# 770-774 Bronson Avenue Transportation Impact Assessment

Step 1 Screening Report
Step 2 Scoping Report
Step 3 Forecasting Report
Step 4 Strategy Report (Revision #3)

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## 1 Screening

This study has been prepared according to the City of Ottawa's 2017 Transportation Impact Assessment (TIA) Guidelines, prior to the June 2023 updates. 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. This report accompanies a zoning by-law amendment/site plan application.

## 2 Existing and Planned Conditions

## 2.1 Proposed Development

The subject property, located at 770-774 Bronson Avenue and 557 Cambridge Street, is zoned as Arterial Mainstreet (AM10[2373], AM1[2003] S296) and is currently undeveloped. The proposed development includes a 22-storey residential building on the east side of the property comprising 117 apartment dwelling units, 71 student housing dwelling units, and 4,742 sq. ft commercial space to be built-out by 2024, connecting to a nine-storey residential building on the west side, comprising 90 apartment units to be built-out by 2025. The site is located along both the Bronson Traditional Mainstreet and Carling Arterial Mainstreet design priority corridors. The plan proposes use of an existing two-way access onto Bronson Avenue with a restriction of the outbound left-turn movement and an outlet onto Cambridge Street, both accessing underground parking with 133 vehicle parking stalls and 221 bicycle parking stalls. Figure 1 illustrates the Study Area Context. Figure 2 illustrates the proposed concept plan.

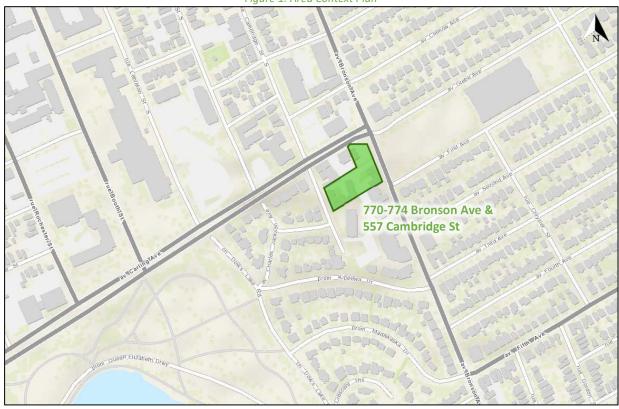
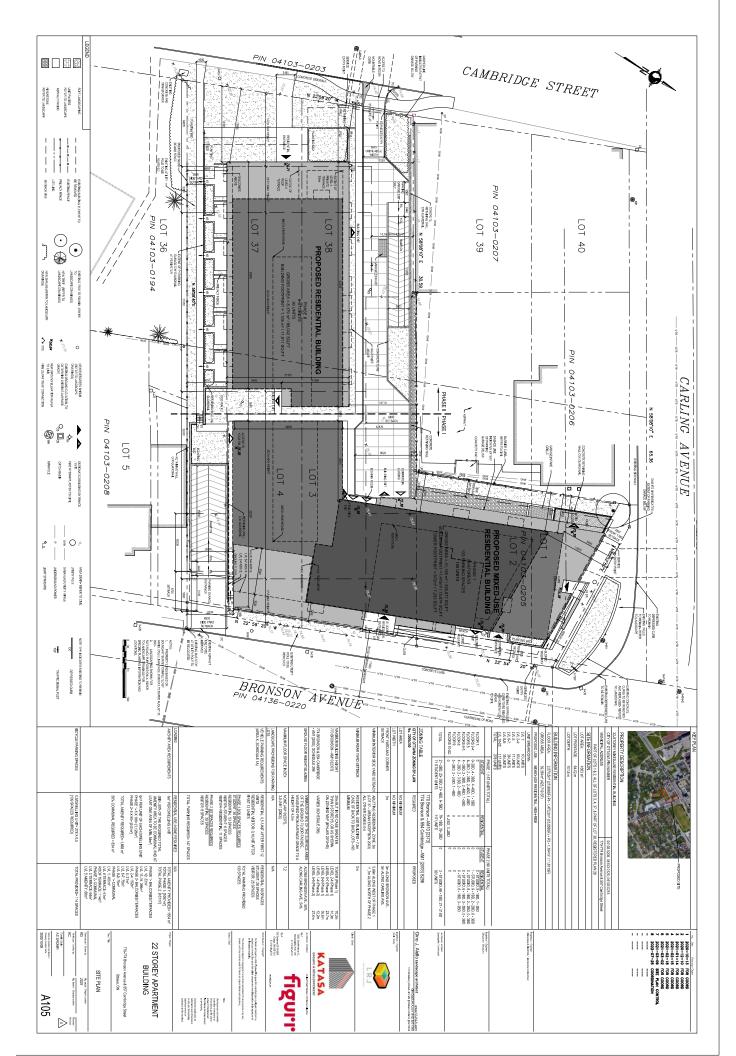


Figure 1: Area Context Plan

Source: http://maps.ottawa.ca/geoOttawa/ Accessed: November 29, 2022





## 2.2 Existing Conditions

## 2.2.1 Area Road Network

Carling Avenue: Carling Avenue is a City of Ottawa arterial road with a divided six-lane urban cross-section including sidewalks on both sides of the road. The outside lanes are shared transit-bike priority lanes and on-street parking is prohibited within the study area on both sides of the road. The transit lane on the south side of Carling Avenue additionally permits tour bus parking at specified times of year. The posted speed limit is 60 km/h and the Ottawa Official Plan reserves a 44.5 metre right of way within the study area. Carling Avenue is a truck route.

Bronson Avenue: Bronson Avenue is a City of Ottawa arterial road with a four-lane urban cross-section including sidewalks on both sides of the road. Within the study area, stopping regulations alternate between no stopping and stopping prohibited from 7:00-9:00am, and 3:30-5:30pm during weekdays. The parking regulations during weekdays alternate between no parking and parking prohibited between 9:00am and 3:00 pm. The posted speed limit is 50 km/h and the Ottawa Official Plan reserves a 23.0 metre right of way within the study area. Bronson Avenue is a truck route.

Booth Street: Booth Street is a City of Ottawa major collector road with a two-lane urban cross-section including sidewalks on both sides of the road. On-street parking is permitted on both sides of the road, approximately 30 metres north of Carling Avenue. The unposted speed limit is 50 km/h and the measured right of way is 20.0 metres within the study area. Booth Street is a truck route.

Fifth Avenue: Fifth Avenue is a City of Ottawa collector road with a two shared-lane urban cross-section including sidewalks on both sides of the road. On-Street parking is permitted on the north side of the road, beyond approximately 90 metres east of Bronson Avenue. The posted speed limit is 30 km/h and the measured right of way is 20.0 metres within the study area.

Cambridge Street: Cambridge Street is a City of Ottawa local road with a two-lane urban cross-section including sidewalks on both sides of the road. North of Carling Avenue, on-street parking is permitted on both sides of the road between 7:00am and 6:00pm, (no parking is allowed between December 1<sup>st</sup> and March 31<sup>st</sup>). On-street parking is permitted on the east side of the road, and is permitted on the west side of the road from 7:00am and 7:00pm between Carling Avenue and Frederick Place. The unposted speed limit is 50 km/h, and the measured right of way is 20.0 metres within the study area.

Powell Avenue: Powell Avenue is a City of Ottawa local road with a two-lane urban cross-section and sidewalks on both sides of the road. On-street parking is permitted on north side of the road west of Bronson Avenue, and on alternating sides of the road to the east. The unposted speed limit is 50 km/h, a 40 km/h posted speed limit is present approximately 50 metres east of Cambridge Street, and a 30 km/h posted speed limit is present approximately 30 metres east of Bronson Avenue. The measured right of way is 18.0 metres east of Bronson Avenue, and between 14.0 metres and 14.5 metres to the west within the study area.

Glebe Avenue: Glebe Avenue is an eastbound City of Ottawa one-way local road with sidewalks on both sides of the street, eastbound and westbound bike lanes on the south side of the road, and a bike lane on the south side of the road east of Percy Street. On-street parking is permitted on the south side of the road, the posted speed limit is 30 km/h and the measured right of way width is 18.0 metres within the study area.

Madawaska Drive: Madawaska Drive is a City of Ottawa local road with a two-lane urban cross-section and sidewalks on both sides of the street. On-street parking is permitted on both sides of the road, the posted speed limit is 40 km/h and the measured right of way width is 16.0 metres within the study area.



## 2.2.2 Existing Intersections

The existing study area intersections within 400 metres of the site have been summarized below:

Carling Avenue at Booth Street

The intersection of Carling Avenue at Booth Street is a signalized T-intersection. The southbound approach consists of an auxiliary right-turn lane and a left-turn lane. The eastbound approach consists of an auxiliary left turn lane, two through lanes, and a shared transit/cycle priority lane, and the westbound approach consists of two through lanes and a shared right-turn/transit/cycle priority lane. Westbound U-turns are prohibited at this intersection.

Carling Avenue at Cambridge Street

The intersection of Carling Avenue at Cambridge Street is an unsignalized intersection, stop-controlled on the minor approaches. The minor northbound and the southbound approaches each consist of a right-turn lane with the Carling Avenue median preventing through or left-turn movements. The eastbound approach consists of two through lanes and a shared through/right-turn lane, and the westbound approach consists of two through lanes and a shared right-turn/transit/cycle priority lane. No turn restrictions were noted.

Bronson Avenue at Powell Avenue

The intersection of Bronson Avenue at Powell Avenue is a signalized intersection. The northbound and southbound approaches each consist of a shared left-turn/though lane and a shared through/right-turn lane. The eastbound and the westbound approaches each consist of a shared all-movements lane. No turn restrictions were noted.

Bronson Avenue at Carling Avenue / Glebe Avenue

The intersection of Bronson Avenue at Carling Avenue/Glebe Avenue is a signalized intersection. The northbound approach consists of an auxiliary left-turn lane, a left-turn lane, and a shared through/right-turn lane and the southbound approach consists of a through lane and a shared through/right-turn lane. The eastbound approach consists of an auxiliary left-turn lane, a shared movement left-turn/through lane, and a right-turn lane and the east leg is inbound only. Southbound left turns are prohibited at this intersection.

Bronson Avenue at Fifth Avenue / Madawaska Drive The intersection of Bronson Avenue at Fifth Avenue/Madawaska Drive is a signalized intersection. The northbound and southbound approaches each consist of a shared left-turn/through lane and a shared through/right-turn lane, and the eastbound and westbound approaches each consist of a shared all-movements lane. Northbound left turns are prohibited between 7:00am and 9:00am for all but authorized vehicles and bicycles.

## 2.2.3 Existing Driveways

Along Cambridge Street, a driveway to a private laneway is present directly across from the proposed site access and three driveways to single detached dwellings are on the west side of Cambridge Street and a drop off loop accessing parking to a mid-rise residential building south of the site. Along Bronson Avenue, driveways to residential and commercial land uses are present on both sides of the road within 200 metres of the proposed site access.



## 2.2.4 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 all study area roads. Cycling facilities include separated two-way bike lanes the south side of Glebe Avenue west of Percy Street, a bike lane on the south side of a Glebe Avenue east of Percy Street, a bike lane on the north side of a First Avenue east of Percy Street. Cycling paths are present in the Commissioners Park. In the Ultimate cycling network, Carling Avenue, Glebe Avenue, Booth Street, and Percy Street are spine routes, Madawaska Drive/Fifth Avenue and First Avenue east of Percy Street are local routes. Madawaska Drive/Fifth Avenue, Glebe Avenue, First Avenue, and Percy Street are neighbourhood bikeways.

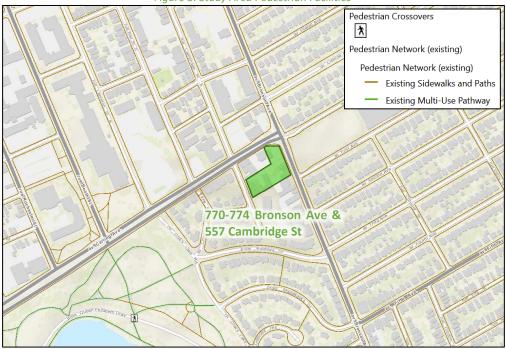


Figure 3: Study Area Pedestrian Facilities

Source: <a href="http://maps.ottawa.ca/geoOttawa/">http://maps.ottawa.ca/geoOttawa/</a> Accessed: November 29, 2022





Source: <a href="http://maps.ottawa.ca/geoOttawa/">http://maps.ottawa.ca/geoOttawa/</a> Accessed: November 29, 2022

Additionally, the collected intersection counts presented in Section 2.2.7 provide existing pedestrian and cyclist demands at the five study area intersections for both AM and PM peak hours. Figure 5 illustrates the existing pedestrian volumes and Figure 6 illustrates the existing cyclist volumes within the study area.



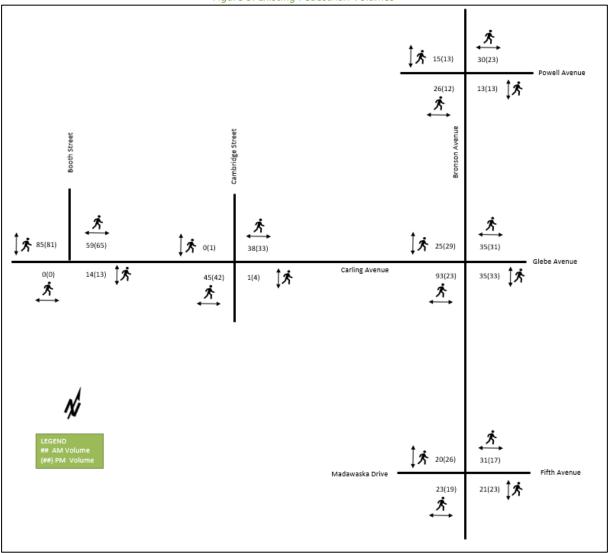


Figure 5: Existing Pedestrian Volumes



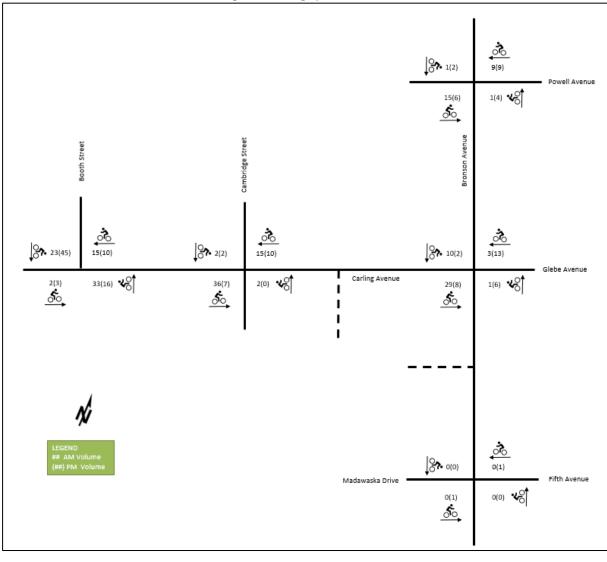


Figure 6: Existing Cyclist Volumes

## 2.2.5 Existing Transit

Figure 7 illustrates the transit system map in the study area and Figure 8 illustrates nearby transit stops. All transit information is from November 29, 2022 and is included for general information purposes and context to the surrounding area.

Within the study area, routes #2, 55, and 56 run along Carling Avenue. Route #55 also runs along Booth Street. At Bronson Avenue and Carling Avenue intersection, route #2 turns south and runs along Bronson Avenue, while route #56 continues running east along Glebe Avenue. Route #10 also runs along Bronson Avenue within vicinity of the subject site and the southbound route has a stop that is located within the existing site access. At the time of this report, due to construction, Line 2 LRT had been substituted with bus service. The frequency of these routes within proximity of the proposed site based on November 29, 2022 service levels are:

- Route #2 7–10-minute service during peak hours, 10-12-minute service all day on weekdays and Saturdays and every 15 minutes on Sundays
- Route #55 15-minute service all day and 30-minute service after 7:00pm



- Route #56 Operating during peak hours only, 15-minute service in peak direction, 30-minute service in off-peak direction
- Route #10 15-minute service all day, 30-minute service after 7:00pm

Figure 7: Existing Study Area Transit Service 114 Adult Trains replaced by buses Trains remplacés par des autobus 417 114 Legend Pretor Rapid uOttawa Heart Institute Institut de cardiologie Civic 56 Frequent 93 — 28 – Local 294 Connexion 56 56 Limited service Carling O Glet 88 56 ⊸ Experimental Farm erme expérimentale 770-774 Bronson Ave & - 28 -Occasional trips 0 557 Cambridge St Queen Elizabeth Terminus Canal Rideau 0 School 0 Transit station O-Train 111 - 2

Source: <a href="http://www.octranspo.com/">http://www.octranspo.com/</a> Accessed: November 29, 2022

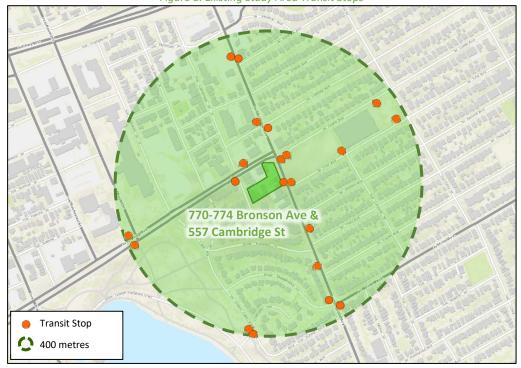


Figure 8: Existing Study Area Transit Stops

Source: <a href="http://www.octranspo.com/">http://www.octranspo.com/</a> Accessed: November 29, 2022



## 2.2.6 Existing Area Traffic Management Measures

On-street parking is prevalent on local roads throughout the study area, bulb-outs are notably found on Cambridge Street at Carling Avenue, mid-block narrowing with alternating parking is found on Powell Avenue, direction control prevents inbound access to Clemow Avenue from Bronson Avenue, an extensive high-visibility gateway surface treatment is found on Glebe Avenue at Bronson Avenue, a radar speed driver feedback sign on Bronson Avenue southbound and a right-in/right-out island is found on Kippewa Drive at Bronson 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 intersections. Table 1 summarizes the intersection count dates.

Intersection **Count Date** Thursday, September 12, 2019 **Carling Avenue at Booth Street** Tuesday, July 26, 2016 **Carling Avenue at Cambridge Street** Thursday, May 17, 2018 Thursday, August 8, 2019 **Bronson Avenue at Powell Avenue** Friday, August 28, 2015 Thursday, September 12, 2019 Bronson Avenue at Carling Avenue/Glebe Avenue Wednesday, January 10, 2018 Bronson Avenue at Fifth Avenue/Madawaska Drive Wednesday, January 10, 2018

Table 1: Intersection Count Date

The volumes within the counts provide are all subject to a number of construction projects that impact that direct applicability of them for the purposes of evaluating as typical conditions and forecasting to future horizons. The long-term construction along Highway 417 and the Bronson rehabilitation and reconstructions have altered the typical travel patterns along Bronson Avenue and Carling Avenue. For example, travel in both directions along Bronson Avenue have been affected, which would put greater demand along Carling Avenue, Booth Street and Powell Avenue. Given these impacts, the counts have been balanced with historic counts to normalize the operations and reflect more typical conditions.

Figure 9 illustrates the existing traffic counts and Table 2 summarizes the existing intersection operations. The level of service for signalized intersections is based on volume to capacity ratio (v/c) calculations for individual lane movements and HCM 2000 v/c calculations for the overall intersection, and average delay for unsignalized intersections. Detailed turning movement count data is included in Appendix B and the Synchro worksheets are provided in Appendix C.



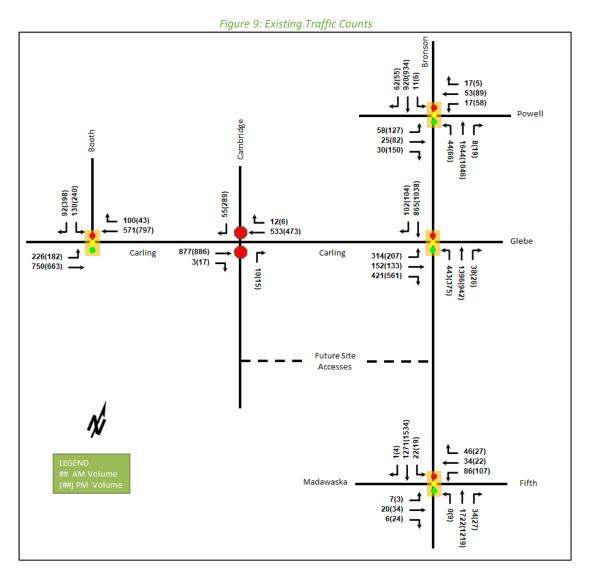


Table 2: Existing Intersection Operations

Intersection	Lana	AM Peak Hour				PM Peak Hour			
	Lane	LOS	V/C	Delay	Q (95 <sup>th</sup> )	LOS	V/C	Delay	Q (95 <sup>th</sup> )
	EBL	С	0.80	65.2	82.0	E	0.93	100.7	#97.9
Caulina Assausa at	EBT	Α	0.40	11.9	60.4	Α	0.35	10.9	52.7
Carling Avenue at  Booth Street	WBT/R	Α	0.42	27.2	60.1	Α	0.42	43.8	91.9
Signalized	SBL	Α	0.32	37.1	45.1	В	0.63	50.0	90.0
Signanzea	SBR	Α	0.24	7.9	13.1	F	1.09	105.2	#169.3
	Overall	Α	0.47	25.3	-	С	0.71	50.0	-
	EB	В	0.70	59.5	40.9	F	1.22	163.9	#183.2
<b>Bronson Avenue</b>	WB	Α	0.45	44.5	31.9	Α	0.60	53.2	63.2
at Powell Avenue	NB	D	0.86	36.1	m42.1	С	0.77	21.4	144.5
Signalized	SB	Α	0.49	6.2	61.7	Α	0.54	12.4	87.3
	Overall	С	0.83	27.0	-	D	0.90	39.2	-



Intersection			AM Peak Hour			PM Peak Hour			
	Lane	LOS	V/C	Delay	Q (95 <sup>th</sup> )	LOS	V/C	Delay	Q (95 <sup>th</sup> )
	EBL	С	0.77	56.7	#93.8	В	0.66	51.7	76.2
	EBL/T	С	0.74	53.5	#92.5	В	0.63	49.0	77.0
Bronson Avenue	EBR	С	0.74	28.4	103.4	F	1.08	92.1	#243.2
at Carling Avenue	NBL	С	0.75	37.9	m54.0	D	0.84	62.9	m#78.6
Street	NBT/R	F	1.39	204.8	#553.6	D	0.87	28.9	m230.5
Signalized	SBT/R	D	0.81	31.4	#156.3	С	0.75	20.6	m111.4
	Overall	F	1.33	101.5	-	F	1.03	42.5	-
_	EB	Α	0.14	32.6	14.1	Α	0.29	39.1	24.9
Bronson Avenue	WB	С	0.79	63.1	57.8	E	0.95	106.6	#87.3
at Fifth Avenue /	NB	С	0.80	13.6	182.0	Α	0.58	7.2	80.1
Madawaska Drive	SB	В	0.68	5.5	41.6	С	0.73	7.0	m75.4
Signalized	Overall	С	0.80	14.2	-	С	0.77	12.9	-
	EBT/R	-	-	-	-	-	-	-	-
o !: •	WBT	-	-	-	-	-	-	-	-
Carling Avenue at	WBR	-	-	-	-	-	-	-	-
Cambridge Street	NBR	В	0.03	14.2	0.8	В	0.04	14.6	0.8
Unsignalized	SBR	В	0.10	11.3	2.3	С	0.48	15.3	19.5
	Overall	Α	_	0.5	-	Α	-	2.8	-

Notes: Saturation flow rate of 1800 veh/h/lane Queue is measured in metres

Peak Hour Factor = 0.90

Delay = average vehicle delay in seconds

m = metered queue

# = volume for the 95th %ile cycle exceeds capacity

The intersection of Carling Avenue and Booth Street shows capacity issues in the PM peak hour, with the eastbound left movement exhibiting high delays and extended queuing as well as the southbound right movement showing as being over capacity with high delays and extended queueing. The southbound right movement's capacity issues are presently exacerbated by the high number of pedestrians using the west crossing the access the eastbound bus stop located on the south side of Carling Avenue. With planned future improvements, impacts from this interaction should be reduced.

During the PM peak hour, the eastbound right at the intersection of Bronson Avenue and Powell Avenue shows as being over capacity. The volume of eastbound left-turning movements impacts performance at this intersection, and if the eastbound approach had an auxiliary left-turn lane and a through/right lane, the v/cs of these lanes would be 0.73 and 0.72 respectively without excessive delay or queuing. Furthermore, during 2019, construction on Bronson Avenue North of Powell Avenue may have resulted in detour volumes in the flow of traffic, thus the operations at this intersection may be slightly better in reality than captured and modelled.

At the intersection of Bronson Avenue and Carling Avenue, during the AM peak hour the eastbound left, the eastbound left/through, the northbound through/right and the southbound through/right movements all exhibit extended queuing and the northbound through/right movement and the overall intersection additionally showing as being over capacity with high delays. Under the previous intersection approach configuration (a northbound auxiliary left-turn lane, a through lane, and a through/right-turn lane) the overall intersection v/c would have been 0.96. During the PM peak hour, the northbound left and eastbound right movement exhibit extended queuing, with the eastbound right movement additionally showing as being over capacity with high delays, and the overall intersection shows as being over capacity.

#### 2.2.8 Collision Analysis

Collision data have 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



types and conditions in the study area, Figure 10 illustrates the intersections and segments analyzed, and Table 4 summarizes the total collisions for each of these locations. Collision data are included in Appendix D.

Table 3: Study Area Collision Summary, 2016-2020

		Number	%
Total (	Collisions	137	100%
	Fatality	1	1%
Classification	Non-Fatal Injury	21	15%
	cation  Non-Fatal Injury Property Damage Only  Approaching Angled Rear end Sideswipe Turning Movement SMV Unattended SMV Other Other  Dry Wet Loose Snow Slush Packed Snow Ice	115	84%
	Approaching	1	1%
	Angled	36	26%
	Rear end	37	27%
Initial Impact Type	Sideswipe	48	35%
Initial Impact Type	<b>Turning Movement</b>	8	6%
	SMV Unattended	1	1%
	SMV Other	5	4%
	Other	1	1%
	Dry	93	68%
	Wet	31	23%
Road Surface Condition	Loose Snow	4	3%
RUAG SUFFACE CONDITION	Slush	5	4%
	Packed Snow	2	1%
	Ice	2	1%
Pedestrian Involved		2	1%
Cyclists Involved		1	1%

Figure 10: Study Area Collision Records





Table 4: Summary of Collision Locations, 2016-2020

	Number	%
Intersections / Segments	137	100%
Bronson Ave @ Carling Ave/Glebe Ave	71	52%
Bronson Ave @ First Ave	36	26%
Bronson Ave btwn Carling Ave & First Ave	8	6%
Bronson Ave btwn Clemow Ave & Carling Ave	8	6%
Bronson Ave btwn First Ave & Second Ave	7	5%
Cambridge St @ Carling Ave	3	2%
Carling Ave btwn Booth St & Cambridge St S	2	1%
Carling Ave btwn Cambridge St S & Bronson Ave	2	1%

Within the study area, the intersections of Bronson Avenue at Carling Avenue/Glebe Avenue and Bronson Avenue at First Avenue are noted to have experienced higher collisions than other locations. Carling Avenue between Cambridge Street South and Bronson Avenue has a fatality collision. Table 5 and Table 6 summarize the collision types and conditions for each of the locations mentioned above.

Table 5: Bronson Avenue at Carling Avenue/Glebe Avenue Collision Summary

		Number	%
To	tal Collisions	71	100%
	Fatality	0	0%
Classification	Non-Fatal Injury	12	17%
	<b>Property Damage Only</b>	59	83%
	Angle	5	7%
	Rear end	27	38%
Initial Impact	Sideswipe	30	42%
Type	<b>Turning Movement</b>	5	7%
	SMV Other	3	4%
	Other	1	1%
	Dry	49	69%
	Wet	15	21%
Road Surface	Loose Snow	3	4%
Condition	Slush	1	1%
	Packed Snow	2	3%
	Ice	1	1%
Pedestrian Involv	Pedestrian Involved		1%
<b>Cyclists Involved</b>		1	1%

The Bronson Avenue at Carling Avenue/Glebe Avenue intersection had a total of 71 collisions during the 2016-2020 time period, with 59 involving property damage only and the remaining twelve having non-fatal injuries. The collision types are most represented by sideswipe with 30 collisions, rear end with 27 collisions, angled and turning movement each with five collisions, SMV other with three collisions, and other with one collision. Rear end collisions are generally represented at congested intersections, and sideswipe collisions may be influenced by northbound vehicles caught in the left-turn trap changing lanes to continue through at the intersection. Weather conditions are not considered to impact collisions at this location. The City is recommended to review this intersection for reduction in collisions, along with active mode and transit operational improvements. No further review of collisions at this location is required as part of this study.



Table 6: Bronson Avenue at First Avenue Collision Summary

		Number	%
To	tal Collisions	36	100%
	Fatality	0	0%
Classification	Non-Fatal Injury	4	11%
	<b>Property Damage Only</b>	32	89%
	Angle	27	75%
<b>Initial Impact</b>	Rear end	3	8%
Type	Sideswipe	3	8%
	Turning Movement	3	8%
	Dry	22	61%
Road Surface	Wet	10	28%
Condition	Loose Snow	1	3%
Condition	Slush	2	6%
	Ice	1	3%
Pedestrian Involved		0	0%
<b>Cyclists Involved</b>		0	0%

The Bronson Avenue at Frist Avenue intersection had a total of 36 collisions during the 2016-2020 time period, with 32 involving property damage only and the remaining four having non-fatal injuries. The collision types are most represented by angle with 27, followed by rear end, sideswipe, and turning movement each with three. Angle collisions may be influenced by westbound right-turning vehicles pushing gaps in the traffic stream, and restricted sight lines on the westbound approach. Conditions could be improved once the corner property redevelops. Weather conditions may influence collisions at this location. No further review of collisions at this location is required as part of this study.

## 2.3 Planned Conditions

## 2.3.1 Changes to the Area Transportation Network

The subject development is located in the Glebe-Dow's Lake neighborhood. Currently, there are no Community Design Plans or Secondary Plans associated with this neighborhood.

Within the Transportation Master Plan, the Rapid Transit and Transit Priority Network's Affordable Network diagram shows isolated transit priority measures on Carling Avenue, east of Booth Street, and Bronson Avenue, south of Carling Street. Furthermore, continuous transit-dedicated lanes would be extended on Carling Avenue, past Booth Street and towards Edgeworth Avenue. As a result, Carling Avenue will become a major east-west transit link, connecting the study area to western neighborhoods as well as major transit anchor points in future horizons.

The Carling Avenue Transit Priority Measures project includes detailed plans outlining the transit infrastructure proposed along the route. Within the study area, this includes changes to lane configuration at Carling Avenue and Bronson Avenue intersection as well as modifications to Carling Avenue cross-section. The exact timing of the Transit Priority implementation within the study area is not clear, with areas west of the study area slated for implementation by 2023, but the measures to the east have been confirmed by City staff as being implemented after 2031. The proposed plan of the Transit Priority Measures in the vicinity of the site can be seen in Figure 11 and is excerpted from the Carling Avenue Transit Priority Measures Open House from February of 2017.





Figure 11: Carling Avenue - Planned Transit Priority Measures

Source: Carling Avenue Transit Priority Measures Open House (February 2017)

Further, plans are in place to improve operational performance of Highway 417 and Bronson Avenue interchange, to the north of the subject site. As part of this project, the vehicle storage of the eastbound off-ramp at Bronson Avenue will increase.

The proposed development is also located in the Bronson Traditional Mainstreet Design Priority Area. However, currently no transportation projects are ongoing or planned in the vicinity of the subject site.

## 2.3.2 Other Study Area Developments

## 567 Cambridge Street

The proposed development application includes a site plan for an addition of a six-storey apartment building with 58 units to an already-existing six-storey apartment building with 70 units (Novatech 2017). No TIA was included as part of this application.

#### 265 Carling Avenue

The proposed development application includes a 20-storey mixed-use building. As part of this development, 168 retirement units, a 1,160 square foot pharmacy and 1,206 square foot hair salon. The development is anticipated to generate 24 new two-way AM peak hour and 36 new two-way PM peak hour auto trips (Parsons 2019).

## 289 Carling Avenue

The proposed development application includes a site plan for 40 residential units with office support spaces totalling in 1000 square metres of gross floor area. The trip generation trigger was not met at this property, and the traffic generation was deemed have a minimal impact on network intersections (CGH 2019).

## 7 McLean Street

The proposed development application includes a site plan for a three-storey apartment building, with 7 units and a gross floor area of 600 square metres. No TIA was included as part of this application.

## 144 Renfrew Avenue

The proposed development application includes a site plan for a three-storey mixed use building. The building will have a total gross floor area of 972 square metres and include commercial use on ground floor and 14 residential



units on upper floor. One parking space is proposed as part of this development and no TIA was included as part of this application.

#### 536 Rochester Street

The proposed development application includes a zoning by-law amendment permitting the conversion of existing dwelling use into a restaurant use with seating for approximately 20 customers. No new parking spaces are proposed as part of this zoning by-law amendment. The projected trip generation for this development is 6 PM peak hour vehicle trips (Novatech 2018).

#### 552 Booth Street

The proposed development application includes a zoning by-law amendment permitting the construction of five buildings with approximately 1000 residential units. The proposed development also includes five existing heritage buildings which will consist of retail and office uses and add up to approximately 142,000 square feet (Parsons 2018). The forecasting report for this development is not yet available on the City's online development application search tool and thus, the projected trip generation of this development is unknown at this point in time.

#### 450 Rochester Road

The proposed development application includes an official plan amendment permitting the construction of mixed-use development. This development will include 540 residential units, a 21,550 square foot grocery store, a 12,210 square foot liquor store, 15,062 square feet of retail on the ground floor and a total 10,360 square feet of retail on second and third floors. The development is anticipated to generate 80 new two-way AM peak hour and 75 new two-way PM peak hour auto trips (Parsons 2019).

## 3 Study Area and Time Periods

## 3.1 Study Area

The study area will include the intersections of:

- Bronson Avenue at:
  - Site Access
  - o Powell Avenue
  - Carling Avenue/Glebe Avenue
  - o Fifth Avenue/Madawaska Drive
- Carling Avenue at:
  - o Booth Street
  - o Cambridge Street
- Cambridge Street at Site Access

The boundary roads will be Bronson Avenue and Carling Avenue and screenline 28, while not considered within this TIA, intersects Carling Avenue at Trillium Pathway.

### 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 2025. As a result, the full build-out plus five years horizon year is 2030.



## 4 Exemption Review

Table 7 summarizes the exemptions for this TIA.

Table 7: Exemption Review

Module	Element	Explanation	Exempt/Required
<b>Design Review Compo</b>	nent		
4.1 Development	4.1.2 Circulation and Access	Only required for site plans	Required
Design	4.1.3 New Street Networks	Only required for plans of subdivision	Exempt
	4.2.1 Parking Supply	Only required for site plans	Required
4.2 Parking	4.2.2 Spillover Parking	Only required for site plans where parking supply is 15% below unconstrained demand	Exempt
Network Impact Comp	onent		
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
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	Exempt – trip generation in AM1 and AM10 zoning will not exceed 200 additional person-trips

# 5 Development-Generated Travel Demand

## 5.1 Mode Shares

Examining the mode shares recommended in the TRANS Trip Generation Manual (2020) for the subject district, derived from the most recent National Capital Region Origin-Destination survey (OD Survey), the existing average district mode shares by land use for Ottawa Inner have been summarized in Table 8. Additionally, proposed rates for the student housing component, modified from the district shared reflecting lower auto ownership and access to school transit passes are summarized in Table 8.

Table 8: TRANS Trip Generation Manual Recommended Mode Shares – Ottawa Inner

Travel Mode	Multi-Unit (High-Rise)		Off-Campu Apartı		Commercial Generator	
	AM	PM	AM	PM	AM	PM
Auto Driver	26%	25%	21%	20%	39%	22%
Auto Passenger	6%	8%	6%	8%	2%	4%
Transit	28%	21%	33%	26%	16%	12%
Cycling	5%	6%	5%	6%	3%	4%
Walking	35%	40%	35%	40%	40%	58%
Total	100%	100%	100%	100%	100%	100%



## 5.2 Trip Generation

This TIA has been prepared using the vehicle and person trip rates for the high-rise residential dwellings using the TRANS Trip Generation Manual (2020) and the vehicle trip rates and derived person trip rates for the commercial component and the Off-Campus Student Apartment average rate from the ITE Trip Generation Manual 10th Edition (2017) using the City-prescribed conversion factor of 1.28. Table 9 summarizes the person trip rates for the proposed high-rise residential dwellings for each peak period and the person trip rates for the student apartment bedrooms by peak hour.

Table 9: Trip Generation Person Trip Rates

	Land Use Code	Peak	Peak I	Period	Peak Hour	
Land Use			Vehicle Trip Rate	Person Trip Rates	Vehicle Trip Rate	Person Trip Rates
Multi Unit (High Rica)	221 & 222	AM	-	0.80	-	-
Multi-Unit (High-Rise)	(TRANS)	PM	-	0.90	-	
Off-Campus Student	225	AM	-	-	0.16	0.20
Apartments	(ITE)	PM	-	-	0.30	0.38
Chrim Botoil Blone (<40k)	822	AM	-	-	2.36	3.02
Strip Retail Plaza (<40k)	(ITE)	PM	-	-	6.59	8.44

Using the above person trip rates, the total person trip generation has been estimated. Table 10 summarizes the total person trip generation for the high-rise residential units by peak period and the commercial component and student apartments by peak hour.

Table 10: Total Person Trip Generation

The state of the s										
l and llag	Linita		AM Peak Perio	d	PM Peak Period					
Land Use	Units	In	Out	Total	In	Out	Total			
Multi-Unit High-Rise	207	51	115	166	108	78	186			
I and IIIaa	Bedrooms/		AM Peak Hou	r	PM Peak Hour					
Land Use	GFA	In	Out	Total	In	Out	Total			
Student Apartments	225	13	32	45	45	41	86			
Strip Retail Plaza (<40k)	4,742 sq.ft	8	6	14	20	20	40			

A conservative pass-by reduction of 15% has been applied to the Strip Retail Plaza(<40k). Internal capture rates from the ITE Trip Generation Handbook 3<sup>rd</sup> Edition have been assigned to the development's retail component for mixed-use developments. The rates summarized in Table 11 represent the percentage of trips to/from the retail use based on the residential component.

Table 11: Internal Capture Rates

Land Use	A	М	PM		
Land Ose	In	Out	In	Out	
Residential to/from Shopping Centre	17%	14%	10%	26%	

Using the above mode share targets, the internal capture and pass-by rates, and the person trip rates, the person trips by mode have been projected. Trip generation by peak hour has been forecasted using the prescribed peak period conversion factors presented in the TRANS Trip Generation Manual (2020) for the high-rise residential units. Table 12 summarizes the residential trip generation by mode and peak hour.



Table 12: Trip Generation by Mode

			AM Peak H		,		M Peak H	lour	
1	Fravel Mode	Mode Share	In	Out	Total	Mode Share	In	Out	Total
	Auto Driver	26%	6	15	21	25%	12	9	21
ie (e	Auto Passenger	6%	2	3	5	8%	4	3	7
Multi-Unit (High-Rise)	Transit	28%	8	18	26	21%	10	8	18
ulti igh	Cycling	5%	2	3	5	6%	3	2	5
ΣΞ	Walking	35%	10	24	34	40%	21	17	38
	Total	100%	28	63	91	100%	50	39	89
	Auto Driver	21%	2	7	9	20%	9	8	17
t nts	Auto Passenger	6%	1	2	3	8%	3	3	6
Student Apartments	Transit	33%	4	11	15	26%	12	11	22
arti e	Cycling	5%	1	1	2	6%	3	3	6
S	Walking	35%	5	11	16	40%	18	16	34
	Total	100%	13	32	45	100%	45	41	86
k)	Auto Driver	39%	2	1	3	22%	1	0	1
<4C	Auto Passenger	2%	0	0	0	4%	1	1	2
) ez	Transit	16%	1	1	2	12%	2	2	4
ola:	Cycling	3%	0	0	0	4%	1	1	2
i ii i	Walking	40%	3	2	5	58%	10	9	19
Strip Retail Plaza (<40k)	Internal Capture	varies	-1	-1	-2	varies	-2	-4	-6
<u>.</u>	Pass-by	15%	-1	-1	-2	15%	-3	-3	-6
Str	Total	100%	6	4	10	100%	15	13	28
	Auto Driver	-	10	23	33	-	22	17	39
	Auto Passenger	-	3	5	8	-	8	7	15
<u>ra</u>	Transit	-	13	30	43	-	24	21	44
Total	Cycling	-	3	4	7	-	7	6	13
	Walking	-	18	37	55	-	49	42	91
	Total	-	47	99	146	-	110	93	203

As shown above, a total of 33 AM and 39 PM new peak hour two-way vehicle trips are projected as a result of the proposed development.

## 5.3 Trip Distribution

To understand the travel of the subject development, the OD Survey has been reviewed to determine the residential travel patterns for the study area's district, which were applied based on the build-out of Ottawa Inner. Table 13 below summarizes the distributions.

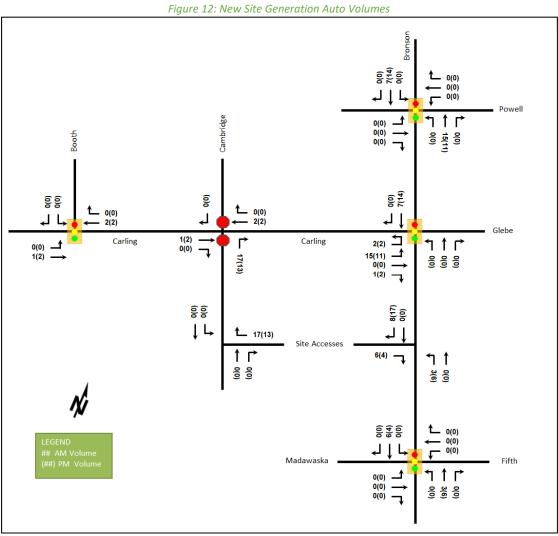
Table 13: OD Survey Distribution – Ottawa Inner

To/From	Residential % of Trips	Via
North	35%	Bronson Ave
South	25%	Bronson Ave
East	20%	Bronson Ave (North)
West	20%	10% Carling Ave, 10% Bronson Ave (North)
Total	100%	-

## 5.4 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. Figure 12 illustrates the new site generated volumes, and Figure 13 illustrates the Pass-by volumes.







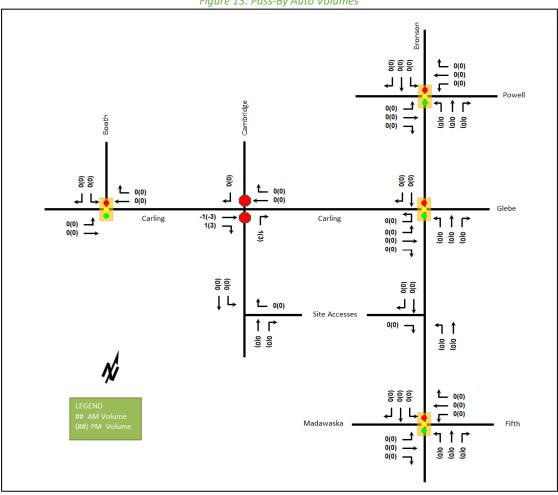


Figure 13: Pass-By Auto Volumes

# 6 Background Network Travel Demands

## 6.1 Transportation Network Plans

The transportation network plans were discussed in Section 2.3. None of the planned improvements are currently scheduled to be completed by the 2030 horizon, which is the furthest horizon analyzed in this TIA.

## 6.2 Background Growth

A review of the background projections from the City's TRANS Regional Model for the 2011 and 2031 horizons was completed to determine the background growth for each of the study area roadways. Table 14 summarizes the results of the model, and the projections are provided in Appendix E. To account for the change in volumes across intersections, the segments of Powell Avenue to the east and west of Bronson Avenue and the segments of Bronson Avenue to the north and south of Carling Avenue will be analyzed and grown as separate entities.



Table 14: TRANS Regional Model Projections – Study Area Growth Rates

Chunch	Direction Growth Per	centage 2011 to 2031	<b>Direction Growth Perce</b>	entage Existing to 2031	
Street	Eastbound	Westbound	Eastbound	Westbound	
Powell (E)	-2.59%	-1.11%	-0.93%	-13.24%	
Powell (W)	5.22%	-	11.27%	-0.54%	
Carling	Carling 0.94%		4.56%	3.51%	
Madawaska	N/A	N/A	18.96%	14.30%	
Fifth	1.34%	-1.13%	2.57%	-4.97%	
	Northbound	Southbound	Northbound	Southbound	
Booth	-0.39%	0.68%	5.67%	4.16%	
Cambridge	-	-	-	10.48%	
Bronson (N)	Bronson (N) 0.95%		-1.19%	1.48%	
Bronson (S)	0.44%	1.06%	-0.44%	3.08%	

Growth rates from the existing horizon will be peak-directionally applied to appropriate links' mainline volumes and major turning movements, rounded to the nearest 0.25%.

## 6.3 Other Developments

The background developments explicitly considered in the background conditions (Section 6.2) include:

- 265 Carling Avenue
- 536 Rochester Street
- 450 Rochester Road

The developments at 567 Cambridge Street, 289 Carling Avenue, 7 McLean Street, and 144 Renfrew Avenue are considered to be negligible and will be accounted for though the background growth rates, and no TIA is currently available for the development at 552 Booth Street. The background development volumes within the study area have been provided in Appendix F.

## 7 Demand Rationalization

## 7.1 2025 Future Background Operations

Figure 14 illustrates the 2025 background volumes and Table 15 summarizes the 2025 background intersection operations. The level of service for signalized intersections is based on v/c calculations for individual lane movements and HCM 2000 v/c calculations for the overall intersection, and average delay for unsignalized intersections. The synchro worksheets for the 2025 future background horizon are provided in Appendix G.



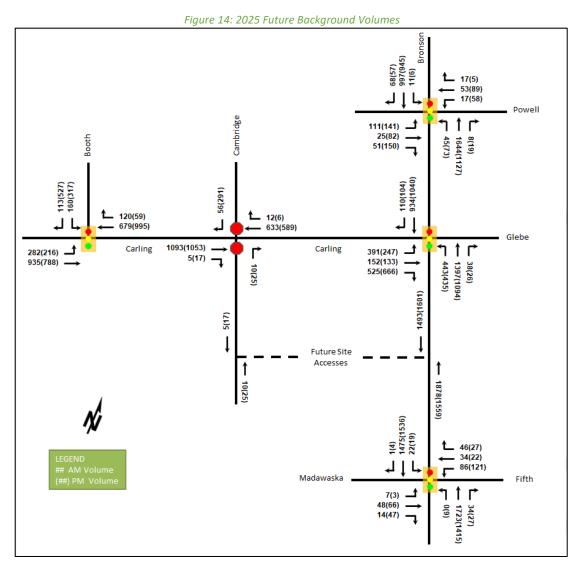


Table 15: 2025 Future Background Intersection Operations

Intersection	Lane		AM Pea	ak Hour		PM Peak Hour				
intersection	Lane	LOS	V/C	Delay	Q (95 <sup>th</sup> )	LOS	V/C	Delay	Q (95 <sup>th</sup> )	
	EBL	D	0.84	67.3	#93.1	Е	0.99	114.8	#106.4	
C	EBT	Α	0.45	12.5	70.3	Α	0.37	11.2	57.1	
Carling Avenue at  Booth Street	WBT/R	Α	0.46	28.8	65.0	Α	0.48	40.0	102.0	
Signalized	SBL	Α	0.36	37.8	49.8	С	0.74	56.0	108.8	
Signunzeu	SBR	Α	0.26	7.8	13.6	F	1.33	198.1	#224.2	
	Overall	Α	0.53	26.5	-	D	0.84	68.2	-	
	EB	D	0.86	74.9	#71.3	F	1.14	135.9	#167.9	
<b>Bronson Avenue at</b>	WB	Α	0.33	38.5	29.0	Α	0.52	49.1	55.9	
Powell Avenue Signalized	NB	С	0.80	15.8	m48.2	С	0.73	19.9	34.6	
	SB	Α	0.49	7.2	59.1	Α	0.49	11.6	75.9	
	Overall	D	0.81	17.0	-	D	0.84	34.2	-	



luda ua a adia u	1		AM Pe	ak Hour			PM Peak Hour				
Intersection	Lane	LOS	V/C	Delay	Q (95 <sup>th</sup> )	LOS	V/C	Delay	Q (95 <sup>th</sup> )		
	EBL	D	0.87	68.3	#102.4	С	0.78	61.8	m74.3		
	EBL/T	D	0.82	61.8	#98.4	С	0.74	56.8	m75.2		
Bronson Avenue at	EBR	D	0.89	43.3	109.4	F	1.23	149.1	#212.9		
Carling Avenue	NBL	В	0.68	36.2	50.8	С	0.75	53.9	m#83.2		
Street	NBT/R	F	1.22	136.7	#478.8	D	0.87	27.4	m#250.0		
Signalized	SBT/R	С	0.76	28.1	#148.9	В	0.68	18.6	m79.7		
	Overall	F	1.22	75.1	-	F	1.04	52.7	-		
	EB	Α	0.27	35.9	22.7	Α	0.49	49.2	41.9		
Bronson Avenue at	WB	С	0.75	59.6	51.3	F	1.19	180.5	#97.0		
Fifth Avenue /	NB	С	0.71	10.4	141.7	Α	0.60	7.4	85.7		
Madawaska Drive	SB	В	0.68	5.6	50.3	В	0.66	6.2	m67.6		
Signalized	Overall	С	0.72	11.2	-	С	0.75	17.3	-		
	EBT/R	-	-	-	-	-	-	-	-		
Caultura Arramana at	WBT	-	-	-	-	-	-	-	-		
Carling Avenue at	WBR	-	-	-	-	-	-	-	-		
Cambridge Street  Unsignalized	NBR	С	0.03	15.1	0.8	С	0.07	15.3	1.5		
	SBR	В	0.09	11.5	2.3	С	0.46	15.3	18.0		
	Overall	Α	-	0.4	-	Α	-	2.4	_		

Notes: Saturation flow rate of 1800 veh/h/lane

Queue is measured in metres Peak Hour Factor = 1.00 Delay = average vehicle delay in seconds

m = metered queue

# = volume for the 95th %ile cycle exceeds capacity

During both the AM and PM peak hours, existing capacity issues at the study area intersections are exacerbated by area growth. The operational changes from the existing conditions are noted below.

The intersection of Carling Avenue and Booth Street is forecasted to exhibit extended queuing on the eastbound left movement during the AM peak hour and this movement is forecasted to be at capacity during the PM peak hour.

Similarly, the intersection of Bronson Avenue and Powell Avenue, the eastbound movement is forecasted to exhibit extended queuing during the AM peak hour.

Operational issues are forecasted to persist at the intersection of Bronson Avenue and Carling Avenue, and specifically, during the PM peak hour, the northbound through/right movement is forecasted to exhibit extended queuing and the eastbound right movement is forecasted to see its v/c, queuing and delays worsen at this horizon.

The intersection of Bronson Avenue at Fifth Avenue/Madawaska drive is forecasted to see the westbound movement become over capacity during the PM peak hour due to area growth.

## 7.2 2030 Future Background Operations

Figure 15 illustrates the 2030 background volumes and Table 16 summarizes the 2030 background intersection operations. The level of service for signalized intersections is based on v/c calculations for individual lane movements and HCM 2000 v/c calculations for the overall intersection, and average delay for unsignalized intersections. The synchro worksheets for the 2030 future background horizon are provided in Appendix H.



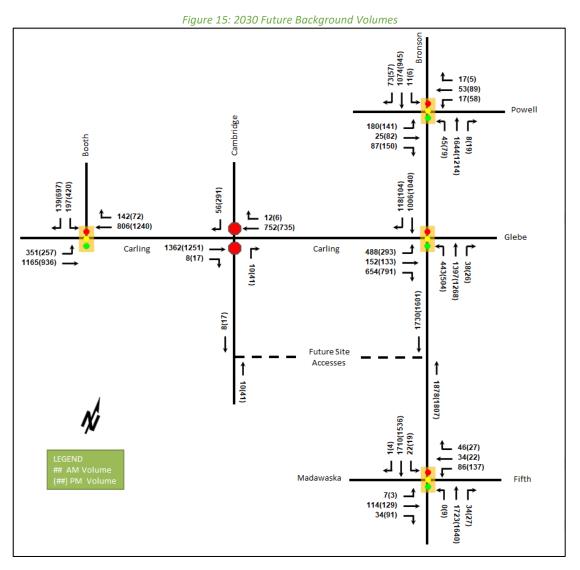


Table 16: 2030 Future Background Intersection Operations

Intersection	lana		AM Pea	ak Hour		PM Peak Hour				
intersection	Lane	LOS	V/C	Delay	Q (95 <sup>th</sup> )	LOS	V/C	Delay	Q (95 <sup>th</sup> )	
	EBL	E	0.93	78.3	#134.2	F	1.18	165.9	#131.4	
CII A	EBT	Α	0.57	14.2	95.6	Α	0.44	12.0	71.1	
Carling Avenue at  Booth Street	WBT/R	Α	0.59	32.6	79.3	Α	0.59	43.7	m126.6	
Signalized	SBL	Α	0.44	39.6	60.6	Е	0.99	88.1	#172.2	
Signanzea	SBR	Α	0.31	7.5	15.0	F	1.82	407.4	#328.8	
	Overall	С	0.64	29.9	-	F	1.10	119.3	-	
	EB	F	1.23	172.4	#127.6	F	1.14	135.9	#167.9	
<b>Bronson Avenue at</b>	WB	Α	0.30	37.5	29.0	Α	0.52	49.1	55.9	
Powell Avenue Signalized	NB	D	0.83	31.6	m60.0	С	0.80	30.3	m119.8	
	SB	Α	0.54	8.3	66.0	Α	0.49	11.6	75.9	
	Overall	E	0.91	36.1	-	D	0.89	38.5	-	



lt			AM Pe	ak Hour		PM Peak Hour			
Intersection	Lane	LOS	V/C	Delay	Q (95 <sup>th</sup> )	LOS	V/C	Delay	Q (95 <sup>th</sup> )
	EBL	Е	0.96	83.4	#127.7	D	0.84	64.7	m77.0
	EBL/T	Е	0.93	75.6	#126.5	С	0.80	58.9	m76.8
Bronson Avenue at	EBR	E	0.97	55.4	#206.0	F	1.46	244.8	m#265.0
<b>Carling Avenue</b>	NBL	Α	0.56	29.5	50.8	D	0.90	63.5	m#103.4
Signalized	NBT/R	F	1.25	147.0	#479.1	F	1.02	68.1	m#426.6
	SBT/R	Е	0.95	44.5	m#162.6	В	0.68	18.6	m79.4
	Overall	F	1.26	84.1	-	F	1.23	86.9	-
	EB	Α	0.54	44.3	47.1	Е	0.94	94.7	#101.1
Bronson Avenue at	WB	D	0.88	79.3	#63.6	F	2.78	859.7	#128.3
Fifth Avenue /	NB	С	0.73	11.6	141.7	В	0.69	9.0	114.4
Madawaska Drive	SB	С	0.80	8.8	m193.4	В	0.67	7.0	m71.5
Signalized	Overall	D	0.81	14.6	-	F	1.03	56.8	-
	EBT/R	-	-	-	-	-	-	-	-
o !: •	WBT	-	-	-	-	-	-	-	-
Carling Avenue at	WBR	-	-	-	-	-	-	-	-
Cambridge Street Unsignalized	NBR	С	0.03	17.5	0.8	С	0.13	17.8	3.0
	SBR	В	0.10	12.2	2.3	С	0.51	17.7	21.8
	Overall	Α	-	0.4	-	Α	-	2.5	-

Notes: Saturation flow rate of 1800 veh/h/lane

Queue is measured in metres Peak Hour Factor = 1.00 Delay = average vehicle delay in seconds

m = metered queue

# = volume for the 95th %ile cycle exceeds capacity

During both the AM and PM peak hours, the study area intersection operations are forecasted to degrade from the existing and 2025 future background conditions with area growth. The operational changes from the 2025 background conditions are noted below.

The intersection of Carling Avenue and Booth Street during the PM peak hour is forecasted to see the eastbound left movement become over capacity with longer delays and further extended queues, the southbound left movement is forecasted to see high delays and extended queues with the movement at capacity, and the southbound right movement is forecasted to see v/c, delay, and queuing degrade, with the overall intersection over capacity at this horizon. The eastbound left-turn can be reduced to a v/c of 1.00 with an additional 3 seconds allocated to the protected phase.

The intersection of Bronson Avenue and Powell Avenue during the AM peak hour shows the eastbound movement as over capacity with high delays and further extended queuing, where operations are forecasted to resemble existing PM peak hour conditions on this movement.

The intersection of Bronson Avenue and Carling Avenue during the AM peak hour shows the eastbound left movement experience high delay and the eastbound right movement exhibit extended queuing, where all movements but the northbound left (LOS A) and northbound through/right (LOS F) operate with LOS E at this horizon. During the PM peak hour at this intersection, the northbound through/right movement is over capacity with further extended queuing, capacity issues worsen for the eastbound right movement, and high average delay at the overall intersection.

The intersection of Bronson Avenue and Fifth Avenue/Madawaska Drive is forecasted to exhibit extended queuing on the westbound movement during the AM peak hour, and during the PM peak hour the overall intersection is over capacity with the westbound movement seeing capacity issues deteriorate. The decreasing operations are a result of the growth along Madawaska Drive towards Bronson Avenue, which is assumed to be cut through from Queen Elizabeth Drive. If this movement is to be permitted in the future background conditions, additional time



in the form of a protected westbound left-turn phase may address capacity concerns at the intersection, although may subsequently result in additional traffic utilizing this route. The intersection should be monitored by City staff.

The planned improvement of transit in the study area may mitigate some of the area capacity issues once implemented. The City will need to review the Carling Avenue improvements within the new TMP and the impacts on the surrounding area to continue the mode share shifts to transit.

## 7.3 Modal Share Sensitivity

Capacity constraints are noted to be present at the intersections of Bronson Avenue and Carling Avenue and Bronson Avenue and Powell Avenue. The development is anticipated to have a fraction of the net traffic increase on the surrounding network (e.g., eastbound Carling Avenue will see an approximate 230 vehicle increase by 2030 from background growth, and the development is forecasted to produce 70 total two-way auto trips during the AM peak). As the background conditions operate in a similar manner to the existing conditions, the sensitivity of additional auto trips from the proposed development is anticipated to have minimal impacts. Regardless of the sensitivity, transportation demand management measures will be required to further reinforce the target modal splits until such time the City expands the bus lanes along Carling Avenue. No further rationalization of the proposed modal shares is considered to be required.

#### 7.4 Network Demand Rationalization

The network volumes illustrate a number of background constraints along Bronson Avenue and Carling Avenue. Specifically, the following locations are noted to have capacity constraints in the existing or are forecasted to become constrained by 2030:

- Booth Street:
  - Southbound right-turn at Carling Avenue during the PM peak
- Bronson Avenue
  - o Northbound through/right-turn at Carling during the AM and PM peaks
- Carling Avenue:
  - Eastbound left-turn at Booth Street during the PM peak
  - o Eastbound right-turn at Bronson Avenue during the PM peak
- Fifth Avenue:
  - Westbound approach at Bronson Avenue during the PM peak
- Powell Avenue:
  - Eastbound approach at Bronson Avenue during the PM peak

The volumes forecast on Booth Street will be at the roadway capacity by 2030, as shown in the existing and background volume figures. The use of Booth Street as an alternate route to a signalized intersection on Carling Avenue, and its connection under Highway 417 make Booth Street a key connection in the area. The redevelopment of the area will also contribute to the near capacity volumes, although no factor has been applied to assess a potential reduction of the existing trips as travel along the corridor becomes more congested with local volumes. A reduction of approximately 130 vehicles from the southbound right-turn would reduce the v/c of the movement to 1.00. It is also noted that the volumes may reflect higher than normal turning movements as drivers have avoided the long-term construction along Highway 417, including various overpass replacements, widening and pre-widening projects, and the City's Jackie Holzman Bridge. The volumes may naturally reduce as travel patterns normalize and the barriers to previous routes have been removed. This intersection can be monitored by the City for operational adjustments, reviewed during the transit priority projects, and through adjacent developments applications to provide local improvements.



The volumes along Bronson Avenue are consistent with a 4-lane arterial roadway and, as shown at the adjacent intersections, can be supported. The northbound through/right-turn has be constrained by the re-allocation of the second through lane to a left-turn lane by the City. The City's change in lane arrangement effectively keeping the left-turn queue within a designated left-turn lane and eliminates the spill back previous experienced at this intersection into the through lanes. As this is an operational choice by the City, no further rationalization of the volumes on Bronson Avenue is required.

Carling Avenue eastbound left-turn at Booth Street is noted in Section 7.2 to require an additional 3 seconds or more to reduce the v/c to 1.00 or lower. The eastbound right-turn at Bronson Avenue is currently over capacity and will continue to be a primary movement for the eastbound approach. Given the existing and 2030 future background volumes, the City will need to provide alternative routes or reduce the auto demand along Carling Avenue by 290 vehicles to maintain existing operations. With the completion of the Highway 417 projects, a shift of volumes to the southbound approach on Bronson Avenue may be realized and use the residual capacity for southbound travel.

The Fifth Avenue westbound approach constraints at Bronson Avenue are a result of the City's TRANS growth forecasts on Madawaska Drive, presumably from cut through traffic from Queen Elizabeth Driveway. The westbound left-turn movement will have limited gaps to turn in this growth is realized. Any growth along Madawaska Drive will compromise the westbound approach and will need to be restricted from cutting through in the future.

The eastbound approach of Powell Avenue at Bronson Avenue is used as a cut through route from Highway 417 to Bronson Avenue using the Rochester Street off-ramp and traveling via Orangeville Street to Bell Street to Powell Avenue. Alternatively, some vehicles also detour via Plymouth Street to Cambridge Street to avoid Bell Street congestion or cut into the extended queueing along Powell Avenue. With the completion of the Highway 417 projects, a shift of volumes to the Bronson Avenue off-ramp may be realized and remove both the left-turn and right-turn movements from Powell Avenue. The further improvements along Chamberlain Street may also contribute to a shifting of these volumes as the Highway 417 off-ramp and intersection on Bronson Avenue is improved.

Overall, Powell Avenue, Booth Street and Madawaska Drive should be monitored by the City to determine if the travel patterns normalize as the Highway 417 construction activities have been completed and once Covid conditions are lifted. If the volumes do not shift to routes with residual capacity (e.g., eastbound right-turn on Carling Avenue to southbound through on Bronson Avenue), then the City will need to pursue additional modal shift programs to ease the forecasted burden and maintain existing volumes in the area.

# 8 Development Design

## 8.1 Design for Sustainable Modes

The proposed development is a mixed-use building with vehicle and bicycle parking located underground. Hard surface connections are provided between proposed building entrances on each side of the building, which connect to surrounding pedestrian facilities. The bus stop along Bronson Avenue will be shifted north of the proposed access and be in proximity to the main entrance, although given the limited right-of-way for expansion to City standards it will remain as a post and sign.

All transit routes listed in Section 2.2.5 stop within 400 metres walk of the site except for the westbound route #55 which stops approximately 500 metres walk from the site. Dow's Lake Station the LRT Trillium line is approximately 950 metres walk from the site entrances.



The infrastructure TDM checklist is provided in Appendix I.

#### 8.2 Circulation and Access

Vehicle access is proposed through a two-way access on Bronson Avenue and a right-out-only access on Cambridge Street that permits full movements for truck access.

Garbage storage is within the parking levels, and collection may occur along Cambridge Street or within the loading area at the terminus of the drive aisle that connects to the Cambridge Street access. Emergency services are assumed to be able to access the site via the three public rights of way.

The ramp accessing the Bronson Avenue driveway includes 2.44-metre-long transition slopes with an 8% grade at both ends of its main slope of 16% and the ramp accessing the drive aisle off of Cambridge Street includes 2.44-metre-long transition slopes with an 8% grade at both ends of its main slope of 15%. Drive aisles support the intended site operations, and turning templates are provided in Appendix J.

## 9 Parking

## 9.1 Parking Supply

The development is proposed as including a total of 133 vehicle parking spaces and 221 bicycle parking spaces.

As all parking is located underground, the zoning by-law minimums for parking is 114 vehicle spaces for tenants (74 for phase 1, 40 for phase 2), 27 vehicle spaces for visitors (18 for phase 1, nine for phase 2), and 139 bicycle parking spaces (94 for phase 1, 45 for phase 2).

No vehicle parking is required for the commercial component from the zoning by-law, and two bicycle parking spaces are required for the commercial component.

The development is proposed as being below minimum vehicle parking rates from the zoning by-law by a total of eight spaces and exceeding the minimum bicycle parking rate. A zoning by-law exemption for the vehicle and parking rate will be required.

# 10 Boundary Street Design

Table 17 summarizes the MMLOS analysis for the boundary streets of Cambridge Street, Carling Avenue, and Bronson Avenue. The existing and future conditions for both streets will be the same and are considered in one row. The boundary street analysis is based on the policy area of "Within 300m of a school" for the segments of Carling Avenue and Bronson Avenue, as they are within this distance Glebe Collegiate Institute, and for the land use designation of "General Urban Area" for the segment of Cambridge Street. The MMLOS worksheets has been provided in Appendix K.

**Bicycle LOS Pedestrian LOS Transit LOS Truck LOS** Segment **PLOS Target BLOS Target TLOS Target TrLOS Target Cambridge Street** C C Α D N/A N/A N/A N/A **Carling Avenue** F Α F C D D Α D **Bronson Avenue** 

Table 17: Boundary Street MMLOS Analysis

Carling Avenue and Bronson Avenue do not meet the pedestrian and cycling MMLOS targets. As is typical throughout the city, the operating speeds and volumes along arterials prevent any sidewalk configuration from meeting targets. Bicycle LOS is limited by mixed traffic conditions as the shared bike/transit lane on Carling Avenue terminates upstream of the site frontage and becomes a right-turn lane, and Bronson Avenue does not have



dedicated cycling facilities. To meet targets Carling Avenue and Bronson Avenue would each require at minimum a curbside bike lane to meet the BLOS targets. The remaining MMLOS targets are being met.

## 11 Access Intersections Design

## 11.1 Location and Design of Access

A two-way access is proposed at the southern limits of the 774 Bronson Avenue parcel in the location of an existing access, consisting of a 6.0-metre two-way driveway accessing the underground parking ramp on Bronson Avenue. This access is proposed as permitting both inbound movements and restricting the outbound left-turn movement through the addition of a No Left Turn sign (Rb-12 (OTM)) on the private eastbound approach. The proposed signage plan is provided in Appendix L.

The existing access on Cambridge Street will be shifted southward to comprise a 3.6-metre two-way lane that will primarily serve as a right-out lane for the underground garage but will additionally permit two-way traffic for loading and move-in operations.

The existing driveways at the north limit of the 774 Bronson Avenue parcel and on 770 Bronson Avenue will be removed and reinstated as full height curb.

Due to the proximity of the Bronson Avenue access to the southern property limits a private approach by-law exemption will be required. In addition, the access on Cambridge Street is proposed to include a 5.0% grade within 9.0 metres of the property line and will also require an exemption from the private approach by-law.

#### 11.2 Intersection Control

The site access intersections are assumed to be stop controlled on the minor approaches with Bronson Avenue and Cambridge Street operating under free-flow conditions.

## 11.3 Access Intersection Design

## 11.3.1 2025 Future Total Access Intersection Operations

The 2025 future total intersection volumes are illustrated in Figure 16 and the access intersection operations are summarized below in Table 18. The level of service is based on HCM 2010 average delay for unsignalized intersections. The synchro worksheets have been provided in Appendix M.



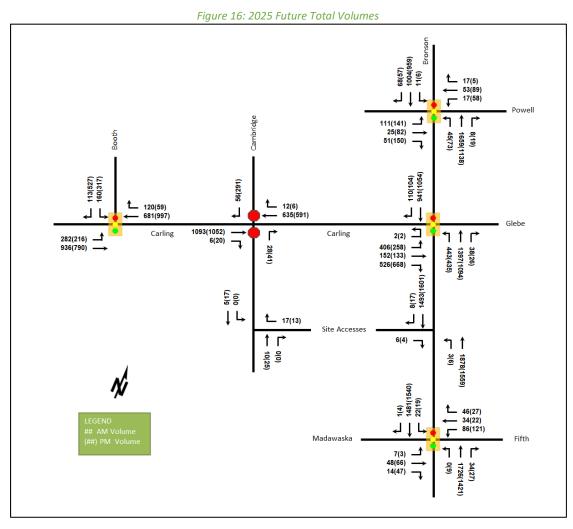


Table 18: 2025 Future Total Access Intersection Operations

!			AM Peak Hour				PM Peak Hour				
Intersection	Lane	LOS	V/C	Delay	Q (95 <sup>th</sup> )	LOS	V/C	Delay	Q (95 <sup>th</sup> )		
Canalanidae Chuash	WBR	Α	0.02	8.4	0.0	Α	0.01	8.5	0.0		
Cambridge Street at Site Access	NBT/R	-	-	-	-	-	-	-	-		
	SBL/T	-	-	-	-	-	-	-	-		
Unsignalized	Overall	Α	-	4.5	-	Α	-	2.0	-		
Buonson Avenue	EBR	С	0.02	15.4	0.8	С	0.01	16.3	0.0		
Bronson Avenue at Site Access Unsignalized	NBL/T	В	0.01	13.2	0.0	В	0.02	14.2	0.0		
	SBL/T	-	-	-	-	-	-	-	-		
	Overall	Α	-	0.0	-	Α	-	0.5	-		

Notes: Saturation flow rate of 1800 veh/h/lane

Queue is measured in metres

Peak Hour Factor = 1.00

Delay = average vehicle delay in seconds

m = metered queue

# = volume for the 95th %ile cycle exceeds capacity

The site accesses are forecast to perform well during both peak hours at the 2025 future total horizon.

## 11.3.2 2030 Future Total Access Intersection Operations

The 2030 future total intersection volumes are illustrated in Figure 17 and the access intersection operations are summarized below in Table 19. The level of service is based on HCM 2010 average delay for unsignalized intersections. The synchro worksheets have been provided in Appendix N.



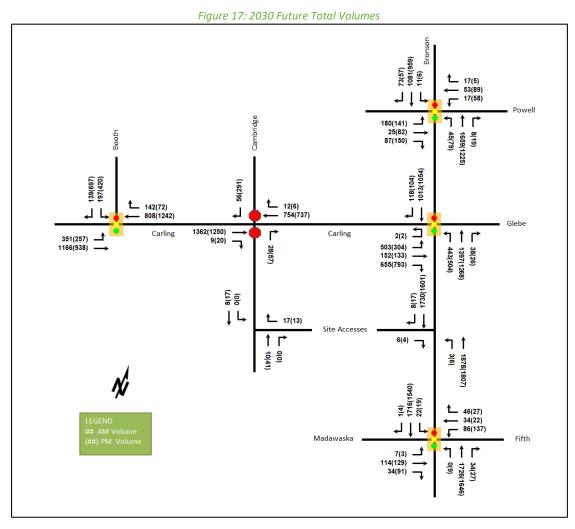


Table 19: 2030 Future Total Access Intersection Operations

lutana atian			AM Pe	ak Hour		PM Peak Hour					
Intersection	Lane	LOS	V/C	Delay	Q (95 <sup>th</sup> )	LOS	V/C	Delay	Q (95 <sup>th</sup> )		
Carrela della a Charach	WBR	Α	0.02	8.4	0.0	Α	0.01	8.5	0.0		
Cambridge Street at Site Access	NBT/R	-	-	-	-	-	-	-	-		
Unsignalized	SBL/T	-	-	-	-	-	-	-	-		
Unsignanzea	Overall	Α	-	4.1	-	Α	-	1.6	-		
Buonson Avenue	EBR	С	0.02	17.5	0.8	С	0.01	16.3	0.0		
Bronson Avenue at Site Access	NBL/T	С	0.01	15.1	0.0	В	0.02	14.2	0.0		
Unsignalized	SBL/T	-	-	-	-	-	-	-	-		
	Overall	Α	-	0.0	-	Α	-	0.0	-		

Saturation flow rate of 1800 veh/h/lane Notes:

Queue is measured in metres

Peak Hour Factor = 1.00

Delay = average vehicle delay in seconds

m = metered queue

# = volume for the 95th %ile cycle exceeds capacity

The site accesses are forecasted to perform well during both peak hours at the 2030 future total horizon.

#### 11.3.3 Access Intersection MMLOS

The access intersections are not signalized and therefore no access intersection MMLOS analysis has been performed.



#### 11.3.4 Recommended Design Elements

The access locations will be designed as typical private approaches, with depressed curbs and sidewalks per City standards. The private approach by-law exemptions noted previously will be required.

# 12 Transportation Demand Management

#### 12.1 Context for TDM

The mode shares used within the TIA represent the unmodified district shares for the high-rise apartment component, with a 5% shift toward transit for the student housing component. Overall, the mode shares are likely to be achieved, and supporting TDM measures should be provided to further shift mode shares toward transit, walking, and cycling.

The subject site is within the Carling Arterial Mainstreet and Bronson Traditional Mainstreet Design Priority Areas.

Total bedrooms within the development are estimated as 147 one-bedroom/bachelor units, 81 two-bedroom units, 23 three-bedroom units, 21 four-bedroom units, and six five-bedroom units for a total of 492 bedrooms, where 71 of the units (225 bedrooms) are student housing. No age restrictions are noted.

#### 12.2 Need and Opportunity

The subject site has been assumed to rely primarily on walking with roughly equal auto and transit shares for the apartment units and with a higher transit share for the student units.

If modal share targets are not met, the largest concentrated impacts will be during the AM peak hour using the residual capacity on the eastbound left-turn movement at the intersection of Bronson Avenue and Carling Avenue.

As such, a supportive TDM program should be provided to help ensure the auto mode share does not exceed the district averages, and to help steer further modal shift. It is noted that transit priority on Carling Avenue after 2031 may additionally shift mode share towards transit outside of the examined horizons.

#### 12.3 TDM Program

The "suite of post occupancy TDM measures" has been summarized in the TDM checklists for the residential land uses. The checklist is provided in Appendix I. The key TDM measures recommended include:

- Designate an internal TDM program coordinator
- Display local area maps with walking cycling routes, and transit schedules and route maps at entrances
- Inclusion of a 6-month Presto card for first time apartment rental, with a set time frame for this offer (e.g., 6-months) from the initial opening of the site
- Unbundle parking cost from or rental costs
- Provide a multimodal travel option information package to new residents

The recommendation for the inclusion of a Presto pass would not apply to the student housing, where these tenants will have access to a university bus pass.

# 13 Neighbourhood Traffic Management

The proposed development will connect to the arterial road network at Bronson Avenue and at Carling Avenue via Cambridge Street, which is a local road. The forecasted volumes along Cambridge Street between the site access and Carling Avenue is in the range of 36-72 two-way vehicles per peak hour. These volumes are below the



TIA Guidelines neighbourhood traffic management threshold for local roads of 120 vehicles per peak hour and thus no further examination is required.

# 14 Transit

# 14.1 Route Capacity

In Section 5.1 the trip generation by mode was estimated, including an estimate of the number of transit trips that will be generated by the proposed development. Table 20 summarizes the transit trip generation.

Table 20: Trip Generation by Transit Mode

Travel Made	Mada Chara	Al	M Peak Ho	ur	PM Peak Hour				
Travel Mode	Mode Share	In	Out	Total	In	Out	Total		
Transit	varies	13 30 43		43	24	21	44		

The proposed development is anticipated to generate an additional 43 AM and 44 PM peak hour two-way transit trips. From the trip distribution found in section 5.3, these values can be further broken down. Table 21 summarizes forecasted site-generated transit ridership trips by direction and the equivalent bus loads.

Table 21: Forecasted Site-Generated Transit Ridership

Dive etiese	AM Pe	ak Hour	PM Pe	ak Hour	Comico Tono	Approximate Equivalent Peak				
Direction	In	Out	In	Out	Service Type	Hour/Direction Bus Loads				
North	4	11	8	7	Bus, LRT	One-quarter of a standard bus				
South	3	7	6	6	Bus, LRT	Negligible				
East	3	6	5	4	Bus	Negligible				
West	3	6	5	4	Bus	Negligible				

# 14.2 Transit Priority

No transit priority is required explicitly for this study as the transit priority lanes on Carling Avenue are to be installed after the horizons analyzed within this TIA.

# 15 Network Intersection Design

#### 15.1 Network Intersection Control

No change to the existing signalized control is recommended for the network intersections.

# 15.2 Network Intersection Design

# 15.2.1 2025 Future Total Network Intersection Operations

The 2025 future total network intersection operations are summarized below in Table 22. The level of service for signalized intersections is based on v/c calculations for individual lane movements and HCM 2000 v/c calculations for the overall intersection, and average delay for unsignalized intersections. The synchro worksheets have been provided in Appendix L.



Table 22: 2025 Future Total Network Intersection Operations

lutaus setiaus	1		AM Pe	ak Hour		PM Peak Hour					
Intersection	Lane	LOS	V/C	Delay	Q (95 <sup>th</sup> )	LOS	V/C	Delay	Q (95 <sup>th</sup> )		
	EBL	D	0.84	67.3	#93.1	Е	0.99	114.8	#106.4		
Caultura Assauss at	EBT	Α	0.45	12.5	70.2	Α	0.37	11.2	57.3		
Carling Avenue at	WBT/R	Α	0.46	28.8	65.0	Α	0.48	41.1	102.0		
Booth Street	SBL	Α	0.36	37.8	49.8	С	0.74	56.0	108.8		
Signalized	SBR	Α	0.26	7.8	13.6	F	1.33	198.1	#224.2		
	Overall	Α	0.53	26.5	-	D	0.84	68.6	-		
	EB	D	0.86	74.9	#71.3	F	1.14	135.9	#167.9		
<b>Bronson Avenue at</b>	WB	Α	0.33	38.5	29.0	Α	0.52	49.1	55.9		
<b>Powell Avenue</b>	NB	D	0.81	17.7	m50.0	С	0.74	20.7	39.4		
Signalized	SB	Α	0.49	7.2	59.5	Α	0.50	11.7	77.5		
	Overall	D	0.82	18.1	-	D	0.85	34.4	-		
	EBL	D	0.89	70.9	#106.5	D	0.82	66.8	m#80.9		
	EBL/T	D	0.85	64.4	#103.7	С	0.75	57.7	m78.2		
<b>Bronson Avenue at</b>	EBR	D	0.89	43.0	109.8	F	1.24	152.0	#214.8		
<b>Carling Avenue</b>	NBL	В	0.68	36.2	50.8	С	0.77	55.1	m#83.2		
Signalized	NBT/R	F	1.23	138.0	#478.9	D	0.88	28.0	m#249.8		
	SBT/R	С	0.77	28.4	#150.6	В	0.69	18.7	m82.4		
	Overall	F	1.22	75.8	-	F	1.05	53.8	-		
	EB	Α	0.27	35.9	22.7	Α	0.49	49.2	41.9		
Bronson Avenue at	WB	С	0.75	59.6	51.3	F	1.19	180.5	#97.0		
Fifth Avenue /	NB	С	0.71	10.4	142.4	В	0.61	7.5	86.2		
Madawaska Drive	SB	В	0.68	5.5	50.3	В	0.67	6.2	m67.3		
Signalized	Overall	С	0.72	11.1	-	С	0.75	17.2	-		
	EBT/R	-	-	-	-	-	-	-	-		
Caultura Assaura	WBT	-	-	-	-	-	-	-	-		
Carling Avenue at	WBR	-	-	-	-	-	-	-	-		
Cambridge Street	NBR	С	0.08	15.6	1.5	С	0.11	15.8	3.0		
Unsignalized	SBR	В	0.09	11.5	2.3	С	0.46	15.3	18.0		
	Overall	Α	-	0.6	-	Α	_	2.5	-		

Notes: Saturation flow rate of 1800 veh/h/lane

Queue is measured in metres Peak Hour Factor = 1.00 Delay = average vehicle delay in seconds

m = metered queue

# = volume for the 95th %ile cycle exceeds capacity

The network intersection operations for the 2025 future total horizon operate similarly to the 2025 future background conditions. During the PM peak hour, the intersection of Bronson Avenue at Carling Avenue's eastbound left movement 95<sup>th</sup> percentile queue length extends from 74.3 metres in the background conditions to 80.9 metres in the total condition, a value less than one car-length. No other new capacity issues are noted.

#### 15.2.2 2030 Future Total Network Intersection Operations

The 2030 future total network intersection operations are summarized below in Table 23. The level of service for signalized intersections is based on v/c calculations for individual lane movements and HCM 2000 v/c calculations for the overall intersection, and average delay for unsignalized intersections. The synchro worksheets have been provided in Appendix M.



Table 23: 2030 Future Total Network Intersection Operations

l	•		AM Pe	ak Hour		PM Peak Hour					
Intersection	Lane	LOS	V/C	Delay	Q (95 <sup>th</sup> )	LOS	V/C	Delay	Q (95 <sup>th</sup> )		
	EBL	Е	0.93	78.3	#134.2	F	1.18	165.9	#131.4		
o !: • .	EBT	Α	0.57	14.3	95.8	Α	0.44	12.0	71.3		
Carling Avenue at Booth Street	WBT/R	Α	0.59	32.7	79.6	Α	0.60	44.3	m124.9		
Signalized	SBL	Α	0.44	39.6	60.6	E	0.99	88.1	#172.2		
Signalizea	SBR	Α	0.31	7.5	15.0	F	1.82	407.4	#328.8		
	Overall	В	0.64	30.0	-	F	1.10	119.4	-		
	EB	F	1.23	172.4	#127.6	F	1.14	135.9	#167.9		
<b>Bronson Avenue at</b>	WB	Α	0.30	37.5	29.0	Α	0.52	49.1	55.9		
<b>Powell Avenue</b>	NB	D	0.84	35.2	m62.2	D	0.81	33.4	m122.6		
Signalized	SB	Α	0.54	8.3	66.6	Α	0.50	11.7	77.5		
	Overall	E	0.92	38.0	-	D	0.90	39.8	-		
	EBL	Е	0.98	87.8	#131.0	D	0.89	71.4	m#85.8		
	EBL/T	Е	0.95	80.9	#132.2	С	0.80	58.6	m79.4		
<b>Bronson Avenue at</b>	EBR	Е	0.98	55.6	#206.0	F	1.47	248.6	m#267.3		
<b>Carling Avenue</b>	NBL	Α	0.56	29.5	50.8	E	0.93	68.5	m#103.5		
Signalized	NBT/R	F	1.25	147.3	#479.2	F	1.02	73.4	m#427.8		
	SBT/R	Е	0.96	45.5	m#164.0	В	0.69	18.7	m82.4		
	Overall	F	1.26	85.1	-	F	1.24	90.0	-		
D A	EB	Α	0.54	44.3	47.1	E	0.94	94.7	#101.1		
Bronson Avenue at	WB	D	0.88	79.3	#63.6	F	2.78	859.7	#128.3		
Fifth Avenue / Madawaska Drive	NB	С	0.73	11.7	142.4	В	0.70	9.1	115.2		
Signalized	SB	С	0.80	8.9	m193.2	В	0.67	7.0	m71.3		
Signunzeu	Overall	D	0.81	14.7	-	F	1.03	56.7	-		
	EBT/R	-	-	-	-	-	-	-	-		
Carling Assessed at	WBT	-	-	-	-	-	-	-	-		
Carling Avenue at Cambridge Street	WBR	-	-	-	-	-	-	-	-		
Unsignalized	NBR	С	0.09	18.3	2.3	С	0.18	18.5	4.5		
Glisigilulized	SBR	В	0.10	12.2	2.3	С	0.51	17.7	21.8		
	Overall	Α	-	0.5	-	Α	-	2.6	-		

Notes: Saturation flow rate of 1800 veh/h/lane

Queue is measured in metres Peak Hour Factor = 1.00 Delay = average vehicle delay in seconds

m = metered queue

# = volume for the 95th %ile cycle exceeds capacity

The network intersection operations for the 2030 future total horizon operate similarly to the 2030 future background conditions. As in the 2025 future total conditions, during the PM peak hour, the eastbound left movement at the intersection of Bronson Avenue at Carling Avenue may exhibit extended queues with the addition of site traffic. No new capacity issues are noted.

#### 15.2.3 Network Intersection MMLOS

Table 24 summarizes the MMLOS analysis for the network intersections of Carling Avenue at Booth Street, Bronson Avenue at Powell Avenue, Bronson Avenue at Carling Avenue/Glebe Avenue, and Bronson Avenue at Fifth Avenue/Madawaska Drive. The existing and future conditions intersections will be considered in separate rows where they score differently. The intersection analysis is based on the policy area of "Within 300 m of a school" for both the intersections of Bronson Avenue at Carling Avenue/Glebe Avenue and Bronson Avenue at Powell Avenue, "Within 600m of a rapid transit station" for Carling Avenue at Booth Street, and "General Urban Area" for the intersection Bronson Avenue at Fifth Avenue/Madawaska Drive. The MMLOS worksheets has been provided in Appendix J.



**Pedestrian LOS Bicycle LOS Transit LOS** Truck LOS **Auto LOS** Intersection **PLOS Target BLOS Target TLOS Target TrLOS Target ALOS Target** D D С Ε **Carling Avenue at** Ex. F Α F C D D **Booth Street** Fut. F Α F C F D D F Ε C E N/A N/A D Ε **Bronson Avenue** Ex. D Α D D at Powell Avenue Fut. C D F N/A N/A Ε Ε D Α D **Bronson Avenue** Ex./ F Α F C F D D D F Ε at Carling Avenue Fut. **Bronson Avenue** Ε C C C N/A N/A Ε Ex. В D C at Fifth Avenue / C C C Fut. Ε В D N/A N/A F Ε Madawaska Drive

Table 24: Network Intersection MMLOS Analysis

The MMLOS targets will not be met for the pedestrian LOS at all network intersections and for the bicycle LOS at all network intersections except for Bronson Avenue at Powell Avenue. Transit LOS will not be met at the intersections of Carling Avenue at Booth Street and Bronson Avenue at Carling Avenue, and auto LOS will not be met at the intersection of Bronson Avenue at Carling Avenue and at the future horizon for the intersections of Bronson Avenue at Powell Avenue and Bronson Avenue at Fifth Avenue/Madawaska Drive.

The pedestrian level of service would require a maximum of two lanes at a crossing to meet a LOS A and a maximum of three lanes to meet LOS C.

The mixed traffic approaches for cyclists and left-turn arrangements at the study area intersections govern the bicycle LOS, requiring alternative left-turn configurations at the intersections of Carling Avenue at Booth Street, and Bronson Avenue at Fifth Avenue/Madawaska Drive and/or bike lanes without shifting across right-turn lanes to meet the targets at the intersection of Carling Avenue at Booth Street and Carling Avenue/Glebe Avenue at Bronson Avenue.

The transit LOS will not be met due to delays on the southbound and eastbound approaches at the intersection of Carling Avenue and Booth Street, the northbound approach at the intersection of Bronson Avenue and Powell Avenue, and all approaches at the intersection of Bronson Avenue and Carling Avenue/Glebe Avenue.

Auto LOS would require overall intersection v/c to be 1.00 or lower.

#### 15.2.4 Recommended Design Elements

No study area intersection design elements are proposed as part of this study.

# 16 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 207 high-rise apartment units, 71 student housing units, and 4,742 sq. ft commercial space
- Accesses will be provided via a two-way access that restricts the outbound left movement onto Bronson Avenue, an outlet on Cambridge Street
- The development is proposed to be completed as two phases built-out by 2025
- The Trip Generation, Location, and Safety triggers were met for the TIA Screening
- This report accompanies and zoning by-law amendment and site plan application



#### **Existing Conditions**

- Carling Avenue and Bronson Avenue are arterial roads, Booth Street is a major collector road, and Fifth Avenue is a collector road in the study area
- Sidewalks are provided on both sides of the study area roadways, separated bike lanes are along Glebe Avenue, and cycling paths are located within Commissioners Park
- A high number of collisions were noted at the Bronson Avenue and Carling Avenue intersection, primarily
  occurring as sideswipe and rear end collisions which may be due to congested conditions and queueing
  from turn-lanes
- Capacity issues are noted at the intersection of Carling Avenue and Booth Street, Bronson Avenue and Powell Avenue, and at the intersection of Bronson Avenue and Carling Avenue
- The continuing Highway 417 construction projects and Bronson Avenue rehabilitation work are considered contributing factors to the high volumes and noted capacity constraints

#### **Development Generated Travel Demand**

- The proposed development is forecasted produce 146 two-way people trips during the AM peak hour and 203 two-way people trips during the PM peak hour
- Of the forecasted people trips, 33 two-way trips will be vehicle trips during the AM peak hour and 39 twoway trips will be vehicle trips during the PM peak hour
- Of the forecasted trips, 35% are anticipated to travel north, 25% to the south, and 20% to each the east and west

#### **Background Conditions**

- The background developments were explicitly included in the background conditions, along with a total background growth of derived from interpolation from the existing volumes to the forecasted volumes along mainlines and major turning movements
- The study area intersections are forecasted to degrade from the existing conditions with area growth where existing capacity issues are worsened and several new capacity issues are present at the future background horizons
- A review of the network constraints identified residual capacity southbound on Bronson Avenue during the PM peak that may serve to alleviate Carling Avenue eastbound right-turn capacity constraints and Powell Avenue cut through traffic now that the Highway 417 construction activities are complete
- The City should endeavour to restrict potential cut through traffic from Queen Elizabeth Driveway on Madawaska Drive

#### **Development Design**

- Vehicle and cycling parking are proposed to be underground
- Hard surface connections are provided between all building entrances and surrounding pedestrian facilities
- The bus stop along the site frontage is proposed as being shifted north of the site access
- Garbage collection may occur on Cambridge Street or within the loading area at the end of the drive aisle
  accessing Cambridge Street, and emergency services are assumed to access the three site frontages



#### **Parking**

- The site will provide 133 vehicle parking spaces and 221 bicycle spaces, where by-law minimums are 141 vehicle spaces and 141 bicycle spaces
- No vehicle parking is required for the commercial space
- A zoning by-law exemption for the vehicle parking rates will be required

#### **Boundary Street Design**

- Carling Avenue and Bronson Avenue will not meet pedestrian and bicycle MMLOS targets, due to the arterial volumes for pedestrian LOS and lack of cycling facilities for bicycle LOS
- The City would need to reconstruct Bronson Avenue and reallocate road space along Carling Avenue to meet the boundary road targets, both of which are beyond the scope of this development

#### **Access Intersections Design**

- One two-way access is proposed onto Bronson Avenue in the location of an existing access with an outbound left-turn restriction through signage
- The existing access onto Cambridge Street is proposed as being shifted southward and being reduced to 3.6 metres in width, mainly facilitating the outbound right-turn movement for the underground garage, but permitting two-way access for garbage and move-in operations
- A private approach bylaw exemption, or acceptance from the City through site plan, will be required for the Cambridge Street access as it the grade is 5% within nine metres of the property line
- A private approach bylaw exemption, or acceptance from the City through site plan, will be required for the Bronson Avenue access as it is less than 3.0 metres from the south property line
- The accesses are proposed as being stop-controlled on the minor approach
- The site accesses are forecast to perform well during both peak hours

#### TDM

- Given the network intersection operations, if the mode share targets are not achieved, the greatest impact of the increased auto travel would be using the residual capacity on the eastbound left-turn movement at the intersection of Carling Avenue and Bronson Avenue during the AM peak hour
- Supportive TDM measures to be included within the proposed development should include:
  - Designate an internal TDM program coordinator
  - Display local area maps with walking cycling routes, and transit schedules and route maps at entrances
  - o Inclusion of a 6-month Presto card for first time new townhome purchase and apartment rental, with a set time frame for this offer (e.g., 6-months) from the initial opening of the site
  - Unbundle parking cost from or rental costs
  - o Provide a multimodal travel option information package to new residents

# NTM

Volumes along Cambridge Street at all horizons do not exceed local road NTM thresholds

#### **Transit**

• The proposed development is anticipated to generate an additional 43 AM and 44 PM peak hour two-way



- Peak hour increases in transit ridership resulting from the site equate to one quarter of a standard bus load standard bus load routes to/from north of the site and negligible impact on other directions
- No impact on area bus routes is anticipated from site-generated ridership, and no specific transit priority measures were considered as part of this development

#### **Network Intersection Design**

- Generally, the future total network intersections will operate similarly to future background conditions with additional queuing on the eastbound left-turn movement at the intersection of Bronson Avenue and Carling Avenue during the PM peak hour, and this movement reaching capacity in the AM peak hour
- The MMLOS targets will not be met for the pedestrian LOS at all network intersections, the bicycle LOS at all but the intersection of Bronson Avenue and Powell Avenue, transit LOS at all but the intersection of Bronson Avenue and Fifth Avenue/Madawaska Drive, and auto LOS at the future horizons at the intersections of Carling Avenue and Booth Street, Bronson Avenue and Carling Avenue, and Bronson Avenue and Fifth Avenue/Madawaska Drive
- Pedestrian targets would require crossings of no more than three lanes at Bronson Avenue at Fifth
  Avenue/Madawaska Drive and two lanes elsewhere, the bicycle targets can be achieved through the
  construction of dedicated cycling facilities, shifting the left-turn configurations out of mixed flow and
  right-turn configurations that do not shift across turn lanes, and transit LOS would require significant delay
  reductions throughout the study area, which are unlikely the be achieved

# 17 Conclusion

It is recommended that, from a transportation perspective, the proposed development applications proceed.

Prepared By:

John Kingsley, EIT

Transportation Engineering-Intern

Reviewed By:



Andrew Harte, P.Eng. Senior Transportation Engineer



# Appendix A

TIA Screening Form and PM Certification Form





City of Ottawa 2017 TIA Guidelines Step 1 - Screening Form Date: 30-Sep-20
Project Number: 2020-64
Project Reference: Katasa 770-774 Bronson

1.1 Description of Proposed Development	
Municipal Address	770-774 Bronson Avenue and 557 Cambridge Street South
Description of Location	Existing garage and gravel lot
Land Use Classification	Arterial Mainstreet (AM10[2373], AM1[2003] S296)
Development Size	333 apartment units
A	Existing Access onto Bronson Avenue, existing access onto
Accesses	Cambridge Avenue
Phase of Development	Two phases
Buildout Year	2025
TIA Requirement	Full TIA Required

1.2 Trip Generation Trigger	
Land Use Type	Townhomes or apartments
Development Size	333 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	No	
Bicycle Networks?		
Is the development in a Design Priority Area (DPA) or Transit-oriented	V	Bronson Traditional and Carling Arterial
Development (TOD) zone?	Yes	Mainstreet Design Priority
Location Trigger	Yes	

1.4. Safety Triggers		
Are posted speed limits on a boundary street 80 km/hr or greater?	No	
Are there any horizontal/vertical curvatures on a boundary street limits	No	
sight lines at a proposed driveway?	INO	
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,	Yes	
or within 150 m of intersection in urban/ suburban conditions)?		
Is the proposed driveway within auxiliary lanes of an intersection?	Yes	
Does the proposed driveway make use of an existing median break that	No	
serves an existing site?	NO	
Is there is a documented history of traffic operations or safety concerns on	Vos	Collisions at Carling Avenue at Bronson
the boundary streets within 500 m of the development?	Yes	Avenue
Does the development include a drive-thru facility?	No	
Safety Trigger	Yes	



# **TIA Plan Reports**

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

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

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

#### **CERTIFICATION**

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

Dated at Ottawa	this <u>20</u> day of <u>September</u>	, 2018.
(City)		
Name:	Andrew Harte	
	(Please Print)	
Professional Title:	<u>Professional Engineer</u>	
Signature	of Individual certifier that s/he meets the above four criteria	_
Signature	of maly redai certifier that s/he meets the above four criteria	

Office Contact Information (Please Print)
Address: 6 Plaza Court
City / Postal Code: Ottawa / K2H 7W1
Telephone / Extension: (613) 697-3797
E-Mail Address: Andrew.Harte@CGHTransportation.com



# Appendix B

**Turning Movement Counts** 



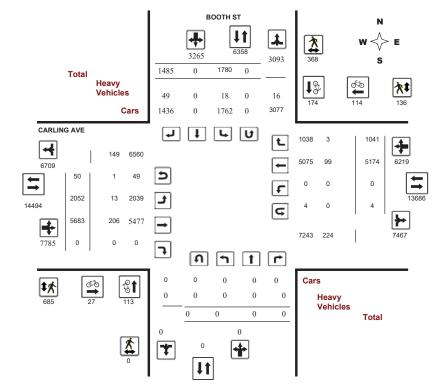


#### **Turning Movement Count - Study Results**

#### **BOOTH ST @ CARLING AVE**

Survey Date: Thursday, September 12, 2019 WO No: 38761 Start Time: 07:00 Device: Miovision

#### **Full Study Diagram**





#### **Transportation Services - Traffic Services**

#### **Turning Movement Count - Study Results**

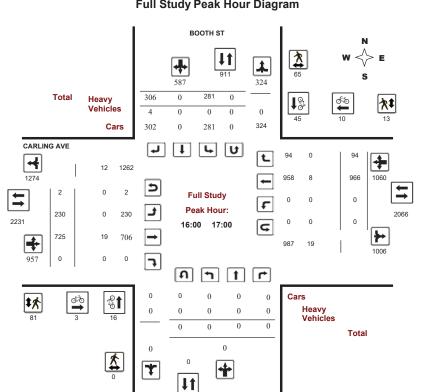
# **BOOTH ST @ CARLING AVE**

Survey Date: Thursday, September 12, 2019 WO No: Start Time: 07:00 Device:

#### **Full Study Peak Hour Diagram**

38761

Miovision



March 11, 2020 March 11, 2020 Page 2 of 8 Page 1 of 8

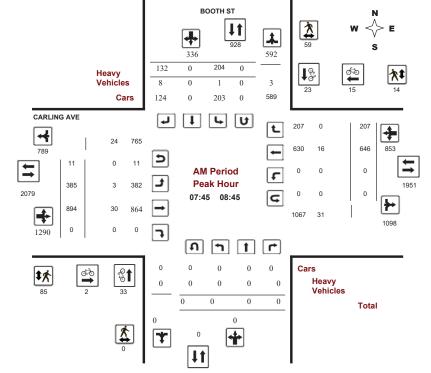


#### **Turning Movement Count - Peak Hour Diagram**

#### **BOOTH ST @ CARLING AVE**

 Survey Date:
 Thursday, September 12, 2019
 WO No:
 38761

 Start Time:
 07:00
 Device:
 Miovision



Comments

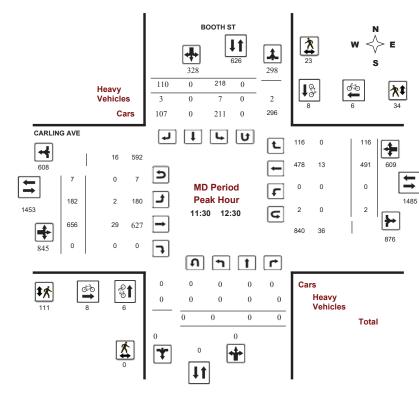


# **Transportation Services - Traffic Services**

#### **Turning Movement Count - Peak Hour Diagram**

# **BOOTH ST @ CARLING AVE**

Survey Date: Thursday, September 12, 2019 WO No: 38761
Start Time: 07:00 Device: Miovision



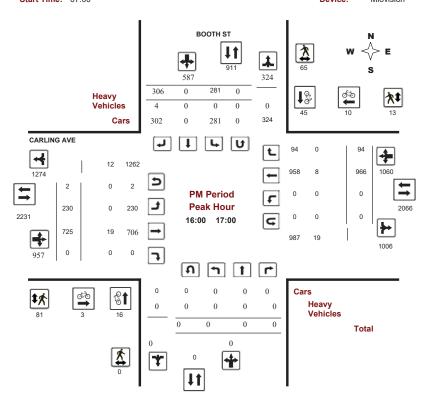
Comments



# **Turning Movement Count - Peak Hour Diagram**

#### **BOOTH ST @ CARLING AVE**

Survey Date: Thursday, September 12, 2019 WO No: 38761
Start Time: 07:00 Device: Miovision



Comments



# **Transportation Services - Traffic Services**

# **Turning Movement Count - Study Results**

#### BOOTH ST @ CARLING AVE

 Survey Date:
 Thursday, September 12, 2019
 WO No:
 38761

 Start Time:
 07:00
 Device:
 Miovision

#### Full Study Summary (8 HR Standard)

Survey Date: Thursday, September 12, Total Observed U-Turns 2019 Northbound: 0 Southbound: 0

								Eastboun	id: 5	0	West	bound	: 4				1.00		
			ВС	OTH	ST							CA	RLING	AVE					
	Northbound				Southbound				-	Е	astbou	ınd		V	/estbo	und			
Period	LT	ST	RT	NB TOT	LT	ST	RT	SB TOT	STR TOT	LT	ST	RT	EB TOT	LT	ST	RT	WB TOT	STR TOT	Grand Total
07:00 08:00	0	0	0	0	198	0	135	333	333	286	724	0	1010	0	576	182	758	1768	2101
08:00 09:00	0	0	0	0	197	0	130	327	327	408	877	0	1285	0	626	191	817	2102	2429
09:00 10:00	0	0	0	0	137	0	103	240	240	339	698	0	1037	0	511	159	670	1707	1947
11:30 12:30	0	0	0	0	218	0	110	328	328	182	656	0	838	0	491	116	607	1445	1773
12:30 13:30	0	0	0	0	179	0	128	307	307	170	649	0	819	0	412	94	506	1325	1632
15:00 16:00	0	0	0	0	269	0	281	550	550	216	710	0	926	0	733	117	850	1776	2326
16:00 17:00	0	0	0	0	281	0	306	587	587	230	725	0	955	0	966	94	1060	2015	2602
17:00 18:00	0	0	0	0	301	0	292	593	593	221	644	0	865	0	859	88	947	1812	2405
Sub Total	0	0	0	0	1780	0	1485	3265	3265	2052	5683	0	7735	0	5174	1041	6215	13950	17215
U Turns				0				0	0				50				4	54	54
Total	0	0	0	0	1780	0	1485	3265	3265	2052	5683	0	7785	0	5174	1041	6219	14004	17269
EQ 12Hr	0	0	0	0	2474	0	2064	4538	4538	2852	7899	0	10821	0	7192	1447	8644	19466	24004
Note: These v	alues ar	e calcul	ated by	/ multipl	ying the	totals b	y the a	ppropriate	e expans	sion fac	tor.			1.39					
AVG 12Hr	. 0	0	0	0	2332	0		4277	4538	2688	7445	0	10198	. 0	6778	1364	8147	19466	24004
Note: These v	olumes	are calc	ulated	by multi	plying th	e Equiv	alent 1	2 hr. total	s by the	AADI	factor.			1					
AVG 24Hr	0	0	0	0	3055	0	2548	5603	5603	3521	9753	0	13360	0	8879	1786	10672	24032	29635
Note: These v	olumes	are calc	ulated	by multi	plying th	e Avera	age Dai	ly 12 hr. t	otals by	12 to 2	4 expans	sion fa	ctor.	1.31					

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

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

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#### **Turning Movement Count - Study Results**

#### **BOOTH ST @ CARLING AVE**

 Survey Date:
 Thursday, September 12, 2019
 WO No:
 38761

 Start Time:
 07:00
 Device:
 Miovision

**BOOTH ST** 

# Full Study 15 Minute Increments CARLING AVE

	No	orthbo	und		Sc	uthbou	nd			E	astbour	ıd		W	estbour	nd			
Time Period	LT	ST	RT	N TOT	LT	ST	RT	S TOT	STR TOT	LT	ST	RT	E TOT	LT	ST	RT	W TOT	STR TOT	Grand Total
07:00 07:15	0	0	0	0	40	0	20	60	146	48	152	0	200	0	117	38	155	146	415
07:15 07:30	0	0	0	0	47	0	37	84	208	72	155	0	227	0	139	52	191	208	502
07:30 07:45	0	0	0	0	52	0	45	97	214	75	194	0	271	0	153	42	195	214	563
07:45 08:00	0	0	0	0	59	0	33	92	233	91	223	0	316	0	167	50	217	233	625
08:00 08:15	0	0	0	0	55	0	26	81	228	94	233	0	331	0	166	53	219	228	631
08:15 08:30	0	0	0	0	42	0	30	72	230	100	238	0	340	0	155	58	213	230	625
08:30 08:45	0	0	0	0	48	0	43	91	237	100	200	0	303	0	158	46	204	237	598
08:45 09:00	0	0	0	0	52	0	31	83	231	114	206	0	325	0	147	34	181	231	589
09:00 09:15	0	0	0	0	39	0	32	71	220	112	160	0	275	0	145	37	183	220	529
09:15 09:30	0	0	0	0	24	0	27	51	200	94	185	0	284	0	129	55	184	200	519
09:30 09:45	0	0	0	0	32	0	27	59	168	72	158	0	230	0	121	37	159	168	448
09:45 10:00	0	0	0	0	42	0	17	59	150	61	195	0	261	0	116	30	146	150	466
11:30 11:45	0	0	0	0	64	0	23	87	154	44	154	0	201	0	125	23	149	154	437
11:45 12:00	0	0	0	0	44	0	24	68	162	55	183	0	239	0	122	39	161	162	468
12:00 12:15	0	0	0	0	50	0	30	80	147	46	152	0	201	0	116	21	137	147	418
12:15 12:30	0	0	0	0	60	0	33	93	163	37	167	0	204	0	128	33	162	163	459
12:30 12:45	0	0	0	0	47	0	29	76	137	35	153	0	189	0	97	26	123	137	388
12:45 13:00	0	0	0	0	54	0	36	90	155	51	179	0	232	0	105	14	119	155	441
13:00 13:15	0	0	0	0	33	0	32	65	130	39	138	0	182	0	103	26	129	130	376
13:15 13:30	0	0	0	0	45	0	31	76	149	45	179	0	224	0	107	28	135	149	435
15:00 15:15	0	0	0	0	78	0	68	146	217	52	155	0	208	0	139	19	158	217	512
15:15 15:30	0	0	0	0	62	0	63	125	221	58	195	0	253	0	172	38	210	221	588
15:30 15:45	0	0	0	0	75	0	77	152	228	44	164	0	208	0	211	32	243	228	603
15:45 16:00	0	0	0	0	54	0	73	127	217	62	196	0	258	0	211	28	239	217	624
16:00 16:15	0	0	0	0	72	0	87	159	239	57	169	0	226	0	233	23	256	239	641
16:15 16:30	0	0	0	0	75	0	56	131	208	53	190	0	243	0	241	24	265	208	639
16:30 16:45	0	0	0	0	65	0	91	156	235	56	177	0	234	0	253	23	276	235	666
16:45 17:00	0	0	0	0	69	0	72	141	229	64	189	0	254	0	239	24	263	229	658
17:00 17:15	0	0	0	0	84	0	76	160	249	60	145	0	205	0	226	29	255	249	620
17:15 17:30	0	0	0	0	74	0	75	149	218	51	189	0	240	0	230	18	248	218	637
17:30 17:45	0	0	0	0	85	0	79	164	236	53	171	0	225	0	216	19	235	236	624
17:45 18:00	0	0	0	0	58	0	62	120	199	57	139	0	196	0	187	22	209	199	525
Total:	0	0	0	0	1780	0	1485	3265	6358	2052	5683	0	7785	0	5174	1041	6219	6358	17,269

Note: U-Turns are included in Totals.



# **Transportation Services - Traffic Services**

#### **Turning Movement Count - Study Results**

#### **BOOTH ST @ CARLING AVE**

 Survey Date:
 Thursday, September 12, 2019
 WO No:
 38761

 Start Time:
 07:00
 Device:
 Miovision

#### **Full Study Cyclist Volume**

		BOOTH ST	-	-	CARLING AV	E	
Time Period	Northbound	Southbound	Street Total	Eastbound	Westbound	Street Total	Grand Total
07:00 07:15	3	3	6	2	2	4	10
07:15 07:30	1	4	5	2	1	3	8
07:30 07:45	7	4	11	0	4	4	15
07:45 08:00	6	8	14	0	4	4	18
08:00 08:15	4	5	9	1	7	8	17
08:15 08:30	12	4	16	0	2	2	18
08:30 08:45	11	6	17	1	2	3	20
08:45 09:00	14	3	17	0	5	5	22
09:00 09:15	7	3	10	1	4	5	15
09:15 09:30	2	1	3	1	3	4	7
09:30 09:45	4	1	5	0	5	5	10
09:45 10:00	4	1	5	1	2	3	8
11:30 11:45	3	1	4	4	0	4	8
11:45 12:00	2	2	4	2	2	4	8
12:00 12:15	1	4	5	0	1	1	6
12:15 12:30	0	1	1	2	3	5	6
12:30 12:45	0	2	2	2	1	3	5
12:45 13:00	0	0	0	0	1	1	1
13:00 13:15	2	1	3	1	0	1	4
13:15 13:30	1	1	2	0	3	3	5
15:00 15:15	1	6	7	0	25	25	32
15:15 15:30	0	7	7	0	5	5	12
15:30 15:45	0	4	4	1	1	2	6
15:45 16:00	1	8	9	1	1	2	11
16:00 16:15	4	6	10	2	2	4	14
16:15 16:30	4	18	22	1	4	5	27
16:30 16:45	5	5	10	0	3	3	13
16:45 17:00	3	16	19	0	1	1	20
17:00 17:15	7	15	22	1	1	2	24
17:15 17:30	1	15	16	0	6	6	22
17:30 17:45	3	9	12	0	8	8	20
17:45 18:00	0	10	10	1	5	6	16
Total	113	174	287	27	114	141	428

March 11, 2020 Page 4 of 8 March 11, 2020 Page 5 of 8



#### **Turning Movement Count - Study Results**

#### **BOOTH ST @ CARLING AVE**

 Survey Date:
 Thursday, September 12, 2019
 WO No:
 38761

 Start Time:
 07:00
 Device:
 Miovision

# Full Study Pedestrian Volume BOOTH ST CARLING AVE

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	0	4	4	5	4	9	13
07:15 07:30	0	6	6	3	1	4	10
07:30 07:45	0	6	6	11	4	15	21
07:45 08:00	0	10	10	9	4	13	23
08:00 08:15	0	15	15	22	6	28	43
08:15 08:30	0	19	19	17	1	18	37
08:30 08:45	0	15	15	37	3	40	55
08:45 09:00	0	10	10	25	1	26	36
09:00 09:15	0	9	9	5	0	5	14
09:15 09:30	0	7	7	10	0	10	17
09:30 09:45	0	7	7	5	12	17	24
09:45 10:00	0	2	2	9	4	13	15
11:30 11:45	0	3	3	6	1	7	10
11:45 12:00	0	6	6	13	6	19	25
12:00 12:15	0	3	3	52	13	65	68
12:15 12:30	0	11	11	40	14	54	65
12:30 12:45	0	10	10	78	6	84	94
12:45 13:00	0	9	9	80	6	86	95
13:00 13:15	0	6	6	48	5	53	59
13:15 13:30	0	8	8	18	1	19	27
15:00 15:15	0	48	48	12	3	15	63
15:15 15:30	0	17	17	7	2	9	26
15:30 15:45	0	11	11	14	2	16	27
15:45 16:00	0	7	7	14	5	19	26
16:00 16:15	0	19	19	15	1	16	35
16:15 16:30	0	14	14	13	1	14	28
16:30 16:45	0	10	10	38	7	45	55
16:45 17:00	0	22	22	15	4	19	41
17:00 17:15	0	14	14	26	5	31	45
17:15 17:30	0	8	8	15	7	22	30
17:30 17:45	0	17	17	16	2	18	35
17:45 18:00	0	15	15	7	5	12	27
Total	0	368	368	685	136	821	1189



# **Transportation Services - Traffic Services**

#### **Turning Movement Count - Study Results**

#### **BOOTH ST @ CARLING AVE**

 Survey Date:
 Thursday, September 12, 2019
 WO No:
 38761

 Start Time:
 07:00
 Device:
 Miovision

#### Full Study Heavy Vehicles

BOOTH ST CARLING AVE

	N	orthbo	und		Sc	outhbou	ınd		Eastbound					W	estbour	nd			
Time Period	LT	ST	RT	N TOT	LT	ST	RT	S TOT	STR TOT	LT	ST	RT	E TOT	LT	ST	RT	W TOT	STR TOT	Grand Total
07:00 07:15	0	0	0	0	0	0	2	3	3	0	5	0	11	0	4	1	10	21	12
07:15 07:30	0	0	0	0	0	0	1	1	1	0	5	0	9	0	3	0	8	17	9
07:30 07:45	0	0	0	0	1	0	3	4	4	0	5	0	12	0	4	0	10	22	13
07:45 08:00	0	0	0	0	0	0	3	5	5	2	10	0	18	0	3	0	13	31	18
08:00 08:15	0	0	0	0	0	0	0	1	1	1	5	0	11	0	5	0	10	21	11
08:15 08:30	0	0	0	0	0	0	3	3	3	0	6	0	14	0	5	0	11	25	14
08:30 08:45	0	0	0	0	1	0	2	3	3	0	9	0	14	0	3	0	13	27	15
08:45 09:00	0	0	0	0	0	0	4	6	6	2	5	0	16	0	5	0	10	26	16
09:00 09:15	0	0	0	0	0	0	3	3	3	0	11	0	19	0	5	0	16	35	19
09:15 09:30	0	0	0	0	0	0	2	3	3	1	7	0	15	0	5	0	12	27	15
09:30 09:45	0	0	0	0	0	0	2	3	3	1	16	0	25	0	6	0	22	47	25
09:45 10:00	0	0	0	0	0	0	0	4	4	3	8	0	17	0	4	1	13	30	17
11:30 11:45	0	0	0	0	3	0	0	3	3	0	12	0	21	0	9	0	24	45	24
11:45 12:00	0	0	0	0	1	0	2	5	5	2	8	0	14	0	2	0	11	25	15
12:00 12:15	0	0	0	0	2	0	1	3	3	0	5	0	8	0	2	0	9	17	10
12:15 12:30	0	0	0	0	1	0	0	1	1	0	4	0	4	0	0	0	5	9	5
12:30 12:45	0	0	0	0	1	0	0	1	1	0	3	0	6	0	3	0	7	13	7
12:45 13:00	0	0	0	0	1	0	2	3	3	0	8	0	10	0	0	0	9	19	11
13:00 13:15	0	0	0	0	1	0	1	3	3	1	6	0	10	0	2	0	9	19	11
13:15 13:30	0	0	0	0	1	0	2	4	4	0	4	0	6	0	0	1	6	12	8
15:00 15:15	0	0	0	0	0	0	2	2	2	0	7	0	12	0	3	0	10	22	12
15:15 15:30	0	0	0	0	0	0	1	1	1	0	1	0	6	0	4	0	5	11	6
15:30 15:45	0	0	0	0	1	0	1	2	2	0	8	0	11	0	2	0	11	22	12
15:45 16:00	0	0	0	0	1	0	2	3	3	0	11	0	15	0	2	0	14	29	16
16:00 16:15	0	0	0	0	0	0	1	1	1	0	7	0	11	0	3	0	10	21	11
16:15 16:30	0	0	0	0	0	0	1	1	1	0	3	0	6	0	2	0	5	11	6
16:30 16:45	0	0	0	0	0	0	0	0	0	0	3	0	5	0	2	0	5	10	5
16:45 17:00	0	0	0	0	0	0	2	2	2	0	6	0	9	0	1	0	7	16	9
17:00 17:15	0	0	0	0	2	0	1	3	3	0	5	0	8	0	2	0	9	17	10
17:15 17:30	0	0	0	0	0	0	2	2	2	0	7	0	12	0	3	0	10	22	12
17:30 17:45	0	0	0	0	0	0	2	2	2	0	1	0	5	0	2	0	3	8	5
17:45 18:00	0	0	0	0	1	0	1	2	2	0	5	0	9	0	3	0	9	18	10
Total: None	0	0	0	0	18	0	49	83	83	13	206	0	369	0	99	3	326	695	389

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#### **Turning Movement Count - Study Results**

#### **BOOTH ST @ CARLING AVE**

Survey Date:Thursday, September 12, 2019WO No:38761Start Time:07:00Device:Miovision

# Full Study 15 Minute U-Turn Total BOOTH ST CARLING AVE

Time I	Period	Northbound U-Turn Total	Southbound U-Turn Total	Eastbound U-Turn Total	Westbound U-Turn Total	Total
07:00	07:15	0	0	0	0	0
07:15	07:30	0	0	0	0	0
07:30	07:45	0	0	2	0	2
07:45	08:00	0	0	2	0	2
08:00	08:15	0	0	4	0	4
08:15	08:30	0	0	2	0	2
08:30	08:45	0	0	3	0	3
08:45	09:00	0	0	5	0	5
09:00	09:15	0	0	3	1	4
09:15	09:30	0	0	5	0	5
09:30	09:45	0	0	0	1	1
09:45	10:00	0	0	5	0	5
11:30	11:45	0	0	3	1	4
11:45	12:00	0	0	1	0	1
12:00	12:15	0	0	3	0	3
12:15	12:30	0	0	0	1	1
12:30	12:45	0	0	1	0	1
12:45	13:00	0	0	2	0	2
13:00	13:15	0	0	5	0	5
13:15	13:30	0	0	0	0	0
15:00	15:15	0	0	1	0	1
15:15	15:30	0	0	0	0	0
15:30	15:45	0	0	0	0	0
15:45	16:00	0	0	0	0	0
16:00	16:15	0	0	0	0	0
16:15	16:30	0	0	0	0	0
16:30	16:45	0	0	1	0	1
16:45	17:00	0	0	1	0	1
17:00	17:15	0	0	0	0	0
17:15	17:30	0	0	0	0	0
17:30	17:45	0	0	1	0	1
17:45	18:00	0	0	0	0	0
To	otal	0	0	50	4	54



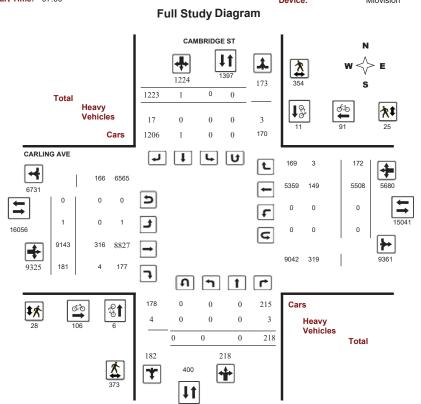
# **Transportation Services - Traffic Services**

#### **Turning Movement Count - Study Results**

# CAMBRIDGE ST @ CARLING AVE

 Survey Date:
 Thursday, May 17, 2018
 WO No:
 37836

 Start Time:
 07:00
 Device:
 Miovision



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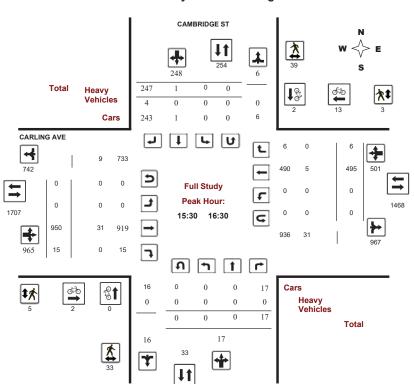
#### **Turning Movement Count - Study Results**

#### **CAMBRIDGE ST @ CARLING AVE**

 Survey Date:
 Thursday, May 17, 2018
 WO No:
 37836

 Start Time:
 07:00
 Device:
 Miovision

#### **Full Study Peak Hour Diagram**





#### **Transportation Services - Traffic Services**

Work Order

37836

#### **Turning Movement Count - Full Study Summary Report**

# CAMBRIDGE ST @ CARLING AVE

 Survey Date:
 Thursday, May 17, 2018
 Total Observed U-Turns
 AADT Factor

 Northbound:
 0
 Southbound:
 0
 .90

 Eastbound:
 0
 Westbound:
 0

								F	ull Stu	ıdy									
			CA	MBRID	GE ST	Γ						C	ARLING	3 AVE	=				
_	N	orthbo	ound		S	outhb	ound		_		Eastbo	ound			Westb	ound			
Period	LT	ST	RT	NB TOT	LT	ST	RT	SB TOT	STR TOT	LT	ST	RT	EB TOT	LT	ST	RT	WB TOT	STR TOT	Gran Tot
07:00 08:00	0	0	8	8	0	0	69	69	77	0	687	2	689	0	492	9	501	1190	126
08:00 09:00	0	0	9	9	0	0	57	57	66	1	900	3	904	0	527	18	545	1449	151
09:00 10:00	0	0	17	17	0	0	50	50	67	0	689	12	701	0	515	18	533	1234	130
10:00 11:00	0	0	12	12	0	0	35	35	47	0	559	15	574	0	401	19	420	994	104
11:00 12:00	0	0	18	18	0	0	42	42	60	0	656	24	680	0	453	10	463	1143	120
12:00 13:00	0	0	20	20	0	0	45	45	65	0	645	17	662	0	423	17	440	1102	116
13:00 14:00	0	0	36	36	0	0	47	47	83	0	679	19	698	0	424	23	447	1145	122
14:00 15:00	0	0	20	20	0	0	73	73	93	0	743	24	767	0	424	20	444	1211	130
15:00 16:00	0	0	17	17	0	0	172	172	189	0	921	12	933	0	471	7	478	1411	160
16:00 17:00	0	0	15	15	0	1	289	290	305	0	886	17	903	0	473	6	479	1382	168
17:00 18:00	0	0	23	23	0	0	249	249	272	0	866	15	881	0	461	7	468	1349	162
18:00 19:00	0	0	23	23	0	0	95	95	118	0	912	21	933	0	444	18	462	1395	151
Sub Total	0	0	218	218	0	1	1223	1224	1442	1	9143	181	9325	0	5508	172	5680	15005	1644
U Turns				0				0	0				0				0	0	
Total	0	0	218	218	0	1	1223	1224	1442	1	9143	181	9325	0	5508	172	5680	15005	1644
AVG 12Hr	0	0	196	196	0	1	1101	1102	1298	1	8229	163	8392	0	4957	155	5112	13504	1480
Note: These v	olumes a	are calo	culated	by multip	lying the	e Equiv	/alent 1	2 hr. tota	ls by the	AADT	factor.			90					
AVG 24Hr	0	0	257	257	0	1	1442	1443	1700	1	10780	213	10994	0	6494	203	6697	17691	1939

#### Comments

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

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#### **Turning Movement Count - Study Results**

#### **CAMBRIDGE ST @ CARLING AVE**

 Survey Date:
 Thursday, May 17, 2018
 WO No:
 37836

 Start Time:
 07:00
 Device:
 Miovision

# Full Study 15 Minute Increments

CAMBRIDGE ST CARLING AVE

	N	orthbou	und		Sc	uthbou	nd			E	astbour	nd	Westbound						
Time Period	LT	ST	RT	N TOT	LT	ST	RT	S TOT	STR TOT	LT	ST	RT	E TOT	LT	ST	RT	W TOT	STR TOT	Grand Total
07:00 07:15	0	0	3	3	0	0	12	12	0	0	118	1	119	0	110	5	115	0	249
07:15 07:30	0	0	0	0	0	0	21	21	1	0	166	0	166	0	120	2	122	1	309
07:30 07:45	0	0	2	2	0	0	24	24	0	0	197	1	198	0	121	1	122	0	346
07:45 08:00	0	0	3	3	0	0	12	12	0	0	206	0	206	0	141	1	142	0	363
08:00 08:15	0	0	1	1	0	0	15	15	1	0	215	1	216	0	126	1	127	1	359
08:15 08:30	0	0	6	6	0	0	17	17	2	0	233	1	234	0	133	3	136	2	393
08:30 08:45	0	0	0	0	0	0	11	11	0	1	223	1	225	0	133	7	140	0	376
08:45 09:00	0	0	2	2	0	0	14	14	0	0	229	0	229	0	135	7	142	0	387
09:00 09:15	0	0	0	0	0	0	14	14	0	0	195	2	197	0	155	7	162	0	373
09:15 09:30	0	0	8	8	0	0	16	16	0	0	174	3	177	0	129	3	132	0	333
09:30 09:45	0	0	6	6	0	0	9	9	1	0	163	4	167	0	121	6	127	1	309
09:45 10:00	0	0	3	3	0	0	11	11	0	0	157	3	160	0	110	2	112	0	286
10:00 10:15	0	0	1	1	0	0	9	9	1	0	149	4	153	0	102	4	106	1	269
10:15 10:30	0	0	4	4	0	0	9	9	0	0	133	4	137	0	101	7	108	0	258
10:30 10:45	0	0	2	2	0	0	10	10	0	0	138	2	140	0	94	2	96	0	248
10:45 11:00	0	0	5	5	0	0	7	7	1	0	139	5	144	0	104	6	110	1	266
11:00 11:15	0	0	6	6	0	0	6	6	0	0	162	9	171	0	104	1	105	0	288
11:15 11:30	0	0	2	2	0	0	14	14	0	0	160	2	162	0	112	1	113	0	291
11:30 11:45	0	0	2	2	0	0	7	7	0	0	187	9	196	0	112	5	117	0	322
11:45 12:00	0	0	8	8	0	0	15	15	0	0	147	4	151	0	125	3	128	0	302
12:00 12:15	0	0	4	4	0	0	11	11	0	0	178	3	181	0	98	0	98	0	294
12:15 12:30	0	0	6	6	0	0	10	10	1	0	148	3	151	0	112	8	120	1	287
12:30 12:45	0	0	6	6	0	0	8	8	0	0	150	7	157	0	107	5	112	0	283
12:45 13:00	0	0	4	4	0	0	16	16	0	0	169	4	173	0	106	4	110	0	303
13:00 13:15	0	0	9	9	0	0	10	10	1	0	178	4	182	0	103	5	108	1	309
13:15 13:30	0	0	7	7	0	0	13	13	0	0	171	3	174	0	116	4	120	0	314
13:30 13:45	0	0	11	11	0	0	11	11	3	0	174	7	181	0	92	6	98	3	301
13:45 14:00	0	0	9	9	0	0	13	13	0	0	156	5	161	0	113	8	121	0	304
14:00 14:15	0	0	7	7	0	0	18	18	0	0	171	10	181	0	92	6	98	0	304
14:15 14:30	0	0	5	5	0	0	10	10	0	0	183	6	189	0	108	2	110	0	314
14:30 14:45	0	0	4	4	0	0	22	22	0	0	201	2	203	0	106	5	111	0	340
14:45 15:00	0	0	4	4	0	0	23	23	1	0	188	6	194	0	118	7	125	1	346
15:00 15:15	0	0	5	5	0	0	36	36	0	0	209	4	213	0	107	3	110	0	364
15:15 15:30	0	0	3	3	0	0	41	41	2	0	227	2	229	0	110	1	111	2	384
15:30 15:45	0	0	7	7	0	0	38	38	0	0	240	6	246	0	132	2	134	0	425
15:45 16:00	0	0	2	2	0	0	57	57	1	0	245	0	245	0	122	1	123	1	427
16:00 16:15	0	0	6	6	0	1	74	75	3	0	222	5	227	0	120	3	123	3	431
16:15 16:30	0	0	2	2	0	0	78	78	0	0	243	4	247	0	121	0	121	0	448
16:30 16:45	0	0	2	2	0	0	60	60	0	0	215	7	222	0	118	3	121	0	405
16:45 17:00	0	0	5	5	0	0	77	77	0	0	206	1	207	0	114	0	114	0	403
17:00 17:15	0	0	5	5	0	0	67	67	0	0	229	3	232	0	117	0	117	0	421
17:15 17:30	0	0	7	7	0	0	76	76	0	0	225	5	230	0	131	2	133	0	446



# **Transportation Services - Traffic Services**

#### **Turning Movement Count - Study Results**

#### CAMBRIDGE ST @ CARLING AVE

Surv	urvey Date: Thursday, May 17, 2018													wo	No:			3	7836	
Star	Start Time: 07:00											Dev	ice:			Mic	oisivo	n		
17:30	17:45	0	0	8	8	0	0	55	55	1	0	192	3	195	0	94	4	98	1	356
17:45	18:00	0	0	3	3	0	0	51	51	0	0	220	4	224	0	119	1	120	0	398
18:00	18:15	0	0	9	9	0	0	38	38	0	0	195	1	196	0	103	3	106	0	349
18:15	18:30	0	0	8	8	0	0	23	23	0	0	231	5	236	0	108	2	110	0	377
18:30	18:45	0	0	2	2	0	0	18	18	0	0	267	5	272	0	121	3	124	0	416
18:45	19:00	0	0	4	4	0	0	16	16	0	0	219	10	229	0	112	10	122	0	371
Total:		0	0	218	218	0	1	1223	1224	20	1	9143	181	9325	0	5508	172	5680	20	16,447

Note: U-Turns are included in Totals.

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#### **Turning Movement Count - Study Results**

#### **CAMBRIDGE ST @ CARLING AVE**

 Survey Date:
 Thursday, May 17, 2018
 WO No:
 37836

 Start Time:
 07:00
 Device:
 Miovision

# Full Study Cyclist Volume CARLING AVE CARLING AVE

		OAMBINDOL O	•		OAITEINO AT	-	
Time Period	Northbound	Southbound	Street Total	Eastbound	Westbound	Street Total	Grand Total
07:00 07:15	0	0	0	1	0	1	1
07:15 07:30	1	1	2	1	2	3	5
07:30 07:45	0	0	0	1	1	2	2
07:45 08:00	1	0	1	1	6	7	8
08:00 08:15	0	0	0	4	4	8	8
08:15 08:30	0	1	1	9	4	13	14
08:30 08:45	1	1	2	22	1	23	25
08:45 09:00	1	0	1	8	0	8	9
9:00 09:15	0	0	0	4	4	8	8
9:15 09:30	0	1	1	1	0	1	2
09:30 09:45	0	0	0	0	0	0	0
9:45 10:00	0	0	0	0	1	1	1
10:00 10:15	0	0	0	0	0	0	0
0:15 10:30	0	0	0	1	1	2	2
10:30 10:45	1	0	1	0	2	2	3
10:45 11:00	0	0	0	1	0	1	1
1:00 11:15	0	0	0	0	3	3	3
1:15 11:30	0	0	0	2	1	3	3
1:30 11:45	0	0	0	1	1	2	2
1:45 12:00	0	1	1	2	0	2	3
2:00 12:15	0	0	0	2	3	5	5
2:15 12:30	0	0	0	4	1	5	5
2:30 12:45	0	0	0	1	1	2	2
2:45 13:00	0	1	1	0	0	0	1
3:00 13:15	0	0	0	2	2	4	4
3:15 13:30	0	0	0	1	2	3	3
3:30 13:45	0	1	1	0	2	2	3
3:45 14:00	0	0	0	0	0	0	0
4:00 14:15	0	0	0	2	1	3	3
4:15 14:30	0	0	0	0	0	0	0
4:30 14:45	0	0	0	2	2	4	4
4:45 15:00	0	0	0	0	0	0	0
5:00 15:15	0	0	0	2	17	19	19
5:15 15:30	0	0	0	0	2	2	2
5:30 15:45	0	0	0	0	6	6	6
5:45 16:00	0	1	1	0	2	2	3
6:00 16:15	0	0	0	2	3	5	5
6:15 16:30	0	1	1	0	2	2	3
6:30 16:45	0	0	0	5	0	5	5
6:45 17:00	0	1	1	0	5	5	6
7:00 17:15	0	0	0	2	2	4	4
7:15 17:30	0	0	0	0	0	0	0
7:30 17:45	0	0	0	3	1	4	4
17:45 18:00	0	0	0	4	1	5	5
18:00 18:15	0	0	0	4	2	6	6



# **Transportation Services - Traffic Services**

#### **Turning Movement Count - Study Results**

CAMBRIDGE ST	CAMBRIDGE ST @ CARLING AVE										
Survey Date: Thursday, May 17, 2018	WO No:	37836									
Start Time: 07:00	Device:	Miovision									

	-	, ,	, ,					
Sta	rt Tim	e: 07:00				Device:	I	Miovision
18:15	18:30	1	1	2	6	1	7	9
18:30	18:45	0	0	0	1	2	3	3
18:45	19:00	0	0	0	4	0	4	4
Total		6	11	17	106	91	197	214
						_	_	

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#### **Turning Movement Count - Study Results**

#### **CAMBRIDGE ST @ CARLING AVE**

 Survey Date:
 Thursday, May 17, 2018
 WO No:
 37836

 Start Time:
 07:00
 Device:
 Miovision

# Full Study Pedestrian Volume CAMBRIDGE ST CARLING AVE

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	0	1	1	0	0	0	1
07:15 07:30	2	4	6	0	2	2	8
07:30 07:45	1	2	3	0	0	0	3
07:45 08:00	3	3	6	0	0	0	6
08:00 08:15	9	10	19	0	0	0	19
08:15 08:30	28	12	40	0	0	0	40
08:30 08:45	5	13	18	0	1	1	19
08:45 09:00	46	16	62	0	0	0	62
09:00 09:15	15	3	18	2	1	3	21
09:15 09:30	14	6	20	0	0	0	20
09:30 09:45	12	6	18	0	1	1	19
09:45 10:00	6	4	10	0	5	5	15
10:00 10:15	4	5	9	0	0	0	9
10:15 10:30	5	4	9	0	0	0	9
10:30 10:45	0	9	9	0	2	2	11
10:45 11:00	0	7	7	0	0	0	7
11:00 11:15	5	1	6	5	0	5	11
11:15 11:30	3	7	10	3	0	3	13
11:30 11:45	1	6	7	0	0	0	7
11:45 12:00	7	7	14	0	0	0	14
12:00 12:15	6	8	14	0	0	0	14
12:15 12:30	6	6	12	0	3	3	15
12:30 12:45	18	11	29	2	3	5	34
12:45 13:00	4	8	12	0	1	1	13
13:00 13:15	10	14	24	0	0	0	24
13:15 13:30	8	6	14	0	0	0	14
13:30 13:45	5	10	15	0	0	0	15
13:45 14:00	7	7	14	0	0	0	14
14:00 14:15	6	15	21	0	1	1	22
14:15 14:30	7	4	11	0	0	0	11
14:30 14:45	8	2	10	0	0	0	10
14:45 15:00	10	6	16	0	0	0	16
15:00 15:15	11	27	38	1	0	1	39
15:15 15:30	7	11	18	2	1	3	21
15:30 15:45	8	11	19	1	0	1	20
15:45 16:00	7	10	17	3	0	3	20
16:00 16:15	6	7	13	1	0	1	14
16:15 16:30	12	11	23	0	3	3	26
16:30 16:45	8	5	13	0	0	0	13
16:45 17:00	16	10	26	0	1	1	27
17:00 17:15	4	6	10	1	0	1	11
17:15 17:30	4	9	13	0	0	0	13
17:30 17:45	8	6	14	1	0	1	15



# **Transportation Services - Traffic Services**

#### **Turning Movement Count - Study Results**

		CAN	IBRIDGE	SI@CAR	LING AVE		
Survey Date:	Thursday, I	May 17, 2018			WO No:		37836
Start Time:	07:00				Device:		Miovision
17:45 18:00	3	3	6	0	0	0	6
18:00 18:15	6	5	11	3	0	3	14
18:15 18:30	1	3	4	2	0	2	6
18:30 18:45	7	4	11	0	0	0	11
18:45 19:00	4	3	7	1	0	1	8
Total	373	354	727	28	25	<b>53</b>	780

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#### **Turning Movement Count - Study Results**

#### **CAMBRIDGE ST @ CARLING AVE**

 Survey Date:
 Thursday, May 17, 2018
 WO No:
 37836

 Start Time:
 07:00
 Device:
 Miovision

# **Full Study Heavy Vehicles**

CAMBRIDGE ST CARLING AVE

	N	orthbo	und		Sc	uthbou	nd			E	astbour	nd		We	estbour	nd			
Time Period	LT	ST	RT	N TOT	LT	ST	RT	S TOT	STR TOT	LT	ST	RT	E TOT	LT	ST	RT	W TOT	STR TOT	Grand Total
07:00 07:15	0	0	0	0	0	0	0	0	0	0	5	0	5	0	2	0	2	7	7
07:15 07:30	0	0	0	0	0	0	1	1	1	0	2	0	2	0	4	0	4	6	7
07:30 07:45	0	0	0	0	0	0	0	0	0	0	4	0	4	0	4	0	4	8	8
07:45 08:00	0	0	0	0	0	0	0	0	0	0	8	0	8	0	4	0	4	12	12
08:00 08:15	0	0	0	0	0	0	1	1	1	0	8	0	8	0	5	0	5	13	14
08:15 08:30	0	0	0	0	0	0	2	2	2	0	6	0	6	0	9	0	9	15	17
08:30 08:45	0	0	0	0	0	0	0	0	0	0	7	0	7	0	2	1	3	10	10
08:45 09:00	0	0	0	0	0	0	0	0	0	0	10	0	10	0	3	0	3	13	13
09:00 09:15	0	0	0	0	0	0	0	0	0	0	5	0	5	0	2	0	2	7	7
09:15 09:30	0	0	0	0	0	0	0	0	0	0	7	0	7	0	5	0	5	12	12
09:30 09:45	0	0	0	0	0	0	1	1	1	0	6	0	6	0	1	0	1	7	8
09:45 10:00	0	0	0	0	0	0	0	0	0	0	9	0	9	0	3	0	3	12	12
10:00 10:15	0	0	0	0	0	0	1	1	1	0	1	0	1	0	4	0	4	5	6
10:15 10:30	0	0	0	0	0	0	0	0	0	0	11	0	11	0	5	0	5	16	16
10:30 10:45	0	0	0	0	0	0	0	0	0	0	12	0	12	0	7	0	7	19	19
10:45 11:00	0	0	1	1	0	0	0	0	1	0	4	0	4	0	1	1	2	6	7
11:00 11:15	0	0	0	0	0	0	0	0	0	0	7	0	7	0	5	0	5	12	12
11:15 11:30	0	0	0	0	0	0	0	0	0	0	4	0	4	0	4	0	4	8	8
11:30 11:45	0	0	0	0	0	0	0	0	0	0	7	0	7	0	3	0	3	10	10
11:45 12:00	0	0	0	0	0	0	0	0	0	0	5	0	5	0	7	0	7	12	12
12:00 12:15	0	0	0	0	0	0	0	0	0	0	5	0	5	0	1	0	1	6	6
12:15 12:30	0	0	0	0	0	0	1	1	1	0	4	0	4	0	4	0	4	8	9
12:30 12:45	0	0	0	0	0	0	0	0	0	0	6	0	6	0	2	0	2	8	8
12:45 13:00	0	0	0	0	0	0	0	0	0	0	5	0	5	0	2	0	2	7	7
13:00 13:15	0	0	0	0	0	0	1	1	1	0	12	0	12	0	3	0	3	15	16
13:15 13:30	0	0	0	0	0	0	0	0	0	0	6	0	6	0	6	0	6	12	12
13:30 13:45	0	0	1	1	0	0	2	2	3	0	7	0	7	0	1	0	1	8	11
13:45 14:00	0	0	0	0	0	0	0	0	0	0	8	1	9	0	5	0	5	14	14
14:00 14:15	0	0	0	0	0	0	0	0	0	0	5	0	5	0	5	1	6	11	11
14:15 14:30	0	0	0	0	0	0	0	0	0	0	7	0	7	0	3	0	3	10	10
14:30 14:45	0	0	0	0	0	0	0	0	0	0	7	1	8	0	3	0	3	11	11
14:45 15:00	0	0	1	1	0	0	0	0	1	0	8	0	8	0	3	0	3	11	12
15:00 15:15	0	0	0	0	0	0	0	0	0	0	7	0	7	0	5	0	5	12	12
15:15 15:30	0	0	0	0	0	0	2	2	2	0	8	0	8	0	1	0	1	9	11
15:30 15:45	0	0	0	0	0	0	0	0	0	0	8	0	8	0	1	0	1	9	9
15:45 16:00	0	0	0	0	0	0	1	1	1	0	7	0	7	0	1	0	1	8	9
16:00 16:15	0	0	0	0	0	0	3	3	3	0	7	0	7	0	2	0	2	9	12
16:15 16:30	0	0	0	0	0	0	0	0	0	0	9	0	9	0	1	0	1	10	10
16:30 16:45	0	0	0	0	0	0	0	0	0	0	5	1	6	0	2	0	2	8	8
16:45 17:00	0	0	0	0	0	0	0	0	0	0	5	0	5	0	1	0	1	6	6
17:00 17:15	0	0	0	0	0	0	0	0	0	0	7	0	7	0	1	0	1	8	8
17:15 17:30	0	0	0	0	0	0	0	0	0	0	7	1	8	0	2	0	2	10	10



# **Transportation Services - Traffic Services**

#### **Turning Movement Count - Study Results**

#### CAMBRIDGE ST @ CARLING AVE

	ey Dat t Time			ay, Ma	ay 17	, 2018	3							WO Dev					7836 ovision	n
17:30	17:45	0	0	0	0	0	0	1	1	1	0	13	0	13	0	2	0	2	15	16
17:45	18:00	0	0	0	0	0	0	0	0	0	0	7	0	7	0	3	0	3	10	10
18:00	18:15	0	0	0	0	0	0	0	0	0	0	3	0	3	0	1	0	1	4	4
18:15	18:30	0	0	0	0	0	0	0	0	0	0	3	0	3	0	2	0	2	5	5
18:30	18:45	0	0	0	0	0	0	0	0	0	0	6	0	6	0	5	0	5	11	11
18:45	19:00	0	0	0	0	0	0	0	0	0	0	6	0	6	0	1	0	1	7	7
Total:	None	0	0	3	3	0	0	17	17	20	0	316	4	320	0	149	3	152	472	492

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#### **Turning Movement Count - Study Results**

#### **CAMBRIDGE ST @ CARLING AVE**

 Survey Date:
 Thursday, May 17, 2018
 WO No:
 37836

 Start Time:
 07:00
 Device:
 Miovision

# Full Study 15 Minute U-Turn Total CAMBRIDGE ST CARLING AVE

Time I	Period	Northbound U-Turn Total	Southbound U-Turn Total	Eastbound U-Turn Total	Westbound U-Turn Total	Total
07:00	07:15	0	0	0	0	0
07:15	07:30	0	0	0	0	0
07:30	07:45	0	0	0	0	0
07:45	08:00	0	0	0	0	0
08:00	08:15	0	0	0	0	0
08:15	08:30	0	0	0	0	0
08:30	08:45	0	0	0	0	0
08:45	09:00	0	0	0	0	0
09:00	09:15	0	0	0	0	0
09:15	09:30	0	0	0	0	0
09:30	09:45	0	0	0	0	0
09:45	10:00	0	0	0	0	0
10:00	10:15	0	0	0	0	0
10:15	10:30	0	0	0	0	0
10:30	10:45	0	0	0	0	0
10:45	11:00	0	0	0	0	0
11:00	11:15	0	0	0	0	0
11:15	11:30	0	0	0	0	0
11:30	11:45	0	0	0	0	0
11:45	12:00	0	0	0	0	0
12:00	12:15	0	0	0	0	0
12:15	12:30	0	0	0	0	0
12:30	12:45	0	0	0	0	0
12:45	13:00	0	0	0	0	0
13:00	13:15	0	0	0	0	0
13:15	13:30	0	0	0	0	0
13:30	13:45	0	0	0	0	0
13:45	14:00	0	0	0	0	0
14:00	14:15	0	0	0	0	0
14:15	14:30	0	0	0	0	0
14:30	14:45	0	0	0	0	0
14:45	15:00	0	0	0	0	0
15:00	15:15	0	0	0	0	0
15:15	15:30	0	0	0	0	0
15:30	15:45	0	0	0	0	0
15:45	16:00	0	0	0	0	0
16:00	16:15	0	0	0	0	0
16:15	16:30	0	0	0	0	0
16:30	16:45	0	0	0	0	0
16:45	17:00	0	0	0	0	0
17:00	17:15	0	0	0	0	0
17:15	17:30	0	0	0	0	0



# **Transportation Services - Traffic Services**

# Turning Movement Count - Study Results

			CAMBRIL	JGE 31 @ '	CARLING	4VE	
Survey [	Date: Thursd	ay, May 17, 20	)18		wo	No:	37836
Start Ti	me: 07:00				De	vice:	Miovision
	17:30	17:45	0	0	0	0	0
	17:45	18:00	0	0	0	0	0
	18:00	18:15	0	0	0	0	0
	18:15	18:30	0	0	0	0	0
	18:30	18:45	0	0	0	0	0
	18:45	19:00	0	0	0	0	0

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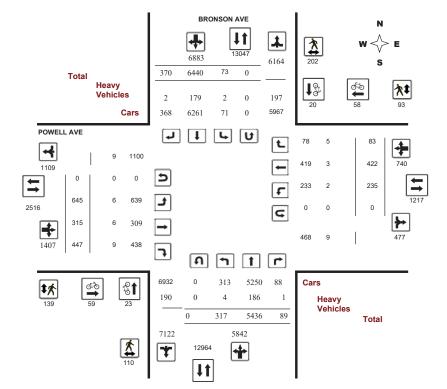
#### **Turning Movement Count - Study Results**

#### **BRONSON AVE @ POWELL AVE**

 Survey Date:
 Thursday, August 08, 2019
 WO No:
 38709

 Start Time:
 07:00
 Device:
 Miovision

#### **Full Study Diagram**





#### **Transportation Services - Traffic Services**

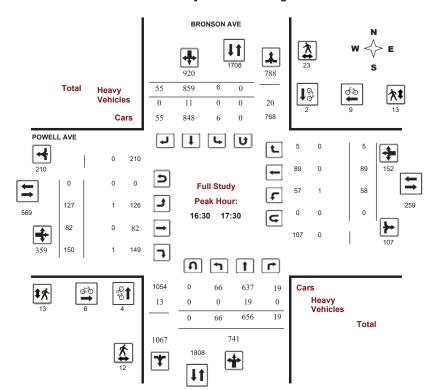
# **Turning Movement Count - Study Results**

# BRONSON AVE @ POWELL AVE

 Survey Date:
 Thursday, August 08, 2019
 WO No:
 38709

 Start Time:
 07:00
 Device:
 Miovision

#### **Full Study Peak Hour Diagram**



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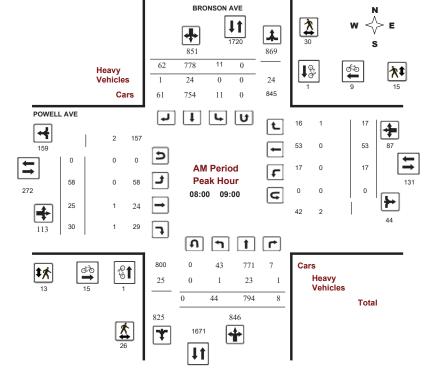


# **Turning Movement Count - Peak Hour Diagram**

#### **BRONSON AVE @ POWELL AVE**

 Survey Date:
 Thursday, August 08, 2019
 WO No:
 38709

 Start Time:
 07:00
 Device:
 Miovision



Comments



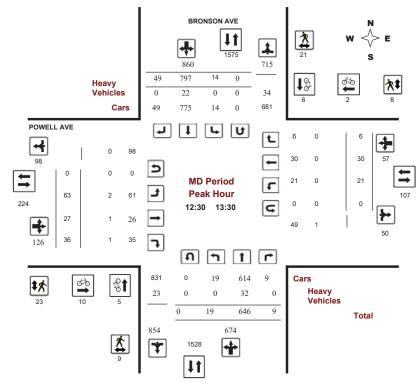
# **Transportation Services - Traffic Services**

#### **Turning Movement Count - Peak Hour Diagram**

# **BRONSON AVE @ POWELL AVE**

 Survey Date:
 Thursday, August 08, 2019
 WO No:
 38709

 Start Time:
 07:00
 Device:
 Miovision



Comments

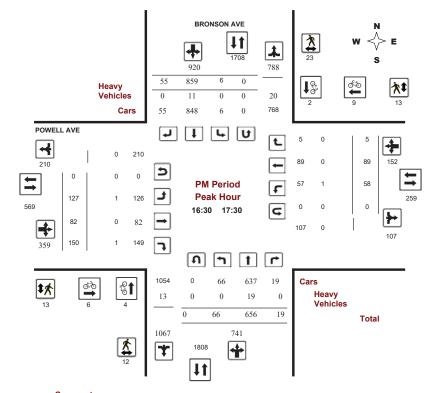


#### **Turning Movement Count - Peak Hour Diagram**

# **BRONSON AVE @ POWELL AVE**

 Survey Date:
 Thursday, August 08, 2019
 WO No:
 38709

 Start Time:
 07:00
 Device:
 Miovision



Comments



#### **Transportation Services - Traffic Services**

# **Turning Movement Count - Study Results**

#### **BRONSON AVE @ POWELL AVE**

 Survey Date:
 Thursday, August 08, 2019
 WO No:
 38709

 Start Time:
 07:00
 Device:
 Miovision

Eastbound:

#### Full Study Summary (8 HR Standard)

Survey Date: Thursday, August 08, 2019 Total Observed U-Turns

Northbound: 0 Southbound: 0 .90

Westbound:

									· ·				0						
			BRO	NSON	AVE				_			PO	WELL	AVE					
	No	rthbou	nd		So	uthbou	ınd			Е	astbou	ınd		W	/estbo	und			
Period	LT	ST	RT	NB TOT	LT	ST	RT	SB TOT	STR TOT	LT	ST	RT	EB TOT	LT	ST	RT	WB TOT	STR TOT	Gran Tot
07:00 08:00	39	714	5	758	6	796	40	842	1600	52	13	19	84	11	31	5	47	131	173
08:00 09:00	44	794	8	846	11	778	62	851	1697	58	25	30	113	17	53	17	87	200	189
09:00 10:00	33	640	11	684	7	733	42	782	1466	51	23	24	98	20	32	13	65	163	162
11:30 12:30	21	617	13	651	13	757	38	808	1459	73	29	28	130	12	43	17	72	202	166
12:30 13:30	19	646	9	674	14	797	49	860	1534	63	27	36	126	21	30	6	57	183	171
15:00 16:00	42	713	8	763	7	875	33	915	1678	106	51	66	223	30	45	11	86	309	198
16:00 17:00	62	674	21	757	7	771	49	827	1584	119	81	145	345	78	104	7	189	534	211
17:00 18:00	57	638	14	709	8	933	57	998	1707	123	66	99	288	46	84	7	137	425	213
Sub Total	317	5436	89	5842	73	6440	370	6883	12725	645	315	447	1407	235	422	83	740	2147	1487
U Turns				0				0	0				0				0	0	- (
Total	317	5436	89	5842	73	6440	370	6883	12725	645	315	447	1407	235	422	83	740	2147	1487
EQ 12Hr	441	7556	124	8120	101	8952	514	9567	17688	897	438	621	1956	327	587	115	1029	2984	2067
Note: These v	alues a	re calcu	lated by	y multiply	ying the	totals b	y the a	ppropriat	e expans	ion fact	or.			1.39					
AVG 12Hr	374	6409	105	6888	86	7593	436	8115	15919	760	371	527	1659	277	498	98	872	2686	1860
Note: These v	olumes	are calc	culated	by multi	plying t	he Equiv	alent 1	2 hr. tota	ls by the	AADT 1	factor.			0.9					
AVG 24Hr	490	8396	137	9023	113	9947	571	10631	19654	996	487	690	2173	363	652	128	1143	3316	2297
Note: These v	olumes	are calc	culated	by multi	plying tl	he Avera	ige Dai	ily 12 hr.	totals by	12 to 24	4 expans	sion fac	ctor.	1.31					

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

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#### **Turning Movement Count - Study Results**

#### **BRONSON AVE @ POWELL AVE**

 Survey Date:
 Thursday, August 08, 2019
 WO No:
 38709

 Start Time:
 07:00
 Device:
 Miovision

#### **Full Study 15 Minute Increments**

BRONSON AVE POWELL AVE

	N	orthbou	ınd		Sc	uthbou	nd			E	astbour	nd		We	estbour	nd			
Time Period	LT	ST	RT	N TOT	LT	ST	RT	S TOT	STR TOT	LT	ST	RT	E TOT	LT	ST	RT	W TOT	STR TOT	Grand Total
07:00 07:15	5	163	0	168	3	211	12	226	7	11	2	4	17	1	4	0	5	7	416
07:15 07:30	8	153	4	165	0	202	4	206	19	13	3	2	18	2	12	1	15	19	404
07:30 07:45	5	218	1	224	1	176	10	187	15	9	2	7	18	3	5	3	11	15	440
07:45 08:00	21	180	0	201	2	207	14	223	13	19	6	6	31	5	10	1	16	13	471
08:00 08:15	15	185	0	200	4	206	13	223	11	10	6	12	28	3	10	1	14	11	465
08:15 08:30	7	203	2	212	3	189	14	206	9	14	5	6	25	3	17	6	26	9	469
08:30 08:45	12	202	3	217	1	190	14	205	15	19	9	7	35	4	17	5	26	15	483
08:45 09:00	10	204	3	217	3	193	21	217	15	15	5	5	25	7	9	5	21	15	480
09:00 09:15	5	164	4	173	2	180	11	193	20	11	8	5	24	5	8	2	15	20	405
09:15 09:30	5	174	0	179	2	175	14	191	16	14	3	5	22	5	4	5	14	16	406
09:30 09:45	9	145	2	156	1	177	10	188	13	13	6	7	26	5	10	4	19	13	389
09:45 10:00	14	157	5	176	2	201	7	210	19	13	6	7	26	5	10	2	17	19	429
11:30 11:45	8	142	5	155	2	197	8	207	9	17	3	11	31	6	8	3	17	9	410
11:45 12:00	7	172	5	184	2	196	7	205	13	16	7	3	26	0	10	6	16	13	431
12:00 12:15	4	156	1	161	5	178	14	197	10	23	9	4	36	3	11	3	17	10	411
12:15 12:30	2	147	2	151	4	186	9	199	11	17	10	10	37	3	14	5	22	11	409
12:30 12:45	5	157	1	163	4	202	11	217	10	9	8	11	28	6	3	2	11	10	419
12:45 13:00	4	149	5	158	5	196	13	214	11	14	5	8	27	4	4	2	10	11	409
13:00 13:15	6	144	2	152	1	184	9	194	15	24	12	7	43	7	15	2	24	15	413
13:15 13:30	4	196	1	201	4	215	16	235	18	16	2	10	28	4	8	0	12	18	476
15:00 15:15	9	187	2	198	0	216	7	223	10	30	3	11	44	2	11	2	15	10	480
15:15 15:30	18	197	1	216	2	212	10	224	11	22	10	16	48	6	6	1	13	11	501
15:30 15:45	9	165	1	175	3	233	8	244	12	26	11	19	56	8	9	3	20	12	495
15:45 16:00	6	164	4	174	2	214	8	224	11	28	27	20	75	14	19	5	38	11	511
16:00 16:15	14	167	6	187	3	184	12	199	12	38	17	29	84	19	36	3	58	12	528
16:15 16:30	14	177	4	195	2	181	11	194	6	21	18	34	73	26	25	2	53	6	515
16:30 16:45	15	145	4	164	1	199	15	215	8	40	30	50	120	15	17	0	32	8	531
16:45 17:00	19	185	7	211	1	207	11	219	7	20	16	32	68	18	26	2	46	7	544
17:00 17:15	17	154	4	175	3	216	12	231	5	34	22	31	87	11	30	1	42	5	535
17:15 17:30	15	172	4	191	1	237	17	255	10	33	14	37	84	14	16	2	32	10	562
17:30 17:45	11	148	1	160	0	244	7	251	7	29	15	12	56	12	21	2	35	7	502
17:45 18:00	14	164	5	183	4	236	21	261	6	27	15	19	61	9	17	2	28	6	533
Total:	317	5436	89	5842	73	6440	370	6883	374	645	315	447	1407	235	422	83	740	374	14,872

Note: U-Turns are included in Totals.



# **Transportation Services - Traffic Services**

#### **Turning Movement Count - Study Results**

#### **BRONSON AVE @ POWELL AVE**

 Survey Date:
 Thursday, August 08, 2019
 WO No:
 38709

 Start Time:
 07:00
 Device:
 Miovision

#### **Full Study Cyclist Volume**

		<b>BRONSON AVE</b>	<b>.</b>		POWELL AVI	E	
Time Period	Northbound	Southbound	Street Total	Eastbound	Westbound	Street Total	Grand Total
07:00 07:15	0	0	0	4	1	5	5
07:15 07:30	0	0	0	2	1	3	3
07:30 07:45	0	1	1	2	0	2	3
07:45 08:00	1	0	1	2	0	2	3
08:00 08:15	1	1	2	4	0	4	6
08:15 08:30	0	0	0	4	4	8	8
08:30 08:45	0	0	0	6	3	9	9
08:45 09:00	0	0	0	1	2	3	3
9:00 09:15	1	0	1	2	1	3	4
9:15 09:30	1	0	1	2	3	5	6
9:30 09:45	1	0	1	4	2	6	7
9:45 10:00	0	2	2	2	1	3	5
11:30 11:45	0	0	0	1	1	2	2
1:45 12:00	1	0	1	0	2	2	3
2:00 12:15	0	2	2	0	0	0	2
12:15 12:30	0	0	0	0	1	1	1
12:30 12:45	2	1	3	0	1	1	4
12:45 13:00	2	2	4	2	0	2	6
13:00 13:15	1	3	4	4	0	4	8
13:15 13:30	0	0	0	4	1	5	5
15:00 15:15	0	0	0	3	1	4	4
15:15 15:30	3	2	5	0	5	5	10
15:30 15:45	2	1	3	1	2	3	6
5:45 16:00	0	0	0	1	1	2	2
16:00 16:15	0	0	0	0	1	1	1
16:15 16:30	0	0	0	0	3	3	3
16:30 16:45	1	0	1	1	3	4	5
6:45 17:00	0	1	1	1	0	1	2
7:00 17:15	1	1	2	1	3	4	6
17:15 17:30	2	0	2	3	3	6	8
17:30 17:45	2	0	2	1	11	12	14
7:45 18:00	1	3	4	1	1	2	6
Total	23	20	43	59	58	117	160

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#### **Turning Movement Count - Study Results**

#### **BRONSON AVE @ POWELL AVE**

 Survey Date:
 Thursday, August 08, 2019
 WO No:
 38709

 Start Time:
 07:00
 Device:
 Miovision

# Full Study Pedestrian Volume BRONSON AVE POWELL AVE

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	4	3	7	6	2	8	15
07:15 07:30	1	3	4	2	2	4	8
07:30 07:45	8	14	22	5	0	5	27
07:45 08:00	3	10	13	5	2	7	20
08:00 08:15	7	9	16	5	6	11	27
08:15 08:30	9	1	10	0	4	4	14
08:30 08:45	5	10	15	4	4	8	23
08:45 09:00	5	10	15	4	1	5	20
09:00 09:15	3	5	8	2	0	2	10
09:15 09:30	3	7	10	5	2	7	17
09:30 09:45	2	9	11	4	8	12	23
09:45 10:00	3	6	9	3	6	9	18
11:30 11:45	1	7	8	5	3	8	16
11:45 12:00	2	1	3	5	1	6	9
12:00 12:15	4	4	8	6	4	10	18
12:15 12:30	3	3	6	3	6	9	15
12:30 12:45	3	6	9	6	4	10	19
12:45 13:00	2	5	7	9	1	10	17
13:00 13:15	4	5	9	6	2	8	17
13:15 13:30	0	5	5	2	1	3	8
15:00 15:15	2	7	9	4	1	5	14
15:15 15:30	0	10	10	1	1	2	12
15:30 15:45	4	6	10	7	2	9	19
15:45 16:00	2	4	6	5	3	8	14
16:00 16:15	3	3	6	2	3	5	11
16:15 16:30	4	1	5	4	0	4	9
16:30 16:45	3	8	11	3	7	10	21
16:45 17:00	2	3	5	2	1	3	8
17:00 17:15	3	8	11	5	1	6	17
17:15 17:30	4	4	8	3	4	7	15
17:30 17:45	6	16	22	8	8	16	38
17:45 18:00	5	9	14	8	3	11	25
Total	110	202	312	139	93	232	544



# **Transportation Services - Traffic Services**

#### **Turning Movement Count - Study Results**

#### **BRONSON AVE @ POWELL AVE**

 Survey Date:
 Thursday, August 08, 2019
 WO No:
 38709

 Start Time:
 07:00
 Device:
 Miovision

# **Full Study Heavy Vehicles**

BRONSON AVE POWELL AVE

	N	orthbo	und		Sc	outhbou	nd			E	astboui	nd		W	estbour	nd			
Time Period	LT	ST	RT	N TOT	LT	ST	RT	S TOT	STR	LT	ST	RT	E TOT	LT	ST	RT	W TOT	STR	Grand Total
07:00 07:15	0	3	0	3	0	4	0	4	7	0	0	0	0	0	0	0	0	0	7
07:15 07:30	0	6	0	6	0	13	0	13	19	1	0	0	1	0	0	0	0	1	20
07:30 07:45	0	9	0	9	0	6	0	6	15	0	0	1	1	0	0	1	1	2	17
07:45 08:00	0	6	0	6	0	7	0	7	13	1	0	0	1	0	0	0	0	1	14
08:00 08:15	0	7	0	7	0	4	0	4	11	0	0	1	1	0	0	0	0	1	12
08:15 08:30	0	4	0	4	0	4	1	5	9	0	0	0	0	0	0	0	0	0	9
08:30 08:45	0	7	1	8	0	7	0	7	15	0	0	0	0	0	0	1	1	1	16
08:45 09:00	1	5	0	6	0	9	0	9	15	0	1	0	1	0	0	0	0	1	16
09:00 09:15	0	11	0	11	0	9	0	9	20	0	0	0	0	0	0	0	0	0	20
09:15 09:30	0	9	0	9	0	7	0	7	16	0	1	1	2	0	0	0	0	2	18
09:30 09:45	0	4	0	4	1	8	0	9	13	0	0	1	1	0	0	2	2	3	16
09:45 10:00	1	10	0	11	1	7	0	8	19	0	0	0	0	0	0	0	0	0	19
11:30 11:45	0	3	0	3	0	6	0	6	9	0	0	0	0	0	0	0	0	0	9
11:45 12:00	0	7	0	7	0	6	0	6	13	0	0	0	0	0	1	0	1	1	14
12:00 12:15	0	3	0	3	0	6	1	7	10	0	1	0	1	0	1	0	1	2	12
12:15 12:30	0	3	0	3	0	8	0	8	11	1	2	0	3	0	1	1	2	5	16
12:30 12:45	0	7	0	7	0	3	0	3	10	0	1	0	1	0	0	0	0	1	11
12:45 13:00	0	6	0	6	0	5	0	5	11	0	0	0	0	0	0	0	0	0	11
13:00 13:15	0	10	0	10	0	5	0	5	15	1	0	1	2	0	0	0	0	2	17
13:15 13:30	0	9	0	9	0	9	0	9	18	1	0	0	1	0	0	0	0	1	19
15:00 15:15	0	5	0	5	0	5	0	5	10	0	0	0	0	0	0	0	0	0	10
15:15 15:30	0	7	0	7	0	4	0	4	11	0	0	0	0	0	0	0	0	0	11
15:30 15:45	0	6	0	6	0	6	0	6	12	0	0	2	2	0	0	0	0	2	14
15:45 16:00	0	5	0	5	0	6	0	6	11	0	0	0	0	0	0	0	0	0	11
16:00 16:15	2	4	0	6	0	6	0	6	12	0	0	0	0	0	0	0	0	0	12
16:15 16:30	0	4	0	4	0	2	0	2	6	0	0	1	1	1	0	0	1	2	8
16:30 16:45	0	6	0	6	0	2	0	2	8	1	0	0	1	0	0	0	0	1	9
16:45 17:00	0	6	0	6	0	1	0	1	7	0	0	1	1	0	0	0	0	1	8
17:00 17:15	0	4	0	4	0	1	0	1	5	0	0	0	0	0	0	0	0	0	5
17:15 17:30	0	3	0	3	0	7	0	7	10	0	0	0	0	1	0	0	1	1	11
17:30 17:45	0	4	0	4	0	3	0	3	7	0	0	0	0	0	0	0	0	0	7
17:45 18:00	0	3	0	3	0	3	0	3	6	0	0	0	0	0	0	0	0	0	6
Total: None	4	186	1	191	2	179	2	183	374	6	6	9	21	2	3	5	10	31	405

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#### **Turning Movement Count - Study Results**

#### **BRONSON AVE @ POWELL AVE**

Survey Date: Thursday, August 08, 2019 WO No: 38709 Start Time: 07:00 Device: Miovision

#### **Full Study 15 Minute U-Turn Total** BRONSON AVE POWELL AVE

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



# **Transportation Services - Traffic Services**

#### **Turning Movement Count - Study Results**

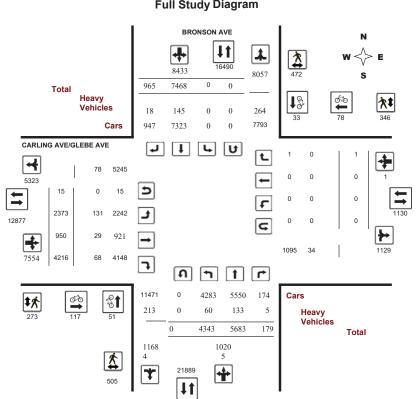
38767

Miovision

#### **BRONSON AVE @ CARLING AVE/GLEBE AVE**

Survey Date: Thursday, September 12, 2019 WO No: Start Time: 07:00 Device:

#### **Full Study Diagram**



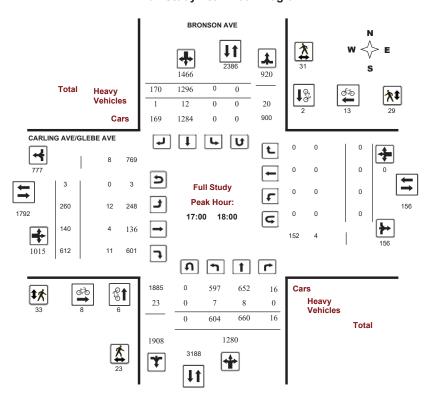
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#### **Turning Movement Count - Study Results**

#### **BRONSON AVE @ CARLING AVE/GLEBE AVE**

Survey Date: Thursday, September 12, 2019 WO No: 38767
Start Time: 07:00 Device: Miovision
Full Study Peak Hour Diagram



March 11, 2020 Page 2 of 8

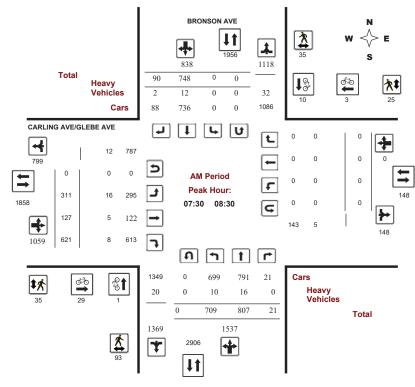
# **Ottawa**

# **Transportation Services - Traffic Services**

# Turning Movement Count - Full Study Peak Hour Diagram

#### BRONSON AVE @ CARLING AVE/GLEBE AVE

Survey Date: Thursday, September 12, 2019 WO No: 38767
Start Time: 07:00 Device: Miovision



Comments

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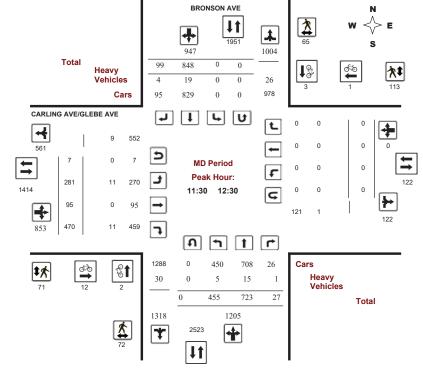


# Turning Movement Count - Full Study Peak Hour Diagram

# **BRONSON AVE @ CARLING AVE/GLEBE AVE**

 Survey Date:
 Thursday, September 12, 2019
 WO No:
 38767

 Start Time:
 07:00
 Device:
 Miovision



Comments

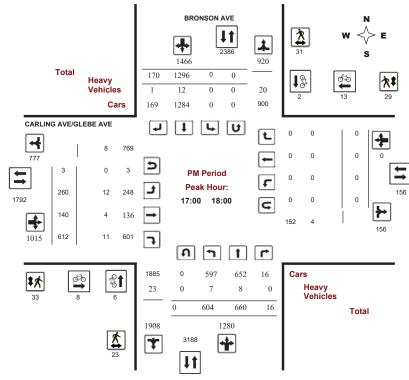
# **Ottawa**

# **Transportation Services - Traffic Services**

# Turning Movement Count - Full Study Peak Hour Diagram

BRONSON AVE @ CARLING AVE/GLEBE AVE

Survey Date: Thursday, September 12, 2019 WO No: 38767
Start Time: 07:00 Device: Miovision



Comments



17:00 18:00

Sub Total

U Turns

Total

EQ 12Hr

4343 5683

4343 5683

7899

179 **10205** 

179 **10205** 

249 14185

# **Transportation Services - Traffic Services**

#### **Turning Movement Count - Study Results**

#### **BRONSON AVE @ CARLING AVE/GLEBE AVE**

 Survey Date:
 Thursday, September 12, 2019
 WO No:
 38767

 Start Time:
 07:00
 Device:
 Miovision

#### Full Study Summary (8 HR Standard)

urvey D	ate:	Thursd	lay, S	eptemb	per 12	.,			Total O	bserv	red U-	Turns					AAD	Γ Facto	or
		2019					N	Northbou	nd: ()		South	bound:	0						
								Eastbour	nd: 15	;	West	bound:	0				1.00		
			BRO	NSON	AVE						CAR	LING	AVE/G	SLEBE	AVE				
_	N	orthbou	nd		So	uthbou	ınd			Е	astbou	nd		W	estbou	ınd			
Period	LT	ST	RT	NB TOT	LT	ST	RT	SB TOT	STR TOT	LT	ST	RT	EB TOT	LT	ST	RT	WB TOT	STR TOT	Grand Total
7:00 08:00	642	809	14	1465	0	668	98	766	2231	269	70	559	898	0	0	0	0	898	3129
8:00 09:00	671	765	34	1470	0	791	81	872	2342	336	151	568	1055	0	0	0	0	1055	3397
9:00 10:00	532	648	29	1209	0	789	89	878	2087	349	119	453	921	0	0	0	0	921	3008
1:30 12:30	455	723	27	1205	0	848	99	947	2152	281	95	470	846	0	0	0	0	846	2998
2:30 13:30	384	697	19	1100	0	902	86	988	2088	278	103	475	856	0	0	0	0	856	2944
5:00 16:00	501	690	23	1214	0	1012	143	1155	2369	302	128	519	949	0	0	0	0	949	3318
6:00 17:00	554	691	17	1262	0	1162	199	1361	2623	298	144	560	1002	0	0	1	1	1003	3626

965 **8433 18638** 2373

0 10381 1341 **11722 25907** 3298 1320 5860

0 7468 965 8433 18638 2373

0 9783 1264 **11047 25907** 3109

7453 9753 307 **17513** 0 12816 1656 **14472 31985** 4072 1630 7235 **12963** 

950 4216

950 4216

7554

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

0 1296 170 **1466** 

0 7468

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

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

Note: These volumes are calculated by multiplying the Equivalent 12 hr. totals by the AADT factor.



#### **Transportation Services - Traffic Services**

# **Turning Movement Count - Study Results**

#### **BRONSON AVE @ CARLING AVE/GLEBE AVE**

 Survey Date:
 Thursday, September 12, 2019
 WO No:
 38767

 Start Time:
 07:00
 Device:
 Miovision

#### **Full Study 15 Minute Increments**

BRONSON AVE CARLING AVE/GLEBE AVE

	Northbound			Southbound				Eastbound				Westbound							
Time Period	LT	ST	RT	N TOT	LT	ST	RT	S TOT	STR TOT	LT	ST	RT	E TOT	LT	ST	RT	W TOT	STR TOT	Grand Total
07:00 07:15	128	194	5	327	0	175	25	200	1064	51	8	117	176	0	0	0	0	1064	703
07:15 07:30	157	202	6	365	0	156	22	178	1100	70	21	129	220	0	0	0	0	1100	763
07:30 07:45	167	225	2	394	0	181	29	210	1228	72	20	146	238	0	0	0	0	1228	842
07:45 08:00	190	188	1	379	0	156	22	178	1144	76	21	167	264	0	0	0	0	1144	821
08:00 08:15	176	200	4	380	0	194	17	211	1229	87	44	157	288	0	0	0	0	1229	879
08:15 08:30	176	194	14	384	0	217	22	239	1261	76	42	151	269	0	0	0	0	1261	892
08:30 08:45	166	184	12	362	0	205	22	227	1185	83	27	124	234	0	0	0	0	1185	823
08:45 09:00	153	187	4	344	0	175	20	195	1127	90	38	136	265	0	0	0	0	1127	804
09:00 09:15	160	154	5	319	0	170	19	189	1058	88	31	138	257	0	0	0	0	1058	765
09:15 09:30	151	178	10	339	0	188	18	206	1104	91	20	102	213	0	0	0	0	1104	758
09:30 09:45	125	178	9	312	0	213	26	239	1127	91	24	94	210	0	0	0	0	1127	761
09:45 10:00	96	138	5	239	0	218	26	244	1037	79	44	119	243	0	0	0	0	1037	726
11:30 11:45	117	186	5	308	0	224	23	247	1156	74	21	117	213	0	0	0	0	1156	768
11:45 12:00	109	213	9	331	0	185	32	217	1145	78	30	121	233	0	0	0	0	1145	781
12:00 12:15	99	150	5	254	0	198	25	223	995	55	19	115	191	0	0	0	0	995	668
12:15 12:30	130	174	8	312	0	241	19	260	1178	74	25	117	216	0	0	0	0	1178	788
12:30 12:45	95	128	3	226	0	245	24	269	1064	66	32	130	228	0	0	0	0	1064	723
12:45 13:00	95	173	6	274	0	229	18	247	1146	83	24	140	247	0	0	0	0	1146	768
13:00 13:15	112	200	6	318	0	200	20	220	1091	71	21	82	174	0	0	0	0	1091	712
13:15 13:30	82	196	4	282	0	228	24	252	1139	58	26	123	207	0	0	0	0	1139	741
15:00 15:15	108	174	11	293	0	223	23	246	1113	70	24	107	201	0	0	0	0	1113	740
15:15 15:30	116	179	0	295	0	247	42	289	1241	79	38	152	269	0	0	0	0	1241	853
15:30 15:45	130	193	9	332	0	258	44	302	1312	78	32	149	260	0	0	0	0	1312	894
15:45 16:00	147	144	3	294	0	284	34	318	1226	75	34	111	220	0	0	0	0	1226	832
16:00 16:15	135	164	3	302	0	269	49	318	1256	69	27	134	230	0	0	0	0	1256	850
16:15 16:30	143	163	4	310	0	315	50	365	1363	78	29	131	238	0	0	1	1	1363	914
16:30 16:45	142	190	8	340	0	293	54	347	1400	72	43	158	274	0	0	0	0	1400	961
16:45 17:00	134	174	2	310	0	285	46	331	1316	79	45	137	261	0	0	0	0	1316	902
17:00 17:15	174	155	6	335	0	330	44	374	1417	63	27	160	251	0	0	0	0	1417	960
17:15 17:30	139	142	5	286	0	331	51	382	1358	65	35	152	252	0	0	0	0	1358	920
17:30 17:45	154	177	2	333	0	302	48	350	1390	65	44	163	273	0	0	0	0	1390	956
17:45 18:00	137	186	3	326	0	333	27	360	1409	67	34	137	239	0	0	0	0	1409	925
Total:	4343	5683	179	1020	0	7468	965	8433	38379	2373	950	4216	7554	0	0	1	1	38379	26,193
																		•	

Note: U-Turns are included in Totals.

March 11, 2020 Page 3 of 8 March 11, 2020 Page 4 of 8

7540

7555

26193



#### **Turning Movement Count - Study Results**

#### **BRONSON AVE @ CARLING AVE/GLEBE AVE**

 Survey Date:
 Thursday, September 12, 2019
 WO No:
 38767

 Start Time:
 07:00
 Device:
 Miovision

**BRONSON AVE** 

#### **Full Study Cyclist Volume**

CARLING AVE/GLEBE AVE

			_	•,			
Time Period	Northbound	Southbound	Street Total	Eastbound	Westbound	Street Total	Grand Total
07:00 07:15	2	1	3	3	0	3	6
07:15 07:30	0	0	0	1	1	2	2
07:30 07:45	0	1	1	3	0	3	4
07:45 08:00	0	2	2	3	1	4	6
08:00 08:15	1	2	3	5	2	7	10
08:15 08:30	0	5	5	18	0	18	23
08:30 08:45	0	3	3	20	2	22	25
08:45 09:00	1	0	1	12	2	14	15
09:00 09:15	2	0	2	5	2	7	9
09:15 09:30	1	1	2	4	0	4	6
09:30 09:45	0	1	1	1	1	2	3
09:45 10:00	2	2	4	1	1	2	6
11:30 11:45	0	1	1	6	0	6	7
11:45 12:00	2	1	3	1	1	2	5
12:00 12:15	0	1	1	3	0	3	4
12:15 12:30	0	0	0	2	0	2	2
12:30 12:45	2	2	4	3	1	4	8
12:45 13:00	1	1	2	3	0	3	5
13:00 13:15	3	1	4	1	2	3	7
13:15 13:30	3	0	3	0	0	0	3
15:00 15:15	0	0	0	0	28	28	28
15:15 15:30	1	2	3	2	5	7	10
15:30 15:45	3	0	3	0	1	1	4
15:45 16:00	4	1	5	0	3	3	8
16:00 16:15	7	2	9	4	1	5	14
16:15 16:30	5	1	6	5	2	7	13
16:30 16:45	3	0	3	1	7	8	11
16:45 17:00	2	0	2	2	2	4	6
17:00 17:15	1	0	1	1	0	1	2
17:15 17:30	1	1	2	2	3	5	7
17:30 17:45	2	0	2	5	5	10	12
17:45 18:00	2	1	3	0	5	5	8
Total	51	33	84	117	78	195	279



# **Transportation Services - Traffic Services**

#### **Turning Movement Count - Study Results**

#### **BRONSON AVE @ CARLING AVE/GLEBE AVE**

 Survey Date:
 Thursday, September 12, 2019
 WO No:
 38767

 Start Time:
 07:00
 Device:
 Miovision

# **Full Study Pedestrian Volume**

BRONSON AVE CARLING AVE/GLEBE AVE

	NB Approach 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	8	2	10	4	4	8	18
07:15 07:30	10	2	12	4	1	5	17
07:30 07:45	7	7	14	5	2	7	21
07:45 08:00	9	4	13	11	2	13	26
08:00 08:15	30	8	38	7	12	19	57
08:15 08:30	47	16	63	12	9	21	84
08:30 08:45	84	16	100	30	20	50	150
08:45 09:00	44	18	62	10	6	16	78
9:00 09:15	6	9	15	2	4	6	21
09:15 09:30	5	5	10	2	7	9	19
09:30 09:45	13	2	15	9	5	14	29
09:45 10:00	3	4	7	5	3	8	15
11:30 11:45	9	21	30	7	35	42	72
11:45 12:00	10	9	19	12	19	31	50
12:00 12:15	26	26	52	28	46	74	126
12:15 12:30	27	9	36	24	13	37	73
12:30 12:45	6	10	16	10	4	14	30
12:45 13:00	4	8	12	3	9	12	24
13:00 13:15	3	10	13	3	4	7	20
13:15 13:30	8	7	15	5	2	7	22
15:00 15:15	28	169	197	4	62	66	263
15:15 15:30	38	24	62	5	15	20	82
15:30 15:45	8	10	18	5	4	9	27
15:45 16:00	2	12	14	8	3	11	25
16:00 16:15	6	13	19	3	6	9	28
16:15 16:30	30	6	36	4	10	14	50
16:30 16:45	4	11	15	7	8	15	30
16:45 17:00	7	3	10	11	2	13	23
17:00 17:15	9	7	16	5	13	18	34
17:15 17:30	4	8	12	11	4	15	27
17:30 17:45	9	7	16	10	10	20	36
17:45 18:00	1	9	10	7	2	9	19
Total	505	472	977	273	346	619	1596

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### **Turning Movement Count - Study Results**

### BRONSON AVE @ CARLING AVE/GLEBE AVE

Survey Date: Thursday, September 12, 2019 WO No: 38767 Start Time: 07:00 Device: Miovision

### **Full Study Heavy Vehicles**

**BRONSON AVE** CARLING AVE/GLEBE AVE Eastbound STR Grand

Time Period	LT	ST	RT	TOT	LT	ST	RT	тот	TOT	LT	ST	RT	TOT	LT	ST	RT	TOT	TOT	Total
07:00 07:15	2	1	0	12	0	6	2	11	23	2	0	3	9	0	0	0	0	9	16
07:15 07:30	2	3	0	8	0	3	0	10	18	4	1	0	7	0	0	0	1	8	13
07:30 07:45	3	5	0	11	0	2	0	10	21	3	0	1	7	0	0	0	0	7	14
07:45 08:00	2	3	0	12	0	4	1	12	24	4	2	3	12	0	0	0	2	14	19
08:00 08:15	2	4	0	10	0	3	1	15	25	7	0	1	11	0	0	0	0	11	18
08:15 08:30	3	4	0	13	0	3	0	9	22	2	3	3	11	0	0	0	3	14	18
08:30 08:45	2	4	0	15	0	7	0	15	30	4	1	2	9	0	0	0	1	10	20
08:45 09:00	5	2	0	15	0	7	0	10	25	1	2	1	9	0	0	0	2	11	18
09:00 09:15	6	6	1	22	0	5	1	20	42	8	1	4	20	0	0	0	2	22	32
09:15 09:30	2	11	1	22	0	5	1	24	46	7	1	3	14	0	0	0	2	16	31
09:30 09:45	3	6	0	16	0	6	0	22	38	10	2	1	16	0	0	0	2	18	28
09:45 10:00	3	5	0	15	0	5	1	17	32	6	3	2	15	0	0	0	3	18	25
11:30 11:45	3	3	0	16	0	5	3	16	32	5	0	5	16	0	0	0	0	16	24
11:45 12:00	0	4	1	12	0	6	1	14	26	3	0	1	5	0	0	0	1	6	16
12:00 12:15	2	2	0	12	0	4	0	8	20	2	0	4	8	0	0	0	0	8	14
12:15 12:30	0	6	0	11	0	4	0	11	22	1	0	1	2	0	0	0	0	2	12
12:30 12:45	0	5	0	13	0	7	1	17	30	4	0	1	6	0	0	0	0	6	18
12:45 13:00	0	2	0	10	0	4	0	11	21	5	1	4	10	0	0	0	1	11	16
13:00 13:15	3	4	2	17	0	4	0	15	32	7	0	4	14	0	0	0	2	16	24
13:15 13:30	0	8	0	13	0	4	0	15	28	3	0	1	4	0	0	0	0	4	16
15:00 15:15	1	7	0	16	0	5	1	17	33	4	1	3	10	0	0	0	1	11	22
15:15 15:30	2	6	0	15	0	6	1	14	29	1	1	1	6	0	0	0	1	7	18
15:30 15:45	1	5	0	10	0	3	1	14	24	5	1	1	9	0	0	0	1	10	17
15:45 16:00	1	5	0	12	0	4	0	14	26	5	2	2	10	0	0	0	2	12	19
16:00 16:15	2	5	0	17	0	9	0	21	38	7	0	1	10	0	0	0	0	10	24
16:15 16:30	0	3	0	7	0	3	1	12	19	5	1	1	8	0	0	0	1	9	14
16:30 16:45	2	5	0	13	0	4	1	14	27	4	1	2	10	0	0	0	1	11	19
16:45 17:00	1	1	0	8	0	5	0	6	14	0	1	1	3	0	0	0	1	4	9
17:00 17:15	2	3	0	15	0	4	0	14	29	7	1	6	16	0	0	0	1	17	23
17:15 17:30	1	1	0	3	0	0	0	2	5	1	1	1	4	0	0	0	1	5	5
17:30 17:45	2	1	0	8	0	4	1	9	17	3	0	1	7	0	0	0	0	7	12
17:45 18:00	2	3	0	12	0	4	0	8	20	1	2	3	8	0	0	0	2	10	15
Total: None	60	133	5	411	0	145	18	427	838	131	29	68	306	0	0	0	34	340	589



### **Transportation Services - Traffic Services**

### **Turning Movement Count - Study Results**

### **BRONSON AVE @ CARLING AVE/GLEBE AVE**

Survey Date: Thursday, September 12, 2019 WO No: 38767 Start Time: 07:00 Device: Miovision

### **Full Study 15 Minute U-Turn Total** BRONSON AVE CARLING AVE/GLEBE AVE

		BRONSON	AVE	CARLING	AVE/GLEBE AVE	:
Time I	Period	Northbound U-Turn Total	Southbound U-Turn Total	Eastbound U-Turn Total	Westbound U-Turn Total	Total
07:00	07:15	0	0	0	0	0
07:15	07:30	0	0	0	0	0
07:30	07:45	0	0	0	0	0
07:45	08:00	0	0	0	0	0
08:00	08:15	0	0	0	0	0
08:15	08:30	0	0	0	0	0
08:30	08:45	0	0	0	0	0
08:45	09:00	0	0	1	0	1
09:00	09:15	0	0	0	0	0
09:15	09:30	0	0	0	0	0
09:30	09:45	0	0	1	0	1
09:45	10:00	0	0	1	0	1
11:30	11:45	0	0	1	0	1
11:45	12:00	0	0	4	0	4
12:00	12:15	0	0	2	0	2
12:15	12:30	0	0	0	0	0
12:30	12:45	0	0	0	0	0
12:45	13:00	0	0	0	0	0
13:00	13:15	0	0	0	0	0
13:15	13:30	0	0	0	0	0
15:00	15:15	0	0	0	0	0
15:15	15:30	0	0	0	0	0
15:30	15:45	0	0	1	0	1
15:45	16:00	0	0	0	0	0
16:00	16:15	0	0	0	0	0
16:15	16:30	0	0	0	0	0
16:30	16:45	0	0	1	0	1
16:45	17:00	0	0	0	0	0
17:00	17:15	0	0	1	0	1
17:15	17:30	0	0	0	0	0
17:30	17:45	0	0	1	0	1
17:45	18:00	0	0	1	0	1
To	otal	0	0	15	0	15

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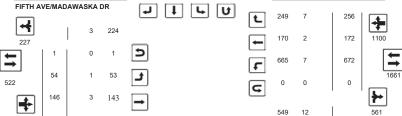


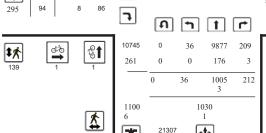
### **Turning Movement Count - Study Results**

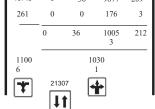
### BRONSON AVE @ FIFTH AVE/MADAWASKA DR

Survey Date: Wednesday, January 10, 2018 WO No: 37405 Start Time: 07:00 Device: Miovision **Full Study Diagram BRONSON AVE** 11 1046 1036













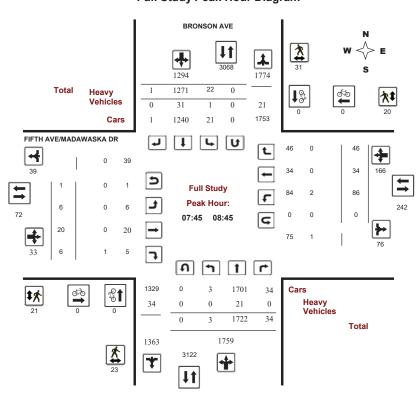
### **Transportation Services - Traffic Services**

### **Turning Movement Count - Study Results**

### BRONSON AVE @ FIFTH AVE/MADAWASKA DR

Survey Date: Wednesday, January 10, 2018 WO No: 37405 Start Time: 07:00 Device: Miovision

### **Full Study Peak Hour Diagram**



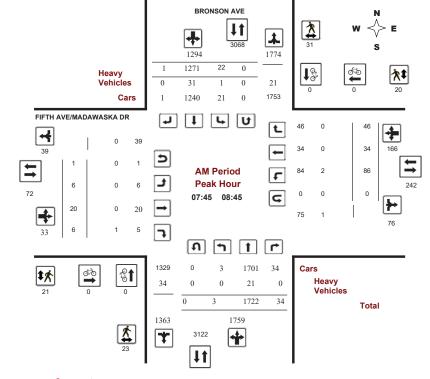
March 11, 2020 March 11, 2020 Page 1 of 8 Page 2 of 8



### **Turning Movement Count - Peak Hour Diagram**

### **BRONSON AVE @ FIFTH AVE/MADAWASKA DR**

Survey Date: Wednesday, January 10, 2018 WO No: 37405
Start Time: 07:00 Device: Miovision



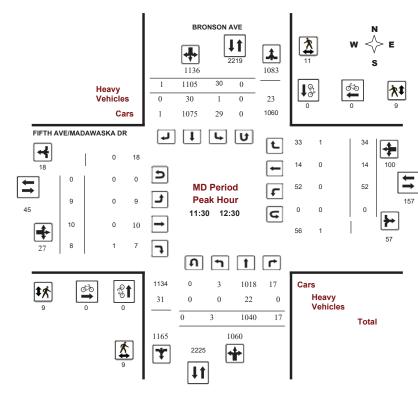
Comments



### **Transportation Services - Traffic Services**

# Turning Movement Count - Peak Hour Diagram BRONSON AVE @ FIFTH AVE/MADAWASKA DR

Survey Date: Wednesday, January 10, 2018 WO No: 37405
Start Time: 07:00 Device: Miovision



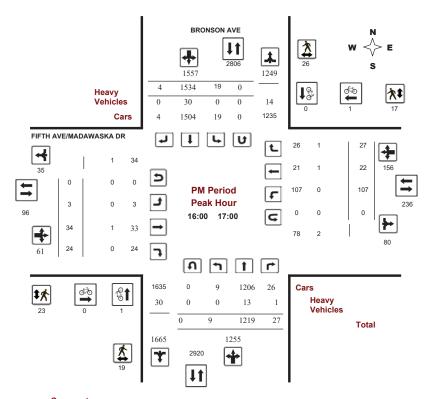
Comments



### **Turning Movement Count - Peak Hour Diagram**

### **BRONSON AVE @ FIFTH AVE/MADAWASKA DR**

Survey Date: Wednesday, January 10, 2018 WO No: 37405
Start Time: 07:00 Device: Miovision



Comments

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### **Transportation Services - Traffic Services**

### **Turning Movement Count - Study Results**

### BRONSON AVE @ FIFTH AVE/MADAWASKA DR

 Survey Date:
 Wednesday, January 10, 2018
 WO No:
 37405

 Start Time:
 07:00
 Device:
 Miovision

Eastbound:

### Full Study Summary (8 HR Standard)

Survey Date: Wednesday, January 10, 201 Total Observed U-Turns

Northbound: 0 Southbound: 0 1,000

Westbound:

								Lactoca	1				U						
			BRC	NSON	AVE						FIFTH	H AVE	/MAD	AWASI	KA DR				
	No	orthbou	nd		Sc	outhbou	ınd			Е	astbou	ınd		V	/estbo	und			
Period	LT	ST	RT	NB TOT	LT	ST	RT	SB TOT	STR TOT	LT	ST	RT	EB TOT	LT	ST	RT	WB TOT	STR TOT	Grand Tota
07:00 08:00	1	1621	12	1634	25	1174	4	1203	2837	6	5	5	16	58	13	30	101	117	295
08:00 09:00	3	1690	40	1733	20	1264	0	1284	3017	7	22	6	35	90	36	47	173	208	322
09:00 10:00	2	1221	25	1248	36	1093	2	1131	2379	6	9	9	24	65	24	29	118	142	252
11:30 12:30	3	1040	17	1060	30	1105	1	1136	2196	9	10	8	27	52	14	34	100	127	2323
12:30 13:30	5	929	15	949	30	1190	2	1222	2171	7	10	8	25	61	23	37	121	146	2317
15:00 16:00	5	1230	34	1269	22	1395	0	1417	2686	7	25	7	39	116	23	30	169	208	2894
16:00 17:00	9	1219	27	1255	19	1534	4	1557	2812	3	34	24	61	107	22	27	156	217	302
17:00 18:00	8	1103	42	1153	21	1485	5	1511	2664	9	31	27	67	123	17	22	162	229	2893
Sub Total	36	10053	212	10301	203	10240	18	10461	20762	54	146	94	294	672	172	256	1100	1394	22150
U Turns				0				0	0				1				0	1	1
Total	36	10053	212	10301	203	10240	18	10461	20762	54	146	94	295	672	172	256	1100	1395	2215
EQ 12Hr	50	13974	295	14318	282	14234	25	14541	28859	75	203	131	410	934	239	356	1529	1939	30798
Note: These v	alues a	are calcu	lated b	y multiply	ying the	e totals b	y the a	ppropriat	e expans	ion fact	or.			1.39					
AVG 12Hr	47	13169		13494	266	13414	24	13704	28859	71	191	123	386	880	225	335	1441	1939	30798
Note: These v	olume	s are calo	culated	by multip	olying t	the Equiv	alent 1	2 hr. tota	ls by the	AADT f	actor.			1					
AVG 24Hr	62	17252	364	17678	348	17573	31	17952	35630	93	251	161	506	1153	295	439	1888	2394	38024
Note: These v	olume	s are cal	culated	by multip	olying t	the Avera	ige Da	ily 12 hr.	totals by	12 to 24	expan	sion fac	tor.	1.31					

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

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### **Turning Movement Count - Study Results**

### BRONSON AVE @ FIFTH AVE/MADAWASKA DR

 Survey Date:
 Wednesday, January 10, 2018
 WO No:
 37405

 Start Time:
 07:00
 Device:
 Miovision

**BRONSON AVE** 

## Full Study 15 Minute Increments FIFTH AVE/MADAWASKA DR

Note: U-Turns are included in Totals.



### **Transportation Services - Traffic Services**

### **Turning Movement Count - Study Results**

## BRONSON AVE @ FIFTH AVE/MADAWASKA DR

DRONGON AVE

 Survey Date:
 Wednesday, January 10, 2018
 WO No:
 37405

 Start Time:
 07:00
 Device:
 Miovision

### **Full Study Cyclist Volume**

		BRONSON AVE	<b>■</b>	FIFTH	AVE/MADAWA	ASKA DR	
Time Period	Northbound	Southbound	Street Total	Eastbound	Westbound	Street Total	Grand Total
07:00 07:15	0	0	0	0	0	0	0
07:15 07:30	0	1	1	0	0	0	1
07:30 07:45	0	0	0	0	1	1	1
07:45 08:00	0	0	0	0	0	0	0
08:00 08:15	0	0	0	0	0	0	0
08:15 08:30	0	0	0	0	0	0	0
08:30 08:45	0	0	0	0	0	0	0
08:45 09:00	0	0	0	1	0	1	1
09:00 09:15	0	0	0	0	0	0	0
09:15 09:30	0	0	0	0	0	0	0
09:30 09:45	0	0	0	0	0	0	0
09:45 10:00	0	0	0	0	0	0	0
11:30 11:45	0	0	0	0	0	0	0
11:45 12:00	0	0	0	0	0	0	0
12:00 12:15	0	0	0	0	0	0	0
12:15 12:30	0	0	0	0	0	0	0
12:30 12:45	0	0	0	0	0	0	0
12:45 13:00	0	0	0	0	0	0	0
13:00 13:15	0	0	0	0	0	0	0
13:15 13:30	0	0	0	0	0	0	0
15:00 15:15	0	0	0	0	1	1	1
15:15 15:30	0	0	0	0	0	0	0
15:30 15:45	0	0	0	0	1	1	1
15:45 16:00	0	0	0	0	1	1	1
16:00 16:15	0	0	0	0	0	0	0
16:15 16:30	1	0	1	0	0	0	1
16:30 16:45	0	0	0	0	0	0	0
16:45 17:00	0	0	0	0	1	1	1
17:00 17:15	0	0	0	0	0	0	0
17:15 17:30	0	0	0	0	0	0	0
17:30 17:45	0	0	0	0	0	0	0
17:45 18:00	0	0	0	0	0	0	0
Total	1	1	2	1	5	6	8

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### **Turning Movement Count - Study Results**

### **BRONSON AVE @ FIFTH AVE/MADAWASKA DR**

 Survey Date:
 Wednesday, January 10, 2018
 WO No:
 37405

 Start Time:
 07:00
 Device:
 Miovision

### **Full Study Pedestrian Volume**

BRONSON AVE FIFTH AVE/MADAWASKA DR

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	6	7	2	0	2	9
07:15 07:30	1	5	6	2	0	2	8
07:30 07:45	2	4	6	3	5	8	14
07:45 08:00	3	4	7	2	2	4	11
08:00 08:15	6	11	17	7	6	13	30
08:15 08:30	5	8	13	6	5	11	24
08:30 08:45	9	8	17	6	7	13	30
08:45 09:00	9	13	22	5	5	10	32
9:00 09:15	2	12	14	7	6	13	27
9:15 09:30	1	6	7	1	2	3	10
9:30 09:45	1	8	9	2	3	5	14
9:45 10:00	0	5	5	4	4	8	13
1:30 11:45	3	1	4	5	4	9	13
1:45 12:00	3	2	5	1	0	1	6
2:00 12:15	1	3	4	2	0	2	6
2:15 12:30	2	5	7	1	5	6	13
12:30 12:45	2	7	9	4	5	9	18
12:45 13:00	0	2	2	4	4	8	10
13:00 13:15	2	5	7	4	5	9	16
13:15 13:30	4	4	8	5	3	8	16
15:00 15:15	1	1	2	5	15	20	22
15:15 15:30	2	2	4	1	10	11	15
5:30 15:45	4	3	7	2	5	7	14
5:45 16:00	4	6	10	1	6	7	17
16:00 16:15	4	5	9	5	6	11	20
16:15 16:30	7	7	14	7	3	10	24
16:30 16:45	2	4	6	5	4	9	15
16:45 17:00	6	10	16	6	4	10	26
17:00 17:15	11	8	19	5	12	17	36
17:15 17:30	11	8	19	8	5	13	32
17:30 17:45	6	8	14	15	6	21	35
17:45 18:00	11	8	19	6	5	11	30
Total	126	189	315	139	152	291	606



### **Transportation Services - Traffic Services**

### **Turning Movement Count - Study Results**

### BRONSON AVE @ FIFTH AVE/MADAWASKA DR

 Survey Date:
 Wednesday, January 10, 2018
 WO No:
 37405

 Start Time:
 07:00
 Device:
 Miovision

### Full Study Heavy Vehicles

				BRO	NSON	I AVE		uli S	ituu	у пе	avy: F			73 MADA	WAS	KA D	R			
		N	orthboi	und		Sc	outhbou	nd			Е	astboui	nd		W	estbour	nd			
Time F	Period	LT	ST	RT	N TOT	LT	ST	RT	S TOT	STR TOT	LT	ST	RT	E TOT	LT	ST	RT	W TOT	STR TOT	Grand Total
07:00	07:15	0	5	0	19	0	13	0	18	37	0	0	1	1	0	0	0	0	1	19
07:15	07:30	0	10	0	22	1	12	0	23	45	0	0	0	0	0	0	0	1	1	23
07:30	07:45	0	5	0	13	0	7	1	14	27	1	0	1	3	0	0	0	0	3	15
07:45	08:00	0	10	0	15	0	4	0	14	29	0	0	0	0	1	0	0	1	1	15
08:00	08:15	0	3	0	10	0	6	0	9	19	0	0	1	1	0	0	0	0	1	10
08:15	08:30	0	5	0	18	0	13	0	18	36	0	0	0	0	0	0	0	0	0	18
08:30	08:45	0	3	0	12	1	8	0	12	24	0	0	0	0	1	0	0	2	2	13
08:45	09:00	0	5	0	13	0	8	0	14	27	0	1	0	1	0	0	1	2	3	15
09:00	09:15	0	19	0	27	1	8	0	28	55	0	0	0	0	0	0	0	1	1	28
09:15	09:30	0	9	0	22	0	11	0	21	43	0	0	2	2	0	0	1	1	3	23
09:30	09:45	0	6	0	15	0	8	0	14	29	0	0	1	1	0	0	0	0	1	15
09:45	10:00	0	5	0	13	1	8	0	14	27	0	0	0	0	0	0	0	1	1	14
11:30	11:45	0	8	0	14	0	5	0	14	28	0	0	1	1	0	0	1	1	2	15
11:45	12:00	0	4	0	12	0	8	0	12	24	0	0	0	0	0	0	0	0	0	12
12:00	12:15	0	7	0	15	1	8	0	16	31	0	0	0	0	0	0	0	1	1	16
12:15	12:30	0	3	0	12	0	9	0	12	24	0	0	0	0	0	0	0	0	0	12
12:30	12:45	0	5	0	9	0	3	0	9	18	0	0	0	0	1	0	1	2	2	10
12:45	13:00	0	1	0	11	1	10	0	13	24	0	0	0	0	0	0	1	2	2	13
13:00	13:15	0	6	1	12	0	5	0	11	23	0	0	0	0	0	0	0	1	1	12
13:15	13:30	0	8	0	17	0	9	0	17	34	0	0	0	0	0	0	0	0	0	17
15:00	15:15	0	8	0	15	0	7	0	16	31	0	0	0	0	0	0	1	1	1	16
15:15	15:30	0	5	1	11	0	4	0	9	20	0	0	0	0	1	0	0	2	2	11
15:30	15:45	0	5	0	16	0	10	0	15	31	0	1	1	2	0	0	0	1	3	17
15:45	16:00	0	2	0	8	0	4	0	6	14	0	0	0	1	2	1	0	3	4	9
16:00	16:15	0	3	0	12	0	9	0	12	24	0	1	0	1	0	0	0	1	2	13
16:15	16:30	0	5	0	13	0	8	0	13	26	0	0	0	1	0	1	0	1	2	14
16:30	16:45	0	2	1	7	0	4	0	6	13	0	0	0	0	0	0	0	1	1	7
16:45	17:00	0	3	0	12	0	9	0	13	25	0	0	0	0	0	0	1	1	1	13
17:00	17:15	0	7	0	11	0	4	0	11	22	0	0	0	0	0	0	0	0	0	11
17:15	17:30	0	3	0	9	0	6	0	9	18	0	0	0	0	0	0	0	0	0	9
17:30	17:45	0	4	0	18	0	13	0	17	35	0	0	0	0	1	0	0	1	1	18
17:45	18:00	0	2	0	7	0	5	0	7	14	0	0	0	0	0	0	0	0	0	7
Total:	None	0	176	3	440	6	246	1	437	877	1	3	8	15	7	2	7	28	43	460

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### **Turning Movement Count - Study Results**

### BRONSON AVE @ FIFTH AVE/MADAWASKA DR

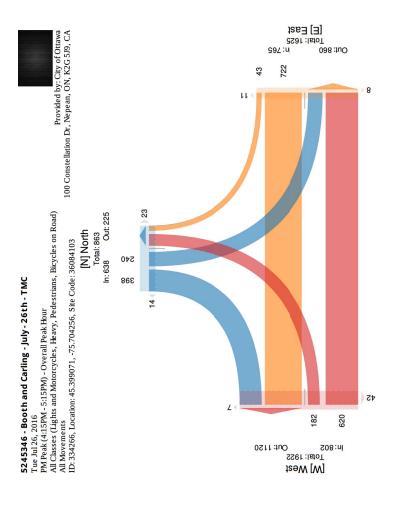
 Survey Date:
 Wednesday, January 10, 2018
 WO No:
 37405

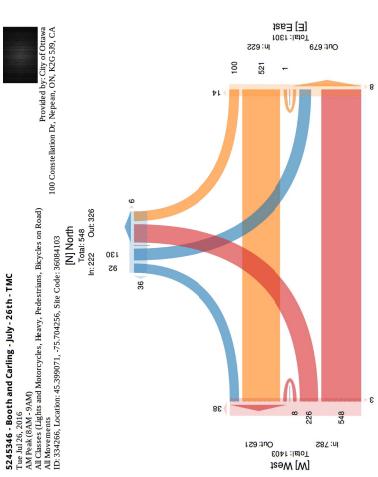
 Start Time:
 07:00
 Device:
 Miovision

# Full Study 15 Minute U-Turn Total BRONSON AVE FIFTH AVE/MADAWASKA DR

Time F	Period	Northbound U-Turn Total	Southbound U-Turn Total	Eastbound U-Turn Total	Westbound U-Turn Total	Total
07:00	07:15	0	0	0	0	0
07:15	07:30	0	0	0	0	0
07:30	07:45	0	0	0	0	0
07:45	08:00	0	0	1	0	1
08:00	08:15	0	0	0	0	0
08:15	08:30	0	0	0	0	0
08:30	08:45	0	0	0	0	0
08:45	09:00	0	0	0	0	0
09:00	09:15	0	0	0	0	0
09:15	09:30	0	0	0	0	0
09:30	09:45	0	0	0	0	0
09:45	10:00	0	0	0	0	0
11:30	11:45	0	0	0	0	0
11:45	12:00	0	0	0	0	0
12:00	12:15	0	0	0	0	0
12:15	12:30	0	0	0	0	0
12:30	12:45	0	0	0	0	0
12:45	13:00	0	0	0	0	0
13:00	13:15	0	0	0	0	0
13:15	13:30	0	0	0	0	0
15:00	15:15	0	0	0	0	0
15:15	15:30	0	0	0	0	0
15:30	15:45	0	0	0	0	0
15:45	16:00	0	0	0	0	0
16:00	16:15	0	0	0	0	0
16:15	16:30	0	0	0	0	0
16:30	16:45	0	0	0	0	0
16:45	17:00	0	0	0	0	0
17:00	17:15	0	0	0	0	0
17:15	17:30	0	0	0	0	0
17:30	17:45	0	0	0	0	0
17:45	18:00	0	0	0	0	0
To	otal	0	0	1	0	1

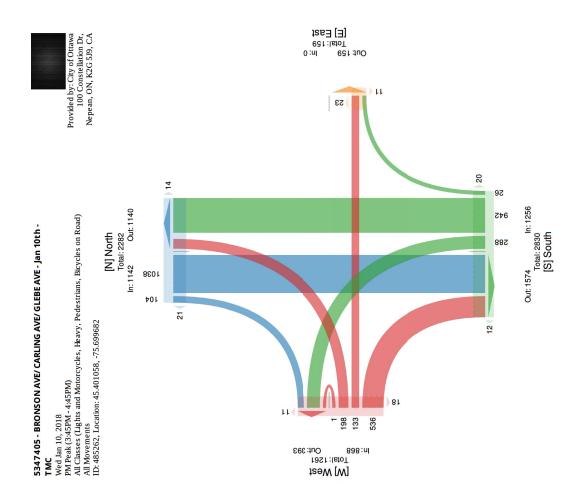
March 11, 2020 Page 8 of 8

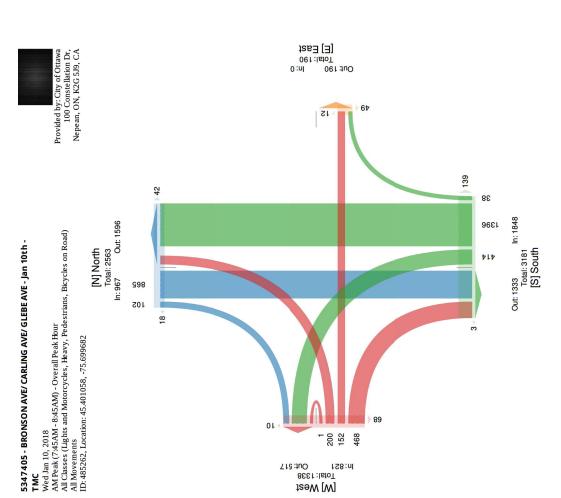




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4 of 8







Jamar Technologies, Inc Turning Movement Count - Full Study Peak Hour Diagram WO No: Device: **BRONSON AVE @ POWELL AVE** Survey Date: Friday, August 28, 2015 Start Time: 07:00

35323

**↓↑** ≈ **# +** ¥ a Total 15 0 **₽** ₹ Heavy Vehicles **₹** ₫ **Ö** Cars 15 33 0 L U t 1364 12 1316 2 1328 12 2 2479 1344 **BRONSON AVE** 07:15 08:15 Peak Hour: **AM Period** Ł t 14 14 2452 11 Ç **♣** ::: **-**1098 1061 37 7 § **+** 13 ภ 1 4 1071 37 Cars **←\$** ∘ Heavy Vehicles **₹**9 **₽** Total POWELL AVE 7 28 2 • **\*** \* 54 4 11

92

# Transportation Services - Traffic Services

Turning Movement Count - Full Study Peak Hour Diagram

**11** § 35323 Jamar Technologies, Inc **\* ♣** 23 **1** 28 Total 23 **4** Device: WO No: Heavy Vehicles ø\$ • Cars **\***\$ **BRONSON AVE @ POWELL AVE** 33 F U 1216 Ł 1201 8 15 950 964 7 2 2601 **BRONSON AVE** 16:30 17:30 Peak Hour: PM Period Ł 0 10 10 t 17 0 17 Ç **\$** 285 € 1341 1321 20 0 0 7 1443 34 32 20 រា ٣ Survey Date: Friday, August 28, 2015 Cars **←** Heavy Vehicles Start Time: 07:00 **₽** Total POWELL AVE 103 229 44 **₩** ∞ 376 **4** 5 517

Comments

Comments

2018-Jan-30

686 **4** 

2452

1463

**(<1**) ~

**=** 

2018-Jan-30 Page 1 of 4

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# Appendix C

Synchro Intersection Worksheets – Existing Conditions



Lanes, Volumes, Timings
1: Carling Avenue & Booth Street

Existing - AM Peak Hour 770-774 Bronson Ave

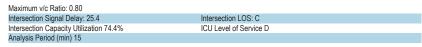
	•	<b>→</b>	-	*	-	1
Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations	ă	<b>*</b>	<b>411</b>		*	7
Traffic Volume (vph)	226	750	571	100	130	92
Future Volume (vph)	226	750	571	100	130	92
Satd. Flow (prot)	1658	3283	4536	0	1658	1427
Flt Permitted	0.950	0200	7000	J	0.950	1741
Satd. Flow (perm)	1571	3283	4536	0	1633	1258
Satd. Flow (RTOR)	1011	3203	31	U	1000	102
Lane Group Flow (vph)	251	833	745	0	144	102
Turn Type	Prot	NA	NA NA	U	Perm	Perm
Protected Phases	5	NA 2	NA 6		reiill	renili
Permitted Phases	5	Z	0		4	4
Detector Phases	5	2	6		4	4
	5	2	0		4	4
Switch Phase	E 0	10.0	10.0		10.0	10.0
Minimum Initial (s)	5.0	10.0	10.0		10.0	10.0
Minimum Split (s)	10.9	22.5	29.7		39.0	39.0
Total Split (s)	34.0	81.0	47.0		39.0	39.0
Total Split (%)	28.3%	67.5%	39.2%		32.5%	32.5%
Yellow Time (s)	3.7	3.7	3.7		3.3	3.3
All-Red Time (s)	2.2	2.0	2.0		2.7	2.7
Lost Time Adjust (s)	0.0	0.0	0.0		0.0	0.0
Total Lost Time (s)	5.9	5.7	5.7		6.0	6.0
Lead/Lag	Lead		Lag			
Lead-Lag Optimize?	Yes		Yes			
Recall Mode	None	Max	C-Max		None	None
Act Effct Green (s)	22.7	75.3	46.7		33.0	33.0
Actuated g/C Ratio	0.19	0.63	0.39		0.28	0.28
v/c Ratio	0.80	0.40	0.42		0.32	0.24
Control Delay	65.2	11.9	27.2		37.1	7.9
Queue Delay	0.0	0.0	0.0		0.0	0.0
Total Delay	65.2	11.9	27.2		37.1	7.9
LOS	03.2 E	П.Э	C C		37.1	7.5 A
Approach Delay		24.2	27.2		25.0	A
		24.2 C	21.2 C		25.0 C	
Approach LOS	EG.C	48.0	44.6		27.0	0.0
Queue Length 50th (m)	56.6					
Queue Length 95th (m)	82.0	60.4	60.1		45.1	13.1
Internal Link Dist (m)	40.0	107.6	286.6		178.3	00.0
Turn Bay Length (m)	40.0	000-	100:			30.0
Base Capacity (vph)	388	2060	1784		449	419
Starvation Cap Reductn	0	0	0		0	0
Spillback Cap Reductn	0	0	0		0	0
Storage Cap Reductn	0	0	0		0	0
Reduced v/c Ratio	0.65	0.40	0.42		0.32	0.24
Intersection Summary						
Cycle Length: 120						
Actuated Cycle Length: 120						
		o G-MPT	Ctort of	Croon		
Offset: 116 (97%), Reference	ed to phas	se p:WB1	, Start of (	oreen		
Natural Cycle: 90						
Control Type: Actuated-Coo	ordinated					

 01-21-2021
 CGH Transportation

 VZ
 Page 1

Lanes, Volumes, Timings
1: Carling Avenue & Booth Street

Existing - AM Peak Hour 770-774 Bronson Ave





 01-21-2021
 CGH Transportation

 VZ
 Page 2

Lanes, Volumes, Timings 3: Bronson Avenue & Powell Avenue

Intersection												
Int Delay, s/veh	0.5											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		<del>ተ</del> ተጉ			<b>^</b>	7			7			7
Traffic Vol. veh/h	0	877	3	0	533	12	0	0	10	0	0	55
Future Vol. veh/h	0	877	3	0	533	12	0	0	10	0	0	55
Conflicting Peds, #/hr	0	0	45	0	0	38	0	0	1	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	1000	-	-	350	-	-	0	-	-	0
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	3	2	2	4	8	2	2	2	2	2	5
Mvmt Flow	0	974	3	0	592	13	0	0	11	0	0	61
Major/Minor N	/lajor1		N.	//ajor2		N.	/linor1		N.	/linor2		
Conflicting Flow All	-	0	0	-	-	0	-	-	535	-	-	334
Stage 1	-	-	-	-	-	-	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-	-	-	-	-	-	-
Critical Hdwy	-	-	-	-	-	-	-	-	7.14	-	-	7
Critical Hdwy Stg 1	-	-	-	-	-	-	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-	-	-	-	-	-	-
Follow-up Hdwy	-	-	-	-	-	-	-	-	3.92	-	-	3.35
Pot Cap-1 Maneuver	0	-	-	0	-	-	0	0	419	0	0	653
Stage 1	0	-	-	0	-	-	0	0	-	0	0	-
Stage 2	0	-	-	0	-	-	0	0	-	0	0	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	-	-	-	-	-	-	-	-	401	-	-	630
Mov Cap-2 Maneuver	-	-	-	-	-	-	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-	-	-	-	-	-	-
Approach	EB			WB			NB			SB		
HCM Control Delay, s	0			0			14.2			11.3		
HCM LOS							В			В		
Minor Lane/Major Mvmt	t I	VBLn1	EBT	EBR	WBT	WBR S						
Capacity (veh/h)		401	-	-	-	-	630					
HCM Lane V/C Ratio		0.028	-	-	-	-	0.097					
HCM Control Delay (s)		14.2	-	-	-	-	11.3					
HCM Lane LOS		В	-	-	-	-	В					
HCM 95th %tile Q(veh)		0.1	-	-	-	-	0.3					

	•	-	$\rightarrow$	•	<b>←</b>	*	1	<b>†</b>	1	-	<b>↓</b>	1
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		44			4			473-			476	
Traffic Volume (vph)	58	25	30	17	53	17	44	1644	8	11	920	62
Future Volume (vph)	58	25	30	17	53	17	44	1644	8	11	920	62
Satd. Flow (prot)	0	1593	0	0	1642	0	0	3275	0	0	3241	0
Flt Permitted		0.768			0.922			0.874			0.917	
Satd. Flow (perm)	0	1222	0	0	1517	0	0	2865	0	0	2975	C
Satd. Flow (RTOR)		14			10			1			16	
Lane Group Flow (vph)	0	125	0	0	97	0	0	1885	0	0	1103	0
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2			6		
Detector Phase	4	4		8	8		2	2		6	6	
Switch Phase												
Minimum Initial (s)	10.0	10.0		10.0	10.0		10.0	10.0		10.0	10.0	
Minimum Split (s)	23.7	23.7		23.7	23.7		32.3	32.3		32.3	32.3	
Total Split (s)	26.0	26.0		26.0	26.0		84.0	84.0		84.0	84.0	
Total Split (%)	23.6%	23.6%		23.6%	23.6%		76.4%	76.4%		76.4%	76.4%	
Yellow Time (s)	3.0	3.0		3.0	3.0		3.3	3.3		3.3	3.3	
All-Red Time (s)	2.7	2.7		2.7	2.7		2.0	2.0		2.0	2.0	
Lost Time Adjust (s)	2.1	0.0		2.1	0.0		2.0	0.0		2.0	0.0	
Total Lost Time (s)		5.7			5.7			5.3			5.3	
Lead/Lag		0.1			0.1			0.0			0.0	
Lead-Lag Optimize?												
Recall Mode	None	None		None	None		C-Max	C-Max		C-Max	C-Max	
Act Effct Green (s)	140110	15.1		140110	15.1		OWIGA	83.9		O WILL	83.9	
Actuated g/C Ratio		0.14			0.14			0.76			0.76	
v/c Ratio		0.70			0.45			0.86			0.49	
Control Delay		59.5			44.5			6.6			6.1	
Queue Delay		0.0			0.0			29.4			0.0	
Total Delay		59.5			44.5			36.1			6.2	
LOS		55.5 E			D			D			Α.2	
Approach Delay		59.5			44.5			36.1			6.2	
Approach LOS		39.5 E			44.3 D			D D			Α.2	
Queue Length 50th (m)		23.0			17.3			53.6			38.4	
Queue Length 95th (m)		40.9			31.9			m42.3			61.7	
Internal Link Dist (m)		74.6			106.0			142.6			39.5	
Turn Bay Length (m)		74.0			100.0			142.0			39.5	
Base Capacity (vph)		236			288			2184			2271	
		0			200			403			0	
Starvation Cap Reductn		0			0			403			119	
Spillback Cap Reductn		0			0			0			0	
Storage Cap Reductn		0.53			0.34							
Reduced v/c Ratio		0.53			0.34			1.06			0.51	
Intersection Summary												
Cycle Length: 110	,											
Actuated Cycle Length: 110		ONDT		TI Chart	of Cuar							
Offset: 21 (19%), Reference	eu to pnase	S Z:NB I L	and 6:5B	il, Start	oi Green							
Natural Cycle: 90	avelia eta d											
Control Type: Actuated-Cor	ordinated											

Lanes, Volumes, Timings

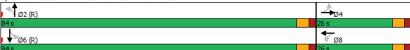
Existing - AM Peak Hour 770-774 Bronson Ave

3: Bronson Avenue & Powell Avenue

Maximum v/c Ratio: 0.86 Intersection Signal Delay: 27.0 Intersection LOS: C Intersection Capacity Utilization 104.8% ICU Level of Service G Analysis Period (min) 15

m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 3: Bronson Avenue & Powell Avenue



01-21-2021 **CGH Transportation** VZ Page 6 Lanes, Volumes, Timings 4: Bronson Avenue & Carling Avenue/Glebe Avenue Existing - AM Peak Hour 770-774 Bronson Ave

	•	-	*	•	+	*	1	1	1	-	<b>↓</b>	1
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	*	ની	7				ሻሻ	1,			<b>∱</b> Љ	
Traffic Volume (vph)	314	152	421	0	0	0	443	1396	38	0	865	102
Future Volume (vph)	314	152	421	0	0	0	443	1396	38	0	865	102
Satd. Flow (prot)	1530	1591	1483	0	0	0	3216	1730	0	0	3246	0
Flt Permitted	0.950	0.982					0.950					
Satd. Flow (perm)	1459	1565	1273	0	0	0	3179	1730	0	0	3246	0
Satd. Flow (RTOR)			30					3			13	
Lane Group Flow (vph)	255	263	468	0	0	0	492	1593	0	0	1074	0
Turn Type	Perm	NA	custom				Prot	NA			NA	
Protected Phases		4					5	2			6	
Permitted Phases	4		4 5									
Detector Phase	4	4	45				5	2			6	
Switch Phase												
Minimum Initial (s)	10.0	10.0					5.0	10.0			10.0	
Minimum Split (s)	31.0	31.0					11.0	24.0			33.0	
Total Split (s)	31.0	31.0					34.0	79.0			45.0	
Total Split (%)	28.2%	28.2%					30.9%	71.8%			40.9%	
Yellow Time (s)	3.3	3.3					3.3	3.3			3.3	
All-Red Time (s)	2.7	2.7					2.7	2.7			2.7	
Lost Time Adjust (s)	0.0	0.0					0.0	0.0			0.0	
Total Lost Time (s)	6.0	6.0					6.0	6.0			6.0	
Lead/Lag							Lead				Lag	
Lead-Lag Optimize?							Yes				Yes	
Recall Mode	None	None					Min	C-Max			C-Max	
Act Effct Green (s)	25.0	25.0	53.6				22.6	73.0			44.4	
Actuated g/C Ratio	0.23	0.23	0.49				0.21	0.66			0.40	
v/c Ratio	0.77	0.74	0.74				0.75	1.39			0.81	
Control Delay	56.7	53.5	28.4				37.8	205.3			31.3	
Queue Delay	0.0	0.0	0.0				0.0	0.2			0.1	
Total Delay	56.7	53.5	28.4				37.8	205.4			31.4	
LOS	Е	D	С				D	F			С	
Approach Delay		42.4						165.9			31.4	
Approach LOS		D						F			С	
Queue Length 50th (m)	54.3	55.4	72.7				50.5	~471.6			107.0	
Queue Length 95th (m)	#93.8	#92.5	103.4				m57.3	#553.7			#156.3	
Internal Link Dist (m)		82.5			112.6			392.2			142.6	
Turn Bay Length (m)							40.0					
Base Capacity (vph)	331	355	696				818	1149			1318	
Starvation Cap Reductn	0	0	0				0	0			14	
Spillback Cap Reductn	0	0	0				0	42			0	
Storage Cap Reductn	0	0	0				0	0			0	
Reduced v/c Ratio	0.77	0.74	0.67				0.60	1.44			0.82	

Intersection Summary

Cycle Length: 110

Actuated Cycle Length: 110
Offset: 53 (48%), Referenced to phase 2:NBT and 6:SBT, Start of Green

Natural Cycle: 150

Control Type: Actuated-Coordinated

01-21-2021 **CGH Transportation** VZ Page 7

Lanes, Volumes, Timings

Existing - AM Peak Hour 770-774 Bronson Ave

4: Bronson Avenue & Carling Avenue/Glebe Avenue

Maximum v/c Ratio: 1.39 Intersection Signal Delay: 101.7 Intersection LOS: F Intersection Capacity Utilization 110.6% ICU Level of Service H Analysis Period (min) 15 ~ Volume exceeds capacity, queue is theoretically infinite. Queue shown is maximum after two cycles. # 95th percentile volume exceeds capacity, queue may be longer. Queue shown is maximum after two cycles. m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 4: Bronson Avenue & Carling Avenue/Glebe Avenue



01-21-2021 **CGH Transportation** VZ Page 8 Lanes, Volumes, Timings 5: Bronson Avenue & Madawaska Drive/Fifth Avenue Existing - AM Peak Hour 770-774 Bronson Ave

	•	-	•	1	<b>←</b>	*	4	<b>†</b>	1	-	ļ	1
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		4			4			<b>†</b> 1>			414	
Traffic Volume (vph)	7	20	6	86	34	46	0	1722	34	22	1271	1
Future Volume (vph)	7	20	6	86	34	46	0	1722	34	22	1271	1
Satd. Flow (prot)	0	1619	0	0	1608	0	0	3302	0	0	3311	C
Flt Permitted		0.939			0.817						0.868	
Satd. Flow (perm)	0	1526	0	0	1319	0	0	3302	0	0	2876	C
Satd. Flow (RTOR)		7			16			4				
Lane Group Flow (vph)	0	37	0	0	185	0	0	1951	0	0	1437	C
Turn Type	Perm	NA		Perm	NA			NA		Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases	4			8						6		
Detector Phase	4	4		8	8			2		6	6	
Switch Phase												
Minimum Initial (s)	10.0	10.0		10.0	10.0			10.0		10.0	10.0	
Minimum Split (s)	23.3	23.3		23.3	23.3			30.3		30.3	30.3	
Total Split (s)	28.0	28.0		28.0	28.0			82.0		82.0	82.0	
Total Split (%)	25.5%	25.5%		25.5%	25.5%			74.5%		74.5%	74.5%	
Yellow Time (s)	3.3	3.3		3.3	3.3			3.3		3.3	3.3	
All-Red Time (s)	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)		5.3			5.3			5.3			5.3	
Lead/Lag												
Lead-Lag Optimize?												
Recall Mode	None	None		None	None			C-Max		C-Max	C-Max	
Act Effct Green (s)		18.4			18.4			81.0			81.0	
Actuated g/C Ratio		0.17			0.17			0.74			0.74	
v/c Ratio		0.14			0.79			0.80			0.68	
Control Delay		32.6			63.1			13.6			5.5	
Queue Delay		0.0			0.0			0.0			0.0	
Total Delay		32.6			63.1			13.6			5.5	
LOS		С			Е			В			Α	
Approach Delay		32.6			63.1			13.6			5.5	
Approach LOS		С			Е			В			Α	
Queue Length 50th (m)		5.5			34.9			127.2			28.4	
Queue Length 95th (m)		14.1			57.8			182.0			41.6	
Internal Link Dist (m)		190.1			132.1			94.8			392.2	
Turn Bay Length (m)												
Base Capacity (vph)		320			284			2431			2117	
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		0.12			0.65			0.80			0.68	
Intersection Summary												
Cycle Length: 110												
Actuated Cycle Length: 110												
Offset: 70 (64%), Reference	ed to phase	2:NBT a	nd 6:SBT	L, Start o	f Green							
Natural Cycle: 80												

Natural Cycle: 80 Control Type: Actuated-Coordinated

01-21-2021 **CGH Transportation** ٧Z Page 9 Lanes, Volumes, Timings 5: Bronson Avenue & Madawaska Drive/Fifth Avenue Existing - AM Peak Hour 770-774 Bronson Ave

Maximum v/c Ratio: 0.80 Intersection Signal Delay: 13.1 Intersection LOS: B Intersection Capacity Utilization 79.8% Analysis Period (min) 15 ICU Level of Service D

Splits and Phases: 5: Bronson Avenue & Madawaska Drive/Fifth Avenue

↑ Ø2 (R)	<b>♣</b> Ø4
82 s	28 s
Ø6 (R)	₩ Ø8
82 s	78 s

01-21-2021 CGH Transportation VZ Page 10 Lanes, Volumes, Timings 1: Carling Avenue & Booth Street 2020 Existing-PM Peak Hour 770-774 Bronson Ave

	•	<b>→</b>	+	4	-	1			
Lane Group	EBL	EBT	WBT	WBR	SBL	SBR			
Lane Configurations	ă	<b>^</b>	<del>ተ</del> ተጉ		*	7			
Traffic Volume (vph)	182	663	797	43	240	398			
Future Volume (vph)	182	663	797	43	240	398			
Satd. Flow (prot)	1658	3283	4678	0	1658	1427			
Flt Permitted	0.950	3203	4070	U	0.950	1421			
Satd. Flow (perm)	1578	3283	4678	0	1632	1230			
Satd. Flow (RTOR)	1070	3203	4070	U	1032	114			
Lane Group Flow (vph)	202	737	934	0	267	442			
				0					
Turn Type	Prot	NA	NA		Perm	Perm			
Protected Phases	5	2	6		-	4			
Permitted Phases	_	•			4	4			
Detector Phase	5	2	6		4	4			
Switch Phase		40 -	10.5		10.	10.			
Minimum Initial (s)	5.0	10.0	10.0		10.0	10.0			
Minimum Split (s)	10.9	22.5	29.7		39.0	39.0			
Total Split (s)	23.0	90.0	67.0		40.0	40.0			
Total Split (%)	17.7%	69.2%	51.5%		30.8%	30.8%			
Yellow Time (s)	3.7	3.7	3.7		3.3	3.3			
All-Red Time (s)	2.2	2.0	2.0		2.7	2.7			
Lost Time Adjust (s)	0.0	0.0	0.0		0.0	0.0			
Total Lost Time (s)	5.9	5.7	5.7		6.0	6.0			
Lead/Lag	Lead		Lag						
Lead-Lag Optimize?	Yes		Yes						
Recall Mode	None	Max	C-Max		None	None			
Act Effct Green (s)	17.1	84.3	61.3		34.0	34.0			
Actuated g/C Ratio	0.13	0.65	0.47		0.26	0.26			
v/c Ratio	0.13	0.05	0.42		0.20	1.09			
Control Delay	100.7	10.9	43.8		50.0	105.2			
		0.0			0.0				
Queue Delay	0.0		0.0			0.0			
Total Delay	100.7	10.9	43.8		50.0	105.2			
LOS	F	В	D		D	F			
Approach Delay		30.2	43.8		84.4				
Approach LOS		С	D		F				
Queue Length 50th (m)	51.9	42.0	78.1			~104.4			
Queue Length 95th (m)	#97.9	52.7	91.9		90.0	#169.3			
Internal Link Dist (m)		107.6	286.6		178.3				
Turn Bay Length (m)	40.0					30.0			
Base Capacity (vph)	218	2128	2211		426	405			
Starvation Cap Reductn	0	0	0		0	0			
Spillback Cap Reductn	0	0	0		0	0			
Storage Cap Reductn	0	0	0		0	0			
Reduced v/c Ratio	0.93	0.35	0.42		0.63	1.09			
	0.00	0.00	0.12		0.00	1.00			
Intersection Summary									
Cycle Length: 130									
Actuated Cycle Length: 130 Offset: 110 (85%), Referenced to phase 6:WBT, Start of Green									
	ced to phas	se 6:WBT	, Start of	Green					
Natural Cycle: 80									
Control Type: Actuated-Coo	ordinated								

01-21-2021 CGH Transportation VZ Page 1

### Lanes, Volumes, Timings 1: Carling Avenue & Booth Street

### 2020 Existing-PM Peak Hour 770-774 Bronson Ave

Maximum v/c Ratio: 1.09 Intersection Signal Delay: 50.0 Intersection LOS: D Intersection Capacity Utilization 76.7% ICU Level of Service D Analysis Period (min) 15 ~ Volume exceeds capacity, queue is theoretically infinite. Queue shown is maximum after two cycles. # 95th percentile volume exceeds capacity, queue may be longer. Queue shown is maximum after two cycles.

Splits and Phases: 1: Carling Avenue & Booth Street



01-21-2021 CGH Transportation VZ Page 2

### HCM 2010 TWSC 2: Cambridge Street & Carling Avenue

HCM Control Delay (s) HCM Lane LOS

HCM 95th %tile Q(veh)

2020	Existing-PM Peak Hour
	770-774 Bronson Ave

Intersection												
Int Delay, s/veh	2.8											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	EDL		EDI	WDL		VV DIT	INDL	INDI	INDIX.	ODL	ODI	JDK 7
Traffic Vol, veh/h	0	<b>↑↑↑</b> 886	17	0	<b>↑↑</b> 473	<b>r</b>	0	0	15	0	0	289
Future Vol. veh/h	0	886	17	0	473	6	0	0	15	0	0	289
Conflicting Peds, #/hr	0	000	42	0	4/3	33	0	0	4	0	0	209
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	riee	riee	None	riee -	riee	None	Stop	Slop -	None	Slop -	Stop -	None
Storage Length	- 1		1000			350			0		-	0
		0	-		0	330		0	-		0	-
Veh in Median Storage, Grade, %	# -	0	- 1		0		- 1	0	- 1		0	
	90	90	90	90	90	90	90	90	90		90	90
Peak Hour Factor										90		
Heavy Vehicles, %	2	3	2	2	4	8	2	2	2	2	2	5
Mvmt Flow	0	984	19	0	526	7	0	0	17	0	0	321
Major/Minor N	lajor1		1	Major2			Minor1		1	Minor2		
Conflicting Flow All	-	0	0	-	-	0	-	-	548	-	-	297
Stage 1	-	-	-	-	-	-	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-	-	-	-	-	-	-
Critical Hdwy	-	-	-	-	-	-	-	-	7.14	-	-	7
Critical Hdwy Stg 1	-	-	-	-	-	-	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-	-	-	-	-	-	-
Follow-up Hdwy	-	-	-	-	-	-	-	-	3.92	-	-	3.35
Pot Cap-1 Maneuver	0	-	-	0	-	-	0	0	411	0	0	690
Stage 1	0	-	-	0	-	-	0	0	-	0	0	-
Stage 2	0	-	-	0	-	-	0	0	-	0	0	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	-	-	-	-	-	-	-	-	393	-	-	668
Mov Cap-2 Maneuver	-	-	-	-	-	-	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-	-	-	-	-	-	-
Stage 2	-		-	-	-		-	-	-	-	-	-
Approach	EB			WB			NB			SB		
HCM Control Delay, s	0			0			14.6			15.3		
HCM LOS	0			U			14.0 B			13.3		
TIOW LOG							ט			U		
Miner Lene/Meier Munet		NBLn1	EBT	EBR	WBT	WBR :	רש וחכ					
Minor Lane/Major Mymt				EDK	VVDI	WBR						
Capacity (veh/h)		393	-	-	-	-	668					
HCM Cartes Delay (a)		0.042	-	-	-		0.481					
HCM Control Delay (s)		14.6	-	-	-	-	15.3					

- - -

Lanes, Volumes, Timings 3: Bronson Avenue & Powell Avenue

Natural Cycle: 65

Control Type: Actuated-Coordinated

2020 Existing-PM Peak Hour 770-774 Bronson Ave

	•	$\rightarrow$	*	1	-	•	1	Ť		-	Į.	4
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SE
Lane Configurations		4			4			414			414	
Traffic Volume (vph)	127	82	150	58	89	5	66	1046	19	6	934	
Future Volume (vph)	127	82	150	58	89	5	66	1046	19	6	934	
Satd. Flow (prot)	0	1572	0	0	1696	0	0	3257	0	0	3249	
Flt Permitted		0.779			0.654			0.744			0.945	
Satd. Flow (perm)	0	1231	0	0	1131	0	0	2430	0	0	3070	
Satd. Flow (RTOR)		27			1			3			10	
Lane Group Flow (vph)	0	399	0	0	169	0	0	1256	0	0	1106	
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2			6		
Detector Phase	4	4		8	8		2	2		6	6	
Switch Phase												
Minimum Initial (s)	10.0	10.0		10.0	10.0		10.0	10.0		10.0	10.0	
Minimum Split (s)	23.7	23.7		23.7	23.7		32.3	32.3		32.3	32.3	
Total Split (s)	38.0	38.0		38.0	38.0		92.0	92.0		92.0	92.0	
Total Split (%)	29.2%	29.2%		29.2%	29.2%		70.8%	70.8%		70.8%	70.8%	
Yellow Time (s)	3.0	3.0		3.0	3.0		3.3	3.3		3.3	3.3	
All-Red Time (s)	2.7	2.7		2.7	2.7		2.0	2.0		2.0	2.0	
Lost Time Adjust (s)		0.0			0.0			0.0			0.0	
Total Lost Time (s)		5.7			5.7			5.3			5.3	
Lead/Lag												
Lead-Lag Optimize?												
Recall Mode	None	None		None	None		C-Max	C-Max		C-Max	C-Max	
Act Effct Green (s)		32.3			32.3			86.7			86.7	
Actuated g/C Ratio		0.25			0.25			0.67			0.67	
v/c Ratio		1.22			0.60			0.77			0.54	
Control Delay		163.9			53.2			17.7			12.3	
Queue Delay		0.0			0.0			3.8			0.1	
Total Delay		163.9			53.2			21.5			12.4	
LOS		F			D			С			В	
Approach Delay		163.9			53.2			21.5			12.4	
Approach LOS		F			D			С			В	
Queue Length 50th (m)		~120.6			38.2			124.8			71.0	
Queue Length 95th (m)		#183.3			63.2			144.6			87.3	
Internal Link Dist (m)		74.6			106.0			142.6			39.5	
Turn Bay Length (m)												
Base Capacity (vph)		326			281			1621			2050	
Starvation Cap Reductn		0			0			277			0	
Spillback Cap Reductn		0			0			0			134	
Storage Cap Reductn		0			0			0			0	
Reduced v/c Ratio		1.22			0.60			0.93			0.58	
Intersection Summary												
Cycle Length: 130												
Actuated Cycle Length: 130	)											

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Lanes, Volumes, Timings
3: Bronson Avenue & Powell Avenue

2020 Existing-PM Peak Hour 770-774 Bronson Ave

Maximum v/c Ratio: 1.22 Intersection Signal Delay: 39.3 Intersection LOS: D Intersection Capacity Utilization 104.0% ICU Level of Service G Analysis Period (min) 15

Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

Queue shown is maximum after two cycles.



 01-21-2021
 CGH Transportation

 VZ
 Page 6

Lanes, Volumes, Timings

2020 Existing-PM Peak Hour 770-774 Bronson Ave

4: Bronson Avenue & Carling Avenue/Glebe Avenue

	•	-	•	•	<b>←</b>	*	4	<b>†</b>	1	-	ļ	4
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	ă	ની	7				77	ĥ			<b>†</b> î>	
Traffic Volume (vph)	207	133	561	0	0	0	375	942	26	0	1038	104
Future Volume (vph)	207	133	561	0	0	0	375	942	26	0	1038	104
Satd. Flow (prot)	1530	1605	1483	0	0	0	3216	1729	0	0	3253	0
Flt Permitted	0.950	0.989					0.950					
Satd. Flow (perm)	1456	1587	1407	0	0	0	3178	1729	0	0	3253	0
Satd. Flow (RTOR)			46					3			12	
Lane Group Flow (vph)	186	192	623	0	0	0	417	1076	0	0	1269	0
Turn Type	Perm	NA	custom				Prot	NA			NA	
Protected Phases		4					5	2			6	
Permitted Phases	4		4.5				-				-	
Detector Phase	4	4	4.5				5	2			6	
Switch Phase			. 3				-	_			-	
Minimum Initial (s)	10.0	10.0					5.0	10.0			10.0	
Minimum Split (s)	31.0	31.0					11.0	24.0			33.0	
Total Split (s)	31.0	31.0					26.0	99.0			73.0	
Total Split (%)	23.8%	23.8%					20.0%	76.2%			56.2%	
Yellow Time (s)	3.3	3.3					3.3	3.3			3.3	
	2.7	2.7					2.7	2.7			2.7	
All-Red Time (s)	0.0	0.0					0.0	0.0			0.0	
Lost Time Adjust (s)												
Total Lost Time (s)	6.0	6.0					6.0	6.0			6.0	
Lead/Lag							Lead				Lag	
Lead-Lag Optimize?	N	N.					Yes	0.14			Yes	
Recall Mode	None	None					Min	C-Max			C-Max	
Act Effct Green (s)	25.0	25.0	51.0				20.0	93.0			67.0	
Actuated g/C Ratio	0.19	0.19	0.39				0.15	0.72			0.52	
v/c Ratio	0.66	0.63	1.08				0.84	0.87			0.75	
Control Delay	51.6	48.9	92.0				62.9	27.7			20.3	
Queue Delay	0.0	0.0	0.0				0.0	1.1			0.3	
Total Delay	51.6	48.9	92.0				62.9	28.9			20.6	
LOS	D	D	F				Е	С			С	
Approach Delay		76.3						38.4			20.6	
Approach LOS		Е						D			С	
Queue Length 50th (m)	48.8	50.2	~161.5				54.1	185.1			99.5	
Queue Length 95th (m)	76.2	77.0	#243.3				m#78.6	m230.5			m110.7	
Internal Link Dist (m)		82.5			112.6			392.2			142.6	
Turn Bay Length (m)							40.0					
Base Capacity (vph)	280	305	579				494	1237			1682	
Starvation Cap Reductn	0	0	0				0	0			78	
Spillback Cap Reductn	0	0	0				0	47			0	
Storage Cap Reductn	0	0	0				0	0			0	
Reduced v/c Ratio	0.66	0.63	1.08				0.84	0.90			0.79	
Intersection Summary								_				
Cycle Length: 130												

Actuated Cycle Length: 130

Offset: 46 (35%), Referenced to phase 2:NBT and 6:SBT, Start of Green

Natural Cycle: 90

Control Type: Actuated-Coordinated

01-21-2021 **CGH Transportation** VZ Page 7 Lanes, Volumes, Timings 4: Bronson Avenue & Carling Avenue/Glebe Avenue 2020 Existing-PM Peak Hour 770-774 Bronson Ave

Maximum v/c Ratio: 1.08 Intersection Signal Delay: 42.5 Intersection LOS: D Intersection Capacity Utilization 82.9% Analysis Period (min) 15 ICU Level of Service E ~ Volume exceeds capacity, queue is theoretically infinite. Queue shown is maximum after two cycles.

# 95th percentile volume exceeds capacity, queue may be longer.

m Volume for 95th percentile queue is metered by upstream signal.

Queue shown is maximum after two cycles.



01-21-2021 CGH Transportation VZ Page 8 Lanes, Volumes, Timings 5: Bronson Avenue & Madawaska Drive/Fifth Avenue

Natural Cycle: 75

Control Type: Actuated-Coordinated

2020 Existing-PM Peak Hour 770-774 Bronson Ave

	<i>•</i>	-	*	1	<b>—</b>	*	1	1	1	-	ļ	4
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SB
Lane Configurations		4			4			414			414	
Traffic Volume (vph)	3	34	24	107	22	27	9	1219	27	19	1534	
Future Volume (vph)	3	34	24	107	22	27	9	1219	27	19	1534	
Satd. Flow (prot)	0	1523	0	0	1635	0	0	3300	0	0	3311	
Flt Permitted		0.990			0.751			0.933			0.916	
Satd. Flow (perm)	0	1510	0	0	1239	0	0	3079	0	0	3035	
Satd. Flow (RTOR)		21			7			5			1	
Lane Group Flow (vph)	0	68	0	0	173	0	0	1394	0	0	1729	
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2			6		
Detector Phase	4	4		8	8		2	2		6	6	
Switch Phase												
Minimum Initial (s)	10.0	10.0		10.0	10.0		10.0	10.0		10.0	10.0	
Minimum Split (s)	23.3	23.3		23.3	23.3		30.3	30.3		30.3	30.3	
Total Split (s)	24.0	24.0		24.0	24.0		106.0	106.0		106.0	106.0	
Total Split (%)	18.5%	18.5%		18.5%	18.5%		81.5%	81.5%		81.5%	81.5%	
Yellow Time (s)	3.3	3.3		3.3	3.3		3.3	3.3		3.3	3.3	
All-Red Time (s)	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)		5.3			5.3			5.3			5.3	
Lead/Lag												
Lead-Lag Optimize?												
Recall Mode	None	None		None	None		C-Max	C-Max		C-Max	C-Max	
Act Effct Green (s)		18.6			18.6			100.8			100.8	
Actuated g/C Ratio		0.14			0.14			0.78			0.78	
v/c Ratio		0.29			0.95			0.58			0.73	
Control Delay		39.1			106.6			7.2			7.0	
Queue Delay		0.0			0.0			0.0			0.0	
Total Delay		39.1			106.6			7.2			7.0	
LOS		D			F			Α			Α	
Approach Delay		39.1			106.6			7.2			7.0	
Approach LOS		D			F			Α			Α	
Queue Length 50th (m)		10.8			42.8			65.7			73.1	
Queue Length 95th (m)		24.9			#87.3			80.1			m75.4	
Internal Link Dist (m)		190.1			132.1			94.8			392.2	
Turn Bay Length (m)												
Base Capacity (vph)		235			184			2388			2353	
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		0.29			0.94			0.58			0.73	
ntersection Summary												
Cycle Length: 130												
Actuated Cycle Length: 130		O LIDE	105-									
Offset: 55 (42%), Reference	ed to phase	2:NBTL	and 6:SB	IL, Start	of Green							

01-21-2021 CGH Transportation VZ Page 9 Lanes, Volumes, Timings 5: Bronson Avenue & Madawaska Drive/Fifth Avenue 2020 Existing-PM Peak Hour 770-774 Bronson Ave

Maximum v/c Ratio: 0.95 Intersection Signal Delay: 12.9 Intersection LOS: B Intersection Signal Delay: 12.9 Intersection Capacity Utilization 84.0% ICU I Analysis Period (min) 15

# 95th percentile volume exceeds capacity, queue may be longer.

Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal. ICU Level of Service E

Splits and Phases: 5: Bronson Avenue & Madawaska Drive/Fifth Avenue



01-21-2021 CGH Transportation VZ Page 10

# Appendix D

Collision Data



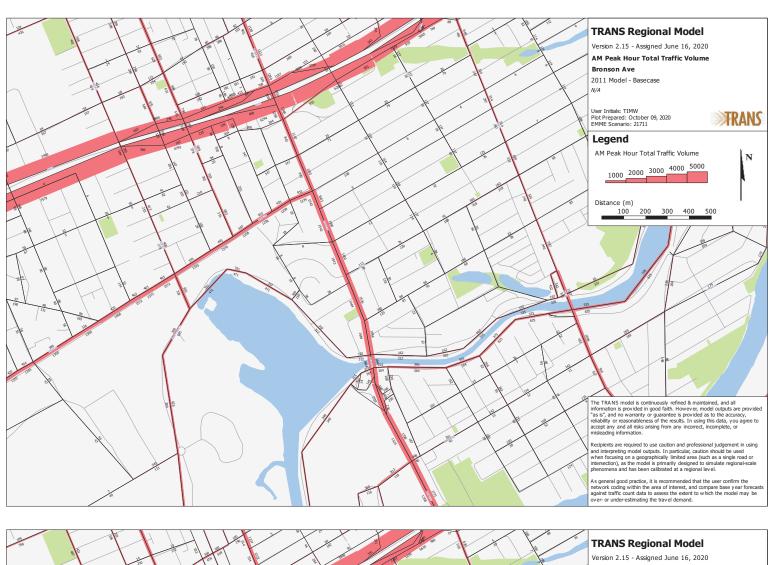
Accident Date	Accident Year	Accident Time	Location	Environment Condition	Light	Traffic Control	Traffic Control Condition	Classification Of Accident	Initial Impact Type	Road Surface Condition
2014-04-01	2014	14:00	BRONSON AVE @ CARLING AVE/GLEBE AVE	01 - Clear	01 - Daylight	01 - Traffic signal		03 - P.D. only	03 - Rear end	01 - Dry
2014-08-16	2014	13:20	BRONSON AVE @ CARLING AVE/GLEBE AVE	02 - Rain	01 - Daylight	01 - Traffic signal		03 - P.D. only	04 - Sideswipe	02 - Wet
2014-08-20 2014-10-11	2014 2014	10:52 16:46	BRONSON AVE @ CARLING AVE/GLEBE AVE BRONSON AVE @ CARLING AVE/GLEBE AVE	01 - Clear 01 - Clear	01 - Daylight 01 - Daylight	01 - Traffic signal 01 - Traffic signal		03 - P.D. only 03 - P.D. only	02 - Angle 04 - Sideswipe	01 - Dry 01 - Dry
2014-10-11	2014	17:06	BRONSON AVE @ CARLING AVE/GLEBE AVE	01 - Clear	07 - Daylight	01 - Traffic signal		03 - P.D. only	03 - Rear end	01 - Dry
2015-05-19	2015	17:23	BRONSON AVE @ CARLING AVE/GLEBE AVE	01 - Clear	01 - Daylight	01 - Traffic signal		02 - Non-fatal injury	07 - SMV other	01 - Dry
2015-07-06	2015	14:24	BRONSON AVE @ CARLING AVE/GLEBE AVE	01 - Clear	01 - Daylight	01 - Traffic signal		02 - Non-fatal injury	07 - SMV other	01 - Dry
2015-09-30 2015-01-20	2015 2015	15:00 14:12	BRONSON AVE @ CARLING AVE/GLEBE AVE BRONSON AVE @ CARLING AVE/GLEBE AVE	01 - Clear 01 - Clear	01 - Daylight 01 - Daylight	01 - Traffic signal 01 - Traffic signal		02 - Non-fatal injury 03 - P.D. only	07 - SMV other 03 - Rear end	01 - Dry 02 - Wet
2015-01-20	2015	8:45	BRONSON AVE @ CARLING AVE/GLEBE AVE	03 - Snow	01 - Daylight 01 - Daylight	01 - Traffic signal		03 - P.D. only	04 - Sideswipe	02 - Wet 04 - Slush
2015-07-18	2015	12:33	BRONSON AVE @ CARLING AVE/GLEBE AVE	01 - Clear	01 - Daylight	01 - Traffic signal		03 - P.D. only	04 - Sideswipe	01 - Dry
2015-01-29	2015	15:45	BRONSON AVE @ CARLING AVE/GLEBE AVE	03 - Snow	01 - Daylight	01 - Traffic signal		03 - P.D. only	04 - Sideswipe	03 - Loose snow
2015-02-10	2015 2015	17:15	BRONSON AVE @ CARLING AVE/GLEBE AVE	01 - Clear 03 - Snow	01 - Daylight 07 - Dark	01 - Traffic signal		03 - P.D. only	03 - Rear end	01 - Dry
2015-02-21 2015-01-14	2015	21:53 21:10	BRONSON AVE @ CARLING AVE/GLEBE AVE BRONSON AVE @ CARLING AVE/GLEBE AVE	03 - Snow	07 - Dark 07 - Dark	01 - Traffic signal 01 - Traffic signal		03 - P.D. only 03 - P.D. only	02 - Angle 03 - Rear end	03 - Loose snow 03 - Loose snow
2015-08-04	2015	9:56	BRONSON AVE @ CARLING AVE/GLEBE AVE	01 - Clear	01 - Daylight	01 - Traffic signal		03 - P.D. only	04 - Sideswipe	01 - Dry
2015-09-16	2015	13:00	BRONSON AVE @ CARLING AVE/GLEBE AVE	01 - Clear	01 - Daylight	01 - Traffic signal		03 - P.D. only	04 - Sideswipe	01 - Dry
2015-09-30	2015	18:13	BRONSON AVE @ CARLING AVE/GLEBE AVE	01 - Clear	01 - Daylight	01 - Traffic signal		03 - P.D. only	04 - Sideswipe	01 - Dry
2016-05-17 2016-05-17	2016 2016	18:07 11:45	BRONSON AVE @ CARLING AVE/GLEBE AVE BRONSON AVE @ CARLING AVE/GLEBE AVE	01 - Clear 01 - Clear	01 - Daylight 01 - Daylight	01 - Traffic signal 01 - Traffic signal		02 - Non-fatal injury 02 - Non-fatal injury	02 - Angle 03 - Rear end	01 - Dry 01 - Dry
2016-03-17	2016	11:45	BRONSON AVE @ CARLING AVE/GLEBE AVE	01 - Clear	01 - Daylight 01 - Daylight	01 - Traffic signal		02 - Non-fatal injury	03 - Real ellu 02 - Angle	01 - Dry 01 - Dry
2016-09-19	2016	22:29	BRONSON AVE @ CARLING AVE/GLEBE AVE	01 - Clear	07 - Dark	01 - Traffic signal		03 - P.D. only	02 - Angle	01 - Dry
2016-10-28	2016	16:45	BRONSON AVE @ CARLING AVE/GLEBE AVE	01 - Clear	01 - Daylight	01 - Traffic signal		03 - P.D. only	03 - Rear end	02 - Wet
2016-01-27 2016-09-16	2016 2016	11:59 15:58	BRONSON AVE @ CARLING AVE/GLEBE AVE	01 - Clear 01 - Clear	01 - Daylight	01 - Traffic signal		03 - P.D. only	03 - Rear end	02 - Wet
2016-09-16	2016 2016	15:58 18:10	BRONSON AVE @ CARLING AVE/GLEBE AVE BRONSON AVE @ CARLING AVE/GLEBE AVE	01 - Clear 01 - Clear	01 - Daylight 01 - Daylight	01 - Traffic signal 01 - Traffic signal		03 - P.D. only 03 - P.D. only	05 - Turning movement 04 - Sideswipe	01 - Dry 01 - Dry
2016-12-12	2016	17:05	BRONSON AVE @ CARLING AVE/GLEBE AVE	03 - Snow	07 - Dark	01 - Traffic signal		03 - P.D. only	04 - Sideswipe	02 - Wet
2016-12-28	2016	19:19	BRONSON AVE @ CARLING AVE/GLEBE AVE	01 - Clear	07 - Dark	01 - Traffic signal		03 - P.D. only	03 - Rear end	01 - Dry
2016-11-24	2016	9:26	BRONSON AVE @ CARLING AVE/GLEBE AVE	03 - Snow	01 - Daylight	01 - Traffic signal		03 - P.D. only	04 - Sideswipe	03 - Loose snow
2016-11-25	2016	18:29	BRONSON AVE @ CARLING AVE/GLEBE AVE	01 - Clear	07 - Dark	01 - Traffic signal		03 - P.D. only	03 - Rear end	01 - Dry
2016-11-30 2016-09-29	2016 2016	20:00 23:15	BRONSON AVE @ CARLING AVE/GLEBE AVE BRONSON AVE @ CARLING AVE/GLEBE AVE	02 - Rain 01 - Clear	07 - Dark 07 - Dark	01 - Traffic signal 01 - Traffic signal		03 - P.D. only 03 - P.D. only	04 - Sideswipe 04 - Sideswipe	02 - Wet 01 - Dry
2017-05-30	2016	12:13	BRONSON AVE @ CARLING AVE/GLEBE AVE BRONSON AVE @ CARLING AVE/GLEBE AVE	01 - Clear	01 - Daylight	01 - Traffic signal		03 - P.D. only	03 - Rear end	01 - Dry
2017-06-22	2017	19:10	BRONSON AVE @ CARLING AVE/GLEBE AVE	01 - Clear	01 - Daylight	01 - Traffic signal		03 - P.D. only	03 - Rear end	01 - Dry
2017-05-14	2017	9:47	BRONSON AVE @ CARLING AVE/GLEBE AVE	02 - Rain	01 - Daylight	01 - Traffic signal		03 - P.D. only	02 - Angle	02 - Wet
2017-07-06 2017-09-14	2017 2017	13:20 18:43	BRONSON AVE @ CARLING AVE/GLEBE AVE BRONSON AVE @ CARLING AVE/GLEBE AVE	01 - Clear 01 - Clear	01 - Daylight 01 - Daylight	01 - Traffic signal 01 - Traffic signal		03 - P.D. only 03 - P.D. only	04 - Sideswipe 05 - Turning movement	01 - Dry
2017-09-14	2017	18:43	BRONSON AVE @ CARLING AVE/GLEBE AVE BRONSON AVE @ CARLING AVE/GLEBE AVE	01 - Clear 01 - Clear	01 - Daylight 01 - Daylight	01 - Traffic signal		03 - P.D. only	03 - Rear end	01 - Dry 01 - Dry
2017-00-12	2017	10:53	BRONSON AVE @ CARLING AVE/GLEBE AVE	01 - Clear	01 - Daylight	01 - Traffic signal		03 - P.D. only	04 - Sideswipe	01 - Dry
2017-10-02	2017	19:43	BRONSON AVE @ CARLING AVE/GLEBE AVE	01 - Clear	07 - Dark	01 - Traffic signal		03 - P.D. only	04 - Sideswipe	01 - Dry
2017-11-09	2017	10:57	BRONSON AVE @ CARLING AVE/GLEBE AVE	01 - Clear	01 - Daylight	01 - Traffic signal		03 - P.D. only	04 - Sideswipe	01 - Dry
2017-11-14	2017	18:16	BRONSON AVE @ CARLING AVE/GLEBE AVE	01 - Clear	07 - Dark	01 - Traffic signal		03 - P.D. only	04 - Sideswipe	01 - Dry
2017-12-11 2017-01-05	2017 2017	16:40 14:06	BRONSON AVE @ CARLING AVE/GLEBE AVE BRONSON AVE @ CARLING AVE/GLEBE AVE	01 - Clear 01 - Clear	05 - Dusk 01 - Daylight	01 - Traffic signal 01 - Traffic signal		03 - P.D. only 03 - P.D. only	03 - Rear end 04 - Sideswipe	01 - Dry 02 - Wet
2017-01-03	2017	9:55	BRONSON AVE @ CARLING AVE/GLEBE AVE	01 - Clear	01 - Daylight	01 - Traffic signal		03 - P.D. only	04 - Sideswipe	02 - Wet
2017-12-23	2017	13:28	BRONSON AVE @ CARLING AVE/GLEBE AVE	03 - Snow	01 - Daylight	01 - Traffic signal		03 - P.D. only	03 - Rear end	05 - Packed snow
2018-02-21	2018	16:27	BRONSON AVE @ CARLING AVE/GLEBE AVE (0002134)	01 - Clear	01 - Daylight	01 - Traffic signal		03 - P.D. only	04 - Sideswipe	01 - Dry
2018-03-26 2018-04-03	2018 2018	18:54 15:20	BRONSON AVE @ CARLING AVE/GLEBE AVE (0002134) BRONSON AVE @ CARLING AVE/GLEBE AVE (0002134)	01 - Clear 01 - Clear	05 - Dusk 01 - Daylight	01 - Traffic signal 01 - Traffic signal		03 - P.D. only 03 - P.D. only	03 - Rear end 03 - Rear end	01 - Dry 01 - Dry
2018-05-18	2018	2:11	BRONSON AVE @ CARLING AVE/GLEBE AVE (0002134)  BRONSON AVE @ CARLING AVE/GLEBE AVE (0002134)	01 - Clear	01 - Daylight 07 - Dark	01 - Traffic signal		03 - P.D. Only 02 - Non-fatal injury	03 - Rear end	01 - Dry
2018-09-09	2018	12:43	BRONSON AVE @ CARLING AVE/GLEBE AVE (0002134)	01 - Clear	01 - Daylight	01 - Traffic signal		02 - Non-fatal injury	07 - SMV other	01 - Dry
2018-10-09	2018	7:36	BRONSON AVE @ CARLING AVE/GLEBE AVE (0002134)	01 - Clear	01 - Daylight	01 - Traffic signal		03 - P.D. only	03 - Rear end	01 - Dry
2018-11-30	2018	8:50	BRONSON AVE @ CARLING AVE/GLEBE AVE (0002134)	01 - Clear	01 - Daylight	01 - Traffic signal		03 - P.D. only	04 - Sideswipe	01 - Dry
2014-05-15 2014-01-31	2014 2014	18:45 11:16	BRONSON AVE @ FIRST AVE BRONSON AVE @ FIRST AVE	01 - Clear 01 - Clear	01 - Daylight 01 - Daylight	02 - Stop sign 02 - Stop sign		02 - Non-fatal injury 03 - P.D. only	05 - Turning movement 02 - Angle	01 - Dry 02 - Wet
2014-01-31	2014	8:30	BRONSON AVE @ FIRST AVE BRONSON AVE @ FIRST AVE	01 - Clear 01 - Clear	01 - Daylight 01 - Daylight	02 - Stop sign 02 - Stop sign		03 - P.D. only 03 - P.D. only	02 - Angle 04 - Sideswipe	02 - Wet 01 - Dry
2014-12-04	2014	12:57	BRONSON AVE @ FIRST AVE	01 - Clear	01 - Daylight	02 - Stop sign		03 - P.D. only	04 - Sideswipe	01 - Dry
2015-03-27	2015	13:36	BRONSON AVE @ FIRST AVE	01 - Clear	01 - Daylight	02 - Stop sign		03 - P.D. only	02 - Angle	03 - Loose snow
2015-08-13	2015	18:18	BRONSON AVE @ FIRST AVE	01 - Clear	01 - Daylight	02 - Stop sign		03 - P.D. only	02 - Angle	01 - Dry
2016-01-29 2016-10-20	2016 2016	12:42 11:59	BRONSON AVE @ FIRST AVE BRONSON AVE @ FIRST AVE	03 - Snow 02 - Rain	01 - Daylight 01 - Daylight	02 - Stop sign 02 - Stop sign		03 - P.D. only 03 - P.D. only	02 - Angle 04 - Sideswipe	02 - Wet 02 - Wet
2016-11-16	2016	15:00	BRONSON AVE @ FIRST AVE	01 - Clear	01 - Daylight	02 - Stop sign		03 - P.D. only	02 - Angle	01 - Dry
2017-06-05	2017	17:10	BRONSON AVE @ FIRST AVE	01 - Clear	01 - Daylight	02 - Stop sign		02 - Non-fatal injury	03 - Rear end	01 - Dry
2017-05-13	2017	10:56	BRONSON AVE @ FIRST AVE	02 - Rain	01 - Daylight	02 - Stop sign		03 - P.D. only	05 - Turning movement	02 - Wet
2017-11-30 2017-12-12	2017 2017	15:47 13:45	BRONSON AVE @ FIRST AVE BRONSON AVE @ FIRST AVE	04 - Freezing Rain 03 - Snow	01 - Daylight 01 - Daylight	02 - Stop sign 02 - Stop sign		03 - P.D. only 03 - P.D. only	04 - Sideswipe 02 - Angle	06 - Ice 03 - Loose snow
2017-12-12	2017	13:45	BRONSON AVE @ FIRST AVE BRONSON AVE @ FIRST AVE (0007719)	03 - Snow 04 - Freezing Rain	01 - Daylight 05 - Dusk	02 - Stop sign 02 - Stop sign		03 - P.D. only	02 - Angle 04 - Sideswipe	03 - Loose snow 02 - Wet
2018-08-21	2018	12:39	BRONSON AVE @ FIRST AVE (0007719)	01 - Clear	01 - Daylight	02 - Stop sign		03 - P.D. only	05 - Turning movement	01 - Dry
2018-08-31	2018	19:23	BRONSON AVE @ FIRST AVE (0007719)	01 - Clear	05 - Dusk	02 - Stop sign		02 - Non-fatal injury	02 - Angle	01 - Dry
2018-10-01	2018	19:56	BRONSON AVE @ FIRST AVE (0007719)	01 - Clear	07 - Dark	02 - Stop sign		03 - P.D. only	02 - Angle	01 - Dry
2018-11-09	2018 2018	10:15 16:05	BRONSON AVE @ FIRST AVE (0007719)	01 - Clear 01 - Clear	01 - Daylight	02 - Stop sign		03 - P.D. only	02 - Angle	01 - Dry
2018-11-23 2014-04-29	2018	12:30	BRONSON AVE @ FIRST AVE (0007719) BRONSON AVE btwn CARLING AVE & FIRST AVE	01 - Clear 01 - Clear	01 - Daylight 01 - Daylight	02 - Stop sign 10 - No control		03 - P.D. only 03 - P.D. only	02 - Angle 03 - Rear end	01 - Dry 01 - Dry
2014-08-08	2014	15:50	BRONSON AVE btwn CARLING AVE & FIRST AVE	01 - Clear	01 - Daylight	10 - No control		03 - P.D. only	04 - Sideswipe	01 - Dry
2014-10-24	2014	19:15	BRONSON AVE btwn CARLING AVE & FIRST AVE	01 - Clear	07 - Dark	10 - No control		03 - P.D. only	02 - Angle	01 - Dry
2015-06-01	2015	19:53	BRONSON AVE btwn CARLING AVE & FIRST AVE	01 - Clear	01 - Daylight	10 - No control		03 - P.D. only	04 - Sideswipe	01 - Dry
2015-04-27 2015-06-22	2015 2015	15:20 8:46	BRONSON AVE btwn CARLING AVE & FIRST AVE BRONSON AVE btwn CARLING AVE & FIRST AVE	01 - Clear 01 - Clear	01 - Daylight 01 - Daylight	10 - No control 10 - No control		03 - P.D. only 03 - P.D. only	03 - Rear end 03 - Rear end	01 - Dry 01 - Dry
2015-10-15	2015	22:10	BRONSON AVE blwn CARLING AVE & FIRST AVE	01 - Clear	07 - Daylight	10 - No control		03 - P.D. only	04 - Sideswipe	01 - Dry
2016-03-09	2016	16:50	BRONSON AVE btwn CARLING AVE & FIRST AVE	01 - Clear	01 - Daylight	10 - No control		03 - P.D. only	03 - Rear end	02 - Wet
2016-06-17	2016	19:09	BRONSON AVE btwn CARLING AVE & FIRST AVE	01 - Clear	01 - Daylight	10 - No control		03 - P.D. only	04 - Sideswipe	01 - Dry
2017-05-24	2017	9:14	BRONSON AVE btwn CARLING AVE & FIRST AVE	01 - Clear	01 - Daylight	10 - No control		02 - Non-fatal injury	04 - Sideswipe	01 - Dry
2017-03-22 2018-06-29	2017 2018	21:32 14:30	BRONSON AVE btwn CARLING AVE & FIRST AVE BRONSON AVE btwn CARLING AVE & FIRST AVE ( 3ZA3OQ)	01 - Clear 01 - Clear	07 - Dark 01 - Davlight	10 - No control 10 - No control		03 - P.D. only 03 - P.D. only	06 - SMV unattended vehicle 04 - Sideswipe	01 - Dry 01 - Dry
2018-06-29	2018	14:30	BRONSON AVE btwn CARLING AVE & FIRST AVE (3ZA3OQ)  BRONSON AVE btwn CARLING AVE & FIRST AVE (3ZA3OQ)	01 - Clear 02 - Rain	01 - Daylight 07 - Dark	10 - No control		03 - P.D. only 03 - P.D. only	04 - Sideswipe	01 - Dry 02 - Wet
2014-12-02	2014	11:02	BRONSON AVE btwn CLEMOW AVE & CARLING AVE	01 - Clear	01 - Daylight	10 - No control		02 - Non-fatal injury	02 - Angle	01 - Dry
2014-04-08	2014	15:30	BRONSON AVE btwn CLEMOW AVE & CARLING AVE	02 - Rain	01 - Daylight	10 - No control		03 - P.D. only	04 - Sideswipe	02 - Wet
2016-02-18 2017-06-19	2016	12:15 12:45	BRONSON AVE btwn CLEMOW AVE & CARLING AVE	01 - Clear	01 - Daylight	10 - No control		02 - Non-fatal injury	01 - Approaching	01 - Dry
2017-06-19 2018-04-16	2017 2018	12:45 13:43	BRONSON AVE btwn CLEMOW AVE & CARLING AVE BRONSON AVE btwn CLEMOW AVE & CARLING AVE (3ZA3OV)	01 - Clear 04 - Freezing Rain	01 - Daylight 01 - Daylight	10 - No control 10 - No control		03 - P.D. only 03 - P.D. only	02 - Angle 04 - Sideswipe	01 - Dry 02 - Wet
2018-04-18	2018	7:42	BRONSON AVE blwn CLEMOW AVE & CARLING AVE (_3ZASOV)	01 - Clear	01 - Daylight 01 - Daylight	10 - No control		03 - P.D. only	04 - Sideswipe	01 - Dry
2018-06-15	2018	12:34	BRONSON AVE btwn CLEMOW AVE & CARLING AVE (_3ZA3OV)	01 - Clear	01 - Daylight	10 - No control		03 - P.D. only	03 - Rear end	01 - Dry
2014-05-08	2014	8:30	BRONSON AVE btwn FIRST AVE & SECOND AVE	01 - Clear	01 - Daylight	10 - No control		02 - Non-fatal injury	03 - Rear end	01 - Dry
2014-08-07 2015-05-10	2014 2015	16:35 19:30	BRONSON AVE btwn FIRST AVE & SECOND AVE BRONSON AVE btwn FIRST AVE & SECOND AVE	01 - Clear 01 - Clear	01 - Daylight 01 - Daylight	10 - No control 10 - No control		03 - P.D. only 03 - P.D. only	03 - Rear end 02 - Angle	01 - Dry 01 - Dry
2015-05-10	2015	19:30	DRONSON AVE DUWII FIRST AVE & SECUND AVE	U1 - Clear	U1 - Daylight	10 - No control		US - P.D. ONly	UZ - Angie	U1 - DIY

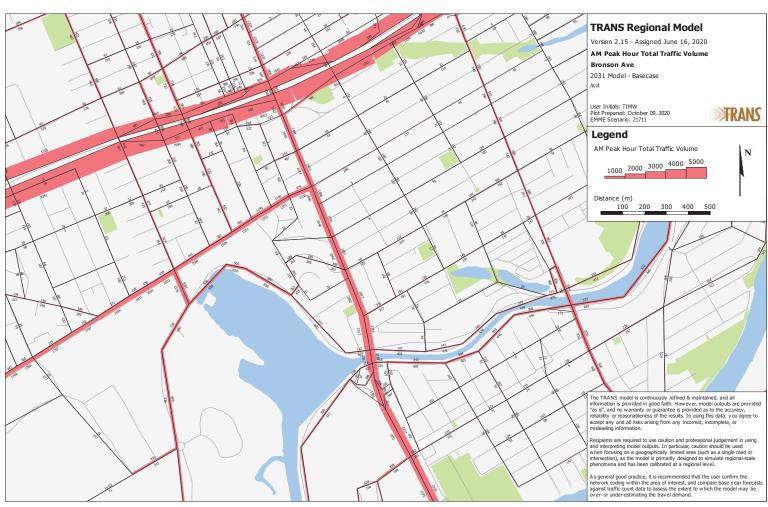
2016-07-05	2016	14:05	BRONSON AVE btwn FIRST AVE & SECOND AVE	01 - Clear	01 - Daylight	10 - No control	02 - Non-fatal injury	04 - Sideswipe	01 - Dry	
2016-05-22	2016	17:54	BRONSON AVE btwn FIRST AVE & SECOND AVE	01 - Clear	01 - Daylight	10 - No control	03 - P.D. only	03 - Rear end	01 - Dry	
2017-11-16	2017	9:09	BRONSON AVE btwn FIRST AVE & SECOND AVE	02 - Rain	01 - Daylight	10 - No control	03 - P.D. only	03 - Rear end	02 - Wet	
2018-08-16	2018	12:57	BRONSON AVE btwn FIRST AVE & SECOND AVE (3ZA3OO)	01 - Clear	01 - Daylight	10 - No control	03 - P.D. only	03 - Rear end	01 - Dry	
2014-01-07	2014	16:40	CAMBRIDGE ST @ CARLING AVE	01 - Clear	05 - Dusk	02 - Stop sign	03 - P.D. only	03 - Rear end	06 - Ice	
2014-04-23	2014	16:17	CAMBRIDGE ST @ CARLING AVE	01 - Clear	01 - Daylight	02 - Stop sign	03 - P.D. only	03 - Rear end	01 - Dry	
2014-09-04	2014	18:11	CAMBRIDGE ST @ CARLING AVE	01 - Clear	01 - Daylight	02 - Stop sign	03 - P.D. only	03 - Rear end	01 - Dry	
2015-07-08	2015	9:16	CAMBRIDGE ST @ CARLING AVE	01 - Clear	01 - Daylight	02 - Stop sign	03 - P.D. only	03 - Rear end	01 - Dry	
2016-07-12	2016	20:54	CAMBRIDGE ST @ CARLING AVE	01 - Clear	05 - Dusk	02 - Stop sign	02 - Non-fatal injury	04 - Sideswipe	01 - Dry	
2015-05-06	2015	15:22	CARLING AVE btwn BOOTH ST & CAMBRIDGE ST S	01 - Clear	01 - Daylight	10 - No control	03 - P.D. only	03 - Rear end	01 - Dry	
2017-05-15	2017	17:09	CARLING AVE btwn CAMBRIDGE ST S & BRONSON AVE	01 - Clear	01 - Daylight	10 - No control	02 - Non-fatal injury	04 - Sideswipe	01 - Dry	
2018-02-09	2018	9:47	CARLING AVE btwn CAMBRIDGE ST S & BRONSON AVE ( 3ZA4S3)	01 - Clear	01 - Daylight	10 - No control	01 - Fatal injury	07 - SMV other	01 - Dry	

# Appendix E

TRANS Model Plots







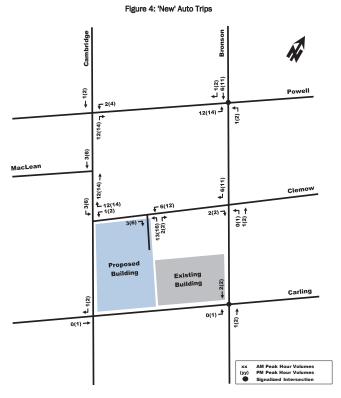
# Appendix F

**Background Development Volumes** 



### **PARSONS**

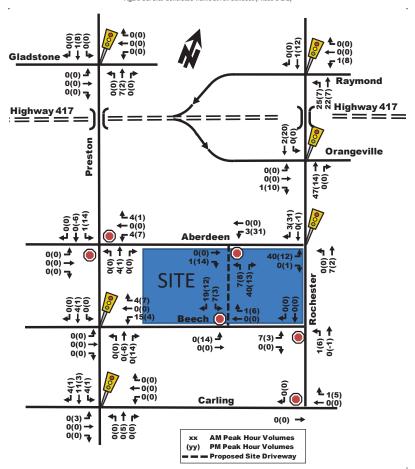
The 'new' auto trips generated by the proposed development are depicted in Figure 4.



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**PARSONS** 

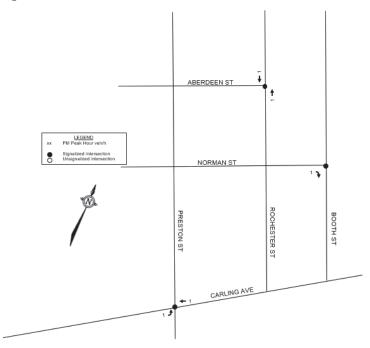
Figure 11: Site-Generated Traffic at Full Buildout (Phase 1 & 2)



Note: values in negative reflect changes in routes based on pass-by trips or net change between trips generated and reduction in public parking lot.

450 Rochester Road - Strategy Report 23

Figure 5: Site Generated Traffic Volumes



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# Appendix G

Synchro Intersection Worksheets – 2025 Future Background Conditions



Lanes, Volumes, Timings
1: Carling Avenue & Booth Street

2025 Future Background - AM Peak Hour 770-774 Bronson Ave

	•	<b>→</b>	-	*	-	1
Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations	ă	<b>^</b>	<b>411</b>		*	7
Traffic Volume (vph)	282	935	679	120	160	113
Future Volume (vph)	282	935	679	120	160	113
Satd. Flow (prot)	1658	3283	4530	0	1658	1427
Flt Permitted	0.950	0200	7000	J	0.950	1741
Satd. Flow (perm)	1592	3283	4530	0	1633	1258
Satd. Flow (RTOR)	1002	3203	32	U	1000	113
Lane Group Flow (vph)	282	935	799	0	160	113
Turn Type	Prot	NA NA	NA	U	Perm	Perm
Protected Phases	5	NA 2	NA 6		reiill	renili
Permitted Phases	5	Z	0		4	4
Detector Phases	5	2	6		4	4
	5	2	0		4	4
Switch Phase	E 0	10.0	10.0		10.0	10.0
Minimum Initial (s)	5.0	10.0	10.0		10.0	10.0
Minimum Split (s)	10.9	22.5	29.7		39.0	39.0
Total Split (s)	34.0	81.0	47.0		39.0	39.0
Total Split (%)	28.3%	67.5%	39.2%		32.5%	32.5%
Yellow Time (s)	3.7	3.7	3.7		3.3	3.3
All-Red Time (s)	2.2	2.0	2.0		2.7	2.7
Lost Time Adjust (s)	0.0	0.0	0.0		0.0	0.0
Total Lost Time (s)	5.9	5.7	5.7		6.0	6.0
Lead/Lag	Lead		Lag			
Lead-Lag Optimize?	Yes		Yes			
Recall Mode	None	Max	C-Max		None	None
Act Effct Green (s)	24.3	75.3	45.1		33.0	33.0
Actuated g/C Ratio	0.20	0.63	0.38		0.28	0.28
v/c Ratio	0.84	0.45	0.46		0.36	0.26
Control Delay	67.3	12.5	28.8		37.8	7.8
Queue Delay	0.0	0.0	0.0		0.0	0.0
Total Delay	67.3	12.5	28.8		37.8	7.8
LOS	07.5	12.3 B	20.0 C		37.0 D	7.0 A
Approach Delay		25.2	28.8		25.3	A
		25.2 C	20.0 C		25.3 C	
Approach LOS	62.4	56.1	50.4		30.4	0.0
Queue Length 50th (m)	63.4					
Queue Length 95th (m)	#93.1	70.3	65.0		49.8	13.6
Internal Link Dist (m)	40.0	107.6	286.6		178.3	00.0
Turn Bay Length (m)	40.0	0000	4700		110	30.0
Base Capacity (vph)	388	2060	1722		449	427
Starvation Cap Reductn	0	0	0		0	0
Spillback Cap Reductn	0	0	0		0	0
Storage Cap Reductn	0	0	0		0	0
Reduced v/c Ratio	0.73	0.45	0.46		0.36	0.26
Intersection Summary						
Cycle Length: 120						
Actuated Cycle Length: 120	1					
		o G-MPT	Ctort of	Croon		
Offset: 116 (97%), Reference	ced to phas	se p:wBI	, Start of (	oreen		
Natural Cycle: 90						
Control Type: Actuated-Coo	ordinated					

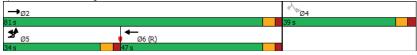
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Lanes, Volumes, Timings
1: Carling Avenue & Booth Street

2025 Future Background - AM Peak Hour 770-774 Bronson Ave

Maximum v/c Ratio: 0.84
Intersection Signal Delay: 26.5
Intersection LOS: C
Intersection Capacity Utilization 77.8%
ICU Level of Service D
Analysis Period (min) 15
# 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 1: Carling Avenue & Booth Street



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0.4

**↑↑↑** 0 1093

0 1093

0

- 1000

EBL EBT EBR WBL WBT WBR

5

0 633

0 633

0 0

- - None

4

- 350

12

12 0 0 10

38

Free Free Free Free Free Stop Stop Stop Stop Stop

595

- 3.92

0

Int Delay, s/veh

Movement Lane Configurations

Traffic Vol, veh/h

Future Vol, veh/h

RT Channelized

Storage Length

Sign Control

Grade, % Peak Hour Factor Heavy Vehicles, %

Mvmt Flow

Conflicting Flow All

Stage 1 Stage 2 Critical Hdwy Critical Hdwy Stg 1 Critical Hdwy Stg 2 Follow-up Hdwy

Pot Cap-1 Maneuve Stage 1

Stage 2 Platoon blocked, % Mov Cap-1 Maneuver Mov Cap-2 Maneuver Stage 1 Stage 2

HCM Control Delay, s

Conflicting Peds, #/hr

Veh in Median Storage, # -

- 3.35

0

**CGH Transportation** 

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	•	-	$\rightarrow$	•	-	*	1	<b>†</b>	1	-	<b>↓</b>	1
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBF
Lane Configurations		4			4			414			414	
Traffic Volume (vph)	111	25	51	17	53	17	45	1644	8	11	997	6
Future Volume (vph)	111	25	51	17	53	17	45	1644	8	11	997	6
Satd. Flow (prot)	0	1586	0	0	1642	0	0	3275	0	0	3241	
Flt Permitted		0.776			0.921			0.879			0.926	
Satd. Flow (perm)	0	1227	0	0	1518	0	0	2882	0	0	3004	(
Satd. Flow (RTOR)		15			10			1			16	
Lane Group Flow (vph)	0	187	0	0	87	0	0	1697	0	0	1076	
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2			6		
Detector Phase	4	4		8	8		2	2		6	6	
Switch Phase												
Minimum Initial (s)	10.0	10.0		10.0	10.0		10.0	10.0		10.0	10.0	
Minimum Split (s)	23.7	23.7		23.7	23.7		32.3	32.3		32.3	32.3	
Total Split (s)	26.0	26.0		26.0	26.0		84.0	84.0		84.0	84.0	
Total Split (%)	23.6%	23.6%		23.6%	23.6%		76.4%	76.4%		76.4%	76.4%	
Yellow Time (s)	3.0	3.0		3.0	3.0		3.3	3.3		3.3	3.3	
All-Red Time (s)	2.7	2.7		2.7	2.7		2.0	2.0		2.0	2.0	
Lost Time Adjust (s)		0.0			0.0		2.0	0.0		2.0	0.0	
Total Lost Time (s)		5.7			5.7			5.3			5.3	
Lead/Lag		0			0.1			0.0			0.0	
Lead-Lag Optimize?												
Recall Mode	None	None		None	None		C-Max	C-Max		C-Max	C-Max	
Act Effct Green (s)	110110	18.4		110110	18.4		o max	80.6		o max	80.6	
Actuated g/C Ratio		0.17			0.17			0.73			0.73	
v/c Ratio		0.86			0.33			0.80			0.49	
Control Delay		74.9			38.5			7.2			7.2	
Queue Delay		0.0			0.0			8.6			0.0	
Total Delay		74.9			38.5			15.8			7.2	
LOS		F			D			В			Α.Δ	
Approach Delay		74.9			38.5			15.8			7.2	
Approach LOS		F			D			В			Α.Δ	
Queue Length 50th (m)		35.6			14.4			63.8			46.3	
Queue Length 95th (m)		#71.3			29.0			m48.2			59.1	
Internal Link Dist (m)		74.6			106.0			142.6			39.5	
Turn Bay Length (m)		14.0			100.0			172.0			00.0	
Base Capacity (vph)		238			288			2112			2205	
Starvation Cap Reductn		0			0			396			0	
Spillback Cap Reductn		0			0			0			97	
Storage Cap Reductn		0			0			0			0	
Reduced v/c Ratio		0.79			0.30			0.99			0.51	
		0.73			0.50			0.55			0.51	
Intersection Summary Cycle Length: 110												
Actuated Cycle Length: 110												
Offset: 21 (19%), Reference		2:NBTL :	and 6:SB	TL. Start	of Green							
Natural Cycle: 80	o to pridoc	LINDIL	0.00	. L, Otali	0. 010011							
Control Type: Actuated-Coo	ordinated											
Control Typo. Actuated=Cot	, diriated											

HCM LOS					С	В
Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBT	WBR SBLn1	
Capacity (veh/h)	367	-	-	-	- 611	
HCM Lane V/C Ratio	0.027	-	-	-	- 0.092	
HCM Control Delay (s)	15.1	-	-	-	- 11.5	
HCM Lane LOS	С	-	-	-	- B	
HCM 95th %tile Q(veh)	0.1	-	-	-	- 0.3	

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03-01-2021

JK

Lanes, Volumes, Timings 3: Bronson Avenue & Powell Avenue 2025 Future Background - AM Peak Hour 770-774 Bronson Ave

2025 Future Background - AM Peak Hour 4: Bronson Avenue & Carling Avenue/Glebe Avenue 770-774 Bronson Ave

Maximum v/c Ratio: 0.86 Intersection Signal Delay: 17.0 Intersection LOS: B Intersection Capacity Utilization 110.1% ICU Level of Service H Analysis Period (min) 15 # 95th percentile volume exceeds capacity, queue may be longer.

Queue shown is maximum after two cycles. m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 3: Bronson Avenue & Powell Avenue



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	*	<b>→</b>	*	1	<b>←</b>	*	4	<b>†</b>	1	-	<b>↓</b>	1
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBF
Lane Configurations	*	ર્ન	7				ሻሻ	<b>1</b> >			<b>ት</b> ኈ	
Traffic Volume (vph)	391	152	525	0	0	0	443	1397	38	0	934	11
Future Volume (vph)	391	152	525	0	0	0	443	1397	38	0	934	110
Satd, Flow (prot)	1530	1583	1483	0	0	0	3216	1730	0	0	3246	(
Flt Permitted	0.950	0.978					0.950					
Satd. Flow (perm)	1459	1551	1271	0	0	0	3182	1730	0	0	3246	(
Satd. Flow (RTOR)			30					3			13	
Lane Group Flow (vph)	270	273	525	0	0	0	443	1435	0	0	1044	(
Turn Type	Perm	NA	pm+ov				Prot	NA			NA	
Protected Phases		4	5				5	2			6	
Permitted Phases	4	•	4					_				
Detector Phase	4	4	5				5	2			6	
Switch Phase								_				
Minimum Initial (s)	10.0	10.0	5.0				5.0	10.0			10.0	
Minimum Split (s)	31.0	31.0	11.0				11.0	24.0			33.0	
Total Split (s)	31.0	31.0	34.0				34.0	79.0			45.0	
Total Split (%)	28.2%	28.2%	30.9%				30.9%	71.8%			40.9%	
Yellow Time (s)	3.3	3.3	3.3				3.3	3.3			3.3	
All-Red Time (s)	2.7	2.7	2.7				2.7	2.7			2.7	
Lost Time Adjust (s)	0.0	0.0	0.0				0.0	0.0			0.0	
	6.0	6.0	6.0				6.0	6.0			6.0	
Total Lost Time (s)	0.0	0.0	Lead				Lead	0.0			Lag	
Lead/Lag Lead-Lag Optimize?			Yes				Yes				Yes	
	Mana	Mana	Min					O M				
Recall Mode	None	None					Min	C-Max			C-Max	
Act Effct Green (s)	23.5	23.5	45.9				22.3 0.20	74.5			46.1	
Actuated g/C Ratio	0.21	0.21	0.42					0.68			0.42	
v/c Ratio	0.87	0.82	0.89				0.68	1.22			0.76	
Control Delay	68.3	61.8	43.3				36.2	136.6			28.0	
Queue Delay	0.0	0.0	0.0				0.0	0.1			0.1	
Total Delay	68.3	61.8	43.3				36.2	136.7			28.1	
LOS	E	E	D				D	F			С	
Approach Delay		54.4						113.0			28.1	
Approach LOS		D						F			С	
Queue Length 50th (m)	58.2	58.2	81.5				45.9	~398.4			102.4	
Queue Length 95th (m)	#102.4	#98.4	109.4				50.8	#478.8			#148.9	
Internal Link Dist (m)		82.5			112.6			392.2			142.6	
Turn Bay Length (m)							40.0					
Base Capacity (vph)	331	352	665				818	1172			1368	
Starvation Cap Reductn	0	0	0				0	0			15	
Spillback Cap Reductn	0	0	0				0	24			0	
Storage Cap Reductn	0	0	0				0	0			0	
Reduced v/c Ratio	0.82	0.78	0.79				0.54	1.25			0.77	
Intersection Summary												
Cycle Length: 110												
Actuated Cycle Length: 110	)											
Offset: 53 (48%), Reference					_							

Natural Cycle: 140

Control Type: Actuated-Coordinated

Lanes, Volumes, Timings

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Lanes, Volumes, Timings

2025 Future Background - AM Peak Hour

4: Bronson Avenue & Carling Avenue/Glebe Avenue

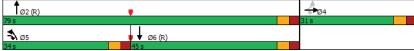
770-774 Bronson Ave

Maximum v/c Ratio: 1.22 
Intersection Signal Delay: 75.1 
Intersection LOS: E
Intersection Capacity Utilization 110.7% 
ICU Level of Service H
Analysis Period (min) 15

Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

Queue shown is maximum after two cycles.

Splits and Phases: 4: Bronson Avenue & Carling Avenue/Glebe Avenue



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Lanes, Volumes, Timings 2025 Future Background - AM Peak Hour 5: Bronson Avenue & Madawaska Drive/Fifth Avenue 770-774 Bronson Ave

•	$\rightarrow$	*	1	-	•	1	1	1	-	Į.	*
EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SE
	4			4			<b>†</b> î>			413+	
7	48	14	86	34	46	0	1723	34	22	1475	
7	48	14	86	34	46	0	1723	34	22	1475	
0	1623	0	0	1608	0	0	3302	0	0	3311	
	0.971			0.824						0.892	
0	1578	0	0	1333	0	0	3302	0	0	2956	
	10			16			4				
0	69	0	0	166	0	0	1757	0	0	1498	
Perm	NA		Perm	NA			NA		Perm	NA	
	4			8			2			6	
4			8						6		
4	4		8	8			2		6	6	
10.0	10.0		10.0	10.0			10.0		10.0	10.0	
23.3	23.3		23.3	23.3			34.3		34.3	34.3	
28.0	28.0		28.0	28.0			82.0		82.0	82.0	
25.5%	25.5%		25.5%	25.5%			74.5%		74.5%	74.5%	
3.3	3.3		3.3	3.3			3.3		3.3	3.3	
2.0	2.0		2.0	2.0			2.0		2.0	2.0	
	0.0			0.0			0.0			0.0	
	5.3			5.3			5.3			5.3	
None	None		None	None			C-Max		C-Max	C-Max	
	17.2			17.2			82.2			82.2	
	0.16			0.16			0.75			0.75	
										0.68	
	35.9			59.6			10.4			5.6	
				0.0			0.0			0.0	
				59.6			10.4			5.6	
							10.4				
							В				
	100.1			102.1			0 1.0			002.2	
	333			287			2467			2207	
	-			-			-			-	
	0.21			0.58			0.71			0.68	
d to phase	2:NBT ar	nd 6:SBT	L, Start o	f Green							
	EBL  7 7 0 0 Perm 4 4 10.0 23.3 28.0 25.5% 3.3 2.0  None	FBL EBT  7 48 7 48 0 1623 0.971 0 1578 10 0 69 Perm NA 4 4 4 4 4 10.0 10.0 23.3 23.3 28.0 28.0 25.5% 25.5% 25.5% 3.3 3.3 2.0 2.0 0.0 5.3  None None 17.2 0.16 0.27 35.9 D 35.9 D 11.1 22.7 190.1 3333 0 0 0 0 0 0 0.21	EBL EBT EBR  7 48 14 7 48 14 7 48 14 0 1623 0 0.971 0 1578 0 10 0 69 0 Perm NA 4 4 4 4 4 4 10.0 10.0 23.3 23.3 28.0 28.0 25.5% 25.5% 3.3 3.3 2.0 2.0 0.0 5.3  None None 17.2 0.16 0.27 35.9 0 0.0 35.9 D 31.1 22.7 190.1 3333 0 0 0 0 0 0 0 0 0.21	EBL EBT EBR WBL  7 48 14 86 7 48 14 86 0 1623 0 0 0.971 0 1578 0 0 0 69 0 0 Perm NA Perm 4 4 8 4 4 4 8 10.0 10.0 10.0 23.3 23.3 23.3 28.0 28.0 28.0 28.0 25.5% 25.5% 3.3 3.3 3.3 2.0 2.0 2.0 2.0  None None None 17.2 0.16 0.27 35.9 0 0 35.9 0 0 35.9 0 0 35.9 0 0 35.9 0 0 0 35.9 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	EBL         EBT         EBR         WBL         WBT           7         48         14         86         34           7         48         14         86         34           7         48         14         86         34           0         1623         0         0         1608           0.971         0.824         0         1333         10         16           0         69         0         0         166         166         166         Perm         NA         Perm         NA         4         8         8         8         4         4         8         8         8         8         8         10.0	EBL         EBT         EBR         WBL         WBT         WBR           7         48         14         86         34         46           7         48         14         86         34         46           0         1623         0         0         1608         0           0.971         0.824         0         1333         0           10         16         0         166         0           0         69         0         0         166         0           Perm         NA         Perm         NA         8         4         4         8         8           4         4         8         8         8         8         4         10.0<	EBL         EBT         EBR         WBL         WBT         WBR         NBL           7         48         14         86         34         46         0           7         48         14         86         34         46         0           0         1623         0         0         1608         0         0           0.971         0.824         0         0         1333         0         0           0         69         0         0         166         0         0           0         69         0         0         166         0         0           Perm         NA         Perm         NA         8         4         4         8         8           4         4         8         8         8         8         4         10.0	EBL         EBT         EBR         WBL         WBT         WBR         NBL         NBT           7         48         14         86         34         46         0         1723           7         48         14         86         34         46         0         1723           0         1623         0         0         1608         0         0         3302           0.971         0.824         0         0         3332         0         0         3302           10         16         4         4         4         8         2         0         1757         0         0         1333         0         0         3302         10         16         4         4         8         2         2         4         4         8         8         2         2         4         8         8         2         2         4         4         8         8         2         2         10.0         10.0         10.0         10.0         10.0         10.0         10.0         10.0         10.0         10.0         10.0         10.0         10.0         10.0         10.0         10.0         10.0 <td>EBL EBT EBR WBL WBT WBR NBL NBT NBR  7 48 14 86 34 46 0 1723 34 7 48 14 86 34 46 0 1723 34 0 1623 0 0 1608 0 0 3302 0 0.971</td> <td>EBL EBT EBR WBL WBT WBR NBL NBT NBR SBL  7 48 14 86 34 46 0 1723 34 22 7 48 14 86 34 46 0 1723 34 22 0 1623 0 0 1608 0 0 3302 0 0 0.971 0.824 0 1578 0 0 1333 0 0 3302 0 0 10 16 4 4 8 8 2 0 0 1757 0 0 Perm NA Perm NA NA Perm NA NA Perm 4 8 2 4 8 8 2 2 6  10.0 10.0 10.0 10.0 10.0 10.0 10.0 10.</td> <td>  Feb.   EBR   WBL   WBT   WBR   NBL   NBR   SBL   SBT    </td>	EBL EBT EBR WBL WBT WBR NBL NBT NBR  7 48 14 86 34 46 0 1723 34 7 48 14 86 34 46 0 1723 34 0 1623 0 0 1608 0 0 3302 0 0.971	EBL EBT EBR WBL WBT WBR NBL NBT NBR SBL  7 48 14 86 34 46 0 1723 34 22 7 48 14 86 34 46 0 1723 34 22 0 1623 0 0 1608 0 0 3302 0 0 0.971 0.824 0 1578 0 0 1333 0 0 3302 0 0 10 16 4 4 8 8 2 0 0 1757 0 0 Perm NA Perm NA NA Perm NA NA Perm 4 8 2 4 8 8 2 2 6  10.0 10.0 10.0 10.0 10.0 10.0 10.0 10.	Feb.   EBR   WBL   WBT   WBR   NBL   NBR   SBL   SBT

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Lanes, Volumes, Timings

2025 Future Background - AM Peak Hour

770-774 Bronson Ave

5: Bronson Avenue & Madawaska Drive/Fifth Avenue

Maximum v/c Ratio: 0.75 Intersection Signal Delay: 11.2 Intersection LOS: B Intersection Capacity Utilization 85.7% ICU Level of Service E

Analysis Period (min) 15

Splits and Phases: 5: Bronson Avenue & Madawaska Drive/Fifth Avenue

opilis and miases.	5. BIOHSON AVENUE & Waddawaska Dilve/Fillin Avenue		
↑ø <sub>2 (R)</sub>		<u> </u>	
82 s		28 s	
Ø6 (R)		<b>★</b> Ø8	
82 s		28 s	

03-01-2021 CGH Transportation JK Page 10 Lanes, Volumes, Timings 1: Carling Avenue & Booth Street 2025 Future Background-PM Peak Hour 770-774 Bronson Ave

	•	<b>→</b>	+	4	1	1
Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations	Ä	<b>^</b>	<b>†</b> †\$		*	7
Traffic Volume (vph)	216	788	995	59	317	527
Future Volume (vph)	216	788	995	59	317	527
Satd. Flow (prot)	1658	3283	4673	0	1658	1427
Flt Permitted	0.950	3203	4013	U	0.950	1421
Satd. Flow (perm)	1581	3283	4673	0	1632	1230
Satd. Flow (RTOR)	1001	3203	4073	U	1032	100
Lane Group Flow (vph)	216	788	1054	0	317	527
1 (1)	Prot	NA	NA	U	Perm	Perm
Turn Type		NA 2			Perm	Perm
Protected Phases	5	2	6		4	4
Permitted Phases	-	^	0		4	
Detector Phase	5	2	6		4	4
Switch Phase		40.0	40.0		40.0	40.0
Minimum Initial (s)	5.0	10.0	10.0		10.0	10.0
Minimum Split (s)	10.9	22.5	29.7		39.0	39.0
Total Split (s)	23.0	90.0	67.0		40.0	40.0
Total Split (%)	17.7%	69.2%	51.5%		30.8%	30.8%
Yellow Time (s)	3.7	3.7	3.7		3.3	3.3
All-Red Time (s)	2.2	2.0	2.0		2.7	2.7
Lost Time Adjust (s)	0.0	0.0	0.0		0.0	0.0
Total Lost Time (s)	5.9	5.7	5.7		6.0	6.0
Lead/Lag	Lead		Lag			
Lead-Lag Optimize?	Yes		Yes			
Recall Mode	None	Max	C-Max		None	None
Act Effct Green (s)	17.1	84.3	61.3		34.0	34.0
Actuated g/C Ratio	0.13	0.65	0.47		0.26	0.26
v/c Ratio	0.13	0.03	0.47		0.20	1.33
Control Delay	114.8	11.2	40.0		56.0	198.1
		0.0	0.0		0.0	0.0
Queue Delay	0.0					
Total Delay	114.8	11.2	40.0		56.0	198.1
LOS	F	В	D		E	F
Approach Delay		33.5	40.0		144.8	
Approach LOS		С	D		F	
Queue Length 50th (m)	56.1	45.7	87.5			~156.1
Queue Length 95th (m)	#106.4	57.1	102.0		108.8	#224.2
Internal Link Dist (m)		107.6	286.6		178.3	
Turn Bay Length (m)	40.0					30.0
Base Capacity (vph)	218	2128	2208		426	395
Starvation Cap Reductn	0	0	0		0	0
Spillback Cap Reductn	0	0	0		0	0
Storage Cap Reductn	0	0	0		0	0
Reduced v/c Ratio	0.99	0.37	0.48		0.74	1.33
	2.50					
Intersection Summary						
Cycle Length: 130	1					
Actuated Cycle Length: 130		- CAMPT	. 011 .	0		
Offset: 110 (85%), Referen	ced to phas	se 6:WBT	, Start of	Green		
Natural Cycle: 90						
Control Type: Actuated-Co	ordinated					

03-01-2021 CGH Transportation JK Page 1

# Lanes, Volumes, Timings 1: Carling Avenue & Booth Street

### 2025 Future Background-PM Peak Hour 770-774 Bronson Ave

Maximum v/c Ratio: 1.33
Intersection Signal Delay: 68.2
Intersection Capacity Utilization 89.0%
ICU Level of Service E
Analysis Period (min) 15

Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.
Queue shown is maximum after two cycles.

Splits and Phases: 1: Carling Avenue & Booth Street



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 CGH Transportation

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HCM 2010 TWSC 2: Cambridge Street & Carling Avenue

HCM 95th %tile Q(veh)

2025 Future Background-PM Peak Hour 770-774 Bronson Ave

latera etter												
Intersection												
Int Delay, s/veh	2.4											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		<del>ተ</del> ተኈ			44	7			7			7
Traffic Vol, veh/h	0	1053	17	0	589	6	0	0	25	0	0	291
Future Vol, veh/h	0	1053	17	0	589	6	0	0	25	0	0	291
Conflicting Peds, #/hr	0	0	42	0	0	33	0	0	4	0	0	1
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	1000	-	-	350	-	-	0	-	-	0
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	3	2	2	4	8	2	2	2	2	2	5
Mvmt Flow	0	1053	17	0	589	6	0	0	25	0	0	291
Major/Minor N	//ajor1			Major2		- 1	Minor1			Minor2		
Conflicting Flow All	- -	0	0	- viajoiz	-	0	-	-	581	-	-	329
Stage 1		-	-		-	-	-		-			323
Stage 2												
Critical Hdwy				-			-	-	7.14		-	7
Critical Hdwy Stg 1	-	-	-						7.17	-	-	
Critical Hdwy Stg 2	_				_		_	-			_	_
Follow-up Hdwy	-		-				-		3.92	-	-	3.35
Pot Cap-1 Maneuver	0	-	_	0	_	-	0	0	391	0	0	658
Stage 1	0			0			0	0	-	0	0	-
Stage 2	0	-	-	0	-	-	0	0	-	0	0	-
Platoon blocked, %					-							
Mov Cap-1 Maneuver	-	-	-	-	-	-	-	-	374	-	_	637
Mov Cap-2 Maneuver	-		-		-		-	-	-	-	-	-
Stage 1	-	-	-	-	-	-	-	-	-	-	-	-
Stage 2	-		-		-		-	-	-	-	-	-
J												
Approach	EB			WB			NB			SB		
	0			0			15.3			15.3		
HCM Control Delay, s HCM LOS	U			U			15.3 C			15.3 C		
LICINI FOS							U			U		
Minor Lane/Major Mvm	t 1	NBLn1	EBT	EBR	WBT	WBR :						
Capacity (veh/h)		374	-	-	-	-	637					
HCM Lane V/C Ratio		0.067	-	-	-	-	0.457					
HCM Control Delay (s)		15.3	-	-	-	-	15.3					
HCM Lane LOS		С	-	-	-	-	С					
LIONA OF SERVICE OVER SEVEN		0.0					0.4					

0.2 - - - 2.4

Lanes, Volumes, Timings 3: Bronson Avenue & Powell Avenue 2025 Future Background-PM Peak Hour 770-774 Bronson Ave

	•	-	*	1	-	•	1	<b>†</b>	1	-	↓	4
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBI
ane Configurations		4			4			414			413-	
Traffic Volume (vph)	141	82	150	58	89	5	73	1127	19	6	945	5
Future Volume (vph)	141	82	150	58	89	5	73	1127	19	6	945	5
Satd. Flow (prot)	0	1575	0	0	1699	0	0	3261	0	0	3248	
Flt Permitted		0.782			0.684			0.768			0.947	
Satd. Flow (perm)	0	1239	0	0	1184	0	0	2511	0	0	3076	
Satd. Flow (RTOR)		25			1			3			10	
Lane Group Flow (vph)	0	373	0	0	152	0	0	1219	0	0	1008	
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2			6		
Detector Phase	4	4		8	8		2	2		6	6	
Switch Phase												
Minimum Initial (s)	10.0	10.0		10.0	10.0		10.0	10.0		10.0	10.0	
Minimum Split (s)	23.7	23.7		23.7	23.7		32.3	32.3		32.3	32.3	
Total Split (s)	38.0	38.0		38.0	38.0		92.0	92.0		92.0	92.0	
Total Split (%)	29.2%	29.2%		29.2%	29.2%		70.8%	70.8%		70.8%	70.8%	
Yellow Time (s)	3.0	3.0		3.0	3.0		3.3	3.3		3.3	3.3	
All-Red Time (s)	2.7	2.7		2.7	2.7		2.0	2.0		2.0	2.0	
Lost Time Adjust (s)	2.1	0.0		2.1	0.0		2.0	0.0		2.0	0.0	
Total Lost Time (s)		5.7			5.7			5.3			5.3	
Lead/Lag		5.1			5.7			3.3			0.0	
Lead-Lag Optimize?												
Recall Mode	None	None		None	None		C-Max	C-Max		C-Max	C-Max	
Act Effct Green (s)	None	32.3		NOHE	32.3		U-IVIAX	86.7		U-IVIAX	86.7	
Actuated g/C Ratio		0.25			0.25			0.67			0.67	
		1.14			0.25			0.67			0.67	
v/c Ratio												
Control Delay		135.9			49.1			17.2			11.6	
Queue Delay		0.0			0.0			2.8			0.0	
Total Delay		135.9			49.1			19.9			11.6	
LOS		F			D			В			В	
Approach Delay		135.9			49.1			19.9			11.6	
Approach LOS		F			D			В			В	
Queue Length 50th (m)		~106.8			33.5			110.3			61.4	
Queue Length 95th (m)		#167.9			55.9			34.6			75.9	
Internal Link Dist (m)		74.6			106.0			142.6			39.5	
Turn Bay Length (m)												
Base Capacity (vph)		326			294			1675			2054	
Starvation Cap Reductn		0			0			332			0	
Spillback Cap Reductn		0			0			0			44	
Storage Cap Reductn		0			0			0			0	
Reduced v/c Ratio		1.14			0.52			0.91			0.50	
Intersection Summary												
Cycle Length: 130												
Actuated Cycle Length: 130												
Offset: 46 (35%), Reference		2:NBTL	and 6:SE	TL, Start	of Green							
Natural Cycle: 65	15 p.1300			-,	2.23							
Control Type: Actuated-Coc	rdinated											

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Lanes, Volumes, Timings 3: Bronson Avenue & Powell Avenue 2025 Future Background-PM Peak Hour 770-774 Bronson Ave

Maximum v/c Ratio: 1.14 Intersection Signal Delay: 34.2 Intersection LOS: C Intersection Capacity Utilization 108.7% ICU Level of Service G Analysis Period (min) 15

Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

Queue shown is maximum after two cycles.



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2025 Future Background-PM Peak Hour 770-774 Bronson Ave

4: Bronson Avenue & Carling Avenue/Glebe Avenue

	۶	<b>→</b>	*	•	<b>—</b>	*	1	†	<i>&gt;</i>	/	<b>+</b>	✓
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	ă	4	7				1,4	₽			<b>↑</b> ↑	
Traffic Volume (vph)	247	133	666	0	0	0	435	1094	26	0	1040	104
Future Volume (vph)	247	133	666	0	0	0	435	1094	26	0	1040	104
Satd. Flow (prot)	1530	1597	1483	0	0	0	3216	1732	0	0	3253	0
Flt Permitted	0.950	0.985					0.950					
Satd. Flow (perm)	1456	1573	1406	0	0	0	3175	1732	0	0	3253	0
Satd. Flow (RTOR)	400	400	63	^	0	^	405	2	^	^	12	0
Lane Group Flow (vph)	188	192	666	0	0	0	435	1120	0	0	1144	0
Turn Type	Perm	NA	pm+ov				Prot	NA			NA	
Protected Phases		4	5 4				5	2			6	
Permitted Phases	4		5				-	2			0	
Detector Phase	4	4	5				5	2			6	
Switch Phase	10.0	10.0	5.0				5.0	10.0			10.0	
Minimum Initial (s) Minimum Split (s)	31.0	31.0	11.0				11.0	24.0			33.0	
Total Split (s)	31.0	31.0	26.0				26.0	99.0			73.0	
Total Split (%)	23.8%	23.8%	20.0%				20.0%	76.2%			56.2%	
Yellow Time (s)	3.3	3.3	3.3				3.3	3.3			3.3	
All-Red Time (s)	2.7	2.7	2.7				2.7	2.7			2.7	
Lost Time Adjust (s)	0.0	0.0	0.0				0.0	0.0			0.0	
Total Lost Time (s)	6.0	6.0	6.0				6.0	6.0			6.0	
Lead/Lag	0.0	0.0	Lead				Lead	0.0			Lag	
Lead-Lag Optimize?			Yes				Yes				Yes	
Recall Mode	None	None	Min				Min	C-Max			C-Max	
Act Effct Green (s)	21.5	21.5	45.0				23.5	96.5			67.0	
Actuated g/C Ratio	0.17	0.17	0.35				0.18	0.74			0.52	
v/c Ratio	0.78	0.74	1.23				0.75	0.87			0.68	
Control Delay	61.8	56.8	149.1				53.9	27.4			18.4	
Queue Delay	0.0	0.0	0.0				0.0	0.0			0.2	
Total Delay	61.8	56.8	149.1				53.9	27.4			18.6	
LOS	Е	Е	F				D	С			В	
Approach Delay		116.5						34.8			18.6	
Approach LOS		F						С			В	
Queue Length 50th (m)	49.5	50.3	~204.9				57.0	198.9			61.7	
Queue Length 95th (m)	m74.3	m75.2	#212.9				m#83.2 r	n#250.0			m79.7	
Internal Link Dist (m)		82.5			112.6			392.2			142.6	
Turn Bay Length (m)							40.0					
Base Capacity (vph)	280	302	541				581	1286			1682	
Starvation Cap Reductn	0	0	0				0	0			93	
Spillback Cap Reductn	0	0	0				0	0			0	
Storage Cap Reductn	0	0	0				0	0			0	
Reduced v/c Ratio	0.67	0.64	1.23				0.75	0.87			0.72	
Intersection Summary												
Cycle Length: 130												

Cycle Length: 130

Actuated Cycle Length: 130

Offset: 46 (35%), Referenced to phase 2:NBT and 6:SBT, Start of Green

Natural Cycle: 100

Control Type: Actuated-Coordinated

03-01-2021 **CGH Transportation** Page 7 JK

Lanes, Volumes, Timings 4: Bronson Avenue & Carling Avenue/Glebe Avenue

2025 Future Background-PM Peak Hour 770-774 Bronson Ave

Maximum v/c Ratio: 1.23 Intersection Signal Delay: 52.7 Intersection LOS: D Intersection Capacity Utilization 89.8% Analysis Period (min) 15 ICU Level of Service E ~ Volume exceeds capacity, queue is theoretically infinite. Queue shown is maximum after two cycles.

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

Splits and Phases: 4: Bronson Avenue & Carling Avenue/Glebe Avenue

m Volume for 95th percentile queue is metered by upstream signal.



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Control Type: Actuated-Coordinated

2025 Future Background-PM Peak Hour

5: Bronson Avenue & Madawaska Drive/Fifth Avenue 770-774 Bronson Ave

	•	$\rightarrow$	*	•	<b>—</b>	*	1	<b>†</b>	1	1	↓	1
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBF
ane Configurations		4			43-			414			414	
Traffic Volume (vph)	3	66	47	121	22	27	9	1415	27	19	1536	
uture Volume (vph)	3	66	47	121	22	27	9	1415	27	19	1536	
Satd. Flow (prot)	0	1521	0	0	1637	0	0	3301	0	0	3310	
It Permitted		0.994			0.580			0.940			0.916	
Satd. Flow (perm)	0	1513	0	0	963	0	0	3103	0	0	3035	
Satd. Flow (RTOR)		22			6			5			1	
ane Group Flow (vph)	0	116	0	0	170	0	0	1451	0	0	1559	
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2			6		
Detector Phase	4	4		8	8		2	2		6	6	
Switch Phase												
Minimum Initial (s)	10.0	10.0		10.0	10.0		10.0	10.0		10.0	10.0	
Minimum Split (s)	23.3	23.3		23.3	23.3		34.3	34.3		34.3	34.3	
Total Split (s)	24.0	24.0		24.0	24.0		106.0	106.0		106.0	106.0	
Total Split (%)	18.5%	18.5%		18.5%	18.5%		81.5%	81.5%		81.5%	81.5%	
Yellow Time (s)	3.3	3.3		3.3	3.3		3.3	3.3		3.3	3.3	
All-Red Time (s)	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)		5.3			5.3			5.3			5.3	
Lead/Lag												
Lead-Lag Optimize?												
Recall Mode	None	None		None	None		C-Max	C-Max		C-Max	C-Max	
Act Effct Green (s)		18.7			18.7			100.7			100.7	
Actuated g/C Ratio		0.14			0.14			0.77			0.77	
v/c Ratio		0.49			1.19			0.60			0.66	
Control Delay		49.2			180.5			7.4			6.2	
Queue Delay		0.0			0.0			0.0			0.0	
Total Delay		49.2			180.5			7.4			6.2	
_OS		D			F			Α			Α	
Approach Delay		49.2			180.5			7.4			6.2	
Approach LOS		D			F			Α			Α	
Queue Length 50th (m)		22.3			~51.1			70.3			70.1	
Queue Length 95th (m)		41.9			#97.0			85.7			m67.6	
Internal Link Dist (m)		190.1			132.1			94.8			392.2	
Turn Bay Length (m)												
Base Capacity (vph)		236			143			2404			2351	
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		0.49			1.19			0.60			0.66	
Intersection Summary												
Cycle Length: 130												
Actuated Cycle Length: 130	)											
Offset: 55 (42%), Reference	ed to phase	2:NBTL	and 6:SE	TL, Start	of Green							
Natural Cycle: 65			2 2.02	-, -:								

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2025 Future Background-PM Peak Hour Lanes, Volumes, Timings 5: Bronson Avenue & Madawaska Drive/Fifth Avenue 770-774 Bronson Ave

Maximum v/c Ratio: 1.19 Intersection Signal Delay: 17.3 Intersection LOS: B Intersection Capacity Utilization 84.9% Analysis Period (min) 15 ICU Level of Service E ~ Volume exceeds capacity, queue is theoretically infinite. Queue shown is maximum after two cycles.

# 95th percentile volume exceeds capacity, queue may be longer. Queue shown is maximum after two cycles. m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 5: Bronson Avenue & Madawaska Drive/Fifth Avenue

Ø2 (R)	<b>→</b> <sub>04</sub>
106 s	24 s
<b>№</b> Ø6 (R)	<b>★</b> Ø8
106 s	24 s

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### Appendix H

Synchro Intersection Worksheets – 2030 Future Background Conditions



Lanes, Volumes, Timings
1: Carling Avenue & Booth Street

2030 Future Background - AM Peak Hour 770-774 Bronson Ave

	<b>*</b>	<b>→</b>	-	*	-	1
Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations	Ä	<b>*</b>	444		ሻ	7
Traffic Volume (vph)	351	1165	806	142	197	139
Future Volume (vph)	351	1165	806	142	197	139
Satd. Flow (prot)	1658	3283	4535	0	1658	1427
Flt Permitted	0.950	0200	7000	J	0.950	1741
Satd. Flow (perm)	1575	3283	4535	0	1633	1258
Satd. Flow (RTOR)	1070	0200	32	J	1000	139
Lane Group Flow (vph)	351	1165	948	0	197	139
Turn Type	Prot	NA	NA	J	Perm	Perm
Protected Phases	5	2	6		1 61111	1 61111
Permitted Phases	3		0		4	4
Detector Phase	5	2	6		4	4
Switch Phase	5	2	0		4	4
Minimum Initial (s)	5.0	10.0	10.0		10.0	10.0
( )	10.9	22.5	29.7		39.0	39.0
Minimum Split (s)						
Total Split (s)	34.0	81.0	47.0		39.0	39.0
Total Split (%)	28.3%	67.5%	39.2%		32.5%	32.5%
Yellow Time (s)	3.7	3.7	3.7		3.3	3.3
All-Red Time (s)	2.2	2.0	2.0		2.7	2.7
Lost Time Adjust (s)	0.0	0.0	0.0		0.0	0.0
Total Lost Time (s)	5.9	5.7	5.7		6.0	6.0
Lead/Lag	Lead		Lag			
Lead-Lag Optimize?	Yes		Yes			
Recall Mode	None	Max	C-Max		None	None
Act Effct Green (s)	27.2	75.3	42.2		33.0	33.0
Actuated g/C Ratio	0.23	0.63	0.35		0.28	0.28
v/c Ratio	0.93	0.57	0.59		0.44	0.31
Control Delay	78.3	14.2	32.6		39.6	7.5
Queue Delay	0.0	0.0	0.0		0.0	0.0
Total Delay	78.3	14.2	32.6		39.6	7.5
LOS	Е	В	С		D	A
Approach Delay		29.1	32.6		26.3	- /
Approach LOS		C	C		C	
Queue Length 50th (m)	80.8	77.6	64.8		38.3	0.0
Queue Length 95th (m)	#134.2	95.6	79.3		60.6	15.0
Internal Link Dist (m)	π107.2	107.6	286.6		178.3	10.0
Turn Bay Length (m)	40.0	107.0	200.0		170.3	30.0
Base Capacity (vph)	388	2060	1614		449	446
	388	2060	1014		449	446
Starvation Cap Reductn	0	0	0		0	0
Spillback Cap Reductn	-	-	-		-	-
Storage Cap Reductn	0	0	0		0	0
Reduced v/c Ratio	0.90	0.57	0.59		0.44	0.31
Intersection Summary						
Cycle Length: 120						
Actuated Cycle Length: 12	0					
Offset: 116 (97%), Referer		se 6:WRT	Start of 0	Green		
Natural Cycle: 90	.cou to pride		, Start OI	0.0011		
Control Type: Actuated-Co	ordinated					
Johnson Type. Actuated-Co	ordinated					

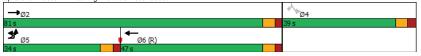
03-01-2021 CGH Transportation JK Page 1

Lanes, Volumes, Timings
1: Carling Avenue & Booth Street

2030 Future Background - AM Peak Hour 770-774 Bronson Ave

Maximum v/c Ratio: 0.93
Intersection Signal Delay: 29.9
Intersection LOS: C
Intersection Capacity Utilization 82.4%
ICU Level of Service E
Analysis Period (min) 15
# 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 1: Carling Avenue & Booth Street



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Intersection												
Int Delay, s/veh	0.4											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	LUL	<b>11</b>	LDIX	WDL	44	7	HUL	INDI	7	ODL	ODI	7
Traffic Vol, veh/h	0	1362	8	0	752	12	0	0	10	0	0	56
Future Vol. veh/h	0	1362	8	0	752	12	0	0	10	0	0	56
Conflicting Peds, #/hr	0	0	45	0	0	38	0	0	1	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length		-	1000			350		-	0	-		0
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	3	2	2	4	8	2	2	2	2	2	5
Mvmt Flow	0	1362	8	0	752	12	0	0	10	0	0	56
Major/Minor N	/lajor1		1	Major2		N	/linor1		N.	/linor2		
Conflicting Flow All	-	0	0	-	-	0	-	-	731	-	-	414
Stage 1	-	-	-	-	-	-	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-	-	-	-	-	-	-
Critical Hdwy	-	-	-	-	-	-	-	-	7.14	-	-	7
Critical Hdwy Stg 1	-	-	-	-	-	-	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-	-	-	-	-	-	-
Follow-up Hdwy	-	-	-	-	-	-	-	-	3.92	-	-	3.35
Pot Cap-1 Maneuver	0	-	-	0	-	-	0	0	312	0	0	579
Stage 1	0	-	-	0	-	-	0	0	-	0	0	-
Stage 2	0	-	-	0	-	-	0	0	-	0	0	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	-	-	-	-	-	-	-	-	299	-	-	559
Mov Cap-2 Maneuver	-	-	-	-	-	-	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-	-	-	-	-	-	-
Approach	EB			WB			NB			SB		
HCM Control Delay, s	0			0			17.5			12.2		
HCM LOS							С			В		
Minor Lane/Major Mvm	t I	NBLn1	EBT	EBR	WBT	WBR S	SBLn1					
Capacity (veh/h)		299	-	-	-	-	559					
HCM Lane V/C Ratio		0.033	-	-	-	-	0.1					
HCM Control Delay (s)		17.5	-	-	-	-	12.2					
HCM Lane LOS		С	-	-	-	-	В					
HCM 95th %tile Q(veh)		0.1	-	-	-	-	0.3					

	•	$\rightarrow$	*	1	-	•	1	Ť		-	¥	4
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		4			4			413-			413-	
Traffic Volume (vph)	180	25	87	17	53	17	45	1644	8	11	1074	73
Future Volume (vph)	180	25	87	17	53	17	45	1644	8	11	1074	73
Satd. Flow (prot)	0	1577	0	0	1642	0	0	3275	0	0	3244	0
Flt Permitted		0.772			0.915			0.871			0.928	
Satd. Flow (perm)	0	1214	0	0	1517	0	0	2855	0	0	3011	0
Satd. Flow (RTOR)		17			10			1			16	
Lane Group Flow (vph)	0	292	0	0	87	0	0	1697	0	0	1158	0
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2			6		
Detector Phase	4	4		8	8		2	2		6	6	
Switch Phase												
Minimum Initial (s)	10.0	10.0		10.0	10.0		10.0	10.0		10.0	10.0	
Minimum Split (s)	23.7	23.7		23.7	23.7		32.3	32.3		32.3	32.3	
Total Split (s)	26.0	26.0		26.0	26.0		84.0	84.0		84.0	84.0	
Total Split (%)	23.6%	23.6%		23.6%	23.6%		76.4%	76.4%		76.4%	76.4%	
Yellow Time (s)	3.0	3.0		3.0	3.0		3.3	3.3		3.3	3.3	
All-Red Time (s)	2.7	2.7		2.7	2.7		2.0	2.0		2.0	2.0	
Lost Time Adjust (s)		0.0			0.0			0.0			0.0	
Total Lost Time (s)		5.7			5.7			5.3			5.3	
Lead/Lag												
Lead-Lag Optimize?												
Recall Mode	None	None		None	None		C-Max	C-Max		C-Max	C-Max	
Act Effct Green (s)		20.3			20.3			78.7			78.7	
Actuated g/C Ratio		0.18			0.18			0.72			0.72	
v/c Ratio		1.23			0.30			0.83			0.54	
Control Delay		172.4			37.5			9.3			8.2	
Queue Delay		0.0			0.0			22.3			0.1	
Total Delay		172.4			37.5			31.6			8.3	
LOS		F			D			C			A	
Approach Delay		172.4			37.5			31.6			8.3	
Approach LOS		F			D			С			A	
Queue Length 50th (m)		~74.7			14.4			86.7			52.0	
Queue Length 95th (m)		#127.6			29.0			m60.0			66.0	
Internal Link Dist (m)		74.6			106.0			142.6			39.5	
Turn Bay Length (m)		1 1.0			100.0			1 12.0			00.0	
Base Capacity (vph)		237			288			2042			2158	
Starvation Cap Reductn		0			0			407			0	
Spillback Cap Reductn		0			0			0			165	
Storage Cap Reductn		0			0			0			0	
Reduced v/c Ratio		1.23			0.30			1.04			0.58	
		1.20			0.00			1.04			0.00	
Intersection Summary												
Cycle Length: 110 Actuated Cycle Length: 110	n											
Offset: 21 (19%), Reference		2·NIRTI	and 6.CD	TI Stort	of Groon							
Natural Cycle: 80	eu to priast	Z.IND I L	anu v.SB	i L, Oldi l	or Green							
Control Type: Actuated-Co	ordinatod											
Control Type. Actuated-Co	ordinated											

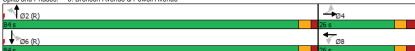
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2030 Future Background - AM Peak Hour 770-774 Bronson Ave

3: Bronson Avenue & Powell Avenue

Maximum v/c Ratio: 1.23 Intersection Signal Delay: 36.1 Intersection LOS: D Intersection Capacity Utilization 116.5% ICU Level of Service H Analysis Period (min) 15 ~ Volume exceeds capacity, queue is theoretically infinite. Queue shown is maximum after two cycles. # 95th percentile volume exceeds capacity, queue may be longer. Queue shown is maximum after two cycles. m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 3: Bronson Avenue & Powell Avenue



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Lanes, Volumes, Timings

2030 Future Background - AM Peak Hour 770-774 Bronson Ave

4: Bronson Avenue & Carling Avenue/Glebe Avenue

	•	-	•	•	<b>—</b>	•	4	<b>†</b>	1	-	ļ	1
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBI
Lane Configurations	7	ર્ન	7				ሻሻ	1>			<b>↑</b> ↑	
Traffic Volume (vph)	488	152	654	0	0	0	443	1397	38	0	1006	11
Future Volume (vph)	488	152	654	0	0	0	443	1397	38	0	1006	11
Satd. Flow (prot)	1530	1576	1483	0	0	0	3216	1730	0	0	3246	
Flt Permitted	0.950	0.974					0.950					
Satd. Flow (perm)	1459	1537	1271	0	0	0	3187	1730	0	0	3246	
Satd. Flow (RTOR)			30					3			13	
Lane Group Flow (vph)	317	323	654	0	0	0	443	1435	0	0	1124	
Turn Type	Perm	NA	pm+ov				Prot	NA			NA	
Protected Phases		4	5				5	2			6	
Permitted Phases	4		4									
Detector Phase	4	4	5				5	2			6	
Switch Phase												
Minimum Initial (s)	10.0	10.0	5.0				5.0	10.0			10.0	
Minimum Split (s)	31.0	31.0	11.0				11.0	24.0			33.0	
Total Split (s)	31.0	31.0	34.0				34.0	79.0			45.0	
Total Split (%)	28.2%	28.2%	30.9%				30.9%	71.8%			40.9%	
Yellow Time (s)	3.3	3.3	3.3				3.3	3.3			3.3	
All-Red Time (s)	2.7	2.7	2.7				2.7	2.7			2.7	
Lost Time Adjust (s)	0.0	0.0	0.0				0.0	0.0			0.0	
Total Lost Time (s)	6.0	6.0	6.0				6.0	6.0			6.0	
Lead/Lag			Lead				Lead				Lag	
Lead-Lag Optimize?			Yes				Yes				Yes	
Recall Mode	None	None	Min				Min	C-Max			C-Max	
Act Effct Green (s)	25.0	25.0	52.2				27.3	73.0			39.8	
Actuated g/C Ratio	0.23	0.23	0.47				0.25	0.66			0.36	
v/c Ratio	0.96	0.93	0.97				0.56	1.25			0.95	
Control Delay	83.4	75.6	55.4				29.5	146.8			44.5	
Queue Delay	0.0	0.0	0.0				0.0	0.1			0.0	
Total Delay	83.4	75.6	55.4				29.5	147.0			44.5	
LOS	F	Е	Е				С	F			D	
Approach Delay		67.3						119.3			44.5	
Approach LOS		Е						F			D	
Queue Length 50th (m)	71.1	71.7	105.5				42.7	~398.3			124.3	
Queue Length 95th (m)	#127.7	#126.5	#206.0				50.8	#479.1		n	n#162.6	
Internal Link Dist (m)		82.5			112.6			392.2			142.6	
Turn Bay Length (m)							40.0					
Base Capacity (vph)	331	349	681				818	1150			1182	
Starvation Cap Reductn	0	0	0				0	0			0	
Spillback Cap Reductn	0	0	0				0	37			0	
Storage Cap Reductn	0	0	0				0	0			0	
Reduced v/c Ratio	0.96	0.93	0.96				0.54	1.29			0.95	
Intersection Summary												
Cycle Length: 110												

Cycle Length: 110

Actuated Cycle Length: 110
Offset: 53 (48%), Referenced to phase 2:NBT and 6:SBT, Start of Green

Natural Cycle: 140

Control Type: Actuated-Coordinated

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2030 Future Background - AM Peak Hour

4: Bronson Avenue & Carling Avenue/Glebe Avenue

770-774 Bronson Ave

Maximum v/c Ratio: 1.25
Intersection Signal Delay: 84.1
Intersection Capacity Utilization 110.8%
ICU Level of Service H
Analysis Period (min) 15

Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

Queue shown is maximum after two cycles.

Splits and Phases: 4: Bronson Avenue & Carling Avenue/Glebe Avenue

m Volume for 95th percentile queue is metered by upstream signal.



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Lanes, Volumes, Timings 2030 Future Background - AM Peak Hour 5: Bronson Avenue & Madawaska Drive/Fifth Avenue 770-774 Bronson Ave

	•	-	$\rightarrow$	1	←	*	4	<b>†</b>	1	-	<b>↓</b>	*
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SI
Lane Configurations		4			4			<b>↑</b> ↑			414	
Traffic Volume (vph)	7	114	34	86	34	46	0	1723	34	22	1710	
Future Volume (vph)	7	114	34	86	34	46	0	1723	34	22	1710	
Satd. Flow (prot)	0	1617	0	0	1608	0	0	3302	0	0	3311	
Flt Permitted		0.984	-	_	0.619	•	•		_		0.899	
Satd. Flow (perm)	0	1592	0	0	1006	0	0	3302	0	0	2980	
Satd. Flow (RTOR)		12		-	16			4	-			
Lane Group Flow (vph)	0	155	0	0	166	0	0	1757	0	0	1733	
Turn Type	Perm	NA		Perm	NA			NA		Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases	4	•		8				_		6		
Detector Phase	4	4		8	8			2		6	6	
Switch Phase				-	-			=		-	-	
Minimum Initial (s)	10.0	10.0		10.0	10.0			10.0		10.0	10.0	
Minimum Split (s)	23.3	23.3		23.3	23.3			34.3		34.3	34.3	
Fotal Split (s)	28.0	28.0		28.0	28.0			82.0		82.0	82.0	
Fotal Split (%)	25.5%	25.5%		25.5%	25.5%			74.5%		74.5%	74.5%	
Yellow Time (s)	3.3	3.3		3.3	3.3			3.3		3.3	3.3	
All-Red Time (s)	2.0	2.0		2.0	2.0			2.0		2.0	2.0	
Lost Time Adjust (s)	2.0	0.0		2.0	0.0			0.0		2.0	0.0	
Fotal Lost Time (s)		5.3			5.3			5.3			5.3	
Lead/Lag		0.0			0.0			0.0			0.0	
Lead-Lag Optimize?												
Recall Mode	None	None		None	None			C-Max		C-Max	C-Max	
Act Effct Green (s)	140110	19.3		140110	19.3			80.1		Owian	80.1	
Actuated g/C Ratio		0.18			0.18			0.73			0.73	
//c Ratio		0.54			0.88			0.73			0.80	
Control Delay		44.3			79.3			11.6			8.8	
Queue Delay		0.0			0.0			0.0			0.0	
Fotal Delay		44.3			79.3			11.6			8.8	
OS		74.5 D			75.5 E			В			Α.	
Approach Delay		44.3			79.3			11.6			8.8	
Approach LOS		44.3 D			79.5 E			В			0.0 A	
Queue Length 50th (m)		27.4			31.0			109.1			56.0	
Queue Length 95th (m)		47.1			#63.6			141.7			m193.4	
nternal Link Dist (m)		190.1			132.1			94.8			392.2	
Furn Bay Length (m)		190.1			132.1			94.0			392.2	
Base Capacity (vph)		338			220			2405			2169	
Starvation Cap Reductn		0			0			0			0	
Spillback Cap Reductn		0			0			0			0	
Storage Cap Reductin		0			0			0			0	
Reduced v/c Ratio		0.46			0.75			0.73			0.80	
		0.40			0.75			0.73			0.00	
Intersection Summary												
Cycle Length: 110 Actuated Cycle Length: 110												
Actuated Cycle Length: 110 Offset: 70 (64%), Reference		2.NDT a	od G-CDT	l Ctort o	of Croon							
	u to priase	z z.ind i al	10 0.5B1	L, Start C	ii Green							
Natural Cycle: 80 Control Type: Actuated-Coo	rdinated											

Control Type: Actuated-Coordinated

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2030 Future Background - AM Peak Hour

5: Bronson Avenue & Madawaska Drive/Fifth Avenue

770-774 Bronson Ave

Maximum v/c Ratio: 0.88 Intersection Signal Delay: 14.6

Intersection LOS: B

Intersection Capacity Utilization 105.4%

ICU Level of Service G

Analysis Period (min) 15

# 95th percentile volume exceeds capacity, queue may be longer.

Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 5: Bronson Avenue & Madawaska Drive/Fifth Avenue



03-01-2021 CGH Transportation JK Page 10

Lanes, Volumes, Timings
1: Carling Avenue & Booth Street

2030 Future Background-PM Peak Hour 770-774 Bronson Ave

	*	-	←	*	-	4
Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations	ă	44	ተተ <sub>ጉ</sub>		*	7
Traffic Volume (vph)	257	936	1240	72	420	697
Future Volume (vph)	257	936	1240	72	420	697
Satd, Flow (prot)	1658	3283	4674	0	1658	1427
Flt Permitted	0.950	0200			0.950	/
Satd, Flow (perm)	1594	3283	4674	0	1632	1230
Satd. Flow (RTOR)	1007	0200	9	- 3	1002	82
Lane Group Flow (vph)	257	936	1312	0	420	697
Turn Type	Prot	NA	NA	J	Perm	Perm
Protected Phases	5	2	6		r Cilli	r cilli
Permitted Phases	3		U		4	4
Detector Phases	5	2	6		4	4
	5	2	0		4	4
Switch Phase	E 0	10.0	10.0		10.0	10.0
Minimum Initial (s)	5.0	10.0	10.0		10.0	10.0
Minimum Split (s)	10.9	22.5	29.7		39.0	39.0
Total Split (s)	23.0	90.0	67.0		40.0	40.0
Total Split (%)	17.7%	69.2%	51.5%		30.8%	30.8%
Yellow Time (s)	3.7	3.7	3.7		3.3	3.3
All-Red Time (s)	2.2	2.0	2.0		2.7	2.7
Lost Time Adjust (s)	0.0	0.0	0.0		0.0	0.0
Total Lost Time (s)	5.9	5.7	5.7		6.0	6.0
Lead/Lag	Lead		Lag			
Lead-Lag Optimize?	Yes		Yes			
Recall Mode	None	Max	C-Max		None	None
Act Effct Green (s)	17.1	84.3	61.3		34.0	34.0
Actuated g/C Ratio	0.13	0.65	0.47		0.26	0.26
v/c Ratio	1.18	0.44	0.59		0.99	1.82
Control Delay	165.9	12.0	43.7		88.1	407.4
Queue Delay	0.0	0.0	0.0		0.0	0.0
Total Delay	165.9	12.0	43.7		88.1	407.4
LOS	100.9 F	12.0 B	43.7 D		00.1	407.4 F
		45.2				F
Approach Delay			43.7		287.3	
Approach LOS	=0 -	D	D		F	0== -
Queue Length 50th (m)	~78.8	57.7	111.2			~255.2
Queue Length 95th (m)	#131.4	71.1	m126.6		#172.2	#328.8
Internal Link Dist (m)		107.6	286.6		178.3	
Turn Bay Length (m)	40.0					30.0
Base Capacity (vph)	218	2128	2208		426	382
Starvation Cap Reductn	0	0	0		0	0
Spillback Cap Reductn	0	0	0		0	0
Storage Cap Reductn	0	0	0		0	0
Reduced v/c Ratio	1.18	0.44	0.59		0.99	1.82
Intersection Summary						
Cycle Length: 130						
Actuated Cycle Length: 13						
Offset: 110 (85%), Referer	nced to phas	se 6:WB1	, Start of (	Green		
Natural Cycle: 100						
Control Type: Actuated-Co	ordinated					
7.						

03-01-2021 CGH Transportation JK Page 1

### Lanes, Volumes, Timings 1: Carling Avenue & Booth Street

#### 2030 Future Background-PM Peak Hour 770-774 Bronson Ave

Maximum v/c Ratio: 1.82 
Intersection Signal Delay: 119.3 Intersection LOS: F
Intersection Capacity Utilization 107.9% ICU Level of Service G
Analysis Period (min) 15

Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

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

m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 1: Carling Avenue & Booth Street



03-01-2021 CGH Transportation JK Page 2

#### HCM 2010 TWSC 2: Cambridge Street & Carling Avenue

HCM 95th %tile Q(veh)

2030 Future Background-PM Peak Hour 770-774 Bronson Ave

Intersection												
Int Delay, s/veh	2.5											
	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Movement  Lane Configurations	EDL		EDK	WDL			NDL	INDI	INDR	ODL	SBI	OBK 7
Traffic Vol, veh/h	0	<b>↑↑</b> ↑ 1251	17	0	<b>↑↑</b> 735	<b>7</b>	0	0	1 41	0	0	291
Future Vol. veh/h	0	1251	17	0	735	6	0	0	41	0	0	291
Conflicting Peds, #/hr	0	0	42	0	0	33	0	0	41	0	0	291
	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
Sign Control RT Channelized	riee	riee	None	riee	riee -	None	Slup	Slup	None	Stop	Stop -	None
Storage Length			1000	- 1	- 1	350			0		- 1	0
Veh in Median Storage		0	1000	-	0	330		0	-		0	U
Grade. %	,# -	0	- 1		0			0			0	
Peak Hour Factor	100	100	100	100	100	100	100	100	100	100	100	100
Heavy Vehicles, %	2	3	100	2	4	8	2	2	2	2	2	100
	0	1251	17	0	735	6	0	0	41	0	0	291
Mvmt Flow	U	1251	17	U	135	р	U	U	41	U	U	291
Major/Minor N	Major1		- 1	Major2		- 1	Minor1		1	Minor2		
Conflicting Flow All	-	0	0	-	-	0	-	-	680	-	-	402
Stage 1	-	-	-	-	-	-	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-	-	-	-	-	-	-
Critical Hdwy	-	-	-	-	-	-	-	-	7.14	-	-	7
Critical Hdwy Stg 1	-	-	-	-	-	-	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-	-	-	-	-	-	-
Follow-up Hdwy	-	-	-	-	-	-	-	-	3.92	-	-	3.35
Pot Cap-1 Maneuver	0	-	-	0	-	-	0	0	337	0	0	590
Stage 1	0	-	-	0	-	-	0	0	-	0	0	-
Stage 2	0	-	-	0	-	-	0	0	-	0	0	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	-	-	-	-	-	-	-	-	323	-	-	571
Mov Cap-2 Maneuver	-	-	-	-	-	-	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-	-	-	-	-	-	-
Approach	EB			WB			NB			SB		
HCM Control Delay, s	0			0			17.8			17.7		
HCM LOS	U			U			17.0 C			17.7		
I IOIVI LOS							U			U		
Minor Lane/Major Mvm	t t	NBLn1	EBT	EBR	WBT	WBR :	SBI n1					
Capacity (veh/h)		323	-	LDIX	WD1	7701(1	571					
HCM Lane V/C Ratio		0.127					0.51					
HCM Control Delay (s)		17.8	-	-			17.7					
HCM Lane LOS		17.6 C			- 1		17.7					
HOM cane LOS		0.4		-			0.0					

Lanes, Volumes, Timings 3: Bronson Avenue & Powell Avenue 2030 Future Background-PM Peak Hour 770-774 Bronson Ave

	<b>→</b>	-	*	1	<b>—</b>	•	1	<b>†</b>	1	-	<b>↓</b>	1
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		44			4			413-			414	
Traffic Volume (vph)	141	82	150	58	89	5	79	1214	19	6	945	57
Future Volume (vph)	141	82	150	58	89	5	79	1214	19	6	945	57
Satd. Flow (prot)	0	1575	0	0	1699	0	0	3262	0	0	3248	(
Flt Permitted		0.782			0.684			0.756			0.946	
Satd. Flow (perm)	0	1239	0	0	1184	0	0	2472	0	0	3073	(
Satd. Flow (RTOR)		25			1			2			10	
Lane Group Flow (vph)	0	373	0	0	152	0	0	1312	0	0	1008	(
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2			6		
Detector Phase	4	4		8	8		2	2		6	6	
Switch Phase												
Minimum Initial (s)	10.0	10.0		10.0	10.0		10.0	10.0		10.0	10.0	
Minimum Split (s)	23.7	23.7		23.7	23.7		32.3	32.3		32.3	32.3	
Total Split (s)	38.0	38.0		38.0	38.0		92.0	92.0		92.0	92.0	
Total Split (%)	29.2%	29.2%		29.2%	29.2%		70.8%	70.8%		70.8%	70.8%	
Yellow Time (s)	3.0	3.0		3.0	3.0		3.3	3.3		3.3	3.3	
All-Red Time (s)	2.7	2.7		2.7	2.7		2.0	2.0		2.0	2.0	
Lost Time Adjust (s)		0.0			0.0		2.0	0.0		2.0	0.0	
Total Lost Time (s)		5.7			5.7			5.3			5.3	
Lead/Lag		• • • • • • • • • • • • • • • • • • • •			• • • • • • • • • • • • • • • • • • • •							
Lead-Lag Optimize?												
Recall Mode	None	None		None	None		C-Max	C-Max		C-Max	C-Max	
Act Effct Green (s)		32.3			32.3			86.7		-	86.7	
Actuated g/C Ratio		0.25			0.25			0.67			0.67	
v/c Ratio		1.14			0.52			0.80			0.49	
Control Delay		135.9			49.1			17.8			11.6	
Queue Delay		0.0			0.0			12.5			0.0	
Total Delay		135.9			49.1			30.3			11.6	
LOS		F			D			C			В	
Approach Delay		135.9			49.1			30.3			11.6	
Approach LOS		F			D			C			В	
Queue Length 50th (m)		~106.8			33.5			114.6			61.5	
Queue Length 95th (m)		#167.9			55.9			m119.8			75.9	
Internal Link Dist (m)		74.6			106.0			142.6			39.5	
Turn Bay Length (m)		14.0			100.0			142.0			00.0	
Base Capacity (vph)		326			294			1649			2052	
Starvation Cap Reductn		0			0			338			0	
Spillback Cap Reductn		0			0			0			44	
Storage Cap Reductn		0			0			0			0	
Reduced v/c Ratio		1.14			0.52			1.00			0.50	
ntersection Summary												
Cycle Length: 130												
ctuated Cycle Length: 130												
Offset: 46 (35%), Reference		2:NBTL	and 6:SB	TL, Start	of Green							

Natural Cycle: 70

Control Type: Actuated-Coordinated

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Lanes, Volumes, Timings 3: Bronson Avenue & Powell Avenue 2030 Future Background-PM Peak Hour 770-774 Bronson Ave

Maximum v/c Ratio: 1.14 Intersection Signal Delay: 38.5 Intersection LOS: D Intersection Capacity Utilization 111.4%

Analysis Period (min) 15

Volume exceeds capacity, queue is theoretically infinite. ICU Level of Service H Queue shown is maximum after two cycles.

# 95th percentile volume exceeds capacity, queue may be longer. Queue shown is maximum after two cycles. m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 3: Bronson Avenue & Powell Avenue

1	<u></u>
92 s	38 s
▼ Ø6 (R)	<b>₹</b> Ø8
92 s	38 s

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2030 Future Background-PM Peak Hour 770-774 Bronson Ave

4: Bronson Avenue & Carling Avenue/Glebe Avenue

	۶	<b>→</b>	*	€	<b>—</b>	*	1	†	<i>&gt;</i>	/	ļ	✓
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	ā	ની	7				1,4	₽			<b>↑</b> ↑	
Traffic Volume (vph)	293	133	791	0	0	0	504	1268	26	0	1040	104
Future Volume (vph)	293	133	791	0	0	0	504	1268	26	0	1040	104
Satd. Flow (prot)	1530	1589	1483	0	0	0	3216	1733	0	0	3253	0
Flt Permitted	0.950	0.981					0.950					
Satd. Flow (perm)	1456	1560	1406	0	0	0	3179	1733	0	0	3253	0
Satd. Flow (RTOR)			63					2			12	
Lane Group Flow (vph)	211	215	791	0	0	0	504	1294	0	0	1144	0
Turn Type	Perm	NA	pm+ov				Prot	NA			NA	
Protected Phases		4	5				5	2			6	
Permitted Phases	4		4									
Detector Phase	4	4	5				5	2			6	
Switch Phase												
Minimum Initial (s)	10.0	10.0	5.0				5.0	10.0			10.0	
Minimum Split (s)	31.0	31.0	11.0				11.0	24.0			33.0	
Total Split (s)	31.0	31.0	26.0				26.0	99.0			73.0	
Total Split (%)	23.8%	23.8%	20.0%				20.0%	76.2%			56.2%	
Yellow Time (s)	3.3	3.3	3.3				3.3	3.3			3.3	
All-Red Time (s)	2.7	2.7	2.7				2.7	2.7			2.7	
Lost Time Adjust (s)	0.0	0.0	0.0				0.0	0.0			0.0	
Total Lost Time (s)	6.0	6.0	6.0				6.0	6.0			6.0	
Lead/Lag			Lead				Lead				Lag	
Lead-Lag Optimize?			Yes				Yes				Yes	
Recall Mode	None	None	Min				Min	C-Max			C-Max	
Act Effct Green (s)	22.4	22.4	45.0				22.6	95.6			67.0	
Actuated g/C Ratio	0.17	0.17	0.35				0.17	0.74			0.52	
v/c Ratio	0.84	0.80	1.46				0.90	1.02			0.68	
Control Delay	64.7	58.9	244.8				63.5	51.0			18.4	
Queue Delay	0.0	0.0	0.0				0.0	17.1			0.2	
Total Delay	64.7	58.9	244.8				63.5	68.1			18.6	
LOS	Е	Е	F				Е	E			В	
Approach Delay		180.8						66.8			18.6	
Approach LOS		F						E			В	
Queue Length 50th (m)	56.5		~207.7								61.7	
Queue Length 95th (m)	m77.0		m#265.0			n	n#103.4 i				m79.4	
Internal Link Dist (m)		82.5			112.6			392.2			142.6	
Turn Bay Length (m)							40.0					
Base Capacity (vph)	280	300	541				558	1274			1682	
Starvation Cap Reductn	0	0	0				0	0			93	
Spillback Cap Reductn	0	0	0				0	58			0	
Storage Cap Reductn	0	0	0				0	0			0	
Reduced v/c Ratio	0.75	0.72	1.46				0.90	1.06			0.72	
Intersection Summary												
Cycle Length: 130												

Cycle Length: 130

Actuated Cycle Length: 130

Offset: 46 (35%), Referenced to phase 2:NBT and 6:SBT, Start of Green

Natural Cycle: 130

Control Type: Actuated-Coordinated

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Lanes, Volumes, Timings 4: Bronson Avenue & Carling Avenue/Glebe Avenue

2030 Future Background-PM Peak Hour 770-774 Bronson Ave

Maximum v/c Ratio: 1.46 Intersection Signal Delay: 86.9 Intersection LOS: F Intersection Capacity Utilization 99.0% Analysis Period (min) 15 ICU Level of Service F ~ Volume exceeds capacity, queue is theoretically infinite. Queue shown is maximum after two cycles.

# 95th percentile volume exceeds capacity, queue may be longer. Queue shown is maximum after two cycles. m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 4: Bronson Avenue & Carling Avenue/Glebe Avenue



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2030 Future Background-PM Peak Hour

5: Bronson Avenue & Madawaska Drive/Fifth Avenue

770-774 Bronson Ave

	•	-	*	•	<b>—</b>	*	1	<b>†</b>	1	-	↓	4
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SB
Lane Configurations		4			4			414			414	
Traffic Volume (vph)	3	129	91	137	22	27	9	1640	27	19	1536	
Future Volume (vph)	3	129	91	137	22	27	9	1640	27	19	1536	
Satd, Flow (prot)	0	1520	0	0	1637	0	0	3305	0	0	3310	
Flt Permitted		0.997			0.264			0.942			0.905	
Satd. Flow (perm)	0	1517	0	0	442	0	0	3113	0	0	2999	
Satd. Flow (RTOR)		22			5			4			1	
Lane Group Flow (vph)	0	223	0	0	186	0	0	1676	0	0	1559	
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2			6		
Detector Phase	4	4		8	8		2	2		6	6	
Switch Phase												
Minimum Initial (s)	10.0	10.0		10.0	10.0		10.0	10.0		10.0	10.0	
Minimum Split (s)	23.3	23.3		23.3	23.3		34.3	34.3		34.3	34.3	
Total Split (s)	24.0	24.0		24.0	24.0		106.0	106.0		106.0	106.0	
Total Split (%)	18.5%	18.5%		18.5%	18.5%		81.5%	81.5%		81.5%	81.5%	
Yellow Time (s)	3.3	3.3		3.3	3.3		3.3	3.3		3.3	3.3	
All-Red Time (s)	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)		5.3			5.3			5.3			5.3	
Lead/Lag												
Lead-Lag Optimize?												
Recall Mode	None	None		None	None		C-Max	C-Max		C-Max	C-Max	
Act Effct Green (s)		18.7			18.7			100.7			100.7	
Actuated g/C Ratio		0.14			0.14			0.77			0.77	
v/c Ratio		0.94			2.78			0.69			0.67	
Control Delay		94.7			859.7			9.0			7.0	
Queue Delay		0.0			0.0			0.0			0.0	
Total Delay		94.7			859.7			9.0			7.0	
LOS		F			F			Α			Α	
Approach Delay		94.7			859.7			9.0			7.0	
Approach LOS		F			F			Α			Α	
Queue Length 50th (m)		52.1			~80.8			93.8			78.0	
Queue Length 95th (m)		#101.1			#128.3			114.4			m71.5	
Internal Link Dist (m)		190.1			132.1			94.8			392.2	
Turn Bay Length (m)												
Base Capacity (vph)		237			67			2412			2323	
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		0.94			2.78			0.69			0.67	
Intersection Summary												
Cycle Length: 130												
Actuated Cycle Length: 130	1											
		2·NRTI	and 6:SP	ITI Start	of Green							
	ou to priast	Z.NUIL	una 0.0L	rie, otait	OI OICEII							
Offset: 55 (42%), Referenc Natural Cycle: 80 Control Type: Actuated-Co	ed to phase	e 2:NBTL	and 6:SE	TL, Start	of Green							

03-01-2021 CGH Transportation JK Page 9

Lanes, Volumes, Timings 2030 Future Background-PM Peak Hour 5: Bronson Avenue & Madawaska Drive/Fifth Avenue 770-774 Bronson Ave

Maximum v/c Ratio: 2.78 Intersection Signal Delay: 56.8 Intersection LOS: E
Intersection Capacity Utilization 99.6% ICU Level of Service F
Analysis Period (min) 15

Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

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

m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 5: Bronson Avenue & Madawaska Drive/Fifth Avenue



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# Appendix I

**TDM Checklist** 



#### **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	abla
	1.2	Travel surveys	
BETTER	1.2.1	Conduct periodic surveys to identify travel-related behaviours, attitudes, challenges and solutions, and to track progress	
	2.	WALKING AND CYCLING	
	2.1	Information on walking/cycling routes & des	tinations
BASIC	2.1.1	Display local area maps with walking/cycling access routes and key destinations at major entrances (multi-family, condominium)	abla
	2.2	Bicycle skills training	
BETTER	2.2.1	Offer on-site cycling courses for residents, or subsidize off-site courses	

	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 (multi-family, condominium)	$\triangledown$
BETTER	3.1.2	Provide real-time arrival information display at entrances (multi-family, condominium)	
	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	Not applicable to the student housing component
BETTER	3.2.2	Offer at least one year of free monthly transit passes on residence purchase/move-in	
	3.3	Enhanced public transit service	
BETTER 1	3.3.1	Contract with OC Transpo to provide early transit services until regular services are warranted by occupancy levels (subdivision)	
	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)	
	4.	CARSHARING & BIKESHARING	
	4.1	Bikeshare stations & memberships	
BETTER	4.1.1	Contract with provider to install on-site bikeshare station (multi-family)	
BETTER	4.1.2	Provide residents with bikeshare memberships, either free or subsidized (multi-family)	
	4.2	Carshare vehicles & memberships	
BETTER	4.2.1	Contract with provider to install on-site carshare vehicles and promote their use by residents	
BETTER	4.2.2	Provide residents with carshare memberships, either free or subsidized	
	5.	PARKING	
	5.1	Priced parking	
BASIC 1	5.1.1	Unbundle parking cost from purchase price (condominium)	
BASIC 1	5.1.2	Unbundle parking cost from monthly rent (multi-family)	Ø

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Version 1.0 (30 June 2017)

	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 information package to new residents	abla
	6.2	Personalized trip planning	
BETTER ★	6.2.1	Offer personalized trip planning to new residents	

### **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-s	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	Ø
BASIC	1.1.2	Locate building entrances in order to minimize walking distances to sidewalks and transit stops/stations	abla
BASIC	1.1.3	Locate building doors and windows to ensure visibility of pedestrians from the building, for their security and comfort	abla
	1.2	Facilities for walking & cycling	
REQUIRED	1.2.1	Provide convenient, direct access to stations or major stops along rapid transit routes within 600 metres; minimize walking distances from buildings to rapid transit; provide pedestrian-friendly, weather-protected (where possible) environment between rapid transit accesses and building entrances; ensure quality linkages from sidewalks through building entrances to integrated stops/stations (see Official Plan policy 4.3.3)	
REQUIRED	1.2.2	Provide safe, direct and attractive pedestrian access from public sidewalks to building entrances through such measures as: reducing distances between public sidewalks and major building entrances; providing walkways from public streets to major building entrances; within a site, providing walkways along the front of adjoining buildings, between adjacent buildings, and connecting areas where people may congregate, such as courtyards and transit stops; and providing weather protection through canopies, colonnades, and other design elements wherever possible (see Official Plan policy 4.3.12)	Ø

14 10

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

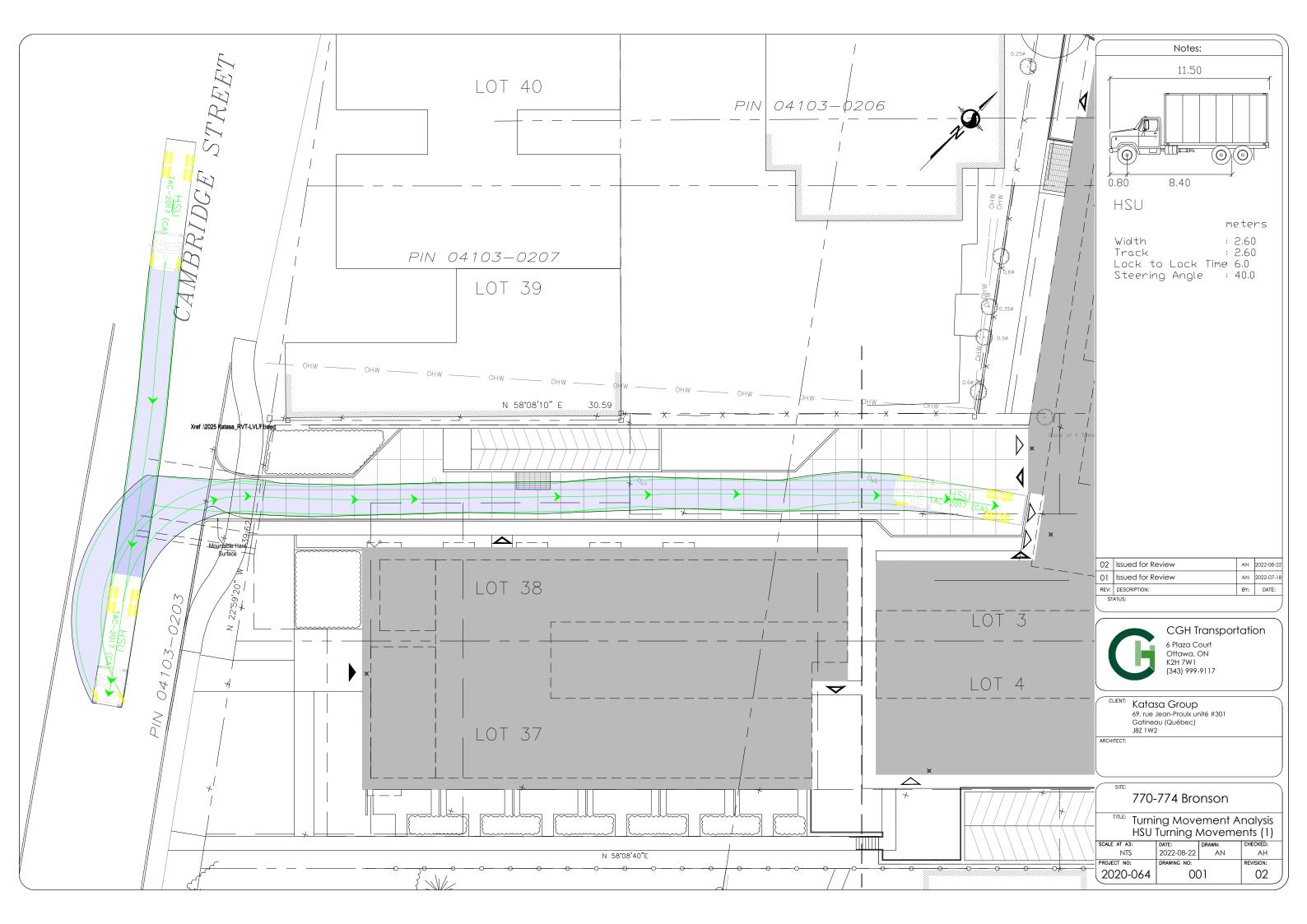
	TDM-	supportive design & infrastructure measures: Residential developments	add descriptions, explanations or plan/drawing references
	2.	WALKING & CYCLING: END-OF-TRIP FACILI	TIES
	2.1	Bicycle parking	
REQUIRED	2.1.1 Provide bicycle parking in highly visible and lighted areas, sheltered from the weather wherever possible (see Official Plan policy 4.3.6)		$\Delta$
REQUIRED	2.1.2	Provide the number of bicycle parking spaces specified for various land uses in different parts of Ottawa; provide convenient access to main entrances or well-used areas (see Zoning By-law Section 111)	Ø
REQUIRED	2.1.3	Ensure that bicycle parking spaces and access aisles meet minimum dimensions; that no more than 50% of spaces are vertical spaces; and that parking racks are securely anchored (see Zoning By-law Section 111)	abla
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	
	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 Zoning By-law Section 111)	
BETTER	2.2.2	Provide secure bicycle parking spaces equivalent to at least the number of units at condominiums or multi-family residential developments	$\Delta$
	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)	
	3.	TRANSIT	
	3.1	Customer amenities	
BASIC	3.1.1	Provide shelters, lighting and benches at any on-site transit stops	
BASIC	3.1.2	Where the site abuts an off-site transit stop and insufficient space exists for a transit shelter in the public right-of-way, protect land for a shelter and/or install a shelter	
BETTER	3.1.3	Provide a secure and comfortable interior waiting area by integrating any on-site transit stops into the building	

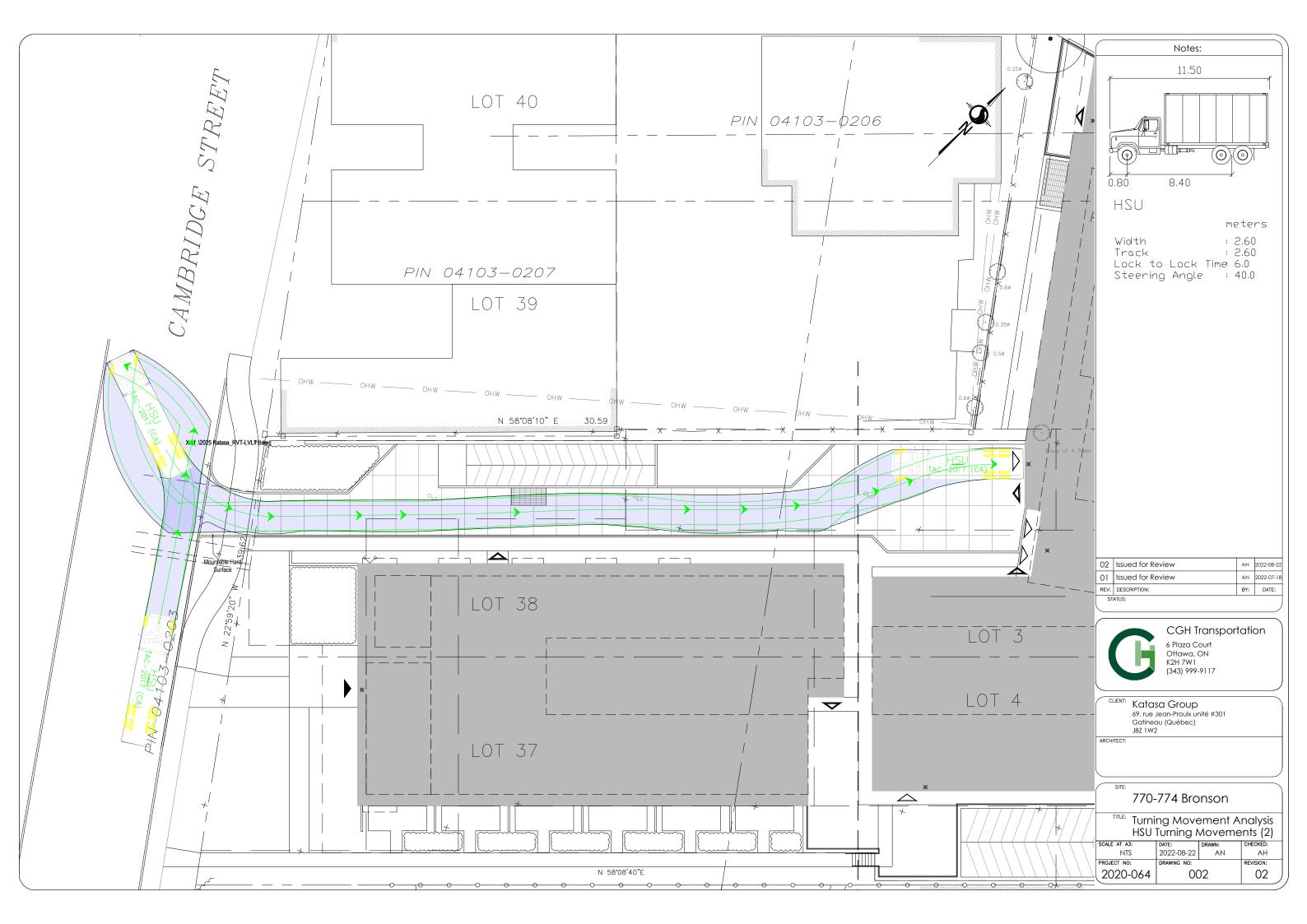
	TDM-s	supportive design & infrastructure measures: Residential developments	Check if completed & add descriptions, explanations or plan/drawing references
	4.	RIDESHARING	
	4.1	Pick-up & drop-off facilities	
BASIC	4.1.1	Provide a designated area for carpool drivers (plus taxis and ride-hailing services) to drop off or pick up passengers without using fire lanes or other no-stopping zones	
	5.	CARSHARING & BIKESHARING	
	5.1	Carshare parking spaces	
BETTER	5.1.1	Provide up to three carshare parking spaces in an R3, R4 or R5 Zone for specified residential uses (see Zoning By-law Section 94)	
	5.2	Bikeshare station location	
BETTER	5.2.1	Provide a designated bikeshare station area near a major building entrance, preferably lighted and sheltered with a direct walkway connection	
	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	abla
BASIC	6.1.2	Provide parking for long-term and short-term users that is consistent with mode share targets, considering the potential for visitors to use off-site public parking	
BASIC	6.1.3	Where a site features more than one use, provide shared parking and reduce the cumulative number of parking spaces accordingly (see Zoning By-law Section 104)	
BETTER	6.1.4	Reduce the minimum number of parking spaces required by zoning by one space for each 13 square metres of gross floor area provided as shower rooms, change rooms, locker rooms and other facilities for cyclists in conjunction with bicycle parking (see Zoning By-law Section 111)	
	6.2	Separate long-term & short-term parking areas	
BETTER	6.2.1	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)	

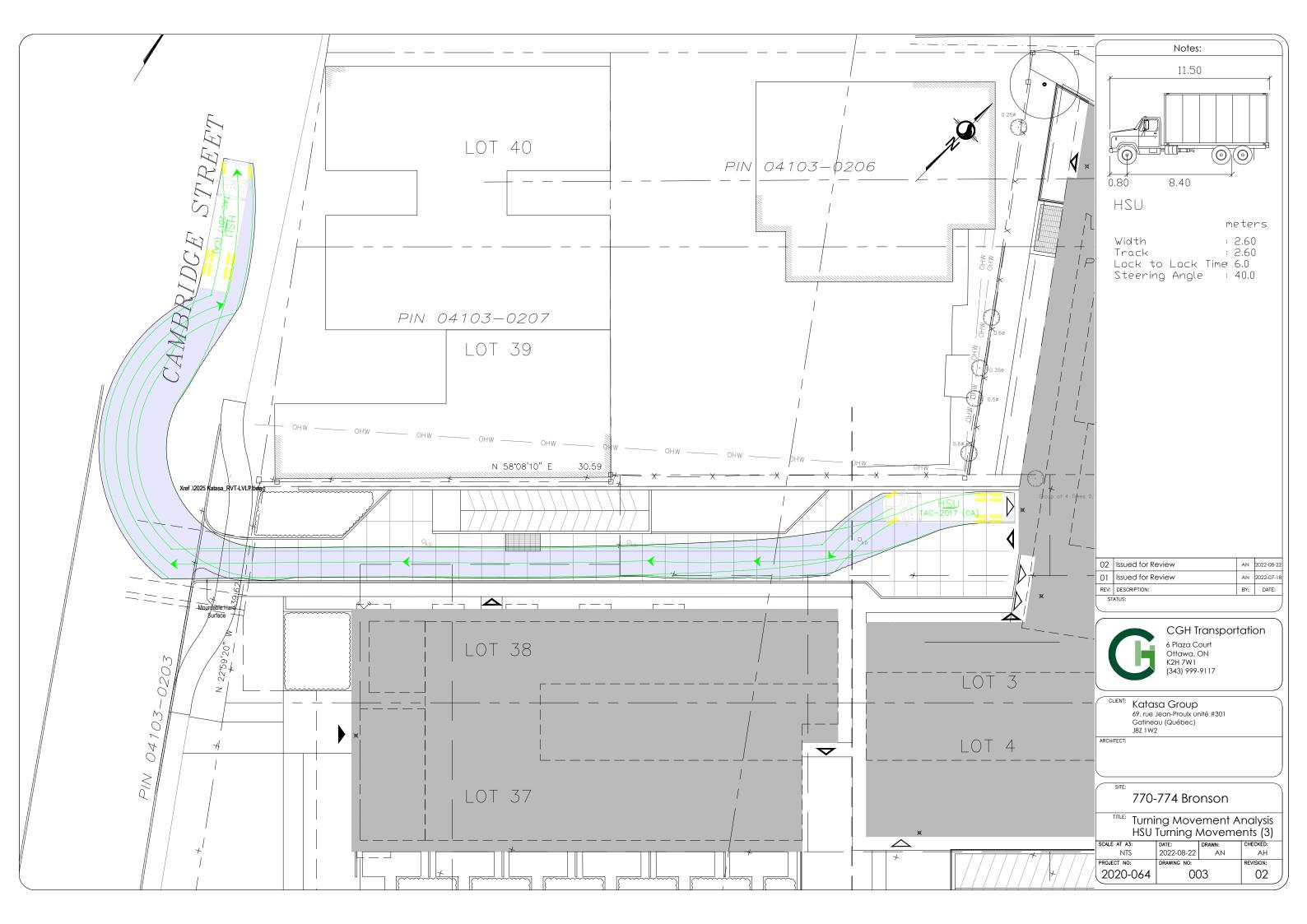
### Appendix J

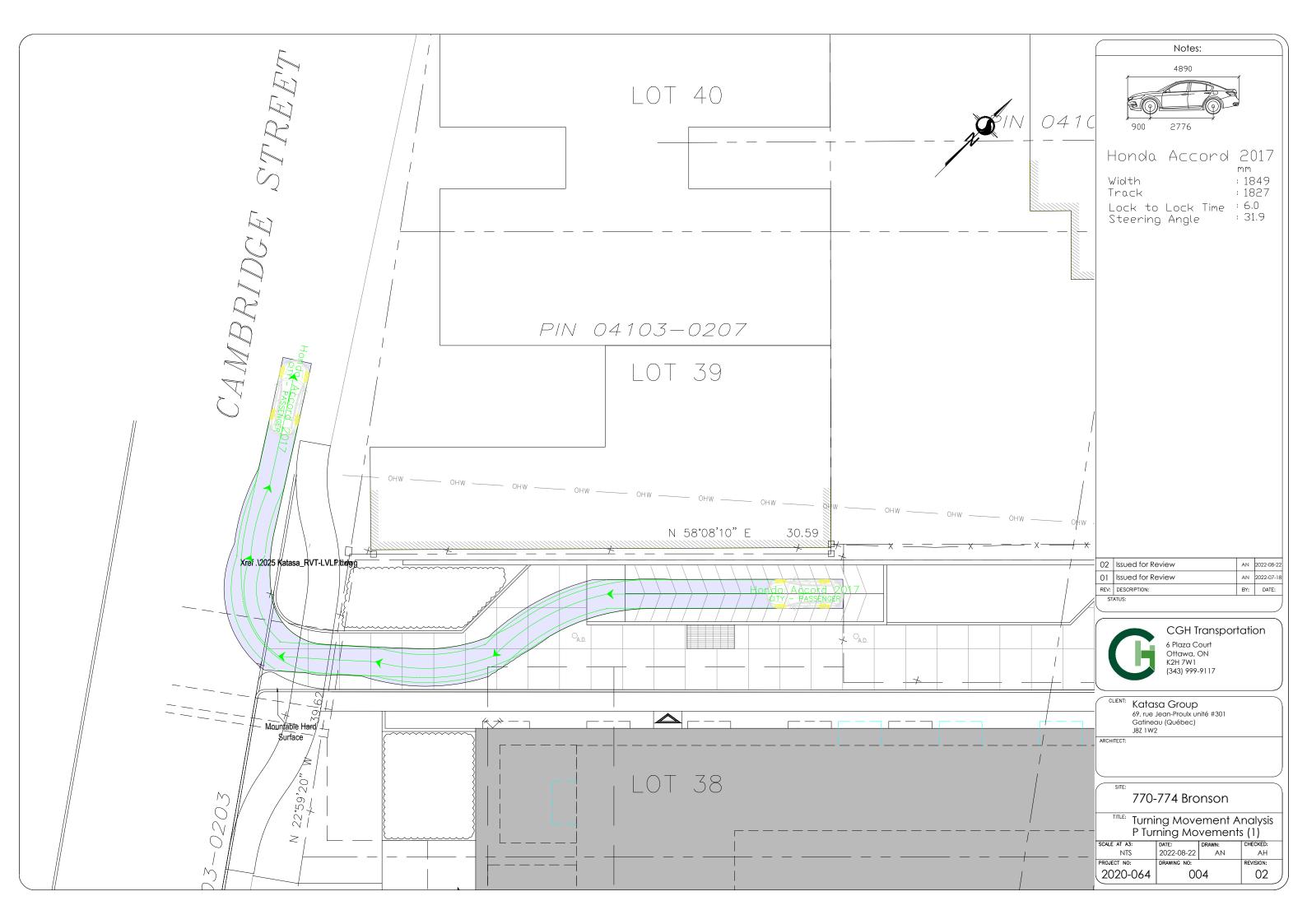
Turning Templates











# Appendix K

MMLOS Analysis



### **Multi-Modal Level of Service - Segments Form**

Consultant Scenario Existing/Future Conditions Date 2020-64

Comments Comments Consultant Condition Inc. Project 2020-64

Date 2020-10-31

SEGMENTS		Street A	Cambridge St bwtn Carling Ave & Frederick Pl	Carling Ave btwn Cambridge St & Bronson Ave	First Ave
			1	2	3
Pedestrian	Sidewalk Width Boulevard Width		1.8 m < 0.5 m	1.5 m < 0.5 m	1.5 m < 0.5 m
	Avg Daily Curb Lane Traffic Volume		≤ 3000	> 3000	> 3000
	Operating Speed On-Street Parking		> 50 to 60 km/h yes	> 60 km/h no	> 60 km/h no
	Exposure to Traffic PLoS	F	C	F	F
de	Effective Sidewalk Width				
Pe	Pedestrian Volume				
_	Crowding PLoS		Α	Α	A
	Level of Service		С	F	F
	Type of Cycling Facility		Mixed Traffic	Mixed Traffic	Mixed Traffic
	Number of Travel Lanes		≤ 2 (no centreline)	≥ 6 lanes total	4-5 lanes total
	Operating Speed		≤ 40 km/h	≥ 50 to 60 km/h	≥ 50 to 60 km/h
	# of Lanes & Operating Speed LoS		Α	F	Е
Bicycle	Bike Lane (+ Parking Lane) Width				
Š	Bike Lane Width LoS	F	-	-	^
Ö	Bike Lane Blockages				
	Blockage LoS		4.0 m materials	440 = =================================	440 - 75
	Median Refuge Width (no median = < 1.8 m) No. of Lanes at Unsignalized Crossing		< 1.8 m refuge ≤ 3 lanes	< 1.8 m refuge ≤ 3 lanes	< 1.8 m refuge ≤ 3 lanes
	Sidestreet Operating Speed		≤ 40 km/h	≤ 40 km/h	≤ 40 km/h
	Unsignalized Crossing - Lowest LoS		A	= 40 KII/II	<b>A</b>
	Level of Service		A	F	E
Ħ	Facility Type			Mixed Traffic	Mixed Traffic
<b>Fransit</b>	Friction or Ratio Transit:Posted Speed	D		Vt/Vp ≥ 0.8	Vt/Vp ≥ 0.8
Tra	Level of Service		-	D	D
	Truck Lane Width			≤ 3.5 m	≤ 3.5 m
S	Travel Lanes per Direction	A		> 1	>1
Truck	Level of Service	Α	-	Α	Α

### Multi-Modal Level of Service - Intersections Form

Consultant
Scenario
Comments

Project	2020-64
Date	2020-10-31

#### Unlocked Rows for Replicating

	INTERSECTIONS		Carling Ave at Booth St Bronson Ave at Powell Ave Bronson Ave at Carling Ave / Glebe Ave							Bro	Bronson Ave at Fifth Ave / Madawaska Dr						
	Crossing Side	NORTH	SOUTH	EAST	WEST	NORTH	SOUTH	EAST	WEST	NORTH	SOUTH	EAST	WEST	NORTH	SOUTH	EAST	WEST
	Lanes	5	0 - 2	8	8	4	4	3	4	5	6	0 - 2	7	5	5	4	4
	Median	No Median - 2.4 m	Median > 2.4 m	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	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	Protected	No left turn / Prohib.	Protected	No left turn / Prohib.	Permissive	Permissive	Permissive	Permissive	No left turn / Prohib.	Permissive	No left turn / Prohib.	Protected	Permissive	Permissive	Permissive	No left turn / Prohib.
	Conflicting Right Turns	Permissive or yield control	No right turn	No right turn	Permissive or yield control	No right turn	Protected/ Permissive	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 prohibited	RTOR prohibited	RTOR allowed	RTOR prohibited	RTOR allowed	RTOR allowed	RTOR allowed	RTOR allowed	RTOR allowed	RTOR allowed	RTOR allowed				
	Ped Signal Leading Interval?	No	No	No	No	No	No	Yes	Yes	No	No	Yes	Yes	No	No	No	No
rian	Right Turn Channel	No Channel	No Right Turn	No Right Turn	No Channel	No Right Turn	No Channel	No Channel	No Channel	No Channel	No Channel	No Channel	No Channel				
St	Corner Radius	3-5m	No Right Turn	No Right Turn	3-5m	3-5m	3-5m	5-10m	3-5m	No Right Turn	5-10m	5-10m	5-10m	3-5m	3-5m	3-5m	3-5m
epec	Crosswalk Type	Std transverse markings	Raised crosswalk	Std transverse markings	Std transverse markings	Std transverse markings	Std transverse markings	Std transverse markings	Std transverse markings	Zebra stripe hi-vis markings	Zebra stripe hi-vis markings	Std transverse markings	Zebra stripe hi-vis markings	Zebra stripe hi-vis markings	Zebra stripe hi-vis markings	Zebra stripe hi-vis markings	Std transverse markings
_	PETSI Score	47	118	21	-2	55	55	73	57	66	24	96	18	42	42	58	63
	Ped. Exposure to Traffic LoS	D	Α	F	F	D	D	С	D	С	F	Α	F	E	E	D	С
	Cycle Length																
	Effective Walk Time																
	Average Pedestrian Delay																
	Pedestrian Delay LoS	-		•	•	-	-	-	•	-	•	-	•	-	-	•	-
		D	Α	F	F	D	D	С	D	С	F	Α	F	Е	E	D	С
	Level of Service F D											F			1	E	
	Approach From	NORTH	SOUTH	EAST	WEST	NORTH	SOUTH	EAST	WEST	NORTH	SOUTH	EAST	WEST	NORTH	SOUTH	EAST	WEST
	Bicycle Lane Arrangement on Approach	Mixed Traffic		Mixed Traffic									Mixed Traffic				
	Right Turn Lane Configuration	≤ 50 m		≤ 50 m									> 50 m				
	Right Turning Speed	≤ 25 km/h		≤ 25 km/h									≤ 25 km/h				
<u>o</u>	Cyclist relative to RT motorists	D	-	D	Α	Α	Α	Α	Α	-	-	-	F	Α	Α	Α	Α
)C	Separated or Mixed Traffic	Mixed Traffic	-	Mixed Traffic	-	-	-	-	-	-	-	-	Mixed Traffic	-	-	-	-
Bicycle	Left Turn Approach	No lane crossed		No lane crossed	≥ 2 lanes crossed	No lane crossed	No lane crossed	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	> 50 to < 60 km/h		≥ 60 km/h	≥ 60 km/h	> 50 to < 60 km/h	> 50 to < 60 km/h	> 50 to < 60 km/h	> 50 to < 60 km/h		> 50 to < 60 km/h		≥ 60 km/h	> 50 to < 60 km/h	> 50 to < 60 km/h	> 40 to ≤ 50 km/h	> 40 to ≤ 50 km/h
	Left Turning Cyclist	C	-	<u> </u>	F	С	С	С	С	-	С	-	c	С	С	В	В
	Lovel of Continu	D	-	D	F	С	С	С	С	-	-	-	F	С	С	В	В
	Level of Service		F									F				C	
Sit .	Average Signal Delay	> 40 sec		≤ 20 sec	> 40 sec	≤ 20 sec	≤ 40 sec			≤ 40 sec	> 40 sec		> 40 sec	≤ 10 sec	≤ 20 sec		
i i		F	-	С	F	С	Е	-	-	E	F	-	F	В	С	-	-
Tra	Level of Service		F				1	<b></b>				F			(	C	
	Effective Corner Radius	< 10 m		< 10 m		< 10 m	< 10 m			10 - 15 m			< 10 m		< 10 m		
<u>~</u>	Number of Receiving Lanes on Departure	≥ 2		≥ 2		1	1			≥ 2			≥ 2		1		
Truck	from Intersection																
Ě	Lovel of Comice	D	-	D	-	F	F	-		В	-	-	D	-	F	-	-
	Level of Service		D					F				D				F	
9	Volume to Capacity Ratio		0.71 -	0.80			0.81	- 0.90			>	1.00			0.71	- 0.80	
Auto	Level of Service		C	;				)				F				C	

### Multi-Modal Level of Service - Intersections Form

Consultant
Scenario
Comments

GH Transportation Inc.	Project	2020-64
uture Conditions	Date	2020-10-31

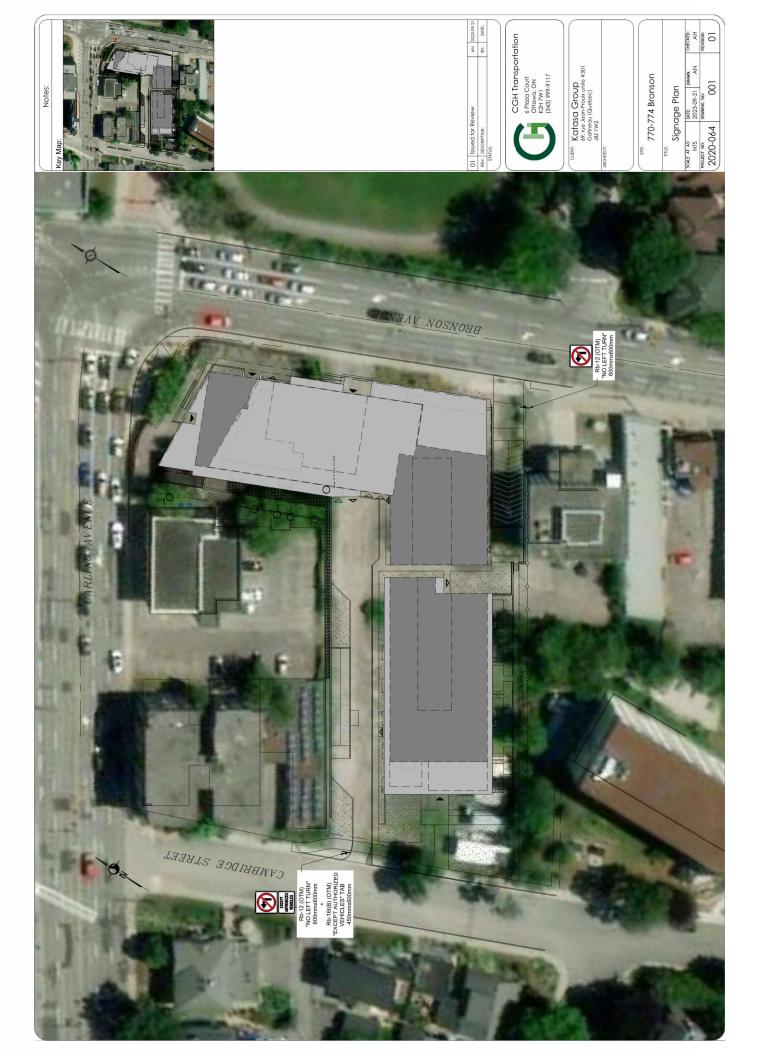
#### Unlocked Rows for Replicating

Lanes Lanes Median  Conflicting Left Turns  Conflicting Right Turns  Right Turns on Red (RTOR)?  Right Turns on Red (RTOR)?  Right Turns on Red (RTOR)?  Right Turns  Right Turns  Right Turns  Right Turns  No No No  No  No  No  No  No  No  No	NORTH SOUTH EAST WEST  5 6 0 - 2 7  No Median - 2.4 m  No left turn / Prohib. Permissive No left turn / Prohib. Protected  No right turn Prohib. Permissive or yield control Permissive or yield control  RTOR prohibited RTOR allowed RTOR allowed RTOR allowed  No No Yes Yes  No Right Turn No Channel No Channel No Channel  No Right Turn Solom 5-10m Solom Zebra stripe hi-vis markings markings markings  66 24 96 18	Permissive Permissive Permissive No left turn / Prohib.  Permissive or yield control Permissive or yield control Permissive or yield control RTOR allowed RTOR allowed RTOR allowed No No No No No No No No Channel No Channel No Channel No Channel S-5m 3-5m 3-5m 3-5m Szebra stripe hi-vis Zebra stripe hi-vis Std transverse			
Median - 2.4 m Median - 2.4 m Median - 2.4 m Modian - 2.4 m No Median - 2.4 m No Med	No Median - 2.4 m No Median -	No Median - 2.4 m Permissive Permissive Permissive or yield control Permissive or yield control Permissive or yield control RTOR allowed RTOR allowed RTOR allowed No No No No No No No Channel No Channel No Channel No Channel Septral Stripe hi-vis Septral Stripe No No Mo Median - 2.4 m No Median - 2.			
Conflicting Left Turns Protected No left turn / Prohib. Protected No left turn / Prohib. Permissive Permissive Permissive Permissive or yield control Right Turns on Red (RToR)? RTOR allowed RTOR prohibited RTOR prohibited RTOR prohibited RTOR prohibited RTOR allowed Ped Signal Leading Interval? No N	No left turn / Prohib. Permissive No left turn / Prohib. Protected  No right turn Prohib. Permissive or yield control  RTOR prohibited RTOR allowed RTOR allowed RTOR allowed  No No Yes Yes  No Right Turn No Channel No Channel  No Right Turn 5-10m 5-10m 5-10m  Zebra stripe hi-vis markings Zebra stripe hi-vis markings markings	Permissive Permissive Permissive No left turn / Prohib.  Permissive or yield control Permissive or yield control Permissive or yield control RTOR allowed RTOR allowed RTOR allowed No No No No No No No No Channel No Channel No Channel No Channel S-5m 3-5m 3-5m 3-5m Szebra stripe hi-vis Zebra stripe hi-vis Std transverse			
Conflicting Right Turns  Permissive or yield control  No right turn  No right turn  No right turn  Permissive or yield control  Right Turns on Red (RToR)?  RTOR allowed  RTOR prohibited  RTOR prohibited  RTOR prohibited  RTOR allowed	No right turn Protected/ Permissive or yield control Permissive or yield control  RTOR prohibited RTOR allowed RTOR allowed RTOR allowed  No No Yes Yes  No Right Turn No Channel No Channel No Channel  No Right Turn 5-10m 5-10m 5-10m  Zebra stripe hi-vis markings Zebra stripe hi-vis markings markings markings	Permissive or yield control  RTOR allowed  No  No  No  No  No  No  No  No  No  N			
Control Contro	No right turn Permissive control control  RTOR prohibited RTOR allowed	control Contro			
Ped Signal Leading Interval? No No No No No No Yes Yes	No No Yes Yes  No Right Turn No Channel No Channel  No Right Turn 5-10m 5-10m 5-10m  Zebra stripe hi-vis Zebra stripe hi-vis Std transverse Zebra stripe hi-vis markings markings markings	No No No No No  No Channel No Channel No Channel  3-5m 3-5m 3-5m 3-5m  Zebra stripe hi-vis Zebra stripe hi-vis Std transverse			
	No Right Turn No Channel No Channel No Channel  No Right Turn 5-10m 5-10m 5-10m  Zebra stripe hi-vis Zebra stripe hi-vis Std transverse Zebra stripe hi-vis markings markings markings	No Channel No Channel No Channel No Channel  3-5m 3-5m 3-5m 3-5m  Zebra stripe hi-vis Zebra stripe hi-vis Std transverse			
Right Turn Channel No	No Right Turn 5-10m 5-10m 5-10m 5-10m  Zebra stripe hi-vis Std transverse Zebra stripe hi-vis markings markings markings markings	3-5m 3-5m 3-5m 3-5m 3-5m  Zebra stripe hi-vis Zebra stripe hi-vis Std transverse			
Corner Radius 3-5m No Right Turn No Right Turn 3-5m 3-5m 5-10m 3-5m	Zebra stripe hi-vis Zebra stripe hi-vis Std transverse Zebra stripe hi-vis markings markings markings	Zebra stripe hi-vis Zebra stripe hi-vis Zebra stripe hi-vis Std transverse			
	markings markings markings markings				
	66 24 96 18	markings markings markings markings			
PETSI Score 47 118 21 -2 55 55 73 57		42 42 58 63			
Ped. Exposure to Traffic LoS D A F F D D C D	C F A F	E E D C			
Cycle Length					
Effective Walk Time					
Average Pedestrian Delay					
Pedestrian Delay LoS					
D A F F D C D	C F A F	E E D C			
Level of Service F	F	E			
Approach From north south east west north south east west	NORTH SOUTH EAST WEST	NORTH SOUTH EAST WEST			
Bicycle Lane Arrangement on Approach Mixed Traffic Mixed Traffic	Mixed Traffic				
Right Turn Lane Configuration ≤ 50 m ≤ 50 m	> 50 m				
Right Turning Speed ≤ 25 km/h ≤ 25 km/h	≤ 25 km/h				
Cyclist relative to RT motorists D - D A A A A A	F	A A A			
Separated or Mixed Traffic Mixed Traffic - Mixed Traffic	Mixed Traffic				
Cyclist relative to R1 motorists D - D A A A A A A A A A A A A A A A A A	No lane crossed No lane crossed	No lane crossed No lane crossed No lane crossed No lane crossed			
Operating Speed > 50 to < 60 km/h ≥ 60 km/h ≥ 60 km/h > 50 to < 6	> 50 to < 60 km/h ≥ 60 km/h	> 50 to < 60 km/h $$ > 50 to < 60 km/h $$ > 40 to $\leq$ 50 km/h $$ > 40 to $\leq$ 50 km/h			
Left Turning Cyclist C - C F C C C	- C - C	C C B B			
D - D F C C C	F	C C B B			
Level of Service F	F	С			
Average Signal Delay ≤ 40 sec ≤ 20 sec > 40 sec ≤ 20 sec > 40 sec	> 40 sec ≤ 40 sec > 40 sec	≤ 10 sec ≤ 20 sec			
Average Signal Delay \$ 40 Sec \$ 20 Sec \$ 40 Sec \$ 40 Sec \$ 20 Sec \$ 40 Sec	F E - F	В С			
Level of Service F	F	С			
Effective Corner Radius < 10 m < 10 m < 10 m	10 - 15 m < 10 m	< 10 m			
Number of Receiving Lanes on Departure	≥2 ≥2	1			
D - D - F F	B D	F - F			
Level of Service D	D	F			
Volume to Capacity Ratio 0.71 - 0.80 > 1.00	> 1.00	> 1.00			
Volume to Capacity Ratio 0.71 - 0.80 > 1.00  Level of Service C F	F	F			

### Appendix L

Access Signage Plan





# Appendix M

Synchro Intersection Worksheets – 2025 Future Total Conditions



Lanes, Volumes, Timings
1: Carling Avenue & Booth Street

2025 Future Total - AM Peak Hour 770-774 Bronson Ave

	*	-	←	*	-	1
Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations	Ä	<b>^</b>	<b>*</b>		T T	7
Traffic Volume (vph)	282	936	681	120	160	113
Future Volume (vph)	282	936	681	120	160	113
	1658	3283	4535	0	1658	1427
Satd. Flow (prot) Flt Permitted		3203	4000	0		1427
	0.950	0000	4505	^	0.950	4050
Satd. Flow (perm)	1577	3283	4535	0	1633	1258
Satd. Flow (RTOR)			32			113
Lane Group Flow (vph)	282	936	801	0	160	113
Turn Type	Prot	NA	NA		Perm	Perm
Protected Phases	5	2	6			
Permitted Phases					4	4
Detector Phase	5	2	6		4	4
Switch Phase						
Minimum Initial (s)	5.0	10.0	10.0		10.0	10.0
Minimum Split (s)	10.9	22.5	29.7		39.0	39.0
Total Split (s)	34.0	81.0	47.0		39.0	39.0
Total Split (%)	28.3%	67.5%	39.2%		32.5%	32.5%
Yellow Time (s)	3.7	3.7	3.7		3.3	3.3
	2.2	2.0	2.0		2.7	2.7
All-Red Time (s)					0.0	
Lost Time Adjust (s)	0.0	0.0	0.0			0.0
Total Lost Time (s)	5.9	5.7	5.7		6.0	6.0
Lead/Lag	Lead		Lag			
Lead-Lag Optimize?	Yes		Yes			
Recall Mode	None	Max	C-Max		None	None
Act Effct Green (s)	24.3	75.3	45.1		33.0	33.0
Actuated g/C Ratio	0.20	0.63	0.38		0.28	0.28
v/c Ratio	0.84	0.45	0.46		0.36	0.26
Control Delay	67.3	12.5	28.8		37.8	7.8
Queue Delay	0.0	0.0	0.0		0.0	0.0
Total Delay	67.3	12.5	28.8		37.8	7.8
LOS	E	В	C		D	A
Approach Delay		25.2	28.8		25.3	
Approach LOS		23.2 C	20.0 C		23.3 C	
	63.4	56.3	50.6		30.4	0.0
Queue Length 50th (m)						
Queue Length 95th (m)	#93.1	70.2	65.0		49.8	13.6
Internal Link Dist (m)		107.6	286.6		178.3	
Turn Bay Length (m)	40.0					30.0
Base Capacity (vph)	388	2060	1723		449	427
Starvation Cap Reductn	0	0	0		0	0
Spillback Cap Reductn	0	0	0		0	0
Storage Cap Reductn	0	0	0		0	0
Reduced v/c Ratio	0.73	0.45	0.46		0.36	0.26
Intersection Summary						
Cycle Length: 120						
Actuated Cycle Length: 120	)					
Offset: 116 (97%), Referen	ced to phas	e 6:WBT	Start of C	Green		
Natural Cycle: 90						
Control Type: Actuated-Coo	ordinated					
Join of Typo. Actuated Col	J. an iatou					

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 CGH Transportation

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Lanes, Volumes, Timings
1: Carling Avenue & Booth Street

2025 Future Total - AM Peak Hour 770-774 Bronson Ave

Maximum v/c Ratio: 0.84 [Intersection Signal Delay: 26.5 Intersection LOS: C Intersection Capacity Utilization 77.8% ICU Level of Service D Analysis Period (min) 15 [ICU Level of Servi

Splits and Phases: 1: Carling Avenue & Booth Street



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 CGH Transportation

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Intersection												
Int Delay, s/veh	0.6											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		<del>ተ</del> ተጉ			44	7			7			7
Traffic Vol, veh/h	0	1094	5	0	635	12	0	0	28	0	0	56
Future Vol, veh/h	0	1094	5	0	635	12	0	0	28	0	0	56
Conflicting Peds, #/h	r 0	0	45	0	0	38	0	0	1	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	100	-	-	35	-	-	0	-	-	0
Veh in Median Storag	ge,# -	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	3	2	2	4	8	2	2	2	2	2	5
Mvmt Flow	0	1094	5	0	635	12	0	0	28	0	0	56
Major/Minor	Major1			Major2		1	/linor1		1	Minor2		
Conflicting Flow All	-	0	0	-	-	0	-	-	596	-	-	356
Stage 1	-	-	-	-	-	-	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-	-	-	-	-	-	-
Critical Hdwy	-	-	-	-	-	-	-	-	7.14	-	-	7

Major/Minor	Major1		Mi	ajor2		Mi	nor1		IV	1inor2			
Conflicting Flow All	-	0	0	-	-	0	-	-	596	-	-	356	
Stage 1	-	-	-	-	-	-	-	-	-	-	-	-	
Stage 2	-	-	-	-	-	-	-	-	-	-	-	-	
Critical Hdwy	-	-	-	-	-	-	-	-	7.14	-	-	7	
Critical Hdwy Stg 1	-	-	-	-	-	-	-	-	-	-	-	-	
Critical Hdwy Stg 2	-	-	-	-	-	-	-	-	-	-	-	-	
Follow-up Hdwy	-	-	-	-	-	-	-	-	3.92	-	-	3.35	
Pot Cap-1 Maneuver	0	-	-	0	-	-	0	0	383	0	0	632	
Stage 1	0	-	-	0	-	-	0	0	-	0	0	-	
Stage 2	0	-	-	0	-	-	0	0	-	0	0	-	
Platoon blocked, %		-	-		-	-							
Mov Cap-1 Maneuver	-	-	-	-	-	-	-	-	367	-	-	610	
Mov Cap-2 Maneuver	-	-	-	-	-	-	-	-	-	-	-	-	
Stage 1	-	-	-	-	-	-	-	-	-	-	-	-	
Stage 2	-	-	-	-	-	-	-	-	-	-	-	-	
Approach	EB			WB			NB			SB			
HCM Control Delay, s	0			0			15.6			11.5			
HCM LOS							С			В			

Minor Lane/Major Mymt	NBLn1	EBT	EBR	WBT	WBR	SBLn1
Capacity (veh/h)	367	-	-	-	-	610
HCM Lane V/C Ratio	0.076	-	-	-	-	0.092
HCM Control Delay (s)	15.6	-	-	-	-	11.5
HCM Lane LOS	С	-	-	-	-	В
LICM 05th 9/ tile O(yeh)	0.2					0.2

			•	•							•	
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		4			4			414			414	
Traffic Volume (vph)	111	25	51	17	53	17	45	1659	8	11	1004	68
Future Volume (vph)	111	25	51	17	53	17	45	1659	8	11	1004	68
Satd. Flow (prot)	0	1586	0	0	1642	0	0	3275	0	0	3241	0
Flt Permitted		0.776			0.921			0.879			0.926	
Satd. Flow (perm)	0	1227	0	0	1518	0	0	2882	0	0	3004	0
Satd. Flow (RTOR)		15			10			1			16	
Lane Group Flow (vph)	0	187	0	0	87	0	0	1712	0	0	1083	0
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2			6		
Detector Phase	4	4		8	8		2	2		6	6	
Switch Phase												
Minimum Initial (s)	10.0	10.0		10.0	10.0		10.0	10.0		10.0	10.0	
Minimum Split (s)	23.7	23.7		23.7	23.7		32.3	32.3		32.3	32.3	
Total Split (s)	26.0	26.0		26.0	26.0		84.0	84.0		84.0	84.0	
Total Split (%)	23.6%	23.6%		23.6%	23.6%		76.4%	76.4%		76.4%	76.4%	
Yellow Time (s)	3.0	3.0		3.0	3.0		3.3	3.3		3.3	3.3	
All-Red Time (s)	2.7	2.7		2.7	2.7		2.0	2.0		2.0	2.0	
Lost Time Adjust (s)		0.0			0.0			0.0			0.0	
Total Lost Time (s)		5.7			5.7			5.3			5.3	
Lead/Lag												
Lead-Lag Optimize?												
Recall Mode	None	None		None	None		C-Max	C-Max		C-Max	C-Max	
Act Effct Green (s)		18.4			18.4			80.6			80.6	
Actuated g/C Ratio		0.17			0.17			0.73			0.73	
v/c Ratio		0.86			0.33			0.81			0.49	
Control Delay		74.9			38.5			7.5			7.2	
Queue Delay		0.0			0.0			10.2			0.0	
Total Delay		74.9			38.5			17.7			7.2	
LOS		E			D			В			Α	
Approach Delay		74.9			38.5			17.7			7.2	
Approach LOS		Е			D			В			A	
Queue Length 50th (m)		35.6			14.4			69.2			46.7	
Queue Length 95th (m)		#71.3			29.0			m50.1			59.5	
Internal Link Dist (m)		74.6			106.0			142.6			39.5	
Turn Bay Length (m)		1 1.0			100.0			112.0			00.0	
Base Capacity (vph)		238			288			2112			2205	
Starvation Cap Reductn		0			0			395			0	
Spillback Cap Reductn		0			0			0			103	
Storage Cap Reductn		0			0			0			0	
Reduced v/c Ratio		0.79			0.30			1.00			0.52	
Intersection Summary												
Cycle Length: 110												
Actuated Cycle Length: 110	)											
Offset: 21 (19%), Reference	ed to phase	2:NBTL a	nd 6:SB	ΓL, Start	of Green							
Natural Cycle: 80												
Control Type: Actuated-Cod	ordinated											

Lanes, Volumes, Timings
3: Bronson Avenue & Powell Avenue

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Lanes, Volumes, Timings 3: Bronson Avenue & Powell Avenue 2025 Future Total - AM Peak Hour

770-774 Bronson Ave

Maximum v/c Ratio: 0.86 Intersection Signal Delay: 18.1 Intersection LOS: B Intersection Capacity Utilization 110.5% ICU Level of Service H Analysis Period (min) 15 # 95th percentile volume exceeds capacity, queue may be longer.

Queue shown is maximum after two cycles. m Volume for 95th percentile queue is metered by upstream signal.



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Lanes, Volumes, Timings 4: Bronson Avenue & Carling Avenue/Glebe Avenue 2025 Future Total - AM Peak Hour 770-774 Bronson Ave

	<b>≛</b>	•	$\rightarrow$	7	1	-	•	1	<b>†</b>		-	ŧ
Lane Group	EBU	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT
Lane Configurations		ă	ની	7				77	f)			<b>†</b> }
Traffic Volume (vph)	2	407	152	526	0	0	0	443	1396	38	0	941
Future Volume (vph)	2	407	152	526	0	0	0	443	1396	38	0	941
Satd. Flow (prot)	0	1530	1582	1483	0	0	0	3216	1730	0	0	3246
Flt Permitted		0.950	0.977					0.950				
Satd. Flow (perm)	0	1460	1548	1271	0	0	0	3178	1730	0	0	3246
Satd. Flow (RTOR)				30					3			13
Lane Group Flow (vph)	0	279	282	526	0	0	0	443	1434	0	0	1051
Turn Type	Perm	Perm	NA	pm+ov				Prot	NA			NA
Protected Phases			4	5				5	2			6
Permitted Phases	4	4		4								
Detector Phase	4	4	4	5				5	2			6
Switch Phase												
Minimum Initial (s)	10.0	10.0	10.0	5.0				5.0	10.0			10.0
Minimum Split (s)	31.0	31.0	31.0	11.0				11.0	24.0			33.0
Total Split (s)	31.0	31.0	31.0	34.0				34.0	79.0			45.0
Total Split (%)	28.2%	28.2%	28.2%	30.9%				30.9%	71.8%			40.9%
Yellow Time (s)	3.3	3.3	3.3	3.3				3.3	3.3			3.3
All-Red Time (s)	2.7	2.7	2.7	2.7				2.7	2.7			2.7
Lost Time Adjust (s)		0.0	0.0	0.0				0.0	0.0			0.0
Total Lost Time (s)		6.0	6.0	6.0				6.0	6.0			6.0
Lead/Lag				Lead				Lead				Lag
Lead-Lag Optimize?				Yes				Yes				Yes
Recall Mode	None	None	None	Min				Min	C-Max			C-Max
Act Effct Green (s)		23.7	23.7	46.1				22.4	74.3			45.9
Actuated g/C Ratio		0.22	0.22	0.42				0.20	0.68			0.42
v/c Ratio		0.89	0.85	0.89				0.68	1.23			0.77
Control Delay		71.2	64.2	43.0				36.2	137.7			28.4
Queue Delay		0.0	0.0	0.0				0.0	0.1			0.1
Total Delay		71.2	64.2	43.0				36.2	137.8			28.5
LOS		Е	E	D				D	F			С
Approach Delay			55.7						113.8			28.5
Approach LOS			E						F			С
Queue Length 50th (m)		60.5	60.5	81.5				45.8	~398.1			103.5
Queue Length 95th (m)		#106.5	#103.7	109.8				50.8	#478.4			#150.6
Internal Link Dist (m)			82.5			112.6			59.6			142.6
Turn Bay Length (m)								40.0				
Base Capacity (vph)		331	351	667				818	1169			1361
Starvation Cap Reductn		0	0	0				0	0			14
Spillback Cap Reductn		0	0	0				0	28			0
Storage Cap Reductn		0	0	0				0	0			0
Reduced v/c Ratio		0.84	0.80	0.79				0.54	1.26			0.78
Intersection Summary												
Cycle Length: 110	,											
Actuated Cycle Length: 110	J											

Actuated Cycle Length: 110
Offset: 53 (48%), Referenced to phase 2:NBT and 6:SBT, Start of Green
Natural Cycle: 140

Control Type: Actuated-Coordinated

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2025 Future Total - AM Peak Hour 770-774 Bronson Ave

4: Bronson Avenue & Carling Avenue/Glebe Avenue

	≪
Lane Group	SBR
LareConfigurations	
Traffic Volume (vph)	110
Future Volume (vph)	110
Satd. Flow (prot)	0
Flt Permitted	
Satd. Flow (perm)	0
Satd. Flow (RTOR)	
Lane Group Flow (vph)	0
Turn Type	
Protected Phases	
Permitted Phases	
Detector Phase	
Switch Phase	
Minimum Initial (s)	
Minimum Split (s)	
Total Split (s)	
Total Split (%)	
Yellow Time (s)	
All-Red Time (s)	
Lost Time Adjust (s)	
Total Lost Time (s)	
Lead/Lag	
Lead-Lag Optimize?	
Recall Mode	
Act Effct Green (s)	
Actuated g/C Ratio	
v/c Ratio	
Control Delay	
Queue Delay	
Total Delay	
LOS	
Approach Delay	
Approach LOS	
Queue Length 50th (m)	
Queue Length 95th (m)	
Internal Link Dist (m)	
Turn Bay Length (m)	
Base Capacity (vph)	
Starvation Cap Reductn	
Spillback Cap Reductn	
Storage Cap Reductn	
Reduced v/c Ratio	

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 CGH Transportation

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Lanes, Volumes, Timings 4: Bronson Avenue & Carling Avenue/Glebe Avenue 2025 Future Total - AM Peak Hour 770-774 Bronson Ave

Maximum v/c Ratio: 1.23
Intersection Signal Delay: 75.7
Intersection LOS: E
Intersection Capacity Utilization 110.7%
ICU Level of Service H
Analysis Period (min) 15

Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.
Queue shown is maximum after two cycles.
Queue shown is maximum after two cycles.



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 CGH Transportation

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Lanes, Volumes, Timings 5: Bronson Avenue & Madawaska Drive/Fifth Avenue 2025 Future Total - AM Peak Hour 770-774 Bronson Ave

	•	$\rightarrow$	*	•	-	•	1	<b>†</b>	-	-	↓	4
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBF
Lane Configurations		4			4			<b>†</b> }			414	
Traffic Volume (vph)	7	48	14	86	34	46	0	1726	34	22	1481	
Future Volume (vph)	7	48	14	86	34	46	0	1726	34	22	1481	
Satd. Flow (prot)	0	1623	0	0	1608	0	0	3302	0	0	3311	(
FIt Permitted		0.971			0.824						0.892	
Satd. Flow (perm)	0	1578	0	0	1333	0	0	3302	0	0	2956	(
Satd. Flow (RTOR)		10			16			4				
Lane Group Flow (vph)	0	69	0	0	166	0	0	1760	0	0	1504	(
Turn Type	Perm	NA		Perm	NA			NA		Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases	4			8						6		
Detector Phase	4	4		8	8			2		6	6	
Switch Phase												
Minimum Initial (s)	10.0	10.0		10.0	10.0			10.0		10.0	10.0	
Minimum Split (s)	23.3	23.3		23.3	23.3			34.3		34.3	34.3	
Total Split (s)	28.0	28.0		28.0	28.0			82.0		82.0	82.0	
Total Split (%)	25.5%	25.5%		25.5%	25.5%			74.5%		74.5%	74.5%	
Yellow Time (s)	3.3	3.3		3.3	3.3			3.3		3.3	3.3	
All-Red Time (s)	2.0	2.0		2.0	2.0			2.0		2.0	2.0	
Lost Time Adjust (s)	2.0	0.0		2.0	0.0			0.0		2.0	0.0	
Total Lost Time (s)		5.3			5.3			5.3			5.3	
Lead/Lag		0.0			0.0			0.0			0.0	
Lead-Lag Optimize?												
Recall Mode	None	None		None	None			C-Max		C-Max	C-Max	
Act Effct Green (s)	110110	17.2		110110	17.2			82.2		o max	82.2	
Actuated g/C Ratio		0.16			0.16			0.75			0.75	
v/c Ratio		0.27			0.75			0.71			0.68	
Control Delay		35.9			59.6			10.4			5.5	
Queue Delay		0.0			0.0			0.0			0.0	
Total Delay		35.9			59.6			10.4			5.5	
LOS		D			E			В			Α	
Approach Delay		35.9			59.6			10.4			5.5	
Approach LOS		D			55.0 E			В			A.5	
Queue Length 50th (m)		11.1			30.9			94.4			37.4	
Queue Length 95th (m)		22.7			51.3			142.4			50.3	
Internal Link Dist (m)		190.1			132.1			94.8			308.6	
Turn Bay Length (m)		100.1			102.1			04.0			000.0	
Base Capacity (vph)		333			287			2467			2207	
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		0.21			0.58			0.71			0.68	
		0.21			0.50			0.71			0.00	
Intersection Summary												
Cycle Length: 110												
Actuated Cycle Length: 110												
Offset: 70 (64%), Reference	ed to phase	2:NBT ar	nd 6:SBT	L, Start o	f Green							
Natural Cycle: 70												
Control Type: Actuated-Control Type:	ordinated											

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Lanes, Volumes, Timings 5: Bronson Avenue & Madawaska Drive/Fifth Avenue 2025 Future Total - AM Peak Hour 770-774 Bronson Ave

Maximum v/c Ratio: 0.75 Intersection Signal Delay: 11.1
Intersection Capacity Utilization 85.8%
Analysis Period (min) 15 Intersection LOS: B ICU Level of Service E

Splits and Phases: 5: Bronson Avenue & Madawaska Drive/Fifth Avenue

†ø2 (R) ₩Ø6 (R)

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Interception						_
Intersection	4.0					
Int Delay, s/veh	4.6					
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations		7	•			<b>†</b>
Traffic Vol, veh/h	0	18	10	0	0	5
Future Vol. veh/h	0	18	10	0	0	5
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-		-	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
Mymt Flow	0	18	10	0	0	5
INIVITIC I TOW	U	10	10	U	U	J
Major/Minor N	Minor1	1	Najor1	N	Major2	
Conflicting Flow All	-	10	0	-	-	-
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-
Critical Hdwy	-	6.22	-	-	-	-
Critical Hdwy Stg 1		-		-		-
Critical Hdwy Stg 2	-		-			_
Follow-up Hdwy		3.318		-		-
Pot Cap-1 Maneuver	0			0	0	_
Stage 1	0	-		0	0	
Stage 2	0		_	0	0	
Platoon blocked. %	U	-		U	U	
		1071				
Mov Cap-1 Maneuver	-					
Mov Cap-2 Maneuver	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-
Approach	WB		NB		SB	
HCM Control Delay, s	8.4		0		0	
HCM LOS	Α.		U		U	
TIOW LOO						
Minor Lane/Major Mvm	t	NBTV	VBLn1	SBT		
Capacity (veh/h)		-	1071	-		
HCM Lane V/C Ratio		-	0.017	-		
HCM Control Delay (s)		-	8.4	-		
HCM Lane LOS			А	-		
HCM 95th %tile Q(veh)		-	0.1			
TION JOHN JOHN Q(VOII)		_	0.1	_		

Intersection						
Int Delay, s/veh	0					
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations	LDL	TOIX	NDL	414	<b>↑</b> 1>	ODIN
Traffic Vol, veh/h	0	6	4	1877	1493	8
Future Vol. veh/h	0	6	4	1877	1493	8
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	Stop -	None	riee -	None	riee -	None
Storage Length		0	- 1	None -	- 1	None -
Veh in Median Storage		-		0	0	
	9, # 0			0	0	
Grade, %	100	400	400	-	100	400
Peak Hour Factor		100	100	100		100
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	0	6	4	1877	1493	8
Major/Minor	Minor2	1	Major1	- 1	Major2	
Conflicting Flow All	-	751	1501	0	-	0
Stage 1	-	-	-	-	-	-
Stage 2	-	-		-	-	-
Critical Hdwy	-	6.94	4.14	-	_	-
Critical Hdwy Stg 1	-	-	-	-	-	-
Critical Hdwy Stg 2	-		-	-	-	-
Follow-up Hdwy		3.32	2.22			
Pot Cap-1 Maneuver	0	353	442		-	-
Stage 1	0	-				
Stage 2	0					
Platoon blocked, %	U			- 1	- 0	- 1
Mov Cap-1 Maneuver		353	442			
		333				
Mov Cap-2 Maneuver	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-
Approach	EB		NB		SB	
HCM Control Delay, s	15.4		0		0	
HCM LOS	С					
Mineral and Marie Ad	. 4	NIDI	NDT	EDL4	ODT	ODE
Minor Lane/Major Mvn	ıt	NBL		EBLn1	SBT	SBR
Capacity (veh/h)		442	-	353	-	-
HCM Lane V/C Ratio		0.009		0.017	-	-
HCM Control Delay (s)		13.2	0	15.4	-	-
HCM Lane LOS		В	Α	С	-	-

0 - 0.1 - -

HCM 95th %tile Q(veh)

Lanes, Volumes, Timings 1: Carling Avenue & Booth Street 2025 Future Total-PM Peak Hour 770-774 Bronson Ave

	•	<b>→</b>	<b>—</b>	1	1	1
Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations	ă	<b>*</b>	<b>411</b>		*	7
Traffic Volume (vph)	216	790	997	59	317	527
Future Volume (vph)	216	790	997	59	317	527
Satd. Flow (prot)	1658	3283	4673	0	1658	1427
Flt Permitted	0.950	0200	.0.0		0.950	
Satd. Flow (perm)	1591	3283	4673	0	1632	1230
Satd. Flow (RTOR)	1001	0200	9	- 3	1002	100
Lane Group Flow (vph)	216	790	1056	0	317	527
Turn Type	Prot	NA	NA	- 3	Perm	Perm
Protected Phases	5	2	6		1 01111	1 01111
Permitted Phases	J		0		4	4
Detector Phase	5	2	6		4	4
Switch Phase	J		0		4	4
Minimum Initial (s)	5.0	10.0	10.0	_	10.0	10.0
	10.9	22.5	29.7		39.0	39.0
Minimum Split (s)	23.0	90.0	67.0		40.0	40.0
Total Split (s)						
Total Split (%)	17.7%	69.2%	51.5%	_	30.8%	30.8%
Yellow Time (s)	3.7	3.7	3.7		3.3	3.3
All-Red Time (s)	2.2	2.0	2.0		2.7	2.7
Lost Time Adjust (s)	0.0	0.0	0.0		0.0	0.0
Total Lost Time (s)	5.9	5.7	5.7		6.0	6.0
Lead/Lag	Lead		Lag			
Lead-Lag Optimize?	Yes		Yes			
Recall Mode	None	Max	C-Max		None	None
Act Effct Green (s)	17.1	84.3	61.3		34.0	34.0
Actuated g/C Ratio	0.13	0.65	0.47		0.26	0.26
v/c Ratio	0.99	0.37	0.48		0.74	1.33
Control Delay	114.8	11.2	41.2		56.0	198.1
Queue Delay	0.0	0.0	0.0		0.0	0.0
Total Delay	114.8	11.2	41.2		56.0	198.1
LOS	F	В	D		Е	F
Approach Delay		33.4	41.2		144.8	
Approach LOS		C	D		F	
Queue Length 50th (m)	56.1	45.8	87.6		74.8	~156.1
Queue Length 95th (m)	#106.4	57.3	102.0		108.8	#224.2
Internal Link Dist (m)	# 100.4	107.6	286.6		178.3	II LL T.L
Turn Bay Length (m)	40.0	101.0	200.0		110.0	30.0
Base Capacity (vph)	218	2128	2208		426	395
Starvation Cap Reductn	0	0	0		0	0
Spillback Cap Reductn	0	0	0		0	0
Storage Cap Reductn	0	0	0		0	0
Reduced v/c Ratio	0.99	0.37	0.48		0.74	1.33
Reduced V/C Rallo	0.99	0.57	0.46		0.74	1.33
Intersection Summary						
Cycle Length: 130						
Actuated Cycle Length: 13	0					
Offset: 110 (85%), Referen		se 6:WBT	Start of C	Green		
Natural Cycle: 90	rood to pride	0.1151	, otari or c	310011		
Control Type: Actuated-Co	ordinated					
Control Type. Actualed=Co	oramated					

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Lanes, Volumes, Timings 1: Carling Avenue & Booth Street 2025 Future Total-PM Peak Hour 770-774 Bronson Ave

Maximum v/c Ratio: 1.33 Intersection Signal Delay: 68.6 Intersection LOS: E Intersection Capacity Utilization 89.1% ICU Level of Service E Analysis Period (min) 15 ~ Volume exceeds capacity, queue is theoretically infinite. Queue shown is maximum after two cycles.

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

Splits and Phases: 1: Carling Avenue & Booth Street



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HCM 95th %tile Q(veh)

Intersection												
Int Delay, s/veh	2.5											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		<del>ተ</del> ተጉ			<b>^</b>	7			7			7
Traffic Vol, veh/h	0	1055	17	0	591	6	0	0	39	0	0	291
Future Vol, veh/h	0	1055	17	0	591	6	0	0	39	0	0	291
Conflicting Peds, #/hr	0	0	42	0	0	33	0	0	4	0	0	1
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	100	-	-	35	-	-	0	-	-	0
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	3	2	2	4	8	2	2	2	2	2	5
Mvmt Flow	0	1055	17	0	591	6	0	0	39	0	0	291
Major/Minor N	/lajor1		1	Major2		1	/linor1		1	Minor2		
Conflicting Flow All	-	0	0	-	-	0	-	-	582	-	-	330
Stage 1	-	-	-	-	-	-	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-	-	-	-	-	-	-
Critical Hdwy	-	-	-	-	-	-	-	-	7.14	-	-	7
Critical Hdwy Stg 1	-	-	-	-	-	-	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-	-	-	-	-	-	-
Follow-up Hdwy	-	-	-	-	-	-	-	-	3.92	-	-	3.35
Pot Cap-1 Maneuver	0	-	-	0	-	-	0	0	391	0	0	657
Stage 1	0	-	-	0	-	-	0	0	-	0	0	-
Stage 2	0	-	-	0	-	-	0	0	-	0	0	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	-	-	-	-	-	-	-	-	374	-	-	636
Mov Cap-2 Maneuver	-	-	-	-	-	-	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-	-	-	-	-	-	-
Approach	EB			WB			NB			SB		
HCM Control Delay, s	0			0			15.7			15.3		
HCM LOS							С			С		
Minor Lane/Major Mvm	t I	NBLn1	EBT	EBR	WBT	WBR S	SBLn1					
Capacity (veh/h)		374	-	-	-	-	636					
HCM Lane V/C Ratio		0.104	-	-	-	-	0.458					
HCM Control Delay (s)		15.7	-	-	-	-	15.3					
HCM Lane LOS		С	-	-	-	-	С					
HOMOSH WITH OF IN		0.0					0.4					

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SB
Lane Configurations		4			4			414			414	
Traffic Volume (vph)	141	82	150	58	89	5	73	1138	19	6	959	
Future Volume (vph)	141	82	150	58	89	5	73	1138	19	6	959	
Satd. Flow (prot)	0	1575	0	0	1699	0	0	3261	0	0	3249	
Flt Permitted		0.782			0.684			0.765			0.947	
Satd. Flow (perm)	0	1239	0	0	1184	0	0	2501	0	0	3076	
Satd. Flow (RTOR)		25			1			3			10	
Lane Group Flow (vph)	0	373	0	0	152	0	0	1230	0	0	1022	
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2			6		
Detector Phase	4	4		8	8		2	2		6	6	
Switch Phase												
Minimum Initial (s)	10.0	10.0		10.0	10.0		10.0	10.0		10.0	10.0	
Minimum Split (s)	23.7	23.7		23.7	23.7		32.3	32.3		32.3	32.3	
Total Split (s)	38.0	38.0		38.0	38.0		92.0	92.0		92.0	92.0	
Total Split (%)	29.2%	29.2%		29.2%	29.2%		70.8%	70.8%		70.8%	70.8%	
Yellow Time (s)	3.0	3.0		3.0	3.0		3.3	3.3		3.3	3.3	
All-Red Time (s)	2.7	2.7		2.7	2.7		2.0	2.0		2.0	2.0	
Lost Time Adjust (s)		0.0			0.0			0.0			0.0	
Total Lost Time (s)		5.7			5.7			5.3			5.3	
Lead/Lag												
Lead-Lag Optimize?												
Recall Mode	None	None		None	None		C-Max	C-Max		C-Max	C-Max	
Act Effct Green (s)		32.3			32.3			86.7			86.7	
Actuated g/C Ratio		0.25			0.25			0.67			0.67	
v/c Ratio		1.14			0.52			0.74			0.50	
Control Delay		135.9			49.1			17.6			11.7	
Queue Delay		0.0			0.0			3.2			0.0	
Total Delay		135.9			49.1			20.8			11.7	
LOS		F			D			С			В	
Approach Delay		135.9			49.1			20.8			11.7	
Approach LOS		F			D			C			В	
Queue Length 50th (m)		~106.8			33.5			115.7			62.8	
Queue Length 95th (m)		#167.9			55.9			39.8			77.5	
Internal Link Dist (m)		74.6			106.0			142.6			39.5	
Turn Bay Length (m)		14.0			100.0			112.0			00.0	
Base Capacity (vph)		326			294			1668			2054	
Starvation Cap Reductn		0			0			329			0	
Spillback Cap Reductn		0			0			0			46	
Storage Cap Reductn		0			0			0			0	
Reduced v/c Ratio		1.14			0.52			0.92			0.51	
		1.14			0.02			0.02			0.01	
Intersection Summary												
Cycle Length: 130												
Actuated Cycle Length: 130												
Offset: 46 (35%), Reference	ed to phase	2:NBTL a	ind 6:SB	TL, Start	of Green							
Natural Cycle: 70												

Lanes, Volumes, Timings

3: Bronson Avenue & Powell Avenue

 09/21/2023
 CGH Transportation

 JK
 Page 4

0.3 - - - - 2.4

2025 Future Total-PM Peak Hour 770-774 Bronson Ave

Maximum v/c Ratio: 1.14 Intersection Signal Delay: 34.5 Intersection LOS: C Intersection Capacity Utilization 109.4% Analysis Period (min) 15 ICU Level of Service H Volume exceeds capacity, queue is theoretically infinite.
 Queue shown is maximum after two cycles.

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

Splits and Phases: 3: Bronson Avenue & Powell Avenue **↑** Ø2 (R) <u>\_</u>204 ₹ø8 Ø6 (R)

09/21/2023 **CGH Transportation** Page 6 Lanes, Volumes, Timings

4: Bronson Avenue & Carling Avenue/Glebe Avenue

2025 Future Total-PM Peak Hour 770-774 Bronson Ave

	<b></b>	۶	<b>→</b>	*	•	<b>←</b>	*	1	†	1	1	ļ
Lane Group	EBU	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SB
Lane Configurations		ă	ર્ન	7				1,1	î,			
Traffic Volume (vph)	2	259	133	668	0	0	0	435	1093	26	0	105
Future Volume (vph)	2	259	133	668	0	0	0	435	1093	26	0	105
Satd. Flow (prot)	0	1530	1595	1483	0	0	0	3216	1732	0	0	325
Flt Permitted		0.950	0.984					0.950				
Satd. Flow (perm)	0	1387	1569	1406	0	0	0	3171	1732	0	0	3257
Satd. Flow (RTOR)				61					2			13
Lane Group Flow (vph)	0	194	200	668	0	0	0	435	1119	0	0	1158
Turn Type	Perm	Perm	NA	pm+ov				Prot	NA			N/
Protected Phases			4	5				5	2			(
Permitted Phases	4	4		4								
Detector Phase	4	4	4	5				5	2			(
Switch Phase												
Minimum Initial (s)	10.0	10.0	10.0	5.0				5.0	10.0			10.0
Minimum Split (s)	31.0	31.0	31.0	11.0				11.0	24.0			33.0
Total Split (s)	31.0	31.0	31.0	26.0				26.0	99.0			73.0
Total Split (%)	23.8%	23.8%	23.8%	20.0%				20.0%	76.2%			56.29
Yellow Time (s)	3.3	3.3	3.3	3.3				3.3	3.3			3.
All-Red Time (s)	2.7	2.7	2.7	2.7				2.7	2.7			2.7
Lost Time Adjust (s)		0.0	0.0	0.0				0.0	0.0			0.0
Total Lost Time (s)		6.0	6.0	6.0				6.0	6.0			6.0
Lead/Lag				Lead				Lead				Lag
Lead-Lag Optimize?				Yes				Yes				Yes
Recall Mode	None	None	None	Min				Min	C-Max			C-Ma
Act Effct Green (s)		22.1	22.1	45.0				22.9	95.9			67.0
Actuated g/C Ratio		0.17	0.17	0.35				0.18	0.74			0.5
v/c Ratio		0.83	0.75	1.24				0.77	0.88			0.69
Control Delay		67.1	57.5	152.0				55.2	27.9			18.0
Queue Delay		0.0	0.0	0.0				0.0	0.0			0.5
Total Delay		67.1	57.5	152.0				55.2	27.9			18.
LOS		E	E	F				E	C			
Approach Delay			118.7						35.6			18.
Approach LOS			F						D			10.
Queue Length 50th (m)		51.6	52.6	~206.8				56.9	198.6			62.
Queue Length 95th (m)		m#81.4	m78.2	#215.6				m#83.2 r				m82.4
Internal Link Dist (m)		1111110 1.4	82.5	π2 10.0		112.6		111#00.21	62.3			142.6
Turn Bay Length (m)			02.0			112.0		40.0	02.0			172.0
Base Capacity (vph)		266	301	540				566	1278			1684
Starvation Cap Reductn		0	0	0				0	0			8
Spillback Cap Reductn		0	0	0				0	0			(
Storage Cap Reductn		0	0	0				0	0			
Reduced v/c Ratio		0.73	0.66	1.24				0.77	0.88			0.7
Intersection Summary Cycle Length: 130												
	1											
Actuated Cycle Length: 130 Offset: 46 (35%), Reference		2·NRT a	nd 6-SPT	Start of I	Green							
21100t. 70 (00 /0), 11016161101	ou to pridate	, 2.11D1 a	110 U.UD I	, Start Or	010011							

Offset: 46 (35%), Referenced to phase 2:NBT and 6:SBT, Sta Natural Cycle: 100

Control Type: Actuated-Coordinated

Lanes, Volumes, Timings

2025 Future Total-PM Peak Hour 770-774 Bronson Ave

4: Bronson Avenue & Carling Avenue/Glebe Avenue

	*
Lane Group	SBR
Lare Configurations	
Traffic Volume (vph)	104
Future Volume (vph)	104
Satd. Flow (prot)	0
Flt Permitted	
Satd. Flow (perm)	0
Satd. Flow (RTOR)	
Lane Group Flow (vph)	0
Turn Type	
Protected Phases	
Permitted Phases	
Detector Phase	
Switch Phase	
Minimum Initial (s)	
Minimum Split (s)	
Total Split (s)	
Total Split (%)	
Yellow Time (s)	
All-Red Time (s)	
Lost Time Adjust (s)	
Total Lost Time (s)	
Lead/Lag	
Lead-Lag Optimize?	
Recall Mode	
Act Effct Green (s)	
Actuated g/C Ratio	
v/c Ratio	
Control Delay	
Queue Delay	
Total Delay	
LOS	
Approach Delay	
Approach LOS	
Queue Length 50th (m)	
Queue Length 95th (m)	
Internal Link Dist (m)	
Turn Bay Length (m)	
Base Capacity (vph)	
Starvation Cap Reductn	
Spillback Cap Reductn	
Storage Cap Reductn	
Reduced v/c Ratio	
Intersection Summary	
intersection outlinary	

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Lanes, Volumes, Timings

2025 Future Total-PM Peak Hour 770-774 Bronson Ave

4: Bronson Avenue & Carling Avenue/Glebe Avenue

Maximum v/c Ratio: 1.24 Intersection Signal Delay: 53.8 Intersection LOS: D Intersection Capacity Utilization 90.3% ICL
Analysis Period (min) 15

Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

# 95th percentile volume exceeds capacity, queue may be longer. ICU Level of Service E

- Queue shown is maximum after two cycles.
- m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 4: Bronson Avenue & Carling Avenue/Glebe Avenue



Lanes, Volumes, Timings 5: Bronson Avenue & Madawaska Drive/Fifth Avenue 2025 Future Total-PM Peak Hour 770-774 Bronson Ave

Lane Group WBT Lane Configurations 417» 1421 **41 1 1 5 4 0** 4 Traffic Volume (vph) Future Volume (vph) 66 47 121 22 27 9 1421 27 19 1540 Satd. Flow (prot) 1521 1637 3301 3310 Flt Permitted 0.994 0.580 0.940 0.915 Satd. Flow (perm) 1513 963 3103 3032 Satd. Flow (RTOR) 22 6 Lane Group Flow (vph) 116 170 1457 1563 Turn Type Perm NA Perm NA Perm NA Perm NA Protected Phases 6 Permitted Phases 4 8 6 Detector Phase Switch Phase Minimum Initial (s) 10.0 10.0 10.0 10.0 10.0 10.0 10.0 10.0 Minimum Split (s) 23.3 23.3 23.3 23.3 34.3 34.3 34.3 34.3 Total Split (s) 24.0 24.0 24.0 24.0 106.0 106.0 106.0 18.5% 18.5% 18.5% 81.5% 81.5% 81.5% 81.5% Total Split (%) 18.5% 3.3 3.3 3.3 Yellow Time (s) 3.3 3.3 3.3 3.3 3.3 All-Red Time (s) 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) 5.3 5.3 5.3 5.3 Lead/Lag Lead-Lag Optimize? None None C-Max C-Max C-Max C-Max Recall Mode None Act Effct Green (s) 18.7 100.7 100.7 18.7 Actuated g/C Ratio 0.14 0.14 0.77 0.77 v/c Ratio 0.49 1.19 0.61 0.67 Control Delay 49.2 180.5 7.5 6.2 Queue Delay 0.0 0.0 0.0 0.0 Total Delay 49.2 180.5 7.5 6.2 LOS D F Α Α 49.2 180.5 Approach Delay 6.2 Approach LOS D F Α Α Queue Length 50th (m) 22.3 ~51.1 71.0 70.3 Queue Length 95th (m) 41.9 #97.0 86.2 m67.2 Internal Link Dist (m) 190.1 132.1 94.8 305.9 Turn Bay Length (m) 2404 2348 Base Capacity (vph) 236 Starvation Cap Reductn 0 0 0 0

Reduced v/c Ratio Intersection Summary

Spillback Cap Reductn Storage Cap Reductn

Cycle Length: 130

Actuated Cycle Length: 130

Offset: 55 (42%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green

0

0.49

Natural Cycle: 65

Control Type: Actuated-Coordinated

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0

1.19

0

0.61

0

0.67

Lanes, Volumes, Timings

2025 Future Total-PM Peak Hour 770-774 Bronson Ave

5: Bronson Avenue & Madawaska Drive/Fifth Avenue

Maximum v/c Ratio: 1.19 Intersection Signal Delay: 17.2 Intersection LOS: B Intersection Capacity Utilization 85.0% ICU Level of Service E

Analysis Period (min) 15

~ Volume exceeds capacity, queue is theoretically infinite.

Queue shown is maximum after two cycles.

# 95th percentile volume exceeds capacity, queue may be longer.

Queue shown is maximum after two cycles. m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 5: Bronson Avenue & Madawaska Drive/Fifth Avenue **↑** Ø2 (R) <del>-</del>7ø4 **₹**Ø8 Ø6 (R)

Stage 1 Stage 2

Intersection						
Int Delay, s/veh	2.1					
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations		7	<b>*</b>			<b></b>
Traffic Vol, veh/h	0	14	25	0	0	17
Future Vol, veh/h	0	14	25	0	0	17
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	e,# 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	0	14	25	0	0	17
Major/Minor	Minor1	-	Major1	N	Major2	
Conflicting Flow All	-	25	0	-	-	-
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-
Critical Hdwy	-	6.22	-	-	-	-
Critical Hdwy Stg 1	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-
Follow-up Hdwy	-	3.318	-	-	-	-
Pot Cap-1 Maneuver	0	1051	-	0	0	-
Stage 1	0	-	-	0	0	-
Stage 2	0	-	-	0	0	-
Platoon blocked, %			-			-
Mov Cap-1 Maneuver	-	1051	-	-	-	-
Mov Cap-2 Maneuver	-	-	-	-	-	-
Ctopo 1						

Approach	WB	NB	SB
HCM Control Delay, s	8.5	0	0
HCM LOS	Α		

Minor Lane/Major Mvmt	NBTV	WBLn1	SBT
Capacity (veh/h)	-	1051	-
HCM Lane V/C Ratio	-	0.013	-
HCM Control Delay (s)	-	8.5	-
HCM Lane LOS	-	Α	-
HCM 95th %tile Q(veh)	-	0	-

latana attan						
Intersection	0.5					
Int Delay, s/veh	0.5					
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations		7		41	ħ۵	
Traffic Vol, veh/h	0	6	7	1558	1599	19
Future Vol, veh/h	0	6	7	1558	1599	19
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 Storag	e, # 0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	100	100	100	100	100	100
Heavy Vehicles, %	2	2	2	2	2	2
Mymt Flow	0	6	7	1558	1599	19
Majar/Minar	Minor		Majart		Majar0	
	Minor2		Major1		Major2	
Conflicting Flow All	-		1618	0	-	0
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-
Critical Hdwy	-	6.94	4.14	-	-	-
Critical Hdwy Stg 1	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-
Follow-up Hdwy	-	3.32	2.22	-	-	-
Pot Cap-1 Maneuver	0	323	399	-	-	-
Stage 1	0	-	-	-	-	-
Stage 2	0	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	-	323	399	-	-	-
Mov Cap-2 Maneuver	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-
Stage 2	-		-			-
, and the second second						
Annanah	ED		ND		CD	
Approach	EB		NB		SB	
HCM Control Delay, s			1		0	
HCM LOS	С					
Minor Lane/Major Mvr	nt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)		399	-	323	-	-
HCM Lane V/C Ratio		0.018		0.019		
HCM Control Delay (s	)	14.2	0.9	16.4		
HCM Lane LOS	,	В	Α.5	C		
I IOW LANE LOS		٥	А	U		

0.1 - 0.1 - -

HCM 95th %tile Q(veh)

# Appendix N

Synchro Intersection Worksheets – 2030 Future Total Conditions



Lanes, Volumes, Timings
1: Carling Avenue & Booth Street

2030 Future Total - AM Peak Hour 770-774 Bronson Ave

	•	-	<b>←</b>	*	-	1
Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations	Ä	<b>^</b>	<b>*</b>		N N	7
Traffic Volume (vph)	351	1166	808	142	197	139
Future Volume (vph)	351	1166	808	142	197	139
		3283	4535	0		1427
Satd. Flow (prot)	1658	3203	4000	U	1658	1421
Flt Permitted	0.950	0000	4505	0	0.950	4050
Satd. Flow (perm)	1592	3283	4535	0	1633	1258
Satd. Flow (RTOR)			32			139
Lane Group Flow (vph)	351	1166	950	0	197	139
Turn Type	Prot	NA	NA		Perm	Perm
Protected Phases	5	2	6			
Permitted Phases					4	4
Detector Phase	5	2	6		4	4
Switch Phase						
Minimum Initial (s)	5.0	10.0	10.0		10.0	10.0
Minimum Split (s)	10.9	22.5	29.7		39.0	39.0
Total Split (s)	34.0	81.0	47.0		39.0	39.0
Total Split (%)	28.3%	67.5%	39.2%		32.5%	32.5%
Yellow Time (s)	3.7	3.7	39.2 /6		3.3	3.3
	2.2	2.0	2.0		2.7	2.7
All-Red Time (s)						
Lost Time Adjust (s)	0.0	0.0	0.0		0.0	0.0
Total Lost Time (s)	5.9	5.7	5.7		6.0	6.0
Lead/Lag	Lead		Lag			
Lead-Lag Optimize?	Yes		Yes			
Recall Mode	None	Max	C-Max		None	None
Act Effct Green (s)	27.2	75.3	42.2		33.0	33.0
Actuated g/C Ratio	0.23	0.63	0.35		0.28	0.28
v/c Ratio	0.93	0.57	0.59		0.44	0.31
Control Delay	78.3	14.3	32.7		39.6	7.5
Queue Delay	0.0	0.0	0.0		0.0	0.0
Total Delay	78.3	14.3	32.7		39.6	7.5
LOS	E	В	C		D	A
Approach Delay		29.1	32.7		26.3	
Approach LOS		29.1 C	32.7 C		20.3 C	
	80.8	77.7	65.0		38.3	0.0
Queue Length 50th (m)						
Queue Length 95th (m)	#134.2	95.8	79.6		60.6	15.0
Internal Link Dist (m)	40 -	107.6	286.6		178.3	
Turn Bay Length (m)	40.0					30.0
Base Capacity (vph)	388	2060	1614		449	446
Starvation Cap Reductn	0	0	0		0	0
Spillback Cap Reductn	0	0	0		0	0
Storage Cap Reductn	0	0	0		0	0
Reduced v/c Ratio	0.90	0.57	0.59		0.44	0.31
Intersection Summary						
Cycle Length: 120						
Actuated Cycle Length: 120	)					
Offset: 116 (97%), Reference		6·WPT	Start of C	Green		
Natural Cycle: 90	ced to phas	e o.vvb i	, Start of C	JI EEN		
	undin nan d					
Control Type: Actuated-Coc	orulnated					

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 Page 1

Lanes, Volumes, Timings
1: Carling Avenue & Booth Street

2030 Future Total - AM Peak Hour 770-774 Bronson Ave

Maximum v/c Ratio: 0.93
Intersection Signal Delay: 30.0
Intersection Capacity Utilization 82.4%
ICU Level of Service E
Analysis Period (min) 15
# 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 1: Carling Avenue & Booth Street



HCM Lane LOS HCM 95th %tile Q(veh)

latana artian												
Intersection	0.5											
Int Delay, s/veh	0.5											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		<del>ተ</del> ተጉ			44	7			7			7
Traffic Vol, veh/h	0	1363	8	0	754	12	0	0	28	0	0	56
Future Vol, veh/h	0	1363	8	0	754	12	0	0	28	0	0	56
Conflicting Peds, #/hr	0	0	45	0	0	38	0	0	1	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	100	-	-	35	-	-	0	-	-	0
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	3	2	2	4	8	2	2	2	2	2	5
Mvmt Flow	0	1363	8	0	754	12	0	0	28	0	0	56
Major/Minor N	/lajor1		1	Major2		ı	/linor1		1	Minor2		
Conflicting Flow All	- viajoi i	0	0	-	-	0	-		732	-	-	415
Stage 1		-	-			-			-	-		-
Stage 2												
Critical Hdwy		_	-	-			-	-	7.14			7
Critical Hdwy Stg 1			-	-	-	-	-	-	7.17	-	-	-
Critical Hdwy Stg 2						-						
Follow-up Hdwy	-								3.92		-	3.35
Pot Cap-1 Maneuver	0	-	-	0	-	-	0	0	312	0	0	578
Stage 1	0			0			0	0	- 012	0	0	-
Stage 2	0	-	-	0	-	_	0	0	-	0	0	_
Platoon blocked, %		-	-			-						
Mov Cap-1 Maneuver	-	-	-	-	-	_	_	_	299	-	-	558
Mov Cap-2 Maneuver									-			-
Stage 1	_	_	_	_	_	_	_	_	_	_	_	_
Stage 2		-			-	-	-	-	-		-	-
5.0.g5 £												
Approach	EB			WB			NB			SB		
HCM Control Delay, s	0			0			18.3			12.2		
HCM LOS	U			U			10.5 C			12.2 B		
TIGW LOS							U			D		
Minor Lane/Major Mvm	t I	NBLn1	EBT	EBR	WBT	WBR S						
Capacity (veh/h)		299	-	-	-	-	558					
HCM Lane V/C Ratio		0.094	-	-	-	-	0.1					
HCM Control Delay (s)		18.3	-	-	-	-	12.2					
HCM Lane LOS		С	-	-	-	-	В					
HCM 95th %tile O(veh)		0.3					0.3					

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	•	-	$\rightarrow$	•	<b>←</b>	*	1	<b>†</b>	1	-	<b>↓</b>	1
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		4			4			414			414	
Traffic Volume (vph)	180	25	87	17	53	17	45	1659	8	11	1081	73
Future Volume (vph)	180	25	87	17	53	17	45	1659	8	11	1081	73
Satd. Flow (prot)	0	1577	0	0	1642	0	0	3275	0	0	3245	0
Flt Permitted		0.772			0.915			0.871			0.928	
Satd. Flow (perm)	0	1214	0	0	1517	0	0	2855	0	0	3011	0
Satd. Flow (RTOR)		17			10			1			16	
Lane Group Flow (vph)	0	292	0	0	87	0	0	1712	0	0	1165	0
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2			6		
Detector Phase	4	4		8	8		2	2		6	6	
Switch Phase												
Minimum Initial (s)	10.0	10.0		10.0	10.0		10.0	10.0		10.0	10.0	
Minimum Split (s)	23.7	23.7		23.7	23.7		32.3	32.3		32.3	32.3	
Total Split (s)	26.0	26.0		26.0	26.0		84.0	84.0		84.0	84.0	
Total Split (%)	23.6%	23.6%		23.6%	23.6%		76.4%	76.4%		76.4%	76.4%	
Yellow Time (s)	3.0	3.0		3.0	3.0		3.3	3.3		3.3	3.3	
All-Red Time (s)	2.7	2.7		2.7	2.7		2.0	2.0		2.0	2.0	
Lost Time Adjust (s)		0.0			0.0		2.0	0.0		2.0	0.0	
Total Lost Time (s)		5.7			5.7			5.3			5.3	
Lead/Lag		0			0			0.0			0.0	
Lead-Lag Optimize?												
Recall Mode	None	None		None	None		C-Max	C-Max		C-Max	C-Max	
Act Effct Green (s)	110110	20.3		110110	20.3		O max	78.7		o max	78.7	
Actuated g/C Ratio		0.18			0.18			0.72			0.72	
v/c Ratio		1.23			0.30			0.84			0.54	
Control Delay		172.4			37.5			9.6			8.3	
Queue Delay		0.0			0.0			25.6			0.1	
Total Delay		172.4			37.5			35.3			8.3	
LOS		F			D			D			A	
Approach Delay		172.4			37.5			35.3			8.3	
Approach LOS		172.4 F			D D			55.5 D			Α.	
Queue Length 50th (m)		~74.7			14.4			92.0			52.5	
Queue Length 95th (m)		#127.6			29.0			m62.3			66.6	
Internal Link Dist (m)		74.6			106.0			142.6			39.5	
Turn Bay Length (m)		14.0			100.0			172.0			00.0	
Base Capacity (vph)		237			288			2042			2158	
Starvation Cap Reductn		0			0			407			0	
Spillback Cap Reductn		0			0			0			170	
Storage Cap Reductn		0			0			0			0	
Reduced v/c Ratio		1.23			0.30			1.05			0.59	
		1.23			0.30			1.00			0.59	
Intersection Summary												
Cycle Length: 110												
Actuated Cycle Length: 110												
Offset: 21 (19%), Reference	ed to phase	2:NBTL a	and 6:SB	ΓL, Start	of Green							
Natural Cycle: 80												
Control Type: Actuated-Coo	ordinated											

Lanes, Volumes, Timings 3: Bronson Avenue & Powell Avenue

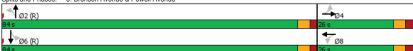
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2030 Future Total - AM Peak Hour 770-774 Bronson Ave

Maximum v/c Ratio: 1.23 Intersection Signal Delay: 38.0 Intersection LOS: D Intersection Capacity Utilization 116.9% ICU Level of Service H Analysis Period (min) 15 ~ Volume exceeds capacity, queue is theoretically infinite. Queue shown is maximum after two cycles.

# 95th percentile volume exceeds capacity, queue may be longer. Queue shown is maximum after two cycles. m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 3: Bronson Avenue & Powell Avenue



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Lanes, Volumes, Timings 4: Bronson Avenue & Carling Avenue/Glebe Avenue 2030 Future Total - AM Peak Hour 770-774 Bronson Ave

	<b>≛</b>	•	$\rightarrow$	*	1	-	•	1	<b>†</b>		-	¥
Lane Group	EBU	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT
Lane Configurations		ă	4	7				ሻሻ	1,			<b>∱</b> ĵ∌
Traffic Volume (vph)	2	504	152	655	0	0	0	443	1396	38	0	1013
Future Volume (vph)	2	504	152	655	0	0	0	443	1396	38	0	1013
Satd. Flow (prot)	0	1530	1575	1483	0	0	0	3216	1730	0	0	3246
FIt Permitted		0.950	0.974					0.950				
Satd. Flow (perm)	0	1460	1536	1271	0	0	0	3182	1730	0	0	3246
Satd. Flow (RTOR)				30					3			13
Lane Group Flow (vph)	0	325	333	655	0	0	0	443	1434	0	0	1131
Turn Type	Perm	Perm	NA	pm+ov				Prot	NA			NA
Protected Phases			4	5				5	2			6
Permitted Phases	4	4		4								
Detector Phase	4	4	4	5				5	2			6
Switch Phase												
Minimum Initial (s)	10.0	10.0	10.0	5.0				5.0	10.0			10.0
Minimum Split (s)	31.0	31.0	31.0	11.0				11.0	24.0			33.0
Total Split (s)	31.0	31.0	31.0	34.0				34.0	79.0			45.0
Total Split (%)	28.2%	28.2%	28.2%	30.9%				30.9%	71.8%			40.9%
Yellow Time (s)	3.3	3.3	3.3	3.3				3.3	3.3			3.3
All-Red Time (s)	2.7	2.7	2.7	2.7				2.7	2.7			2.7
Lost Time Adjust (s)		0.0	0.0	0.0				0.0	0.0			0.0
Total Lost Time (s)		6.0	6.0	6.0				6.0	6.0			6.0
Lead/Lag				Lead				Lead				Lag
Lead-Lag Optimize?				Yes				Yes				Yes
Recall Mode	None	None	None	Min				Min	C-Max			C-Max
Act Effct Green (s)		25.0	25.0	52.2				27.2	73.0			39.8
Actuated g/C Ratio		0.23	0.23	0.47				0.25	0.66			0.36
v/c Ratio		0.98	0.95	0.98				0.56	1.25			0.96
Control Delay		88.5	80.9	55.6				29.5	146.8			45.5
Queue Delay		0.0	0.0	0.0				0.0	0.2			0.0
Total Delay		88.5	80.9	55.6				29.5	146.9			45.5
LOS		F	F	Е				С	F			D
Approach Delay			70.2						119.2			45.5
Approach LOS			Е						F			D
Queue Length 50th (m)		73.4	74.7	105.7				42.7	~397.8			125.5
Queue Length 95th (m)		#132.0	#132.2	#206.0				50.8	#478.6		n	#164.0
Internal Link Dist (m)			82.5			112.6			59.6			142.6
Turn Bay Length (m)								40.0				
Base Capacity (vph)		331	349	681				818	1149			1181
Starvation Cap Reductn		0	0	0				0	0			0
Spillback Cap Reductn		0	0	0				0	41			0
Storage Cap Reductn		0	0	0				0	0			0
Reduced v/c Ratio		0.98	0.95	0.96				0.54	1.29			0.96
Intersection Summary												
Cycle Length: 110												
Astusted Cycle Langth: 110	0											

Actuated Cycle Length: 110

Offset: 53 (48%), Referenced to phase 2:NBT and 6:SBT, Start of Green Natural Cycle: 140

Control Type: Actuated-Coordinated

Lanes, Volumes, Timings

2030 Future Total - AM Peak Hour 770-774 Bronson Ave

4: Bronson Avenue & Carling Avenue/Glebe Avenue

	*
Lane Group	SBR
LareConfigurations	
Traffic Volume (vph)	118
Future Volume (vph)	118
Satd. Flow (prot)	0
Flt Permitted	
Satd. Flow (perm)	0
Satd. Flow (RTOR)	
Lane Group Flow (vph)	0
Turn Type	
Protected Phases	
Permitted Phases	
Detector Phase	
Switch Phase	
Minimum Initial (s)	
Minimum Split (s)	
Total Split (s)	
Total Split (%)	
Yellow Time (s)	
All-Red Time (s)	
Lost Time Adjust (s)	
Total Lost Time (s)	
Lead/Lag	
Lead-Lag Optimize?	
Recall Mode	
Act Effct Green (s)	
Actuated g/C Ratio	
v/c Ratio	
Control Delay	
Queue Delay	
Total Delay	
LOS	
Approach Delay	
Approach LOS	
Queue Length 50th (m)	
Queue Length 95th (m)	
Internal Link Dist (m)	
Turn Bay Length (m)	
Base Capacity (vph)	
Starvation Cap Reductn	
Spillback Cap Reductn	
Storage Cap Reductn	
Reduced v/c Ratio	
Intersection Summary	

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Lanes, Volumes, Timings
4: Bronson Avenue & Carling Avenue/Glebe Avenue

2030 Future Total - AM Peak Hour 770-774 Bronson Ave

Maximum v/c Ratio: 1.25
Intersection Signal Delay: 85.0
Intersection LOS: F
Intersection Capacity Utilization 110.8%
ICU Level of Service H
Analysis Period (min) 15

Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

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

M Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 4: Bronson Avenue & Carling Avenue/Glebe Avenue

Lanes, Volumes, Timings 5: Bronson Avenue & Madawaska Drive/Fifth Avenue 2030 Future Total - AM Peak Hour 770-774 Bronson Ave

	•	-	•	1	-	*		<b>†</b>	1	1	Į.	1
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBF
Lane Configurations		4			4			ħβ			414	
Traffic Volume (vph)	7	114	34	86	34	46	0	1726	34	22	1716	
Future Volume (vph)	7	114	34	86	34	46	0	1726	34	22	1716	
Satd. Flow (prot)	0	1617	0	0	1608	0	0	3302	0	0	3311	
Flt Permitted		0.984			0.619						0.899	
Satd. Flow (perm)	0	1592	0	0	1006	0	0	3302	0	0	2980	
Satd. Flow (RTOR)		12			16			4				
Lane Group Flow (vph)	0	155	0	0	166	0	0	1760	0	0	1739	
Turn Type	Perm	NA		Perm	NA			NA		Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases	4			8						6		
Detector Phase	4	4		8	8			2		6	6	
Switch Phase												
Minimum Initial (s)	10.0	10.0		10.0	10.0			10.0		10.0	10.0	
Minimum Split (s)	23.3	23.3		23.3	23.3			34.3		34.3	34.3	
Total Split (s)	28.0	28.0		28.0	28.0			82.0		82.0	82.0	
Total Split (%)	25.5%	25.5%		25.5%	25.5%			74.5%		74.5%	74.5%	
Yellow Time (s)	3.3	3.3		3.3	3.3			3.3		3.3	3.3	
All-Red Time (s)	2.0	2.0		2.0	2.0			2.0		2.0	2.0	
Lost Time Adjust (s)	2.0	0.0		2.0	0.0			0.0		2.0	0.0	
Total Lost Time (s)		5.3			5.3			5.3			5.3	
Lead/Lag		0.0			0.0			0.0			0.0	
Lead-Lag Optimize?												
Recall Mode	None	None		None	None			C-Max		C-Max	C-Max	
Act Effct Green (s)	140110	19.3		140110	19.3			80.1		O IVIUX	80.1	
Actuated g/C Ratio		0.18			0.18			0.73			0.73	
v/c Ratio		0.10			0.10			0.73			0.80	
Control Delay		44.3			79.3			11.7			8.9	
Queue Delay		0.0			0.0			0.0			0.0	
Total Delay		44.3			79.3			11.7			8.9	
LOS		77.5 D			7 5.5 E			В			0.5 A	
Approach Delay		44.3			79.3			11.7			8.9	
Approach LOS		44.3 D			79.5 E			В			0.9 A	
Queue Length 50th (m)		27.4			31.0			109.4			56.0	
Queue Length 95th (m)		47.1			#63.6			142.4			m193.2	
Internal Link Dist (m)		190.1			132.1			94.8			308.6	
Turn Bay Length (m)		130.1			102.1			34.0			300.0	
Base Capacity (vph)		338			220			2405			2169	
Starvation Cap Reductn		0			0			2405			2109	
		0			0			0			0	
Spillback Cap Reductn Storage Cap Reductn		0			0			0			0	
Reduced v/c Ratio		0.46			0.75			0.73			0.80	
		0.40			0.75			0.73			0.00	
Intersection Summary												
Cycle Length: 110												
Actuated Cycle Length: 110	J											

Offset: 70 (64%), Referenced to phase 2:NBT and 6:SBTL, Start of Green

Natural Cycle: 80

Control Type: Actuated-Coordinated

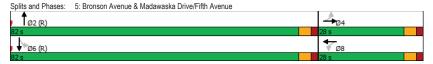
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Lanes, Volumes, Timings 5: Bronson Avenue & Madawaska Drive/Fifth Avenue 2030 Future Total - AM Peak Hour 770-774 Bronson Ave

Maximum v/c Ratio: 0.88 Intersection Signal Delay: 14.7 Intersection LOS: B Intersection Capacity Utilization 105.6% ICU Level of Service G Analysis Period (min) 15 # 95th percentile volume exceeds capacity, queue may be longer.

Queue shown is maximum after two cycles.

M Volume for 95th percentile queue is metered by upstream signal.



Intersection						
Int Delay, s/veh	4.2					
**		WDD	NDT	NDD	OD	ODT
Movement	WBL		NBT	NBR	SBL	SBT
Lane Configurations		7	<b>↑</b>		_	<b>^</b>
Traffic Vol, veh/h	0	18	10	0	0	8
Future Vol, veh/h	0	18	10	0	0	8
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
Grade, %	0	-	0	-	-	0
Peak Hour Factor	100	100	100	100	100	100
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	0	18	10	0	0	8
Major/Minor N	/linor1	ı	/lajor1	N	Major2	
Conflicting Flow All	-	10	0	-	-	
Stage 1	-	-	-		-	
Stage 2						
Critical Hdwy		6.22				
						-
Critical Hdwy Stg 1	-	-				-
Critical Hdwy Stg 2	-	-	-	-	-	-
Follow-up Hdwy		3.318	-	-	-	-
Pot Cap-1 Maneuver	0	1071	-	0	0	-
Stage 1	0	-	-	0	0	-
Stage 2	0	-	-	0	0	-
Platoon blocked, %			-			-
Mov Cap-1 Maneuver	-	1071	-	-	-	-
Mov Cap-2 Maneuver	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-
Stage 2	-	-		-		-
J						
Approach	WB		NB		SB	
HCM Control Delay, s	8.4		ND 0		0	
HCM LOS	0.4 A		U		U	
HCM LOS	А					
Minor Lane/Major Mvmt		NBTV	VBLn1	SBT		
Capacity (veh/h)		-	1071	-		
HCM Lane V/C Ratio		-	0.017	-		
HCM Control Delay (s)		-	8.4	-		
HCM Lane LOS			Α			
HCM 95th %tile Q(veh)		-	0.1	-		
HOW JOHN JOHN (VEH)			0.1			

Intersection						
Int Delay, s/veh	0					
•						
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations		7		41₽	ħβ	
Traffic Vol, veh/h	0	6	4	1877	1730	8
Future Vol, veh/h	0	6	4	1877	1730	8
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	0	6	4	1877	1730	8
				_		
	/linor2		Major1		Major2	
Conflicting Flow All	-	869	1738	0	-	0
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-
Critical Hdwy	-	6.94	4.14	-	-	-
Critical Hdwy Stg 1	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-
Follow-up Hdwy	-	3.32	2.22	-	-	-
Pot Cap-1 Maneuver	0	295	358	-	-	-
Stage 1	0	-	-	-		-
Stage 2	0		-		-	-
Platoon blocked, %						
Mov Cap-1 Maneuver	-	295	358		-	-
Mov Cap-2 Maneuver		200	-			
Stage 1			-	-	-	
Stage 2	- 1					
Staye 2		-	-	-		-
Approach	EB		NB		SB	
HCM Control Delay, s	17.5		0		0	
HCM LOS	С					
Minor Lane/Major Mvmt		NBL		EBLn1	SBT	SBR
Capacity (veh/h)		358	-	295	-	-
HCM Lane V/C Ratio		0.011	-	0.02	-	-
HCM Control Delay (s)		15.2	0	17.5	-	-
HCM Lane LOS		С	Α	С	-	-
HCM 95th %tile Q(veh)		0	-	0.1	-	-
/ouio a(voii)				0.1		

Lanes, Volumes, Timings 1: Carling Avenue & Booth Street

Control Type: Actuated-Coordinated

2030 Future Total-PM Peak Hour 770-774 Bronson Ave

		-	-	-	-	*
Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations	ă	<b>^</b>	ተተ <sub>ጉ</sub>		*	7
Traffic Volume (vph)	257	938	1242	72	420	697
Future Volume (vph)	257	938	1242	72	420	697
Satd. Flow (prot)	1658	3283	4674	0	1658	1427
Flt Permitted	0.950				0.950	-
Satd. Flow (perm)	1611	3283	4674	0	1632	1230
Satd. Flow (RTOR)			9			82
Lane Group Flow (vph)	257	938	1314	0	420	697
Turn Type	Prot	NA	NA		Perm	Perm
Protected Phases	5	2	6			
Permitted Phases		_			4	4
Detector Phase	5	2	6		4	4
Switch Phase	- 0		- 0			7
Minimum Initial (s)	5.0	10.0	10.0		10.0	10.0
Minimum Split (s)	10.9	22.5	29.7		39.0	39.0
Total Split (s)	23.0	90.0	67.0		40.0	40.0
	17.7%		51.5%			30.8%
Total Split (%)		69.2%			30.8%	
Yellow Time (s)	3.7	3.7	3.7		3.3	3.3
All-Red Time (s)	2.2	2.0	2.0		2.7	2.7
Lost Time Adjust (s)	0.0	0.0	0.0		0.0	0.0
Total Lost Time (s)	5.9	5.7	5.7		6.0	6.0
Lead/Lag	Lead		Lag			
Lead-Lag Optimize?	Yes		Yes			
Recall Mode	None	Max			None	None
Act Effct Green (s)	17.1	84.3	61.3		34.0	34.0
Actuated g/C Ratio	0.13	0.65	0.47		0.26	0.26
v/c Ratio	1.18	0.44	0.60		0.99	1.82
Control Delay	165.9	12.0	44.2		88.1	407.4
Queue Delay	0.0	0.0	0.0		0.0	0.0
Total Delay	165.9	12.0	44.2		88.1	407.4
LOS	F	В	D		F	F
Approach Delay		45.1	44.2		287.3	
Approach LOS		73.1 D	D		207.5	
Queue Length 50th (m)	~78.8	57.8	111.4		107.5	~255.2
Queue Length 95th (m)	#131.4		m125.5		#172.2	
Internal Link Dist (m)	#131.4	107.6	286.6		178.3	#520.0
Turn Bay Length (m)	40.0	107.0	200.0		170.3	30.0
	218	2128	2208		426	382
Base Capacity (vph)						
Starvation Cap Reductn	0	0	0		0	0
Spillback Cap Reductn	0	0	0		0	0
Storage Cap Reductn	0	0	0		0	0
Reduced v/c Ratio	1.18	0.44	0.60		0.99	1.82
Intersection Summary						
Cycle Length: 130						
Actuated Cycle Length: 13	30					
Offset: 110 (85%), Refere		e 6:WRT	. Start of 0	Green		
Natural Cycle: 100	niced to phas	IC 0.44D1	, otali or c	Jicon		
o I I T	P 4 1					

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### Lanes, Volumes, Timings 1: Carling Avenue & Booth Street

2030 Future Total-PM Peak Hour 770-774 Bronson Ave

Maximum v/c Ratio: 1.82 Intersection Signal Delay: 119.4 Intersection LOS: F Intersection Capacity Utilization 107.9% Analysis Period (min) 15 ICU Level of Service G Volume exceeds capacity, queue is theoretically infinite.
 Queue shown is maximum after two cycles.

# 95th percentile volume exceeds capacity, queue may be longer. Queue shown is maximum after two cycles. m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 1: Carling Avenue & Booth Street



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Intersection												
Int Delay, s/veh	2.6											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		ተተ <sub>ጉ</sub>			44	7			7			7
Traffic Vol, veh/h	0	1253	17	0	737	6	0	0	55	0	0	291
Future Vol, veh/h	0	1253	17	0	737	6	0	0	55	0	0	291
Conflicting Peds, #/hr	0	0	42	0	0	33	0	0	4	0	0	1
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	100	-	-	35	-	-	0	-	-	0
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	3	2	2	4	8	2	2	2	2	2	5
Mymt Flow	0	1253	17	0	737	6	0	0	55	0	0	291
		1200	•						00			201
Major/Minor N	/lajor1		1	Major2		ı	/linor1		N	/linor2		
Conflicting Flow All	-	0	0	-	-	0	-	-	681	-	-	403
Stage 1		-	-			-			-			-
Stage 2												
Critical Hdwy	_			_				_	7.14	-		7
Critical Hdwy Stg 1	- 1								7.14			-
Critical Hdwy Stg 2												
Follow-up Hdwy				- :					3.92			3.35
Pot Cap-1 Maneuver	0			0			0	0	337	0	0	589
Stage 1	0			0	- 1		0	0	331	0	0	303
Stage 2	0			0			0	0		0	0	
Platoon blocked. %	U			U	- :		U	U		U	U	
Mov Cap-1 Maneuver				_			_	-	323	-		570
Mov Cap-1 Maneuver								- 1	323			5/0
Stage 1	- 1	-	-	-		_	-	-	-	-		-
Stage 1 Stage 2					-			-		-		-
Stage 2	-	-	-	-	-	-	-	-	-	-	-	_
Approach	EB			WB			NB			SB		
HCM Control Delay, s	0			0			18.4			17.7		
HCM LOS	0			U			10.4 C			C		
110111 200												
Minor Lane/Major Mvmt		NBLn1	EBT	EBR	WBT	WBR S	SBLn1					
Capacity (veh/h)		323	-	-	-	-	570					
HCM Lane V/C Ratio		0.17			-		0.511					
HCM Control Delay (s)		18.4	-	-	-	-	17.7					
HCM Lane LOS		C	-				C					
HCM 95th %tile Q(veh)		0.6		_			2.9					
TION JOHN JOHN (VEII)		0.0					2.3					

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Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		4			4			414			413	
Traffic Volume (vph)	141	82	150	58	89	5	79	1225	19	6	959	57
Future Volume (vph)	141	82	150	58	89	5	79	1225	19	6	959	57
Satd. Flow (prot)	0	1575	0	0	1699	0	0	3262	0	0	3249	0
Flt Permitted		0.782			0.684			0.753			0.946	
Satd. Flow (perm)	0	1239	0	0	1184	0	0	2462	0	0	3073	0
Satd. Flow (RTOR)		25			1			2			10	
Lane Group Flow (vph)	0	373	0	0	152	0	0	1323	0	0	1022	0
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2			6		
Detector Phase	4	4		8	8		2	2		6	6	
Switch Phase												
Minimum Initial (s)	10.0	10.0		10.0	10.0		10.0	10.0		10.0	10.0	
Minimum Split (s)	23.7	23.7		23.7	23.7		32.3	32.3		32.3	32.3	
Total Split (s)	38.0	38.0		38.0	38.0		92.0	92.0		92.0	92.0	
Total Split (%)	29.2%	29.2%		29.2%	29.2%		70.8%	70.8%		70.8%	70.8%	
Yellow Time (s)	3.0	3.0		3.0	3.0		3.3	3.3		3.3	3.3	
All-Red Time (s)	2.7	2.7		2.7	2.7		2.0	2.0		2.0	2.0	
Lost Time Adjust (s)	2.1	0.0		2.7	0.0		2.0	0.0		2.0	0.0	
Total Lost Time (s)		5.7			5.7			5.3			5.3	
Lead/Lag		0.1			0.1			0.0			0.0	
Lead-Lag Optimize?												
Recall Mode	None	None		None	None		C-Max	C-Max		C-Max	C-Max	
Act Effct Green (s)	140110	32.3		140110	32.3		O IVIUX	86.7		O Max	86.7	
Actuated g/C Ratio		0.25			0.25			0.67			0.67	
v/c Ratio		1.14			0.52			0.81			0.50	
Control Delay		135.9			49.1			18.2			11.7	
Queue Delay		0.0			0.0			15.2			0.0	
Total Delay		135.9			49.1			33.3			11.7	
LOS		F			D			C			В	
Approach Delay		135.9			49.1			33.3			11.7	
Approach LOS		133.9 F			43.1 D			33.3 C			В	
Queue Length 50th (m)		~106.8			33.5			120.0			62.8	
Queue Length 95th (m)		#167.9			55.9			m123.6			77.5	
Internal Link Dist (m)		74.6			106.0			142.6			39.5	
Turn Bay Length (m)		74.0			100.0			142.0			33.3	
Base Capacity (vph)		326			294			1642			2052	
Starvation Cap Reductn		0			0			334			0	
Spillback Cap Reductn		0			0			0			46	
Storage Cap Reductn		0			0			0			0	
Reduced v/c Ratio		1.14			0.52			1.01			0.51	
		1.14			0.52			1.01			0.01	
Intersection Summary												
Cycle Length: 130	,											
Actuated Cycle Length: 130		O-NIDT!	I C-CD	TI 04- 1	- ( 0							
Offset: 46 (35%), Reference	ea to phase	SINRIL 8	and 6:SB	L, Start	of Green							
Natural Cycle: 70	and a start											
Control Type: Actuated-Coo	ordinated											

### 2030 Future Total-PM Peak Hour 770-774 Bronson Ave

Maximum v/c Ratio: 1.14
Intersection Signal Delay: 39.8
Intersection LOS: D
Intersection Capacity Utilization 112.1%
ICU Level of Service H
Analysis Period (min) 15

Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

Queue shown is maximum after two cycles.

Splits and Phases: 3: Bronson Avenue & Powell Avenue

m Volume for 95th percentile queue is metered by upstream signal.



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 CGH Transportation

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Lanes, Volumes, Timings

2030 Future Total-PM Peak Hour 770-774 Bronson Ave

4: Bronson Avenue & Carling Avenue/Glebe Avenue

	•	۶	<b>→</b>	*	€	<b>←</b>	*	1	†	1	-	ļ
Lane Group	EBU	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT
Lane Configurations		ă	ર્ન	7				ሻሻ	ĵ»			<b>↑</b> ↑
Traffic Volume (vph)	2	305	133	793	0	0	0	504	1267	26	0	1054
Future Volume (vph)	2	305	133	793	0	0	0	504	1267	26	0	1054
Satd. Flow (prot)	0	1530	1587	1483	0	0	0	3216	1733	0	0	3257
Flt Permitted		0.950	0.980					0.950				
Satd. Flow (perm)	0	1387	1556	1406	0	0	0	3171	1733	0	0	3257
Satd. Flow (RTOR)				61					2			12
Lane Group Flow (vph)	0	215	225	793	0	0	0	504	1293	0	0	1158
Turn Type	Perm	Perm	NA	pm+ov				Prot	NA			NA
Protected Phases			4	5				5	2			6
Permitted Phases	4	4		4								
Detector Phase	4	4	4	5				5	2			6
Switch Phase												
Minimum Initial (s)	10.0	10.0	10.0	5.0				5.0	10.0			10.0
Minimum Split (s)	31.0	31.0	31.0	11.0				11.0	24.0			33.0
Total Split (s)	31.0	31.0	31.0	26.0				26.0	99.0			73.0
Total Split (%)	23.8%	23.8%	23.8%	20.0%				20.0%	76.2%			56.2%
Yellow Time (s)	3.3	3.3	3.3	3.3				3.3	3.3			3.3
All-Red Time (s)	2.7	2.7	2.7	2.7				2.7	2.7			2.7
Lost Time Adjust (s)		0.0	0.0	0.0				0.0	0.0			0.0
Total Lost Time (s)		6.0	6.0	6.0				6.0	6.0			6.0
Lead/Lag				Lead				Lead				Lag
Lead-Lag Optimize?				Yes				Yes				Yes
Recall Mode	None	None	None	Min				Min	C-Max			C-Max
Act Effct Green (s)		23.0	23.0	45.0				22.0	95.0			67.0
Actuated g/C Ratio		0.18	0.18	0.35				0.17	0.73			0.52
v/c Ratio		0.88	0.82	1.47				0.93	1.02			0.69
Control Delay		70.6	60.7	248.6				67.1	52.6			18.6
Queue Delay		0.0	0.0	0.0				0.0	19.5			0.2
Total Delay		70.6	60.7	248.6				67.1	72.1			18.7
LOS		Е	Е	F				Е	Е			В
Approach Delay			183.3						70.7			18.7
Approach LOS			F						Е			В
Queue Length 50th (m)		58.1	60.1	~209.4				~70.6	~266.1			62.3
Queue Length 95th (m)		m#84.4		m#267.0			n	n#103.5 r				m82.4
Internal Link Dist (m)			82.5			112.6			62.3			142.6
Turn Bay Length (m)								40.0				
Base Capacity (vph)		266	299	539				544	1267			1684
Starvation Cap Reductn		0	0	0				0	0			85
Spillback Cap Reductn		0	0	0				0	63			0
Storage Cap Reductn		0	0	0				0	0			0
Reduced v/c Ratio		0.81	0.75	1.47				0.93	1.07			0.72
Intersection Summary												
Cycle Length: 130												

Actuated Cycle Length: 130

Offset: 46 (35%), Referenced to phase 2:NBT and 6:SBT, Start of Green

Natural Cycle: 130

Control Type: Actuated-Coordinated

Lanes, Volumes, Timings

2030 Future Total-PM Peak Hour 770-774 Bronson Ave

4: Bronson Avenue & Carling Avenue/Glebe Avenue

	*
Lane Group	SBR
Laresconfigurations	
Traffic Volume (vph)	104
Future Volume (vph)	104
Satd. Flow (prot)	0
Flt Permitted	
Satd. Flow (perm)	0
Satd. Flow (RTOR)	
Lane Group Flow (vph)	0
Turn Type	
Protected Phases	
Permitted Phases	
Detector Phase	
Switch Phase	
Minimum Initial (s)	
Minimum Split (s)	
Total Split (s)	
Total Split (%)	
Yellow Time (s)	
All-Red Time (s)	
Lost Time Adjust (s)	
Total Lost Time (s)	
Lead/Lag	
Lead-Lag Optimize?	
Recall Mode	
Act Effct Green (s)	
Actuated g/C Ratio	
v/c Ratio	
Control Delay	
Queue Delay	
Total Delay	
LOS	
Approach Delay	
Approach LOS	
Queue Length 50th (m)	
Queue Length 95th (m)	
Internal Link Dist (m)	
Turn Bay Length (m)	
Base Capacity (vph)	
Starvation Cap Reductn	
Spillback Cap Reductn	
Storage Cap Reductn	
Reduced v/c Ratio	
Intersection Summary	

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Lanes, Volumes, Timings

2030 Future Total-PM Peak Hour 770-774 Bronson Ave

4: Bronson Avenue & Carling Avenue/Glebe Avenue

Maximum v/c Ratio: 1.47 Intersection Signal Delay: 89.5 Intersection LOS: F Intersection Capacity Utilization 99.1% Analysis Period (min) 15 ICU Level of Service F

- Volume exceeds capacity, queue is theoretically infinite.
   Queue shown is maximum after two cycles.

  # 95th percentile volume exceeds capacity, queue may be longer.

- Queue shown is maximum after two cycles.
- m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 4: Bronson Avenue & Carling Avenue/Glebe Avenue



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Lanes, Volumes, Timings 5: Bronson Avenue & Madawaska Drive/Fifth Avenue 2030 Future Total-PM Peak Hour 770-774 Bronson Ave

	<i>•</i>	-	*	1	←	•	1	<b>†</b>	1	-	Į.	4
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		4			4			414			414	
Traffic Volume (vph)	3	129	91	137	22	27	9	1646	27	19	1540	4
Future Volume (vph)	3	129	91	137	22	27	9	1646	27	19	1540	4
Satd. Flow (prot)	0	1520	0	0	1637	0	0	3305	0	0	3310	0
Flt Permitted		0.997			0.264			0.942			0.905	
Satd. Flow (perm)	0	1517	0	0	442	0	0	3113	0	0	2999	0
Satd. Flow (RTOR)		22			5			4			1	
Lane Group Flow (vph)	0	223	0	0	186	0	0	1682	0	0	1563	0
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2			6		
Detector Phase	4	4		8	8		2	2		6	6	
Switch Phase												
Minimum Initial (s)	10.0	10.0		10.0	10.0		10.0	10.0		10.0	10.0	
Minimum Split (s)	23.3	23.3		23.3	23.3		34.3	34.3		34.3	34.3	
Total Split (s)	24.0	24.0		24.0	24.0		106.0	106.0		106.0	106.0	
Total Split (%)	18.5%	18.5%		18.5%	18.5%		81.5%	81.5%		81.5%	81.5%	
Yellow Time (s)	3.3	3.3		3.3	3.3		3.3	3.3		3.3	3.3	
All-Red Time (s)	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)		5.3			5.3			5.3			5.3	
Lead/Lag												
Lead-Lag Optimize?												
Recall Mode	None	None		None	None		C-Max	C-Max		C-Max	C-Max	
Act Effct Green (s)		18.7			18.7			100.7			100.7	
Actuated q/C Ratio		0.14			0.14			0.77			0.77	
v/c Ratio		0.94			2.78			0.70			0.67	
Control Delay		94.7			859.7			9.1			7.0	
Queue Delay		0.0			0.0			0.0			0.0	
Total Delay		94.7			859.7			9.1			7.0	
LOS		F			F			Α			Α	
Approach Delay		94.7			859.7			9.1			7.0	
Approach LOS		F			F			Α			A	
Queue Length 50th (m)		52.1			~80.8			94.7			77.9	
Queue Length 95th (m)		#101.1			#128.3			115.2			m71.3	
Internal Link Dist (m)		190.1			132.1			94.8			305.9	
Turn Bay Length (m)												
Base Capacity (vph)		237			67			2412			2323	
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		0.94			2.78			0.70			0.67	
Intersection Summary												
Cycle Length: 130												
Actuated Cycle Length: 130												
Offset: 55 (42%) Reference	ed to phase	2·NRTI a	and 6:SRT	I Start	of Green							

Offset: 55 (42%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green Natural Cycle: 80
Control Type: Actuated-Coordinated

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Lanes, Volumes, Timings 5: Bronson Avenue & Madawaska Drive/Fifth Avenue 2030 Future Total-PM Peak Hour 770-774 Bronson Ave

Maximum v/c Ratio: 2.78	
Intersection Signal Delay: 56.7	Intersection LOS: E
Intersection Capacity Utilization 99.8%	ICU Level of Service F
Analysis Period (min) 15	
<ul> <li>Volume exceeds capacity, queue is theoretically infinite.</li> </ul>	
Queue shown is maximum after two cycles.	
# 95th percentile volume exceeds capacity, queue may be lon	ger.
Queue shown is maximum after two cycles.	
m Volume for 95th percentile queue is metered by upstream s	ignal.

Splits and Phases:	5: Bronson Avenue & Madawaska Drive/Fifth Avenue	
Ø2 (R)		<b>♣</b> <sub>Ø4</sub>
106 s		24 s
Ø6 (R)		<b>₩</b> Ø8

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HCM 95th %tile Q(veh)

Intersection			_		_	
Int Delay, s/veh	1.7					
iii Delay, Sivell						
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations		7	<b>↑</b>			<b>↑</b>
Traffic Vol, veh/h	0	14	41	0	0	17
Future Vol, veh/h	0	14	41	0	0	17
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-		-	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	0	14	41	0	0	17
Major/Minor	Minor1	N	/lajor1		Major2	
	-	41		-		
Conflicting Flow All Stage 1		41	0	-	-	-
	-			-	-	-
Stage 2	-		-	-	-	-
Critical Hdwy	-	6.22	-	-	-	
Critical Hdwy Stg 1	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-		-	-	-
Follow-up Hdwy		3.318	-	-	-	-
Pot Cap-1 Maneuver	0	1030	-	0	0	-
Stage 1	0	-	-	0	0	-
Stage 2	0	-	-	0	0	-
Platoon blocked, %			-			-
Mov Cap-1 Maneuver	-	1030	-	-	-	-
Mov Cap-2 Maneuver	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-
Approach	WB		NB		SB	
HCM Control Delay, s	8.5		0		0	
HCM LOS	0.5 A		U		U	
I IOW LOO						
Minor Lane/Major Mvm	ıt		VBLn1	SBT		
Capacity (veh/h)			1030	-		
HCM Lane V/C Ratio		-	0.014	-		
HCM Control Delay (s)		-	8.5	-		
HCM Lane LOS		-	Α	-		
HOMOSEL MUST OF LE			^			

Intersection						
Int Delay, s/veh	0.1					
**	• • • •					
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations		7		4₽	۴Þ	
Traffic Vol, veh/h	0	6	7		1599	19
Future Vol, veh/h	0	6	7	1806	1599	19
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	0	6	7	1806	1599	19
	- 0				.000	
	linor2		Major1		Major2	
Conflicting Flow All	-	809	1618	0	-	0
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-
Critical Hdwy	-	6.94	4.14	-	-	-
Critical Hdwy Stg 1	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-
Follow-up Hdwy	-	3.32	2.22	-	-	-
Pot Cap-1 Maneuver	0	323	399	-	-	-
Stage 1	0	-	-	-		-
Stage 2	0	-	-		-	
Platoon blocked, %	- 0					
Mov Cap-1 Maneuver	_	323	399		_	
Mov Cap-1 Maneuver		-	-	-		
Stage 1						
Stage 2					- 1	
Staye 2	-	-	-	-		-
Approach	EB		NB		SB	
HCM Control Delay, s	16.4		0.1		0	
HCM LOS	C					
	J					
Minor Lane/Major Mvmt		NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)		399	-	323	-	-
HCM Lane V/C Ratio		0.018	-	0.019	-	-
HCM Control Delay (s)		14.2	0	16.4	-	-
HCM Lane LOS		В	Α	С	-	-
HCM 95th %tile Q(veh)		0.1	-	0.1	_	_