

951 Gladstone Avenue and 145 Loretta Avenue North Transportation Impact Assessment

Step 1 Screening Report

Step 2 Scoping Report

Step 3 Forecasting Report

Step 4 Strategy Report

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1 Screening

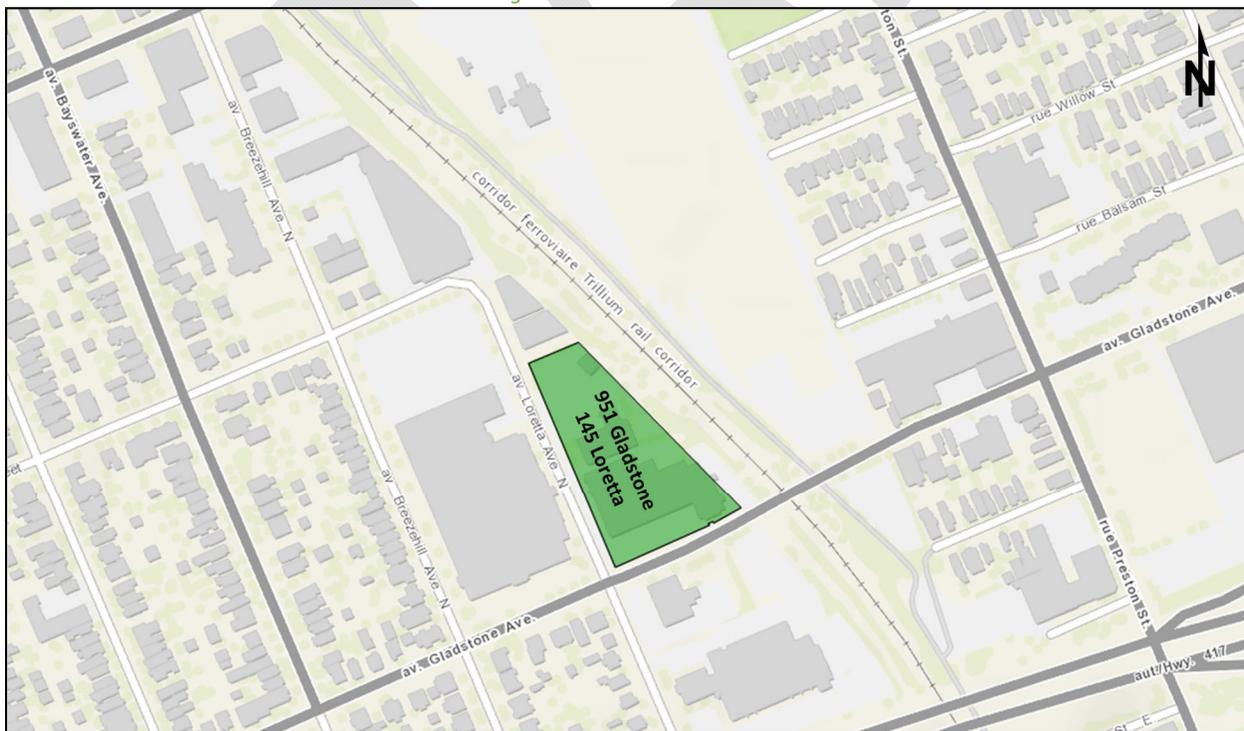
This study has been prepared according to the City of Ottawa's 2017 Transportation Impact Assessment (TIA) Guidelines. Accordingly, a Step 1 Screening Form has been prepared and is included as Appendix A, along with the Certification Form for TIA Study PM. As shown in the Screening Form, a TIA is required including the Design Review component and the Network Impact Component.

2 Existing and Planned Conditions

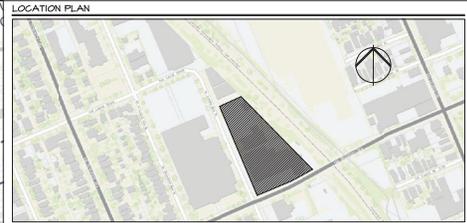
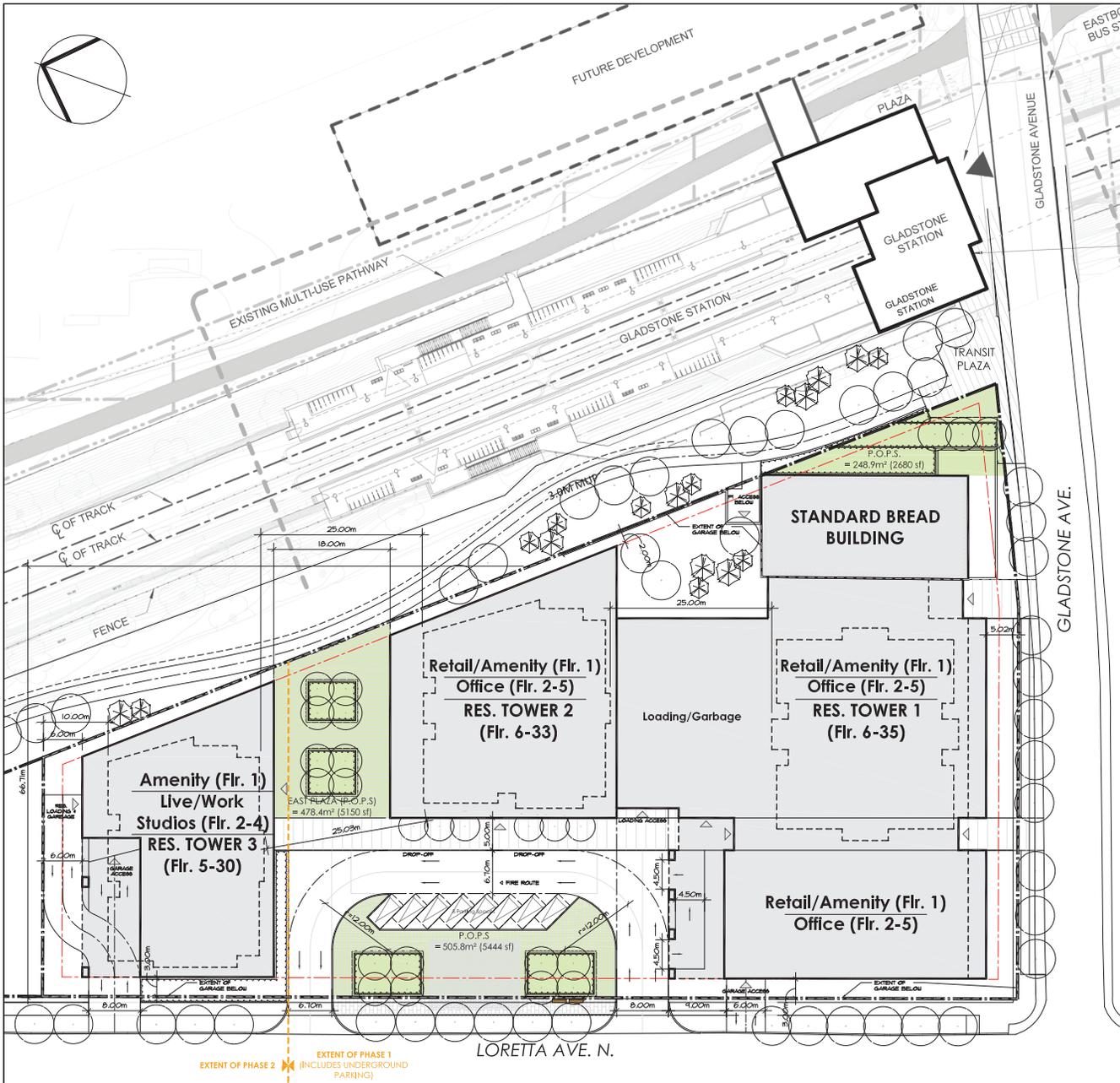
2.1 Proposed Development

The proposed development, located at 951 Gladstone Avenue and 145 Loretta Avenue North, is currently zoned general industrial. The existing land uses include brewery, jujitsu club, cross-fit gym, glass blowing, art studio, beer and wine supply, bread bakery, and other assorted industrial uses. The application includes proposed Official Plan and Zoning By-Law Amendments to allow for high-rise residential and commercial/retail uses, and a site plan application. The proposed development would include apartments totalling 745 units, 206,480 sq. ft office (including the existing building), and 17,894 sq. ft. of retail space. A total of 521 parking spaces and 518 bicycle parking spaces will be provided. The existing access on Gladstone Avenue will be removed and converted to a pedestrian plaza connecting to the Gladstone Trillium Line Station, and a one-way access loop and two garage accesses will be provided along Loretta Avenue North. The frontage along Loretta Avenue North would formalize the curb edge and remove the paved shoulder and open access along the building frontage. The anticipated full build-out and occupancy horizon is 2023. Figure 1 illustrates the Study Area Context. Figure 2 illustrates the proposed site plan.

Figure 1: Area Context Plan



Source: <http://maps.ottawa.ca/geoOttawa/> Accessed: October 5, 2018



ZONING NOTES:

DEVELOPMENT STATS	PROPOSED
LOT AREA	10292.9 m ² (1021172 sq.ft.)
LOT WIDTH	66.7m IRREGULAR
LOT DEPTH	90.0m
TOTAL UNITS	~608
FRONT YARD SETBACK: GLADSTONE AVE.	5 m
REAR YARD SETBACK	5 m
CORNER SIDE YARD SETBACK: LORETTA AVE. N.	3 m
INTERIOR SIDE YARD SETBACK: TRILLIUM RAIL CORRIDOR	2 m
MAXIMUM HEIGHT	± 129 m
NUMBER OF STOREYS	35
BUILDING FOOTPRINT AREA	5241 m ² (562714 sq.ft.)
GROSS FLOOR AREA	41615 m ² (447062 sq.ft.)

PARKING REQUIREMENTS

LAND USE	REQUIRED	PROVIDED VEHICLE PARKING
APARTMENT	1.75 MAX SPACE PER UNIT	375 SPACES (0.5 SPACES/UNIT)
VISITOR	01 SPACE MAX PER UNIT BUT MAX. 30 SPACES	30 SPACES
RETAIL	3.6 MAX SPACES / 100m ² GFA	17 SPACES (0 SPACE / 1076 ft ²)
OFFICE	2.2 MAX SPACES / 100m ² GFA	48 SPACES (0.75 SPACES / 1076 ft ²)
TOTAL		521 SPACES

3. BICYCLE PARKING
REQUIRED BICYCLE PARKING SPACES
RESIDENTIAL: (0.5 SPACES/UNIT)
COMMERCIAL: (1 / 500 SQM COMMERCIAL GFA)

4. AMENITY SPACE REQUIREMENTS
REQUIRED AMENITY SPACE: 6 m² REQUIRED PER UNIT

5. REQUIRED AREA FOR PRIVATELY OWNED PUBLIC SPACE - P.O.P.S.
REQUIRED 120m² (130111 sq.ft.)
PROVIDED 1233m² (13279 sq.ft.)

NOTE: ALL EXISTING SITE INFORMATION AS PER SITE SURVEY PLAN DATED _____, 2016 AND PREPARED BY STANTEC

no.	date	revision

It is the responsibility of the appropriate contractor to check and verify all dimensions on site and report all errors and/or omissions to the architect.

All contractors must comply with all pertinent codes and by-laws.

Do not scale drawings.

This drawing may not be used for construction until signed.

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PROJECT LOCATION:
GLADSTONE & LORETTA

951 GLADSTONE AVE.

DRAWING TITLE:
SITE PLAN

DRAWN BY: DATE: SCALE:
YD: 16/04/17 1:500

PROJECT:
1706

DRAWING NO.:

A001

REVISION NO.:

1 SITE PLAN
A0.01 1:500

Notes

2.2 Existing Conditions

2.2.1 Area Road Network

Gladstone Avenue: Gladstone Avenue is a City of Ottawa major collector road with a two-lane urban cross-section including sidewalks and a posted speed limit of 40 km/h. The current right-of-way is 20.0 metres, with additional width provided in proximity to the rail corridor.

Loretta Avenue North/Laurel Street: Loretta Avenue N is a City of Ottawa local road with a two-lane urban cross-section including paved shoulders on the east side and a sidewalk on the west side. The posted speed is 40 km/h and the right-of-way is 20.0 metres.

Breezehill Avenue: Breezehill Avenue is a City of Ottawa local road with a two-lane urban cross-section, including sidewalks, and parking on the east side of the road. The posted speed limit is 40 km/h and the right-of-way is 20.0 metres.

Bayswater Avenue: Bayswater Avenue is a City of Ottawa collector road with a two-lane urban cross-section, including sidewalks and on-street parking. The unposted speed limit is 50 km/h and the right-of-way is 25.0 metres.

Preston Street: Preston Street is a City of Ottawa arterial road with a two-lane urban cross-section, including parking lanes and auxiliary lanes at major intersections. The unposted speed limit is 50 km/h and the Ottawa Official Plan reserves a 23.0 metre right-of-way.

Somerset Street West: Somerset Street West is a City of Ottawa arterial road with a two-lane cross-section, including sidewalks and on street parking. The unposted speed limit is 50 km/h and the right-of-way is 20.0 metres. East of Breezehill Avenue, bike lanes are provided.

2.2.2 Existing Intersections

Gladstone Avenue / Bayswater Avenue

The intersection of Gladstone Avenue and Bayswater Avenue is a signalized intersection with shared all movement lanes on each approach. No turn restrictions were noted.

Gladstone Avenue / Preston Street

The intersection of Gladstone Avenue and Preston Street is a signalized intersection with auxiliary left-turn lanes on the northbound, westbound, and southbound approaches. No turn restrictions were noted.

Somerset Street West / Breezehill Avenue

The intersection of Somerset Street West and Breezehill Avenue is a minor stop-controlled intersection with shared movement lanes on all approaches. Bike lanes along Somerset Street West start/end on the east side of the intersection. No turn restrictions were noted.

Gladstone Avenue / Loretta Street North

The intersection of Gladstone Avenue and Loretta Street North is a minor stop-controlled intersection with shared movement lanes on all approaches. No turn restrictions were noted.

Breezehill Avenue / Laurel Street

The intersection of Breezehill Avenue and Laurel Street is an all-way stop-controlled intersection with shared movement lanes on all approaches. No turn restrictions were noted.

2.2.3 Existing Driveways

Along Gladstone Avenue, a driveway to the City of Ottawa yard (175 Loretta Avenue North) is located opposite the existing site access adjacent to the Trillium Rail Corridor, and an access to 950 Gladstone Avenue within 5.0 metres of the Loretta Avenue North intersection. Between Loretta Avenue North and Breezehill Avenue, an access loop is located on the north side of Gladstone Avenue to the Canadian Bank Note Limited, and five driveways are located on the south side.

Along Loretta Avenue North, two accesses are provided on the west side of the road for the Canadian Bank Note Limited site, and a single access is located north of the proposed site for 131 Loretta Avenue North. The paved shoulder is used for perpendicular parking along Loretta Avenue North as well.

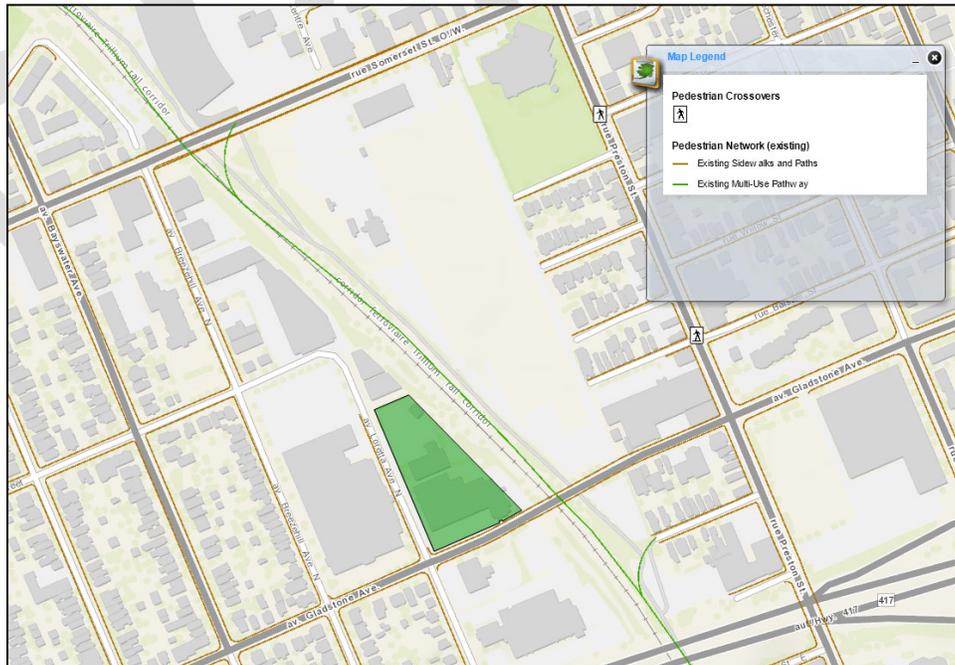
2.2.4 Existing Cycling and Pedestrian Facilities

Figure 3 illustrates the pedestrian facilities in the study area and Figure 4 illustrates the cycling facilities.

Sidewalks are provided along both sides of the roadways in the study area with the exception of the east side of Breezehill Avenue between Gladstone Avenue and Laurel Street, on both sides of Laurel Street, and the east side of Loretta Avenue North. The Trillium Pathway is a multi-use pathway along the east side of the Trillium Rail Corridor.

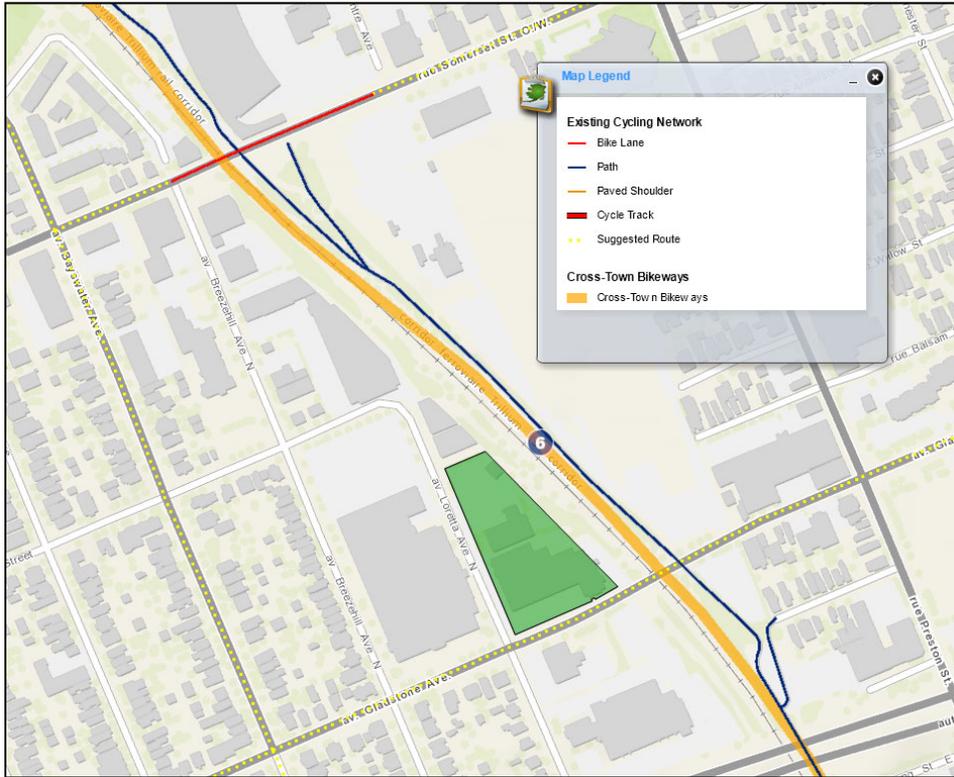
The cycling network consists of the Trillium Pathway as a cross-town bikeway, suggested biking routes along Gladstone Avenue, Bayswater Avenue and Somerset Street W, including bike lanes on the bridge over the Trillium Rail Corridor.

Figure 3: Study Area Pedestrian Facilities



Source: <http://maps.ottawa.ca/geoOttawa/> Accessed: October 5, 2018

Figure 4: Study Area Cycling Facilities



Source: <http://maps.ottawa.ca/geoOttawa/> Accessed: October 5, 2018

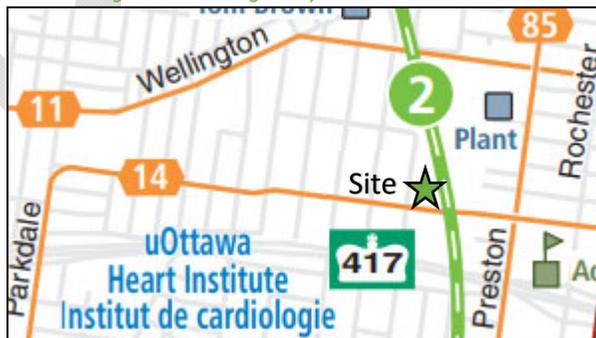
2.2.5 Existing Transit

Within the study area, Route #14 operates along Gladstone Avenue, Route #11 along Somerset Street W, and Route #85 along Preston Street. Figure 5 illustrates the transit routes in the study area. The frequency of these routes within proximity to the proposed site is currently:

- Route #11 - every 15-30 minutes, with higher frequency during the commuter peaks and day time
- Route #14 – every 30 minutes, with higher frequency during the commuter peaks and day time
- Route #85 - every 15-30 minutes, with higher frequency during the commuter peaks and day time

The Trillium Station at Carling Avenue is located approximately 1.0 km walking distance to the south and the Bayview Station is approximately 1.1 km walking distance to the north.

Figure 5: Existing Study Area Transit Service



Source: <http://www.octranspo.com/> Accessed: October 5, 2018

2.2.6 Existing Area Traffic Management Measures

Within the study area, vertical centreline stake bollards are located along Gladstone Avenue, Breezehill Avenue, and Bayswater Avenue.

2.2.7 Existing Peak Hour Travel Demand

Existing turning movement counts were acquired from the City of Ottawa for the existing Study Area intersection. Table 1 summarizes the intersection count dates.

Table 1: Intersection Count Date

Intersection	Count Date	Source
Gladstone Avenue and Bayswater Avenue	Wednesday July 27, 2016	City of Ottawa
Gladstone Avenue and Preston Street	Tuesday June 20, 2017	City of Ottawa
Somerset Street West and Breezehill Avenue	Thursday August 12, 2015	City of Ottawa
Gladstone Avenue and Loretta Avenue North	Tuesday, April 23, 2019	The Traffic Specialist
Breezehill Avenue and Laurel Street	Tuesday, April 23, 2019	The Traffic Specialist

The intersections were not assigned any growth to estimate the 2018 adjusted traffic counts and Table 2 summarizes the existing study area intersection operations. Figure 6 illustrates the existing traffic volumes.

Detailed turning movement count data is included in Appendix B, and the synchro worksheets are provided in Appendix C.

Figure 6: Existing Traffic Volumes

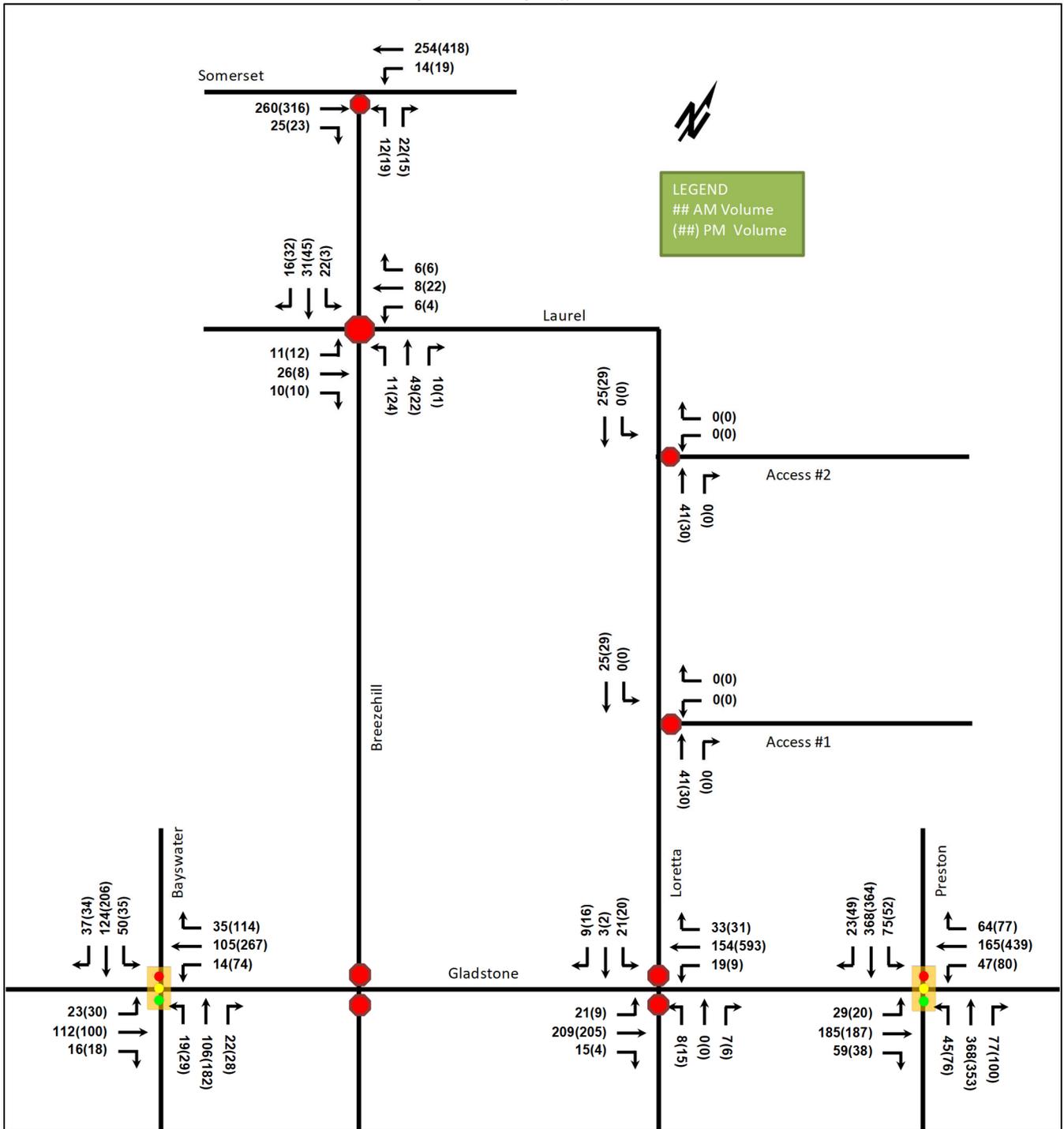


Table 2: Existing Intersection Operations

Intersection	Lane	AM Peak Hour				PM Peak Hour			
		LOS	Delay	V/C	Q (95 th)	LOS	Delay	V/C	Q (95 th)
Gladstone Avenue & Preston Street Signalized	EB	C	32.3	0.71	#61.2	C	21.3	0.55	43.8
	WBL	C	25.1	0.27	13.1	B	17.5	0.26	16.3
	WBT/R	C	26.4	0.59	43.7	D	44.0	0.92	#117.8
	NBL	A	8.2	0.12	6.9	B	16.8	0.32	15.6
	NBT/R	B	11.9	0.54	54.2	C	20.8	0.69	74.3
	SBL	A	9.8	0.23	11.2	B	15.3	0.24	11.2
	SBT/R	B	10.9	0.46	45.8	B	19.0	0.62	65.4
	Overall	B	17.7	-	-	-	C	26.5	-
Gladstone Avenue & Bayswater Avenue Signalized	EB	B	10.1	0.23	18.1	A	7.9	0.20	14.5
	WB	A	9.0	0.23	17.0	B	15.0	0.66	58.8
	NB	B	13.9	0.28	21.2	C	21.0	0.54	38.7
	SB	B	16.2	0.43	31.0	C	23.5	0.62	45.7
	Overall	B	12.6	-	-	-	B	17.5	-
Somerset Street W & Breezehill Avenue Unsignalized	EB	-	-	-	-	-	-	-	-
	WB	A	0.4	0.01	0.0	A	0.4	0.02	0.1
	NB	B	12.2	0.07	0.2	B	18.0	0.12	0.4
	Overall	A	0.9	-	-	-	A	1.0	-
Gladstone Avenue & Loretta Avenue Unsignalized	EN	A	0.7	0.02	0.1	A	0.4	0.01	0.0
	WB	A	0.7	0.02	0.1	A	0.1	0.01	0.0
	NB	B	11.9	0.03	0.1	C	20.0	0.09	0.3
	SB	B	13.0	0.08	0.2	C	20.3	0.15	0.5
	Overall	A	1.9	-	-	-	A	1.5	-
Breezehill Avenue & Laurel Street Unsignalized	EN	A	7.5	0.06	0.2	A	7.3	0.04	0.1
	WB	A	7.3	0.03	0.1	A	7.4	0.04	0.1
	NB	A	7.5	0.09	0.3	A	7.5	0.06	0.2
	SB	A	7.5	0.09	0.3	A	7.3	0.10	0.3
	Overall	A	7.5	-	-	-	A	7.4	-

Notes: Saturation flow rate of 1800 veh/h/lane
PHF = 0.90

The existing intersection operations predominantly operate with high levels of service during the peak hours. The westbound through/right-turn lane has a v/c ratio above 0.9 during the PM peak, and no other capacity issues were noted.

The queue in the eastbound and westbound through/right-turn lanes at the Gladstone Avenue and Preston Street intersection may extend beyond the adjacent private approach accesses.

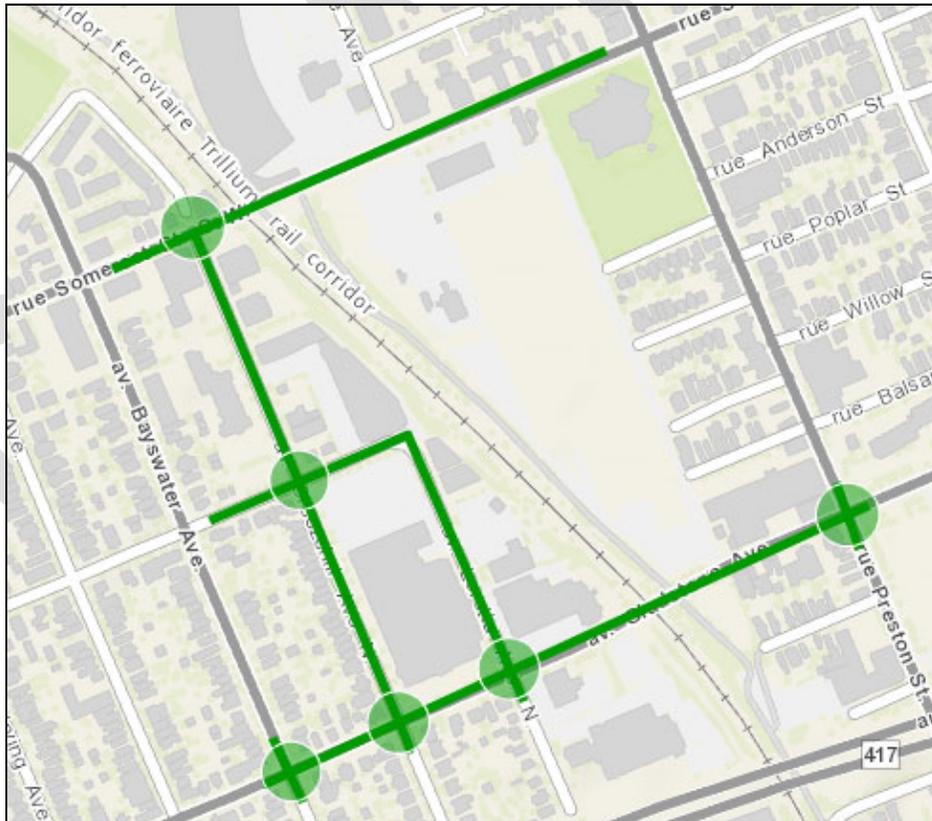
2.2.8 Collision Analysis

Collision data has been acquired from the City of Ottawa open data website (data.ottawa.ca) for five years prior to the commencement of this TIA for the surrounding study area road network. Table 3 summarizes the collisions documented in the study area and Figure 7 illustrates the intersections and segments analyzed. Collision data is included in Appendix D.

Table 3 :Study Area Collision Summary

		Number	%
Total Collisions		74	100%
Classification	Fatality	0	0%
	Non-Fatal Injury	27	36%
	Property Damage Only	47	64%
Initial Impact Type	Angle	21	28%
	Rear end	16	22%
	Sideswipe	5	7%
	Turning Movement	15	20%
	SMV Other	5	7%
	SMV Unattended	7	9%
	Other	5	7%
	Road Surface Condition	Dry	49
Wet		16	22%
Loose Snow		6	8%
Slush		1	1%
Ice		2	3%
Pedestrian Involved		3	4%
Cyclists Involved		11	15%

Figure 7: Study Area Collision Records



Of the collisions noted above, 23 collisions occurred at the Gladstone Avenue and Preston Street intersection, 16 collisions occurred on Somerset Street West between Breezhill Avenue and Preston Street, and 11 collisions occurred at the Gladstone Avenue and Bayswater Avenue intersection. Along the frontage of the proposed site, a

single collision was noted at the Gladstone Avenue and Loretta Avenue North intersection and 3 collisions on Gladstone Avenue between Loretta Avenue North and Preston Street.

With respect to active mode collisions, the cyclist collisions were all noted at the Gladstone Avenue/Preston Street intersection (5) and the Somerset Street West segment between Breezehill Avenue and Preston Street (5), and on Gladstone Avenue between Baywater Avenue and Breezehill Avenue. The pedestrian collisions were all noted at the Gladstone Avenue and Preston Street intersection.

During the traffic count program, the following issues were noted at the Breezehill Avenue and Laurel Street intersection:

- Cedar hedge on southwest quadrant significantly limits sight lines
- Vehicles parking close to the intersection on the east and south sides also limit sight lines
- Cyclists and vehicles are noted to ignore the all-way stop-control

It is recommended the City remove the hedge within the right-of-way to provide a proper sight triangle, add this intersection for police enforcement of the stop-control and bylaw for parking enforcement in proximity to the intersection.

2.3 Planned Conditions

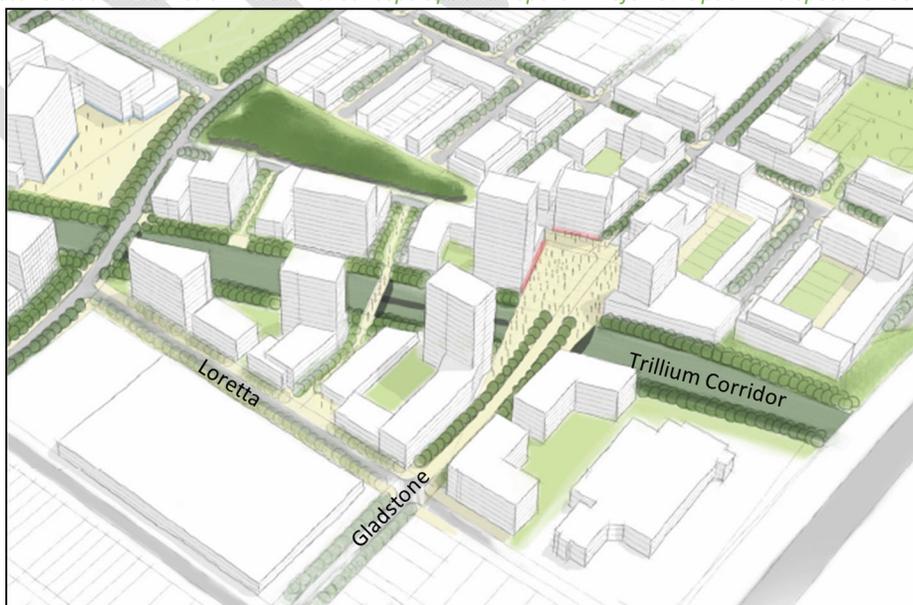
2.3.1 Changes to the Area Transportation Network

The subject development is within the Gladstone Station District CDP (2014) and as such, is subject to the development and planning vision outlined with the CDP. The CDP visioning option for the transit-oriented development node, illustrated in Figure 8, has the following new transportation infrastructure elements:

- Trillium LRT station plaza identified as a node/landmark/gateway for the community
- a multi-use crossing is proposed over the rail line between Gladstone Avenue and Laurel Street W
- a new road connection across the rail line between Laurel Street W and Oak Street

Beyond the station plaza, these improvements are not identified in the City's affordable network and not time frame is available for their construction.

Figure 8: Gladstone Station District CDP Vision & Concept Options Report – Preferred Option: Perspective Looking North-East



2.3.2 Other Study Area Developments

1040 and 1050 Somerset Street

The combined site would include a 32-storey residential building between the Trillium Rail corridor and Breezehill Avenue, and a 23-storey residential building on the west side of Breezehill Avenue. Both sites would include ground floor commercial/retail and provide underground parking. Access to the 1040 site was proposed along Breezehill Avenue and a laneway access on Somerset Street West was proposed for the 1050 site. These files have not advanced since 2013.

989 Somerset Street

The proposed development consists of a mixed-use building with ground floor retail and 127 residential units above. The transportation impact of this site will be primarily on Somerset Street West and Preston Street. In addition, this file has not advanced since 2014.

3 Study Area and Time Periods

3.1 Study Area

The study area will include the intersections of Gladstone Avenue and Bayswater Avenue, Gladstone Avenue and Preston Street, and Somerset Street West and Breezehill Avenue. Gladstone Avenue and Loretta Avenue North are noted as the boundary roads for the site.

The TRANS screenline SL-29 will need to be reviewed along the Trillium rail corridor, for the Gladstone Avenue and Somerset Street W bridge crossings.

3.2 Time Periods

As the proposed development is composed entirely of residential units the AM and PM peak hours will be examined.

3.3 Horizon Years

The anticipated build-out year is 2023. As a result, the full build-out plus five years horizon year is 2028.

4 Exemption Review

Table 4 summarizes the exemptions for this TIA.

Table 4: Exemption Review

Module	Element	Explanation	Exempt/Required
Design Review Component			
4.1 Development Design	4.1.2 Circulation and Access	Only required for site plans	Required
	4.2.3 New Street Networks	Only required for plans of subdivision	Exempt
4.2 Parking	4.2.1 Parking Supply	Only required for site plans	Required
	4.2.2 Spillover Parking	Only required for site plans where parking supply is 15% below unconstrained demand	Exempt
Network Impact Component			
4.5 Transportation Demand Management	All Elements	Not required for site plans expected to have fewer than 60 employees and/or students on location at any given time	Required

Module	Element	Explanation	Exempt/Required
4.6 Neighbourhood Traffic Management	4.6.1 Adjacent Neighbourhoods	Only required when the development relies on local or collector streets for access and total volumes exceed ATM capacity thresholds	Required
4.8 Network Concept		Only required when proposed development generates more than 200 person-trips during the peak hour in excess of equivalent volume permitted by established zoning	Required

5 Development-Generated Travel Demand

5.1 Trip Generation and Mode Shares

This TIA has been prepared using the vehicle and person trip rates for the residential components using the TRANS Trip Generation Study Report (2009) and person trip rates for general office and the vehicle trip rates for the retail components using the ITE Trip Generation Manual (10th Edition). To estimate person trip generation for the retail component, a factor of 1.28 has been applied to the ITE rates. Table 5 summarizes the person trip rates for the proposed land uses.

Table 5: Trip Generation Person Trip Rates

Dwelling Type	Land Use Code	Peak Hour	Vehicle Trip Rate	Person Trip Rates
High-rise condominiums (3+ floors)	232 (TRANS)	AM	-	1.03
		PM	-	0.85
General Office (Dense Multi-Use)	710	AM	-	1.51
		PM	-	1.57
Shopping Centre (Dense Multi-Use)	820	AM	2.41	3.08
		PM	4.92	6.3

Using the above Person Trip rates, the total person trip generation has been estimates. Table 6 below illustrates the total person trip generation by dwelling type.

Table 6: Total Person Trip Generation

Land Use	Units / GFA	AM Peak Hour			PM Peak Hour		
		In	Out	Total	In	Out	Total
High-rise condominiums	745	116	368	484	314	193	507
General Office	206,480	243	40	283	47	244	291
Shopping Centre	17,894	128	78	206	94	101	195
Total Person Trips		487	486	973	455	538	993

As the proposed development is within a transit-oriented development zone, TOD mode shares will be applied for the development and are summarized in Table 7.

Table 7: TOD Mode Share

Travel Mode	Mode Share
Auto Driver	15%
Auto Passenger	5%
Transit	65%
Non-Auto	15%
Total	100%

Internal capture rates from the ITE Trip Generation Handbook 3rd Edition assigned to the development for the office and retail components for mixed-use developments. The rates summarized in Table 8 represent the percentage of trips to/from the retail or office uses based on the residential component.

Table 8: Internal Capture Rates

Land Use	AM		PM	
	In	Out	Total	In
General Office	3%	1%	57%	2%
Shopping Centre	17%	14%	10%	26%

Using the above mode shares, person trip rates, and the internal capture rates the person trips by mode have been projected. Table 9 summarizes the trip generation by mode.

Table 9: Trip Generation by Mode

Travel Mode	Mode Share	In	Out	Total	In	Out	Total
Auto Driver	15%	69	71	141	67	77	144
Auto Passenger	5%	23	23	47	22	26	48
Transit	65%	302	309	611	290	333	623
Non-Auto Modes	15%	69	71	141	67	77	144
Internal Capture		5	-29	-11	-40	-36	-31
Total	100%	465	475	940	446	512	958

As shown above, 141 AM and 144 PM peak hour two-way vehicle trips are projected as a result of the proposed development.

5.2 Trip Distribution

To understand the travel patterns of the subject development the OD Survey has been reviewed to determine the existing travel patterns. Table 10 below summarizes the distribution.

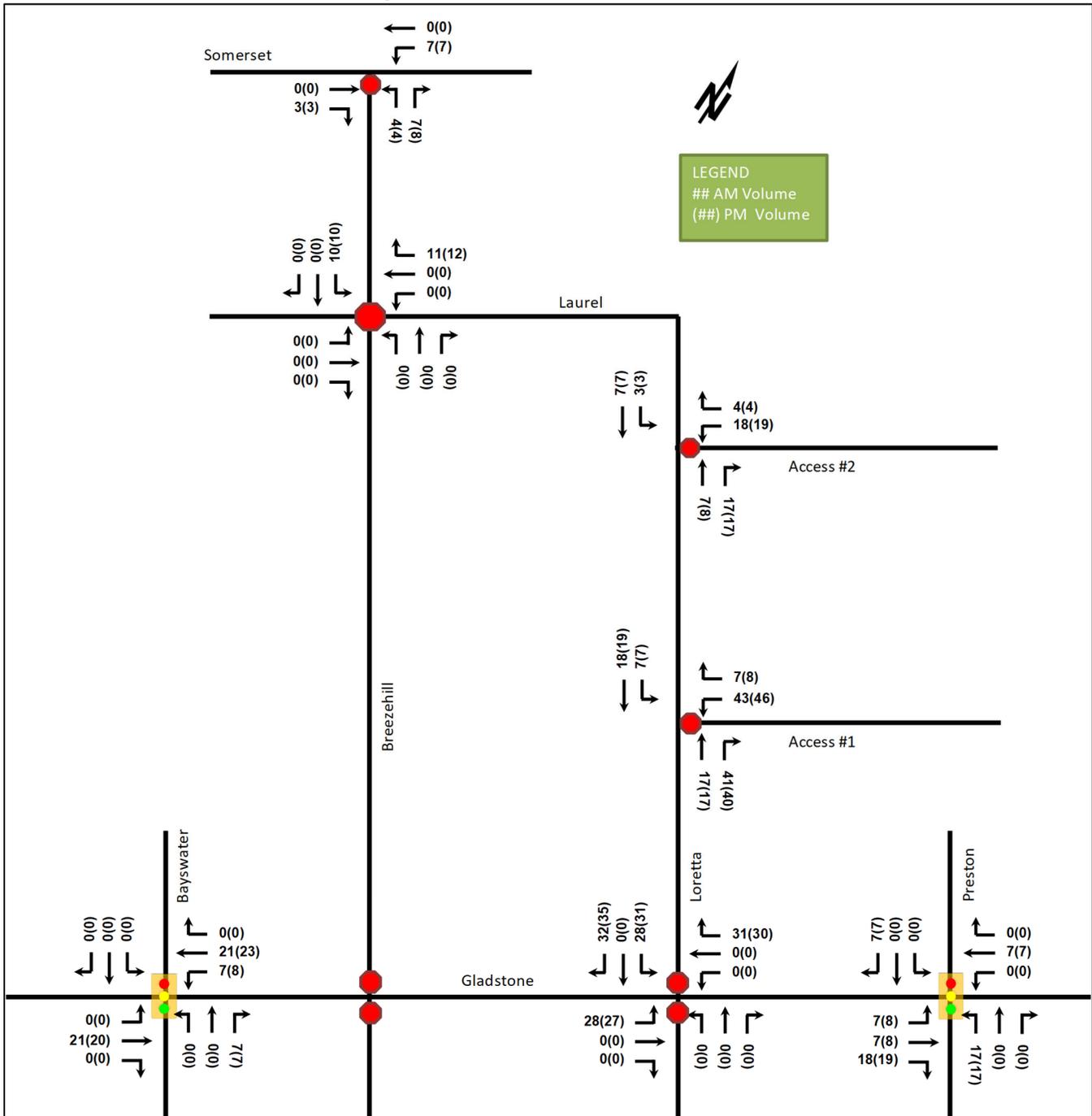
Table 10: OD Survey Existing Mode Share – Ottawa Inner

To/From	Percent of Trips
North	20%
South	35%
East	25%
West	20%
Total	100%

5.3 Trip Assignment

Using the distribution outlined above, turning movement splits, and access to major transportation infrastructure, the trips generated by the site have been assigned to the Study Area road network and are illustrated in Figure 9.

Figure 9: New Site Generation Auto Volumes



6 Background Network Travel Demands

6.1 Transportation Network Plans

The transportation network plans were discussed in Section 2.3.1. Beyond the opening of the Trillium LRT Gladstone Station, no additional network changes have been included in the preparation of this TIA.

6.2 Background Growth

The auto demand within the inner area of Ottawa has been documented as decreasing over the past 10 years, resulting in reduced demand on many roadways. As such, no growth has been applied to the study area intersections.

6.3 Other Developments

No background developments were explicitly considered as part of this TIA.

The future background traffic volumes are anticipated to remain the same as the existing conditions and no improvements are recommended.

7 Demand Rationalization

The existing SL-29 screenline two-way volumes, by mode, along the Trillium rail corridor for the Gladstone Avenue and Somerset Street W crossings has been summarized in Table 11. The auto volumes are approximately 60% to the east during the AM peak and 70% to the west during the PM peak. The theoretical capacity of these roadways could range between 700-900 vehicles per lane, which would provide approximately 30% or more residual capacity in the peak direction for each of these roadways, or be the equivalent to a level of service B.

Table 11: SL-29 Screenline Summary

Vehicle/Mode	Gladstone Bridge		Somerset Bridge	
	AM	PM	AM	PM
	404	676	494	850
	72	61	120	135
	57	65	168	264
	91	86	88	41
	9	10	10	9

Based on the capacity analysis and screenline data, no capacity constraints are currently noted for the area and rationalization for adjusted demand is not required for this TIA.

8 Development Design

8.1 Design for Sustainable Modes

The proposed development is a mixed-use residential development, with 521 parking spaces including 8 surface spaces in the one-way access loop, and 518 bicycle parking spaces. Pedestrian connections will be made to the sidewalks along the site frontages and to the existing multi-use-pathway along the west side of the Trillium LRT.

Beyond the active mode network, the existing transit system stop is located at the corner of Gladstone Avenue and Loretta Avenue and the future Gladstone Station will be adjacent the proposed development and connected via a pedestrian plaza.

8.2 Circulation and Access

Site access will consist of private approaches via two accesses to underground parking and a one-way loop along Loretta Avenue. The accesses will include depressed curb and sidewalks. The one-way loop is a fire route and meets these requirements, and the south part of the loop will also serve as a loading access. The turning templates were completed and the 8.0m width was provided to accommodate these larger movements. The underground parking drive aisles and proposed parking stall sizes meet the by-law requirements.

Garbage pick up will be located on the north side of Tower 3. No issues noted for the turning radius of vehicles.

9 Parking

9.1 Parking Supply

The site provides 521 vehicle parking spaces, including 8 surface stalls and two levels of underground parking. A total of 518 bicycle parking spaces will be provided. The vehicle parking is provided at a rate of 0.5 spaces per residential unit, 0.75 spaces per 1,076 sq. ft of office space and 1.0 spaces per 1,076 sq. ft. of retail space. The bicycle parking is provided at a rate above 0.5 per residential unit and 1.0 per 2,691 sq. ft. of office or retail space. The vehicle and bicycle parking meet the by-law requirements for a TOD site.

10 Boundary Street Design

Table 12 summarizes the MMLOS analysis for the boundary roads of Gladstone Avenue and Loretta Avenue. The existing and future conditions are the same and have been provided as a single line using the central area/within 600m of a rapid transit station criterion. The MMLOS worksheet has been provided in Appendix E.

Table 12: Boundary Street MMLOS Analysis

Segment	Pedestrian LOS		Bicycle LOS		Transit LOS		Truck LOS	
	PLOS	Target	BLOS	Target	TLOS	Target	TrLOS	Target
Gladstone Avenue	C	A	B	B	D	D	B	D
Loretta Street (Existing)	E	A	B	D	-	-	-	-
Loretta Street (Future)	A	A	B	D	-	-	-	-

The road segments of Gladstone Avenue and Loretta Avenue does not meet the targets for pedestrian level of service. Along Gladstone Avenue, the pedestrian level of service is governed by the daily traffic volume and cannot be mitigated without the reduction of traffic along the roadway. The existing Loretta Avenue is governed by the lack of facilities and will meet the targets in the future conditions.

Given the above, no mitigation is recommended for the boundary road segments.

11 Access Intersections Design

11.1 Location and Design of Access

The site accesses will connect directly to Loretta Avenue, through two underground garage accesses and a one-way loop along the frontage of the site. The accesses will consist of depressed curbs and sidewalks.

11.2 Access Intersection Control

The underground garage accesses will be two-way, and the one-way loop will be inbound on the south side and outbound on the north side. The accesses will be stop controlled on the minor approach.

11.3 Access Intersection Design

11.3.1 Future Total Access Intersection Operations

Figure 10 illustrate the future total volumes and Table 13 summarizes the access intersection operations. The level of service is based on the HCM criteria for average delay at unsignalized intersections. The synchro worksheets are provided in Appendix F.

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Figure 10: Future Total Traffic Volumes

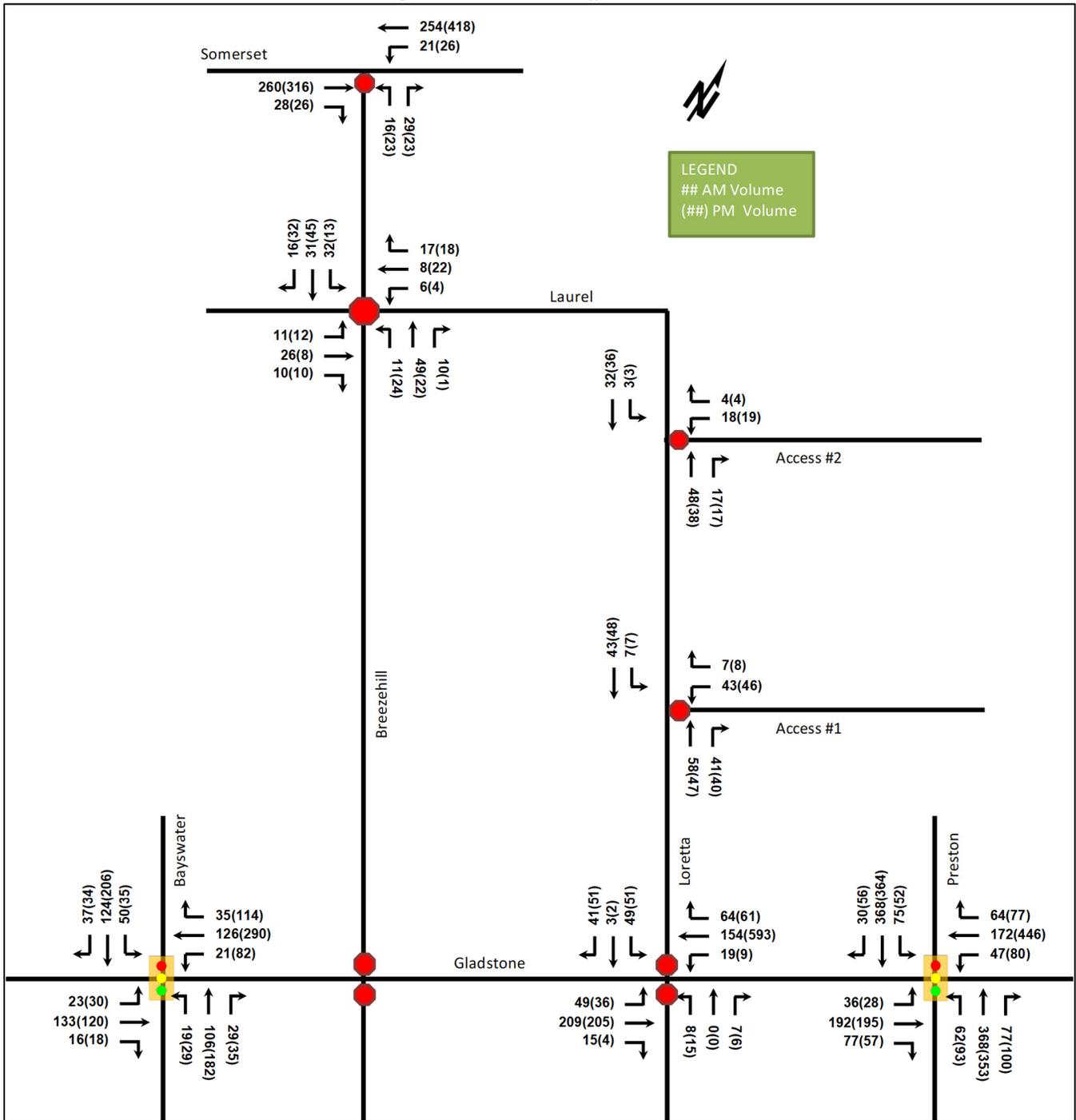


Table 13: Future Total Access Intersection Operations

Intersection	Lane	AM Peak Hour				PM Peak Hour			
		LOS	Delay	V/C	Q (95 th)	LOS	Delay	V/C	Q (95 th)
Loretta Avenue & Loop Access #2 <i>Unsignalized</i>	WB	A	9.0	0.03	0.1	A	9.0	0.03	0.1
	NB	-	-	-	-	-	-	-	-
	SB	A	0.6	0.00	0.0	A	0.6	0.00	0.0
	Overall	A	1.8	-	-	A	2.0	-	-
Loretta Avenue & Garage Access #1 <i>Unsignalized</i>	WB	A	9.4	0.06	0.2	A	9.4	0.06	0.2
	NB	-	-	-	-	-	-	-	-
	SB	A	1.0	0.01	0.0	A	0.9	0.01	0.0
	Overall	A	2.6	-	-	A	2.8	-	-

Notes: Saturation flow rate of 1800 veh/h/lane
PHF = 0.90

The future total access intersection operations are anticipated to operate well.

11.3.2 Access Intersection MMLoS

No signalized intersections serve as access to the subject development.

12 Transportation Demand Management

12.1 Context for TDM

The mode shares used within the TIA represent the planning level targets for a transit-oriented design (TOD). Should these mode shares not be reached, the subject site accesses Loretta Avenue, connecting to Gladstone Avenue and Breezehill Avenue, will see an impact on the adjacent residential land-uses. If the travel modes match the existing Ottawa West area mode shares, this would increase the vehicular traffic by over 3 times the TOD mode shares.

Tenants have not been finalized at this time, therefore any relocations from within Ottawa-Gatineau or the specific business operations cannot be confirmed until the tenants are known.

For the residential land use, a total of 1,171 bedrooms are expected to be within the development and no age restrictions are noted. The retail and office land uses will be determined by lease options and are entirely dependant on tenants to determine the number and occupation of employees, and clients/customers travelling from the Ottawa-Gatineau area and within 2.0km of the site.

12.2 Need and Opportunity

The subject site has been assumed to rely predominantly on transit due to the proximity to the future Gladstone LRT Station. As mentioned above, a decrease in the assumed 65% transit mode share and increase to the existing 50% auto mode share for the area, would see an increase of over 3 times the auto trips from the proposed development.

The development is planned to coincide with the Gladstone Station construction. The convenience of the transit station should provide the opportunity to reach the forecast transit mode share, although incentives for new residential tenants exists within the TDM framework. Hard measures, such as reduced parking provisions, would limit the risk of higher auto mode shares being produced from the site.

12.3 TDM Program

The “suite of post occupancy TDM measures” has been summarized in the TDM checklists for both the residential and non-residential land uses. The checklist is provided in Appendix G.

The key TDM measures recommended include:

- Enhanced connectivity of pedestrians and cyclists to the adjacent network and adjacent Gladstone LRT station
- Engagement with local bike share programs (e.g. VeloGO) to include onsite space for bike rack/storage
- Posting of pedestrian, cycling, and transit information and maps at primary entrances/exits
- Inclusion of a 1-month Presto card for first time new residential tenants, along with a set time frame for this offer (e.g. 6-months) from the ‘opening’ of the building/tower.

13 Neighbourhood Traffic Management

The existing (and future background) volumes along Gladstone Avenue at Preston Avenue are approximately 550 vehicles during the peak hours in the peak direction. This exceeds the TIA Guidelines threshold of 300 vehicles during the peak hour. This threshold is too low for collector roadways and is not considered to be an existing or background issue, and the increase of approximately 90-135 vehicles during the peak hours in the peak direction from the subject site is not considered significant for a collector roadway.

14 Transit

14.1 Route Capacity

The existing Trillium line provides capacity for 1,000 passengers per direction per hour on a 15-minute service schedule. The future plans include a steady increase in service time to 8-minutes (1,750 passengers per direction per hour) as demand increases.

Based on the trip distribution and forecasted transit trips for the site, the transit ridership has been summarized in Table 14, identifying the direction of travel and percent capacity impact of these new trips. The range of the impacts are 9-20% of the opening service capacity of the Trillium LRT. Therefore, a revised service time schedule of 12 minutes may be required to support this development if the opening service capacity is fully utilized prior to this development.

Table 14: LRT Volumes and Capacity

Direction of Travel	Movement at Gladstone Station	AM	PM	% Capacity
Northbound	Arrival	177	170	17-18%
	Departure	97	105	10-11%
Southbound	Arrival	95	91	9-10%
	Departure	181	195	18-20%

If a maximum of 10% of the transit mode share utilizes the existing route #14, this may see the need for an additional single bus (55-person capacity) during the peak hours to accommodate the additional demand.

14.2 Transit Priority

No transit priority is required/considered for the study area.

15 Review of Network Concept

The background and forecasted site trips do not exceed the anticipated lane capacities on the boundary road network. The construction and connectivity to the future Gladstone LRT Station is a priority to ensure the transit modal share is achieved and there is a minimal impact on the road network.

16 Network Intersection Design

16.1 Network Intersection Control

The signal warrants were completed for the intersections of Somerset Street W and Breezehill Avenue, and Gladstone Avenue and Loretta Avenue N. Gladstone Avenue and Loretta Avenue N warranted signals, based on the City’s warrant matrix. Operationally, the intersection projected to operate well (see Section 16.2.1) and it is recommended that this intersection remain a minor stop-controlled intersection in the future. The warrant calculation has been provided in Appendix H.

16.2 Network Intersection Design

16.2.1 Future Total Network Intersection Operations

The future total future traffic volumes for both the 2023 and 2028 horizons are the same and have been illustrated in **Error! Reference source not found.** and the intersection operations are summarized in Table 15. The level of service is based on the HCM criteria for average delay at unsignalized and signalized intersections. The synchro worksheets have been provided in Appendix F.

Table 15: Future Total Network Intersection Operations

Intersection	Lane	AM Peak Hour				PM Peak Hour			
		LOS	Delay	V/C	Q (95 th)	LOS	Delay	V/C	Q (95 th)
Gladstone Avenue & Preston Street <i>Signalized</i>	EB	C	32.8	0.72	#61.8	C	20.6	0.55	43.5
	WBL	C	24.4	0.25	12.1	B	17.1	0.23	14.9
	WBT/R	C	25.2	0.55	40.2	C	34.0	0.84	#102.8
	NBL	A	8.3	0.14	8.2	B	16.5	0.32	16.7
	NBT/R	B	10.9	0.49	46.7	B	18.6	0.62	63.8
	SBL	A	9.1	0.19	9.9	B	14.0	0.19	9.8
	SBT/R	B	10.3	0.42	40.6	B	17.7	0.57	58.3
	Overall	B	17.4	-	-	C	22.6	-	-
Gladstone Avenue & Bayswater Avenue <i>Signalized</i>	EB	B	10.3	0.24	18.6	A	8.0	0.20	15.0
	WB	A	9.6	0.25	18.6	B	14.4	0.63	55.4
	NB	B	13.0	0.27	19.5	B	20.0	0.50	35.6
	SB	B	15.3	0.38	27.5	C	21.7	0.56	40.5
	Overall	B	12.2	-	-		16.5	-	-
Somerset Street W & Breezehill Avenue <i>Unsignalized</i>	EB	-	-	-	-	-	-	-	-
	WB	A	0.6	0.02	0.1	A	0.5	0.03	0.1
	NB	B	12.0	0.08	0.3	C	16.6	0.13	0.4
	Overall	A	1.2	-	-	A	1.2	-	-
Gladstone Avenue & Loretta Avenue <i>Unsignalized</i>	EB	A	1.4	0.04	0.1	A	1.4	0.04	0.1
	WB	A	0.6	0.01	0.0	A	0.1	0.01	0.0
	NB	B	12.4	0.03	0.1	C	21.1	0.09	0.3
	SB	B	13.3	0.18	0.6	C	23.5	0.35	1.5
	Overall	A	3.2	-	-	A	3.2	-	-
Breezehill Avenue & Laurel Street <i>Unsignalized</i>	EB	A	7.5	0.06	0.2	A	7.3	0.04	0.1
	WB	A	7.2	0.04	0.1	A	7.2	0.05	0.2
	NB	A	7.5	0.08	0.3	A	7.5	0.06	0.2
	SB	A	7.5	0.09	0.3	A	7.4	0.10	0.3
	Overall	A	7.5	-	-	A	7.4	-	-

Notes: Saturation flow rate of 1800 veh/h/lane
PHF = 1.00

The future total intersection operations are similar to the existing conditions.

16.2.2 Network Intersection MMLOS

Table 16 summarizes the MMLOS analysis for the network intersections of Gladstone Avenue and Preston Street, and Gladstone Avenue and Bayswater Avenue. The existing and future conditions are the same and have been provided as a single line using the central area/within 600m of a rapid transit station criterion. The MMLOS worksheet has been provided in Appendix E.

Table 16: Network Intersection MMLOS Analysis

Segment	Pedestrian LOS		Bicycle LOS		Transit LOS		Truck LOS		Auto LOS	
	PLOS	Target	BLOS	Target	TLOS	Target	TrLOS	Target	ALOS	Target
Gladstone Avenue & Preston Street	C	A	D	B	D	D	F	D	B	E
Gladstone Avenue & Bayswater Avenue	B	A	D	B	C	D	F	-	A	E

The intersection of Gladstone Avenue and Preston Street does not meet the targets for pedestrian, bicycle and truck level of service. The pedestrian level of service is governed by the crossing distance on the north, south and east sides of the intersection and cannot be mitigated without reducing the size of the intersection. The west side can reach LOS A with a pedestrian leading interval. Dedicated cycling facilities would be required on the approaches to the intersection to meet the bicycle target. The truck level of service is governed by the single receiving lane and would require an additional receiving lane or corner radii greater than 15 metres to reach the truck targets.

Similar to the above, the intersection of Gladstone Avenue and Bayswater Avenue does not meet the targets for pedestrian, bicycle and truck level of service. The pedestrian level of service can be mitigated through the addition a leading crossing interval on the east and west sides of the intersection, and addition of the crossing interval and crosswalk type including colour/texture or zebra markings. Dedicated cycling facilities would be required on the approaches to the intersection to meet the bicycle target. The truck level of service is governed by the single receiving lane and would require an additional receiving lane or corner radii greater than 15 metres to reach the truck targets.

Given the above, it is recommended that the City explore the inclusion of pedestrian leading intervals at both area intersections and alternative crosswalk types at Gladstone Avenue and Bayswater Avenue. No mitigation is recommended for the bicycle or truck level of service due to property restrictions and impact on the pedestrian level of service required to improve either score.

17 Summary of Improvements Indicated and Modifications Options

The following summarizes the analysis and results presented in this TIA report:

Proposed Site and Screening

- The proposed site includes 745 residential units, 206,480 sq. ft of office space, and 17,894sq. ft. of retail space and is located on the northeast quadrant of the Gladstone Avenue and Loretta Avenue N intersection
- A one-way access loop and two underground parking accesses will be provided along Loretta Avenue N and the existing access on Gladstone Avenue will be removed

- The removed Gladstone Avenue access will be converted into a pedestrian plaza and integrate with the future Gladstone LRT Station
- The development is proposed to be completed as a single phase by 2023
- The Trip Generation, Location, and Safety triggers were all met for the TIA Screening

Existing Conditions

- Gladstone Avenue (major collector), Loretta Avenue N, Breezehill Avenue, Bayswater Avenue (collector), Preston Street (arterial), and Somerset Street W (arterial) are the local roadways, posted at 40km/h or unposted at 50 km/h
- The study area roads have sidewalks on at least one side of the local roads and both sides of the collectors and arterials
- Bike lanes are provided on Somerset Street W, east of Breezehill Avenue, and Gladstone Avenue, Bayswater Avenue and Somerset Street W are suggested bike routes
- The Trillium Pathway runs along the east side of the Trillium LRT corridor
- The existing transit route #14 travels along Gladstone Avenue, route #11 along Somerset Street W and #85 along Preston Street
- The Carling and Bayview Trillium LRT Stations are within a 1.1km walk from the site
- No operational issues are noted for the study area intersections

Development Generated Travel Demand

- The proposed development is forecasted to generate 973 people two-way trips during the AM peak and 993 people two-way trips during the PM peak
- Based on the transit-oriented design area mode shares, a total of 141 two-way vehicle trips will be generated during the AM peak and 144 two-way vehicles trips during the PM peak
- The distribution of the site trips is estimated to be 20% to the north, 35% to the south, 25% to the east, and 20% to the west

Background Conditions

- Adjacent developments have either been on hold for extended periods of time with an unknown horizon, or are too small to have a noticeable impact on the adjacent road network
- Additionally, the background growth in the Ottawa core has been decreasing and a 0% growth was assumed for the area
- The future background intersection operations are the same as the existing intersections

Development Design

- A total of 521 car parking stalls and a total of 518 bicycle parking spaces will be provided on site
- Pedestrian connections will be made to Gladstone Avenue and Loretta Avenue, and to the multi-use pathway along the west side of the Trillium LRT
- No traffic calming elements are recommended as part of this development

Boundary Street Design

- Gladstone Avenue does not meet pedestrian due to auto volumes
- Loretta Avenue does not meet pedestrian level of service during the existing conditions and will meet the targets with the new sidewalk and landscaping along the frontage of the proposed development
- No improvements are recommended for Gladstone Avenue to meet the MMLOS targets

Access Intersections Design

- Access will be provided through private approaches to Loretta Avenue, including two underground garage accesses and a one-way loop for truck access and drop-offs
- The access intersection will operate as a minor stop control
- The accesses along Loretta Avenue is anticipated to operate well during the future total horizon
- No MMLOS analysis is required for stop controlled intersections

TDM

- The development is planned to be completed along side the future Gladstone LRT Station and is the primary supportive infrastructure element to achieve the assumed mode shares and site success
- Additional supportive TDM measures include:
 - Enhanced connectivity of pedestrians and cyclists to the adjacent network and adjacent Gladstone LRT station
 - Engagement with local bike share programs (e.g. VeloGO) to include onsite space for bike rack/storage
 - Posting of pedestrian, cycling, and transit information and maps at primary entrances/exits
 - Inclusion of a 1-month Presto card for first time new residential tenants, along with a set time frame for this offer (e.g. 6-months) from the 'opening' of the building/tower.

Neighbourhood Traffic Management

- The TIA thresholds are met for the existing and background conditions for collector roadways on Gladstone Avenue
- The forecasted transit-oriented design site traffic will be minimal, and it is not considered an issue for the adjacent neighbourhood

Transit

- The forecasted transit trips will include 611 two-way trips during the AM peak and 623 two-way trips during the PM peak
- An additional peak hour bus for route #14 may be required to support the proposed development
- The Trillium LRT service time may need to be increased, reducing the 15-minute service time to a 12-minute service time to support the proposed development
- No transit priority measures are recommended

Review of Network Concept

- The site is not anticipated to impact the transportation network concepts

Network Intersection Design

- No improvements for the study area intersection are required to support the proposed development
- The existing operational issues are not exacerbated by the additional site auto traffic
- The intersections of Gladstone Avenue and Preston Street, and Gladstone Avenue and Bayswater Avenue do not meet the pedestrian, bicycle or truck MMLOS targets
- A leading crossing interval in the signal timing will improve the pedestrian level of service slightly at each intersection and should be explored by the City

- No mitigation for the bicycle and truck level of service is recommended due to the property constraints in the area and the negative impact it would have on the pedestrian level of service at the intersections

18 Next Steps

Following the circulation and review of this Strategy Report, any outstanding comments will be addressed within the context of the site plan submission. Following the completion of the remaining TIA Steps and sign-off has been received from City Transportation Project Manager, a signed and stamped final report will be provided to City staff.

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Appendix A

TIA Screening Form and PM Certification Form

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TIA Plan Reports

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

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

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

CERTIFICATION

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

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

City Of Ottawa
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Télécopieur: 613-560-6006

Dated at Ottawa this 20 day of September, 2018.
(City)

Name: Andrew Harte
(Please Print)

Professional Title: Professional Engineer



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

Office Contact Information (Please Print)
Address: 13 Markham Avenue
City / Postal Code: Ottawa / K2G 3Z1
Telephone / Extension: (613) 697-3797
E-Mail Address: Andrew.Harte@CGHTransportation.com



City of Ottawa 2017 TIA Guidelines
Step 1 - Screening FormDate: Oct. 5, 2018
Project Number: 2018-36
Project Reference: Trinity - Gladstone-Loretta

1.1 Description of Proposed Development	
Municipal Address	951 Gladstone Ave, 145 Loretta Ave N
Description of Location	PLAN 73 BLK C LOTS 2 AND 3;PT LOT 1 WCA LOTS 1 TO 4 ELA;PT BLK C PT CHAMPAGNE AVE; PLAN 73 BLK C LOTS 5 TO 8
Land Use Classification	Apartments (Bachelor-3 Bdrm), Office, Retail
Development Size	Apartments: 931 units, Office: 141,750 sq. ft, Retail 21,686 sq.ft
Accesses	2 accesses, Loretta Ave
Phase of Development	Single Phase
Buildout Year	2023
TIA Requirement	Full TIA Required

1.2 Trip Generation Trigger	
Land Use Type	Townhomes or apartments
Development Size	931 Units
Trip Generation Trigger	Yes

1.3 Location Triggers	
Does the development propose a new driveway to a boundary street that is designated as part of the City's Transit Priority, Rapid Transit or Spine Bicycle Networks?	Yes
Is the development in a Design Priority Area (DPA) or Transit-oriented Development (TOD) zone?	Yes
Location Trigger	Yes

1.4. Safety Triggers	
Are posted speed limits on a boundary street are 80 km/hr or greater?	No
Are there any horizontal/vertical curvatures on a boundary street limits sight lines at a proposed driveway?	No
Is the proposed driveway within the area of influence of an adjacent traffic signal or roundabout (i.e. within 300 m of intersection in rural conditions, or within 150 m of intersection in urban/ suburban conditions)?	No
Is the proposed driveway within auxiliary lanes of an intersection?	No
Does the proposed driveway make use of an existing median break that serves an existing site?	No
Is there is a documented history of traffic operations or safety concerns on the boundary streets within 500 m of the development?	No
Does the development include a drive-thru facility?	No
Safety Trigger	No

Appendix B

Turning Movement Counts

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Transportation Services - Traffic Services W.O. 36100
Turning Movement Count - 15 Minute Summary Report

BAYSWATER AVE @ GLADSTONE AVE

Survey Date: Wednesday, July 27, 2016 **Total Observed U-Turns**
 Northbound: 0 Southbound: 0
 Eastbound: 0 Westbound: 0

Time Period	Northbound					Eastbound					Westbound					W STR TOT	S TR TOT	E TR TOT	W STR TOT	Grand Total
	L	T	R	T	T	L	T	R	T	T	L	T	R	T	T					
07:00-07:15	0	13	3	16	31	6	48	64	5	22	3	30	2	11	6	19	49	113		
07:15-07:30	2	21	2	25	3	23	3	29	54	5	21	3	29	2	18	5	25	54	108	
07:30-07:45	1	19	2	22	10	32	2	44	66	9	24	3	36	3	21	8	32	68	134	
07:45-08:00	2	25	7	34	8	35	5	48	82	5	28	3	36	4	14	4	22	58	140	
08:00-08:15	3	20	5	28	18	30	11	59	87	5	36	1	42	3	19	7	29	71	158	
08:15-08:30	5	32	3	40	8	29	7	44	84	7	28	4	39	1	22	9	32	71	155	
08:30-08:45	3	24	7	34	10	32	15	57	91	5	23	8	36	5	26	10	41	77	168	
08:45-09:00	8	30	7	45	14	33	4	51	96	6	25	3	34	5	38	9	52	86	182	
09:00-09:15	3	27	8	38	9	24	7	40	78	7	28	3	38	5	19	8	32	70	148	
09:15-09:30	4	18	10	32	10	28	9	47	79	3	29	2	34	2	20	8	30	64	143	
09:30-09:45	7	13	8	28	10	14	5	29	57	6	23	5	34	3	21	7	31	65	122	
09:45-10:00	4	12	5	21	9	19	2	30	51	5	24	3	32	1	25	6	32	64	115	
11:30-11:45	4	28	5	37	2	21	5	28	65	2	27	2	31	12	24	10	46	77	142	
11:45-12:00	5	15	14	34	10	23	6	39	73	1	30	3	34	5	46	14	65	99	172	
12:00-12:15	6	25	9	40	8	28	8	44	84	5	28	0	33	7	35	8	50	83	167	
12:15-12:30	6	17	5	28	8	23	13	44	72	4	26	4	34	6	38	15	59	93	165	
12:30-12:45	7	28	10	45	5	18	3	26	71	8	29	4	41	3	27	6	36	77	148	
12:45-13:00	7	27	13	47	10	15	4	29	76	3	26	5	34	7	28	10	45	79	155	
13:00-13:15	3	14	3	20	7	24	4	35	55	4	30	3	37	4	32	16	52	89	144	
13:15-13:30	5	20	8	33	10	17	4	31	64	9	33	4	46	2	38	10	50	96	160	
15:00-15:15	4	48	5	57	10	30	9	49	106	6	32	3	41	7	27	11	45	86	192	
15:15-15:30	2	53	3	58	6	42	8	56	114	8	20	8	36	9	35	26	70	106	220	
15:30-15:45	1	52	7	60	4	38	2	44	104	7	28	2	37	11	60	35	106	143	247	
15:45-16:00	4	46	5	55	8	25	6	39	94	5	25	5	35	9	46	23	78	113	207	
16:00-16:15	6	57	7	70	12	35	10	57	127	11	30	6	47	13	69	33	115	162	289	
16:15-16:30	7	44	3	54	9	47	9	65	119	8	26	1	35	24	66	27	117	152	271	
16:30-16:45	8	44	8	60	5	69	9	83	143	7	26	8	41	11	66	32	109	150	293	
16:45-17:00	8	37	10	55	9	55	6	70	125	4	18	3	25	26	66	22	114	139	264	
17:00-17:15	9	40	2	51	6	58	15	79	130	9	26	6	41	22	57	27	106	147	277	
17:15-17:30	5	36	10	51	9	37	12	58	109	9	23	6	38	16	73	26	115	153	262	
17:30-17:45	3	28	5	36	6	35	8	49	85	11	29	5	45	11	50	13	74	119	204	
17:45-18:00	6	26	9	41	10	28	10	48	89	6	21	2	29	5	38	11	54	83	172	

TOTAL: 148 939 208 1295 274 998 227 1499 2794 195 844 121 1160 246 1175 462 1833 3043 5837
Note: U-Turns are included in Totals.



Transportation Services - Traffic Services W.O. 36100
Turning Movement Count - Cyclist Volume Report

BAYSWATER AVE @ GLADSTONE AVE

Count Date: Wednesday, July 27, 2016 **Start Time:** 07:00

Time Period	BAYSWATER AVE			GLADSTONE AVE			Street Total	Grand Total
	Northbound	Southbound	Street Total	Eastbound	Westbound	Street Total		
07:00-08:00	6	2	8	29	14	43	51	
08:00-09:00	12	7	19	63	18	81	100	
09:00-10:00	5	0	5	19	15	34	39	
11:30-12:30	2	0	2	11	14	25	27	
12:30-13:30	2	0	2	10	0	10	12	
15:00-16:00	3	4	7	10	9	19	26	
16:00-17:00	3	7	10	21	51	72	82	
17:00-18:00	11	11	22	35	40	75	97	
Total	44	31	75	198	161	359	434	

Comment:

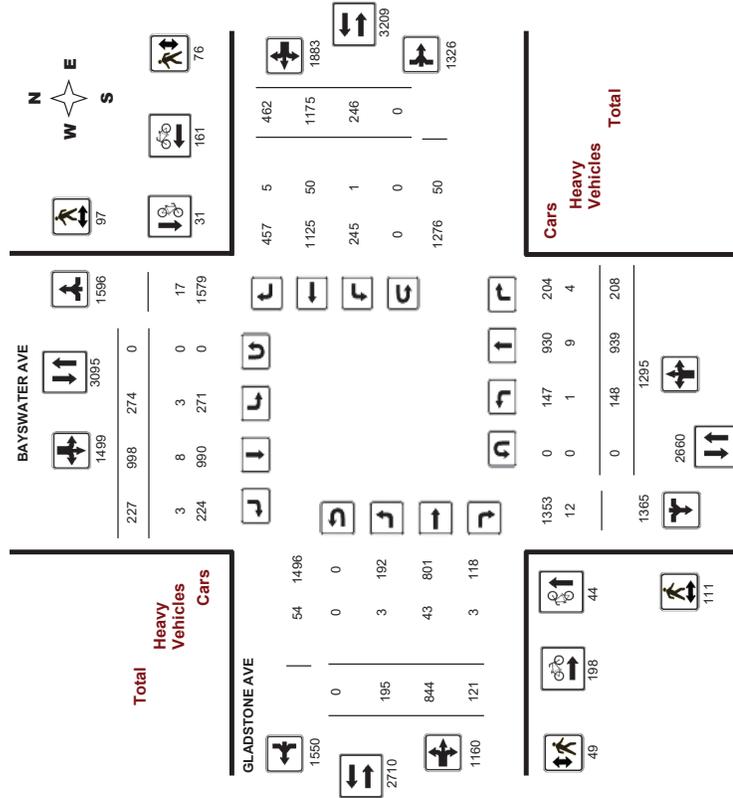


Transportation Services - Traffic Services
Turning Movement Count - Full Study Diagram

BAYSWATER AVE @ GLADSTONE AVE

Survey Date: Wednesday, July 27, 2016

WO#: 36100
 Device: MiOVision



Comments



Transportation Services - Traffic Services

W.O.
36100

Turning Movement Count - Heavy Vehicle Report

BAYSWATER AVE @ GLADSTONE AVE

Survey Date: Wednesday, July 27, 2016

Time Period	Northbound						Eastbound						Westbound						Grand Total	
	BAYSWATER AVE			GLADSTONE AVE			BAYSWATER AVE			GLADSTONE AVE			BAYSWATER AVE			GLADSTONE AVE				
	LT	ST	RT	N	LT	ST	RT	S	STR	TOT	LT	ST	RT	E	LT	ST	RT	W		STR
07:00-08:00	0	0	1	1	1	1	0	2	3	2	2	0	4	1	8	0	9	13	16	
08:00-09:00	0	2	0	2	0	3	1	4	6	0	4	2	6	0	7	1	8	14	20	
09:00-10:00	0	1	0	1	0	1	0	1	2	0	4	0	4	0	5	0	5	9	11	
11:30-12:30	0	1	3	4	1	0	1	2	6	0	6	0	6	0	8	2	10	16	22	
12:30-13:30	1	5	0	6	1	2	0	3	9	0	9	1	10	0	9	0	9	19	28	
15:00-16:00	0	0	0	0	0	0	0	0	0	0	9	0	9	0	3	2	5	14	14	
16:00-17:00	0	0	0	0	0	0	1	1	1	1	6	0	7	0	6	0	6	13	14	
17:00-18:00	0	0	0	0	0	1	0	1	1	0	3	0	3	0	4	0	4	7	8	
Sub Total	1	9	4	14	3	8	3	14	28	3	43	3	49	1	50	5	56	105	133	
U-Turns (Heavy Vehicles)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	1	9	4	14	3	8	3	14	28	3	43	3	49	1	50	5	56	105	133	

Heavy Vehicles include Buses, Single-Unit Trucks and Articulated Trucks. Further, they ARE included in the Turning Movement Count Summary.



Transportation Services - Traffic Services
Turning Movement Count - Full Study Summary Report
BAYSWATER AVE @ GLADSTONE AVE

Work Order
36100

Survey Date: Wednesday, July 27, 2016

Total Observed U-Turns
 Northbound: 0 Southbound: 0
 Eastbound: 0 Westbound: 0
 AADT Factor
 .90

Full Study

Period	BAYSWATER AVE								GLADSTONE AVE								Grand Total			
	Northbound				Southbound				Eastbound				Westbound							
	LT	ST	RT	TOT	NB	LT	ST	TOT	SB	RT	LT	TOT	EB	LT	ST	TOT		WB	RT	LT
07:00-08:00	5	78	14	97	32	121	16	169	286	24	95	12	131	11	64	23	98	229	495	
08:00-09:00	19	106	22	147	50	124	37	211	388	23	112	16	151	14	105	35	154	305	663	
09:00-10:00	18	70	31	119	38	85	23	146	265	21	104	13	138	11	85	29	125	263	528	
11:30-12:30	21	85	33	139	28	95	32	155	294	12	111	9	132	30	143	47	220	352	646	
12:30-13:30	22	89	34	145	32	74	15	121	266	24	118	16	158	16	125	42	183	341	607	
15:00-16:00	11	199	20	230	28	135	25	188	418	26	105	18	149	36	168	95	299	448	866	
16:00-17:00	29	182	28	239	35	206	34	275	514	30	100	18	148	74	267	114	455	603	1117	
17:00-18:00	23	130	26	179	31	158	45	234	413	35	99	19	153	54	218	77	349	502	915	
Sub Total	148	939	208	1295	274	988	227	1499	2794	195	644	121	1160	246	1175	462	1883	3043	5837	
U-Turns	0				0				0				0				0	0	0	0
Total	148	939	208	1295	274	988	227	1499	2794	195	644	121	1160	246	1175	462	1883	3043	5837	
EQ 12Hr	206	1305	289	1800	381	1387	316	2084	3884	271	1173	188	1612	342	1633	642	2617	4229	8113	
Note: These values are calculated by multiplying the totals by the appropriate expansion factor.																				
Note: These values are calculated by multiplying the totals by the appropriate expansion factor.																				
Note: These values are calculated by multiplying the totals by the appropriate expansion factor.																				
AVG 12Hr	185	1175	260	1620	343	1248	284	1875	3495	244	1056	151	1451	308	1470	578	2356	3807	7302	
Note: These volumes are calculated by multiplying the Equivalent 12 hr. totals by the AADT factor.																				
AVG 24Hr	243	1539	341	2122	449	1636	372	2457	4579	320	1383	198	1901	403	1926	757	3086	4887	9566	
Note: These volumes are calculated by multiplying the Average Daily 12 hr. totals by 12 to 24 expansion factor.																				

Comments:
 Note: U-Turns provided for approach totals. Refer to 'U-Turn' Report for specific breakdown.



Transportation Services - Traffic Services
Turning Movement Count - Pedestrian Volume Report
BAYSWATER AVE @ GLADSTONE AVE

Work Order
36100

Count Date: Wednesday, July 27, 2016

Start Time: 07:00

Time Period	NB Approach (E or W Crossing)	SB Approach (E or W Crossing)	EB Approach (N or S Crossing)	WB Approach (N or S Crossing)	Total	Grand Total
07:00-07:15	1	1	0	1	1	3
07:15-07:30	3	0	1	0	1	4
07:30-07:45	4	5	2	1	3	12
07:45-08:00	3	3	1	6	7	13
08:00-08:15	11	9	4	8	12	32
08:15-08:30	2	5	1	3	4	11
08:30-08:45	5	6	1	4	5	16
08:45-09:00	8	2	0	0	0	10
09:00-09:15	1	5	1	1	2	8
09:15-09:30	16	18	3	8	11	45
09:30-09:45	3	5	2	0	2	10
09:45-10:00	2	4	1	2	3	7
10:00-10:15	4	3	2	2	4	11
10:15-10:30	4	3	2	4	4	11
10:30-10:45	2	1	0	3	3	6
10:45-11:00	11	11	5	7	12	34
11:00-11:15	1	4	0	1	1	6
11:15-11:30	3	0	0	4	4	7
11:30-11:45	3	0	0	9	9	12
11:45-12:00	3	0	1	1	3	8
12:00-12:15	4	1	2	2	3	10
12:15-12:30	4	1	1	1	1	8
12:30-12:45	11	5	2	15	17	33
12:45-13:00	3	0	2	1	3	6
13:00-13:15	5	1	0	0	0	6
13:15-13:30	4	1	0	2	2	7
13:30-13:45	5	2	1	3	4	11
13:45-14:00	17	4	3	6	9	30
14:00-14:15	0	1	0	1	1	2
14:15-14:30	3	1	4	2	6	10
14:30-14:45	4	2	1	2	3	9
14:45-15:00	2	4	0	3	3	7
15:00-16:00	9	6	5	8	13	28
16:00-16:15	6	9	3	4	7	22
16:15-16:30	2	1	4	0	4	7
16:30-16:45	8	7	5	5	10	25
16:45-17:00	11	6	1	2	3	20
17:00-17:15	27	23	13	11	24	74
17:15-17:30	3	8	1	4	4	15
17:30-17:45	1	7	3	7	10	18
17:45-18:00	2	3	2	5	7	12
18:00-18:15	3	3	6	6	6	12
18:15-18:30	9	21	30	14	27	57
18:30-18:45	9	21	30	14	27	57
18:45-19:00	9	21	30	14	27	57
Total	111	97	208	76	125	333

Comment:



Transportation Services - Traffic Services

Turning Movement Count - Peak Hour Diagram

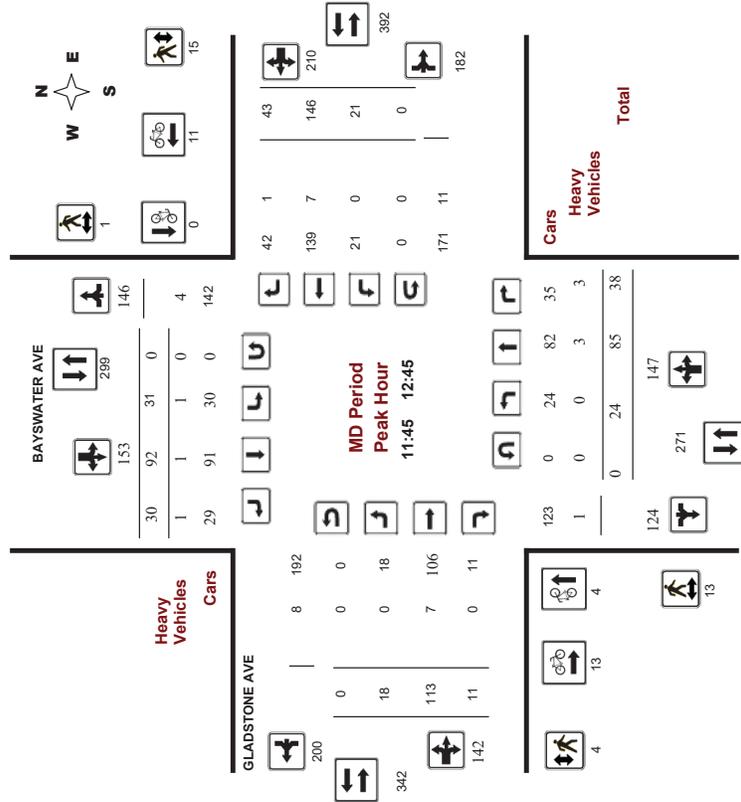
BAYSWATER AVE @ GLADSTONE AVE

Survey Date: Wednesday, July 27, 2016

WO No: 36100

Start Time: 07:00

Device: Miovision



Comments



Transportation Services - Traffic Services

Turning Movement Count - Peak Hour Diagram

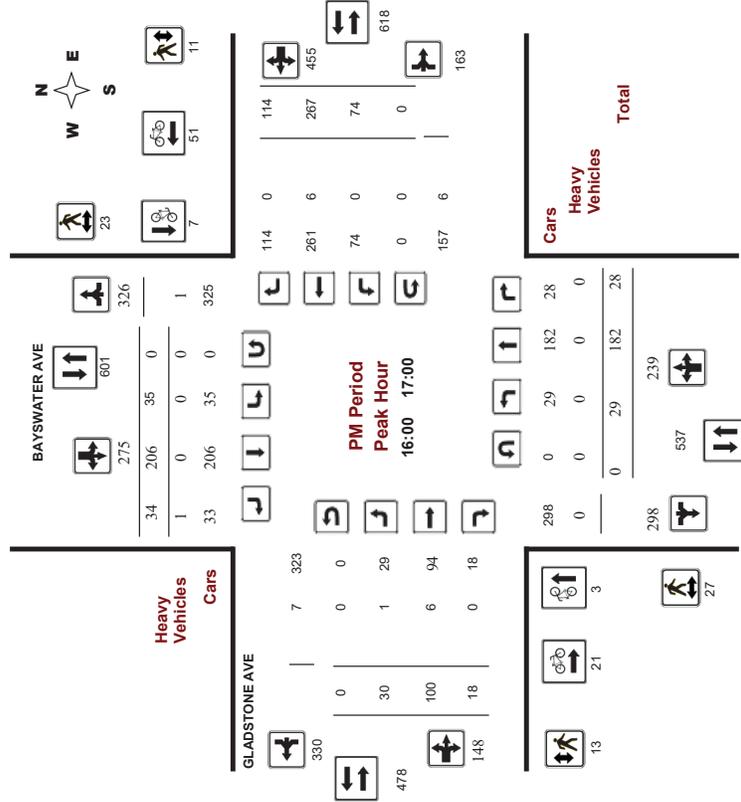
BAYSWATER AVE @ GLADSTONE AVE

Survey Date: Wednesday, July 27, 2016

WO No: 36100

Start Time: 07:00

Device: Miovision



Comments



Transportation Services - Traffic Services

Work Order
36100

Turning Movement Count - 15 Min U-Turn Total Report BAYSWATER AVE @ GLADSTONE AVE

Survey Date: Wednesday, July 27, 2016

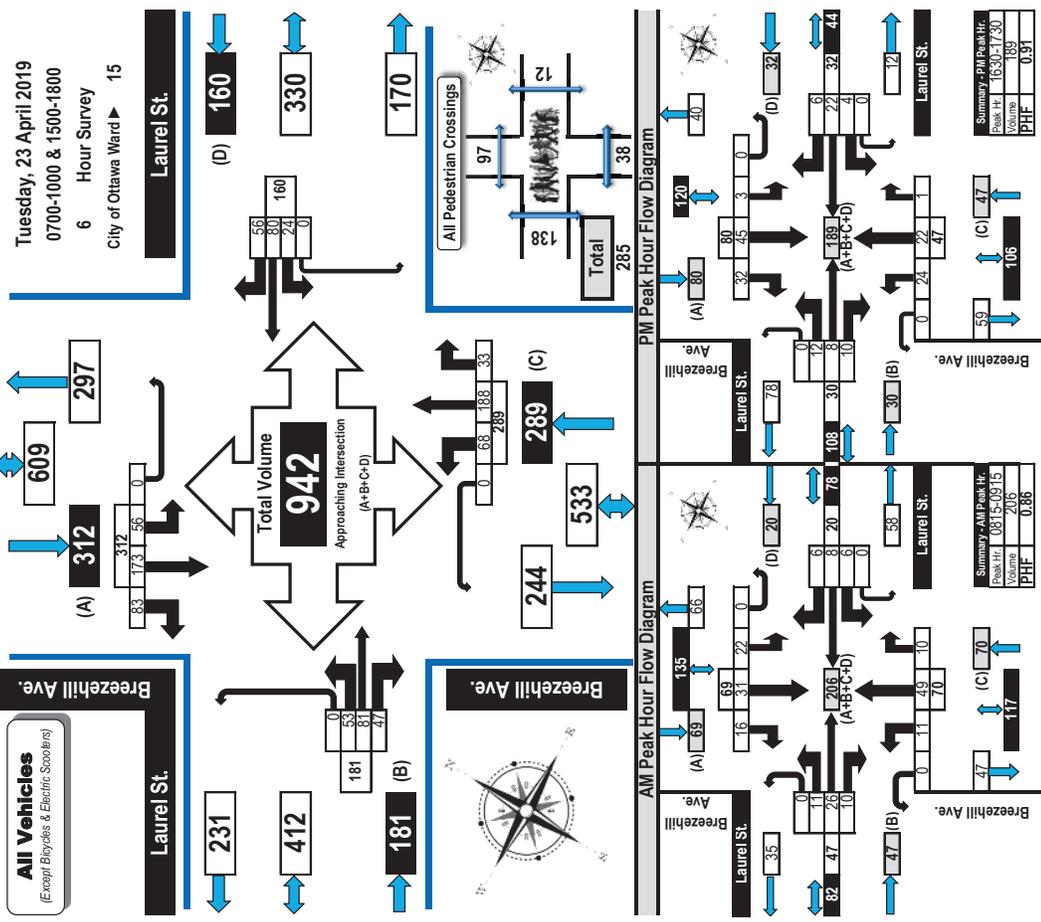
Time Period	Northbound		Southbound		Eastbound		Westbound		Total
	U-Turn	Total	U-Turn	Total	U-Turn	Total	U-Turn	Total	
07:00	0	0	0	0	0	0	0	0	0
07:15	0	0	0	0	0	0	0	0	0
07:30	0	0	0	0	0	0	0	0	0
07:45	0	0	0	0	0	0	0	0	0
08:00	0	0	0	0	0	0	0	0	0
08:15	0	0	0	0	0	0	0	0	0
08:30	0	0	0	0	0	0	0	0	0
08:45	0	0	0	0	0	0	0	0	0
09:00	0	0	0	0	0	0	0	0	0
09:15	0	0	0	0	0	0	0	0	0
09:30	0	0	0	0	0	0	0	0	0
09:45	0	0	0	0	0	0	0	0	0
10:00	0	0	0	0	0	0	0	0	0
11:30	0	0	0	0	0	0	0	0	0
11:45	0	0	0	0	0	0	0	0	0
12:00	0	0	0	0	0	0	0	0	0
12:15	0	0	0	0	0	0	0	0	0
12:30	0	0	0	0	0	0	0	0	0
12:45	0	0	0	0	0	0	0	0	0
13:00	0	0	0	0	0	0	0	0	0
13:15	0	0	0	0	0	0	0	0	0
13:30	0	0	0	0	0	0	0	0	0
15:00	0	0	0	0	0	0	0	0	0
15:15	0	0	0	0	0	0	0	0	0
15:30	0	0	0	0	0	0	0	0	0
15:45	0	0	0	0	0	0	0	0	0
16:00	0	0	0	0	0	0	0	0	0
16:15	0	0	0	0	0	0	0	0	0
16:30	0	0	0	0	0	0	0	0	0
16:45	0	0	0	0	0	0	0	0	0
17:00	0	0	0	0	0	0	0	0	0
17:15	0	0	0	0	0	0	0	0	0
17:30	0	0	0	0	0	0	0	0	0
17:45	0	0	0	0	0	0	0	0	0
18:00	0	0	0	0	0	0	0	0	0
Total	0	0	0	0	0	0	0	0	0



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

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

Breezhill Avenue & Laurel Street





Turning Movement Count Summary Report AADT and Expansion Factors

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

Breezehill Avenue & Laurel Street

Survey Date: Tuesday, 23 April 2019 Start Time: 0700 AADT Factor: 0.7
 Weather: AM: Partly Cloudy +10°C Survey Duration: 6 Hrs. Survey Hours: 0700-1000 & 1500-1800
 Weather: PM: Overcast +17°C Surveyor(s): Cairnmoody

Time Period	Laurel St.						Breezehill Ave.						Southbound					
	Eastbound		Westbound		Northbound		Southbound		Eastbound		Westbound		Northbound		Southbound			
	LT	RT	UT	LT	RT	UT	LT	ST	RT	UT	LT	ST	RT	UT	LT	ST	RT	UT

Time Period	LT	RT	UT	EIB Tot	LT	ST	RT	UT	W/B Street Tot	LT	ST	RT	UT	N/B Street Tot	LT	ST	RT	UT	S/B Street Tot	Grand Total	
0700-0800	4	16	4	24	2	5	7	0	14	38	7	26	7	0	40	10	17	2	0	29	69
0800-0900	12	19	5	36	6	8	11	0	25	61	12	44	9	0	65	15	36	18	0	69	134
0900-1000	12	19	11	42	4	11	10	0	25	67	4	39	8	0	51	14	21	9	0	44	95
1500-1600	4	9	12	25	6	19	16	0	41	66	14	29	6	0	49	8	29	8	0	45	94
1600-1700	12	11	10	33	4	19	7	0	30	63	9	27	0	0	36	6	33	18	0	57	93
1700-1800	9	7	5	21	2	18	5	0	25	46	22	23	3	0	48	3	37	28	0	68	116
Totals	53	81	47	181	24	80	56	0	160	341	68	188	33	0	289	56	173	83	0	312	601

Equivalent 12 & 24-hour Vehicle Volumes Including the Annual Average Daily Traffic (AADT) Factor
 Applicable to the Day and Month of the Turning Movement Count

Expansion factors are applied exclusively to standard weekday 8-hour turning movement counts conducted during the hours of 0700h - 1000h, 1130h - 1330h and 1500h - 1800h

Equivalent 12-hour vehicle volumes. These volumes are calculated by multiplying the 8-hour totals by the 8 → 12 expansion factor of 1.31

Equi. 12-hr n/a n/a

Average daily 12-hour vehicle volumes. These volumes are calculated by multiplying the equivalent 12-hour totals by the AADT factor of 0.7

AADT 12-hr n/a n/a

24-hour AADT. These volumes are calculated by multiplying the average daily 12-hour vehicle volumes by the 12 → 24 expansion factor of 1.31

AADT 24-hr n/a n/a

AADT and expansion factors provided by the City of Ottawa

AM Peak Hour Factor → 0.86	Highest Hourly Vehicle Volume Between 0700h & 1000h																				
	LT	ST	RT	UT	TOT S.TOT	LT	ST	RT	UT	TOT											
0815-0915	11	26	10	0	47	6	8	6	0	20	67	11	49	10	0	70	22	31	16	0	69

PM Peak Hour Factor → 0.91	Highest Hourly Vehicle Volume Between 1500h & 1800h																				
	LT	ST	RT	UT	TOT S.TOT	LT	ST	RT	UT	TOT											
1630-1730	12	8	10	0	30	4	22	6	0	32	62	24	22	1	0	47	3	45	32	0	80

Comments:
 A cedar hedge growing along the property frontage on the southwest quadrant is creating a serious sightline problem. The majority of the cyclists as well as some drivers ignore the all-way stop control. Vehicles parked too close to the intersection on both Laurel Street, east of Breezehill Avenue and Breezehill Avenue, south of Laurel Street create a sightline problem.

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

Printed on: 4/25/2019 Prepared by: thetrafficspecialists@gmail.com Summary: All Vehicles

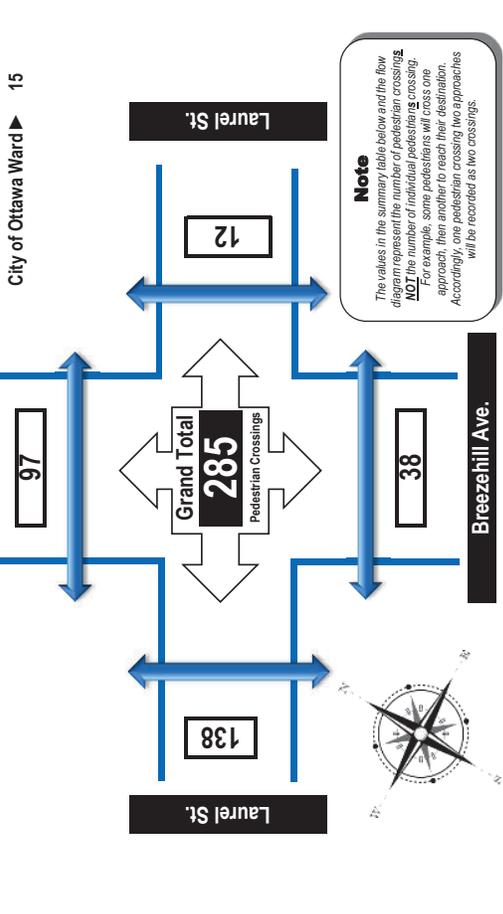


Turning Movement Count Pedestrian Crossings Summary and Flow Diagram



Breezehill Avenue & Laurel Street

Tuesday, 23 April 2019
 0700-1000 & 1500-1800
 6 Hour Survey
 City of Ottawa Ward 15



Note
 The values in the summary table below and the flow diagram represent the number of pedestrian crossings. NOT the number of individual pedestrians crossing. For example, some pedestrians will cross one approach, then another to reach their destination. Accordingly, one pedestrian crossing two approaches will be recorded as two crossings.

Time Period	West Side Crossing		East Side Crossing		South Side Crossing		North Side Crossing		Grand Total
	Laurel St.	Street Total	Laurel St.	Street Total	Breezehill Ave.	Street Total	Breezehill Ave.	Street Total	
0700-0800	5	6	1	6	3	11	8	11	17
0800-0900	54	58	4	58	14	32	18	32	90
0900-1000	2	2	0	2	0	4	4	4	6
1500-1600	50	50	0	50	12	23	23	35	85
1600-1700	12	13	1	13	2	22	22	24	37
1700-1800	15	21	6	21	7	29	22	29	50
Totals	138	150	12	150	38	97	97	135	285

Comments:
 A cedar hedge growing along the property frontage on the southwest quadrant is creating a serious sightline problem. The majority of the cyclists as well as some drivers ignore the all-way stop control. Vehicles parked too close to the intersection on both Laurel Street, east of Breezehill Avenue and Breezehill Avenue, south of Laurel Street create a sightline problem.

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

Printed on: 4/25/2019 Prepared by: thetrafficspecialists@gmail.com Summary: Pedestrian Crossings



Transportation Services - Traffic Services W.O. 37971
Turning Movement Count - 15 Minute Summary Report

BREEZEHILL AVE @ GLADSTONE AVE

Survey Date: Wednesday, July 18, 2018 **Total Observed U-Turns**
 Northbound: 0 Southbound: 0
 Eastbound: 0 Westbound: 0

Time Period	Northbound				Eastbound				Westbound				W	STR	TOT	Grand Total			
	L	T	R	T	L	T	R	T	L	T	R	T							
07:00	0	0	0	0	3	3	3	3	32	0	35	0	18	2	20	55	58		
07:15	0	0	0	0	3	4	4	4	28	0	32	0	30	8	38	70	74		
07:30	0	1	2	0	3	3	5	3	36	0	39	0	18	4	22	61	66		
07:45	0	0	1	1	5	1	3	9	10	7	36	0	35	2	37	80	90		
08:00	0	0	1	1	4	0	4	8	9	4	40	0	40	4	34	78	87		
08:15	0	0	1	1	1	0	7	8	9	10	49	0	40	8	48	107	116		
08:30	0	1	0	2	3	0	8	11	13	4	53	0	42	7	49	106	119		
08:45	0	0	1	1	2	0	1	3	4	5	60	0	65	1	44	53	118		
09:00	0	1	2	2	0	2	4	6	4	38	0	42	0	27	14	41	83		
09:15	0	0	0	0	6	12	12	8	42	0	50	0	46	9	55	105	117		
09:30	0	0	0	0	9	0	7	16	16	3	35	0	38	2	38	86	102		
09:45	0	1	0	3	5	0	5	10	13	9	42	0	51	0	32	84	97		
11:30	0	1	3	5	0	5	10	13	3	44	0	47	1	39	4	44	104		
11:45	0	0	1	7	0	4	11	12	9	43	1	53	1	39	2	42	95		
12:00	0	0	1	7	0	7	14	15	7	40	1	48	0	42	6	48	96		
12:15	0	1	2	5	0	5	10	12	1	39	3	43	0	48	8	56	99		
12:30	0	1	0	1	8	0	3	11	12	5	36	0	41	0	37	4	41		
12:45	0	1	3	4	5	1	5	11	15	5	37	0	42	1	33	75	90		
13:00	0	0	0	0	2	0	4	6	6	2	45	0	47	0	49	2	51		
13:15	0	0	1	2	1	3	6	7	1	39	1	41	1	58	2	61			
15:00	0	1	0	3	2	0	6	8	11	2	43	1	46	0	67	5	72		
15:15	0	1	1	3	4	0	3	7	10	0	37	0	37	0	87	4	91		
15:30	0	1	0	2	7	0	4	11	13	2	39	0	41	0	88	2	90		
15:45	0	0	2	2	5	0	7	12	14	4	45	0	49	0	105	5	110		
16:00	0	0	0	0	2	0	6	8	8	4	56	1	61	0	103	5	108		
16:15	0	1	2	10	0	10	20	22	2	56	2	60	2	124	5	131			
16:30	0	0	0	0	6	0	2	8	8	46	2	56	0	118	9	127			
16:45	0	0	0	0	7	0	6	13	13	3	41	0	44	1	133	5	139		
17:00	0	0	0	2	5	0	5	10	12	4	44	0	48	3	122	8	133		
17:15	0	2	3	4	1	2	7	10	0	49	1	50	2	112	3	117			
17:30	0	1	3	1	0	6	7	10	2	34	2	38	1	114	2	117			
17:45	0	0	0	0	0	6	0	1	7	0	30	0	30	0	93	1	94		
TOTAL:	20	8	18	46	140	4	144	288	334	128	1334	15	1477	16	2009	158	2183	3660	3994

Note: U-Turns are included in Totals. **Comment:**



Transportation Services - Traffic Services Work Order 37971
Turning Movement Count - Cyclist Volume Report

BREEZEHILL AVE @ GLADSTONE AVE

Count Date: Wednesday, July 18, 2018 **Start Time:** 07:00

Time Period	BREEZEHILL AVE		GLADSTONE AVE		Street Total	Grand Total
	Northbound	Southbound	Eastbound	Westbound		
07:00-08:00	4	1	39	23	62	67
08:00-09:00	2	2	98	15	113	117
09:00-10:00	0	1	29	24	53	54
11:30-12:30	0	0	17	11	28	28
12:30-13:30	0	2	7	10	17	19
15:00-16:00	1	3	26	33	59	63
16:00-17:00	1	3	28	49	77	81
17:00-18:00	2	6	36	71	107	115
Total	10	18	280	236	516	544

Comment:

Note: These volumes consists of bicycles only (no mopeds or motorcycles) and ARE NOT included in the Turning Movement Count Summary.

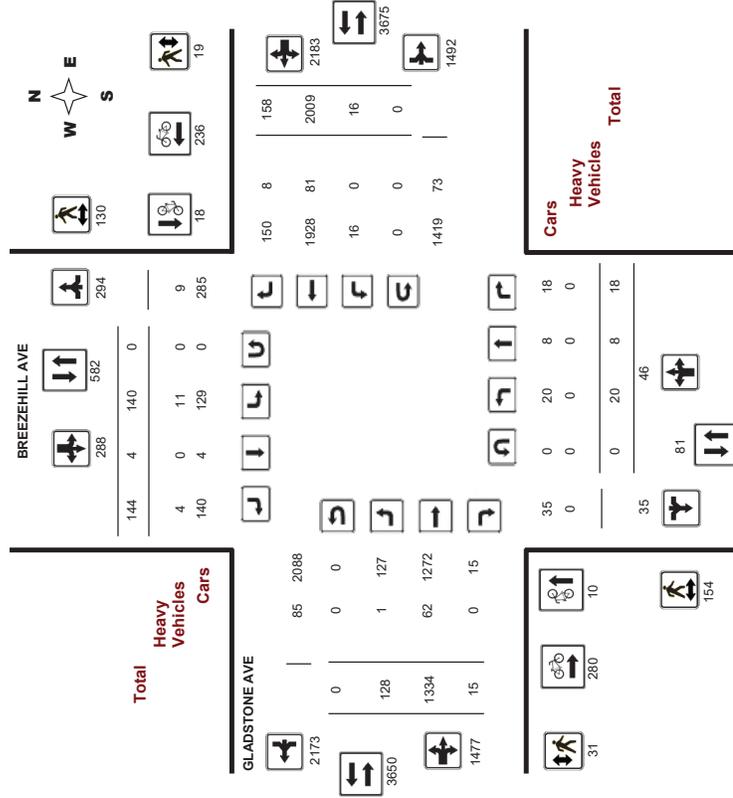


Transportation Services - Traffic Services
Turning Movement Count - Full Study Diagram

BREEZEHILL AVE @ GLADSTONE AVE

Survey Date: Wednesday, July 18, 2018

WO#: 37971
 Device: Miovision



Comments



Transportation Services - Traffic Services

W.O.
37971

Turning Movement Count - Heavy Vehicle Report

BREEZEHILL AVE @ GLADSTONE AVE

Survey Date: Wednesday, July 18, 2018

Time Period	Northbound			Southbound			Eastbound			Westbound			W STR TOT	RT	ST	LT	Grand Total			
	LT	ST	TOT	N	LT	ST	TOT	S	STR	TOT	RT	ST						LT	E	STR
07:00-08:00	0	0	0	0	0	0	0	1	1	1	0	11	0	11	0	12	1	13	24	25
08:00-09:00	0	0	0	0	0	0	0	0	0	0	0	11	0	11	0	11	0	11	22	22
09:00-10:00	0	0	0	0	0	0	0	1	1	1	0	10	0	10	0	12	1	13	23	24
11:30-12:30	0	0	0	0	0	0	0	2	6	6	1	9	0	10	0	10	3	13	23	29
12:30-13:30	0	0	0	0	0	0	1	2	2	2	0	7	0	7	0	9	0	9	16	18
15:00-16:00	0	0	0	0	0	0	1	1	1	1	0	5	0	5	0	6	0	6	11	12
16:00-17:00	0	0	0	0	0	0	3	0	3	3	0	7	0	7	0	15	3	18	25	28
17:00-18:00	0	0	0	0	0	0	1	0	1	1	0	2	0	2	0	6	0	6	8	9
Sub Total	0	0	0	0	0	0	11	4	15	15	1	62	0	63	0	81	8	89	152	167
U-Turns (Heavy Vehicles)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	0	0	0	0	0	0	11	4	15	15	1	62	0	63	0	81	8	89	152	167

Heavy Vehicles include Buses, Single-Unit Trucks and Articulated Trucks. Further, they ARE included in the Turning Movement Count Summary.



Transportation Services - Traffic Services
Turning Movement Count - Full Study Summary Report
BREEZEHILL AVE @ GLADSTONE AVE

Work Order
37971

Survey Date: Wednesday, July 18, 2018

Total Observed U-Turns
 Northbound: 0 Southbound: 0
 Eastbound: 0 Westbound: 0
 AADT Factor
 .90

Full Study

Period	BREEZEHILL AVE								GLADSTONE AVE											
	Northbound				Southbound				Eastbound				Westbound							
	LT	ST	RT	TOT	NB	LT	ST	TOT	SB	RT	LT	TOT	EB	LT	ST	TOT	WB	RT	LT	TOT
07:00-08:00	0	1	2	3	8	1	10	19	22	17	132	0	149	0	101	16	117	266	288	288
08:00-09:00	1	1	3	5	10	0	20	30	35	23	202	0	225	1	156	27	184	409	444	444
09:00-10:00	3	1	1	5	22	0	20	42	47	24	157	0	181	2	143	32	177	358	405	405
11:30-12:30	5	0	2	7	24	0	21	45	52	20	166	5	191	2	168	20	190	381	433	433
12:30-13:30	1	2	3	6	17	2	15	34	40	13	157	1	171	2	175	9	186	357	397	397
15:00-16:00	4	3	3	10	18	0	20	38	48	8	164	1	173	0	347	16	363	536	584	584
16:00-17:00	1	0	1	2	25	0	24	49	51	17	199	5	221	3	478	24	505	726	777	777
17:00-18:00	5	0	3	8	16	1	14	31	39	6	157	3	166	6	441	14	461	627	666	666
Sub Total	20	8	18	46	140	4	144	288	334	128	1334	15	1477	16	2009	158	2183	3660	3994	3994
U Turns	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	20	8	18	46	140	4	144	288	334	128	1334	15	1477	16	2009	158	2183	3660	3994	3994
EQ 12hr	28	11	25	64	195	6	200	400	464	178	1854	21	2053	22	2793	220	3034	5087	5551	5551

Note: These values are calculated by multiplying the totals by the appropriate expansion factor.

1.39

Period	LT	ST	RT	TOT	NB	LT	ST	TOT	SB	RT	LT	TOT	EB	LT	ST	TOT	WB	RT	LT	TOT
AVG 12hr	25	10	23	58	175	5	180	360	418	160	1669	19	1848	20	2513	188	2731	4579	4997	4997

Note: These volumes are calculated by multiplying the Average Daily 12 hr. totals by 12 to 24 expansion factor.

.90

Period	LT	ST	RT	TOT	NB	LT	ST	TOT	SB	RT	LT	TOT	EB	LT	ST	TOT	WB	RT	LT	TOT
AVG 24hr	33	13	29	75	229	7	236	472	547	210	2186	25	2421	26	3292	259	3578	5989	6546	6546

Note: These volumes are calculated by multiplying the Average Daily 12 hr. totals by 12 to 24 expansion factor.

1.31

Comments:
 Note: U-Turns provided for approach totals. Refer to 'U-Turn' Report for specific breakdown.



Transportation Services - Traffic Services
Turning Movement Count - Pedestrian Volume Report
BREEZEHILL AVE @ GLADSTONE AVE

Work Order
37971

Count Date: Wednesday, July 18, 2018

Start Time: 07:00

Time Period	NB Approach (E or W Crossing)	SB Approach (E or W Crossing)	EB Approach (N or S Crossing)	WB Approach (N or S Crossing)	Total	Grand Total
07:00-07:15	6	5	1	0	1	12
07:15-07:30	5	3	1	1	2	10
07:30-07:45	7	3	0	2	2	12
07:45-08:00	2	3	5	2	2	7
08:00-08:15	20	14	2	5	7	41
08:15-08:30	5	4	0	0	0	9
08:30-08:45	8	2	3	0	3	13
08:45-09:00	11	6	2	1	3	20
09:00-09:15	5	9	14	4	4	18
09:15-09:30	29	21	9	1	10	60
09:30-09:45	6	3	2	1	3	12
09:45-10:00	3	3	0	0	0	6
10:00-10:15	1	2	2	0	2	5
10:15-10:30	6	3	0	0	0	9
10:30-10:45	16	11	4	1	5	32
10:45-11:00	7	7	14	0	14	14
11:00-11:15	5	1	6	1	1	7
11:15-11:30	3	4	1	0	1	8
11:30-11:45	6	2	8	0	0	8
11:45-12:00	21	14	35	2	2	37
12:00-12:15	2	5	7	0	2	9
12:15-12:30	2	4	4	0	1	5
12:30-12:45	4	3	7	0	0	7
12:45-13:00	2	3	5	0	0	5
13:00-13:15	10	13	23	3	3	26
13:15-13:30	9	3	12	0	0	12
13:30-13:45	3	1	4	1	1	5
13:45-14:00	6	3	9	0	0	9
14:00-14:15	4	7	11	0	0	11
14:15-14:30	14	14	36	1	1	37
14:30-14:45	2	0	9	0	0	9
14:45-15:00	3	7	10	1	6	16
15:00-15:15	5	6	11	4	3	18
15:15-15:30	7	3	10	1	1	11
15:30-15:45	17	23	40	5	14	54
15:45-16:00	6	6	16	2	3	19
16:00-16:15	5	7	12	0	1	13
16:15-16:30	0	2	2	0	1	3
16:30-16:45	5	9	9	3	3	12
16:45-17:00	19	20	39	8	8	47
17:00-17:15	154	130	284	31	50	334

Comment:



Transportation Services - Traffic Services

Turning Movement Count - Peak Hour Diagram

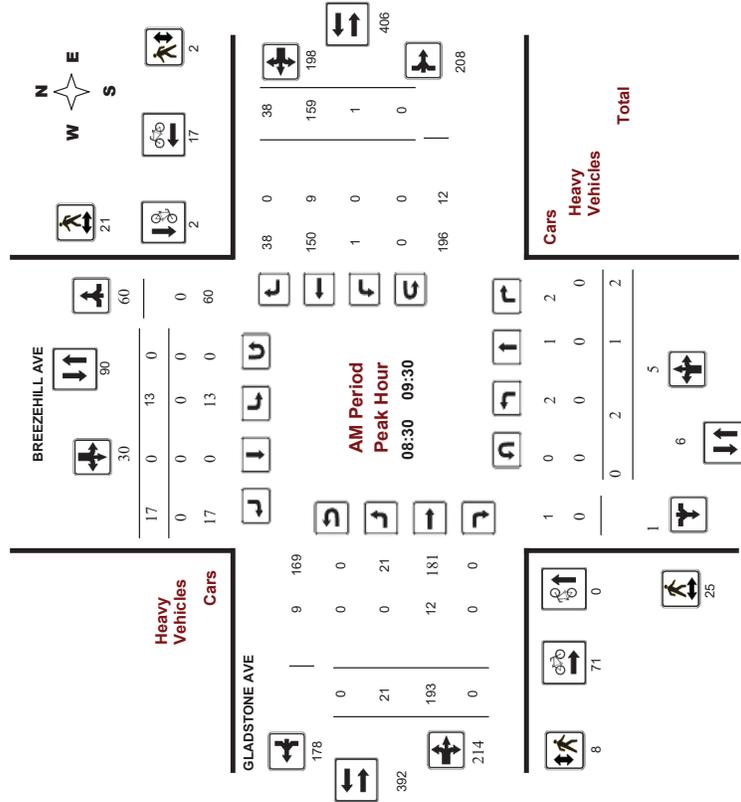
BREEZEHILL AVE @ GLADSTONE AVE

Survey Date: Wednesday, July 18, 2018

WO No: 37971

Start Time: 07:00

Device: Miovision



Transportation Services - Traffic Services

Turning Movement Count - Peak Hour Diagram

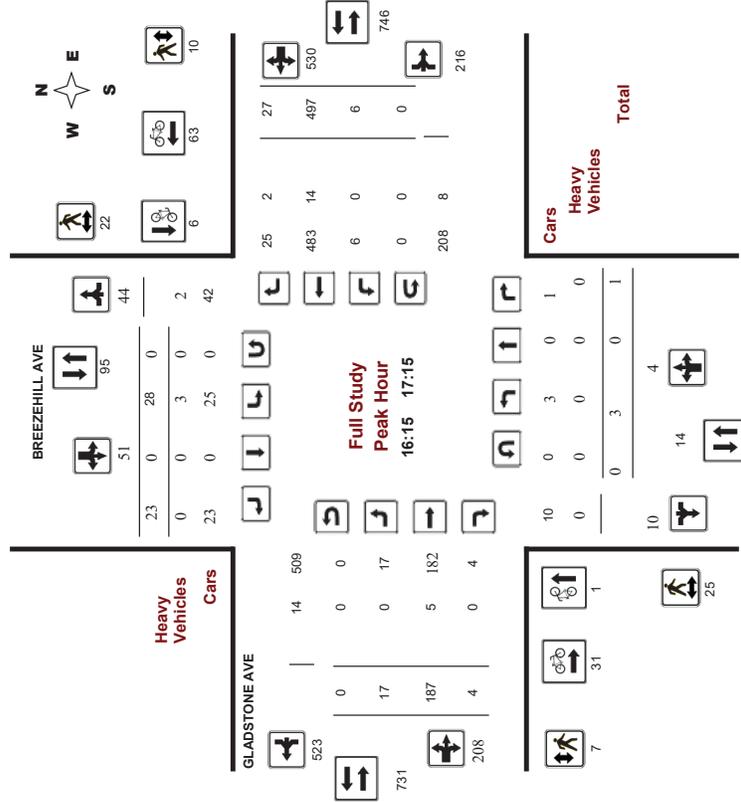
BREEZEHILL AVE @ GLADSTONE AVE

Survey Date: Wednesday, July 18, 2018

WO No: 37971

Start Time: 07:00

Device: Miovision





Transportation Services - Traffic Services

Work Order
37971

Turning Movement Count - 15 Min U-Turn Total Report

BREEZEHILL AVE @ GLADSTONE AVE

Survey Date: Wednesday, July 18, 2018

Time Period	Northbound		Southbound		Eastbound		Westbound		Total
	U-Turn	Total	U-Turn	Total	U-Turn	Total	U-Turn	Total	
07:00	0	0	0	0	0	0	0	0	0
07:15	0	0	0	0	0	0	0	0	0
07:30	0	0	0	0	0	0	0	0	0
07:45	0	0	0	0	0	0	0	0	0
08:00	0	0	0	0	0	0	0	0	0
08:15	0	0	0	0	0	0	0	0	0
08:30	0	0	0	0	0	0	0	0	0
08:45	0	0	0	0	0	0	0	0	0
09:00	0	0	0	0	0	0	0	0	0
09:15	0	0	0	0	0	0	0	0	0
09:30	0	0	0	0	0	0	0	0	0
09:45	0	0	0	0	0	0	0	0	0
10:00	0	0	0	0	0	0	0	0	0
11:30	0	0	0	0	0	0	0	0	0
11:45	0	0	0	0	0	0	0	0	0
12:00	0	0	0	0	0	0	0	0	0
12:15	0	0	0	0	0	0	0	0	0
12:30	0	0	0	0	0	0	0	0	0
12:45	0	0	0	0	0	0	0	0	0
13:00	0	0	0	0	0	0	0	0	0
13:15	0	0	0	0	0	0	0	0	0
15:00	0	0	0	0	0	0	0	0	0
15:15	0	0	0	0	0	0	0	0	0
15:30	0	0	0	0	0	0	0	0	0
15:45	0	0	0	0	0	0	0	0	0
16:00	0	0	0	0	0	0	0	0	0
16:15	0	0	0	0	0	0	0	0	0
16:30	0	0	0	0	0	0	0	0	0
16:45	0	0	0	0	0	0	0	0	0
17:00	0	0	0	0	0	0	0	0	0
17:15	0	0	0	0	0	0	0	0	0
17:30	0	0	0	0	0	0	0	0	0
17:45	0	0	0	0	0	0	0	0	0
18:00	0	0	0	0	0	0	0	0	0
Total	0	0	0	0	0	0	0	0	0



Transportation Services - Traffic Services

35301

Turning Movement Count - 15 Minute Summary Report

BREEZEHILL AVE @ SOMERSET ST

Survey Date: Thursday, August 13, 2015

Total Observed U-Turns
Northbound: 0 Southbound: 0
Eastbound: 4 Westbound: 2

Time Period	BREEZEHILL AVE								SOMERSET ST								W STR TOT	STR TOT	Grand Total			
	Northbound				Southbound				Eastbound				Westbound									
	LT	ST	RT	TOT	LT	ST	RT	TOT	LT	ST	RT	TOT	LT	ST	RT	TOT						
07:00	2	0	2	4	0	0	0	0	4	0	0	0	0	27	5	32	3	21	0	24	56	60
07:15	0	0	6	6	0	0	0	0	6	0	0	0	0	29	3	32	2	35	0	37	69	75
07:30	2	0	3	5	0	0	0	0	5	0	0	0	0	53	2	55	1	35	0	36	91	96
07:45	2	0	4	6	0	0	0	0	6	0	0	0	0	62	3	65	4	54	0	58	123	129
08:00	3	0	6	9	0	0	0	0	9	0	0	0	0	65	5	70	4	56	0	60	130	139
08:15	4	0	5	9	0	0	0	0	9	0	0	0	0	92	3	95	4	42	0	46	141	150
08:30	3	0	4	7	0	0	0	0	7	0	0	0	0	54	5	59	3	40	0	43	102	109
08:45	3	0	9	12	0	0	0	0	12	0	0	0	0	64	4	68	4	50	0	54	122	134
09:00	3	0	6	9	0	0	0	0	9	0	0	0	0	63	8	71	5	68	0	73	144	153
09:15	3	0	4	7	0	0	0	0	7	0	0	0	0	62	4	66	5	53	0	58	124	133
09:30	5	0	7	13	0	0	0	0	13	0	0	0	0	76	3	79	2	66	0	68	147	160
09:45	2	0	5	7	0	0	0	0	7	0	0	0	0	59	10	70	2	67	0	69	139	146
11:30	5	0	2	7	0	0	0	0	7	0	0	0	0	81	2	83	3	74	0	77	160	167
11:45	9	0	3	12	0	0	0	0	12	0	0	0	0	81	3	84	5	69	0	74	158	170
12:00	7	0	12	19	0	0	0	0	19	0	0	0	0	78	8	86	12	80	0	92	178	197
12:15	4	0	8	12	0	0	0	0	12	0	0	0	0	69	4	74	5	70	0	75	149	161
12:30	6	0	3	9	0	0	0	0	9	0	0	0	0	71	5	76	2	64	0	66	142	151
12:45	1	0	4	5	0	0	0	0	5	0	0	0	0	80	9	89	5	72	0	77	166	171
13:00	4	0	3	7	0	0	0	0	7	0	0	0	0	65	7	72	2	66	0	68	140	147
13:15	5	0	5	10	0	0	0	0	10	0	0	0	0	49	5	54	6	86	0	92	146	156
15:00	6	0	2	8	0	0	0	0	8	0	0	0	0	65	5	70	2	74	0	76	146	154
15:15	7	0	6	13	0	0	0	0	13	0	0	0	0	66	2	68	5	89	0	94	162	175
15:30	8	0	8	16	0	0	0	0	16	0	0	0	0	58	4	62	3	93	0	96	158	174
15:45	4	0	2	6	0	0	0	0	6	0	0	0	0	61	4	66	6	75	0	81	147	153
16:00	2	0	7	9	0	0	0	0	9	0	0	0	0	73	3	76	5	96	0	101	177	186
16:15	3	0	5	8	0	0	0	0	8	0	0	0	0	87	7	94	7	108	0	115	209	217
16:30	5	0	3	8	0	0	0	0	8	0	0	0	0	85	8	93	4	104	0	109	182	190
16:45	3	0	4	7	0	0	0	0	7	0	0	0	0	86	3	89	6	114	0	120	209	216
17:00	3	0	3	11	0	0	0	0	11	0	0	0	0	78	5	83	2	92	0	94	177	188
17:15	4	0	3	7	0	0	0	0	7	0	0	0	0	78	3	81	7	113	0	121	202	209
17:30	4	0	5	9	0	0	0	0	9	0	0	0	0	64	3	68	7	110	0	117	185	194
17:45	2	0	6	8	0	0	0	0	8	0	0	0	0	76	2	78	3	93	0	96	174	182
TOTAL:	132	0	155	287	0	0	0	0	287	0	0	0	0	2137	147	2288	136	2329	0	2467	4755	5042

Note: U-Turns are included in Totals. Comment:



Transportation Services - Traffic Services
Turning Movement Count - Cyclist Volume Report

Work Order
35301

BREEZEHILL AVE @ SOMERSET ST

Count Date: Thursday, August 13, 2015 **Start Time:** 07:00

Time Period	BREEZEHILL AVE			SOMERSET ST			Grand Total
	Northbound	Southbound	Street Total	Eastbound	Westbound	Street Total	
07:00-08:00	6	0	6	38	24	62	68
08:00-09:00	17	0	17	99	39	138	155
09:00-10:00	6	0	6	33	28	61	67
11:30-12:30	4	0	4	28	25	53	57
12:30-13:30	2	0	2	21	30	51	53
15:00-16:00	3	0	3	41	34	75	78
16:00-17:00	3	0	3	50	79	129	132
17:00-18:00	4	0	4	59	101	160	164
Total	45	0	45	369	360	729	774

Comment:



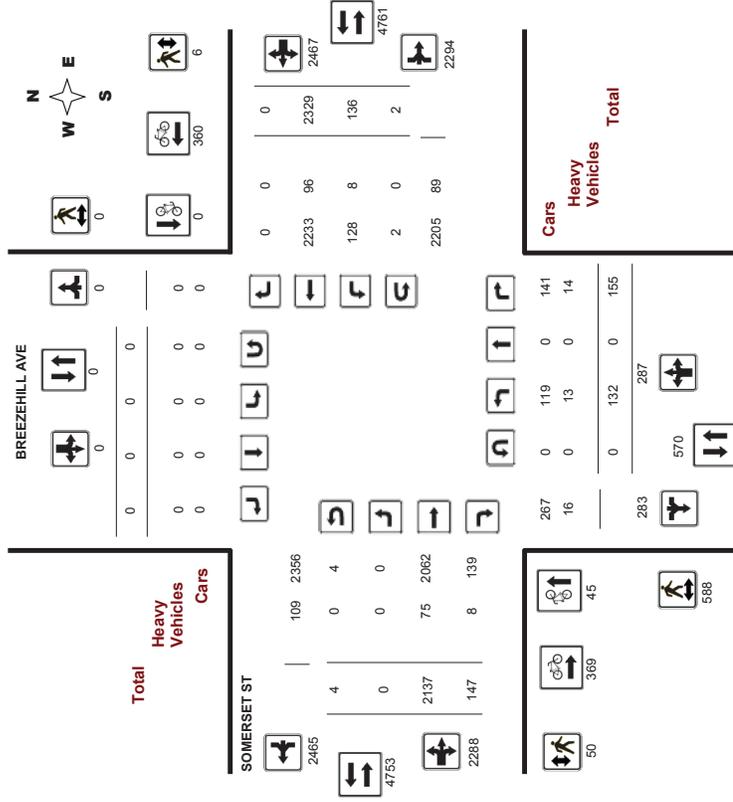
Transportation Services - Traffic Services
Turning Movement Count - Full Study Diagram

BREEZEHILL AVE @ SOMERSET ST

Survey Date: Thursday, August 13, 2015

WO#: 35301

Device: Miovision



Note: These volumes consists of bicycles only (no mopeds or motorcycles) and ARE NOT included in the Turning Movement Count Summary.



Transportation Services - Traffic Services

W.O. 35301



Transportation Services - Traffic Services

Work Order 35301

Turning Movement Count - Heavy Vehicle Report

Turning Movement Count - Pedestrian Volume Report

BREEZEHILL AVE @ SOMERSET ST

Survey Date: Thursday, August 13, 2015

Count Date: Thursday, August 13, 2015

Start Time: 07:00

Time Period	Northbound					Eastbound					Westbound					Grand Total		
	LT	ST	RT	TOT	N	LT	ST	RT	TOT	E	LT	ST	RT	TOT	W		STR	TOT
07:00-08:00	2	0	1	3	0	0	0	0	0	7	1	8	2	12	0	14	22	25
08:00-09:00	1	0	2	3	0	0	0	0	0	12	0	12	1	15	0	16	28	31
09:00-10:00	4	0	6	10	0	0	0	0	0	11	2	13	0	15	0	15	28	38
11:30-12:30	4	0	2	6	0	0	0	0	0	10	0	10	4	11	0	15	25	31
12:30-13:30	1	0	0	1	0	0	0	0	0	7	3	10	1	13	0	14	24	25
15:00-16:00	1	0	3	4	0	0	0	0	0	11	0	11	0	15	0	15	26	30
16:00-17:00	0	0	0	0	0	0	0	0	0	7	1	8	0	7	0	7	15	15
17:00-18:00	0	0	0	0	0	0	0	0	0	10	1	11	0	8	0	8	19	19
Sub Total	13	0	14	27	0	0	0	0	0	75	8	83	8	96	0	104	187	214
U-Turns (Heavy Vehicles)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	13	0	14	27	0	0	0	0	0	75	8	83	8	96	0	104	187	214

Heavy Vehicles include Buses, Single-Unit Trucks and Articulated Trucks. Further, they ARE included in the Turning Movement Count Summary.

BREEZEHILL AVE @ SOMERSET ST

Count Date: Thursday, August 13, 2015

Start Time: 07:00

Time Period	NB Approach (E or W Crossing)	SB Approach (E or W Crossing)	EB Approach (N or S Crossing)	WB Approach (N or S Crossing)	Total	Total	Grand Total
07:00-07:15	8	0	0	0	8	0	8
07:15-07:30	8	0	0	0	8	1	9
07:30-07:45	14	0	1	0	14	1	15
07:45-08:00	15	0	2	1	15	3	18
07:00-08:00	45	0	3	2	45	5	50
08:00-08:15	10	0	1	1	10	2	12
08:15-08:30	25	0	0	0	25	0	25
08:30-08:45	14	0	3	0	14	3	17
08:45-09:00	10	0	0	0	10	0	10
08:00-09:00	59	0	4	1	59	5	64
09:00-09:15	13	0	0	0	13	0	13
09:15-09:30	12	0	0	0	12	0	12
09:30-09:45	16	0	0	0	16	0	16
09:45-10:00	9	0	0	0	9	0	9
09:00-10:00	50	0	0	0	50	0	50
11:30-11:45	18	2	2	0	18	2	20
11:45-12:00	8	0	3	0	8	3	11
12:00-12:15	21	0	2	0	21	2	23
12:15-12:30	19	0	1	1	19	1	20
11:30-12:30	66	0	7	1	66	7	74
12:30-12:45	21	0	0	0	21	0	21
12:45-13:00	16	0	0	0	16	0	16
13:00-13:15	16	0	0	0	16	0	16
13:15-13:30	18	0	0	0	18	1	19
12:30-13:30	71	0	0	1	71	1	72
15:00-15:15	19	0	2	0	19	2	21
15:15-15:30	26	1	1	0	26	1	27
15:30-15:45	21	0	1	0	21	1	22
15:45-16:00	21	0	0	0	21	0	21
15:00-16:00	87	0	4	0	87	4	91
16:00-16:15	13	2	2	0	13	2	15
16:15-16:30	20	0	6	0	20	6	26
16:30-16:45	24	0	3	0	24	3	27
16:45-17:00	30	0	6	0	30	6	36
16:00-17:00	87	0	17	0	87	17	104
17:00-17:15	26	0	3	0	26	3	29
17:15-17:30	37	0	5	1	37	5	43
17:30-17:45	35	0	7	0	35	7	42
17:45-18:00	25	0	0	0	25	0	25
17:00-18:00	123	0	15	1	123	15	139
Total	588	0	50	6	588	56	644

Comment:

Turning Movement Count - Full Study Summary Report

BREEZEHILL AVE @ SOMERSET ST

Survey Date: Thursday, August 13, 2015
 Total Observed U-Turns
 Northbound: 0 Southbound: 0
 Eastbound: 4 Westbound: 2
 AADT Factor: .90

Full Study

Period	BREEZEHILL AVE												Grand Total						
	Northbound						Southbound												
	LT	ST	RT	TOT	SB	TOT	LT	ST	RT	TOT	EB	TOT							
07:00-08:00	6	0	15	21	0	0	0	0	0	0	171	13	184	10	145	0	155	339	360
08:00-09:00	13	0	24	37	0	0	0	0	0	0	275	17	292	15	188	0	203	495	532
09:00-10:00	16	0	22	38	0	0	0	0	0	0	260	25	285	14	254	0	268	553	591
11:30-12:30	25	0	25	50	0	0	0	0	0	0	309	17	326	25	293	0	318	644	694
12:30-13:30	16	0	15	31	0	0	0	0	0	0	265	26	291	15	268	0	303	594	625
15:00-16:00	25	0	18	43	0	0	0	0	0	0	250	15	265	16	331	0	347	612	655
16:00-17:00	13	0	19	32	0	0	0	0	0	0	311	21	332	22	422	0	444	776	808
17:00-18:00	18	0	17	35	0	0	0	0	0	0	296	13	309	19	408	0	427	736	771
Sub Total	132	0	155	287	0	0	0	0	0	0	2137	147	2284	136	2329	0	2465	4749	5036
U-Turns	0	0	0	0	0	0	0	0	0	0	4	4	8	8	0	0	0	0	0
Total	132	0	155	287	0	0	0	0	0	0	2137	147	2288	136	2329	0	2467	4755	5042
EQ 12hr	183	0	215	399	0	0	0	0	0	0	2970	204	3180	189	3237	0	3429	6609	7008

Note: These values are calculated by multiplying the totals by the appropriate expansion factor.

AVG 12hr: 165 0 194 359 0 0 0 0 399 0 2673 184 2862 170 2914 0 3086 5946 6307

Note: These volumes are calculated by multiplying the Average Daily 12 hr. totals by the AADT factor. 1.39

AVG 24hr: 216 0 254 470 0 0 0 0 470 0 3502 241 3750 223 3817 0 4043 7793 8263

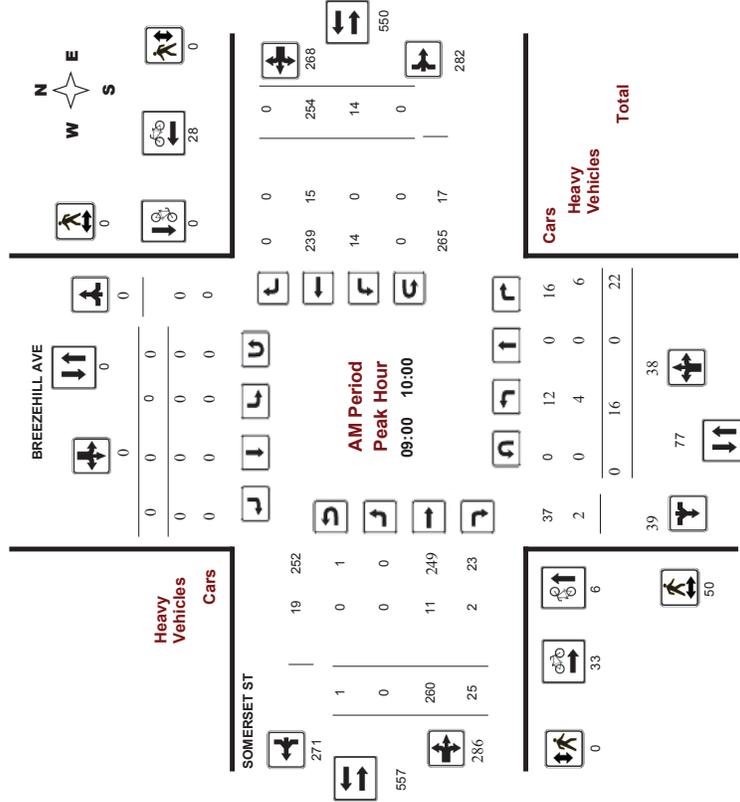
Note: These volumes are calculated by multiplying the Average Daily 12 hr. totals by 12 to 24 expansion factor. 1.31

Comments: U-Turns provided for approach totals. Refer to 'U-Turn' Report for specific breakdown.

Turning Movement Count - Peak Hour Diagram

BREEZEHILL AVE @ SOMERSET ST

Survey Date: Thursday, August 13, 2015
 WO No: 35301
 Start Time: 07:00
 Device: Miovision





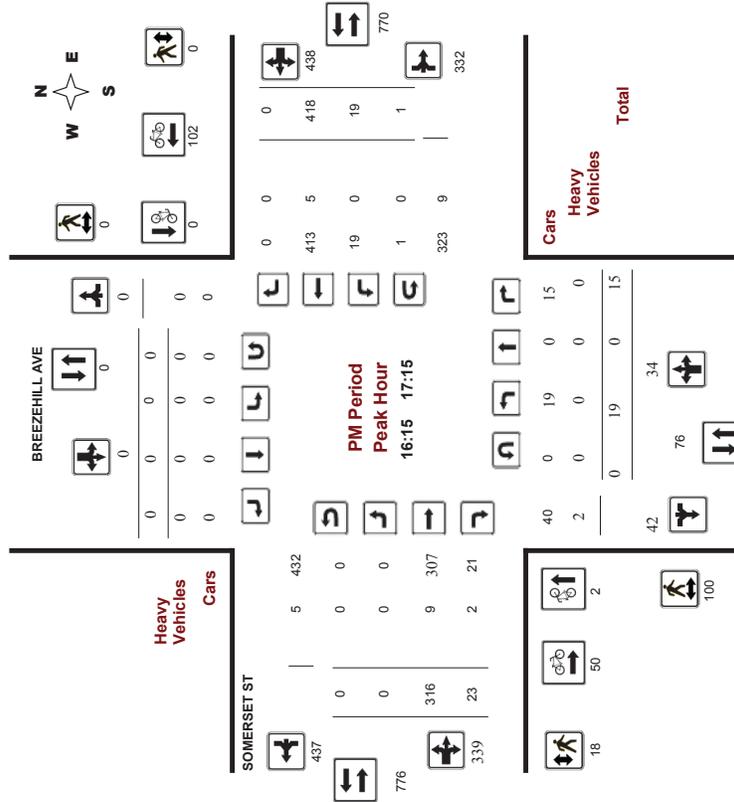
Transportation Services - Traffic Services

Turning Movement Count - Peak Hour Diagram

BREEZEHILL AVE @ SOMERSET ST

Survey Date: Thursday, August 13, 2015
Start Time: 07:00

WO No: 35301
Device: Miovision



Survey Date: Thursday, August 13, 2015

BREEZEHILL AVE @ SOMERSET ST

Time Period	Northbound		Southbound		Eastbound		Westbound		Total
	U-Turn	Total	U-Turn	Total	U-Turn	Total	U-Turn	Total	
07:00	0	0	0	0	0	0	0	0	0
07:15	0	0	0	0	0	0	0	0	0
07:30	0	0	0	0	0	0	0	0	0
07:45	0	0	0	0	0	0	0	0	0
08:00	0	0	0	0	0	0	0	0	0
08:15	0	0	0	0	0	0	0	0	0
08:30	0	0	0	0	0	0	0	0	0
08:45	0	0	0	0	0	0	0	0	0
09:00	0	0	0	0	0	0	0	0	0
09:15	0	0	0	0	0	0	0	0	0
09:30	0	0	0	0	0	0	0	0	0
09:45	0	0	0	0	1	1	0	0	1
11:30	0	0	0	0	0	0	0	0	0
11:45	0	0	0	0	0	0	0	0	0
12:00	0	0	0	0	0	0	0	0	0
12:15	0	0	0	0	0	0	0	0	0
12:30	0	0	0	0	1	1	0	0	1
12:45	0	0	0	0	0	0	0	0	0
13:00	0	0	0	0	0	0	0	0	0
13:15	0	0	0	0	0	0	0	0	0
15:00	0	0	0	0	0	0	0	0	0
15:15	0	0	0	0	0	0	0	0	0
15:30	0	0	0	0	0	0	0	0	0
15:45	0	0	0	0	0	0	0	0	0
16:00	0	0	0	0	1	1	0	0	1
16:15	0	0	0	0	0	0	0	0	0
16:30	0	0	0	0	0	0	0	0	0
16:45	0	0	0	0	0	0	1	1	1
17:00	0	0	0	0	0	0	0	0	0
17:15	0	0	0	0	0	0	1	1	1
17:30	0	0	0	0	1	1	0	0	1
17:45	0	0	0	0	0	0	0	0	0
18:00	0	0	0	0	0	0	0	0	0
Total	0	0	0	0	4	4	2	2	6

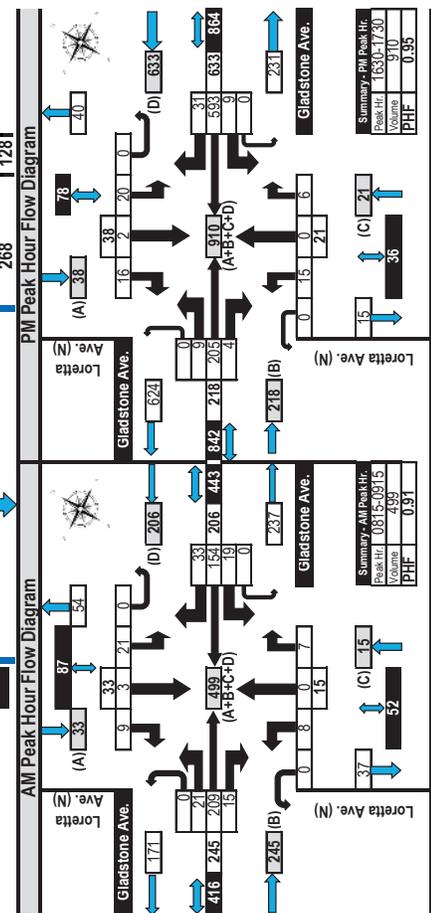
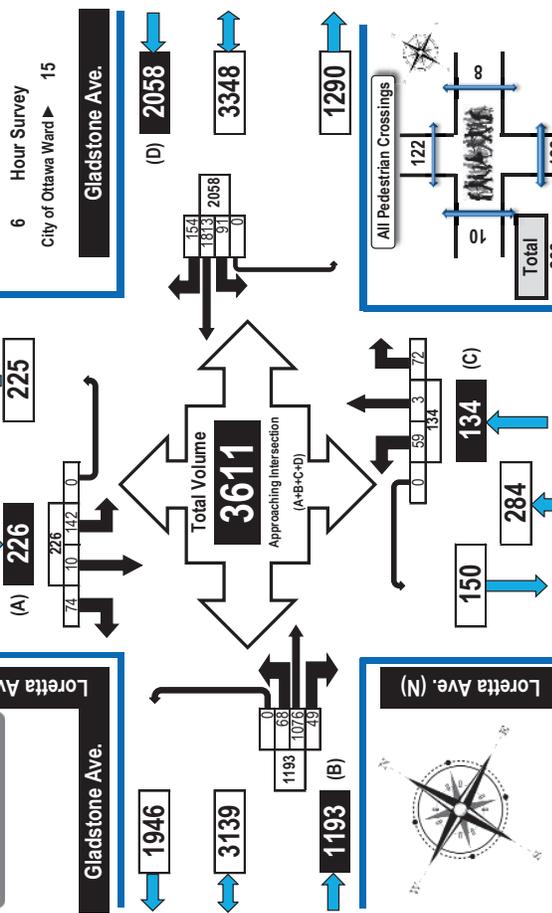


Turning Movement Count Summary, AM and PM Peak Hour Flow Diagrams

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

Gladstone Avenue & Loretta Avenue North

All Vehicles (Except Bicycles & Electric Scooters)
 Tuesday, 23 April 2019
 0700-1000 & 1500-1800
 6 Hour Survey
 City of Ottawa Ward 15



Printed on: 4/24/2019
 Prepared by: thetrafficspecialists@gmail.com
 Flow Diagrams: AM PM Peak



Turning Movement Count Summary Report AADT and Expansion Factors

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

Gladstone Avenue & Loretta Avenue North

Survey Date: Tuesday, 23 April 2019
 Start Time: 0700
 AADT Factor: 0.7
 Weather AM: Partly Cloudy +10°C
 Survey Duration: 6 Hrs.
 Survey Hours: 0700-1000 & 1500-1800
 Weather PM: Overcast +17°C
 Surveyor(s): Carmody

Time Period	Eastbound			Westbound			Northbound			Southbound			Grand Total										
	LT	ST	RT	LT	ST	RT	LT	ST	RT	LT	ST	RT		UT									
0700-0800	6	142	18	0	166	22	112	24	0	158	324	1	0	6	7	13	3	4	0	20	27	351	
0800-0900	17	214	9	0	240	19	140	35	0	194	434	8	0	10	0	18	20	2	3	0	25	43	477
0900-1000	16	168	11	0	195	24	160	27	0	211	406	2	0	7	0	9	14	2	11	0	27	36	442
1500-1600	10	174	5	0	189	13	358	22	0	393	582	26	1	35	0	62	39	1	24	0	64	126	708
1600-1700	9	188	2	0	199	4	525	18	0	547	746	11	1	10	0	22	37	1	20	0	58	80	826
1700-1800	10	190	4	0	204	9	518	28	0	555	759	11	1	4	0	16	19	1	12	0	32	48	807
Totals	68	1076	49	0	1193	91	1813	154	0	2058	3251	59	3	72	0	134	142	10	74	0	226	360	3611

Equivalent 12 & 24-hour Vehicle Volumes Including the Annual Average Daily Traffic (AADT) Factor
 Applicable to the Day and Month of the Turning Movement Count

Expansion factors are applied exclusively to standard weekday 8-hour turning movement counts conducted during the hours of 0700h - 1000h, 1130h - 1330h and 1500h - 1800h

Equivalent 12-hour vehicle volumes. These volumes are calculated by multiplying the 8-hour totals by the 8 → 12 expansion factor of 1.39

Average daily 12-hour vehicle volumes. These volumes are calculated by multiplying the equivalent 12-hour totals by the AADT factor of 0.7

24-Hour AADT. These volumes are calculated by multiplying the average daily 12-hour vehicle volumes by the 12 → 24 expansion factor of 1.31

AM Peak Hour	Eastbound			Westbound			Northbound			Southbound			Highest Hourly Vehicle Volume Between 0700h & 1000h										
	LT	ST	RT	LT	ST	RT	LT	ST	RT	LT	ST	RT		UT									
0815-0915	21	209	15	0	245	19	154	33	0	206	451	8	0	7	0	15	21	3	9	0	33	48	499

PM Peak Hour	Eastbound			Westbound			Northbound			Southbound			Highest Hourly Vehicle Volume Between 1500h & 1800h										
	LT	ST	RT	LT	ST	RT	LT	ST	RT	LT	ST	RT		UT									
1630-1730	9	205	4	0	218	9	593	31	0	633	851	15	0	6	0	21	20	2	16	0	38	59	910

Comments: No traffic issues noted during survey.

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

Printed on: 4/24/2019
 Prepared by: thetrafficspecialists@gmail.com
 Summary: All Vehicles

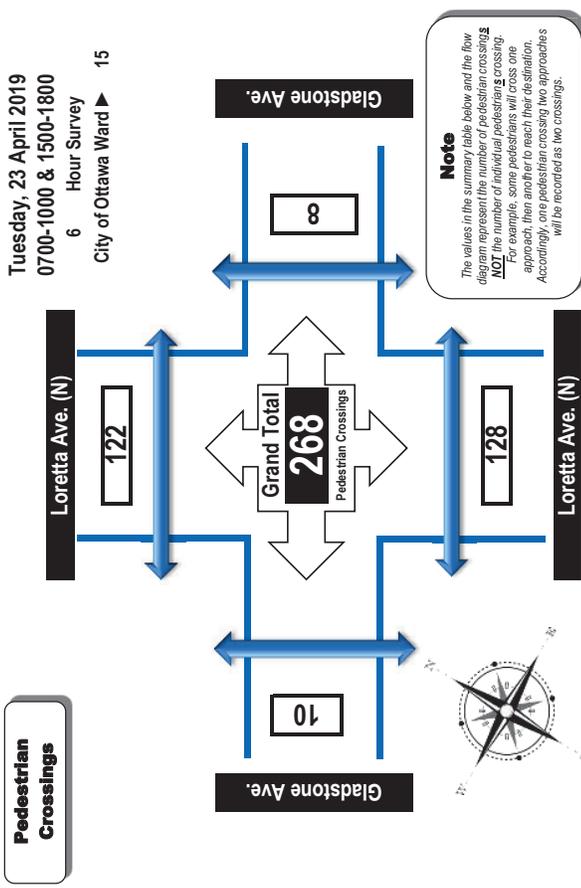


Turning Movement Count Pedestrian Crossings Summary and Flow Diagram



Gladstone Avenue & Loretta Avenue North Ottawa, ON

Tuesday, 23 April 2019
0700-1000 & 1500-1800
6 Hour Survey
City of Ottawa Ward 15



Note
The values in the summary table below and the flow diagram represent the number of pedestrian crossings. **NOT** the number of individual pedestrians crossing. For example, some pedestrians will cross one approach, then another to reach their destination. Accordingly, one pedestrian crossing two approaches will be recorded as two crossings.

Time Period	West Side Crossing Gladstone Ave.		East Side Crossing Gladstone Ave.		South Side Crossing Loretta Ave. (N)		North Side Crossing Loretta Ave. (N)		Grand Total
	Street Total	Gladstone Ave.	Street Total	Gladstone Ave.	Street Total	Loretta Ave. (N)	Street Total	Loretta Ave. (N)	
0700-0800	6	2	8	2	13	15	28	36	
0800-0900	2	2	4	2	14	16	30	34	
0900-1000	0	0	0	0	16	17	33	33	
1500-1600	0	1	1	1	24	23	47	48	
1600-1700	0	0	0	0	27	28	55	55	
1700-1800	2	3	5	3	34	23	57	62	
Totals	10	8	18	128	122	122	250	268	

Comments:
No traffic issues noted during survey.

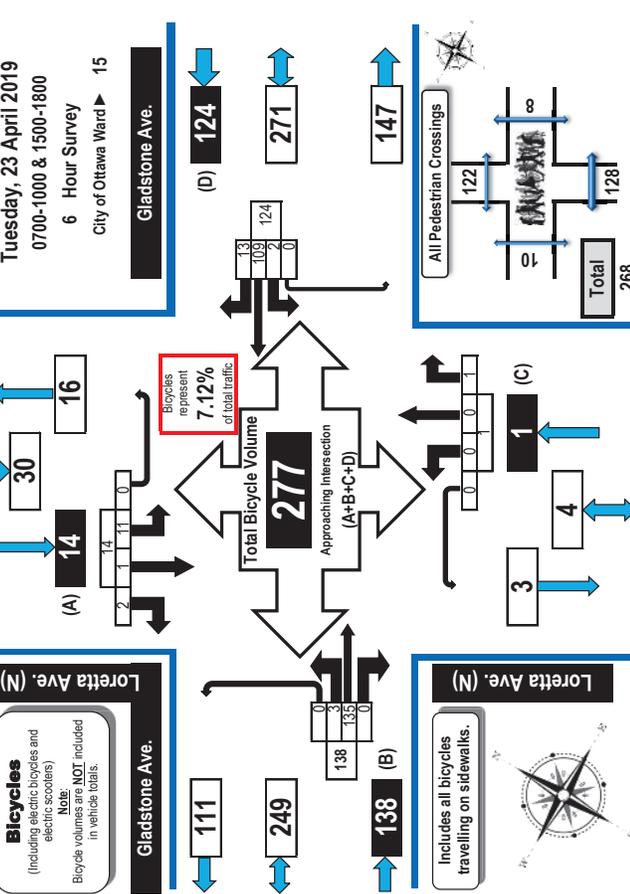


Turning Movement Count Bicycle Summary Flow Diagram



Gladstone Avenue & Loretta Avenue North Ottawa, ON

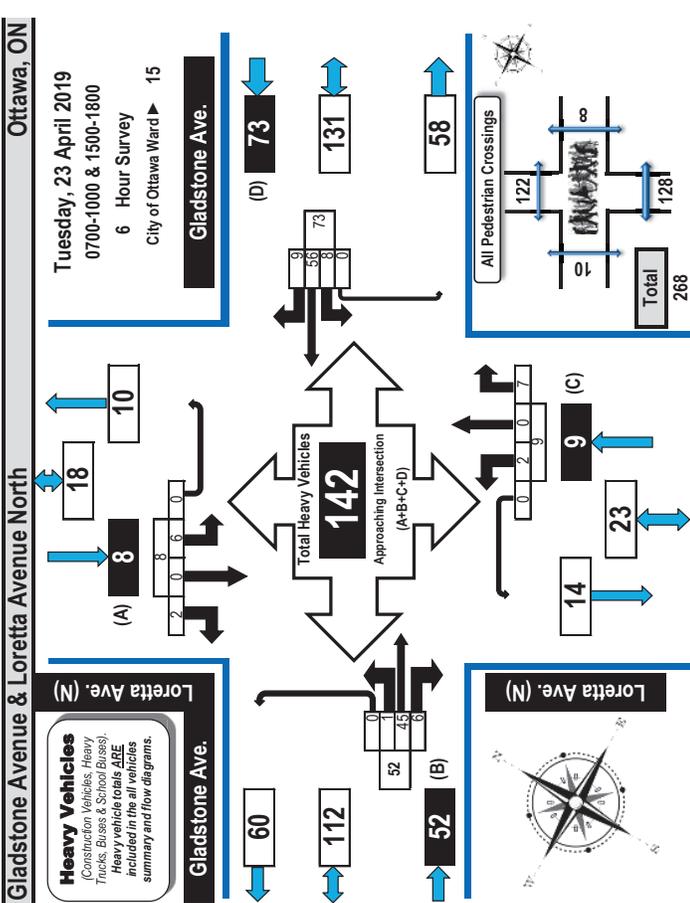
Tuesday, 23 April 2019
0700-1000 & 1500-1800
6 Hour Survey
City of Ottawa Ward 15



Note
Bicycles represent 7.12% of total traffic. Includes all bicycles travelling on sidewalks. All Pedestrian Crossings.

Time Period	Gladstone Ave. Eastbound			Gladstone Ave. Westbound			Loretta Ave. (N) Northbound			Loretta Ave. (N) Southbound			Total	
	LT	ST	RT	LT	ST	RT	LT	ST	RT	LT	ST	RT		
0700-0800	0	26	0	26	0	9	1	0	10	0	0	0	0	1
0800-0900	1	55	0	56	1	15	2	0	18	0	0	0	1	7
0900-1000	0	15	0	15	0	8	0	0	8	0	0	0	0	1
1500-1600	1	10	0	11	0	14	1	0	15	0	0	0	0	1
1600-1700	1	17	0	18	1	29	2	0	32	0	0	0	0	1
1700-1800	0	12	0	12	0	34	7	0	41	0	0	0	0	1
Totals	3	135	0	138	2	109	13	0	124	0	0	1	11	1

Comments:
No traffic issues noted during survey.



Time Period	Gladstone Ave. Eastbound				Gladstone Ave. Westbound				Loretta Ave. (N) Northbound				Loretta Ave. (N) Southbound				S. Tot	G. Tot	
	LT	ST	RT	UT	LT	ST	RT	UT	LT	ST	RT	UT	LT	ST	RT	UT			
0700-0800	0	6	2	0	8	1	7	1	0	9	0	0	1	0	0	0	0	18	0
0800-0900	0	8	1	0	9	0	10	3	0	13	0	0	4	2	0	0	0	2	28
0900-1000	1	14	1	0	16	2	15	3	0	20	0	0	0	1	0	2	0	3	39
1500-1600	0	6	1	0	7	3	7	1	0	11	0	0	2	1	0	0	0	1	21
1600-1700	0	5	1	0	6	1	10	0	0	11	2	0	0	2	1	0	0	1	20
1700-1800	0	6	0	0	6	1	7	1	0	9	0	0	0	1	0	0	0	1	16
Totals	1	45	6	0	52	8	56	9	0	73	2	0	7	0	9	6	0	8	142

Comments:
 No traffic issues noted during survey.

Survey Date: Tuesday, June 20, 2017
 Total Observed U-Turns
 Northbound: 0 Southbound: 0
 Eastbound: 1 Westbound: 0

Time Period	Northbound				Southbound				Eastbound				Westbound				Grand Total		
	LT	ST	RT	TOT	LT	ST	RT	TOT	S	STR	TOT	LT	ST	RT	TOT	W		STR	TOT
07:00	12	66	16	94	12	82	2	96	190	4	25	10	39	10	27	19	56	95	285
07:15	3	78	19	100	14	104	3	121	221	2	24	8	34	10	23	12	45	79	300
07:30	13	85	15	113	10	70	4	84	197	3	29	13	45	8	25	12	45	90	287
07:45	13	95	15	123	17	90	7	114	237	11	32	10	53	13	24	14	51	104	341
08:00	12	89	17	128	19	85	3	107	235	7	39	16	62	13	28	21	62	124	359
08:15	14	100	27	141	18	91	10	119	260	9	56	19	84	17	40	17	74	158	418
08:30	9	120	21	150	20	91	3	114	264	5	52	14	71	6	49	14	69	140	404
08:45	10	94	16	120	16	78	0	94	214	10	50	13	73	12	41	16	69	142	356
09:00	13	81	20	114	21	108	10	139	253	5	27	13	45	12	35	17	64	109	362
09:15	18	61	18	98	23	94	8	125	223	8	27	12	47	12	40	21	73	120	343
09:30	14	79	17	110	24	84	11	119	229	9	25	10	45	21	26	15	62	107	336
09:45	9	73	19	101	16	75	3	94	195	4	30	11	45	11	38	17	66	111	306
11:30	8	70	20	98	20	63	4	87	185	5	24	14	43	29	22	20	71	114	299
11:45	9	67	23	99	15	89	13	117	216	2	38	12	52	27	53	27	107	159	375
12:00	13	79	21	113	11	84	11	106	219	5	35	13	53	30	41	28	99	152	371
12:15	11	89	25	125	16	67	5	88	213	5	35	14	54	22	44	29	95	149	362
12:30	7	53	19	79	18	97	11	126	205	6	33	13	52	21	34	27	82	134	339
12:45	16	63	27	106	21	77	4	102	208	8	32	19	59	22	44	25	91	150	358
13:00	13	89	19	121	14	83	9	106	227	9	40	19	68	24	44	21	89	157	384
13:15	12	73	22	107	29	75	8	112	219	10	35	11	56	21	41	21	83	139	358
15:00	15	84	29	128	8	95	8	111	239	5	39	26	70	24	62	27	113	183	422
15:15	21	118	24	163	17	97	9	123	286	6	40	11	57	16	64	15	95	152	438
15:30	12	98	16	126	13	73	10	96	222	5	39	14	58	26	92	20	138	196	418
15:45	13	108	16	137	12	86	6	104	241	10	48	14	72	19	96	15	130	202	443
16:00	27	118	19	164	15	83	9	107	271	4	40	8	52	22	97	14	133	185	456
16:15	14	104	22	140	12	95	10	117	257	3	48	11	62	18	107	20	145	207	464
16:30	16	83	29	128	9	86	8	103	231	6	51	13	70	24	101	20	145	215	446
16:45	22	92	23	137	15	103	10	128	265	3	43	6	52	18	114	24	156	208	473
17:00	17	95	27	146	16	80	21	117	263	8	45	8	61	20	117	13	150	211	474
17:15	12	79	24	115	7	85	8	100	215	1	40	9	50	24	100	20	144	194	409
17:30	13	86	31	130	15	71	7	93	223	8	48	8	64	26	85	25	136	200	423
17:45	13	84	12	109	6	94	11	111	220	8	45	12	65	27	78	20	125	190	410
TOTAL:	432	2763	668	3863	499	2735	246	3480	7343	194	1214	404	1813	605	1832	626	3063	4876	12219

Note: U-Turns are included in Totals.
 Comment:



Transportation Services - Traffic Services
Turning Movement Count - Cyclist Volume Report

Work Order
37132

GLADSTONE AVE @ PRESTON ST

Time Period	PRESTON ST			GLADSTONE AVE			Grand Total
	Northbound	Southbound	Street Total	Eastbound	Westbound	Street Total	
07:00-08:00	0	8	8	19	14	33	41
08:00-09:00	10	14	24	47	25	72	96
09:00-10:00	7	8	15	15	21	36	51
11:30-12:30	5	9	14	10	8	18	32
12:30-13:30	8	10	18	4	14	18	36
15:00-16:00	8	8	16	17	15	32	48
16:00-17:00	11	13	24	20	42	62	86
17:00-18:00	7	8	15	27	38	65	80
Total	56	78	134	159	177	336	470

Comment:

Count Date: Tuesday, June 20, 2017

Start Time: 07:00



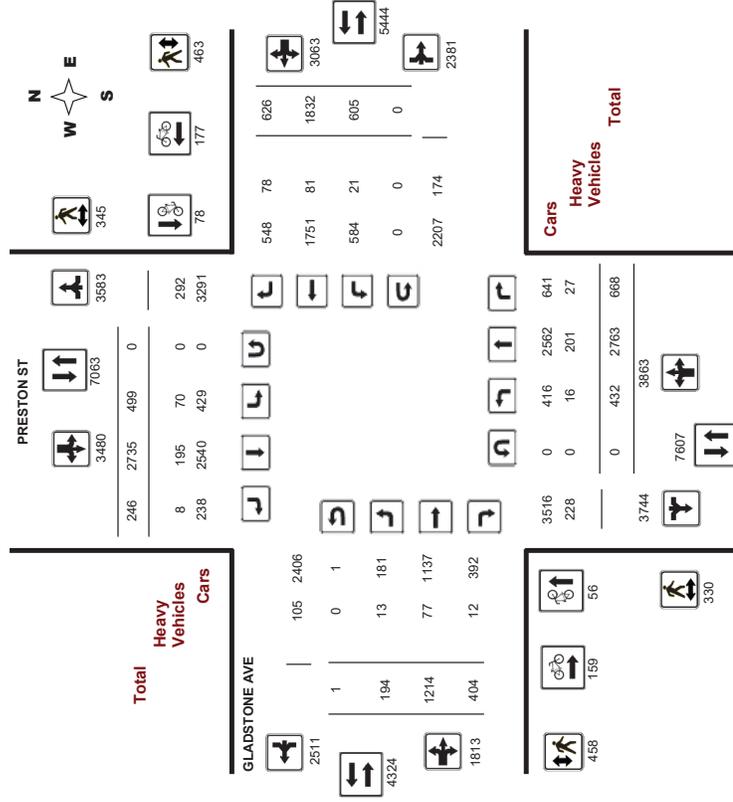
Transportation Services - Traffic Services
Turning Movement Count - Full Study Diagram

GLADSTONE AVE @ PRESTON ST

Survey Date: Tuesday, June 20, 2017

WO#: 37132

Device: Miovision



Comments

Note: These volumes consists of bicycles only (no mopeds or motorcycles) and ARE NOT included in the Turning Movement Count Summary.



Transportation Services - Traffic Services

W.O. 37132

Turning Movement Count - Heavy Vehicle Report



Transportation Services - Traffic Services

Work Order 37132

Turning Movement Count - Pedestrian Volume Report

GLADSTONE AVE @ PRESTON ST

Survey Date: Tuesday, June 20, 2017

PRESTON ST

Time Period	Northbound			Southbound			Eastbound			Westbound			W	STR	TOT	Grand Total			
	LT	ST	RT	N	LT	ST	RT	E	LT	ST	RT	TOT							
07:00 08:00	1	26	5	32	13	22	1	36	68	2	12	1	15	0	9	5	14	29	97
08:00 09:00	1	28	5	34	11	26	0	37	71	4	10	3	17	4	12	10	26	43	114
09:00 10:00	4	33	5	42	12	40	0	52	94	2	12	4	18	3	13	12	28	46	140
11:30 12:30	1	25	2	28	6	29	4	39	67	1	9	1	11	3	9	14	26	37	104
12:30 13:30	5	27	2	34	15	22	0	37	71	1	10	2	13	7	11	11	29	42	113
15:00 16:00	3	27	4	34	3	24	3	30	64	3	6	1	10	3	12	8	23	33	97
16:00 17:00	1	21	3	25	7	18	0	25	50	0	11	0	11	0	9	11	20	31	81
17:00 18:00	0	14	1	15	3	14	0	17	32	0	7	0	7	1	6	7	14	21	53
Sub Total	16	201	27	244	70	195	8	273	517	13	77	12	102	21	81	78	180	282	799
U-Turns (Heavy Vehicles)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	16	201	27	244	70	195	8	273	517	13	77	12	102	21	81	78	180	282	799

Heavy Vehicles include Buses, Single-Unit Trucks and Articulated Trucks. Further, they ARE included in the Turning Movement Count Summary.

Count Date: Tuesday, June 20, 2017

GLADSTONE AVE @ PRESTON ST

Start Time: 07:00

Time Period	NB Approach (E or W Crossing)	SB Approach (E or W Crossing)	Total	EB Approach (N or S Crossing)	WB Approach (N or S Crossing)	Total	Grand Total
07:00 07:15	1	3	4	1	3	4	8
07:15 07:30	7	5	12	3	4	7	19
07:30 07:45	7	10	17	7	12	20	37
07:45 08:00	19	6	25	12	14	26	51
08:00 08:15	34	24	58	24	33	57	115
08:15 08:30	10	7	17	9	16	25	42
08:30 08:45	8	9	17	4	15	19	36
08:45 09:00	26	22	48	21	40	61	109
09:00 09:15	13	16	29	10	23	33	62
09:15 09:30	57	54	111	44	84	138	249
09:30 09:45	12	6	18	3	9	12	30
09:45 10:00	8	6	14	5	14	19	33
10:00 10:15	4	9	13	9	3	12	25
10:15 10:30	9	10	19	10	12	22	41
10:30 10:45	33	31	64	27	38	65	129
10:45 11:00	9	4	13	4	14	18	35
11:00 11:15	8	9	17	11	9	20	37
11:15 11:30	14	13	27	18	13	31	58
11:30 11:45	14	9	23	27	8	35	58
11:45 12:00	45	35	80	64	44	108	188
12:00 12:15	10	9	19	16	20	36	55
12:15 12:30	8	8	16	13	16	29	45
12:30 12:45	6	11	17	20	14	34	51
12:45 13:00	6	6	12	12	12	24	34
13:00 13:15	28	34	62	61	62	123	185
13:15 13:30	6	7	13	16	14	30	43
13:30 13:45	9	11	20	20	19	39	49
13:45 14:00	10	5	15	17	11	28	43
14:00 14:15	21	11	32	11	13	24	56
14:15 14:30	46	34	80	54	57	111	191
14:30 14:45	8	14	22	22	14	36	58
14:45 15:00	10	15	25	20	16	36	61
15:00 15:15	10	16	26	33	22	55	81
15:15 15:30	10	16	26	28	12	40	68
15:30 15:45	44	57	101	103	64	167	268
15:45 16:00	16	16	31	18	18	41	72
16:00 16:15	13	17	30	18	22	40	70
16:15 16:30	9	18	27	13	8	21	48
16:30 16:45	6	25	31	27	23	50	81
16:45 17:00	43	76	119	81	71	152	271
Total	330	345	675	468	463	931	1596

Comment:

Turning Movement Count - Full Study Summary Report

GLADSTONE AVE @ PRESTON ST

Survey Date: Tuesday, June 20, 2017

Total Observed U-Turns
Northbound: 0 Southbound: 0 AADT Factor
Eastbound: 1 Westbound: 0 .90

Full Study

Period	PRESTON ST				GLADSTONE AVE				Grand Total											
	Northbound		Southbound		Eastbound		Westbound													
	LT	ST	RT	TOT	LT	ST	RT	TOT	WB TOT	STR TOT										
07:00-08:00	41	324	65	430	53	346	16	415	845	20	110	41	171	41	99	57	368	1213		
08:00-09:00	45	413	81	539	73	345	16	434	973	31	197	62	290	48	158	68	564	1537		
09:00-10:00	55	294	74	423	84	361	32	477	900	26	109	46	181	56	139	70	446	1346		
11:30-12:30	41	305	89	435	62	303	33	398	833	17	132	53	202	108	160	104	574	1407		
12:30-13:30	48	278	87	413	82	332	32	446	859	33	140	62	235	88	163	94	580	1439		
15:00-16:00	61	408	85	554	50	351	33	434	988	26	166	65	257	85	314	77	733	1721		
16:00-17:00	79	397	93	569	51	367	37	455	1024	16	182	38	236	82	419	78	579	1839		
17:00-18:00	62	344	94	500	44	330	47	421	921	25	178	37	240	97	380	78	555	1716		
Sub Total	432	2763	668	3863	499	2735	246	3480	7343	194	1214	404	1812	605	1832	626	3063	4875		
U-Turns	0				0				1				0				1			
Total	432	2763	668	3863	499	2735	246	3480	7343	194	1214	404	1813	605	1832	626	3063	4876	12219	
EQ 12hr	600	3841	929	5370	684	3802	342	4837	10207	270	1687	562	2520	841	2546	870	4258	6778	16985	
Note: These values are calculated by multiplying the totals by the appropriate expansion factor.																				
AVG 12hr	540	3457	836	4833	624	3421	308	4333	9186	243	1519	505	2268	757	2292	783	3832	6100	15286	
Note: These volumes are calculated by multiplying the Equivalent 12 hr. totals by the AADT factor.																				
AVG 24hr	708	4528	1095	6331	818	4482	403	5703	12034	318	1990	662	2971	991	3002	1026	5020	7991	20025	
Note: These volumes are calculated by multiplying the Average Daily 12 hr. totals by 12 to 24 expansion factor.																				

Comments:

Note: U-Turns provided for approach totals. Refer to 'U-Turn' Report for specific breakdown.

Turning Movement Count - Peak Hour Diagram

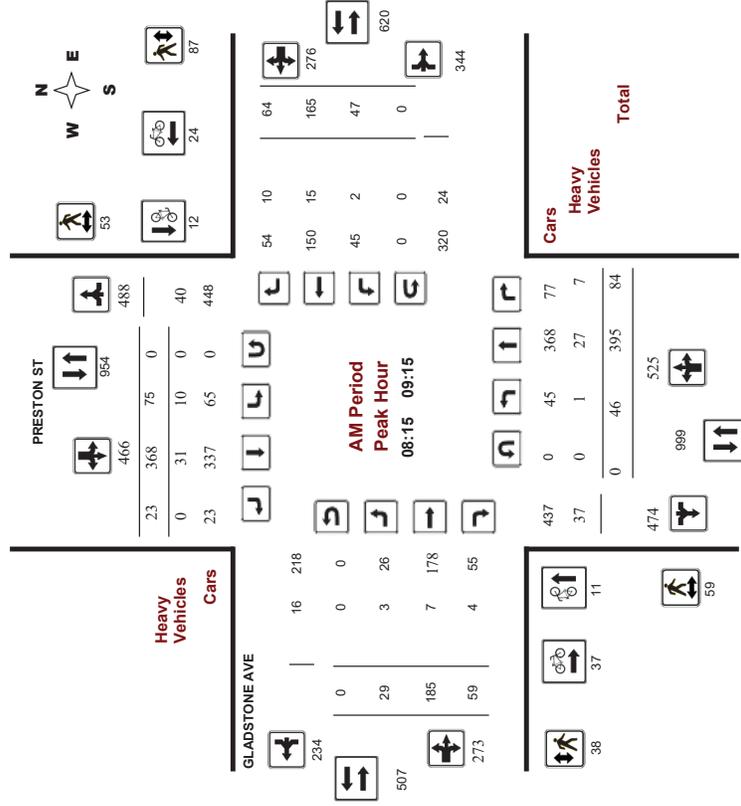
GLADSTONE AVE @ PRESTON ST

Survey Date: Tuesday, June 20, 2017

WO No: 37132

Start Time: 07:00

Device: Miovision



Comments



Transportation Services - Traffic Services

Turning Movement Count - Peak Hour Diagram

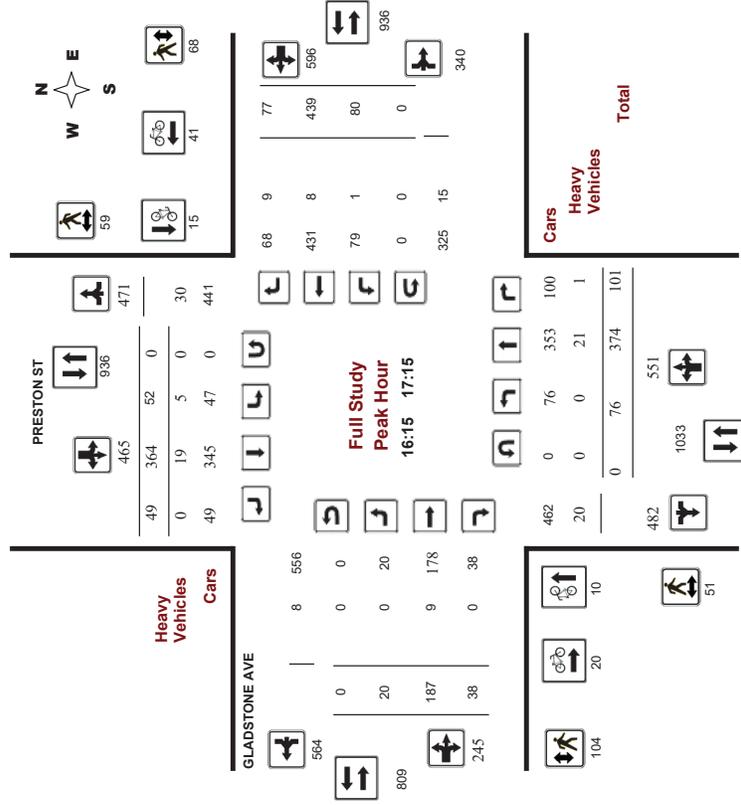
GLADSTONE AVE @ PRESTON ST

Survey Date: Tuesday, June 20, 2017

WO No: 37132

Start Time: 07:00

Device: Miovision



Comments



Transportation Services - Traffic Services

Turning Movement Count - Peak Hour Diagram

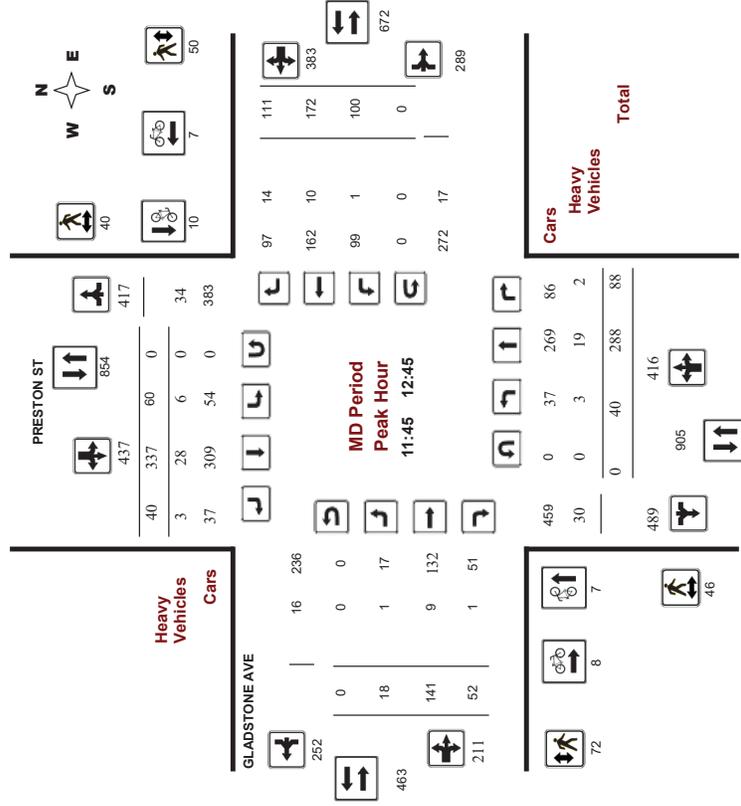
GLADSTONE AVE @ PRESTON ST

Survey Date: Tuesday, June 20, 2017

WO No: 37132

Start Time: 07:00

Device: Miovision



Comments



Transportation Services - Traffic Services

Work Order
37132

Turning Movement Count - 15 Min U-Turn Total Report GLADSTONE AVE @ PRESTON ST

Survey Date: Tuesday, June 20, 2017

Time Period	Northbound U-Turn Total	Southbound U-Turn Total	Eastbound U-Turn Total	Westbound U-Turn Total	Total
07:00	0	0	0	0	0
07:15	0	0	0	0	0
07:30	0	0	0	0	0
07:45	0	0	0	0	0
08:00	0	0	0	0	0
08:15	0	0	0	0	0
08:30	0	0	0	0	0
08:45	0	0	0	0	0
09:00	0	0	0	0	0
09:15	0	0	0	0	0
09:30	0	0	1	0	1
09:45	0	0	0	0	0
11:30	0	0	0	0	0
11:45	0	0	0	0	0
12:00	0	0	0	0	0
12:15	0	0	0	0	0
12:30	0	0	0	0	0
12:45	0	0	0	0	0
13:00	0	0	0	0	0
13:15	0	0	0	0	0
13:30	0	0	0	0	0
15:00	0	0	0	0	0
15:15	0	0	0	0	0
15:30	0	0	0	0	0
15:45	0	0	0	0	0
16:00	0	0	0	0	0
16:15	0	0	0	0	0
16:30	0	0	0	0	0
16:45	0	0	0	0	0
17:00	0	0	0	0	0
17:15	0	0	0	0	0
17:30	0	0	0	0	0
17:45	0	0	0	0	0
18:00	0	0	0	0	0
Total	0	0	1	0	1



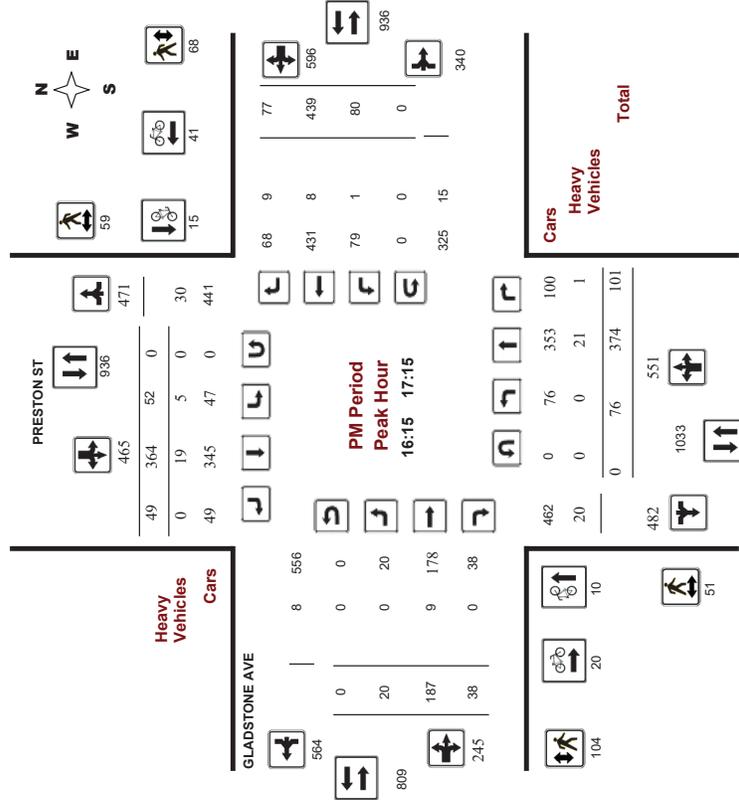
Transportation Services - Traffic Services Turning Movement Count - Peak Hour Diagram GLADSTONE AVE @ PRESTON ST

Survey Date: Tuesday, June 20, 2017

Start Time: 07:00

WO No: 37132

Device: Miovision



Appendix C

Existing Synchro Worksheets

DRAFT

Lanes, Volumes, Timings
1: Preston & Gladstone

08-01-2019



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	29	185	59	47	165	64	45	368	77	75	368	23
Traffic Volume (vph)	29	185	59	47	165	64	45	368	77	75	368	23
Future Volume (vph)	0	1580	0	1621	1560	0	1621	1606	0	1621	1680	0
Satd. Flow (prot)	0.942	0.452	0.452	0.457								
Flt Permitted	0	1484	0	722	1560	0	752	1606	0	648	1680	0
Satd. Flow (perm)	20			27			25					7
Lane Group Flow (vph)	0	304	0	52	254	0	50	495	0	83	435	0
Turn Type	Perm	NA										
Protected Phases	4			8			2				6	
Permitted Phases	4			8			2				6	
Minimum Split (s)	21.5	21.5	22.5	22.5	23.7	23.7	23.7	23.7	23.7	23.7	23.7	23.7
Total Split (s)	25.0	25.0	25.0	25.0	45.0	45.0	45.0	45.0	45.0	45.0	45.0	45.0
Total Split (%)	35.7%	35.7%	35.7%	35.7%	64.3%	64.3%	64.3%	64.3%	64.3%	64.3%	64.3%	64.3%
Yellow Time (s)	3.0	3.0	3.0	3.0	3.3	3.3	3.3	3.3	3.3	3.3	3.3	3.3
All-Red Time (s)	2.5	2.5	3.5	3.5	2.4	2.4	2.4	2.4	2.4	2.4	2.4	2.4
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	5.5	5.5	6.5	6.5	5.7	5.7	5.7	5.7	5.7	5.7	5.7	5.7
Lead/Lag												
Lead-Lag Optimize?												
Act Effct Green (s)	19.5	18.5	18.5	18.5	39.3	39.3	39.3	39.3	39.3	39.3	39.3	39.3
Actuated G/C Ratio	0.28	0.26	0.26	0.26	0.56	0.56	0.56	0.56	0.56	0.56	0.56	0.56
v/c Ratio	0.71	0.27	0.59	0.12	0.54	0.23	0.46	0.23	0.46	0.23	0.46	0.23
Control Delay	32.3	25.1	26.4	8.2	11.9	9.8	10.9	9.8	10.9	9.8	10.9	9.8
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	32.3	25.1	26.4	8.2	11.9	9.8	10.9	9.8	10.9	9.8	10.9	9.8
LOS	C	C	C	C	A	B	A	B	A	B	A	B
Approach Delay	32.3	26.2	26.2	11.6	10.7	10.7	10.7	10.7	10.7	10.7	10.7	10.7
Approach LOS	C	C	C	B	B	B	B	B	B	B	B	B
Queue Length 50th (m)	30.6	5.0	23.6	2.6	32.2	4.6	27.6	4.6	27.6	4.6	27.6	4.6
Queue Length 95th (m)	#61.2	13.1	43.7	6.9	54.2	11.2	45.8	11.2	45.8	11.2	45.8	11.2
Internal Link Dist (m)	107.7		126.7	144.2	119.4	119.4	119.4	119.4	119.4	119.4	119.4	119.4
Turn Bay Length (m)	427	190	432	422	912	363	946	363	946	363	946	363
Base Capacity (vph)	0	0	0	0	0	0	0	0	0	0	0	0
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.71	0.27	0.59	0.12	0.54	0.23	0.46	0.23	0.46	0.23	0.46	0.23

Intersection Summary

Cycle Length: 70	
Actuated Cycle Length: 70	
Offset: 37 (53%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green	
Natural Cycle: 55	
Control Type: Prelimed	
Maximum v/c Ratio: 0.71	
Intersection Signal Delay: 17.7	Intersection LOS: B
Intersection Capacity Utilization 85.3%	ICU Level of Service E
Analysis Period (min) 15	

Lanes, Volumes, Timings
1: Preston & Gladstone

08-01-2019



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	29	185	59	47	165	64	45	368	77	75	368	23
Traffic Volume (vph)	29	185	59	47	165	64	45	368	77	75	368	23
Future Volume (vph)	0	1580	0	1621	1560	0	1621	1606	0	1621	1680	0
Satd. Flow (prot)	0.942	0.452	0.452	0.457								
Flt Permitted	0	1484	0	722	1560	0	752	1606	0	648	1680	0
Satd. Flow (perm)	20			27			25					7
Lane Group Flow (vph)	0	304	0	52	254	0	50	495	0	83	435	0
Turn Type	Perm	NA										
Protected Phases	4			8			2				6	
Permitted Phases	4			8			2				6	
Minimum Split (s)	21.5	21.5	22.5	22.5	23.7	23.7	23.7	23.7	23.7	23.7	23.7	23.7
Total Split (s)	25.0	25.0	25.0	25.0	45.0	45.0	45.0	45.0	45.0	45.0	45.0	45.0
Total Split (%)	35.7%	35.7%	35.7%	35.7%	64.3%	64.3%	64.3%	64.3%	64.3%	64.3%	64.3%	64.3%
Yellow Time (s)	3.0	3.0	3.0	3.0	3.3	3.3	3.3	3.3	3.3	3.3	3.3	3.3
All-Red Time (s)	2.5	2.5	3.5	3.5	2.4	2.4	2.4	2.4	2.4	2.4	2.4	2.4
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	5.5	5.5	6.5	6.5	5.7	5.7	5.7	5.7	5.7	5.7	5.7	5.7
Lead/Lag												
Lead-Lag Optimize?												
Act Effct Green (s)	19.5	18.5	18.5	18.5	39.3	39.3	39.3	39.3	39.3	39.3	39.3	39.3
Actuated G/C Ratio	0.28	0.26	0.26	0.26	0.56	0.56	0.56	0.56	0.56	0.56	0.56	0.56
v/c Ratio	0.71	0.27	0.59	0.12	0.54	0.23	0.46	0.23	0.46	0.23	0.46	0.23
Control Delay	32.3	25.1	26.4	8.2	11.9	9.8	10.9	9.8	10.9	9.8	10.9	9.8
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	32.3	25.1	26.4	8.2	11.9	9.8	10.9	9.8	10.9	9.8	10.9	9.8
LOS	C	C	C	C	A	B	A	B	A	B	A	B
Approach Delay	32.3	26.2	26.2	11.6	10.7	10.7	10.7	10.7	10.7	10.7	10.7	10.7
Approach LOS	C	C	C	B	B	B	B	B	B	B	B	B
Queue Length 50th (m)	30.6	5.0	23.6	2.6	32.2	4.6	27.6	4.6	27.6	4.6	27.6	4.6
Queue Length 95th (m)	#61.2	13.1	43.7	6.9	54.2	11.2	45.8	11.2	45.8	11.2	45.8	11.2
Internal Link Dist (m)	107.7		126.7	144.2	119.4	119.4	119.4	119.4	119.4	119.4	119.4	119.4
Turn Bay Length (m)	427	190	432	422	912	363	946	363	946	363	946	363
Base Capacity (vph)	0	0	0	0	0	0	0	0	0	0	0	0
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.71	0.27	0.59	0.12	0.54	0.23	0.46	0.23	0.46	0.23	0.46	0.23

Intersection Summary

Cycle Length: 70	
Actuated Cycle Length: 70	
Offset: 37 (53%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green	
Natural Cycle: 55	
Control Type: Prelimed	
Maximum v/c Ratio: 0.71	
Intersection Signal Delay: 17.7	Intersection LOS: B
Intersection Capacity Utilization 85.3%	ICU Level of Service E
Analysis Period (min) 15	

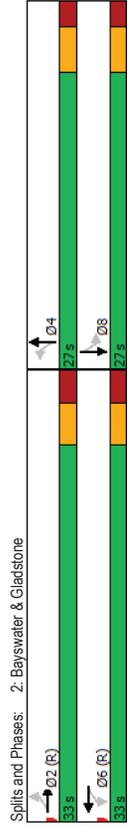
Lanes, Volumes, Timings
2: Bayswater & Gladstone

08-01-2019

	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	23	112	16	14	105	35	19	106	22	50	124	37
Traffic Volume (vph)	23	112	16	14	105	35	19	106	22	50	124	37
Future Volume (vph)	0	1651	0	0	1620	0	0	1650	0	0	1635	0
Satd. Flow (prot)	0.945			0.971			0.946			0.894		
Flt Permitted	0	1566	0	0	1577	0	0	1570	0	0	1476	0
Satd. Flow (perm)	13			32			16			20		
Satd. Flow (RTOR)	0	168	0	0	172	0	0	163	0	0	235	0
Lane Group Flow (vph)	Perm	NA										
Turn Type	2	2	6	6	4	4	8					
Protected Phases	2	2	6	6	4	4	8					
Permitted Phases	21.5	21.5	21.5	21.5	20.3	20.3	20.3	20.3	20.3	20.3	20.3	20.3
Minimum Split (s)	33.0	33.0	33.0	33.0	27.0	27.0	27.0	27.0	27.0	27.0	27.0	27.0
Total Split (s)	55.0%	55.0%	55.0%	55.0%	45.0%	45.0%	45.0%	45.0%	45.0%	45.0%	45.0%	45.0%
Total Split (%)	3.0	3.0	3.0	3.0	3.3	3.3	3.3	3.3	3.3	3.3	3.3	3.3
Yellow Time (s)	2.5	2.5	2.5	2.5	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
All-Red Time (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Lost Time Adjust (s)	5.5	5.5	5.5	5.5	5.3	5.3	5.3	5.3	5.3	5.3	5.3	5.3
Total Lost Time (s)												
Lead/Lag												
Lead-Lag Optimize?												
Act Effct Green (s)	27.5			27.5			21.7					21.7
Actuated G/C Ratio	0.46			0.46			0.36					0.36
v/c Ratio	0.23			0.23			0.28					0.43
Control Delay	10.1			9.0			13.9					16.2
Queue Delay	0.0			0.0			0.0					0.0
Total Delay	10.1			9.0			13.9					16.2
LOS	B			A			B					B
Approach Delay	10.1			9.0			13.9					16.2
Approach LOS	B			A			B					B
Queue Length 50th (m)	8.9			8.0			10.2					15.8
Queue Length 95th (m)	18.1			17.0			21.2					31.0
Internal Link Dist (m)	86.5			86.5			86.5					86.6
Turn Bay Length (m)												
Base Capacity (vph)	724			740			578					546
Starvation Cap Reductn	0			0			0					0
Spillback Cap Reductn	0			0			0					0
Storage Cap Reductn	0			0			0					0
Reduced v/c Ratio	0.23			0.23			0.28					0.43
Intersection Summary												
Cycle Length: 60												
Actuated Cycle Length: 60												
Offset: 29 (48%), Referenced to phase 2:EBTL and 6:WBTL, Start of Green												
Natural Cycle: 45												
Control Type: Prelimed												
Maximum v/c Ratio: 0.43												
Intersection Signal Delay: 12.6												
Intersection Capacity Utilization 43.4%												
ICU Level of Service A												
Analysis Period (min) 15												

Lanes, Volumes, Timings
2: Bayswater & Gladstone

08-01-2019



HCM 2010 TWSC

3: Breezehill & Somersset

08-01-2019

Intersection												
Int Delay, s/veh												1.9
Movement	EBL	EBR	WBL	WBR	NBL	NBR						
Lane Configurations												
Traffic Vol, veh/h	260	25	14	254	12	22						
Future Vol, veh/h	260	25	14	254	12	22						
Conflicting Peds, #/hr	0	50	50	0	0	0						
Sign Control	Free	Free	Free	Free	Stop	Stop						
RT Channelized	-	None	-	None	-	None						
Storage Length	-	-	-	-	-	0						
Veh in Median Storage, #	0	-	-	0	0	-						
Grade, %	0	-	-	0	0	-						
Peak Hour Factor	90	90	90	90	90	90						
Heavy Vehicles, %	2	2	2	2	2	2						
Mvmt Flow	289	28	16	282	13	24						
Major/Minor	Major1	Major2	Minor1									
Conflicting Flow All	0	0	367	0	667	353						
Stage 1	-	-	-	-	353	-						
Stage 2	-	-	-	-	314	-						
Critical Hdwy	-	-	-	-	4.12	-	6.42	6.22				
Critical Hdwy Stg 1	-	-	-	-	-	-	5.42	-				
Critical Hdwy Stg 2	-	-	-	-	-	-	5.42	-				
Follow-up Hdwy	-	-	-	-	2.218	-	3.518	3.318				
Pot Cap-1 Maneuver	-	-	-	-	1192	-	424	691				
Stage 1	-	-	-	-	-	-	711	-				
Stage 2	-	-	-	-	-	-	741	-				
Platoon blocked, %	-	-	-	-	-	-	-	-				
Mov Cap-1 Maneuver	-	-	-	-	1136	-	397	659				
Mov Cap-2 Maneuver	-	-	-	-	-	-	397	-				
Stage 1	-	-	-	-	-	-	678	-				
Stage 2	-	-	-	-	-	-	728	-				
Approach	EB	WB	NB									
HCM Control Delay, s	0	0.4	12.2									
HCM LOS	B											
Minor Lane/Major Mvmt	NBLn1	EBL	EBR	WBL	WBR							
Capacity (veh/h)	535	-	-	1136	-							
HCM Lane V/C Ratio	0.071	-	-	0.014	-							
HCM Control Delay (s)	12.2	-	-	8.2	0							
HCM Lane LOS	B	-	-	A	A							
HCM 95th %tile Q(veh)	0.2	-	-	0	-							

Trinity Gladstone-Loretta AM Peak Existing Conditions

HCM 2010 TWSC

4: Loretta & Gladstone

08-01-2019

Intersection												
Int Delay, s/veh												1.9
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	21	209	15	19	154	33	8	0	7	21	3	9
Future Vol, veh/h	21	209	15	19	154	33	8	0	7	21	3	9
Conflicting Peds, #/hr	16	0	14	14	0	16	2	0	2	2	0	2
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	None	-	None	-	None	-	None	-	None	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	90	90	90	90	90	90	90	90	90	90	90	90
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	23	232	17	21	171	37	9	0	8	23	3	10
Major/Minor	Major1	Major2	Minor1									
Conflicting Flow All	224	0	0	263	0	0	541	567	257	541	557	208
Stage 1	-	-	-	-	-	-	301	301	-	248	248	-
Stage 2	-	-	-	-	-	-	240	266	-	293	309	-
Critical Hdwy	4.12	-	-	4.12	-	-	7.12	6.92	6.22	7.12	6.52	6.22
Critical Hdwy Stg 1	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Follow-up Hdwy	2.218	-	-	2.218	-	-	3.518	4.018	3.318	3.518	4.018	3.318
Pot Cap-1 Maneuver	1345	-	-	1301	-	-	452	433	782	452	439	832
Stage 1	-	-	-	-	-	-	708	665	-	756	701	-
Stage 2	-	-	-	-	-	-	763	689	-	715	660	-
Platoon blocked, %	-	-	-	-	-	-	-	-	-	-	-	-
Mov Cap-1 Maneuver	1325	-	-	1284	-	-	424	405	770	427	410	818
Mov Cap-2 Maneuver	-	-	-	-	-	-	424	405	-	427	410	-
Stage 1	-	-	-	-	-	-	685	643	-	730	677	-
Stage 2	-	-	-	-	-	-	734	666	-	692	638	-
Approach	EB	WB	NB									
HCM Control Delay, s	0.7	0.7	11.9									
HCM LOS	B											
Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1				
Capacity (veh/h)	537	1325	-	-	1284	-	-	489				
HCM Lane V/C Ratio	0.031	0.018	-	-	0.016	-	-	0.075				
HCM Control Delay (s)	11.9	7.8	0	-	7.9	0	-	13				
HCM Lane LOS	B	A	A	-	A	-	-	B				
HCM 95th %tile Q(veh)	0.1	0.1	-	-	0.1	-	-	0.2				

Trinity Gladstone-Loretta AM Peak Existing Conditions

HCM 2010 AWSC
5: Breezehill & Laurel

08-01-2019

Intersection	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Intersection Delay, s/veh	7.5											
Intersection LOS	A											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	11	26	10	6	8	6	11	49	10	22	31	16
Traffic Vol, veh/h	11	26	10	6	8	6	11	49	10	22	31	16
Future Vol, veh/h	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Peak Hour Factor	2	2	2	2	2	2	2	2	2	2	2	2
Heavy Vehicles, %	12	29	11	7	9	7	12	54	11	24	34	18
Mvmt Flow	0	1	0	0	1	0	0	1	0	0	1	0
Number of Lanes												
Approach	EB	WB	WB	EB	WB	WB	NB	NB	SB	SB	SB	SB
Opposing Approach	WB	EB	WB	EB	WB	WB	SB	SB	NB	NB	SB	SB
Opposing Lanes	1	1	1	1	1	1	1	1	1	1	1	1
Conflicting Approach Left	SB	NB	NB	EB	WB	WB	EB	WB	WB	WB	EB	WB
Conflicting Lanes Left	1	1	1	1	1	1	1	1	1	1	1	1
Conflicting Approach Right	NB	SB	SB	WB	WB	WB	EB	WB	WB	WB	EB	WB
Conflicting Lanes Right	1	1	1	1	1	1	1	1	1	1	1	1
HCM Control Delay	7.5	7.3	7.3	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5
HCM LOS	A											

Lane	NBLn1	EBLn1	EBLn1	WBLn1	SBLn1	SBLn1
Vol Left, %	16%	23%	30%	30%	32%	
Vol Thru, %	70%	55%	40%	45%		
Vol Right, %	14%	21%	30%	23%		
Sign Control	Stop	Stop	Stop	Stop	Stop	
Traffic Vol by Lane	70	47	20	69		
LT Vol	11	11	6	22		
Through Vol	49	26	8	31		
RT Vol	10	10	6	16		
Lane Flow Rate	78	52	22	77		
Geometry Grp	1	1	1	1		
Degree of Uhl (X)	0.088	0.06	0.025	0.086		
Departure Headway (Hd)	4.067	4.136	4.12	4.047		
Convergence, Y/N	Yes	Yes	Yes	Yes		
Cap	875	855	857	879		
Service Time	2.12	2.212	2.204	2.101		
HCM Lane V/C Ratio	0.089	0.061	0.026	0.088		
HCM Control Delay	7.5	7.5	7.3	7.5		
HCM Lane LOS	A	A	A	A		
HCM 95th-ile Q	0.3	0.2	0.1	0.3		

Trinity Gladstone-Loretta AM Peak Existing Conditions

Lanes, Volumes, Timings
1: Preston & Gladstone

08-01-2019

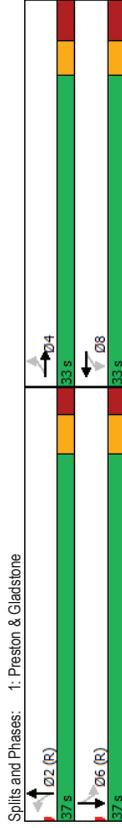
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	4	4	4	4	4	4	4	4	4	4	4	4
Traffic Volume (vph)	20	187	38	80	439	77	76	363	100	52	364	49
Future Volume (vph)	20	187	38	80	439	77	76	363	100	52	364	49
Satd. Flow (prot)	0	1626	0	1621	1623	0	1621	1593	0	1621	1630	0
Flt P/Permitted	0.785	0.579	0.379									
Satd. Flow (perm)	0	1278	0	922	1623	0	592	1593	0	545	1630	0
Satd. Flow (RTOR)	15			15			26			12		
Lane Group Flow (vph)	0	272	0	89	574	0	84	503	0	58	458	0
Turn Type	Perm	NA										
Protected Phases	4			8			2			6		
Permitted Phases	4			8			2			6		
Minimum Split (s)	22.5	22.5	22.5	22.5	22.5	22.5	23.7	23.7	23.7	23.7	23.7	23.7
Total Split (s)	33.0	33.0	33.0	33.0	33.0	33.0	37.0	37.0	37.0	37.0	37.0	37.0
Total Split (%)	47.1%	47.1%	47.1%	47.1%	47.1%	47.1%	52.9%	52.9%	52.9%	52.9%	52.9%	52.9%
Yellow Time (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.3	3.3	3.3	3.3	3.3	3.3
All-Red Time (s)	3.5	3.5	3.5	3.5	3.5	3.5	2.4	2.4	2.4	2.4	2.4	2.4
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	6.5	6.5	6.5	6.5	6.5	6.5	5.7	5.7	5.7	5.7	5.7	5.7
Lead/Lag												
Lead-Lag Optimize?												
Act Effct Green (s)	26.5	26.5	26.5	26.5	26.5	26.5	31.3	31.3	31.3	31.3	31.3	31.3
Actuated g/C Ratio	0.38	0.38	0.38	0.38	0.38	0.38	0.45	0.45	0.45	0.45	0.45	0.45
v/c Ratio	0.55	0.26	0.92	0.32	0.92	0.32	0.69	0.69	0.24	0.62	0.62	0.62
Control Delay	21.3	17.5	44.0	16.8	20.8	15.3	19.0	19.0	15.3	19.0	19.0	19.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	21.3	17.5	44.0	16.8	20.8	15.3	19.0	19.0	15.3	19.0	19.0	19.0
LOS	C	B	D	B	C	B	C	C	B	B	B	B
Approach Delay	21.3	40.4		20.2			18.6					
Approach LOS	C	D		C			B					
Queue Length 50th (m)	23.6	7.2	62.8	6.2	43.9	4.1	39.3					
Queue Length 95th (m)	43.8	16.3	#17.8	15.6	74.3	11.2	65.4					
Internal Link Dist (m)	107.7		126.7		144.2		119.4					
Turn Bay Length (m)	36.0			18.0			27.0					
Base Capacity (vph)	493	349	623	264	726	243	735					
Salvation Cap Reducth	0	0	0	0	0	0	0					
Spillback Cap Reducth	0	0	0	0	0	0	0					
Storage Cap Reducth	0	0	0	0	0	0	0					
Reduced v/c Ratio	0.55	0.26	0.92	0.32	0.69	0.24	0.62					
Intersection Summary												
Cycle Length: 70												
Actuated Cycle Length: 70												
Offset: 40 (57%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green												
Natural Cycle: 60												
Control Type: Pretimed												
Maximum v/c Ratio: 0.92												
Intersection Signal Delay: 26.5												
Intersection Capacity Utilization 81.9%												
Analysis Period (min) 15												

Trinity Gladstone-Loretta PM Peak Existing Conditions

Lanes, Volumes, Timings
1: Preston & Gladstone

08-01-2019

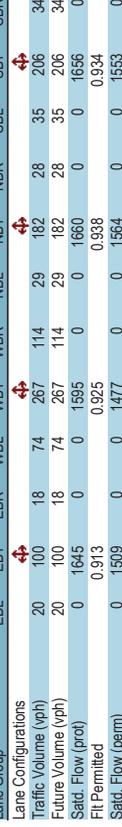
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.



Lanes, Volumes, Timings
2: Bayswater & Gladstone

08-01-2019

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

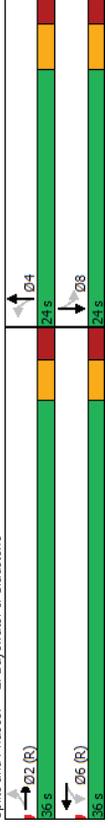


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	20	100	18	74	267	114	29	182	28	35	206	34
Future Volume (vph)	20	100	18	74	267	114	29	182	28	35	206	34
Satd. Flow (prot)	0	1645	0	0	1595	0	0	1660	0	0	1656	0
Flt Permitted	0.913			0.925			0.938				0.934	
Satd. Flow (RTOR)	0	1509	0	0	1477	0	0	1564	0	0	1553	0
Lane Group Flow (vph)	0	153	0	0	506	0	0	265	0	0	306	0
Turn Type	Perm	NA										
Protected Phases	2			6			4				8	
Permitted Phases	2			6			4				8	
Minimum Split (s)	21.5	21.5	21.5	21.5	21.5	21.5	20.3	20.3	20.3	20.3	20.3	20.3
Total Split (s)	36.0	36.0	36.0	36.0	36.0	36.0	24.0	24.0	24.0	24.0	24.0	24.0
Total Split (%)	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	40.0%	40.0%	40.0%	40.0%	40.0%	40.0%
Yellow Time (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.3	3.3	3.3	3.3	3.3	3.3
All-Red Time (s)	2.5	2.5	2.5	2.5	2.5	2.5	2.0	2.0	2.0	2.0	2.0	2.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	5.5	5.5	5.5	5.5	5.5	5.5	5.3	5.3	5.3	5.3	5.3	5.3
Lead/Lag												
Lead-Lag Optimize?												
Act Effct Green (s)	30.5			30.5			18.7				18.7	
Actuated g/C Ratio	0.51			0.51			0.31				0.31	
v/c Ratio	0.20			0.66			0.54				0.62	
Control Delay	7.9			15.0			21.0				23.5	
Queue Delay	0.0			0.0			0.0				0.0	
Total Delay	7.9			15.0			21.0				23.5	
LOS	A			B			C				C	
Approach Delay	7.9			15.0			21.0				23.5	
Approach LOS	A			B			C				C	
Queue Length 50th (m)	6.8			31.7			20.8				25.0	
Queue Length 95th (m)	14.5			88.8			38.7				45.7	
Internal Link Dist (m)	86.5			86.5			86.5				86.5	
Turn Bay Length (m)												
Base Capacity (vph)	775			770			495				492	
Salvation Cap Reducth	0			0			0				0	
Spillback Cap Reducth	0			0			0				0	
Storage Cap Reductin	0			0			0				0	
Reduced v/c Ratio	0.20			0.66			0.54				0.62	
Intersection Summary												
Cycle Length: 60												
Actuated Cycle Length: 60												
Offset: 53 (88%), Referenced to phase 2EBTL and 6WBTL, Start of Green												
Natural Cycle: 50												
Control Type: Pretimed												
Maximum v/c Ratio: 0.66												
Intersection Signal Delay: 17.5												
Intersection Capacity Utilization 64.0%												
ICU Level of Service C												
Analysis Period (min) 15												

Lanes, Volumes, Timings
2: Bayswater & Gladstone

08-01-2019

Splits and Phases: 2: Bayswater & Gladstone



HCM 2010 TWSC
3: Breezehill & Somersset

08-01-2019

Intersection	1							
In/Delay, s/veh	EBT	EBR	WBL	WBT	NBL	NBR		
Movement	316	23	19	418	19	15		
Lane Configurations	T P W							
Traffic Vol, veh/h	316	23	19	418	19	15		
Future Vol, veh/h	316	23	19	418	19	15		
Conflicting Peds, #/hr	0	100	100	0	18	0		
Sign Control	Free	Free	Free	Free	Stop	Stop		
RT Channelized	-	None	-	None	-	None		
Storage Length	-	-	-	-	-	0		
Veh in Median Storage, #	0	-	-	0	0	0		
Grade, %	0	-	-	0	0	0		
Peak Hour Factor	90	90	90	90	90	90		
Heavy Vehicles, %	2	2	2	2	2	2		
Mvmt Flow	351	26	21	464	21	17		
Major/Minor	Major1	Major2	Minor1					
Conflicting Flow All	0	0	477	0	988	464		
Stage 1	-	-	-	-	464	-		
Stage 2	-	-	-	-	524	-		
Critical Hdwy	-	-	4.12	-	6.42	6.22		
Critical Hdwy Stg 1	-	-	-	-	5.42	-		
Critical Hdwy Stg 2	-	-	-	-	5.42	-		
Follow-up Hdwy	-	-	2.218	-	3.518	3.318		
Pot Cap-1 Maneuver	-	-	1085	-	274	598		
Stage 1	-	-	-	-	633	-		
Stage 2	-	-	-	-	594	-		
Platoon blocked, %	-	-	-	-	-	-		
Mov Cap-1 Maneuver	-	-	984	-	237	542		
Mov Cap-2 Maneuver	-	-	-	-	237	-		
Stage 1	-	-	-	-	574	-		
Stage 2	-	-	-	-	567	-		
Approach	EB	WB	NB					
HCM Control Delay, s	0	0.4	18					
HCM LOS	C							
Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT			
Capacity (veh/h)	315	-	-	984	-			
HCM Lane V/C Ratio	0.12	-	-	0.021	-			
HCM Control Delay (s)	18	-	-	8.7	0			
HCM Lane LOS	C	-	-	A	A			
HCM 95th %tile Q(veh)	0.4	-	-	0.1	-			

Intersection													
Int Delay, s/veh													1.5
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	
Lane Configurations	9	205	4	9	583	31	15	0	6	20	2	16	
Traffic Vol, veh/h	9	205	4	9	583	31	15	0	6	20	2	16	
Future Vol, veh/h	23	0	24	0	24	0	24	0	0	1	1	0	0
Conflicting Peds, #/hr	Free	Free											
Sign Control	-	-	-	-	-	-	-	-	-	-	-	-	-
RT Channelized	-	-	-	-	-	-	-	-	-	-	-	-	-
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	-	-	-	-	-	-	-	-	-	-	-	-
Grade, %	-	-	-	-	-	-	-	-	-	-	-	-	-
Peak Hour Factor	90	90	90	90	90	90	90	90	90	90	90	90	
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2	
Mvmt Flow	10	228	4	10	669	34	17	0	7	22	2	18	
Major/Minor	Major1	Major2	Minor1	Minor2									
Conflicting Flow All	717	0	0	256	0	0	980	1011	255	975	996	700	
Stage 1	-	-	-	-	-	-	274	274	-	720	720	-	
Stage 2	-	-	-	-	-	-	706	737	-	255	276	-	
Critical Hwy	412	-	-	412	-	-	712	652	622	712	652	622	
Critical Hwy Stg 1	-	-	-	-	-	-	612	552	-	612	552	-	
Critical Hwy Stg 2	-	-	-	-	-	-	612	552	-	612	552	-	
Follow-up Hwy	2218	-	-	2218	-	-	3518	4018	3318	3518	4018	3318	
Pot Cap-1 Maneuver	884	-	-	1309	-	-	229	240	784	231	244	439	
Stage 1	-	-	-	-	-	-	732	683	-	419	432	-	
Stage 2	-	-	-	-	-	-	427	425	-	749	682	-	
Platoon blocked, %	-	-	-	-	-	-	-	-	-	-	-	-	
Mov Cap-1 Maneuver	864	-	-	1280	-	-	209	224	766	219	227	429	
Mov Cap-2 Maneuver	-	-	-	-	-	-	209	224	-	219	227	-	
Stage 1	-	-	-	-	-	-	706	659	-	404	417	-	
Stage 2	-	-	-	-	-	-	402	410	-	732	658	-	
Approach	EB	WB	WB	EB	WB	WB	NB	NB	SB	SB	SB	SB	
HCM Control Delay, s	0.4	0.1	0.1	0.1	0.1	0.1	20	20.3	20.3	20.3	20.3	20.3	
HCM LOS	C	C	C	C	C	C	C	C	C	C	C	C	
Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1	SBL	SBL	SBL	SBL	
Capacity (veh/h)	264	864	-	-	1280	-	-	-	-	277	-	-	
HCM Lane V/C Ratio	0.088	0.012	-	-	0.008	-	-	-	-	0.152	-	-	
HCM Control Delay (s)	20	9.2	0	0	7.8	0	0	0	0	20.3	0	0	
HCM Lane LOS	C	A	A	A	A	A	A	A	A	A	A	A	
HCM 95th %ile Q(veh)	0.3	0	-	-	0	-	-	-	-	0.5	-	-	

Intersection													
Int Delay, s/veh													7.4
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	
Lane Configurations	12	8	10	4	22	6	24	22	1	3	45	32	
Traffic Vol, veh/h	12	8	10	4	22	6	24	22	1	3	45	32	
Future Vol, veh/h	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	
Peak Hour Factor	2	2	2	2	2	2	2	2	2	2	2	2	
Heavy Vehicles, %	13	9	11	4	24	7	27	24	1	3	50	36	
Mvmt Flow	0	1	0	0	1	0	0	1	0	0	1	0	
Approach	EB	WB	WB	EB	WB	WB	NB	NB	SB	SB	SB	SB	
Opposing Approach	WB	EB	EB	WB	WB	WB	SB	SB	SB	NB	NB	NB	
Opposing Lanes	1	1	1	1	1	1	1	1	1	1	1	1	
Conflicting Approach Left	SB	SB	NB	NB	EB	EB	WB	WB	WB	WB	WB	WB	
Conflicting Lanes Left	1	1	1	1	1	1	1	1	1	1	1	1	
Conflicting Approach Right	NB	NB	SB	SB	WB	WB	EB	EB	EB	EB	EB	EB	
Conflicting Lanes Right	1	1	1	1	1	1	1	1	1	1	1	1	
HCM Control Delay	7.3	7.4	7.4	7.4	7.4	7.4	7.5	7.3	7.3	7.3	7.3	7.3	
HCM LOS	A	A	A	A	A	A	A	A	A	A	A	A	
Lane	NBLn1	EBLn1	EBLn1	WBLn1	SBLn1								
Vol Left, %	51%	40%	12%	4%	4%	4%	4%	4%	4%	4%	4%	4%	
Vol Thru, %	47%	27%	69%	56%	56%	56%	56%	56%	56%	56%	56%	56%	
Vol Right, %	2%	33%	19%	40%	40%	40%	40%	40%	40%	40%	40%	40%	
Sign Control	Stop												
Traffic Vol by Lane	47	30	32	80	80	80	80	80	80	80	80	80	
LT Vol	24	12	4	3	3	3	3	3	3	3	3	3	
Through Vol	22	8	22	45	45	45	45	45	45	45	45	45	
RT Vol	1	10	6	32	32	32	32	32	32	32	32	32	
Lane Flow Rate	52	33	36	89	89	89	89	89	89	89	89	89	
Geometry Grp	1	1	1	1	1	1	1	1	1	1	1	1	
Degree of Utl (X)	0.061	0.038	0.041	0.095	0.095	0.095	0.095	0.095	0.095	0.095	0.095	0.095	
Departure Headway (Ht)	4.212	4.085	4.116	3.862	3.862	3.862	3.862	3.862	3.862	3.862	3.862	3.862	
Convergence, Y/N	Yes												
Cap	846	867	861	923	923	923	923	923	923	923	923	923	
Service Time	2.26	2.153	2.183	1.908	1.908	1.908	1.908	1.908	1.908	1.908	1.908	1.908	
HCM Lane V/C Ratio	0.061	0.038	0.042	0.096	0.096	0.096	0.096	0.096	0.096	0.096	0.096	0.096	
HCM Control Delay	7.5	7.3	7.4	7.3	7.3	7.3	7.3	7.3	7.3	7.3	7.3	7.3	
HCM Lane LOS	A	A	A	A	A	A	A	A	A	A	A	A	
HCM 95th %ile Q	0.2	0.1	0.1	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	

Appendix D

Collision Data

DRAFT

Accident Date	Accident Year	Accident Time	Location	Environment Condition	Light	Traffic Control	Traffic Control Condition	Classification Of Accident	Initial Impact Type	Road Surface Condition
2016-10-02	2016	1:33:00 PM	BAYSWATER AVE @ GLADSTONE AVE	02 - Rain	01 - Daylight	01 - Traffic signal	02 - Intersection related	02 - Non-fatal injury	03 - Rear end	02 - Wet
2015-02-05	2015	12:54:00 PM	BAYSWATER AVE @ GLADSTONE AVE	01 - Clear	01 - Daylight	01 - Traffic signal	03 - At intersection	02 - Non-fatal injury	02 - Angle	02 - Wet
2016-06-14	2016	5:42:00 PM	BAYSWATER AVE @ GLADSTONE AVE	01 - Clear	01 - Daylight	01 - Traffic signal	02 - Intersection related	03 - P.D. only	03 - Rear end	01 - Dry
2016-11-12	2016	6:01:00 PM	BAYSWATER AVE @ GLADSTONE AVE	01 - Clear	07 - Dark	01 - Traffic signal	02 - Intersection related	03 - P.D. only	03 - Rear end	01 - Dry
2017-08-21	2017	1:29:00 PM	BAYSWATER AVE @ GLADSTONE AVE	01 - Clear	01 - Daylight	01 - Traffic signal	03 - At intersection	03 - P.D. only	05 - Turning movement	01 - Dry
2017-10-14	2017	12:20:00 PM	BAYSWATER AVE @ GLADSTONE AVE	01 - Clear	01 - Daylight	01 - Traffic signal	03 - At intersection	03 - P.D. only	05 - Turning movement	02 - Wet
2017-11-28	2017	7:06:00 PM	BAYSWATER AVE @ GLADSTONE AVE	01 - Clear	07 - Dark	01 - Traffic signal	02 - Intersection related	02 - Non-fatal injury	03 - Rear end	01 - Dry
2017-02-12	2017	1:39:00 PM	BAYSWATER AVE @ GLADSTONE AVE	03 - Snow	01 - Daylight	01 - Traffic signal	03 - At intersection	03 - P.D. only	02 - Angle	03 - Loose snow
2013-02-21	2013	8:42:00 AM	BAYSWATER AVE @ GLADSTONE AVE	01 - Clear	01 - Daylight	01 - Traffic signal	02 - Intersection related	03 - P.D. only	02 - Angle	01 - Dry
2013-08-13	2013	6:02:00 PM	BAYSWATER AVE @ GLADSTONE AVE	02 - Rain	01 - Daylight	01 - Traffic signal	03 - At intersection	03 - P.D. only	03 - Rear end	02 - Wet
2013-10-01	2013	3:38:00 PM	BAYSWATER AVE @ GLADSTONE AVE	01 - Clear	01 - Daylight	01 - Traffic signal	04 - At/near private drive	03 - P.D. only	02 - Angle	01 - Dry
2016-12-07	2016	3:25:00 PM	BREEZEHILL AVE @ GLADSTONE AVE	01 - Clear	01 - Daylight	02 - Stop sign	03 - At intersection	02 - Non-fatal injury	05 - Turning movement	02 - Wet
2014-08-11	2014	4:00:00 PM	BREEZEHILL AVE @ GLADSTONE AVE	01 - Clear	01 - Daylight	02 - Stop sign	03 - At intersection	03 - P.D. only	02 - Angle	01 - Dry
2013-12-14	2013	5:50:00 PM	BREEZEHILL AVE @ GLADSTONE AVE	06 - Strong wind	07 - Dark	02 - Stop sign	01 - Non intersection	03 - P.D. only	02 - Angle	06 - Ice
2015-12-14	2015	4:00:00 PM	BREEZEHILL AVE @ SOMERSET ST	01 - Clear	05 - Dusk	02 - Stop sign	03 - At intersection	02 - Non-fatal injury	02 - Angle	01 - Dry
2013-09-17	2013	4:38:00 PM	BREEZEHILL AVE @ SOMERSET ST	01 - Clear	01 - Daylight	02 - Stop sign	02 - Intersection related	03 - P.D. only	99 - Other	01 - Dry
2016-09-29	2016	12:00:00 AM	BREEZEHILL AVE N btwn SOMERSET ST W & LAUREL ST	01 - Clear	00 - Unknown	10 - No control	01 - Non intersection	03 - P.D. only	06 - SMV unattended veh	01 - Dry
2015-11-11	2015	7:26:00 PM	GLADSTONE AVE @ LORETTA AVE	02 - Rain	07 - Dark	02 - Stop sign	03 - At intersection	02 - Non-fatal injury	05 - Turning movement	02 - Wet
2016-06-29	2016	9:45:00 AM	GLADSTONE AVE @ PRESTON ST	01 - Clear	01 - Daylight	01 - Traffic signal	02 - Intersection related	03 - P.D. only	07 - SMV other	01 - Dry
2017-10-23	2017	2:18:00 PM	GLADSTONE AVE @ PRESTON ST	01 - Clear	01 - Daylight	01 - Traffic signal	02 - Intersection related	03 - P.D. only	02 - Angle	01 - Dry
2017-12-27	2017	9:15:00 AM	GLADSTONE AVE @ PRESTON ST	03 - Snow	01 - Daylight	01 - Traffic signal	03 - At intersection	03 - P.D. only	05 - Turning movement	06 - Ice
2016-02-12	2016	5:40:00 PM	GLADSTONE AVE @ PRESTON ST	03 - Snow	05 - Dusk	01 - Traffic signal	02 - Intersection related	03 - P.D. only	03 - Rear end	03 - Loose snow
2014-09-11	2014	9:26:00 PM	GLADSTONE AVE @ PRESTON ST	01 - Clear	07 - Dark	01 - Traffic signal	03 - At intersection	02 - Non-fatal injury	05 - Turning movement	01 - Dry
2014-11-10	2014	5:47:00 PM	GLADSTONE AVE @ PRESTON ST	01 - Clear	07 - Dark	01 - Traffic signal	03 - At intersection	02 - Non-fatal injury	05 - Turning movement	01 - Dry
2014-10-01	2014	5:08:00 PM	GLADSTONE AVE @ PRESTON ST	01 - Clear	01 - Daylight	01 - Traffic signal	03 - At intersection	02 - Non-fatal injury	05 - Turning movement	01 - Dry
2014-02-03	2014	4:20:00 PM	GLADSTONE AVE @ PRESTON ST	01 - Clear	01 - Daylight	01 - Traffic signal	02 - Intersection related	03 - P.D. only	03 - Rear end	02 - Wet
2014-04-20	2014	11:48:00 AM	GLADSTONE AVE @ PRESTON ST	01 - Clear	01 - Daylight	01 - Traffic signal	03 - At intersection	03 - P.D. only	02 - Angle	01 - Dry
2014-05-08	2014	2:17:00 PM	GLADSTONE AVE @ PRESTON ST	01 - Clear	01 - Daylight	01 - Traffic signal	02 - Intersection related	03 - P.D. only	99 - Other	01 - Dry
2014-11-08	2014	12:01:00 PM	GLADSTONE AVE @ PRESTON ST	01 - Clear	01 - Daylight	01 - Traffic signal	02 - Intersection related	03 - P.D. only	03 - Rear end	01 - Dry
2014-12-02	2014	8:44:00 AM	GLADSTONE AVE @ PRESTON ST	01 - Clear	01 - Daylight	01 - Traffic signal	02 - Intersection related	03 - P.D. only	99 - Other	01 - Dry
2014-11-18	2014	8:57:00 AM	GLADSTONE AVE @ PRESTON ST	01 - Clear	01 - Daylight	01 - Traffic signal	03 - At intersection	03 - P.D. only	05 - Turning movement	01 - Dry
2014-11-24	2014	1:08:00 AM	GLADSTONE AVE @ PRESTON ST	01 - Clear	07 - Dark	01 - Traffic signal	03 - At intersection	03 - P.D. only	07 - SMV other	02 - Wet
2016-08-10	2016	9:45:00 AM	GLADSTONE AVE @ PRESTON ST	01 - Clear	01 - Daylight	01 - Traffic signal	03 - At intersection	02 - Non-fatal injury	03 - Rear end	01 - Dry
2016-07-26	2016	3:25:00 PM	GLADSTONE AVE @ PRESTON ST	01 - Clear	01 - Daylight	01 - Traffic signal	02 - Intersection related	02 - Non-fatal injury	07 - SMV other	01 - Dry
2016-04-01	2016	6:23:00 AM	GLADSTONE AVE @ PRESTON ST	01 - Clear	03 - Dawn	01 - Traffic signal	03 - At intersection	02 - Non-fatal injury	07 - SMV other	02 - Wet
2016-08-09	2016	6:13:00 PM	GLADSTONE AVE @ PRESTON ST	01 - Clear	01 - Daylight	01 - Traffic signal	02 - Intersection related	02 - Non-fatal injury	05 - Turning movement	01 - Dry
2013-01-28	2013	9:30:00 AM	GLADSTONE AVE @ PRESTON ST	03 - Snow	01 - Daylight	01 - Traffic signal	03 - At intersection	02 - Non-fatal injury	02 - Angle	03 - Loose snow
2013-02-08	2013	2:34:00 PM	GLADSTONE AVE @ PRESTON ST	03 - Snow	01 - Daylight	01 - Traffic signal	01 - Non intersection	02 - Non-fatal injury	07 - SMV other	03 - Loose snow
2013-05-05	2013	3:26:00 PM	GLADSTONE AVE @ PRESTON ST	01 - Clear	01 - Daylight	01 - Traffic signal	01 - Non intersection	02 - Non-fatal injury	05 - Turning movement	01 - Dry
2013-05-30	2013	12:25:00 PM	GLADSTONE AVE @ PRESTON ST	01 - Clear	01 - Daylight	01 - Traffic signal	04 - At/near private drive	03 - P.D. only	03 - Rear end	01 - Dry
2013-10-15	2013	7:33:00 PM	GLADSTONE AVE @ PRESTON ST	01 - Clear	07 - Dark	01 - Traffic signal	03 - At intersection	02 - Non-fatal injury	05 - Turning movement	01 - Dry
2015-10-27	2015	5:05:00 PM	GLADSTONE AVE btwn BAYSWATER AVE & BREEZEHILL AV	01 - Clear	01 - Daylight	10 - No control	04 - At/near private drive	03 - P.D. only	02 - Angle	01 - Dry
2014-12-12	2014	4:54:00 PM	GLADSTONE AVE btwn BAYSWATER AVE & BREEZEHILL AV	01 - Clear	07 - Dark	10 - No control	04 - At/near private drive	03 - P.D. only	02 - Angle	04 - Slush
2013-03-05	2013	1:30:00 PM	GLADSTONE AVE btwn BAYSWATER AVE & BREEZEHILL AV	01 - Clear	01 - Daylight	10 - No control	03 - At intersection	02 - Non-fatal injury	03 - Rear end	01 - Dry
2013-07-19	2013	7:45:00 AM	GLADSTONE AVE btwn BAYSWATER AVE & BREEZEHILL AV	01 - Clear	01 - Daylight	10 - No control	03 - At intersection	02 - Non-fatal injury	03 - Rear end	01 - Dry
2014-09-11	2014	11:18:00 AM	GLADSTONE AVE btwn LORETTA AVE N & PRESTON ST	01 - Clear	01 - Daylight	10 - No control	04 - At/near private drive	03 - P.D. only	02 - Angle	01 - Dry
2014-09-04	2014	2:06:00 PM	GLADSTONE AVE btwn LORETTA AVE N & PRESTON ST	01 - Clear	01 - Daylight	10 - No control	01 - Non intersection	03 - P.D. only	03 - Rear end	01 - Dry
2013-09-21	2013	6:51:00 PM	GLADSTONE AVE btwn LORETTA AVE N & PRESTON ST	02 - Rain	05 - Dusk	10 - No control	01 - Non intersection	03 - P.D. only	02 - Angle	02 - Wet
2014-02-07	2014	3:00:00 PM	LAUREL ST btwn BAYSWATER AVE & BREEZEHILL AVE N	01 - Clear	01 - Daylight	10 - No control	01 - Non intersection	03 - P.D. only	06 - SMV unattended veh	02 - Wet
2013-05-19	2013	1:35:00 AM	LAUREL ST btwn BAYSWATER AVE & BREEZEHILL AVE N	01 - Clear	07 - Dark	10 - No control	01 - Non intersection	03 - P.D. only	06 - SMV unattended veh	01 - Dry
2015-06-06	2015	8:00:00 PM	LAUREL ST btwn BREEZEHILL AVE N & LORETTA AVE N	01 - Clear	01 - Daylight	10 - No control	01 - Non intersection	03 - P.D. only	06 - SMV unattended veh	01 - Dry
2013-09-08	2013	2:00:00 PM	LAUREL ST btwn BREEZEHILL AVE N & LORETTA AVE N	01 - Clear	01 - Daylight	10 - No control	02 - Intersection related	03 - P.D. only	02 - Angle	01 - Dry
2013-12-17	2013	6:30:00 PM	SOMERSET ST W btwn BAYSWATER AVE & BREEZEHILL AV	03 - Snow	07 - Dark	10 - No control	03 - At intersection	03 - P.D. only	99 - Other	03 - Loose snow
2013-01-19	2013	2:04:00 PM	SOMERSET ST W btwn BREEZEHILL AVE N & PRESTON ST	03 - Snow	01 - Daylight	10 - No control	03 - At intersection	03 - P.D. only	99 - Other	03 - Loose snow
2013-07-18	2013	5:29:00 PM	SOMERSET ST W btwn BREEZEHILL AVE N & PRESTON ST	01 - Clear	01 - Daylight	10 - No control	02 - Intersection related	02 - Non-fatal injury	04 - Sideswipe	01 - Dry
2013-09-07	2013	12:15:00 PM	SOMERSET ST W btwn BREEZEHILL AVE N & PRESTON ST	02 - Rain	01 - Daylight	10 - No control	04 - At/near private drive	03 - P.D. only	03 - Rear end	02 - Wet
2013-09-09	2013	4:30:00 PM	SOMERSET ST W btwn BREEZEHILL AVE N & PRESTON ST	01 - Clear	01 - Daylight	10 - No control	03 - At intersection	03 - P.D. only	03 - Rear end	01 - Dry
2013-11-20	2013	8:09:00 AM	SOMERSET ST W btwn BREEZEHILL AVE N & PRESTON ST	01 - Clear	01 - Daylight	10 - No control	02 - Intersection related	02 - Non-fatal injury	02 - Angle	01 - Dry
2017-01-03	2017	12:46:00 AM	SOMERSET ST W btwn BAYSWATER AVE & BREEZEHILL AV	01 - Clear	07 - Dark	10 - No control	04 - At/near private drive	02 - Non-fatal injury	05 - Turning movement	02 - Wet
2015-08-05	2015	10:59:00 AM	SOMERSET ST W btwn BAYSWATER AVE & BREEZEHILL AV	01 - Clear	01 - Daylight	10 - No control	01 - Non intersection	03 - P.D. only	04 - Sideswipe	01 - Dry
2014-04-14	2014	5:38:00 PM	SOMERSET ST W btwn BAYSWATER AVE & BREEZEHILL AV	02 - Rain	01 - Daylight	10 - No control	04 - At/near private drive	03 - P.D. only	02 - Angle	02 - Wet

2017-05-09	2017	2:42:00 PM	SOMERSET ST W btwn BAYSWATER AVE & BREEZEHILL AV	01 - Clear	01 - Daylight	10 - No control	04 - At/near private drive	03 - P.D. only	02 - Angle	01 - Dry
2017-12-07	2017	3:38:00 PM	SOMERSET ST W btwn BAYSWATER AVE & BREEZEHILL AV	01 - Clear	01 - Daylight	10 - No control	04 - At/near private drive	03 - P.D. only	02 - Angle	01 - Dry
2015-04-10	2015	12:00:00 PM	SOMERSET ST W btwn BREEZEHILL AVE N & PRESTON ST	01 - Clear	01 - Daylight	10 - No control	01 - Non intersection	03 - P.D. only	06 - SMV unattended veh	01 - Dry
2015-03-04	2015	8:22:00 AM	SOMERSET ST W btwn BREEZEHILL AVE N & PRESTON ST	01 - Clear	01 - Daylight	10 - No control	04 - At/near private drive	03 - P.D. only	02 - Angle	02 - Wet
2015-09-26	2015	9:23:00 AM	SOMERSET ST W btwn BREEZEHILL AVE N & PRESTON ST	01 - Clear	01 - Daylight	10 - No control	01 - Non intersection	03 - P.D. only	06 - SMV unattended veh	01 - Dry
2014-03-06	2014	5:38:00 PM	SOMERSET ST W btwn BREEZEHILL AVE N & PRESTON ST	01 - Clear	05 - Dusk	10 - No control	01 - Non intersection	02 - Non-fatal injury	03 - Rear end	01 - Dry
2014-05-15	2014	8:40:00 AM	SOMERSET ST W btwn BREEZEHILL AVE N & PRESTON ST	01 - Clear	01 - Daylight	10 - No control	01 - Non intersection	02 - Non-fatal injury	04 - Sideswipe	01 - Dry
2016-05-08	2016	1:37:00 PM	SOMERSET ST W btwn BREEZEHILL AVE N & PRESTON ST	01 - Clear	01 - Daylight	10 - No control	01 - Non intersection	02 - Non-fatal injury	04 - Sideswipe	01 - Dry
2016-07-11	2016	6:43:00 PM	SOMERSET ST W btwn BREEZEHILL AVE N & PRESTON ST	01 - Clear	01 - Daylight	10 - No control	04 - At/near private drive	02 - Non-fatal injury	05 - Turning movement	01 - Dry
2016-08-03	2016	9:12:00 AM	SOMERSET ST W btwn BREEZEHILL AVE N & PRESTON ST	01 - Clear	01 - Daylight	10 - No control	01 - Non intersection	03 - P.D. only	04 - Sideswipe	01 - Dry
2017-06-08	2017	4:42:00 PM	SOMERSET ST W btwn BREEZEHILL AVE N & PRESTON ST	01 - Clear	01 - Daylight	10 - No control	01 - Non intersection	02 - Non-fatal injury	05 - Turning movement	01 - Dry
2017-11-30	2017	11:17:00 AM	SOMERSET ST W btwn BREEZEHILL AVE N & PRESTON ST	01 - Clear	01 - Daylight	10 - No control	01 - Non intersection	03 - P.D. only	06 - SMV unattended veh	01 - Dry
2017-01-20	2017	1:01:00 PM	SOMERSET ST W btwn BREEZEHILL AVE N & PRESTON ST	01 - Clear	01 - Daylight	10 - No control	04 - At/near private drive	03 - P.D. only	02 - Angle	02 - Wet

Appendix E

MMLOS Analysis

DRAFT

Multi-Modal Level of Service - Intersections Form

Consultant
Scenario
Comments

CGH Transportation Inc
Existing and Future

Project
Date

2019-36
2019-08-06

INTERSECTIONS		Gladstone @ Bayswater				Gladstone @ Preston			
Crossing Side		NORTH	SOUTH	EAST	WEST	NORTH	SOUTH	EAST	WEST
Pedestrian	Lanes	0 - 2	0 - 2	0 - 2	0 - 2	3	3	3	0 - 2
	Median	No Median - 2.4 m	No Median - 2.4 m	No Median - 2.4 m	No Median - 2.4 m	No Median - 2.4 m	No Median - 2.4 m	No Median - 2.4 m	No Median - 2.4 m
	Conflicting Left Turns	Permissive	Permissive	Permissive	Permissive	Permissive	Permissive	Permissive	Permissive
	Conflicting Right Turns	Permissive or yield control	Permissive or yield control	Permissive or yield control	Permissive or yield control	Permissive or yield control	Permissive or yield control	Permissive or yield control	Permissive or yield control
	Right Turns on Red (RTor) ?	RTOR allowed	RTOR allowed	RTOR allowed	RTOR allowed	RTOR allowed	RTOR allowed	RTOR allowed	RTOR allowed
	Ped Signal Leading Interval?	No	No	No	No	no	no	no	No
	Right Turn Channel	No Channel	No Channel	No Channel	No Channel	No Channel	No Channel	No Channel	No Channel
	Corner Radius	5-10m	5-10m	5-10m	5-10m	5-10m	5-10m	10-15m	5-10m
	Crosswalk Type	Std transverse markings	Std transverse markings	Zebra stripe hi-vis markings	Zebra stripe hi-vis markings	Zebra stripe hi-vis markings	Textured/coloured pavement	Textured/coloured pavement	Textured/coloured pavement
	PETSI Score	86	86	89	89	74	74	73	89
Ped. Exposure to Traffic LoS	B	B	B	B	C	C	C	B	
Level of Service	B				C				
Approach From		NORTH	SOUTH	EAST	WEST	NORTH	SOUTH	EAST	WEST
Bicycle	Bicycle Lane Arrangement on Approach	Mixed Traffic	Mixed Traffic	Mixed Traffic	Mixed Traffic	Mixed Traffic	Mixed Traffic	Mixed Traffic	Mixed Traffic
	Right Turn Lane Configuration	≤ 50 m	≤ 50 m	≤ 50 m	≤ 50 m	≤ 50 m	≤ 50 m	≤ 50 m	≤ 50 m
	Right Turning Speed	≤ 25 km/h	≤ 25 km/h	≤ 25 km/h	≤ 25 km/h	≤ 25 km/h	≤ 25 km/h	≤ 25 km/h	≤ 25 km/h
	Cyclist relative to RT motorists	D	D	D	D	D	D	D	D
	Separated or Mixed Traffic	Mixed Traffic	Mixed Traffic	Mixed Traffic	Mixed Traffic	Mixed Traffic	Mixed Traffic	Mixed Traffic	Mixed Traffic
	Left Turn Approach	No lane crossed	No lane crossed	No lane crossed	No lane crossed	No lane crossed	No lane crossed	No lane crossed	No lane crossed
	Operating Speed	> 40 to ≤ 50 km/h	> 40 to ≤ 50 km/h	> 40 to ≤ 50 km/h	> 40 to ≤ 50 km/h	> 40 to ≤ 50 km/h	> 40 to ≤ 50 km/h	> 40 to ≤ 50 km/h	> 40 to ≤ 50 km/h
Left Turning Cyclist	B	B	B	B	B	B	B	B	
Level of Service	D				D				
Transit	Average Signal Delay	≤ 20 sec	≤ 20 sec	≤ 20 sec	≤ 10 sec	≤ 20 sec	≤ 20 sec	≤ 30 sec	≤ 30 sec
	Level of Service	C	C	C	B	C	C	D	D
Level of Service	C				D				
Truck	Effective Corner Radius	< 10 m	< 10 m	< 10 m	< 10 m	< 10 m	< 10 m	10 - 15 m	< 10 m
	Number of Receiving Lanes on Departure from Intersection	1	1	1	1	1	1	1	1
	Level of Service	F	F	F	F	F	F	E	F
Level of Service	F				F				
Auto	Volume to Capacity Ratio	0.0 - 0.60				0.61 - 0.70			
	Level of Service	A				B			

Multi-Modal Level of Service - Segments Form

Consultant
Scenario
Comments

CGH Transportation Inc
Existing and Future

Project
Date

2019-36
2019-08-06

SEGMENTS		Street A	Gladstone	Loretta (existing)	Loretta (future)	Section
			1	2	3	4
Pedestrian	Sidewalk Width	-	≥ 2 m	1.5 m	≥ 2 m	
	Boulevard Width		< 0.5	< 0.5 m	0.5 - 2 m	
	Avg Daily Curb Lane Traffic Volume		> 3000	≤ 3000	≤ 3000	
	Operating Speed		> 30 to 50 km/h	> 30 to 50 km/h	> 30 to 50 km/h	
	On-Street Parking		no	yes	yes	
	Exposure to Traffic PLoS		C	E	A	-
	Effective Sidewalk Width					
Pedestrian Volume						
Crowding PLoS	-	-	-	-		
Level of Service	-	-	-	-		
Bicycle	Type of Cycling Facility	B	Mixed Traffic	Mixed Traffic	Mixed Traffic	
	Number of Travel Lanes		≤ 2 (no centreline)	≤ 2 (no centreline)	≤ 2 (no centreline)	
	Operating Speed		>40 to <50 km/h	>40 to <50 km/h	>40 to <50 km/h	
	# of Lanes & Operating Speed LoS		B	B	B	-
	Bike Lane (+ Parking Lane) Width					
	Bike Lane Width LoS		-	-	-	-
	Bike Lane Blockages					
	Blockage LoS		-	-	-	-
	Median Refuge Width (no median = < 1.8 m)		< 1.8 m refuge	< 1.8 m refuge	< 1.8 m refuge	
	No. of Lanes at Unsignalized Crossing		≤ 3 lanes	≤ 3 lanes	≤ 3 lanes	
Sidestreet Operating Speed	>40 to 50 km/h	≤ 40 km/h	≤ 40 km/h			
Unsignalized Crossing - Lowest LoS	B	A	A	-		
Level of Service	B	B	B	-		
Transit	Facility Type	D	Mixed Traffic			
	Friction or Ratio Transit:Posted Speed		Vt/Vp ≥ 0.8			
Level of Service	D	-	-	-		
Truck	Truck Lane Width	B	> 3.7 m	> 3.7 m	> 3.7 m	
	Travel Lanes per Direction		1	1	1	
Level of Service	B	B	B	-		
Auto	Level of Service	Not Applicable				

Appendix F

Future Total Synchro Worksheets

DRAFT

Lanes, Volumes, Timings
1: Preston & Gladstone

08-02-2019



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	36	192	77	47	172	64	62	368	77	75	368	30
Traffic Volume (vph)	36	192	77	47	172	64	62	368	77	75	368	30
Future Volume (vph)	0	1560	0	1621	1563	0	1621	1606	0	1621	1674	0
Satd. Flow (prot)	0.936		0.453	0.487						0.449		
Flt Permitted												
Satd. Flow (perm)	0	1455	0	724	1563	0	798	1606	0	705	1674	0
Satd. Flow (RTOR)	24		26	26			25			25		10
Lane Group Flow (vph)	0	305	0	47	236	0	62	445	0	75	398	0
Turn Type	Perm	NA										
Protected Phases	4		4	8		8	2		2		6	
Permitted Phases	4		8	8		8	2		2		6	
Minimum Split (s)	21.5	21.5	22.5	22.5	22.5	23.7	23.7	23.7	23.7	23.7	23.7	23.7
Total Split (s)	25.0	25.0	25.0	25.0	25.0	45.0	45.0	45.0	45.0	45.0	45.0	45.0
Total Split (%)	35.7%	35.7%	35.7%	35.7%	35.7%	64.3%	64.3%	64.3%	64.3%	64.3%	64.3%	64.3%
Yellow Time (s)	3.0	3.0	3.0	3.0	3.0	3.3	3.3	3.3	3.3	3.3	3.3	3.3
All-Red Time (s)	2.5	2.5	3.5	3.5	3.5	2.4	2.4	2.4	2.4	2.4	2.4	2.4
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	5.5	5.5	6.5	6.5	6.5	5.7	5.7	5.7	5.7	5.7	5.7	5.7
Lead/Lag												
Lead-Lag Optimize?												
Act Effct Green (s)	19.5		18.5	18.5		39.3	39.3		39.3		39.3	
Actuated G/C Ratio	0.28		0.26	0.26		0.56	0.56		0.56		0.56	
v/c Ratio	0.72		0.25	0.55		0.14	0.49		0.19		0.42	
Control Delay	32.8		24.4	25.2		8.3	10.9		9.1		10.3	
Queue Delay	0.0		0.0	0.0		0.0	0.0		0.0		0.0	
Total Delay	32.8		24.4	25.2		8.3	10.9		9.1		10.3	
LOS	C		C	C		A	B		A		B	
Approach Delay	32.8		25.0	25.0		10.6	10.6		10.1		10.1	
Approach LOS	C		C	C		B	B		B		B	
Queue Length 50th (m)	30.4		4.5	21.5		3.2	27.5		4.0		24.4	
Queue Length 95th (m)	#61.8		12.1	40.2		8.2	46.7		9.9		40.6	
Internal Link Dist (m)	107.7		126.7	126.7		144.2	144.2		119.4		119.4	
Turn Bay Length (m)	36.0		36.0	36.0		18.0	18.0		27.0		27.0	
Base Capacity (vph)	422		191	432		448	912		385		944	
Starvation Cap Reductn	0		0	0		0	0		0		0	
Spillback Cap Reductn	0		0	0		0	0		0		0	
Storage Cap Reductn	0		0	0		0	0		0		0	
Reduced v/c Ratio	0.72		0.25	0.55		0.14	0.49		0.19		0.42	

Intersection Summary

Cycle Length: 70	
Actuated Cycle Length: 70	
Offset: 37 (53%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green	
Natural Cycle: 50	
Control Type: Prelimed	
Maximum v/c Ratio: 0.72	
Intersection Signal Delay: 17.4	Intersection LOS: B
Intersection Capacity Utilization 87.8%	ICU Level of Service E
Analysis Period (min) 15	

Trinity Gladstone-Loretta AM Peak Total Future

Synchro 10 Light Report
Page 1

Lanes, Volumes, Timings
1: Preston & Gladstone

08-02-2019



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	36	192	77	47	172	64	62	368	77	75	368	30
Traffic Volume (vph)	36	192	77	47	172	64	62	368	77	75	368	30
Future Volume (vph)	0	1560	0	1621	1563	0	1621	1606	0	1621	1674	0
Satd. Flow (prot)	0.936		0.453	0.487						0.449		
Flt Permitted												
Satd. Flow (perm)	0	1455	0	724	1563	0	798	1606	0	705	1674	0
Satd. Flow (RTOR)	24		26	26			25			25		10
Lane Group Flow (vph)	0	305	0	47	236	0	62	445	0	75	398	0
Turn Type	Perm	NA										
Protected Phases	4		4	8		8	2		2		6	
Permitted Phases	4		8	8		8	2		2		6	
Minimum Split (s)	21.5	21.5	22.5	22.5	22.5	23.7	23.7	23.7	23.7	23.7	23.7	23.7
Total Split (s)	25.0	25.0	25.0	25.0	25.0	45.0	45.0	45.0	45.0	45.0	45.0	45.0
Total Split (%)	35.7%	35.7%	35.7%	35.7%	35.7%	64.3%	64.3%	64.3%	64.3%	64.3%	64.3%	64.3%
Yellow Time (s)	3.0	3.0	3.0	3.0	3.0	3.3	3.3	3.3	3.3	3.3	3.3	3.3
All-Red Time (s)	2.5	2.5	3.5	3.5	3.5	2.4	2.4	2.4	2.4	2.4	2.4	2.4
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	5.5	5.5	6.5	6.5	6.5	5.7	5.7	5.7	5.7	5.7	5.7	5.7
Lead/Lag												
Lead-Lag Optimize?												
Act Effct Green (s)	19.5		18.5	18.5		39.3	39.3		39.3		39.3	
Actuated G/C Ratio	0.28		0.26	0.26		0.56	0.56		0.56		0.56	
v/c Ratio	0.72		0.25	0.55		0.14	0.49		0.19		0.42	
Control Delay	32.8		24.4	25.2		8.3	10.9		9.1		10.3	
Queue Delay	0.0		0.0	0.0		0.0	0.0		0.0		0.0	
Total Delay	32.8		24.4	25.2		8.3	10.9		9.1		10.3	
LOS	C		C	C		A	B		A		B	
Approach Delay	32.8		25.0	25.0		10.6	10.6		10.1		10.1	
Approach LOS	C		C	C		B	B		B		B	
Queue Length 50th (m)	30.4		4.5	21.5		3.2	27.5		4.0		24.4	
Queue Length 95th (m)	#61.8		12.1	40.2		8.2	46.7		9.9		40.6	
Internal Link Dist (m)	107.7		126.7	126.7		144.2	144.2		119.4		119.4	
Turn Bay Length (m)	36.0		36.0	36.0		18.0	18.0		27.0		27.0	
Base Capacity (vph)	422		191	432		448	912		385		944	
Starvation Cap Reductn	0		0	0		0	0		0		0	
Spillback Cap Reductn	0		0	0		0	0		0		0	
Storage Cap Reductn	0		0	0		0	0		0		0	
Reduced v/c Ratio	0.72		0.25	0.55		0.14	0.49		0.19		0.42	

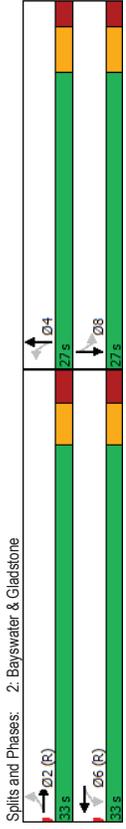
Intersection Summary

Cycle Length: 70	
Actuated Cycle Length: 70	
Offset: 37 (53%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green	
Natural Cycle: 50	
Control Type: Prelimed	
Maximum v/c Ratio: 0.72	
Intersection Signal Delay: 17.4	Intersection LOS: B
Intersection Capacity Utilization 87.8%	ICU Level of Service E
Analysis Period (min) 15	

Trinity Gladstone-Loretta AM Peak Total Future

Synchro 10 Light Report
Page 2

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	23	133	16	21	126	35	19	106	29	50	124	37
Traffic Volume (vph)	23	133	16	21	126	35	19	106	29	50	124	37
Future Volume (vph)	0	1657	0	0	1630	0	0	1638	0	0	1635	0
Satd. Flow (prot)	0.953			0.961			0.952			0.900		
FI Permitted	0	1584	0	0	1572	0	0	1568	0	0	1485	0
Satd. Flow (RTOR)	11			26			22			20		
Lane Group Flow (vph)	0	172	0	0	182	0	0	154	0	0	211	0
Turn Type	Perm	NA										
Protected Phases	2		2		6		6		4		4	
Permitted Phases	2		2		6		4		4		8	
Minimum Split (s)	21.5	21.5	21.5	21.5	21.5	21.5	20.3	20.3	20.3	20.3	20.3	20.3
Total Split (s)	33.0	33.0	33.0	33.0	33.0	33.0	27.0	27.0	27.0	27.0	27.0	27.0
Total Split (%)	55.0%	55.0%	55.0%	55.0%	55.0%	55.0%	45.0%	45.0%	45.0%	45.0%	45.0%	45.0%
Yellow Time (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.3	3.3	3.3	3.3	3.3	3.3
All-Red Time (s)	2.5	2.5	2.5	2.5	2.5	2.5	2.0	2.0	2.0	2.0	2.0	2.0
Lost Time Adjust (s)	0.0			0.0			0.0			0.0		
Total Lost Time (s)	5.5			5.5			5.3			5.3		
Lead/Lag												
Lead-Lag Optimize?												
Act Effct Green (s)	27.5			27.5			21.7			21.7		
Actuated G/C Ratio	0.46			0.46			0.36			0.36		
v/c Ratio	0.24			0.25			0.27			0.38		
Control Delay	10.3			9.6			13.0			15.3		
Queue Delay	0.0			0.0			0.0			0.0		
Total Delay	10.3			9.6			13.0			15.3		
LOS	B			A			B			B		
Approach Delay	10.3			9.6			13.0			15.3		
Approach LOS	B			A			B			B		
Queue Length 50th (m)	9.3			8.9			9.0			13.8		
Queue Length 95th (m)	18.6			18.6			19.5			27.5		
Internal Link Dist (m)	86.5			86.5			86.5			86.6		
Turn Bay Length (m)												
Base Capacity (vph)	731			734			581			549		
Starvation Cap Reductn	0			0			0			0		
Spillback Cap Reductn	0			0			0			0		
Storage Cap Reductn	0			0			0			0		
Reduced v/c Ratio	0.24			0.25			0.27			0.38		
Intersection Summary												
Cycle Length: 60												
Actuated Cycle Length: 60												
Offset: 29 (48%), Referenced to phase 2:EBTL and 6:WBTL, Start of Green												
Natural Cycle: 45												
Control Type: Prelimed												
Maximum v/c Ratio: 0.38												
Intersection Signal Delay: 12.2												
Intersection Capacity Utilization 43.9%												
ICU Level of Service A												
Analysis Period (min) 15												



Intersection												
Int Delay, s/veh												1.2
Movement	EBL	EBR	WBL	WBR	NBL	NBR						
Lane Configurations												
Traffic Vol, veh/h	260	28	21	254	16	29						
Future Vol, veh/h	260	28	21	254	16	29						
Conflicting Peds, #/hr	0	50	50	0	0	0						
Sign Control	Free	Free	Free	Free	Stop	Stop						
RT Channelized	-	None	-	None	-	None						
Storage Length	-	-	-	-	-	0						
Veh in Median Storage, #	0	-	-	0	0	-						
Grade, %	0	-	-	-	0	0						
Peak Hour Factor	100	100	100	100	100	100						
Heavy Vehicles, %	2	2	2	2	2	2						
Mvmt Flow	260	28	21	254	16	29						
Major/Minor												
	Major1	Major2	Minor1									
Conflicting Flow All	0	0	338	0	620	324						
Stage 1	-	-	324	-	-	-						
Stage 2	-	-	296	-	-	-						
Critical Hwy	-	4.12	-	6.42	6.22	-						
Critical Hwy Stg 1	-	-	-	5.42	-	-						
Critical Hwy Stg 2	-	-	-	5.42	-	-						
Follow-up Hwy	-	2.218	-	3.518	3.318	-						
Pot Cap-1 Maneuver	-	1221	-	452	717	-						
Stage 1	-	-	733	-	-	-						
Stage 2	-	-	755	-	-	-						
Platoon blocked, %	-	-	-	-	-	-						
Mov Cap-1 Maneuver	-	1164	-	422	684	-						
Mov Cap-2 Maneuver	-	-	422	-	-	-						
Stage 1	-	-	699	-	-	-						
Stage 2	-	-	739	-	-	-						
Approach												
	EB	WB	NB									
HCM Control Delay, s	0	0.6	12									
HCM LOS			B									
Minor Lane/Major Mvmt												
	NBLn1	EBL	EBR	WBL	WBR							
Capacity (veh/h)	560	-	-	1164	-							
HCM Lane V/C Ratio	0.08	-	-	0.018	-							
HCM Control Delay (s)	12	-	-	8.2	0							
HCM Lane LOS	B	-	-	A	A							
HCM 95th %tile Q(veh)	0.3	-	-	0.1	-							

Intersection													
Int Delay, s/veh												3.2	
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	
Lane Configurations													
Traffic Vol, veh/h	49	209	15	19	154	64	8	0	7	49	3	41	
Future Vol, veh/h	49	209	15	19	154	64	8	0	7	49	3	41	
Conflicting Peds, #/hr	16	0	14	14	0	16	2	0	2	2	0	2	
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop	
RT Channelized	-	None	-	None	-	None	-	None	-	None	-	None	
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-	
Veh in Median Storage, #	0	0	-	-	0	-	-	0	-	0	-	0	
Grade, %	0	0	-	-	0	-	-	0	-	0	-	0	
Peak Hour Factor	100	100	100	100	100	100	100	100	100	100	100	100	
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2	
Mvmt Flow	49	209	15	19	154	64	8	0	7	49	3	41	
Major/Minor													
	Major1	Major2	Minor1	Minor2									
Conflicting Flow All	234	0	0	238	0	0	577	601	233	560	576	204	
Stage 1	-	-	-	329	329	-	240	240	-	240	240	-	
Stage 2	-	-	-	248	272	-	320	336	-	320	336	-	
Critical Hwy	4.12	-	-	4.12	-	-	7.12	6.52	6.22	7.12	6.52	6.22	
Critical Hwy Stg 1	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-	
Critical Hwy Stg 2	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-	
Follow-up Hwy	2.218	-	-	2.218	-	-	3.518	4.018	3.318	3.518	4.018	3.318	
Pot Cap-1 Maneuver	1333	-	-	1329	-	-	428	414	806	439	428	837	
Stage 1	-	-	-	684	646	-	763	707	-	684	646	-	
Stage 2	-	-	-	756	685	-	692	642	-	756	685	-	
Platoon blocked, %	-	-	-	-	-	-	-	-	-	-	-	-	
Mov Cap-1 Maneuver	1313	-	-	1312	-	-	380	379	794	408	392	823	
Mov Cap-2 Maneuver	-	-	-	-	-	-	380	379	-	408	392	-	
Stage 1	-	-	-	-	-	-	646	610	-	720	684	-	
Stage 2	-	-	-	-	-	-	702	663	-	655	607	-	
Approach													
	EB	WB	NB	SB									
HCM Control Delay, s	1.4	0.6	12.4	13.3									
HCM LOS			B	B									
Minor Lane/Major Mvmt													
	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1					
Capacity (veh/h)	502	1313	-	-	1312	-	-	524					
HCM Lane V/C Ratio	0.03	0.037	-	-	0.014	-	-	0.177					
HCM Control Delay (s)	12.4	7.8	0	-	7.8	0	-	13.3					
HCM Lane LOS	B	A	A	-	A	A	-	B					
HCM 95th %tile Q(veh)	0.1	0.1	-	-	0	-	-	0.6					

Intersection	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Intersection Delay, s/veh	7.5											
Intersection LOS	A											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	11	26	10	6	8	17	11	49	10	32	31	16
Traffic Vol, veh/h	11	26	10	6	8	17	11	49	10	32	31	16
Future Vol, veh/h	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Peak Hour Factor	2	2	2	2	2	2	2	2	2	2	2	2
Heavy Vehicles, %	0	0	0	0	0	0	0	0	0	0	0	0
Mvmt Flow	0	1	0	0	0	1	0	1	0	0	1	0
Number of Lanes												
Approach	EB	WB	WB	WB	WB	NB	NB	NB	NB	SB	SB	SB
Opposing Approach	WB	EB	SB	SB	SB	WB	WB	WB	WB	NB	NB	NB
Opposing Lanes	1	1	1	1	1	1	1	1	1	1	1	1
Conflicting Approach Left	SB	NB	EB	EB	EB	WB						
Conflicting Lanes Left	1	1	1	1	1	1	1	1	1	1	1	1
Conflicting Approach Right	NB	SB	WB	WB	WB	EB						
Conflicting Lanes Right	1	1	1	1	1	1	1	1	1	1	1	1
HCM Control Delay	7.5	7.2	7.2	7.2	7.2	7.5	7.5	7.5	7.5	7.5	7.5	7.5
HCM LOS	A	A	A	A	A	A	A	A	A	A	A	A
Lane	NBLn1	EBLn1	EBLn1	WBLn1	WBLn1	SBLn1						
Vol Left, %	16%	23%	19%	19%	41%							
Vol Thru, %	70%	55%	26%	39%								
Vol Right, %	14%	21%	55%	20%								
Sign Control	Stop											
Traffic Vol by Lane	70	47	31	79								
LT Vol	11	11	6	32								
Through Vol	49	26	8	31								
RT Vol	10	10	17	16								
Lane Flow Rate	70	47	31	79								
Geometry Grp	1	1	1	1								
Degree of Uhl (X)	0.079	0.054	0.034	0.09								
Departure Headway (Hd)	4.077	4.134	3.936	4.083								
Convergence, Y/N	Yes	Yes	Yes	Yes								
Cap	873	856	897	872								
Service Time	2.129	2.21	2.018	2.134								
HCM Lane V/C Ratio	0.08	0.055	0.035	0.091								
HCM Control Delay	7.5	7.5	7.2	7.5								
HCM Lane LOS	A	A	A	A								
HCM 95th-tile Q	0.3	0.2	0.1	0.3								

Intersection	WBL	WBR	NBT	NBR	SBL	SBT
Intersection Delay, s/veh	1.8					
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations	18	4	48	17	3	32
Traffic Vol, veh/h	18	4	48	17	3	32
Future Vol, veh/h	18	4	48	17	3	32
Conflicting Peds. #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	- None					
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	100	100	100	100	100	100
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	18	4	48	17	3	32
Major/Minor	Minor1	Major1	Major2	Major2		
Conflicting Flow All	95	57	0	0	65	0
Stage 1	57	-	-	-	-	-
Stage 2	38	-	-	-	-	-
Critical Hdwy	6.42	6.22	-	-	4.12	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3,518	3,318	-	-	2,218	-
Pot Cap-1 Maneuver	905	1009	-	-	1537	-
Stage 1	966	-	-	-	-	-
Stage 2	984	-	-	-	-	-
Platoon blocked, %	-	-	-	-	-	-
Mov Cap-1 Maneuver	903	1009	-	-	1537	-
Mov Cap-2 Maneuver	903	-	-	-	-	-
Stage 1	966	-	-	-	-	-
Stage 2	982	-	-	-	-	-
Approach	WB	NB	SB	SB		
HCM Control Delay, s	9	0	0	0.6		
HCM LOS	A					
Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT	
Capacity (veh/h)	-	-	921	1537	-	-
HCM Lane V/C Ratio	-	-	0.024	0.002	-	-
HCM Control Delay (s)	-	-	9	7.3	0	-
HCM Lane LOS	-	-	A	A	A	-
HCM 95th-tile Q(veh)	-	-	0.1	0	-	-

08-02-2019
 HCM 2010 TWSC
 7: Loretta & Access #1

Intersection	WBL	WBR	NBT	NBR	SBL	SBT
Int Delay, s/veh	2.6					
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations	W	W	T	T	T	T
Traffic Vol, veh/h	43	7	58	41	7	43
Future Vol, veh/h	43	7	58	41	7	43
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	100	100	100	100	100	100
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	43	7	58	41	7	43
Minor1	Minor1	Major1	Major2			
Conflicting Flow All	136	79	0	0	99	0
Stage 1	79	-	-	-	-	-
Stage 2	57	-	-	-	-	-
Critical Hwy	6.42	6.22	-	-	4.12	-
Critical Hwy Stg 1	5.42	-	-	-	-	-
Critical Hwy Stg 2	5.42	-	-	-	-	-
Follow-up Hwy	3.518	3.318	-	-	2.218	-
Pot Cap-1 Maneuver	857	981	-	-	1484	-
Stage 1	944	-	-	-	-	-
Stage 2	966	-	-	-	-	-
Platoon blocked, %	-	-	-	-	-	-
Mov Cap-1 Maneuver	853	981	-	-	1484	-
Mov Cap-2 Maneuver	853	-	-	-	-	-
Stage 1	944	-	-	-	-	-
Stage 2	961	-	-	-	-	-
Approach	WB	NB	SB	SB		
HCM Control Delay, s	9.4	0	1			
HCM LOS	A					
Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT	
Capacity (veh/h)	-	-	869	1484	-	-
HCM Lane V/C Ratio	-	-	0.058	0.005	-	-
HCM Control Delay (s)	-	-	9.4	7.4	0	-
HCM Lane LOS	-	-	A	A	A	-
HCM 95th %ile Q(veh)	-	-	0.2	0	-	-

Trinity Gladstone-Loretta AM Peak Total/Future

08-02-2019
 Lanes, Volumes, Timings
 1: Preston & Gladstone

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	EB	EB	EB	WB	WB	WB	NB	NB	NB	SB	SB	SB
Traffic Volume (vph)	28	192	57	80	446	77	93	363	100	52	364	56
Future Volume (vph)	28	192	57	80	446	77	93	363	100	52	364	56
Satd. Flow (prot)	0	1600	0	1621	1624	0	1621	1593	0	1621	1621	0
Flt P/Permitted	0.815	0.574			0.417					0.384		
Satd. Flow (perm)	0	1305	0	915	1624	0	645	1593	0	618	1621	0
Satd. Flow (RTOR)	21			14			26			14		
Lane Group Flow (vph)	0	277	0	80	523	0	93	463	0	52	420	0
Turn Type	Perm	NA	Perm	NA	Perm	NA	Perm	NA	Perm	NA	Perm	NA
Protected Phases	4			8			2			6		
Permitted Phases	4			8			2			6		
Minimum Split (s)	22.5	22.5	22.5	22.5	22.5	23.7	23.7	23.7	37.0	37.0	37.0	37.0
Total Split (s)	33.0	33.0	33.0	33.0	33.0	37.0	37.0	37.0	52.9%	52.9%	52.9%	52.9%
Total Split (%)	47.1%	47.1%	47.1%	47.1%	47.1%	52.9%	52.9%	52.9%	52.9%	52.9%	52.9%	52.9%
Yellow Time (s)	3.0	3.0	3.0	3.0	3.0	3.3	3.3	3.3	3.3	3.3	3.3	3.3
All-Red Time (s)	3.5	3.5	3.5	3.5	3.5	2.4	2.4	2.4	2.4	2.4	2.4	2.4
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	6.5	6.5	6.5	6.5	6.5	5.7	5.7	5.7	5.7	5.7	5.7	5.7
Lead/Lag												
Lead-Lag Optimize?												
Act Effct Green (s)	26.5	26.5	26.5	26.5	26.5	31.3	31.3	31.3	0.45	0.45	0.45	0.45
Actuated g/C Ratio	0.38	0.38	0.38	0.38	0.38	0.45	0.45	0.45	0.32	0.32	0.32	0.32
v/c Ratio	0.55	0.23	0.84	0.23	0.84	0.62	0.62	0.62	0.19	0.19	0.19	0.19
Control Delay	20.6	17.1	34.0	16.5	18.6	14.0	14.0	14.0	17.7	17.7	17.7	17.7
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	20.6	17.1	34.0	16.5	18.6	14.0	14.0	14.0	17.7	17.7	17.7	17.7
LOS	C	B	C	B	C	B	B	B	B	B	B	B
Approach Delay	20.6	20.6	31.8	18.2	18.2							
Approach LOS	C	C	C	C	C							
Queue Length 50th (m)	23.4	6.4	54.6	6.9	37.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6
Queue Length 95th (m)	43.5	14.9	#102.8	16.6	63.8	9.8	9.8	9.8	58.3	58.3	58.3	58.3
Internal Link Dist (m)	107.7		126.7		144.2							
Turn Bay Length (m)	36.0		18.0		27.0							
Base Capacity (vph)	507	346	623	288	726	276	276	276	732	732	732	732
Salvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.55	0.23	0.84	0.32	0.62	0.19	0.19	0.19	0.57	0.57	0.57	0.57
Intersection Summary												
Cycle Length: 70												
Actuated Cycle Length: 70												
Offset: 40 (57%), Referenced to phase 2/NBTL and 6/SBTL, Start of Green												
Natural Cycle: 60												
Control Type: Pretimed												
Maximum v/c Ratio: 0.84												
Intersection Signal Delay: 22.6												
Intersection Capacity Utilization 90.9%												
ICU Level of Service E												
Analysis Period (min) 15												

Trinity Gladstone-Loretta PM Peak Future Total

Lanes, Volumes, Timings
1: Preston & Gladstone

08-02-2019

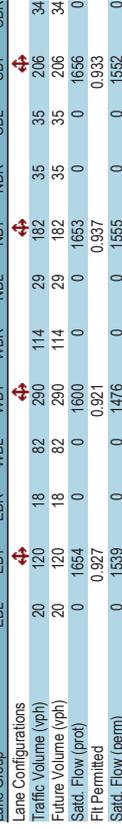
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.



Lanes, Volumes, Timings
2: Bayswater & Gladstone

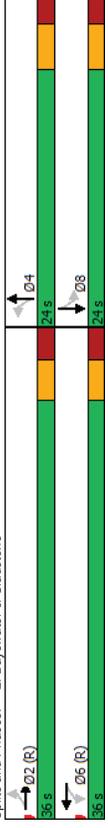
08-02-2019

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	20	120	18	82	290	114	29	182	35	35	206	34
Future Volume (vph)	20	120	18	82	290	114	29	182	35	35	206	34
Satd. Flow (prot)	0	1654	0	0	1600	0	0	1663	0	0	1656	0
Flt Permitted	0.927			0.921			0.937				0.933	
Satd. Flow (perm)	0	1539	0	0	1476	0	0	1555	0	0	1552	0
Satd. Flow (RTOR)	16			37			14				12	
Lane Group Flow (vph)	0	158	0	0	486	0	0	246	0	0	275	0
Turn Type	Perm	NA										
Protected Phases	2			6			4				8	
Permitted Phases	2			6			4				8	
Minimum Split (s)	21.5	21.5	21.5	21.5	20.3	20.3	20.3	20.3	20.3	20.3	20.3	20.3
Total Split (s)	36.0	36.0	36.0	36.0	24.0	24.0	24.0	24.0	24.0	24.0	24.0	24.0
Total Split (%)	60.0%	60.0%	60.0%	60.0%	40.0%	40.0%	40.0%	40.0%	40.0%	40.0%	40.0%	40.0%
Yellow Time (s)	3.0	3.0	3.0	3.0	3.3	3.3	3.3	3.3	3.3	3.3	3.3	3.3
All-Red Time (s)	2.5	2.5	2.5	2.5	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Lost Time Adjust (s)	0.0			0.0			0.0				0.0	
Total Lost Time (s)	5.5			5.5			5.3				5.3	
Lead/Lag												
Lead-Lag Optimize?												
Act Effct Green (s)	30.5			30.5			18.7				18.7	
Actuated g/C Ratio	0.51			0.51			0.31				0.31	
v/c Ratio	0.20			0.63			0.50				0.56	
Control Delay	8.0			14.4			20.0				21.7	
Queue Delay	0.0			0.0			0.0				0.0	
Total Delay	8.0			14.4			20.0				21.7	
LOS	A			B			C				C	
Approach Delay	8.0			14.4			20.0				21.7	
Approach LOS	A			B			C				C	
Queue Length 50th (m)	7.2			30.0			18.8				21.8	
Queue Length 95th (m)	15.0			55.4			35.6				40.5	
Internal Link Dist (m)	86.5			86.5			86.5				86.5	
Turn Bay Length (m)												
Base Capacity (vph)	790			768			494				491	
Salvation Cap Reductn	0			0			0				0	
Spillback Cap Reductn	0			0			0				0	
Storage Cap Reductn	0			0			0				0	
Reduced v/c Ratio	0.20			0.63			0.50				0.56	
Intersection Summary												
Cycle Length: 60												
Actuated Cycle Length: 60												
Offset: 53 (88%), Referenced to phase 2EBTL and 6WBTL, Start of Green												
Natural Cycle: 50												
Control Type: Pretimed												
Maximum v/c Ratio: 0.63												
Intersection Signal Delay: 16.5												
Intersection Capacity Utilization 72.5%												
ICU Level of Service C												
Analysis Period (min) 15												

Splits and Phases: 2: Bayswater & Gladstone



Intersection	12					
In/Delay, s/veh	EBT	EBR	WBL	WBT	NBL	NBR
Movement	316	26	26	418	23	23
Lane Configurations	316	26	26	418	23	23
Traffic Vol, veh/h	316	26	26	418	23	23
Future Vol, veh/h	0	100	100	0	18	0
Conflicting Peds, #/hr	Free	Free	Free	Free	Stop	Stop
Sign Control	- None					
RT Channelized	-	-	-	-	-	-
Storage Length	-	-	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	100	100	100	100	100	100
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	316	26	26	418	23	23
Major/Minor	Major1	Major2	Minor1			
Conflicting Flow All	0	0	442	0	917	429
Stage 1	-	-	-	-	429	-
Stage 2	-	-	-	-	488	-
Critical Hdwy	-	-	4.12	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	-	-	2.218	-	3.518	3.318
Pot Cap-1 Maneuver	-	-	1118	-	302	626
Stage 1	-	-	-	-	657	-
Stage 2	-	-	-	-	617	-
Platoon blocked, %	-	-	-	-	-	-
Mov Cap-1 Maneuver	-	-	1014	-	260	568
Mov Cap-2 Maneuver	-	-	-	-	260	-
Stage 1	-	-	-	-	596	-
Stage 2	-	-	-	-	587	-
Approach	EB	WB	WB	NB		
HCM Control Delay, s	0	0.5	0.5	16.6		
HCM LOS				C		
Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT	
Capacity (veh/h)	357	-	-	1014	-	
HCM Lane V/C Ratio	0.129	-	-	0.026	-	
HCM Control Delay (s)	16.6	-	-	8.6	0	
HCM Lane LOS	C	-	-	A	A	
HCM 95th %tile Q(veh)	0.4	-	-	0.1	-	

Intersection	Int Delay, s/veh	3.2											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	
Lane Configurations	36	205	4	9	583	61	15	0	6	51	2	51	
Traffic Vol, veh/h	36	205	4	9	583	61	15	0	6	51	2	51	
Future Vol, veh/h	23	0	24	23	0	24	0	0	0	1	1	0	
Conflicting Peds, #/hr	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop	
Sign Control	-	-	None	-	-	None	-	-	None	-	-	None	
RT Channelized	-	-	-	-	-	-	-	-	-	-	-	-	
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-	
Veh in Median Storage, #	-	0	-	-	0	-	-	-	0	-	-	0	
Grade, %	-	0	-	-	0	-	-	-	0	-	-	0	
Peak Hour Factor	100	100	100	100	100	100	100	100	100	100	100	100	
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2	
Mvmt Flow	36	205	4	9	583	61	15	0	6	51	2	51	
Major/Minor	Major1	Major2	Minor1	Minor2									
Conflicting Flow All	678	0	0	233	0	0	971	999	232	949	971	648	
Stage 1	-	-	-	-	-	-	303	303	-	666	666	-	
Stage 2	-	-	-	-	-	-	668	696	-	283	305	-	
Critical Hwy	4.12	-	-	4.12	-	-	7.12	6.52	6.22	7.12	6.52	6.22	
Critical Hwy Stg 1	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-	
Critical Hwy Stg 2	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-	
Follow-up Hwy	2.218	-	-	2.218	-	-	3.518	4.018	3.318	3.518	4.018	3.318	
Pot Cap-1 Maneuver	914	-	-	1335	-	-	232	243	807	240	253	470	
Stage 1	-	-	-	-	-	-	706	664	-	449	457	-	
Stage 2	-	-	-	-	-	-	448	443	-	724	662	-	
Platoon blocked, %	-	-	-	-	-	-	-	-	-	-	-	-	
Mov Cap-1 Maneuver	894	-	-	1305	-	-	192	219	788	222	228	459	
Mov Cap-2 Maneuver	-	-	-	-	-	-	192	219	-	222	228	-	
Stage 1	-	-	-	-	-	-	659	620	-	419	442	-	
Stage 2	-	-	-	-	-	-	392	428	-	685	618	-	
Approach	EB	WB	NB	WB	NB	SB							
HCM Control Delay, s	1.4	0.1	21.1	21.1	21.1	23.5	C	C	C	C	C	C	
HCM LOS													
Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1					
Capacity (veh/h)	245	894	-	-	1305	-	-	297					
HCM Lane V/C Ratio	0.086	0.04	-	-	0.007	-	-	0.35					
HCM Control Delay (s)	21.1	9.2	0	-	7.8	0	-	23.5					
HCM Lane LOS	C	A	A	A	A	A	A	C					
HCM 95th %ile Q(veh)	0.3	0.1	-	-	0	-	-	1.5					

Intersection	Int Delay, s/veh	7.4											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	
Lane Configurations	12	8	10	4	22	18	24	22	1	13	45	32	
Traffic Vol, veh/h	12	8	10	4	22	18	24	22	1	13	45	32	
Future Vol, veh/h	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Peak Hour Factor	2	2	2	2	2	2	2	2	2	2	2	2	
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2	
Mvmt Flow	12	8	10	4	22	18	24	22	1	13	45	32	
Number of Lanes	0	1	0	0	1	0	0	1	0	0	1	0	
Approach	EB	WB	WB	WB	NB								
Opposing Approach	WB	EB	EB	EB	SB								
Opposing Lanes	1	1	1	1	1	1	1	1	1	1	1	1	
Conflicting Approach Left	SB	NB	NB	NB	EB	EB	EB	EB	WB	WB	WB	WB	
Conflicting Lanes Left	1	1	1	1	1	1	1	1	1	1	1	1	
Conflicting Approach Right	NB	SB	SB	SB	WB	WB	WB	WB	EB	EB	EB	EB	
Conflicting Lanes Right	1	1	1	1	1	1	1	1	1	1	1	1	
HCM Control Delay	7.3	7.2	7.2	7.2	7.5	7.5	7.4	7.4	7.4	7.4	7.4	7.4	
HCM LOS	A	A	A	A	A	A	A	A	A	A	A	A	
Lane	NBLn1	EBLn1	WBLn1	SBLn1									
Vol Left, %	51%	40%	9%	14%									
Vol Thru, %	47%	27%	50%	36%									
Vol Right, %	2%	33%	41%	36%									
Sign Control	Stop	Stop	Stop	Stop									
Traffic Vol by Lane	47	30	44	90									
LT Vol	24	12	4	13									
Through Vol	22	8	22	45									
RT Vol	1	10	18	32									
Lane Flow Rate	47	30	44	90									
Geometry Grp	1	1	1	1									
Degree of Uln (X)	0.055	0.034	0.048	0.098									
Departure Headway (Ht)	4.221	4.085	3.967	3.914									
Convergence, Y/N	Yes	Yes	Yes	Yes									
Cap	844	867	893	911									
Service Time	2.268	2.153	2.033	1.957									
HCM Lane V/C Ratio	0.056	0.035	0.049	0.099									
HCM Control Delay	7.5	7.3	7.2	7.4									
HCM Lane LOS	A	A	A	A									
HCM 95th %ile Q	0.2	0.1	0.2	0.3									

Intersection												
Int Delay, s/veh												2
Movement	WBL	WBR	NBT	NBR	SBL	SBT						
Lane Configurations	W	W	T	T	T	T						
Traffic Vol, veh/h	19	4	38	17	3	36						
Future Vol, veh/h	19	4	38	17	3	36						
Conflicting Peds, #/hr	0	0	0	0	0	0						
Sign Control	Stop	Stop	Free	Free	Free	Free						
RT Channelized	-	None	-	None	-	None						
Storage Length	0	-	-	-	-	-						
Veh in Median Storage, #	0	-	0	-	-	0						
Grade, %	0	-	0	-	-	0						
Peak Hour Factor	100	100	100	100	100	100						
Heavy Vehicles, %	2	2	2	2	2	2						
Mvmt Flow	19	4	38	17	3	36						
Major/Minor	Minor1	Minor1	Major1	Major1	Major2	Major2						
Conflicting Flow All	89	47	0	0	55	0						
Stage 1	47	-	-	-	-	-						
Stage 2	42	-	-	-	-	-						
Critical Hdwy	6.42	6.22	-	-	4.12	-						
Critical Hdwy Stg 1	5.42	-	-	-	-	-						
Critical Hdwy Stg 2	5.42	-	-	-	-	-						
Follow-up Hdwy	3,518	3,318	-	-	2,218	-						
Pot Cap-1 Maneuver	912	1022	-	-	1550	-						
Stage 1	975	-	-	-	-	-						
Stage 2	980	-	-	-	-	-						
Platoon blocked, %	-	-	-	-	-	-						
Mov Cap-1 Maneuver	910	1022	-	-	1550	-						
Mov Cap-2 Maneuver	910	-	-	-	-	-						
Stage 1	975	-	-	-	-	-						
Stage 2	978	-	-	-	-	-						
Approach	WB	NB	SB									
HCM Control Delay, s	9	0	0	0.6								
HCM LOS	A											
Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT							
Capacity (veh/h)	-	-	928	1550	-							
HCM Lane V/C Ratio	-	-	0.025	0.002	-							
HCM Control Delay (s)	-	-	9	7.3	0							
HCM Lane LOS	-	-	A	A	A							
HCM 95th %tile Q(veh)	-	-	0.1	0	-							

Intersection												
Int Delay, s/veh												2.8
Movement	WBL	WBR	NBT	NBR	SBL	SBT						
Lane Configurations	W	W	T	T	T	T						
Traffic Vol, veh/h	46	8	47	40	7	48						
Future Vol, veh/h	46	8	47	40	7	48						
Conflicting Peds, #/hr	0	0	0	0	0	0						
Sign Control	Stop	Stop	Free	Free	Free	Free						
RT Channelized	-	None	-	None	-	None						
Storage Length	0	-	-	-	-	-						
Veh in Median Storage, #	0	-	0	-	-	0						
Grade, %	0	-	0	-	-	0						
Peak Hour Factor	100	100	100	100	100	100						
Heavy Vehicles, %	2	2	2	2	2	2						
Mvmt Flow	46	8	47	40	7	48						
Major/Minor	Minor1	Minor1	Major1	Major1	Major2	Major2						
Conflicting Flow All	129	67	0	0	87	0						
Stage 1	67	-	-	-	-	-						
Stage 2	62	-	-	-	-	-						
Critical Hdwy	6.42	6.22	-	-	4.12	-						
Critical Hdwy Stg 1	5.42	-	-	-	-	-						
Critical Hdwy Stg 2	5.42	-	-	-	-	-						
Follow-up Hdwy	3,518	3,318	-	-	2,218	-						
Pot Cap-1 Maneuver	865	997	-	-	1509	-						
Stage 1	956	-	-	-	-	-						
Stage 2	961	-	-	-	-	-						
Platoon blocked, %	-	-	-	-	-	-						
Mov Cap-1 Maneuver	861	997	-	-	1509	-						
Mov Cap-2 Maneuver	861	-	-	-	-	-						
Stage 1	956	-	-	-	-	-						
Stage 2	956	-	-	-	-	-						
Approach	WB	NB	SB									
HCM Control Delay, s	9.4	0	0	0.9								
HCM LOS	A											
Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT							
Capacity (veh/h)	-	-	879	1509	-							
HCM Lane V/C Ratio	-	-	0.061	0.005	-							
HCM Control Delay (s)	-	-	9.4	7.4	0							
HCM Lane LOS	-	-	A	A	A							
HCM 95th %tile Q(veh)	-	-	0.2	0	-							

Appendix G

TDM Checklist

DRAFT

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

Legend

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

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

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

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

TDM measures: *Non-residential developments*

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

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

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

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

Legend

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

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

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

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

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

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

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

Legend

REQUIRED The Official Plan or Zoning By-law provides related guidance that must be followed

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

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

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

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

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

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

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

**TDM-Supportive Development Design and Infrastructure Checklist:
Residential Developments (multi-family or condominium)**

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

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

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

TDM-supportive design & infrastructure measures: Residential developments		Check if completed & add descriptions, explanations or plan/drawing references
2. WALKING & CYCLING: END-OF-TRIP FACILITIES		
2.1 Bicycle parking		
REQUIRED	2.1.1 Provide bicycle parking in highly visible and lighted areas, sheltered from the weather wherever possible (see <i>Official Plan policy 4.3.6</i>)	<input checked="" type="checkbox"/>
REQUIRED	2.1.2 Provide the number of bicycle parking spaces specified for various land uses in different parts of Ottawa; provide convenient access to main entrances or well-used areas (see <i>Zoning By-law Section 111</i>)	<input checked="" type="checkbox"/>
REQUIRED	2.1.3 Ensure that bicycle parking spaces and access aisles meet minimum dimensions, that no more than 50% of spaces are vertical spaces, and that parking racks are securely anchored (see <i>Zoning By-law Section 111</i>)	<input checked="" type="checkbox"/>
BASIC	2.1.4 Provide bicycle parking spaces equivalent to the expected number of resident-owned bicycles, plus the expected peak number of visitor cyclists	<input type="checkbox"/>
2.2 Secure bicycle parking		
REQUIRED	2.2.1 Where more than 50 bicycle parking spaces are provided for a single residential building, locate at least 25% of spaces within a building/structure, a secure area (e.g. supervised parking lot or enclosure) or bicycle lockers (see <i>Zoning By-law Section 111</i>)	<input checked="" type="checkbox"/>
BETTER	2.2.2 Provide secure bicycle parking spaces equivalent to at least the number of units at condominiums or multi-family residential developments	<input checked="" type="checkbox"/>
2.3 Bicycle repair station		
BETTER	2.3.1 Provide a permanent bike repair station, with commonly used tools and an air pump, adjacent to the main bicycle parking area (or secure bicycle parking area, if provided)	<input checked="" type="checkbox"/>
3. TRANSIT		
3.1 Customer amenities		
BASIC	3.1.1 Provide shelters, lighting and benches at any on-site transit stops	<input checked="" type="checkbox"/>
BASIC	3.1.2 Where the site abuts an off-site transit stop and insufficient space exists for a transit shelter in the public right-of-way, protect land for a shelter and/or install a shelter	<input checked="" type="checkbox"/>
BETTER	3.1.3 Provide a secure and comfortable interior waiting area by integrating any on-site transit stops into the building	<input checked="" type="checkbox"/>

TDM-supportive design & infrastructure measures: Residential developments		Check if completed & add descriptions, explanations or plan/drawing references
4. RIDESHARING		
4.1 Pick-up & drop-off facilities		
BASIC	4.1.1 Provide a designated area for carpool drivers (plus taxis and ride-hailing services) to drop off or pick up passengers without using fire lanes or other no-stopping zones	<input checked="" type="checkbox"/>
5. CARSHARING & BIKESHARING		
5.1 Carshare parking spaces		
BETTER	5.1.1 Provide up to three carshare parking spaces in an R3, R4 or RS Zone for specified residential uses (see <i>Zoning By-law Section 94</i>)	<input type="checkbox"/>
5.2 Bikeshare station location		
BETTER	5.2.1 Provide a designated bikeshare station area near a major building entrance, preferably lighted and sheltered with a direct walkway connection	<input checked="" type="checkbox"/>
6. PARKING		
6.1 Number of parking spaces		
REQUIRED	6.1.1 Do not provide more parking than permitted by zoning, nor less than required by zoning, unless a variance is being applied for	<input type="checkbox"/>
BASIC	6.1.2 Provide parking for long-term and short-term users that is consistent with mode share targets, considering the potential for visitors to use off-site public parking	<input checked="" type="checkbox"/>
BASIC	6.1.3 Where a site features more than one use, provide shared parking and reduce the cumulative number of parking spaces accordingly (see <i>Zoning By-law Section 104</i>)	<input checked="" type="checkbox"/>
BETTER	6.1.4 Reduce the minimum number of parking spaces required by zoning by one space for each 13 square metres of gross floor area provided as shower rooms, change rooms, locker rooms and other facilities for cyclists in conjunction with bicycle parking (see <i>Zoning By-law Section 111</i>)	<input checked="" type="checkbox"/>
6.2 Separate long-term & short-term parking areas		
BETTER	6.2.1 Provide separate areas for short-term and long-term parking (using signage or physical barriers) to permit access controls and simplify enforcement (i.e. to discourage residents from parking in visitor spaces, and vice versa)	<input checked="" type="checkbox"/>

Appendix H

Signal Warrant

DRAFT

Gladstone Avenue @ Loretta Avenue
 Total Future (2023)

Justification #7

Justification	Description	Minimum Requirement		Minimum Requirement		Compliance		Signal	
		1 Lane Highway		2 or More Lanes		Sectional			Entire %
		Free Flow	Restr. Flow	Free Flow	Restr. Flow	Numerical	%		
1. Minimum Vehicular Volume	A. Vehicle volume, all approaches (average hour)	480	720	600	900	413	57%	34%	No
	B. Vehicle volume, along minor streets (average hour)	120	170	120	170	58	34%		
2. Delay to Cross Traffic	A. Vehicle volumes, major street (average hour)	480	420	600	900	355	84%	43%	No
	B. Combined vehicle and pedestrian volume crossing artery from minor streets (average hour)	50	75	50	75	32	43%		

Notes

1. Refer to OTM Book 12, pg 88, Nov 2007
2. Lowest section percentage governs justification
3. Average hourly volumes estimated from peak hour volumes, $AHV = PM/2$ or $(AM + PM) / 4$
4. T-intersection factor corrected, applies only to 1B

Somerset Street @ Breezehill Avenue
 Total Future (2023)

Justification #7

Justification	Description	Minimum Requirement		Minimum Requirement		Compliance		Signal	
		1 Lane Highway		2 or More Lanes		Sectional			Entire %
		Free Flow	Restr. Flow	Free Flow	Restr. Flow	Numerical	%		
1. Minimum Vehicular Volume	A. Vehicle volume, all approaches (average hour)	480	720	600	900	359	50%	19%	No
	B. Vehicle volume, along minor streets (average hour)	120	170	120	170	33	19%		
2. Delay to Cross Traffic	A. Vehicle volumes, major street (average hour)	480	420	600	900	337	80%	12%	No
	B. Combined vehicle and pedestrian volume crossing artery from minor streets (average hour)	50	75	50	75	9	12%		

Notes

1. Refer to OTM Book 12, pg 88, Nov 2007
2. Lowest section percentage governs justification
3. Average hourly volumes estimated from peak hour volumes, $AHV = PM/2$ or $(AM + PM) / 4$
4. T-intersection factor corrected, applies only to 1B