

**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
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OTTAWA**

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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 m² 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.

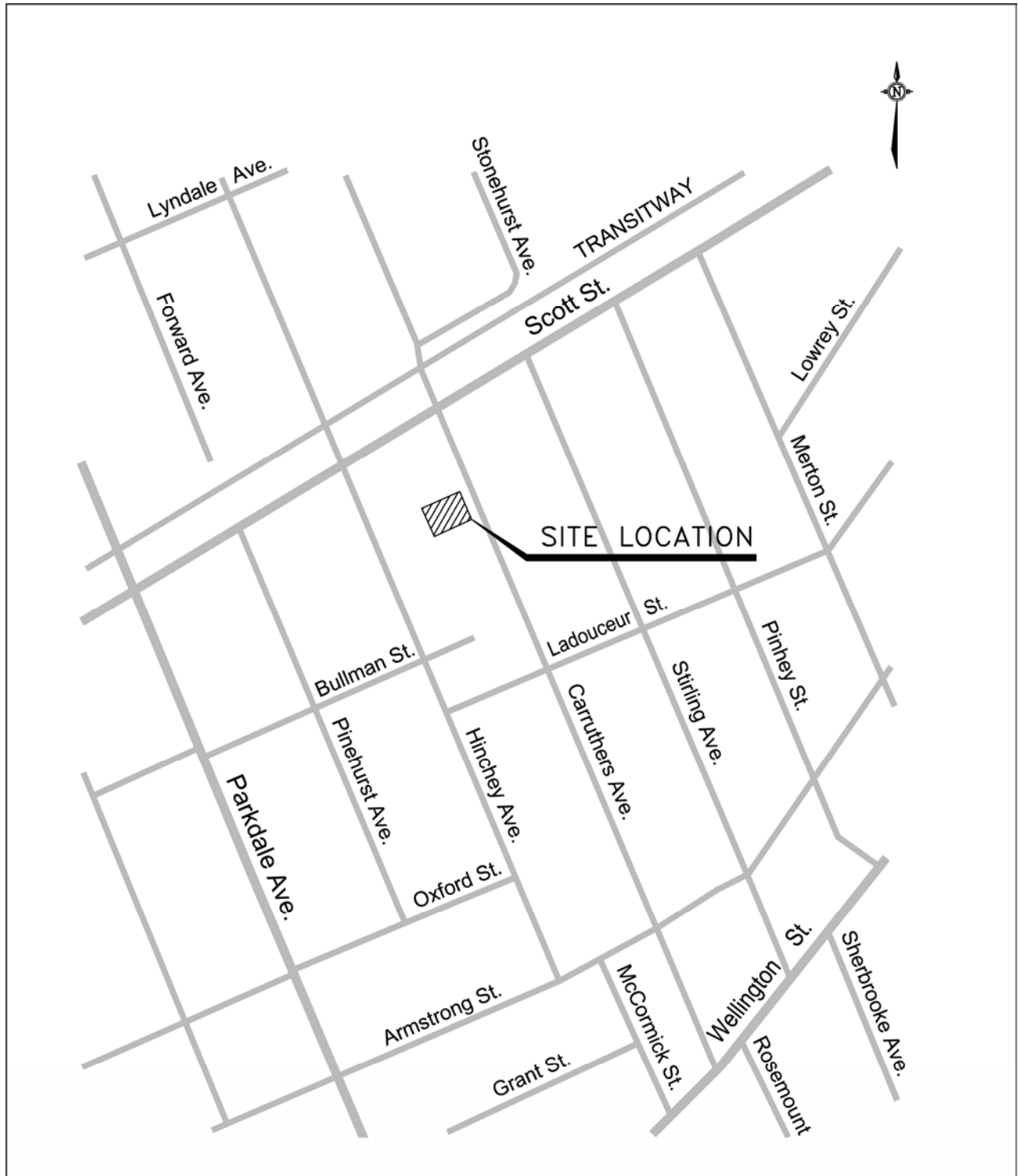
1.1 Scope of Work

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

**FIGURE 1.1
SITE LOCATION PLAN**



NOT TO SCALE

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:

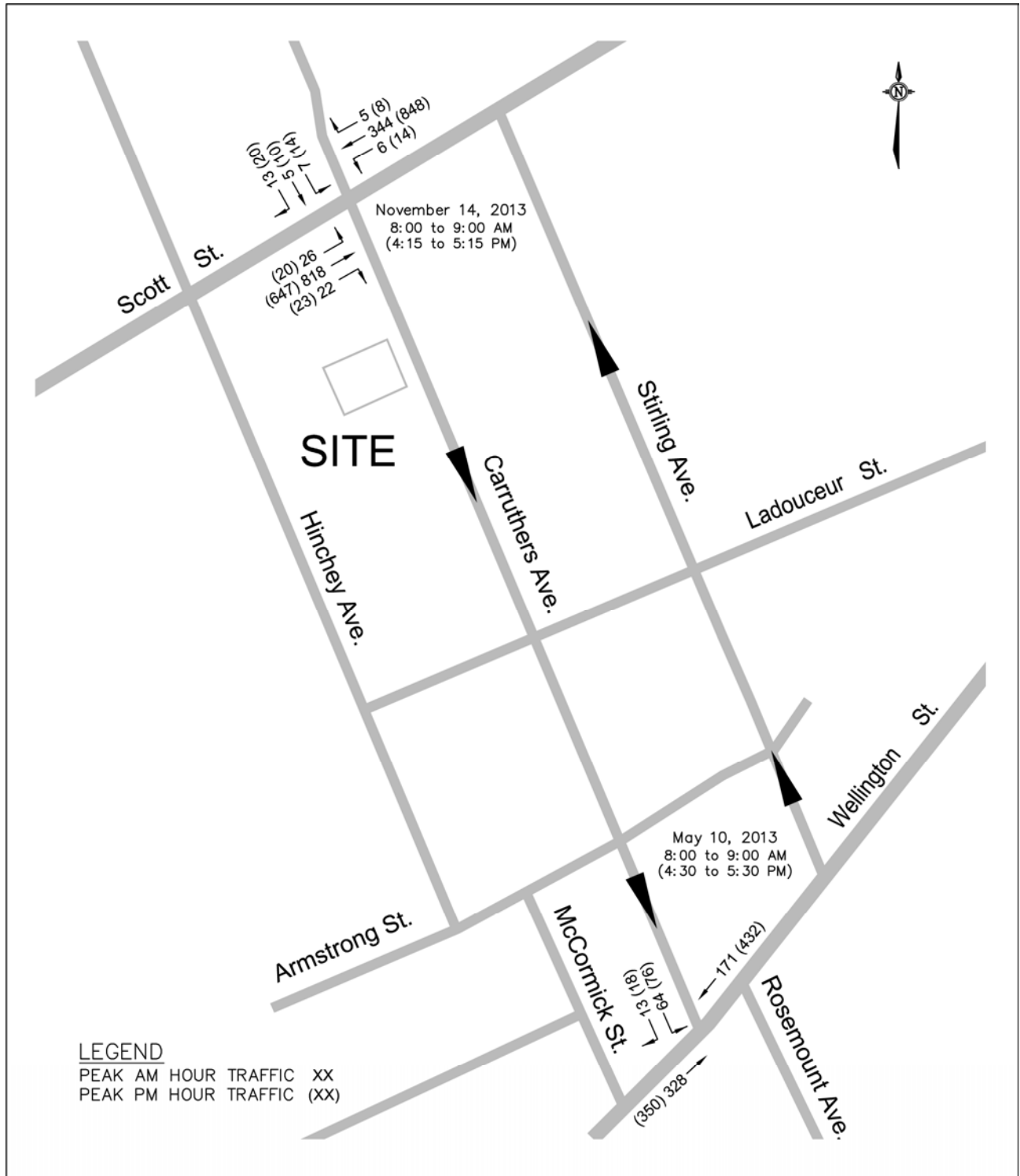
Eastbound Scott Approach -	One shared left/through lane
	One shared through/right lane
Westbound Scott Approach -	One shared left/through lane
	One shared through/right lane
Southbound Carruthers Approach -	One left turn lane
	One shared through/right lane

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 m² 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

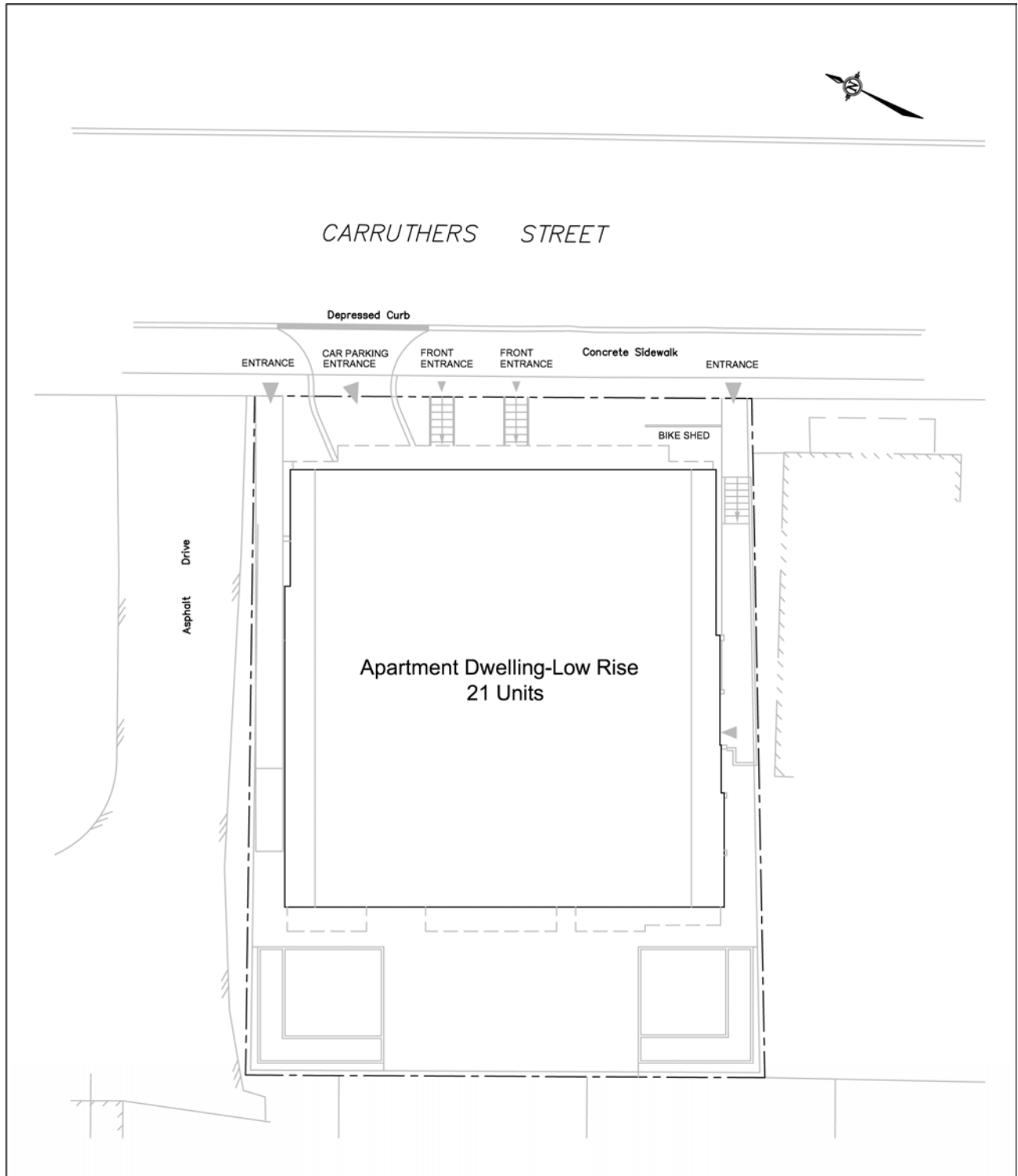
The number of site generated trips was based on the type and use of the proposed building. The site generated trips were determined using the Institute of Transportation Engineers (ITE) document, *Trip Generation*. The analysis used the trip generation rates for a 21 unit low-rise apartment building. 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	
	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



NOT TO SCALE

TABLE 3.2
PEAK HOUR SITE TRIPS GENERATED

UNIT TYPE	WEEKDAY PEAK AM HR.			WEEKDAY PEAK PM HR.		
	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:

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

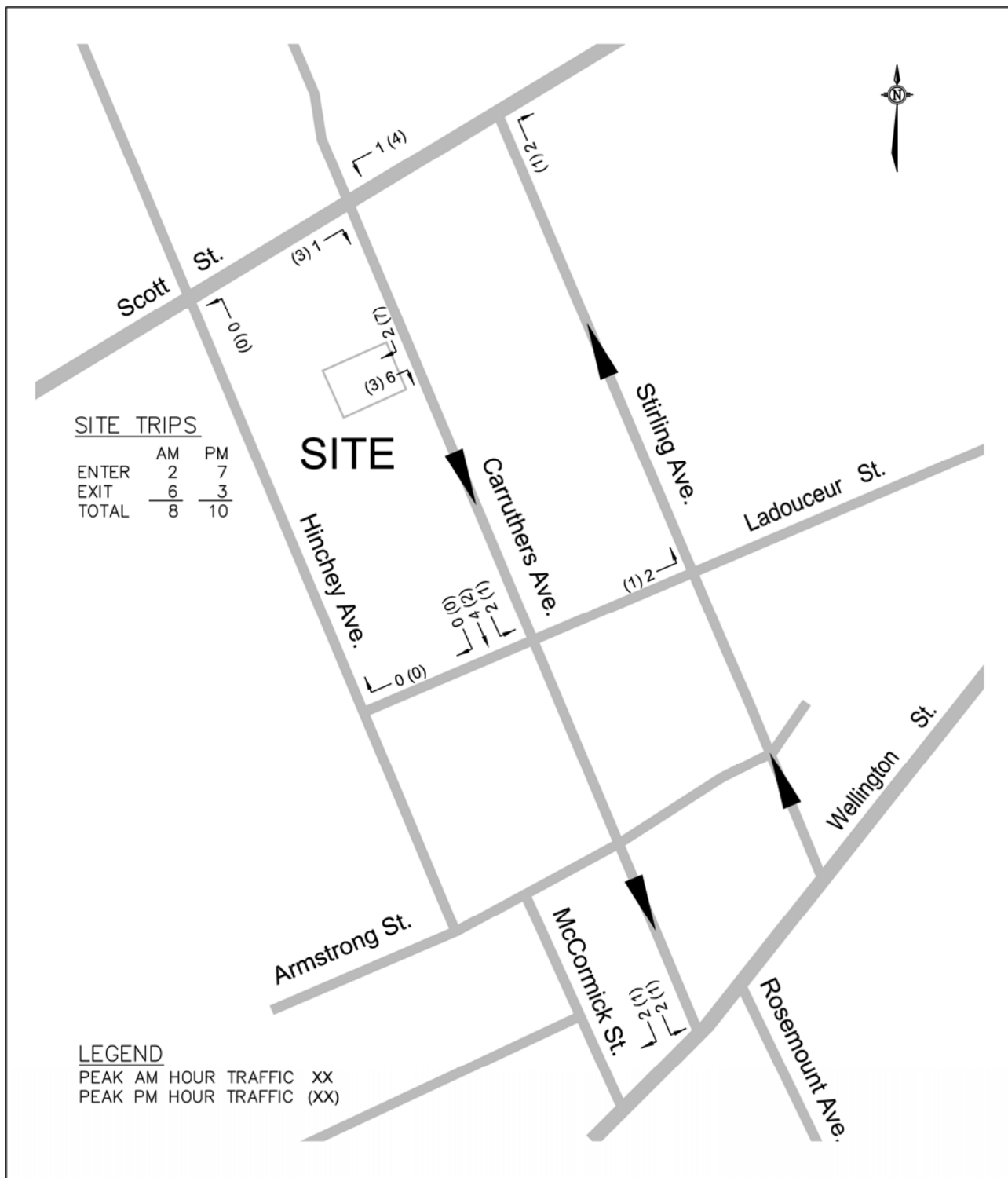
The trips were proportioned as shown above, but were distributed along the surrounding roads to reflect the one-way traffic restrictions along Carruthers Avenue and Stirling Avenue, and that Hinchey Avenue does not extend to Wellington Street. Figure 3.2 shows the expected distribution of site generated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



NOT TO SCALE

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 = 1.040

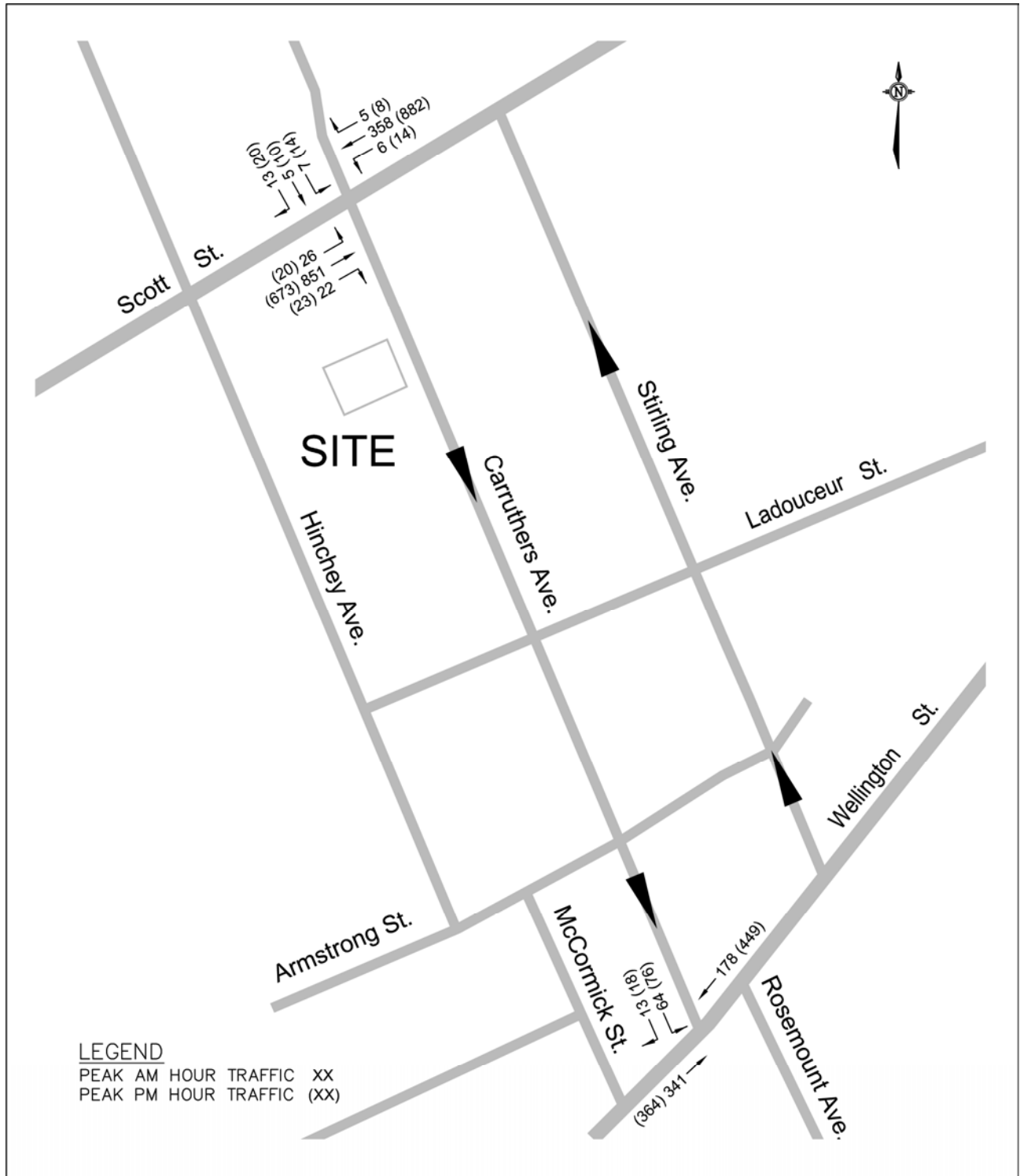
2013 to 2020 = 1.149

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 Carruthers/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.

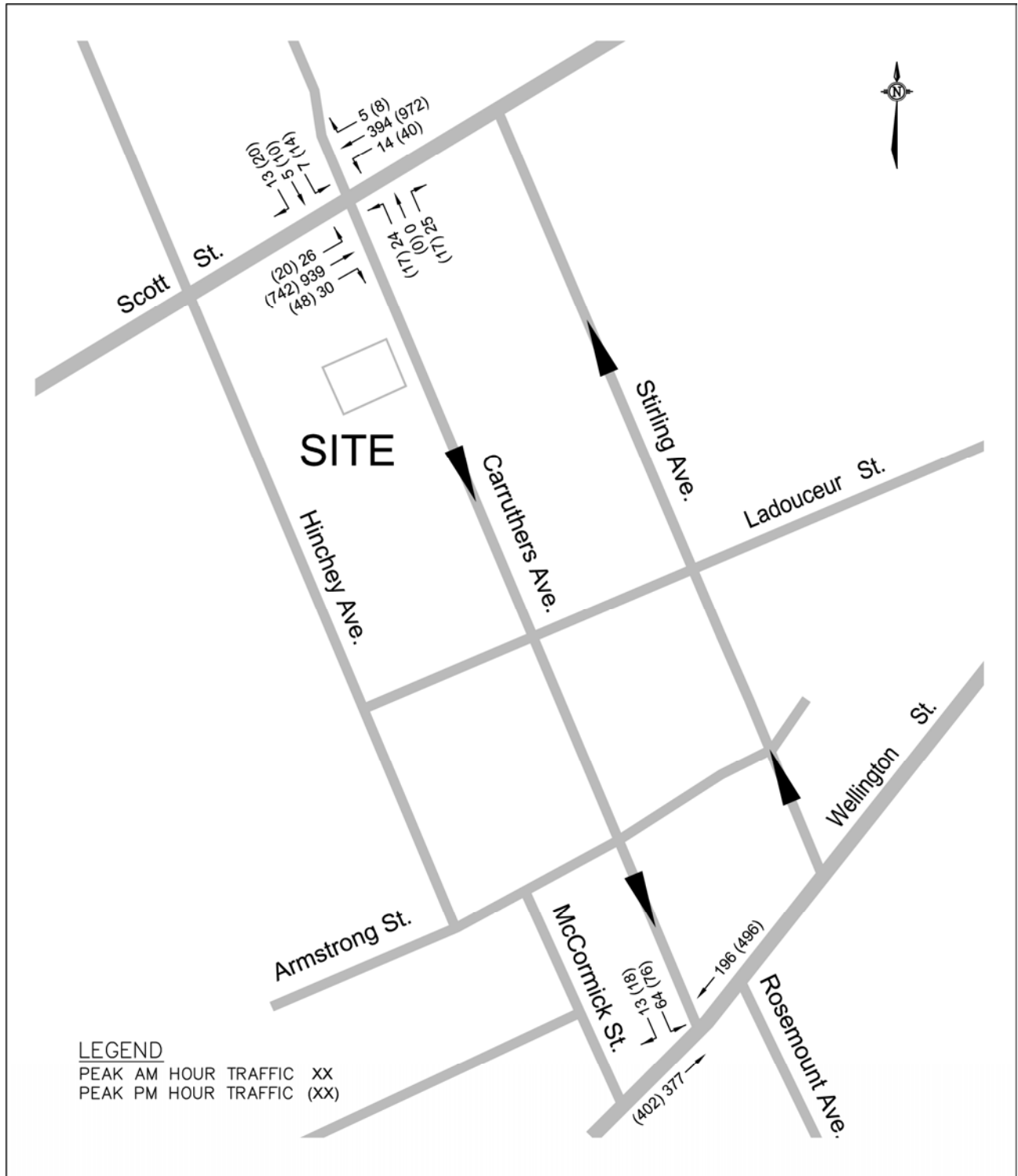
The 2020 peak hour background traffic which is shown in Figure 4.2 of this report would include the 2.0 Percent Average Annual Compounded growth factor as discussed earlier, plus the expected site generated trips from the 12 Stirling Avenue development as shown in Figure 4 of the Delcan *Transportation 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.

FIGURE 4.1
YEAR 2015 PEAK AM AND PM HOUR BACKGROUND TRAFFIC



NOT TO SCALE

FIGURE 4.2
YEAR 2020 PEAK AM AND PM HOUR BACKGROUND TRAFFIC



NOT TO SCALE

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.

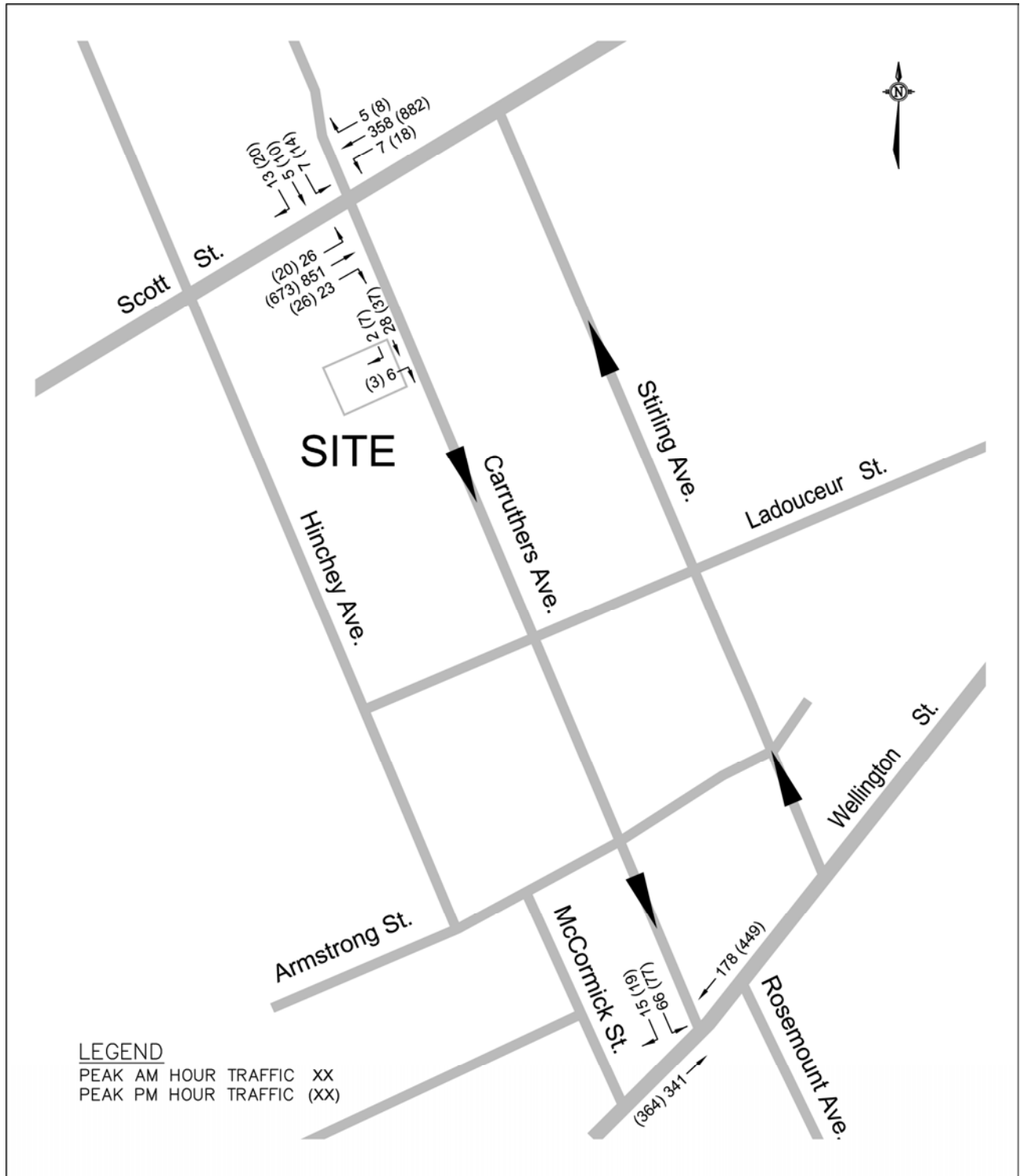
The operational analysis of the intersection utilized the 2013 traffic counts and traffic signal timing plan obtained from the City of Ottawa. The traffic counts determined that during the peak AM and PM hour, all lane movements at the intersection would function at a Level of Service (LoS) “A”. Table 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	WEEKDAY PEAK AM HR. YEAR 2013 2015 (2020)		WEEKDAY PEAK PM HR. YEAR 2013 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)	A A (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)	A A (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)

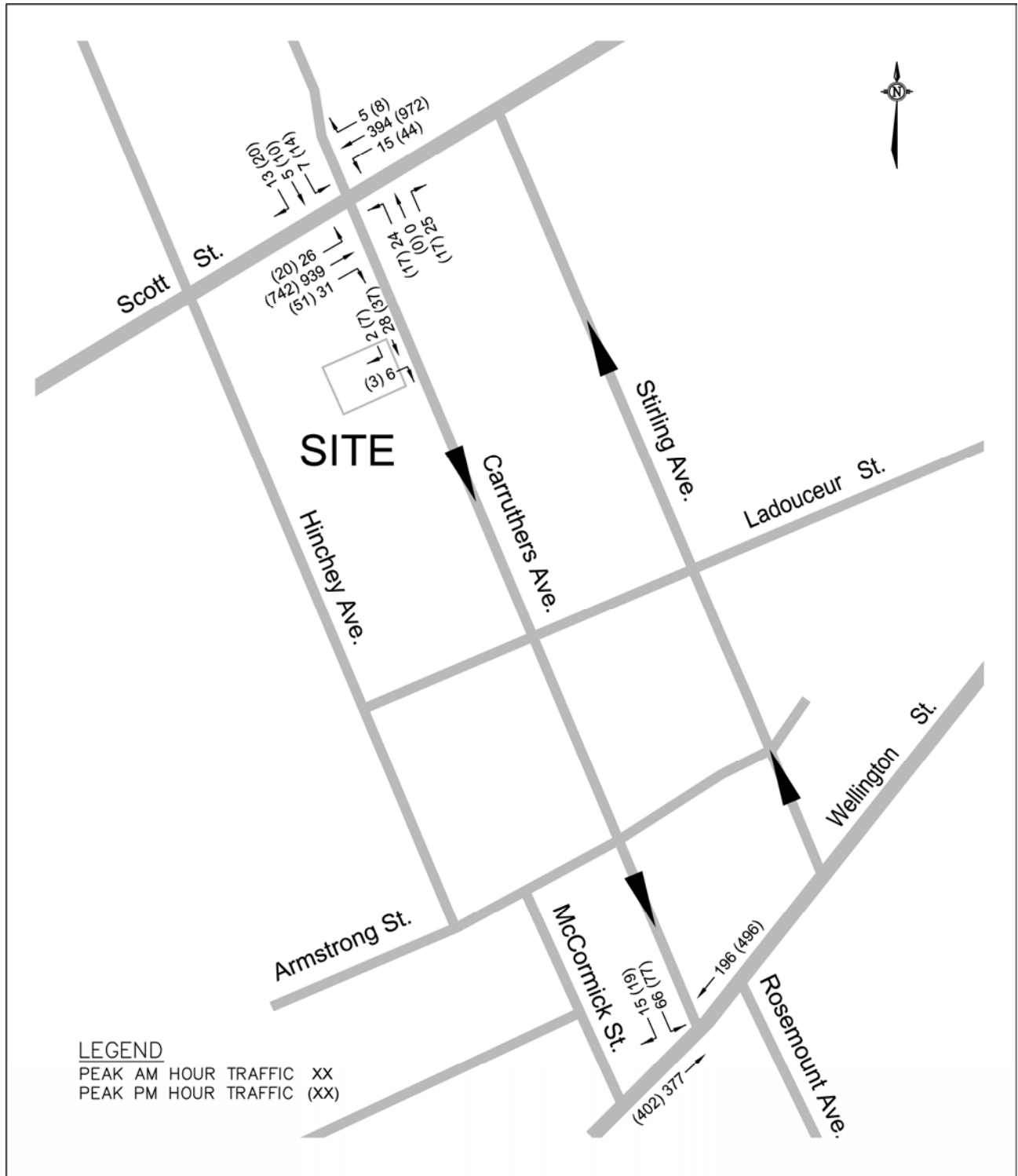
* The Northbound intersection approach was constructed as part of the 12 Stirling Avenue approach. The approach is assumed to be constructed by the year 2020

FIGURE 4.3
YEAR 2015 PEAK AM AND PM HOUR TOTAL TRAFFIC



NOT TO SCALE

FIGURE 4.4
YEAR 2020 PEAK AM AND PM HOUR TOTAL TRAFFIC



NOT TO SCALE

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	WEEKDAY PEAK AM HR. YEAR 2013 2015 (2020)		WEEKDAY PEAK PM HR. YEAR 2013 2015 (2020)	
	LoS	v/c (sec.)	LoS	v/c (sec.)
EB Through – Wellington	A A (A)	0.30 0.31 (0.35)	A A (A)	0.31 0.32 (0.36)
WB Through – Wellington	A A (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)
Total Intersection	A A (A)	0.30 0.31 (0.33)	A A (A)	0.38 0.39 (0.43)

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/Wellington Intersection					
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.

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 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 in 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

David J. Halpenny, P. Eng.



APPENDIX

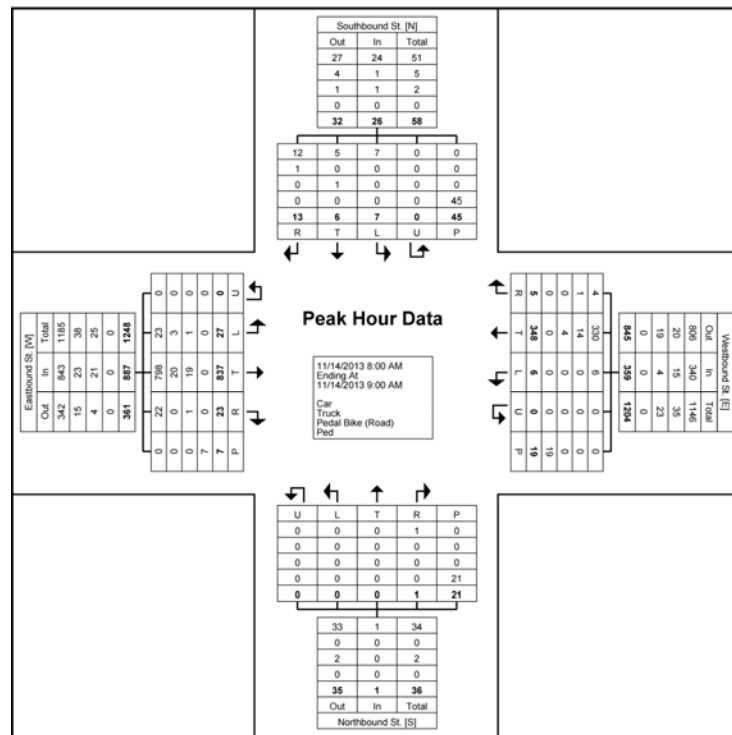
TRAFFIC COUNTS

OPERATIONAL ANALYSIS WORK SHEETS

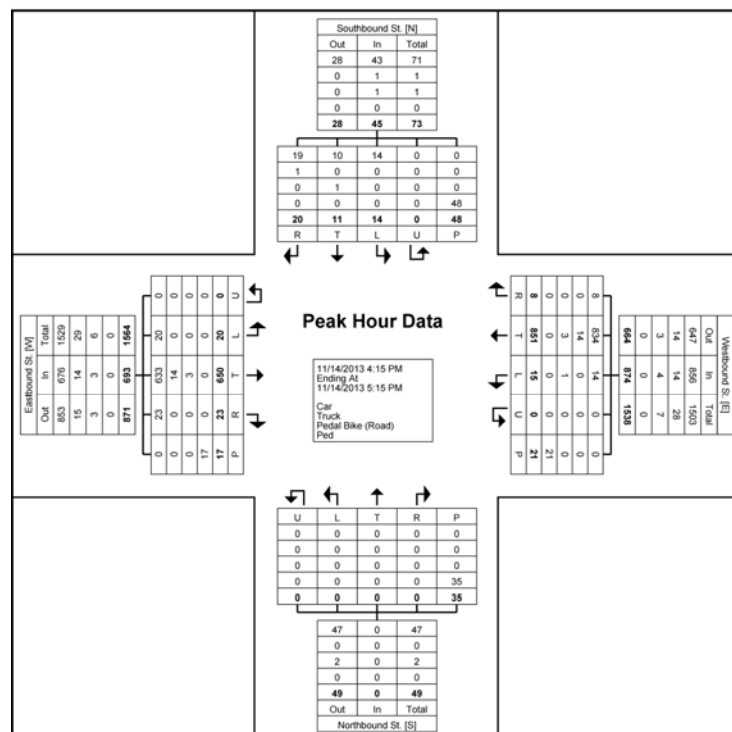
COLLISION REPORTS

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

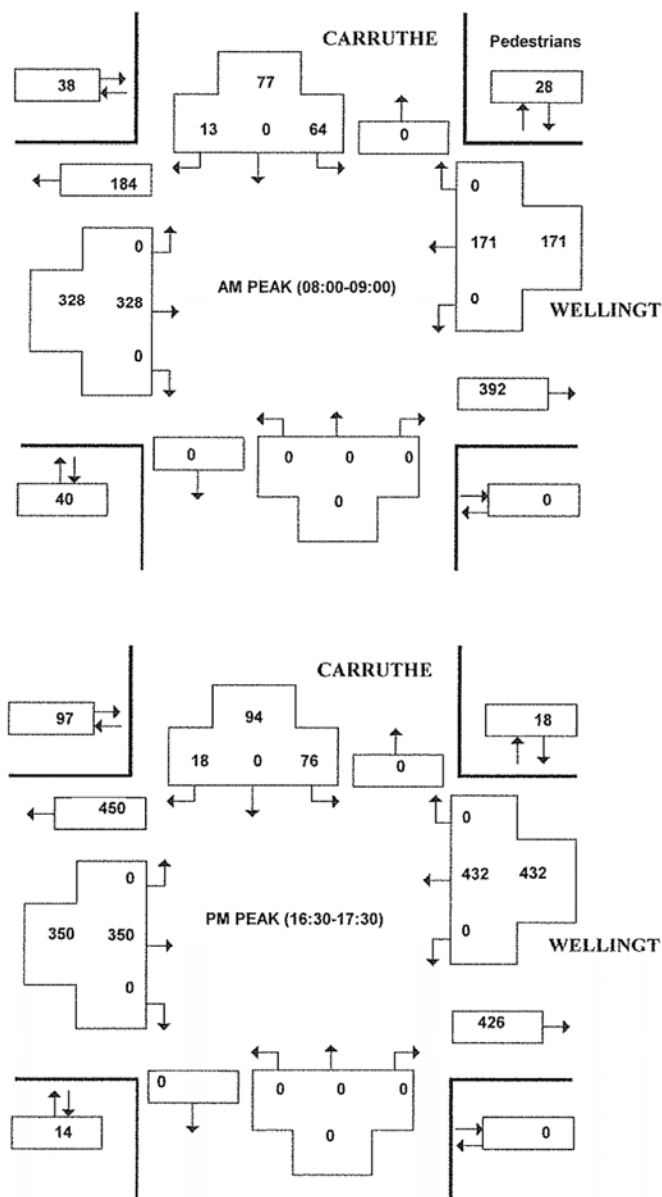
Count ID 3182

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: 0
Eastbound: 0 Westbound: 1

AADT Factor
Friday in May is
0.8



Approved by : AP

Printed on : 13/03/2014

EXHIBIT 3

2013 PEAK AM HOUR EXISTING TRAFFIC ANALYSIS – Scott/Carruthers

HCS+: Signalized Intersections Release 5.4

Analyst: Inter.: **Scott/Carruthers**
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													
	Eastbound			Westbound			Northbound			Southbound			
	L	T	R	L	T	R	L	T	R	L	T	R	
No. Lanes	0	2	0	0	2	0	0	0	0	1	1	0	
LGConfig	LTR			LTR						L	TR		
Volume	26	818	22	6	344	5				7	5	13	
Lane Width	3.6			3.6						3.6	3.6		
RTOR Vol				0						0			
Duration	0.25		Area Type: All other areas										
Signal Operations													
Phase Combination			1	2	3	4	5			6	7	8	
EB	Left	P					NB	Left					
	Thru	P						Thru					
	Right	P						Right					
	Peds	X						Peds	X				
WB	Left	P					SB	Left	A				
	Thru	P						Thru	A				
	Right	P						Right	A				
	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													

CAPACITY AND LOS WORKSHEET							
Capacity Analysis and Lane Group Capacity							
Appr/ Mvmt	Lane Group	Adj Flow Rate (v)	Adj Sat Flow Rate (s)	Flow Ratio (v/s)	Green Ratio (g/C)	--Lane Group-- Capacity (c)	v/c Ratio
Eastbound							
Prot							
Perm							
Left							
Prot							
Perm							
Thru	LTR	941	3130	# 0.30	0.66	2066	0.46
Right							
Westbound							
Prot							
Perm							
Left							
Prot							
Perm							
Thru	LTR	386	3153	0.12	0.66	2081	0.19
Right							
Northbound							
Prot							
Perm							
Left							
Prot							
Perm							
Thru							
Right							
Southbound							
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 flow ratios for critical lane groups, $Y_c = \text{Sum (v/s)} = 0.31$
Total lost time per cycle, $L = 10.70 \text{ sec}$
Critical flow rate to capacity ratio, $X_c = (Y_c) (C) / (C-L) = 0.35$

EXHIBIT 4

2013 PEAK PM HOUR EXISTING TRAFFIC ANALYSIS – Scott/Carruthers

HCS+: Signalized Intersections Release 5.4

Analyst: Inter.: **Scott/Carruthers**
Period: **Peak PM Hour** Year: **November 14, 2013**
Project ID: 178 Carruthers Avenue
E/W St: Scott Street N/S St: Carruthers Avenue

SIGNALIZED INTERSECTION SUMMARY													
	Eastbound			Westbound			Northbound			Southbound			
	L	T	R	L	T	R	L	T	R	L	T	R	
No. Lanes	0	2	0	0	2	0	0	0	0	1	1	0	
LGConfig	LTR			LTR						L	TR		
Volume	20	647	23	14	848	8				14	10	20	
Lane Width	3.6			3.6						3.6	3.6		
RTOR Vol	0			0						0			
Duration	0.25		Area Type: All other areas										
Signal Operations													
Phase Combination			1	2	3	4	5			6	7	8	
EB	Left	P					NB	Left					
	Thru	P						Thru					
	Right	P						Right					
	Peds	X						Peds	X				
WB	Left	P					SB	Left	A				
	Thru	P						Thru	A				
	Right	P						Right	A				
	Peds	X						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 Length: 100.0 secs													

CAPACITY AND LOS WORKSHEET								
Capacity Analysis and Lane Group Capacity								
Appr/ Mvmt	Lane Group	Adj Flow Rate (v)	Adj Sat Flow Rate (s)	Flow Ratio (v/s)	Green Ratio (g/C)	--Lane Group-- Capacity (c)	v/c Ratio	
Eastbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru	LTR	750	3047	0.25	0.68	2063	0.36	
Right								
Westbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru	LTR	946	3153	# 0.30	0.68	2135	0.44	
Right								
Northbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru								
Right								
Southbound								
Prot								
Perm								
Left	L	15	1710	0.01	0.22	369	0.04	
Prot								
Perm								
Thru	TR	33	1620	# 0.02	0.22	350	0.09	
Right								

Sum of flow ratios for critical lane groups, $Y_c = \text{Sum (v/s)} = 0.32$
Total lost time per cycle, $L = 10.70 \text{ sec}$
Critical flow rate to capacity ratio, $X_c = (Y_c) (C) / (C-L) = 0.36$

HCS+: Signalized Intersections Release 5.4

Analyst:	Inter.: Scott/Carruthers
Period: Peak AM Hour	Year: Year 2015
Project ID: 178 Carruthers Avenue	
E/W St: Scott Street	N/S St: Carruthers Avenue

SIGNALIZED INTERSECTION SUMMARY												
	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	0	2	0	0	2	0	0	0	0	1	1	0
LGConfig	LTR			LTR						TR		
Volume	26	851	23	7	358	5				7	5	13
Lane Width	3.6			3.6						3.6	3.6	
RTOR Vol	0			0						0		

Duration		0.25	Area Type: All		other areas				
Phase Combination		1	2	3	4	5	6	7	8
EB	Left	P				NB	Left		
	Thru	P					Thru		
	Right	P					Right		
	Peds	X					Peds	X	
WB	Left	P				SB	Left	A	
	Thru	P					Thru	A	
	Right	P					Right	A	
	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		

CAPACITY AND LOS WORKSHEET								
Capacity Analysis		Lane Group Capacity			Green	--Lane Group--		
Appr/ Mvmt	Lane Group	Adj Flow Rate (v)	Adj Sat Flow Rate (s)	Flow Ratio (v/s)	Ratio (g/C)	Capacity (c)	v/c Ratio	
Eastbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru	LTR	978	3130	# 0.31	0.66	2066	0.47	
Right								
Westbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru	LTR	402	3142	0.13	0.66	2074	0.19	
Right								
Northbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru								
Right								
Southbound								
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 flow ratios for critical lane groups, $Y_c = \text{Sum } (v/s) = 0.32$
 Total lost time per cycle, $L = 10.70 \text{ sec}$
 Critical flow rate to capacity ratio, $X_c = (Y_c) (C) / (C-L) = 0.37$

EXHIBIT 6

2015 PEAK PM HOUR TOTAL TRAFFIC ANALYSIS – Scott/Carruthers

HCS+: Signalized Intersections Release 5.4

Analyst: Inter.: **Scott/Carruthers**
Period: **Peak PM Hour** Year: **Year 2015**
Project ID: 178 Carruthers Avenue
E/W St: Scott Street N/S St: Carruthers Avenue

SIGNALIZED INTERSECTION SUMMARY													
	Eastbound			Westbound			Northbound			Southbound			
	L	T	R	L	T	R	L	T	R	L	T	R	
No. Lanes	0	2	0	0	2	0	0	0	0	1	1	0	
LGConfig	LTR			LTR						L	TR		
Volume	20	673	26	18	882	8				14	10	20	
Lane Width	3.6			3.6						3.6	3.6		
RTOR Vol	0			0						0			
Duration	0.25		Area Type: All other areas										
Signal Operations													
Phase Combination			1	2	3	4	5 6 7 8						
EB	Left	P					NB	Left					
	Thru	P						Thru					
	Right	P						Right					
	Peds	X						Peds	X				
WB	Left	P					SB	Left	A				
	Thru	P						Thru	A				
	Right	P						Right	A				
	Peds	X						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 Length: 100.0 secs													

CAPACITY AND LOS WORKSHEET							
Capacity Analysis and Lane Group Capacity							
Appr/ Mvmt	Lane Group	Adj Flow Rate (v)	Adj Sat Flow Rate (s)	Flow Ratio (v/s)	Green Ratio (g/C)	--Lane Group-- Capacity (c)	v/c Ratio
Eastbound							
Prot							
Perm							
Left							
Prot							
Perm							
Thru	LTR	782	3043	0.26	0.68	2060	0.38
Right							
Westbound							
Prot							
Perm							
Left							
Prot							
Perm							
Thru	LTR	988	3124	# 0.32	0.68	2115	0.47
Right							
Northbound							
Prot							
Perm							
Left							
Prot							
Perm							
Thru							
Right							
Southbound							
Prot							
Perm							
Left	L	15	1710	0.01	0.22	369	0.04
Prot							
Perm							
Thru	TR	33	1620	# 0.02	0.22	350	0.09
Right							

Sum of flow ratios for critical lane groups, $Y_c = \text{Sum (v/s)} = 0.34$
Total lost time per cycle, $L = 10.70 \text{ sec}$
Critical flow rate to capacity ratio, $X_c = (Y_c) (C) / (C-L) = 0.38$

HCS+: Signalized Intersections Release 5.4

Analyst:	Inter.: Scott/Carruthers
Period: Peak AM Hour	Year: Year 2020
Project ID: 178 Carruthers Avenue	
E/W St: Scott Street	N/S St: Carruthers Avenue

SIGNALIZED INTERSECTION SUMMARY															
	Eastbound				Westbound			Northbound			Southbound				
	L	T	R		L	T	R	L	T	R	L	T	R		
No. Lanes	0	2	0		0	2	0		0	1	0		1	1	0
LGConfig	LTR				LTR			LTR			L	TR			
Volume	26	939	31		15	394	5		24	0	25		7	5	13
Lane Width	3.6				3.6			3.6			3.6	3.6			
RTOR Vol	0				0			0			0				
Duration	0.25	Area Type: All other areas													
Signal Operations															
Phase Combination		1	2	3	4	5		6	7	8					
EB	Left	P				NB	Left	A							
	Thru	P					Thru	A							
	Right	P					Right	A							
	Peds	X					Peds	X							
WB	Left	P				SB	Left	A							
	Thru	P					Thru	A							
	Right	P					Right	A							
	Peds	X					Peds	X							
NB	Right					EB	Right								
SB	Right					WB	Right								
Green	62.7														
Yellow	3.3														
All Red	2.0														
										Cycle Length: 95.0					secs

CAPACITY AND LOS WORKSHEET							
Capacity Analysis		Lane Group Capacity					
Appr/ Mvmt	Lane Group	Adj Flow Rate (v)	Adj Sat Flow Rate (s)	Flow Ratio (v/s)	Green Ratio (g/C)	--Lane Capacity (c)	--Lane Group-- v/c Ratio
Eastbound							
Prot							
Perm							
Left							
Prot							
Perm							
Thru	LTR	1083	3128	# 0.35	0.66	2064	0.52
Right							
Westbound							
Prot							
Perm							
Left							
Prot							
Perm							
Thru	LTR	449	3037	0.15	0.66	2004	0.22
Right							
Northbound							
Prot							
Perm							
Left							
Prot							
Perm							
Thru	LTR	53	1523	# 0.03	0.23	346	0.15
Right							
Southbound							
Prot							
Perm							
Left	L	8	1300	0.01	0.23	296	0.03
Prot							
Perm							
Thru	TR	19	1601	0.01	0.23	364	0.05
Right							
Sum of flow ratios for critical lane groups, Yc =							
Total lost time per cycle, L = 10.70 sec					Sum (v/s) = 0.38		
Critical flow rate to capacity ratio,				Xc = (Yc) (C) / (C-L) = 0.43			

HCS+: Signalized Intersections Release 5.4

Inter.: **Scott/Carruthers**
Year: **Year 2020**

Duration		0.25	Area Type: All		other areas				
Phase Combination		1	2	3	4	5	6	7	8
EB	Left	P				NB Left	A		
	Thru	P				Thru	A		
	Right	P				Right	A		
	Peds	X				Peds	X		
WB	Left	P				SB Left	A		
	Thru	P				Thru	A		
	Right	P				Right	A		
	Peds	X				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 Length: 100.0 secs		

Sum of flow ratios for critical lane groups, $Y_c = \text{Sum } (v/s) = 0.41$
 Total lost time per cycle, $L = 10.70 \text{ sec}$
 Critical flow rate to capacity ratio, $X_c = (Y_c) (C) / (C-L) = 0.45$

EXHIBIT 9

2013 PEAK AM HOUR EXISTING TRAFFIC ANALYSIS – Wellington/Carruthers

HCS+: Signalized Intersections Release 5.4

Analyst: Inter.: **Wellington/Carruthers**
Period: **Peak AM Hour** Year: **May 10, 2013**
Project ID: 178 Carruthers Avenue
E/W St: Wellington Street N/S St: Carruthers Avenue

SIGNALIZED INTERSECTION SUMMARY												
	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	0	1	0	0	1	0	0	0	0	0	0	0
LGConfig	T			T						LR		
Volume	328			171						64		13
Lane Width	3.6			3.6						3.6		
RTOR Vol										0		

Duration	0.25	Area Type: All other areas										
		Signal				Operations						
Phase Combination	1	2	3	4	5	6	7	8				
EB Left					NB Left							
Thru	P				Thru							
Right					Right							
Peds	X				Peds	X						
WB Left					SB Left	A						
Thru	P				Thru							
Right					Right	A						
Peds	X				Peds	X						
NB Right					EB Right							
SB Right					WB Right							
Green	46.8					12.9						
Yellow	3.3					3.3						
All Red	1.9					1.8						
Cycle Length: 70.0 secs												

CAPACITY AND LOS WORKSHEET								
Capacity Analysis and Lane Group Capacity								
Appr/ Mvmt	Lane Group	Adj Flow Rate (v)	Adj Sat Flow Rate (s)	Flow Ratio (v/s)	Green Ratio (g/C)	--Lane Capacity (c)	Group v/c Ratio	
Eastbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru T		357	1765	# 0.20	0.67	1180	0.30	
Right								
Westbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru T		186	1765	0.11	0.67	1180	0.16	
Right								
Northbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru								
Right								
Southbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru LR		84	1689	# 0.05	0.18	311	0.27	
Right								

Sum of flow ratios for critical lane groups, $Y_c = \text{Sum (v/s)} = 0.25$
Total lost time per cycle, $L = 10.30 \text{ sec}$
Critical flow rate to capacity ratio, $X_c = (Y_c) (C) / (C-L) = 0.30$

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

SIGNALIZED INTERSECTION SUMMARY												
	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	0	1	0	0	1	0	0	0	0	0	0	0
LGConfig	T			T						LR		
Volume	350			432						76		18
Lane Width	3.6			3.6						3.6		
RTOR Vol											0	

Duration	0.25	Area Type: All other areas										
		Signal				Operations						
Phase Combination	1	2	3	4	5	6	7	8				
EB Left					NB Left							
Thru	P				Thru							
Right					Right							
Peds	X				Peds	X						
WB Left					SB Left	A						
Thru	P				Thru							
Right					Right	A						
Peds	X				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						
Cycle Length: 75.0 secs												

CAPACITY AND LOS WORKSHEET								
Capacity Analysis and Lane Group Capacity								
Appr/ Mvmt	Lane Group	Adj Flow Rate (v)	Adj Sat Flow Rate (s)	Flow Ratio (v/s)	Green Ratio (g/C)	--Lane Capacity (c)	Group v/c Ratio	
Eastbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru T		380	1765	0.22	0.69	1219	0.31	
Right								
Westbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru T		470	1765	# 0.27	0.69	1219	0.39	
Right								
Northbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru								
Right								
Southbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru LR		103	1685	# 0.06	0.17	290	0.36	
Right								

Sum of flow ratios for critical lane groups, $Y_c = \text{Sum (v/s)} = 0.33$
Total lost time per cycle, $L = 10.30 \text{ sec}$
Critical flow rate to capacity ratio, $X_c = (Y_c) (C) / (C-L) = 0.38$

EXHIBIT 11

2015 PEAK AM HOUR TOTAL TRAFFIC ANALYSIS – Wellington/Carruthers

HCS+: Signalized Intersections Release 5.4

Analyst: Inter.: **Wellington/Carruthers**
Period: **Peak AM Hour** Year: **Year 2015**
Project ID: 178 Carruthers Avenue
E/W St: Wellington Street N/S St: Carruthers Avenue

SIGNALIZED INTERSECTION SUMMARY												
	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	0	1	0	0	1	0	0	0	0	0	0	0
LGConfig	T			T						LR		
Volume	341			178						66		15
Lane Width	3.6			3.6						3.6		
RTOR Vol											0	

Duration	0.25	Area Type: All other areas										
		Signal				Operations						
Phase Combination	1	2	3	4	5	6	7	8				
EB Left					NB Left							
Thru	P				Thru							
Right					Right							
Peds	X				Peds	X						
WB Left					SB Left	A						
Thru	P				Thru							
Right					Right	A						
Peds	X				Peds	X						
NB Right					EB Right							
SB Right					WB Right							
Green	46.8					12.9						
Yellow	3.3					3.3						
All Red	1.9					1.8						
Cycle Length: 70.0 secs												

CAPACITY AND LOS WORKSHEET								
Capacity Analysis and Lane Group Capacity								
Appr/ Mvmt	Lane Group	Adj Flow Rate (v)	Adj Sat Flow Rate (s)	Flow Ratio (v/s)	Green Ratio (g/C)	--Lane Capacity (c)	Group v/c Ratio	
Eastbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru T		371	1765	# 0.21	0.67	1180	0.31	
Right								
Westbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru T		193	1765	0.11	0.67	1180	0.16	
Right								
Northbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru								
Right								
Southbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru LR		88	1687	# 0.05	0.18	311	0.28	
Right								

Sum of flow ratios for critical lane groups, $Y_c = \text{Sum (v/s)} = 0.26$
Total lost time per cycle, $L = 10.30 \text{ sec}$
Critical flow rate to capacity ratio, $X_c = (Y_c) (C) / (C-L) = 0.31$

EXHIBIT 12

2015 PEAK PM HOUR TOTAL TRAFFIC ANALYSIS – Wellington/Carruthers

HCS+: Signalized Intersections Release 5.4

Analyst: Inter.: **Wellington/Carruthers**
Period: **Peak PM Hour** Year: **Year 2015**
Project ID: 178 Carruthers Avenue
E/W St: Wellington Street N/S St: Carruthers Avenue

SIGNALIZED INTERSECTION SUMMARY												
	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	0	1	0	0	1	0	0	0	0	0	0	0
LGConfig	T			T						LR		
Volume	364			449						77		19
Lane Width	3.6			3.6						3.6		
RTOR Vol											0	

Duration	0.25	Area Type: All other areas										
		Signal				Operations						
Phase Combination	1	2	3	4	5	6	7	8				
EB Left					NB Left							
Thru	P				Thru							
Right					Right							
Peds	X				Peds	X						
WB Left					SB Left	A						
Thru	P				Thru							
Right					Right	A						
Peds	X				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						
Cycle Length: 75.0 secs												

CAPACITY AND LOS WORKSHEET								
Capacity Analysis and Lane Group Capacity								
Appr/ Mvmt	Lane Group	Adj Flow Rate (v)	Adj Sat Flow Rate (s)	Flow Ratio (v/s)	Green Ratio (g/C)	--Lane Group-- Capacity (c)	v/c Ratio	
Eastbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru T		396	1765	0.22	0.69	1219	0.32	
Right								
Westbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru T		488	1765	# 0.28	0.69	1219	0.40	
Right								
Northbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru								
Right								
Southbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru LR		105	1684	# 0.06	0.17	290	0.36	
Right								

Sum of flow ratios for critical lane groups, $Y_c = \text{Sum (v/s)} = 0.34$
Total lost time per cycle, $L = 10.30 \text{ sec}$
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

Analyst: Inter.: **Wellington/Carruthers**
Period: **Peak AM Hour** Year: **Year 2020**
Project ID: 178 Carruthers Avenue
E/W St: Wellington Street N/S St: Carruthers Avenue

SIGNALIZED INTERSECTION SUMMARY												
	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	0	1	0	0	1	0	0	0	0	0	0	0
LGConfig	T			T						LR		
Volume	377			196						66		15
Lane Width	3.6			3.6						3.6		
RTOR Vol											0	

Duration	0.25	Area Type: All other areas										
		Signal				Operations						
Phase Combination	1	2	3	4	5	6	7	8				
EB Left					NB Left							
Thru	P				Thru							
Right					Right							
Peds	X				Peds	X						
WB Left					SB Left	A						
Thru	P				Thru							
Right					Right	A						
Peds	X				Peds	X						
NB Right					EB Right							
SB Right					WB Right							
Green	46.8					12.9						
Yellow	3.3					3.3						
All Red	1.9					1.8						
Cycle Length: 70.0 secs												

CAPACITY AND LOS WORKSHEET								
Capacity Analysis and Lane Group Capacity								
Appr/ Mvmt	Lane Group	Adj Flow Rate (v)	Adj Sat Flow Rate (s)	Flow Ratio (v/s)	Green Ratio (g/C)	--Lane Capacity (c)	Group v/c Ratio	
Eastbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru T		410	1765	# 0.23	0.67	1180	0.35	
Right								
Westbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru T		213	1765	0.12	0.67	1180	0.18	
Right								
Northbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru								
Right								
Southbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru LR		88	1687	# 0.05	0.18	311	0.28	
Right								

Sum of flow ratios for critical lane groups, $Y_c = \text{Sum (v/s)} = 0.28$
Total lost time per cycle, $L = 10.30 \text{ sec}$
Critical flow rate to capacity ratio, $X_c = (Y_c) (C) / (C-L) = 0.33$

EXHIBIT 14

2020 PEAK PM HOUR TOTAL TRAFFIC ANALYSIS – Wellington/Carruthers

HCS+: Signalized Intersections Release 5.4

Analyst: Inter.: **Wellington/Carruthers**
Period: **Peak PM Hour** Year: **Year 2020**
Project ID: 178 Carruthers Avenue
E/W St: Wellington Street N/S St: Carruthers Avenue

SIGNALIZED INTERSECTION SUMMARY												
	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	0	1	0	0	1	0	0	0	0	0	0	0
LGConfig	T			T						LR		
Volume	402			496						77		19
Lane Width	3.6			3.6						3.6		
RTOR Vol											0	

Duration	0.25	Area Type: All other areas										
		Signal				Operations						
Phase Combination	1	2	3	4	5	6	7	8				
EB Left					NB Left							
Thru	P				Thru							
Right					Right							
Peds	X				Peds	X						
WB Left					SB Left	A						
Thru	P				Thru							
Right					Right	A						
Peds	X				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						
Cycle Length: 75.0 secs												

CAPACITY AND LOS WORKSHEET								
Capacity Analysis and Lane Group Capacity								
Appr/	Lane	Adj	Adj	Flow	Green	--Lane Group--		
Mvmt	Group	Flow Rate	Flow Rate	Ratio	Ratio	Capacity	v/c	
		(v)	(s)	(v/s)	(g/C)	(c)	Ratio	
Eastbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru T		437	1765	0.25	0.69	1219	0.36	
Right								
Westbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru T		539	1765	# 0.31	0.69	1219	0.44	
Right								
Northbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru								
Right								
Southbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru LR		105	1684	# 0.06	0.17	290	0.36	
Right								

Sum of flow ratios for critical lane groups, $Y_c = \text{Sum (v/s)} = 0.37$
Total lost time per cycle, $L = 10.30 \text{ sec}$
Critical flow rate to capacity ratio, $X_c = (Y_c) (C) / (C-L) = 0.43$

EXHIBIT 15

COLLISION REPORTS - January 1, 2010 to January 1, 2013

Collision Main Detail Summary										FROM: 2010/01/01 TO: 2013/01/01	
OnTRAC Reporting System											
CARRUTHERS AVE & SCOTT ST											
Former Municipality: Ottawa											
COLLISION ID	DATE	DAY	TIME	ENV	Traffic Control: Traffic signal			Number of Collisions: 7			No. PED
					LIGHT	IMPACT TYPE	CLASS	SURFACE COND'N	VEHICLE MANOEUVRE	VEHICLE TYPE	
1	2010/08/25	We	17:57	Rain	Daylight	Turning	Non-fatal	Wet	Going ahead	Passenger van	0
2	2011/09/15	Thu	16:20	Clear	Daylight	Turning	P.D. only	Wet	Turning left	Automobile, station	0
3	2011/09/19	Mo	17:50	Clear	Daylight	Single vehicle	Non-fatal	Dry	Turning left	Automobile, station	1
4	2011/10/14	Frid	13:53	Rain	Daylight	Turning	P.D. only	Dry	Turning left	Automobile, station	0
5	2011/10/17	Mo	10:55	Clear	Daylight	Single vehicle	P.D. only	Wet	Going ahead	Automobile, station	1
6	2011/12/12	Mo	17:33	Clear	Dark	Rear end	P.D. only	Dry	Turning left	Pick-up truck	0
7	2012/01/12	Thu	16:10	Snow	Daylight	Sideswipe	P.D. only	Dry	Slowing or	Pick-up truck	0
								Loose snow	Going ahead	Automobile, station	0
								Loose snow	Changing lanes	Automobile, station	0
CARRUTHERS AVE & WELLINGTON ST											
Former Municipality: Ottawa											
COLLISION ID	DATE	DAY	TIME	ENV	Traffic Control: Traffic signal			Number of Collisions: 1			No. PED
					LIGHT	IMPACT TYPE	CLASS	SURFACE COND'N	VEHICLE MANOEUVRE	VEHICLE TYPE	
8	2010/09/15	We	08:27	Clear	Daylight	Single vehicle	Non-fatal	Dry	Turning left	Pick-up truck	1

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

EXHIBIT 16 TRANSPORTATION BRIEF – CHECK LIST

Address	178 Carruthers Avenue	<u>TIS / TB / CTS</u>
File #	114-593	
Date	March 21, 2014	

Check list

- ☒ Municipal address;
- ☒ Location relative to major elements of the existing transportation system (eg., the site is location in the southwest quadrant of the intersection of Main Street/ First Street, 600 metres from the Maple Street Rapid Transit Station);
- ☒ Existing land uses or permitted use provisions in the Official Plan, Zoning By-law, etc.;
- ☒ Proposed land uses and relevant planning regulations to be used in the analysis;
- ☒ Proposed development size (building size, number of residential units, etc.) and location on site;
- ☒ Estimated date of occupancy;
- ☒ Planned phasing of development;
- ☒ Proposed number of parking spaces (not relevant for Draft Plans of Subdivision); and
- ☒ Proposed access points and type of access (full turns, right-in / right-out, turning restrictions, etc.
- ☒ Study area;
- ☒ Time periods and phasing; and
- ☒ Horizon years (include reference to phased development).

Existing Contitions

- ☒ Existing roads and ramps in the study area, including jurisdiction, classification, number of lanes, and posted speed limit;
- ☒ Existing intersections, including type of control, lane configurations, turning restrictions, and any other relevant data (eg., extraordinary lane widths, grades, etc.);
- ☒ Existing access points to adjacent developments (both sides of all roads bordering the site);
- ☒ Existing transit system, including stations and stops;
- ☒ Existing on- and off-road bicycle facilities and pedestrian sidewalks and pathway networks;
- ☒ Existing system operations (V/C, LOS); and

- ☒ Major trip generators / attractors within the Study Area should be indicated.

Demand Forecasting

- ☒ General background growth;
- ☒ Other study area developments;
- ☒ Changes to the study area road network;
- ☐ Future background system operations (V/C, LOS, queue lengths);
- ☒ Trip generation rates;
- ☒ Trip distribution and assignment;

Impact Analysis

- ☒ Total future system operations (V/C, LOS, queue lengths);
- ☒ Signal and auxiliary lane (device) warrants;
- ☒ Operational / safety assessment (eg., sight line assessment where grades are an issue);
- ☒ Storage analysis for closely spaced intersections;
- ☒ Pedestrian and bicycle network connections and continuity;
- ☐ On-site circulation and design;
- ☒ Potential for neighbourhood impacts; and
- ☒ TDM.
- ☒ Synchro Files (Highway Capacity Software)

CTS

Impact Analysis

- ☐ Network Capacity Analysis;
- ☐ Non-auto network connections and continuity;
- ☐ Potential for community impacts, and
- ☐ TDM.
- ☐ Synchro Files (Highway Capacity Software)
- ☐ Screenline Analysis