# APARTMENT BUILDING 178 CARRUTHERS AVENUE CITY OF OTTAWA

# TRANSPORTATION BRIEF REVISED

Prepared for:

178 Carruthers Property Inc.

December 10, 2014

114-593 Brief\_2.doc

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#### APARTMENT BUILDING 178 CARRUTHERS AVENUE OTTAWA

# TRANSPORTATION BRIEF REVISED

#### 1. INTRODUCTION

A Site Plan has been prepared for the redevelopment of property at 178 Carruthers Avenue. The site is a residential parcel of land located on the west side of Carruthers Avenue approximately 65 m south of Scott Street and 240 m east of Parkdale Avenue. The property is approximately 567 m<sup>2</sup> in size and currently contains a 4 unit residential building. The location of the site is shown in Figure 1.1.

The owners of the property propose the construction of an apartment building containing 21 low rise apartment units in a four storey building. The building will have one access onto Carruthers Avenue which will provide access to an underground garage. The site will provide parking for 15 vehicles. Substantial completion of the site works is expected by the year 2015.

The study has determined that the number of new site generated trips would not trigger the preparation of a Transportation Impact Assessment report as documented in the City of Ottawa *Transportation Impact Assessment Guidelines*. A Transportation Brief report was prepared as part of the Site Plan Application for the lands. The Transportation Brief report would determine the expected number of peak hour trips generated by the site, and the impact that the site would have on the intersections of Scott Street and Carruthers Avenue, and Wellington Street and Carruthers Avenue.

#### 1.1 Scope of Work

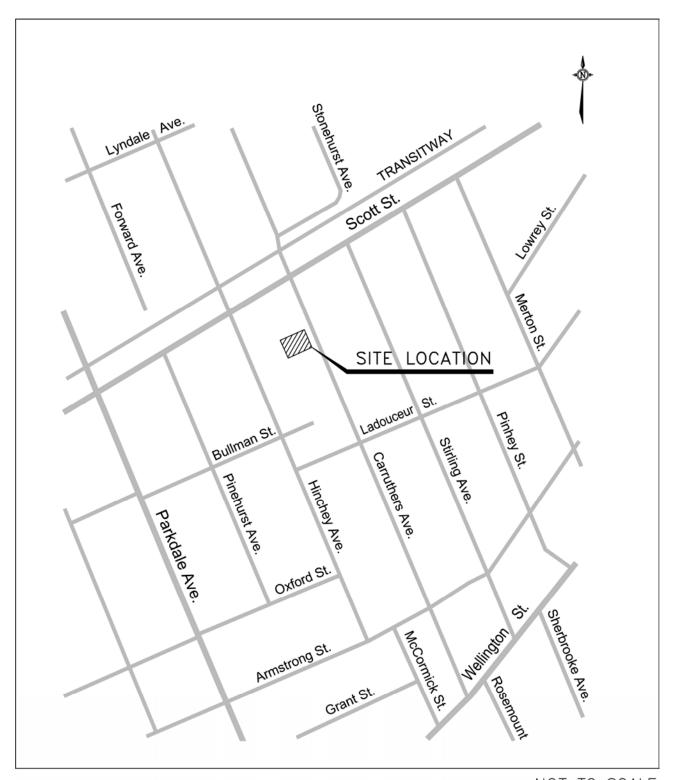
The scope of the traffic assessment would be the preparation of a Transportation Brief which would examine the impact of the site on the surrounding roads and intersections. Because of the proposed residential building and type of development in the area, the study has taken the weekday peak AM and PM hours as the time periods that the study will be examining the roads. The years which the operational analysis will examine the roads would be for the year 2013 (traffic counts), at 2015 when the proposed apartment building will be completed, and at the year 2020 which represents five years beyond the completion of the building.

#### 2. ADJACENT ROADS AND INTERSECTIONS

The proposed apartment building will be located on Carruthers Avenue. Carruthers Avenue is a two lane north-south local street which links Burnside Avenue to the north with Wellington Street to the south. The street is restricted to one-way traffic southbound between Scott Street

2

# FIGURE 1.1 SITE LOCATION PLAN



and Wellington Street, and two-way traffic north of Scott Street. Between Scott Street and Armstrong Street, parking along Carruthers Avenue is prohibited on the west side of the street and permitted along the east side with the exception of a 2 hour limit between 8:00 AM and 5:00 PM weekdays. Pedestrian sidewalks exist along both sides of Carruthers Avenue.

Scott Street is located approximately 65 m north of the site. Scott Street is designated as an arterial road in the City of Ottawa *Transportation Master Plan* (TMP). The road is a four lane east-west undivided roadway with a posted speed limit of 50 km./h. Parking is prohibited along both sides of the street. Pedestrian sidewalks exist along both sides of the street with no cycling lanes in the vicinity of Carruthers Avenue.

At the south end of Carruthers Avenue is Wellington Street. Wellington Street is an east-west arterial road with a two lane urban road cross section. Parking is permitted in designated areas along both sides of the road, but is restricted to a 2 hour limit between 8:00 AM and 5:30 PM Monday to Friday. Sidewalks exist along both sides of the road and Wellington Street is designated as an On-road Cycling Route in the City of Ottawa TMP.

The intersection of Carruthers Avenue and Scott Street is controlled by traffic signals with Scott Street forming the eastbound and westbound approaches, and Carruthers Avenue the southbound approach. With Carruthers Avenue a one-way street southbound, there would be no traffic at the south approach. The intersection has the following lane configuration:

Eastbound Scott Approach - One shared left/through lane

One shared through/right lane

Westbound Scott Approach - One shared left/through lane

One shared through/right lane

Southbound Carruthers Approach - One left turn lane

One shared through/right lane

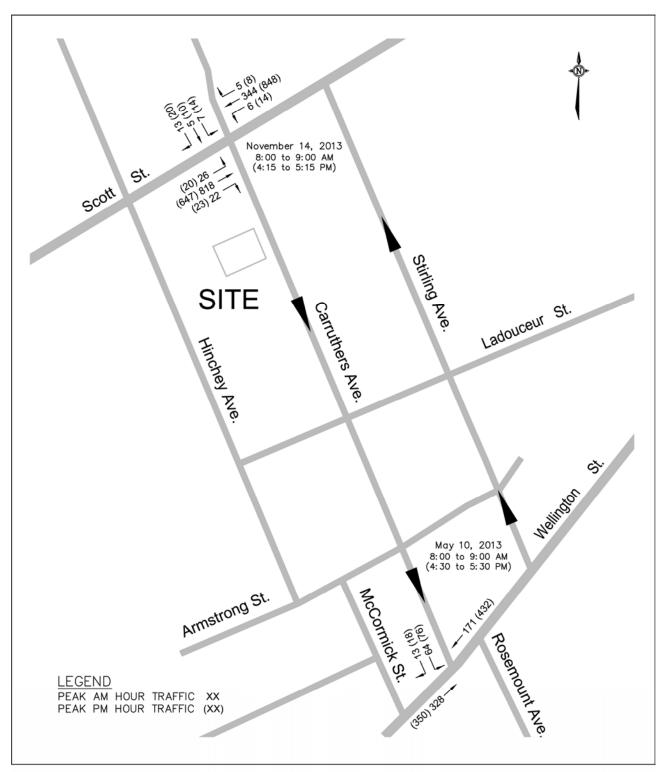
The intersection of Carruthers Avenue and Wellington Street is a "T" intersection controlled by traffic signals. Wellington Street forms the eastbound and westbound approaches, and Carruthers Avenue the northbound approach. Rosemount Avenue is located south of Wellington Street with the Rosemount/Wellington intersection located approximately 20 m east of the Carruthers/Wellington intersection. The intersection has the following lane configuration:

Eastbound Wellington Approach - One through lane

Westbound Wellington Approach - One shared through/right lane Southbound Carruthers Approach - One shared left/right lane

Figure 2.1 shows the weekday peak AM and PM hour traffic counts taken by the City of Ottawa at the intersection of Carruthers Avenue and Scott Street on November 14, 2013, and at the intersection of Carruthers Street and Wellington Street on May 10, 2014. The City's counts are provided in the Appendix as Exhibit 1 for the Carruthers/Scott intersection and Exhibit 2 for the Carruthers/Wellington intersection.

FIGURE 2.1 YEAR 2013 PEAK AM AND PM HOUR TRAFFIC COUNTS



#### 3. PROPOSED APARTMENT BUILDING

The owners of land at 178 Carruthers Avenue, 178 Carruthers Property Inc., have proposed the redevelopment of the property to include a 21 unit apartment building. The land is currently occupied by a residential building which contains 4 apartment units. The property is approximately 567 m<sup>2</sup> in size and is currently zoned "R4S", Residential Fourth Density Zone, which will support the proposed development.

The site is located on the west side of Carruthers Avenue approximately 65 m south of Scott Street. The building will be a four storey building with one driveway access onto Carruthers Avenue. The Site Plan provides 15 parking spaces in an underground parking garage of which 10 are designated for residents and 5 parking spaces for visitors.

Figure 3.1 shows a conceptual site plan of the proposed apartment building which is expected to be substantially completed by 2015.

#### 3.1 Trip Generation

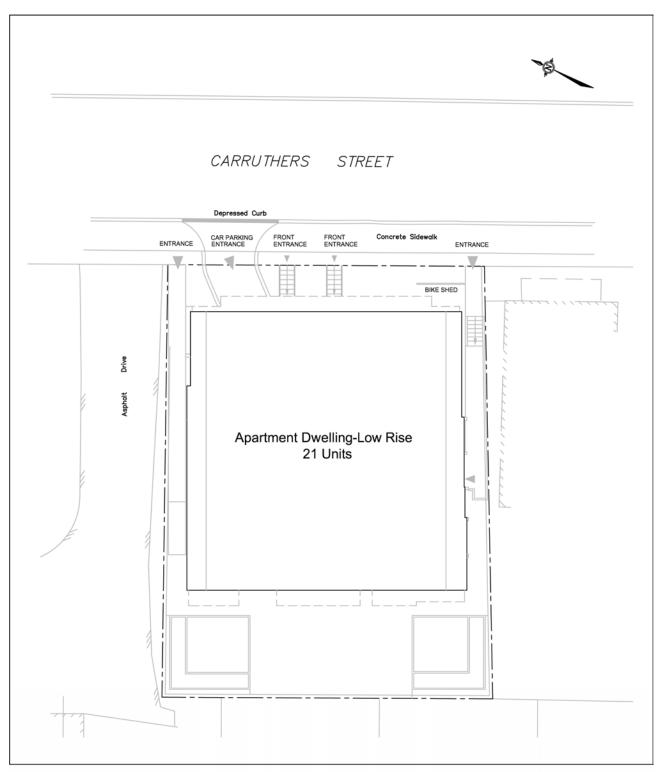
The number of site generated trips was based on the type and use of the proposed building. The site generated trips were determined using the Institute of Transportation Engineers (ITE) document, *Trip Generation*. The analysis used the trip generation rates for a 21 unit low-rise apartment building. The trip generation rate analysis used the average trip rates for a "Low-Rise Apartment" (ITE Land Use Code 221). Table 3.1 presents the expected site generation rates for the peak AM and PM hours of the adjacent street traffic.

TABLE 3.1 TRIP GENERATION RATES

LAND USE	TRIP GENERATION RATE					
LAND USE	Peak AM Hr.	Peak PM Hr.				
Low-Rise Apartment (ITE Land Use 221)	0.46 T/Unit	0.58 T/Unit				

The number of site generated trips utilized the trip rates of Table 3.1 and the proportion of trips entering and exiting the site as documented in the ITE manual. The City of Ottawa's 2013 TMP states that the 2011 morning peak hour transit share was just over 22 percent and the goal of the TMP is to increase the transit share to 26 percent by the year 2031. With OC Transpo transit routes located along Scott Street and the Tunney's Pasture Transit Station located approximately 625 m away, the study has applied a 20 percent transit share rate to the expected site trips for the apartment building. Table 3.2 shows the expected number of peak hour site generated trips for the apartment building.

# FIGURE 3.1 CONCEPTUAL SITE PLAN



**TABLE 3.2** 

# PEAK HOUR SITE TRIPS GENERATED

UNIT TYPE	WEEKD	AY PEAK	AM HR.	WEEKDAY PEAK PM HR.					
UNITIFE	TOTAL	ENTER	EXIT	TOTAL	ENTER	EXIT			
Apartment (ITE 221)	10	2 (21%)	8 (79%)	12	8 (65%)	4 (35%)			
20% Transit Share Reduction	-2	0	-2	-2	-1	-1			
Total Trips	8	2	6	10	7	3			

#### 3.2 **Trip Distribution**

The distribution of site generated trips was determined following an examination of the 2013 traffic counts along Scott Street and Wellington Street and the employment areas within the region. The trips generated by the site were proportioned as follows for both the weekday peak AM and PM hours:

0% To/From the North To/From the South 35% 40% To/From the East To/From the West 25%

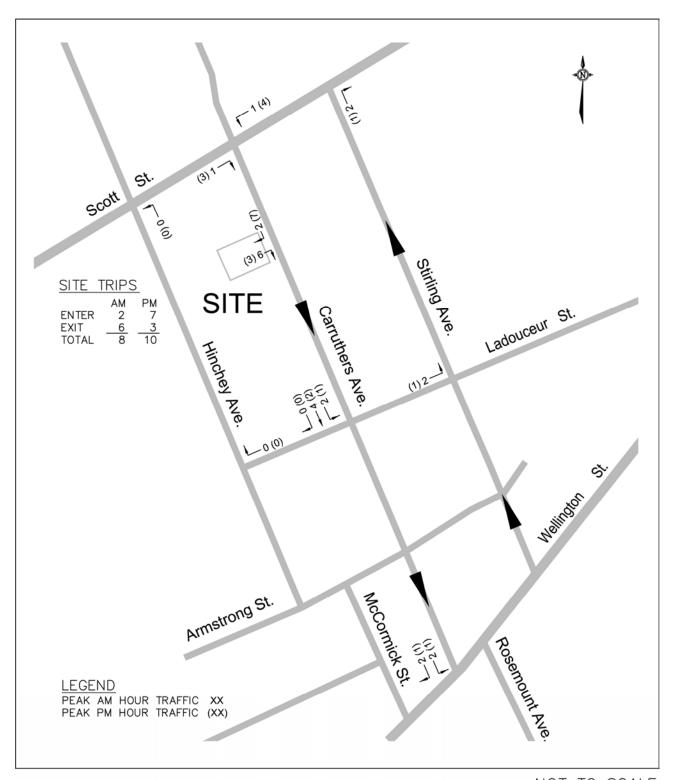
The trips were proportioned as shown above, but were distributed along the surrounding roads to reflect the one-way traffic restrictions along Carruthers Avenue and Stirling Avenue, and that Hinchey Avenue does not extend to Wellington Street. Figure 3.2 shows the expected distribution of site generated trips during the weekday peak AM and PM hours.

#### 4. TRANSPORTATION IMPACT

The study will examine the operation of the Carruthers/Scott and Carruthers/Wellington intersections. The site access onto Caruthers Avenue was not examined as the traffic volumes are very low and Carruthers Avenue is a one-way street resulting in a very good level of service. The study will analyze the intersections for the current 2013 traffic counts, at 2015 when construction of the site is expected to be completed, and at 2020 which represents five years beyond completion. The analysis will use the *Highway Capacity Software*, which utilizes the intersection capacity analysis procedure as documented in the 2010 Highway Capacity Manual.

For a signalized intersection, the operation or level of service of an intersection is determined from the volume to capacity ratio (v/c) for each lane movement as documented by the City of Ottawa in the Transportation Impact Study Assessment Guidelines, October 2006. The following relates the level of service with the volume to capacity ratio at each lane movement.

FIGURE 3.2
PEAK AM AND PM HOUR SITE GENERATED TRIPS



LEVEL OF SERVICE	VOLUME TO CAPACITY RATIO
Level of Service A	0 to 0.60
Level of Service B	0.61 to 0.70
Level of Service C	0.71 to 0.80
Level of Service D	0.81 to 0.90
Level of Service E	0.91 to 1.00
Level of Service F	> 1.00

#### 4.1 Background and Total Traffic Volumes

The study will examine the impact of the site at the years 2015 and 2020. The growth in background traffic was determined from Figure 2.10 of the 2013 City of Ottawa TMP which shows that the total average annual growth in population projected from 2011 to 2031 was approximately 1.05 percent. The study has therefore utilized an annual growth in background traffic volumes of 2.0 percent. The following are the growth factors applied to the 2013 traffic counts which are presented in Figure 2.1. The study projected only the Scott Street through movements at the Carruthers/Scott intersection and Wellington Street through movements at the Carruthers/Wellington intersection because the surrounding residential area is already built up with little growth expected by the 2015 horizon year of the study.

#### 2.0 Percent Average Annual Compounded Growth

2013 to 2015 = 1.0402013 to 2020 = 1.149

Figure 4.1 shows the expected 2015 peak AM and PM hour background traffic volumes utilizing the above growth factors (excluding site generated trips).

A Site Plan Application has been submitted to the City of Ottawa for development at 12 Stirling Avenue. The development proposes 144 residential condominiums, 4 townhouses, an additional 26 condo units and approximately 4,175 ft² of retail/commercial space. The development proposes a site access onto Carruthers Avenue approximately 25 m south of the Carruther/Scott intersection. The developer of the site proposes that a short section of Carruthers Avenue between Scott Street and the site access be converted to two-way traffic, with westbound left turn movements prohibited for vehicles exiting the garage. The Carruthers/Scott traffic signals would be modified to include the northbound Carruthers approach and traffic from the 12 Stirling Avenue development. It is assumed that the development would be constructed by the 2020 horizon year of the study. A *Transportation Brief* report dated March 7, 2013 was prepared by Delcan which examined the impact of trips generated by the 12 Stirling Avenue project.

The 2020 peak hour background traffic which is shown in Figure 4.2 of this report would include the 2.0 Percent Average Annual Compounded growth factor as discussed earlier, plus the expected site generated trips from the 12 Stirling Avenue development as shown in Figure 4 of the Delcan *Transportation Brief* report. All site generated trips from the 12 Stirling Avenue development would be directed to the Carruthers/Scott intersection with no trips travelling southbound along Carruthers Avenue past the site.

Transportation Brief (Nevisca)

FIGURE 4.1 YEAR 2015 PEAK AM AND PM HOUR BACKGROUND TRAFFIC

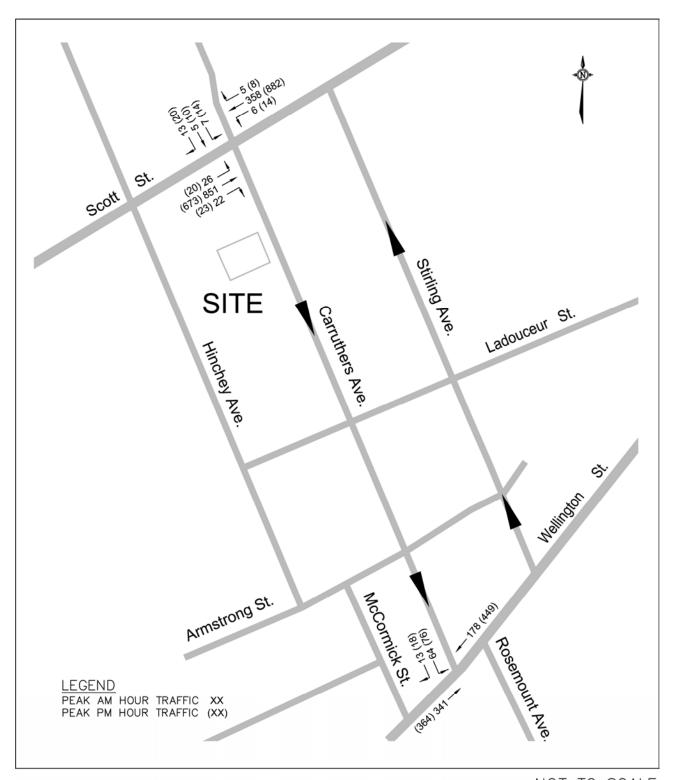
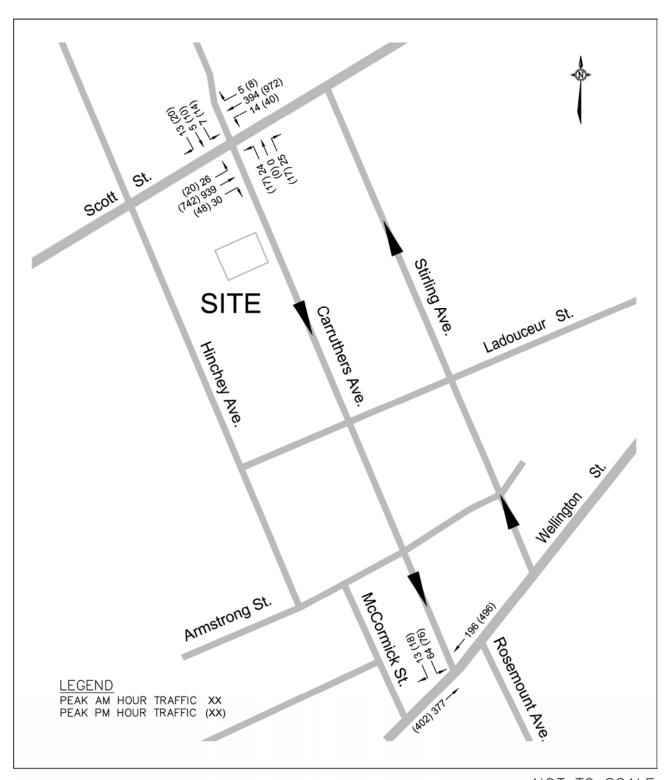


FIGURE 4.2 YEAR 2020 PEAK AM AND PM HOUR BACKGROUND TRAFFIC



The total traffic volumes are the addition of the future background traffic and the expected site generated trips (Figure 3.2). Figure 4.3 shows the 2015 total traffic volumes and Figure 4.4 the 2020 total traffic volumes.

#### 4.2 Traffic Analysis

The Transportation Brief report will examine the operation of the Carruthers/Scott and Carruthers/Wellington intersections. The results of the analysis are discussed in detail in the following sections:

### Scott Street and Carruthers Avenue Intersection

The intersection of Scott Street and Carruthers Avenue is controlled by traffic signals and is located approximately 65 m north (centreline to centreline) of the site. Scott Street is a four lane road forming the eastbound and westbound approaches, and Carruthers Avenue the northbound approach. Carruthers Avenue south of Scott Street is restricted to one-way traffic southbound; therefore there are no vehicles at the northbound approach to the intersection.

The operational analysis of the intersection utilized the 2013 traffic counts and traffic signal timing plan obtained from the City of Ottawa. The traffic counts determined that during the peak AM and PM hour, all lane movements at the intersection would function at a Level of Service (LoS) "A". Table 4.1 summarizes the operation of the intersection with the analysis sheets provided in the Appendix as Exhibit 3 for the peak AM hour and Exhibit 4 for the peak PM hour.

TABLE 4.1 CARRUTHERS/SCOTT – LoS & Volume/Capacity (v/c)

Intersection Approach		OAY PEAK AM HR. R 2013 2015 (2020)	WEEKDAY PEAK PM HR. YEAR <i>2013</i> 2015 (2020)				
	LoS	v/c (sec.)	LoS	v/c (sec.)			
EB Left/Through/Right - Scott	A A (A)	0.46 0.47 (0.52)	A A (A)	0.36 0.38 (0.43)			
WB Left/Through/Right - Scott	A A (A)	0.19 0.19 (0.21)	AA(A)	0.44 0.47 (0.56)			
SB Left – Carruthers	A A (A)	0.02 0.02 (0.02)	A A (A)	0.04 0.04 (0.05)			
SB Through/Right – Carruthers	A A (A)	0.05 0.05 (0.05)	AA(A)	0.09 0.09 (0.09)			
*NB Left/Through/Right – Carruthers	(A)	(0.15)	(A)	(0.11)			
Total Intersection	A A (A)	0.35 0.37 (0.43)	A A (A)	0.36 0.38 (0.45)			

The Northbound intersection approach was constructed as part of the 12 Stirling Avenue approach. The approach is assumed to be constructed by the year 2020

# FIGURE 4.3 YEAR 2015 PEAK AM AND PM HOUR TOTAL TRAFFIC

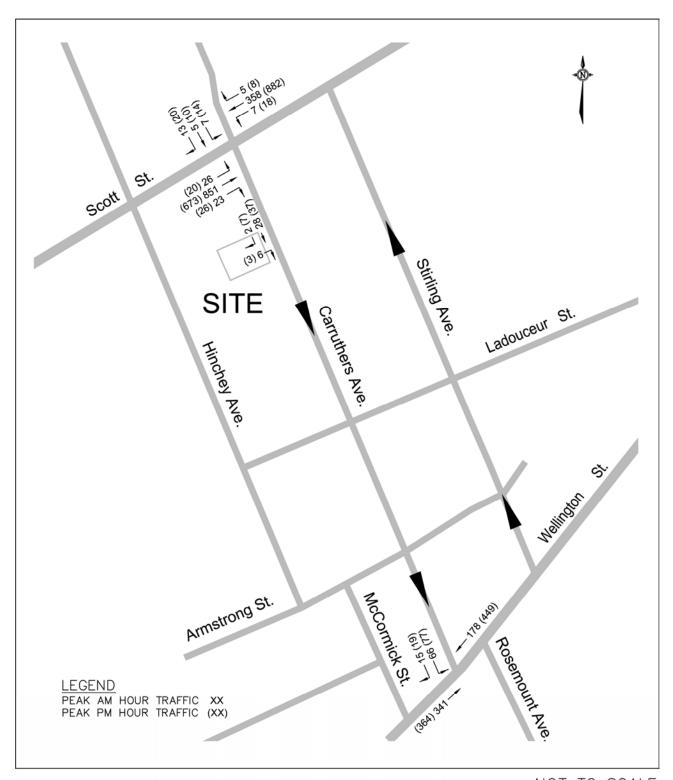
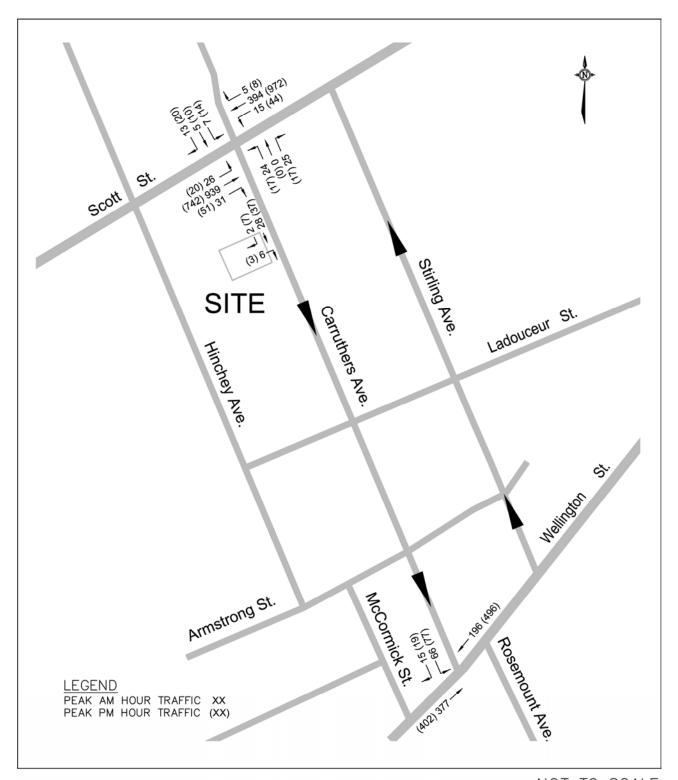


FIGURE 4.4 YEAR 2020 PEAK AM AND PM HOUR TOTAL TRAFFIC



Transportation Brief (Novicea)

For the expected traffic at the years 2015 the intersection would continue to operate at a LoS "A" during both the peak AM and PM hours. The operational analysis utilized the existing traffic signal timing plan. Table 4.1 summarizes the operation of the intersection with the analysis sheets provided as Exhibits 5 and 6.

The expected 2020 total traffic counts assumes the construction of a northbound Carruthers Avenue approach which is constructed as part of the development of the 12 Stirling Avenue site. The northbound approach would receive all exiting traffic from the 12 Stirling Avenue parking garage, but would not provide a benefit for other existing development along Carruthers Avenue. All approach movements would function at a LoS "A" during both the peak AM and PM hour. Table 4.1 summarizes the operation of the intersection with the analysis sheets provided as Exhibit 7 for the peak AM hour and Exhibit 8 for the peak PM hour.

There would be no requirement for modifications to the intersection due to the development of the site.

#### Wellington Street and Carruthers Avenue Intersection

The intersection of Wellington Street and Carruthers Avenue is a signalized intersection located approximately 400 m south of the site. The intersection is a "T" intersection with Wellington Street forming the eastbound and westbound approaches, and Carruthers Avenue the northbound (one-way traffic) approach. The Carruthers/Wellington intersection is the main point for eastbound and westbound exiting traffic from the site. The intersection of Rosemount Avenue and Wellington Street is located approximately 20 m east of Carruthers Avenue.

The operational analysis of the Carruthers/Wellington intersection determined that the intersection operated at a LoS "A" during both the peak AM and PM hours using the 2013 traffic counts and signal timing plan obtained from the City of Ottawa. Table 4.2 summarizes the 2013 operation of the intersection with the analysis sheets provided as Exhibit 9 for the peak AM hour and Exhibit 10 for the peak PM hour.

TABLE 4.2 CARRUTHERS/WELLINGTON – LoS & Volume/Capacity (v/c)

Intersection Approach		OAY PEAK AM HR. R 2013 2015 (2020)	WEEKDAY PEAK PM HR. YEAR <i>2013</i> 2015 (2020)				
	LoS	v/c (sec.)	LoS	v/c (sec.)			
EB Through – Wellington	AA(A)	0.30 0.31 (0.35)	A A (A)	0.31 0.32 (0.36)			
WB Through – Wellington	AA(A)	0.16 0.16 (0.18)	A A (A)	0.39 0.40 (0.44)			
SB Left/Right – Carruthers	A A (A)	0.27 0.28 (0.28)	A A (A)	0.36 0.36 (0.36)			
<b>Total Intersection</b>	A A (A)	0.30 0.31 (0.33)	A A (A)	0.38 0.39 (0.43)			

Transportation brief (Revised)

The Carruthers/Wellington intersection would continue to operate at a LoS "A" during both the peak AM and PM hours for the expected traffic at the year 2015 (completion of the site) and 2020 (5 years beyond completion). The operation of the intersection is summarized in Table 4.2 with the analysis sheets provided as Exhibits 11 to 14.

There would be no requirement for improvements to the intersection due to the development of the residential building at 178 Carruthers Avenue.

#### 4.3 Collision Reports

A three year collision report summary was obtained from the City of Ottawa for the year 2010 through 2012 at the Carruthers/Scott and Carruthers/Wellington intersections. The reports determined that over a three year time period there were 7 reported collisions at the Carruthers/Scott intersection and 1 reported collision at the Carruthers/Wellington intersection. The number and type of collisions reported at the two intersections showed that there would be no requirement for further intersection modifications. Table 4.3 summarizes the types of collisions reported at the intersections over the three year period, with the City of Ottawa collision reports provided in the Appendix as Exhibit 15.

TABLE 4.3 COLLISION SUMMARY – 2010 to 2013

	COLLISION DATA													
Year	Rear-End	Angular	Turning	Other	Total									
Carruthers/Scott Intersection														
2010	0	0	1	0	1									
2011	1	0	2	2	5									
2012	0	0	0	1	1									
Carruthers/V	Vellington Inte	rsection												
2010	0	0	0	1	1									
2011	0	0	0	0	0									
2012	0	0	0	0	0									

#### 4.4 Site Access and Parking

The Site access is located at the north end of the property. There are no obstructions in the northerly direction which would affect the sight line of exiting vehicles from seeing southbound vehicles travelling along Carruthers Avenue. The neighbour adjacent to the south side of the property has a privacy fence which terminates at the property line. The fence would not obstruct the sight line of exiting vehicles from seeing pedestrians using the sidewalk along the west side of the street.

Transportation Brist (Textiood)

The Site Plan provides 5 parking spaces for visitors or approximately 1 parking space for every 4 apartment units. On-street parking is provided along Carruthers Avenue with parking between Scott Street and Armstrong Street prohibited on the west side of the street and permitted along the east side with the exception of a 2 hour limit between 8:00 AM and 5:00 PM weekdays. The east side of Carruthers Avenue has the capacity for approximately 15 parked cars with approximately 3 to 5 parked cars observed during the day.

#### 4.5 Transportation Demand Management (TDM)

The City of Ottawa is implementing Transportation Demand Management (TDM) measures as a plan to reduce peak hour traffic along the City's transportation network. The Site Plan does serve the principals of TDM by locating the site in close proximity to pedestrian, cycling and transit facilities. The following list the facilities which would reduce the volumes of peak hour vehicular traffic:

- 1. Sidewalks exist along both sides of the road for Carruthers Avenue, Scott Street and Wellington Street. The developer shall maintain a 2.0 m wide sidewalk across the frontage of the site with a sidewalk and curb depression at the access to the parking garage.
- 2. OC Transpo Regular Route 16 travels along Scott Street and Regular Route 2 travels along Wellington Street. Bus stops are located at the Carruthers/Scott and Carruthers/Wellington intersections.
- 3. Scott Street and Wellington Street are designated as primary cycling routes.
- 4. The site provides 15 parking spaces for 21 apartment units which would promote occupants to not own cars but instead to use public transit. The area does provide retail shopping and employment within walking distance.

5. FINDINGS

# The owners of land at 178 Carrythers Avenue have proposed the const

The owners of land at 178 Carruthers Avenue have proposed the construction of a 21 unit low rise apartment building which would replace the existing 4 unit building. The site is located approximately 65 m south of the intersection of Carruthers Avenue and Scott Street. The site will have one driveway entrance onto Carruthers Avenue which will provide access to a 15 space underground parking garage. Substantial completion of the building is expected by the year 2015.

The Transportation Brief study analysis has examined the Carruthers/Scott and Carruthers/Wellington intersections which would be most impacted by the expected site generated trips. The access to the building at 178 Carruthers Avenue was not examined as the traffic along Carruthers Avenue is low and the traffic is restricted to one-way traffic southbound which would result is the site having a negligible impact on the traffic along Carruthers Avenue. The analysis was completed for the existing and future weekday peak AM and PM hour traffic of the adjacent roads. The findings and recommendations of the study are summarized in the following:

- 1) The trip generation analysis determined that the apartment building would generate 8 trips during the peak AM hour and 10 trips during the peak PM hour. The site would provide 15 parking spaces in an underground parking garage of which 10 are designated for residents and 5 parking spaces for visitors.
- 2) The Carruthers/Scott and Carruthers/Wellington intersections were examined utilizing the 2013 traffic counts, and expected future traffic at the years 2015 (completion of the apartment building) and 2020 (5 years beyond completion). The analysis used the existing traffic signal timing plans obtained from the City of Ottawa. The analysis determined that the intersections operated at a Level of Service "A" during both the peak AM and PM hours at the years 2013, 2015 and 2020. There would be no modifications to the intersections required due to the development of the site as a 21 unit apartment building.
- 3) A Transportation Brief Check List is provided in the Appendix as Exhibit 16.

Prepared by:

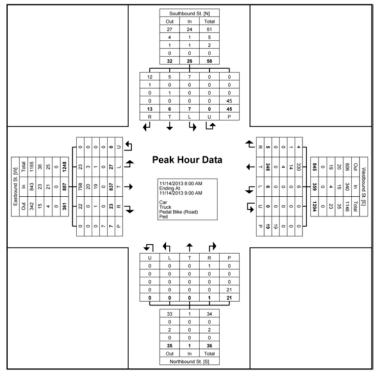
David J. Halpenny, P. Eng.

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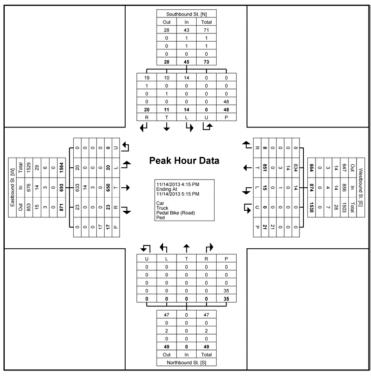
# **APPENDIX**

# TRAFFIC COUNTS OPERATIONAL ANALYSIS WORK SHEETS COLLISION REPORTS TRANSPORTATION BRIEF - CHECK LIST

# EXHIBIT 1 CITY OF OTTAWA 2013 TRAFFIC COUNTS – Carruthers/Scott



Turning Movement Peak Hour Data Plot (8:00 AM)



Turning Movement Peak Hour Data Plot (4:15 PM)

# EXHIBIT 2 CITY OF OTTAWA 2013 TRAFFIC COUNTS – Carruthers/Wellington



Public Works and Services Department

Count ID 3182

#### CARRUTHERS AVE and WELLINGTON ST

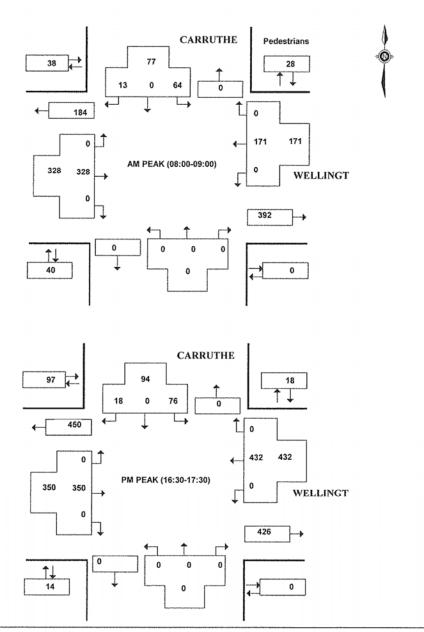
(ULRS Listing CARRUTHE & WELLINGT)

Survey Date: Friday 10 May 2013

Conditions: dry Start Time: 0700 Total Observed U-Turns

Northbound: 0 Southbound: Eastbound: 0 Westbound: AADT Factor Friday in May is

0.8



Approved by: AP Printed on: 13/03/2014

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# **EXHIBIT 3** 2013 PEAK AM HOUR EXISTING TRAFFIC ANALYSIS - Scott/Carruthers

| Westbound | Northbound | Southbound |

HCS+: Signalized Intersections Release 5.4

Inter.: Scott/Carruthers Analyst: Period: Peak AM Hour Year: November 14, 2013

Project ID: 178 Carruthers Avenue

E/W St: Scott Street N/S St: Carruthers Avenue SIGNALIZED INTERSECTION SUMMARY\_

	L T		T F		L	T R		T R
No. Lanes	0 2	0	) 2 (	)	- I	0 0		1 0
	LTR		LTR		i		i L	TR
Volume	26 818 2	22   6	344 5		1		17 5	5 13
Lane Width		I	3.6				3.6 3	
RTOR Vol		0	0		I			0
Duration	0.25	Area Type:						
Phase Combi	nation 1	2 3	ignal Ope 4		lons	5	6 7	8
EB Left	P P	2 3		NB	Left	5	0 /	O
Thru	P		i		Thru			
Right	P		į		Right			
Peds	X				Peds	X		
WB Left	P		1	SB	Left	A		
Thru	P				Thru			
Right	P		!		Right			
Peds	X		!	ED	Peds			
NB Right SB Right				WB	Right Right			
Green	62.7		1	WD	Kigiic	21.6		
Yellow	3.3					3.3		
All Red	2.0					2.1		
							Length: 9	95.0 secs
Capacity An	alysis and :	CAPACI			ORKSHEE	ET		
Capacity An		Adj /			OW	Green	Lane Gi	quo
Appr/ L	ane Flo	w Rate Fi	Low Rate	Ra	atio	Ratio	Capacity	v/c
Mvmt G			(s)		7/s)	(g/C)	Capacity (c)	Ratio
Eastbound Prot								
Perm								
Left								
Prot								
Perm								
Thru L	TR 9	41	3130	# (	.30	0.66	2066	0.46
Right								
Westbound								
Prot								
Perm								
Left								
Prot Perm								
	TR 3	86	3153	(	12	0.66	2081	0 19
Right								**
Northbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru Pight								
Right Southbound								
Prot								
Perm								
	. 8		1710	(	0.00	0.23	389	0.02
Prot								
Perm	_							
Thru T	R 1	9	1601	# (	0.01	0.23	364	0.05
Right								
Sum of flow	ratios for	critical	lane gro	ups	s, Yc =	Sum	(v/s) =	0.31

Total lost time per cycle, L = 10.70 sec Critical flow rate to capacity ratio, xc = (yc)(c)/(c-L)

Xc = (Yc)(C)/(C-L) = 0.35

# **EXHIBIT 4** 2013 PEAK PM HOUR EXISTING TRAFFIC ANALYSIS - Scott/Carruthers

HCS+: Signalized Intersections Release 5.4

Inter.: Scott/Carruthers Analyst: Period: Peak PM Hour Year: November 14, 2013 Period: Peak PM Hour
Project ID: 178 Carruthers Avenue

E/W St: Scott Street N/S St: Carruthers Avenue

		SIC	NALIZED IN	rerse	CTION :	SUMMARY				
	Ea	stbound				thbound			uthbound	I
	L	T R	L T	R	L	T R	.	L	T R	- 1
No. Lanes		2 0	0 2	0	0	0 0		<u>-</u>	1 0	¦
LGConfig	İ	LTR		Ü		0 0		L	TR	i
Volume	20			3	i			14	10 20	i
Lane Widt		3.6			İ		i	3.6	3.6	i
RTOR Vol	1	0	(	)	1		-		0	-
Duration	0.25	Area 1	Type: All of	ther	areas					
			Signal Or		ions					
Phase Com EB Left	binatio:	n 1 2 P	3 4		T - E +	5	6	7	8	
EB Left Thru		P		NB	Left Thru					
Right		P		l I	Right					
Peds		X		l I	Peds	Х				
WB Left		P		   SB	Left	A				
Thru		P		1	Thru	A				
Right		P		i I	Right					
Peds		X		I	Peds	X				
NB Right				EB	Right					
SB Right				WB	Right					
Green		67.7				21.6				
Yellow		3.3				3.3				
All Red		2.0				2.1				
						Cycle	Ler	ngth:	100.0	secs
Capacity	Analwei	CAR s and Lane (	PACITY AND I		ORKSHE	ET				
capacity	Anarysi	Adj	Adj Sat		OW	Green	T	ane	Group	
Appr/	Lane		Flow Rate			Ratio			_	
Mvmt	Group	(v)	(s)		/s)	(g/C)	υar	(c)	Ratio	
					,					
Eastbound										
Prot										
Perm										
Left										
Prot										
Perm										
Thru	LTR	750	3047	0	.25	0.68	2	2063	0.36	
Right										
Westbound										
Prot										
Perm										
Left										
Prot										
Perm			_							
Thru	LTR	946	3153	# 0	.30	0.68	2	2135	0.44	
Right										
Northboun	d									
Prot										
Perm										
Left										
Prot										
Perm										
Thru										
Right	.1									
Southboun	α									
Prot										
Perm	_				0.1	0 00				
	L	15	1710	0	.01	0.22	3	369	0.04	
Prot										
Perm	mp.	2.2	1.000		0.0	0 00		250	0 00	
Thru Pight		33	1620	# 0	.UZ	0.22	3	550	0.09	
Right										
Cum of fl	ow rati	os for criti	cal lane di	rollne	Vc =	Siim	(37/6		= 0 32	

Sum of flow ratios for critical lane groups, Yc = Sum (v/s) = 0.32 Total lost time per cycle, L = 10.70 sec Critical flow rate to capacity ratio, Xc = (Yc)(C)/(C-L) = 0.36

# **EXHIBIT 5** 2015 PEAK AM HOUR TOTAL TRAFFIC ANALYSIS - Scott/Carruthers

HCS+: Signalized Intersections Release 5.4

SIGNALIZED INTERSECTION SUMMARY

Inter.: Scott/Carruthers Analyst: Year: Year 2015

Period: Peak AM Hour Project ID: 178 Carruthers Avenue

E/W St: Scott Street N/S St: Carruthers Avenue

	l Fac		Westbour			thbound	So	uthbound	
	L		Westbour		L	T R		T R	
	-	1 10	1	10		1 10	1 -	1 10	i
No. Lanes	i 0	2 0	0 2	0	i 0	0 0		1 0	'i
LGConfig	i		LTF		İ		i L	TR	i
Volume	126		7 358	_	i I		i 7	5 13	i
Lane Width			3.6		İ		13.6	3.6	i
RTOR Vol	i			0	İ		i	0	i
Duration	0.25	Area '	Type: All o	other	areas				
			Signal (	perat	ions				
Phase Comb	ination	n 1 2	3 4			5	6 7	8	
EB Left		P		NB	Left				
Thru		P		1	Thru				
Right		P			Right				
Peds		X			Peds	X			
WB Left		P		SB	Left	A			
Thru		P			Thru	A			
Right		P			Right				
Peds		X			Peds	X			
NB Right				EB	Right				
SB Right				WB	Right				
Green		62.7				21.6			
Yellow		3.3				3.3			
All Red		2.0				2.1			
						Cycle	Length:	95.0	secs
~			PACITY AND		ORKSHE	ET			
Capacity A	nalysis	s and Lane				<b>a</b>	<b>.</b>		
- /	_	Adj	Adj Sat				Lane	_	
Appr/			e Flow Rat				Capacit	_	
Mvmt	Group	(v)	(s)	(v.	/S)	(g/C)	(c)	Ratio	
Eastbound									
Prot									
Perm									
Left									
Prot									
Perm									
	LTR	978	3130	# 0	.31	0.66	2066	0.47	
Right		3.0	0100	" 0	• • •	0.00	2000	0.17	
Westbound									
Prot									
Perm									
Left									
Prot									
Perm									
	LTR	402	3142	0	.13	0.66	2074	0.19	
Right									
Northbound									
Prot									
Perm									
Left									
Prot									
Perm									
Thru									
Right									
Southbound	ļ								
Prot									
Perm									
Left	L	8	1710	0	.00	0.23	389	0.02	
Prot									
Perm									
Thru	TR	19	1601	# 0	.01	0.23	364	0.05	
Right									
Sum of flo		os for crit	ical lane q	groups	, Yc =	Sum	(v/s)	= 0.32	

Total lost time per cycle, L = 10.70 sec Critical flow rate to capacity ratio,

Xc = (Yc)(C)/(C-L) = 0.37

# **EXHIBIT 6** 2015 PEAK PM HOUR TOTAL TRAFFIC ANALYSIS - Scott/Carruthers

HCS+: Signalized Intersections Release 5.4

Inter.: Scott/Carruthers Analyst: Period: Peak PM Hour Year: Year 2015

Project ID: 178 Carruthers Avenue

E/W St: Scott Street N/S St: Carruthers Avenue

		210	NALIZED IN'	TERSEC	CTION :	SUMMAR	ĽΥ			
	Ea:	stbound				thboun		So	uthbou	nd
	L	T R	L T	R	L	T	R	L	T	R
No. Lanes		2 0	0 2	'		0	0	<u>-</u>	1	0
LGConfig	İ	LTR			Ü	Ü		L	TR	i
Volume	20			8 j				14		20 j
Lane Widt	h	3.6	3.6	I				3.6	3.6	
RTOR Vol	I	0		0					1	)
Duration	0.25	Area T	ype: All o							
Phase Com	hinatio	n 1 2	Signal O <sub>]</sub> 3 4		ons	5	6		8	
EB Left	DINACIO	P 2		NB	Left	5	0	,	0	
Thru		P		i	Thru					
Right		P		Ī	Right					
Peds		X		1	Peds	X				
WB Left		P		SB	Left	A				
Thru		P		1	Thru	A				
Right		P		1	Right					
Peds		X			Peds	X				
NB Right					Right					
SB Right		67.7		WB	Right					
Green Yellow		3.3				21.6				
All Red						2.1				
utt ven		2.0					e Tier	nath.	100.0	secs
						-1		- 5		
			ACITY AND		RKSHE:	ET				
Capacity 1	Analysi	s and Lane G				_			~	
_ ,	_	Adj	Adj Sat			Green			Group-	
Appr/			Flow Rate			Ratio				
Mvmt	Group	(v)	(s)	(v/	S)	(g/C)		(c)	Rat.	10
Eastbound										
Eastbound Prot										
Prot Perm										
Prot Perm Left										
Prot Perm Left Prot										
Prot Perm Left Prot Perm										
Prot Perm Left Prot Perm Thru	LTR	782	3043	0.	.26	0.68		2060	0.3	3
Prot Perm Left Prot Perm Thru Right	LTR	782	3043	0.	.26	0.68		2060	0.3	3
Prot Perm Left Prot Perm Thru Right Westbound	LTR	782	3043	0.	.26	0.68		2060	0.3	3
Prot Perm Left Prot Perm Thru Right Westbound Prot	LTR	782	3043	0.	. 26	0.68		2060	0.3	3
Prot Perm Left Prot Perm Thru Right Westbound Prot Perm	LTR	782	3043	0.	26	0.68		2060	0.3	3
Prot Perm Left Prot Perm Thru Right Westbound Prot Perm Left	LTR	782	3043	0.	26	0.68		2060	0.3	3
Prot Perm Left Prot Perm Thru Right Westbound Prot Perm Left Prot	LTR	782	3043	0.	26	0.68	3 2	2060	0.3	3
Prot Perm Left Prot Perm Thru Right Westbound Prot Perm Left Prot Perm	LTR									
Prot Perm Left Prot Perm Thru Right Westbound Prot Perm Left Prot Perm	LTR	782 988	3043					2060		
Prot Perm Left Prot Perm Thru Right Westbound Prot Perm Left Prot Perm Thru Right	LTR									
Prot Perm Left Prot Perm Thru Right Westbound Prot Perm Left Prot Perm	LTR									
Prot Perm Left Prot Perm Thru Right Westbound Prot Perm Left Prot Perm Left Northbound	LTR									
Prot Perm Left Prot Perm Thru Right Westbound Prot Perm Left Prot Perm Thru Right Northbound	LTR									
Prot Perm Left Prot Perm Thru Right Westbound Prot Perm Left Prot Perm Thru Right Northbounc	LTR									
Prot Perm Left Prot Perm Thru Right Westbound Prot Perm Left Prot Perm Thru Right Northbound Prot Perm Left Left	LTR									
Prot Perm Left Prot Perm Thru Right Westbound Prot Perm Left Prot Perm Thru Right Northbound Prot Perm Left Prot Perm Thru Right Northbound Prot Perm Left Prot	LTR									
Prot Perm Left Prot Perm Thru Right Westbound Prot Perm Left Prot Perm Thru Right Northbound Prot Perm Left Prot Perm Left Prot Pirot Perm Left Prot Perm Left Prot Perm Left Prot Perm Left Prot Perm Thru Right	LTR LTR d									
Prot Perm Left Prot Perm Thru Right Westbound Prot Perm Left Prot Perm Thru Right Northbound Prot Perm Left Prot Perm Left Prot Perm Left Prot Perm Left Prot Perm Left Prot Perm Left Prot Perm Left Prot Perm Left Prot Perm Left Prot Perm Left Prot Perm Left Prot Perm Left Prot Perm Left Prot Perm Left Prot Perm Left Prot Perm Left Prot Perm Left Prot Perm Left Prot Perm Right Southbound	LTR LTR d									
Prot Perm Left Prot Perm Thru Right Westbound Prot Perm Left Prot Perm Thru Right Northbound Prot Perm Left Prot Perm Thru Right Southbound Prot Perm Thru Right	LTR LTR d									
Prot Perm Left Prot Perm Thru Right Westbound Prot Perm Left Prot Perm Thru Right Northbound Prot Perm Left Prot Perm Left Prot Perm Left Prot Perm Left Prot Perm Left Prot Perm Thru Right Southbound Prot Perm Thru Right Southbound Prot Perm	LTR LTR d	988	3124	# 0-	32	0.68		2115	0.4	7
Prot Perm Left Prot Perm Thru Right Westbound Prot Perm Left Prot Perm Thru Right Northbound Prot Perm Left Prot Perm Left Prot Perm Left Prot Perm Left Prot Perm Left Prot Perm Left Prot Perm Left Prot Perm Left Prot Perm Left Prot Perm Left Prot Perm Left Prot Perm Left Prot Perm Left Prot Perm Left Prot Perm Left	LTR LTR d			# 0-	32	0.68		2115		7
Prot Perm Left Prot Perm Thru Right Westbound Prot Perm Left Prot Perm Thru Right Northbound Prot Perm Left Prot Perm Left Prot Perm Left Prot Perm Left Prot Perm Thru Right Southbound Prot Perm Left Prot Perm Thru Right Southbound Prot Perm Left Prot Prot Perm Left Prot Perm Left Prot	LTR LTR d	988	3124	# 0-	32	0.68		2115	0.4	7
Prot Perm Left Prot Perm Thru Right Westbound Prot Perm Left Prot Perm Thru Right Northbound Prot Perm Left Prot Perm Left Prot Perm Left Prot Perm Left Prot Perm Thru Right Southbound Prot Perm Thru Right Southbound Prot Perm Left Prot Perm Left Prot Perm	LTR LTR d	988	3124	# 0.	32	0.68		2115	0.4	7
Prot Perm Left Prot Perm Thru Right Westbound Prot Perm Left Prot Perm Thru Right Northbound Prot Perm Left Prot Perm Left Prot Perm Left Prot Perm Left Prot Perm Thru Right Southbound Prot Perm Left Prot Perm Thru Right Southbound Prot Perm Left Prot Perm Left Prot Perm	LTR LTR d	988	3124	# 0.	32	0.68		2115	0.4	7

Sum of flow ratios for critical lane groups, Yc = Sum (v/s) = 0.34 Total lost time per cycle, L = 10.70 sec Critical flow rate to capacity ratio, Xc = (Yc)(C)/(C-L) = 0.38

# **EXHIBIT 7** 2020 PEAK AM HOUR TOTAL TRAFFIC ANALYSIS - Scott/Carruthers

HCS+: Signalized Intersections Release 5.4

SIGNALIZED INTERSECTION SUMMARY

Inter.: Scott/Carruthers Analyst: Period: Peak AM Hour Year: Year 2020

Project ID: 178 Carruthers Avenue

E/W St: Scott Street N/S St: Carruthers Avenue

	I Ea	stboun		We				Nor		_		So	uthbo	und	
	L	T		l L	Т	R		L	T	R		l L	Т	R	i
	i			. – i			i								i
No. Lanes	0	2	0	0	2	0	i	0	1	0		1	1	0	i
LGConfig		LTR		l	LT	R	-		LT	R		L	TR		1
Volume	126	939	31	15	394	5	- 1	24	0	25		7	5	13	
Lane Width	n	3.6		l	3.6				3.6			3.6	3.6		
RTOR Vol			0	l		0	- 1			0				0	
Duration	0.25		Area 1												
							ati	ons							
Phase Comb	oinatio		2	3	4		_		5		6	7		8	
EB Left		P				N	В	Left	A						
Thru		P P						Thru	A						
Right Peds		X						Right Peds							
WB Left		P				l Si		Left							
Thru		P				3	ь	Thru							
Right		P				ì		Right							
Peds		X				i		Peds							
NB Right		21				E		Right							
SB Right						W		Right							
Green		62.7							21.	6					
Yellow		3.3							3.3						
All Red		2.0							2.1						
									Су	cle	Ler	ngth:	95.0		secs
								RKSHE	ET						
Capacity A	Analysi														
			Adj					W					Group		
	Lane		w Rate	e Fl									y Λ		
Mvmt	Group		(V)		(s)		(V/	's)	(g/	C)		(c)	Ra	tio	
Eastbound															
Prot															
Perm															
Left															
Prot															
Perm															
Thru	LTR	1	083		3128	#	0.	.35	0.	66	2	2064	0.	52	
Right															
Westbound															
Prot															
Perm															
Left															
Prot															
Perm															
Thru	LTR	4	49		3037		0.	.15	0.	66	2	2004	0.	22	
Right															
Northbound	d														
Prot															
Perm Left															
Prot															
Perm															
Thru	LTR	5	3		1523	#	Ο	.03	0	23	4	346	0.	15	
Right	2211	9	9		1020	"	٠.	. 0 5	٠.	23	,	, 10	٠.	10	
Southbound	d														
Prot															
Perm															
Left	L	8			1300		0.	01	0.	23	2	296	0.	03	
Prot															
Perm															
Thru	TR	1	9		1601		0.	01	0.	23	3	364	0.	05	
Right															
Sum of flo		os for		ical		grou	ps,	Yc =	S	um	(v/s	3)	= 0.3	8	

Total lost time per cycle, L = 10.70 sec Critical flow rate to capacity ratio,

Xc = (Yc)(C)/(C-L) = 0.43

# **EXHIBIT 8** 2020 PEAK PM HOUR TOTAL TRAFFIC ANALYSIS - Scott/Carruthers

HCS+: Signalized Intersections Release 5.4

Inter.: Scott/Carruthers Analyst: Period: Peak PM Hour Year: Year 2020

Project ID: 178 Carruthers Avenue

E/W St: Scott Street N/S St: Carruthers Avenue

E/W St: Sco	tt Street			N/S	St: Ca	arruthe:	rs Avenue		
		STGNAT.	IZED INT	ERSE	TTON 9	STIMMARY			
	Eastbour					-	Sou	t.hbound	
	L T	RIL			L	T R		T R	į
No. Lanes	0 2		0 2	0	'	1 0	¦	1 0	¦
LGConfig	LTI		LTR		l	LTR	L	TR	i
Volume	20 742	51  44	972 8			0 17		10 20	i
Lane Width		1	3.6			3.6		3.6	i
	1	0	0			0	1	0	i
KIOK VOI	I	0 1	O		ı	0	1	U	'
Duration	0.25	Area Type	: All ot ignal Op						
Phase Combi	nation 1	2 3		0100		5	6 7	8	
EB Left	P		1	NB	Left	A			
Thru	P		1		Thru	A			
Right	P		i i		Right	A			
Peds	X		i		Peds	X			
WB Left	P		i	SB	Left	A			
Thru	P		i	~-	Thru				
Right	P		i		Right				
Peds	X		i		Peds				
NB Right	21		- 1	EB	Right				
SB Right				WB	Right				
Green	67.7		1	WD	KIGIIC	21.6			
Yellow	3.3					3.3			
All Red									
AII Ked	2.0					2.1	Length:	100 0	0000
						CYCIE	nength.	100.0	3663
		CAPACI	TY AND L	OS W	ORKSHEI	ET			
Capacity An	alysis and								
		Adj .	Adj Sat	Fl	WC	Green	Lane G	roup	
Appr/ I	ane Flo	ow Rate F	low Rate	Ra	tio	Ratio	Capacity	v/c	
Mvmt G	roup	ow Rate F (v)	(s)	(v	/s)	(g/C)	(c)	Ratio	
Eastbound									
Prot									
Perm									
Left									
Prot									
Perm									
	TR 8	384	3025	Ω	29	0 68	2048	0.43	
Right	111/	301	3023	U	. 23	0.00	2040	0.45	
Westbound									
Prot									
Perm									
Left									
Prot									
Perm									
	TR :	1114	2916	# 0	.38	0.68	1974	0.56	
Right									
Northbound									
Prot									
Perm									
Left									
Prot									
Perm									
Thru I	TR :	36	1535	# 0	.02	0.22	332	0.11	
Right									
Southbound									
Prot									
Perm									
Left I		15	1321	Λ	0.1	0 22	285	0.05	
Prot	-			0		V.22	200	0.00	
Perm									
Thru T	'B	33	1620	Λ	0.2	0 22	350	n na	
Right	.11		1020	U		0.22	JJ0	0.00	
9									
Sum of flow	ratios for	r critical	lane gr	oups	, Yc =	Sum	(v/s) =	0.41	

Total lost time per cycle, L = 10.70 sec Critical flow rate to capacity ratio, xc = Sum (v/s) xc = (yc)(c-L)

Xc = (Yc)(C)/(C-L) = 0.45

# **EXHIBIT 9** 2013 PEAK AM HOUR EXISTING TRAFFIC ANALYSIS – Wellington/Carruthers

HCS+: Signalized Intersections Release 5.4

Inter.: Wellington/Carruthers Analyst:

Period: Peak AM Hour Year: May 10, 2013

Project ID: 178 Carruthers Avenue E/W St: Wellington Street N/S St: Carruthers Avenue

					SI	GNALI	ZED I	NTERSI	ECTION	SUMMA	RY			
			Eas	tbou			stbou		Nor	thbou		So	uthbound	T
			L	Т	R	L	Т	R	L	Т	R	L	T R	I
No.	Lanes	i-	0	1	0	i	1	0	-¦	0	0	¦	0 0	¦
	onfig	i		T		İ	T		i			i	LR	i
Vol	.ume	ĺ		328		I	171		İ			164	13	İ
Lar	e Widt	h		3.6		İ	3.6		ĺ			i	3.6	ĺ
RTC	R Vol					1			1				0	1
			2.5		3	m	711							
Dur	ation	U	.25		Area				areas					
Pha	se Com	bina	tion	1	2	3		Ī		5		6 7	8	
EB	Left							NB	Left					
	Thru			P				1	Thru					
	Right							1	Right					
	Peds			X				1	Peds					
WB	Left							SB	Left	A				
	Thru			P				1	Thru					
	Right								Right					
	Peds			X					Peds					
	Right							EB	_					
	Right							WB	Right					
Gre				46.8						12.9	)			
	.low			3.3						3.3				
All	Red			1.9						1.8				
										Сус	:le	Length:	70.0	secs
					CA	PACTT	Y AND	T.OS I	VORKSHE	ET				
Cap	acity	Anal	ysis	and					.0144.0112					
-	_		-		Adj			t F	Low	Gree	n	Lane	Group	
	Appr/	Lan	e	Fl	ow Rat	e Fl	ow Ra	te Ra	atio	Rati	.0	Capacit	y v/c	
		Gro			(v)			(7		(q/C			Ratio	
	tbound													
	Prot													
	Perm													
	Left													
	Prot													
	Perm													
	Thru	T			357		1765	# (	0.20	0.6	7	1180	0.30	
	Right													
	tbound													
	Prot													
	Perm													
	Left													
	Prot													
	Perm													
	Thru	T			186		1765	(	).11	0.6	7	1180	0.16	
	Right													
Nor	thboun	d												
	Prot													
	Perm													
	Left													
	Prot													
	Perm													
	Thru													
	Right													
Sou	ıthboun	d												
	Prot													
	Perm													
	Left													
	Prot													
	Perm													
	Thru	LR			84		1689	# (	0.05	0.1	. 8	311	0.27	
	Right													
Sum	of fl	ow r	atio	s fo	r crit	ical	lane	groups	s, Yc =	Su	ım (	v/s)	= 0.25	

Sum of flow ratios for critical lane groups, Yc = Sum (v/s) = 0.25 Total lost time per cycle, L = 10.30 sec Critical flow rate to capacity ratio, Xc = (Yc)(C)/(C-L) = 0.30

# **EXHIBIT 10** 2013 PEAK PM HOUR EXISTING TRAFFIC ANALYSIS – Wellington/Carruthers

HCS+: Signalized Intersections Release 5.4

Analyst: Inter.: Wellington/Carruthers

Period: Peak PM Hour Year: May 10, 2013

Project ID: 178 Carruthers Avenue E/W St: Wellington Street N/S St: Carruthers Avenue

								SUMMAR'				
	Eas	stbou T	nd   R		stbou: T		Nor	thboun T		So L	uthbound T R	
	"	1	A	ш	1	K	1	1 1		ш	1 1	
No. Lanes	i 0	1	i	0	1	0	i 0	0	0 i	0	0 0	i
LGConfig	1	T	I		T				- 1		LR	
Volume	i	350	i		432		ĺ		i	76	18	ĺ
Lane Width	i	3.6	i		3.6		ĺ		i		3.6	ĺ
RTOR Vol	İ		i				İ		i		0	i
Duration	0.25		Area 1			other Operat						
Phase Comb	ination	n 1	2	3				5	6	7	8	
EB Left						NB	Left					
Thru		P				1	Thru					
Right						1	Right					
Peds		X				Ì	Peds	X				
WB Left						SB	Left	A				
Thru		P				i	Thru					
Right		_				i	Right	A				
Peds		X				i	Peds					
NB Right		21				EB						
SB Right						WB	Right					
-		51.8				I MD	KIGIIC	12.9				
Green												
Yellow		3.3						3.3				
All Red		1.9						1.8	- T		75 0	
								CAGT	e Len	igtn:	75.0	secs
			CAF	PACTT	Z AND	LOS W	ORKSHE:	ET				
Capacity A	nalysis	and					011110112					
	-		Adj			t ÎFl	OW	Green	I	ane	Group	
Appr/	Lane	Fl	ow Rate		-					acit	y v/c	
	Group		(v)		(s)		/s)	(g/C)		(c)	Ratio	
			,		( - )	•	, -,	13, -,		( - )		
Eastbound												
Prot												
Perm												
Left												
Prot												
Perm												
	m		200		1765	0	.22	0.69	1	219	0.31	
	T		380		L765	U		0.09	1	219	0.31	
Right												
Westbound												
Prot												
Perm												
Left												
Prot												
Perm												
Thru	T		470		L765	# 0	.27	0.69	1	219	0.39	
Right												
Northbound												
Prot												
Perm												
Left												
Prot												
Perm												
Thru												
Right												
Southbound												
Prot												
Perm												
Left												
Prot												
Perm												
Thru	LR		103	:	L685	# 0	.06	0.17	2	90	0.36	
Right												
Sum of flo	w ratio	os fo	r criti	cal .	lane	arolins	Yc =	Siim	(v/s	. )	= 0.33	

Sum of flow ratios for critical lane groups, Yc = Sum (v/s) = 0.33 Total lost time per cycle, L = 10.30 sec Critical flow rate to capacity ratio, Xc = (Yc)(C)/(C-L) = 0.38

# **EXHIBIT 11** 2015 PEAK AM HOUR TOTAL TRAFFIC ANALYSIS – Wellington/Carruthers

HCS+: Signalized Intersections Release 5.4

SIGNALIZED INTERSECTION SUMMARY

Inter.: Wellington/Carruthers Analyst:

Period: Peak AM Hour Year: Year 2015

Project ID: 178 Carruthers Avenue E/W St: Wellington Street N/S St: Carruthers Avenue

	I East	tbound	Westbou			thbound		ıthbound	
	L		L T	R	L	T R		T R	
	l		l		I				1
No. Lanes	1 0	1 0	0 1	0	0	0 0	1 0	0 0	
LGConfig		T	l T		1		I	LR	
Volume	;	341	178		1		166	15	
Lane Width	;	3.6	3.6		1		1	3.6	
RTOR Vol					1		I	0	
Duration	0.25	Area	Type: All						
Phase Comb	ination	1 2	Signal 4	operat 	ions	5	6 7	8	
EB Left	IIIation	1 2	3 4		Tof+	J	0 /	0	
Thru		P		NB	Left Thru				
Right		_		i	Right				
Peds		X		i	Peds				
WB Left		••		SB		A			
Thru		P		1 02	Thru				
Right		-		i	Right				
Peds		X		i	Peds	X			
NB Right				EB					
SB Right				WB	Right				
Green	4	46.8			,	12.9			
Yellow		3.3				3.3			
All Red		1.9				1.8			
						Cycle	Length:	70.0	secs
			PACITY AND		ORKSHE	ET			
Capacity A	nalysis					C	T /	~	
7/		Adj	Adj Sa				Lane (	-	
Appr/			e Flow Ra				Capacity		
Mvmt (	Group	(v)	(s)	( ∨	/s)	(g/C)	(c)	Ratio	
Eastbound									
Prot									
Perm									
Left									
Prot									
Perm									
Thru '	Γ	371	1765	# 0	.21	0.67	1180	0.31	
Right									
Westbound									
Prot									
Perm									
Left									
Prot									
Perm									
Perm Thru	Г	193	1765	0	.11	0.67	1180	0.16	
Perm Thru Right	Г	193	1765	0	.11	0.67	1180	0.16	
Perm Thru ! Right Northbound	г	193	1765	0	.11	0.67	1180	0.16	
Perm Thru ' Right Northbound Prot	Г	193	1765	0	.11	0.67	1180	0.16	
Perm Thru ' Right Northbound Prot Perm	Г	193	1765	0	.11	0.67	1180	0.16	
Perm Thru Right Northbound Prot Perm Left	Г	193	1765	0	.11	0.67	1180	0.16	
Perm Thru Right Northbound Prot Perm Left Prot	г	193	1765	0	.11	0.67	1180	0.16	
Perm Thru Right Northbound Prot Perm Left Prot Perm	Г	193	1765	0	.11	0.67	1180	0.16	
Perm Thru Right Northbound Prot Perm Left Prot Perm Thru	Г	193	1765	0	.11	0.67	1180	0.16	
Perm Thru Right Northbound Prot Perm Left Prot Perm Thru Right	г	193	1765	0	.11	0.67	1180	0.16	
Perm Thru Right Northbound Prot Perm Left Prot Perm Thru Right Southbound	г	193	1765	0	.11	0.67	1180	0.16	
Perm Thru Right Northbound Prot Perm Left Prot Perm Thru Right Southbound Prot	r	193	1765	0	.11	0.67	1180	0.16	
Perm Thru Right Northbound Prot Perm Left Prot Perm Thru Right Southbound Prot Perm	Г	193	1765	0	.11	0.67	1180	0.16	
Perm Thru Right Northbound Prot Perm Left Prot Perm Thru Right Southbound Prot Perm Left	г	193	1765	0	.11	0.67	1180	0.16	
Perm Thru Right Northbound Prot Perm Left Prot Perm Thru Right Southbound Prot Perm Left Prot	г	193	1765	0	.11	0.67	1180	0.16	
Perm Thru Right Northbound Prot Perm Left Prot Perm Thru Right Southbound Prot Perm Left Prot Perm									
Perm Thru Right Northbound Prot Perm Left Prot Perm Thru Right Southbound Prot Perm Left Prot		193					1180		

Total lost time per cycle, L = 10.30 sec Critical flow rate to capacity ratio,

Xc = (Yc)(C)/(C-L) = 0.31

# **EXHIBIT 12** 2015 PEAK PM HOUR TOTAL TRAFFIC ANALYSIS – Wellington/Carruthers

HCS+: Signalized Intersections Release 5.4

Inter.: Wellington/Carruthers Analyst:

Period: Peak PM Hour Year: Year 2015

Project ID: 178 Carruthers Avenue E/W St: Wellington Street N/S St: Carruthers Avenue

	Eas	stbound	Westboun	.d	Nor	thbound		Sot	uthbound	
	L	T R	L T	R	L	T R	.   1	L	T R	
		1 0			!		!_			!
No. Lanes		1 0	0 1	0	0	0 0		0	0 0	!
LGConfig			I T					7	LR	!
/olume	. !	364	449				17	/	19	
Lane Widtl		3.6	3.6		1				3.6	
RTOR Vol			l		1		I		0	ı
Duration	0.25	Area '	Type: All o	ther	areas					
21		n 1 2	Signal O		ions	5		7		
Phase Comb EB Left	oinatior	1 1 2	3 4	NB	Left	5	6	/	8	
Thru		P		1	Thru					
Right		_		1	Right					
Peds		Х		1	Peds	Х				
		Λ		1 00						
WB Left				SB	Left	A				
Thru		P		1	Thru					
Right				1	Right					
Peds		X			Peds					
NB Right				EB	_					
SB Right				WB	Right					
Green		51.8				12.9				
Yellow		3.3				3.3				
All Red		1.9				1.8				
						Cycle	Lengt	:h	75.0	secs
		0.3	D3.07MU 331D		00110110					
Capacity	Analysis	and Lane (	PACITY AND Group Capac		OKKSHE.	ET				
				-	∩W	Green	T <sub>i</sub> ar	ne (	Group	
		Adj	Adj Sat	F.T.	O **					
Appr/	Lane		Adj Sat e Flow Rat						y v/c	
Appr/ Mvmt	Lane Group			e Ra				city	_	
Mvmt	Group	Flow Rate	e Flow Rat	e Ra	tio	Ratio	Capa	city	y v/c	
Mvmt Eastbound	Group	Flow Rate	e Flow Rat	e Ra	tio	Ratio	Capa	city	y v/c	
Mvmt Eastbound Prot	Group	Flow Rate	e Flow Rat	e Ra	tio	Ratio	Capa	city	y v/c	
Mvmt Eastbound Prot Perm	Group	Flow Rate	e Flow Rat	e Ra	tio	Ratio	Capa	city	y v/c	
Mvmt Eastbound Prot Perm Left	Group	Flow Rate	e Flow Rat	e Ra	tio	Ratio	Capa	city	y v/c	
Mvmt Eastbound Prot Perm	Group	Flow Rate	e Flow Rat	e Ra	tio	Ratio	Capa	city	y v/c	
Mvmt Eastbound Prot Perm Left	Group	Flow Rate	e Flow Rat (s)	e Ra (v	tio /s) 	Ratio (g/C)	Capa (	city	y v/c	
Mvmt Eastbound Prot Perm Left Prot	Group	Flow Rate	e Flow Rat	e Ra (v	tio /s) 	Ratio (g/C)	Capa (	eity e)	y v/c	
Mvmt  Eastbound  Prot  Perm  Left  Prot  Perm	Group	Flow Rate	e Flow Rat (s)	e Ra (v	tio /s) 	Ratio (g/C)	Capa (	eity e)	y v/c Ratio	
Mvmt  Eastbound Prot Perm Left Prot Perm Thru Right	Group T	Flow Rate	e Flow Rat (s)	e Ra (v	tio /s) 	Ratio (g/C)	Capa (	eity e)	y v/c Ratio	
Mvmt  Eastbound Prot Perm Left Prot Perm Thru Right	Group T	Flow Rate	e Flow Rat (s)	e Ra (v	tio /s) 	Ratio (g/C)	Capa (	eity e)	y v/c Ratio	
Mvmt  Eastbound Prot Perm Left Prot Perm Thru Right Westbound	Group T	Flow Rate	e Flow Rat (s)	e Ra (v	tio /s) 	Ratio (g/C)	Capa (	eity e)	y v/c Ratio	
Mvmt  Eastbound Prot Perm Left Prot Perm Thru Right Westbound Prot	Group T	Flow Rate	e Flow Rat (s)	e Ra (v	tio /s) 	Ratio (g/C)	Capa (	eity e)	y v/c Ratio	
Mvmt  Eastbound Prot Perm Left Prot Perm Thru Right Westbound Prot Perm Left	Group T	Flow Rate	e Flow Rat (s)	e Ra (v	tio /s) 	Ratio (g/C)	Capa (	eity e)	y v/c Ratio	
Mvmt  Eastbound Prot Perm Left Prot Perm Thru Right Westbound Prot Perm Left Prot	Group T	Flow Rate	e Flow Rat (s)	e Ra (v	tio /s) 	Ratio (g/C)	Capa (	eity e)	y v/c Ratio	
Mvmt  Eastbound Prot Perm Left Prot Perm Thru Right Westbound Prot Perm Left Prot Perm	Group T	Flow Rate (v)	e Flow Rat (s)  1765	e Ra (v	tio /s)	Ratio (g/C)  0.69	Capac (6	2ity 	y v/c Ratio	
Mvmt  Eastbound Prot Perm Left Prot Perm Thru Right Westbound Prot Perm Left Prot Perm Thru	Group T	Flow Rate	e Flow Rat (s)  1765	e Ra (v	tio /s)	Ratio (g/C)	Capac (6	eity e)	y v/c Ratio	
Mvmt  Eastbound Prot Perm Left Prot Right Westbound Prot Perm Left Prot Perm Left Prot Perm Left Prot Pirot Perm Right	T	Flow Rate (v)	e Flow Rat (s)  1765	e Ra (v	tio /s)	Ratio (g/C)  0.69	Capac (6	2ity 	y v/c Ratio	
Mvmt  Eastbound Prot Perm Left Prot Right Westbound Prot Perm Left Prot Perm Left Prot Right Northbound	T	Flow Rate (v)	e Flow Rat (s)  1765	e Ra (v	tio /s)	Ratio (g/C)  0.69	Capac (6	2ity 	y v/c Ratio	
Mvmt  Eastbound Prot Perm Left Prot Perm Thru Right Westbound Prot Perm Left Prot Perm Thru Right Northbound	T	Flow Rate (v)	e Flow Rat (s)  1765	e Ra (v	tio /s)	Ratio (g/C)  0.69	Capac (6	2ity 	y v/c Ratio	
Mvmt  Castbound Prot Perm Left Prot Right Westbound Prot Perm Left Prot Perm Thru Right Northbound Prot Perm Thru Reft Prot Perm Thru Reft Prot Perm Thru Reft Prot Perm Thru Reft Prot Perm Thru Reft Northbound Prot Perm	T	Flow Rate (v)	e Flow Rat (s)  1765	e Ra (v	tio /s)	Ratio (g/C)  0.69	Capac (6	2ity 	y v/c Ratio	
Mvmt  Eastbound Prot Perm Left Prot Right Westbound Prot Perm Left Prot Perm Left Prot Perm Left Prot Perm Thru Right Northbound Prot Perm Left Left Right Northbound Prot Perm Left	T	Flow Rate (v)	e Flow Rat (s)  1765	e Ra (v	tio /s)	Ratio (g/C)  0.69	Capac (6	2ity 	y v/c Ratio	
Mvmt  Castbound Prot Perm Left Prot Right Westbound Prot Perm Left Prot Perm Thru Right Northbound Prot Perm Thru Perm Thru Perm Thru Perm Thru Perm Thru Perm Thru Perm Thru Perm Thru Perm Thru Perm Prot Perm	T	Flow Rate (v)	e Flow Rat (s)  1765	e Ra (v	tio /s)	Ratio (g/C)  0.69	Capac (6	2ity 	y v/c Ratio	
Mvmt  Eastbound Prot Perm Left Prot Right Westbound Prot Perm Left Prot Perm Left Prot Perm Left Prot Perm Thru Right Northbound Prot Perm Left Left Right Northbound Right Left	T	Flow Rate (v)	e Flow Rat (s)  1765	e Ra (v	tio /s)	Ratio (g/C)  0.69	Capac (6	2ity 	y v/c Ratio	
Mvmt  Eastbound Prot Perm Left Prot Right Westbound Prot Perm Left Prot Perm Left Prot Perm Thru Right Northbound Prot Perm Left Prot Perm Left Prot Perm Left Prot Perm	T	Flow Rate (v)	e Flow Rat (s)  1765	e Ra (v	tio /s)	Ratio (g/C)  0.69	Capac (6	2ity 	y v/c Ratio	
Mvmt  Castbound Prot Perm Left Prot Right Westbound Prot Perm Left Prot Perm Thru Right Northbound Prot Perm Left Prot Perm Thru Right Northbound Prot Perm	T	Flow Rate (v)	e Flow Rat (s)  1765	e Ra (v	tio /s)	Ratio (g/C)  0.69	Capac (6	2ity 	y v/c Ratio	
Mvmt  Castbound Prot Perm Left Prot Right Westbound Prot Perm Left Prot Perm Left Prot Perm Left Prot Perm Thru Right Northbound Prot Perm Left Prot Prot Prot Right Northbound Prot Perm Left Prot Perm Left Prot Right Right	T	Flow Rate (v)	e Flow Rat (s)  1765	e Ra (v	tio /s)	Ratio (g/C)  0.69	Capac (6	2ity 	y v/c Ratio	
Mvmt  Eastbound Prot Perm Left Prot Right Westbound Prot Perm Left Prot Perm Left Prot Perm Thru Right Northbound Prot Perm Left Prot Perm Thru Right Northbound Prot Perm Left Prot Perm Left Prot Southbound	T	Flow Rate (v)	e Flow Rat (s)  1765	e Ra (v	tio /s)	Ratio (g/C)  0.69	Capac (6	2ity 	y v/c Ratio	
Mvmt  Eastbound Prot Perm Left Prot Perm Thru Right Westbound Prot Perm Left Prot Perm Thru Right Northbound Prot Perm Thru Right Northbound Prot Perm Left Prot Perm Thru Right Northbound Prot Perm Thru Right Prot Perm Thru Right Routhbound Prot	T	Flow Rate (v)	e Flow Rat (s)  1765	e Ra (v	tio /s)	Ratio (g/C)  0.69	Capac (6	2ity 	y v/c Ratio	
Mvmt  Castbound Prot Perm Left Prot Right Westbound Prot Perm Thru Right Northbound Prot Perm Thru Right Northbound Prot Perm Left Prot Perm Thru Right Southbound Prot Perm Thru Right Orthbound Prot Perm Thru Right Frot Perm Thru Right Frot Perm Thru Right Frot Perm Thru Right Frot Perm Thru Right Frot Perm Thru Right Frot Perm Thru Right Frot Perm	T	Flow Rate (v)	e Flow Rat (s)  1765	e Ra (v	tio /s)	Ratio (g/C)  0.69	Capac (6	2ity 	y v/c Ratio	
Mvmt  Eastbound Prot Perm Left Prot Perm Thru Right Westbound Prot Perm Left Prot Perm Left Prot Perm Thru Right Northbound Prot Perm Left Prot Perm Left Prot Perm Left Prot Perm Left Prot Perm Left Prot Perm Left Prot Perm Left Prot Perm Left Prot Perm Left Prot Perm Left Left Southbound Prot Perm Left	T	Flow Rate (v)	e Flow Rat (s)  1765	e Ra (v	tio /s)	Ratio (g/C)  0.69	Capac (6	2ity 	y v/c Ratio	
Mvmt  Eastbound Prot Perm Left Prot Right Westbound Prot Perm Left Prot Perm Left Prot Perm Thru Right Northbound Prot Perm Left Prot Perm Left Prot Perm Left Prot Perm Left Prot Perm Thru Right Southbound Prot Perm Thru Right Frot Perm Thru Right Frot Perm Thru Right Frot	T	Flow Rate (v)	e Flow Rat (s)  1765	e Ra (v	tio /s)	Ratio (g/C)  0.69	Capac (6	2ity 	y v/c Ratio	
Mvmt  Eastbound Prot Perm Left Prot Perm Left Prot Perm Left Prot Perm Left Prot Perm Thru Right Northbound Prot Perm Left Prot Perm Left Prot Perm Left Prot Perm Left Prot Perm Left Prot Perm Thru Right Southbound Prot Perm Left Prot Perm	T T d	Flow Rate (v)  396	e Flow Rat (s)  1765	e Ra (v 0 0 # 0	.22	0.69	12:	19	v/c Ratio	
Mvmt  Eastbound Prot Perm Left Prot Right Westbound Prot Perm Left Prot Perm Left Prot Perm Thru Right Northbound Prot Perm Left Prot Perm Left Prot Perm Left Prot Perm Left Prot Perm Thru Right Southbound Prot Perm Thru Right Frot Perm Thru Right Frot Perm Thru Right Frot	T T d	Flow Rate (v)	e Flow Rat (s)  1765	e Ra (v 0 0 # 0	.22	0.69	12:	19	v/c Ratio	

Total lost time per cycle, L = 10.30 sec Critical flow rate to capacity ratio,

 $X_{C} = (Y_{C})(C)/(C-L) = 0.39$ 

# **EXHIBIT 13** 2020 PEAK AM HOUR TOTAL TRAFFIC ANALYSIS – Wellington/Carruthers

HCS+: Signalized Intersections Release 5.4

Inter.: Wellington/Carruthers Analyst:

Period: Peak AM Hour Year: Year 2020

Project ID: 178 Carruthers Avenue E/W St: Wellington Street N/S St: Carruthers Avenue

	Eas		GNALIZED IN Westboun			thbound		Southbound	
	l L		L T		L	T R		T R	
	!				!		!		!
No. Lanes	0	1 0	0 1	0	0	0 0		0 0 0	
LGConfig		T						LR	!
Volume		377	196				66	15	!
Lane Width	n	3.6	3.6				ļ	3.6	!
RTOR Vol	I				I		I	0	- 1
Duration	0.25	Area 1	Type: All o						
Phase Comb	oination	1 2	Signal O 3 4		ions	5	6	7 8	
EB Left	JINACION	. 1 2		NB	Left	J	0	7 0	
Thru		P		1	Thru				
Right		-		i	Right				
Peds		X		i	Peds	Х			
WB Left		Λ		I CD	Left	A			
		P		1 20	Thru				
Thru		P		1					
Right		v		I	Right				
Peds		X		1 55	Peds				
NB Right				EB	_				
SB Right		16.0		WB	Right				
Green		46.8				12.9			
Yellow		3.3				3.3			
All Red		1.9				1.8			
						Cycle	Length	1: 70.0	secs
		CAI	PACITY AND	TOS W	UDKSHE.	ET.			
Capacity 1	Analysis	and Lane (			U111011E.				
	2	Adj	Adj Sat	_	OW	Green	Lane	Group	
Appr/	Lane	Flow Rate	Flow Rat			Ratio	Capaci	ty v/c	
Mvmt	Group	(v)	(s)		/s)	(g/C)	(c)	Ratio	
		(∀)	(s)		/s)			Ratio	
Eastbound		(v)	(s)		/s)			Ratio	
		(v)	(s)		/s)			Ratio	
Eastbound Prot Perm		(∀)	(s)		/s) 			Ratio	
Eastbound Prot		(v)	(s) 		/s) 			Ratio	
Eastbound Prot Perm		(v)	(s)		/s) 			Ratio	
Eastbound Prot Perm Left		(v)	(s)		/s) 			Ratio	
Eastbound Prot Perm Left Prot		(v) 	(s) 	(v.		(g/C) 	(c)	Ratio	
Eastbound Prot Perm Left Prot Perm	Group			(v.		(g/C) 	(c)		
Eastbound Prot Perm Left Prot Perm Thru	Group			(v.		(g/C) 	(c)		
Eastbound Prot Perm Left Prot Perm Thru Right	Group			(v.		(g/C) 	(c)		
Eastbound Prot Perm Left Prot Perm Thru Right Westbound	Group			(v.		(g/C) 	(c)		
Eastbound Prot Perm Left Prot Perm Thru Right Westbound Prot Perm	Group			(v.		(g/C) 	(c)		
Eastbound Prot Perm Left Prot Perm Thru Right Westbound Prot Perm Left	Group			(v.		(g/C) 	(c)		
Eastbound Prot Perm Left Prot Perm Thru Right Westbound Prot Perm Left Prot	Group			(v.		(g/C) 	(c)		
Eastbound Prot Perm Left Prot Perm Thru Right Westbound Prot Perm Left Prot Perm	T	410	1765	# 0	.23	0.67	1180	0.35	
Eastbound Prot Perm Left Prot Perm Thru Right Westbound Prot Perm Left Prot Perm Thru	Group			# 0		0.67	1180	0.35	
Eastbound Prot Perm Left Prot Perm Thru Right Westbound Prot Perm Left Prot Perm Left Prot Right	T	410	1765	# 0	.23	0.67	1180	0.35	
Eastbound Prot Perm Left Prot Perm Thru Right Westbound Prot Perm Left Prot Perm Thru Right Northbound	T	410	1765	# 0	.23	0.67	1180	0.35	
Eastbound Prot Perm Left Prot Perm Thru Right Westbound Prot Perm Left Prot Perm Thru Right	T	410	1765	# 0	.23	0.67	1180	0.35	
Eastbound Prot Perm Left Prot Perm Thru Right Westbound Prot Perm Left Prot Perm Thru Right Northbound	T	410	1765	# 0	.23	0.67	1180	0.35	
Eastbound Prot Perm Left Prot Perm Thru Right Westbound Prot Perm Left Prot Perm Thru Right Northbounc	T	410	1765	# 0	.23	0.67	1180	0.35	
Eastbound Prot Perm Left Prot Right Westbound Prot Perm Left Prot Perm Left Prot Perm Thru Right Northbound Prot Perm Left Prot Perm Thru Right Northbound Prot Perm Left Prot	T	410	1765	# 0	.23	0.67	1180	0.35	
Eastbound Prot Perm Left Prot Perm Thru Right Westbound Prot Perm Thru Right Northbound Prot Perm Thru Right Northbound Prot Perm Left Prot Perm	T	410	1765	# 0	.23	0.67	1180	0.35	
Eastbound Prot Perm Left Prot Perm Thru Right Westbound Prot Perm Left Prot Perm Thru Right Northbound Prot Perm Thru Thru Right Northbound Prot Perm Left Prot Perm Thru Thru Thru Thru Thru	T	410	1765	# 0	.23	0.67	1180	0.35	
Eastbound Prot Perm Left Prot Perm Thru Right Westbound Prot Perm Left Prot Perm Thru Right Northbounc Prot Perm Left Prot Perm Thru Right Right Right Right Rothbound	T	410	1765	# 0	.23	0.67	1180	0.35	
Eastbound Prot Perm Left Prot Perm Thru Right Westbound Prot Perm Left Prot Perm Thru Right Northbounc Prot Perm Left Prot Perm Thru Right Right Right Right Rothbound	T	410	1765	# 0	.23	0.67	1180	0.35	
Eastbound Prot Perm Left Prot Perm Thru Right Westbound Prot Perm Left Prot Perm Thru Right Northbounc Perm Left Port Perm Thru Right Rorthbound Right Rorthbound Rorthbound Rorthbound Rorthbound Rorthbound Right Rorthbound Right	T	410	1765	# 0	.23	0.67	1180	0.35	
Eastbound Prot Perm Left Prot Right Westbound Prot Perm Left Prot Perm Thru Right Northbound Prot Perm Thru Right Northbound Prot Perm Left Prot Perm Thru Right Northbound Prot Perm Left Prot Perm Left Prot Perm Southbound	T	410	1765	# 0	.23	0.67	1180	0.35	
Eastbound Prot Perm Left Prot Right Westbound Prot Perm Thru Right Westbound Prot Perm Thru Right Northbound Prot Perm Thru Right Northbound Prot Perm Left Prot Perm Thru Right Southbound Prot Perm	T	410	1765	# 0	.23	0.67	1180	0.35	
Eastbound Prot Perm Left Prot Perm Thru Right Westbound Prot Perm Thru Right Northbound Prot Perm Left Prot Perm Thru Right Northbound Prot Perm Left Prot Perm Left Prot Perm Left Prot Perm Left Prot Perm Thru Right Southbound Prot Perm	T	410	1765	# 0	.23	0.67	1180	0.35	
Eastbound Prot Perm Left Prot Right Westbound Prot Perm Left Prot Perm Thru Right Northbound Prot Perm Left Prot Perm Thru Right Northbound Prot Perm Left Prot Perm Left Prot Perm Left Prot Perm Thru Right Southbound Prot Perm Thru Right Frot Perm Thru Right Frot Perm Thru Right Frot	T	410	1765	# 0	.23	0.67	1180	0.35	
Eastbound Prot Perm Left Prot Perm Thru Right Westbound Prot Perm Thru Right Northbound Prot Perm Thru Right Northbound Prot Perm Left Prot Perm Thru Left Prot Perm Left Prot Perm Thru Right Southbound Prot Perm	T	410 213	1765	# 0	.12	0.67	1180	0.35	
Eastbound Prot Perm Left Prot Perm Thru Right Westbound Prot Perm Left Prot Perm Thru Right Northbound Prot Perm Left Prot Perm Thru Right Northbound Prot Perm Left Prot Perm Left Prot Perm Thru Right Southbound Prot Perm Thru Right Southbound Prot Perm Thru Right Frot	T	410	1765	# 0	.12	0.67	1180	0.35	

Total lost time per cycle, L = 10.30 sec Critical flow rate to capacity ratio,

Xc = (Yc)(C)/(C-L) = 0.33

# **EXHIBIT 14** 2020 PEAK PM HOUR TOTAL TRAFFIC ANALYSIS – Wellington/Carruthers

HCS+: Signalized Intersections Release 5.4

Inter.: Wellington/Carruthers Analyst:

Period: Peak PM Hour Year: Year 2020

Project ID: 178 Carruthers Avenue E/W St: Wellington Street N/S St: Carruthers Avenue

								SUMMAI						
							Nor					ıthbo	und	I
	L	T	R	L	T	R	L	T	R		L	T	R	1
No. Lanes		1	¦		1	0	¦	0	0	¦	0	0		¦
LGConfig		T	U 1		T	U	1	U	U	i	U	LR		
Volume	i	402	i		496		i			17	7	111/	19	i
Lane Width		3.6	i		3.6		i			1	•	3.6		i
	i		i				i			i			0	i
Duration	0.25	P	Area I			other								
Phase Comb	ination	1	2	Sig	nal ( 4		ions	.5	6		7		8	
EB Left	IIIa LIOI	. 1	2	3	4		Left	J	,	)	,		0	
Thru		P				112	Thru							
Right						i	Right							
Peds		X				ì	Peds							
WB Left						SB	Left	A						
Thru		P				ĺ	Thru							
Right						1	Right	A						
Peds		X				1	Peds	X						
NB Right						EB	Right							
SB Right						WB	Right							
Green		51.8						12.9						
Yellow		3.3						3.3						
All Red		1.9						1.8						
								Сус	le I	Leng	th:	75.0		secs
			CAF	астту	ZND	TOS W	ORKSHE	ET						
Capacity A	nalvsis						OKKOIIL							
	2 - 2						OW	Gree	n -	La	ne G	Froup		
Appr/	Lane	Flow	v Rate	Flo	w Rat	e Ra	tio	Ratio	5 (			_		
Mvmt	Group	(	(V)		(s)	(v	/s)	(g/C)	)	(	c)	Ra	tio	
Mvmt	Group		(v)		(s)	(v	ow tio /s)	(g/C)	)	(	c) 	Ra	tio ———	
Mvmt Eastbound	Group		(v)		(s)	(v	/s)	(g/C	)		c) 	Ra	tio ———	
Mvmt Eastbound Prot	Group		(▽)		(s)	(v	/s)	(g/C)	)		c) 	Ra	tio	
Mvmt Eastbound Prot Perm	Group		(▽)		(s)	(∨	·/s)	(g/C)	)		c) 	Ra	tio 	
Mvmt  Eastbound  Prot  Perm  Left	Group		(v) 		(s)	(v	·/s)	(g/C	)		c) 	Ra	tio 	
Mvmt  Eastbound Prot Perm Left Prot	Group		(v) 		(s)	(∨	/s) 	(g/C	)		c) 	Ra	tio	
Mvmt  Eastbound Prot Perm Left Prot Perm														
Mvmt  Eastbound Prot Perm Left Prot Perm Thru	Group ———— T		(v) 				.25							
Eastbound Prot Perm Left Prot Perm Thru Right														
Mvmt  Eastbound Prot Perm Left Prot Perm Thru Right Westbound														
Mvmt  Eastbound Prot Perm Left Prot Perm Thru Right														
Mvmt  Eastbound Prot Perm Left Prot Perm Thru Right Westbound Prot														
Mvmt  Eastbound Prot Perm Left Prot Perm Thru Right Westbound Prot Perm														
Mvmt  Eastbound Prot Perm Left Prot Perm Thru Right Westbound Prot Perm Left														
Mvmt  Eastbound Prot Perm Left Prot Perm Thru Right Westbound Prot Perm Left Prot Perm		43		1	.765	0		0.6	9	12	19		36	
Mvmt  Eastbound Prot Perm Left Prot Perm Thru Right Westbound Prot Perm Left Prot Perm Left Prot Right	T	43	37	1	.765	0	.25	0.6	9	12	19	0.	36	
Mvmt  Eastbound Prot Perm Left Prot Perm Thru Right Westbound Prot Perm Left Prot Perm Left Northbound	T	43	37	1	.765	0	.25	0.6	9	12	19	0.	36	
Mvmt  Eastbound Prot Perm Left Prot Perm Thru Right Westbound Prot Perm Left Prot Perm Thru Right Northbound Prot	T	43	37	1	.765	0	.25	0.6	9	12	19	0.	36	
Mvmt  Eastbound Prot Perm Left Prot Perm Thru Right Westbound Prot Perm Left Prot Perm Thru Right Northbound Prot Perm	T	43	37	1	.765	0	.25	0.6	9	12	19	0.	36	
Mvmt  Eastbound Prot Perm Left Prot Perm Thru Right Westbound Prot Perm Left Prot Perm Thru Right Northbound Prot Perm Thru Right	T	43	37	1	.765	0	.25	0.6	9	12	19	0.	36	
Mvmt  Eastbound Prot Perm Left Prot Perm Thru Right Westbound Prot Perm Left Prot Perm Thru Right Northbound Prot Perm Left Prot Perm Thru Right Northbound Prot Perm Left Prot	T	43	37	1	.765	0	.25	0.6	9	12	19	0.	36	
Mvmt  Eastbound Prot Perm Left Prot Perm Thru Right Westbound Prot Perm Left Prot Perm Thru Right Northbound Prot Perm Thru Right Northbound Prot Perm Left Prot Perm Left Prot Perm	T	43	37	1	.765	0	.25	0.6	9	12	19	0.	36	
Mvmt  Eastbound Prot Perm Left Prot Perm Thru Right Westbound Prot Perm Left Prot Perm Thru Right Northbound Prot Perm Thru Right Northbound Prot Perm Left Prot Perm Thru Thru Thru Thru Thru Thru Thru Thru	T	43	37	1	.765	0	.25	0.6	9	12	19	0.	36	
Mvmt  Eastbound Prot Perm Left Prot Perm Thru Right Westbound Prot Perm Left Prot Perm Left Prot Perm Thru Right Northbound Prot Perm Left Prot Perm Thru Right Northbound Prot Perm Left Prot Perm Left Prot Perm Left Prot Perm Left Prot Perm Right	T	43	37	1	.765	0	.25	0.6	9	12	19	0.	36	
Mvmt  Eastbound Prot Perm Left Prot Perm Thru Right Westbound Prot Perm Left Prot Perm Thru Right Northbound Prot Perm Left Prot Perm Thru Right Northbound Prot Perm Left Prot Perm Left Prot Southbound	T	43	37	1	.765	0	.25	0.6	9	12	19	0.	36	
Mvmt  Eastbound Prot Perm Left Prot Perm Thru Right Westbound Prot Perm Left Prot Perm Thru Right Northbound Prot Perm Left Prot Perm Thru Right Northbound Prot Perm Left Prot Perm Left Prot Perm Left Prot Perm Thru Right Southbound Prot	T	43	37	1	.765	0	.25	0.6	9	12	19	0.	36	
Mvmt  Eastbound Prot Perm Left Prot Perm Thru Right Westbound Prot Perm Left Prot Perm Thru Right Northbound Prot Perm Left Prot Perm Thru Right Northbound Prot Perm Left Prot Perm Left Prot Perm Thru Right Southbound Prot Perm	T	43	37	1	.765	0	.25	0.6	9	12	19	0.	36	
Mvmt  Eastbound Prot Perm Left Prot Perm Thru Right Westbound Prot Perm Left Prot Perm Thru Right Northbound Prot Perm Left Prot Perm Thru Right Northbound Prot Perm Left Prot Perm Left Prot Perm Left Prot Perm Left Prot Perm Thru Right Southbound Prot Perm Left Left	T	43	37	1	.765	0	.25	0.6	9	12	19	0.	36	
Mvmt  Eastbound Prot Perm Left Prot Perm Thru Right Westbound Prot Perm Left Prot Perm Thru Right Northbound Prot Perm Left Prot Perm Left Prot Perm Left Prot Perm Left Prot Perm Left Prot Perm Left Prot Perm Left Prot Perm Thru Right Southbound Prot Perm Left Prot Perm Left Prot	T	43	37	1	.765	0	.25	0.6	9	12	19	0.	36	
Mvmt  Eastbound Prot Perm Left Prot Perm Thru Right Westbound Prot Perm Left Prot Perm Thru Right Northbound Prot Perm Left Prot Perm Left Prot Perm Left Prot Perm Left Prot Perm Thru Right Southbound Prot Perm Thru Right Southbound Prot Perm Thru Right Southbound Prot Perm Left Prot Perm	T	43	337	1	765	# 0	.25	0.6	9	12	19	0.	36	
Mvmt  Eastbound Prot Perm Left Prot Perm Thru Right Westbound Prot Perm Left Prot Perm Thru Right Northbound Prot Perm Left Prot Perm Left Prot Perm Left Prot Perm Thru Right Southbound Prot Perm Thru Right Southbound Prot Perm Thru Right Southbound Prot Perm Left Prot Perm Left Prot Perm	T	43	337	1	765	# 0	.25	0.6	9	12	19	0.	36	

Total lost time per cycle, L = 10.30 sec Critical flow rate to capacity ratio,

Xc = (Yc)(C)/(C-L) = 0.43

Collision Main Detail Summary

# **EXHIBIT 15 COLLISION REPORTS - January 1, 2010 to January 1, 2013**

	OnTR	OnTRAC Reporting System	rting S	Systen								FROM: 2010/01/01	TO: 2013/01/01	/01/01
S	RRUTHER	CARRUTHERS AVE & SCOTT ST	SCOT	T ST		Tooling Control	Ī		A Parish	r constraint				
101	mer Municip	Former Municipality: Ottawa	æ			Iraffic Control: Iraffic signal	gnai		Numbe	Number of Collisions: /				
0	COLLISION	DATE DAY TIME ENV	DAY	TIMI	E ENV	IMPACT TYPE LIGHT	CLASS	DIR	SURFACE COND'N	VEHICLE MANOEUVRE	VEHICLE TYPE	FIRST EVENT	DRIVER	No. PED
-		2010/08/25 We 17:57 Rain	5 We	17:57	7 Rain	Daylight Turning	Non-fatal	V1 W	Wet	Going ahead Turning left	Passenger van Automobile, station	Other motor vehicle Other motor vehicle		0
2		2011/09/15 Thu 16:20 Clear	5 Thu	16:20	Clear	Daylight Turning	P.D. only	√2 E W	Diy Diy	Going ahead Turning left	Automobile, station Automobile, station	Other motor vehicle Other motor vehicle		0
3		2011/09/19 Mo 17:50 Clear	9 Mo	17:50	) Clear	Daylight Single vehicle	Non-fatal	V1 S	Dry	Turning left	Automobile, station	Pedestrian		-
4		2011/10/14 Frid 13:53 Rain	4 Frid	13:53	3 Rain	Daylight Turning	P.D. only	Z S ≅ M ≥	Wet	Turning left	Automobile, station	Other motor vehicle		0
2		2011/10/17 Mo 10:55 Clear	7 Mo	10:55	Clear	Daylight Single vehicle	P.D. only	-	Dry	Turning left	Pick-up truck	Pedestrian		-
9		2011/12/12 Mo 17:33 Clear	2 Mo	17:33	3 Clear	Dark Rear end	P.D. only	22 × ×	D D	Slowing or Slowing or	Pick-up truck	Other motor vehicle		0
7		2012/01/12 Thu 16:10 Snow	2 Thu	16:10	Snow (	Daylight Sideswipe	P.D. only		Loose snow	Going ahead Changing lanes	Automobile, station Automobile, station	Other motor vehicle Other motor vehicle		0
CA	RRUTHER	CARRUTHERS AVE & WELLINGTON	WELL	INGT	ON ST					)				
For	ner Municip	Former Municipality: Ottawa	æ			Traffic Control: Traffic signal	gnal		Numbe	Number of Collisions: 1				
0	COLLISION	DATE DAY TIME ENV	DAY	TIM	E ENV	IMPACT TYPE LIGHT	CLASS	DIR	SURFACE COND'N	VEHICLE MANOEUVRE	VEHICLE TYPE	FIRST EVENT	DRIVER	No. PED
80		2010/09/15 We 08:27 Clear	5 We	08:27	7 Clear	Daylight Single vehicle Non-fatal V1 S	Non-fatal	V1 S	Dry	Turning left	Pick-up truck	Pedestrian		-

(Note: Time of Day = "00:00" represents unknown collision time March 19, 2014

# EXHIBIT 16 TRANSPORTATION BRIEF – CHECK LIST

Addres	ss 1/8 Carruthers Avenue	<u>тіѕ /(тв) стѕ</u>
File#	114-593	
Date	March 21, 2014	
Check	k list_	
$\boxtimes$	Municipal address;	
⊠.	Location relative to major elements of the existing translocation in the southwest quadrant of the intersection metres from the Maple Street Rapid Transit Station);	
$\boxtimes$	Existing land uses or permitted use provisions in the	Official Plan, Zoning By-law, etc.;
$\boxtimes$	Proposed land uses and relevant planning regulations	s to be used in the analysis;
$\boxtimes$	Proposed development size (building size, number of on site;	residential units, etc.) and location
$\boxtimes$	Estimated date of occupancy;	
$\boxtimes$	Planned phasing of development;	
$\boxtimes$	Proposed number of parking spaces (not relevant for	Draft Plans of Subdivision); and
$\boxtimes$	Proposed access points and type of access (full turns restrictions, etc.	, right-in / right-out, turning
$\boxtimes$	Study area;	
$\boxtimes$	Time periods and phasing; and	
$\boxtimes$	Horizon years (include reference to phased development	nent).
Existin	ng Contitions	
$\boxtimes$	Existing roads and ramps in the study area, including of lanes, and posted speed limit;	jurisdiction, classification, number
$\boxtimes$	Existing intersections, including type of control, lane of and any other relevant data (eg., extraordinary lane w	
$\boxtimes$	Existing access points to adjacent developments (bot site);	h sides of all roads bordering the
$\boxtimes$	Existing transit system, including stations and stops;	
×	Existing on- and off-road bicycle facilities and pedestr networks:	ian sidewalks and pathway
$\boxtimes$	Existing system operations (V/C, LOS); and	

 $\boxtimes$ Major trip generators / attractors within the Study Area should be indicated. **Demand Forecasting**  $\boxtimes$ General background growth;  $\boxtimes$ Other study area developments;  $\boxtimes$ Changes to the study area road network; Future background system operations (V/C, LOS, queue lengths);  $\boxtimes$ Trip generation rates;  $\boxtimes$ Trip distribution and assignment; **Impact Analysis**  $\boxtimes$ Total future system operations (V/C, LOS, queue lengths);  $\boxtimes$ Signal and auxiliary lane (device) warrants;  $\boxtimes$ Operational / safety assessment (eg., sight line assessment where grades are an issue);  $\boxtimes$ Storage analysis for closely spaced intersections;  $\boxtimes$ Pedestrian and bicycle network connections and continuity; On-site circulation and design;  $\boxtimes$ Potential for neighourhood impacts; and TDM.  $\bowtie$  $\boxtimes$ Synchro Files (Highway Capacity Software) <u>CTS</u> **Impact Analysis** Network Capacity Analysis; Non-auto network connections and continuity; Potential for community impacts, and TDM. Synchro Files (Highway Capacity Software) Screenline Analysis