

## Technical Memo

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Project: Cooper @ Roe Intersection Assessment  
Project #: 17310  
Subject: Cooper @ Roe Traffic Signal Timings

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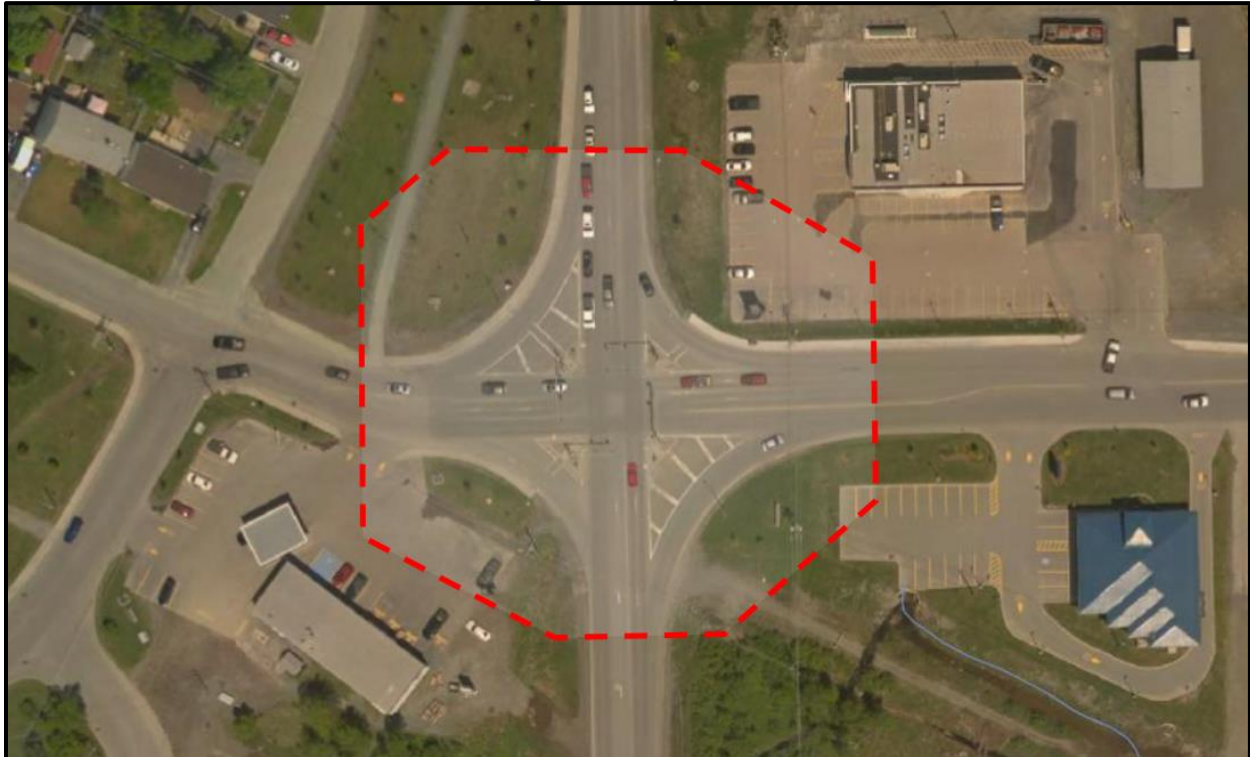
To: John Boland, Town of Gander  
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Peter Allaby, P.Eng., Crandall Engineering Ltd.  
Date: November 28, 2017

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### Introduction

Over the past few years several developments have been added near the intersection of Cooper Boulevard and Roe Avenue in Gander, Newfoundland. It is believed that these additional developments have altered the traffic patterns at the Cooper/Roe intersection. The Town of Gander hired Crandall Engineering Ltd. to evaluate recent traffic counts that were completed at the intersection and to determine whether the traffic signal timings should be modified to better accommodate the existing traffic patterns. The Study Area for this analysis was limited to the Cooper Boulevard @ Roe Avenue intersection, shown below in **Figure 1**.

*Figure 1 - Study Area*



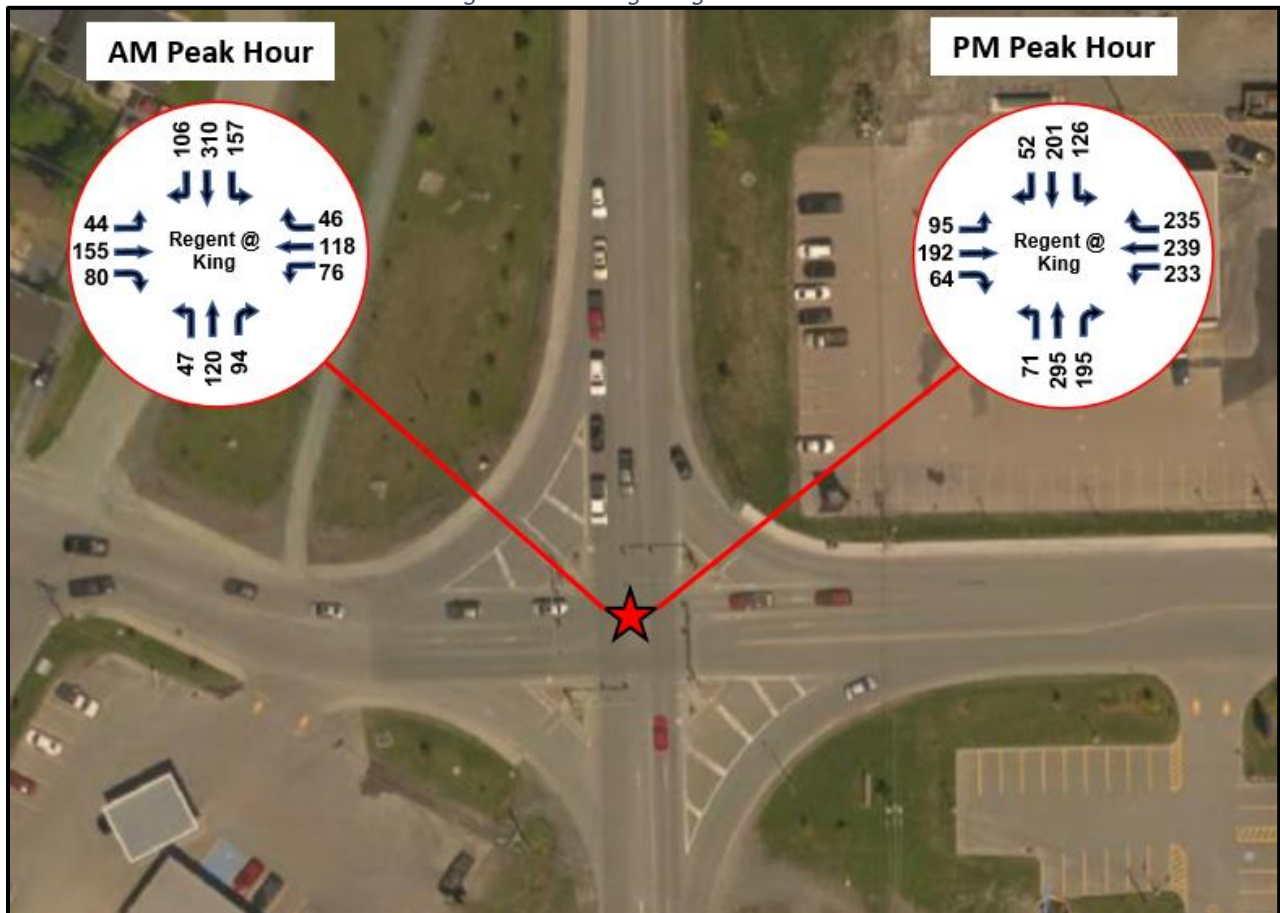
## Existing Data

Staff from the Town of Gander completed two traffic counts at the Cooper/Roe intersection on Tuesday, September 26, 2017 and Thursday, September 28<sup>th</sup>, 2017. These traffic counts were provided to the Study Team for analysis and are included in **Appendix B**. Town staff also provided the existing traffic signal timings that are currently being used at this intersection. Town staff indicated that detection is provided for all movements; however, it is believed that only one set of signal timings (Max 1) is currently programmed for the intersection.

## Traffic Volumes

The traffic counts that were completed by the Town were compared and it was determined that both counts were consistent with each other; therefore the counts were averaged for the analysis. The AM and PM peak hour volumes used for the analysis are summarized below in **Figure 2**.

Figure 2 - Existing Design Volumes





## LOS Results

The AM and PM peak hour traffic volumes were modelled in Synchro using the existing traffic signal timings. It was assumed that Max 1 timings were being used during both peak periods, as indicated by Town staff. The traffic signal timings were then adjusted and optimized to best accommodate the existing volumes and the LOS results with the updated traffic signal timings were reported.

With the updated traffic signal timings, the intersection is expected to operate at an overall LOS C during the AM peak period and a LOS D during the PM peak period. All turning movements would operate efficiently during the AM peak period. During the PM peak period, all movements operate below capacity, but some congestion is still expected. The eastbound through/right movement is expected to operate at a LOS E and the northbound through/right movement is expected to operate with a v/c ratio of 0.93 with queuing in excess of 100m. The LOS results with the existing and updated traffic signal timings are summarized in **Table 1**.

The updated traffic signal timings are expected to reduce average delays by approximately 7 seconds/vehicle during the AM peak period and 24 seconds/vehicle during the PM peak period. This is equivalent to a 22% reduction in delay during the AM peak period and a 36% reduction in delay during the PM peak period.

## Updated Traffic Signal Timings

We recommend that the following changes be made to the traffic signal timings:

1. Operate two sets of signal timings. Max 1, with a cycle length of 100 seconds, will be used for the majority of the day. Max 2, with a cycle length of 130 seconds, will be used from 11 am - 6 pm. It was noted that the noon hour volumes are comparable to the PM volumes, which is why the noon hour period has been included in Max 2.
2. Eliminate the 2 second all-red phases from the eastbound and westbound advanced left turn movements.
3. Reduce the minimum green times to allow the phases to change quicker during low-volume situations.

The recommended signal timings are included in **Appendix A**.



Table 1 - LOS Comparison of Existing and Updated Traffic Signal Timings

Cooper Blvd. @ Roe Ave. & Edinburgh Ave.			Overall LOS & Delay (sec/veh)	Turning Movement LOS Average Delay (seconds per vehicle) [Volume to Capacity Ratio (v/c)] 95 <sup>th</sup> Percentile Queue (m)											
Scenario	Traffic Control	Time Period		Eastbound			Westbound			Northbound			Southbound		
				L ↶	T ↑	R ↷	L ↶	T ↑	R ↷	L ↶	T ↑	R ↷	L ↶	T ↑	R ↷
Existing Signal Timings		AM Peak	LOS C 30.7	B 17.0 [0.09] 13	C 33.7 [0.50] 69	Shared	B 18.0 [0.18] 19	C 31.9 [0.24] 38	A <1 [0.09] <1	B 19.0 [0.16] 14	C 29.3 [0.43] 59	Shared	C 21.2 [0.37] 37	D 41.4 [0.74] 145	Shared
		PM Peak <sup>1</sup>	LOS E 67.0	B 18.3 [0.27] 22	D 44.3 [0.68] 86	Shared	C 25.7 [0.66] 51	D 36.2 [0.54] 72	A 5.4 [0.45] 10	C 24.0 [0.25] 23	F 178.1 [1.29] 230	Shared	D 45.5 [0.73] 45	D 40.4 [0.59] 90	Shared
With Updated Signal Timings		AM Peak	LOS C 24.0	B 17.8 [0.10] 13	D 36.8 [0.66] 67	Shared	B 19.0 [0.22] 20	C 29.1 [0.28] 38	A <1 [0.10] <1	B 13.0 [0.12] 11	C 21.4 [0.40] 48	Shared	B 14.3 [0.31] 30	C 25.6 [0.59] 109	Shared
		PM Peak	LOS D 42.6	C 27.3 [0.34] 30	E 68.6 [0.87] 108	Shared	D 44.5 [0.81] 70	D 43.2 [0.58] 87	A 6.6 [0.47] 11	C 26.9 [0.28] 24	D 55.0 [0.93] 163	Shared	D 52.6 [0.64] 39	C 28.7 [0.44] 73	Shared

<sup>1</sup>The PM Peak Hour LOS Results with Existing Signal Timings were determined assuming that Max 1 timings are being used during the PM peak period.



## Appendix A -Traffic Signal Timings

Intersection: Cooper @ Roe/Edinburgh  
 Type of Control: Actd-Uncrd

Movement	SBL	NB	WBL	EB	NBL	SB	EBL	WB
Street	Cooper	Cooper	Roe	Edinburgh	Cooper	Cooper	Edinburgh	Roe
Phase #	1	2	3	4	5	6	7	8
Min Green	8	20	8	10	8	20	8	10
Max Green 1	10	35	10	23	10	35	10	23
Max Green 2	10	52	20	26	10	52	10	36
Max Green 3								
Max Green 4								
Amber	4	4	4	4	4	4	4	4
All-Red	2	2	0	2	2	2	0	2
Extension	3	3	4	4	3	3	4	4
Walk		10		10		10		10
Walk Extension (Y/N)		N		N		N		N
Ped Clearance		13		13		13		13
Recall		Min				Min		
Actuated	Y	Y	Y	Y	Y	Y	Y	Y
Max Split 1	16	41	14	29	16	41	14	29
Max Split 2	16	58	24	32	16	58	14	42
Max Split 3	0	0	0	0	0	0	0	0
Max Split 4	0	0	0	0	0	0	0	0

Time of Day Patterns	Time Periods	Cycle Length
Max 1 - Standard	Standard - All other time periods	100
Max 2 - Noon and PM	11 am - 6 pm	130
Max 3		
Max 4		



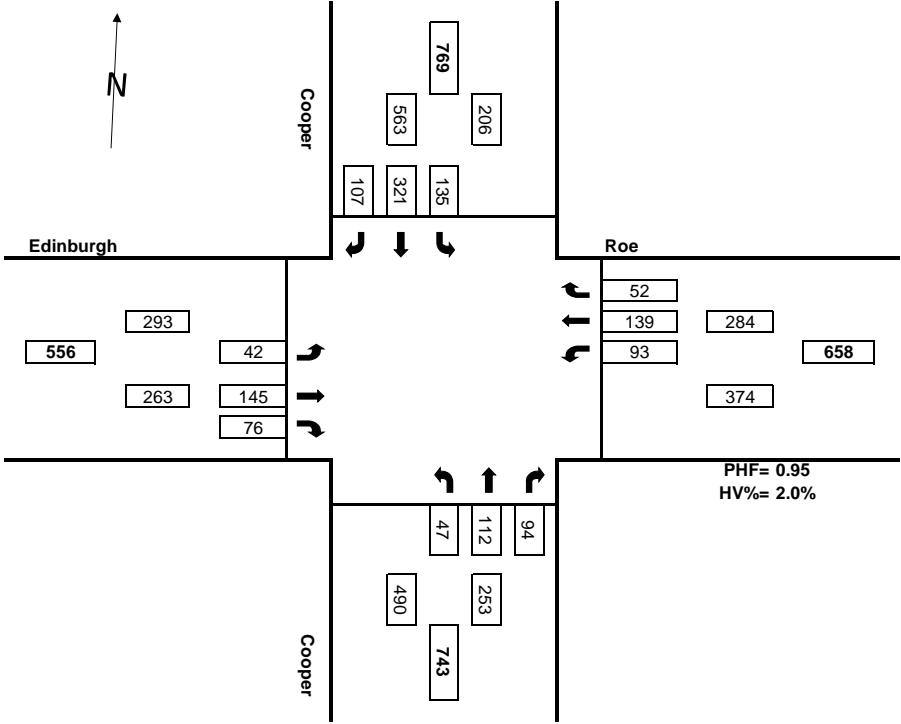
## Appendix B - Traffic Volumes

# Traffic Count Summary AM and PM Peak Hours

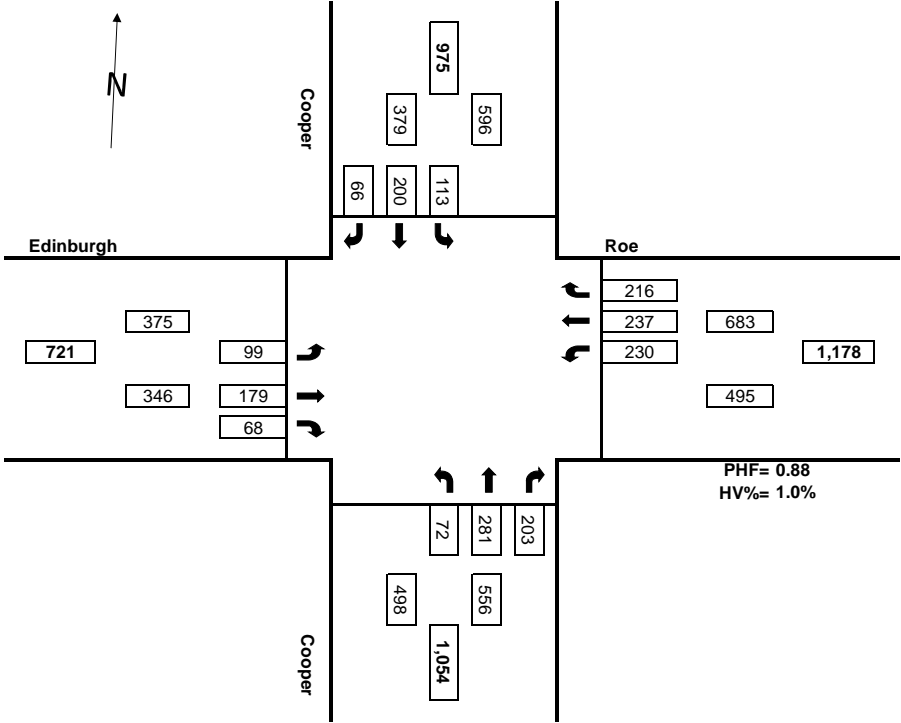
Cooper Blvd. @ Roe Ave. & Edinburgh Ave.

26-Sep-17

**AM Peak Hour 08:15 - 09:15**



**PM Peak Hour 16:00 - 17:00**



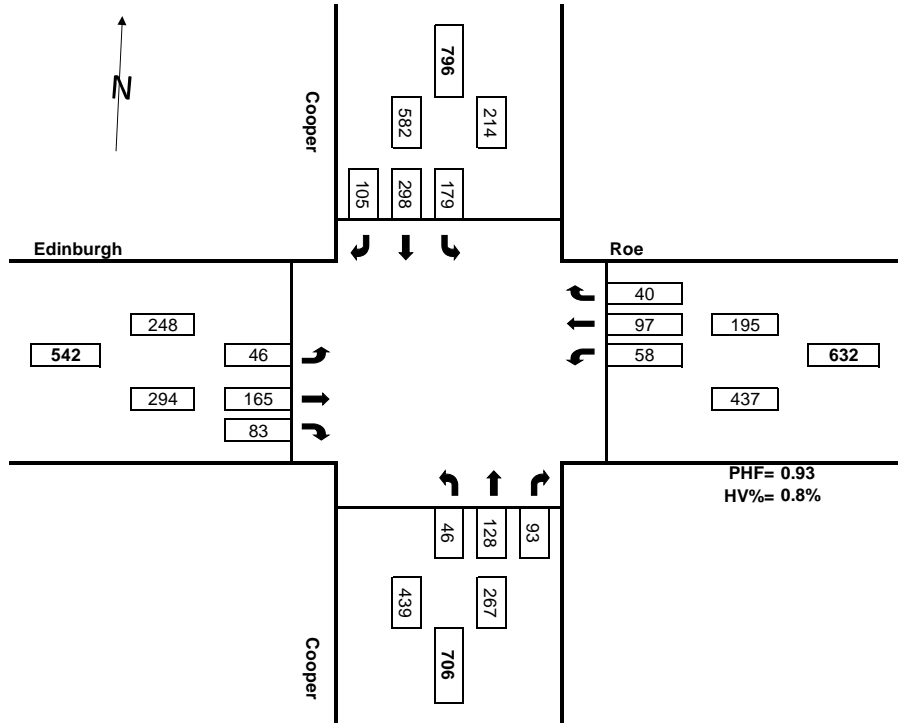


# Traffic Count Summary AM and PM Peak Hours

Cooper Blvd. @ Roe Ave. & Edinburgh Ave.

28-Sep-17

AM Peak Hour 07:45 - 08:45



PM Peak Hour 16:00 - 17:00

