Presented To:	Operations Committee
Presented:	Monday, Dec 07, 2015
Report Date	Friday, Nov 13, 2015
Type:	Managers' Reports

Request for Decision

Safety Concerns - LaSalle Boulevard at LaSalle Court Mall / 901 LaSalle Boulevard

Recommendation

THAT no changes be made at this intersection and that traffic volumes continue to be monitored to determine if an advanced left turn phase for westbound traffic becomes warranted, all in accordance with the report from the General Manager of Infrastructure Services dated November 12, 2015.

Signed By

Report Prepared By
Joe Rocca
Acting Co-ordinator of Transportation & Traffic Engineering Services
Digitally Signed Nov 13, 15

Division Review
David Shelsted
Director of Roads & Transportation Services
Digitally Signed Nov 13, 15

Recommended by the Department
Tony Cecutti
General Manager of Infrastructure Services
Digitally Signed Nov 19, 15

Recommended by the C.A.O.
Kevin Fowke
Acting Chief Administrative Officer
Digitally Signed Nov 25, 15

Background

At the September Operations Committee meeting, the following motions were passed:

> THAT the City of Greater Sudbury continues to monitor traffic volumes at the intersection of LaSalle Boulevard and 901 LaSalle Boulevard to determine if an advanced left turn signal for westbound traffic becomes warranted, all in accordance with the report from the General Manager of Infrastructure Services dated July 14, 2015;
>
> AND THAT staff prepare alternative signal configurations by the December 2015 Operations Committee meeting.

LaSalle Boulevard is a secondary arterial roadway that carries an average annual daily traffic (AADT) volume of 34,000 vehicles near the LaSalle Court Mall. LaSalle Boulevard, at its signalized intersection with LaSalle Court Mall/901 LaSalle Boulevard, is constructed with two through lanes and a separate left turn lane for both approaches. The intersection itself is located in New Sudbury and is currently controlled with traffic signals (Exhibit ‘A’). Eastbound traffic at this intersection currently has an advanced left turn phase. This intersection is also a part of a coordinated traffic signal system. The system extends from Somers Street to just east of Holland Road, a distance of 2.3 km. There is a total of eight signalized intersections within the system, all interconnected and operated by an on-street master. The intent of coordinating traffic signals is to provide smooth flow of traffic along a corridor in order to reduce travel times, stop and delay. By minimizing delays, you are able to increase the capacity of the roadway without having to widen the road.

Westbound Advanced Left Turn Phase

A separate left turn phase is required when the left turn volume is greater than the capacity of the left turn lane. The Ontario Ministry of Transportation has provided a method to calculate the number of vehicles that can turn left during the green and amber phases. The capacity of the left turn lane is calculated based on the gap acceptance behavior of left turning drivers, signal timing, gap in opposing traffic flow and geometry. The City uses a more conservative value than recommended by the province. For westbound traffic at this intersection, approximately 30 vehicles will be able to make a left turn during the peak hour of traffic.

City staff conducted another 8-hour turning movement count at the above intersection on October 14, 2015 in order to compare the differences between the turning movements that were conducted in May 25, 2015. The new count indicated that there were a total of three (3) vehicles that made a left turn during the afternoon peak period as compared to ten (10) vehicles during the same peak period conducted on May 25, 2015. Based on the new turning movement count conducted on October 14, 2015, the analysis again concludes that a left turn phase is not currently warranted.

Collision History

The request for a left turn phase indicated that safety was a concern at this intersection. A review of City's collision records for this intersection, between 2009 to 2015 inclusive, indicates that there were no collisions that involved westbound left turning vehicles at this intersection during the 6 1/2 year period. It is unlikely that safety would be improved with the addition of a separate left turn phase. When warranted, separate left turn phases do provide a benefit for left turning traffic while they increase delays to all other movements at the intersection.

Impact of Adding the Westbound Left Turn Phase

In order to assess the projected impact that an advanced left turn phase would have on the capacity of this intersection, two simulation models, Synchro and SimTraffic, were used to evaluate various traffic parameters. These parameters include delay, total number of stops, maximum length of queue, average speed and travel time. Comparisons of these parameters were made in terms of performance or measures of effectiveness, before and after the simulated scenario.

Synchro is primarily used for modeling traffic flow, traffic signal progression, and optimization of traffic signal timing. SimTraffic uses the outputs of the Synchro program to model the entire road network and can provide an animation of vehicular and pedestrian related traffic. They are commonly used by traffic engineers to provide detailed performance data or measures of effectiveness (MOE).

The results of the before and after scenarios are tabulated in Table 1 for the intersection of LaSalle Boulevard and the LaSalle Court Mall and in Table 2 for the coordinated traffic signal system from Somers Street to just east of Holland Road.

Table 1 - LaSalle Boulevard at LaSalle Court Mall Intersection Performance

Parameter	Before	After	Difference
Delay per vehicle (second/vehicle)	15.1	16.7	1.6
Total Stops (vehicle/hour)	210	259	49
Total Delay (minute)	138	144	6
Average speed (km/h)	23	21	-2
95th percentile queue length for the eastbound through lane (m)	163	189	26

Table 2 - Total Network Performance – Somers Street to East of Holland Road

Parameter	Before	After	Difference
Delay per vehicle (second/vehicle)	80.6	91.1	10.5
Total Stops (vehicle/hour)	1660	1835	175
Total Delay (hr)	21.4	23.4	2.0
Average speed (km/h)	26	24	-2

When reviewing the impact of adding the westbound advanced left turn has on the intersection, the impact is best demonstrated by the effect on the 95th percentile queue length for eastbound traffic. For eastbound traffic, a queue length of 189 meters will extend close to the intersection of LaSalle Boulevard and Montrose Avenue (see Exhibit 'B'). This demonstrates the impact on the capacity of roadway that a small change in signal timing will have. With a small growth in traffic, the vehicle queue length from this intersection will spill into Montrose Avenue intersection.

When considering the impact on the network from Somers Street to just east of Holland Road the most commonly used parameter is delay. By adding the westbound advanced left turn, each vehicle travelling on LaSalle Boulevard during the afternoon peak hour will be delayed by 10.5 seconds. This delay summed across all vehicles totals 2.0 hours.

The cost of this increased delay to the community can be expressed in three ways:

1. Increased travel time cost ($)
2. Increased fuel consumption (litres and $)
3. Increased vehicle emissions (tonnes)

A summary of these costs can be found in Table 3 below. The detailed calculations can be found in Exhibit 'C'.

Table 3 - Annual Impact of Increased Delay During the Afternoon Peak Hour

Annual travel time cost of all peak hour($)	$65,854
Annual Fuel Consumption during afternoon peak hour (Litres)	8,320
Annual Vehicle emission Increase (tonnes)	19.5

Based on the above table, the annual cost increase of travel time through the coordinated system during the afternoon peak hour only is approximately $66,000. Increased delay through the network will result in an additional 8,320 litres of fuel consumed per year. An increase in fuel consumption through the network will also increase vehicle emissions by approximately 20 tonnes per year. Additional delay would also be introduced during the remainder of the day. The costs associated with the additional delay would be in addition to those in Table 3.

Based on the traffic volumes, collision history and capacity analysis, staff recommend that no changes be made at this intersection and that traffic volumes continue to be monitored to determine if an advanced left turn phase for westbound traffic becomes warranted in the future.

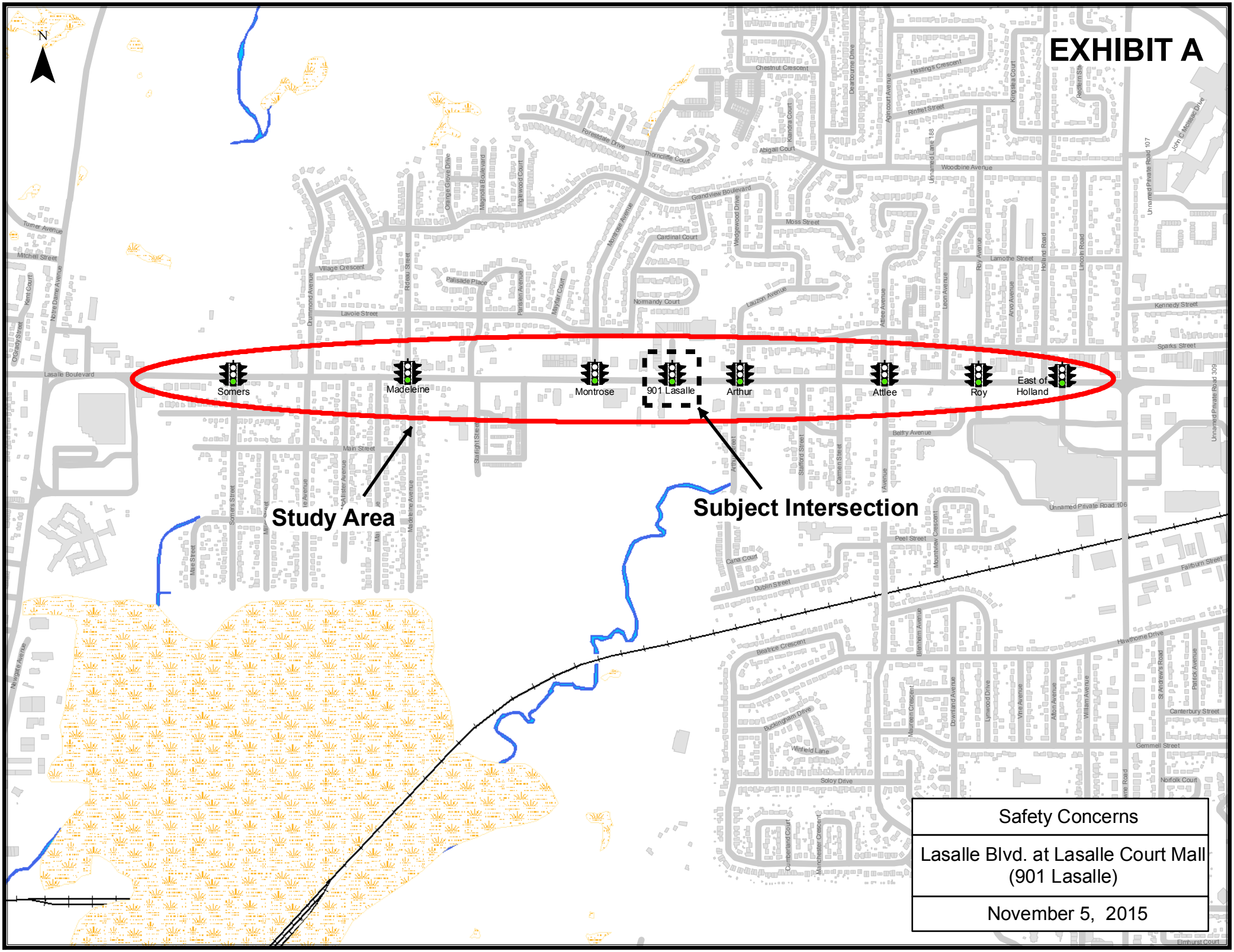
EXHIBIT A
N
Somers
Madeleine
Montrose
901 Lasalle
Arthur
Attlee
Roy
East of Holland
Study Area
Subject Intersection
Lasalle Boulevard
Main Street
Lavoie Street
Kennedy Street
Sparks Street
Belfry Avenue
Peel Street
Dublin Street
Hawthorne Drive
Fairburn Street
Canterbury Street
Gemmel Street
Norfolk Court
Elmhurst Court
Safety Concerns
Lasalle Blvd. at Lasalle Court Mall
(901 Lasalle)
November 5, 2015

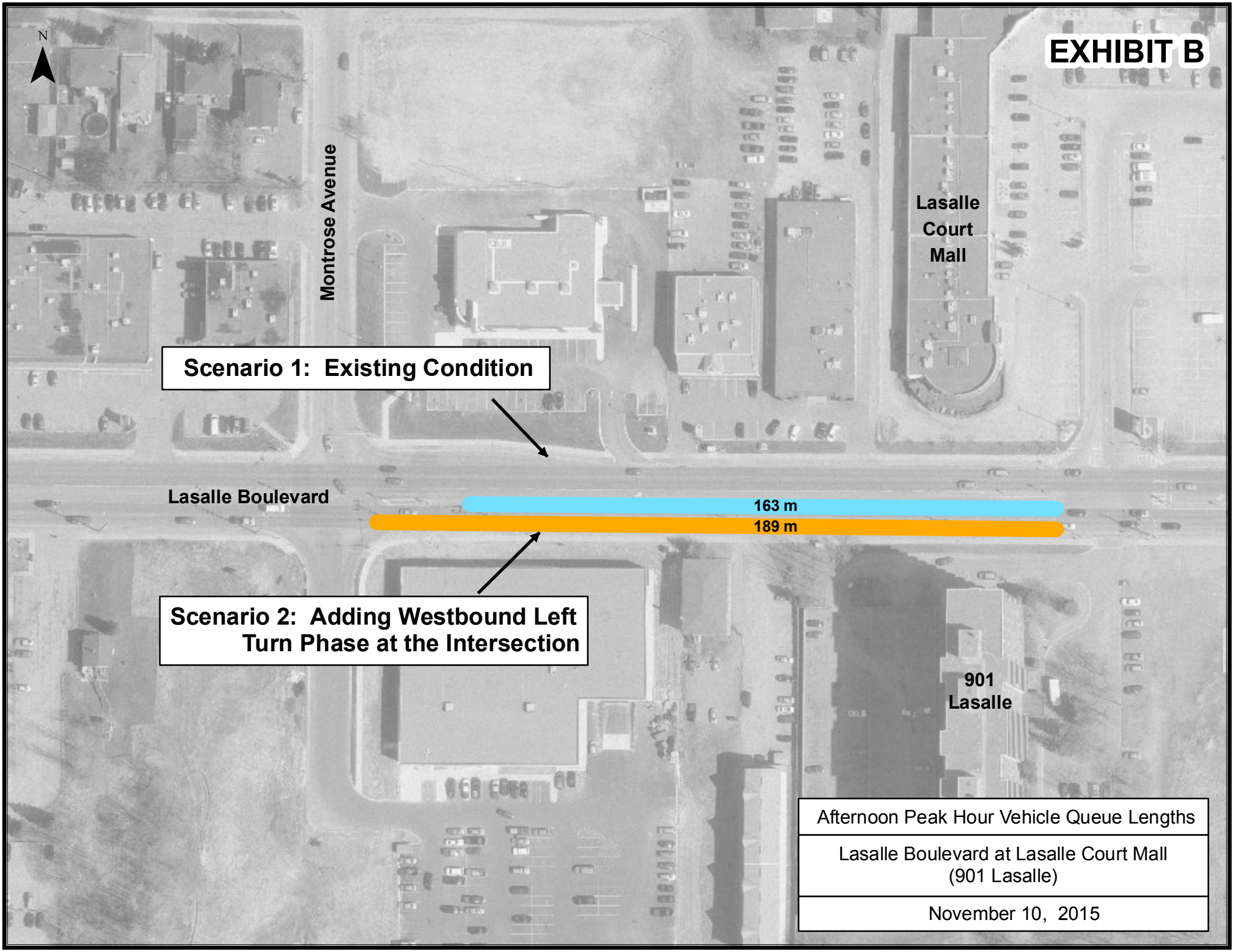
EXHIBIT B
N
Montrose Avenue
Lasalle Court Mall
Scenario 1: Existing Condition
Lasalle Boulevard
163 m
189 m
Scenario 2: Adding Westbound Left Turn Phase at the Intersection
901 Lasalle
Afternoon Peak Hour Vehicle Queue Lengths
Lasalle Boulevard at Lasalle Court Mall (901 Lasalle)
November 10, 2015

EXHIBIT C

Annual Impact of Increase Delay Calculations

Total travel time cost

Total annual travel time cost = [TRP* (TDA – TDB)/3600 * OCCP * D * WP] + [TRT * (TDA – TDB)/3600 * OCCT * D * WT]

TR = PM peak hour traffic volume = 5166 vehicle per hour
Truck traffic = 5%

TRP = PM peak hour passenger volume = 4908 vehicle / hour
TRT = PM peak hour truck volume = 258 truck per hour
TDB =Existing total Delay per vehicle = 80.6 second/vehicle
TDA = Total Delay per vehicle with westbound advanced left turn phase = 91.1 second/vehicle
OCCP = average person occupancy rate for passenger vehicle = 1.2
OCCT = average person occupancy rate for passenger truck = 1
WP = Passenger car average hourly wage = $13.71 (50% of full time wages for passenger cars)
WT = Truck average hourly wage = $23.62 (100% of full time wages for trucks)
D = Number of weekdays during a year = 260 days

Total Travel Time Cost = [4908 *(91.1-80.6)/3600*1.2*260*13.71]+[258*(*(91.1-80.6)/3600*1.2*260*23.62]
= $65,854

Fuel Consumption
Annual Fuel Consumption = (Fuel used After – Fuel used Before)*260 day/year

Fuel used before pilot project = 232.4 litres (from Simtraffic)
Fuel used after pilot project = 264.4 litres (from Simtraffic)

Annual Fuel consumption = (264.4-232.4)*260
= 8,320 Litres

Vehicle Emissions
1 Litre of gasoline burned creates 2,348 grams of CO_2 (United States Environmental Protection Agency)

Annual CO_2 emissions = (8,320 x 2,348) / 1,000,000
= 19.5 tonnes