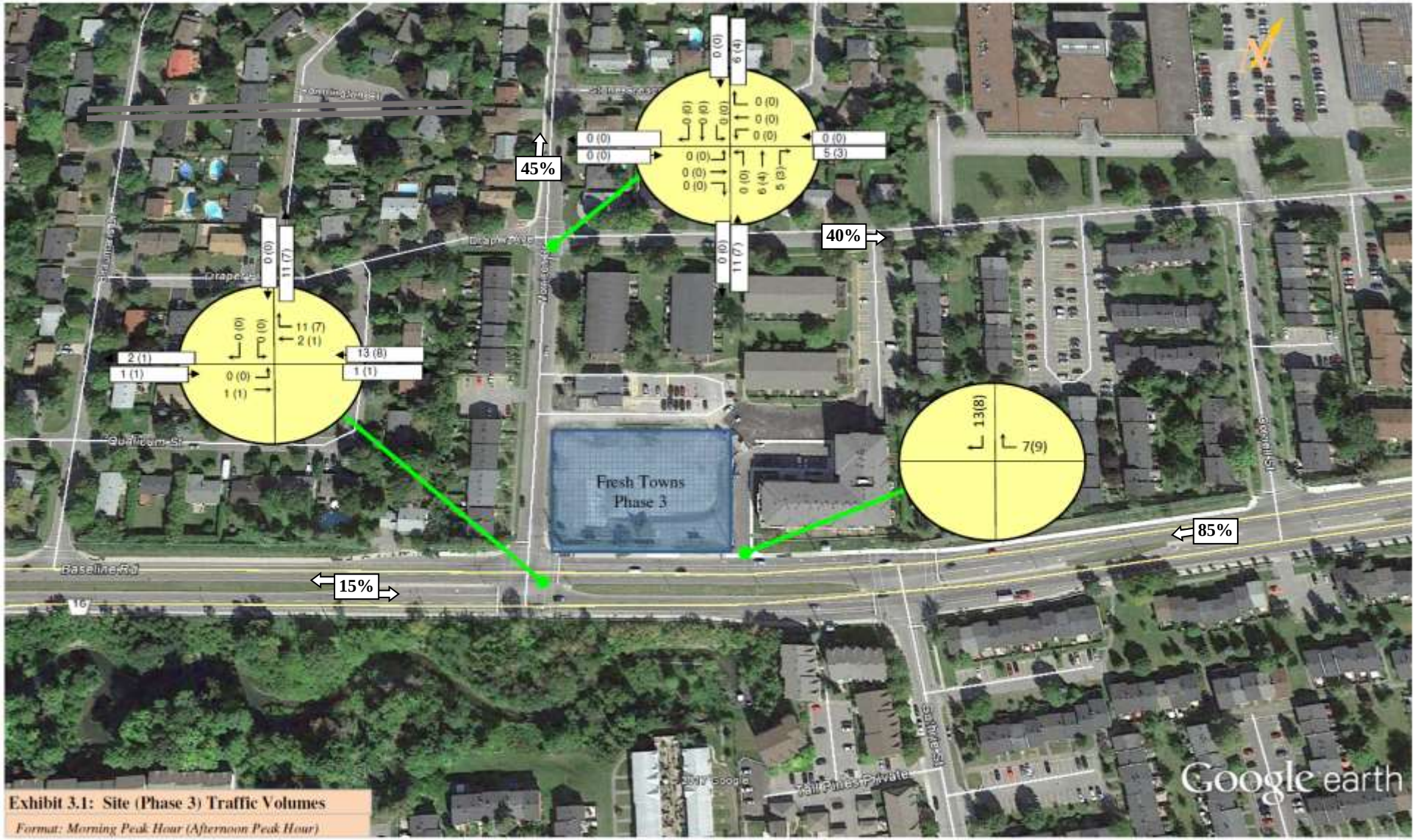


Exhibit 3.1: Site (Phase 3) Traffic Volumes

Format: Morning Peak Hour (Afternoon Peak Hour)

3.3 DEMAND RATIONALIZATION

This section rationalizes the assumed future travel demands for the study area to determine if there are any auto capacity limitations of the transportation network. Given the low auto-vehicle trips generated by the proposed development, the site access and intersections are expected to operate at satisfactory level of service assuming build-out of the development. The proposed development is anticipated to generate 20 vph during the peak hour of travel demand. This translates on average to a single vehicle every 3 minutes during the peak hour.

4.0 ANALYSIS / STRATEGY

4.1 DEVELOPMENT DESIGN

This section of the report reviews the transportation network elements within the vicinity of the proposed site to ensure they provide efficient access for all users.

4.1.1 Design for Sustainable Modes

The proposed site is located at the north-east corner of Baseline Rd. / Morrison Dr. within the Fresh Town development. Baseline Rd. and Morrison Dr. both accommodate bus routes that provide connections to major stations / stops (baseline station, Lincoln fields, etc.). Future transit provisions are also proposed within the greater study area (section 3.2.1) that would further encourage transit share for the study area. A bus stop/shelter exists along Baseline Rd. with a future bus stop/shelter along Morrison Dr.

In terms of walking distance, all residents of the proposed development are within 80m of the Morrison / Baseline transit stop and within 150m of the Baseline / Guthrie transit stop.

Bicycle parking would be provided by way of resident parking garages.

Other active mode facilities (such bike lanes along Baseline Rd. and sidewalks) are accommodated within the study area.

4.1.2 Circulation and Access

Loading, short term delivery and garbage pick-ups would be accommodated within the internal roadway of the site. Emergency vehicle access is anticipated to be along Baseline Rd. access (which is a shared access with the adjacent CCC 994 building) with an exit access option along Morrison Dr.

4.2 PARKING

4.2.1 Parking Supply

Since the development accommodates townhomes, residents are provided with private garage for parking along driveways.

4.3 BOUNDARY STREET DESIGN

Mobility

The Multi-Modal Level of Service (MMLOS) guidelines was used to evaluate the segment level of service for all mode of transportation (pedestrians, cyclists, transit, trucks) within the immediate study area. The boundary streets Baseline Rd. (fronting the site) and Morrison Drive (between Draper Ave. and Baseline Rd.) were reviewed as per the segment MMLOS guidelines. The site is located within 300m of St. Paul's Highschool, therefore the MMLOS targets were referenced from the bottom 3 rows of Exhibit 22.

The analysis assumes that the roadway operating speed and posted speed are closely related. Therefore, the posted speed was adopted as the operating speed along Baseline Drive and Morrison Drive for the purposes of MMLOS analysis.

It is worthwhile to note that the Baseline Road EA recommended a Bus Rapid Transit Corridor with a station at Morrison Drive. The typical roadway cross-section recommended a 1.2m boulevard, a 1.5m cycle track and a 2.0m sidewalk within a ROW of approximately 36m. Any improvements required to meet the target MMLOS thresholds would be considered throw-away given the long-term plans for the corridor.

1) Pedestrian LOS[2]

- *Baseline Rd.* currently accommodates a 2.0m sidewalk width fronting the site (between right-in/right-out and Morrison Dr.). The existing configuration was found to result in a segment pedestrian LOS "F".
    - A 2.2m boulevard is proposed to be provided fronting the site along Baseline Road. This, in combination of a 2.0m sidewalk, would result in an improved PLOS "D" due to the 70 km/hr operating speed.
    - The target LOS "A" is viewed as untenable given that the speed limit on Baseline Road would be required to be lowered to 30 km/hr.

2 Reference: MMLOS Guidelines Exhibit 4 – PLOS Segment Evaluation Table

- *Morrison Drive* fronting the proposed site would accommodate a sidewalk of 2m in width and approximately a 1.8m wide boulevard. The operating speed was found to be approximately 40 km/hr, therefore resulting in a PLOS "A" for this segment.

2) Bicycle LOS[3]

- *Baseline Rd.* currently accommodates an approximate 1.6m cycling lane. The MMLOS analysis found a BLOS "E" as a result of Baseline Rd. being posted at 70km/hr.
    - Considering a 60 km/hr speed limit would improve the BLOS to a "C" that would meet the target MMLOS for a site within 300m of a school;
- *Morrison Drive* is considered mixed traffic, an operating speed of approximately 40 km/hr, and exists without a marked centerline. Hence, the MMLOS analysis was found to determine a BLOS "A".

3) Transit LOS[4]

Baseline Rd. is an arterial roadway that accommodates major intersections rather than individual driveways within the study area. There are no dedicated bus lanes along Baseline Rd. or Morrison Drive, therefore, the TLOS can be predicted to be "D".

4) Truck LOS

The truck LOS for the segment of the Baseline Rd. and Morrison Dr. was evaluated based on Exhibit 20. The result indicated that Morrison Dr. exhibits TkLOS "B" and Baseline Rd. exhibits TkLOS "A".

3 Reference: MMLOS Guidelines Exhibit 11 – BLOS Segment Evaluation Table
4 Reference: MMLOS Guidelines Exhibit 15 – TLOS Segment Evaluation Table

5) Summary of MMLOS

Table 4.2 depicts the MMLOS for all modes of transportation for the study area corridors and provides a comparison to the target LOS shown in the MMLOS guidelines (general urban area).

Table 4.2: Segment MMLOS Summary

Intersections	Pedestrian (PLOS)		Bicycle (BLOS)		Transit (TLOS)[1]		Truck (TkLOS)[2]	
	PLOS	Target	BLOS	Target	TLOS	Target	TkLOS	Target
Morrison Dr.	A	A	A	B	D	NA	B	No Target
Baseline Rd.	**D**	A	**E**	C	D	D	A	D

1- Exhibit 22 – Minimum Desirable MMLOS Targets: Includes TLOS targets for Transit Priority (TP) corridors only. Morrison Dr. is not designated as a transit priority corridor in the TMP. Therefore, no target was included in this table.

2- Exhibit 22 – Minimum Desirable MMLOS Targets: The table does not identify a target for TkLOS for collector and local roads within the General Urban Area.

The following bullets summaries Table 4.2 above:

- All modes of transportation meet or exceed the target (where available) assuming the "Within 300m of a School" area (Exhibit 22) except for the:
    - Pedestrian facility along Baseline Rd. where the PLOS is "D". Despite the 2m sidewalk and 2.15m boulevard fronting the proposed site along Baseline Rd., the low level of service is predominately due to the posted speed of Baseline Rd. (70 kph). Lowering the posted speed limit to 60 km/hr would be a practical solution given that Baseline Road is 60 km/hr to the east of Greenbank Road (approximately 600m from Morrison Drive) and would therefore be an extension of the 60 km/hr zone; and
    - BLOS along Baseline Rd. fronting the site where the worst-case BLOS is "E" due to the posted speed of Baseline Rd. A reduction in posted speed limit to 60 km/hr would result in a BLOS "C" that meets the Spine Route BLOS target within 300m of a school.

However, the Baseline Road plans, as detailed in the "Baseline Road Bus Rapid Transit Corridor Planning and EA Study", recommended continuous median transit lanes along Baseline Road, unidirectional cycle tracks and a parallel sidewalk facility on both sides of Baseline Road with protected intersections which could be preceded by transit priority measures. It may be more prudent not to consider such a speed reduction knowing that the entire Baseline Corridor will ultimately be undergoing significant changes in the relatively near future.

Road Safety

The collision information (outlined in Section 2.1.2) determined that no specific patterns were identified at the study area intersections.

Neighbourhood Traffic Management (NTM)

The proposed site is forecasted to add approximately 20 vph during the peak hour of travel demand on the study area roads. This translates on average to a single vehicle every 3 minutes during the peak hour. Therefore, the proposed site traffic volumes are not anticipated to result in significant impact on traffic operation.

4.4 ACCESS INTERSECTION DESIGN

4.4.1 Location and Design of Access

The proposed site access along Baseline Rd. is an existing shared access with the neighboring development and was previously approved as part of that development's Site Plan Application. The shared access is to be shifted to the west and would be located approximately 75m east of Morrison Dr., adopt a width of 6.7m and provide a throat length of approximately 25m.

4.4.2 Intersection Control

The right-in/right-out site access would be controlled by a stop sign with free flow conditions along westbound Baseline Rd.

4.4.3 Intersection Design

The immediate study area intersections were analyzed using Synchro 10^{TM} software for both morning and afternoon peak hours of travel demand. For the purpose of this analysis, a volume to capacity (v/c) ratio greater than 0.90 was considered unsatisfactory.

Table 4.1: Intersection Capacity Analysis Results

Intersections	Morning Peak Hour			Afternoon Peak Hour		
	Overall LOS	*Critical Approach*		*Overall LOS*	*Critical Approach*	
		Movement	*LOS, V/C*		*Movement*	*LOS, V/C*
Existing Traffic Analysis						
Baseline Rd / Morrison Dr (Signalized)	A	SB	C, 0.51	B	SB	D, 0.72
Morrison Dr / Draper Ave (All-Way STOP Control)	A	NB	A, 0.41	A	SB	A, 0.21
2019 Traffic Analysis (Phase 3 Build-out)						
Baseline Rd / Morrison Dr (Signalized)	A	SB	C, 0.52	B	SB	D, 0.72
Morrison Dr / Draper Ave (All-Way STOP Control)	A	NB	A, 0.38	A	SB	A, 0.20
2024 Traffic Analysis (5-year post development)						
Baseline Rd / Morrison Dr (Signalized)	A	SB	C, 0.52	B	SB	D, 0.71
Morrison Dr / Draper Ave (All-Way STOP Control)	A	NB	A, 0.38	A	SB	A, 0.20

The study area intersections resulted in satisfactory level of service during both peak hours of travel demand. Appendix "C" also illustrates the intersection MMLOS for Baseline Road / Morrison Drive.

5.0 SUMMARY OF FINDINGS & CONCLUSION

The Fresh Towns Phase 3 TIA report yields the following findings:

- The proposed site traffic volumes are not anticipated to result in significant impact on traffic operation (~ 20 vph during peak hour of travel demand / average single vehicle every 3 minutes).
- The study area intersections operate at satisfactory level of service assuming forecast conditions during both peak hours of travel demand.
- The current transit provisions would accommodate the additional ridership anticipated as a result of the proposed development. The future transit provisions would also encourage transit ridership (new bus pad / shelter on Morrison Dr. and the existing bus pad / shelter on Baseline Rd.).
- The study area accommodates sidewalks, boulevards and bike lanes (Baseline Rd.) fronting the proposed site that would facilitate active mode of transportation.
- All modes of transportation meet or exceed the MMLOS targets assuming the "within 300m of a School" area. The study found two exceptions along the Baseline Road corridor fronting the site where, due to the 70 km/hr operating speed:
  a. the PLOS was found to result in a LOS "D" (Target: LOS "A"); and

b. where the BLOS was found to result in a LOS "E" (Cycling Spine Route Target: LOS "C").

The Baseline PLOS and BLOS could be improved by a lowered posted speed limit of 60 km/hr along Baseline Road between Greenbank Road and to the west of Morrison Drive. This recommendation is supported by the existing 60 km/hr posted speed limit to the east of Greenbank Road. This modification would result in a PLOS "C" and a BLOS "C" along this segment, and would therefore meeting the BLOS target. The PLOS target of "A" would require a speed limit of 30 km/hr which is viewed as untenable within the study area along Baseline Road.

However, the Baseline Road plans, as detailed in the "Baseline Road Bus Rapid Transit Corridor Planning and EA Study", recommended continuous median transit lanes along Baseline Road, unidirectional cycle tracks and a parallel sidewalk facility on both sides of Baseline Road with protected intersections which could be preceded by transit priority measures. It may be more prudent not to consider such a speed reduction knowing that the entire Baseline Corridor will ultimately be undergoing significant changes in the relatively near future.

The traffic analysis indicates that no roadway modification improvements are required as a result of the proposed Fresh Town Phase 3 development. The results indicate that the City of Ottawa should be encouraged to assemble the appropriate conditions that would permit the development application to proceed.

Yours Truly,

Mr. Arthur Gordon B.A. P.Eng
Principal Engineer
Castleglenn Consultants Inc.
December, 2019

Mr. Jake Berube B.Eng. EIT
Traffic Planning Specialist
Castleglenn Consultants Inc

Appendix A

Screening Form

Castleglenn Consultants
Engineers, Project Managers & Planners

2460 Lancaster Road, Suite 200,
Ottawa, Ontario, K1B 4S5
Tel: 613-731-4052

City of Ottawa 2017 TIA Guidelines Screening Form

Ms. Rosanna Baggs
Project Manager, City of Ottawa
110 Laurier Avenue West,
Ottawa, ON, K1G 6J9

November 22nd, 2018

Please see below the completed screening form for the proposed Freshtown Phase 3 development located at the 2795 Baseline Road.

1. Description of Proposed Development

Municipal Address	2795 Baseline Road
Description of Location	The proposed site is located at the north-east corner of Baseline Road and Morrison Drive
Land Use Classification	Townhomes
Development Size (units)	32-to-35 units (units to be defined during the study process)
Development Size (m^2)	NA
Number of Accesses and Locations	Two access locations: Morrison Drive and Baseline Road. An emergency vehicle exit access is also proposed along Morrison Drive. *Accesses to be confirmed during the study process. *
Phase of Development	Unknown at this stage
Buildout Year	Unknown

2. Trip Generation Trigger

The development will consist of about 32-to-35 townhome units. **The proposed development size is less than the minimum threshold size (90 units) and therefore, the Trip Generation Trigger is not satisfied.**

Table 2: Trip Generation Trigger

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

Castleglenn Consultants
Engineers, Project Managers & Planners

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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).*

The site has an access from Baseline Road, which is a transit priority corridor. Therefore, **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

The development access is within 150m of Baseline Rd / Morrison Drive traffic signal intersection, therefore, **the Safety Trigger is satisfied.**

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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	

Please review the above screening information and let us know your comments or questions before proceeding to the next step of the TIA.

Yours Truly,

Arman Matti

Arman Matti, P.Eng.
Transportation Engineer
Castleglenn Consultants Inc.

Appendix B

Forecast Traffic Volumes

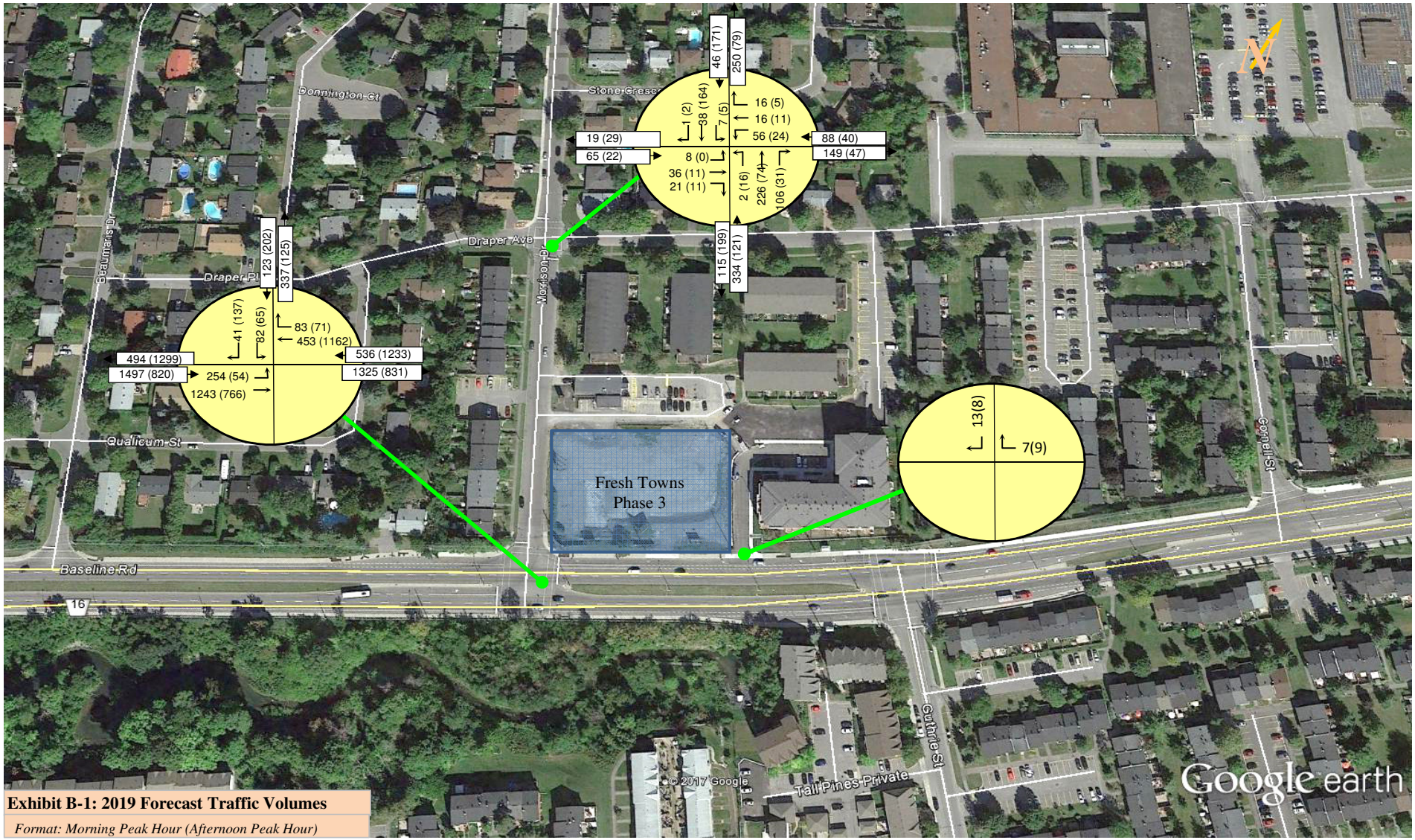


Exhibit B-1: 2019 Forecast Traffic Volumes

Format: Morning Peak Hour (Afternoon Peak Hour)

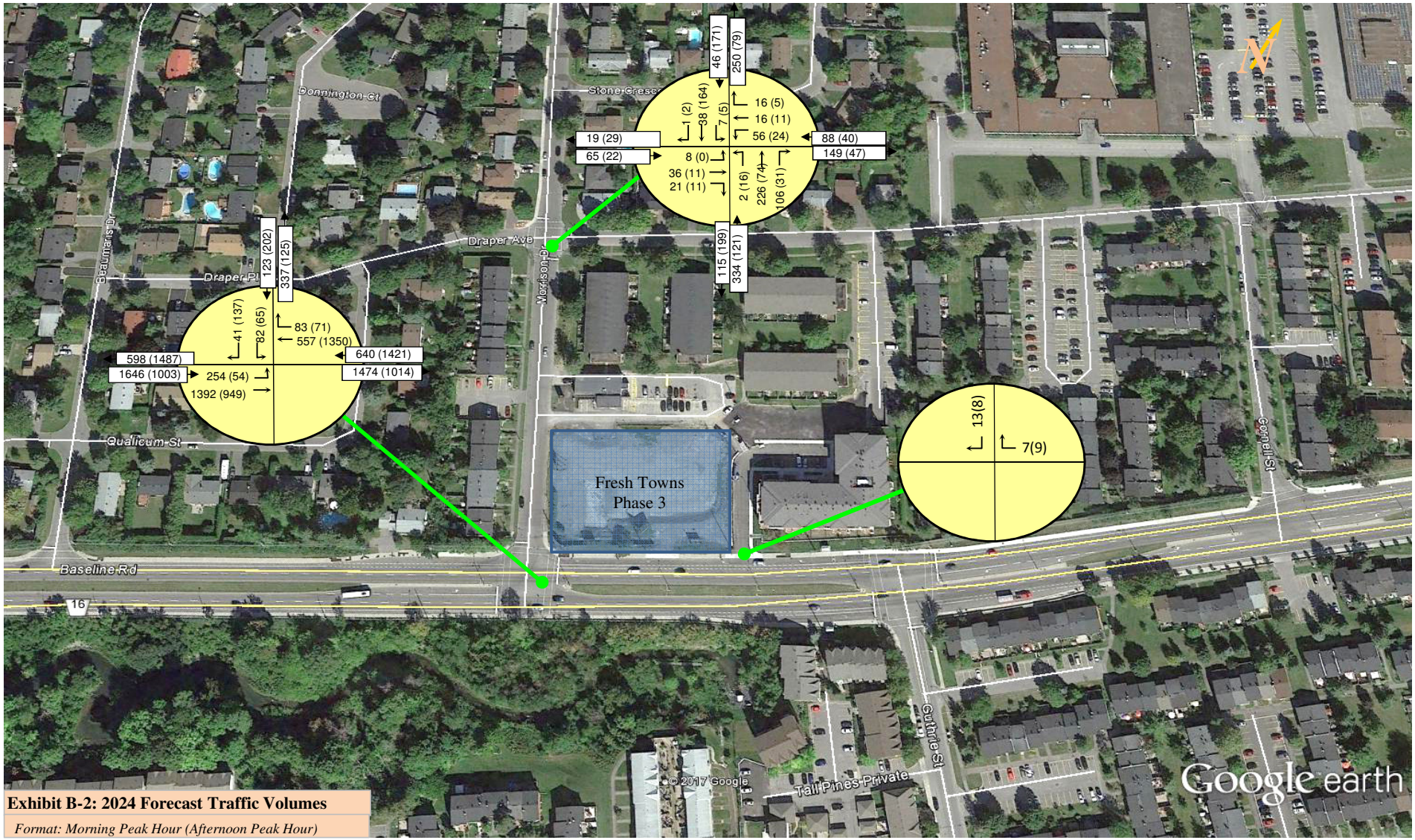
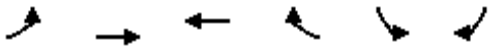


Exhibit B-2: 2024 Forecast Traffic Volumes

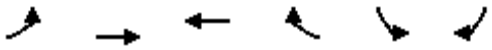
Format: Morning Peak Hour (Afternoon Peak Hour)

Appendix C

Traffic Analysis



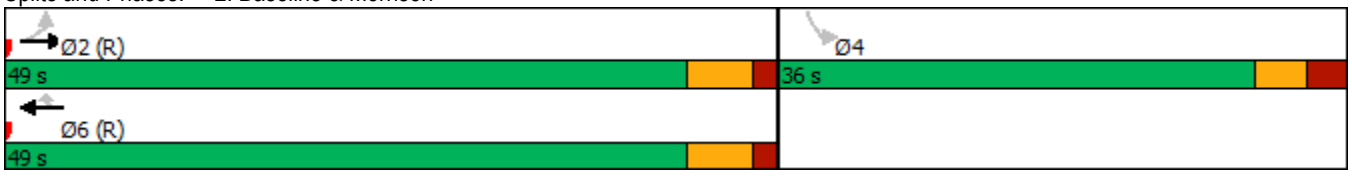
Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	251	1218	442	66	69	37
Future Volume (vph)	251	1218	442	66	69	37
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800
Storage Length (m)	45.1			0.0	0.0	0.0
Storage Lanes	1			1	1	0
Taper Length (m)	25.0				7.6	
Lane Util. Factor	1.00	0.95	0.95	1.00	1.00	1.00
Ped Bike Factor	1.00			0.97	0.99	
Frt				0.850	0.953	
Flt Protected	0.950				0.968	
Satd. Flow (prot)	1647	3424	3293	1517	1497	0
Flt Permitted	0.473				0.968	
Satd. Flow (perm)	818	3424	3293	1478	1493	0
Right Turn on Red				Yes		Yes
Satd. Flow (RTOR)				73	35	
Link Speed (k/h)		69	69		50	
Link Distance (m)		126.1	152.5		180.4	
Travel Time (s)		6.6	8.0		13.0	
Confl. Peds. (#/hr)	3			3	4	2
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Heavy Vehicles (%)	5%	1%	5%	2%	12%	11%
Adj. Flow (vph)	279	1353	491	73	77	41
Shared Lane Traffic (%)						
Lane Group Flow (vph)	279	1353	491	73	118	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Left	Left	Right	Left	Right
Median Width(m)		3.7	3.7		3.7	
Link Offset(m)		0.0	0.0		0.0	
Crosswalk Width(m)		4.9	4.9		4.9	
Two way Left Turn Lane						
Headway Factor	1.06	1.06	1.06	1.06	1.06	1.06
Turning Speed (k/h)	26			14	26	14
Number of Detectors	1	2	2	1	1	
Detector Template	Left	Thru	Thru	Right	Left	
Leading Detector (m)	2.1	10.0	10.0	2.1	2.1	
Trailing Detector (m)	0.0	0.0	0.0	0.0	0.0	
Detector 1 Position(m)	0.0	0.0	0.0	0.0	0.0	
Detector 1 Size(m)	2.1	0.6	0.6	2.1	2.1	
Detector 1 Type	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	
Detector 1 Channel						
Detector 1 Extend (s)	0.0	0.0	0.0	0.0	0.0	
Detector 1 Queue (s)	0.0	0.0	0.0	0.0	0.0	
Detector 1 Delay (s)	0.0	0.0	0.0	0.0	0.0	
Detector 2 Position(m)		9.4	9.4			
Detector 2 Size(m)		0.6	0.6			
Detector 2 Type		Cl+Ex	Cl+Ex			
Detector 2 Channel						
Detector 2 Extend (s)		0.0	0.0			



Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Turn Type	Perm	NA	NA	Perm	Perm	
Protected Phases		2	6			
Permitted Phases	2			6	4	
Detector Phase	2	2	6	6	4	
Switch Phase						
Minimum Initial (s)	10.0	10.0	10.0	10.0	10.0	
Minimum Split (s)	29.9	29.9	38.9	38.9	36.0	
Total Split (s)	49.0	49.0	49.0	49.0	36.0	
Total Split (%)	57.6%	57.6%	57.6%	57.6%	42.4%	
Maximum Green (s)	43.1	43.1	43.1	43.1	30.0	
Yellow Time (s)	4.2	4.2	4.2	4.2	3.3	
All-Red Time (s)	1.7	1.7	1.7	1.7	2.7	
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	
Total Lost Time (s)	5.9	5.9	5.9	5.9	6.0	
Lead/Lag						
Lead-Lag Optimize?						
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	
Recall Mode	C-Max	C-Max	C-Max	C-Max	None	
Walk Time (s)	10.0	10.0	10.0	10.0	7.0	
Flash Dont Walk (s)	14.0	14.0	14.0	14.0	23.0	
Pedestrian Calls (#/hr)	0	0	0	0	0	
Act Effct Green (s)	65.9	65.9	65.9	65.9	11.6	
Actuated g/C Ratio	0.78	0.78	0.78	0.78	0.14	
v/c Ratio	0.44	0.51	0.19	0.06	0.51	
Control Delay	7.8	5.9	3.9	1.3	31.7	
Queue Delay	0.0	0.0	0.0	0.0	0.0	
Total Delay	7.8	5.9	3.9	1.3	31.7	
LOS	A	A	A	A	C	
Approach Delay		6.2	3.5		31.7	
Approach LOS		A	A		C	

Intersection Summary			
Area Type:	Other		
Cycle Length: 85			
Actuated Cycle Length: 85			
Offset: 11 (13%), Referenced to phase 2:EBTL and 6:WBT, Start of Green			
Natural Cycle: 75			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 0.51			
Intersection Signal Delay: 6.8		Intersection LOS: A	
Intersection Capacity Utilization 58.9%		ICU Level of Service B	
Analysis Period (min) 15			

Splits and Phases: 2: Baseline & Morrison

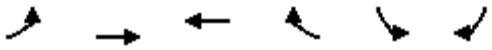


Intersection	
Intersection Delay, s/veh	9.4
Intersection LOS	A

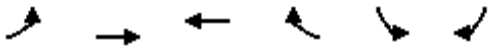
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	8	36	21	49	16	13	2	218	97	6	36	1
Future Vol, veh/h	8	36	21	49	16	13	2	218	97	6	36	1
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Heavy Vehicles, %	0	0	0	0	0	0	0	0	0	0	0	0
Mvmt Flow	9	40	23	54	18	14	2	242	108	7	40	1
Number of Lanes	0	1	0	0	1	0	0	1	0	0	1	0

Approach	EB	WB	NB	SB
Opposing Approach	WB	EB	SB	NB
Opposing Lanes	1	1	1	1
Conflicting Approach Left	SB	NB	EB	WB
Conflicting Lanes Left	1	1	1	1
Conflicting Approach Right	NB	SB	WB	EB
Conflicting Lanes Right	1	1	1	1
HCM Control Delay	8.3	8.6	10	8
HCM LOS	A	A	A	A

Lane	NBLn1	EBLn1	WBLn1	SBLn1
Vol Left, %	1%	12%	63%	14%
Vol Thru, %	69%	55%	21%	84%
Vol Right, %	31%	32%	17%	2%
Sign Control	Stop	Stop	Stop	Stop
Traffic Vol by Lane	317	65	78	43
LT Vol	2	8	49	6
Through Vol	218	36	16	36
RT Vol	97	21	13	1
Lane Flow Rate	352	72	87	48
Geometry Grp	1	1	1	1
Degree of Util (X)	0.407	0.095	0.118	0.062
Departure Headway (Hd)	4.163	4.72	4.892	4.672
Convergence, Y/N	Yes	Yes	Yes	Yes
Cap	866	758	731	766
Service Time	2.185	2.756	2.929	2.705
HCM Lane V/C Ratio	0.406	0.095	0.119	0.063
HCM Control Delay	10	8.3	8.6	8
HCM Lane LOS	A	A	A	A
HCM 95th-tile Q	2	0.3	0.4	0.2



Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	51	750	1138	56	58	134
Future Volume (vph)	51	750	1138	56	58	134
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800
Storage Length (m)	45.1			0.0	0.0	0.0
Storage Lanes	1			1	1	0
Taper Length (m)	25.0				7.6	
Lane Util. Factor	1.00	0.95	0.95	1.00	1.00	1.00
Ped Bike Factor	0.99			0.93	0.98	
Frt				0.850	0.906	
Flt Protected	0.950				0.985	
Satd. Flow (prot)	1631	3390	3390	1547	1519	0
Flt Permitted	0.187				0.985	
Satd. Flow (perm)	319	3390	3390	1440	1517	0
Right Turn on Red				Yes		Yes
Satd. Flow (RTOR)				62	53	
Link Speed (k/h)		69	69		50	
Link Distance (m)		126.1	125.0		180.4	
Travel Time (s)		6.6	6.5		13.0	
Confl. Peds. (#/hr)	24			24	4	11
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Heavy Vehicles (%)	6%	2%	2%	0%	8%	4%
Adj. Flow (vph)	57	833	1264	62	64	149
Shared Lane Traffic (%)						
Lane Group Flow (vph)	57	833	1264	62	213	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Left	Left	Right	Left	Right
Median Width(m)		3.7	3.7		3.7	
Link Offset(m)		0.0	0.0		0.0	
Crosswalk Width(m)		4.9	4.9		4.9	
Two way Left Turn Lane						
Headway Factor	1.06	1.06	1.06	1.06	1.06	1.06
Turning Speed (k/h)	26			14	26	14
Number of Detectors	1	2	2	1	1	
Detector Template	Left	Thru	Thru	Right	Left	
Leading Detector (m)	2.1	10.0	10.0	2.1	2.1	
Trailing Detector (m)	0.0	0.0	0.0	0.0	0.0	
Detector 1 Position(m)	0.0	0.0	0.0	0.0	0.0	
Detector 1 Size(m)	2.1	0.6	0.6	2.1	2.1	
Detector 1 Type	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	
Detector 1 Channel						
Detector 1 Extend (s)	0.0	0.0	0.0	0.0	0.0	
Detector 1 Queue (s)	0.0	0.0	0.0	0.0	0.0	
Detector 1 Delay (s)	0.0	0.0	0.0	0.0	0.0	
Detector 2 Position(m)		9.4	9.4			
Detector 2 Size(m)		0.6	0.6			
Detector 2 Type		Cl+Ex	Cl+Ex			
Detector 2 Channel						
Detector 2 Extend (s)		0.0	0.0			



Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Turn Type	Perm	NA	NA	Perm	Prot	
Protected Phases		2	6		4	
Permitted Phases	2			6		
Detector Phase	2	2	6	6	4	
Switch Phase						
Minimum Initial (s)	10.0	10.0	10.0	10.0	10.0	
Minimum Split (s)	29.9	29.9	38.9	38.9	36.0	
Total Split (s)	64.0	64.0	64.0	64.0	36.0	
Total Split (%)	64.0%	64.0%	64.0%	64.0%	36.0%	
Maximum Green (s)	58.1	58.1	58.1	58.1	30.0	
Yellow Time (s)	4.2	4.2	4.2	4.2	3.3	
All-Red Time (s)	1.7	1.7	1.7	1.7	2.7	
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	
Total Lost Time (s)	5.9	5.9	5.9	5.9	6.0	
Lead/Lag						
Lead-Lag Optimize?						
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	
Recall Mode	C-Max	C-Max	C-Max	C-Max	None	
Walk Time (s)	10.0	10.0	10.0	10.0	7.0	
Flash Dont Walk (s)	14.0	14.0	14.0	14.0	23.0	
Pedestrian Calls (#/hr)	0	0	0	0	0	
Act Effct Green (s)	71.6	71.6	71.6	71.6	16.5	
Actuated g/C Ratio	0.72	0.72	0.72	0.72	0.16	
v/c Ratio	0.25	0.34	0.52	0.06	0.72	
Control Delay	9.8	6.4	8.1	1.8	42.9	
Queue Delay	0.0	0.0	0.0	0.0	0.0	
Total Delay	9.8	6.4	8.1	1.8	42.9	
LOS	A	A	A	A	D	
Approach Delay		6.6	7.8		42.9	
Approach LOS		A	A		D	

Intersection Summary			
Area Type:	Other		
Cycle Length: 100			
Actuated Cycle Length: 100			
Offset: 28 (28%), Referenced to phase 2:EBTL and 6:WBT, Start of Green			
Natural Cycle: 75			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 0.72			
Intersection Signal Delay: 10.4		Intersection LOS: B	
Intersection Capacity Utilization 71.3%		ICU Level of Service C	
Analysis Period (min) 15			

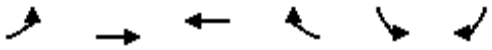
Splits and Phases: 2: Baseline & Morrison

Intersection	
Intersection Delay, s/veh	8
Intersection LOS	A

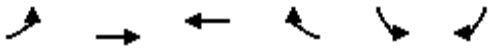
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	0	11	11	20	11	4	16	69	22	2	161	2
Future Vol, veh/h	0	11	11	20	11	4	16	69	22	2	161	2
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Heavy Vehicles, %	0	0	0	0	0	0	0	0	0	0	0	0
Mvmt Flow	0	12	12	22	12	4	18	77	24	2	179	2
Number of Lanes	0	1	0	0	1	0	0	1	0	0	1	0

Approach	EB	WB	NB	SB
Opposing Approach	WB	EB	SB	NB
Opposing Lanes	1	1	1	1
Conflicting Approach Left	SB	NB	EB	WB
Conflicting Lanes Left	1	1	1	1
Conflicting Approach Right	NB	SB	WB	EB
Conflicting Lanes Right	1	1	1	1
HCM Control Delay	7.4	7.9	7.8	8.3
HCM LOS	A	A	A	A

Lane	NBLn1	EBLn1	WBLn1	SBLn1
Vol Left, %	15%	0%	57%	1%
Vol Thru, %	64%	50%	31%	98%
Vol Right, %	21%	50%	11%	1%
Sign Control	Stop	Stop	Stop	Stop
Traffic Vol by Lane	107	22	35	165
LT Vol	16	0	20	2
Through Vol	69	11	11	161
RT Vol	22	11	4	2
Lane Flow Rate	119	24	39	183
Geometry Grp	1	1	1	1
Degree of Util (X)	0.134	0.029	0.05	0.209
Departure Headway (Hd)	4.057	4.299	4.627	4.097
Convergence, Y/N	Yes	Yes	Yes	Yes
Cap	871	837	779	867
Service Time	2.142	2.301	2.628	2.165
HCM Lane V/C Ratio	0.137	0.029	0.05	0.211
HCM Control Delay	7.8	7.4	7.9	8.3
HCM Lane LOS	A	A	A	A
HCM 95th-tile Q	0.5	0.1	0.2	0.8



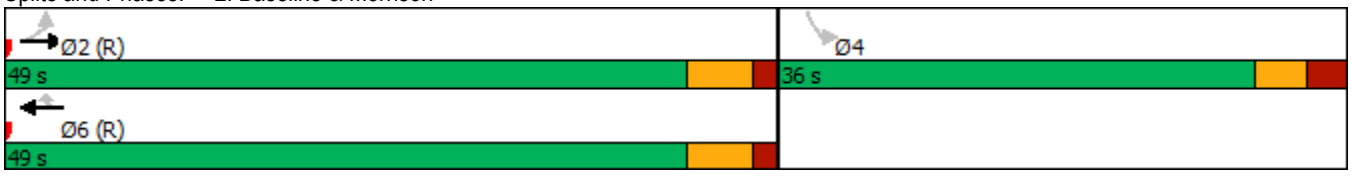
Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	254	1243	453	83	82	41
Future Volume (vph)	254	1243	453	83	82	41
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800
Storage Length (m)	45.1			0.0	0.0	0.0
Storage Lanes	1			1	1	0
Taper Length (m)	25.0				7.6	
Lane Util. Factor	1.00	0.95	0.95	1.00	1.00	1.00
Ped Bike Factor	1.00			0.97	0.99	
Frt				0.850	0.955	
Flt Protected	0.950				0.968	
Satd. Flow (prot)	1647	3424	3293	1517	1500	0
Flt Permitted	0.491				0.968	
Satd. Flow (perm)	849	3424	3293	1478	1496	0
Right Turn on Red				Yes		Yes
Satd. Flow (RTOR)				83	33	
Link Speed (k/h)		69	69		50	
Link Distance (m)		126.1	160.0		180.4	
Travel Time (s)		6.6	8.3		13.0	
Confl. Peds. (#/hr)	3			3	4	2
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Heavy Vehicles (%)	5%	1%	5%	2%	12%	11%
Adj. Flow (vph)	254	1243	453	83	82	41
Shared Lane Traffic (%)						
Lane Group Flow (vph)	254	1243	453	83	123	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Left	Left	Right	Left	Right
Median Width(m)		3.7	3.7		3.7	
Link Offset(m)		0.0	0.0		0.0	
Crosswalk Width(m)		4.9	4.9		4.9	
Two way Left Turn Lane						
Headway Factor	1.06	1.06	1.06	1.06	1.06	1.06
Turning Speed (k/h)	26			14	26	14
Number of Detectors	1	2	2	1	1	
Detector Template	Left	Thru	Thru	Right	Left	
Leading Detector (m)	2.1	10.0	10.0	2.1	2.1	
Trailing Detector (m)	0.0	0.0	0.0	0.0	0.0	
Detector 1 Position(m)	0.0	0.0	0.0	0.0	0.0	
Detector 1 Size(m)	2.1	0.6	0.6	2.1	2.1	
Detector 1 Type	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	
Detector 1 Channel						
Detector 1 Extend (s)	0.0	0.0	0.0	0.0	0.0	
Detector 1 Queue (s)	0.0	0.0	0.0	0.0	0.0	
Detector 1 Delay (s)	0.0	0.0	0.0	0.0	0.0	
Detector 2 Position(m)		9.4	9.4			
Detector 2 Size(m)		0.6	0.6			
Detector 2 Type		Cl+Ex	Cl+Ex			
Detector 2 Channel						
Detector 2 Extend (s)		0.0	0.0			



Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Turn Type	Perm	NA	NA	Perm	Perm	
Protected Phases		2	6			
Permitted Phases	2			6	4	
Detector Phase	2	2	6	6	4	
Switch Phase						
Minimum Initial (s)	10.0	10.0	10.0	10.0	10.0	
Minimum Split (s)	29.9	29.9	38.9	38.9	36.0	
Total Split (s)	49.0	49.0	49.0	49.0	36.0	
Total Split (%)	57.6%	57.6%	57.6%	57.6%	42.4%	
Maximum Green (s)	43.1	43.1	43.1	43.1	30.0	
Yellow Time (s)	4.2	4.2	4.2	4.2	3.3	
All-Red Time (s)	1.7	1.7	1.7	1.7	2.7	
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	
Total Lost Time (s)	5.9	5.9	5.9	5.9	6.0	
Lead/Lag						
Lead-Lag Optimize?						
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	
Recall Mode	C-Max	C-Max	C-Max	C-Max	None	
Walk Time (s)	10.0	10.0	10.0	10.0	7.0	
Flash Dont Walk (s)	14.0	14.0	14.0	14.0	23.0	
Pedestrian Calls (#/hr)	0	0	0	0	0	
Act Effct Green (s)	65.6	65.6	65.6	65.6	11.9	
Actuated g/C Ratio	0.77	0.77	0.77	0.77	0.14	
v/c Ratio	0.39	0.47	0.18	0.07	0.52	
Control Delay	7.1	5.6	3.9	1.3	32.4	
Queue Delay	0.0	0.0	0.0	0.0	0.0	
Total Delay	7.1	5.6	3.9	1.3	32.4	
LOS	A	A	A	A	C	
Approach Delay		5.9	3.5		32.4	
Approach LOS		A	A		C	

Intersection Summary			
Area Type:	Other		
Cycle Length: 85			
Actuated Cycle Length: 85			
Offset: 11 (13%), Referenced to phase 2:EBTL and 6:WBT, Start of Green			
Natural Cycle: 75			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 0.52			
Intersection Signal Delay: 6.8		Intersection LOS: A	
Intersection Capacity Utilization 59.1%		ICU Level of Service B	
Analysis Period (min) 15			

Splits and Phases: 2: Baseline & Morrison

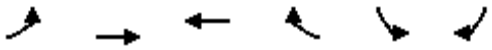


Intersection	
Intersection Delay, s/veh	9.2
Intersection LOS	A

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Traffic Vol, veh/h	8	36	21	56	16	16	2	226	106	7	38	1
Future Vol, veh/h	8	36	21	56	16	16	2	226	106	7	38	1
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Heavy Vehicles, %	0	0	0	0	0	0	0	0	0	0	0	0
Mvmt Flow	8	36	21	56	16	16	2	226	106	7	38	1
Number of Lanes	0	1	0	0	1	0	0	1	0	0	1	0

Approach	EB	WB	NB	SB
Opposing Approach	WB	EB	SB	NB
Opposing Lanes	1	1	1	1
Conflicting Approach Left	SB	NB	EB	WB
Conflicting Lanes Left	1	1	1	1
Conflicting Approach Right	NB	SB	WB	EB
Conflicting Lanes Right	1	1	1	1
HCM Control Delay	8.1	8.5	9.7	8
HCM LOS	A	A	A	A

Lane	NBLn1	EBLn1	WBLn1	SBLn1
Vol Left, %	1%	12%	64%	15%
Vol Thru, %	68%	55%	18%	83%
Vol Right, %	32%	32%	18%	2%
Sign Control	Stop	Stop	Stop	Stop
Traffic Vol by Lane	334	65	88	46
LT Vol	2	8	56	7
Through Vol	226	36	16	38
RT Vol	106	21	16	1
Lane Flow Rate	334	65	88	46
Geometry Grp	1	1	1	1
Degree of Util (X)	0.384	0.084	0.118	0.059
Departure Headway (Hd)	4.137	4.673	4.829	4.636
Convergence, Y/N	Yes	Yes	Yes	Yes
Cap	872	766	742	772
Service Time	2.154	2.706	2.859	2.664
HCM Lane V/C Ratio	0.383	0.085	0.119	0.06
HCM Control Delay	9.7	8.1	8.5	8
HCM Lane LOS	A	A	A	A
HCM 95th-tile Q	1.8	0.3	0.4	0.2



Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	54	766	1162	71	65	137
Future Volume (vph)	54	766	1162	71	65	137
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800
Storage Length (m)	45.1			0.0	0.0	0.0
Storage Lanes	1			1	1	0
Taper Length (m)	25.0				7.6	
Lane Util. Factor	1.00	0.95	0.95	1.00	1.00	1.00
Ped Bike Factor	0.99			0.93	0.98	
Frt				0.850	0.908	
Flt Protected	0.950				0.984	
Satd. Flow (prot)	1631	3390	3390	1547	1521	0
Flt Permitted	0.217				0.984	
Satd. Flow (perm)	370	3390	3390	1440	1519	0
Right Turn on Red				Yes		Yes
Satd. Flow (RTOR)				71	68	
Link Speed (k/h)		69	69		50	
Link Distance (m)		126.1	157.0		180.4	
Travel Time (s)		6.6	8.2		13.0	
Confl. Peds. (#/hr)	24			24	4	11
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Heavy Vehicles (%)	6%	2%	2%	0%	8%	4%
Adj. Flow (vph)	54	766	1162	71	65	137
Shared Lane Traffic (%)						
Lane Group Flow (vph)	54	766	1162	71	202	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Left	Left	Right	Left	Right
Median Width(m)		3.7	3.7		3.7	
Link Offset(m)		0.0	0.0		0.0	
Crosswalk Width(m)		4.9	4.9		4.9	
Two way Left Turn Lane						
Headway Factor	1.06	1.06	1.06	1.06	1.06	1.06
Turning Speed (k/h)	26			14	26	14
Number of Detectors	1	2	2	1	1	
Detector Template	Left	Thru	Thru	Right	Left	
Leading Detector (m)	2.1	10.0	10.0	2.1	2.1	
Trailing Detector (m)	0.0	0.0	0.0	0.0	0.0	
Detector 1 Position(m)	0.0	0.0	0.0	0.0	0.0	
Detector 1 Size(m)	2.1	0.6	0.6	2.1	2.1	
Detector 1 Type	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	
Detector 1 Channel						
Detector 1 Extend (s)	0.0	0.0	0.0	0.0	0.0	
Detector 1 Queue (s)	0.0	0.0	0.0	0.0	0.0	
Detector 1 Delay (s)	0.0	0.0	0.0	0.0	0.0	
Detector 2 Position(m)		9.4	9.4			
Detector 2 Size(m)		0.6	0.6			
Detector 2 Type		Cl+Ex	Cl+Ex			
Detector 2 Channel						
Detector 2 Extend (s)		0.0	0.0			

Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Turn Type	Perm	NA	NA	Perm	Prot	
Protected Phases		2	6		4	
Permitted Phases	2			6		
Detector Phase	2	2	6	6	4	
Switch Phase						
Minimum Initial (s)	10.0	10.0	10.0	10.0	10.0	
Minimum Split (s)	29.9	29.9	38.9	38.9	36.0	
Total Split (s)	64.0	64.0	64.0	64.0	36.0	
Total Split (%)	64.0%	64.0%	64.0%	64.0%	36.0%	
Maximum Green (s)	58.1	58.1	58.1	58.1	30.0	
Yellow Time (s)	4.2	4.2	4.2	4.2	3.3	
All-Red Time (s)	1.7	1.7	1.7	1.7	2.7	
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	
Total Lost Time (s)	5.9	5.9	5.9	5.9	6.0	
Lead/Lag						
Lead-Lag Optimize?						
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	
Recall Mode	C-Max	C-Max	C-Max	C-Max	None	
Walk Time (s)	10.0	10.0	10.0	10.0	7.0	
Flash Dont Walk (s)	14.0	14.0	14.0	14.0	23.0	
Pedestrian Calls (#/hr)	0	0	0	0	0	
Act Effct Green (s)	72.9	72.9	72.9	72.9	15.2	
Actuated g/C Ratio	0.73	0.73	0.73	0.73	0.15	
v/c Ratio	0.20	0.31	0.47	0.07	0.70	
Control Delay	7.7	5.6	6.9	1.6	39.0	
Queue Delay	0.0	0.0	0.0	0.0	0.0	
Total Delay	7.7	5.6	6.9	1.6	39.0	
LOS	A	A	A	A	D	
Approach Delay		5.8	6.6		39.0	
Approach LOS		A	A		D	

Intersection Summary			
Area Type:	Other		
Cycle Length: 100			
Actuated Cycle Length: 100			
Offset: 28 (28%), Referenced to phase 2:EBTL and 6:WBT, Start of Green			
Natural Cycle: 75			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 0.70			
Intersection Signal Delay: 9.2		Intersection LOS: A	
Intersection Capacity Utilization 74.1%		ICU Level of Service D	
Analysis Period (min) 15			

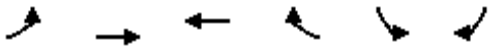
Splits and Phases: 2: Baseline & Morrison

Intersection	
Intersection Delay, s/veh	7.9
Intersection LOS	A

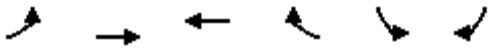
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	0	11	11	24	11	5	16	74	31	5	164	2
Future Vol, veh/h	0	11	11	24	11	5	16	74	31	5	164	2
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Heavy Vehicles, %	0	0	0	0	0	0	0	0	0	0	0	0
Mvmt Flow	0	11	11	24	11	5	16	74	31	5	164	2
Number of Lanes	0	1	0	0	1	0	0	1	0	0	1	0

Approach	EB	WB	NB	SB
Opposing Approach	WB	EB	SB	NB
Opposing Lanes	1	1	1	1
Conflicting Approach Left	SB	NB	EB	WB
Conflicting Lanes Left	1	1	1	1
Conflicting Approach Right	NB	SB	WB	EB
Conflicting Lanes Right	1	1	1	1
HCM Control Delay	7.4	7.8	7.7	8.2
HCM LOS	A	A	A	A

Lane	NBLn1	EBLn1	WBLn1	SBLn1
Vol Left, %	13%	0%	60%	3%
Vol Thru, %	61%	50%	28%	96%
Vol Right, %	26%	50%	12%	1%
Sign Control	Stop	Stop	Stop	Stop
Traffic Vol by Lane	121	22	40	171
LT Vol	16	0	24	5
Through Vol	74	11	11	164
RT Vol	31	11	5	2
Lane Flow Rate	121	22	40	171
Geometry Grp	1	1	1	1
Degree of Util (X)	0.135	0.026	0.051	0.195
Departure Headway (Hd)	4.012	4.277	4.599	4.101
Convergence, Y/N	Yes	Yes	Yes	Yes
Cap	882	842	783	867
Service Time	2.091	2.278	2.6	2.166
HCM Lane V/C Ratio	0.137	0.026	0.051	0.197
HCM Control Delay	7.7	7.4	7.8	8.2
HCM Lane LOS	A	A	A	A
HCM 95th-tile Q	0.5	0.1	0.2	0.7



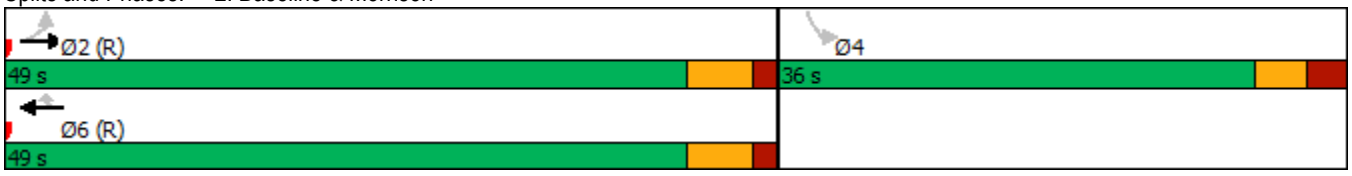
Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	254	1392	557	83	82	41
Future Volume (vph)	254	1392	557	83	82	41
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800
Storage Length (m)	45.1			0.0	25.0	0.0
Storage Lanes	1			1	0	0
Taper Length (m)	25.0				20.0	
Lane Util. Factor	1.00	0.95	0.95	1.00	1.00	1.00
Ped Bike Factor	1.00			0.97	0.99	
Frt				0.850	0.955	
Flt Protected	0.950				0.968	
Satd. Flow (prot)	1647	3424	3293	1517	1500	0
Flt Permitted	0.443				0.968	
Satd. Flow (perm)	766	3424	3293	1478	1496	0
Right Turn on Red				Yes		Yes
Satd. Flow (RTOR)				83	33	
Link Speed (k/h)		69	69		50	
Link Distance (m)		126.1	153.2		180.4	
Travel Time (s)		6.6	8.0		13.0	
Confl. Peds. (#/hr)	3			3	4	2
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Heavy Vehicles (%)	5%	1%	5%	2%	12%	11%
Adj. Flow (vph)	254	1392	557	83	82	41
Shared Lane Traffic (%)						
Lane Group Flow (vph)	254	1392	557	83	123	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Left	Left	Right	Left	Right
Median Width(m)		3.7	3.7		3.7	
Link Offset(m)		0.0	0.0		0.0	
Crosswalk Width(m)		4.9	4.9		4.9	
Two way Left Turn Lane						
Headway Factor	1.06	1.06	1.06	1.06	1.06	1.06
Turning Speed (k/h)	26			14	26	14
Number of Detectors	1	2	2	1	1	
Detector Template	Left	Thru	Thru	Right	Left	
Leading Detector (m)	2.1	10.0	10.0	2.1	2.1	
Trailing Detector (m)	0.0	0.0	0.0	0.0	0.0	
Detector 1 Position(m)	0.0	0.0	0.0	0.0	0.0	
Detector 1 Size(m)	2.1	0.6	0.6	2.1	2.1	
Detector 1 Type	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	
Detector 1 Channel						
Detector 1 Extend (s)	0.0	0.0	0.0	0.0	0.0	
Detector 1 Queue (s)	0.0	0.0	0.0	0.0	0.0	
Detector 1 Delay (s)	0.0	0.0	0.0	0.0	0.0	
Detector 2 Position(m)		9.4	9.4			
Detector 2 Size(m)		0.6	0.6			
Detector 2 Type		Cl+Ex	Cl+Ex			
Detector 2 Channel						
Detector 2 Extend (s)		0.0	0.0			



Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Turn Type	Perm	NA	NA	Perm	Perm	
Protected Phases		2	6			
Permitted Phases	2			6	4	
Detector Phase	2	2	6	6	4	
Switch Phase						
Minimum Initial (s)	10.0	10.0	10.0	10.0	10.0	
Minimum Split (s)	29.9	29.9	46.9	46.9	36.0	
Total Split (s)	49.0	49.0	49.0	49.0	36.0	
Total Split (%)	57.6%	57.6%	57.6%	57.6%	42.4%	
Maximum Green (s)	43.1	43.1	43.1	43.1	30.0	
Yellow Time (s)	4.2	4.2	4.2	4.2	3.3	
All-Red Time (s)	1.7	1.7	1.7	1.7	2.7	
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	
Total Lost Time (s)	5.9	5.9	5.9	5.9	6.0	
Lead/Lag						
Lead-Lag Optimize?						
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	
Recall Mode	C-Max	C-Max	C-Max	C-Max	None	
Walk Time (s)	10.0	10.0	10.0	10.0	7.0	
Flash Dont Walk (s)	14.0	14.0	14.0	14.0	23.0	
Pedestrian Calls (#/hr)	0	0	0	0	0	
Act Effct Green (s)	65.6	65.6	65.6	65.6	11.9	
Actuated g/C Ratio	0.77	0.77	0.77	0.77	0.14	
v/c Ratio	0.43	0.53	0.22	0.07	0.52	
Control Delay	8.0	6.2	4.1	1.3	32.4	
Queue Delay	0.0	0.0	0.0	0.0	0.0	
Total Delay	8.0	6.2	4.1	1.3	32.4	
LOS	A	A	A	A	C	
Approach Delay		6.5	3.7		32.4	
Approach LOS		A	A		C	

Intersection Summary			
Area Type:	Other		
Cycle Length: 85			
Actuated Cycle Length: 85			
Offset: 11 (13%), Referenced to phase 2:EBTL and 6:WBT, Start of Green			
Natural Cycle: 85			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 0.53			
Intersection Signal Delay: 7.1		Intersection LOS: A	
Intersection Capacity Utilization 59.9%		ICU Level of Service B	
Analysis Period (min) 15			

Splits and Phases: 2: Baseline & Morrison

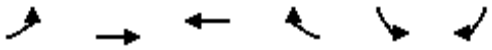


Intersection	
Intersection Delay, s/veh	9.2
Intersection LOS	A

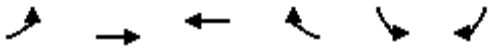
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	8	36	21	56	16	16	2	226	106	7	38	1
Future Vol, veh/h	8	36	21	56	16	16	2	226	106	7	38	1
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Heavy Vehicles, %	0	0	0	0	0	0	0	0	0	0	0	0
Mvmt Flow	8	36	21	56	16	16	2	226	106	7	38	1
Number of Lanes	0	1	0	0	1	0	0	1	0	0	1	0

Approach	EB	WB	NB	SB
Opposing Approach	WB	EB	SB	NB
Opposing Lanes	1	1	1	1
Conflicting Approach Left	SB	NB	EB	WB
Conflicting Lanes Left	1	1	1	1
Conflicting Approach Right	NB	SB	WB	EB
Conflicting Lanes Right	1	1	1	1
HCM Control Delay	8.1	8.5	9.7	8
HCM LOS	A	A	A	A

Lane	NBLn1	EBLn1	WBLn1	SBLn1
Vol Left, %	1%	12%	64%	15%
Vol Thru, %	68%	55%	18%	83%
Vol Right, %	32%	32%	18%	2%
Sign Control	Stop	Stop	Stop	Stop
Traffic Vol by Lane	334	65	88	46
LT Vol	2	8	56	7
Through Vol	226	36	16	38
RT Vol	106	21	16	1
Lane Flow Rate	334	65	88	46
Geometry Grp	1	1	1	1
Degree of Util (X)	0.384	0.084	0.118	0.059
Departure Headway (Hd)	4.137	4.673	4.829	4.636
Convergence, Y/N	Yes	Yes	Yes	Yes
Cap	872	766	742	772
Service Time	2.154	2.706	2.859	2.664
HCM Lane V/C Ratio	0.383	0.085	0.119	0.06
HCM Control Delay	9.7	8.1	8.5	8
HCM Lane LOS	A	A	A	A
HCM 95th-tile Q	1.8	0.3	0.4	0.2



Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	54	949	1350	71	65	137
Future Volume (vph)	54	949	1350	71	65	137
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800
Storage Length (m)	45.1			0.0	25.0	0.0
Storage Lanes	1			1	0	0
Taper Length (m)	25.0				20.0	
Lane Util. Factor	1.00	0.95	0.95	1.00	1.00	1.00
Ped Bike Factor	1.00			0.93	0.98	
Frt				0.850	0.908	
Flt Protected	0.950				0.984	
Satd. Flow (prot)	1631	3390	3390	1547	1521	0
Flt Permitted	0.167				0.984	
Satd. Flow (perm)	286	3390	3390	1440	1519	0
Right Turn on Red				Yes		Yes
Satd. Flow (RTOR)				71	43	
Link Speed (k/h)		69	69		50	
Link Distance (m)		126.1	154.5		180.4	
Travel Time (s)		6.6	8.1		13.0	
Confl. Peds. (#/hr)	24			24	4	11
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Heavy Vehicles (%)	6%	2%	2%	0%	8%	4%
Adj. Flow (vph)	54	949	1350	71	65	137
Shared Lane Traffic (%)						
Lane Group Flow (vph)	54	949	1350	71	202	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Left	Left	Right	Left	Right
Median Width(m)		3.7	3.7		3.7	
Link Offset(m)		0.0	0.0		0.0	
Crosswalk Width(m)		4.9	4.9		4.9	
Two way Left Turn Lane						
Headway Factor	1.06	1.06	1.06	1.06	1.06	1.06
Turning Speed (k/h)	26			14	26	14
Number of Detectors	1	2	2	1	1	
Detector Template	Left	Thru	Thru	Right	Left	
Leading Detector (m)	2.1	10.0	10.0	2.1	2.1	
Trailing Detector (m)	0.0	0.0	0.0	0.0	0.0	
Detector 1 Position(m)	0.0	0.0	0.0	0.0	0.0	
Detector 1 Size(m)	2.1	0.6	0.6	2.1	2.1	
Detector 1 Type	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	
Detector 1 Channel						
Detector 1 Extend (s)	0.0	0.0	0.0	0.0	0.0	
Detector 1 Queue (s)	0.0	0.0	0.0	0.0	0.0	
Detector 1 Delay (s)	0.0	0.0	0.0	0.0	0.0	
Detector 2 Position(m)		9.4	9.4			
Detector 2 Size(m)		0.6	0.6			
Detector 2 Type		Cl+Ex	Cl+Ex			
Detector 2 Channel						
Detector 2 Extend (s)		0.0	0.0			



Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Turn Type	Perm	NA	NA	Perm	Prot	
Protected Phases		2	6		4	
Permitted Phases	2			6		
Detector Phase	2	2	6	6	4	
Switch Phase						
Minimum Initial (s)	10.0	10.0	10.0	10.0	10.0	
Minimum Split (s)	29.9	29.9	38.9	38.9	36.0	
Total Split (s)	64.0	64.0	64.0	64.0	36.0	
Total Split (%)	64.0%	64.0%	64.0%	64.0%	36.0%	
Maximum Green (s)	58.1	58.1	58.1	58.1	30.0	
Yellow Time (s)	4.2	4.2	4.2	4.2	3.3	
All-Red Time (s)	1.7	1.7	1.7	1.7	2.7	
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	
Total Lost Time (s)	5.9	5.9	5.9	5.9	6.0	
Lead/Lag						
Lead-Lag Optimize?						
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	
Recall Mode	C-Max	C-Max	C-Max	C-Max	None	
Walk Time (s)	10.0	10.0	10.0	10.0	7.0	
Flash Dont Walk (s)	14.0	14.0	14.0	14.0	23.0	
Pedestrian Calls (#/hr)	0	0	0	0	0	
Act Effct Green (s)	71.8	71.8	71.8	71.8	16.3	
Actuated g/C Ratio	0.72	0.72	0.72	0.72	0.16	
v/c Ratio	0.26	0.39	0.56	0.07	0.71	
Control Delay	10.5	6.7	8.4	1.7	44.2	
Queue Delay	0.0	0.0	0.0	0.0	0.0	
Total Delay	10.5	6.7	8.4	1.7	44.2	
LOS	B	A	A	A	D	
Approach Delay		6.9	8.1		44.2	
Approach LOS		A	A		D	

Intersection Summary			
Area Type:	Other		
Cycle Length: 100			
Actuated Cycle Length: 100			
Offset: 28 (28%), Referenced to phase 2:EBTL and 6:WBT, Start of Green			
Natural Cycle: 75			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 0.71			
Intersection Signal Delay: 10.4		Intersection LOS: B	
Intersection Capacity Utilization 74.3%		ICU Level of Service D	
Analysis Period (min) 15			

Splits and Phases: 2: Baseline & Morrison

Intersection	
Intersection Delay, s/veh	7.9
Intersection LOS	A

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	0	11	11	24	11	5	16	74	31	5	164	2
Future Vol, veh/h	0	11	11	24	11	5	16	74	31	5	164	2
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Heavy Vehicles, %	0	0	0	0	0	0	0	0	0	0	0	0
Mvmt Flow	0	11	11	24	11	5	16	74	31	5	164	2
Number of Lanes	0	1	0	0	1	0	0	1	0	0	1	0

Approach	EB	WB	NB	SB
Opposing Approach	WB	EB	SB	NB
Opposing Lanes	1	1	1	1
Conflicting Approach Left	SB	NB	EB	WB
Conflicting Lanes Left	1	1	1	1
Conflicting Approach Right	NB	SB	WB	EB
Conflicting Lanes Right	1	1	1	1
HCM Control Delay	7.4	7.8	7.7	8.2
HCM LOS	A	A	A	A

Lane	NBLn1	EBLn1	WBLn1	SBLn1
Vol Left, %	13%	0%	60%	3%
Vol Thru, %	61%	50%	28%	96%
Vol Right, %	26%	50%	12%	1%
Sign Control	Stop	Stop	Stop	Stop
Traffic Vol by Lane	121	22	40	171
LT Vol	16	0	24	5
Through Vol	74	11	11	164
RT Vol	31	11	5	2
Lane Flow Rate	121	22	40	171
Geometry Grp	1	1	1	1
Degree of Util (X)	0.135	0.026	0.051	0.195
Departure Headway (Hd)	4.012	4.277	4.599	4.101
Convergence, Y/N	Yes	Yes	Yes	Yes
Cap	882	842	783	867
Service Time	2.091	2.278	2.6	2.166
HCM Lane V/C Ratio	0.137	0.026	0.051	0.197
HCM Control Delay	7.7	7.4	7.8	8.2
HCM Lane LOS	A	A	A	A
HCM 95th-tile Q	0.5	0.1	0.2	0.7

Intersections		Baseline Rd / Morrison Dr			
	Crossing Side	***North***	***South***	***East***	***West***
Pedestrian	Lanes	2 (120)		5 (72)	5 (72)
	Median	No (-4)		No (-4)	No (-4)
	Conflicting LT	Permissive (-8)		Permissive (-8)	No LT (0)
	Conflicting RT	Perm/yield control (-5)		No RT (0)	Perm/yield control (-5)
	RTOR	Allowed (-3)		NA	Allowed (-3)
	Leading Ped Interval	No (-2)		No (-2)	No (-2)
	Corner Radius	>5-to-10 m (-5)		No RT (0)	>5-to-10 m (-5)
	Crosswalk Treatment	Standard transverse markings (-7)		Standard transverse markings (-7)	Standard transverse markings (-7)
	PETSI Score	83		51	46
	Ped. Exposure to traffic LOS	B		D	D
	Cycle Length	100		100	100
	Effective Walk Time	30		24	24
	Avg Ped Delay	24.5		29	29
	Ped Delay LOS	C		C	C
	LOS	C		D	D
		D			
	Approach From	***North***	***South***	***East***	***West***
Bicycle	Bike lane arrangment on approach	Mixed Traffic		Pocket Bike Lanes	Bike Lane
	Right-turn lane configuration	Shared		Dedicated RT lane to the right of bike lane and > 50m	No RT lane - T-intersection
	Right turning speed				
	RT cyclist - LOS	NA		D	NA
	Left turn approach	Shared - No lane crossed		No LT movement - NA	2 or more lanes crossed
	Left-turn Operating speed			NA	>=50km/hr
	Left turn cyclists - LOS	B		NA	F
Transit	Avg. Delay	<= 40 sec		< 10 sec	< 10 sec
	LOS	E		B	B
		E			
Truck	Effective corner radius	10 to 15m		10 to 15m	
	No. of receiving lanes on departure from intersection	2		1	
	LOS	B		E	
		E			

Appendix D

Pre-Qualification Letter

TIA Plan Reports

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

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

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

CERTIFICATION

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

[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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Ottawa (Ontario) K1P 1J1
Tél. : 613-580-2424
Télécopieur: 613-560-6006

Dated at Ottawa (City) this 6 day of December, 20 19.

Name: Arthur Gordon
(Please Print)

Professional Title: Principal Engineer

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

Office Contact Information (Please Print)
Address: Sutie 200 - 2460 Lancaster Road
City / Postal Code: Ottawa / K1B 4S5
Telephone / Extension: 613 - 731 - 4052
E-Mail Address: agordon@castleglenn.ca

Stamp