



Crandall File #: 16414  
January 20, 2017

Mr. John Boland  
Planning & Control Technician  
Town of Gander  
100 Elizabeth Drive  
Gander, NL, A1V 1G7

Dear Mr. Boland:

**Cooper Boulevard Access Study  
Gander, NL**

The Town of Gander retained Crandall Engineering Ltd. to complete a transportation assessment of a proposed street access on Cooper Boulevard, south of Airport Boulevard. The objective of this transportation study was to determine if the proposed access location is appropriate considering operational and safety issues, and if it is, make recommendations for traffic control and lane configurations. The results of our assessment are outlined below.

**STUDY SCOPE**

The following tasks were completed to carry out this assessment:

- Site information was assembled, including aerial and property mapping, the proposed site plan, and traffic data at the Cooper Blvd/James Blvd intersection (from 2014);
- A site visit was completed to observe available sight distance and other site conditions.
- The location of the proposed access was evaluated with respect to available sight distance and intersection spacing;
- Future traffic volumes on the proposed street were estimated based on the proposed development plan and potential for short cutting traffic between Cooper Blvd and James Blvd. Level of service and turning lane requirements were analysed.
- Recommendations were made as to the appropriateness of the proposed access from an operations and safety standpoint as well as traffic control and lane configuration requirements.
- Our findings and recommendations were documented in this letter report.

The Study Area for this assessment included the proposed street access, the Cooper Blvd/James Blvd intersection and Cooper Boulevard for a distance of 500m south of James Boulevard.

**EXISTING SITE CONDITIONS**

Cooper Boulevard functions as an urban arterial roadway connecting the Trans-Canada Highway to Airport Boulevard/James Boulevard, Memorial Drive, and Magee Road, and continues as provincial Route 330 to the north of the Town. Cooper Boulevard also serves as the major connection between the TCH and the Gander International Airport and experiences traffic volumes of approximately 7,000 vehicles/day south of James Boulevard.

Between the TCH and James Boulevard, Cooper Boulevard is a two-lane roadway with a rural cross-section and a speed limit of 60 km/h. Two accesses are located on this segment of Cooper Boulevard, described as follows:

- Laurel Road intersects the west side of Cooper Boulevard, 190 m south of James Boulevard. The intersection has stop control on the Laurel Road approach and painted channelized right turns. A northbound left turn lane is provided on Cooper Boulevard with a storage length of 60m and a taper length of 65m. Laurel road serves a variety a commercial sites, including a new restaurant site under construction.
- A rear access to the Dominion store intersects the west side of Cooper Boulevard 500m south of James Boulevard. It appears full movements are permitted at this access. No turning lanes are provided.

The east side of Cooper Boulevard is undeveloped south of James Boulevard; however a Toyota dealership and Hyundai dealership are located on James Boulevard just east of Cooper Boulevard. Both developments currently have access onto James Boulevard. The proposed public street would intersect James Boulevard between these developments.

#### **DESCRIPTION OF PROPOSED STREET**

As shown in the site plan in **Appendix A**, the proposed street is a 250m long local street connecting between Cooper Boulevard and James Boulevard. The street would intersect Cooper Boulevard 260m south of James Boulevard and would intersect James Boulevard 200m east of Cooper Boulevard. North of James Boulevard, the street continues north to Roe Avenue, providing access to developable commercial and light industrial lands. It is understood that the developer is asking for full access onto both James Boulevard and Cooper Boulevard.

Five development lots are shown abutting the proposed street. Two properties are already developed and are occupied by the Toyota dealership and Hyundai dealership, both fronting James Boulevard. The remaining three properties are undeveloped and total an area of 2.8 hectares. It is assumed that the properties would be developed with highway commercial uses.

#### **ACCESS MANAGEMENT AND INTERSECTION SPACING**

The process of access management is to *“effectively manage the provision of access to the public road system for new development or redevelopment. The primary objective is to provide safe and orderly access consistent with the functional and operational requirements of the public roads and the accessibility needs of the adjacent land uses”* (TAC Geometric Design Guide 1999). Controlling access along a corridor preserves the operational integrity of the corridor and minimizes vehicle conflicts and collision potential.

Although no formal statutes govern the control of access along Cooper Boulevard, it has been the Town’s practice to limit placement of new public or private accesses on Cooper Boulevard between the TCH and Magee Road. Preferably, access to developable land is provided from existing side streets. Where recent accesses on Cooper Boulevard have been installed, desirable spacing has been maintained.

The spacing of intersections along a road has a large impact on the operation, level of service, and capacity of the roadway. Typically, it is desirable to space intersections on urban arterials by a distance of at least 200m to minimize conflicts and allow for placement of back to back left turn lanes. The proposed street access on Cooper Boulevard is 260m from the Cooper Boulevard/James Boulevard intersection and approximately 80m from the Cooper Boulevard/Laurel Road intersection. The spacing to the Laurel Road intersection is considerably less than the desirable 200m spacing, thus prohibiting the opportunity to construct a separate southbound left turn lane on Cooper Boulevard. Additionally, northbound vehicles in the northbound turning lane, waiting to left onto Laurel Road, could interfere with sight distance for vehicles entering Cooper Boulevard from the proposed street. Traffic volumes on Laurel Road are expected to increase once the new restaurant development is open.

### SIGHT DISTANCE

Intersection sight distance of 200m is recommended for vehicles turning left or right onto Cooper Boulevard from the proposed street access. This is based on Transportation Association of Canada (TAC) guidelines for a 70 km/h operating speed on Cooper Boulevard. The premise is that the 200m of sight distance will allow a vehicle to turn onto Cooper Boulevard without being overtaken by an approaching vehicle travelling at 70 km/h.

Based on site observations, the available sight distance along Cooper Boulevard from the proposed street access location is greater than 200m in both directions (refer to photos in **Appendix B**). Therefore, sight distance requirements are satisfied; however, as noted above, northbound traffic turning left into Laurel Road could interfere with sight lines, particularly if left turning traffic is queued.

### TRAFFIC OPERATIONS ANALYSIS

Future traffic operations were analysed to determine how the street network would operate with the proposed street in place between Cooper Boulevard and James Boulevard. The evening (PM) peak was selected for analysis as it represents the peak travel period for development traffic as well as existing traffic. Existing traffic volumes at the Cooper Boulevard/James Boulevard intersection were obtained from a previous count completed in 2014. Traffic on the proposed street was estimated by generating trips for the adjacent development lots and adding in traffic likely to shortcut between Cooper Boulevard and James Boulevard. This is described in more detail below:

- **Development Traffic** - Five development lots border the proposed street. Two are already developed as car dealerships. It is assumed the other three lots, totaling 2.8 hectares, will be developed as highway commercial uses. For the purposes of this exercise it was assumed the uses would be retail based, with potential for 50,000 ft<sup>2</sup> of store space (15-20% of land area). Trip generation rates for the developments were estimated using the Institute of Transportation Engineer's (ITE) Trip Generation Manual (9<sup>th</sup> Edition). **Table 1** shows the number of vehicle trips derived from the trip rates. These traffic volumes were then assigned to the surrounding road network based on existing travel patterns.

**Table 1 - Traffic Generation for Developments along the Proposed Street**

Development	Size	Weekday PM Peak Hour Trips			Daily Total Trips
		Enter	Exit	Total	
Car Dealerships	20,000 ft <sup>2</sup>	20	32	52	650
Future Retail Development	50,000 ft <sup>2</sup>	89	97	186	2,140
Total Traffic		119	129	248	2,790

- **Short-Cutting Traffic** - The proposed street will present a short-cut route for traffic travelling between Cooper Boulevard and James Boulevard (i.e. traffic moving between the TCH and the Airport). The route will be shorter, more direct, and will avoid the signalized intersection. This would not be the intended use of the street and will increase traffic volumes along the street and turning conflicts at the intersections on James Boulevard and Cooper Boulevard. For the purposes of the traffic operations analysis, we have assumed that 50% of traffic moving between Cooper and James will short-cut through the proposed street.

Existing and future PM Peak hour traffic volumes are shown on the figures in **Appendix C**. The operational analysis indicates that all intersections would operate within acceptable levels of delay (refer to **Appendix D** for results). Note that this analysis did not consider the impacts of extending the street north of James Boulevard which will add additional traffic to the Cooper Boulevard access. Additionally, a left turn lane warrant analysis reveals that forecasted traffic volumes do not meet the warrants for either a southbound left turn lane on Cooper Boulevard or a westbound left turn lane on James Boulevard at the proposed street intersections.

Operations were also analysed for a scenario without the proposed access on Cooper Boulevard. In this scenario, all development traffic would enter and exit via the access on James Boulevard. Revised traffic volume estimates are included in **Appendix C**. The operational analysis indicates that all movements would operate within acceptable levels of delay. No turning lanes would be required on James Boulevard.

## **CONCLUSIONS AND RECOMMENDATIONS**

The findings of this assessment indicate that although the proposed street access could be implemented on Cooper Boulevard without significant impacts to operations and safety, the new access would only be 80m from the Laurel Road intersection and would introduce new conflict points to the corridor. It would also cause the new street to become an obvious short cut route for traffic moving between Cooper Boulevard and James Boulevard. The Cooper Boulevard access is not critical to serving development traffic and it would not provide operational benefits to the public street network.

It has been the Town's practice to limit new access points on Cooper Boulevard and when new access points have been introduced, desirable spacing is maintained. To preserve the operational

integrity of the Cooper Boulevard corridor and to avoid introduction of new conflict points, it would be desirable to permit access to the proposed street from James Boulevard only and terminate the street as a cul-de-sac without access to Cooper Boulevard. The length of the street would be 200-250m, which is within an acceptable range for a cul-de-sac and all development traffic could be handled at the James Boulevard intersection.

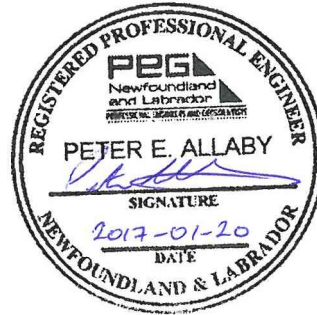
Please do not hesitate to contact me should you require any clarifications to this letter.

Yours truly,

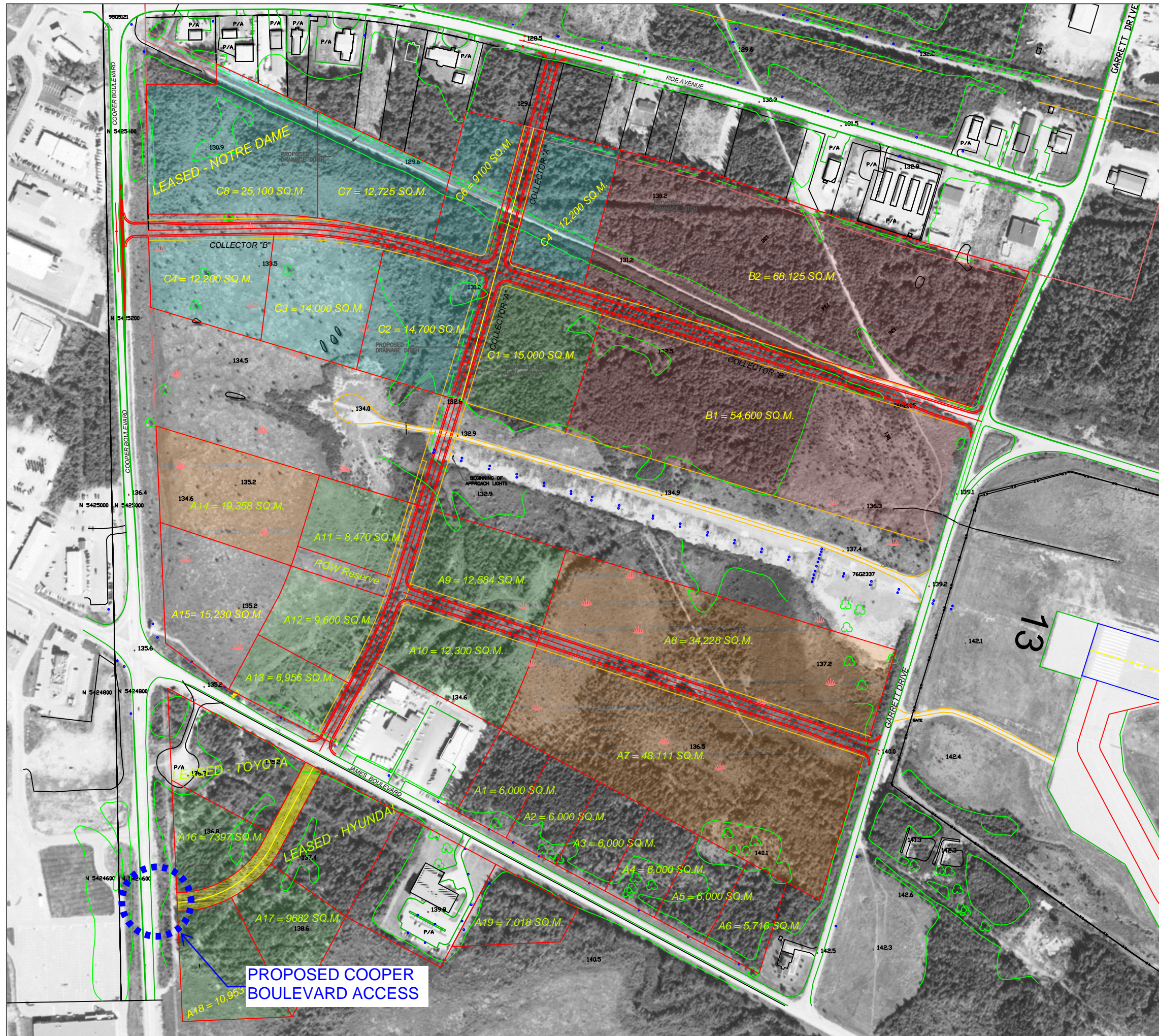
**CRANDALL ENGINEERING LTD.**



**Peter Allaby, P.Eng.**  
Senior Transportation Engineer



**APPENDIX A  
PROPOSED SITE PLAN**



NOTES

- Phase I
- Phase II
- Phase III

NO.	DESCRIPTION	DATE
1.	ISSUED FOR REVIEW	07/02/13
REVISIONS		

CONSULTING ENGINEERS & ARCHITECTS LICENSE  
WWW.ECON.NC.COM  
19 EDGEMOUTH AVE. GAITHER, NC

PROFESSIONAL ENGINEER AND LANDSCAPE ARCHITECT  
PERMIT HOLDER  
This Permit Allows  
Professional Engineering and Landscaping  
Work to be Performed by P.E.O. 6200  
which is valid for the year 2013

**ECON LIMITED**

STAMP:

**B. J. THOMSON**  
PROFESSIONAL ENGINEER  
STATE OF NORTH CAROLINA

OWNER:  
GANDER INTERNATIONAL AIRPORT AUTHORITY

PROJECT:  
COMMERCIAL LAND DEVELOPMENT

TITLE:  
MASTER PLAN

SCALE: 1:2000	DATE: DEC. 2012	DRAWN BY: A.S. & G.P.
DESIGNED BY: B.T. & G.P.	CHECKED BY:	APPROVED BY:

PROJECT NO. 12517	DWG NO. 1 OF 16
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**APPENDIX B  
SITE PHOTOS**



Looking South on Cooper Boulevard from Proposed Access Location

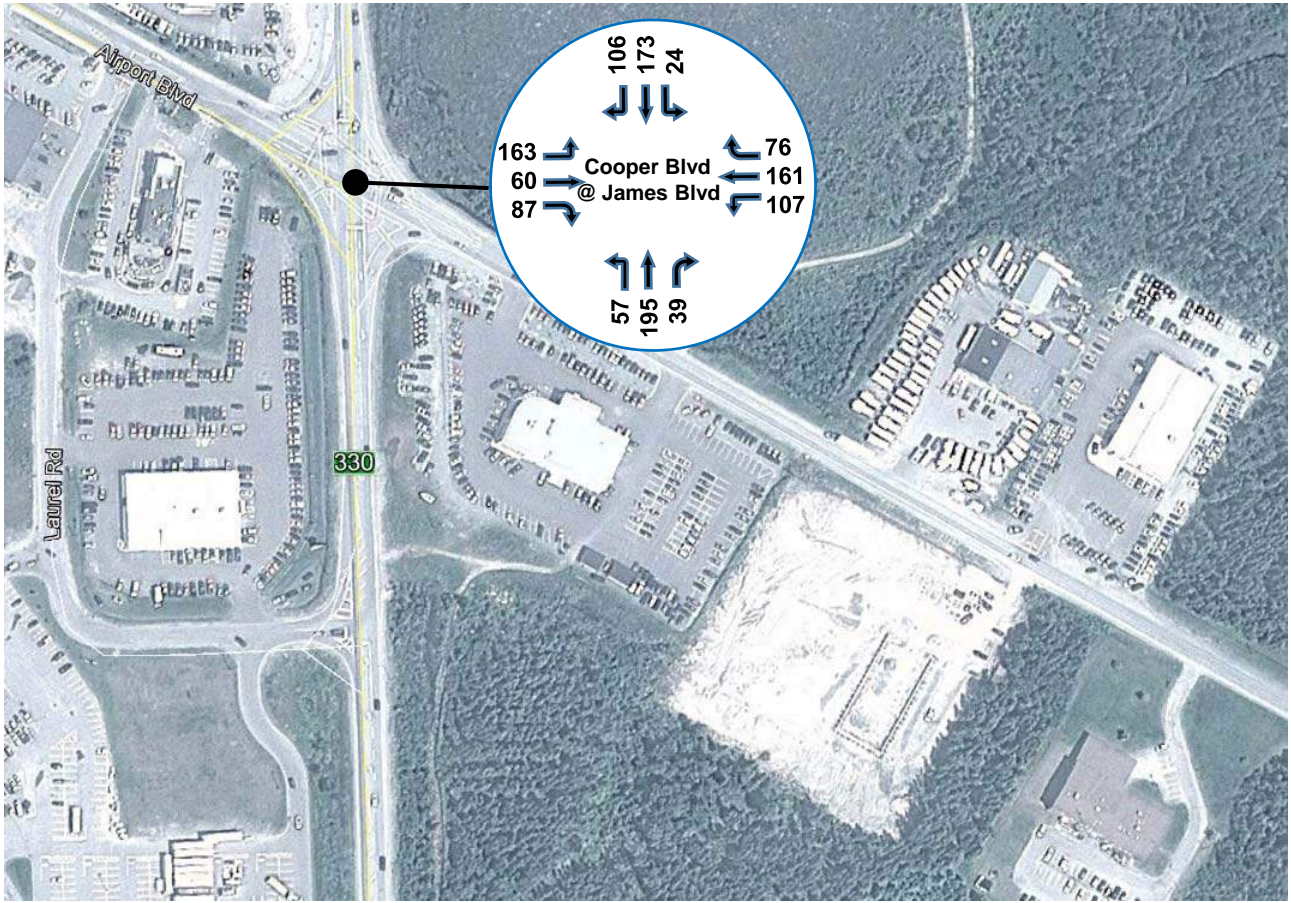


Looking North on Cooper Boulevard toward Proposed Access Location

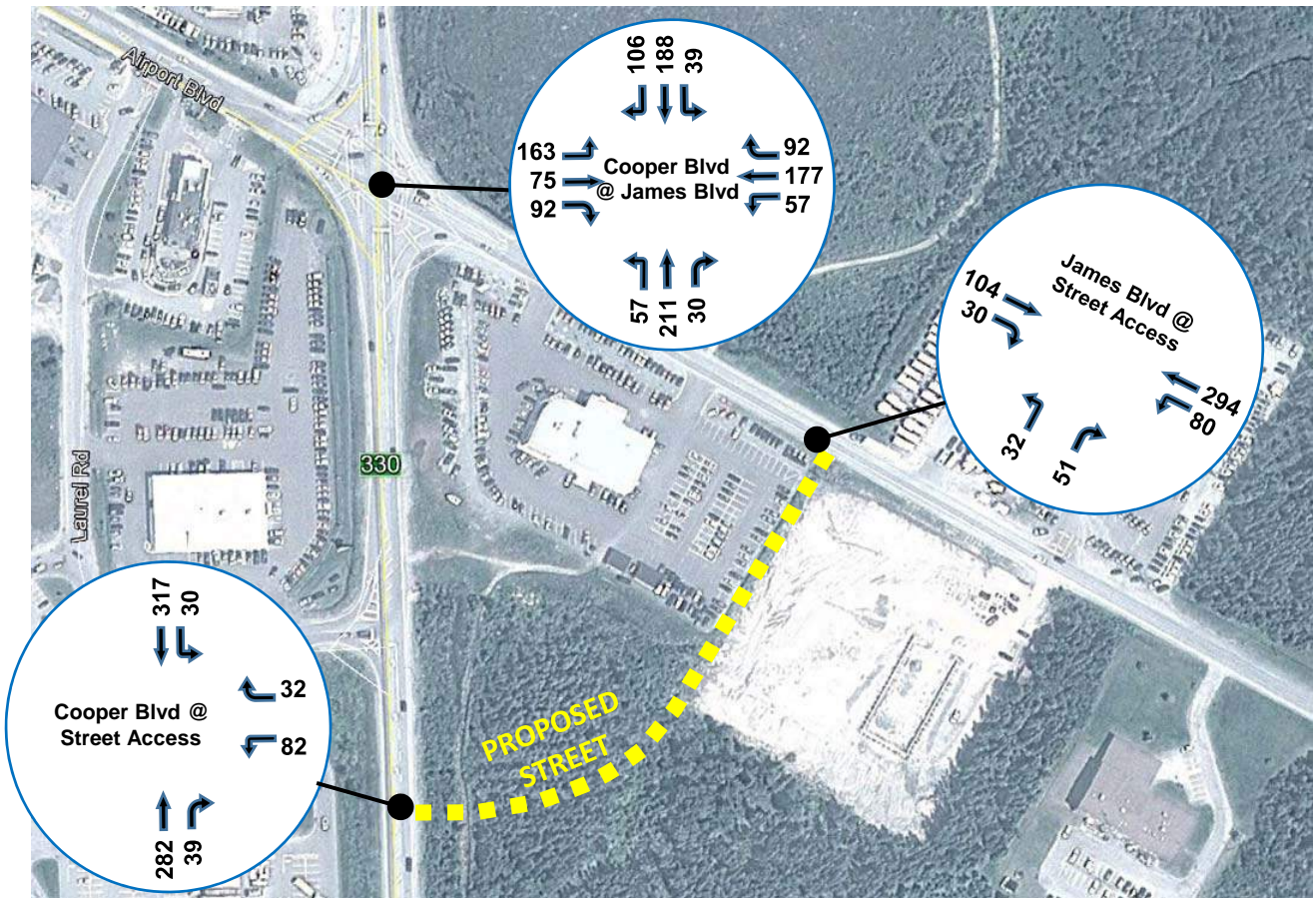


**APPENDIX C**  
**TRAFFIC VOLUME DIAGRAMS**

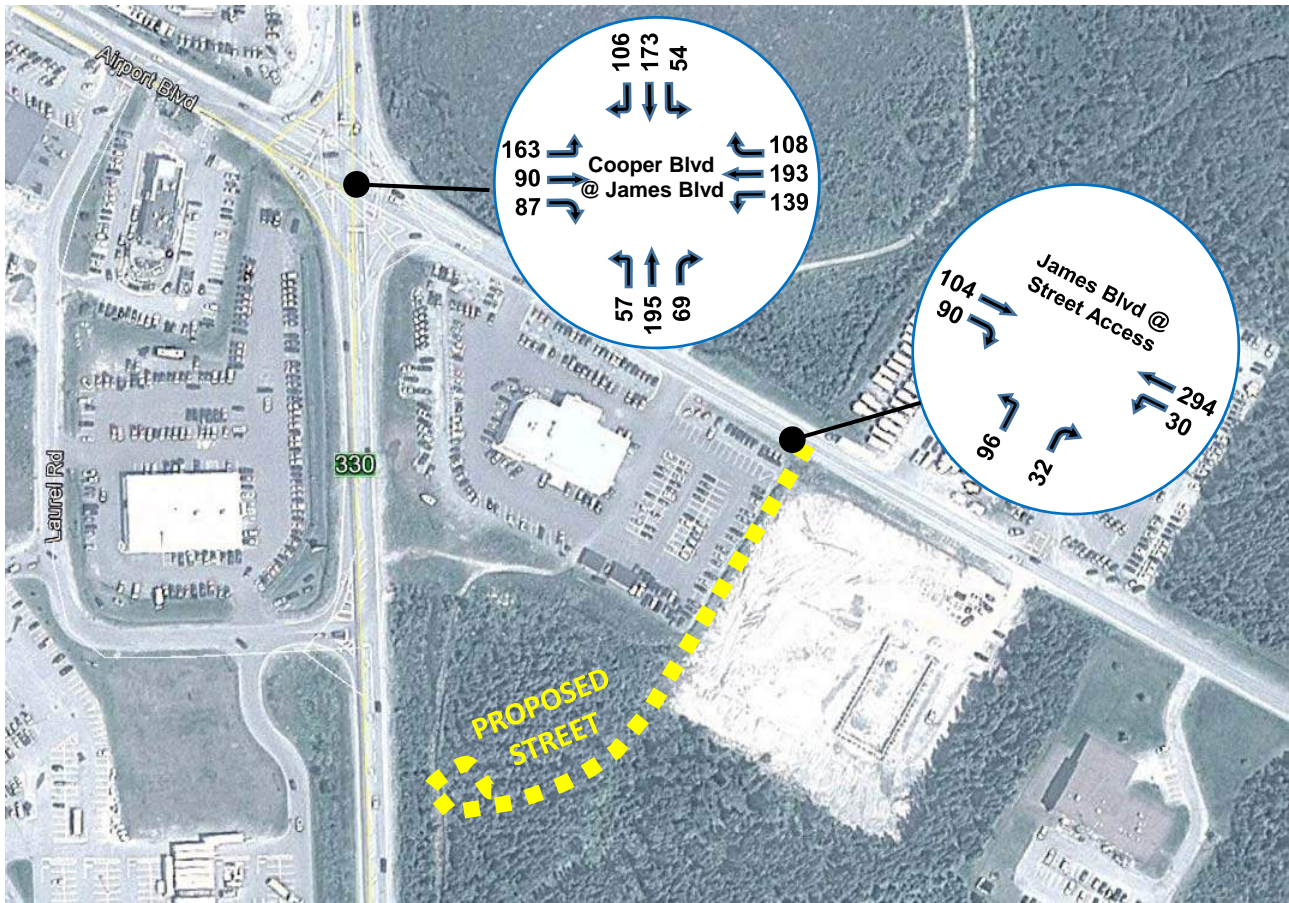
# PM Peak - Existing



# PM Peak – With Proposed Street



# PM Peak - With Proposed Street but no access on Cooper Blvd

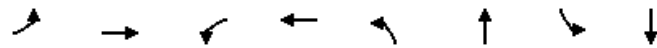


**APPENDIX D**  
**OPERATIONAL ANALYSIS RESULTS**

Cooper Blvd Access Study  
1: Cooper Blvd & James Blvd

PM Peak with Proposed Street Access

1/4/2017



Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations								
Traffic Volume (vph)	163	75	57	177	73	211	39	188
Future Volume (vph)	163	75	57	177	73	211	39	188
Turn Type	pm+pt	NA	pm+pt	NA	pm+pt	NA	pm+pt	NA
Protected Phases	7	4	3	8	5	2	1	6
Permitted Phases	4		8		2		6	
Detector Phase	7	4	3	8	5	2	1	6
Switch Phase								
Minimum Initial (s)	10.0	15.0	10.0	15.0	10.0	15.0	10.0	15.0
Minimum Split (s)	15.0	23.0	15.0	23.0	15.0	23.0	15.0	23.0
Total Split (s)	15.0	27.0	15.0	27.0	15.0	33.0	15.0	33.0
Total Split (%)	16.7%	30.0%	16.7%	30.0%	16.7%	36.7%	16.7%	36.7%
Yellow Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
All-Red Time (s)	0.0	1.0	0.0	1.0	0.0	1.0	0.0	1.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.0	5.0	4.0	5.0	4.0	5.0	4.0	5.0
Lead/Lag	Lead	Lag	Lead	Lag	Lead	Lag	Lead	Lag
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Recall Mode	None	None	None	None	None	Min	None	Min
Act Effct Green (s)	31.5	24.6	28.8	17.5	28.2	21.7	27.3	18.7
Actuated g/C Ratio	0.44	0.34	0.40	0.24	0.39	0.30	0.38	0.26
v/c Ratio	0.39	0.29	0.11	0.64	0.19	0.47	0.09	0.66
Control Delay	16.4	16.7	13.8	31.0	13.5	25.0	12.6	29.5
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	16.4	16.7	13.8	31.0	13.5	25.0	12.6	29.5
LOS	B	B	B	C	B	C	B	C
Approach Delay		16.6		28.0		22.3		27.6
Approach LOS		B		C		C		C

Intersection Summary

Cycle Length: 90  
 Actuated Cycle Length: 71.9  
 Natural Cycle: 80  
 Control Type: Actuated-Uncoordinated  
 Maximum v/c Ratio: 0.66  
 Intersection Signal Delay: 23.6  
 Intersection Capacity Utilization 63.6%  
 Analysis Period (min) 15  
 Intersection LOS: C  
 ICU Level of Service B

Splits and Phases: 1: Cooper Blvd & James Blvd

15 s	33 s	15 s	27 s
15 s	33 s	15 s	27 s

Cooper Blvd Access Study  
2: Proposed Street & Cooper Blvd

PM Peak with Proposed Street Access

1/4/2017

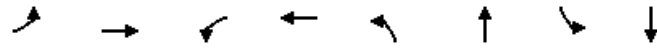


Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	82	32	282	39	30	317
Future Volume (Veh/h)	82	32	282	39	30	317
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	89	35	307	42	33	345
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			None			None
Median storage (veh)						
Upstream signal (m)						257
pX, platoon unblocked						
vC, conflicting volume	739	328			349	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	739	328			349	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	76	95			97	
cM capacity (veh/h)	374	713			1210	
<b>Direction, Lane #</b>						
	WB 1	NB 1	SB 1			
Volume Total	124	349	378			
Volume Left	89	0	33			
Volume Right	35	42	0			
cSH	432	1700	1210			
Volume to Capacity	0.29	0.21	0.03			
Queue Length 95th (m)	8.9	0.0	0.6			
Control Delay (s)	16.6	0.0	1.0			
Lane LOS	C		A			
Approach Delay (s)	16.6	0.0	1.0			
Approach LOS	C					
<b>Intersection Summary</b>						
Average Delay			2.9			
Intersection Capacity Utilization			52.0%		ICU Level of Service	A
Analysis Period (min)			15			



Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↔			↔	↔	
Traffic Volume (veh/h)	104	30	80	294	32	51
Future Volume (Veh/h)	104	30	80	294	32	51
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	113	33	87	320	35	55
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage (veh)						
Upstream signal (m)	206					
pX, platoon unblocked						
vC, conflicting volume			146		624	130
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			146		624	130
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			94		92	94
cM capacity (veh/h)			1436		422	920
<b>Direction, Lane #</b>						
	EB 1	WB 1	NB 1			
Volume Total	146	407	90			
Volume Left	0	87	35			
Volume Right	33	0	55			
cSH	1700	1436	631			
Volume to Capacity	0.09	0.06	0.14			
Queue Length 95th (m)	0.0	1.5	3.8			
Control Delay (s)	0.0	2.1	11.7			
Lane LOS		A	B			
Approach Delay (s)	0.0	2.1	11.7			
Approach LOS			B			
<b>Intersection Summary</b>						
Average Delay			3.0			
Intersection Capacity Utilization			42.1%	ICU Level of Service		A
Analysis Period (min)			15			



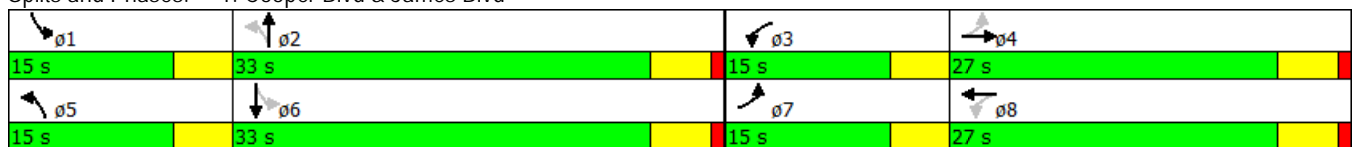


Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations								
Traffic Volume (vph)	163	90	139	193	57	195	54	173
Future Volume (vph)	163	90	139	193	57	195	54	173
Turn Type	pm+pt	NA	pm+pt	NA	pm+pt	NA	pm+pt	NA
Protected Phases	7	4	3	8	5	2	1	6
Permitted Phases	4		8		2		6	
Detector Phase	7	4	3	8	5	2	1	6
Switch Phase								
Minimum Initial (s)	10.0	15.0	10.0	15.0	10.0	15.0	10.0	15.0
Minimum Split (s)	15.0	23.0	15.0	23.0	15.0	23.0	15.0	23.0
Total Split (s)	15.0	27.0	15.0	27.0	15.0	33.0	15.0	33.0
Total Split (%)	16.7%	30.0%	16.7%	30.0%	16.7%	36.7%	16.7%	36.7%
Yellow Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
All-Red Time (s)	0.0	1.0	0.0	1.0	0.0	1.0	0.0	1.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.0	5.0	4.0	5.0	4.0	5.0	4.0	5.0
Lead/Lag	Lead	Lag	Lead	Lag	Lead	Lag	Lead	Lag
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Recall Mode	None	None	None	None	None	Min	None	Min
Act Effct Green (s)	31.4	22.1	30.0	18.3	24.6	18.3	24.6	18.3
Actuated g/C Ratio	0.45	0.32	0.43	0.26	0.35	0.26	0.35	0.26
v/c Ratio	0.39	0.34	0.25	0.67	0.15	0.58	0.14	0.61
Control Delay	15.0	18.9	13.5	30.2	14.0	27.7	13.8	27.4
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	15.0	18.9	13.5	30.2	14.0	27.7	13.8	27.4
LOS	B	B	B	C	B	C	B	C
Approach Delay		17.0		24.9		25.3		25.2
Approach LOS		B		C		C		C

Intersection Summary

Cycle Length: 90  
 Actuated Cycle Length: 69.4  
 Natural Cycle: 80  
 Control Type: Actuated-Uncoordinated  
 Maximum v/c Ratio: 0.67  
 Intersection Signal Delay: 23.2  
 Intersection Capacity Utilization 64.7%  
 Analysis Period (min) 15  
 Intersection LOS: C  
 ICU Level of Service C

Splits and Phases: 1: Cooper Blvd & James Blvd



Cooper Blvd Access Study  
2: Proposed Street & James Blvd

PM Peak with Street Cul-de-Sac  
1/4/2017



Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↶			↷	↷	
Traffic Volume (veh/h)	104	90	30	294	96	32
Future Volume (Veh/h)	104	90	30	294	96	32
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	113	98	33	320	104	35
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage (veh)						
Upstream signal (m)	206					
pX, platoon unblocked						
vC, conflicting volume			211	548		162
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			211	548		162
tC, single (s)			4.1	6.4		6.2
tC, 2 stage (s)						
tF (s)			2.2	3.5		3.3
p0 queue free %			98	79		96
cM capacity (veh/h)			1360	485		883
Direction, Lane #	EB 1	WB 1	NB 1			
Volume Total	211	353	139			
Volume Left	0	33	104			
Volume Right	98	0	35			
cSH	1700	1360	547			
Volume to Capacity	0.12	0.02	0.25			
Queue Length 95th (m)	0.0	0.6	7.6			
Control Delay (s)	0.0	0.9	13.8			
Lane LOS			A		B	
Approach Delay (s)	0.0	0.9	13.8			
Approach LOS			B			
Intersection Summary						
Average Delay			3.2			
Intersection Capacity Utilization			45.4%	ICU Level of Service		A
Analysis Period (min)	15					