# 112-134 Nelson Street Transportation Impact Assessment

Step 1 Screening Report
Step 2 Scoping Report
Step 3 Forecasting Report
Step 4 Strategy Report

# Prepared for:

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# 1 Screening

This study has been prepared according to the City of Ottawa's 2017 Transportation Impact Assessment (TIA) Guidelines. Accordingly, a Step 1 Screening Form has been prepared and is included as Appendix A, along with the Certification Form for the 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 site plan application.

# 2 Existing and Planned Conditions

# 2.1 Proposed Development

The existing site, zoned as Residential Fifth Density (R5B[2664] S421-h) and General Industrial (IG1 H(11)) presently contains a low-rise commercial building and surface parking lot on the 112 Nelson Street parcel, and a restaurant and rear surface lot on the 134 Nelson Street parcel, is proposed as being redeveloped with a nine-storey residential building comprising 421 dwelling units. Access to underground parking comprising 18 tenant vehicle spaces, 17 visitor vehicle spaces, five carshare spaces, nine scooter spaces, and 482 bicycle spaces is proposed via a full-movement access onto Nelson Street. The development is anticipated to be built out in a single phase by 2024.

Figure 1 illustrates the Study Area Context. Figure 2 illustrates the proposed concept plan.



Source: http://maps.ottawa.ca/geoOttawa/ Accessed: November 11, 2022





# 2.2 Existing Conditions

# 2.2.1 Area Road Network

King Edward Avenue: King Edward Avenue is a City of Ottawa arterial road with a divided six-lane urban cross-section to the north, and a divided four-lane urban cross-section to the south of Rideau Street, with sidewalks on both sides of the road. North of Rideau Street, the southbound curb lane is a shared cycling/transit priority lane during the PM peak period (3:30PM-5:30PM), and on-street parking is permitted on the west side of the road (no stopping 7:00AM-9:00AM & 3:00PM-5:30PM) and on the east side of the road (no stopping 3:30PM-5:30PM to the south and 7:00AM-9:00AM & 3:00PM-5:30PM to the north of York Street). The posted speed limit is 40 km/h, the Ottawa Official Plan reserves a 40.0- metre right of way north of Rideau Street, and the measured right of way is 20.0 metres south of Rideau Street. King Edward Avenue is a truck route.

*Rideau Street*: Rideau Street is a City of Ottawa arterial road with a four-lane urban cross-section with sidewalks on both sides of the road. Within the study area, the outside lanes are designated for transit, taxis, and cyclists during peak periods (7:00AM-9:00AM & 3:30-5:30PM) and on-street parking is permitted outside of these times. The posted speed limit is 40 km/h and the Ottawa Official Plan reserves a 30.0-metre right of way to the west and a 26.0-metre right of way to the east of King Edward Avenue. Rideau Street is a truck route.

Nelson Street: Nelson Street is a City of Ottawa local road with a two-lane urban cross-section with sidewalks on both sides of the road. South of Rideau Street, Nelson Street is discontinuous with only bicycle and pedestrian access permitted to Besserer Street. North of Rideau Street, on-street parking is permitted on the west side of the road along the 152 Nelson Street frontage and is permitted on the east side of the road between the Loblaws' truck access and Murray Street. On-street parking is also permitted on both sides of the road north of Murray Street and on the west side of the road south of Besserer Street. The unposted speed limit is assumed to be 50 km/h and the measured right of way is 18.5 metres to the north of Rideau Street and varies between 18.5 metres and 20.0 metres to the south of Rideau street.

*Friel Street*: Friel Street is a City of Ottawa local road with a two-lane urban cross-section with sidewalks on both sides of the road. On-street parking is permitted on the east side of the road north of Rideau Street, in two bays on the east side of the road between Rideau Street and Besserer Street, and on the west side of the road south of Besserer Street. The unposted speed limit is assumed to be 50 km/h and the measured right of way is 20.0 metres.

York Street: York Street is a City of Ottawa local road with a divided four-lane urban cross-section west of King Edward Avenue within the study area and with a two-lane urban cross-section to the east. Sidewalks are provided on both sides of the road. The unposted speed limit is assumed to be 50 km/h and the measured right of way is 38.0 metres to the west and is 20.0 metres to the east of King Edward Avenue.

# 2.2.2 Existing Intersections

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

York Street at King Edward Avenue

The intersection of York Street at King Edward Avenue is a signalized intersection. The northbound approach consists of an auxiliary left-turn lane, two through lanes, and a shared through/right-turn lane and the southbound approach consists of two through lanes and a shared through/right-turn lane that operates as a shared transit priority through/auxiliary right-turn lane weekdays from 3:00PM-5:30PM. The eastbound and westbound approaches each consist of a right-turn lane. Northbound U-turns, southbound left turns, and eastbound left turns and through movements are restricted and



directional measures furthermore prevent left turns and through movements on the eastbound approach.

York Street at Nelson Street

The intersection of York Street at Nelson is an all-way stop-controlled intersection. All approaches consist of a shared all-movements lane. Northbound left-turns and westbound through movements are restricted weekdays from 3:30PM-5:30PM, bicycles excepted.

Rideau Street at King Edward Avenue

The intersection of Rideau Street at King Edward Avenue is a signalized intersection. The northbound approach consists of two through lanes and an auxiliary right-turn lane, and the southbound approach consists of an auxiliary left-turn lane, two through lanes, and a right-turn lane. The eastbound approach consists of an auxiliary left-turn lane, a through lane, and a shared through/right-turn lane and the westbound approach consists of a through lane and a shared through/right-turn lane. The curb lanes on the eastbound and westbound approach operate as shared transit priority through/right-turn lanes weekdays from 7:00AM-9:00AM and 3:30-5:30PM. Northbound and westbound left turns are prohibited, and southbound and westbound right turns on red are prohibited from 7:00AM-7:00PM.

Rideau Street at Nelson Street

The intersection of Rideau Street at Nelson Street is a signalized intersection. The northbound and southbound approaches each consist of a shared all-movements lane. The eastbound and westbound approaches each consist of an auxiliary left-turn lane, a through lane, and a shared through/right-turn lane. The curb lanes on the eastbound and westbound approach operate as shared transit priority through/right-turn lanes weekdays from 7:00AM-9:00AM and 3:30-5:30PM. No turn restrictions were noted.

Rideau Street at Friel Street

The intersection of Rideau Street at Friel Street is a signalized intersection. The northbound and southbound approaches each consist of a shared all-movements lane. The eastbound and westbound approaches each consist of a shared left-turn/through lane, and a shared through/right-turn lane. The curb lanes on the eastbound and westbound approach operate as shared transit priority through/right-turn lanes weekdays from 7:00AM-9:00AM and 3:30-5:30PM. Eastbound and westbound left turns are restricted from 7:00AM-9:00AM, bicycles excepted.

# 2.2.3 Existing Driveways

Within 200 metres of the site access, driveways to a rear parking lot for a hotel, to a mid-rise residential building, to a paid parking lot and an auto garage, to single residences, and to a restaurant exist on the west side of Nelson Street. Two driveways to parking lots for attached housing, a driveway to a grocery store loading area and one to its underground parking exist on the east side of Nelson Street. South of Rideau Street, a driveway to a community health centre is on the east side of Nelson Street, and driveways to a restaurant and to low-rise residential land uses are present on the west side of the road.



On Rideau Street, within 200 metres of the site access, driveways to a hotel, and to a convenience store are present on the north side of the road, and driveways to a drug store, to detached commercial and restaurant land uses, to rear parking for a commercial strip, are present as well as an inlet to a restaurant on the south side of the road.

# 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 roadways. Cycling facilities include a curbed bike lane on Cumberland Street between Besserer Street and George Street and a bike lane on Stewart Street, Wilbrod Street, and St. Patrick Street.

St. Patrick Street, Murray Street, Stewart Street, Wilbrod Street, and Cumberland Street south of St. Andrew Street are spine routes. York Street, Beausoleil Drive, Laurier Street, Cumberland Street north of St. Andrew Street and Chapel Street are local routes. Stewart Street east of Cumberland Street, Wilbrod Street, and Cumberland Street south of Stewart Street are cross-town bikeways, and Cumberland Street north of Guigues Avenue is a neighbourhood bikeway.

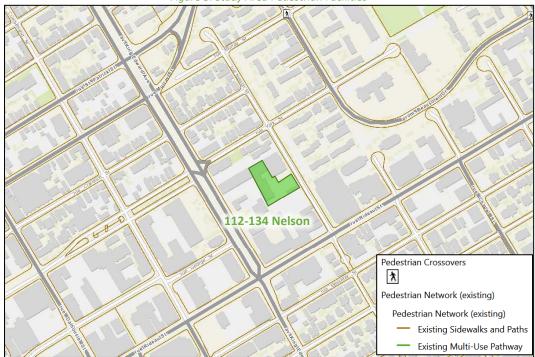
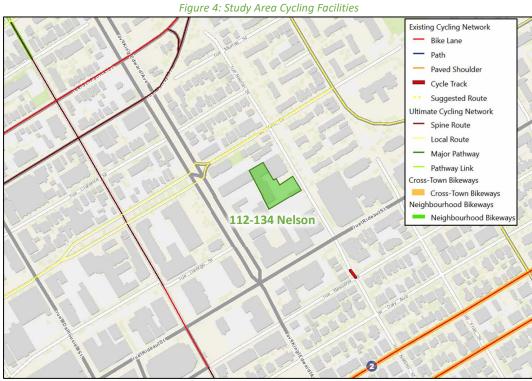


Figure 3: Study Area Pedestrian Facilities

Source: http://maps.ottawa.ca/geoOttawa/ Accessed: November 11, 2022





Source: <a href="http://maps.ottawa.ca/geoOttawa/">http://maps.ottawa.ca/geoOttawa/</a> Accessed: November 11, 2022

Pedestrian and cyclist volumes included in study area intersection counts, presented in Section 2.2.7, have been compiled and are illustrated in Figure 5 and Figure 6 respectively.

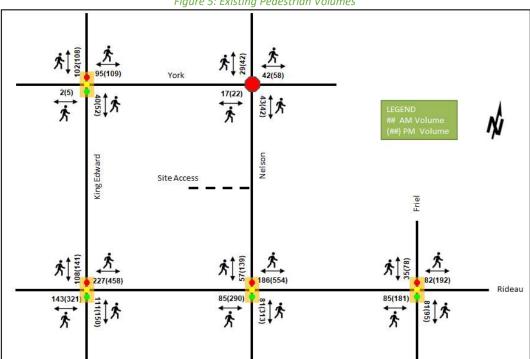


Figure 5: Existing Pedestrian Volumes



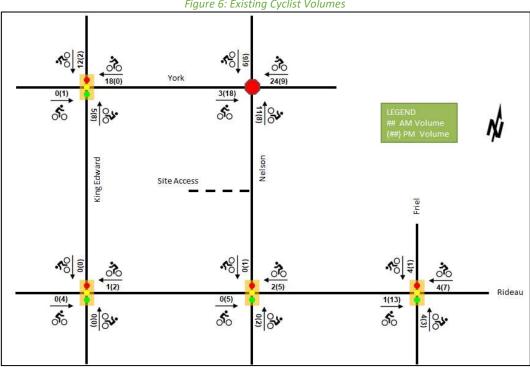


Figure 6: Existing Cyclist Volumes

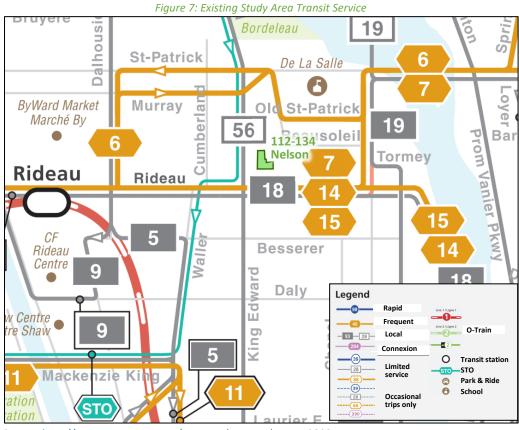
### 2.2.5 **Existing Transit**

Figure 7 illustrates the transit system map in the study area and Figure 8 illustrates nearby transit stops. All transit information is from November 11, 2022, and is included for general information purposes and context to the surrounding area.

Within the study area, the route #56 travels along King Edward Avenue, and the routes #7, #12, #14, #15, #17, and #18 travel along Rideau Street. The site lies just over 800 metres walking distance from the Rideau Station LRT terminal. The frequency of these routes within proximity of the proposed site based on November 11, 2022 service levels are:

- Route #7 5-10 minute service during the peak periods, and 15-30 minute during the off-peak times
- Route # 12 15-minute service all day
- Route # 14 15-minute daytime service, 30-minute service after 7:00PM
- Route # 15 5-10-minute service during the peak periods, and 15-30 minute during the off-peak times
- Route # 18 30-minute service all day
- Route #56 15-minute service in the peak period/direction, 30-minute service during the peak period in the off-peak direction





Source: <a href="http://www.octranspo.com/">http://www.octranspo.com/</a> Accessed: November 11, 2022



Source: <a href="http://maps.ottawa.ca/geoOttawa/">http://maps.ottawa.ca/geoOttawa/</a> Accessed: November 11, 2022



# 2.2.6 Existing Area Traffic Management Measures

Bulb-outs on local roads intersecting Rideau Street, on-road speed limit messaging pavement markings on King Edward Avenue, vehicular directional closures on York Street, and vehicle access closures on Nelson Street constitute the primary traffic management measures within the study area.

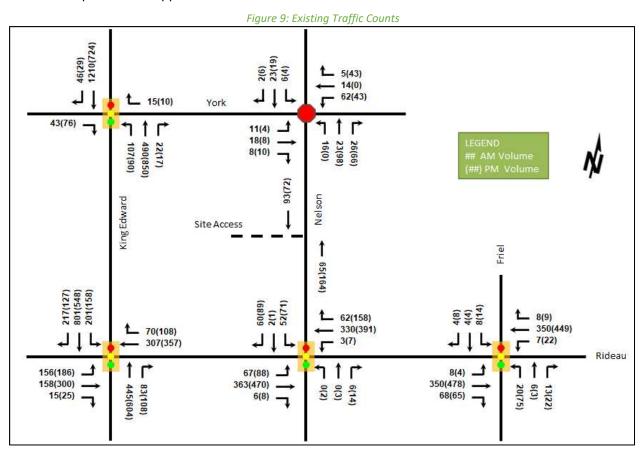
# 2.2.7 Existing Peak Hour Travel Demand

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

Table 1: Intersection Count Date		
Intersection	Count Date	
York Street at King Edward Avenue	Wednesday, September 21, 2016	
York Street at Nelson Street	Wednesday, September 21, 2016	
Rideau Street at King Edward Avenue	Tuesday, January 14, 2020	
Rideau Street at Nelson Street	Tuesday, January 14, 2020	
Rideau Street at Friel Street	Tuesday, May 9, 2017	

Table 1: Intersection Count Date

Figure 9 illustrates the existing traffic counts, balanced along King Edward Avenue, and Table 2 summarizes the existing intersection operations. Additionally, given the turn restrictions at the intersection of York Street and Nelson Street were not in effect at the time of the traffic counts, these volumes have been removed along York Street. 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.



C C G H TRANSPORTATION

Table 2: Existing Intersection Operations

Intercection	Lane		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>
	EBR	Α	0.03	0.0	0.0	Α	0.06	0.1	0.0
	WBR	Α	0.03	0.1	0.0	Α	0.02	0.1	0.0
York Street at King	NBL	Α	0.19	1.4	0.4	Α	0.13	0.8	0.4
Edward Avenue	NBT/R	Α	0.19	9.9	25.1	Α	0.33	11.3	44.9
Signalized	SBT(/R)†	Α	0.48	13.0	71.4	Α	0.39	12.2	59.1
-	SBR†	-	-	-	-	Α	0.05	2.8	3.5
	Overall	Α	0.39	11.2	-	Α	0.34	10.8	-
	EB	Α	0.05	7.4	0.8	Α	0.03	7.4	0.8
York Street at	WB	Α	0.11	7.8	3.0	Α	0.11	7.7	3.0
Nelson Street	NB	Α	0.08	7.4	2.3	Α	0.20	8.0	5.3
Unsignalized	SB	Α	0.04	7.5	0.8	Α	0.04	7.4	0.8
	Overall	Α	-	7.6	-	Α	-	7.8	-
	EBL	Α	0.48	43.0	53.9	В	0.66	52.6	66.4
	EBT/R	Α	0.10	9.1	13.1	Α	0.20	11.7	26.0
	WBT/R	Α	0.45	31.8	52.2	Α	0.58	34.5	66.0
Rideau Street at	NBT	В	0.61	40.5	66.9	В	0.70	39.2	87.6
King Edward	NBR	Α	0.28	2.2	0.0	Α	0.37	3.3	0.0
Avenue	SBL	D	0.84	68.5	#78.0	D	0.83	71.5	#61.2
Signalized	SBT	С	0.72	33.6	108.1	Α	0.46	25.7	65.4
	SBR	Α	0.36	12.6	35.8	Α	0.22	11.0	21.2
	Overall	С	0.71	33.4	-	С	0.79	31.9	-
	EBL	Α	0.15	8.5	10.9	Α	0.26	9.5	12.8
	EBT	Α	0.34	9.0	47.1	Α	0.50	12.8	70.8
	EBR	Α	0.01	0.0	0.0	Α	0.02	0.1	0.0
Rideau Street at	WBL	Α	0.01	6.7	m0.5	Α	0.03	10.3	m1.1
Nelson Street	WBT	Α	0.31	7.3	30.6	Α	0.50	12.9	39.8
Signalized	WBR	Α	0.11	1.9	3.1	Α	0.56	9.5	8.7
	NB	Α	0.01	0.0	0.0	Α	0.09	14.6	6.2
	SB	Α	0.38	16.2	20.9	В	0.63	29.2	#40.5
	Overall	Α	0.34	8.6	-	Α	0.59	14.2	-
	EBL/T	Α	0.36	5.1	11.3	Α	0.48	5.0	23.2
	EBR	Α	0.09	0.5	0.3	Α	0.13	0.9	m1.0
Rideau Street at	WBL/T	Α	0.36	10.4	50.9	Α	0.49	11.5	72.2
Friel Street	WBR	Α	0.01	0.0	0.0	Α	0.02	0.2	0.3
Signalized	NB	Α	0.12	16.2	10.2	A	0.41	28.5	27.8
-	SB	Α	0.05	17.6	5.7	Α	0.10	20.2	9.1
	Overall	A	0.30	7.6		A	0.46	9.8	

Queue is measured in metres

Peak Hour Factor = 0.90

m = metered queue

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

†Per Section 2.2.2, curb lane is a SBT/R during AM peak and a transit/right-turn lane during PM peak

During both the AM and PM peak hours, the study area intersections operate well as modelled. Extended queuing is noted on the southbound left movement during both peak hours at the intersection of Rideau Street and King Edward Avenue, and on the southbound movement at the intersection of Rideau Street and Nelson Street.

# 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 are 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	%
То	tal Collisions	77	100%
	Fatality	0	0%
Classification	Non-Fatal Injury	20	26%
	<b>Property Damage Only</b>	57	74%
	Approaching	1	1%
	Angle	11	14%
	Rear end	11	14%
Initial Impact	Sideswipe	14	18%
Type	<b>Turning Movement</b>	17	22%
	SMV Unattended	9	12%
	SMV Other	10	13%
	Other	4	5%
	Dry	57	74%
Road Surface	Wet	13	17%
Condition	Loose Snow	4	5%
Condition	Slush	1	1%
	Ice	2	3%
Pedestrian Involv	ed	7	9%
<b>Cyclists Involved</b>		3	4%

Figure 10: Study Area Collision Records





Table 4: Summary of Collision Locations, 2016-2020

	Number	%
Intersections / Segments	77	100%
Rideau St @ Nelson St	20	26%
Rideau St between Nelson St & Friel St	12	16%
York St @ King Edward Ave	11	14%
Rideau St between King Edward Ave & Nelson St	11	14%
Nelson St between York St & Rideau St	9	12%
King Edward Ave NB between York St & Rideau St	7	9%
King Edward Ave NB between Clarence St & York St	6	8%
York St between Turn Lane & Nelson St	1	1%

Within the study area, the intersection of Rideau Street at Nelson Street and the segments of Rideau Street between Nelson Street and Friel Street are noted to have experienced higher collisions than other locations. Table 5 and Table 6 summarize the collision types and conditions for each location.

Table 5: Rideau Street at Nelson Street Collision Summary

		Number	%
То	tal Collisions	20	100%
	Fatality	0	0%
Classification	Non-Fatal Injury	8	40%
	<b>Property Damage Only</b>	12	60%
	Angle	1	5%
	Rear end	2	10%
Initial Impact	Sideswipe	5	25%
Туре	<b>Turning Movement</b>	7	35%
	SMV Other	4	20%
	Other	1	5%
Road Surface	Dry	18	90%
Condition	Wet	2	10%
Pedestrian Involv	Pedestrian Involved		20%
<b>Cyclists Involved</b>		2	10%

The Rideau Street at Nelson Street intersection had a total of 20 collisions during the 2016-2020 time period, with 12 involving property damage only and the remaining eight having non-fatal injuries. The collision types are most represented by turning movement with seven collisions, followed by sideswipe with five, four as SMV (other), two as rear end and one each as angle and other. The City's Cycling Safety Review of High-Volume Intersections (March 2020) completed a review of this intersection for pedestrian and cycling-related observations and movements. The report suggested improvements such as the reduction of the skew on the west leg crosswalk and of the north-south horizontal offset, and the removal of the turn lanes for the inclusion of cycle tracks at the intersection, which may help address a variety of collisions noted at this intersection. Weather conditions do not affect collisions at this location. No further analysis and no local improvements are required as part of this study.



Table 6: Rideau Street between Nelson Street and Friel Street Collision Summary

		Number	%
To	otal Collisions	12	100%
	Fatality	0	0%
Classification	Non-Fatal Injury	3	25%
	<b>Property Damage Only</b>	9	75%
	Approaching	1	8%
	Rear end	2	17%
Initial Image at	Sideswipe	1	8%
Initial Impact Type	<b>Turning Movement</b>	3	25%
Туре	SMV Unattended	2	17%
	SMV Other	2	17%
	Other	1	8%
	Dry	5	42%
<b>Road Surface</b>	Wet	4	33%
Condition	Loose Snow	2	17%
	Ice	1	8%
Pedestrian Involv	Pedestrian Involved		8%
<b>Cyclists Involved</b>		0	0%

The segment of Rideau Street between Nelson Street and Friel Street had a total of 12 collisions during the 2016-2020 time period, with nine involving property damage only and the remaining three having non-fatal injuries. The collision types are most represented by turning movement with three collisions, followed by rear end, SMV (unattended), and SMV (other) with two each, and approaching, sideswipe and other with one each. No collision type is disproportionately represented in this time period. Weather conditions do not affect collisions at this location. No further collision review is required as part of this study.

# 2.3 Planned Conditions

### 2.3.1 Changes to the Area Transportation Network

The subject development is not within a CDP Area and no changes are listed within the Planned Construction Projects portal.

Within the Transportation Master Plan, the Rapid Transit and Transit Priority (RTTP) Network's Network Concept diagram shows a continuous measures transit priority corridor along King Edward Avenue north of Rideau Street, however it is not included in the Affordable Network. Both networks include a continuous measures transit priority corridor along Rideau Street and an isolated measures transit priority corridor along Murray Street and St. Patrick Street north of the study area.

# 2.3.2 Other Study Area Developments

# 261-277 King Edward Avenue, 260 Murray Street

The proposed development application includes a site plan for the construction of a mixed-use building comprising 23 residential dwelling units and 5,500 ft<sup>2</sup> of retail space. The expected build-out date is unknown, and the development is anticipated to generate only a marginal traffic increase. (Novatech, 2016)

# 216 Murray Street

The proposed development application includes a zoning by-law amendment to permit the construction of an eight-storey, 48-unit mixed-use supportive housing development. A memo is included with the application addressing development design elements only. (WSP, 2021)



### 250 Besserer Street

The proposed development application includes a site plan for the construction of a residential building comprising 99 units. The development is anticipated to be built out in 2021 and to generate 10 new AM and PM peak hour two-way auto trips. (CGH, 2019)

# 110 York Street, 137 George Street

The proposed development application includes a zoning by-law amendment to permit the expansion of a proposed hotel by 128 rooms. The development is anticipated to be built out in 2021 and to generate 31 new AM and 36 new PM peak hour two-way auto trips. (Novatech, 2018)

# 141 George Street

The proposed development application includes a site plan for a temporary surface parking lot. No TIA is available for this development.

### 78-80 Nelson Street, 253-257 York Street

The proposed development application includes a zoning by-law amendment to permit the construction of a four-storey addition and a three-storey addition to the two existing buildings on the properties. No TIA is available for this development.

# 197, 200, 201 Wilbrod Steet

The proposed development application a site plan for the construction of a four-storey building including a total of 19-units. No TIA is available for this development.

### 360 Friel Street

The proposed development application a site plan for construction of a three-storey addition (17 units) to the existing 2.5-storey residential building. No TIA is required for this development.

### 280 Laurier Avenue

The proposed development application a zoning by-law amendment and site plan for construction of a three-storey addition (18 units) to the existing building. No TIA is available for this development.

### 29 Russell Avenue

The proposed development application a zoning by-law amendment and site plan for construction of a three-storey addition (7 units) to the existing heritage building. No TIA is available for this development.

# 3 Study Area and Time Periods

# 3.1 Study Area

The study area will include the intersections of:

- York Street at:
  - King Edward Avenue
  - Nelson Street
- Rideau Street at:
  - King Edward Avenue
  - Nelson Street
  - o Friel Street

The boundary road will be Nelson Street, and TRANS Screenline SL37, while not reviewed within this report, is within proximity to the site along King Edward Avenue.



# 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 2024. As a result, the full build-out plus five years horizon year is 2029.

# 4 Exemption Review

Table 7 summarizes the exemptions for this TIA.

Table 7: Exemption Review

Module	Element	Explanation	Exempt/Required			
Design Review Compo	Design Review Component					
4.1 Development	4.1.2 Circulation and Access	Only required for site plans	Required			
Design	4.2.3 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	Required			
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			

# 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.



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

Tues al Manda	Multi-Unit (High-Rise)		
Travel Mode	AM	PM	
Auto Driver	26%	25%	
Auto Passenger	6%	8%	
Transit	28%	21%	
Cycling	5%	6%	
Walking	35%	40%	
Total	100%	100%	

The development is proposing only 18 vehicle spaces for tenants and 17 for visitors, thereby limiting the opportunity for auto trips. It proposes secure bicycle parking at one space per unit as Transportation Demand Management (TDM) measures. The development is also situated approximately 120 metres walk from Rideau Street which has a high density of supportive land uses, including a large grocery store at the corner of Rideau Street and Nelson Street, and continuous lanes transit priority connecting to Rideau Station on the Confederation LRT line which is additionally 850 metres-walk from the development. Given the foregoing, a unique mode share breakdown is additionally presented for the development. The modified mode share targets proposed for the development are summarized in Table 9.

Table 9: Proposed Development Mode Shares

Tubic 3.11ope	Tuble 9. Froposed Development Wode Shares				
Travel Mode	Multi-Unit (High-Rise)				
Travel Widde	AM	PM			
Auto Driver	17%	16%			
Auto Passenger	5%	7%			
Transit	33%	26%			
Cycling	5%	6%			
Walking	40%	45%			
Total	100%	100%			

# 5.2 Trip Generation

This TIA has been prepared using the vehicle and person trip rates for the residential dwellings using the TRANS Trip Generation Manual (2020). Table 10 summarizes the person trip rates for the proposed residential land uses for each peak period.

Table 10: Trip Generation Person Trip Rate in Peak Period

Land Use	Land Use Code	Peak	Person Trip Rates
Mariti Heit (High Dice)	221 & 222	AM	0.80
Multi-Unit (High-Rise)	(TRANS)	PM	0.90

Using the above person trip rates, the total person trip generation has been estimated. Table 11 summarizes the total person trip generation.

Table 11: Total Person Trip Generation

Land Has	l lucitor	Δ.	M Peak Perio	d	PM Peak Period		
Land Use	Units	In	Out	Total	In	Out	Total
Multi-Unit (High-Rise)	421	104	233	337	220	159	379



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 residential component. Table 12 summarizes the residential trip generation by mode and peak hour.

Table 12: Trip Generation by Mode

	AM Peak Hour						PM Peak Hour				
7	Fravel Mode	Mode Share	In	Out	Total	Mode Share	ln	Out	Total		
	Auto Driver	17%	9	19	28	16%	15	11	26		
ie (e)	Auto Passenger	5%	2	6	8	7%	7	5	12		
그 뜻	Transit	33%	19	42	61	26%	27	19	46		
Multi-Unit (High-Rise)	Cycling	5%	3	7	10	6%	6	5	11		
ΣΞ	Walking	40%	24	54	78	45%	51	37	89		
	Total	100%	57	128	184	100%	106	77	186		

As shown above, a total of 28 AM and 26 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 district residential travel patterns which were then 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	Inbound Via	<b>Outbound Via</b>
North	10%	King Edward Ave	King Edward Ave
South	40%	King Edward Ave	25% Rideau St(W), 15% Rideau St (E)
East	10%	Rideau St	Rideau St
West	40%	10% King Edward Ave (S), 30% Rideau St	Rideau St
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 11 illustrates the new site generated volumes.



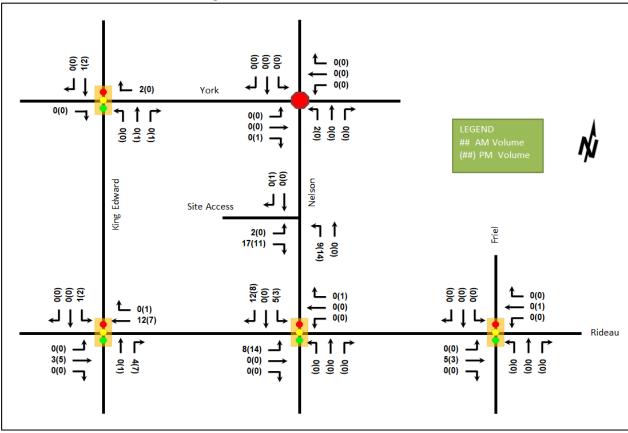


Figure 11: New Site Generation Auto Volumes

# 6 Background Network Travel Demands

# 6.1 Transportation Network Plans

The transportation network plans were discussed in Section 2.3. None of the projects listed are expected to occur within the TIA horizons or to have any notable impact on the study area traffic volumes and travel patterns.

# 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.

Direction Growth % from 2011 to 2031 Direction Growth % from 2011 to Existing Street **Eastbound** Westbound **Eastbound** Westbound Rideau St 0.61% 0.50% -4.49% -5.63% Northbound Southbound Northbound Southbound **King Edward Ave** 0.16% 0.53% -3.29% -5.65%

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

A review of the 2011 and 2031 TRANS model horizons anticipated that a slight increase in network volumes would be observed in the area. Noting discrepancy from these forecasted trends through the examination of the existing volumes, it was concluded that a comparison of the existing volumes to the TRANS 2011 horizon was required to determine the extent of the historic trends. The last columns of Table 14 summarize this growth, showing a



significant decrease in volumes on the study area arterials. As such, no background growth will be applied to the study area roadways.

# 6.3 Other Developments

As the only active files with TIAs and non-negligible traffic generation within the study area, the background developments explicitly considered in the background conditions (Section 6.2) include:

- 250 Besserer Street
- 110 York Street, 137 George Street

Both of these developments are anticipated to be completed prior to 2024 and are included in the background volumes in Section 7.1. The background development volumes within the study area have been provided in Appendix F.

# 7 Demand Rationalization

# 7.1 2024 and 2029 Future Background Operations

Figure 12 illustrates the 2024 and 2029 background volumes and Table 15 summarizes the 2024 and 2029 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 2024 and 2029 future background horizon are provided in Appendix G.

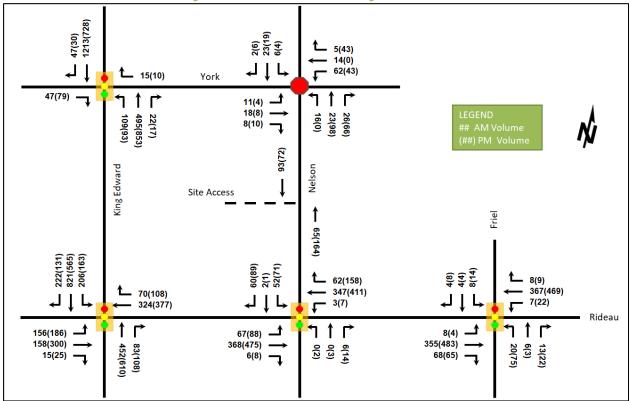


Figure 12: 2024 and 2029 Future Background Volumes



Table 15: 2024 and 2029 Future Background Intersection Operations

Intersection	Lane		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> )	
	EBR	Α	0.03	0.0	0.0	Α	0.05	0.1	0.0	
	WBR	Α	0.03	0.1	0.0	Α	0.02	0.1	0.0	
York Street at King Edward Avenue	NBL	Α	0.17	1.1	0.4	Α	0.11	0.7	0.3	
	NBT/R	Α	0.18	9.8	22.7	Α	0.30	11.0	39.9	
Signalized	SBT(/R)†	Α	0.43	12.4	62.4	Α	0.36	11.8	52.4	
	SBR†	-	-	-	-	Α	0.04	2.6	3.1	
	Overall	Α	0.35	10.7	-	Α	0.28	10.1	-	
	EB	Α	0.04	7.3	0.8	Α	0.03	7.3	0.8	
York Street at	WB	Α	0.10	7.8	2.3	Α	0.10	7.6	2.3	
Nelson Street	NB	Α	0.07	7.4	1.5	Α	0.18	7.8	4.5	
Unsignalized	SB	Α	0.04	7.4	0.8	Α	0.03	7.4	0.8	
onorginum_cu	Overall	Α	-	7.5	-	Α	-	7.7	-	
	EBL	Α	0.44	41.8	49.2	Α	0.59	49.6	60.0	
	EBT/R	Α	0.09	9.0	11.8	Α	0.18	11.5	23.4	
	WBT/R	Α	0.43	31.3	48.8	Α	0.54	33.6	61.3	
Rideau Street at	NBT	Α	0.56	39.3	61.0	В	0.63	37.4	78.7	
King Edward	NBR	Α	0.25	1.9	0.0	Α	0.34	2.8	0.0	
Avenue	SBL	С	0.74	55.3	#63.0	В	0.70	54.7	#48.4	
Signalized	SBT	В	0.66	32.0	97.7	Α	0.43	25.1	60.2	
	SBR	Α	0.33	12.3	32.8	Α	0.21	10.9	19.8	
	Overall	В	0.65	31.4	-	В	0.70	29.9	-	
	EBL	Α	0.12	8.1	9.6	Α	0.22	8.9	11.7	
	EBT	Α	0.31	8.7	42.2	Α	0.45	11.5	62.5	
	EBR	Α	0.01	0.0	0.0	Α	0.02	0.1	0.0	
Rideau Street at	WBL	Α	0.01	6.7	m0.6	Α	0.02	10.1	m1.0	
Nelson Street	WBT	Α	0.30	7.2	29.0	Α	0.48	12.6	37.4	
Signalized	WBR	Α	0.10	2.0	3.0	Α	0.50	8.0	7.6	
•	NB	Α	0.01	0.0	0.0	Α	0.08	15.1	5.9	
	SB	Α	0.35	15.9	19.3	Α	0.57	25.6	34.5	
	Overall	Α	0.31	8.4	-	Α	0.50	13.0	-	
	EBL/T	Α	0.33	4.8	9.6	Α	0.44	4.8	21.1	
	EBR	A	0.08	0.5	0.2	A	0.12	0.8	m0.8	
Rideau Street at	WBL/T	A	0.33	10.2	47.3	A	0.46	11.0	66.1	
Friel Street	WBR	A	0.01	0.0	0.0	A	0.02	0.1	0.1	
Signalized	NB	A	0.11	16.0	9.5	A	0.37	27.1	25.4	
- 9	SB	A	0.04	17.4	5.5	A	0.09	20.1	8.4	
	Overall	A	0.28	7.5	_	Δ	0.43	9.3		
Notes: Saturation flo	w rate of 1800 v		V.=0	7.0	Delay = averag	,,		3.5	1	

Queue is measured in metres

m = metered queue

Peak Hour Factor = 1.00

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

†Per Section 2.2.2, curb lane is a SBT/R during AM peak and a transit/right-turn lane during PM peak

During both peak hours, the study area intersections operate well and similarly to existing conditions. No capacity issues are noted.



# 7.2 Modal Share Sensitivity and Demand Rationalization Conclusions

Given that no capacity constraints have been identified within the study area, increases in site-generated traffic from forecasted through failure to meet the target mode shares are not anticipated to have to impact the study area intersections. Therefore, no rationalization for adjusted demand is required for this TIA.

# 8 Development Design

# 8.1 Design for Sustainable Modes

The proposed development is a residential building with the main entrance and parking garage entrance located on the Nelson Street frontage. A hard surface connection is proposed from the main entrance to the sidewalk on Nelson Street. Bicycles are proposed as accessing the parking garage ramp to three secure bicycle storage rooms on the parking level.

### 8.2 Circulation and Access

Garbage collection is proposed as taking place on Nelson Street, and emergency services are proposed as accessing the site via the Nelson Street frontage, without circulating the site parking facilities via the ramp.

# 9 Parking

# 9.1 Parking Supply

The site proposes 18 vehicle parking spaces for residents, 17 vehicle parking spaces for guests, five carshare spaces, nine scooter spaces, and 482 bicycle parking spaces, all located below ground. From the zoning by-law, the required parking for the proposed site is 164 vehicle spaces for tenants, 30 vehicle spaces for visitors and 211 bicycle spaces.

The proposed vehicle parking is under the by-law requirement of 194 and the reduced parking spaces will serve as a TDM measure for the site.

### 9.2 Spillover Parking

As the proposed parking provision is more than 15% below that prescribed by the by-law, spillover parking should be considered. The zoning by-law prescribes a total of 194 vehicle parking spaces and the site plan proposes 35 vehicle spaces excluding scooter and carshare spaces, leaving 159 spaces fewer than otherwise required.

### 9.2.1 Site Design and Tenant Factors

A number of mitigating factors are present within the proposed development, however, chief among them will be the composition of the tenancy, and the marketing of units as not to have access to parking. Another mitigating factor includes the site's context of being 120 metres-walk from Rideau Street, which includes a transit priority corridor and a high density of supportive land uses. Rideau Station on the Confederation LRT line is 850 metres-walk from the building entrance.

The building is marketed to prospective tenants who work in the market, attend school nearby, or generally have an urban lifestyle. Furthermore, making these prospective tenants aware that they will have no parking space early in the process of engagement will select for tenants who do not require regular use of a car, especially given over one bike parking space per unit is being provided, and the site's proximity to transit. Finally, five carshare spaces are being provided which may satisfy many tenants' occasional requirements for a vehicle. Overall, only a minority of prospective tenants with vehicles might proceed to lease a unit with no access to parking and, coupled with the low rate of personal auto access, the resultant overall potential for spillover parking will be low.



# 9.2.2 Local Area Parking Studies

Notwithstanding the site and tenant factors reducing the likelihood of spill over parking, a review the adjacent parking conditions and area parking studies was completed to gain an understanding of the residual capacity in the area. It is noted that no parking surveys could be completed during the current pandemic and a desktop review was completed.

On-street parking on Nelson Street, York Street east of Nelson Street, is restricted to one hour, and York Street is within a parking permitting area. On-street parking on York Street west of Nelson Street is restricted to two hours. On-street parking on King Edward Avenue is restricted to one hour on the east side with no stopping during the weekday PM peak period, and to three hours on the west side with no stopping during both weekday peak periods. On-street parking on Rideau Street is restricted to two hours, with no stopping during the weekday peak periods. Three-hour on-street parking is permitted on Murray Street east of King Edward Avenue.

The parking restrictions for all but Murray Street are considered to discourage their use as spillover parking for the site users. Furthermore, within the immediate site context, private paid off-street parking is available to the public within the Loblaws grocer across the street from the site, and within a surface lot that shares the north and much of the west property lines of the building.

No local area parking studies are available for the immediate project area but are available for several areas within 400 metres-walk of the site. The ByWard Market Local Area Parking Study (LAPS) was completed in 2011 for an area north of George Street and west of King Edward Avenue, and the Downtown Rideau Local Area Parking Study (LAPS) was completed in 2011 for an area south of George Street and west of King Edward Avenue. The Downtown Rideau LAPS found an average occupancy rate of 57%, a peak occupancy rate of 77%, and an average duration of 2.9 hours within its study area, notably with a peak on-street parking occupancy rate of over 100%. The Byward Market LAPS found an average occupancy rate of 61%, a peak occupancy rate of 84%, and an average duration of 3.0 hours within its study area, notably with a peak on-street parking occupancy rate of over 91%. Some residual parking capacity may be available to site-generated autos in the off-street parking facilities in these study areas.

Should the adjacent community remain concerned with the potential spillover parking, it is recommended through the public consultation process that further permitting areas can be created to assist in area enforcement or signed parking be modified to further restrict parking beyond the existing stipulations. It should be noted, however, that these measures are not without impact on the residents of the concerned community and should be considered when discussing with City Staff and the Ward Councillor.

# 10 Boundary Street Design

Table 16 summarizes the MMLOS analysis for the boundary streets of Nelson Street. 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" as the segment of Nelson Street analyzed is within this distance of York Street Public School. The MMLOS worksheets has been provided in Appendix H.

Table 16: Boundary Street MMLOS Analysis

Commont	Pedesti	Pedestrian LOS		le LOS	Transit LOS		Truck LOS	
Segment	PLOS	Target	BLOS	Target	TLOS	Target	TrLOS	Target
Nelson Street	С	Α	D	D	-	-	-	-

Nelson Street does not meet the pedestrian LOS targets given the high target set by the policy area of being within 300 metres of a school. To meet this target, a boulevard of 0.5-to-2.0 metres would need to be introduced within the cross-section. Given the relatively short site frontage of approximately 18.5 metres and the context of the



existing facilities, implementing this treatment would be considered inappropriate and the existing facilities are considered adequate.

# 11 Access Intersections Design

# 11.1 Location and Design of Access

The development proposes access to Nelson Street via a full-moves two-way access. The two-way access is proposed being approximately 6.7-metres-wide and proposes a 16% grade on the ramp. The outbound lane is proposed as being separated from the adjacent property line by approximately 1.4 metres.

From the private approach by-law, a setback of three metres from an adjacent property line is required, for which an exemption would be required.

# 11.2 Intersection Control

The site access is proposed as being stop-controlled on its approach with Nelson Street operating under free-flow conditions.

# 11.3 Access Intersection Design

# 11.3.1 2024 and 2029 Future Total Access Intersection Operations

The 2024 and 2029 future total intersection volumes are illustrated in Figure 13 and the access intersection operations are summarized below in Table 17. The level of service is based on HCM average delay for unsignalized intersections. The synchro worksheets have been provided in Appendix I.

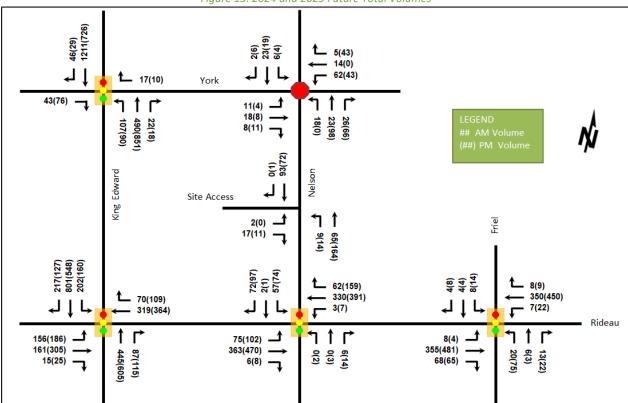


Figure 13: 2024 and 2029 Future Total Volumes



Table 17: 2024 and 2029 Future Total Access Intersection Operations

Interception	Lana		AM Pea	ak Hour			PM Pea	ak Hour	
Intersection	Lane	LOS	V/C	Delay	Q (95 <sup>th</sup> )	LOS	V/C	Delay	Q (95 <sup>th</sup> )
Cita Assess and	EBL/R	Α	0.02	8.9	0.8	Α	0.01	8.7	0.0
Site Access and	NBL/T	Α	0.01	7.4	0.0	Α	0.01	7.4	0.0
Nelson Street	SBT/R	-	-	-	-	-	-	-	-
Signalized	Overall	Α	-	1.3	-	Α	-	0.8	-

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 access intersection at the 2024 and 2029 future total horizon operates well. No capacity issues are noted.

### 11.3.2 Access Intersection MMLOS

As the access intersection is not signalized, no access intersection MMLOS analysis has been conducted.

# 11.3.3 Recommended Design Elements

The site would require an exemption to the private approach by-law based upon the distance from the driveway to the adjacent property line.

# 12 Transportation Demand Management

# 12.1 Context for TDM

The mode shares used within the TIA represent a shift from auto modes to transit and walking modes. Given the characteristics of the residents discussed within Section 9.2, the modal shares are likely to be achieved and supporting TDM measures should be provided to ensure this outcome.

The subject site is not within a design priority area and no age restrictions are noted. The total bedroom count within the development is 421 across 376 studio or one-bedroom units, eight two-bedroom units, and 37 threebedroom units.

# 12.2 Need and Opportunity

The subject site has been assumed to rely predominantly on active modes and transit based upon the proximity to supportive land uses and high order transit. The increase in these sustainable modes was additionally arrived at by the composition of the tenancy having a low level of access to personal auto travel. The study area intersections are anticipated to have residual capacity and the increase in sustainable modes is considered achievable.

# 12.3 TDM Program

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

- Display area walking, cycling, and transit maps with route schedules
- Provide a multimodal travel option information package to new residents
- Provide a permanent bicycle repair station adjacent to secure bicycle parking area
- Contract with provider to install on-site bikeshare (or other micromobility, e.g. scooter) station
- Contract with provider to install on-site carshare vehicles and promote their use by residents
- Inclusion of a 1-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 purchase or rental cost

# 13 Neighbourhood Traffic Management

The proposed development will connect to the arterial road network at Rideau Street via Nelson Street (a local road) and King Edward Avenue via Nelson Street and York Street (a local road) except during the PM peak hour where the outbound link is broken by turn restrictions. The TIA guidelines have outlined thresholds for two-way traffic on local and have been found to be too low for the purposes of this analysis. City Staff have noted that these thresholds are under review and will be updated in the future.

In general, York Street east of King Edward Street is anticipated to convey between 38 to 39 vehicles during the peak hours. Nelson Street north of Rideau Street is anticipated to convey between 268 to 436 vehicles during the peak hours, of which site traffic constitutes between 9.7% and 5.7% of volumes. No changes to the roadway classifications or proposed road network are resultant from the addition of site traffic.

# 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 18 summarizes the transit trip generation.

Table 18: Trip Generation by Transit Mode

Travel Mode	Mada Chara	Mode Share AM Peak Hour					r
Travel Mode	iviode Share	In	Out	Total	In	Out	Total
Transit	33% (26%)	19	42	61	27	19	46

The proposed development is anticipated to generate an additional 61 AM and 46 PM peak hour two-way transit trips. From the trip distribution found in section 5.3, these values can be further broken down. Table 19 summarizes forecasted site-generated transit ridership trips by direction and the equivalent bus loads.

Table 19: Forecasted Site-Generated Transit Ridership

rable 13. Forecasted Site Generated Transit Macisinp									
Divantian	AM Pe	ak Hour	PM Pe	eak Hour	Comico Turo	Approximate Equivalent Peak			
Direction	In	Out	In	Out	Service Type	Hour/Direction Bus Loads			
North	2	4	3	2	Bus	Negligible			
South	8	17	11	8	LRT, Bus	Half of a standard bus			
East	2	4	3	2	Bus	Negligible			
West	8	17	11	8	LRT, Bus	Half of a standard bus			

# 14.2 Transit Priority

The site does not propose a driveway onto the Rideau Street transit priority corridor. No delays or other impacts from site turning movements are anticipated to affect transit priority or transit level of service.

# 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 2024 and 2029 Future Total Network Intersection Operations

The 2024 and 2029 future total network intersection operations are summarized below in Table 20. 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 I.

Table 20: 2024 and 2029 Future Total Network Intersection Operations

				ak Hour	.work interset	PM Peak Hour			
Intersection	Lane	LOS	V/C	Delay	Q (95 <sup>th</sup> )	LOS	V/C	Delay	Q (95 <sup>th</sup> )
	EBR	Α	0.03	0.0	0.0	Α	0.05	0.1	0.0
	WBR	Α	0.03	0.1	0.0	Α	0.02	0.1	0.0
York Street at King	NBL	Α	0.17	1.1	0.4	Α	0.11	0.7	0.3
Edward Avenue	NBT/R	Α	0.18	9.8	22.5	Α	0.30	11.0	39.9
Signalized	SBT(/R)†	Α	0.43	12.4	62.1	Α	0.35	11.8	52.3
	SBR†	-	-	-	-	Α	0.04	2.5	3.1
	Overall	Α	0.35	10.7	-	Α	0.28	10.1	-
	EB	Α	0.08	7.4	1.5	Α	0.18	7.8	4.5
York Street at	WB	Α	0.04	7.3	0.8	Α	0.03	7.3	0.8
<b>Nelson Street</b>	NB	Α	0.10	7.8	2.3	Α	0.10	7.6	2.3
Unsignalized	SB	Α	0.04	7.4	0.8	Α	0.03	7.4	0.8
_	Overall	Α	-	7.5	-	Α	-	7.7	-
	EBL	Α	0.44	41.8	49.2	Α	0.59	49.6	60.0
	EBT/R	Α	0.10	9.1	12.1	Α	0.19	11.5	23.7
	WBT/R	Α	0.42	31.2	48.3	Α	0.53	33.4	59.7
Rideau Street at	NBT	Α	0.55	39.2	60.1	В	0.63	37.3	77.8
King Edward	NBR	Α	0.27	2.0	0.0	Α	0.37	3.4	0.0
Avenue	SBL	С	0.71	53.3	#59.9	В	0.68	53.0	#46.1
Signalized	SBT	В	0.65	31.5	94.6	Α	0.41	24.9	58.1
	SBR	Α	0.33	12.2	32.1	Α	0.21	10.9	19.2
	Overall	В	0.64	31.0	-	В	0.69	29.6	-
	EBL	Α	0.16	8.6	11.0	Α	0.26	9.4	13.2
	EBT	Α	0.34	9.1	41.4	Α	0.45	11.4	61.5
	EBR	Α	0.01	0.0	0.0	Α	0.02	0.1	0.0
Rideau Street at	WBL	Α	0.01	6.7	m0.5	Α	0.02	10.3	m1.1
<b>Nelson Street</b>	WBT	Α	0.31	7.6	27.8	Α	0.45	12.3	36.3
Signalized	WBR	Α	0.10	2.0	2.9	Α	0.53	8.8	7.4
	NB	Α	0.01	0.0	0.0	А	0.08	15.1	5.9
	SB	Α	0.39	15.7	20.9	В	0.63	28.3	#38.0
	Overall	Α	0.32	8.9	-	Α	0.51	13.4	-
	EBL/T	Α	0.33	5.0	10.3	А	0.44	4.8	21.5
	EBR	Α	0.09	0.5	0.3	Α	0.12	0.8	m0.7
Rideau Street at Friel Street Signalized	WBL/T	Α	0.32	10.0	44.9	Α	0.44	10.7	62.7
	WBR	Α	0.01	0.0	0.0	А	0.02	0.1	0.1
	NB	Α	0.11	16.0	9.5	Α	0.37	27.1	25.5
	SB	Α	0.04	17.4	5.5	А	0.09	20.1	8.4
	Overall	Α	0.27	7.4	-	Α	0.41	9.2	-

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

†Per Section 2.2.2, curb lane is a SBT/R during AM peak and a transit/right-turn lane during PM peak



During both the AM and PM peak hours, the study area intersections at the 2024 and 2029 future total horizon operate well and similarly to 2024 and 2029 future background conditions except for the southbound movement at the intersection of Rideau Street at Nelson Street, where the queue is expected to increase 3.5 metres compared to the background conditions.

A SimTraffic review was completed to examine queuing on the southbound movement at Rideau Street at Nelson Street during the PM peak hour at the 2024 and 2029 future total horizon. The 95th percentile queue length is forecasted to be 45.3 metres during the PM peak hour, which is shorter than the approximately 57-metre distance from this approach to the access intersection. SimTraffic reports are provided in Appendix K.

No mitigation for this condition is required based on site traffic.

### 15.2.2 Network Intersection MMLOS

Table 21 summarizes the MMLOS analysis for the network intersections of York Street at King Edward Avenue and Rideau Street at King Edward Avenue, Rideau Street at Nelson Street, and Rideau Street at Friel Street. The existing and future conditions for the intersections will be the same and are considered in one row. The intersection analysis is based on the land use designation "Central Area" for the intersections of York Street at King Edward Avenue and Rideau Street at King Edward Avenue, and on the policy area of "Within 300m of a school" for the intersections of Rideau Street at Nelson Street and Rideau Street at Friel Street, as each are within this distance of York Street Public School. The MMLOS worksheets has been provided in Appendix H.

**Pedestrian LOS Bicycle LOS Transit LOS** Truck LOS Auto LOS Intersection **PLOS Target BLOS** Target **TLOS Target TrLOS** Target **ALOS Target** York Street at King Α C Ε **Edward Avenue Rideau Street at King** F Α F D Ε С Α D В Ε **Edward Avenue** Rideau Street at Ē Α E D С C В Ε **Nelson Street Rideau Street at Friel** D D C C Α Ε Ε Α Street

Table 21: Study Area Intersection MMLOS Analysis

The MMLOS targets will not be met for the pedestrian and bicycle LOS at all study area intersections, and transit LOS at the intersection of Rideau Street and King Edward Avenue.

To meet pedestrian LOS targets, the maximum crossing distance on all pedestrian crossings would need to be reduced to two lane-widths.

Bicycle LOS is limited by the mixed-flow left-turn conditions and would require two-stage left turns or bike boxes on all approaches that permit left turns. Bicycle LOS is also limited by the mixed-flow right-turn conditions at the intersection of Rideau Street and King Edward Avenue, and would require separated facilities on the north and southbound approaches on King Edward Avenue.

Transit LOS at the intersection of Rideau Street and King Edward Avenue is limited by delays on the northbound, southbound and westbound approaches, which would need to be below 20 seconds to meet targets.

# 15.2.3 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 421 apartment units, 35 vehicle parking spaces, five carshare parking spaces and nine scooter spaces
- Accesses will be provided to Nelson Street via a full-moves access
- The development is proposed to be completed as a single phase by 2024
- The Trip Generation and Safety triggers were met for the TIA Screening
- This report supports a site plan application

# **Existing Conditions**

- King Edward Avenue and Rideau Street are arterial roads in the study area
- Sidewalks are provided on both sides of the study area roadways, a curbed bike lane is on Cumberland Street and bike lanes are on Stewart Street, Wilbrod Street, and St. Patrick Street
- St. Patrick Street, Murray Street, Stewart Street, Wilbrod Street, and Cumberland Street south of St. Andrew Street are spine routes. York Street, Beausoleil Drive, Laurier Street, Cumberland Street north of St. Andrew Street and Chapel Street are local routes. Stewart Street east of Cumberland Street, Wilbrod Street, and Cumberland Street south of Stewart Street are cross-town bikeways, and Cumberland Street north of Guigues Avenue is a neighbourhood bikeway
- The high volumes roadways have produced a high number of collisions at the study area intersections, primarily at the Rideau Street at Nelson Street intersection, which was studied as art of the City's Cycling Safety Review of High-Volume Intersections
- Some queueing is noted on the southbound left movement at the Rideau Street at King Edward Avenue intersection, but the study area intersections generally operate well

### **Development Generated Travel Demand**

- The proposed development is forecasted produce 184 two-way people trips during the AM peak hour and 186 two-way people trips during the PM peak hour
- Of the forecasted people trips, 28 two-way trips will be vehicle trips during the AM peak hour and 26 twoway trips will be vehicle trips during the PM peak hour
- Of the forecasted auto trips, 10% are anticipated to travel each north and east, and 40% to travel each
  west and south

### **Background Conditions**

- Through examining historical trends for the study area roadways, no growth was identified in or applied to the network
- The background developments were explicitly included in the background conditions
- All study area intersections will operate similarly to the existing conditions

### **Development Design**

- The bike and auto parking areas are to be located underground
- Pedestrian connections will be made from the building entrance to Nelson Street



 Emergency vehicles and garbage collection vehicles are anticipated to access the Nelson Street frontage, and not to circulate the site

# **Parking**

- 18 vehicle spaces for residents, 17 for visitors are proposed, along with five carshare spaces, nine scooter spaces, and 482 bicycle spaces
- Required tenant parking from the zoning by-law is not being met
- Mitigating factors such as the site context and access to transit and marketing the units as not having
  access to parking would select for tenants who do not rely on personal auto travel, and carshare is
  provided to enable occasional use of personal auto travel
- Off-street parking availability has been demonstrated within 400 metres-walk of the site, off-street private
  paid parking is available in close proximity to the site, and signed on-street parking in the neighbourhood
  is generally restricted to one or two hours
- Spillover parking is not anticipated to be an issue, but local residents can request permitting areas or further time restrictions to area parking if desirable

# **Boundary Street Design**

- The boundary streets will not meet the high pedestrian LOS targets for being within 300 metres of a school
- To meet targets, a boulevard would have to be introduced along the site's limited frontage which would be inconsistent with area facilities which are generally considered adequate, thus no improvements are recommended as part of this study

# **Access Intersections Design**

- A full-moves approximately 6.7-metre-wide two-way access with a 16% grade accessing the underground, is proposed 1.4 metres offset from the southern property line of the site's Nelson Street frontage
- The separation from the property line does not meet minimums from the private approach by-law
- The access intersection will be stop-controlled on the minor approach of the site driveway, with Nelson Street operating under free flow conditions
- Access intersection operations are forecast to be good at the future total horizons
- An exemption will need to be sought for the separation from the adjacent property line

### TDM

- To further support the reduced parking beyond the inherent function and context of the development, supportive TDM measures should be included as part of the development
- Supportive TDM measures to be included within the proposed development should include:
  - Display area walking, cycling, and transit maps with route schedules
  - o Provide a multimodal travel option information package to new residents
  - o Provide a permanent bicycle repair station adjacent to secure bicycle parking area
  - Contract with provider to install on-site bikeshare (or other micromobility, e.g. scooter) station
  - o Contract with provider to install on-site carshare vehicles and promote their use by residents
  - o Inclusion of a 1-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
  - o Unbundle parking cost from purchase or rental costs



### NTM

- York Street east of King Edward Street is anticipated to convey between 38 to 39 vehicles during the peak
  hours and Nelson Street north of Rideau Street is anticipated to convey between 268 to 436 vehicles
  during the peak hours, of which site traffic constitutes between 9.7% and 5.7% of volumes
- No changes to the roadway classifications or proposed road network are proposed for the site

# **Transit**

- The proposed development is anticipated to generate an additional 61 AM and 46 PM peak hour two-way transit trips
- Peak hour increases in transit ridership resulting from the site equate to half of a standard bus load southerly and westerly of the site, and negligible impact northerly and easterly of the site, a standard bus load of the site
- Transit priority is not anticipated to be affected by the development either via newly proposed driveways or from turning movements on the priority corridor

# **Network Intersection Design**

- Generally, the network intersections will operate similarly to the background conditions with the addition of site traffic
- The MMLOS targets will not be met for the pedestrian and cycling LOS at all study area intersections, and transit LOS at the intersection of Rideau Street at King Edward Avenue
- Pedestrian LOS targets cannot be met without reducing all study area crossings to two lane-widths and cycling LOS targets require left-turn configurations out of mixed flow for all permitted left turn movements and separated facilities for the northbound and southbound approaches at the intersection of Rideau Street at King Edward Avenue
- Transit LOS would require reduction in delay on the northbound southbound and westbound approaches at the intersection of Rideau Street at King Edward Avenue

# 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: 13-Oct-20
Project Number: 2020-88
Project Reference: 112 Nelson

1.1 Description of Proposed Development	
Municipal Address	112 Nelson Street
Description of Legation	L-shaped parcel fronting Nelson Street between
Description of Location	Rideau Street and York Street
Land Use Classification	R5 application approved 2018-07-11
Development Size	320 residential dwelling units
Accesses	One onto Nelson St
Phase of Development	Single
Buildout Year	2024
TIA Requirement	Full TIA Required

1.2 Trip Generation Trigger	
Land Use Type	Townhomes or apartments
Development Size	320 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	No
Development (TOD) zone?	No
Location Trigger	No

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?	NO	
Is the proposed driveway within the area of influence of an adjacent traffic		
signal or roundabout (i.e. within 300 m of intersection in rural conditions,	Yes	
or within 150 m of intersection in urban/ suburban conditions)?		
Is the proposed driveway within auxiliary lanes of an intersection?	No	
Does the proposed driveway make use of an existing median break that	No	
serves an existing site?	INO	
Is there is a documented history of traffic operations or safety concerns on	No	
the boundary streets within 500 m of the development?	INO	
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 (City)	this 20 day of September	, 2018
Name:	Andrew Harte (Places Print)	
Professional Title:	(Please Print)  Professional Engineer	
Signatura	of Individed Market that she shows four criteria	
Signature	of Individual certifier that s/he meets the above four criteria	

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



# Appendix B

**Turning Movement Counts** 





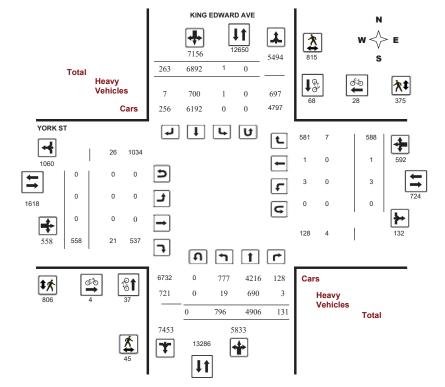
#### **Turning Movement Count - Study Results**

#### KING EDWARD AVE @ YORK ST

 Survey Date:
 Wednesday, September 21, 2016
 WO No:
 36337

 Start Time:
 07:00
 Device:
 Miovision

#### **Full Study Diagram**





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

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

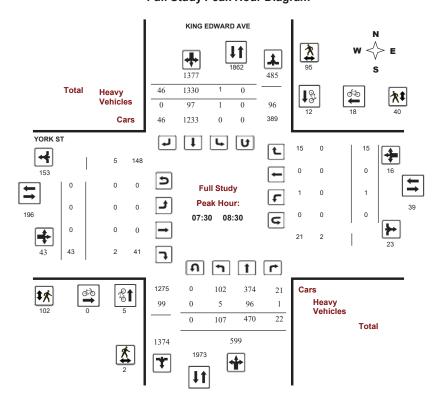
#### KING EDWARD AVE @ YORK ST

Survey Date: Wednesday, September 21, 2016 WO No:
Start Time: 07:00 Device:

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

36337

Miovision



March 22, 2021 Page 1 of 8 March 22, 2021 Page 2 of 8

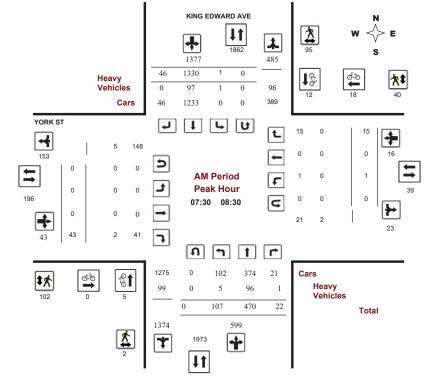


## **Turning Movement Count - Peak Hour Diagram**

#### KING EDWARD AVE @ YORK ST

 Survey Date:
 Wednesday, September 21, 2016
 WO No:
 36337

 Start Time:
 07:00
 Device:
 Miovision



Comments

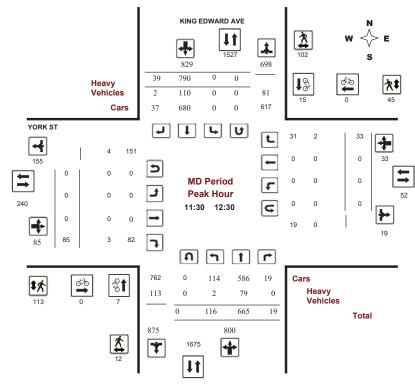


## **Transportation Services - Traffic Services**

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

#### KING EDWARD AVE @ YORK ST

Survey Date: Wednesday, September 21, 2016 WO No: 36337
Start Time: 07:00 Device: Miovision



Comments

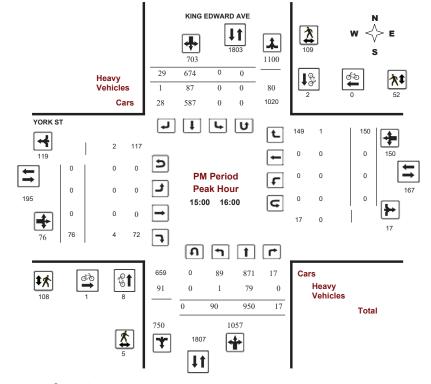


#### **Turning Movement Count - Peak Hour Diagram**

#### KING EDWARD AVE @ YORK ST

 Survey Date:
 Wednesday, September 21, 2016
 WO No:
 36337

 Start Time:
 07:00
 Device:
 Miovision



Comments



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

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

#### KING EDWARD AVE @ YORK ST

 Survey Date:
 Wednesday, September 21, 2016
 WO No:
 36337

 Start Time:
 07:00
 Device:
 Miovision

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

Survey Date: Wednesday, September 21, Total Observed U-Turns 2016 Northbound: 0 Southbound: 0

								10.0.00			Oout		. 0						
								Eastbou	nd: 0		Wes	tbound:	0				1.00		
		K	ING E	DWAF	RD AV	Έ						)	ORK S	ST					
	No	rthbou	nd		So	uthbou	ınd			Ea	astbo	und		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	Grand Tota
07:00 08:00	97	460	23	580	0	1200	30	1230	1810	0	0	40	40	1	0	10	11	51	1861
08:00 09:00	102	494	26	622	1	1203	51	1255	1877	0	0	40	40	0	0	18	18	58	1935
09:00 10:00	124	546	10	680	0	975	46	1021	1701	0	0	61	61	0	1	19	20	81	1782
11:30 12:30	116	665	19	800	0	790	39	829	1629	0	0	85	85	0	0	33	33	118	1747
12:30 13:30	127	640	12	779	0	782	19	801	1580	0	0	82	82	2	0	24	26	108	1688
15:00 16:00	90	950	17	1057	0	674	29	703	1760	0	0	76	76	0	0	150	150	226	1986
16:00 17:00	58	437	10	505	0	633	25	658	1163	0	0	91	91	0	0	185	185	276	1439
17:00 18:00	82	714	14	810	0	635	24	659	1469	0	0	83	83	0	0	149	149	232	1701
Sub Total	796	4906	131	5833	1	6892	263	7156	12989	0	0	558	558	3	1	588	592	1150	14139
U Turns	0			0	0			0	0	0			0	0			0	0	0
Total	796	4906	131	5833	1	6892	263	7156	12989	0	0	558	558	3	1	588	592	1150	14139
EQ 12Hr	1106	6819	182	8107	1	9580	366	9947	18054	0	0	776	776	4	1	817	822	1598	19652
Note: These	values a	re calcu	lated b	y multiply	ying the	e totals b	y the a	ppropria	te expans	ion facto	or.			1.39					
AVG 12Hr	1106	6819	182	8107	1	9580	366	9947	18054	0	0	776	776	4	1	817	822	1598	19652
Note: These	volumes	are cald	culated	by multip	olying t	he Equiv	alent 1	2 hr. tota	als by the	AADT fa	actor.			1.00					
AVG 24Hr	1449	8933	238	10620	1	12550	479	13030	23650	0	0	1017	1017	5	1	1070	1076	2093	25743
Note: These	volumes	are cal	culated	by multip	plying t	he Avera	age Da	ily 12 hr.	totals by	12 to 24	expan	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**

#### KING EDWARD AVE @ YORK ST

 Survey Date:
 Wednesday, September 21, 2016
 WO No:
 36337

 Start Time:
 07:00
 Device:
 Miovision

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

KING EDWARD AVE YORK ST

	N	orthbou	ınd		Sc	uthbou	nd			Е	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	18	123	2	143	0	262	6	268	411	0	0	5	5	0	0	2	2	7	418
07:15 07:30	21	93	6	120	0	268	6	274	394	0	0	8	8	0	0	1	1	9	403
07:30 07:45	32	114	8	154	0	311	9	320	474	0	0	18	18	1	0	4	5	23	497
07:45 08:00	26	130	7	163	0	359	9	368	531	0	0	9	9	0	0	3	3	12	543
08:00 08:15	28	120	4	152	0	351	10	361	513	0	0	12	12	0	0	3	3	15	528
08:15 08:30	21	106	3	130	1	309	18	328	458	0	0	4	4	0	0	5	5	9	467
08:30 08:45	25	126	12	163	0	275	8	283	446	0	0	14	14	0	0	6	6	20	466
08:45 09:00	28	142	7	177	0	268	15	283	460	0	0	10	10	0	0	4	4	14	474
09:00 09:15	36	130	2	168	0	250	18	268	436	0	0	9	9	0	1	5	6	15	451
09:15 09:30	39	139	2	180	0	253	8	261	441	0	0	17	17	0	0	3	3	20	461
09:30 09:45	28	136	2	166	0	246	12	258	424	0	0	17	17	0	0	6	6	23	447
09:45 10:00	21	141	4	166	0	226	8	234	400	0	0	18	18	0	0	5	5	23	423
11:30 11:45	30	212	5	247	0	186	11	197	444	0	0	18	18	0	0	13	13	31	475
11:45 12:00	37	139	5	181	0	187	11	198	379	0	0	26	26	0	0	12	12	38	417
12:00 12:15	31	162	3	196	0	195	11	206	402	0	0	19	19	0	0	3	3	22	424
12:15 12:30	18	152	6	176	0	222	6	228	404	0	0	22	22	0	0	5	5	27	431
12:30 12:45	25	134	5	164	0	212	2	214	378	0	0	21	21	2	0	5	7	28	406
12:45 13:00	29	163	1	193	0	198	8	206	399	0	0	22	22	0	0	7	7	29	428
13:00 13:15	45	175	1	221	0	173	2	175	396	0	0	29	29	0	0	6	6	35	431
13:15 13:30	28	168	5	201	0	199	7	206	407	0	0	10	10	0	0	6	6	16	423
15:00 15:15	19	227	5	251	0	192	9	201	452	0	0	21	21	0	0	28	28	49	501
15:15 15:30	27	249	3	279	0	167	9	176	455	0	0	20	20	0	0	32	32	52	507
15:30 15:45	20	219	4	243	0	149	8	157	400	0	0	19	19	0	0	43	43	62	462
15:45 16:00	24	255	5	284	0	166	3	169	453	0	0	16	16	0	0	47	47	63	516
16:00 16:15	24	147	4	175	0	126	6	132	307	0	0	29	29	0	0	44	44	73	380
16:15 16:30	9	107	3	119	0	178	8	186	305	0	0	27	27	0	0	49	49	76	381
16:30 16:45	14	117	2	133	0	157	7	164	297	0	0	15	15	0	0	59	59	74	371
16:45 17:00	11	66	1	78	0	172	4	176	254	0	0	20	20	0	0	33	33	53	307
17:00 17:15	15	148	2	165	0	183	7	190	355	0	0	28	28	0	0	56	56	84	439
17:15 17:30	19	143	3	165	0	161	6	167	332	0	0	19	19	0	0	37	37	56	388
17:30 17:45	25	222	3	250	0	140	3	143	393	0	0	14	14	0	0	32	32	46	439
17:45 18:00	23	201	6	230	0	151	8	159	389	0	0	22	22	0	0	24	24	46	435
Total:	796	4906	131	5833	1	6892	263	7156	12989	0	0	558	558	3	1	588	592	12989	14,139

Note: U-Turns are included in Totals.



## **Transportation Services - Traffic Services**

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

#### KING EDWARD AVE @ YORK ST

 Survey Date:
 Wednesday, September 21, 2016
 WO No:
 36337

 Start Time:
 07:00
 Device:
 Miovision

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

	KI	NG EDWARD A	VE	- <b>,</b>			
Time Period	Northbound	Southbound	Street Total	Eastbound	Westbound	Street Total	Grand Total
07:00 07:15	0	1	1	0	1	1	2
07:15 07:30	1	0	1	0	0	0	1
07:30 07:45	1	4	5	0	1	1	6
07:45 08:00	0	2	2	0	4	4	6
08:00 08:15	3	3	6	0	7	7	13
08:15 08:30	1	3	4	0	6	6	10
08:30 08:45	0	0	0	3	4	7	7
08:45 09:00	2	1	3	0	2	2	5
09:00 09:15	1	0	1	0	3	3	4
09:15 09:30	0	1	1	0	0	0	1
09:30 09:45	0	1	1	0	0	0	1
09:45 10:00	4	1	5	0	0	0	5
11:30 11:45	0	1	1	0	0	0	1
11:45 12:00	4	5	9	0	0	0	9
12:00 12:15	2	6	8	0	0	0	8
12:15 12:30	1	3	4	0	0	0	4
12:30 12:45	1	2	3	0	0	0	3
12:45 13:00	0	1	1	0	0	0	1
13:00 13:15	1	0	1	0	0	0	1
13:15 13:30	0	2	2	0	0	0	2
15:00 15:15	3	0	3	1	0	1	4
15:15 15:30	0	0	0	0	0	0	0
15:30 15:45	2	1	3	0	0	0	3
15:45 16:00	3	1	4	0	0	0	4
16:00 16:15	2	5	7	0	0	0	7
16:15 16:30	1	1	2	0	0	0	2
16:30 16:45	1	3	4	0	0	0	4
16:45 17:00	0	3	3	0	0	0	3
17:00 17:15	0	6	6	0	0	0	6
17:15 17:30	1	5	6	0	0	0	6
17:30 17:45	0	4	4	0	0	0	4
17:45 18:00	2	2	4	0	0	0	4
Total	37	68	105	4	28	32	137

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

#### KING EDWARD AVE @ YORK ST

 Survey Date:
 Wednesday, September 21, 2016
 WO No:
 36337

 Start Time:
 07:00
 Device:
 Miovision

## **Full Study Pedestrian Volume**

KING EDWARD AVE YORK ST

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	2	15	17	11	7	18	35
07:15 07:30	0	17	17	17	4	21	38
07:30 07:45	0	21	21	19	4	23	44
07:45 08:00	0	28	28	19	8	27	55
08:00 08:15	0	21	21	38	16	54	75
08:15 08:30	2	25	27	26	12	38	65
08:30 08:45	1	15	16	30	8	38	54
08:45 09:00	1	21	22	17	9	26	48
09:00 09:15	0	16	16	17	8	25	41
09:15 09:30	4	19	23	26	15	41	64
09:30 09:45	1	15	16	15	10	25	41
09:45 10:00	1	15	16	14	14	28	44
11:30 11:45	4	21	25	29	12	41	66
11:45 12:00	2	29	31	29	10	39	70
12:00 12:15	1	21	22	23	14	37	59
12:15 12:30	5	31	36	32	9	41	77
12:30 12:45	2	21	23	41	18	59	82
12:45 13:00	9	30	39	34	9	43	82
13:00 13:15	0	25	25	19	8	27	52
13:15 13:30	1	20	21	12	14	26	47
15:00 15:15	1	27	28	25	9	34	62
15:15 15:30	0	21	21	27	14	41	62
15:30 15:45	0	35	35	24	15	39	74
15:45 16:00	4	26	30	32	14	46	76
16:00 16:15	1	29	30	27	7	34	64
16:15 16:30	0	35	35	25	14	39	74
16:30 16:45	0	29	29	33	10	43	72
16:45 17:00	1	29	30	29	19	48	78
17:00 17:15	0	43	43	41	18	59	102
17:15 17:30	0	35	35	18	10	28	63
17:30 17:45	0	37	37	25	18	43	80
17:45 18:00	2	43	45	32	18	50	95
Total	45	815	860	806	375	1181	2041



## **Transportation Services - Traffic Services**

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

#### KING EDWARD AVE @ YORK ST

 Survey Date:
 Wednesday, September 21, 2016
 WO No:
 36337

 Start Time:
 07:00
 Device:
 Miovision

#### **Full Study Heavy Vehicles**

KING EDWARD AVE YORK ST

	N	orthbo	und		Sc	outhbou	ınd			Е	astbour	nd		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	27	0	27	0	11	0	11	38	0	0	0	0	0	0	0	0	0	38
07:15 07:30	4	28	0	32	0	20	0	20	52	0	0	1	1	0	0	0	0	1	53
07:30 07:45	1	16	1	18	0	27	0	27	45	0	0	1	1	0	0	0	0	1	46
07:45 08:00	1	29	0	30	0	23	0	23	53	0	0	0	0	0	0	0	0	0	53
08:00 08:15	3	29	0	32	0	25	0	25	57	0	0	1	1	0	0	0	0	1	58
08:15 08:30	0	22	0	22	1	22	0	23	45	0	0	0	0	0	0	0	0	0	45
08:30 08:45	0	31	0	31	0	24	0	24	55	0	0	0	0	0	0	0	0	0	55
08:45 09:00	0	43	0	43	0	32	0	32	75	0	0	0	0	0	0	0	0	0	75
09:00 09:15	2	30	0	32	0	26	1	27	59	0	0	0	0	0	0	0	0	0	59
09:15 09:30	2	33	0	35	0	23	1	24	59	0	0	1	1	0	0	0	0	1	60
09:30 09:45	0	32	0	32	0	31	0	31	63	0	0	1	1	0	0	0	0	1	64
09:45 10:00	0	31	1	32	0	30	0	30	62	0	0	2	2	0	0	0	0	2	64
11:30 11:45	2	24	0	26	0	30	1	31	57	0	0	1	1	0	0	0	0	1	58
11:45 12:00	0	16	0	16	0	27	0	27	43	0	0	0	0	0	0	2	2	2	45
12:00 12:15	0	19	0	19	0	29	0	29	48	0	0	0	0	0	0	0	0	0	48
12:15 12:30	0	20	0	20	0	24	1	25	45	0	0	2	2	0	0	0	0	2	47
12:30 12:45	0	19	0	19	0	28	0	28	47	0	0	0	0	0	0	0	0	0	47
12:45 13:00	1	20	0	21	0	22	1	23	44	0	0	0	0	0	0	0	0	0	44
13:00 13:15	2	24	0	26	0	21	0	21	47	0	0	1	1	0	0	0	0	1	48
13:15 13:30	0	19	0	19	0	28	1	29	48	0	0	0	0	0	0	0	0	0	48
15:00 15:15	0	16	0	16	0	23	0	23	39	0	0	1	1	0	0	0	0	1	40
15:15 15:30	1	21	0	22	0	23	1	24	46	0	0	0	0	0	0	0	0	0	46
15:30 15:45	0	23	0	23	0	19	0	19	42	0	0	1	1	0	0	1	1	2	44
15:45 16:00	0	19	0	19	0	22	0	22	41	0	0	2	2	0	0	0	0	2	43
16:00 16:15	0	8	1	9	0	13	0	13	22	0	0	0	0	0	0	0	0	0	22
16:15 16:30	0	10	0	10	0	13	0	13	23	0	0	2	2	0	0	0	0	2	25
16:30 16:45	0	7	0	7	0	18	0	18	25	0	0	0	0	0	0	0	0	0	25
16:45 17:00	0	9	0	9	0	15	0	15	24	0	0	0	0	0	0	1	1	1	25
17:00 17:15	0	18	0	18	0	9	0	9	27	0	0	3	3	0	0	0	0	3	30
17:15 17:30	0	12	0	12	0	16	0	16	28	0	0	0	0	0	0	1	1	1	29
17:30 17:45	0	15	0	15	0	13	0	13	28	0	0	1	1	0	0	2	2	3	31
17:45 18:00	0	20	0	20	0	13	0	13	33	0	0	0	0	0	0	0	0	0	33
Total: None	19	690	3	712	1	700	7	708	1420	0	0	21	21	0	0	7	7	28	1,448

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

#### KING EDWARD AVE @ YORK ST

Survey Date: Wednesday, September 21, 2016 WO No: 36337 Start Time: 07:00 Device: Miovision

#### **Full Study 15 Minute U-Turn Total** KING EDWARD AVE YORK ST

		KING EDWAI	ND AVE		OKKO	
Time	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
T	otal	0	0	0	0	0



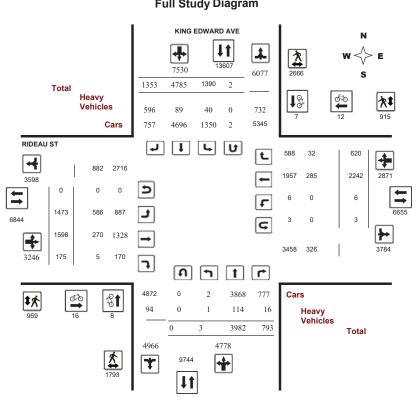
## **Transportation Services - Traffic Services**

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

## KING EDWARD AVE @ RIDEAU ST

Survey Date: Tuesday, January 14, 2020 WO No: 39318 Start Time: 07:00 Device: Miovision

#### **Full Study Diagram**



5470795 - TUE JAN 14, 2020 - 8HRS - LORETTA

March 22, 2021 March 22, 2021 Page 1 of 8 Page 8 of 8



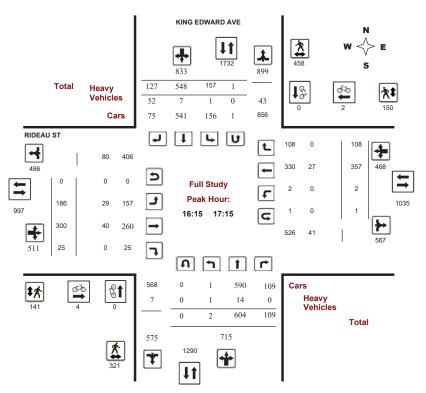
#### **Turning Movement Count - Study Results**

#### KING EDWARD AVE @ RIDEAU ST

 Survey Date:
 Tuesday, January 14, 2020
 WO No:
 39318

 Start Time:
 07:00
 Device:
 Miovision

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



5470795 - TUE JAN 14, 2020 - 8HRS - LORETTA



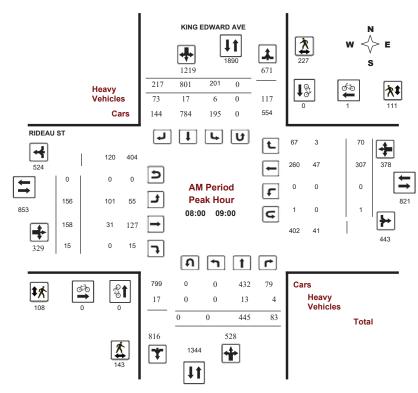
## **Transportation Services - Traffic Services**

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

#### KING EDWARD AVE @ RIDEAU ST

 Survey Date:
 Tuesday, January 14, 2020
 WO No:
 39318

 Start Time:
 07:00
 Device:
 Miovision



Comments 5470795 - TUE JAN 14, 2020 - 8HRS - LORETTA

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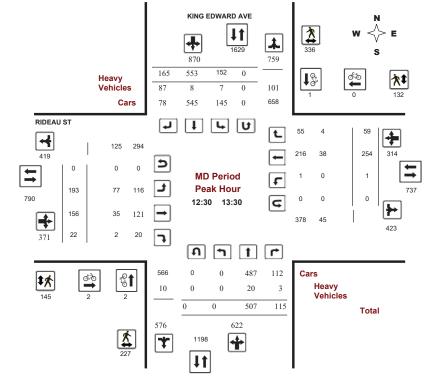


## **Turning Movement Count - Peak Hour Diagram**

#### KING EDWARD AVE @ RIDEAU ST

 Survey Date:
 Tuesday, January 14, 2020
 WO No:
 39318

 Start Time:
 07:00
 Device:
 Miovision



**Comments** 5470795 - TUE JAN 14, 2020 - 8HRS - LORETTA



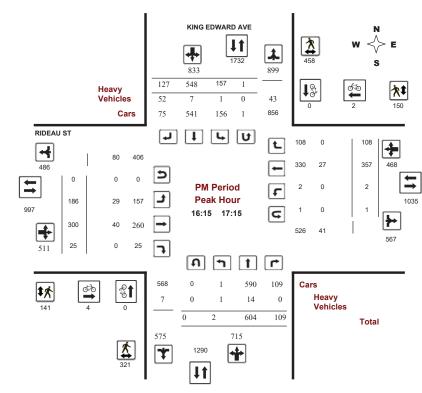
## **Transportation Services - Traffic Services**

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

#### KING EDWARD AVE @ RIDEAU ST

 Survey Date:
 Tuesday, January 14, 2020
 WO No:
 39318

 Start Time:
 07:00
 Device:
 Miovision



Comments 5470795 - TUE JAN 14, 2020 - 8HRS - LORETTA



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

#### KING EDWARD AVE @ RIDEAU ST

 Survey Date:
 Tuesday, January 14, 2020
 WO No:
 39318

 Start Time:
 07:00
 Device:
 Miovision

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

Survey Date: Tuesday, January 14, 2020 Total Observed U-Turns

Northbound: 0 Southbound: 2

Northbound: 0 Southbound: 2 1.10
Eastbound: 0 Westbound: 3

		K	ING E	DWAF	RD AV	E						R	IDEAU	ST					
	No	rthbou	ınd		So	uthbou	und		_	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	0	351	67	418	235	768	204	1207	1625	155	140	21	316	0	207	58	265	581	2206
08:00 09:00	0	445	83	528	201	801	217	1219	1747	156	158	15	329	0	307	70	377	706	2453
09:00 10:00	0	365	102	467	198	767	185	1150	1617	175	170	19	364	2	212	66	280	644	2261
11:30 12:30	1	425	100	526	152	453	153	758	1284	183	159	33	375	0	261	74	335	710	1994
12:30 13:30	0	507	115	622	152	553	165	870	1492	193	156	22	371	1	254	59	314	685	2177
15:00 16:00	0	607	110	717	147	454	140	741	1458	209	243	22	474	1	322	91	414	888	2346
16:00 17:00	1	624	107	732	159	483	127	769	1501	198	297	24	519	0	370	111	481	1000	2501
17:00 18:00	1	658	109	768	146	506	162	814	1582	204	275	19	498	2	309	91	402	900	2482
Sub Total	3	3982	793	4778	1390	4785	1353	7528	12306	1473	1598	175	3246	6	2242	620	2868	6114	18420
U Turns	0			0	2			2	2	0			0	3			3	3	5
Total	3	3982	793	4778	1392	4785	1353	7530	12308	1473	1598	175	3246	9	2242	620	2871	6117	18425
EQ 12Hr	4	5535	1102	6641	1935	6651	1881	10467	17108	2047	2221	243	4511	13	3116	862	3991	8502	25610
Note: These v	alues a	re calcu	ılated b	y multipl	ying the	totals b	y the a	ppropria	te expans	sion fac	tor.			1.39					
AVG 12Hr	4	6089	1212	7305	2128	7316	2069	11513	18818	2252	2443	267	4962	14	3428	948	4390	9352	28170
Note: These v	olumes	are cal	culated	by mult	iplying tl	he Equiv	valent 1	2 hr. tota	als by the	AADT	factor.			1.10					
AVG 24Hr	5	7977	1588	9570	2788	9584	2710	15082	24652	2950	3200	350	6500	18	4491	1242	5751	12251	36903
Note: These v	olumes	are cal	culated	by mult	iplying tl	he Avera	age Dai	ily 12 hr.	totals by	12 to 2	4 expans	sion fac	ctor.	1.31					

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



## **Transportation Services - Traffic Services**

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

#### KING EDWARD AVE @ RIDEAU ST

 Survey Date:
 Tuesday, January 14, 2020
 WO No:
 39318

 Start Time:
 07:00
 Device:
 Miovision

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

KING EDWARD AVE RIDEAU ST

		N	orthbo	und		Sc	uthbou	nd		Eastbound					Westbound					
Time Pe	eriod	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	79	12	91	59	198	49	306	397	38	29	6	73	0	36	16	52	125	522
07:15	07:30	0	92	17	109	54	179	50	283	392	41	33	4	78	0	45	10	55	133	525
07:30	07:45	0	75	20	95	66	186	49	301	396	38	40	6	84	0	64	15	79	163	559
07:45	08:00	0	105	18	123	56	205	56	317	440	38	38	5	81	0	62	17	79	160	600
08:00	08:15	0	103	17	120	49	214	51	314	434	41	36	7	84	0	81	15	96	180	614
08:15	08:30	0	103	15	118	55	217	51	323	441	33	37	5	75	0	81	18	99	174	615
08:30	08:45	0	117	24	141	54	168	63	285	426	32	40	2	74	1	72	22	95	169	595
08:45	09:00	0	122	27	149	43	202	52	297	446	50	45	1	96	0	73	15	88	184	630
09:00	09:15	0	107	26	133	54	197	38	289	422	41	34	6	81	1	60	17	78	159	581
09:15	09:30	0	78	26	104	50	184	45	279	383	42	46	5	93	2	61	13	76	169	552
09:30	09:45	0	77	30	107	49	202	55	306	413	50	42	2	94	0	47	22	69	163	576
09:45 1	10:00	0	103	20	123	45	184	47	276	399	42	48	6	96	0	44	14	58	154	553
11:30 1	11:45	0	120	24	144	44	99	35	178	322	44	41	6	91	0	73	22	95	186	508
11:45 1	12:00	1	112	27	140	41	106	40	187	327	38	36	6	80	0	61	16	77	157	484
12:00 1	12:15	0	102	25	127	34	111	38	183	310	50	43	12	105	0	65	20	85	190	500
12:15 1	12:30	0	91	24	115	33	137	40	210	325	51	39	9	99	0	62	16	78	177	502
12:30 1	12:45	0	135	24	159	38	173	43	254	413	51	30	4	85	1	55	10	66	151	564
12:45 1	13:00	0	135	18	153	32	152	43	227	380	50	38	9	97	0	64	12	76	173	553
13:00 1	13:15	0	125	38	163	40	118	45	203	366	50	34	4	88	0	61	20	81	169	535
13:15 1	13:30	0	112	35	147	42	110	34	186	333	42	54	5	101	0	74	17	91	192	525
15:00 1	15:15	0	146	33	179	40	111	42	193	372	54	54	2	110	0	78	23	101	211	583
15:15 1	15:30	0	135	27	162	39	113	40	192	354	50	65	6	121	0	68	24	92	213	567
15:30 1	15:45	0	165	24	189	36	108	25	169	358	53	54	8	115	1	81	22	104	219	577
15:45 1	16:00	0	161	26	187	32	122	33	187	374	52	70	6	128	0	95	22	117	245	619
16:00 1	16:15	0	185	29	214	40	100	36	176	390	49	64	4	117	0	91	24	115	232	622
16:15 1	16:30	0	134	17	151	37	111	36	184	335	62	81	4	147	0	102	31	133	280	615
16:30 1	16:45	1	154	31	186	41	121	28	190	376	46	73	12	131	0	83	27	110	241	617
16:45 1	17:00	0	151	30	181	41	151	27	219	400	41	79	4	124	1	94	29	124	248	648
17:00 1	17:15	1	165	31	197	39	165	36	240	437	37	67	5	109	2	78	21	101	210	647
17:15 1	17:30	0	147	22	169	32	116	37	185	354	49	67	3	119	0	78	23	101	220	574
17:30 1	17:45	0	163	31	194	43	100	49	192	386	62	69	5	136	0	83	25	108	244	630
17:45 1	18:00	0	183	25	208	34	125	40	199	407	56	72	6	134	0	70	22	92	226	633
Total:		3	3982	793	4778	1392	4785	1353	7530	12308	1473	1598	175	3246	9	2242	620	2871	12308	18,425
			•		•													•		

Note: U-Turns are included in Totals.

March 22, 2021 Page 3 of 8 March 22, 2021 Page 4 of 8



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

#### KING EDWARD AVE @ RIDEAU ST

 Survey Date:
 Tuesday, January 14, 2020
 WO No:
 39318

 Start Time:
 07:00
 Device:
 Miovision

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

			. an otaay	<b>- J - - - - - - - - - -</b>			
	KI	NG EDWARD A	VE				
Time Period	Northbound	Southbound	Street Total	Eastbound	Westbound	Street Total	Grand Total
07:00 07:15	0	0	0	0	1	1	1
07:15 07:30	0	1	1	0	1	1	2
07:30 07:45	1	0	1	1	1	2	3
07:45 08:00	1	0	1	0	2	2	3
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	1	1	1
08:45 09:00	0	0	0	0	0	0	0
09:00 09:15	0	0	0	0	1	1	1
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	1	0	1	1	0	1	2
11:45 12:00	0	0	0	1	1	2	2
12:00 12:15	1	0	1	0	0	0	1
12:15 12:30	0	1	1	0	1	1	2
12:30 12:45	1	0	1	0	0	0	1
12:45 13:00	0	0	0	1	0	1	1
13:00 13:15	1	0	1	0	0	0	1
13:15 13:30	0	1	1	1	0	1	2
15:00 15:15	0	0	0	1	0	1	1
15:15 15:30	0	0	0	1	0	1	1
15:30 15:45	0	0	0	0	0	0	0
15:45 16:00	0	0	0	0	0	0	0
16:00 16:15	0	1	1	1	0	1	2
16:15 16:30	0	0	0	1	2	3	3
16:30 16:45	0	0	0	1	0	1	1
16:45 17:00	0	0	0	1	0	1	1
17:00 17:15	0	0	0	1	0	1	1
17:15 17:30	0	0	0	2	1	3	3
17:30 17:45	1	1	2	0	0	0	2
17:45 18:00	1	2	3	2	0	2	5
Total	8	7	15	16	12	28	43



## **Transportation Services - Traffic Services**

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

#### KING EDWARD AVE @ RIDEAU ST

 Survey Date:
 Tuesday, January 14, 2020
 WO No:
 39318

 Start Time:
 07:00
 Device:
 Miovision

## **Full Study Pedestrian Volume**

KING EDWARD AVE RIDEAU ST

	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	10	36	46	16	5	21	67
07:15 07:30	13	33	46	7	6	13	59
7:30 07:45	31	61	92	19	10	29	121
7:45 08:00	47	62	109	15	15	30	139
8:00 08:15	33	69	102	27	39	66	168
8:15 08:30	36	70	106	33	25	58	164
8:30 08:45	41	47	88	28	25	53	141
8:45 09:00	33	41	74	20	22	42	116
9:00 09:15	34	58	92	14	18	32	124
9:15 09:30	37	56	93	21	22	43	136
9:30 09:45	36	61	97	42	38	80	177
9:45 10:00	43	58	101	33	30	63	164
11:30 11:45	51	71	122	33	24	57	179
11:45 12:00	64	71	135	29	24	53	188
12:00 12:15	61	77	138	35	28	63	201
12:15 12:30	67	73	140	31	28	59	199
12:30 12:45	72	94	166	52	42	94	260
12:45 13:00	44	100	144	43	42	85	229
13:00 13:15	42	75	117	23	28	51	168
13:15 13:30	69	67	136	27	20	47	183
15:00 15:15	60	99	159	23	22	45	204
15:15 15:30	63	93	156	24	23	47	203
15:30 15:45	81	104	185	41	43	84	269
15:45 16:00	67	124	191	30	35	65	256
16:00 16:15	73	134	207	30	40	70	277
16:15 16:30	92	109	201	30	39	69	270
16:30 16:45	71	108	179	38	25	63	242
16:45 17:00	64	102	166	33	30	63	229
17:00 17:15	94	139	233	40	56	96	329
17:15 17:30	83	144	227	42	43	85	312
17:30 17:45	92	120	212	36	39	75	287
17:45 18:00	89	110	199	44	29	73	272
Total	1793	2666	4459	959	915	1874	6333

5470795 - TUE JAN 14, 2020 - 8HRS - LORETTA

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

#### KING EDWARD AVE @ RIDEAU ST

 Survey Date:
 Tuesday, January 14, 2020
 WO No:
 39318

 Start Time:
 07:00
 Device:
 Miovision

## Full Study Heavy Vehicles

KING EDWARD AVE RIDEAU ST

	N	orthbo	und		Sc	outhbou	ind			Е	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	Grand Total
07:00 07:15	0	6	1	7	1	3	14	18	25	24	8	0	32	0	9	5	14	46	71
07:15 07:30	0	2	0	2	1	3	19	23	25	27	5	0	32	0	15	2	17	49	74
07:30 07:45	0	4	0	4	0	7	14	21	25	20	10	0	30	0	10	1	11	41	66
07:45 08:00	0	3	1	4	1	2	16	19	23	22	5	0	27	0	8	3	11	38	61
08:00 08:15	0	6	1	7	1	5	17	23	30	28	9	0	37	0	12	0	12	49	79
08:15 08:30	0	2	0	2	2	5	17	24	26	17	7	0	24	0	13	1	14	38	64
08:30 08:45	0	3	2	5	2	1	16	19	24	21	5	0	26	0	11	1	12	38	62
08:45 09:00	0	2	1	3	1	6	23	30	33	35	10	0	45	0	11	1	12	57	90
09:00 09:15	0	1	0	1	2	3	26	31	32	30	5	0	35	0	14	1	15	50	82
09:15 09:30	0	7	0	7	5	1	27	33	40	27	11	0	38	0	8	1	9	47	87
09:30 09:45	0	5	0	5	1	7	28	36	41	28	10	0	38	0	8	5	13	51	92
09:45 10:00	0	3	1	4	2	3	22	27	31	23	8	1	32	0	8	0	8	40	71
11:30 11:45	0	3	0	3	2	5	18	25	28	21	8	0	29	0	12	1	13	42	70
11:45 12:00	0	2	1	3	0	2	20	22	25	23	7	0	30	0	7	1	8	38	63
12:00 12:15	0	3	1	4	3	2	25	30	34	25	12	1	38	0	12	2	14	52	86
12:15 12:30	0	4	1	5	2	2	25	29	34	18	7	0	25	0	5	0	5	30	64
12:30 12:45	0	4	1	5	0	2	22	24	29	25	9	0	34	0	7	1	8	42	71
12:45 13:00	0	8	1	9	1	4	23	28	37	18	9	0	27	0	14	1	15	42	79
13:00 13:15	0	5	1	6	4	0	23	27	33	15	3	1	19	0	7	1	8	27	60
13:15 13:30	0	3	0	3	2	2	19	23	26	19	14	1	34	0	10	1	11	45	71
15:00 15:15	0	1	3	4	2	5	18	25	29	20	12	0	32	0	9	0	9	41	70
15:15 15:30	0	1	0	1	1	2	21	24	25	11	9	0	20	0	9	0	9	29	54
15:30 15:45	0	5	0	5	2	1	14	17	22	13	7	0	20	0	9	0	9	29	51
15:45 16:00	0	5	0	5	1	3	13	17	22	12	11	0	23	0	8	0	8	31	53
16:00 16:15	0	5	0	5	0	4	19	23	28	7	6	0	13	0	8	1	9	22	50
16:15 16:30	0	2	0	2	0	2	16	18	20	12	10	0	22	0	8	0	8	30	50
16:30 16:45	1	6	0	7	0	1	10	11	18	5	11	0	16	0	8	0	8	24	42
16:45 17:00	0	1	0	1	1	2	15	18	19	6	10	0	16	0	5	0	5	21	40
17:00 17:15	0	5	0	5	0	2	11	13	18	6	9	0	15	0	6	0	6	21	39
17:15 17:30	0	4	0	4	0	0	15	15	19	6	6	0	12	0	4	1	5	17	36
17:30 17:45	0	2	0	2	0	2	17	19	21	14	10	1	25	0	5	1	6	31	52
17:45 18:00	0	1	0	1	0	0	13	13	14	8	7	0	15	0	5	0	5	20	34
Total: None	1	114	16	131	40	89	596	725	856	586	270	5	861	0	285	32	317	1178	2,034



## **Transportation Services - Traffic Services**

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

#### KING EDWARD AVE @ RIDEAU ST

 Survey Date:
 Tuesday, January 14, 2020
 WO No:
 39318

 Start Time:
 07:00
 Device:
 Miovision

# Full Study 15 Minute U-Turn Total KING EDWARD AVE RIDEAU ST

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	1	1
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	1	1
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	1	1
17:00	17:15	0	1	0	0	1
17:15	17:30	0	0	0	0	0
17:30	17:45	0	0	0	0	0
17:45	18:00	0	1	0	0	1
To	otal	0	2	0	3	5

March 22, 2021 Page 7 of 8 March 22, 2021 Page 8 of 8



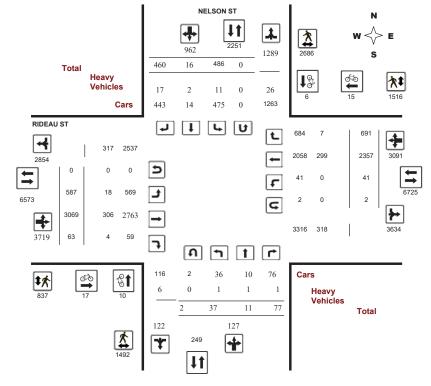
#### **Turning Movement Count - Study Results**

#### **NELSON ST @ RIDEAU ST**

 Survey Date:
 Tuesday, January 14, 2020
 WO No:
 39319

 Start Time:
 07:00
 Device:
 Miovision

#### **Full Study Diagram**



5470796 - TUE JAN 14, 2020 - 8HRS - LORETTA



## **Transportation Services - Traffic Services**

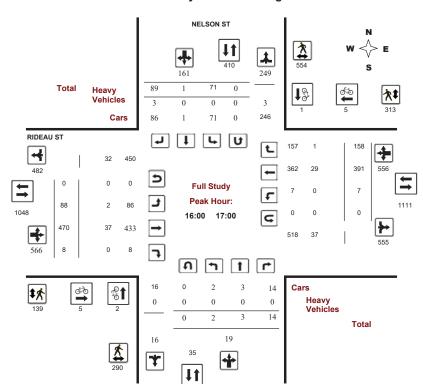
#### **Turning Movement Count - Study Results**

#### **NELSON ST @ RIDEAU ST**

 Survey Date:
 Tuesday, January 14, 2020
 WO No:
 39319

 Start Time:
 07:00
 Device:
 Miovision

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



5470796 - TUE JAN 14, 2020 - 8HRS - LORETTA

March 22, 2021 Page 1 of 8 March 22, 2021 Page 2 of 8

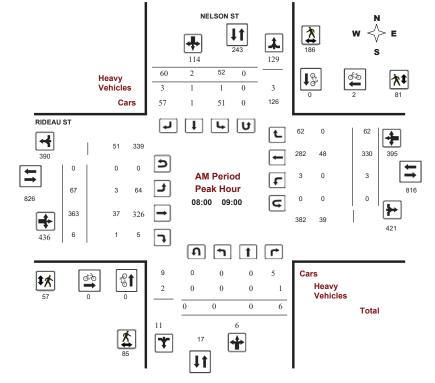


#### **Turning Movement Count - Peak Hour Diagram**

#### **NELSON ST @ RIDEAU ST**

 Survey Date:
 Tuesday, January 14, 2020
 WO No:
 39319

 Start Time:
 07:00
 Device:
 Miovision



**Comments** 5470796 - TUE JAN 14, 2020 - 8HRS - LORETTA



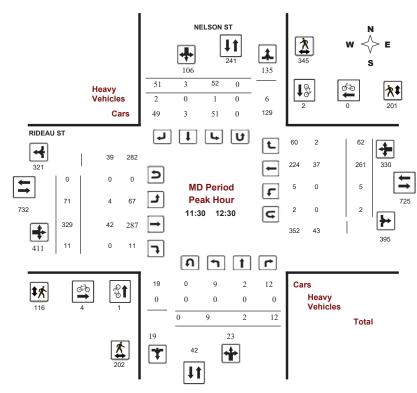
## **Transportation Services - Traffic Services**

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

#### **NELSON ST @ RIDEAU ST**

 Survey Date:
 Tuesday, January 14, 2020
 WO No:
 39319

 Start Time:
 07:00
 Device:
 Miovision



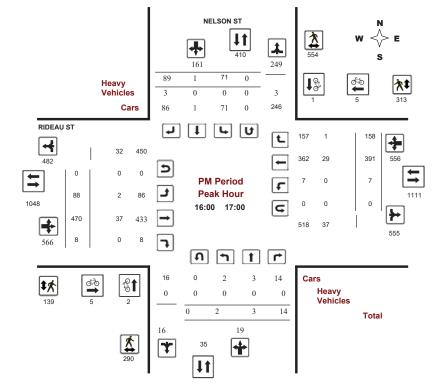
Comments 5470796 - TUE JAN 14, 2020 - 8HRS - LORETTA



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

#### **NELSON ST @ RIDEAU ST**

Survey Date: Tuesday, January 14, 2020 WO No: 39319 Start Time: 07:00 Device: Miovision



Comments 5470796 - TUE JAN 14, 2020 - 8HRS - LORETTA



## **Transportation Services - Traffic Services**

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

#### **NELSON ST @ RIDEAU ST**

Survey Date: Tuesday, January 14, 2020 WO No: 39319 Miovision

Start Time: 07:00 Device:

## Full Study Summary (8 HR Standard)

Survey Date: Tuesday, January 14, 2020 **Total Observed U-Turns AADT Factor** Southbound: 0 1.10

Eastbound: Westbound: 2 NELSON ST RIDEAU ST Northbound Southbound Eastbound Westbound LT ST RT LT ST ST RT RT ST RT Period LT TOT TOT Total TOT 08:00 09:00 120 330 831 951 09:00 10:00 221 797 11:30 12:30 12:30 13:30 848 15:00 16:00 212 993 1205 16:00 17:00 158 1122 17:00 18:00 15 67 147 162 457 535 315 117 975 1137 77 125 460 1087 587 3069 63 3719 41 2357 691 3089 6808 7895 Sub Total 11 486 16 962 U Turns 127 16 460 63 3719 43 Total 39 11 77 486 962 1089 587 3069 2357 691 3091 6810 7899 EQ 12Hr 54 107 176 22 639 1337 1513 816 60 3276 960 10979 15 676 1.39 Note: These values are calculated by multiplying the totals by the appropriate expansion factor. 24 703 66 12078 Note: These volumes are calculated by multiplying the Equivalent 12 hr. totals by the AADT factor. 1.10 AVG 24Hr 4721 1383 **6190** 13641 15821 921 1927 **2180** 1176 6148 86

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.



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

#### **NELSON ST @ RIDEAU ST**

 Survey Date:
 Tuesday, January 14, 2020
 WO No:
 39319

 Start Time:
 07:00
 Device:
 Miovision

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

NELSON ST RIDEAU ST

	N	orthbou	und		So	uthbou	nd			Е	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	1	1	6	0	3	9	10	14	85	0	99	0	49	7	56	155	165
07:15 07:30	0	0	2	2	11	0	6	17	19	19	84	2	105	0	53	10	63	168	187
07:30 07:45	0	0	1	1	8	0	9	17	18	24	87	1	112	1	72	14	87	199	217
07:45 08:00	0	0	0	0	9	1	14	24	24	17	92	1	110	0	74	10	84	194	218
08:00 08:15	0	0	1	1	10	0	17	27	28	19	78	2	99	1	82	15	98	197	225
08:15 08:30	0	0	3	3	13	0	15	28	31	17	85	1	103	2	80	15	97	200	231
08:30 08:45	0	0	0	0	17	0	16	33	33	14	99	2	115	0	81	17	98	213	246
08:45 09:00	0	0	2	2	12	2	12	26	28	17	101	1	119	0	87	15	102	221	249
09:00 09:15	1	0	0	1	8	0	14	22	23	13	85	3	101	0	61	13	74	175	198
09:15 09:30	1	0	1	2	13	0	5	18	20	19	91	2	112	1	66	19	86	198	218
09:30 09:45	5	0	3	8	7	1	13	21	29	17	83	4	104	3	44	5	52	156	185
09:45 10:00	2	0	2	4	7	1	11	19	23	9	107	0	116	0	50	9	59	175	198
11:30 11:45	1	0	3	4	14	0	12	26	30	18	93	3	114	1	79	20	100	214	244
11:45 12:00	3	0	0	3	8	1	16	25	28	18	80	1	99	0	47	19	66	165	193
12:00 12:15	4	1	5	10	9	1	13	23	33	19	81	5	105	4	72	11	87	192	225
12:15 12:30	1	1	4	6	21	1	10	32	38	16	75	2	93	2	63	12	77	170	208
12:30 12:45	3	0	2	5	11	3	12	26	31	9	79	2	90	3	50	15	68	158	189
12:45 13:00	2	0	6	8	12	0	10	22	30	16	71	2	89	2	73	15	90	179	209
13:00 13:15	2	0	1	3	7	1	13	21	24	16	85	5	106	2	56	15	73	179	203
13:15 13:30	2	0	4	6	19	0	10	29	35	18	101	1	120	3	75	14	92	212	247
15:00 15:15	2	0	3	5	24	0	20	44	49	24	95	4	123	0	82	34	116	239	288
15:15 15:30	2	3	4	9	31	0	13	44	53	25	112	3	140	2	79	46	127	267	320
15:30 15:45	2	0	1	3	34	0	22	56	59	21	91	1	113	0	77	35	112	225	284
15:45 16:00	2	0	4	6	26	1	18	45	51	26	102	3	131	1	99	31	131	262	313
16:00 16:15	1	0	7	8	15	0	29	44	52	28	101	0	129	0	91	52	143	272	324
16:15 16:30	1	1	0	2	15	1	25	41	43	28	111	1	140	0	106	43	149	289	332
16:30 16:45	0	2	4	6	25	0	15	40	46	19	120	5	144	3	95	32	130	274	320
16:45 17:00	0	0	3	3	16	0	20	36	39	13	138	2	153	4	99	31	134	287	326
17:00 17:15	0	0	3	3	23	1	25	49	52	14	117	1	132	4	72	33	109	241	293
17:15 17:30	2	3	5	10	23	1	17	41	51	20	105	2	127	2	82	27	111	238	289
17:30 17:45	0	0	2	2	13	0	11	24	26	23	115	0	138	1	87	35	123	261	287
17:45 18:00	0	0	0	0	19	0	14	33	33	17	120	1	138	1	74	22	97	235	268
Total:	39	11	77	127	486	16	460	962	1089	587	3069	63	3719	43	2357	691	3091	1089	7,899

Note: U-Turns are included in Totals.



## **Transportation Services - Traffic Services**

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

#### **NELSON ST @ RIDEAU ST**

 Survey Date:
 Tuesday, January 14, 2020
 WO No:
 39319

 Start Time:
 07:00
 Device:
 Miovision

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

		NELSON ST	. un otaay	,	RIDEAU ST		
Time Period	Northbound	Southbound	Street Total	Eastbound	Westbound	Street Total	Grand Total
07:00 07:15	0	0	0	0	2	2	2
07:15 07:30	0	0	0	0	1	1	1
07:30 07:45	1	0	1	1	1	2	3
07:45 08:00	0	0	0	1	2	3	3
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	2	2	2
08:45 09:00	0	0	0	0	0	0	0
09:00 09:15	0	1	1	0	0	0	1
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	1	0	1	0	0	0	1
11:30 11:45	0	0	0	1	0	1	1
11:45 12:00	0	1	1	2	0	2	3
12:00 12:15	1	0	1	1	0	1	2
12:15 12:30	0	1	1	0	0	0	1
12:30 12:45	0	1	1	0	0	0	1
12:45 13:00	0	0	0	0	1	1	1
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	1	0	1	0	0	0	1
15:15 15:30	0	0	0	2	0	2	2
15:30 15:45	1	1	2	0	0	0	2
15:45 16:00	1	0	1	0	0	0	1
16:00 16:15	0	0	0	1	2	3	3
16:15 16:30	0	0	0	1	1	2	2
16:30 16:45	1	0	1	1	2	3	4
16:45 17:00	1	1	2	2	0	2	4
17:00 17:15	0	0	0	1	0	1	1
17:15 17:30	0	0	0	2	0	2	2
17:30 17:45	1	0	1	0	1	1	2
17:45 18:00	1	0	1	1	0	1	2
Total	10	6	16	17	15	32	48

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

#### **NELSON ST @ RIDEAU ST**

 Survey Date:
 Tuesday, January 14, 2020
 WO No:
 39319

 Start Time:
 07:00
 Device:
 Miovision

## **Full Study Pedestrian Volume**

NELSON ST RIDEAU ST

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	10	31	41	4	4	8	49
7:15 07:30	7	30	37	4	9	13	50
7:30 07:45	18	40	58	8	19	27	85
7:45 08:00	30	47	77	8	11	19	96
8:00 08:15	16	47	63	15	16	31	94
8:15 08:30	20	52	72	15	18	33	105
8:30 08:45	23	43	66	12	17	29	95
8:45 09:00	26	44	70	15	30	45	115
9:00 09:15	25	51	76	19	26	45	121
9:15 09:30	34	46	80	5	19	24	104
9:30 09:45	23	56	79	11	24	35	114
9:45 10:00	32	45	77	11	26	37	114
1:30 11:45	51	75	126	38	45	83	209
1:45 12:00	57	75	132	18	58	76	208
2:00 12:15	44	87	131	28	46	74	205
2:15 12:30	50	108	158	32	52	84	242
2:30 12:45	49	94	143	51	41	92	235
2:45 13:00	43	87	130	39	54	93	223
3:00 13:15	49	82	131	34	54	88	219
3:15 13:30	39	67	106	26	52	78	184
5:00 15:15	58	94	152	29	67	96	248
5:15 15:30	62	108	170	39	78	117	287
5:30 15:45	67	124	191	37	53	90	281
5:45 16:00	76	100	176	28	81	109	285
6:00 16:15	70	126	196	23	73	96	292
6:15 16:30	70	161	231	40	75	115	346
6:30 16:45	71	130	201	31	81	112	313
6:45 17:00	79	137	216	45	84	129	345
7:00 17:15	81	138	219	34	80	114	333
7:15 17:30	68	114	182	44	72	116	298
7:30 17:45	90	130	220	50	84	134	354
7:45 18:00	54	117	171	44	67	111	282
Total	1492	2686	4178	837	1516	2353	6531

5470796 - TUE JAN 14, 2020 - 8HRS - LORETTA



## **Transportation Services - Traffic Services**

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

#### **NELSON ST @ RIDEAU ST**

 Survey Date:
 Tuesday, January 14, 2020
 WO No:
 39319

 Start Time:
 07:00
 Device:
 Miovision

#### **Full Study Heavy Vehicles**

NELSON ST RIDEAU ST

	1	Northbo	und		Sc	outhbou	nd			Е	astbour	nd		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 07:1	5 0	0	0	0	2	0	0	2	2	0	8	0	8	0	17	0	17	25	27
07:15 07:3	0 0	0	0	0	0	0	0	0	0	0	5	0	5	0	14	1	15	20	20
07:30 07:4	5 0	0	0	0	0	0	0	0	0	0	10	0	10	0	11	1	12	22	22
07:45 08:0	0 0	0	0	0	0	0	1	1	1	0	6	0	6	0	10	0	10	16	17
08:00 08:1	5 0	0	1	1	0	0	0	0	1	1	11	1	13	0	12	0	12	25	26
08:15 08:3	0 0	0	0	0	0	0	2	2	2	0	10	0	10	0	11	0	11	21	23
08:30 08:4	5 0	0	0	0	0	0	1	1	1	2	4	0	6	0	11	0	11	17	18
08:45 09:0	0 0	0	0	0	1	1	0	2	2	0	12	0	12	0	14	0	14	26	28
09:00 09:1	5 0	0	0	0	1	0	0	1	1	0	7	0	7	0	12	0	12	19	20
09:15 09:3	0 0	0	0	0	0	0	1	1	1	1	17	0	18	0	9	0	9	27	28
09:30 09:4	5 0	0	0	0	0	0	0	0	0	0	8	1	9	0	11	0	11	20	20
09:45 10:0	0 0	0	0	0	1	1	0	2	2	0	11	0	11	0	8	0	8	19	21
11:30 11:4	5 0	0	0	0	0	0	0	0	0	0	11	0	11	0	13	0	13	24	24
11:45 12:0	0 0	0	0	0	0	0	0	0	0	2	7	0	9	0	6	1	7	16	16
12:00 12:1	5 0	0	0	0	0	0	2	2	2	2	15	0	17	0	13	1	14	31	33
12:15 12:3	0 0	0	0	0	1	0	0	1	1	0	9	0	9	0	5	0	5	14	15
12:30 12:4	5 1	0	0	1	0	0	1	1	2	0	10	1	11	0	8	0	8	19	21
12:45 13:0	0 0	0	0	0	1	0	2	3	3	1	12	0	13	0	14	0	14	27	30
13:00 13:1	5 0	0	0	0	0	0	1	1	1	0	6	0	6	0	7	1	8	14	15
13:15 13:3	0 0	0	0	0	0	0	0	0	0	1	16	0	17	0	8	0	8	25	25
15:00 15:1	5 0	0	0	0	0	0	2	2	2	1	14	1	16	0	6	1	7	23	25
15:15 15:3	0 0	1	0	1	2	0	0	2	3	0	11	0	11	0	10	0	10	21	24
15:30 15:4	5 0	0	0	0	0	0	0	0	0	1	9	0	10	0	11	0	11	21	21
15:45 16:0	0 0	0	0	0	1	0	0	1	1	2	10	0	12	0	6	0	6	18	19
16:00 16:1	5 0	0	0	0	0	0	1	1	1	0	7	0	7	0	9	1	10	17	18
16:15 16:3	0 0	0	0	0	0	0	1	1	1	1	8	0	9	0	7	0	7	16	17
16:30 16:4	5 0	0	0	0	0	0	1	1	1	0	11	0	11	0	7	0	7	18	19
16:45 17:0	0 0	0	0	0	0	0	0	0	0	1	11	0	12	0	6	0	6	18	18
17:00 17:1	5 0	0	0	0	0	0	0	0	0	0	10	0	10	0	6	0	6	16	16
17:15 17:3	0 0	0	0	0	0	0	1	1	1	1	4	0	5	0	7	0	7	12	13
17:30 17:4	5 0	0	0	0	0	0	0	0	0	1	9	0	10	0	5	0	5	15	15
17:45 18:0	0 0	0	0	0	1	0	0	1	1	0	7	0	7	0	5	0	5	12	13
Total: Non	e 1	1	1	3	11	2	17	30	33	18	306	4	328	0	299	7	306	634	667

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

#### NELSON ST @ RIDEAU ST

 Survey Date:
 Tuesday, January 14, 2020
 WO No:
 39319

 Start Time:
 07:00
 Device:
 Miovision

# Full Study 15 Minute U-Turn Total NELSON ST RIDEAU ST

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	1	0	0	0	1
09:15	09:30	0	0	0	0	0
09:30	09:45	0	0	0	0	0
09:45	10:00	1	0	0	0	1
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	1	1
12:15	12:30	0	0	0	1	1
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**

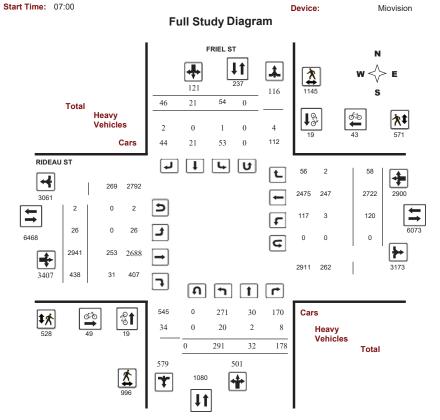
#### FRIEL ST @ RIDEAU ST

WO No:

Survey Date: Tuesday, May 09, 2017

day, May 09, 2017

37008



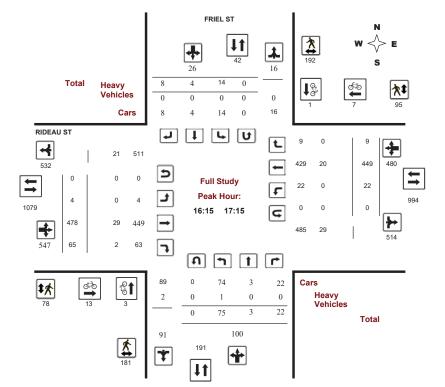
March 22, 2021 Page 8 of 8 March 22, 2021 Page 1 of 8



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

#### FRIEL ST @ RIDEAU ST

Survey Date: Tuesday, May 09, 2017 WO No: 37008
Start Time: 07:00 Device: Miovision
Full Study Peak Hour Diagram



March 22, 2021 Page 2 of 8



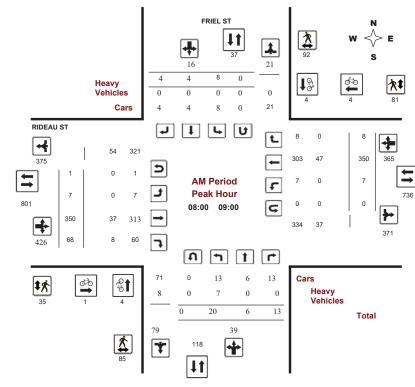
## **Transportation Services - Traffic Services**

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

#### FRIEL ST @ RIDEAU ST

 Survey Date:
 Tuesday, May 09, 2017
 WO No:
 37008

 Start Time:
 07:00
 Device:
 Miovision



Comments

2021-Mar-22 Page 1 of 3

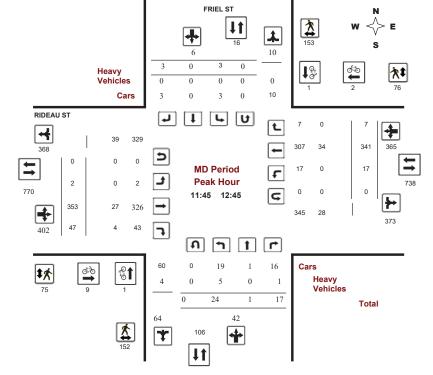


## **Turning Movement Count - Peak Hour Diagram**

## FRIEL ST @ RIDEAU ST

 Survey Date:
 Tuesday, May 09, 2017
 WO No:
 37008

 Start Time:
 07:00
 Device:
 Miovision



Comments



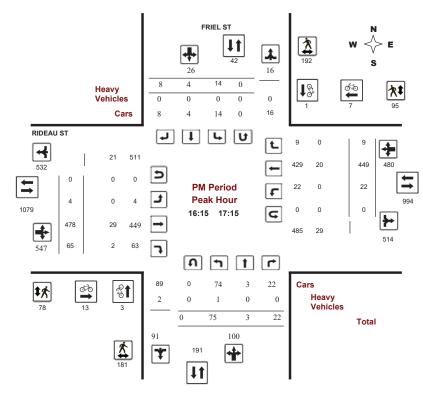
## **Transportation Services - Traffic Services**

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

#### FRIEL ST @ RIDEAU ST

 Survey Date:
 Tuesday, May 09, 2017
 WO No:
 37008

 Start Time:
 07:00
 Device:
 Miovision



Comments



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

#### FRIEL ST @ RIDEAU ST

 Survey Date:
 Tuesday, May 09, 2017
 WO No:
 37008

 Start Time:
 07:00
 Device:
 Miovision

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

Survey Date: Tuesday, May 09, 2017 Total Observed U-Turns

Northbound: 0 Southbound: 0 90

Eastbound: 2 Westbound: 0

			FI	RIEL S	T							R	IDEAU	ST					
	Nor	thbou	nd		Sou	uthbou	ınd			Е	astbou	ınd		V	/estbou	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	9	3	11	23	6	2	4	12	35	5	283	46	334	7	258	8	273	607	642
08:00 09:00	20	6	13	39	8	4	4	16	55	7	350	68	425	7	350	8	365	790	845
09:00 10:00	22	0	21	43	2	0	2	4	47	0	304	43	347	17	285	12	314	661	708
11:30 12:30	21	1	20	42	6	0	5	11	53	1	349	46	396	16	335	6	357	753	806
12:30 13:30	19	2	25	46	3	2	6	11	57	3	336	43	382	12	332	5	349	731	788
15:00 16:00	61	7	35	103	8	5	8	21	124	6	426	69	501	15	360	2	377	878	1002
16:00 17:00	84	5	21	110	14	5	7	26	136	1	478	60	539	26	430	10	466	1005	1141
17:00 18:00	55	8	32	95	7	3	10	20	115	3	415	63	481	20	372	7	399	880	995
Sub Total	291	32	178	501	54	21	46	121	622	26	2941	438	3405	120	2722	58	2900	6305	6927
U Turns	0			0	0			0	0	2			2	0			0	2	2
Total	291	32	178	501	54	21	46	121	622	28	2941	438	3407	120	2722	58	2900	6307	6929
EQ 12Hr	404	44	247	695	75	29	64	168	863	39	4088	609	4736	167	3784	81	4032	8768	9631
Note: These	values ar	e calcul	lated by	/ multiply	ing the	totals b	y the a	opropriat	e expans	ion fact	or.			1.39					
AVG 12Hr	364	40	222	626	68	26	58	152	778	35	3679	548	4262	150	3406	73	3629	7891	8669
Note: These	volumes	are calc	culated	by multip	olying th	e Equiv	alent 1	2 hr. tota	ls by the	AADT	factor.			.90					
AVG 24Hr	477	52	291	820	89	34	76	199	1019	46	4819	718	5583	196	4462	96	4754	10337	11356

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

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



## **Transportation Services - Traffic Services**

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

#### FRIEL ST @ RIDEAU ST

 Survey Date:
 Tuesday, May 09, 2017
 WO No:
 37008

 Start Time:
 07:00
 Device:
 Miovision

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

FRIEL ST RIDEAU ST

	N	orthbo	und		Sc	outhbou	nd			E	astboui	nd		W	estbour	ıd			
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	1	2	1	4	0	0	0	0	4	3	73	7	83	1	52	0	53	136	140
07:15 07:30	1	0	3	4	0	0	1	1	5	0	75	10	85	1	70	2	73	158	163
07:30 07:45	3	0	5	8	4	0	2	6	14	1	75	13	89	2	64	1	67	156	170
07:45 08:00	4	1	2	7	2	2	1	5	12	1	60	16	77	3	72	5	80	157	169
08:00 08:15	4	2	7	13	2	3	3	8	21	1	91	17	109	1	94	2	97	206	227
08:15 08:30	6	4	1	11	4	0	1	5	16	3	84	21	108	1	83	3	87	195	211
08:30 08:45	5	0	1	6	0	1	0	1	7	1	81	16	98	1	91	2	94	192	199
08:45 09:00	5	0	4	9	2	0	0	2	11	3	94	14	111	4	82	1	87	198	209
09:00 09:15	8	0	8	16	0	0	0	0	16	0	86	10	96	8	73	5	86	182	198
09:15 09:30	5	0	3	8	1	0	1	2	10	0	82	9	91	1	76	3	80	171	181
09:30 09:45	4	0	4	8	0	0	0	0	8	0	65	14	79	6	59	1	66	145	153
09:45 10:00	5	0	6	11	1	0	1	2	13	0	71	10	81	2	77	3	82	163	176
11:30 11:45	4	0	10	14	3	0	4	7	21	1	74	14	89	3	77	2	82	171	192
11:45 12:00	5	0	8	13	1	0	1	2	15	0	109	12	121	4	98	2	104	225	240
12:00 12:15	6	1	0	7	2	0	0	2	9	0	84	11	95	3	83	1	87	182	191
12:15 12:30	6	0	2	8	0	0	0	0	8	0	82	9	91	6	77	1	84	175	183
12:30 12:45	7	0	7	14	0	0	2	2	16	2	78	15	95	4	83	3	90	185	201
12:45 13:00	5	0	6	11	0	0	1	1	12	0	86	13	99	1	89	0	90	189	201
13:00 13:15	3	1	4	8	2	1	3	6	14	1	105	10	116	3	83	1	87	203	217
13:15 13:30	4	1	8	13	1	1	0	2	15	1	67	5	73	4	77	1	82	155	170
15:00 15:15	14	0	10	24	2	0	1	3	27	1	103	13	117	4	86	0	90	207	234
15:15 15:30	13	0	9	22	2	4	1	7	29	2	107	15	124	1	96	1	98	222	251
15:30 15:45	21	4	11	36	2	0	1	3	39	1	113	16	130	3	94	0	97	227	266
15:45 16:00	13	3	5	21	2	1	5	8	29	2	103	25	130	7	84	1	92	222	251
16:00 16:15	24	3	4	31	1	2	2	5	36	0	113	13	126	7	90	3	100	226	262
16:15 16:30	26	1	5	32	3	1	2	6	38	0	121	12	133	6	105	1	112	245	283
16:30 16:45	18	0	4	22	4	2	3	9	31	0	118	21	139	8	108	2	118	257	288
16:45 17:00	16	1	8	25	6	0	0	6	31	1	126	14	141	5	127	4	136	277	308
17:00 17:15	15	1	5	21	1	1	3	5	26	3	113	18	134	3	109	2	114	248	274
17:15 17:30	10	4	14	28	3	0	3	6	34	0	98	19	117	7	100	0	107	224	258
17:30 17:45	17	1	7	25	2	1	1	4	29	0	112	11	123	3	81	3	87	210	239
17:45 18:00	13	2	6	21	1	1	3	5	26	0	92	15	107	7	82	2	91	198	224
Total:	291	32	178	501	54	21	46	121	622	28	2941	438	3407	120	2722	58	2900	622	6,929

Note: U-Turns are included in Totals.

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

#### FRIEL ST @ RIDEAU ST

 Survey Date:
 Tuesday, May 09, 2017
 WO No:
 37008

 Start Time:
 07:00
 Device:
 Miovision

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

		FRIEL ST			RIDEAU ST		
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	0	0	0	1	1	2	2
07:30 07:45	2	2	4	0	4	4	8
07:45 08:00	2	0	2	0	2	2	4
08:00 08:15	2	2	4	0	2	2	6
08:15 08:30	0	1	1	0	0	0	1
08:30 08:45	1	0	1	0	2	2	3
08:45 09:00	1	1	2	1	0	1	3
09:00 09:15	1	1	2	1	2	3	5
09:15 09:30	1	1	2	0	1	1	3
09:30 09:45	0	1	1	2	0	2	3
09:45 10:00	0	0	0	0	0	0	0
11:30 11:45	0	1	1	1	1	2	3
11:45 12:00	1	0	1	2	0	2	3
12:00 12:15	0	0	0	2	1	3	3
12:15 12:30	0	0	0	5	1	6	6
12:30 12:45	0	1	1	0	0	0	1
12:45 13:00	0	1	1	4	2	6	7
13:00 13:15	1	0	1	1	2	3	4
13:15 13:30	0	0	0	2	1	3	3
15:00 15:15	0	1	1	0	1	1	2
15:15 15:30	1	0	1	3	2	5	6
15:30 15:45	0	2	2	1	2	3	5
15:45 16:00	0	1	1	1	3	4	5
16:00 16:15	2	0	2	2	3	5	7
16:15 16:30	0	0	0	5	2	7	7
16:30 16:45	0	0	0	1	0	1	1
16:45 17:00	2	1	3	2	0	2	5
17:00 17:15	1	0	1	5	5	10	11
17:15 17:30	0	1	1	1	2	3	4
17:30 17:45	1	1	2	2	1	3	5
17:45 18:00	0	0	0	3	0	3	3
Total	19	19	38	49	43	92	130



## **Transportation Services - Traffic Services**

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

#### FRIEL ST @ RIDEAU ST

 Survey Date:
 Tuesday, May 09, 2017
 WO No:
 37008

 Start Time:
 07:00
 Device:
 Miovision

## **Full Study Pedestrian Volume**

FRIEL ST RIDEAU ST

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	7	7	14	0	6	6	20
07:15 07:30	7	19	26	5	13	18	44
07:30 07:45	13	13	26	11	11	22	48
07:45 08:00	19	17	36	13	15	28	64
08:00 08:15	19	18	37	1	24	25	62
08:15 08:30	19	24	43	13	16	29	72
08:30 08:45	25	26	51	10	16	26	77
08:45 09:00	22	24	46	11	25	36	82
09:00 09:15	17	29	46	8	17	25	71
09:15 09:30	23	30	53	5	17	22	75
09:30 09:45	15	29	44	12	8	20	64
09:45 10:00	18	21	39	29	9	38	77
11:30 11:45	23	29	52	19	7	26	78
11:45 12:00	35	34	69	22	19	41	110
12:00 12:15	29	40	69	18	19	37	106
12:15 12:30	44	37	81	20	15	35	116
12:30 12:45	44	42	86	15	23	38	124
12:45 13:00	42	36	78	35	12	47	125
13:00 13:15	34	29	63	10	12	22	85
13:15 13:30	29	40	69	14	13	27	96
15:00 15:15	34	55	89	24	14	38	127
15:15 15:30	35	34	69	18	23	41	110
15:30 15:45	39	60	99	25	40	65	164
15:45 16:00	52	38	90	17	22	39	129
16:00 16:15	38	57	95	13	20	33	128
16:15 16:30	47	34	81	22	28	50	131
16:30 16:45	40	52	92	12	20	32	124
16:45 17:00	47	54	101	23	16	39	140
17:00 17:15	47	52	99	21	31	52	151
17:15 17:30	43	60	103	30	24	54	157
17:30 17:45	38	55	93	26	15	41	134
17:45 18:00	52	50	102	26	21	47	149
Total	996	1145	2141	528	571	1099	3240

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

#### FRIEL ST @ RIDEAU ST

 Survey Date:
 Tuesday, May 09, 2017
 WO No:
 37008

 Start Time:
 07:00
 Device:
 Miovision

#### Full Study Heavy Vehicles

FRIEL ST RIDEAU ST

		N	orthbo	und		Sc	uthbou	nd			Е	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	Grand Total
07:00	07:15	0	0	0	0	0	0	0	0	0	0	12	1	13	0	8	0	8	21	21
07:15	07:30	0	0	1	1	0	0	0	0	1	0	10	2	12	0	7	0	7	19	20
07:30	07:45	0	0	0	0	0	0	0	0	0	0	7	3	10	0	12	0	12	22	22
07:45	08:00	1	0	0	1	0	0	1	1	2	0	8	1	9	0	11	1	12	21	23
08:00	08:15	1	0	0	1	0	0	0	0	1	0	13	2	15	0	9	0	9	24	25
08:15	08:30	2	0	0	2	0	0	0	0	2	0	8	2	10	0	11	0	11	21	23
08:30	08:45	3	0	0	3	0	0	0	0	3	0	6	1	7	0	13	0	13	20	23
08:45	09:00	1	0	0	1	0	0	0	0	1	0	10	3	13	0	14	0	14	27	28
09:00	09:15	1	0	0	1	0	0	0	0	1	0	8	3	11	1	10	0	11	22	23
09:15	09:30	2	0	0	2	0	0	0	0	2	0	7	3	10	0	9	0	9	19	21
09:30	09:45	2	0	0	2	0	0	0	0	2	0	8	1	9	0	8	0	8	17	19
09:45	10:00	1	0	0	1	0	0	0	0	1	0	9	1	10	0	8	0	8	18	19
11:30	11:45	0	0	1	1	0	0	0	0	1	0	8	1	9	0	4	0	4	13	14
11:45	12:00	1	0	0	1	0	0	0	0	1	0	6	1	7	0	9	0	9	16	17
12:00	12:15	2	0	0	2	0	0	0	0	2	0	9	2	11	0	11	0	11	22	24
12:15	12:30	2	0	0	2	0	0	0	0	2	0	5	0	5	0	4	0	4	9	11
12:30	12:45	0	0	1	1	0	0	0	0	1	0	7	1	8	0	10	0	10	18	19
12:45	13:00	0	0	0	0	0	0	0	0	0	0	8	1	9	0	4	0	4	13	13
13:00	13:15	0	0	0	0	0	0	0	0	0	0	6	0	6	0	7	0	7	13	13
13:15	13:30	0	0	0	0	0	0	0	0	0	0	7	0	7	0	9	0	9	16	16
15:00	15:15	0	0	2	2	1	0	0	1	3	0	6	0	6	1	4	0	5	11	14
15:15	15:30	0	0	1	1	0	0	0	0	1	0	4	0	4	0	8	0	8	12	13
15:30	15:45	0	0	0	0	0	0	0	0	0	0	8	0	8	0	5	0	5	13	13
15:45	16:00	0	0	1	1	0	0	0	0	1	0	7	0	7	1	12	0	13	20	21
16:00	16:15	0	2	1	3	0	0	1	1	4	0	9	0	9	0	4	1	5	14	18
16:15	16:30	1	0	0	1	0	0	0	0	1	0	10	1	11	0	4	0	4	15	16
16:30	16:45	0	0	0	0	0	0	0	0	0	0	7	1	8	0	6	0	6	14	14
16:45	17:00	0	0	0	0	0	0	0	0	0	0	5	0	5	0	4	0	4	9	9
17:00	17:15	0	0	0	0	0	0	0	0	0	0	7	0	7	0	6	0	6	13	13
17:15	17:30	0	0	0	0	0	0	0	0	0	0	8	0	8	0	5	0	5	13	13
17:30	17:45	0	0	0	0	0	0	0	0	0	0	11	0	11	0	5	0	5	16	16
17:45	18:00	0	0	0	0	0	0	0	0	0	0	9	0	9	0	6	0	6	15	15
Total:	None	20	2	8	30	1	0	2	3	33	0	253	31	284	3	247	2	252	536	569



## **Transportation Services - Traffic Services**

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

#### FRIEL ST @ RIDEAU ST

 Survey Date:
 Tuesday, May 09, 2017
 WO No:
 37008

 Start Time:
 07:00
 Device:
 Miovision

#### Full Study 15 Minute U-Turn Total

FRIEL ST RIDEAU ST

		TIMEL	,,		DEAG GI	
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	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	1	0	1
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	2	0	2

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# Appendix C

Synchro Intersection Worksheets – Existing Conditions



Lanes, Volumes, Timings 1: King Edward & York

Existing AM Peak Hour
112 Nelson Street

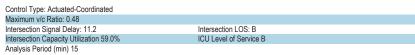
	*	*	1	<b>†</b>	<b>↓</b>
Lane Group	EBR	WBR	NBL	NBT	SBT
Lane Configurations	7	7	*	<b>11</b>	<b>11</b>
Traffic Volume (vph)	43	15	107	490	1210
Future Volume (vph)	43	15	107	490	1210
Lane Group Flow (vph)	48	17	119	568	1395
Turn Type	Free	Perm	pm+pt	NA	NA
Protected Phases	1100	. 0	8	2	6
Permitted Phases	Free	8	2	_	Ū
Detector Phase	1100	8	8	2	6
Switch Phase		- 3	- 0		0
Minimum Initial (s)		10.0	10.0	10.0	10.0
Minimum Split (s)		39.8	39.8	32.0	32.0
Total Split (s)		39.8	39.8	80.2	80.2
Total Split (%)		33.2%	33.2%	66.8%	66.8%
Maximum Green (s)		33.2%	33.2%	74.2	74.2
			3.3		3.0
Yellow Time (s)		3.3		3.0	
All-Red Time (s)		3.5	3.5	3.0	3.0
Lost Time Adjust (s)		0.0	0.0	0.0	0.0
Total Lost Time (s)		6.8	6.8	6.0	6.0
Lead/Lag					
Lead-Lag Optimize?					
Vehicle Extension (s)		3.0	3.0	3.0	3.0
Recall Mode		None	None	C-Max	C-Max
Walk Time (s)		25.0	25.0	18.0	18.0
Flash Dont Walk (s)		8.0	8.0	8.0	8.0
Pedestrian Calls (#/hr)		95	95	40	102
Act Effct Green (s)	120.0	33.0	106.4	74.2	74.2
Actuated g/C Ratio	1.00	0.28	0.89	0.62	0.62
v/c Ratio	0.03	0.03	0.19	0.19	0.48
Control Delay	0.0	0.1	1.4	9.9	13.0
Queue Delay	0.0	0.0	0.0	0.0	0.0
Total Delay	0.0	0.1	1.4	9.9	13.0
LOS	Α	Α	Α	Α	В
Approach Delay				8.5	13.0
Approach LOS				Α	В
Queue Length 50th (m)	0.0	0.0	0.2	19.4	60.6
Queue Length 95th (m)	0.0	0.0	0.4	25.1	71.4
Internal Link Dist (m)	0.0	0.0	0.1	218.1	130.8
Turn Bay Length (m)			85.0	210.1	100.0
Base Capacity (vph)	1491	576	613	2918	2907
Starvation Cap Reductn	0	0	013	2310	2307
Spillback Cap Reductn	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0
Reduced v/c Ratio	0.03	0.03	0.19	0.19	0.48
Reduced V/C Ratio	0.03	0.03	0.19	0.19	0.48
Intersection Summary					

Cycle Length: 120
Actuated Cycle Length: 120
Offset: 95 (79%), Referenced to phase 2:NBTL and 6:SBT, Start of Green

Natural Cycle: 75

05-14-2021 CGH Transportation JK Page 1 Lanes, Volumes, Timings 1: King Edward & York

Existing AM Peak Hour 112 Nelson Street



Splits and Phases: 1: King Edward & York



05-14-2021 CGH Transportation JK Page 2

	•	<b>→</b>	<b>←</b>	<b>†</b>	1	-	Į.	4				
Lane Group	EBL	EBT	WBT	NBT	NBR	SBL	SBT	SBR	Ø1	Ø2	Ø3	Ø5
Lane Configurations	*	<b>↑</b> Ъ	<b>†</b> p	<b>^</b>	7	ች	44	7				
Traffic Volume (vph)	156	158	307	445	83	201	801	217				
Future Volume (vph)	156	158	307	445	83	201	801	217				
Lane Group Flow (vph)	173	193	419	494	92	223	890	241				
Turn Type	Prot	NA	NA	NA	custom	custom	NA	custom				
Protected Phases	11	12	56	34		13	78	11	1	2	3	5
Permitted Phases					4	8		8				
Detector Phase	11	12	56	34	4	13	7.8	11				
Switch Phase												
Minimum Initial (s)	5.0				10.0	5.0		5.0	1.0	10.0	1.0	1.0
Minimum Split (s)	11.2				23.7	9.5		11.2	5.0	29.8	5.0	5.0
Total Split (s)	30.0				24.0	14.0		30.0	5.0	62.0	5.0	5.0
Total Split (%)	27.3%				21.8%	12.7%		27.3%	5%	56%	5%	5%
Maximum Green (s)	23.8				17.3	9.5		23.8	3.0	55.2	3.0	3.0
Yellow Time (s)	3.3				3.0	3.5		3.3	2.0	3.3	2.0	2.0
All-Red Time (s)	2.9				3.7	1.0		2.9	0.0	3.5	0.0	0.0
Lost Time Adjust (s)	0.0				0.0	0.0		0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	6.2				6.7	4.5		6.2				
Lead/Lag	0.2					4.5		0.2	Lead	Lan	Lead	Lead
Lead-Lag Optimize?					Lag Yes				Yes	Lag Yes	Yes	Yes
Vehicle Extension (s)	3.0				3.0	3.0		3.0	3.0	3.0	3.0	3.0
										C-Max		
Recall Mode	Max				Max 2.0	Max		Max	Max 3.0	C-IMAX 2.0	Max 3.0	Max 3.0
Walk Time (s)												
Flash Dont Walk (s)					15.0				0.0	21.0	0.0	0.0
Pedestrian Calls (#/hr)	00.0	0=0	00		111		44.0	== 0	143	143	111	227
Act Effct Green (s)	23.8	65.0	35.0	27.0	17.3	33.5	41.0	55.6				
Actuated g/C Ratio	0.22	0.59	0.32	0.25	0.16	0.30	0.37	0.51				
v/c Ratio	0.48	0.10	0.45	0.61	0.28	0.84	0.72	0.36				
Control Delay	43.0	9.1	31.8	40.5	2.2	68.5	33.6	12.6				
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0				
Total Delay	43.0	9.1	31.8	40.5	2.2	68.5	33.6	12.6				
LOS	D	Α	С	D	Α	Е	С	В				
Approach Delay		25.2	31.8	34.5			35.6					
Approach LOS		С	С	С			D					
Queue Length 50th (m)	32.7	8.1	37.5	49.6	0.0	38.4	85.2	22.6				
Queue Length 95th (m)	53.9	13.1	52.2	66.9	0.0	#78.0	108.1	35.8				
Internal Link Dist (m)		125.5	140.5	133.0			218.1					
Turn Bay Length (m)	65.0				20.0	105.0						
Base Capacity (vph)	358	1848	922	813	326	264	1235	665				
Starvation Cap Reductn	0	0	0	0	0	0	0	0				
Spillback Cap Reductn	0	0	0	0	0	0	0	0				
Storage Cap Reductn	0	0	0	0	0	0	0	0				
Reduced v/c Ratio	0.48	0.10	0.45	0.61	0.28	0.84	0.72	0.36				
Intersection Summary												

In	te	rs	e	cti	0	n	S	u	m	m	a	ŋ	

Cycle Length: 110
Actuated Cycle Length: 110
Offset: 92 (84%), Referenced to phase 2:EBT and 6:WBT, Start of Green Natural Cycle: 90

Lane Group         Ø6         Ø7         Ø8           Lane Configurations         Traffic Volume (vph)         Future Volume (vph)
Traffic Volume (vph) Future Volume (vph) Lane Group Flow (vph) Turn Type Protected Phases Detector Phase Switch Phase Minimum Initial (s) Minimum Split (s) Total Split (s) 31.8 5.0 38.0
Future Volume (vph) Lane Group Flow (vph) Turn Type Protected Phases 6 7 8 Permitted Phases Detector Phase Switch Phase Minimum Initial (s) 10.0 1.0 10.0 Minimum Split (s) 31.8 5.0 25.9 Total Split (s) 32.0 5.0 38.0
Lane Group Flow (vph) Turn Type Protected Phases 6 7 8 Permitted Phases Detector Phase Switch Phase Whinimum Initial (s) 10.0 1.0 10.0 Minimum Spiti (s) 31.8 5.0 25.9 Total Split (s) 32.0 5.0 38.0
Turn Type         6         7         8           Protected Phases         8         Permitted Phases           Detector Phase         Switch Phase         Winimum Initial (s)         10.0         1.0         10.0           Minimum Split (s)         31.8         5.0         25.9           Total Split (s)         32.0         5.0         38.0
Protected Phases 6 7 8 Permitted Phases Detector Phase Switch Phase Minimum Initial (s) 10.0 1.0 10.0 Minimum Split (s) 31.8 5.0 25.9 Total Split (s) 32.0 5.0 38.0
Permitted Phases           Detector Phase         Switch Phase           Switch Phase         10.0         1.0         10.0           Minimum Initial (s)         31.8         5.0         25.9           Total Split (s)         32.0         5.0         38.0
Detector Phase           Switch Phase         10.0         1.0         10.0           Minimum Initial (s)         31.8         5.0         25.9           Total Split (s)         32.0         5.0         38.0
Switch Phase         10.0         1.0         10.0           Minimum Initial (s)         31.8         5.0         25.9           Total Split (s)         32.0         5.0         38.0
Minimum Initial (s)         10.0         1.0         10.0           Minimum Split (s)         31.8         5.0         25.9           Total Split (s)         32.0         5.0         38.0
Minimum Split (s) 31.8 5.0 25.9 Total Split (s) 32.0 5.0 38.0
Total Split (s) 32.0 5.0 38.0
Total Split (%) 29% 5% 35%
Maximum Green (s) 25.2 3.0 31.1
Yellow Time (s) 3.3 2.0 3.0
All-Red Time (s) 3.5 0.0 3.9
Lost Time Adjust (s)
Total Lost Time (s)
Lead/Lag Lag Lead Lag
Lead-Lag Optimize? Yes Yes Yes
Vehicle Extension (s) 3.0 3.0 3.0
Recall Mode C-Max Max Max
Walk Time (s) 2.0 3.0 2.0
Flash Dont Walk (s) 23.0 0.0 17.0
Pedestrian Calls (#/hr) 227 108 108
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)
Tum Bay Length (m)
Base Capacity (vph)
Starvation Cap Reductn
Spillback Cap Reductn
Storage Cap Reductn
Reduced v/c Ratio
Intersection Summary

Lanes, Volumes, Timings 2: King Edward & Rideau Existing AM Peak Hour 112 Nelson Street Lanes, Volumes, Timings 3: Nelson & Rideau

Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.84	
Intersection Signal Delay: 33.4	Intersection LOS: C
Intersection Capacity Utilization 60.4%	ICU Level of Service B
Analysis Period (min) 15	
# 95th percentile volume exceeds capacity, queue may be lon	ger.
Queue shown is maximum after two cycles.	

	•	-	*	•	-	•	<b>†</b>	-	. ↓
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBT	SBL	SBT
Lane Configurations	*	<b>1</b>	7	ች	<b></b>	7	4		4
Traffic Volume (vph)	67	363	6	3	330	62	0	52	2
Future Volume (vph)	67	363	6	3	330	62	0	52	2
Lane Group Flow (vph)	74	403	7	3	367	69	7	0	127
Turn Type	Perm	NA	Perm	Perm	NA	Perm	NA	Perm	NA
Protected Phases		2			6		4		8
Permitted Phases	2		2	6		6		8	
Detector Phase	2	2	2	6	6	6	4	8	8
Switch Phase									
Minimum Initial (s)	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0
Minimum Split (s)	26.8	26.8	26.8	26.8	26.8	26.8	27.0	27.0	27.0
Total Split (s)	53.0	53.0	53.0	53.0	53.0	53.0	27.0	27.0	27.0
Total Split (%)	66.3%	66.3%	66.3%	66.3%	66.3%	66.3%	33.8%	33.8%	33.8%
Maximum Green (s)	47.2	47.2	47.2	47.2	47.2	47.2	21.0	21.0	21.0
Yellow Time (s)	3.3	3.3	3.3	3.3	3.3	3.3	3.3	3.3	3.3
All-Red Time (s)	2.5	2.5	2.5	2.5	2.5	2.5	2.7	2.7	2.7
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0
Total Lost Time (s)	5.8	5.8	5.8	5.8	5.8	5.8	6.0		6.0
Lead/Lag									
Lead-Lag Optimize?									
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Recall Mode	C-Max	C-Max	C-Max	C-Max	C-Max	C-Max	None	None	None
Walk Time (s)	15.0	15.0	15.0	15.0	15.0	15.0	7.0	7.0	7.0
Flash Dont Walk (s)	6.0	6.0	6.0	6.0	6.0	6.0	14.0	14.0	14.0
Pedestrian Calls (#/hr)	85	85	85	186	186	186	81	57	57
Act Effct Green (s)	53.8	53.8	53.8	53.8	53.8	53.8	18.8		18.8
Actuated g/C Ratio	0.67	0.67	0.67	0.67	0.67	0.67	0.24		0.24
v/c Ratio	0.15	0.34	0.01	0.01	0.31	0.11	0.01		0.38
Control Delay	8.5	9.0	0.0	6.7	7.3	1.9	0.0		16.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0
Total Delay	8.5	9.0	0.0	6.7	7.3	1.9	0.0		16.2
LOS	A	Α	Α	Α	Α	Α	Α		В
Approach Delay		8.8			6.4				16.2
Approach LOS		Α			Α				В
Queue Length 50th (m)	4.7	29.7	0.0	0.2	21.1	0.1	0.0		7.1
Queue Length 95th (m)	10.9	47.1	0.0	m0.5	30.6	3.1	0.0		20.9
Internal Link Dist (m)		140.5			117.5		126.5		219.1
Turn Bay Length (m)	40.0		20.0	10.0		20.0			
Base Capacity (vph)	494	1172	832	537	1172	652	556		363
Starvation Cap Reductn	0	0	0	0	0	0	0		0
Spillback Cap Reductn	0	0	0	0	0	0	0		0
Storage Cap Reductn	0	0	0	0	0	0	0		0
Reduced v/c Ratio	0.15	0.34	0.01	0.01	0.31	0.11	0.01		0.35

Intersection Summary
Cycle Length: 80
Actuated Cycle Length: 80
Offset: 34 (43%), Referenced to phase 2:EBTL and 6:WBTL, Start of Green
Natural Cycle: 55

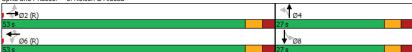
Lanes, Volumes, Timings 3: Nelson & Rideau

Existing AM Peak Hour

112 Nelson Street

Control Type: Actuated-Coordinated Maximum v/c Ratio: 0.38 Intersection LOS: A ICU Level of Service B Intersection Signal Delay: 8.6 Intersection Capacity Utilization 60.4% Analysis Period (min) 15 m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 3: Nelson & Rideau



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Lanes, Volumes, Timings 4: Friel & Rideau

Existing AM Peak Hour 112 Nelson Street

	•	<b>→</b>	•	•	<b>←</b>	*	1	<b>†</b>	-	ļ	
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	SBL	SBT	
Lane Configurations		ર્ન	7		ની	7		44		4	
Traffic Volume (vph)	8	350	68	7	350	8	20	6	8	4	
Future Volume (vph)	8	350	68	7	350	8	20	6	8	4	
Lane Group Flow (vph)	0	398	76	0	397	9	0	43	0	17	
Turn Type	Perm	NA	Perm	Perm	NA	Perm	Perm	NA	Perm	NA	
Protected Phases		2			6			4		8	
Permitted Phases	2		2	6		6	4		8		
Detector Phase	2	2	2	6	6	6	4	4	8	8	
Switch Phase											
Minimum Initial (s)	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	
Minimum Split (s)	25.7	25.7	25.7	25.7	25.7	25.7	29.8	29.8	29.8	29.8	
Total Split (s)	50.0	50.0	50.0	50.0	50.0	50.0	30.0	30.0	30.0	30.0	
Total Split (%)	62.5%	62.5%	62.5%	62.5%	62.5%	62.5%	37.5%	37.5%	37.5%	37.5%	
Maximum Green (s)	44.3	44.3	44.3	44.3	44.3	44.3	24.2	24.2	24.2	24.2	
Yellow Time (s)	3.3	3.3	3.3	3.3	3.3	3.3	3.3	3.3	3.3	3.3	
All-Red Time (s)	2.4	2.4	2.4	2.4	2.4	2.4	2.5	2.5	2.5	2.5	
Lost Time Adjust (s)		0.0	0.0		0.0	0.0		0.0		0.0	
Total Lost Time (s)		5.7	5.7		5.7	5.7		5.8		5.8	
Lead/Lag											
Lead-Lag Optimize?											
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	
Recall Mode	C-Max	C-Max	C-Max	C-Max	C-Max	C-Max	None	None	None	None	
Walk Time (s)	13.0	13.0	13.0	13.0	13.0	13.0	12.0	12.0	12.0	12.0	
Flash Dont Walk (s)	7.0	7.0	7.0	7.0	7.0	7.0	12.0	12.0	12.0	12.0	
Pedestrian Calls (#/hr)	85	85	85	82	82	82	81	81	35	35	
Act Effct Green (s)		51.6	51.6	· · ·	51.6	51.6		21.2		21.2	
Actuated g/C Ratio		0.64	0.64		0.64	0.64		0.26		0.26	
v/c Ratio		0.36	0.09		0.36	0.01		0.12		0.05	
Control Delay		5.1	0.5		10.4	0.0		16.2		17.6	
Queue Delay		0.0	0.0		0.0	0.0		0.0		0.0	
Total Delay		5.1	0.5		10.4	0.0		16.2		17.6	
LOS		A	A		В	A		В		В	
Approach Delay		4.3			10.2			16.2		17.6	
Approach LOS		Α.			В			В.		В.	
Queue Length 50th (m)		6.4	0.1		32.1	0.0		3.1		1.4	
Queue Length 95th (m)		11.3	0.3		50.9	0.0		10.2		5.7	
Internal Link Dist (m)		117.5	0.0		103.0	0.0		131.9		64.0	
Turn Bay Length (m)		117.5	20.0		100.0	20.0		101.0		0-1.0	
Base Capacity (vph)		1113	802		1114	795		417		419	
Starvation Cap Reductn		0	0		0	0		0		0	
Spillback Cap Reductn		0	0		0	0		0		0	
Storage Cap Reductn		0	0		0	0		0		0	
Reduced v/c Ratio		0.36	0.09		0.36	0.01		0.10		0.04	
Nouvodu Wo Mallo		0.50	0.03		0.50	0.01		0.10		0.04	

Intersection Summary

Cycle Length: 80

Actuated Cycle Length: 80

Offset: 50 (63%), Referenced to phase 2:EBTL and 6:WBTL, Start of Green

Natural Cycle: 60

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#### Lanes, Volumes, Timings 4: Friel & Rideau

#### Existing AM Peak Hour 112 Nelson Street

Control Type: Actuated-Coordinated		
Maximum v/c Ratio: 0.36		
Intersection Signal Delay: 7.6	Intersection LOS: A	
Intersection Capacity Utilization 70.1%	ICU Level of Service C	
Analysis Period (min) 15		

Splits and Phases: 4: Friel & Rideau

opilio una i ridoco. 4. i rioi a ridoca		
Ø2 (R)	<b>1</b> Ø4	
50 s	30 s	
₩ Ø6 (R)	Ø8	
50 s	30 s	

HCM 2010 AWSC Existing AM Peak Hour 5: Nelson & York Existing AM Peak Hour

	Intersection	
	Intersection Delay, s/veh	7.6
itersection LOS A	Intersection LOS	Α

EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
	44			43-			44			4	
11	18	8	62	14	5	16	23	26	6	23	2
11	18	8	62	14	5	16	23	26	6	23	2
0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
2	2	2	2	2	2	2	2	2	2	2	2
12	20	9	69	16	6	18	26	29	7	26	2
0	1	0	0	1	0	0	1	0	0	1	0
EB			WB			NB			SB		
WB			EB			SB			NB		
1			1			1			1		
SB			NB			EB			WB		
1			1			1			1		
NB			SB			WB			EB		
1			1			1			1		
7.4			7.8			7.4			7.5		
Α			Α			Α			Α		
	11 11 0.90 2 12 0 EB WB 1 SB 1 NB	11 18 11 18 0.90 0.90 2 2 12 20 0 1 EB WB 1 SB 1 NB 1 7.4	11 18 8 11 18 8 0.90 0.90 0.90 2 2 2 2 12 20 9 0 1 0 EB WB 1 SB 1 NB 1 7.4	11 18 8 62 11 18 8 62 0.90 0.90 0.90 0.90 2 2 2 2 2 12 20 9 69 0 1 0 0  EB WB WB B 1 1 SB NB 1 1 NB SB NB 1 1 NB SB 1 1 NB T NB	11 18 8 62 14 11 18 8 62 14 0.90 0.90 0.90 0.90 2 2 2 2 2 2 12 20 9 69 16 0 1 0 0 1  EB WB WB B SB 1 1 1 SB NB 1 1 1 SB NB 1 1 1 NB SB 1 1 1 NB SB 1 7,4 7,8	11	11	11	11	11	##

Lane	NBLn1	EBLn1	WBLn1	SBLn1
Vol Left, %	25%	30%	77%	19%
Vol Thru, %	35%	49%	17%	74%
Vol Right, %	40%	22%	6%	6%
Sign Control	Stop	Stop	Stop	Stop
Traffic Vol by Lane	65	37	81	31
LT Vol	16	11	62	6
Through Vol	23	18	14	23
RT Vol	26	8	5	2
Lane Flow Rate	72	41	90	34
Geometry Grp	1	1	1	1
Degree of Util (X)	0.08	0.047	0.107	0.04
Departure Headway (Hd)	3.998	4.119	4.268	4.218
Convergence, Y/N	Yes	Yes	Yes	Yes
Cap	884	859	833	837
Service Time	2.077	2.192	2.325	2.305
HCM Lane V/C Ratio	0.081	0.048	0.108	0.041
HCM Control Delay	7.4	7.4	7.8	7.5
HCM Lane LOS	Α	Α	Α	Α
HCM 95th-tile Q	0.3	0.1	0.4	0.1

Lanes, Volumes, Timings 1: King Edward & York

Existing PM Peak Hour 112 Nelson Street

				<b>†</b>	•	
Lane Group	EBR	WBR	NBL	NBT	SBT	SBR
Lane Configurations	7	7	ች	<del>ተ</del> ተጉ	<b>^</b>	7
Traffic Volume (vph)	76	10	90	850	724	29
Future Volume (vph)	76	10	90	850	724	29
Lane Group Flow (vph)	84	11	100	963	804	32
Turn Type	Free	Perm	pm+pt	NA	NA	Perm
Protected Phases			8	2	6	
Permitted Phases	Free	8	2			6
Detector Phase		8	8	2	6	6
Switch Phase						
Minimum Initial (s)		10.0	10.0	10.0	10.0	10.0
Minimum Split (s)		39.8	39.8	32.0	32.0	32.0
Total Split (s)		39.8	39.8	80.2	80.2	80.2
Total Split (%)		33.2%	33.2%	66.8%	66.8%	66.8%
Maximum Green (s)		33.0	33.0	74.2	74.2	74.2
Yellow Time (s)		3.3	3.3	3.0	3.0	3.0
All-Red Time (s)		3.5	3.5	3.0	3.0	3.0
Lost Time Adjust (s)		0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)		6.8	6.8	6.0	6.0	6.0
Lead/Lag						
Lead-Lag Optimize?						
Vehicle Extension (s)		3.0	3.0	3.0	3.0	3.0
Recall Mode		None	None	C-Max	C-Max	C-Max
Walk Time (s)		25.0	25.0	18.0	18.0	18.0
Flash Dont Walk (s)		8.0	8.0	8.0	8.0	8.0
Pedestrian Calls (#/hr)	100.0	109	109	52 74.2	108	108 74.2
Act Effet Green (s)	120.0	33.0	106.4	0.62	74.2 0.62	0.62
Actuated g/C Ratio	1.00	0.28	0.89			
v/c Ratio	0.06	0.02	0.13	0.33	0.39	0.05
Control Delay Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	0.0	0.0	0.0	11.3	12.2	2.8
LOS	0.1 A	0.1 A	0.8 A	11.3 B	12.2 B	2.8 A
Approach Delay	А	A	А	10.3	11.9	A
Approach LOS				10.3 B	11.9 B	
Queue Length 50th (m)	0.0	0.0	0.2	37.0	46.9	0.0
Queue Length 95th (m)	0.0	0.0	0.4	44.9	59.1	3.5
Internal Link Dist (m)	0.0	0.0	0.4	218.1	130.8	0.0
Turn Bay Length (m)			85.0	210.1	100.0	30.0
Base Capacity (vph)	1489	445	764	2930	2050	687
Starvation Cap Reductn	0	0	0	0	0	007
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.06	0.02	0.13	0.33	0.39	0.05
Intersection Summary	0.00	0.02	00	0.00	0.00	0.00

Cycle Length: 120
Actuated Cycle Length: 120
Offset: 58 (48%), Referenced to phase 2:NBTL and 6:SBT, Start of Green Natural Cycle: 75

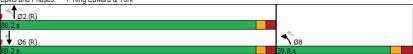
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#### Lanes, Volumes, Timings 1: King Edward & York

Existing PM Peak Hour 112 Nelson Street

Control Type: Actuated-Coordinated Maximum v/c Ratio: 0.39 Intersection Signal Delay: 10.5 Intersection Capacity Utilization 59.3% Analysis Period (min) 15 Intersection LOS: B
ICU Level of Service B

Splits and Phases: 1: King Edward & York



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	•	-	<b>←</b>	<b>†</b>	1	-	<b>↓</b>	1				
Lane Group	EBL	EBT	WBT	NBT	NBR	SBL	SBT	SBR	Ø1	Ø2	Ø3	Ø5
Lane Configurations	7	<b>†</b> î>	<b>†</b> î>	<b>^</b>	7	٦	<b>^</b>	7				
Traffic Volume (vph)	186	300	357	604	108	158	548	127				
Future Volume (vph)	186	300	357	604	108	158	548	127				
Lane Group Flow (vph)	207	361	517	671	120	176	609	141				
Turn Type	Prot	NA	NA	NA	custom	custom	NA	custom				
Protected Phases	11	12	56	3 4		13	7 8	11	1	2	3	5
Permitted Phases					4	8		8				
Detector Phase	11	12	56	3 4	4	13	7 8	11				
Switch Phase												
Minimum Initial (s)	5.0				10.0	5.0		5.0	1.0	10.0	1.0	1.0
Minimum Split (s)	11.2				23.7	9.5		11.2	5.0	29.8	5.0	5.0
Total Split (s)	27.0				29.0	12.0		27.0	5.0	59.0	5.0	5.0
Total Split (%)	24.5%				26.4%	10.9%		24.5%	5%	54%	5%	5%
Maximum Green (s)	20.8				22.3	7.5		20.8	3.0	52.2	3.0	3.0
Yellow Time (s)	3.3				3.0	3.5		3.3	2.0	3.3	2.0	2.0
All-Red Time (s)	2.9				3.7	1.0		2.9	0.0	3.5	0.0	0.0
Lost Time Adjust (s)	0.0				0.0	0.0		0.0				
Total Lost Time (s)	6.2				6.7	4.5		6.2				
Lead/Lag					Lag				Lead	Lag	Lead	Lead
Lead-Lag Optimize?					Yes				Yes	Yes	Yes	Yes
Vehicle Extension (s)	3.0				3.0	3.0		3.0	3.0	3.0	3.0	3.0
Recall Mode	Max				Max	Max		Max	Max	C-Max	Max	Max
Walk Time (s)					2.0				3.0	2.0	3.0	3.0
Flash Dont Walk (s)					15.0				0.0	21.0	0.0	0.0
Pedestrian Calls (#/hr)					150				321	321	150	458
Act Effct Green (s)	20.8	62.0	35.0	32.0	22.3	36.5	44.0	55.6				
Actuated g/C Ratio	0.19	0.56	0.32	0.29	0.20	0.33	0.40	0.51				
v/c Ratio	0.66	0.20	0.58	0.70	0.37	0.83	0.46	0.22				
Control Delay	52.6	11.7	34.5	39.2	3.3	71.5	25.7	11.0				
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0				
Total Delay	52.6	11.7	34.5	39.2	3.3	71.5	25.7	11.0				
LOS	D	В	С	D	Α	Е	С	В				
Approach Delay		26.6	34.5	33.8			32.1					
Approach LOS		С	С	С			С					
Queue Length 50th (m)	41.6	18.2	48.6	67.3	0.0	28.1	49.7	12.3				
Queue Length 95th (m)	66.4	26.0	66.0	87.6	0.0	#61.2	65.4	21.2				
Internal Link Dist (m)		125.5	140.5	133.0			218.1					
Turn Bay Length (m)	65.0				20.0	105.0		95.0				
Base Capacity (vph)	313	1774	890	964	321	212	1326	631				
Starvation Cap Reductn	0	0	0	0	0	0	0	0				
Spillback Cap Reductn	0	0	0	0	0	0	0	0				
Storage Cap Reductn	0	0	0	0	0	0	0	0				
Reduced v/c Ratio	0.66	0.20	0.58	0.70	0.37	0.83	0.46	0.22				
Intersection Summary												

n	t	e	rs	66	91	t	0	n	k	S	U	I	n	r	n	a	r	y	

Cycle Length: 110
Actuated Cycle Length: 110
Offset: 92 (84%), Referenced to phase 2:EBT and 6:WBT, Start of Green Natural Cycle: 90

Lane Group	Ø6	Ø7	Ø8
Lane Configurations			
Traffic Volume (vph)			
Future Volume (vph)			
Lane Group Flow (vph)			
Turn Type			
Protected Phases	6	7	8
Permitted Phases	0	- 1	0
Detector Phases			
Switch Phase			
	40.0	4.0	40.0
Minimum Initial (s)	10.0	1.0	10.0
Minimum Split (s)	31.8	5.0	25.9
Total Split (s)	32.0	5.0	41.0
Total Split (%)	29%	5%	37%
Maximum Green (s)	25.2	3.0	34.1
Yellow Time (s)	3.3	2.0	3.0
All-Red Time (s)	3.5	0.0	3.9
Lost Time Adjust (s)			
Total Lost Time (s)			
Lead/Lag	Lag	Lead	Lag
Lead-Lag Optimize?	Yes	Yes	Yes
Vehicle Extension (s)	3.0	3.0	3.0
Recall Mode	C-Max	Max	Max
Walk Time (s)	2.0	3.0	2.0
Flash Dont Walk (s)	23.0	0.0	17.0
Pedestrian Calls (#/hr)	458	141	141
Act Effct Green (s)	450	141	141
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			
TOURDOU VIO INDIO			
Intersection Summary			

Lanes, Volumes, Timings 2: King Edward & Rideau Existing PM Peak Hour 112 Nelson Street Lanes, Volumes, Timings 3: Nelson & Rideau

Existing PM Peak Hour 112 Nelson Street

Control Type: Actuated-Coordinated		
Maximum v/c Ratio: 0.83		
Intersection Signal Delay: 31.9	Intersection LOS: C	
Intersection Capacity Utilization 67.8%	ICU Level of Service C	
Analysis Period (min) 15		
# 95th percentile volume exceeds capacity, queue	may be longer.	
Queue shown is maximum after two cycles.		

Splits and Phases: 2: King Edward & Rideau

	۶	<b>→</b>	*	•	<b>←</b>	*	1	†	/	ļ	
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	SBL	SBT	
Lane Configurations	7	<b>†</b>	7	ሻ	<b>†</b>	7		4		4	
Traffic Volume (vph)	88	470	8	7	391	158	2	3	71	1	
Future Volume (vph)	88	470	8	7	391	158	2	3	71	1	
Lane Group Flow (vph)	98	522	9	8	434	176	0	21	0	179	
Turn Type	pm+pt	NA	Perm	Perm	NA	Perm	Perm	NA	Perm	NA	
Protected Phases	5	2			6			4		8	
Permitted Phases	2		2	6		6	4		8		
Detector Phase	5	2	2	6	6	6	4	4	8	8	
Switch Phase											
Minimum Initial (s)	5.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	
Minimum Split (s)	10.8	26.8	26.8	26.8	26.8	26.8	27.0	27.0	27.0	27.0	
Total Split (s)	12.0	60.0	60.0	48.0	48.0	48.0	30.0	30.0	30.0	30.0	
Total Split (%)	13.3%	66.7%	66.7%	53.3%	53.3%	53.3%	33.3%	33.3%	33.3%	33.3%	
Maximum Green (s)	6.2	54.2	54.2	42.2	42.2	42.2	24.0	24.0	24.0	24.0	
Yellow Time (s)	3.3	3.3	3.3	3.3	3.3	3.3	3.3	3.3	3.3	3.3	
All-Red Time (s)	2.5	2.5	2.5	2.5	2.5	2.5	2.7	2.7	2.7	2.7	
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0		0.0		0.0	
Total Lost Time (s)	5.8	5.8	5.8	5.8	5.8	5.8		6.0		6.0	
Lead/Lag	Lead			Lag	Lag	Lag					
Lead-Lag Optimize?	Yes			Yes	Yes	Yes					
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	
Recall Mode	None	C-Max	C-Max	C-Max	C-Max	C-Max	Max	Max	Max	Max	
Walk Time (s)		15.0	15.0	15.0	15.0	15.0	7.0	7.0	7.0	7.0	
Flash Dont Walk (s)		6.0	6.0	6.0	6.0	6.0	14.0	14.0	14.0	14.0	
Pedestrian Calls (#/hr)		290	290	500	500	500	313	313	139	139	
Act Effct Green (s)	54.2	54.2	54.2	44.6	44.6	44.6		24.0		24.0	
Actuated g/C Ratio	0.60	0.60	0.60	0.50	0.50	0.50		0.27		0.27	
v/c Ratio	0.26	0.50	0.02	0.03	0.50	0.56		0.09		0.63	
Control Delay	9.5	12.2	0.1	10.3	12.7	9.5		14.6		29.2	
Queue Delay	0.0	0.6	0.0	0.0	0.2	0.0		0.0		0.0	
Total Delay	9.5	12.8	0.1	10.3	12.9	9.5		14.6		29.2	
LOS	Α	В	Α	В	В	Α		В		С	
Approach Delay		12.1			11.9			14.6		29.2	
Approach LOS		В			В			В		С	
Queue Length 50th (m)	6.6	46.9	0.0	0.4	28.8	1.5		0.6		16.6	
Queue Length 95th (m)	12.8	70.8	0.0	m1.1	39.8	8.7		6.2		#40.5	
Internal Link Dist (m)		140.5			117.5			126.5		218.8	
Turn Bay Length (m)	40.0		20.0	10.0		20.0					
Base Capacity (vph)	372	1050	429	303	864	316		245		283	
Starvation Cap Reductn	0	220	0	0	73	0		0		0	
Spillback Cap Reductn	0	0	0	0	0	0		0		0	
Storage Cap Reductn	0	0	0	0	0	0		0		0	
Reduced v/c Ratio	0.26	0.63	0.02	0.03	0.55	0.56		0.09		0.63	

Intersection Summary
Cycle Length: 90
Actuated Cycle Length: 90
Offset: 52 (58%), Referenced to phase 2:EBTL and 6:WBTL, Start of Green
Natural Cycle: 65

Lanes, Volumes, Timings 3: Nelson & Rideau

Existing PM Peak Hour 112 Nelson Street

Control Type: Actuated-Coordinated Maximum v/c Ratio: 0.63 Intersection Signal Delay: 14.2 Intersection LOS: B Intersection Capacity Utilization 69.6% Analysis Period (min) 15 ICU Level of Service C # 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: Nelson & Rideau



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Lanes, Volumes, Timings 4: Friel & Rideau

Existing PM Peak Hour 112 Nelson Street

	•	<b>→</b>	*	•	-	*	1	†	/	Į.	
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	SBL	SBT	
Lane Configurations		ર્ન	7		ર્ન	7		4		4	
Traffic Volume (vph)	4	478	65	22	449	9	75	3	14	4	
Future Volume (vph)	4	478	65	22	449	9	75	3	14	4	
Lane Group Flow (vph)	0	535	72	0	523	10	0	110	0	29	
Turn Type	Perm	NA	Perm	Perm	NA	Perm	Perm	NA	Perm	NA	
Protected Phases		2			6			4		8	
Permitted Phases	2		2	6		6	4		8		
Detector Phase	2	2	2	6	6	6	4	4	8	8	
Switch Phase											
Minimum Initial (s)	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	
Minimum Split (s)	25.7	25.7	25.7	25.7	25.7	25.7	29.8	29.8	29.8	29.8	
Total Split (s)	60.0	60.0	60.0	60.0	60.0	60.0	30.0	30.0	30.0	30.0	
Total Split (%)	66.7%	66.7%	66.7%	66.7%	66.7%	66.7%	33.3%	33.3%	33.3%	33.3%	
Maximum Green (s)	54.3	54.3	54.3	54.3	54.3	54.3	24.2	24.2	24.2	24.2	
Yellow Time (s)	3.3	3.3	3.3	3.3	3.3	3.3	3.3	3.3	3.3	3.3	
All-Red Time (s)	2.4	2.4	2.4	2.4	2.4	2.4	2.5	2.5	2.5	2.5	
Lost Time Adjust (s)		0.0	0.0		0.0	0.0		0.0		0.0	
Total Lost Time (s)		5.7	5.7		5.7	5.7		5.8		5.8	
Lead/Lag											
Lead-Lag Optimize?											
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	
Recall Mode	C-Max	C-Max	C-Max	C-Max	C-Max	C-Max	None	None	None	None	
Walk Time (s)	13.0	13.0	13.0	13.0	13.0	13.0	12.0	12.0	12.0	12.0	
Flash Dont Walk (s)	7.0	7.0	7.0	7.0	7.0	7.0	12.0	12.0	12.0	12.0	
Pedestrian Calls (#/hr)	181	181	181	192	192	192	95	95	78	78	
Act Effct Green (s)		57.3	57.3		57.3	57.3		21.2		21.2	
Actuated g/C Ratio		0.64	0.64		0.64	0.64		0.24		0.24	
v/c Ratio		0.48	0.13		0.49	0.02		0.41		0.10	
Control Delay		4.9	0.9		11.5	0.2		28.5		20.2	
Queue Delay		0.1	0.0		0.0	0.0		0.0		0.0	
Total Delay		5.0	0.9		11.5	0.2		28.5		20.2	
LOS		Α	Α		В	Α		С		С	
Approach Delay		4.5			11.3			28.5		20.2	
Approach LOS		A			В			С		С	
Queue Length 50th (m)		15.7	0.2		47.4	0.0		13.2		2.6	
Queue Length 95th (m)		23.2	m1.0		72.2	0.3		27.8		9.1	
Internal Link Dist (m)		117.5	00.0		103.0	00.0		131.9		64.0	
Turn Bay Length (m)		4400	20.0		400=	20.0					
Base Capacity (vph)		1106	562		1065	535		307		338	
Starvation Cap Reductn		53	0		0	0		0		0	
Spillback Cap Reductn		0	0		0	0		0		0	
Storage Cap Reductn		0	0		0	0		0		0	
Reduced v/c Ratio		0.51	0.13		0.49	0.02		0.36		0.09	

#### Intersection Summary

Cycle Length: 90

Actuated Cycle Length: 90

Offset: 48 (53%), Referenced to phase 2:EBTL and 6:WBTL, Start of Green

Natural Cycle: 60

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#### Lanes, Volumes, Timings 4: Friel & Rideau

Existing PM Peak Hour

112 Nelson Street

Control Type: Actuated-Coordinated Maximum v/c Ratio: 0.49 Intersection LOS: A ICU Level of Service D Intersection Signal Delay: 9.8 Intersection Capacity Utilization 77.3% Analysis Period (min) 15 m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 4: Friel & Rideau

→ Ø2 (R)	<b>↑</b> Ø4
60 s	30 s
<b>♦</b> Ø6 (R)	<b>↓</b> Ø8
60 s	30 s

HCM 2010 AWSC Existing PM Peak Hour 112 Nelson Street 5: Nelson & York

Intersection Intersection Delay, s/veh Intersection LOS 7.8

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		4			4			4			44	
Traffic Vol, veh/h	4	8	10	43	0	43	0	98	66	4	19	6
Future Vol, veh/h	4	8	10	43	0	43	0	98	66	4	19	6
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	4	9	11	48	0	48	0	109	73	4	21	7
Number of Lanes	0	1	0	0	1	0	0	1	0	0	1	0
Approach	EB			WB				NB		SB		
Opposing Approach	WB			EB				SB		NB		
Opposing Lanes	1			1				1		1		
Conflicting Approach Left	SB			NB				EB		WB		
Conflicting Lanes Left	1			1				1		1		
Conflicting Approach Right	NB			SB				WB		EB		
Conflicting Lanes Right	1			1				1		1		
HCM Control Delay	7.4			7.7				8		7.4		
HCM LOS	Α			Α				Α		Α		

Lane	NBLn1	EBLn1	WBLn1	SBLn1
Vol Left, %	0%	18%	50%	14%
Vol Thru, %	60%	36%	0%	66%
Vol Right, %	40%	45%	50%	21%
Sign Control	Stop	Stop	Stop	Stop
Traffic Vol by Lane	164	22	86	29
LT Vol	0	4	43	4
Through Vol	98	8	0	19
RT Vol	66	10	43	6
Lane Flow Rate	182	24	96	32
Geometry Grp	1	1	1	1
Degree of Util (X)	0.199	0.029	0.109	0.037
Departure Headway (Hd)	3.926	4.257	4.125	4.188
Convergence, Y/N	Yes	Yes	Yes	Yes
Cap	904	846	855	841
Service Time	1.993	2.257	2.218	2.284
HCM Lane V/C Ratio	0.201	0.028	0.112	0.038
HCM Control Delay	8	7.4	7.7	7.4
HCM Lane LOS	Α	Α	Α	Α
HCM 95th-tile Q	0.7	0.1	0.4	0.1

# Appendix D

Collision Data

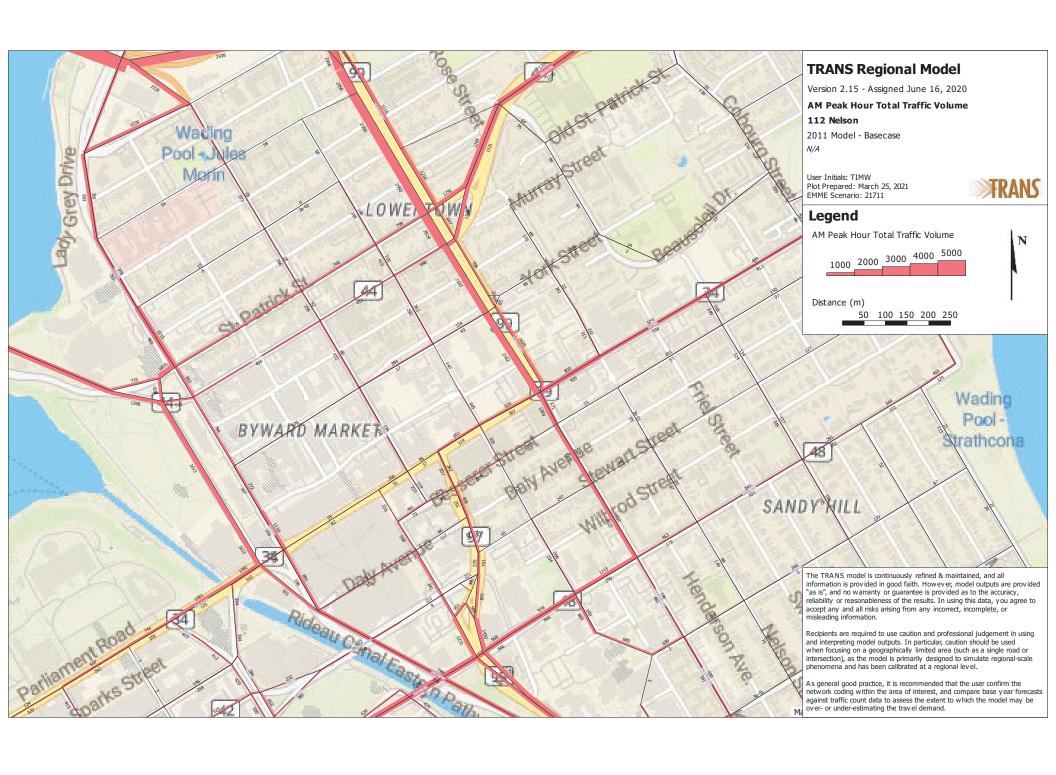


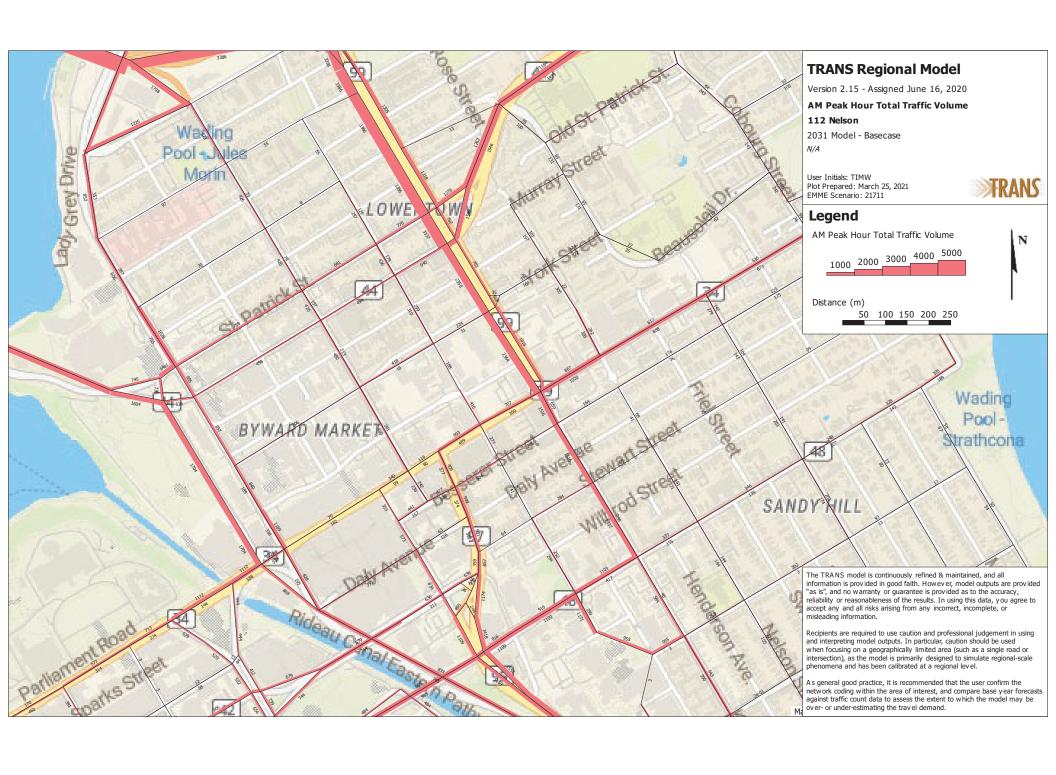
						Traffic Control	Traffic Control Condition	Classification Of Accident			# Vehicles			# Pedestrians
Accident Date 2017-12-28	Accident Year 2017	Accident Time 8:30	Location KING EDWARD AVE @ YORK ST (0008244)	Environment Condition 01 - Clear	Light 01 - Daylight	01 - Traffic signal	01 - Functioning	03 - P.D. only	Initial Impact Type 03 - Rear end	Road Surface Condition 01 - Dry	# venicies 2	# Motorcycles 0	# Bicycles 0	# Pedestrians
2017-02-20	2017	13:15	KING EDWARD AVE @ YORK ST (0008244)	01 - Clear	01 - Daylight	01 - Traffic signal	01 - Functioning	03 - P.D. only	03 - Rear end	01 - Dry	2	0	0	0
2018-09-14	2018	14:40	KING EDWARD AVE @ YORK ST (0008244)	01 - Clear	01 - Daylight	01 - Traffic signal	01 - Functioning	03 - P.D. only	03 - Rear end	01 - Dry	2	0	0	0
2018-08-29	2018	16:07	KING EDWARD AVE @ YORK ST (0008244)	01 - Clear	01 - Daylight	01 - Traffic signal	01 - Functioning	03 - P.D. only	03 - Rear end	01 - Dry	2	0	0	0
2018-09-19	2018	14:50	KING EDWARD AVE @ YORK ST (0008244)	01 - Clear	01 - Daylight	01 - Traffic signal	01 - Functioning	03 - P.D. only	05 - Turning movement	01 - Dry	2	0	0	0
2018-09-18 2019-10-10	2018 2019	16:15 13:11	KING EDWARD AVE @ YORK ST (0008244) KING EDWARD AVE @ YORK ST (0008244)	01 - Clear 01 - Clear	01 - Daylight 01 - Daylight	01 - Traffic signal 01 - Traffic signal	01 - Functioning 00 - Unknown	03 - P.D. only 03 - P.D. only	02 - Angle 04 - Sideswipe	01 - Dry 01 - Dry	2	0	0	0
2019-10-10	2019	16:30	KING EDWARD AVE @ YORK ST (0008244)	01 - Clear	OS - Daylight	01 - Traffic signal	01 - Functioning	03 - P.D. only	04 - Sideswipe	01 - DI y	2	0	0	0
2019-04-19	2019	22:00	KING EDWARD AVE @ YORK ST (0008244)	02 - Rain	07 - Dark	01 - Traffic signal	01 - Functioning	02 - Non-fatal injury	05 - Turning movement	02 - Wet	2	0	0	0
2020-03-17	2020	8:33	KING EDWARD AVE @ YORK ST (0008244)	04 - Freezing Rain	01 - Daylight	01 - Traffic signal	01 - Functioning	02 - Non-fatal injury	03 - Rear end	04 - Slush	3	0	0	0
2020-08-03	2020	21:34	KING EDWARD AVE @ YORK ST (0008244)	01 - Clear	07 - Dark	01 - Traffic signal	01 - Functioning	03 - P.D. only	05 - Turning movement	01 - Dry	2	0	0	0
2016-12-15 2016-03-15	2016 2016	16:09 16:55	NELSON ST @ RIDEAU ST (0007626)	01 - Clear 02 - Rain	05 - Dusk	01 - Traffic signal	01 - Functioning	03 - P.D. only 03 - P.D. only	05 - Turning movement	01 - Dry 02 - Wet	2	0	0	0
2016-03-15	2016	21:47	NELSON ST @ RIDEAU ST (0007626) NELSON ST @ RIDEAU ST (0007626)	02 - Kairi 01 - Clear	01 - Daylight 07 - Dark	01 - Traffic signal 01 - Traffic signal	01 - Functioning 01 - Functioning	03 - P.D. only 02 - Non-fatal injury	05 - Turning movement 05 - Turning movement	02 - Wet 01 - Dry	2	0	1	0
2016-08-25	2016	16:23	NELSON ST @ RIDEAU ST (0007626)	01 - Clear	01 - Daylight	01 - Traffic signal	01 - Functioning	02 - Non-fatal injury	05 - Turning movement	01 - Dry	2	0	1	Ö
2017-10-12	2017	15:38	NELSON ST @ RIDEAU ST (0007626)	01 - Clear	01 - Daylight	01 - Traffic signal	01 - Functioning	02 - Non-fatal injury	07 - SMV other	01 - Dry	1	0	0	1
2017-11-15	2017	11:24	NELSON ST @ RIDEAU ST (0007626)	01 - Clear	01 - Daylight	01 - Traffic signal	01 - Functioning	03 - P.D. only	04 - Sideswipe	01 - Dry	2	0	0	0
2017-06-04	2017	16:14	NELSON ST @ RIDEAU ST (0007626)	01 - Clear	01 - Daylight	01 - Traffic signal	00 - Unknown	03 - P.D. only	05 - Turning movement	01 - Dry	2	0	0	0
2017-07-16	2017 2017	14:30 13:46	NELSON ST @ RIDEAU ST (0007626)	01 - Clear 01 - Clear	01 - Daylight	01 - Traffic signal	01 - Functioning 00 - Unknown	03 - P.D. only	04 - Sideswipe	01 - Dry	2	0	0	0
2017-07-27	2017	13:46 11:55	NELSON ST @ RIDEAU ST (0007626) NELSON ST @ RIDEAU ST (0007626)	01 - Clear 01 - Clear	01 - Daylight 01 - Daylight	01 - Traffic signal 01 - Traffic signal	00 - Unknown 01 - Functioning	03 - P.D. only 03 - P.D. only	05 - Turning movement 04 - Sideswipe	01 - Dry 01 - Dry	2	0	0	0
2018-04-03	2018	17:40	NELSON ST @ RIDEAU ST (0007626)	01 - Clear	01 - Daylight	01 - Traffic signal	01 - Functioning	03 - P.D. only	99 - Other	01 - Dry	2	0	0	Ö
2018-05-03	2018	12:30	NELSON ST @ RIDEAU ST (0007626)	02 - Rain	01 - Daylight	01 - Traffic signal	01 - Functioning	02 - Non-fatal injury	07 - SMV other	02 - Wet	1	0	0	1
2018-05-20	2018	21:00	NELSON ST @ RIDEAU ST (0007626)	01 - Clear	07 - Dark	01 - Traffic signal	01 - Functioning	02 - Non-fatal injury	07 - SMV other	01 - Dry	1	0	0	1
2018-06-03	2018	17:52	NELSON ST @ RIDEAU ST (0007626)	01 - Clear	01 - Daylight	01 - Traffic signal	01 - Functioning	02 - Non-fatal injury	05 - Turning movement	01 - Dry	2	0	0	0
2019-03-08 2019-04-01	2019 2019	16:13 9:16	NELSON ST @ RIDEAU ST (0007626) NELSON ST @ RIDEAU ST (0007626)	01 - Clear	01 - Daylight	01 - Traffic signal 01 - Traffic signal	01 - Functioning	03 - P.D. only	03 - Rear end	01 - Dry	2	0	0	0
2019-04-01	2019	15:45	NELSON ST @ RIDEAU ST (0007626)	01 - Clear 01 - Clear	01 - Daylight 01 - Daylight	01 - Traffic signal	01 - Functioning 01 - Functioning	02 - Non-fatal injury 02 - Non-fatal injury	07 - SMV other 02 - Angle	01 - Dry 01 - Dry	2	0	0	0
2019-04-16	2019	9:15	NELSON ST @ RIDEAU ST (0007626)	01 - Clear	01 - Daylight	01 - Traffic signal	01 - Functioning	03 - P.D. only	04 - Sideswipe	01 - Dry	2	0	ō	0
2019-06-27	2019	18:00	NELSON ST @ RIDEAU ST (0007626)	01 - Clear	01 - Daylight	01 - Traffic signal	01 - Functioning	03 - P.D. only	03 - Rear end	01 - Dry	2	0	0	0
2020-02-28	2020	18:15	NELSON ST @ RIDEAU ST (0007626)	01 - Clear	07 - Dark	01 - Traffic signal	01 - Functioning	03 - P.D. only	04 - Sideswipe	01 - Dry	2	0	0	0
2016-06-26	2016	11:00	KING EDWARD AVE NB btwn CLARENCE ST & YORK ST (3ZA3WR)	01 - Clear	01 - Daylight	10 - No control	0	03 - P.D. only	06 - SMV unattended vehicle		1	0	0	0
2018-04-27 2018-06-14	2018 2018	15:46 15:18	KING EDWARD AVE NB btwn CLARENCE ST & YORK ST (3ZA3WR) KING EDWARD AVE NB btwn CLARENCE ST & YORK ST (3ZA3WR)	01 - Clear 01 - Clear	01 - Daylight 01 - Daylight	10 - No control 10 - No control	0	03 - P.D. only 03 - P.D. only	03 - Rear end 03 - Rear end	01 - Dry 01 - Dry	2	0	0	0
2020-04-21	2020	22:04	KING EDWARD AVE NB blwn CLARENCE ST & YORK ST ( 3ZA3WR)	01 - Clear	07 - Daylight	10 - No control	0	03 - P.D. only	06 - SMV unattended vehicle	01 - Dry	1	0	0	0
2020-06-20	2020	15:11	KING EDWARD AVE NB btwn CLARENCE ST & YORK ST ( 3ZA3WR)	01 - Clear	01 - Daylight	10 - No control	0	03 - P.D. only	06 - SMV unattended vehicle	01 - Dry	1	0	ō	0
2020-08-23	2020	5:33	KING EDWARD AVE NB btwn CLARENCE ST & YORK ST (3ZA3WR)	01 - Clear	07 - Dark	10 - No control	0	03 - P.D. only	06 - SMV unattended vehicle	01 - Dry	1	0	0	0
2016-11-05	2016	15:44	KING EDWARD AVE NB btwn YORK ST & RIDEAU ST (3ZA1ZH)	01 - Clear	01 - Daylight	10 - No control	0	03 - P.D. only	06 - SMV unattended vehicle	01 - Dry	1	0	0	0
2016-12-02	2016	10:37	KING EDWARD AVE NB btwn YORK ST & RIDEAU ST (3ZA1ZH)	01 - Clear	01 - Daylight	10 - No control	0	03 - P.D. only	02 - Angle	02 - Wet	2	0	0	0
2016-12-13 2016-02-22	2016 2016	15:03 13:30	KING EDWARD AVE NB btwn YORK ST & RIDEAU ST (3ZA1ZH) KING EDWARD AVE NB btwn YORK ST & RIDEAU ST (3ZA1ZH)	01 - Clear 01 - Clear	01 - Daylight 01 - Daylight	10 - No control 10 - No control	0	02 - Non-fatal injury 03 - P.D. only	07 - SMV other 02 - Angle	02 - Wet 01 - Dry	1 2	0	0	1
2016-03-30	2016	17:42	KING EDWARD AVE NB btwn YORK ST & RIDEAU ST ( 3ZA1ZH)	01 - Clear	01 - Daylight	10 - No control	0	03 - P.D. only	04 - Sideswipe	01 - Dry	2	0	0	0
2016-04-11	2016	6:41	KING EDWARD AVE NB btwn YORK ST & RIDEAU ST (3ZA1ZH)	04 - Freezing Rain	01 - Daylight	10 - No control	0	02 - Non-fatal injury	99 - Other	02 - Wet	4	0	ō	0
2019-07-13	2019	6:54	KING EDWARD AVE NB btwn YORK ST & RIDEAU ST (3ZA1ZH)	01 - Clear	01 - Daylight	10 - No control	0	02 - Non-fatal injury	07 - SMV other	01 - Dry	1	0	0	1
2016-01-01	2016	22:35	NELSON ST btwn YORK ST & RIDEAU ST (3ZA82D)	03 - Snow	07 - Dark	10 - No control	0	03 - P.D. only	04 - Sideswipe	03 - Loose snow	2	0	0	0
2016-04-10 2018-07-22	2016 2018	13:42 5:30	NELSON ST btwn YORK ST & RIDEAU ST (3ZA82D)  NELSON ST btwn YORK ST & RIDEAU ST (_3ZA82D)	01 - Clear 01 - Clear	01 - Daylight 03 - Dawn	10 - No control 10 - No control	0	03 - P.D. only 03 - P.D. only	06 - SMV unattended vehicle 04 - Sideswipe	01 - Dry 01 - Dry	1	0	0	0
2018-07-22	2018	19:40	NELSON ST DIWN YORK ST & RIDEAU ST (_3ZA82D)	02 - Rain	01 - Daylight	10 - No control	0	03 - P.D. only	04 - Sideswipe 04 - Sideswipe	01 - Dry 02 - Wet	2	0	0	0
2019-09-19	2019	15:55	NELSON ST btwn YORK ST & RIDEAU ST ( 3ZA82D)	01 - Clear	01 - Daylight	10 - No control	0	03 - P.D. only	02 - Angle	01 - Dry	2	0	0	0
2019-11-16	2019	20:49	NELSON ST btwn YORK ST & RIDEAU ST (3ZA82D)	01 - Clear	07 - Dark	10 - No control	0	03 - P.D. only	04 - Sideswipe	01 - Dry	2	0	0	0
2019-12-06	2019	14:35	NELSON ST btwn YORK ST & RIDEAU ST (3ZA82D)	01 - Clear	01 - Daylight	10 - No control	0	03 - P.D. only	02 - Angle	01 - Dry	2	0	0	0
2019-12-19	2019	13:00	NELSON ST btwn YORK ST & RIDEAU ST (3ZA82D)	01 - Clear	01 - Daylight	10 - No control	0	03 - P.D. only	02 - Angle	02 - Wet	2	0	0	0
2020-11-11 2019-05-08	2020 2019	20:30 16:00	NELSON ST btwn YORK ST & RIDEAU ST (3ZA82D) YORK ST btwn TURN LANE & NELSON ST (3ZA7AE)	01 - Clear 01 - Clear	07 - Dark 01 - Daylight	10 - No control 10 - No control	0	03 - P.D. only 03 - P.D. only	06 - SMV unattended vehicle 02 - Angle	01 - Dry 01 - Dry	1	0	0	0
2019-03-08	2019	8:55	RIDEAU ST btwn NELSON ST & FRIEL ST ( 3ZA3WJ)	01 - Clear	01 - Daylight	10 - No control	0	02 - Non-fatal injury	02 - Aligie 03 - Rear end	01 - DI y	2	0	0	0
2016-08-08	2016	14:17	RIDEAU ST btwn NELSON ST & FRIEL ST ( 3ZA3WJ)	01 - Clear	01 - Daylight	10 - No control	0	03 - P.D. only	04 - Sideswipe	01 - Dry	2	1	ō	ō
2017-01-09	2017	14:29	RIDEAU ST btwn NELSON ST & FRIEL ST (3ZA3WJ)	01 - Clear	01 - Daylight	10 - No control	0	03 - P.D. only	06 - SMV unattended vehicle	01 - Dry	1	0	0	0
2017-09-14	2017	14:45	RIDEAU ST btwn NELSON ST & FRIEL ST (3ZA3WJ)	01 - Clear	01 - Daylight	10 - No control	0	02 - Non-fatal injury	07 - SMV other	01 - Dry	1	0	0	1
2018-03-02	2018	20:06	RIDEAU ST btwn NELSON ST & FRIEL ST (3ZA3WJ)	01 - Clear	07 - Dark	10 - No control	0	03 - P.D. only	99 - Other	03 - Loose snow	2	0	0	0
2018-03-13	2018	10:03	RIDEAU ST btwn NELSON ST & FRIEL ST (3ZA3WJ)	03 - Snow	01 - Daylight	10 - No control	0	03 - P.D. only	05 - Turning movement	02 - Wet	2	0	0	0
2019-01-25 2019-02-04	2019 2019	22:00 6:00	RIDEAU ST btwn NELSON ST & FRIEL ST (3ZA3WJ) RIDEAU ST btwn NELSON ST & FRIEL ST (3ZA3WJ)	03 - Snow 01 - Clear	07 - Dark 07 - Dark	10 - No control 10 - No control	0	03 - P.D. only 03 - P.D. only	07 - SMV other 05 - Turning movement	06 - Ice 03 - Loose snow	1	0	0	0
2019-01-30	2019	21:00	RIDEAU ST btwn NELSON ST & FRIEL ST ( 3ZA3WJ)	01 - Clear	07 - Dark	10 - No control	0	03 - P.D. only	03 - Rear end	02 - Wet	2	0	0	Ö
2019-07-28	2019	3:03	RIDEAU ST btwn NELSON ST & FRIEL ST ( 3ZA3WJ)	01 - Clear	07 - Dark	10 - No control	0	03 - P.D. only	06 - SMV unattended vehicle		1	0	ō	0
2020-02-16	2020	4:49	RIDEAU ST btwn NELSON ST & FRIEL ST (3ZA3WJ)	01 - Clear	07 - Dark	10 - No control	0	02 - Non-fatal injury	01 - Approaching	02 - Wet	2	0	0	0
2020-08-23	2020	11:21	RIDEAU ST btwn NELSON ST & FRIEL ST (3ZA3WJ)	01 - Clear	01 - Daylight	10 - No control	0	03 - P.D. only	05 - Turning movement	01 - Dry	2	0	0	0
2016-10-28	2016	18:46	RIDEAU ST btwn KING EDWARD AVE & NELSON ST (3ZA3VG)	01 - Clear	07 - Dark	10 - No control	0	03 - P.D. only	05 - Turning movement	01 - Dry	2	0	0	0
2016-12-26 2016-07-23	2016	12:33 11:00	RIDEAU ST btwn KING EDWARD AVE & NELSON ST (_3ZA3VG)	04 - Freezing Rain	01 - Daylight	10 - No control	0	02 - Non-fatal injury	05 - Turning movement 07 - SMV other	06 - Ice 01 - Dry	2	0	0	0
2016-07-23	2016 2016	11:00	RIDEAU ST btwn KING EDWARD AVE & NELSON ST (3ZA3VG) RIDEAU ST btwn KING EDWARD AVE & NELSON ST (3ZA3VG)	01 - Clear 01 - Clear	01 - Daylight 01 - Daylight	10 - No control 10 - No control	0	03 - P.D. only 02 - Non-fatal injury	07 - SMV other 05 - Turning movement	01 - Dry 01 - Dry	1	0	1	0
2016-09-16	2016	16:21	RIDEAU ST blwn KING EDWARD AVE & NELSON ST ( 3ZA3VG)	01 - Clear	01 - Daylight	10 - No control	0	03 - P.D. only	02 - Angle	01 - Dry	2	ő	ō	ő
2017-06-03	2017	14:30	RIDEAU ST btwn KING EDWARD AVE & NELSON ST (_3ZA3VG)	01 - Clear	01 - Daylight	10 - No control	0	03 - P.D. only	02 - Angle	01 - Dry	2	o o	o	o o
2017-07-18	2017	21:30	RIDEAU ST btwn KING EDWARD AVE & NELSON ST (3ZA3VG)	01 - Clear	07 - Dark	10 - No control	0	02 - Non-fatal injury	07 - SMV other	01 - Dry	1	1	0	0
2018-11-07	2018	12:24	RIDEAU ST btwn KING EDWARD AVE & NELSON ST (_3ZA3VG)	01 - Clear	01 - Daylight	10 - No control	0	02 - Non-fatal injury	99 - Other	01 - Dry	2	0	0	0
2018-02-07 2018-06-17	2018 2018	19:03 23:54	RIDEAU ST btwn KING EDWARD AVE & NELSON ST (_3ZA3VG) RIDEAU ST btwn KING EDWARD AVE & NELSON ST (_3ZA3VG)	03 - Snow 01 - Clear	07 - Dark 07 - Dark	10 - No control 10 - No control	0	03 - P.D. only 03 - P.D. only	04 - Sideswipe 05 - Turning movement	03 - Loose snow 01 - Dry	3	0	0	0
2018-06-17	2018 2018	23:54 14:30	RIDEAU ST DIWN KING EDWARD AVE & NELSON ST (3ZA3VG) RIDEAU ST DIWN KING EDWARD AVE & NELSON ST (3ZA3VG)	01 - Clear 01 - Clear	07 - Dark 01 - Daylight	10 - No control 10 - No control	0	03 - P.D. only 03 - P.D. only	05 - Turning movement 02 - Angle	01 - Dry 01 - Dry	2	0	0	0
2018-07-13	2018	14:50	NIDERO 31 DIWITNING EDWARD AVE & NELSON ST (32A3VG)	ui - ciear	u1 - Dayright	TO - NO COUCTOI	U	U3 - P.D. Only	uz - Angle	U1 - DIY	2	U	U	U

# Appendix E

Synchro Intersection Worksheets – 2022 Future Background Conditions





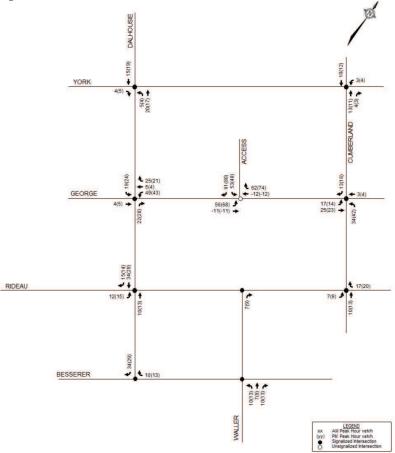


# Appendix F

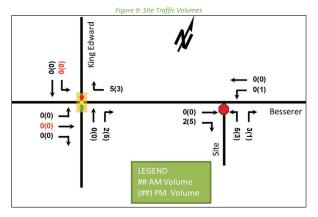
**Background Development Volumes** 







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# Appendix G

Synchro Intersection Worksheets – Future Background 2024 & 2029



Lanes, Volumes, Timings 1: King Edward & York Future Background 2024 & 2029AM Peak Hour
112 Nelson Street

	-	*	1	<b>†</b>	Ţ
Lane Group	EBR	WBR	NBL	NBT	SBT
Lane Configurations	7	7	*	<b>441</b>	<b>11</b>
Traffic Volume (vph)	47	15	109	495	1213
Future Volume (vph)	47	15	109	495	1213
Lane Group Flow (vph)	47	15	109	517	1260
Turn Type	Free	Perm	pm+pt	NA	NA
Protected Phases	1100		8	2	6
Permitted Phases	Free	8	2		
Detector Phase	1100	8	8	2	6
Switch Phase					
Minimum Initial (s)		10.0	10.0	10.0	10.0
Minimum Split (s)		39.8	39.8	32.0	32.0
Total Split (s)		39.8	39.8	80.2	80.2
Total Split (%)		33.2%	33.2%	66.8%	66.8%
Maximum Green (s)		33.0	33.0	74.2	74.2
Yellow Time (s)		3.3	3.3	3.0	3.0
All-Red Time (s)		3.5	3.5	3.0	3.0
Lost Time Adjust (s)		0.0	0.0	0.0	0.0
Total Lost Time (s)		6.8	6.8	6.0	6.0
Lead/Lag		0.0	0.0	0.0	0.0
Lead-Lag Optimize?					
Vehicle Extension (s)		3.0	3.0	3.0	3.0
Recall Mode		None	None	C-Max	C-Max
Walk Time (s)		25.0	25.0	18.0	18.0
Flash Dont Walk (s)		8.0	8.0	8.0	8.0
		95	95	40	102
Pedestrian Calls (#/hr)	120.0	33.0	106.4	74.2	74.2
Act Effct Green (s) Actuated g/C Ratio	1.00	0.28	0.89	0.62	0.62
v/c Ratio	0.03	0.03	0.17	0.18	0.43
Control Delay	0.0	0.1	1.1	9.8	12.4
Queue Delay	0.0	0.0	0.0	0.0	0.0
Total Delay	0.0	0.1	1.1	9.8	12.4
LOS	Α	Α	Α	A	B
Approach Delay				8.3	12.4
Approach LOS	0.0	0.0	0.0	A	В
Queue Length 50th (m)	0.0	0.0	0.2	17.5	52.6
Queue Length 95th (m)	0.0	0.0	0.4	22.7	62.4
Internal Link Dist (m)			05.0	218.1	130.8
Turn Bay Length (m)		=00	85.0	00.40	
Base Capacity (vph)	1491	599	642	2918	2903
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	0.03	0.03	0.17	0.18	0.43
Intersection Summary					

#### ntersection Summary

Cycle Length: 120 Actuated Cycle Length: 120

Offset: 95 (79%), Referenced to phase 2:NBTL and 6:SBT, Start of Green

Natural Cycle: 75

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 CGH Transportation

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# Lanes, Volumes, Timings 1: King Edward & York

Future Background 2024 & 2029AM Peak Hour
112 Nelson Street

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.43
Intersection Signal Delay: 10.7
Intersection Capacity Utilization 59.0%

Analysis Period (min) 15

Splits and Phases: 1: King Edward & York



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	۶	<b>→</b>	<b>←</b>	<b>†</b>	1	-	<b>↓</b>	1				
Lane Group	EBL	EBT	WBT	NBT	NBR	SBL	SBT	SBR	Ø1	Ø2	Ø3	Ø5
Lane Configurations	ሻ	ħβ	<b>↑</b> Ъ	<b>^</b>	7	ች	<b>^</b>	7				
Traffic Volume (vph)	156	158	324	452	83	206	821	222				
Future Volume (vph)	156	158	324	452	83	206	821	222				
Lane Group Flow (vph)	156	173	394	452	83	206	821	222				
Turn Type	Prot	NA	NA	NA	custom	custom	NA	custom				
Protected Phases	11	12	56	3 4		13	7 8	11	1	2	3	5
Permitted Phases					4	8		8				
Detector Phase	11	12	56	3 4	4	13	7 8	11				
Switch Phase												
Minimum Initial (s)	5.0				10.0	5.0		5.0	1.0	10.0	1.0	1.0
Minimum Split (s)	11.2				23.7	9.5		11.2	5.0	29.8	5.0	5.0
Total Split (s)	30.0				24.0	14.0		30.0	5.0	62.0	5.0	5.0
Total Split (%)	27.3%				21.8%	12.7%		27.3%	5%	56%	5%	5%
Maximum Green (s)	23.8				17.3	9.5		23.8	3.0	55.2	3.0	3.0
Yellow Time (s)	3.3				3.0	3.5		3.3	2.0	3.3	2.0	2.0
All-Red Time (s)	2.9				3.7	1.0		2.9	0.0	3.5	0.0	0.0
Lost Time Adjust (s)	0.0				0.0	0.0		0.0				
Total Lost Time (s)	6.2				6.7	4.5		6.2				
Lead/Lag					Lag				Lead	Lag	Lead	Lead
Lead-Lag Optimize?					Yes				Yes	Yes	Yes	Yes
Vehicle Extension (s)	3.0				3.0	3.0		3.0	3.0	3.0	3.0	3.0
Recall Mode	Max				Max	Max		Max	Max	C-Max	Max	Max
Walk Time (s)					2.0				3.0	2.0	3.0	3.0
Flash Dont Walk (s)					15.0				0.0	21.0	0.0	0.0
Pedestrian Calls (#/hr)					111				143	143	111	227
Act Effct Green (s)	23.8	65.0	35.0	27.0	17.3	33.5	41.0	55.6				
Actuated g/C Ratio	0.22	0.59	0.32	0.25	0.16	0.30	0.37	0.51				
v/c Ratio	0.44	0.09	0.43	0.56	0.25	0.74	0.66	0.33				
Control Delay	41.8	9.0	31.3	39.3	1.9	55.3	32.0	12.3				
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0				
Total Delay	41.8	9.0	31.3	39.3	1.9	55.3	32.0	12.3				
LOS	D	Α	С	D	Α	Е	С	В				
Approach Delay		24.6	31.3	33.5			32.3					
Approach LOS		С	С	С			С					
Queue Length 50th (m)	29.2	7.2	34.9	44.7	0.0	35.0	76.4	20.6				
Queue Length 95th (m)	49.2	11.8	48.8	61.0	0.0	#63.0	97.7	32.8				
Internal Link Dist (m)		125.5	140.5	133.0			218.1					
Turn Bay Length (m)	65.0				20.0	105.0						
Base Capacity (vph)	358	1849	927	813	326	280	1235	665				
Starvation Cap Reductn	0	0	0	0	0	0	0	0				
Spillback Cap Reductn	0	0	0	0	0	0	0	0				
Storage Cap Reductn	0	0	0	0	0	0	0	0				
Reduced v/c Ratio	0.44	0.09	0.43	0.56	0.25	0.74	0.66	0.33				
Intersection Summary												

te	rse	ct	101	<u>ก 8</u>	Su	m	m	ar	

Cycle Length: 110
Actuated Cycle Length: 110
Offset: 92 (84%), Referenced to phase 2:EBT and 6:WBT, Start of Green Natural Cycle: 90

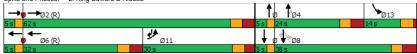
Lane Group	Ø6	Ø7	Ø8
Lane Configurations	100	, OI	200
Traffic Volume (vph)			
Future Volume (vph)			
Lane Group Flow (vph)			
Turn Type			
Protected Phases	6	7	8
Permitted Phases	0	- 1	ď
Detector Phase			
Switch Phase			
	10.0	1.0	10.0
Minimum Initial (s)			
Minimum Split (s)	31.8	5.0	25.9
Total Split (s)	32.0	5.0	38.0
Total Split (%)	29%	5%	35%
Maximum Green (s)	25.2	3.0	31.1
Yellow Time (s)	3.3	2.0	3.0
All-Red Time (s)	3.5	0.0	3.9
Lost Time Adjust (s)			
Total Lost Time (s)			
Lead/Lag	Lag	Lead	Lag
Lead-Lag Optimize?	Yes	Yes	Yes
Vehicle Extension (s)	3.0	3.0	3.0
Recall Mode	C-Max	Max	Max
Walk Time (s)	2.0	3.0	2.0
Flash Dont Walk (s)	23.0	0.0	17.0
Pedestrian Calls (#/hr)	227	108	108
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			

### Lanes, Volumes, Timings 2: King Edward & Rideau

Future Background 2024 & 2029AM Peak Hour 112 Nelson Street

Control Type: Actuated-Coordinated Maximum v/c Ratio: 0.74 Intersection Signal Delay: 31.4 Intersection Capacity Utilization 61.3% Analysis Period (min) 15 Intersection LOS: C
ICU Level of Service B # 95th percentile volume exceeds capacity, queue may be longer. Queue shown is maximum after two cycles.

Splits and Phases: 2: King Edward & Rideau



05-14-2021 CGH Transportation JK Page 5 Lanes, Volumes, Timings 3: Nelson & Rideau

Future Background 2024 & 2029AM Peak Hour 112 Nelson Street

	*	<b>→</b>	•	•	<b>←</b>	*	<b>†</b>	-	<b>↓</b>
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBT	SBL	SBT
Lane Configurations	*	<b>1</b>	7	ሻ	<b>1</b>	7	44		44
Traffic Volume (vph)	67	368	6	3	347	62	0	52	2
Future Volume (vph)	67	368	6	3	347	62	0	52	2
Lane Group Flow (vph)	67	368	6	3	347	62	6	0	114
Turn Type	Perm	NA	Perm	Perm	NA	Perm	NA	Perm	NA
Protected Phases		2			6		4		8
Permitted Phases	2		2	6		6		8	
Detector Phase	2	2	2	6	6	6	4	8	8
Switch Phase									
Minimum Initial (s)	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0
Minimum Split (s)	26.8	26.8	26.8	26.8	26.8	26.8	27.0	27.0	27.0
Total Split (s)	53.0	53.0	53.0	53.0	53.0	53.0	27.0	27.0	27.0
Total Split (%)	66.3%	66.3%	66.3%	66.3%	66.3%	66.3%	33.8%	33.8%	33.8%
Maximum Green (s)	47.2	47.2	47.2	47.2	47.2	47.2	21.0	21.0	21.0
Yellow Time (s)	3.3	3.3	3.3	3.3	3.3	3.3	3.3	3.3	3.3
All-Red Time (s)	2.5	2.5	2.5	2.5	2.5	2.5	2.7	2.7	2.7
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0
Total Lost Time (s)	5.8	5.8	5.8	5.8	5.8	5.8	6.0		6.0
Lead/Lag									
Lead-Lag Optimize?									
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Recall Mode	C-Max	C-Max	C-Max	C-Max	C-Max	C-Max	None	None	None
Walk Time (s)	15.0	15.0	15.0	15.0	15.0	15.0	7.0	7.0	7.0
Flash Dont Walk (s)	6.0	6.0	6.0	6.0	6.0	6.0	14.0	14.0	14.0
Pedestrian Calls (#/hr)	85	85	85	186	186	186	81	57	57
Act Effct Green (s)	53.8	53.8	53.8	53.8	53.8	53.8	18.8		18.8
Actuated g/C Ratio	0.67	0.67	0.67	0.67	0.67	0.67	0.24		0.24
v/c Ratio	0.13	0.31	0.01	0.01	0.30	0.10	0.01		0.35
Control Delay	8.3	8.7	0.0	6.7	7.2	2.0	0.0		15.9
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0
Total Delay	8.3	8.7	0.0	6.7	7.2	2.0	0.0		15.9
LOS	Α	Α	Α	Α	Α	Α	Α		В
Approach Delay		8.5			6.4				15.9
Approach LOS		Α			Α				В
Queue Length 50th (m)	4.2	26.4	0.0	0.2	19.5	0.0	0.0		6.3
Queue Length 95th (m)	9.8	42.2	0.0	m0.6	29.0	3.0	0.0		19.3
Internal Link Dist (m)		140.5			117.5		126.5		219.1
Turn Bay Length (m)	40.0		20.0	10.0		20.0			
Base Capacity (vph)	503	1172	832	560	1172	650	575		360
Starvation Cap Reductn	0	0	0	0	0	0	0		0
Spillback Cap Reductn	0	0	0	0	0	0	0		0
	0	U							
Storage Cap Reductn	0	0	0	0	0	0	0		0

Intersection Summary

Cycle Length: 80

Actuated Cycle Length: 80

Offset: 34 (43%), Referenced to phase 2:EBTL and 6:WBTL, Start of Green

Natural Cycle: 55

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# Lanes, Volumes, Timings 3: Nelson & Rideau

Future Background 2024 & 2029AM Peak Hour
112 Nelson Street

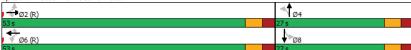
Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.35
Intersection Signal Delay: 8.4 Intersection LOS: A
Intersection Capacity Utilization 60.7% ICU Level of Service B

Analysis Period (min) 15

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

Splits and Phases: 3: Nelson & Rideau



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 CGH Transportation

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Lanes, Volumes, Timings 4: Friel & Rideau

Future Background 2024 & 2029AM Peak Hour
112 Nelson Street

	•	-	•	•	+	•	1	<b>†</b>	-	ļ	
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	SBL	SBT	
Lane Configurations		ની	7		4	7		4		4	
Traffic Volume (vph)	8	355	68	7	367	8	20	6	8	4	
Future Volume (vph)	8	355	68	7	367	8	20	6	8	4	
Lane Group Flow (vph)	0	363	68	0	374	8	0	39	0	16	
Turn Type	Perm	NA	Perm	Perm	NA	Perm	Perm	NA	Perm	NA	
Protected Phases		2			6			4		8	
Permitted Phases	2		2	6		6	4		8		
Detector Phase	2	2	2	6	6	6	4	4	8	8	
Switch Phase											
Minimum Initial (s)	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	
Minimum Split (s)	25.7	25.7	25.7	25.7	25.7	25.7	29.8	29.8	29.8	29.8	
Total Split (s)	50.0	50.0	50.0	50.0	50.0	50.0	30.0	30.0	30.0	30.0	
Γotal Split (%)	62.5%	62.5%	62.5%	62.5%	62.5%	62.5%	37.5%	37.5%	37.5%	37.5%	
Maximum Green (s)	44.3	44.3	44.3	44.3	44.3	44.3	24.2	24.2	24.2	24.2	
Yellow Time (s)	3.3	3.3	3.3	3.3	3.3	3.3	3.3	3.3	3.3	3.3	
All-Red Time (s)	2.4	2.4	2.4	2.4	2.4	2.4	2.5	2.5	2.5	2.5	
Lost Time Adjust (s)		0.0	0.0		0.0	0.0		0.0		0.0	
Total Lost Time (s)		5.7	5.7		5.7	5.7		5.8		5.8	
_ead/Lag											
Lead-Lag Optimize?											
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	
Recall Mode	C-Max	C-Max	C-Max	C-Max	C-Max	C-Max	None	None	None	None	
Walk Time (s)	13.0	13.0	13.0	13.0	13.0	13.0	12.0	12.0	12.0	12.0	
Flash Dont Walk (s)	7.0	7.0	7.0	7.0	7.0	7.0	12.0	12.0	12.0	12.0	
Pedestrian Calls (#/hr)	85	85	85	82	82	82	81	81	35	35	
Act Effct Green (s)		51.6	51.6		51.6	51.6		21.2		21.2	
Actuated g/C Ratio		0.64	0.64		0.64	0.64		0.26		0.26	
//c Ratio		0.33	0.08		0.33	0.01		0.11		0.04	
Control Delay		4.8	0.5		10.2	0.0		16.0		17.4	
Queue Delay		0.0	0.0		0.0	0.0		0.0		0.0	
Total Delay		4.8	0.5		10.2	0.0		16.0		17.4	
LOS		A	A		В	A		В		В	
Approach Delay		4.1	7.		10.0	7.		16.0		17.4	
Approach LOS		A			Α			В		В	
Queue Length 50th (m)		5.6	0.1		29.7	0.0		2.8		1.3	
Queue Length 95th (m)		9.6	0.1		47.3	0.0		9.5		5.5	
nternal Link Dist (m)		117.5	0.2		103.0	0.0		131.9		64.0	
Furn Bay Length (m)		117.3	20.0		103.0	20.0		131.8		04.0	
Base Capacity (vph)		1114	802		1117	795		417		424	
Starvation Cap Reductn		0	002		0	795		417		424	
Spillback Cap Reductn		0	0		0	0		0		0	
Storage Cap Reductn		0	0		0	0		0		0	
Reduced v/c Ratio		0.33	0.08		0.33	0.01		0.09		0.04	

Intersection Summary

Cycle Length: 80

Actuated Cycle Length: 80

Offset: 50 (63%), Referenced to phase 2:EBTL and 6:WBTL, Start of Green

Natural Cycle: 60

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## Lanes, Volumes, Timings 4: Friel & Rideau

Future Background 2024 & 2029AM Peak Hour 112 Nelson Street

Future Background 2024 & 2029AM Peak Hour 112 Nelson Street

Control Type: Actuated-Coordinated		
Maximum v/c Ratio: 0.33		
Intersection Signal Delay: 7.5	Intersection LOS: A	
Intersection Capacity Utilization 70.4%	ICU Level of Service C	
Analysis Period (min) 15		

Intersection LOS	Α											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		4			4			4			44	
Traffic Vol, veh/h	11	18	8	62	14	5	16	23	26	6	23	2
Future Vol, veh/h	11	18	8	62	14	5	16	23	26	6	23	2
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	11	18	8	62	14	5	16	23	26	6	23	2
Number of Lanes	0	1	0	0	1	0	0	1	0	0	1	0
Approach	EB			WB			NB			SB		
Opposing Approach	WB			EB			SB			NB		
Opposing Lanes	1			1			1			1		
Conflicting Approach Left	SB			NB			EB			WB		
Conflicting Lanes Left	1			1			1			1		
Conflicting Approach Right	NB			SB			WB			EB		
Conflicting Lanes Right	1			1			1			1		
HCM Control Delay	7.3			7.8			7.4			7.4		
HCM LOS	Α			Α			Α			Α		
Lane		NBLn1	EBLn1	WBLn1	SBLn1							
Vol Left, %		25%	30%	77%	19%							
Vol Thru %		35%	/00/	17%	7/10/							

Lane	NBLn1	EBLn1	WBLn1	SBLn1
Vol Left, %	25%	30%	77%	19%
Vol Thru, %	35%	49%	17%	74%
Vol Right, %	40%	22%	6%	6%
Sign Control	Stop	Stop	Stop	Stop
Traffic Vol by Lane	65	37	81	31
LT Vol	16	11	62	6
Through Vol	23	18	14	23
RT Vol	26	8	5	2
Lane Flow Rate	65	37	81	31
Geometry Grp	1	1	1	1
Degree of Util (X)	0.072	0.042	0.096	0.036
Departure Headway (Hd)	3.972	4.094	4.247	4.189
Convergence, Y/N	Yes	Yes	Yes	Yes
Cap	891	867	839	844
Service Time	2.043	2.158	2.297	2.266
HCM Lane V/C Ratio	0.073	0.043	0.097	0.037
HCM Control Delay	7.4	7.3	7.8	7.4
HCM Lane LOS	Α	Α	Α	Α
HCM 95th-tile Q	0.2	0.1	0.3	0.1

HCM 2010 AWSC

5: Nelson & York

Intersection Delay, s/veh

7.5

Lanes, Volumes, Timings 1: King Edward & York Future Background 2024 & 2029PM Peak Hour 112 Nelson Street

	7	•	1	1	<b>↓</b>	4
Lane Group	EBR	WBR	NBL	NBT	SBT	SBR
Lane Configurations	1	7	*	ተተ <sub>ጉ</sub>	44	7
Traffic Volume (vph)	79	10	93	853	728	30
Future Volume (vph)	79	10	93	853	728	30
Lane Group Flow (vph)	79	10	93	870	728	30
Turn Type	Free	Perm	pm+pt	NA	NA	Perm
Protected Phases			8	2	6	
Permitted Phases	Free	8	2			6
Detector Phase		8	8	2	6	6
Switch Phase						
Minimum Initial (s)		10.0	10.0	10.0	10.0	10.0
Minimum Split (s)		39.8	39.8	32.0	32.0	32.0
Total Split (s)		39.8	39.8	80.2	80.2	80.2
Total Split (%)		33.2%	33.2%	66.8%	66.8%	66.8%
Maximum Green (s)		33.0	33.0	74.2	74.2	74.2
Yellow Time (s)		3.3	3.3	3.0	3.0	3.0
All-Red Time (s)		3.5	3.5	3.0	3.0	3.0
Lost Time Adjust (s)		0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)		6.8	6.8	6.0	6.0	6.0
Lead/Lag						
Lead-Lag Optimize?						
Vehicle Extension (s)		3.0	3.0	3.0	3.0	3.0
Recall Mode		None	None	C-Max	C-Max	C-Max
Walk Time (s)		25.0	25.0	18.0	18.0	18.0
Flash Dont Walk (s)		8.0	8.0	8.0	8.0	8.0
Pedestrian Calls (#/hr)		109	109	52	108	108
Act Effct Green (s)	120.0	33.0	106.4	74.2	74.2	74.2
Actuated g/C Ratio	1.00	0.28	0.89	0.62	0.62	0.62
v/c Ratio	0.05	0.02	0.12	0.30	0.36	0.04
Control Delay	0.1	0.1	0.8	11.0	11.8	2.6
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	0.1	0.1	0.8	11.0	11.8	2.6
LOS	Α	Α	Α	В	В	A
Approach Delay				10.0	11.4	
Approach LOS				Α	В	
Queue Length 50th (m)	0.0	0.0	0.2	32.6	41.2	0.0
Queue Length 95th (m)	0.0	0.0	0.3	39.9	52.4	3.1
Internal Link Dist (m)				218.1	130.8	
Turn Bay Length (m)			85.0			30.0
Base Capacity (vph)	1489	464	792	2930	2050	687
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.05	0.02	0.12	0.30	0.36	0.04
Interception Cummens						

Intersection Summary

Cycle Length: 120 Actuated Cycle Length: 120

Offset: 58 (48%), Referenced to phase 2:NBTL and 6:SBT, Start of Green

Natural Cycle: 75

 05-14-2021
 CGH Transportation

 JK
 Page 1

# Lanes, Volumes, Timings 1: King Edward & York

Future Background 2024 & 2029PM Peak Hour
112 Nelson Street

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.36

Intersection Signal Delay: 10.1 Intersection LOS: B
Intersection Capacity Utilization 59.3% ICU Level of Service B

Analysis Period (min) 15

Splits and Phases: 1: King Edward & York



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	•	<b>→</b>	<b>—</b>	†	~	<b>/</b>	<b>↓</b>	4				
Lane Group	EBL	EBT	WBT	NBT	NBR	SBL	SBT	SBR	Ø1	Ø2	Ø3	Ø5
Lane Configurations	ሻ	<b>†</b> î>	ħβ	<b>^</b>	7	ሻ	<b>^</b>	7				
Traffic Volume (vph)	186	300	377	610	108	163	565	131				
Future Volume (vph)	186	300	377	610	108	163	565	131				
Lane Group Flow (vph)	186	325	485	610	108	163	565	131				
Turn Type	Prot	NA	NA	NA	custom	custom	NA	custom				
Protected Phases	11	12	56	3 4		13	7 8	11	1	2	3	5
Permitted Phases					4	8		8				
Detector Phase	11	12	56	3 4	4	13	7 8	11				
Switch Phase												
Minimum Initial (s)	5.0				10.0	5.0		5.0	1.0	10.0	1.0	1.0
Minimum Split (s)	11.2				23.7	9.5		11.2	5.0	29.8	5.0	5.0
Total Split (s)	27.0				29.0	12.0		27.0	5.0	59.0	5.0	5.0
Total Split (%)	24.5%				26.4%	10.9%		24.5%	5%	54%	5%	5%
Maximum Green (s)	20.8				22.3	7.5		20.8	3.0	52.2	3.0	3.0
Yellow Time (s)	3.3				3.0	3.5		3.3	2.0	3.3	2.0	2.0
All-Red Time (s)	2.9				3.7	1.0		2.9	0.0	3.5	0.0	0.0
Lost Time Adjust (s)	0.0				0.0	0.0		0.0				
Total Lost Time (s)	6.2				6.7	4.5		6.2				
Lead/Lag					Lag				Lead	Lag	Lead	Lead
Lead-Lag Optimize?					Yes				Yes	Yes	Yes	Yes
Vehicle Extension (s)	3.0				3.0	3.0		3.0	3.0	3.0	3.0	3.0
Recall Mode	Max				Max	Max		Max	Max	C-Max	Max	Max
Walk Time (s)					2.0				3.0	2.0	3.0	3.0
Flash Dont Walk (s)					15.0				0.0	21.0	0.0	0.0
Pedestrian Calls (#/hr)					150				321	321	150	458
Act Effct Green (s)	20.8	62.0	35.0	32.0	22.3	36.5	44.0	55.6				
Actuated g/C Ratio	0.19	0.56	0.32	0.29	0.20	0.33	0.40	0.51				
v/c Ratio	0.59	0.18	0.54	0.63	0.34	0.70	0.43	0.21				
Control Delay	49.6	11.5	33.6	37.4	2.8	54.7	25.1	10.9				
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0				
Total Delay	49.6	11.5	33.6	37.4	2.8	54.7	25.1	10.9				
LOS	D	В	С	D	Α	D	С	В				
Approach Delay		25.4	33.6	32.2			28.6					
Approach LOS		С	С	С			С					
Queue Length 50th (m)	36.8	16.1	44.9	59.8	0.0	25.8	45.4	11.3				
Queue Length 95th (m)	60.0	23.4	61.3	78.7	0.0	#48.4	60.2	19.8				
Internal Link Dist (m)		125.5	140.5	133.0			218.1					
Turn Bay Length (m)	65.0				20.0	105.0		95.0				
Base Capacity (vph)	313	1774	897	964	321	233	1326	631				
Starvation Cap Reductn	0	0	0	0	0	0	0	0				
Spillback Cap Reductn	0	0	0	0	0	0	0	0				
Storage Cap Reductn	0	0	0	0	0	0	0	0				
Reduced v/c Ratio	0.59	0.18	0.54	0.63	0.34	0.70	0.43	0.21				
Intersection Summary												

In	te	rs	e	cti	0	n	S	u	m	m	a	ŋ	

Cycle Length: 110
Actuated Cycle Length: 110
Offset: 92 (84%), Referenced to phase 2:EBT and 6:WBT, Start of Green Natural Cycle: 90

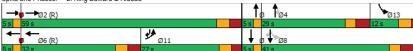
Lane Group	Ø6	Ø7	Ø8
Lane Configurations			
Traffic Volume (vph)			
Future Volume (vph)			
Lane Group Flow (vph)			
Turn Type			
Protected Phases	6	7	8
	б	1	8
Permitted Phases			
Detector Phase			
Switch Phase			
Minimum Initial (s)	10.0	1.0	10.0
Minimum Split (s)	31.8	5.0	25.9
Total Split (s)	32.0	5.0	41.0
Total Split (%)	29%	5%	37%
Maximum Green (s)	25.2	3.0	34.1
Yellow Time (s)	3.3	2.0	3.0
All-Red Time (s)	3.5	0.0	3.9
Lost Time Adjust (s)	3.3	0.0	3.9
Total Lost Time (s)			
Lead/Lag	Lag	Lead	Lag
Lead-Lag Optimize?	Yes	Yes	Yes
Vehicle Extension (s)	3.0	3.0	3.0
Recall Mode	C-Max	Max	Max
Walk Time (s)	2.0	3.0	2.0
Flash Dont Walk (s)	23.0	0.0	17.0
Pedestrian Calls (#/hr)	458	141	141
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			
Reduced V/C Ratio			
Intersection Summary			

#### Lanes, Volumes, Timings 2: King Edward & Rideau

Future Background 2024 & 2029PM Peak Hour 112 Nelson Street

Control Type: Actuated-Coordinated Maximum v/c Ratio: 0.70 Intersection LOS: C
ICU Level of Service C Intersection Signal Delay: 29.9 Intersection Capacity Utilization 68.7% Analysis Period (min) 15 # 95th percentile volume exceeds capacity, queue may be longer. Queue shown is maximum after two cycles.

## Splits and Phases: 2: King Edward & Rideau



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Lanes, Volumes, Timings 3: Nelson & Rideau

Future Background 2024 & 2029PM Peak Hour 112 Nelson Street

	•	-	•	•	<b>←</b>	*		<b>†</b>	-	ļ	
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	SBL	SBT	
Lane Configurations	*	<b>*</b>	7	7	<b>*</b>	7		4		4	
Traffic Volume (vph)	88	475	8	7	411	158	2	3	71	1	
Future Volume (vph)	88	475	8	7	411	158	2	3	71	1	
Lane Group Flow (vph)	88	475	8	7	411	158	0	19	0	161	
Turn Type	pm+pt	NA	Perm	Perm	NA	Perm	Perm	NA	Perm	NA	
Protected Phases	5	2			6			4		8	
Permitted Phases	2		2	6		6	4		8		
Detector Phase	5	2	2	6	6	6	4	4	8	8	
Switch Phase											
Minimum Initial (s)	5.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	
Minimum Split (s)	10.8	26.8	26.8	26.8	26.8	26.8	27.0	27.0	27.0	27.0	
Total Split (s)	12.0	60.0	60.0	48.0	48.0	48.0	30.0	30.0	30.0	30.0	
Total Split (%)	13.3%	66.7%	66.7%	53.3%	53.3%	53.3%	33.3%	33.3%	33.3%	33.3%	
Maximum Green (s)	6.2	54.2	54.2	42.2	42.2	42.2	24.0	24.0	24.0	24.0	
Yellow Time (s)	3.3	3.3	3.3	3.3	3.3	3.3	3.3	3.3	3.3	3.3	
All-Red Time (s)	2.5	2.5	2.5	2.5	2.5	2.5	2.7	2.7	2.7	2.7	
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0		0.0		0.0	
Total Lost Time (s)	5.8	5.8	5.8	5.8	5.8	5.8		6.0		6.0	
Lead/Lag	Lead			Lag	Lag	Lag					
Lead-Lag Optimize?	Yes			Yes	Yes	Yes					
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	
Recall Mode	None	C-Max	C-Max	C-Max	C-Max	C-Max	Max	Max	Max	Max	
Walk Time (s)		15.0	15.0	15.0	15.0	15.0	7.0	7.0	7.0	7.0	
Flash Dont Walk (s)		6.0	6.0	6.0	6.0	6.0	14.0	14.0	14.0	14.0	
Pedestrian Calls (#/hr)		290	290	500	500	500	313	313	139	139	
Act Effct Green (s)	54.2	54.2	54.2	44.6	44.6	44.6		24.0		24.0	
Actuated g/C Ratio	0.60	0.60	0.60	0.50	0.50	0.50		0.27		0.27	
v/c Ratio	0.23	0.45	0.02	0.02	0.48	0.50		0.08		0.57	
Control Delay	9.1	11.5	0.1	10.1	12.4	8.0		15.1		25.6	
Queue Delay	0.0	0.0	0.0	0.0	0.2	0.0		0.0		0.0	
Total Delay	9.1	11.5	0.1	10.1	12.6	8.0		15.1		25.6	
LOS	Α	В	Α	В	В	Α		В		С	
Approach Delay		11.0			11.3			15.1		25.6	
Approach LOS		В			В			В		С	
Queue Length 50th (m)	5.9	41.1	0.0	0.4	26.7	1.1		0.6		13.6	
Queue Length 95th (m)	11.7	62.5	0.0	m1.0	37.4	7.6		5.9		34.5	
Internal Link Dist (m)		140.5			117.5			126.5		218.8	
Turn Bay Length (m)	40.0		20.0	10.0		20.0					
Base Capacity (vph)	379	1050	429	310	864	313		250		283	
Starvation Cap Reductn	0	0	0	0	76	0		0		0	
Spillback Cap Reductn	0	0	0	0	0	0		0		0	
Storage Cap Reductn	0	0	0	0	0	0		0		0	
Reduced v/c Ratio	0.23	0.45	0.02	0.02	0.52	0.50		0.08		0.57	

## Intersection Summary

Cycle Length: 90

Actuated Cycle Length: 90

Offset: 52 (58%), Referenced to phase 2:EBTL and 6:WBTL, Start of Green

Natural Cycle: 65

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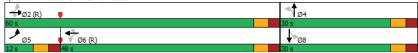
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### Lanes, Volumes, Timings 3: Nelson & Rideau

#### Future Background 2024 & 2029PM Peak Hour 112 Nelson Street

Control Type: Actuated-Coordinated Maximum v/c Ratio: 0.57 Intersection Signal Delay: 13.0 Intersection LOS: B Intersection Capacity Utilization 69.8% ICU Level of Service C Analysis Period (min) 15 m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 3: Nelson & Rideau



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Lanes, Volumes, Timings 4: Friel & Rideau

Future Background 2024 & 2029PM Peak Hour 112 Nelson Street

	•	-	•	•	+	•	1	<b>†</b>	-	ļ	
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	SBL	SBT	
Lane Configurations		ર્ન	7		ર્ન	7		4		4	
Traffic Volume (vph)	4	483	65	22	469	9	75	3	14	4	
Future Volume (vph)	4	483	65	22	469	9	75	3	14	4	
Lane Group Flow (vph)	0	487	65	0	491	9	0	100	0	26	
Turn Type	Perm	NA	Perm	Perm	NA	Perm	Perm	NA	Perm	NA	
Protected Phases		2			6			4		8	
Permitted Phases	2		2	6		6	4		8		
Detector Phase	2	2	2	6	6	6	4	4	8	8	
Switch Phase											
Minimum Initial (s)	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	
Minimum Split (s)	25.7	25.7	25.7	25.7	25.7	25.7	29.8	29.8	29.8	29.8	
Total Split (s)	60.0	60.0	60.0	60.0	60.0	60.0	30.0	30.0	30.0	30.0	
Total Split (%)	66.7%	66.7%	66.7%	66.7%	66.7%	66.7%	33.3%	33.3%	33.3%	33.3%	
Maximum Green (s)	54.3	54.3	54.3	54.3	54.3	54.3	24.2	24.2	24.2	24.2	
Yellow Time (s)	3.3	3.3	3.3	3.3	3.3	3.3	3.3	3.3	3.3	3.3	
All-Red Time (s)	2.4	2.4	2.4	2.4	2.4	2.4	2.5	2.5	2.5	2.5	
Lost Time Adjust (s)		0.0	0.0		0.0	0.0		0.0		0.0	
Total Lost Time (s)		5.7	5.7		5.7	5.7		5.8		5.8	
Lead/Lag		•	•		***	***					
Lead-Lag Optimize?											
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	
Recall Mode	C-Max	C-Max	C-Max	C-Max	C-Max	C-Max	None	None	None	None	
Walk Time (s)	13.0	13.0	13.0	13.0	13.0	13.0	12.0	12.0	12.0	12.0	
Flash Dont Walk (s)	7.0	7.0	7.0	7.0	7.0	7.0	12.0	12.0	12.0	12.0	
Pedestrian Calls (#/hr)	181	181	181	192	192	192	95	95	78	78	
Act Effct Green (s)		57.3	57.3	.02	57.3	57.3		21.2		21.2	
Actuated g/C Ratio		0.64	0.64		0.64	0.64		0.24		0.24	
//c Ratio		0.44	0.12		0.46	0.02		0.37		0.09	
Control Delay		4.7	0.8		11.0	0.1		27.1		20.1	
Queue Delay		0.1	0.0		0.0	0.0		0.0		0.0	
Total Delay		4.8	0.8		11.0	0.1		27.1		20.1	
OS		Α.	A		В	A		C		C	
Approach Delay		4.3	7.		10.8	7.		27.1		20.1	
Approach LOS		4.5 A			10.0 B			27.1		20.1	
Queue Length 50th (m)		13.9	0.1		43.3	0.0		11.7		2.3	
Queue Length 95th (m)		21.1	m0.8		66.1	0.0		25.4		8.4	
nternal Link Dist (m)		117.5	1110.0		103.0	0.1		131.9		64.0	
Furn Bay Length (m)		117.3	20.0		103.0	20.0		131.8		04.0	
Base Capacity (vph)		1105	562		1070	535		308		343	
Starvation Cap Reductn		88	0		0	000		0		0	
Spillback Cap Reductn		00	0		0	0		0		0	
Storage Cap Reductn		0	0		0	0		0		0	
Reduced v/c Ratio		0.48	0.12		0.46	0.02		0.32		0.08	
Reduced V/C Ratio		0.48	0.12		0.46	0.02		0.32		0.08	

## Intersection Summary

Cycle Length: 90

Actuated Cycle Length: 90

Offset: 48 (53%), Referenced to phase 2:EBTL and 6:WBTL, Start of Green

Natural Cycle: 60

JK

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#### Lanes, Volumes, Timings 4: Friel & Rideau

Future Background 2024 & 2029PM Peak Hour 112 Nelson Street HCM 2010 AWSC Future Background 2024 & 2029PM Peak Hour 5: Nelson & York 112 Nelson Street

Control Type: Actuated-Coordinated Maximum v/c Ratio: 0.46 Intersection LOS: A ICU Level of Service D Intersection Signal Delay: 9.3 Intersection Capacity Utilization 77.6% Analysis Period (min) 15

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

Splits and Phases: 4: Friel & Rideau

JK



Intersection LOS	Α											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		44			4			4			4	
Traffic Vol, veh/h	4	8	10	43	0	43	0	98	66	4	19	6
Future Vol, veh/h	4	8	10	43	0	43	0	98	66	4	19	6
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	4	8	10	43	0	43	0	98	66	4	19	6
Number of Lanes	0	1	0	0	1	0	0	1	0	0	1	0
Approach	EB			WB				NB		SB		
Opposing Approach	WB			EB				SB		NB		
Opposing Lanes	1			1				1		1		
Conflicting Approach Left	SB			NB				EB		WB		
Conflicting Lanes Left	1			1				1		1		
Conflicting Approach Right	NB			SB				WB		EB		
Conflicting Lanes Right	1			1				1		1		
HCM Control Delay	7.3			7.6				7.8		7.4		
HCM LOS	Α			Α				Α		Α		
Lana		NIDI n1	EBLn1	WBLn1	SBLn1							
Lane		NBLn1	EDLNI	VVDLNI	ODLNI							

Lane	NBLn1	EBLn1	WBLn1	SBLn1
Vol Left, %	0%	18%	50%	14%
Vol Thru, %	60%	36%	0%	66%
Vol Right, %	40%	45%	50%	21%
Sign Control	Stop	Stop	Stop	Stop
Traffic Vol by Lane	164	22	86	29
LT Vol	0	4	43	4
Through Vol	98	8	0	19
RT Vol	66	10	43	6
Lane Flow Rate	164	22	86	29
Geometry Grp	1	1	1	1
Degree of Util (X)	0.178	0.025	0.098	0.033
Departure Headway (Hd)	3.902	4.101	4.086	4.152
Convergence, Y/N	Yes	Yes	Yes	Yes
Cap	912	858	865	851
Service Time	1.961	2.197	2.166	2.235
HCM Lane V/C Ratio	0.18	0.026	0.099	0.034
HCM Control Delay	7.8	7.3	7.6	7.4
HCM Lane LOS	Α	Α	Α	Α
HCM 95th-tile Q	0.6	0.1	0.3	0.1

Intersection

Intersection Delay, s/veh

7.7

# Appendix H

MMLOS Analysis



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

Consultant	CGH Transportation Inc.	Project	2020-88	
Scenario	Existing/Future	Date	2022-11-15	
Comments				

SEGMENTS			Nelson Street		
strian	Sidewalk Width Boulevard Width Avg Daily Curb Lane Traffic Volume Operating Speed On-Street Parking	С	≥ 2 m < 0.5 ≤ 3000 > 50 to 60 km/h no		
Pedestrian	Exposure to Traffic PLoS  Effective Sidewalk Width  Pedestrian Volume  Crowding PLoS  Level of Service	C	A C	-	-
Bicycle	Type of Cycling Facility  Number of Travel Lanes  Operating Speed  # of Lanes & Operating Speed LoS  Bike Lane (+ Parking Lane) Width  Bike Lane Width LoS  Bike Lane Blockages  Blockage LoS  Median Refuge Width (no median = < 1.8 m)  No. of Lanes at Unsignalized Crossing  Sidestreet Operating Speed  Unsignalized Crossing - Lowest LoS  Level of Service	D	Mixed Traffic  ≤ 2 (no centreline)  ≥ 50 to 60 km/h  D  -  < 1.8 m refuge  ≤ 3 lanes  ≤ 40 km/h  A  D	-	-
Transit	Facility Type Friction or Ratio Transit:Posted Speed  Level of Service	-	-	-	-
Truck	Truck Lane Width Travel Lanes per Direction  Level of Service	-	-	-	-

# Multi-Modal Level of Service - Intersections Form

Consultant	
Scenario	
Comments	

GH Transportation Inc.	Project	2020-88
xisting/Future	Date	2022-11-15

	INTERSECTIONS		York St at Kii	ng Edward Ave			Rideau St at Ki	ng Edward Ave			Rideau St a	at Nelson St			Rideau S	t at Friel St	
	Crossing Side	NORTH	SOUTH	EAST	WEST	NORTH	SOUTH	EAST	WEST	NORTH	SOUTH	EAST	WEST	NORTH	SOUTH	EAST	WEST
	Lanes	8		3	0 - 2	8	8	6	6	0 - 2	0 - 2	5	5	0 - 2	0 - 2	5	5
	Median	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	No Median - 2.4 m
	Conflicting Left Turns	No left turn / Prohib.		No left turn / Prohib.	Permissive	Protected	No left turn / Prohib.	Protected/ Permissive	No left turn / Prohib.	Protected/ Permissive	Permissive						
	Conflicting Right Turns	Permissive or yield control		Permissive or yield control	Permissive or yield control	Permissive or yield control	Permissive or yield control	Permissive or yield control	Protected/ Permissive	Permissive or yield control							
	Right Turns on Red (RToR) ?	RTOR allowed		RTOR allowed	RTOR allowed	RTOR prohibited	RTOR allowed	RTOR prohibited	RTOR allowed								
	Ped Signal Leading Interval?	No		No	No	Yes	Yes	Yes	Yes	No							
rian	Right Turn Channel	No Channel		No Channel	No Channel	No Channel	No Channel	No Channel	No Channel	No Channel	No Channel	No Channel	No Channel	No Channel	No Channel	No Channel	No Channel
sti	Corner Radius	5-10m		10-15m	10-15m	>25m	15-25m	5-10m	10-15m	5-10m							
Pedestrian	Crosswalk Type	Zebra stripe hi-vis markings		Std transverse markings	Std transverse markings	Zebra stripe hi-vis markings											
	PETSI Score	7		78	85	1	-1	29	33	89	89	41	41	89	89	41	41
	Ped. Exposure to Traffic LoS	F	-	В	В	F	F	F	E	В	В	E	E	В	В	E	E
	Cycle Length																
	Effective Walk Time																
	Average Pedestrian Delay																
	Pedestrian Delay LoS	-	-	-	-	-	-	-	-	-	•	-	-	-	-	•	-
		F	-	В	В	F	F	F	E	В	В	E	E	В	В	E	E
	Level of Service			F								E				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										
	Right Turn Lane Configuration					> 50 m	≤ 50 m										
	Right Turning Speed					≤ 25 km/h	≤ 25 km/h										
<u>o</u>	Cyclist relative to RT motorists	-	Α	-	-	F	D	-	Α	Α	Α	Α	Α	Α	Α	Α	Α
ြင္က	Separated or Mixed Traffic	-	-	•	•	Mixed Traffic	Mixed Traffic	-	•	-	-	-	-	-	-	•	-
Bicycle	Left Turn Approach		≥ 2 lanes crossed			≥ 2 lanes crossed			One lane crossed	No lane crossed	No lane crossed	One lane crossed	One lane crossed	No lane crossed	No lane crossed	One lane crossed	One lane crossed
	Operating Speed		> 50 to < 60 km/h			> 50 to < 60 km/h			> 50 to < 60 km/h	> 40 to ≤ 50 km/h	> 40 to ≤ 50 km/h	> 50 to < 60 km/h		> 40 to ≤ 50 km/h	> 40 to ≤ 50 km/h	> 50 to < 60 km/h	> 50 to < 60 km/h
	Left Turning Cyclist	-	F	-	-	F	Α	-	E	В	В	E	E	В	В	E	E
		-	F	-	-	F	D	-	E	В	В	E	E	В	В	E	E
	Level of Service			F				=				E				E	
#	Average Signal Delay	≤ 10 sec	≤ 20 sec			≤ 40 sec	≤ 40 sec	≤ 40 sec	≤ 20 sec			≤ 20 sec	≤ 20 sec			≤ 10 sec	≤ 20 sec
ınsit		В	С		-	E	E	E	С	-	-	С	С	-	-	В	С
Tra	Level of Service			С			ı				(	C				С	
	Effective Corner Radius					> 15 m		> 15 m	> 15 m								
Truck	Number of Receiving Lanes on Departure from Intersection					≥ 2		≥ 2	≥ 2								
2		-	-	-	-	Α	-	Α	Α	-	-	-	-	-	-	-	-
	Level of Service			-			/	١				-				-	
•	Volume to Capacity Ratio		0.61	1 - 0.70			0.61	0.70			0.61	- 0.70			0.0	- 0.60	
Auto	Level of Service			В			ı	3				3				A	

# Appendix I

Synchro Intersection Worksheets – Future Total 2024 & 2029



Lanes, Volumes, Timings 1: King Edward & York

Future Total 2024 & 2029AM Peak Hour 112 Nelson Street

	*	*	1	<b>†</b>	Į.
Lane Group	EBR	WBR	NBL	NBT	SBT
Lane Configurations	7	7	*	<b>11</b>	<b>11</b>
Traffic Volume (vph)	43	17	107	490	1211
Future Volume (vph)	43	17	107	490	1211
Lane Group Flow (vph)	43	17	107	512	1257
Turn Type	Free	Perm	pm+pt	NA	NA
Protected Phases	1100	I GIIII	8	2	6
Permitted Phases	Free	8	2	2	U
Detector Phase	1166	8	8	2	6
Switch Phase		0	0		U
Minimum Initial (s)		10.0	10.0	10.0	10.0
Minimum Split (s)		39.8	39.8	32.0	32.0
		39.8	39.8	80.2	80.2
Total Split (s)			33.2%	66.8%	66.8%
Total Split (%)		33.2%	33.2%	74.2	
Maximum Green (s)					74.2
Yellow Time (s)		3.3	3.3	3.0	3.0
All-Red Time (s)		3.5	3.5	3.0	3.0
Lost Time Adjust (s)		0.0	0.0	0.0	0.0
Total Lost Time (s)		6.8	6.8	6.0	6.0
Lead/Lag					
Lead-Lag Optimize?					
Vehicle Extension (s)		3.0	3.0	3.0	3.0
Recall Mode		None	None	C-Max	C-Max
Walk Time (s)		25.0	25.0	18.0	18.0
Flash Dont Walk (s)		8.0	8.0	8.0	8.0
Pedestrian Calls (#/hr)		112	112	57	102
Act Effct Green (s)	120.0	33.0	106.4	74.2	74.2
Actuated g/C Ratio	1.00	0.28	0.89	0.62	0.62
v/c Ratio	0.03	0.03	0.17	0.18	0.43
Control Delay	0.0	0.1	1.1	9.8	12.4
Queue Delay	0.0	0.0	0.0	0.0	0.0
Total Delay	0.0	0.1	1.1	9.8	12.4
LOS	Α.	A	A	Α.	В
Approach Delay	71	7.	71	8.3	12.4
Approach LOS				A	В
Queue Length 50th (m)	0.0	0.0	0.2	17.2	52.4
Queue Length 95th (m)	0.0	0.0	0.2	22.5	62.1
Internal Link Dist (m)	0.0	0.0	0.4	218.1	130.8
Turn Bay Length (m)			85.0	210.1	130.0
Base Capacity (vph)	1491	577	643	2913	2907
Starvation Cap Reductn	1491	0	043	2913	2907
	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0
Storage Cap Reductn	-		_		_
Reduced v/c Ratio	0.03	0.03	0.17	0.18	0.43
Intersection Summary					
0 1 1 11 100					

Cycle Length: 120
Actuated Cycle Length: 120
Offset: 95 (79%), Referenced to phase 2:NBTL and 6:SBT, Start of Green

Natural Cycle: 75

11/15/2022 JK CGH Transportation Page 1 Lanes, Volumes, Timings 1: King Edward & York

Future Total 2024 & 2029AM Peak Hour 112 Nelson Street

Control Type: Actuated-Coordinated Maximum v/c Ratio: 0.43 Intersection Signal Delay: 10.7 Intersection Capacity Utilization 59.4% Analysis Period (min) 15 Intersection LOS: B
ICU Level of Service B

Splits and Phases: 1: King Edward & York



11/15/2022 CGH Transportation JK Page 2

	•	-	<b>←</b>	<b>†</b>	1	-	<b>↓</b>	4				
Lane Group	EBL	EBT	WBT	NBT	NBR	SBL	SBT	SBR	Ø1	Ø2	Ø3	Ø5
Lane Configurations	7	<b>†</b> }	<b>†</b> 1>	<b>^</b>	7	٦	<b>^</b>	7				
Traffic Volume (vph)	156	161	319	445	87	202	801	217				
Future Volume (vph)	156	161	319	445	87	202	801	217				
Lane Group Flow (vph)	156	176	389	445	87	202	801	217				
Turn Type	Prot	NA	NA	NA	custom	custom	NA	custom				
Protected Phases	11	12	56	3 4		13	7 8	11	1	2	3	5
Permitted Phases					4	8		8				
Detector Phase	11	12	56	3 4	4	13	78	11				
Switch Phase												
Minimum Initial (s)	5.0				10.0	5.0		5.0	1.0	10.0	1.0	1.0
Minimum Split (s)	11.2				23.7	9.5		11.2	5.0	29.8	5.0	5.0
Total Split (s)	30.0				24.0	14.0		30.0	5.0	62.0	5.0	5.0
Total Split (%)	27.3%				21.8%	12.7%		27.3%	5%	56%	5%	5%
Maximum Green (s)	23.8				17.3	9.5		23.8	3.0	55.2	3.0	3.0
Yellow Time (s)	3.3				3.0	3.5		3.3	2.0	3.3	2.0	2.0
All-Red Time (s)	2.9				3.7	1.0		2.9	0.0	3.5	0.0	0.0
Lost Time Adjust (s)	0.0				0.0	0.0		0.0				
Total Lost Time (s)	6.2				6.7	4.5		6.2				
Lead/Lag					Lag				Lead	Lag	Lead	Lead
Lead-Lag Optimize?					Yes				Yes	Yes	Yes	Yes
Vehicle Extension (s)	3.0				3.0	3.0		3.0	3.0	3.0	3.0	3.0
Recall Mode	Max				Max	Max		Max	Max	C-Max	Max	Max
Walk Time (s)					2.0				3.0	2.0	3.0	3.0
Flash Dont Walk (s)					15.0				0.0	21.0	0.0	0.0
Pedestrian Calls (#/hr)					146				182	182	146	306
Act Effct Green (s)	23.8	65.0	35.0	27.0	17.3	33.5	41.0	55.6				
Actuated g/C Ratio	0.22	0.59	0.32	0.25	0.16	0.30	0.37	0.51				
v/c Ratio	0.44	0.10	0.42	0.55	0.27	0.71	0.65	0.33				
Control Delay	41.8	9.1	31.2	39.2	2.0	53.3	31.5	12.2				
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0				
Total Delay	41.8	9.1	31.2	39.2	2.0	53.3	31.5	12.2				
LOS	D	Α	С	D	Α	D	С	В				
Approach Delay		24.4	31.2	33.1			31.7					
Approach LOS		С	С	С			С					
Queue Length 50th (m)	29.2	7.3	34.4	44.0	0.0	34.3	73.9	20.0				
Queue Length 95th (m)	49.2	12.1	48.3	60.1	0.0	#59.9	94.6	32.1				
Internal Link Dist (m)		125.5	140.5	133.0			218.1					
Turn Bay Length (m)	65.0				20.0	105.0						
Base Capacity (vph)	358	1850	926	813	326	283	1235	665				
Starvation Cap Reductn	0	0	0	0	0	0	0	0				
Spillback Cap Reductn	0	0	0	0	0	0	0	0				
Storage Cap Reductn	0	0	0	0	0	0	0	0				
Reduced v/c Ratio	0.44	0.10	0.42	0.55	0.27	0.71	0.65	0.33				
Intersection Summary												

n	ter	se	cti	on	Sı	ım	m	ary	1

Cycle Length: 110
Actuated Cycle Length: 110
Offset: 92 (84%), Referenced to phase 2:EBT and 6:WBT, Start of Green Natural Cycle: 90

Lane Group	Ø6	Ø7	Ø8
Lane Configurations			
Traffic Volume (vph)			
Future Volume (vph)			
Lane Group Flow (vph)			
Turn Type			
Protected Phases	6	7	8
Permitted Phases	U	- 1	0
Detector Phase			
Switch Phase			
Minimum Initial (s)	10.0	1.0	10.0
	31.8	5.0	25.9
Minimum Split (s)			
Total Split (s)	32.0	5.0	38.0
Total Split (%)	29%	5%	35%
Maximum Green (s)	25.2	3.0	31.1
Yellow Time (s)	3.3	2.0	3.0
All-Red Time (s)	3.5	0.0	3.9
Lost Time Adjust (s)			
Total Lost Time (s)			
Lead/Lag	Lag	Lead	Lag
Lead-Lag Optimize?	Yes	Yes	Yes
Vehicle Extension (s)	3.0	3.0	3.0
Recall Mode	C-Max	Max	Max
Walk Time (s)	2.0	3.0	2.0
Flash Dont Walk (s)	23.0	0.0	17.0
Pedestrian Calls (#/hr)	306	128	128
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			

Lanes, Volumes, Timings 2: King Edward & Rideau

Control Type: Actuated-Coordinated Maximum v/c Ratio: 0.71

Future Total 2024 & 2029AM Peak Hour 112 Nelson Street

Intersection LOS: C ICU Level of Service B

Intersection Signal Delay: 31.0
Intersection Capacity Utilization 60.8%
Analysis Period (min) 15 # 95th percentile volume exceeds capacity, queue may be longer. Queue shown is maximum after two cycles.

# Splits and Phases: 2: King Edward & Rideau → **→** Ø2 (R) <u>₩</u><sub>Ø11</sub> Ø6 (R)

11/15/2022 JK CGH Transportation Page 5 Lanes, Volumes, Timings 3: Nelson & Rideau

Future Total 2024 & 2029AM Peak Hour 112 Nelson Street

	*	-	•	1	<b>←</b>	*	<b>†</b>	-	ļ
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBT	SBL	SBT
Lane Configurations	*	<b>*</b>	7	ሻ	<b>1</b>	7	4		4
Traffic Volume (vph)	75	363	6	3	330	62	0	57	2
Future Volume (vph)	75	363	6	3	330	62	0	57	2
Lane Group Flow (vph)	75	363	6	3	330	62	6	0	131
Turn Type	Perm	NA	Perm	Perm	NA	Perm	NA	Perm	NA
Protected Phases		2			6		4		8
Permitted Phases	2		2	6		6		8	
Detector Phase	2	2	2	6	6	6	4	8	8
Switch Phase									
Minimum Initial (s)	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0
Minimum Split (s)	26.8	26.8	26.8	26.8	26.8	26.8	27.0	27.0	27.0
Total Split (s)	53.0	53.0	53.0	53.0	53.0	53.0	27.0	27.0	27.0
Total Split (%)	66.3%	66.3%	66.3%	66.3%	66.3%	66.3%	33.8%	33.8%	33.8%
Maximum Green (s)	47.2	47.2	47.2	47.2	47.2	47.2	21.0	21.0	21.0
Yellow Time (s)	3.3	3.3	3.3	3.3	3.3	3.3	3.3	3.3	3.3
All-Red Time (s)	2.5	2.5	2.5	2.5	2.5	2.5	2.7	2.7	2.7
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0
Total Lost Time (s)	5.8	5.8	5.8	5.8	5.8	5.8	6.0		6.0
Lead/Lag									
Lead-Lag Optimize?									
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Recall Mode	C-Max	C-Max	C-Max	C-Max	C-Max	C-Max	None	None	None
Walk Time (s)	15.0	15.0	15.0	15.0	15.0	15.0	7.0	7.0	7.0
Flash Dont Walk (s)	6.0	6.0	6.0	6.0	6.0	6.0	14.0	14.0	14.0
Pedestrian Calls (#/hr)	89	89	89	225	225	225	89	88	88
Act Effct Green (s)	49.4	49.4	49.4	49.4	49.4	49.4	18.8		18.8
Actuated g/C Ratio	0.62	0.62	0.62	0.62	0.62	0.62	0.24		0.24
v/c Ratio	0.16	0.34	0.01	0.01	0.31	0.10	0.01		0.39
Control Delay	8.6	9.1	0.0	6.7	7.6	2.0	0.0		15.7
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0
Total Delay	8.6	9.1	0.0	6.7	7.6	2.0	0.0		15.7
LOS	Α	Α	Α	Α	Α	Α	Α		В
Approach Delay		8.9			6.7				15.7
Approach LOS		Α			Α				В
Queue Length 50th (m)	4.7	25.9	0.0	0.2	17.9	0.2	0.0		6.9
Queue Length 95th (m)	11.0	41.4	0.0	m0.5	27.8	2.9	0.0		20.9
Internal Link Dist (m)		140.5			117.5		126.5		88.4
Turn Bay Length (m)	40.0		20.0	10.0		20.0			
Base Capacity (vph)	464	1077	766	512	1077	602	577		369
Starvation Cap Reductn	0	0	0	0	0	0	0		0
Spillback Cap Reductn	0	0	0	0	0	0	0		0
Storage Cap Reductn	0	0	0	0	0	0	0		0
Reduced v/c Ratio	0.16	0.34	0.01	0.01	0.31	0.10	0.01		0.36

Intersection Summary

Cycle Length: 80

Office: 34 (43%), Referenced to phase 2:EBTL and 6:WBTL, Start of Green Natural Cycle: 55

JK

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#### Lanes, Volumes, Timings 3: Nelson & Rideau

#### Future Total 2024 & 2029AM Peak Hour 112 Nelson Street

Control Type: Actuated-Coordinated Maximum v/c Ratio: 0.39 Intersection LOS: A ICU Level of Service B Intersection Signal Delay: 8.9 Intersection Capacity Utilization 60.6% Analysis Period (min) 15 m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 3: Nelson & Rideau



11/15/2022 JK **CGH Transportation** Page 7 Lanes, Volumes, Timings 4: Friel & Rideau

Future Total 2024 & 2029AM Peak Hour 112 Nelson Street

	•	-	•	•	<b>←</b>	•	1	<b>†</b>	-	ļ	
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	SBL	SBT	
Lane Configurations		ની	7		ની	7		4		4	
Traffic Volume (vph)	8	355	68	7	350	8	20	6	8	4	
Future Volume (vph)	8	355	68	7	350	8	20	6	8	4	
Lane Group Flow (vph)	0	363	68	0	357	8	0	39	0	16	
Turn Type	Perm	NA	Perm	Perm	NA	Perm	Perm	NA	Perm	NA	
Protected Phases		2			6			4		8	
Permitted Phases	2		2	6		6	4		8		
Detector Phase	2	2	2	6	6	6	4	4	8	8	
Switch Phase											
Minimum Initial (s)	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	
Minimum Split (s)	25.7	25.7	25.7	25.7	25.7	25.7	29.8	29.8	29.8	29.8	
Total Split (s)	50.0	50.0	50.0	50.0	50.0	50.0	30.0	30.0	30.0	30.0	
Total Split (%)	62.5%	62.5%	62.5%	62.5%	62.5%	62.5%	37.5%	37.5%	37.5%	37.5%	
Maximum Green (s)	44.3	44.3	44.3	44.3	44.3	44.3	24.2	24.2	24.2	24.2	
Yellow Time (s)	3.3	3.3	3.3	3.3	3.3	3.3	3.3	3.3	3.3	3.3	
All-Red Time (s)	2.4	2.4	2.4	2.4	2.4	2.4	2.5	2.5	2.5	2.5	
Lost Time Adjust (s)		0.0	0.0		0.0	0.0		0.0		0.0	
Total Lost Time (s)		5.7	5.7		5.7	5.7		5.8		5.8	
Lead/Lag											
Lead-Lag Optimize?											
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	
Recall Mode	C-Max	C-Max	C-Max	C-Max	C-Max	C-Max	None	None	None	None	
Walk Time (s)	13.0	13.0	13.0	13.0	13.0	13.0	12.0	12.0	12.0	12.0	
Flash Dont Walk (s)	7.0	7.0	7.0	7.0	7.0	7.0	12.0	12.0	12.0	12.0	
Pedestrian Calls (#/hr)	85	85	85	82	82	82	81	81	35	35	
Act Effct Green (s)		51.6	51.6		51.6	51.6		21.2		21.2	
Actuated g/C Ratio		0.64	0.64		0.64	0.64		0.26		0.26	
//c Ratio		0.33	0.09		0.32	0.01		0.11		0.04	
Control Delay		5.0	0.05		10.0	0.0		16.0		17.4	
Queue Delay		0.0	0.0		0.0	0.0		0.0		0.0	
Total Delay		5.0	0.5		10.0	0.0		16.0		17.4	
LOS		J.0	Α.5		В	Α.		В		17.4 B	
Approach Delay		4.3			9.8			16.0		17.4	
Approach LOS		4.5 A			3.0 A			В		17.4 B	
Queue Length 50th (m)		6.0	0.1		28.1	0.0		2.8		1.3	
Queue Length 95th (m)		10.3	0.1		44.9	0.0		9.5		5.5	
nternal Link Dist (m)		117.5	0.3		103.0	0.0		131.9		64.0	
Turn Bay Length (m)		111.3	20.0		100.0	20.0		131.8		04.0	
Base Capacity (vph)		1113	793		1116	780		415		423	
Starvation Cap Reductn		0	193		0	0		413		423	
Spillback Cap Reductn		0	0		0	0		0		0	
Storage Cap Reductn		0	0		0	0		0		0	
Reduced v/c Ratio		0.33	0.09		0.32	0.01		0.09		0.04	

Intersection Summary

Cycle Length: 80

Offset: 50 (63%), Referenced to phase 2:EBTL and 6:WBTL, Start of Green

Natural Cycle: 60

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### Lanes, Volumes, Timings 4: Friel & Rideau

### Future Total 2024 & 2029AM Peak Hour 112 Nelson Street

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.33
Intersection Signal Delay: 7.4
Intersection LOS: A
Intersection Capacity Utilization 70.4%
ICU Level of Service C

Analysis Period (min) 15

Splits and Phases: 4: Friel & Rideau

Ø2 (R)	<b>↑</b> ø4	
50 s	30 s	
₩ Ø6 (R)	₩ Ø8	
50 s	30 s	

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 CGH Transportation

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HCM 2010 AWSC 5: Nelson & York Future Total 2024 & 2029AM Peak Hour 112 Nelson Street

Intersection												
Intersection Delay, s/veh	7.5											
Intersection LOS	Α											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		4			4			4			4	
Traffic Vol, veh/h	11	18	8	62	14	5	18	23	26	6	23	2
Future Vol, veh/h	11	18	8	62	14	5	18	23	26	6	23	2
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	11	18	8	62	14	5	18	23	26	6	23	2
Number of Lanes	0	1	0	0	1	0	0	1	0	0	1	0
Approach	EB			WB			NB			SB		
Opposing Approach	WB			EB			SB			NB		
Opposing Lanes	1			1			1			1		
Conflicting Approach Left	SB			NB			EB			WB		
Conflicting Lanes Left	1			1			1			1		
Conflicting Approach Right	NB			SB			WB			EB		
Conflicting Lanes Right	1			1			1			1		
HCM Control Delay	7.3			7.8			7.4			7.4		
HCM LOS	Α			Α			Α			Α		
Lane		NBLn1	EBLn1	WBLn1	SBLn1							
Vol Left, %		27%	30%	77%	19%							
Vol Thru, %		34%	49%	17%	74%							
Vol Right, %		39%	22%	6%	6%							

Lane	NBLn1	EBLn1	WBLn1	SBLn1	
Vol Left, %	27%	30%	77%	19%	
Vol Thru, %	34%	49%	17%	74%	
Vol Right, %	39%	22%	6%	6%	
Sign Control	Stop	Stop	Stop	Stop	
Traffic Vol by Lane	67	37	81	31	
LT Vol	18	11	62	6	
Through Vol	23	18	14	23	
RT Vol	26	8	5	2	
Lane Flow Rate	67	37	81	31	
Geometry Grp	1	1	1	1	
Degree of Util (X)	0.074	0.042	0.096	0.036	
Departure Headway (Hd)	3.983	4.098	4.25	4.191	
Convergence, Y/N	Yes	Yes	Yes	Yes	
Cap	889	865	838	844	
Service Time	2.054	2.162	2.301	2.268	
HCM Lane V/C Ratio	0.075	0.043	0.097	0.037	
HCM Control Delay	7.4	7.3	7.8	7.4	
HCM Lane LOS	Α	Α	Α	Α	
HCM 95th-tile Q	0.2	0.1	0.3	0.1	

		-	•	4	<b>†</b>	Ţ	4
tersection	Lane Group	EBR	WBR	NBL	NBT	SBT	SBR
Delay, s/veh 1.3	Lane Configurations	EDR #	WDK	NDL	<b>†</b> †	<b>†</b> †	JDK #
	Traffic Volume (vph)		10	90		<b>TT</b> 726	29
overnent EBL EBR NBL NBT SBT SBR	Future Volume (vph)	76 76	10 10	90	851 851	726	29
ne Configurations 🏋 🐧 🖒	Lane Group Flow (vph)	76	10	90	869	726	29
ffic Vol, veh/h 2 17 9 65 93 0							
rure Vol, veh/h 2 17 9 65 93 0	Turn Type	Free	Perm	pm+pt	NA	NA	Perm
onflicting Peds, #/hr 0 0 0 0 0 0	Protected Phases			8	2	6	
gn Control Stop Stop Free Free Free	Permitted Phases	Free	8	2			6
Channelized - None - None - None	Detector Phase		8	8	2	6	6
orage Length 0	Switch Phase						
eh in Median Storage. # 0 0 0 -	Minimum Initial (s)		10.0	10.0	10.0	10.0	10.0
ade. % 0 0 0 -	Minimum Split (s)		39.8	39.8	32.0	32.0	32.0
nade, // 0	Total Split (s)		39.8	39.8	80.2	80.2	80.2
ear Violutics. % 2 2 2 2 2 2 2 2 2	Total Split (%)		33.2%	33.2%	66.8%	66.8%	66.8%
	Maximum Green (s)		33.0	33.0	74.2	74.2	74.2
vmt Flow 2 17 9 65 93 0	Yellow Time (s)		3.3	3.3	3.0	3.0	3.0
	All-Red Time (s)		3.5	3.5	3.0	3.0	3.0
ajor/Minor Minor2 Major1 Major2	Lost Time Adjust (s)		0.0	0.0	0.0	0.0	0.0
onflicting Flow All 176 93 93 0 - 0	Total Lost Time (s)		6.8	6.8	6.0	6.0	6.0
Stage 1 93	Lead/Lag		0.0	0.0	0.0	0.0	0.0
Stage 2 83	Lead-Lag Optimize?						
13 13 13 13 13 13 13 13 13 13 13 13 13 1	Vehicle Extension (s)		3.0	3.0	3.0	3.0	3.0
	Recall Mode		None	None	C-Max	C-Max	
tical Hdwy Stg 2 5.42	Walk Time (s)		25.0	25.0	18.0	18.0	18.0 8.0
llow-up Hdwy 3.518 3.318 2.218	Flash Dont Walk (s)		8.0	8.0	8.0	8.0	
t Cap-1 Maneuver 814 964 1501	Pedestrian Calls (#/hr)		127	127	70	108	108
Stage 1 931	Act Effct Green (s)	120.0	33.0	106.4	74.2	74.2	74.2
Stage 2 940	Actuated g/C Ratio	1.00	0.28	0.89	0.62	0.62	0.62
atoon blocked, %	v/c Ratio	0.05	0.02	0.11	0.30	0.35	0.04
ov Cap-1 Maneuver 809 964 1501	Control Delay	0.1	0.1	0.7	11.0	11.8	2.5
ov Cap-2 Maneuver 809	Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Stage 1 925	Total Delay	0.1	0.1	0.7	11.0	11.8	2.5
Stage 2 940	LOS	Α	Α	Α	В	В	Α
	Approach Delay				10.0	11.4	
	Approach LOS				В	В	
pproach EB NB SB	Queue Length 50th (m)	0.0	0.0	0.2	32.6	41.1	0.0
CM Control Delay, s 8.9 0.9 0	Queue Length 95th (m)	0.0	0.0	0.3	39.9	52.3	3.1
CM LOS A	Internal Link Dist (m)				218.1	130.8	
	Turn Bay Length (m)			85.0	2.0.1		30.0
nor Lane/Major Mvmt NBL NBT EBLn1 SBT SBR	Base Capacity (vph)	1489	465	793	2930	2050	686
	Starvation Cap Reductn	0	403	0	2330	2030	000
apacity (veh/h) 1501 - 945	Spillback Cap Reductin	0	0	0	0	0	0
ICM Lane V/C Ratio 0.006 - 0.02	Storage Cap Reductn	0	0	0	0	0	0
CM Control Delay (s) 7.4 0 8.9				-			0.04
CM Lane LOS A A A	Reduced v/c Ratio	0.05	0.02	0.11	0.30	0.35	0.04
M 95th %tile Q(veh) 0 - 0.1	Intersection Summary		_				_
	Cycle Length: 120						
	Astronta d Octaballa as attacked						

Actuated Cycle Length: 120
Offset: 58 (48%), Referenced to phase 2:NBTL and 6:SBT, Start of Green

Natural Cycle: 75

# Lanes, Volumes, Timings 1: King Edward & York

#### Future Total 2024 & 2029PM Peak Hour 112 Nelson Street

Control Type: Actuated-Coordinated		
Maximum v/c Ratio: 0.35		
Intersection Signal Delay: 10.1	Intersection LOS: B	
Intersection Capacity Utilization 59.3%	ICU Level of Service B	
Analysis Period (min) 15		

Splits and Phases: 1: King Edward & York



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Lanes, Volumes, Timings 2: King Edward & Rideau

Future Total 2024 & 2029PM Peak Hour 112 Nelson Street

	•	<b>→</b>	<b>←</b>	<b>†</b>	1	-	ļ	1				
Lane Group	EBL	EBT	WBT	NBT	NBR	SBL	SBT	SBR	Ø1	Ø2	Ø3	Ø5
Lane Configurations	*	<b>†</b> 1>	<b>∱</b> }	<b>^</b>	7	ሻ	<b>^</b>	7				
Traffic Volume (vph)	186	305	364	605	115	160	548	127				
Future Volume (vph)	186	305	364	605	115	160	548	127				
Lane Group Flow (vph)	186	330	473	605	115	160	548	127				
Turn Type	Prot	NA	NA	NA	custom	custom	NA	custom				
Protected Phases	11	12	56	3 4		13	78	11	1	2	3	5
Permitted Phases					4	8		8				
Detector Phase	11	12	56	3 4	4	13	78	11				
Switch Phase												
Minimum Initial (s)	5.0				10.0	5.0		5.0	1.0	10.0	1.0	1.0
Minimum Split (s)	11.2				23.7	9.5		11.2	5.0	29.8	5.0	5.0
Total Split (s)	27.0				29.0	12.0		27.0	5.0	59.0	5.0	5.0
Total Split (%)	24.5%				26.4%	10.9%		24.5%	5%	54%	5%	5%
Maximum Green (s)	20.8				22.3	7.5		20.8	3.0	52.2	3.0	3.0
Yellow Time (s)	3.3				3.0	3.5		3.3	2.0	3.3	2.0	2.0
All-Red Time (s)	2.9				3.7	1.0		2.9	0.0	3.5	0.0	0.0
Lost Time Adjust (s)	0.0				0.0	0.0		0.0				
Total Lost Time (s)	6.2				6.7	4.5		6.2				
Lead/Lag					Lag				Lead	Lag	Lead	Lead
Lead-Lag Optimize?					Yes				Yes	Yes	Yes	Yes
Vehicle Extension (s)	3.0				3.0	3.0		3.0	3.0	3.0	3.0	3.0
Recall Mode	Max				Max	Max		Max	Max	C-Max	Max	Max
Walk Time (s)					2.0				3.0	2.0	3.0	3.0
Flash Dont Walk (s)					15.0				0.0	21.0	0.0	0.0
Pedestrian Calls (#/hr)					186				362	362	186	500
Act Effct Green (s)	20.8	62.0	35.0	32.0	22.3	36.5	44.0	55.6				
Actuated g/C Ratio	0.19	0.56	0.32	0.29	0.20	0.33	0.40	0.51				
v/c Ratio	0.59	0.19	0.53	0.63	0.37	0.68	0.41	0.21				
Control Delay	49.6	11.5	33.4	37.3	3.4	53.0	24.9	10.9				
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0				
Total Delay	49.6	11.5	33.4	37.3	3.4	53.0	24.9	10.9				
LOS	D	В	С	D	Α	D	С	В				
Approach Delay		25.2	33.4	31.9			28.2					
Approach LOS		С	С	С			С					
Queue Length 50th (m)	36.8	16.4	43.6	59.2	0.0	25.3	43.7	10.9				
Queue Length 95th (m)	60.0	23.7	59.7	77.8	0.0	#46.1	58.1	19.2				
Internal Link Dist (m)		125.5	140.5	133.0			218.1					
Turn Bay Length (m)	65.0				20.0	105.0		95.0				
Base Capacity (vph)	313	1778	890	964	311	235	1326	614				
Starvation Cap Reductn	0	0	0	0	0	0	0	0				
Spillback Cap Reductn	0	0	0	0	0	0	0	0				
Storage Cap Reductn	0	0	0	0	0	0	0	0				
Reduced v/c Ratio	0.59	0.19	0.53	0.63	0.37	0.68	0.41	0.21				

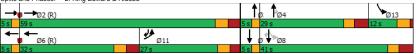
Intersection Summary

Cycle Length: 110
Actuated Cycle Length: 110
Offset: 92 (84%), Referenced to phase 2:EBT and 6:WBT, Start of Green Natural Cycle: 90

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Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.68	
Intersection Signal Delay: 29.6	Intersection LOS: C
Intersection Capacity Utilization 68.3%	ICU Level of Service C
Analysis Period (min) 15	
# 95th percentile volume exceeds capacity, queue may be lon	ger.
Queue shown is maximum after two cycles.	

Splits and Phases: 2: King Edward & Rideau



Lane Group	Ø6	Ø7	Ø8
Lane Configurations			
Traffic Volume (vph)			
Future Volume (vph)			
Lane Group Flow (vph)			
Turn Type			
Protected Phases	6	7	8
Permitted Phases	•		
Detector Phase			
Switch Phase			
Minimum Initial (s)	10.0	1.0	10.0
Minimum Split (s)	31.8	5.0	25.9
Total Split (s)	32.0	5.0	41.0
Total Split (%)	29%	5%	37%
Maximum Green (s)	25.2	3.0	34.1
Yellow Time (s)	3.3	2.0	3.0
All-Red Time (s)	3.5	0.0	3.9
Lost Time Adjust (s)			
Total Lost Time (s)			
Lead/Lag	Lag	Lead	Lag
Lead-Lag Optimize?	Yes	Yes	Yes
Vehicle Extension (s)	3.0	3.0	3.0
Recall Mode	C-Max	Max	Max
Walk Time (s)	2.0	3.0	2.0
Flash Dont Walk (s)	23.0	0.0	17.0
Pedestrian Calls (#/hr)	500	162	162
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 Summary			

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 CGH Transportation

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 CGH Transportation

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Lanes, Volumes, Timings 3: Nelson & Rideau

Future Total 2024 & 2029PM Peak Hour 112 Nelson Street

	•	-	*	•	<b>←</b>	*	1	<b>†</b>	-	ļ	
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	SBL	SBT	
Lane Configurations	ች	<b>↑</b>	7	7	<b>1</b>	7		4		4	
Traffic Volume (vph)	102	470	8	7	391	159	2	3	74	1	
Future Volume (vph)	102	470	8	7	391	159	2	3	74	1	
Lane Group Flow (vph)	102	470	8	7	391	159	0	19	0	172	
Turn Type	pm+pt	NA	Perm	Perm	NA	Perm	Perm	NA	Perm	NA	
Protected Phases	5	2			6			4		8	
Permitted Phases	2		2	6		6	4		8		
Detector Phase	5	2	2	6	6	6	4	4	8	8	
Switch Phase											
Minimum Initial (s)	5.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	
Minimum Split (s)	10.8	26.8	26.8	26.8	26.8	26.8	27.0	27.0	27.0	27.0	
Total Split (s)	12.0	60.0	60.0	48.0	48.0	48.0	30.0	30.0	30.0	30.0	
Total Split (%)	13.3%	66.7%	66.7%	53.3%	53.3%	53.3%	33.3%	33.3%	33.3%	33.3%	
Maximum Green (s)	6.2	54.2	54.2	42.2	42.2	42.2	24.0	24.0	24.0	24.0	
Yellow Time (s)	3.3	3.3	3.3	3.3	3.3	3.3	3.3	3.3	3.3	3.3	
All-Red Time (s)	2.5	2.5	2.5	2.5	2.5	2.5	2.7	2.7	2.7	2.7	
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0		0.0		0.0	
Total Lost Time (s)	5.8	5.8	5.8	5.8	5.8	5.8		6.0		6.0	
Lead/Lag	Lead			Lag	Lag	Lag					
Lead-Lag Optimize?	Yes			Yes	Yes	Yes					
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	
Recall Mode	None	C-Max	C-Max	C-Max	C-Max	C-Max	Max	Max	Max	Max	
Walk Time (s)		15.0	15.0	15.0	15.0	15.0	7.0	7.0	7.0	7.0	
Flash Dont Walk (s)		6.0	6.0	6.0	6.0	6.0	14.0	14.0	14.0	14.0	
Pedestrian Calls (#/hr)		294	294	500	500	500	322	322	171	171	
Act Effct Green (s)	54.2	54.2	54.2	44.6	44.6	44.6		24.0		24.0	
Actuated g/C Ratio	0.60	0.60	0.60	0.50	0.50	0.50		0.27		0.27	
v/c Ratio	0.27	0.45	0.02	0.02	0.45	0.53		0.08		0.63	
Control Delay	9.4	11.4	0.1	10.3	12.3	8.8		15.1		28.3	
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0		0.0		0.0	
Total Delay	9.4	11.4	0.1	10.3	12.3	8.8		15.1		28.3	
LOS	Α	В	Α	В	В	Α		В		С	
Approach Delay		10.9			11.3			15.1		28.3	
Approach LOS		В			В			В		С	
Queue Length 50th (m)	6.9	40.4	0.0	0.4	25.8	1.0		0.6		15.0	
Queue Length 95th (m)	13.2	61.5	0.0	m1.1	36.3	7.4		5.9		#38.0	
Internal Link Dist (m)		140.5			117.5			126.5		91.5	
Turn Bay Length (m)	40.0		20.0	10.0		20.0		2.45			
Base Capacity (vph)	383	1050	426	310	864	302		247		275	
Starvation Cap Reductn	0	0	0	0	0	0		0		0	
Spillback Cap Reductn	0	0	0	0	0	0		0		0	
Storage Cap Reductn	0	0	0	0	0	0		0		0	
Reduced v/c Ratio	0.27	0.45	0.02	0.02	0.45	0.53		0.08		0.63	

## Intersection Summary

Cycle Length: 90

Actuated Cycle Length: 90
Offset: 52 (58%), Referenced to phase 2:EBTL and 6:WBTL, Start of Green

Natural Cycle: 65

11/15/2022 JK CGH Transportation Page 6 Lanes, Volumes, Timings 3: Nelson & Rideau

Future Total 2024 & 2029PM Peak Hour 112 Nelson Street

Control Type: Actuated-Coordinated Maximum v/c Ratio: 0.63 Intersection LOS: B
ICU Level of Service C Intersection Signal Delay: 13.4 Intersection Capacity Utilization 70.6% Analysis Period (min) 15 # 95th percentile volume exceeds capacity, queue may be longer.

Queue shown is maximum after two cycles.

Splits and Phases: 3: Nelson & Rideau

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



11/15/2022 CGH Transportation JK Page 7 Lanes, Volumes, Timings 4: Friel & Rideau

Future Total 2024 & 2029PM Peak Hour 112 Nelson Street

	•	-	*	•	<b>←</b>	*	1	<b>†</b>	1	ļ	
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	SBL	SBT	
Lane Configurations		ની	7		ર્ન	7		44		4	
Traffic Volume (vph)	4	481	65	22	450	9	75	3	14	4	
Future Volume (vph)	4	481	65	22	450	9	75	3	14	4	
Lane Group Flow (vph)	0	485	65	0	472	9	0	100	0	26	
Turn Type	Perm	NA	Perm	Perm	NA	Perm	Perm	NA	Perm	NA	
Protected Phases		2			6			4		8	
Permitted Phases	2		2	6		6	4		8		
Detector Phase	2	2	2	6	6	6	4	4	8	8	
Switch Phase											
Minimum Initial (s)	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	
Minimum Split (s)	25.7	25.7	25.7	25.7	25.7	25.7	29.8	29.8	29.8	29.8	
Total Split (s)	60.0	60.0	60.0	60.0	60.0	60.0	30.0	30.0	30.0	30.0	
Total Split (%)	66.7%	66.7%	66.7%	66.7%	66.7%	66.7%	33.3%	33.3%	33.3%	33.3%	
Maximum Green (s)	54.3	54.3	54.3	54.3	54.3	54.3	24.2	24.2	24.2	24.2	
Yellow Time (s)	3.3	3.3	3.3	3.3	3.3	3.3	3.3	3.3	3.3	3.3	
All-Red Time (s)	2.4	2.4	2.4	2.4	2.4	2.4	2.5	2.5	2.5	2.5	
Lost Time Adjust (s)		0.0	0.0		0.0	0.0		0.0		0.0	
Total Lost Time (s)		5.7	5.7		5.7	5.7		5.8		5.8	
Lead/Lag											
Lead-Lag Optimize?											
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	
Recall Mode	C-Max	C-Max	C-Max	C-Max	C-Max	C-Max	None	None	None	None	
Walk Time (s)	13.0	13.0	13.0	13.0	13.0	13.0	12.0	12.0	12.0	12.0	
Flash Dont Walk (s)	7.0	7.0	7.0	7.0	7.0	7.0	12.0	12.0	12.0	12.0	
Pedestrian Calls (#/hr)	185	185	185	201	201	201	95	95	82	82	
Act Effct Green (s)		57.3	57.3		57.3	57.3		21.2		21.2	
Actuated g/C Ratio		0.64	0.64		0.64	0.64		0.24		0.24	
v/c Ratio		0.44	0.12		0.44	0.02		0.37		0.09	
Control Delay		4.7	0.8		10.7	0.1		27.1		20.1	
Queue Delay		0.1	0.0		0.0	0.0		0.0		0.0	
Total Delay		4.8	0.8		10.7	0.1		27.1		20.1	
LOS		Α	Α		В	Α		С		С	
Approach Delay		4.3			10.5			27.1		20.1	
Approach LOS		Α			В			С		С	
Queue Length 50th (m)		14.2	0.1		40.9	0.0		11.7		2.3	
Queue Length 95th (m)		21.5	m0.7		62.7	0.1		25.5		8.4	
Internal Link Dist (m)		117.5			103.0			131.9		64.0	
Turn Bay Length (m)			20.0			20.0					
Base Capacity (vph)		1105	554		1068	516		306		342	
Starvation Cap Reductn		92	0		0	0		0		0	
Spillback Cap Reductn		0	0		0	0		0		0	
Storage Cap Reductn		0	0		0	0		0		0	
Reduced v/c Ratio		0.48	0.12		0.44	0.02		0.33		0.08	

Intersection Summary

Cycle Length: 90
Actuated Cycle Length: 90
Offset: 48 (53%), Referenced to phase 2:EBTL and 6:WBTL, Start of Green

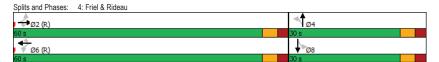
Natural Cycle: 60

11/15/2022 JK CGH Transportation Page 8 Lanes, Volumes, Timings 4: Friel & Rideau

Future Total 2024 & 2029PM Peak Hour 112 Nelson Street

Control Type: Actuated-Coordinated Maximum v/c Ratio: 0.44 Intersection Signal Delay: 9.2 Intersection Capacity Utilization 77.5% Analysis Period (min) 15 Intersection LOS: A ICU Level of Service D

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



11/15/2022 CGH Transportation JK Page 9

Intersection												
Intersection Delay, s/veh	7.7											
Intersection LOS	Α											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		4			4			4			43-	
Traffic Vol, veh/h	4	8	11	43	0	43	0	98	66	4	19	6
Future Vol, veh/h	4	8	11	43	0	43	0	98	66	4	19	6
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	4	8	11	43	0	43	0	98	66	4	19	6
Number of Lanes	0	1	0	0	1	0	0	1	0	0	1	C
Approach	EB			WB				NB		SB		
Opposing Approach	WB			EB				SB		NB		
Opposing Lanes	1			1				1		1		
Conflicting Approach Left	SB			NB				EB		WB		
Conflicting Lanes Left	1			1				1		1		
Conflicting Approach Right	NB			SB				WB		EB		
Conflicting Lanes Right	1			1				1		1		
HCM Control Delay	7.3			7.6				7.8		7.4		
HCM LOS	Α			Α				Α		Α		
.ane		NBLn1	EBLn1	WBLn1	SBLn1							
Vol Left, %		0%	17%	50%	14%							
/ol Thru, %		60%	35%	0%	66%							
/ol Right, %		40%	48%	50%	21%							
Sign Control		Stop	Stop	Stop	Stop							
Traffic Vol by Lane		164	23	86	29							
_T Vol		0	4	43	4							
Through Vol		98	8	0	19							
RT Vol		66	11	43	6							
ane Flow Rate		164	23	86	29							
Geometry Grp		1	1	1	1							
Degree of Util (X)		0.178	0.026	0.098	0.033							
		3.902	4.085	4.086	4.152							
Convergence, Y/N		Yes	Yes	Yes	Yes							
Departure Headway (Hd) Convergence, Y/N Cap		910	861	865	850							
Convergence, Y/N Cap Service Time		910 1.963	861 2.181	865 2.167	850 2.237							
Convergence, Y/N Cap Service Time HCM Lane V/C Ratio		910 1.963 0.18	861 2.181 0.027	865 2.167 0.099	850 2.237 0.034							
Convergence, Y/N Cap Service Time		910 1.963	861 2.181	865 2.167	850 2.237							

Intersection						
Int Delay, s/veh	0.8					
-						
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations	Y			લી	ß	
Traffic Vol, veh/h	0	11	14	164	72	1
Future Vol, veh/h	0	11	14	164	72	1
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	11	14	164	72	1
	·					•
	Minor2		Major1		Major2	
Conflicting Flow All	265	73	73	0	-	0
Stage 1	73	-	-	-	-	-
Stage 2	192	-	-	-	-	-
Critical Hdwy	6.42	6.22	4.12	-	-	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	2.218	-	-	-
Pot Cap-1 Maneuver	724	989	1527	-	-	-
Stage 1	950	-	-	-	-	-
Stage 2	841	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	717	989	1527	-	-	-
Mov Cap-2 Maneuver	717	-	-	-		
Stage 1	941	-	-	-	-	-
Stage 2	841					
Olugo 2	0.11					
Approach	EB		NB		SB	
HCM Control Delay, s	8.7		0.6		0	
HCM LOS	Α					
Minor Lane/Major Mvm	nt .	NBL	NDT	EBLn1	SBT	SBR
	IL					
Capacity (veh/h)		1527	-	989	-	-
HCM Lane V/C Ratio		0.009		0.011	-	-
HCM Control Delay (s)		7.4	0	8.7	-	-
HCM Lane LOS		A	Α	A	-	-
HCM 95th %tile Q(veh)	)	0	-	0	-	-

# Appendix J

**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	
	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)	
	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)	
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	✓
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	*	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)	abla
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	abla
BETTER		4.2.2	Provide residents with carshare memberships, either free or subsidized	
		5.	PARKING	
		5.1	Priced parking	
BASIC	*	5.1.1	Unbundle parking cost from purchase price (condominium)	
BASIC	*	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 7	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	Ø
BASIC	1.1.3	Locate building doors and windows to ensure visibility of pedestrians from the building, for their security and comfort	Ø
	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)	Ø
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)	<b>∠</b>

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	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)	ℴ
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)	abla
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)	<b>♥</b>
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)	Ø
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)	$\square$
BETTER	2.2.2	Provide secure bicycle parking spaces equivalent to at least the number of units at condominiums or multi-family residential developments	Ø
	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)	<b>₫</b>
	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	

			Check if completed &
	TDM-s	supportive design & infrastructure measures:  Residential developments	add descriptions, explanations or plan/drawing references
	4.	RIDESHARING	
BASIC	<b>4.1</b> 4.1.1	Pick-up & drop-off facilities  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)	$\square$
	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	abla
	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	
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	$\square$
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 K

SimTraffic Intersection Worksheets – Future Total 2024 & 2029



01-31-2023

# Summary of All Intervals

Run Number	1	2	3	Avg	
Start Time	8:00	8:00	8:00	8:00	
End Time	9:00	9:00	9:00	9:00	
Total Time (min)	60	60	60	60	
Time Recorded (min)	30	30	30	30	
# of Intervals	2	2	2	2	
# of Recorded Intervals	1	1	1	1	
Vehs Entered	1518	1484	1548	1516	
Vehs Exited	1510	1492	1545	1517	
Starting Vehs	74	76	84	76	
Ending Vehs	82	68	87	75	
Travel Distance (km)	830	815	852	832	
Travel Time (hr)	39.7	38.7	41.5	40.0	
Total Delay (hr)	19.2	18.5	20.3	19.3	
Total Stops	2069	2045	2146	2087	
Fuel Used (I)	94.8	92.2	98.2	95.1	

### Interval #0 Information Seeding

Start Time	8:00						
End Time	8:30						
Total Time (min)	30						
Volumes adjusted by Growth Factors.							
No data recorded this interval.							

## Interval #1 Information Recording

Start Time	8:30
End Time	9:00
Total Time (min)	30
Volumes adjusted by Growth Fa	actors.

Run Number	1	2	3	Avg	
Vehs Entered	1518	1484	1548	1516	
Vehs Exited	1510	1492	1545	1517	
Starting Vehs	74	76	84	76	
Ending Vehs	82	68	87	75	
Travel Distance (km)	830	815	852	832	
Travel Time (hr)	39.7	38.7	41.5	40.0	
Total Delay (hr)	19.2	18.5	20.3	19.3	
Total Stops	2069	2045	2146	2087	
Fuel Used (I)	94.8	92.2	98.2	95.1	

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# Queuing and Blocking Report Future Total 2024 & 2029

otal 2024 & 2029 01-31-2023

Intersection: 3: Nel	son & R	ideau								
Movement	EB	EB	EB	WB	WB	WB	NB	SB		
Directions Served	L	Т	R	L	T	R	LTR	LTR		
Maximum Queue (m)	54.6	89.1	17.6	6.0	60.4	34.9	8.7	51.3		
Average Queue (m)	17.0	40.3	1.8	1.2	29.9	16.1	2.4	21.9		
95th Queue (m)	43.5	80.0	11.2	6.2	53.4	33.4	7.7	45.3		
Link Distance (m)		142.2			128.1		138.4	98.8		
Upstream Blk Time (%)										
Queuing Penalty (veh)										
Storage Bay Dist (m)	40.0		20.0	10.0		20.0				
Storage Blk Time (%)		16		3	33	1				
Queuing Penalty (veh)		17		14	54	5				

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