Gladstone Village Development

TIA Report – April 2022

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TIA Report

Parsons has been retained by the Ottawa Community Housing Corporation to prepare a TIA in support of a Plan of Subdivision Application for a mixed-use development known as Gladstone Village. This document follows the TIA process as outlined in the City Transportation Impact Assessment (TIA) Guidelines (2017). The following report represents Step 5 of the TIA Report. All City comment responses and the initial Screening Form have been provided in **Appendix A**.

1. Screening Form

The Screening Form confirmed the need for a TIA Report based on the Trip Generation, Location and Safety triggers. The Trip Generation trigger was met based on the large size of the development. The Location trigger was met due to the location of the proposed development site in a Transit-Oriented zone and the designation of a boundary street as Spine Route and Transit Priority Corridor. The Safety Trigger is met due to the proximity of a signalized intersection to a proposed site driveway.

2. Scoping Report

2.1. Existing and Planned Conditions

2.1.1. PROPOSED DEVELOPMENT

The proposed development site is located at the municipal address of 933 Gladstone Ave, in a vacant land north of Gladstone Ave and between Preston St and the Trillium Line LRT corridor, as shown in **Figure 1**. The subject site is currently zoned Mixed-Use Centre (MC).

The proposed development is anticipated to consist of 96 townhome units and 1,004 high-rise apartment units. At the time of this study, the size and scope of the ancillary uses onsite had yet to be confirmed. For the purposes of this study, the proponent provided conservative approximations for potential non-residential uses to support this TIA, including approximately 77,000 sq.ft of ground floor retail, commercial and institutional space, as well as 100,000 sq.ft of office space.

The apartment units will be housed within seven buildings that range from 8-storeys to 30-storeys in height, with a podium connecting some buildings. The estimated full buildout horizon for the proposed development was 2031. The current concept plan is shown in **Figure 2**.

Figure 1: Local Context

The proposed development will utilize an existing connection to Preston St via an “Oak St extension” that will connect to “Street A”, which connects to a short internal street labeled “Larch St extension” within the site before extending south as “Street B”. A conceptual third connection to Street B is provided at Balsam St, which is consistent with the Corsa Italia Station District Secondary Plan (CISP). However, the CISP acknowledged that Larch St may be considered in lieu of Balsam St if future transportation studies support the need. The data and findings of this TIA demonstrate that a Larch St connection is technically preferred for resiliency and redundancy purposes of the transportation network. As such, the Larch St connection should be pursued in lieu of the Balsam St connection, as per the Secondary Plan.

Figure 2: Proposed Concept Plan

2.1.2. EXISTING CONDITIONS

Area Road Network

The following roads were included in the TIA. Descriptions for each road within the study area have been provided below.

Gladstone Ave is an east-west municipal major collector roadway within the City of Ottawa, that extends from Parkdale Ave in the west to Cartier St in the east. The roadway consists of a two-lane cross-section and a posted speed limit of 40km/h.

Somerset St W is an east-west municipal arterial roadway within the City of Ottawa, which extends from Queen Elizabeth Dr in the east to Garland St in the west, where it continues as Wellington St W. Within the study area, the roadway consists of a two-lane cross-section with an assumed speed limit of 50km/h.

Preston St is a north-south municipal arterial roadway within the City of Ottawa, that extends from Albert St in the north to Carling Ave in the south. An extension from Albert St to Sir John A. Macdonald Parkway is proposed in the City of Ottawa TMP. Within the study area, the roadway consists of a two-lane cross-section and an assumed posted speed limit of 50km/h.

Rochester St is a north-south municipal roadway within the City of Ottawa and is classified as a local road north of Gladstone Ave and a major collector south of thereof. The roadway extends from Carling Ave in the south and terminates at a neighborhood south of Albert St. The roadway consists of a two-lane cross-section, with an on-street parking lane available along both sides of the roadway. The posted speed limit is 50km/h.

Oak St is a short (dead-end) east-west municipal local roadway providing access to residential units and parking for the adjacent park area. The roadway consists of a two-lane cross-section, with a sidewalk facility on the south side only.

Laurel St is a short (dead-end) east-west municipal local roadway providing access to residential units. The roadway consists of a two-lane cross-section and sidewalk facilities on the north and south sides.

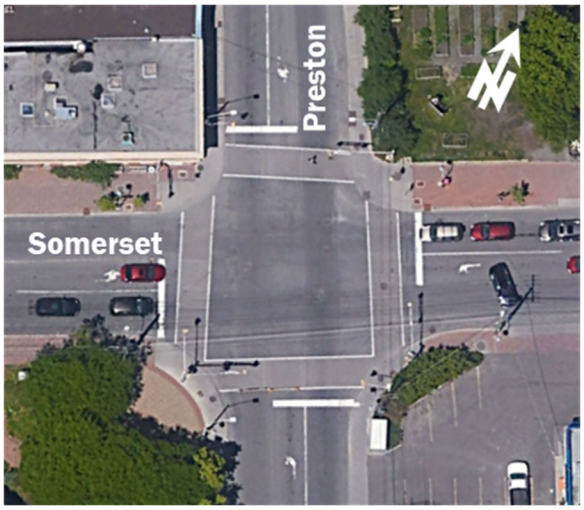
Larch St is a short (dead-end) east-west municipal local roadway providing access to residential units. The roadway consists of a two-lane cross-section and sidewalk facilities on the north side only.

Balsam St is a short (dead-end) east-west municipal local roadway providing access to residential units and the Preston Hardware store's parking lot. The roadway consists of a two-lane cross-section and sidewalk facilities on the north side and partially on the south side. Balsam St functions as the primary access for local residents, as well as customer parking and commercial deliveries and loading activities related to the Preston Hardware.

Existing Study Area Intersections

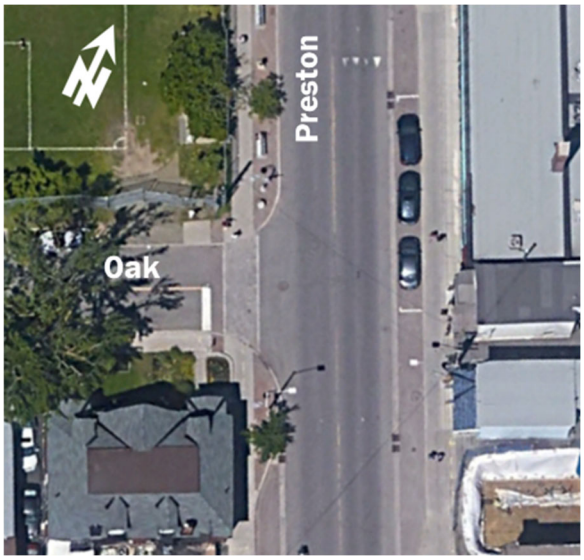
Preston/Somerset

The Preston/Somerset intersection is a four-legged signalized intersection. All legs of the intersection consist of a shared through/right-turn lane and an auxiliary left-turn lane. Right-turns on red are not permitted on weekdays between 7am and 7pm at this intersection.



Preston/Oak

The Preston/Oak intersection is an unsignalized three-legged "T" intersection, with STOP control on the minor movement only (Oak). The north leg (Preston) consists of a shared through/right-turn lane. The south leg (Preston) consists of a shared through/left-turn lane. The west leg (Oak) consists of a shared right-turn/left-turn lane. There are no restricted movements at this intersection.



Preston/Laurel

The Preston/Laurel intersection is an unsignalized three-legged "T" intersection, with STOP control on the minor movement only (Laurel). The north leg (Preston) consists of a shared through/right-turn lane. The south leg (Preston) consists of a shared through/left-turn lane. The west leg (Laurel) consists of a shared right-turn/left-turn lane. There are no restricted movements at this intersection.

Preston/Larch

The Preston/Larch intersection is an unsignalized three-legged “T” intersection, with STOP control on the minor movement only (Larch). The north leg (Preston) consists of a shared through/right-turn lane. The south leg (Preston) consists of a shared through/left-turn lane. The west leg (Larch) consists of a shared right-turn/left-turn lane. There are no restricted movements at this intersection.

Preston/Balsam

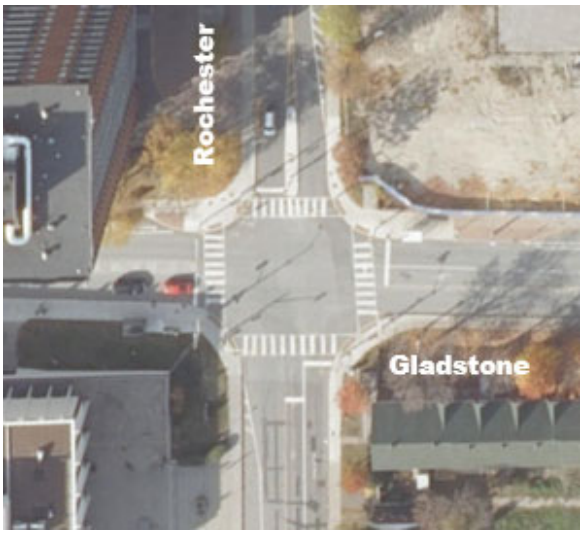
The Preston/Balsam intersection is an unsignalized four-legged intersection, with STOP control on the minor movements (Balsam). All legs of the intersection consist of a single all-movement lane. A Pedestrian Crossover (PXO) is provided on the north leg of the intersection. There are no restricted movements at this intersection. Preston Hardware customers and commercial trucks frequently use this intersection to access the rear parking and loading dock along Balsam St.

Preston/Gladstone

The Preston/Gladstone intersection is a signalized four-legged intersection. The north and south legs (Preston) consist of a shared through/right-turn lane and an auxiliary left-turn lane. The east leg (Gladstone) consists of a shared through/right-turn lane and an auxiliary left-turn lane. The west leg (Gladstone) consists of a single all-movement lane. There are no restricted movements at this intersection.

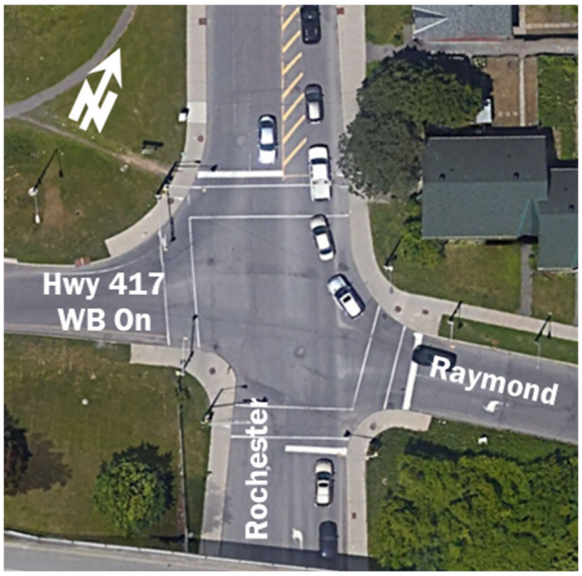
Gladstone/Rochester

The Gladstone/Rochester intersection is a signalized four-legged intersection. The east leg (Gladstone) consists of a shared through/right-turn lane and an auxiliary left-turn lane. The west leg consists of a shared through/right-turn lane. The south leg (Rochester) consists of a shared through/right-turn lane and an auxiliary left-turn lane. The north leg consists of a single all-movement lane. Eastbound left-turns are prohibited at this intersection and trucks are not permitted to enter the north leg.



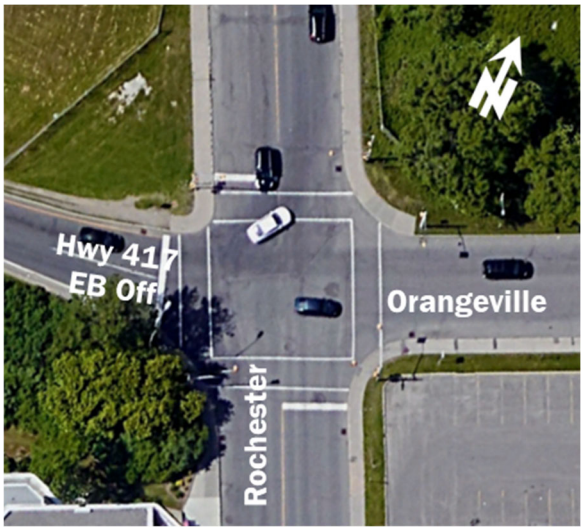
Rochester/Raymond/Hwy 417 WB On Ramp

The intersection is a signalized four-legged intersection, with signal control on the north, south and east legs. The west leg (Hwy 417 WB On Ramp) is a one-way westbound ramp. The south leg (Rochester) consists of a through lane and an auxiliary left-turn lane. The north leg (Rochester) consists of a through lane and an auxiliary right-turn lane. The east leg (Raymond) consists of a shared through/right-turn lane and an auxiliary left-turn lane. There are no restricted movements at this intersection.



Rochester/Orangeville/Hwy 417 EB Off Ramp

The intersection is a signalized four-legged intersection, with signal control on the north, south and west legs. The east leg (Orangeville) is a one-way eastbound roadway. The north leg (Rochester) consists of a through lane and a shared through/left-turn lane. The south leg (Rochester) consists of a through lane and a shared through/right-turn lane. The west leg (Hwy 417 WB Off Ramp) consists of a through/left-turn lane and a through/right-turn lane. Trucks are not permitted to enter the east leg (Orangeville) of the intersection.



Existing Driveways to Adjacent Developments

Four existing local roadways are adjacent to the subject site, Oak St, Laurel St, Larch St, and Balsam St. These roads primarily access single family homes along Oak St, Laurel St, Larch St, and Balsam St (north side), and some small businesses. The Preston Hardware parking lot access is located on the south side of Balsam St. There are minor accesses within 200m of the proposed Oak/Gladstone intersection serving minor restaurant parking lots, homes, and private parking lots.

Pedestrian/Cycling Network

Given the urban context, sidewalk facilities are provided throughout the study area, including both sides of Preston St, Gladstone Ave, Rochester St, and Laurel St. They are only provided on the south side of Oak St, and on the north side of Larch St and Balsam St. Two Pedestrian Crossovers (PXO) are provided along Preston St, one located on the north leg of the Preston/Balsam intersection, and one on the south side of the Preston/Anderson intersection (the latter is located approximately 35m north of Oak St).

In terms of cycling facilities, the Trillium Line Multi-Use Pathway (MUP) runs north-south, directly west of the proposed development and adjacent to the Trillium Line LRT corridor. This is a well-travelled MUP that provides regional pedestrian cycling connectivity from the Trans Canada Trail to the north (along the Ottawa River) to the Rideau Canal Western Pathway at Dow's Lake to the south. Additionally, both Somerset St W and Gladstone Ave are classified as spine routes in the City of Ottawa.

Transit Network

Due to the current circumstances regarding COVID-19, many bus services have been altered by OC Transpo on March 30, 2020, to operate on a different schedule, due to the lower transit ridership volumes. The following description of OC Transpo routes within the study area reflect the typical bus operations prior to the March 30 service changes:

- **Route #2 (O-Train Bayview <-> Greenboro):** this route operates as a replacement to the O-Train Line 2 during its expansion process. Route #2 operates at a rate of every 12 minutes every day throughout the week. The nearest bus stop to the site is at the intersection of Preston/Balsam.
- **Route #11 (Parliament <-> Bayshore):** identified by OC Transpo as a "Frequent Route", this route operates all day, 7 days a week and at an average rate of every 15 minutes during weekday peak hours. The nearest bus stop to the site is at the intersection of Preston/Somerset.
- **Route #14 (St-Laurent <-> Tunney's Pasture):** identified by OC Transpo as a "Frequent Route", this route operates all day, 7 days a week and at an average rate of every 15-to-30 minutes during weekday peak hours. The nearest bus stop to the site is at the intersection of Preston/Gladstone.
- **Route #85 (Gatineau <-> Bayshore)**: identified by OC Transpo as a "Frequent Route", this route operates at a high frequency within the study area. Route #85 operates 7 days a week, at an average rate of every 15 minutes or less during weekday peak hours. The nearest bus stops to the site are along Preston St.
- **Route #114 (Rideau <-> Carlington)**: identified by OC Transpo as a "Local Route", this route operates from Monday to Friday on a selected trip only basis. The nearest bus stio to the site is at the intersection of Preston/Gladstone.

The transit network for the study area is illustrated in **Figure 3** and the transit route maps are provided in **Appendix B**. **Figure 4** illustrates the bus stop locations.

Figure 3: Area Transit Network

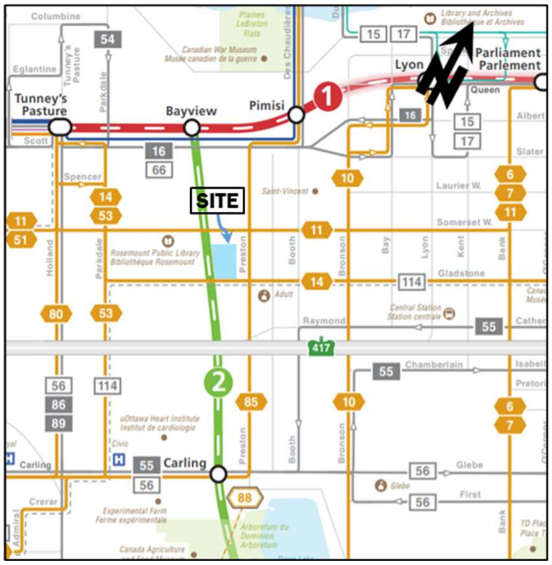
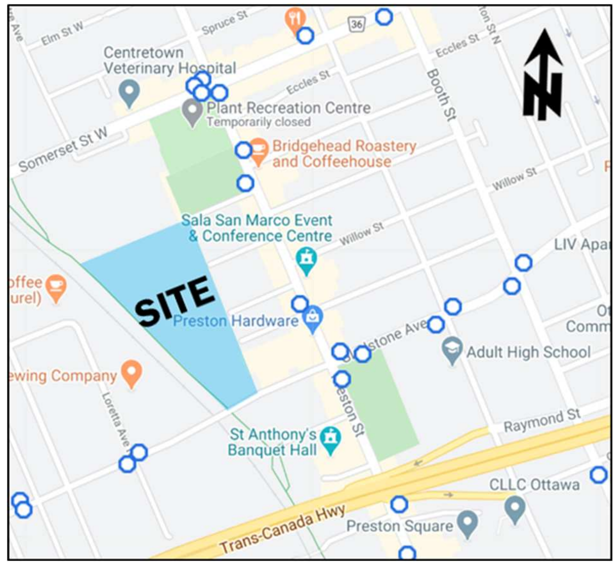


Figure 4: Bus Stop Locations

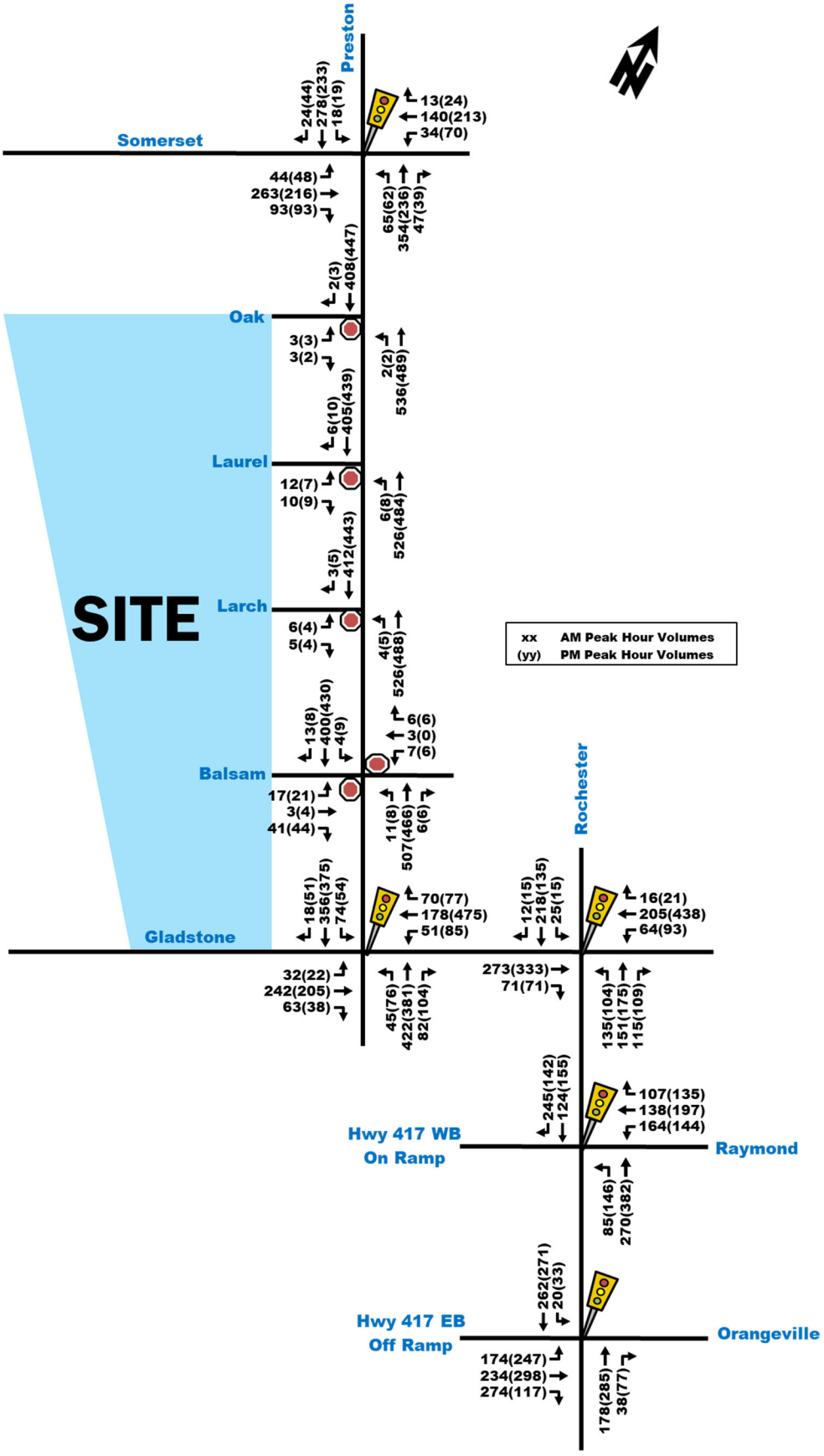


Peak Hour Travel Demands

The existing peak hour traffic volumes at the signalized intersections within the study area were obtained from the City of Ottawa and are illustrated in Figure 5. The raw traffic volume counts have been provided in Appendix C. With regards to the unsignalized intersections along Preston St, inbound and outbound traffic volumes from minor streets (Oak St, Laurel St and Larch St) were assumed based on a conservative 1 vehicle trip per residential unit estimate. This is a conservative assumption as calculations using the 2020 TRANS Report indicates a trip rate of approximately 0.35 to 0.40 vehicles per single-detached unit in the Ottawa Inner Area during the morning and afternoon peak hours.

A morning and afternoon peak hour traffic count was completed by Parsons December 2, 2020, for the intersection of Preston/Balsam. For simplicity and ensuring a more conservative approach, the through volumes at all unsignalized intersections on Preston St were balanced based on the volumes at the intersection of Gladstone/Preston intersection.

Figure 5: Existing Peak Hour Traffic Volumes



Existing Road Safety Conditions

A five-year collision history data (2014-2018, inclusive) was requested and obtained from the City of Ottawa for all intersections and road segments within the study area. It was determined that a total of 100 collisions involving two or more vehicles have occurred at intersections and road segments bounding the Gladstone Village site. Of the 100 collisions, 31 resulted from rear ends, 23 from turning movements, 15 from sideswipes, 23 from angled collisions, 2 from approaching and 6 from "other". Furthermore, the majority of collisions, 71 collisions, resulted in property damage only, while 29 resulted in non-fatal injuries. The source collision data provided by the City of Ottawa and detailed analysis results are provided in **Appendix D**.

A standard unit of measure for assessing collisions at an intersection is based on the number of collisions per million entering vehicles (MEV). Intersections with a ratio of 1.0 Collisions/MEV or greater are considered to be at a higher risk for collisions. Based on the City of Ottawa TIA Guidelines (2017), a collision pattern is characterized as a sequence of more than six collisions of the same impact type occurring for a specific movement within a five-year period. At signalized intersections within the study area, reported collisions have historically taken place at a rate of:

- 0.61 Collisions/MEV at the intersection of Gladstone Ave/Preston St. A total of 23 collisions occurred at this intersection in the past five-years, with no particular collision patterns observed. The highest sequence of collisions that occurred is 5 rear end collisions in the northbound approach.
- 0.71 Collisions/MEV at the intersection of Gladstone Ave/Rochester St. A total of 21 collisions occurred at this intersection with no particular collision pattern observed. The highest sequence of collisions that occurred is 5 angled collisions in the eastbound approach. The number of eastbound angled collisions may decrease in the future as a result of the recent prohibition of the EBL movement.
- 0.67 Collisions/MEV at the intersection of Preston St/Somerset St W. A total of 22 collisions occurred at this intersection with no particular collision pattern observed. The highest sequence of collisions that occurred is 5 rear end collisions in the westbound approach.

With regards to road segments on the development site's boundary streets, the number of collisions that have occurred are as follows:

- 24 collisions at different locations along Preston St, between Somerset St W and Gladstone Ave. The collisions are comprised of 7 rear ends, 3 turning movement, 4 sideswipe, 6 angled, 1 approaching and 3 "other" collisions.
- 4 collisions along Gladstone Ave, between Loretta Ave N and Preston St. The collisions are comprised of 1 rear end, 1 sideswipe, 1 angled and 1 approaching collisions.
- 5 collisions along Gladstone Ave, between Preston St and Rochester St. The collisions are comprised of 1 rear end, 1 turning movement, 1 sideswipe and 2 angled collisions.

Overall, there were no indications of significant safety concerns within the study area based on the historical collision review.

2.1.3. PLANNED CONDITIONS

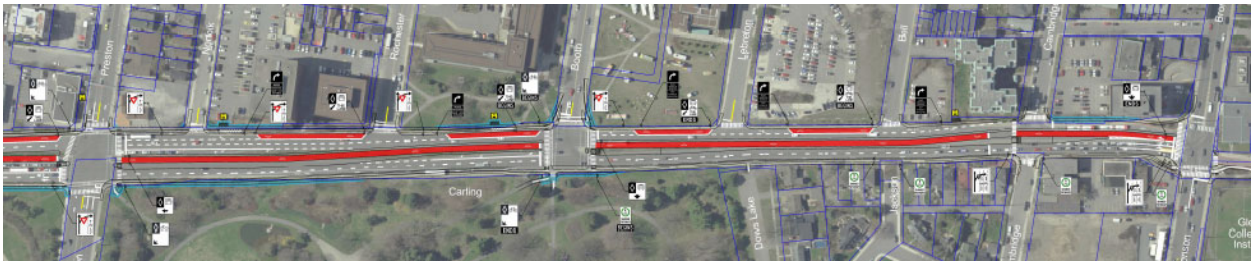
Stage 2 LRT

The Light Rail Transit (LRT) in the City of Ottawa has entered Stage 2 of its development, which will include the extending of Trillium Line rail corridor to Limebank in Riverside South. The Trillium Line expansion is expected to be completed by year 2022. Along with the expansion, new stations will be constructed along the Trillium Line, including Corso Italia Station (formerly Gladstone Station), which will be constructed immediately north of Gladstone Ave and west of the proposed Gladstone Village development site.

Carling Transit Priority Study

The Carling Ave Transit Priority Study is currently underway to provide a Recommended Functional Design Plan. The current plan within the vicinity of the site is shown as **Figure 6**. The curbside bus lanes along Carling Ave are expected to be implemented by 2022, and median bus lanes are expected between 2026 and 2028.

Figure 6: Carling Ave Transit Priority Plan

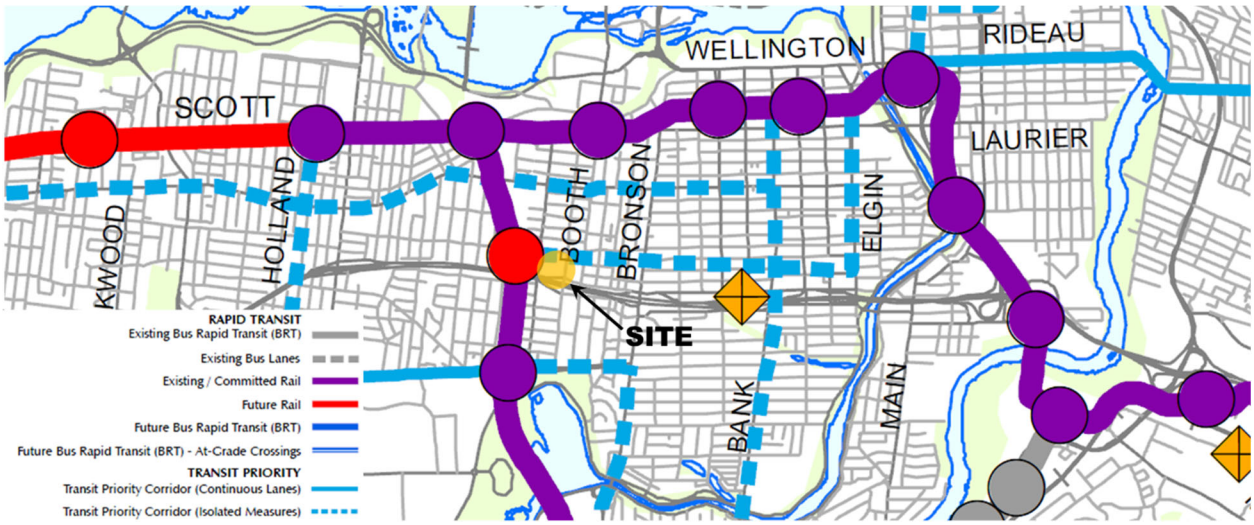


Source: https://ottawa.ca/en/carling-avenue-transit-priority-measures

Gladstone Ave Transit Priority

As seen in **Figure 7**, Gladstone Ave is proposed a transit priority corridor with isolated measures as per the 2031 Affordable Network within the Transportation Master Plan. The isolated transit priority corridor measures are proposed from Elgin St to the future Corso Italia LRT Station, passing adjacent to the site on Gladstone Ave.

Figure 7: Transportation Master Plan: 2031 Affordable Network



Source: https://ottawa.ca/en/planning-development-and-construction/official-plan-and-master-plans/transportation-master-plan

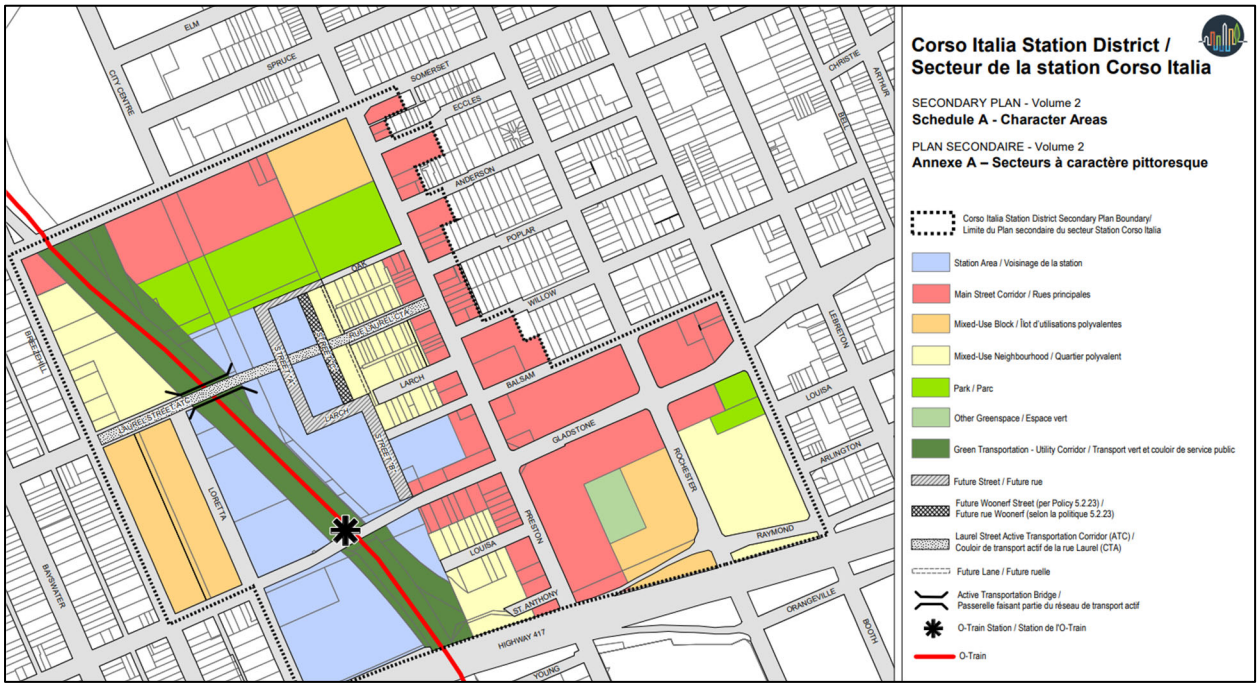
Other future transportation network changes may include:

- The extension of Preston St from its north terminus at Albert St to Sir John A. Parkway as illustrated in the TMP's Network Concept and Affordable Network. However, City staff have confirmed that this has not been budgeted for as of yet.
- The signalization of the Trillium Line MUP crossing on Gladstone Ave to be built by TransitNext as part of LRT Stage 2 works.
- As part of planned pedestrian safety enhancements, the eastbound and southbound right-turn-on-red will be prohibited at the intersection of Preston/Gladstone.

Corso Italia (formerly Gladstone) Station District Secondary Plan

Previously, three planning studies were undertaken by the City of Ottawa around the future adjacent LRT Stations at Bayview Station, Gladstone Station and Preston-Carling Station. The purpose of these studies was to examine how the areas around these stations may be redeveloped. Since then, Secondary Plans have been completed for both Bayview Station and Preston-Carling Station. The Gladstone Station study was put on hold for several years and reinitiated in May 2019 and the secondary plan was approved by the Planning Committee in February 2021. The potential land uses within the Corso Italia District, as provided in Schedule A of the Secondary Plan, are illustrated in **Figure 8**.

Figure 8: Corso Italia Station District Potential Land Use (from City of Ottawa)



The purpose of the Corso Italia Station District Secondary Plan is to provide a "detailed area-based policy direction to guide both public and private development and investments over the next 25 years." The following are major considerations with regards to transportation in the Secondary Plan, affecting internal roads and site accesses of the Gladstone Village development, as well as study area roads such as Gladstone Ave and Rochester St:

- A new Laurel St Active Transportation Corridor (ATC) will connect from the dead-end of Laurel St to the Trillium Line pathway through the Gladstone Village site, where it will provide a pedestrian/cyclist crossing over the rail corridor and connect to a future north-south MUP that runs parallel on the west side of the rail corridor.
- Balsam St and/or Larch St can be connected to the proposed Gladstone Village development based on the recommendations of transportation studies, such as the subject TIA for the Gladstone Village Plan of Subdivision or any subsequent TIA submitted along with a given Site Plan Application.
- Along the north side of Gladstone Ave, between the Trillium Line corridor and Booth St, ample sidewalks space shall be provided, separated by a planted trees strip, and will include ample bicycle parking and bus stops and shelters. A widened right-of-way for Gladstone Ave to accommodate active transportation needs shall also include a bicycle lane.
- Rochester St is anticipated to be designed as a complete street, which will include wide sidewalks, bicycle facilities, on-street parking, and street trees within the available right-of-way.

- Bicycle parking is to be provided at a minimum rate of 1.0 bike parking space per residential unit.
- Speed management measures along the internal streets of Gladstone Village, including allowing a maximum driving speed of 30km/h, providing bulb-outs, speed humps, etc.

Other Area Developments

The following section outlines adjacent developments within the study area. It should be noted that, based on the City of Ottawa's Development Applications search tool, many applications have been initiated surrounding the development site. However, the majority of these applications involve minor renovations to an existing development, or the construction of a low-rise residential building. **Figure 9** illustrates the locations of major other area developments, relative to the Gladstone Village development site.

Figure 9: Other Nearby Developments

951 Gladstone Ave and 145 Loretta Ave North

A mixed-use development proposed by Commvesco Levinson Viner (CLV), which will consist of 846 residential units, 198,165 sq.ft. of office space and 17,611 sq.ft. of retail space. The development will be fully constructed by 2026. During the morning peak hour, the development is anticipated to generate approximately 116 vehicle trips and 774 person trips. During the afternoon peak hour, the development is anticipated to generate approximately 125 vehicle trips and 840 person trips.

811 Gladstone Ave

A residential development is proposed by the Ottawa Community Housing Corporation at 811 Gladstone Ave. The development will consist of 108 residential units and 32 townhomes and is expected to be constructed in 2020. During the morning peak hour, the development is expected to generate 15 vehicle trips and 100 total person trips. During the afternoon peak hour, the development is expected to generate 16 vehicle trips and 105 total person trips. Given the low projected number of vehicle trips, the traffic impact caused by this development is considered negligible. As such, it will not be included in the future background volumes illustrated in this report.

818 Gladstone Ave (Rochester Heights)

The Ottawa Community Housing Corporation is proposing a mixed-use development at 818 Gladstone Ave. The site is currently occupied by nine residential building, for which a Demolition Control Application has been received by the City. The new development will consist of 673 residential units, as well as 71,600 ft^2 commercial space. The anticipated year of occupancy for this development is 2028.

989 Somerset St/158 Spruce St

The proposed development by Domicile Development Inc. consists of 127 residential condo units and 15,169 ft^2 of commercial space within a 12-storey building. The development was anticipated to generate up to 50 veh/h during the afternoon peak hour, which are expected to utilize the intersection of Albert/City Centre. As such, it will not be included in the future background volumes illustrated in this report.

1040 Somerset St

Claridge Homes is proposing a 30-storey mixed-use building that will provide 268 residential units and 141 m^2 of commercial space. Full buildout of the development is anticipated by 2025. The development is anticipated to generate up to approximately 26 new auto trips in the study area.

1050 Somerset St

Claridge Homes is proposing a 28-storey mixed-use building that will provide 271 condo units and 567 m^2 of commercial space. The traffic analysis report provided on the Development Applications search tool appears to be outdated, having been prepared in 2012, and inconsistent with the proposed site statistics. As such, it is assumed that the application is on hold and this development will not be included in the future background volumes illustrated in this report.

Other Developments

The following are other anticipated future developments that were worth noting, but were not included in the future background volumes due to lack of available information or were considered far enough away to have limited impact on the study area.

- **Adjoining Lands to the east of the Gladstone Village site** – the Corso Italia Station District Secondary Plan has granted the adjoining block to the east of the site between Larch St, Balsam St and Preston St a height of 6-storeys for their development. Additionally, the adjoining block between Balsam St, Gladstone Ave and Preston St was granted a podium height of 6-storey, coupled with 12-storey and 25-storey towers. Altogether, these two blocks now have the potential to be redeveloped with more than 600 residential units. The redevelopment of one or both of these blocks may be on the horizon within the coming years, given the incentives for the redevelopment.

- A **Federal building (PSPC)** is located at 1010 Somerset St W in the land directly north of the Gladstone Village site. Due to servicing limitations, the site may be redeveloped in conjunction with the development of Gladstone Village. A TIA Study has not yet been competed for this expansion.
- **The Ottawa Hospital** is constructing a new campus at 930 Carling Ave and 520 Preston St. The site will take up considerable space but is also anticipated to promote active and transit modes of travel. At the time of this study, a TIA Study was being prepared in support of a zoning application, but has yet to be approved.

- **Canada Lands Company (CLC)** is proposing to construct a mixed-use development at 552 Booth St, consisting of five residential buildings containing 1,000 dwelling units and five heritage buildings containing 142,200 sq.ft. of retail/office space. The site is currently occupied by a Natural Resources Canada office/research complex. The new development is expected to be constructed by 2025. While the development is expected to generate 175 vehicle trips during both morning and afternoon peak hours, most vehicles are anticipated to utilize both Hwy 417 and Carling Ave, which is outside the area of influence of the Gladstone Village site.

2.2. Study Area and Time Periods

The proposed development is a mixed-use residential development that is anticipated to be fully constructed by 2031. As such, the horizon year being analyzed in this report is 2031 using the weekday morning and afternoon peak hour time period traffic volumes.

Note that the TIA Guidelines typically require analysis of a second horizon year at five-years after full buildout (i.e. 2036). However, the City of Ottawa TMP and affordable networks only provide plans for future City infrastructure up to year 2031. Furthermore, the subject site will be located in close proximity to the new Corso Italia LRT Station, which will greatly increase transit use in the surrounding area. The peak hour performance of the adjacent road network is expected to be very similar in 2036. As such, the 2036 horizon year was not assessed in this TIA report. Considering the applicant is applying for a Plan of Subdivision application, there will be subsequent opportunities to assess the long-term transportation implications through the Site Plan Control Applications for future phases of this development, at which time there may be more clarity on the long-term plans for the City's transportation network beyond the 2031 horizon.

Proposed study area intersections are outlined below and highlighted in **Figure 10**.

- Preston St/Somerset St W;
- Preston St/Gladstone Ave;
- Gladstone Ave/Rochester St;
- Rochester St/Raymond St/Hwy 417 WB On Ramp;
- Rochester St/Orangeville St/Hwy 417 EB Off Ramp;
- Preston St/Oak St;
- Preston St/Laurel St;
- Preston St/Larch St; and
- Preston St/Balsam St.

Figure 10: Study Area

2.3. Exemption Review

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

Table 1: Exemptions Review Summary

Module	Element	Exemption Consideration
4.1 Development Design	4.1.2 Circulation and Access	This element is not required for applications involving Plan of Subdivision.
4.2 Parking	All	This module is not required for applications involving Plan of Subdivision.

3. Forecasting

3.1. Development Generated Travel Demand

3.1.1. TRIP GENERATION AND MODE SHARES

Trip Generation Rates

The proposed development will consist of 96 townhome units, 1,004 apartment units, approximately 77,000 ft^2 of retail/commercial/institutional space that is anticipated to be used primarily by the local community, as well as 100,000 ft^2 of office space. The size of the non-residential land uses (retail/commercial/institutional and office spaces) were based on conservative estimates, the scale of these uses will be confirmed in subsequent Site Plan Control applications for future phases.

The appropriate trip generation rates for townhomes and high-rise apartment units were obtained from the 2020 TRANS Trip Generation Manual. The Manual provides person-trip rates during the peak AM and PM periods (i.e. 7am-9:30am and 3:30PM-6PM). The peak hour trip generation rates for the non-residential land uses were obtained from the ITE Trip Generation Manual (10th edition), assuming "Shopping Center" land use for the retail/commercial/institutional land use and "General Office Building" for the office land use. The trip rates are summarized in **Table 2** below.

Table 2: Proposed Development Trip Rates

Land Use	ITE/TRANS Designation	Data Source	Trip Rates	
			AM Peak	PM Peak
Residential	"Townhomes (Low-Rise Units)"	TRANS	T = 1.35(du);	T = 1.58(du);
	"High-Rise Apartments"	TRANS	T = 0.8(du);	T = 0.9(du);
Commercial	"Shopping Center"	ITE 820	T = 0.94(x);	T = 3.81(x);
Office	"General Office Building"	ITE 710	T = 1.16(x); T = 0.94(x) + 26.49;	T = 1.15(x); Ln(T) = 0.95Ln(x) + 0.36;

Notes: *T = Average Vehicle Trip Ends*
du = Dwelling unit
x = Gross Floor Area (1,000 ft^2)

Residential Trip Generation

Using the respective residential trip rates in **Table 2**, the total number of vehicles per hour generated by the proposed residential land uses of Gladstone Village are calculated for the morning and afternoon peak periods, as shown in **Table 3**.

Table 3: Residential Units Peak Period Person Trip Generation

Land Use	Dwelling Units	AM Peak Period Person Trips	PM Peak Period Person Trips
Townhomes (Low-Rise Units)	96	130	152
High-Rise Apartments	1,004	803	904
	Total	933	1,056

The proposed development's residential land use is anticipated to generate a total of approximately 933 and 1,056 person trips during the morning and afternoon peak periods, respectively. The total peak period person trips in **Table 3** are then divided into different travel modes using mode share percentages obtained from the 2020 TRANS Manual for the "Ottawa Inner Area" district. **Table 4** and **Table 5** provide the travel mode breakdown for the proposed townhome and high-rise apartments, respectively.

Table 4: Townhomes Peak Period Trips Mode Shares Breakdown

Travel Mode	Mode Share	AM Peak Period Person Trip	Mode Share	PM Peak Period Person Trips
Auto Driver	27%	35	31%	47
Auto Passenger	8%	10	9%	14
Transit	26%	33	20%	30
Cycling	9%	12	9%	14
Walking	30%	39	31%	47
Total Person Trips	**100%**	**130**	**100%**	**152**

Table 5: High-Rise Apartments Peak Period Trips Mode Shares Breakdown

Travel Mode	Mode Share	AM Peak Period Person Trip	Mode Share	PM Peak Period Person Trips
Auto Driver	26%	210	25%	229
Auto Passenger	6%	49	8%	74
Transit	28%	224	21%	193
Cycling	5%	44	6%	53
Walking	34%	276	39%	355
Total Person Trips	**100%**	**803**	**100%**	**904**

Standard traffic analysis is usually conducted using the morning and afternoon peak hour trips as they represent a worst-case scenario. In the 2020 TRANS Manual, Table 4 provides conversions rates from peak period to peak hours for different mode shares. The conversion rates are provided in **Table 6** below.

Table 6: Peak Period to Peak Hour Conversion Factors (2020 TRANS Manual)

Travel Mode	Peak Period to Peak Hour Conversion Factors	
	AM	PM
Auto Driver and Passenger	0.48	0.44
Transit	0.55	0.47
Bike	0.58	0.48
Walk	0.58	0.52

Using the conversion rates in **Table 6** and the peak period person trips for different travel modes in **Table 4** and **Table 5**, the peak hour trips for different travel modes can be calculated as shown in **Table 7** and **Table 8**.

Table 7: Townhomes Peak Hour Trips Mode Share Breakdown

Travel Mode	AM Peak Hour Trips	PM Peak Hour Trips
Auto Driver	17	21
Auto Passenger	5	6
Transit	18	14
Cycling	7	7
Walking	23	24
Total Person Trips	**70**	**72**

Table 8: High-Rise Apartments Peak Hour Trips Mode Share Breakdown

Travel Mode	AM Peak Hour Trips	PM Peak Hour Trips
Auto Driver	101	101
Auto Passenger	23	32
Transit	123	91
Cycling	26	25
Walking	160	185
Total Person Trips	**433**	**434**

As shown above, the residential land use of the proposed development is anticipated to generate a total of up to 506 total person trips, 122 total vehicle trips, 141 total transit trips and 241 total active transport (walking and cycling) trips during peak hours.

However, these mode shares do not account for the location of the proposed Gladstone Village development immediately next to the future Corso Italia LRT Station. With regards to transit-oriented development (TOD) areas, particularly for LRT stations along the Confederation Line, the City identifies mode share targets to be 20% auto driver and auto passenger, 65% transit and 15% active transportation modes.

The Corso Italia (Gladstone) LRT Station is located along the O-Train's Trillium Line, which would offer a great level of transit connectivity in the area, with planned intensification noted in the Corso Italia Station District Secondary Plan. Therefore, a slightly lower transit mode share was assumed for the proposed Gladstone Village development to reflect greater active travel potential being located near the City Core Area. The new assumed mode share percentages are provided in **Table 9** and **Table 10** for the townhomes and high-rise apartments, respectively.

Table 9: Townhomes Peak Hour Trips TOD Mode Share Breakdown

Travel Mode	Mode Share	AM Peak Hour Trips	PM Peak Hour Trips
Auto Driver	15%	10	11
Auto Passenger	5%	3	4
Transit	50%	35	36
Cycling	5%	3	4
Walking	25%	17	18
Total Person Trips	**100%**	**70**	**72**

Table 10: High-Rise Apartments Peak Hour Trips TOD Mode Share Breakdown

Travel Mode	Mode Share	AM Peak Hour Trips	PM Peak Hour Trips
Auto Driver	15%	65	65
Auto Passenger	5%	22	22
Transit	50%	217	217
Cycling	5%	22	22
Walking	25%	108	108
Total Person Trips	**100%**	**433**	**434**

Using the modified mode shares above, the breakdown of inbound and outbound trips for the townhomes and high-rise apartments are provided in **Table 11** and **Table 12** respectively.

Table 11: Townhomes Mode Shares Breakdown (2020 TRANS Report)

Travel Mode	AM Peak (Person Trips/h)			PM Peak (Person Trips/h)		
	In (30%)	Out (70%)	Total	In (56%)	Out (44%)	Total
Auto Driver	3	7	10	6	5	11
Auto Passenger	1	2	3	2	2	4
Transit	11	25	35	20	16	36
Cycling	1	2	3	2	2	4
Walking	5	12	17	10	8	18
Total Person Trips	**21**	**49**	**70**	**40**	**32**	**72**

Table 12: High-Rise Apartments Mode Shares Breakdown (2020 TRANS Report)

Travel Mode	AM Peak (Person Trips/h)			PM Peak (Person Trips/h)		
	In (31%)	Out (69%)	Total	In (58%)	Out (42%)	Total
Auto Driver	20	45	65	38	27	65
Auto Passenger	7	15	22	13	9	22
Transit	67	150	217	126	91	217
Cycling	7	15	22	13	9	22
Walking	33	75	108	63	45	108
Total Person Trips	**134**	**299**	**433**	**252**	**182**	**434**

Using the tables above, the projected number of trips anticipated to be generated by the residential land uses of Gladstone Village are provided in **Table 13**.

Table 13: Total Residential Trip Generation

Travel Mode	AM Peak (Person Trips/h)			PM Peak (Person Trips/h)		
	In	Out	Total	In	Out	Total
Auto Driver	23	52	75	44	32	76
Auto Passenger	8	17	25	15	11	26
Transit	78	175	252	146	107	253
Cycling	8	17	25	15	11	26
Walking	38	87	125	73	53	126
Total Person Trips	**155**	**348**	**503**	**292**	**214**	**506**

As shown in **Table 13**, the total number of vehicle trips anticipated to be generated by the residential land uses are 75 and 76 vehicles per hour during the morning and afternoon peak hours.

Retail/Commercial/Institutional and Office Trip Generation

The local context for commercial retail uses, i.e. along Preston St and Gladstone Ave, are generally small-scale providing specialty goods/services. As such, the retail/commercial/institutional component of Gladstone Village was expected to provide a similar form of land uses that would be used mostly by the local community. At this early stage of the process, there was no information on potential tenants or specific uses onsite. Therefore, the ITE designation for "Shopping Center" was used as a very conservative assumption to estimate the number of trips generated by the anticipated non-residential and non-office uses.

Using the trip rates provided in **Table 2**, the total number of person trips per hour generated by the proposed non-residential land uses of Gladstone Village are multiplied by a factor of 1.28, as per TIA standards, to account for typical North American auto occupancy values of approximately 1.15 and combined transit and non-motorized modal shares of less than 10%. The resulting total person trips per hours are summarized in **Table 14**.

Table 14: Non-Residential Person Trips

Land Use	GFA (ft^2)	AM Peak (Person Trips/h)			PM Peak (Person Trips/h)		
		In	Out	Total	In	Out	Total
Shopping Center	77,000	57	36	93	180	196	376
General Office	100,000	132	22	154	23	123	146
Total		189	58	247	203	319	522

As shown in **Table 14**, the proposed development's retail and office land uses are anticipated to generate a total of approximately 247 and 522 person trips during the morning and afternoon peak hours, respectively. The total peak hour person trips in **Table 14** are then divided into different travel modes using mode share percentages obtained from the 2020 TRANS Manual for the "Ottawa Inner Area" district. **Table 15** and **Table 16** provide the travel mode breakdown for the proposed retail/commercial/institutional and office land uses, respectively.

Table 15: Shopping Centre Peak Hour Trips Mode Shares Breakdown

Travel Mode	Mode Share	AM Peak Hour Person Trip	Mode Share	PM Peak Hour Person Trips
Auto Driver	39%	36	22%	81
Auto Passenger	2%	2	4%	14
Transit	16%	15	12%	47
Cycling	3%	3	4%	15
Walking	40%	37	58%	219
Total Person Trips	**100%**	**93**	**100%**	**376**

Table 16: Office Peak Hour Trips Mode Shares Breakdown

Travel Mode	Mode Share	AM Peak Hour Person Trip	Mode Share	PM Peak Hour Person Trips
Auto Driver	45%	70	45%	66
Auto Passenger	7%	11	7%	10
Transit	29%	45	29%	42
Cycling	8%	12	8%	11
Walking	11%	17	11%	16
Total Person Trips	**100%**	**154**	**100%**	**146**

Given the proximity of the proposed land uses to the future Corso Italia LRT Station, the office land use is expected to have a similar mode share percentage breakdown to the residential land use. For the non-residential and non-office uses, these uses are expected to primarily serve the local community, thereby generating a high non-motorized (walk/bike) number of trips and lower transit and auto driver trips.

Using the total person trips in **Table 14** and modified future mode share percentages, the person trips anticipated to be generated by the retail/commercial/industrial land use are shown in **Table 17**, while the person trips anticipated to be generated by the office land use are shown in **Table 18.** The anticipated commercial retail uses proposed onsite are intended to serve the local community and Centertown area. As such, a percentage of the vehicle trips generated are anticipated to be pass-by vehicles. Furthermore, a **20% reduction in trips** was applied to the total person trips of the retail/commercial/institutional land uses (**Table 17**) to account for multi-purpose/internal trips between institutional and retail/commercial land uses.

Table 17: Shopping Center Trip Generation, with 20% Reduction in Total Person Trips

Travel Mode	Mode Share	AM Peak (Person Trips/h)			PM Peak (Person Trips/h)		
		In (62%)	Out (38%)	Total	In (48%)	Out (52%)	Total
Auto Driver	10%	4	3	7	14	16	30
Auto Passenger	5%	2	2	4	7	8	15
Transit	25%	12	7	19	36	39	75
Cycling	15%	7	4	11	22	23	45
Walking	45%	20	13	33	65	70	135
Total Person Trips (20% Reduction)	**100%**	**46**	**28**	**74**	**144**	**157**	**301**
Less Pass-by	34% (PM)	0	0	0	-5	-5	-10
Total New Auto Trips		**4**	**3**	**7**	**9**	**11**	**20**

Table 18: Office Trip Generation

Travel Mode	Mode Share	AM Peak (Person Trips/h)			PM Peak (Person Trips/h)		
		In (86%)	Out (14%)	Total	In (16%)	Out (84%)	Total
Auto Driver	15%	20	3	23	4	18	22
Auto Passenger	5%	7	1	8	1	6	7
Transit	50%	66	11	77	12	61	73
Cycling	5%	7	1	8	1	6	7
Walking	25%	34	5	39	6	31	37
Total Person Trips	**100%**	**132**	**22**	**154**	**23**	**123**	**146**

As shown in **Table 17**, the retail/commercial/institutional land uses are anticipated to generate a total of 74 and 301 person trips per hour, as well as 7 and 20 vehicle trips per hour, during the morning and afternoon peak hours respectively. The average pass-by percentage of a Shopping Center is 34%, which was applied to the afternoon peak hour only, as the morning peak hour trips are minimal. As shown in **Table 18,** the office land use is anticipated to generate a total of 154 and 146 person trips per hour, as well as 23 and 22 vehicle trips per hour, during the morning and afternoon peak hours respectively.

Total Trips Generated

The total person trips anticipated to be generated by the residential, retail/commercial/institutional and office land uses of the future Gladstone Village development are provided in **Table 19**.

Table 19: Total Trips Generated by Gladstone Village

Travel Mode	AM Peak (Person Trips/h)			PM Peak (Person Trips/h)		
	In	Out	Total	In	Out	Total
Auto Driver	47	58	105	62	66	128
Auto Passenger	17	20	37	23	25	48
Transit	156	193	348	194	207	401
Cycling	22	22	44	38	40	78
Walking	92	105	197	144	154	298
Total Person Trips	**333**	**398**	**731**	**459**	**494**	**953**
Less Pass-by	0	0	0	-5	-5	-10
Total New Auto Trips	**47**	**58**	**105**	**57**	**61**	**118**

Based on the results provided in **Table 19**, the future development is anticipated to generate approximately 731 and 953 person trips, as well as 105 and 118 vehicle trips during the morning and afternoon peak hours respectively.

3.1.2. TRIP DISTRIBUTION AND ASSIGNMENT

Based on the 2011 OD Survey (Ottawa Inner Area district) and the location of adjacent arterial roadways and neighbourhoods, the distribution of site-generated traffic volumes was estimated as follows:

- 35% to/from the east via HWY-417 and Gladstone Ave;
- 30% to/from the west HWY-417 and Gladstone Ave;
- 15% to/from the north via Preston St; and,
- 20% to/from the south via Preston St.

The anticipated 'new' and 'Pass-By' auto trips for the proposed development from **Table 19** were then assigned to the road networks as shown in **Figure 11**.

3.1.3. TRANSPORTATION NETWORK PLANS

Refer to **Section 2.1.3: Planned Conditions**.

3.1.4. BACKGROUND GROWTH

A regression analysis was conducted using historic traffic count data (years 2002, 2004, 2006, 2011 and 2017) at the intersection of Gladstone/Preston. The results are summarized in **Table 20** below, with detailed analysis provided in **Appendix E**.

Table 20: Historical Background Traffic Growth at Gladstone/Preston

Time Period	Percent Annual Change				
	North Leg	South Leg	East Leg	West Leg	Overall
8 hrs	-1.32%	-1.07%	0.23%	1.27%	**-0.38%**
AM Peak	-1.43%	-1.00%	0.70%	1.42%	**-0.29%**
PM Peak	-1.60%	-1.67%	0.67%	2.21%	**-0.13%**

As shown in **Table 20**, the intersection of Gladstone/Preston only experienced growth on the west leg of the intersection. All other legs of the intersection have experienced either negative growth or no growth.

The Gladstone Station (now Corso Italia Station) District CDP – Transportation Review report (prepared by MMM Group in June 2015) considers future developments in the area in order to determine future traffic volumes in the Corso Italia Station District, and did not apply a traffic growth rate.

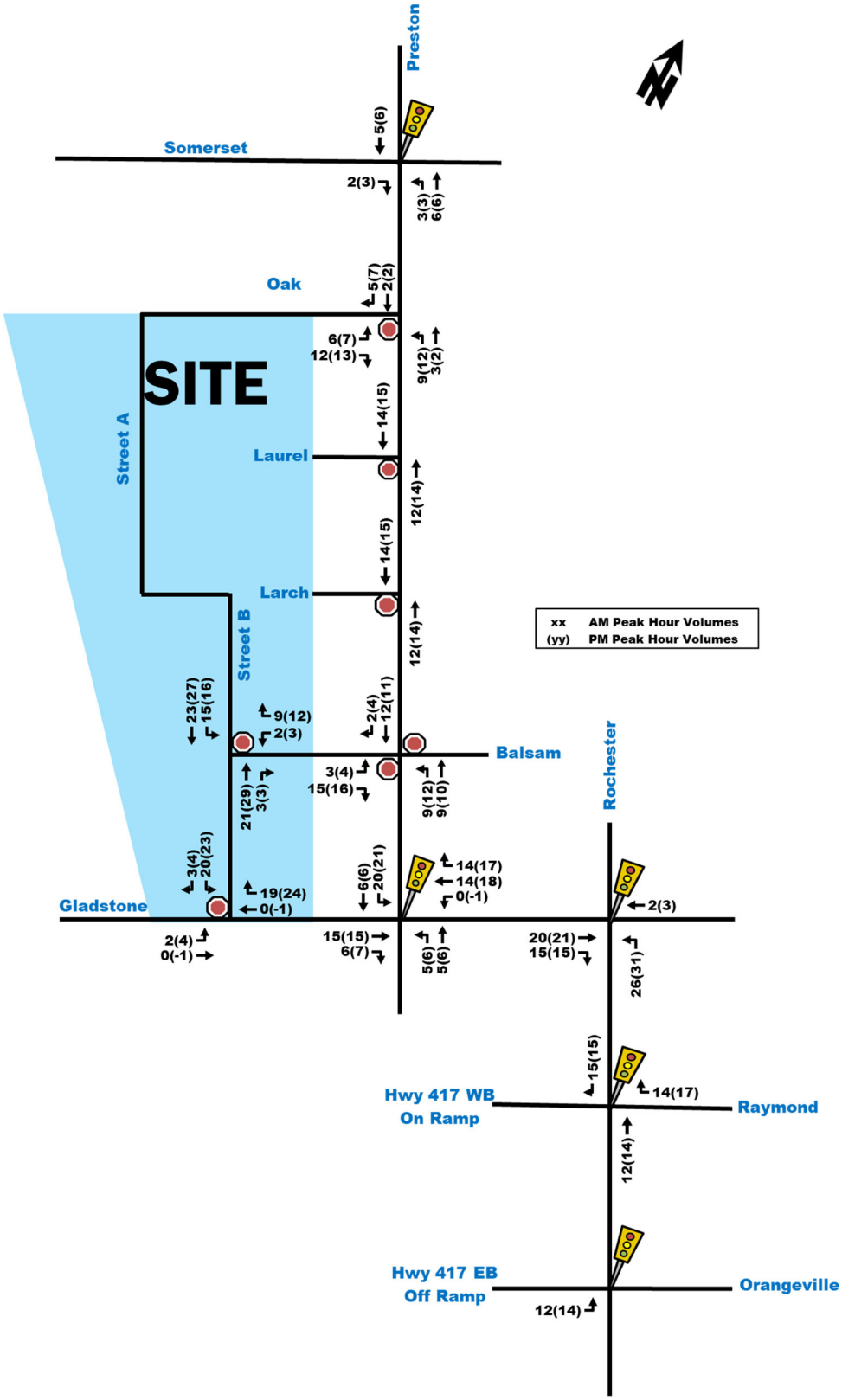
Therefore, a traffic growth rate of 0% was applied to the study area intersections.

3.1.5. OTHER DEVELOPMENTS

Descriptions of other area developments taking place within the study area was provided in **Section 2.1.3 - Other Area Developments**. Traffic volumes generated by the following other area developments were obtained from their respective TIA reports and considered in the analysis:

- 951 Gladstone Ave & 145 Loretta Ave North (**Figure 12**),
- 818 Gladstone Ave – Rochester Heights (**Figure 13**), and
- 1040 Somerset St (**Figure 14**).

Figure 11: 'New' and 'Pass-By' Site-Generated Traffic



3.2. Background Network Traffic

Figure 12: 951 Gladstone Ave & 145 Loretta Ave North Site-Generated Traffic Volumes

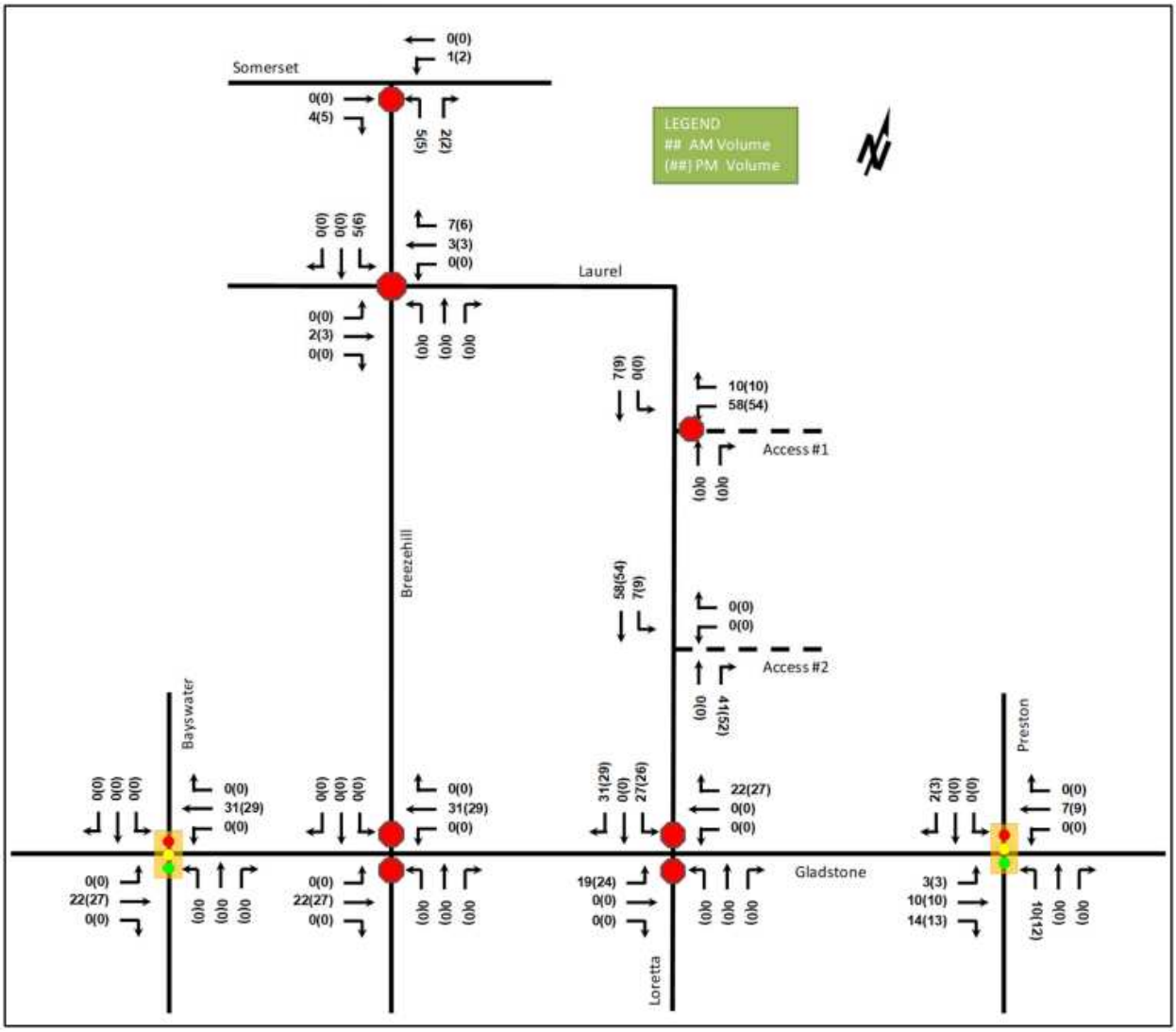


Figure 13: Rochester Heights – 818 Gladstone Ave Site-Generated Traffic Volumes

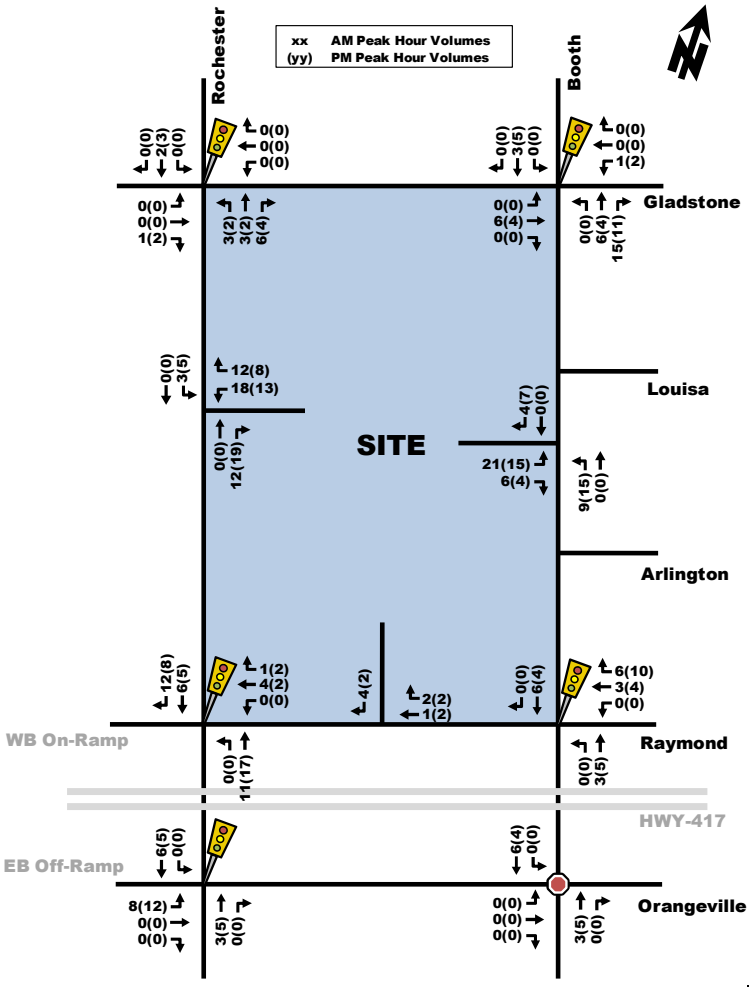
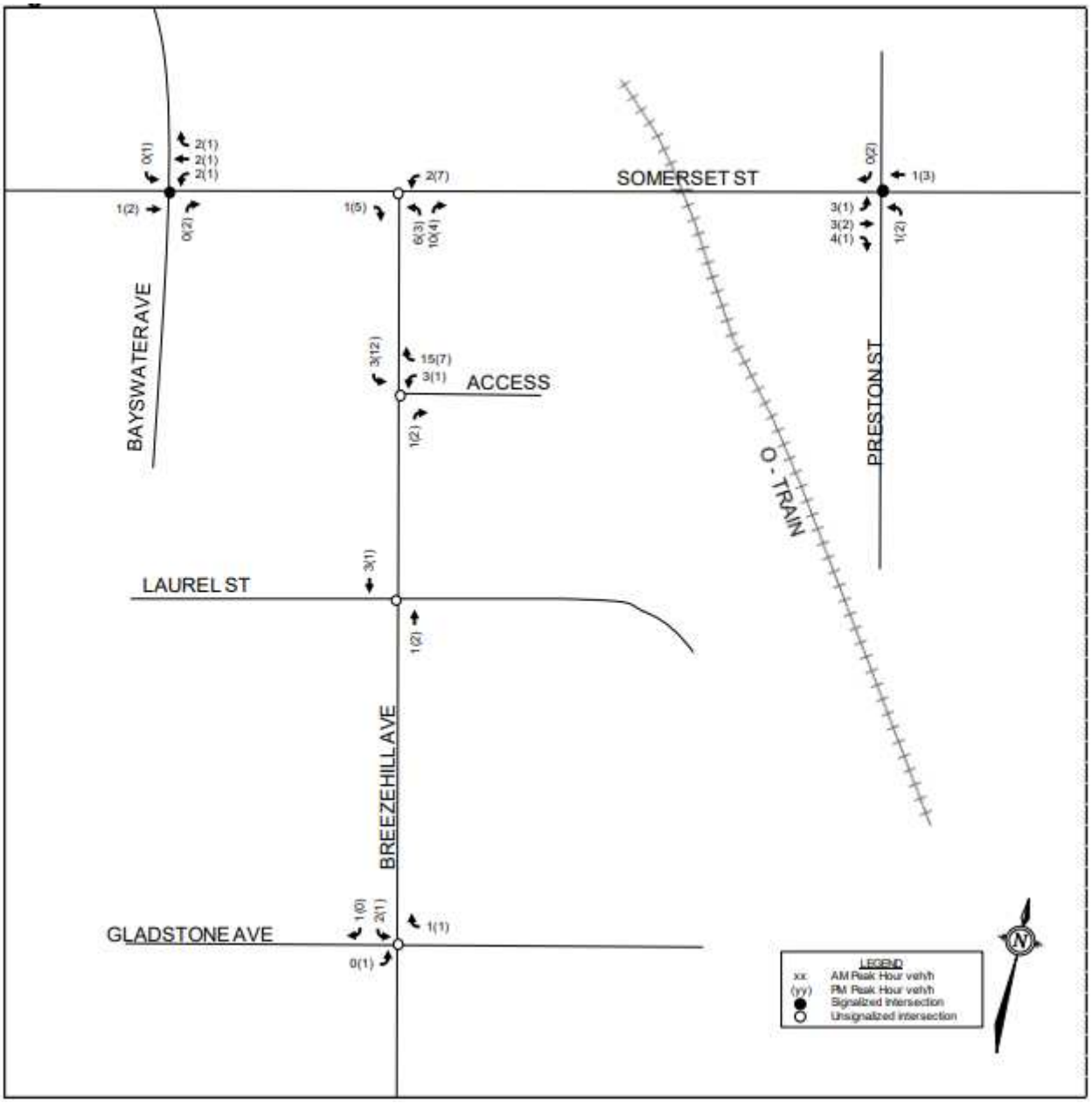


Figure 14: 1040 Somerset St Site-Generated Traffic Volumes



3.3. Demand Rationalization

Existing peak hour traffic volumes along Preston St and Gladstone Ave range between 500 and 650 vphpl in the peak direction respectively, which was reasonable for major collector and arterial roads. Since the annual growth was estimated to be 0%, the future background traffic volumes were not expected to increase significantly.

The future site-generated and adjacent development peak hour traffic volumes will add traffic to the adjacent road network, but the overall impact will be minor due to the influence of the upcoming Corso Italia LRT Station. Therefore, the proposed travel demand assumptions were considered acceptable.

4. Analysis

4.1. Development Design

4.1.1. DESIGN FOR SUSTAINABLE MODES

The City of Ottawa's TDM-Supportive Development Design and Infrastructure has been provided in Appendix F.

Car parking spaces are proposed in both underground parking garages for each apartment building and in private driveways for the townhome units. Bicycle parking spaces are also anticipated to be provided in the underground parking garage and on the surface.

As illustrated in the Site Plan (Figure 2), pedestrian and cycling facilities will be provided throughout the Gladstone Village site, including sidewalks on both sides of the internal Street A, Street B and Larch St extension, along with pedestrian crossings at various points, and internal pathways connecting to/from the Trillium Line MUP. The sidewalks and pathways will also connect to the existing sidewalk facilities on Gladstone Ave, Balsam St, Larch St, Laurel St and Oak St. Note, the existing section of Oak St only has a sidewalk on the south side.

Transit operations of the existing bus routes operating in the area may be modified by OC Transpo once the Corso Italia LRT Station is fully constructed.

Design related elements will be reviewed in more detail during the Site Plan Control applications for future phases.

4.1.2. CIRCULATION AND ACCESS

Exempt – see Section 2.3.

4.1.3. NEW STREET NETWORKS

Oak St extension and Street B represent the internal spine roads that connect to the external network at Preston St and Gladstone Ave. A third internal road connection is needed to provide resiliency and redundancy in the internal network. Balsam St was encouraged as the third connection in the CISP, but this roadway has significant constraints, and the preferred third connection is Larch St to the benefit of the local road network. A more detailed discussion regarding the third connection has been provided in Section 4.4.

The internal road network will be designed as a 30 km/h residential local street, with various traffic calming measures, on-street parking along certain sections, and sidewalks and pathways to ensure excellent connectivity for pedestrians and cyclists to surrounding networks and transit facilities.

An internal woonerf is proposed between townhome units, providing access for garbage and other City services. Multiple connection points will be provided to the Trillium Pathway, with a proposed connection between Blocks C and D to a future active transportation corridor and bridge crossing over the Trillium Line.

The proposed Street B/Gladstone intersection is expected to be full movement stop-controlled intersection. There will not be any significant modifications to existing off-site intersections or roadways. Therefore, a Road Modification Approval (RMA) report which consists of functional design drawings, was not necessary.

A new pedestrian crossover (PXO) may be considered the Preston/Laurel intersection, to provide pedestrians with a higher level of connectivity to areas on the other side of Preston St. This location was considered suitable for a PXO based on a future desire line, extending from existing sidewalks provided on Laurel St connecting to the proposed internal pathway, and eventually to the proposed pedestrian bridge crossing over the Trillium Line. It is also adequately spaced from the two existing PXOs on Preston St, at Balsam St and at Anderson St. This option will be explored further during the Site Plan Control process.

4.2. Parking

The total number of parking spaces anticipated to be provided will be identified in future Site Plan Applications, which will be completed in separate phases. Based on the City of Ottawa Parking Provisions, the development is located in "Area Z: Near Major LRT Stations", where no off-street vehicle parking is required to be provided for the proposed land uses. Nonetheless, as mentioned previously, parking will be provided as needed in underground parking garages for the residential buildings and as private driveways for the townhomes, along with parking for the office and retail components.

Visitor parking for the residential land uses is required to be provided at a rate of 0.1 per dwelling unit per building, with a maximum of 30 spaces needed per building, which equates to 120 parking spaces required for the 1,004 apartment units proposed in four different building blocks.

Bicycle parking is required at a rate of 0.50 per dwelling unit and 1 per 250m^2 of office/retail space in the Parking Provisions, which equates to 502 spaces for the 1,004 apartment units and 66 spaces for the combined retail/office space of 177,000 ft^2 (16,444 m^2). It should be noted that the Corso Italia District Secondary Plan requires a minimum rate of 1.0 bike parking space per multi-residential unit, which equates to 1,004 bike parking spaces. The applicant has indicated that the 1:1 ratio of bike parking to residential unit will be accommodated by the development.

4.3. Boundary Street Design

Using discrete quantitative methods, the Multi-Modal Level of Service (MMLOS) analysis describes the level of convenience and comfort experienced by pedestrians, cyclists, transit, and trucks. MMLOS analysis was conducted at the boundary roads of the proposed development, Gladstone Ave, Oak St, and Balsam St or Larch St. The geometry and features along the boundary streets are anticipated to be the same in both existing and future horizon year conditions for both Gladstone Ave and Oak St. Balsam St and Larch St may have different future designs as detailed by their cross-section discussion in **Section 4.4**, which assumes that both roads are enhanced to 30kph street designs, but maintain the existing ROW. Below is a description of the proposed development's boundary streets at the site's frontage:

Gladstone Ave (major collector road classification)

- 2.0m wide sidewalk and no boulevard,
- 2 lanes total (1 EB and 1 WB),
- 3.7m wide lanes,
- Operating speed of 50km/h,
- More than 3000 average daily curb lane traffic volume,
- No on-street parking, cycling facilities or transit facilities, and
- Not a designated truck route.

Oak St (local road classification)

- 1.8m wide sidewalk and no boulevard,
- 2 lanes total (1 EB and 1 WB),
- 3.5m wide curb-side lanes,
- Operating speed of 40km/h or less,
- Less than 3000 average daily curb lane traffic volume,
- On-street parking on one side of the road,
- No cycling or transit facilities, and
- Not a designated truck route.

Balsam St or Larch St (local road classifications)

- 1.8m wide sidewalks and no boulevard on both roads in existing conditions,

- 2m wide sidewalks on both roads and 2m wide inner boulevard on Larch St only in future conditions,
- 2 lanes total (1 EB and 1 WB),
- 3.5m wide curb-side lanes on Balsam St (shared with on-street parking in existing conditions) and 3.25m wide lanes on Larch St,
- Operating speed of 40km/h or less,
- Less than 3000 average daily curb lane traffic volume,
- On-street parking on one side of both roads in existing conditions and on one side of Larch St only in future conditions,
- No cycling or transit facilities, and
- Not a designated truck route, although a high volume of commercial trucks utilizes Balsam St.

Detailed analysis results have been provided in **Appendix G**. **Table 21** below provides a summary of the results, along with the minimum desirable targets obtained from the MMLOS Guidelines, for each respective travel mode. The targets are based on the proposed development site's location in a "within 300m of a school" Policy Area for existing conditions and in a "within 600m of a rapid transit station" Policy Area for future conditions, both of which provide the same MMLOS targets.

Table 21: MMLOS Analysis, Boundary Road Segments

Road Segment	Level of Service							
	Pedestrian (PLOS)		Bicycle (BLOS)		Transit (TLOS)		Truck (TkLOS)	
	PLOS	Target	BLOS	Target	TLOS	Target	TkLOS	Target
Gladstone Ave	C	A	D	B	D	D	B	No Target
Oak St	B	A	A	D	N/A	N/A	N/A	No Target
Balsam St	B, B*	A	A	D	N/A	N/A	C	No Target
Larch St	B, A*	A	A	D	N/A	N/A	N/A	No Target

*Based on the respective potential future cross-section designs in Section 4.4.

Red font in the table above indicates that the respective desirable target has not been met. As shown in **Table 21**, the pedestrian LOS targets are not met at any of the road segments in existing conditions, but are only met at Larch St in future conditions. Gladstone Ave does not achieve the PLOS 'A' due to the high average daily curb lane traffic volume and lack of boulevard. Oak St and Balsam St would require wider boulevard and sidewalk widths to achieve the PLOS 'A', which may not be achievable due to a limited right-of-way. Larch St can potentially provide a 2m boulevard in the future, given the available ROW.

The bicycle LOS target is not achieved along Gladstone Ave. This is due to high operating speeds and lack of dedicated cycling facilities.

It should be noted that there are no applicable TLOS results or targets for Oak St and Balsam St or Larch St as they are local roads with limited accessibility and no transit operations. Similarly, trucks are rarely anticipated to access Oak St or Larch St, as such, there is no applicable analysis result. On Balsam St, trucks access the Preston Hardware Store in existing and future conditions, which will be discussed in more detail in **Section 4.4**. Note that no TkLOS targets are available for these boundary roads in the MMLOS Guidelines.

4.4. Access Intersection Design

The main access intersections to the proposed development are proposed at three locations, including Oak St, Gladstone Ave and a third access at either Balsam St or Larch St, all of which are anticipated to permit all turning movements. The following discussion has been provided to inform the City of any potential design challenges at these locations.

<u>Preston/Oak Existing Intersection</u>

Oak St currently provides access to single-family homes on south side and a parking on the north side adjacent to Plouffe Park. As shown in **Figure 2**, the Oak St extension will connect to Street A, which connects to a short internal road labeled Larch St extension and connects to Street B which continues south to Gladstone Ave. The

internal roads of Gladstone Village provide access to the parking garage ramps of each building block and to the third connection (either Balsam St or Larch St). No changes to the existing Preston/Oak design were anticipated.

Gladstone/Street B New Site Access

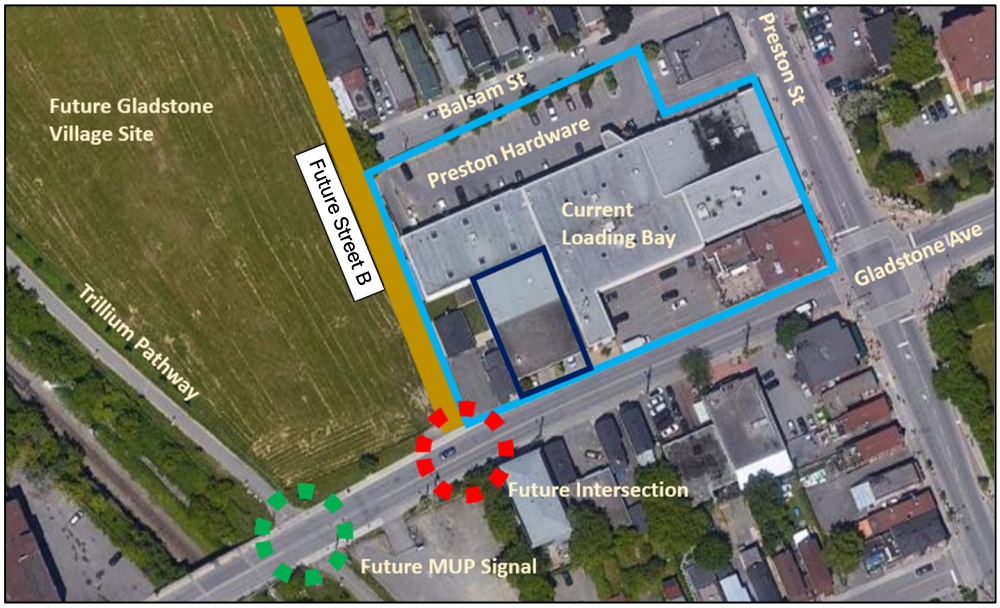
Potential design challenges at the future Gladstone/Street B intersection were assessed in this section. A supporting illustration has been provided in **Figure 15**

The Trillium Pathway crosses Gladstone Ave approximately 45m west of the proposed Gladstone/Street B access location, and City staff indicated that this crossing will be signalized once the Corso Italia LRT Station is constructed. It is assumed that the purpose of the signal is to allow pedestrians and cyclists to safely cross Gladstone Ave as demand increases in the future. The proximity of these two future intersections may create design challenges, particularly if an eastbound left-turn lane or traffic signal are triggered at Gladstone/Street B in the future. However, it was noted that the MTO left-turn lane warrant analysis for unsignalized intersections at the Gladstone/Street B access confirmed a left-turn lane was not warranted in the future. Further detail regarding future intersection operations and anticipated queues at Gladstone/Street B have been provided in **Section 4.9.2**. Therefore, a traffic control signal was not considered at this intersection.

City staff suggested restricting vehicle movements to right-in/right-out only at this intersection. Based on a review of local conditions, the location of the Oak/Gladstone intersection does not appear to be high risk location for collisions based on the forecasted peak hour volumes, anticipated level of service, and existing sightlines. Synchro analysis under full buildout conditions shows the Gladstone/Street B intersection operating at LOS 'A', while the southbound movement at an acceptable LOS 'C' (analysis provided in **Section 4.9.2**.). The operating speed on Gladstone Ave is 50km/h and Gladstone Ave is only a two-lane road. These results do not suggest there will be challenges for motorists leaving the site. We recommend the City observe operations during the Phase 1 occupancy to confirm if there is need for mitigation measures for future phases.

Another consideration for the Gladstone/Oak St intersection is the adjoining blocks to the east, between Larch/Balsam/Preston and between Balsam/Gladstone/Preston. Altogether, these 2 blocks now have the potential to be redeveloped with 600+ residential units, per the Secondary Plan. That said, redevelopment of either or both blocks may be on the horizon within the coming years. One of the key issues cited by the local Councilor was the existing truck loading bay fronting onto Gladstone Ave, which causes trucks to block the sidewalk and portions of the roadway at certain times of the day. The implications and possible mitigation of this concern was not considered in this TIA due to the uncertain timing and status of future development, but we have highlighted them, and they should be reviewed during future development applications within this block.

Figure 15: Potential Design Challenges for the Future Gladstone/Street B Intersection



Third Connection Location (Balsam St vs Larch St)

The Oak/Preston and Street B/Gladstone intersections are intended to be the primary access/egress points to the proposed development, but a third connection is needed to add resiliency to the local road network to avoid the other intersections being overburdened during peak periods by spreading traffic to three access points rather than two, thereby reducing the potential risks of severe congestion and incidents at the two primary access intersections. In addition, a 15% auto driver mode share for the development was assumed at full buildout, which is based on the City's target mode shares for TOD zones. The third connection also provides additional resiliency if ever this mode share target is not achieved. Finally, the third connection also adds redundancy in the local road network in the event either access is disrupted or closed (e.g. a vehicle failure/incident, maintenance/construction etc.).

The Secondary Plan currently suggests Balsam St as the third connection point. However, there was a stipulation that the preferred connection location would need to be vetted in future traffic studies, such as the subject TIA Report. The following discussion provides a rationale for Larch St as the preferred third connection.

Future Development

Balsam St currently provides access to local businesses (primarily the Preston Hardware) and a small number of single-family homes. There are no plans to alter the design of the Preston/Balsam intersection to support the subject site. Operationally, no modifications are needed to support the proposed development, however this does not account for future redevelopment of the block as noted in the Secondary Plan. Larch St currently provides access to residential homes and businesses on the corners of Preston St, and would provide access to future 6-storey building on the south side of Larch St.

The future Balsam St would need to accommodate 600+ new residential units, with future buildings capable of having a 6-storey podium and twin towers of 12-storeys and 25-storeys respectively, as shown in **Figure 16**. Additionally, if the existing Preston Hardware site remains, or is expanded, there is expected to be increased truck and delivery activity on Balsam St, mixed with general traffic.

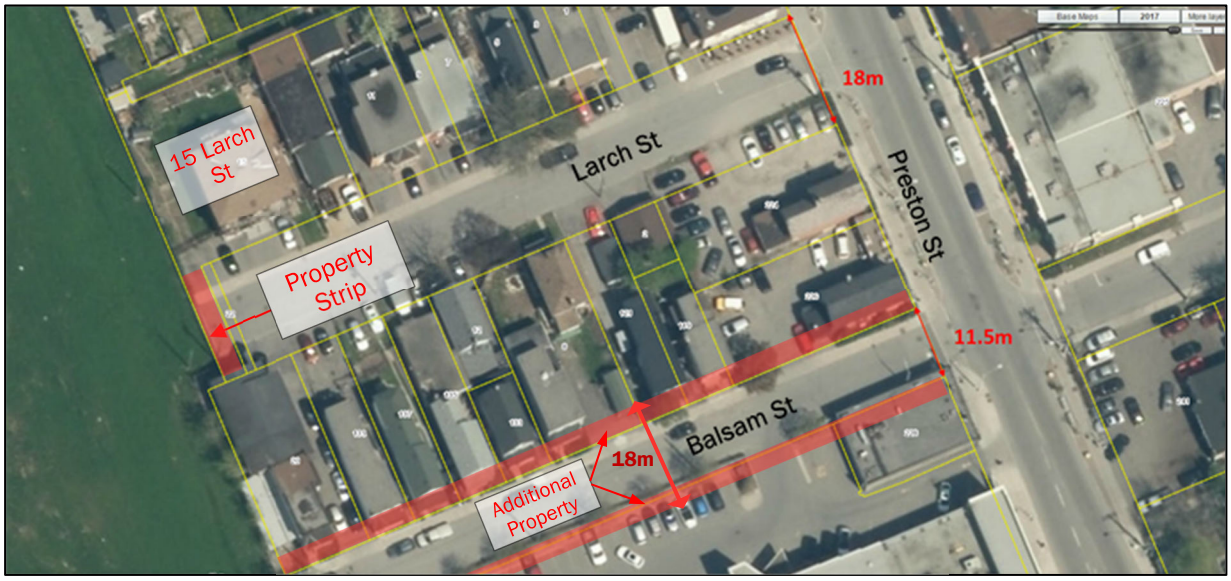
Figure 16: Preston Hardware Expansion with more than 600 New Potential Units

Design Constraints

There are also design constraints with Balsam St. There are substandard sidewalk facilities and the northwest and southwest corner buildings at Preston St abut the property line within a narrow 11.5m of right-of-way (ROW), as shown in **Figure 17**. Additionally, there are frequent truck deliveries along Balsam St to/from the Preston Hardware store, which could further impede traffic movements along Balsam St. In contrast, Larch St has 18m ROW available that can adequately accommodate pedestrian facilities, on-street parking, and landscaping. The ROW of Larch St and the future internal streets within Gladstone Village are expected to closely match, which ensures a smooth transition if a connection is made. Potential cross-section concepts have been provided in **Figure 18** and **Figure 19** that highlight the benefits of the wider ROW on Larch St.

Sight distances at the Larch St approach to Preston St are also slightly improved compared to the Balsam St approach, particularly for outbound left-turns, since the building at the southwest corner at Balsam/Preston is located within 1m of the street edge.

Figure 17: Balsam St and Larch St ROW



Property Implications

The significant design constraints on Balsam St would require the City to acquire additional property on either side of the road (an additional 6.5m total) to provide an equivalent ROW to Larch St.

One property implication on Larch St is also shown in **Figure 17**, where a property strip extends from the residential unit at 15 Larch St. This property strip will need to be acquired to connect to the municipal street network.

Neighbourhood Traffic Management

Another key point in favor of Larch St is that more traffic is likely to use Balsam St as a shortcut to Gladstone Ave than they are to use Larch St. This is because the intersection of Preston/Balsam is a four-legged intersection where traffic can travel westbound through Balsam St, while Larch St does not have an opposing east leg for traffic to shortcut through. Additionally, southbound right-turn traffic may also find Balsam St to be a more attractive shortcut to Gladstone Ave as it provides a shorter distance to avoid the Preston/Gladstone intersection compared to Larch St.

Figure 18: Balsam St 11.5m Concept Cross-Section

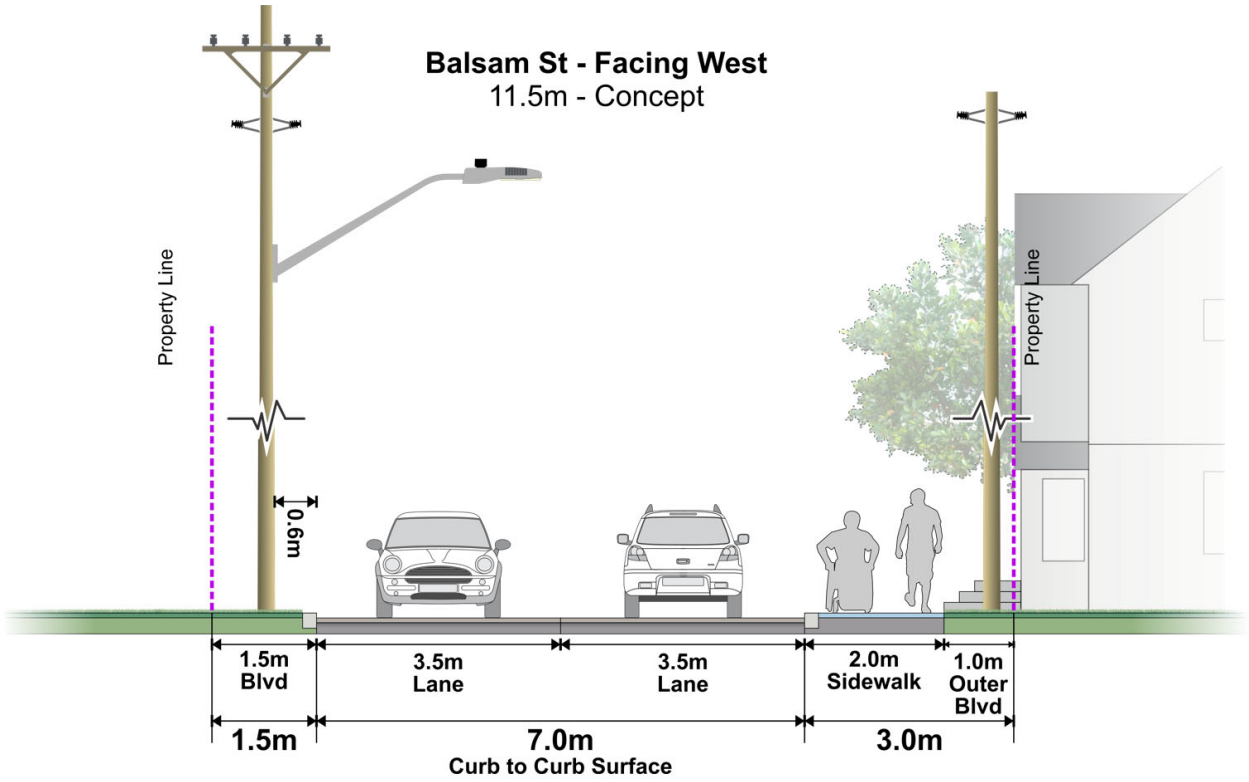
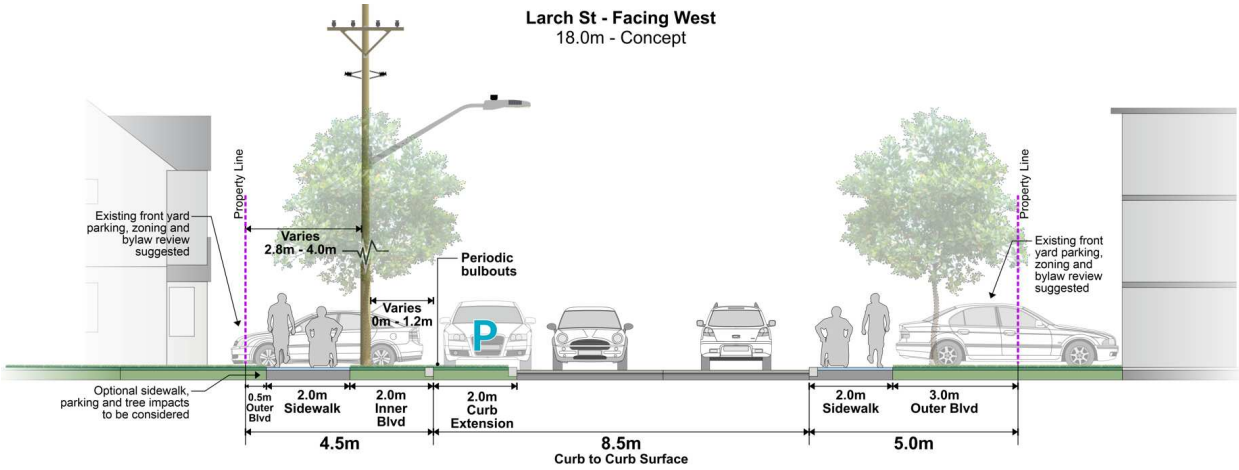


Figure 19: Larch St 18m Concept Cross-Section

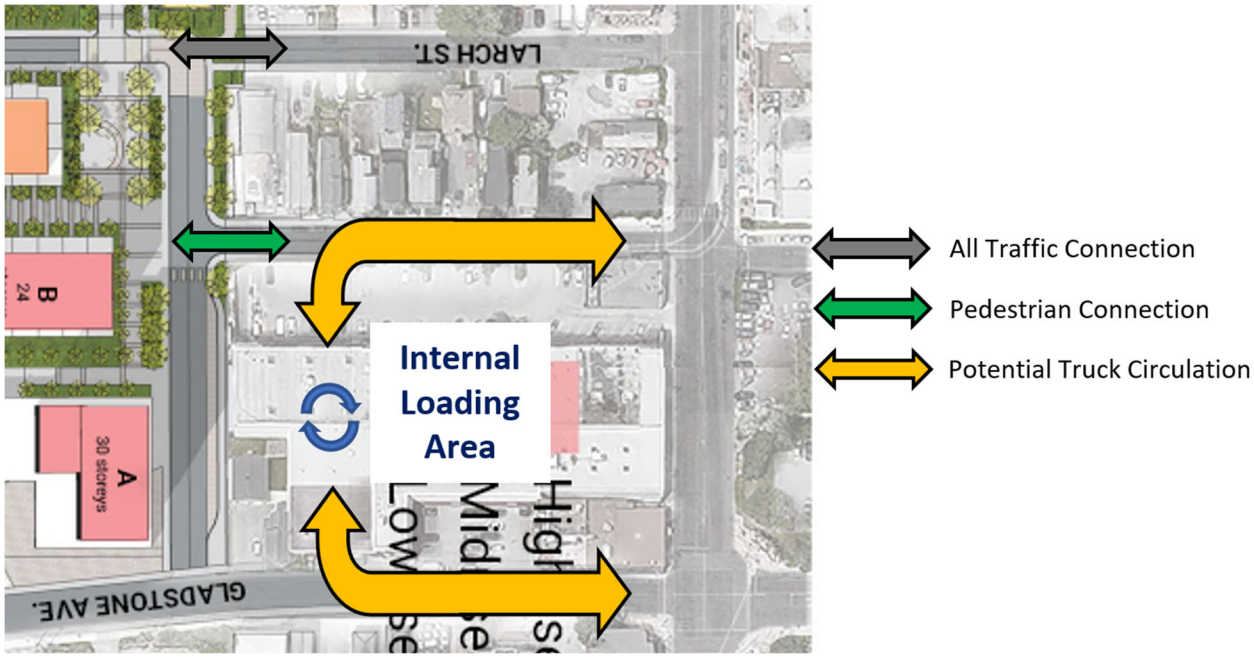


Closing

Based on the preceding discussion, the technically preferred location for the third connection to Gladstone Village is Larch St at the Larch St extension internal road of the site. It has sufficient ROW to accommodate future traffic and design requirements, it requires minimum property acquisition, it provides equal spacing of connecting streets within the local road network (between Oak St extension and Gladstone Ave), it minimizes short-cutting since it is a T-intersection and is farther from Gladstone Ave, and it does not risk a mix of future commercial truck/delivery traffic with general traffic. A revised cross-section (such as **Figure 19**) with traffic calming measures incorporated can minimize impacts on local residents, e.g. speed humps. As detailed by the MMLOS analysis, Larch St provides more opportunities to improve its level of convenience and comfort for local residents than Balsam St.

Balsam St should remain a dead-end road for general traffic, but it may still provide a pedestrian connection to Street B to promote active travel permeability in the network. Truck and delivery loading activities related to commercial uses within the Preston/Gladstone block should remain off-street, to minimize impacts to the adjacent road network (e.g. Gladstone Ave), as shown in **Figure 20**. This potential solution should be reviewed as part of future development applications within this block.

Figure 20: Potential Balsam St and Larch St Road Network Plan



4.5. Transportation Demand Management

The TDM Measures Checklist for potential applications onsite has been provided in **Appendix F**.

4.5.1. CONTEXT FOR TDM

The proposed development is located in both a Design Priority Area (DPA), known as Preston/Champagne Mixed Use Centre, and a Transit-Oriented Development (DPA) zone, where the future Corso Italia LRT Station is located within 250m. The property is owned and will be managed by the Ottawa Community Housing (OCH) Corporation.

Given the proposed land-uses of the development, it is assumed that most trips generated will be from residents leaving the site in the AM peak to go to work and returning to the site in the PM peak. A number of trips will also be generated by nonresidential uses such as office and retail space. The office space in particular would see trips travel to the site in the AM peak and leave the site in the PM peak.

Sections 3.1.1 and **3.1.2** describe how many trips are anticipated per travel mode and anticipates the likely locations that they will travel to and from based on the OD-Survey 2011 for Ottawa.

4.5.2. NEED AND OPPORTUNITY

The proposed development is located in a well-developed core area of the City of Ottawa, where transit and active transportation facilities, such as the LRT, the bike pathways, and the sidewalks, are well-maintained and developed, which naturally results in increased transit and active transportation usage and decreased auto trips.

The proximity of the development to the future Corso Italia LRT Station and the current ongoing east, west and south expansions of the LRT would further result in an increasing transit usage. As highlighted by the Corso Italia Station District Secondary Plan, the City has been adopting aggressive policies in transit-oriented development (TOD) in hopes of reducing personal vehicle use.

The proposed development is expected to utilize Transportation Demand Management (TDM) measures to maintain sustainable transit and active mode shares, as described in more detail in **Section 4.5.3** below.

4.5.3. TDM PROGRAM

The TDM Infrastructure and TDM Measures Checklists have both been provided in **Appendix F** for the residential land uses of the development. For the non-residential land uses, the TDM measures that may be provided largely depend on the type of commercial (i.e. grocery store, minor specialized businesses, etc.) or office use that would be on site.

At the time of this study, the development plan was still in its early stages and too early to confirm the type of non-residential land uses that would ultimately be provided. As such, the non-residential checklists were excluded from the TIA, but OCH is committed to supporting transit and active transport travel modes of the non-residential land uses, and specifics will be provided in subsequent Site Plan Control applications when more information about the size, scale, and type of non-residential uses are available.

A summary of proposed residential measures in each respective checklist are identified below.

<u>Proposed measures identified in the TDM-supportive Development Design and Infrastructure Checklist are:</u>

- All ten (10) Required measures related to Walking and Cycling (facilities and bicycle parking) and Vehicle Parking have been satisfied
- Eleven (11) of the fourteen (14) basic measures related to Walking and Cycling and Parking have been satisfied, namely:
    - Locating building close to the street.
    - Locating building entrances to minimize walk distance to sidewalks and transit.
    - Locating building doors and windows to ensure visibility of pedestrians.
    - Providing safe, direct and attractive walking routes to transit.
    - Ensuring walking routes are secure, visible, and lighted.
    - Designing roads for cyclist circulation.
    - Providing lighting, landscaping and benches along walking and cycling routes.
    - Providing wayfinding signage for site access.
    - Providing bicycle parking equivalent to expected number of resident-owned and visitor cyclists.
    - Providing parking for long-term and short-term users.
    - Provide shared parking for different uses (i.e. visitors, commercial, etc.)
- Three (3) of the seven (7) better measures related to Walking and Cycling and Carsharing and Bikesharing have been satisfied, namely:
    - Providing secure bike parking spaces equivalent to at least the number of units.
    - Providing a permanent bike repair station.
    - Providing carshare parking spaces for tenants and the benefit of the surrounding community.

<u>Proposed measures identified in the TDM Measures Checklist are:</u>

- Display walking and cycling information at major entrances.
- Display transit information at major entrances.
- Provide on-site carshare vehicles for residents and carshare memberships.
- Unbundle parking costs from monthly rent.
- Provide multi-modal travel information package to new residents.

4.6. Neighbourhood Traffic Management

This module of the TIA Report is required if the development relies on local or collector roads for access. Preston St and Somerset St are both classified as arterial roads and as such were not included in this analysis.

Based on the TIA Guidelines, the ideal two-way traffic volume threshold is 120 veh/h for local roads and 600 veh/h for major collector roads. Using the existing (**Figure 5**) and total projected 2031 traffic volumes (derived in **Section 4.9.1**), the following observations were made:

- Two-way traffic volumes on Oak St, Larch St or Balsam St are not expected to exceed the ideal two-way threshold of 120 veh/h of local roads.
- Two-way traffic volumes on Rochester St exceed the ideal two-way threshold of 600 veh/h of a major collector road in both existing and future conditions, with volumes up to approximately 850 veh/h during the morning peak hour and 920 veh/h during the afternoon peak hour.
- Two-way traffic volumes on Gladstone Ave exceed the ideal two-way threshold of 600 veh/h in both existing and future conditions, with volumes up to approximately 790 veh/h during the morning peak hour and 1,100 veh/h during the afternoon peak hour.

Among the internal roads, Oak St extension is the primary roadway connection while either Balsam St or Larch St would be a minor connection. The internal roads will be designed with sufficient capacity to accommodate local traffic needs. As previously noted, Balsam St has some design constraints given the limited right-of-way (11.5m) available, and while it would not necessarily affect corridor capacity, it would have limited space for other features.

Rochester, while not directly adjacent to the subject site, was expected to carry some development traffic. Due to the nature of the roadway as an access to/from Highway 417, high volumes of traffic are currently utilizing it south of Gladstone Ave, during the peak hours. Similarly, traffic volumes along Gladstone Ave are significantly greater in existing and future conditions compared to the ideal threshold of 600 veh/h.

The City may elect to reclassify both Rochester St and Gladstone Ave to arterial roads. However, it is notable that both collisions data at their respective intersections and traffic analysis results (provided in **Section 4.9.1**) indicates that there are no major delays, safety, or traffic operation concerns within the study area. Additionally, the City is in the process of implementing Stage 2 LRT, intensification policies, and promoting active modes of transportation within the City Core Area that will help reduce vehicle demand in the fullness of time. These initiatives will take time to mature before a lasting influence on travel behaviour is recognized. Therefore, no adjustments to existing roadway classifications are recommended.

4.7. Transit

As shown in **Table 19**, the proposed development is anticipated to generate up to a total of 401 transit trips during peak hours. These trips are expected to utilize both the Trillium Line LRT at the future Corso Italia Station along with any bus routes that will be operating in the area. The LRT was created with the purpose of accommodating a substantial number of riders in the future. As such, the future transit network is expected to have sufficient capacity that can easily accommodate the projected number of site-generated transit trips.

Existing conditions (pre-COVID) transit ridership data was obtained from OC Transpo for eight bus stops near the proposed development site, as shown in **Figure 21**. The data, provided in **Table 22**, is a summary of average bus boarding, alighting and occupancy information for bus routes at each of the respective stop numbers, during the morning and afternoon peak hours.

Figure 21: Transit Ridership Data Bus Stop Locations

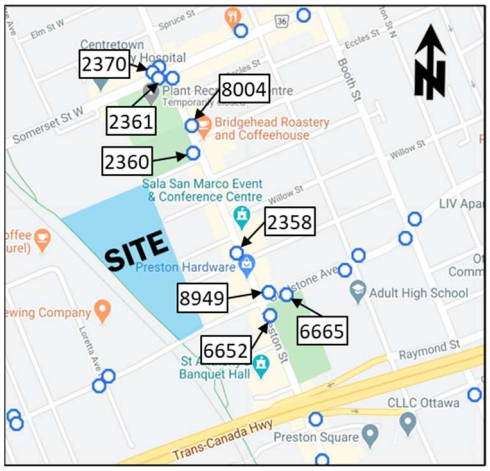


Table 22: Transit Ridership Data (5 Jan 2020 - 16 Mar 2020)

Stop No.	Location	Route	Direction	AM			PM		
				Boarding	Alighting	Avg. Load at Depart.	Boarding	Alighting	Avg. Load at Depart.
2358	Preston / Balsam	85	WB	18	59	32	20	26	22
2360	Preston / Oak	85	WB	7	4	35	6	12	23
2361	Somerset W / Preston	11	EB	23	10	18	28	12	21
2370	Somerset W / Preston	11	WB	15	19	14	17	26	24
6652	Preston / Gladstone	85	EB	18	54	20	27	26	23
6665	Gladstone / Preston	14	EB	17	29	11	40	8	12
		114	EB	-	-	-	-	-	-
8004	Preston / Anderson	85	EB	16	9	20	9	14	22
8949	Gladstone / Preston	14	WB	4	27	12	14	46	18
		114	WB	-	-	-	-	-	-

As shown in **Table 22**, the average load of each bus route at its respective bus stop ranges from about 11 to 35 persons during the peak hours. It should be noted that these bus routes serve their respective stops several times during peak hours. Bus routes #11, #14 and #87 in particular are “frequent routes” that arrive every 15 minutes or less during peak hours. In the future, the LRT will also be providing service in the area, at the Corso Italia Station. It is assumed that the LRT will arrive approximately every 5 minutes or less during peak hours.

Based on information obtained from the OC Transpo website, the person capacity of OC Transpo vehicles, which includes the number of seats on the bus plus the standing capacity, ranges from approximately 65 occupants in its smallest vehicles to approximately 150 occupants in its largest vehicles. The existing Trillium Line’s LRT capacity is approximately 262 occupants. However, the train is being upgraded in the future and is expected to accommodate a significantly greater capacity. Additionally, the Trillium Line South extension is expected to be designed to allow for conversion to a twin-track LRT, which will greatly increase capacity, although the timing for this is conversion is unknown at this time.

Therefore, based on the current average bus loads, the available capacity and frequency of the existing bus routes, and the future anticipated capacity and frequency of the LRT, the proposed development generating approximately 400 transit trips during peak hours is anticipated to be accommodated by the available and future transit services.

4.8. Review of Network Concept

Estimated site generated vehicle trips were approximately 105 during the morning peak hour and 118 during the afternoon peak hour. This result reflects the influence of the Corso Italia LRT Station and anticipated intensification in the nearby communities (as outlined in the Corso Italia Station District Secondary Plan), which will greatly increase transit and active transportation use to the site. Therefore, the number of vehicle trips will be manageable considering the area network currently has spare roadway capacity during the peak hour periods.

With regards to anticipated site-generated transit trips, they range from approximately 348 trips during the morning peak hour to 401 trips during the afternoon peak hour. The LRT is expected to comfortably accommodate these transit users. Therefore, the transit and auto networks are anticipated to perform acceptably with the added volumes from the Gladstone Village.

4.9. Intersection Design

4.9.1. INTERSECTION CONTROL

Stop control will be provided on Street B approaching Gladstone Ave. All other off-site intersection controls in the study area will continue to operate as in existing conditions, with prohibited eastbound and southbound right-turn-on-red introduced in the future at the intersection of Preston/Gladstone. Providing a traffic signal at the Gladstone Ave access is not considered necessary and would not be feasible due to the proximity of the access within 40m of the proposed future Trillium Line MUP crossing signal. Future background and total projected 2031 scenarios include analysis of the proposed signal to assess impacts to the transportation network.

4.9.2. INTERSECTION DESIGN

Synchro 10 Trafficware was used to analyze intersection performance of intersections within the study area. Critical movements at each of the intersections were assessed based on either the movement with the highest volume-to-capacity ratio (for signalized intersections), or the movement experiencing the highest average delay (for unsignalized intersections). It should be noted that, as per the TIA Guidelines, the Peak Hour Factor (PHF) used for analysis was 0.90 in existing conditions and 1.0 in all future scenario conditions. All Synchro report outputs for existing and future conditions have been provided in **Appendix H**.

Existing Conditions

Table 23 below summarizes the intersection performance of study area intersections, based on existing conditions traffic volumes illustrated in **Figure 5**.

Table 23: Existing Conditions Intersection Performance

Intersection	Weekday AM Peak (PM Peak)					
	Critical Movement			Intersection 'As a Whole'		
	LOS	max. v/c or avg. delay (s)	Movement	Delay (s)	LOS	v/c
Preston/Somerset (S)	D(B)	0.86(0.68)	EBT(EBT)	29.1(23.3)	C(A)	0.72(0.55)
Preston/Gladstone (S)	E(E)	0.91(0.97)	EBT(WBT)	23.8(30.5)	B(C)	0.67(0.80)
Rochester/Gladstone (S)	C(B)	0.73(0.70)	EBT(WBT)	22.9(24.2)	A(B)	0.59(0.61)
Rochester/Hwy 417 WB on/Raymond (S)	B(C)	0.64(0.74)	WBT(WBT)	13.5(16.5)	A(A)	0.50(0.57)
Rochester/Hwy 417 EB off/Orangeville (S)	D(E)	0.86(0.92)	EBT(EBT)	19.2(24.9)	B(A)	0.63(0.48)
Preston/Oak (U)	B(C)	14.0(15.2)	EB(EB)	0.1(0.1)	-	-
Preston/Laurel (U)	C(C)	15.2(15.6)	EB(EB)	0.4(0.4)	-	-
Preston/Larch (U)	C(C)	15.9(17.3)	EB(EB)	0.3(0.2)	-	-
Preston/Balsam (U)	C(D)	22.0(25.5)	WB(EB)	1.7(2.3)	-	-

Note: Analysis of signalized intersections assumes a PHF of 0.9 and a saturation flow rate of 1800 veh/h/lane.
(S) – Signalized intersection.
(U) – Unsignalized intersection.

As shown in **Table 23**, the signalized intersections 'as a whole' operate at a LOS 'C' or better during the morning and afternoon peak hours. The critical WBT movement at the intersection of Preston/Gladstone operates near

capacity during the afternoon peak hour. With regards to unsignalized intersections, critical movements operate at a LOS 'C' or better during both peak hours.

Total Future Background 2031

Table 24 below summarizes the Synchro traffic operations at study area intersections, based on total future background 2031 traffic volumes, which consist of the existing traffic volumes added to the total volumes of future other area developments as shown in Figure 22.

Table 24: Total Future Background 2031 Intersection Performance

Intersection	Weekday AM Peak (PM Peak)					
	Critical Movement			Intersection 'As a Whole'		
	LOS	max. v/c or avg. delay (s)	Movement	Delay (s)	LOS	v/c
Preston/Somerset (S)	C(B)	0.80(0.62)	EBT(EBT)	26.8(22.3)	B(A)	0.66(0.50)
Preston/Gladstone (S)	E(D)	0.92(0.90)	EBT(WBT)	24.0(25.4)	B(C)	0.64(0.73)
Rochester/Gladstone (S)	B(B)	0.69(0.63)	EBT(WBT)	21.6(22.7)	A(A)	0.55(0.55)
Rochester/Hwy 417 WB on/Raymond (S)	B(C)	0.61(0.72)	WBT(WBT)	12.8(15.6)	A(A)	0.47(0.54)
Rochester/Hwy 417 EB off/Orangeville (S)	D(D)	0.82(0.86)	EBT(EBT)	17.5(22.4)	A(A)	0.59(0.44)
Gladstone/MUP Crossing (S)	A(B)	0.49(0.67)	EBT(WBT)	11.8(12.5)	A(B)	0.49(0.67)
Preston/Oak (U)	B(B)	13.7(14.5)	EB(EB)	0.1(0.1)	-	-
Preston/Laurel (U)	B(B)	14.6(14.8)	EB(EB)	0.4(0.4)	-	-
Preston/Larch (U)	C(C)	15.4(16.0)	EB(EB)	0.2(0.2)	-	-
Preston/Balsam (U)	C(C)	20.7(21.3)	WB(EB)	1.6(1.9)	-	-

Note: Analysis of signalized intersections assumes a PHF of 1.0 and a saturation flow rate of 1800 veh/h/lane.
(S) – Signalized intersection.
(U) – Unsignalized intersection.

As shown in Table 24, operations are better than existing conditions due to increasing the PHF to 1.0 and limited growth on the adjacent road network. Signalized intersections 'as a whole' operate at a LOS 'C' or better during peak hours, with critical movements operating at a LOS 'D' or better. However, the eastbound through movement at Preston/Gladstone is projected to experience slightly higher congestion during the peak hours and continues to operate at a LOS 'E'.

Critical movements at unsignalized intersections operate at LOS 'C' or better during peak hours.

Total Projected 2031

Based on total projected 2031 traffic volumes in Figure 23, study area intersections were analyzed using Synchro, with results summarized in Table 25. Note that the walking/cycling trips anticipated to be generated by the proposed development were accounted for in the Synchro model.

Figure 22: Future Background 2031 Traffic Volumes

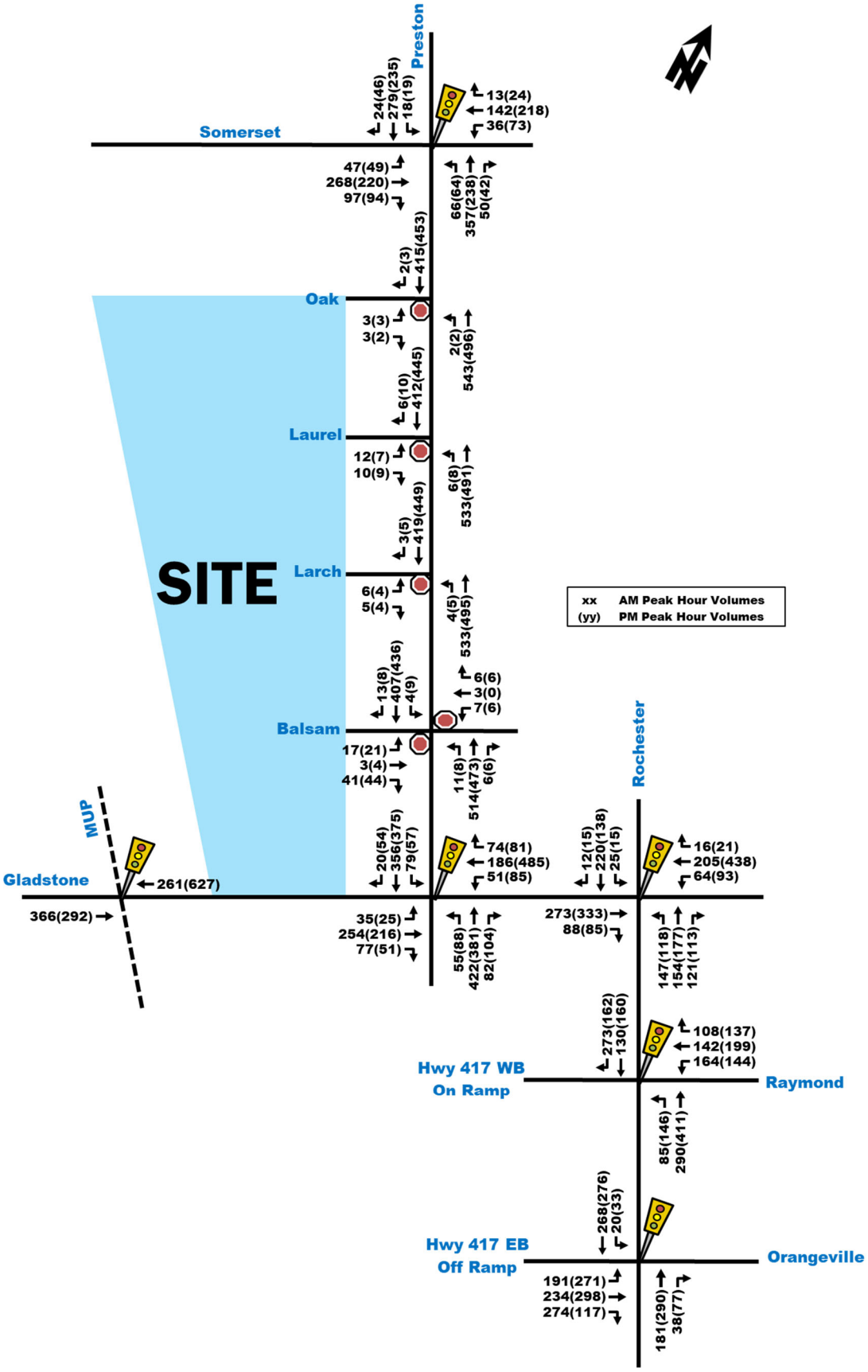


Table 25: Total Projected 2031 Intersection Performance

Intersection	Weekday AM Peak (PM Peak)					
	Critical Movement			Intersection 'As a Whole'		
	LOS	max. v/c or avg. delay (s)	Movement	Delay (s)	LOS	v/c
Preston/Somerset (S)	D(B)	0.82(0.65)	EBT(EBT)	28.0(22.8)	B(A)	0.68(0.53)
Preston/Gladstone (S)	B(D)	0.69(0.81)	EBT(WBT)	22.4(27.5)	B(C)	0.64(0.72)
Rochester/Gladstone (S)	C(B)	0.76(0.64)	EBT(EBT)	23.4(23.4)	B(A)	0.61(0.54)
Rochester/Hwy 417 WB on/Raymond (S)	B(C)	0.63(0.74)	WBT(WBT)	12.8(15.8)	A(A)	0.49(0.57)
Rochester/Hwy 417 EB off/Orangeville (S)	D(D)	0.82(0.86)	EBT(EBT)	17.6(22.6)	A(A)	0.59(0.44)
Gladstone/MUP Crossing (S)	A(B)	0.50(0.66)	EBT(WBT)	11.8(12.4)	A(B)	0.50(0.66)
Preston/Oak (U)	B(C)	14.1(15.5)	EB(EB)	0.5(0.6)	-	-
Preston/Laurel (U)	C(C)	15.8(16.7)	EB(EB)	0.4(0.4)	-	-
Preston/Larch (U)	C(C)	16.7(18.2)	EB(EB)	0.2(0.2)	-	-
Preston/Balsam (U)	C(D)	25.7(31.5)	WB(EB)	2.3(3.3)	-	-
Gladstone/Street B (U)	B(C)	13.5(15.6)	SB(SB)	0.5(0.5)	-	-

Note: Analysis of signalized intersections assumes a PHF of 1.0 and a saturation flow rate of 1800 veh/h/lane.
(S) – Signalized intersection.
(U) – Unsignalized intersection.

As shown in **Table 25**, the signalized intersections 'as a whole' are projected to operate at a LOS 'C' or better during the morning and afternoon peak hours, with critical movements operating at LOS 'D' or better. Note that phase splits at the Preston/Gladstone intersection were optimized in Synchro for both peak hours, which improved traffic operations. Unsignalized intersections, including the future Gladstone/Street B intersection, operated at a LOS 'D' or better during both peak hours.

4.9.3. TRILLIUM PATHWAY CROSSING AT GLADSTONE AVE

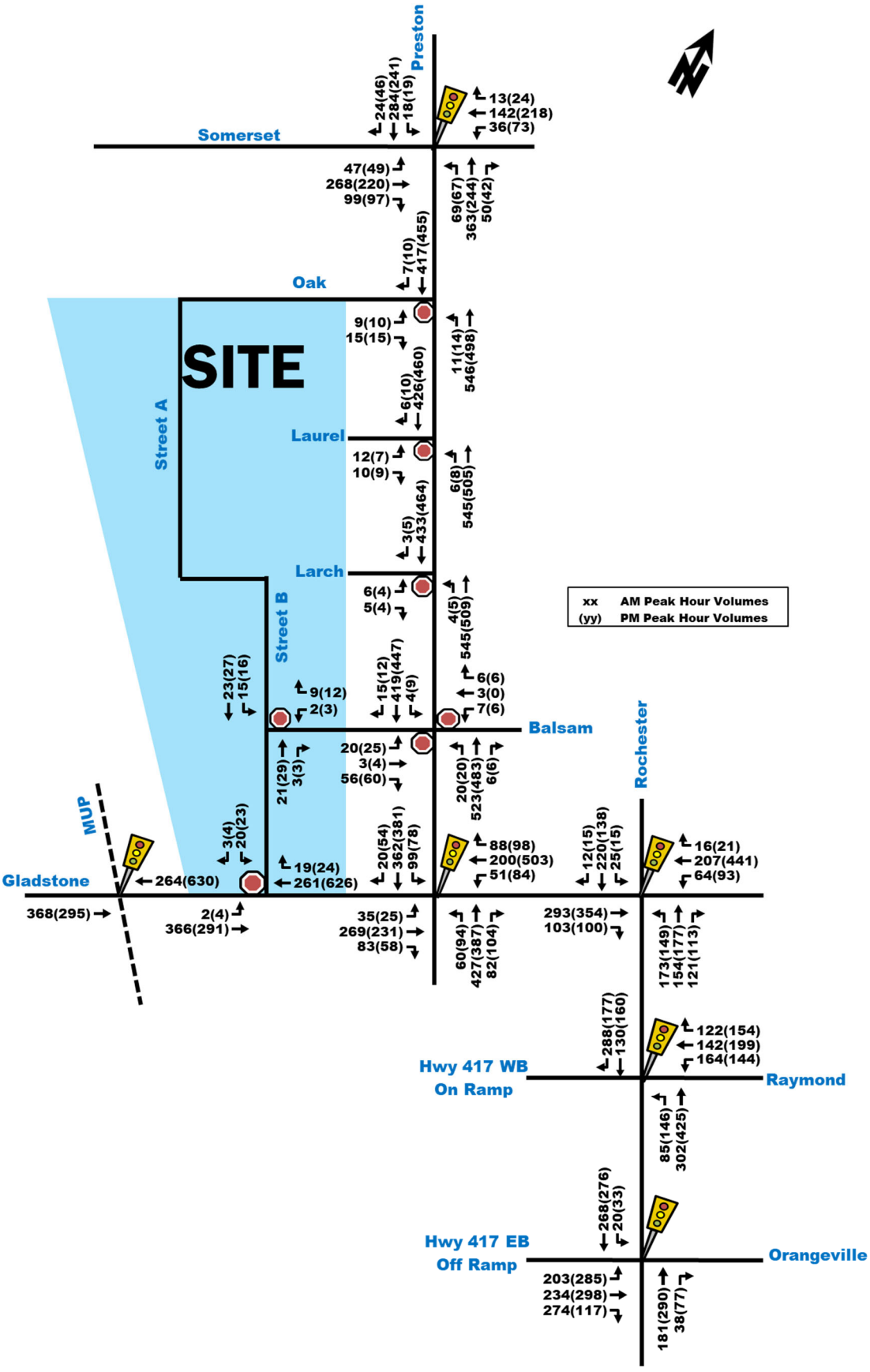
City staff have confirmed that the Trillium Pathway crossing at Gladstone Ave will be signalized as part of the LRT Phase 2 work. The traffic signal was modelled in Synchro to determine if there will be queueing impacts along the Gladstone Ave corridor between the Pathway and Preston St, and its interaction with the proposed Street B/Gladstone access intersection. The planned Pathway signal will be located approximately 155m west of the Gladstone/Preston intersection; 45m west of the future Gladstone/Street B intersection.

The future Pathway signal was modeled in Synchro using a pedestrian phase, where amber, red, walk and don't walk times were determined using the Ontario Traffic Manual (OTM) Book 12 methodology. Additionally, a pretimed signal control was provided and the cycle length was optimized to ensure the most optimal traffic operations are available. This approach represents a worst-case scenario where the Pathway signal would activate every cycle to provide crossing time for pedestrians and cyclists. In reality, the traffic signal would only be triggered when a user is present.

It was determined that the westbound 95th percentile queue at the future Pathway signal was approximately 25m and 75m in the morning and afternoon peak hours respectively. The eastbound 95th percentile queue approaching the Gladstone/Preston intersection was approximately 70m and 45m respectively. The projected queue lengths are not expected to exceed the available storage space of 155m between the future Pathway signal and the Gladstone/Preston intersection.

Under this worst-case scenario, the westbound queue at the future Pathway signal may occasionally spillback in the afternoon peak hour beyond the Gladstone/Street B intersection. However, the 50th percentile queue length, which represents the average queue length experienced by traffic during the peak hour, indicates that the queue length is expected to be less than available 45m. While there may be intermittent queue spillback during the afternoon peak hour, it is not expected to significantly impact the Gladstone/Street B intersection operations under normal traffic conditions.

Figure 23: Total Projected 2031 Traffic Volumes



4.9.4. INTERSECTION MMLOS ANALYSIS

As per requirements of the TIA Guidelines, MMLOS analysis was conducted for signalized intersections. While no signalized intersections exist at the frontage of the proposed development site, the intersections of Preston/Gladstone, Somerset/Preston and Gladstone/Rochester were analyzed as they are within reasonable distance of the development.

Since there are no anticipated major future modifications at the noted intersections, analysis was conducted assuming existing conditions. However, the eastbound and southbound right-turn on red phase will be prohibited at the intersection of Preston/Gladstone in the future, which may improve the pedestrian LOS slightly for the west and north crosswalks, but overall PLOS is expected to be the same.

The analysis is conducted for four different travel modes, including pedestrian, cyclist, transit, and trucks. For each travel mode, a minimum desirable LOS target is obtained from the City of Ottawa TIA Guidelines. In existing conditions, the MMLOS targets are based on a "within 300m of a school" policy area for the intersections of Preston/Gladstone and Gladstone/Rochester and a "traditional main street" land-use designation for the intersection of Somerset/Preston. In future conditions, targets at all intersections are based on a "within 600m of a rapid transit station" policy area. Note that "within 600m of a rapid transit station" and "within 300m of a school" policy areas both provide the exact same MMLOS targets.

A summary of the analysis results and respective minimum desirable LOS targets are provided in **Table 26**, with the detailed analysis provided in **Appendix H**.

Table 26: Signalized Intersection MMLOS Analysis

Intersection	Level of Service							
	Pedestrian (PLOS)		Bicycle (BLOS)		Transit (TLOS)		Truck (TkLOS)	
	PLOS	Target	BLOS	Target	TLOS	Target	TkLOS	Target
Preston/Gladstone	D	A	D	B	F	D	F	D
Somerset/Preston	C	B/A*	E	C/B*	F	C/D*	F	D
Gladstone/Rochester	E	A	E	B	D	D	F	D
*Future conditions minimum desirable LOS targets (within 600m of a rapid transit station)								

Red font in the table above indicates that the desirable target LOS is not achieved. As shown in **Table 26**, minimum desirable LOS targets are not met as follows:

- With regards to pedestrian LOS, the results are largely based on the number of lanes that pedestrians have to cross, followed by the degree of comfort and safety that pedestrians feel while crossing. This includes factors such as the amount of interference with crossing pedestrians due to permissible vehicle left-turns and right-turns. Achieving a PLOS 'A' at the intersections would require a reduction in the number of lanes, which would not be ideal given the context and location of the intersections. Nonetheless, there are currently no safety concerns at the study area intersections with regards to pedestrians.
- With regards to bicycle LOS, the target LOS is not achieved due to the lack of cycling facilities at the intersections (i.e. cyclists operate in mixed traffic conditions). However, there are no safety concerns for cyclists at the study area intersections, as posted speeds are low in the area and the Trillium Line Pathway provides a high level of safe connectivity dedicated to pedestrians and cyclists.
- With regards to transit LOS, the target LOS is not achieved at both the Preston/Gladstone and Somerset/Preston intersections due to the high delays experienced by the east and west approaches of the intersections. Since buses operate in mixed traffic, they experience the same level of delay as general traffic at the intersection. Adjusting the signal timing and phasing of the intersection to provide more dedicated green time to the approaches with high delays may help reduce the traffic delays.
- With regards to truck LOS, the LOS targets are not achieved due to the narrow corner radiuses of the intersections and the number of receiving lanes (1 receiving lane on all legs of the intersection). It should

be noted that the MMLOS Guidelines do not consider the geometric arrangement of left-turn lanes, such as locations where stop bars of the left-turn lanes are set back from the stop bars of their respective through/right-turn lanes, thereby providing ample room for trucks to complete their left or right turning movements.

5. Findings, Conclusions and Recommendations

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

Proposed Development

- Ottawa Community Housing Corporation is proposing a large-scale mixed-use development known as Gladstone Village on vacant land located in the northwest quadrant of the Gladstone/Trillium Line Corridor crossing. The municipal address of the development is 933 Gladstone Ave.
- The development will consist of approximately 96 townhome units and 1,004 apartment units, along with a conservative estimate of 77,000 sq.ft of retail/commercial/ institutional space and 100,000 sq.ft of office space.
- Parking will be provided in an underground structure for the apartment buildings, with limited private driveways and surface parking for the townhome units.
- The development is anticipated to generate approximately 730 and 950 person trips, and approximately 105 and 130 vehicle trips during the morning and afternoon peak hours, respectively.
- Gladstone Village will be located directly adjacent to the future Corso Italia LRT Station (formerly Gladstone Station), which is anticipated to be constructed by 2022 as part of the Stage 2 O-Train Trillium Line 2 expansion. As a result, transit usage was expected to be very high, and active transportation modes (walking and cycling) were also expected to be high given the City's intensification policies reflected in the Corso Italia Station District Secondary Plan.
- Vehicle access to Gladstone Village will be provided via:
    - Preston St/Oak St;
    - A new intersection at Gladstone Ave (at Street B); and,
    - Preston St/Larch St, which is the preferred third connection based on the findings of this TIA.

Existing and Future Background Conditions

- Under existing conditions, the westbound through movement at the Gladstone/Preston intersection operated near capacity during the afternoon peak hour. All other existing intersections operated within City standards.
- A review of historical traffic volumes indicated a decreasing growth trend at the Gladstone/Preston intersection. In accordance with the Secondary Plan traffic study, no growth rate was applied to the study area intersections. A select number of adjacent development traffic volumes were added separately based on recent traffic studies.
- In the future background 2031 conditions, overall study area conditions are better compared to existing conditions (due to increasing PHF to 1.0). However, the EBT movement at the intersection of Preston/Gladstone demonstrated slightly increased congestion in the morning peak hour.
- MMLOS analysis for boundary streets was conducted for Gladstone Ave, Oak St, Balsam St and Larch St. The results indicate that the pedestrian LOS targets are not met on any of the boundary roads in existing conditions and bicycle LOS target is not met along Gladstone Ave. Remaining bicycle, transit, and truck targets were met. In future conditions, based on the potential cross-section designs of Larch St and Balsam St, the pedestrian LOS would only be met along Larch St given the potential to add a boulevard within the available ROW.

- With regards to PLOS, the desirable targets are not met due to lack of wider boulevards and sidewalks on all boundary streets. The daily curb lane traffic volumes along Gladstone Ave are also high, causing reduced pedestrian comfort.
- With regards to BLOS, the desirable target is not achieved along Gladstone Ave due to lack of dedicated cycling facility and high operating speeds.

- MMLOS analysis was conducted for the signalized intersections Preston/Gladstone, Somerset/Preston, and Gladstone/Rochester. The analysis indicated that almost all the desirable LOS targets were not achieved. It is noteworthy that the collisions and safety review did not indicate there are any significant concerns at study area intersections.
  - The PLOS desirable targets at the intersections are not achieved due to the number of lanes that pedestrians have to cross. However, reducing the number of lanes is not ideal given the context and location of the intersections.
  - The BLOS desirable targets at the intersections are not achieved due to the lack of cycling facilities. However, it is noted that the posted speeds are low in the study area and the Trillium Pathway provides a high quality and protected environment for cyclists.
  - The TLOS desirable targets at the intersections of Preston/Gladstone and Somerset/Preston are not achieved due to the high delays experienced by buses in mixed traffic.
  - The TkLOS desirable targets at the intersections are not achieved due to narrow corner radiuses and the number of receiving lanes for trucks at the intersections (1 lane). However, some measures such as set back of left-turn lanes stop bars helps provide additional space for right-turning trucks to complete their movements.

Projected Conditions

- The applicant is committed to implementing a suite of TDM measures within the subject development to encourage transit and active modes of travel among local residents, as detailed in Section 4.5.3.
- Based on neighbourhood traffic management review, it was determined that:
  - Two-way traffic along Oak St, Larch St or Balsam St do not exceed the local road threshold of 120 veh/h during peak hours.
  - Two-way traffic along both Rochester St and Gladstone Ave do exceed the major collector road threshold, and the City may elect to reclassify both as arterial roads. It is noteworthy that both collision and traffic analysis indicate no major safety or operational concerns along these corridors. Furthermore, given the City's ongoing investments into sustainable modes of travel and intensification policies within the City core areas, reclassifications may not be appropriate.
- The proposed development is anticipated to generate approximately 400 transit trips during peak hours. A review of existing and future (with Corso Italia Station) transit demand indicated that these volumes should be comfortably accommodated by the future transit network.
- Total projected 2031 conditions, including future vehicle/walking/cycling trips on the adjacent road network generated by the proposed development were incorporated in the Synchro model. The analysis results have been summarized below:
  - All signalized intersections 'as a whole' operate at a LOS 'C' or better during both peak hours. The Preston/Gladstone intersection phase timings were optimized in Synchro, which improved the intersection's operations.
  - Unsignalized intersections, including the future site access at Gladstone Ave, operate at a LOS 'D' or better during both peak hours.

Design Considerations

- Permitting all movements and stop control on the southbound approach is recommended at the proposed Gladstone/Street B intersection. Gladstone Ave would remain free flow. Left-turn warrant analysis confirmed an eastbound left-turn lane was not required.
- The Trillium Pathway crossing at Gladstone Ave will be signalized once the Corso Italia LRT Station is completed. Analysis of the 95th percentile queue lengths indicate the westbound vehicle queue may occasionally extend beyond the Gladstone/Street B intersection during the afternoon peak hour. However, on average the westbound queue will not interfere with the upstream intersection.
- It is recommended that the City observe operations at Gladstone/Street B intersection during the Phase 1 occupancy to confirm if there is need for mitigation measures for future phases.
- The technically preferred location for the third connection to Gladstone Village is Larch St (as detailed in Section 4.4) over Balsam St. It has sufficient ROW to accommodate future traffic and incorporate a Complete Streets approach, it has fewer property implications, it provides improved sight distances, it provides equal spacing of connecting streets within the local road network (between Oak St and Gladstone Ave), it minimizes short-cutting since it is a T-intersection and is farther from Gladstone Ave, and it does not risk a mix of future commercial truck/delivery traffic with general traffic. A revised design with traffic calming measures can minimize impacts on local residents, e.g. speed humps. Based on MMLOS analysis, the future potential design of Larch St can provide a higher level of convenience and comfort for pedestrians.
- Balsam St should remain a dead-end street for general traffic, but it may still provide a pedestrian connection to the future Street B to promote active travel permeability in the network. Truck and delivery loading activities related to commercial uses within the Preston/Gladstone block should remain off-street, to minimize impacts to the adjacent road network. These details should be reviewed as part of future development applications within this block.
- Based on the preliminary design review of the proposed access intersections, no significant off-site roadway modifications were expected. Therefore, an RMA is not required.
- A new pedestrian crossing (PXO) may be considered the Preston/Laurel intersection, to provide pedestrians with a higher quality crossing across Preston St. This location was considered suitable for a PXO based on the potential desire line through the proposed development and crossing over the Trillium Line. This potential modification will also be confirmed during the Site Plan Control process.

Overall, the proposed development as outlined in the preceding study can be accommodated by the adjacent road network at the 2031 horizon. The development plan leverages its location in close proximity to the future Corso Italia LRT Station with abundant active transportation facilities and a modern site design to mitigate traffic impacts. The analysis confirmed that no off-site roadway modifications were needed to support the development based on information available at the time of this study. A key consideration for City staff is the status of the anticipated Preston Hardware site expansion, which may trigger some design and capacity challenges in the future. Therefore, the development is recommended from a transportation perspective.

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