

# **MMM Group Limited**

# Traffic Impact Study

129 South Street Condominium Development – Town of Gananoque

Prepared for: Riviyra Developments Inc.

COMMUNITIES
TRANSPORTATION
BUILDINGS
INFRASTRUCTURE





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www.mmm.ca

October 15, 2013 16-13083-001-T01

Mr. Ken Dantzer Riviyra Developments Inc. P.O. Box 70 Glenburnie, ON K0H 1S0

Dear Mr. Dantzer:

Subject: Traffic Impact Study

129 South Street
Town of Gananogue

MMM Group Limited is very pleased to present our Traffic Impact Study for your proposed condominium development to be located at 129 South Street in the Town of Gananogue.

This report analyzes the transportation impacts for this development, and addresses the suitability of the proposed parking arrangement and site circulation requirements. The expected traffic conditions in 2018 are not greatly impacted by the construction of this development, and the available roadway capacity is anticipated to be adequate to support the 88 a.m. and 103 p.m. peak hour trips generated by this site. Additionally, the proposed parking supply exceeds the Town's Bylaw requirements, and no issues are expected to arise from a traffic operations perspective.

We trust that this study adequately addresses the transportation impacts of your proposed development. Please contact us if you have any questions or comments with respect to our report.

Yours very truly,

**MMM GROUP LIMITED** 

David B. Richardson, P.Eng., PTOE Senior Project Manager & Partner

**Transportation Planning** 

Christopher Tam, EIT Project Engineer Transportation Planning

# TRAFFIC IMPACT STUDY

# PROPOSED RESIDENTIAL DEVELOPMENT 129 SOUTH STREET

# **TOWN OF GANANOQUE**

**Prepared for:** 

Riviyra Developments Inc.

October 2013 16-13083-001-T01

## PROJECT TEAM MEMBER LIST

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Project Coordinator: Raymond Maitlall, B.A.Pols.

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Katherine Ellard, C.Tech

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## 1.0 INTRODUCTION

MMM Group Limited was retained by Riviyra Developments Inc. to prepare a Traffic Impact Study (TIS) in support of the proposed residential development to be located at 129 South Street in the Town of Gananoque.

This development is proposed to consist of 102 condominium units, and this report documents the assessment of the transportation issues associated with the proposed development.

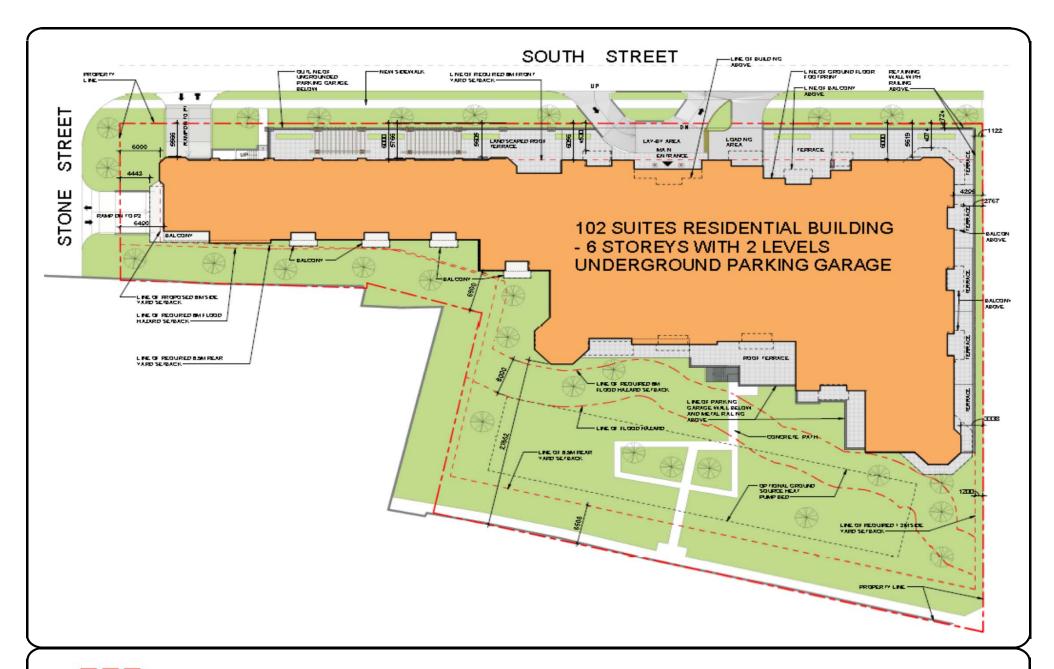
The study area is shown in **Figure 1.1** while the concept development site plan is illustrated in **Figure 1.2**.







**FIGURE 1.1** Proposed Site Location





# FIGURE 1.2

Proposed Ground Level Site Layout

#### 2.0 EXISTING CONDITIONS

## 2.1 Study Area and Data Collection

The study area for this traffic impact study includes the following intersections. The existing lane configurations are shown in **Figure 2.1**:

- South Street at Stone Street South (Unsignalized);
- Stone Street South at Water Street (Unsignalized);
- King Street East at Stone Street South (Signalized);
- King Street East at Charles Street South (Signalized); and
- King Street East at William Street South (Signalized).

Accu-Traffic Inc. was retained to conduct turning movement counts (TMC) at the above-noted intersections. The TMCs were collected during the weekday periods from 7 to 9 a.m. and from 4 to 6 p.m. on Tuesday, September 24, 2013. The existing weekday a.m. and p.m. traffic volumes are shown in **Figure 2.2**. The peak hour traffic data, along with the existing signal timing plans for the signalized intersections are provided in **Appendix A**.

#### 2.2 Transit

Currently, there is no transit service offered in the Town of Gananoque, nor are there any plans for future service. Accordingly, this travel mode has not been factored into our analysis.

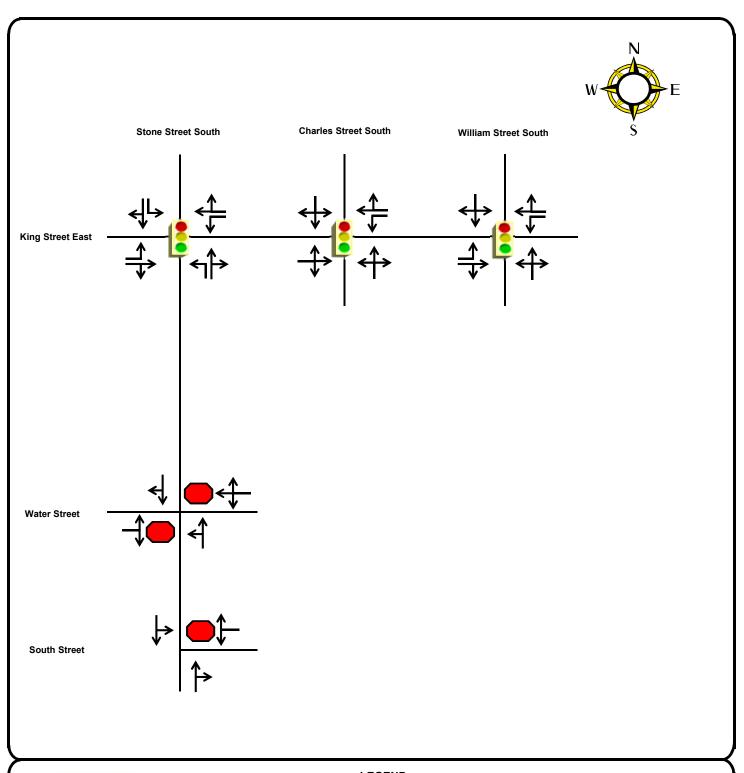
## 2.3 Methodology

Traffic conditions in the study area were analyzed using the **Synchro 8** traffic analysis software. This software incorporates the methodology outlined in the *Highway Capacity Manual (HCM), Transportation Research Board, 2000.* The intersection capacity analysis provides an indication of traffic operations based on calculations of volume-to-capacity (v/c) and delays for individual movements at an intersection. A Level of Service (LOS) denoted by letters 'A' through 'D' represents satisfactory traffic operations. LOS denoted by the letters 'E' and 'F' indicates congested traffic operations. The Level of Service definitions for signalized and unsignalized intersections are included in **Appendix B**.

## 2.4 Existing Traffic Operations

Traffic operations were analyzed at the previously noted intersections to determine the existing LOS during the weekday a.m. and p.m. peak hours. The results of the intersection capacity analysis for existing conditions are summarized in **Table 2.1**. Detailed intersection capacity analysis sheets are included in **Appendix C**.







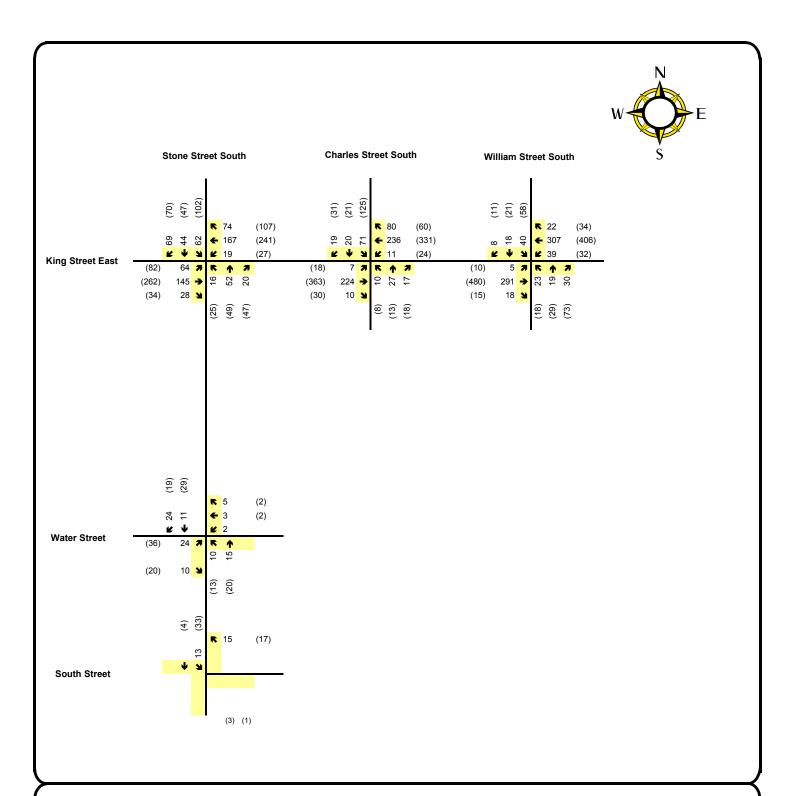
# <u>LEGEND</u>

Signalized Intersection



**FIGURE 2.1**Existing Lane Configurations

Stop Control





#### **LEGEND**

AM Peak Hour Volumes (XX) PM Peak Hour Volumes

FIGURE 2.2 **Existing Peak Hour Traffic** Volumes

XX

# TABLE 2.1 EXISTING TRAFFIC CONDITIONS

	Comtrol		day A.M. k Hour	Weekday P.M. Peak Hour		
Intersection	Control Type	LOS (Delay in seconds)	Critical Movement(s) (v/c)	LOS (Delay in seconds)	Critical Movement(s) (v/c)	
South Street at Stone Street South	Unsignalized	A (7.9)		A (6.7)		
Stone Street South at Water Street	Unsignalized	A (4.6)	-	A (4.7)		
King Street East at Stone Street South	Signalized	C (20.9)		B (19.5)		
King Street East at Charles Street South	Signalized	B (11.6)		B (12.3)		
King Street East at William Street South	Signalized	A (9.7)		B (10.6)		

Notes: 1. The LOS at an unsignalized intersection is defined by the movement with the highest delay under HCM 2000.

Under existing conditions, the study area intersections operate at LOS C or better, indicating that there are low delays at these intersections. No operational issues are noted from the results of the traffic analysis.



<sup>2.</sup> Critical movements are those with a volume-to-capacity ratio exceeding 0.80 for a signalized intersection or with a LOS of 'D', 'E' or 'F'

#### 3.0 SITE-GENERATED TRAFFIC

## 3.1 Trip Generation

The trip generation associated with the proposed residential development was based on the *Institute of Transportation Engineers (ITE) Trip Generation Manual, 9<sup>th</sup> Edition.* Land Use Code 230 – Condominium was used to develop site-generated trips for this development. A summary of the trip generation information for the proposed development is presented in **Table 3.1**.

TABLE 3.1
TRIP GENERATION

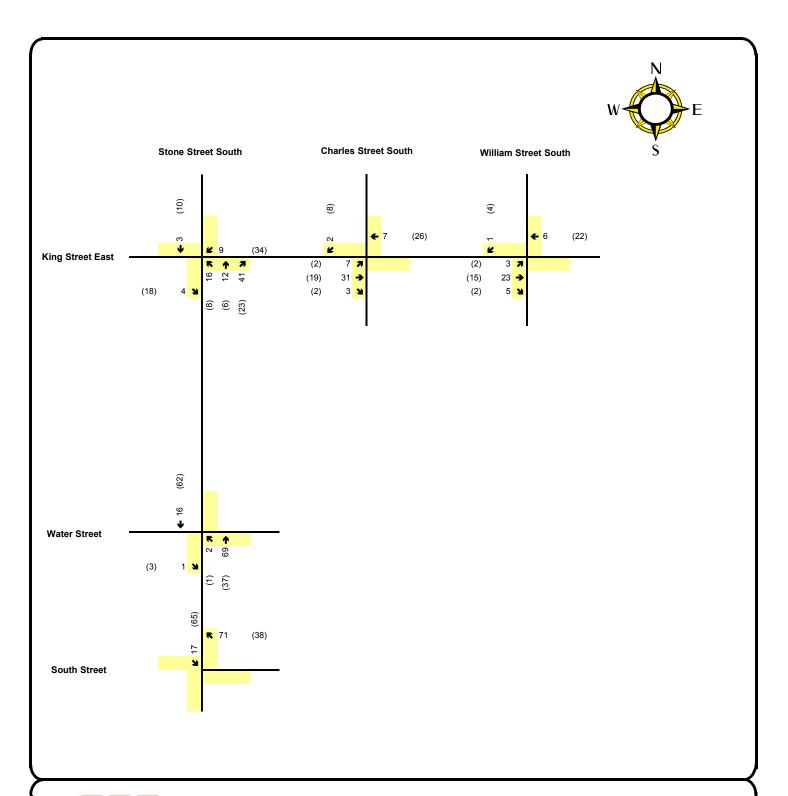
ITE LAND USE CODE		DAY A.M. KHOUR		CDAY P.M.  K HOUR  Outbound  Trips  37  103
(MAGNITUDE)	Inbound Trips	Outbound Trips	Inbound Trips	
230 Condominium (102 units)	17	71	66	37
TOTAL	88 103		03	

As indicated in Table 3.2, the proposed development is expected to generate a total of 88 and 103 trips in the weekday a.m. and p.m. peak hours, respectively.

# 3.2 Trip Distribution and Assignment

The projected residential distribution was developed based on the distribution of existing traffic in the area, as determined by the turning movement counts which were conducted. The distribution is summarized in **Table 3.2**, and **Figure 3.1** illustrates the resulting site traffic assignment of the trips generated by this development.







#### **LEGEND**

XX AM Peak Hour Volumes (XX) PM Peak Hour Volumes

FIGURE 3.1
Site-Generated Peak Hour
Traffic Volumes

# TABLE 3.2 TRIP DISTRIBUTION

Location of Gateway		AY A.M. HOUR		DAY P.M. K HOUR
	Inbound	Outbound	Inbound	Outbound
King Street (E of William)	36.8%	32.3%	33.8%	40.0%
King Street (W of Stone)	23.7%	22.6%	27.1%	22.0%
Water Street (W of Stone)	3.4%	3.3%	4.0%	2.2%
Water Street (E of Stone)	1.0%	0%	0.3%	0.0%
William Street (N of King)	6.6%	4.1%	6.4%	4.8%
William Street (S of King)	0.0%	6.7%	0.0%	4.5%
Charles Street (N of King)	11.0%	10.2%	12.7%	6.0%
Charles Street (S of King)	0.0%	3.7%	0.0%	4.9%
Stone Street (N of King)	17.5%	17.0%	15.7%	15.6%
TOTAL	100%	100%	100%	100%

#### 4.0 FUTURE TRAFFIC CONDITIONS

## 4.1 Background Information

Based on information from the Town of Gananoque, there are no major roadway improvements proposed within the study area over the five-year study horizon.

# 4.2 Background Growth

The future background volumes were determined by using the average growth rate within the Town of Gananoque, as calculated by comparing the existing population and the future projected population in 2029 as indicated in the Official Plan. This growth rate was determined to be 0.8% per year. As a result, existing traffic volumes were grown by this amount per year to the 2018 horizon year that was used for the future analysis. **Figure 4.1** illustrates the future background traffic volumes.

## 4.3 Future Background Traffic Operations

The projected 2018 future background traffic volumes consist of existing traffic volumes plus the adjacent background development traffic as discussed in Section 4.3. The results of the intersection capacity analysis are shown in **Table 4.1**. Detailed intersection capacity analysis sheets are included in **Appendix D**.

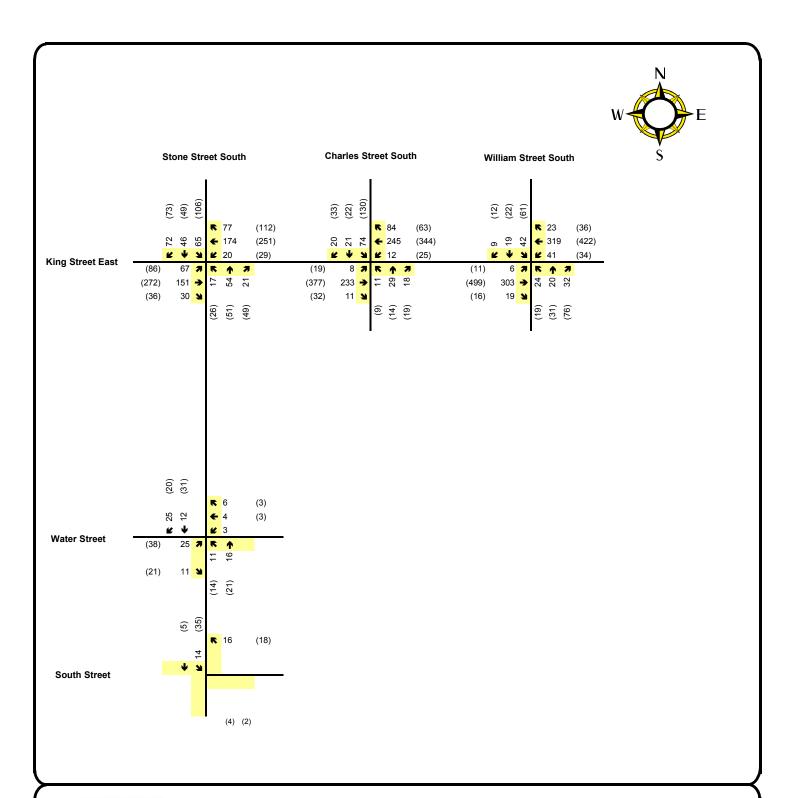
TABLE 4.1
FUTURE BACKGROUND TRAFFIC CONDITIONS

	Comtrol		day A.M. lk Hour	Weekday P.M. Peak Hour		
Intersection	Control Type	LOS (Delay in seconds)	(Delay in   Movement(s)		Critical Movement(s) (v/c)	
South Street at Stone Street South	Unsignalized	A (7.9)		A (6.4)		
Stone Street South at Water Street	Unsignalized	A (4.7)	ŀ	A (4.8)		
King Street East at Stone Street South	Signalized	C (21.2)	ŀ	B (20.0)		
King Street East at Charles Street South	Signalized	B (11.8)	I	B (12.7)		
King Street East at William Street South	Signalized	A (9.8)		B (10.9)		

Notes: 1. The LOS at an unsignalized intersection is defined by the movement with the highest delay under HCM 2000.

<sup>2.</sup> Critical movements are those with a volume-to-capacity ratio exceeding 0.80 for a signalized intersection or with a LOS of 'D', 'E' or 'F'







#### **LEGEND**

AM Peak Hour Volumes PM Peak Hour Volumes FIGURE 4.1
Future Background Traffic
Volumes

XX

(XX)

The future background traffic conditions remain largely unchanged from the existing traffic conditions, with delays increasing by a very small amount. As a result, the future background scenario is expected to continue to operate well during both peak hours.

#### 4.4 Total Future Traffic Conditions

The total future traffic conditions were calculated by taking the site generated traffic as detailed in Section 3 and adding it to the background traffic volumes shown in Figure 4.1. The resulting total future traffic volumes are shown in **Figure 4.2**. , and a summary of the total future traffic operations are outlined below in **Table 4.2**. Detailed intersection capacity analysis sheets are included in **Appendix E**.

TABLE 4.2
TOTAL FUTURE TRAFFIC CONDITIONS

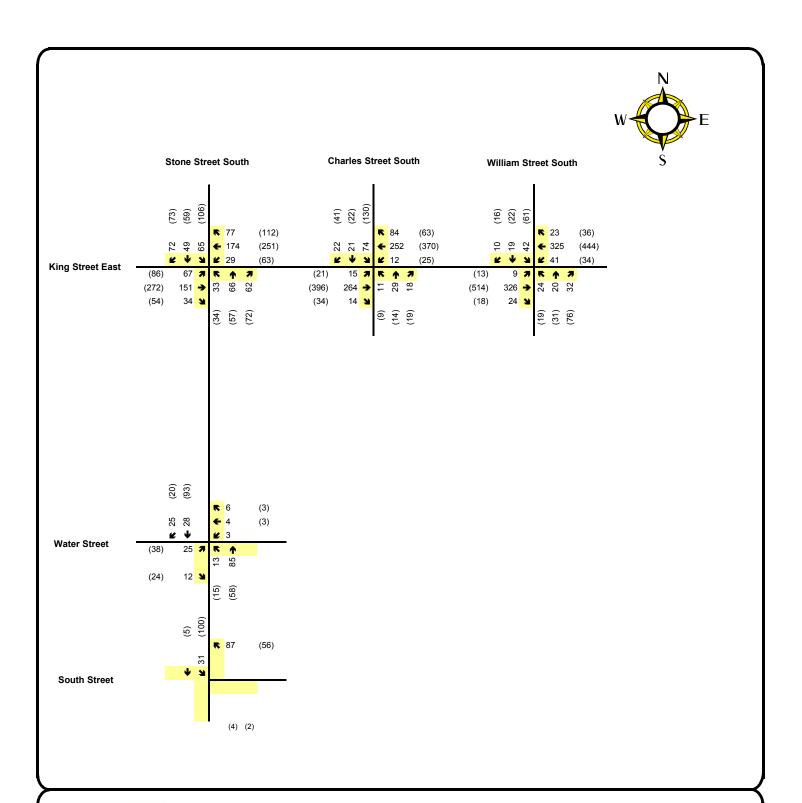
	Comtrol		day A.M. ak Hour	Weekday P.M. Peak Hour			
Intersection	Control Type	LOS (Delay in seconds)	Critical Movement(s) (v/c)	LOS (Delay in seconds)	Critical Movement(s) (v/c)		
South Street at Stone Street South	Unsignalized	A (8.3)		A (7.4)			
Stone Street South at Water Street	Unsignalized	A (2.9)	ı	A (3.2)			
King Street East at Stone Street South	Signalized	C (21.3)	I	C (20.6)	-		
King Street East at Charles Street South	Signalized	B (11.4)	-	C (12.9)			
King Street East at William Street South	Signalized	A (9.8)		B (11.2)			

Notes: 1. The LOS at an unsignalized intersection is defined by the movement with the highest delay under HCM 2000.

The addition of the site generated traffic has resulted in very marginal impacts on the study area network. All of the intersections are expected to operate at virtually the same level of service compared to future background conditions, with the estimated increase in delay expected to be, at most, 1.6 seconds per vehicle. As a result, the development can be readily accommodated by the existing road network with no improvements necessary.



<sup>2.</sup> Critical movements are those with a volume-to-capacity ratio exceeding 0.80 for a signalized intersection or with a LOS of 'D', 'E' or 'F'





#### **LEGEND**

XX AM Peak Hour Volumes (XX) PM Peak Hour Volumes

FIGURE 4.2
Total Future
Traffic Volumes

#### 5.0 PARKING REQUIREMENTS

The Town of Gananoque's Development Permit By-law dated October 2010 stipulates that parking for apartment dwellings requires a minimum of 1.25 spaces per unit. Additionally, one barrier-free parking space is required for every 20 standard parking spaces (or part thereof), and is to be included as part of the overall total.

**Table 5.1** summarizes the parking requirements related to the proposed development.

TABLE 5.1
BY-LAW PARKING REQUIREMENTS

Type of Use	Minimum Parking Requirements	Magnitude of Proposed Use	No. of Spaces Required
Residential (Apartment)	1.25 spaces per dwelling unit		128
Barrier-free Parking	1.0 spaces for every 20 standard spaces (or part thereof)	102 units	7*
		Total Required	128 spaces
		Total Supplied	163 spaces

<sup>\*</sup> These 7 spaces are included as part of the overall total of required parking spaces.

Based on the above, the proposed development is supplying 35 spaces above the Town's By-law requirement. The current site plan illustrates a visitor's parking supply of 17 spaces, as well as a total of seven barrier-free parking spaces for the site. All parking spaces must be a minimum of 3.0 metres in width and 6.0 metres in length, and barrier-free spaces must also be separated by an aisle of a minimum of 1.5 metres in width.



#### 6.0 CONCLUSIONS AND RECOMMENDATIONS

Based on the analysis, the following conclusions can be drawn:

- Under the existing conditions, all boundary road intersections are operating at good to excellent overall LOS during the a.m. and p.m. peak hours;
- The proposed development is estimated to generate a total of 88 and 103 trips in the weekday a.m. and p.m. peak hours, respectively;
- The future background traffic conditions indicate that there will be only minor increases in delay, but that the overall LOS of the study area intersections will remain good to excellent;
- The total future traffic conditions also indicate that the boundary road intersections will
  operate at the same Levels of Service as the future background scenario. Therefore, the
  effect of the proposed development on the overall road network capacity is minimal; and
- The proposed parking supply for the condominium exceeds the requirements of the Town's
  Development Permit By-law, with a total of 163 spaces. This includes 139 standard stalls,
  17 visitor spaces and seven barrier-free spaces for a surplus of 35 spaces for this
  development.

Based on the preceding traffic study, no roadway or other improvements are required to support the expected traffic generated by the proposed development. Accordingly, from a traffic operations perspective, this development can proceed as planned.

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# APPENDIX A

# Traffic Count Data and Signal Timing Plans





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7000	<i>, ,</i> , ,		IIIV.

Morning	Specifie From: 7 To: 9		d	-	ne Hou om: 8 o: 9		)			
Municipality: Site #: Intersection: TFR File #: Count date:	Weather conditions: Person(s) who counted:									
** Non-Signali	zed Intersed	tion **		Major Ro	oad: S	tone S	St runs	N/S		
North Leg Total: 28 North Entering: 13 North Peds: 10 Peds Cross:	Cyclists Trucks Cars Totals	0 0 0	0 0 0 0 13 13 13 Std	one St	Cyclists Trucks Cars Totals	0 15 15 15	Cars 15 0 15 uth St	East Leg East Ent East Ped Peds Cro  Trucks 0 0 0	ering: ds: oss:	15 0 X
			Stone St	Î			Cars 13	Trucks	Cyclist 0	s Total:
	Cars Trucks Cyclists Totals	0 0	Cal Truck Cyclis Tota	ss 0 ts 0	0 0 0	0 0 0		Peds Cro South Pe South Er South Le	eds: ntering:	



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Municipality: Site #: ntersection: FFR File #: Count date:	Weather conditions: Person(s) who counted:										
* Non-Signali	zed Intersec	tion **		Maj	or Roa	ad: S	tone S	t runs	N/S		
North Leg Total: 57 North Entering: 37 North Peds: 4 Peds Cross:	Cyclists Trucks Cars Totals	1 0 3 4	0	2 0 35 Stone St		Cyclists Trucks Cars Totals	1 18 20	Cars 16 0 16 uth St	East E East F Peds (		17 8 X
			Stone S	St				Cars 33	Truck 0	s Cyclis	ts Totals
	Cars Trucks Cyclists Totals	0 1	Tro Cyc	Cars ucks clists	2 0 1 3	1 0 0	3 0 1				



Morning Peak Diagram	Specified Period From: 7:00:00 To: 9:00:00	One Hour Peak         From: 7:45:00         To: 8:45:00						
Municipality: Gananoque Site #: 1315400002 Intersection: Stone St & Water St  FR File #: 7 Count date: 24-Sep-13	Weather conditions:  Person(s) who counted:							
* Signalized Intersection **	Major Road: Stone St	runs N/S						
Peds Cross: Mater St  Cyclists Trucks Cars Totals  Water St  Wyord	Trucks 2 Cars 41 Totals 44  tone St	East Leg Total: 10 East Entering: 10 East Peds: 5 Peds Cross:   Cars Trucks Cyclists Total 4 1 0 5 3 0 0 3 1 1 0 2 8 2 0  St						
0 0 0 0 0 0 10 10 10 Stone St		Cars Trucks Cyclists Total						
West Peds: 10 Trucks 1 Trucks 1 West Entering: 34 Cyclists 0 Cycli	ars 10 15 0 25 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	Peds Cross:   South Peds: 6  South Entering: 25  South Leg Total: 48						



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Afternoon F	Peak Dia	gram	Specifi From: To:	16:00:00 18:00:00	d	One I From To:	Hour Pe : 16:00:0	00		
	100002 St & Water St		Weather conditions:  Person(s) who counted:							
* Signalized Inters	ection **		Major I	Road: S	tone St	runs N/S	3			
North Leg Total: 106  North Entering: 48  North Peds: 3  Peds Cross:    Cyclists Trucks Cars Total	Trucks 0 Cars 18 Totals 19	29 0	Í	Cyclists Trucks Cars Totals	5 1 5 57 5 58	Eas Eas Pec	st Leg Total: st Entering: st Peds: ds Cross: ucks Cyclis	4 7 X		
1 1 32 34	Nater St	w <del>-</del>	N E			1 1 2 0 0 0 3 1	0 0 0 0	2 2 0		
Cyclists Trucks     Cars     Total       0     0     36     36       0     0     0     0       1     0     19     20	als		S		John		ucks Cyclis	te Tota		
1 0 55	7	Stone St				0 0	0	0		
Peds Cross:  West Peds: 17 West Entering: 56	Cars 48 Trucks 0 Cyclists 1	Tru	cks 1	20 0 0 0 0 0	32 1 0	Sou	ds Cross: uth Peds: uth Entering:	<ul><li>5</li><li>33</li></ul>		



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Morning	j Pea	k Diag	ıram			<b>n:</b> 7:0	<b>Perioc</b> 00:00 00:00	I	One Fro	m:	ur Pea 7:30:00 3:30:00	)
Municipality: Site #: Intersection: TFR File #: Count date:	Ganano 131540 King St 8 24-Sep-	Weather conditions:  Person(s) who counted:										
** Signalized	nterse	ction **			Мајо	r Ro	ad: Kir	ng St E	runs	W/E		
North Leg Total: 36 North Entering: 17 North Peds: 9 Peds Cross:   Cyclists Trucks Car 0 17 235	s Totals	Cyclists 0 Trucks 5 Cars 64 Totals 69	2 3 39 44	0 1 61 62	2 9 164 Stone St			6 182 190		East En East Pe Peds C	ds:	260 8 X
Cyclists Trucks       Car         0       3       61         0       8       137         0       0       28         0       11       226	64 145 28			Stone S	s s	$\hat{\mathbf{T}}$			St E Cars 218	Trucks	Cyclist:	s Totals
Peds Cross: X West Peds: 12 West Entering: 23 West Leg Total: 48	7	Cars 86 Trucks 3 Cyclists 2 Totals 91		Tr Cyd	Cars 15 ucks 1 clists 0 otals 16	47 3 2 52	20 0 0	82 4 2				



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Municipality: Site #: Intersection: TFR File #: Count date:		Weather conditions: Person(s) who counted:								
** Signalized I	nters	ection **			Majo	r Roa	ad: King	St E rui	ns W/E	
North Leg Total: 45 North Entering: 219 North Peds: 8 Peds Cross:   Cyclists Trucks Care 2 14 320	9 s Tota 336	1	0 0 47 47	102 Si	tone St		Cyclists 0 Trucks 3 Cars 233 Totals 234		East Leg Total East Entering East Peds: Peds Cross:  Trucks Cycli 0 0 11 1 1 0 12 1	375 39 X
Cyclists Trucks     Care       0     2     80       3     10     249       0     0     34       3     12     363	82 262 34			Stone St	S	Î	F	Cars		ists Totals 411
Peds Cross:  West Peds: 19 West Entering: 376 West Leg Total: 716	8	Cars 107 Trucks 1 Cyclists 0 Totals 108		Truc Cyclis	rs 22 ks 2 sts 1 als 25	48 1 0 49	47 111 0 3 0 1	7	Peds Cross: South Peds: South Enterin South Leg To	•



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Morning	Peak D	ıagrar	n	From		Period	One Hour Peak From: 7:45:00			
								_		
				То:	9:	00:00	То	):	8:45:0	0
Municipality:	Gananoque			Weat	her	conditions	:			
Site #:	1315400004									
Intersection:	King St E & Ch	Perso	Person(s) who counted:							
TFR File #:	12									
Count date:	24-Sep-13									
** Signalized In	tersection	**		Majo	r Ro	ad: King St	E run	s W/E		
North Leg Total: 224	Cyclists	0 0	0	0	$\triangle$	Cyclists 0		East Le	g Total:	639
North Entering: 110	Trucks	0 2	0	2		Trucks 2		East Er	ntering:	327
North Peds: 11	Cars	19 18	71	108		Cars 112		East Pe	eds:	5
Peds Cross:	Totals	19 20	71			Totals 114		Peds C	ross:	X
Cyclists Trucks Cars	Totals	J		Charles St			Cars	Trucks	Cyclis	to Total
0 9 256	265					13	78	2	0	80
0 9 250	203						227	9	0	236
				N			10	1	0	11
	King St E			<b>A</b>		75	315	12	0	_
	Ĭ		W	E						
Cyclists Trucks Cars	Totals			<b>V</b>		Kin	g St E			
0 0 7	7			S						
0 7 217	224								•	
0 0 10	<u> </u> 10				$\langle \cdot \rangle$	ightharpoonup	Cars		Cyclis	
0 7 234	•		Charles S	St 🖳			304	8	0	312
<b>V</b>										

## **Comments**

Cars 10

Trucks 0

Cyclists 0

Totals 10

16

1

0

17

53

1

0

Peds Cross:

South Peds:

South Entering: 54

South Leg Total: 95

 $\bowtie$ 

4

 $\mathbb{X}$ 

9

Cars 38

Trucks 3

Cyclists 0

Totals 41

Peds Cross:

West Peds:

West Entering: 241

West Leg Total: 506



	A	ccu-ir	affic in	IC.						
Afternoon I	Peak Diag	ram		Period 6:00:00 3:00:00	One Hour Peak From: 16:00:00 To: 17:00:00					
Site #: 1315	noque 400004 St E & Charles St ep-13		Weather conditions: Person(s) who counted:							
** Signalized Inters	section **		Major Ro	ad: King St	E runs W/E					
North Leg Total: 268  North Entering: 177  North Peds: 6  Peds Cross:   Cyclists Trucks Cars Total  1 11 358 370	• •	1 125 C	harles St	Cyclists 2 Trucks 3 Cars 86 Totals 91	East Leg Total: 921 East Entering: 415 East Peds: 19 Peds Cross:   Cars Trucks Cyclists Totals 59 1 0 60 320 10 1 331 24 0 0 24 403 11 1					
Cyclists Trucks Cars Total  1		Charles St	s • • • • • • • • • • • • • • • • • • •	King	Cars Trucks Cyclists Totals 492 12 2 506					
Peds Cross:  West Peds: 61 West Entering: 411 West Leg Total: 781	Cars 71 Trucks 0 Cyclists 4 Totals 75	Truc	ars 7 11 ks 1 1 sts 0 1 als 8 13	18 36 0 2 0 1	Peds Cross:  South Peds: 60 South Entering: 39 South Leg Total: 114					



ACCU-11	anic inc.								
Morning Peak Diagram	Specified Period         One Hour Peak           From: 7:00:00         From: 7:45:00           To: 9:00:00         To: 8:45:00								
Municipality: Gananoque Site #: 1315400005 Intersection: King St E & William St TFR File #: 13 Count date: 24-Sep-13	Weather conditions: Person(s) who counted:								
** Signalized Intersection **	Major Road: King St E runs W/E								
North Entering:         66         Trucks         0         1         0         6           North Peds:         10         Cars         8         17         40         6           Peds Cross:         ⋈         Totals         8         18         40	Cyclists 0 Trucks 1 Cars 45 Totals 46  Cars Trucks Cyclists Totals  Cars Trucks Cyclists Totals								
0 11 327 338  King St E	22 0 0 22 298 9 0 307 36 3 0 39								
Cyclists Trucks Cars Totals 0 1 4 5 1 5 285 291	King St E								
0 1 17 18 William S	Cars Trucks Cyclists Totals 354 6 1 361								
West Peds: 2 Trucks 5 Trucks 5 West Entering: 314 Cyclists 0 Cycl	Cars       21       19       29       69       Peds Cross:       ⋈         cks       2       0       1       3       South Peds:       5         lists       0       0       0       South Entering:       72         otals       23       19       30       South Leg Total:       147								



#### **Afternoon Peak Diagram Specified Period One Hour Peak** From: 16:00:00 **From:** 16:00:00 To: 18:00:00 To: 17:00:00 Weather conditions: Municipality: Gananoque Site #: 1315400005 Intersection: King St E & William St Person(s) who counted: TFR File #: 13 Count date: 24-Sep-13 \*\* Signalized Intersection \*\* Major Road: King St E runs W/E North Leg Total: 163 Cyclists 0 0 3 Cyclists 3 East Leg Total: 1083 0 0 North Entering: 90 Trucks 0 Trucks 1 East Entering: 472 Cars 69 North Peds: 18 Cars 11 18 58 87 East Peds: 33 $\mathbb{X}$ Totals 73 Peds Cross: Totals 11 21 58 Peds Cross: ⋈ William St Totals Trucks Cyclists Totals Cyclists Trucks Cars Cars 10 424 435 33 0 34 395 406 10 1 32 0 32 King St E 460 2 10 Cyclists Trucks Cars Totals King St E 0 0 10 10 3 12 465 480 Trucks Cyclists Totals 1 0 14 15 Cars 594 4 12 489 13 611 William St $\mathbb{X}$ Peds Cross: $\bowtie$ Cars 64 Cars 18 71 115 Peds Cross: 2 West Peds: 11 Trucks 0 Trucks 0 1 South Peds: 25 1 3 West Entering: 505 Cyclists 4 Cyclists 0 1 South Entering: 120

#### **Comments**

Totals 18

South Leg Total: 188

West Leg Total: 940

Totals 68



# SIGNAL TIMING PLAN (Tourist Season)

LOCATION: King St and Charles St Gananoque Ontario

MODE of OPERATION: Fixed (Time Based Coordination)

TIMING DEVELOPED BY: <u>Signalcorps</u>

DATE TIMING DEVELOPED: <u>June 2, 2011</u>

#### **CONTROLLER TIMING DATA**

#### **MOVEMENT (FAZE)**

		King St EB/WB		Charles S N/S	t			
PHASE	1	<b>2</b>	3	4	5	6	7	8
MIN GREEN	Ċ	<u>-</u> 27	-	<mark>24</mark>	-	-	-	-
BIKE GREEN	_		_	-	_	_	_	_
CS MGRN	_	_	_	_	_	_	_	_
WALK	_	11	_	8	_	_	_	_
PEDESTRIAN CLEARANCE	_	16	_	16	_	_	_	_
VEHICLE EXTENSION	_	-	_	-	_	_	_	_
VEHICLE EXTENSION 2	_	_	_	_	_	_	_	_
MAX EXTENSION	_	_	_	_	_	_	_	_
MAX 1	-	<del>7</del> 1	-	- 29	-	-	-	_
MAX 2	-	33	-	2 <b>9</b> 28	-	-	-	-
	-	33	-	20	-	-	-	-
MAX 3	-	-	-	-	-	-	-	-
DET MAX	-	-	-	-	-	-	-	-
YELLOW	-	3	-	3	-	-	-	-
RED CLEAR	-	2	-	2	-	-	-	-
RED REVERT	-	2	-	2	-	-	-	-
ACT B4	-	-	-	-	-	-	-	-
SEC/ACT	-	-	-	-	-	-	-	-
MAX INI	-	-	-	-	-	-	-	-
TIME B4 INIT	-	-	-	-	-	-	-	-
CARS WT	-	-	-	-	-	-	-	-
TT REDUC	-	-	-	-	-	-	-	-
MIN GAP	-	-	-	-	-	-	-	-

## COORDINATED PATTERN 1 TS2 FORMAT

TIMING PLAN: AM (0800-1145) Mon-Fri

CYCLE LENGTH: 100

OFFSETS: 35

**SPLITS** 

PHASE 1 PHASE 5	-	PHASE 2 PHASE 6	<mark>71</mark> -	PHASE 3	-		SE 4 ASE 8	29 -				
VEHICLE POUR VEHICLE POUR PHASE RESULIT EXTERNAL SPLIT DMD XARTERY I		(1) 0 NO 0 (1) 0	0 (2) 0	(2) 0 (2)	0							
PHASE NUM COORDINAT VEHICLE RE VEHICLE MA PED RECAL PHASE OMIT SPARE	TED ECAI AX R L	PHASES LL			1	2 X X X X	3	<b>4</b> X X -	5 - - - - -	6 - - - - -	7 - - - - -	8 - - - - -
ALTERNATE	E SE	QUENCE			Α	В	С	D	E	F		

## **COORDINATED PATTERN 2**

#### **TS2 FORMAT**

TIMING PLAN: MIDDAY (1145-1615) Mon-Fri

CYCLE LENGTH: 100

OFFSETS: 11

SPLITS

ALTERNATE SEQUENCE			Α	В	С	D	E	F		
VEHICLE RECALL VEHICLE MAX RECALL PED RECALL PHASE OMIT SPARE			- - - -	X X X		X X -	- - - -	- - - -	- - - -	- - - -
PHASE NUMBER COORDINATED PHASES			1	<b>2</b> X	3	4	5	6	7	8
PHASE RESERVICE SPLIT EXTENSION RIN SPLIT DMD PATTERN XARTERY PATTERN		(1)	NO 0 (1) 0	(2) 0	0 (2)	0				
VEHICLE PERM VEHICLE PERM 2 DISP			(1) 0	0	(2)	0				
SPLITS PHASE 1 - PHASE 2 PHASE 5 - PHASE 6	<mark>71</mark> -	PHASE PHASE			SE 4 ASE 8	29 -				

## **COORDINATED PATTERN 3**

#### **TS2 FORMAT**

TIMING PLAN: PM (1615-1800) Mon-Fri

CYCLE LENGTH: 100

OFFSETS: 3

**SPLITS** 

PHASE 1 - PHASE 5 -	PHASE 2 PHASE 6	<mark>71</mark> -	PHASE 3 PHASE 7	- -		SE 4 SE 8	29 -					
VEHICLE PERM VEHICLE PERM PHASE RESERV SPLIT EXTENSION SPLIT DMD PAT XARTERY PAT	2 DISP ICE DN RING ITERN		(1) 0 N( (1) (1)	) )	0 0 0	(2) (2) (2)	0 0 0					
PHASE NUMBER COORDINATED VEHICLE RECAL VEHICLE MAX R PED RECALL PHASE OMIT SPARE	R PHASES L		1 - - - - -	- -	<b>2</b> X X X X	3 - - - -	4 - - X X -	5	6 - - - - -	7 - - - - -	<b>8</b>	
ALTERNATE SE	QUENCE		Α -	-	В	C -	D -	Е	F -			

## **COORDINATED PATTERN 4**

## **TS2 FORMAT**

TIMING PLAN: WEEKEND (0800-1800) Sat-Sun

CYCLE LENGTH: 100

OFFSETS: 11

SPLITS

PHASE 1 PHASE 5	-	PHASE 2 PHASE 6	<mark>71</mark> -	PHASE 3 PHASE 7			ASE 4 ASE 8	29 -				
VEHICLE P VEHICLE P PHASE RES SPLIT EXTE SPLIT DMD XARTERY	ERM SERV NSIO PA	I 2 DISP /ICE ON RING FTERN			(1) 0 NO (1) (1) 0	0 0 0	(2) (2) (2)	0 0 0				
PHASE NUM COORDINA VEHICLE RE VEHICLE MA PED RECAL PHASE OMI SPARE	MBEI TED ECAI AX R L	R PHASES LL			1	<b>2</b> X - X X	3 - - - - -	4 - X X	<b>5</b>	6	7 - - - - -	8 - - - - -
ALTERNATI	E SE	QUENCE		_	A	В	С	D	E	F		

#### TS2 FORMAT (NO CHANGE)

TIMING PLAN: OFF PEAK (1800-0800) Mon-Fri

CYCLE LENGTH: 61 OFFSETS: RECALL

SPLITS

PHASE 1	-	PHASE 2	33	PHASE 3	-	PHASE 4		28				
PHASE 5	-	PHASE 6	-	PHASE 7	-	PHASE 8		-				
VEHICLE I	PERN	<b>I</b>		(1)		0	(2)	0				
VEHICLE I	PERN	1 2 DISP		0								
PHASE RE	SERY	VICE		NO	O							
SPLIT EXT	ENSI	ON RING		(1)	)	0	(2)	0				
SPLIT DMI	D PA	TTERN		(1)	)	0	(2)	0				
XARTERY	PAT	TERN		0								
PHASE NU	MBE	R		1		2	3	4	5	6	7	8
COORDINA	<b>ATED</b>	PHASES		-		Χ	-	-	-	-	-	-
VEHICLE R	RECA	LL		-		-	-	-	-	-	-	-
VEHICLE M	1AX F	RECALL		-		Χ	-	Χ	-	-	-	-
PED RECA				-		Χ	-	Χ	-	-	-	-
PHASE OM	1IT			-		-	-	-	-	-	-	-
SPARE				-		-	-	-	-	-	-	-
ALTERNAT	E SE	QUENCE		Α		в с		D	Е	F		

#### COORDINATED PATTERN 6

#### TS2 FORMAT (NO CHANGE)

TIMING PLAN: OFF PEAK (1800-0800) Sat-Sun

CYCLE LENGTH: 61 OFFSETS: RECALL

SPLITS PHASE 1 - PHASE 2 PHASE 5 - PHASE 6		33	PHASE :	-		ASE 4 ASE 8	28					
VEHICLE PERM VEHICLE PERM 2 DISP				(1) 0	0	(2)	0					
PHASE RES					NO							
SPLIT EXTE	ENSIC	N RING			(1)	0	(2)	0				
SPLIT DMI	PAT	TERN			(1)	0	(2)	0				
XARTERY	PATT	ΓERN			0							
PHASE NUI		='			1	2	3	4	5	6	7	8
COORDINA					-	Χ	-	-	-	-	-	-
VEHICLE R		_			-	-	-	-	-	-	-	-
VEHICLE M		ECALL			-	Χ	-	Χ	-	-	-	-
PED RECAL					-	Χ	-	Χ	-	-	-	-
PHASE OM	IT				-	-	-	-	-	-	-	-
SPARE					-	-	-	-	-	-	-	-
ALTERNATE SEQUENCE				Α	В	С	D	E	F			
				_		_	_	_	_	_		



## SIGNAL TIMING PLAN (Tourist Season)

LOCATION: King St and Stone St Gananoque Ontario

MODE of OPERATION: Fixed (Time Based Coordination)

TIMING DEVELOPED BY: <u>Signalcorps</u>

DATE TIMING DEVELOPED: <u>June 2, 2011</u>

#### **CONTROLLER TIMING DATA**

#### **MOVEMENT (FAZE)**

	E\A//L =	King St	NO# T	Stone St				
DUACE	EW/LT	EB/WB	NS/LT	N/S	_	•	7	
PHASE	1	2	3	4	5	6	7	8
MIN GREEN	6	27	5	24	-	-	-	-
BIKE GREEN	-	-	-	-	-	-	-	-
CS MGRN	-	-	-	-	-	-	-	-
WALK	-	13	-	7	-	-	-	-
PEDESTRIAN CLEARANCE	-	14	-	17	-	-	-	-
VEHICLE EXTENSION	-	-	-	-	-	-	-	-
VEHICLE EXTENSION 2	-	-	-	-	-	-	-	-
MAX EXTENSION	-	-	-	-	-	-	-	-
MAX 1	10	<mark>52</mark>	9	29	-	-	-	-
MAX 2	-	32	-	29	-	-	-	-
MAX 3	-	-	-	-	-	-	-	-
DET MAX	-	-	-	-	-	-	-	-
YELLOW	4	3	4	3	-	-	-	-
RED CLEAR	-	2	-	2	-	-	-	-
RED REVERT	-	2	-	2	-	-	-	-
ACT B4	-	-	-	-	-	-	-	-
SEC/ACT	-	-	-	-	-	-	-	-
MAX INI	-	-	-	-	-	-	-	-
TIME B4 INIT	-	-	-	-	-	-	-	-
CARS WT	-	-	-	-	-	-	-	-
TT REDUC	-	-	-	-	-	-	-	-
MIN GAP	-	-	-	-	-	-	-	-

#### **TS2 FORMAT**

TIMING PLAN: AM (0800-1145) Mon-Fri

CYCLE LENGTH: 100

OFFSETS: 69

**SPLITS** 

PHASE 1 PHASE 5	10 -	PHASE 2 PHASE 6	<mark>52</mark> -	PHASE 3 PHASE 7			ASE 4 ASE 8	29 -				
VEHICLE P VEHICLE P PHASE RES	ERM	1 2 DISP			(1) 0 NO	0	(2)	0				
SPLIT EXTE SPLIT DMI XARTERY	ENSIC PA	ON RING(1) FTERN			0 (1) 0	(2) 0	0 (2)	0				
PHASE NUI COORDINA VEHICLE R VEHICLE M PED RECAL PHASE OM	TED ECAL AX R .L	PHASES _L			1 - - X -	2 X - X X	3 - - X -	4 - - X X	5 - - - -	6 - - - -	7 - - - -	8 - - - -
SPARE ALTERNAT	E SE	QUENCE		-	- A	- B -	- C	- D -	- E -	- F -	-	-

#### **COORDINATED PATTERN 2**

#### **TS2 FORMAT**

TIMING PLAN: MIDDAY (1145-1615) Mon-Fri

PHASE 1 10 PHASE 2 52 PHASE 3 9 PHASE 4 29

CYCLE LENGTH: 100

OFFSETS: 47

**SPLITS** 

PHASE 5 -	PHASE 6 -	- PHASE 7 - PHASE 8 -		-						
VEHICLE PERM			(1)	0	(2)	0				
VEHICLE PERM	2 DISP		0							
PHASE RESERVI	CE		NO							
SPLIT EXTENSION	N RIN	(1)	0	(2)	0					
SPLIT DMD PAT	ΓERN		(1)	0	(2)	0				
XARTERY PATT	ERN		0							
PHASE NUMBER			1	2	3	4	5	6	7	8
COORDINATED P	PHASES		-	Χ	-	-	-	-	-	-
VEHICLE RECALL			-	-	-	-	-	-	-	-
VEHICLE MAX RE	CALL		X	Χ	Χ	X	-	-	-	-
PED RECALL			-	Χ	-	Χ	-	-	-	-
PHASE OMIT			-	-	-	-	-	-	-	-
SPARE			-	-	-	-	-	-	-	-
ALTERNATE SEQ	UENCE		Α	В	С	D	E	F		
		_		_	_	-	_	_		

#### TS2 FORMAT

TIMING PLAN: PM (1615-1800) Mon-Fri

CYCLE LENGTH: 100

OFFSETS: 31

**SPLITS** 

PHASE 1 PHASE 5	10 -	PHASE 2 PHASE 6	<mark>52</mark> -	PHASE 3 PHASE 7	9 -		ASE 4 ASE 8	29 -					
VEHICLE I VEHICLE I PHASE RE SPLIT EXTI SPLIT DMI XARTERY	PERM SERV ENSIO D PAT	I 2 DISP VICE ON RING ITTERN		() N (1	IO 1) 1)	0 0 0	(2) (2) (2)	0 0 0					
PHASE NUI COORDINA VEHICLE R VEHICLE M PED RECA PHASE OM SPARE	TED ECAL IAX R LL	PHASES L		1 - - X - -		2 X - X X -	3 - X -	4 - - X X - -	<b>5</b>	6	7 - - - - -	8 - - - - -	
ALTERNAT	E SE	QUENCE		<b>A</b>	,	B -	С -	D -	E -	F -			

#### **COORDINATED PATTERN 4**

### TS2 FORMAT

TIMING PLAN: WEEKEND (0800-1800) Sat-Sun

CYCLE LENGTH: 100

OFFSETS: 46

SPLITS

PHASE 1 PHASE 5	10 -	PHASE 2 PHASE 6	<mark>52</mark> -	PHASE 3 PHASE 7	9 -		HASE 4 ASE 8	29 -				
VEHICLE PERM VEHICLE PERM 2 DISP PHASE RESERVICE SPLIT EXTENSION RING		2 DISP		(	(1) 0 NO	0	(2)	0				
	NSIC PAT	DN RING ΓΤΕRN		(	(1) (1) (0)	0	(2) (2)	0				
PHASE NUM COORDINA VEHICLE RI VEHICLE MA PED RECAL PHASE OMI SPARE	TED ECAL AX R .L	PHASES L		1 - - X - -		2 X - X X -	3 - - X - -	4 - X X -	5 - - - - -	6 - - - - -	7 - - - - -	8 - - - - -
ALTERNAT	E SE	QUENCE		-		B -	C -	D -	Е	F -		

#### TS2 FORMAT (NO CHANGE)

CYCLE LENGTH: 61 OFFSETS: RECALL

**SPLITS** 

PHASE 1 - PHAS PHASE 5 - PHAS		ASE 3 - ASE 7 -		PHASE 4 PHASE 8					
VEHICLE PERM VEHICLE PERM 2 DISI PHASE RESERVICE SPLIT EXTENSION RING SPLIT DMD PATTERN XARTERY PATTERN	G	(1) 0 NO (1) (1)	0 0 0	(2) (2) (2)	0 0 0				
PHASE NUMBER COORDINATED PHASE VEHICLE RECALL VEHICLE MAX RECALL PED RECALL PHASE OMIT SPARE		- - -	2 X - X X -	3 - - - X	4 - - X X	5 - - - - -	6 - - - - -	7 - - - -	8 - - - - -
ALTERNATE SEQUENC	E	Α	В	С	D	E	F		

#### **COORDINATED PATTERN 6**

#### TS2 FORMAT (NO CHANGE)

TIMING PLAN: OFF PEAK (1800-0800) Sat-Sun

CYCLE LENGTH: 61 OFFSETS: RECALL

	HASE 2 32 HASE 6 -	PHASE 3 PHASE 7			ASE 4 ASE 8	29 -				
VEHICLE PERM VEHICLE PERM 2 I			(1) 0	0	(2)	0				
PHASE RESERVICE SPLIT EXTENSION I SPLIT DMD PATTE XARTERY PATTER	RING ERN		NO (1) (1)	0 0	(2) (2)	0 0				
PHASE NUMBER COORDINATED PHA			1	<b>2</b> X	3	4	5	6	7	8
VEHICLE RECALL VEHICLE MAX RECAPED RECALL	ALL		- - -	X X	-	X X	- - -	- - -	- - -	- - -
PHASE OMIT SPARE			X - X - 		-	-	-	-	-	
ALTERNATE SEQU	ENCE		Α	В	С	D	E	F		



## SIGNAL TIMING PLAN (Tourist Season)

LOCATION: King St and William St Gananoque Ontario

MODE of OPERATION: Fixed (Time Based Coordination)

TIMING DEVELOPED BY: <u>Signalcorps</u>

DATE TIMING DEVELOPED: <u>June 2, 2011</u>

#### **CONTROLLER TIMING DATA**

#### **MOVEMENT (FAZE)**

		King St EB/WB		William St N/S	İ				
PHASE	1	<b>2</b>	3	4	5	6	7	8	
MIN GREEN		29	-	22	-	-	<u>.</u>	-	
BIKE GREEN	_	_	_	-	_	_	_	_	
CS MGRN				_					
WALK	_	16	_	7	_	-	_	_	
	-	16	-		-	-	-	-	
PEDESTRIAN CLEARANCE	-	13	-	15	-	-	-	-	
VEHICLE EXTENSION	-	-	-	-	-	-	-	-	
VEHICLE EXTENSION 2	-	-	-	-	-	-	-	-	
MAX EXTENSION	-	<u>-</u>	-	-	-	-	-	-	
MAX 1	-	<mark>71</mark>	-	29	-	-	-	-	
MAX 2	-	34	-	27	-	-	-	-	
MAX 3	-	-	-	-	-	-	-	-	
DET MAX	-	-	-	-	-	-	-	-	
YELLOW	-	3	-	3	-	-	-	-	
RED CLEAR	-	2	-	2	-	-	-	-	
RED REVERT	-	2	-	2	-	-	-	-	
ACT B4	-	-	-	-	-	-	-	-	
SEC/ACT	-	-	-	-	-	-	-	-	
MAX INI	-	-	-	-	-	-	-	-	
TIME B4 INIT	-	-	-	-	-	-	-	-	
CARS WT	-	-	-	-	-	-	-	-	
TT REDUC	-	-	-	-	-	-	-	-	
MIN GAP	-	-	-	-	-	-	-	-	

#### **TS2 FORMAT**

TIMING PLAN: AM (0800-1145) Mon-Fri

CYCLE LENGTH: 100

OFFSETS: 7

SPLITS

PHASE 1 - PHASE 2 PHASE 5 - PHASE 6		5114055			29 -					
THACE O	- PHASE 7 -			111/02 0						
VEHICLE PERM		(1)	0	(2)	0					
VEHICLE PERM 2 DISP		0								
PHASE RESERVICE		NO								
SPLIT EXTENSION RING(1	)	0	(2)	0						
SPLIT DMD PATTERN		(1)	0	(2)	0					
XARTERY PATTERN		0								
DUACE NUMBED		4	2	3	4	5	6	7	0	
PHASE NUMBER COORDINATED PHASES		1	X	<b>3</b>	4	<b>5</b>	0	-	8	
VEHICLE RECALL		- -	-	_	_	_	_	_	_	
VEHICLE MAX RECALL		_	Χ	_	Х	_	_	-	_	
PED RECALL		-	X	-	X	-	-	-	-	
PHASE OMIT		-	-	-	-	-	-	-	-	
SPARE		-	-	-	-	-	-	-	-	
ALTERNATE SEQUENCE		Α	В	С	D	Е	F			

#### **COORDINATED PATTERN 2**

#### **TS2 FORMAT**

TIMING PLAN: MIDDAY (1145-1615) Mon-Fri

CYCLE LENGTH: 100

OFFSETS: 92

ALTERNATE SEQUENCE		_	Α	В	С	D	E	F		
ALTERNATE OF OUTNOT				_	•	_	_	_		
SPARE			-	-	-	-	-	-	-	-
PHASE OMIT			-	-	-	-	-	-	-	-
PED RECALL			-	X	-	X	-	-	-	-
VEHICLE MAX RECALL			_	Χ	_	Х	_	_	_	_
VEHICLE RECALL			-	-	-	-	-	-	-	-
COORDINATED PHASES				X	<b>.</b>	4	5	-	-	0
PHASE NUMBER			1	2	3	4	5	6	7	8
XARTERY PATTERN			0							
SPLIT DMD PATTERN			(1)	0	(2)	0				
SPLIT EXTENSION RIN		(1)	0	(2)	0					
PHASE RESERVICE			NO							
VEHICLE PERM 2 DISP			0							
VEHICLE PERM			(1)	0	(2)	0				
PHASE 5 - PHASE 6	-	PHASE	-		ASE 8	-				
PHASE 1 - PHASE 2	<mark>71</mark>	PHASE	3 -	PHA	SE 4	29				
SPLITS										

#### **TS2 FORMAT**

TIMING PLAN: PM (1615-1800) Mon-Fri

CYCLE LENGTH: 100

OFFSETS: 76

**SPLITS** 

	-	PHASE 2 PHASE 6	<mark>71</mark> -	PHASE 3			ASE 4 ASE 8	29 -				
VEHICLE PE VEHICLE PE PHASE RESE SPLIT EXTEN SPLIT DMD XARTERY P	ERM ERV NSIC PA	I 2 DISP VICE ON RING ITTERN			(1) 0 NO (1) (1) 0	0 0 0	(2) (2) (2)	0 0 0				
PHASE NUMI COORDINAT VEHICLE RE VEHICLE MA PED RECALL PHASE OMIT SPARE	ED CAL X R -	PHASES L			1	2 X - X X -	3	4 - X X -	5 - - - - -	6	7 - - - - -	8 - - - - -
ALTERNATE	SE	QUENCE			Α	В	С	D	E	F		

#### **COORDINATED PATTERN 4**

#### **TS2 FORMAT**

TIMING PLAN: WEEKEND (0800-1800) Sat-Sun

CYCLE LENGTH: 100

OFFSETS: 88

**SPLITS** 

PHASE 1 - PHASE 2 PHASE 5 - PHASE 6	<mark>71</mark> -	PHASE 3 - PHASE 7 -		IASE 4 IASE 8	29 -				
VEHICLE PERM		(1)	0	(2)	0				
VEHICLE PERM 2 DISP		0							
PHASE RESERVICE		NO							
SPLIT EXTENSION RING		(1)	0	(2)	0				
SPLIT DMD PATTERN		(1)	0	(2)	0				
XARTERY PATTERN		0							
PHASE NUMBER		1	2	3	4	5	6	7	8
COORDINATED PHASES		-	Χ	-	-	-	-	-	-
VEHICLE RECALL		-	-	-	-	-	-	-	-
VEHICLE MAX RECALL		-	Χ	-	Χ	-	-	-	-
PED RECALL		-	Χ	-	Χ	-	-	-	-
PHASE OMIT		-	-	-	-	-	-	-	-
SPARE		-	-	-	-	-	-	-	-
ALTERNATE SEQUENCE		Α	В	С	D	E	F		

#### **TS2 FORMAT (NO CHANGE)**

CYCLE LENGTH: 61 OFFSETS: RECALL

**SPLITS** 

_	ASE 2 34 ASE 6 -	PHASE 3 PHASE 7	-	PHAS PHAS		27 -				
VEHICLE PERM VEHICLE PERM 2 DI PHASE RESERVICE SPLIT EXTENSION RI SPLIT DMD PATTER XARTERY PATTERN	NG N	1 (	(1) 0 NO (1) (1) 0	0 0 0	(2) (2) (2)	0 0 0				
PHASE NUMBER COORDINATED PHAS VEHICLE RECALL VEHICLE MAX RECAL PED RECALL PHASE OMIT SPARE		1 - - - - -	2 >- >> - >>	< - - < - < -	<b>3</b>	4 - X X	5 - - - - -	6	7 - - - -	8 - - - - -
ALTERNATE SEQUEN	ICE	A	\ E	3 (		D	E	F		

#### **COORDINATED PATTERN 6**

#### TS2 FORMAT (NO CHANGE)

TIMING PLAN: OFF PEAK (1800-0800) Sat-Sun

CYCLE LENGTH: 61 OFFSETS: RECALL

SPLITS PHASE 1 PHASE 5	-	PHASE 2 PHASE 6	34 -	PHASE S	-		ASE 4 ASE 8	27 -				
VEHICLE F					(1)	0	(2)	0				
VEHICLE F	PERM	2 DISP			0							
PHASE RES	SERV	ICE			NO							
SPLIT EXTE	ENSIC	N RING			(1)	0	(2)	0				
SPLIT DMI	D PAT	TERN			(1)	0	(2)	0				
XARTERY	PAT	ΓERN			0							
PHASE NUI	MBER	ł			1	2	3	4	5	6	7	8
COORDINA	TED	PHASES			-	Χ	-	-	-	-	-	-
VEHICLE R	ECAL	L			-	-	-	-	-	-	-	-
VEHICLE M	AX RI	ECALL			-	Χ	-	Χ	-	-	-	-
					-	Χ	-	Χ	-	-	-	-
PED RECAI	_L											
PED RECAI PHASE OM					-	-	-	-	-	-	-	-
					-	-	-	-	-	-	-	-

## APPENDIX B

## **Level of Service Definitions**



## LEVEL OF SERVICE DEFINITIONS AT SIGNALIZED INTERSECTIONS<sup>(1)</sup>

Level of service for signalized intersections is defined in terms of delay, which is a measure of driver discomfort and frustration, fuel consumption, and lost travel time. Specifically, level-of-service (LOS) criteria are stated in terms of the average control delay per vehicle, typically for a 15-min analysis period. The criteria are given in the table below. Delay may be measured in the field or estimated using software such as Highway Capacity Software. Delay is a complex measure and is dependent upon a number of variables, including quality of progression, the cycle length, the green ratio, and the v/c ratio for the lane group in question.

Level of Service	Control Delay per vehicle (sec)	
A	LOS A describes operations with very low delay, up to 5 sec per vehicle. This level of service occurs when progression is extremely favourable and most vehicles arrive during the green phase. Most vehicles do not stop at all. Short cycle lengths may also contribute to low delay.	≤ 10
В	LOS B describes operations with delay greater than 10 and up to 20 sec per vehicle. This level generally occurs with good progression, short cycle lengths, or both. More vehicles stop than with LOS A, causing higher levels of average delay.	$> 10$ and $\le 20$
С	LOS C describes operations with delay greater than 20 and up to 35 sec per vehicle. These higher delays may result from fair progression, longer cycle lengths, or both. Individual cycle failures may begin to appear at this level. The number of vehicles stopping is significant at this level, though many still pass through the intersection without stopping.	$> 20$ and $\le 35$
D	LOS D describes operations with delay greater than 35 and up to 55 sec per vehicle. At level D, the influence of congestion becomes more noticeable. Longer delays may result from some combination of unfavourable progression, long cycle lengths, of high $v/c$ ratios. Many vehicles stop, and the proportion of vehicles not stopping declines. Individual cycle failures are noticeable.	> 35 and ≤ 55
Е	LOS E describes operations with delay greater than 55 and up to 80 sec per vehicle. This level is considered by many agencies to be the limit of acceptable delay. These high delay values generally indicate poor progression, long cycle lengths, and high $v/c$ ratios. Individual cycle failures are frequent occurrences.	> 55 and ≤ 80
F	LOS F describes operations with delay in excess of 80 sec per vehicle. This level, considered to be unacceptable to most drivers, often occurs with oversaturation, that is, when arrival flow rates exceed the capacity of the intersection. It may also occur at high $v/c$ ratios below 1.0 with many individual cycle failures. Poor progression and long cycle lengths may also be major contributing causes to such delay levels.	> 80

#### (1) Highway Capacity Manual 2000

## LEVEL OF SERVICE DEFINITIONS AT UNSIGNALIZED INTERSECTIONS<sup>(1)</sup>

The level of service criteria for unsignalized intersections are given in the table below. As used here, total delay is defined as the total elapsed time from when a vehicle stops at the end of the queue until the vehicle departs from the stop line; this time includes the time required for the vehicle to travel from the last-in-queue position to the first-in-queue position. The average total delay for any particular minor movement is a function of the service rate or capacity of the approach and the degree of saturation.

Level of Service	Average Total Delay (sec/veh)				
A	Little or no traffic delay occurs. Approaches appear open, turning movements are easily made, and drivers have freedom of operation.	≤ 10			
В	Short traffic delays occur. Many drivers begin to feel somewhat restricted in terms of freedom of operation.	$> 10 \text{ and } \le 15$			
С	Average traffic delays occur. Operations are generally stable, but drivers emerging from the minor street may experience difficulty in completing their movement. This may occasionally impact on the stability of flow on the major street.	$> 15 \text{ and } \le 25$			
D	Long traffic delays occur. Motorists emerging from the minor street experience significant restriction and frustration. Drivers on the major street will experience congestion and delay as drivers emerging from the minor street interfere with the major through movements.	$> 25 \text{ and} \le 35$			
Е	Very long traffic delays occur. Operations approach the capacity of the intersection.	$> 35 \text{ and } \le 50$			
F	Saturation occurs, with vehicle demand exceeding the available capacity. Very long traffic delays occur.	> 50			

<sup>(1)</sup> Highway Capacity Manual 2000.

J:\Capacity Appendix\Unsignalized\hcs unsignalized\_delay.doc

## **APPENDIX C**

# Intersection Capacity Analysis Existing Traffic Conditions



# Lanes, Volumes, Timings 3: Stone Street South

15/10/2013

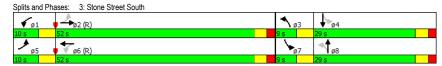
	۶	<b>→</b>	•	•	<b>←</b>	•	4	†	~	<b>/</b>	ļ	4
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	ሻ	- ↑		ሻ	<b>^</b>		ሻ	<b>1</b>		7	£	
Volume (vph)	64	145	28	19	167	74	16	52	20	62	44	69
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Storage Length (m)	30.0		0.0	35.0		0.0	30.0		0.0	35.0		0.0
Storage Lanes	1		0	1		0	1		0	1		0
Taper Length (m)	7.5			7.5			7.5			7.5		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor	0.98	0.99		0.99	0.99		0.97	0.99		0.98	0.97	
Frt		0.976			0.954			0.958			0.909	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1629	1664	0	1710	1614	0	1613	1632	0	1676	1476	0
Flt Permitted	0.546			0.623			0.662			0.706		
Satd. Flow (perm)	920	1664	0	1111	1614	0	1089	1632	0	1218	1476	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		13			30			18			74	
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		96.1			200.4			528.8			53.5	
Travel Time (s)		6.9			14.4			38.1			3.9	
Confl. Peds. (#/hr)	9		4	4		9	12		8	8		12
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	5%	6%	0%	0%	7%	0%	6%	6%	0%	2%	7%	7%
Adj. Flow (vph)	70	158	30	21	182	80	17	57	22	67	48	75
Shared Lane Traffic (%)												
Lane Group Flow (vph)	70	188	0	21	262	0	17	79	0	67	123	0
Turn Type	pm+pt	NA		pm+pt	NA		pm+pt	NA		pm+pt	NA	
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases	2			6			8			4		
Minimum Split (s)	10.0	52.0		10.0	52.0		9.0	29.0		9.0	29.0	
Total Split (s)	10.0	52.0		10.0	52.0		9.0	29.0		9.0	29.0	
Total Split (%)	10.0%	52.0%		10.0%	52.0%		9.0%	29.0%		9.0%	29.0%	
Maximum Green (s)	6.0	47.0		6.0	47.0		5.0	24.0		5.0	24.0	
Yellow Time (s)	4.0	3.0		4.0	3.0		4.0	3.0		4.0	3.0	
All-Red Time (s)	0.0	2.0		0.0	2.0		0.0	2.0		0.0	2.0	
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	
Walk Time (s)		5.0			5.0			5.0			5.0	
Flash Dont Walk (s)		11.0			11.0			11.0			11.0	
Pedestrian Calls (#/hr)	= 4.0	0		= 4.0	0		00.0	0			0	
Act Effct Green (s)	54.0	47.0		54.0	47.0		30.0	24.0		30.0	24.0	
Actuated g/C Ratio	0.54	0.47		0.54	0.47		0.30	0.24		0.30	0.24	
v/c Ratio	0.13	0.24		0.03	0.34		0.05	0.20		0.17	0.30	
Control Delay	10.0	15.7		16.1	28.0		22.6	25.3		24.3	16.1	
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay	10.0	15.7		16.1	28.0		22.6	25.3		24.3	16.1	
LOS	A	В		В	C		С	C		С	В	
Approach Delay		14.1			27.1			24.8			19.0	
Approach LOS		В			С			С			В	

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Lanes, Volumes, Timings 3: Stone Street South

15/10/2013

	•	-	$\rightarrow$	•	←	•	1	<b>†</b>	~	-	ļ	4
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Queue Length 50th (m)	5.9	20.4		2.8	43.5		2.3	9.9		9.3	7.9	
Queue Length 95th (m)	12.1	35.0		m8.1	70.2		7.2	22.3		19.3	23.3	
Internal Link Dist (m)		72.1			176.4			504.8			29.5	
Turn Bay Length (m)	30.0			35.0			30.0			35.0		
Base Capacity (vph)	539	788		635	774		352	405		388	410	
Starvation Cap Reductn	0	0		0	0		0	0		0	0	
Spillback Cap Reductn	0	0		0	0		0	0		0	0	
Storage Cap Reductn	0	0		0	0		0	0		0	0	
Reduced v/c Ratio	0.13	0.24		0.03	0.34		0.05	0.20		0.17	0.30	
Intersection Summary												
Area Type:	Other											
Cycle Length: 100												
Actuated Cycle Length: 100	)											
Offset: 87 (87%), Reference	ed to phase	2:EBTL a	nd 6:WB	TL, Start	of Green							
Natural Cycle: 100												
Control Type: Pretimed												
Maximum v/c Ratio: 0.34												
Intersection Signal Delay: 2	0.9			In	tersection	LOS: C						
Intersection Capacity Utiliza	ation 58.3%			IC	U Level o	of Service	В					
Analysis Period (min) 15												
m Volume for 95th percer	ntile queue is	metered	by upstr	eam signa	al.							



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4: King Street

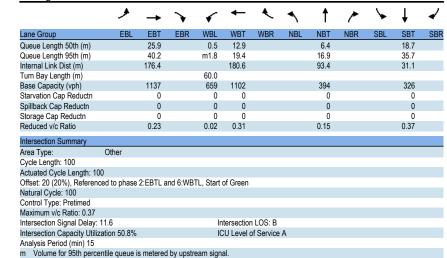
1. Tung Gudot	•		$\overline{}$		<b>—</b>	•	•	†	<i>&gt;</i>	$\overline{}$	1	7
			*	*			7	•	,	001	*	
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	-	4	40	7	<b>\$</b>	00	40	4	47	74	4	40
Volume (vph)	7	224	10	11	236	80	10	27	17	71	20	19
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Storage Length (m)	0.0		0.0	60.0		0.0	0.0		0.0	0.0		0.0
Storage Lanes	7.5		U	7.5		U	7.5		U	7.5		U
Taper Length (m)	1.00	4.00	4.00		4.00	4.00		4.00	4.00	1.00	4.00	4.00
Lane Util. Factor Ped Bike Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
				1.00				0.99			0.99	
Frt		0.994		0.050	0.962			0.958			0.976	
Fit Protected	^	0.998	0	0.950	4050	^	^	0.991	0	0	0.969	0
Satd. Flow (prot)	0	1735	0	1569	1652	0	0	1662	0	0	1660	0
FIt Permitted	^	0.990	0	0.608	4050	^	0	0.948	0	0	0.780	0
Satd. Flow (perm)	0	1721	0	999	1652	0	U	1585	0	U	1328	0
Right Turn on Red		_	Yes		00	Yes		40	Yes		40	Yes
Satd. Flow (RTOR)		5			36			18			10	
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		200.4			204.6			117.4			55.1	
Travel Time (s)		14.4			14.7			8.5	_	_	4.0	
Confl. Peds. (#/hr)	11		4	4		11	9		5	5		9
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	0%	3%	0%	9%	4%	3%	0%	0%	6%	0%	10%	0%
Adj. Flow (vph)	8	243	11	12	257	87	11	29	18	77	22	21
Shared Lane Traffic (%)	•	222	•	40	244	•	•		•	•	400	•
Lane Group Flow (vph)	0	262	0	12	344	0	0	58	0	0	120	0
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		2			6			8			4	
Permitted Phases	2	=4.0		6	=4.0		8	00.0		4	20.0	
Minimum Split (s)	71.0	71.0		71.0	71.0		29.0	29.0		29.0	29.0	
Total Split (s)	71.0	71.0		71.0	71.0		29.0	29.0		29.0	29.0	
Total Split (%)	71.0%	71.0%		71.0%	71.0%		29.0%	29.0%		29.0%	29.0%	
Maximum Green (s)	66.0	66.0		66.0	66.0		24.0	24.0		24.0	24.0	
Yellow Time (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
All-Red Time (s)	2.0	2.0		2.0	2.0		2.0	2.0		2.0	2.0	
Lost Time Adjust (s)		0.0		0.0	0.0			0.0			0.0	
Total Lost Time (s)		5.0		5.0	5.0			5.0			5.0	
Lead/Lag												
Lead-Lag Optimize?												
Walk Time (s)	11.0	11.0		11.0	11.0		8.0	8.0		8.0	8.0	
Flash Dont Walk (s)	16.0	16.0		16.0	16.0		16.0	16.0		16.0	16.0	
Pedestrian Calls (#/hr)	0	0		0	0		0	0		0	0	
Act Effct Green (s)		66.0		66.0	66.0			24.0			24.0	
Actuated g/C Ratio		0.66		0.66	0.66			0.24			0.24	
v/c Ratio		0.23		0.02	0.31			0.15			0.37	
Control Delay		8.4		4.6	4.8			23.6			32.8	
Queue Delay		0.0		0.0	0.0			0.0			0.0	
Total Delay		8.4		4.6	4.8			23.6			32.8	
LOS		Α		Α	Α			С			С	
Approach Delay		8.4			4.8			23.6			32.8	
Approach LOS		Α			Α			С			С	

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#### Lanes, Volumes, Timings

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Splits and Phases: 4: King Street



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## Lanes, Volumes, Timings 5: King Street

Approach LOS

Lane Group EBL EBT EBR WBL WBT WBR NBT NBR Lane Configurations Volume (vph) 291 307 22 23 Ideal Flow (vphpl) 1800 1800 1800 1800 1800 1800 1800 1800 1800 1800 1800 1800 Storage Length (m) 85.0 0.0 25.0 0.0 0.0 0.0 0.0 0.0 Storage Lanes 0 0 Λ 0 Λ Λ Taper Length (m) 7.5 Lane Util. Factor 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 Ped Bike Factor 0.99 1.00 0.99 1.00 0.96 0.96 0.944 0.983 Frt 0.991 0.990 Flt Protected 0.950 0.950 0.984 0.971 Satd. Flow (prot) 1425 1742 1583 0 0 1729 0 1551 0 0 1685 0 Flt Permitted 0.519 0.535 0.906 0.811 Satd. Flow (perm) 771 1742 887 1729 0 1426 0 1361 0 0 0 Right Turn on Red Yes Yes Yes 33 Satd. Flow (RTOR) 8 Link Speed (k/h) 50 50 50 50 Link Distance (m) 204.6 68.0 118.0 53.5 14.7 Travel Time (s) 4.9 8.5 3.9 Confl. Peds. (#/hr) 10 5 5 10 2 28 28 Peak Hour Factor 0.92 0.92 0.92 0.92 0.92 0.92 0.92 0.92 0.92 0.92 0.92 0.92 Heavy Vehicles (%) 20% 2% 6% 8% 3% 0% 9% 0% 3% 0% 6% 0% Adj. Flow (vph) 316 20 42 334 24 25 21 33 43 20 5 9 Shared Lane Traffic (%) Lane Group Flow (vph) 5 336 42 358 79 72 Perm Turn Type NA Perm NA Perm NA Perm NA Protected Phases Permitted Phases 2 6 8 Minimum Split (s) 71.0 71.0 71.0 71.0 29.0 29.0 29.0 29.0 Total Split (s) 71.0 71.0 71.0 71.0 29.0 29.0 29.0 29.0 Total Split (%) 71.0% 71.0% 71.0% 71.0% 29.0% 29.0% 29.0% 29.0% Maximum Green (s) 66.0 66.0 66.0 66.0 24.0 24.0 24.0 24.0 3.0 3.0 3.0 3.0 3.0 3.0 Yellow Time (s) 3.0 3.0 All-Red Time (s) 2.0 2.0 2.0 2.0 2.0 2.0 2.0 2.0 Lost Time Adjust (s) 0.0 0.0 0.0 0.0 0.0 0.0 Total Lost Time (s) 5.0 5.0 5.0 5.0 5.0 5.0 Lead/Lag Lead-Lag Optimize? Walk Time (s) 16.0 16.0 16.0 16.0 7.0 7.0 7.0 7.0 15.0 Flash Dont Walk (s) 13.0 13.0 13.0 13.0 15.0 15.0 15.0 Pedestrian Calls (#/hr) 0 Act Effct Green (s) 66.0 66.0 66.0 66.0 24.0 24.0 Actuated q/C Ratio 0.66 0.66 0.66 0.66 0.24 0.24 0.01 v/c Ratio 0.29 0.07 0.31 0.22 0.22 Control Delay 3.8 5.1 8.0 20.9 29.6 Queue Delay 0.0 0.0 0.0 0.0 0.0 0.0 Total Delay 3.8 5.1 6.5 8.0 20.9 29.6 LOS Α Α Α Α С С 20.9 Approach Delay 29.6 7.8

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Α

С

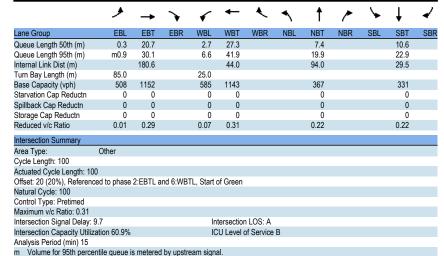
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#### Lanes, Volumes, Timings

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Splits and Phases: 5: King Street



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	•	•	<b>†</b>	<i>&gt;</i>	<b>&gt;</b>	ţ		
Movement	WBL	WBR	NBT	NBR	SBL	SBT		
Lane Configurations	W		1>			ની		
Volume (veh/h)	0	15	0	0	13	0		
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)	0	16	0	0	14	0		
Pedestrians			1			10		
Lane Width (m)			3.6			3.6		
Walking Speed (m/s)			1.2			1.2		
Percent Blockage			0			1		
Right turn flare (veh)								
Median type			None			None		
Median storage veh)								
Upstream signal (m)								
pX, platoon unblocked								
vC, conflicting volume	29	10			0			
vC1, stage 1 conf vol								
vC2, stage 2 conf vol								
vCu, unblocked vol	29	10			0			
tC, single (s)	6.4	6.2			4.1			
tC, 2 stage (s)								
tF (s)	3.5	3.3			2.2			
p0 queue free %	100	98			99			
cM capacity (veh/h)	981	1068			1636			
Direction, Lane #	WB 1	NB 1	SB 1					
Volume Total	16	0	14					
Volume Left	0	0	14					
Volume Right	16	0	0					
cSH	1068	1700	1636					
Volume to Capacity	0.02	0.00	0.01					
Queue Length 95th (m)	0.4	0.0	0.2					
Control Delay (s)	8.4	0.0	7.2					
Lane LOS	Α		Α					
Approach Delay (s)	8.4	0.0	7.2					
Approach LOS	Α							
Intersection Summary								
Average Delay			7.9				_	
Intersection Capacity Utiliza	ation		16.2%	IC	U Level o	f Service		
Analysis Period (min)			15					
, 5.0 . 6.100 (11.111)								

	۶	<b>→</b>	•	•	•	•	4	<b>†</b>	~	-	↓	4
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations			1		4			<b>†</b>			<b>1</b> >	
Volume (veh/h)	24	0	10	2	3	5	10	15	0	0	11	24
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	26	0	11	2	3	5	11	16	0	0	12	26
Pedestrians		10			5			6			4	
Lane Width (m)		3.6			3.6			3.6			3.6	
Walking Speed (m/s)		1.2			1.2			1.2			1.2	
Percent Blockage		1			0			1			0	
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	84	78	41	85	91	25	48			21		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	84	78	41	85	91	25	48			21		
tC, single (s)	7.1	6.5	6.2	7.6	6.5	6.4	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	4.0	4.0	3.5	2.2			2.2		
p0 queue free %	97	100	99	100	100	99	99			100		
cM capacity (veh/h)	867	800	1022	771	787	994	1559			1601		
Direction, Lane #	EB 1	WB 1	NB 1	SB 1								
Volume Total	37	11	27	38								
Volume Left	26	2	11	0								
Volume Right	11	5	0	26								
cSH	907	874	1559	1700								
Volume to Capacity	0.04	0.01	0.01	0.02								
Queue Length 95th (m)	1.0	0.3	0.2	0.0								
Control Delay (s)	9.1	9.2	3.0	0.0								
Lane LOS	Α	Α	Α									
Approach Delay (s)	9.1	9.2	3.0	0.0								
Approach LOS	Α	Α										
Intersection Summary												
Average Delay			4.6									
Intersection Capacity Utilization	1		Err%	IC	U Level o	of Service			Н			
Analysis Period (min)			15									

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3: Stone Street South

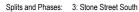
	۶	-	$\rightarrow$	•	<b>←</b>	•	4	<b>†</b>	<b>/</b>	-	ļ	4
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	7	ĵ.		Ť	ĵ»		7	ĵ.		Ť	f)	
Volume (vph)	82	262	34	27	241	107	25	49	47	102	47	70
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Storage Length (m)	30.0		0.0	35.0		0.0	30.0		0.0	35.0		0.0
Storage Lanes	1		0	1		0	1		0	1		0
Taper Length (m)	7.5			7.5			7.5			7.5		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor	0.99	0.99		0.97	0.99		0.97	0.95		0.93	0.96	
Frt		0.983			0.954			0.926			0.910	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1676	1694	0	1644	1642	0	1583	1569	0	1676	1571	0
Flt Permitted	0.433			0.487			0.654			0.690		
Satd. Flow (perm)	759	1694	0	815	1642	0	1054	1569	0	1132	1571	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		9			30			46			71	
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		96.1			200.4			528.8			53.5	
Travel Time (s)		6.9			14.4			38.1			3.9	
Confl. Peds. (#/hr)	8		32	32		8	19		39	39		19
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	2%	4%	0%	4%	5%	0%	8%	2%	0%	2%	0%	1%
Adj. Flow (vph)	89	285	37	29	262	116	27	53	51	111	51	76
Shared Lane Traffic (%)												
Lane Group Flow (vph)	89	322	0	29	378	0	27	104	0	111	127	0
Turn Type	pm+pt	NA		pm+pt	NA		pm+pt	NA		pm+pt	NA	
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases	2			6			8			4		
Minimum Split (s)	10.0	52.0		10.0	52.0		9.0	29.0		9.0	29.0	
Total Split (s)	10.0	52.0		10.0	52.0		9.0	29.0		9.0	29.0	
Total Split (%)	10.0%	52.0%		10.0%	52.0%		9.0%	29.0%		9.0%	29.0%	
Maximum Green (s)	6.0	47.0		6.0	47.0		5.0	24.0		5.0	24.0	
Yellow Time (s)	4.0	3.0		4.0	3.0		4.0	3.0		4.0	3.0	
All-Red Time (s)	0.0	2.0		0.0	2.0		0.0	2.0		0.0	2.0	
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	
Walk Time (s)		13.0			13.0			7.0			7.0	
Flash Dont Walk (s)		14.0			14.0			17.0			17.0	
Pedestrian Calls (#/hr)		0			0			0			0	
Act Effct Green (s)	54.0	47.0		54.0	47.0		30.0	24.0		30.0	24.0	
Actuated g/C Ratio	0.54	0.47		0.54	0.47		0.30	0.24		0.30	0.24	
v/c Ratio	0.19	0.40		0.06	0.48		0.08	0.25		0.30	0.29	
Control Delay	10.5	18.7		12.7	21.2		23.0	19.9		26.7	16.9	
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay	10.5	18.7		12.7	21.2		23.0	19.9		26.7	16.9	
LOS	В	В		В	С		С	В		С	В	
Approach Delay		16.9			20.6			20.5			21.5	
Approach LOS		В			С			С			С	

30/09/2013 Existing PM Synchro 8 Report Page 1 Lanes, Volumes, Timings

3: Stone Street South

	•	-	$\rightarrow$	•	<b>—</b>	•	1	<b>†</b>		-	ļ	4
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Queue Length 50th (m)	7.5	40.2		2.3	38.2		3.7	9.4		15.9	9.0	
Queue Length 95th (m)	14.6	62.4		m7.9	66.7		9.8	23.8		29.3	24.7	
Internal Link Dist (m)		72.1			176.4			504.8			29.5	
Turn Bay Length (m)	30.0			35.0			30.0			35.0		
Base Capacity (vph)	464	800		489	787		342	411		366	431	
Starvation Cap Reductn	0	0		0	0		0	0		0	0	
Spillback Cap Reductn	0	0		0	0		0	0		0	0	
Storage Cap Reductn	0	0		0	0		0	0		0	0	
Reduced v/c Ratio	0.19	0.40		0.06	0.48		0.08	0.25		0.30	0.29	
Intersection Summary												
Area Type:	Other											
Cycle Length: 100												
Actuated Cycle Length: 10	00											
Offset: 20 (20%), Referen	ced to phase	2:EBTL a	ind 6:WB	TL, Start	of Green							
Natural Cycle: 100												
Control Type: Pretimed												
Maximum v/c Patio: 0.48												

Maximum v/c Ratio: 0.48
Intersection Signal Delay: 19.5
Intersection Capacity Utilization 59.2%
ICU
Analysis Period (min) 15
m Volume for 95th percentile queue is metered by upstream signal. Intersection LOS: B ICU Level of Service B





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4: King Street

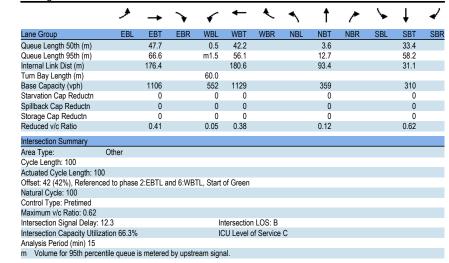
4: King Street											10/	10/2013
	۶	<b>→</b>	•	•	<b>←</b>	•	4	<b>†</b>	/	-	ţ	4
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		4		7	<b>1</b>			4			4	
Volume (vph)	18	363	30	24	331	60	8	13	18	125	21	31
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Storage Length (m)	0.0		0.0	60.0		0.0	0.0		0.0	0.0		0.0
Storage Lanes	0		0	1		0	0		0	0		0
Taper Length (m)	7.5			7.5			7.5			7.5		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor		0.99		0.95	1.00			0.96			0.95	
Frt		0.990			0.977			0.937			0.976	
Flt Protected		0.998		0.950				0.990			0.966	
Satd. Flow (prot)	0	1712	0	1710	1702	0	0	1542	0	0	1642	0
Flt Permitted		0.975		0.491				0.936			0.763	
Satd. Flow (perm)	0	1672	0	837	1702	0	0	1433	0	0	1263	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		8			19			20			10	
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		200.4			204.6			117.4			55.1	
Travel Time (s)		14.4			14.7			8.5			4.0	
Confl. Peds. (#/hr)	6		60	60		6	61		19	19		61
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	6%	3%	0%	0%	3%	2%	13%	8%	0%	1%	0%	0%
Adj. Flow (vph)	20	395	33	26	360	65	9	14	20	136	23	34
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	448	0	26	425	0	0	43	0	0	193	0
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		2			6			8			4	
Permitted Phases	2			6			8			4		
Minimum Split (s)	71.0	71.0		71.0	71.0		29.0	29.0		29.0	29.0	
Total Split (s)	71.0	71.0		71.0	71.0		29.0	29.0		29.0	29.0	
Total Split (%)	71.0%	71.0%		71.0%	71.0%		29.0%	29.0%		29.0%	29.0%	
Maximum Green (s)	66.0	66.0		66.0	66.0		24.0	24.0		24.0	24.0	
Yellow Time (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
All-Red Time (s)	2.0	2.0		2.0	2.0		2.0	2.0		2.0	2.0	
Lost Time Adjust (s)		0.0		0.0	0.0			0.0			0.0	
Total Lost Time (s)		5.0		5.0	5.0			5.0			5.0	
Lead/Lag												
Lead-Lag Optimize?												
Walk Time (s)	11.0	11.0		11.0	11.0		8.0	8.0		8.0	8.0	
Flash Dont Walk (s)	16.0	16.0		16.0	16.0		16.0	16.0		16.0	16.0	
Pedestrian Calls (#/hr)	0	0		0	0		0	0		0	0	
Act Effct Green (s)		66.0		66.0	66.0			24.0			24.0	
Actuated g/C Ratio		0.66		0.66	0.66			0.24			0.24	
v/c Ratio		0.41		0.05	0.38			0.12			0.62	
Control Delay		6.2		2.3	5.0			19.9			42.2	
Queue Delay		0.0		0.0	0.0			0.0			0.0	
Total Delay		6.2		2.3	5.0			19.9			42.2	
LOS		Α		Α	Α			В			D	
Approach Delay		6.2			4.9			19.9			42.2	
Approach LOS		Α			Α			В			D	

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#### Lanes, Volumes, Timings

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4: King Street 15/10/2013



Splits and Phases: 4: King Street



## Lanes, Volumes, Timings 5: King Street

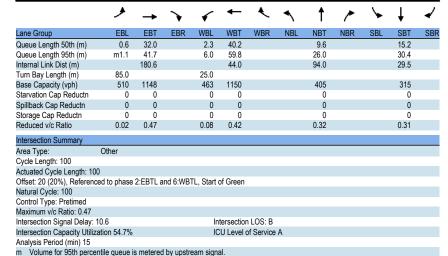
Lane Group EBL EBT EBR WBL WBT WBR NBT NBR Lane Configurations Volume (vph) 480 406 29 32 21 Ideal Flow (vphpl) 1800 1800 1800 1800 1800 1800 1800 1800 1800 1800 1800 1800 Storage Length (m) 85.0 0.0 25.0 0.0 0.0 0.0 0.0 0.0 Storage Lanes 0 0 Λ 0 Λ Λ Taper Length (m) 7.5 Lane Util. Factor 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 Ped Bike Factor 0.99 1.00 0.98 1.00 0.94 0.96 0.919 0.983 Frt 0.996 0.988 Flt Protected 0.950 0.950 0.992 0.969 Satd. Flow (prot) 1710 1739 1710 0 1528 0 1705 0 1739 0 0 0 Flt Permitted 0.436 0.397 0.951 0.761 Satd. Flow (perm) 774 1739 702 1739 0 1460 0 1291 0 0 0 Right Turn on Red Yes Yes Yes 72 Satd. Flow (RTOR) 3 9 Link Speed (k/h) 50 50 50 50 Link Distance (m) 204.6 68.0 118.0 53.5 Travel Time (s) 14.7 4.9 8.5 3.9 Confl. Peds. (#/hr) 18 25 25 18 11 33 33 11 Peak Hour Factor 0.92 0.92 0.92 0.92 0.92 0.92 0.92 0.92 0.92 0.92 0.92 0.92 Heavy Vehicles (%) 0% 3% 0% 0% 2% 0% 0% 3% 1% 0% 0% 0% Adj. Flow (vph) 11 522 16 35 441 37 20 32 79 23 12 63 Shared Lane Traffic (%) Lane Group Flow (vph) 11 538 35 478 0 131 98 Perm Turn Type NA Perm NA Perm NA Perm NA Protected Phases Permitted Phases 2 6 8 Minimum Split (s) 71.0 71.0 71.0 71.0 29.0 29.0 29.0 29.0 Total Split (s) 71.0 71.0 71.0 71.0 29.0 29.0 29.0 29.0 Total Split (%) 71.0% 71.0% 71.0% 71.0% 29.0% 29.0% 29.0% 29.0% Maximum Green (s) 66.0 66.0 66.0 66.0 24.0 24.0 24.0 24.0 3.0 3.0 3.0 3.0 3.0 3.0 Yellow Time (s) 3.0 3.0 All-Red Time (s) 2.0 2.0 2.0 2.0 2.0 2.0 2.0 2.0 Lost Time Adjust (s) 0.0 0.0 0.0 0.0 0.0 0.0 Total Lost Time (s) 5.0 5.0 5.0 5.0 5.0 5.0 Lead/Lag Lead-Lag Optimize? Walk Time (s) 16.0 16.0 16.0 16.0 7.0 7.0 7.0 7.0 15.0 Flash Dont Walk (s) 13.0 13.0 13.0 13.0 15.0 15.0 15.0 Pedestrian Calls (#/hr) 0 Act Effct Green (s) 66.0 66.0 66.0 66.0 24.0 24.0 Actuated q/C Ratio 0.66 0.66 0.66 0.66 0.24 0.24 0.02 v/c Ratio 0.47 0.08 0.42 0.32 0.31 Control Delay 4.2 6.6 9.1 17.6 32.2 Queue Delay 0.0 0.0 0.0 0.0 0.0 0.0 Total Delay 4.2 6.6 6.6 9.1 17.6 32.2 LOS Α Α Α Α В С Approach Delay 17.6 32.2 6.6 9.0 Approach LOS Α Α В С

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#### Lanes, Volumes, Timings

15/10/2013

5: King Street 15/10/2013



Splits and Phases: 5: King Street



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15/10/2013	
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	€	•	<b>†</b>	1	-	ļ	
Movement	WBL	WBR	NBT	NBR	SBL	SBT	
Lane Configurations	M		î,			4	
Volume (veh/h)	0	17	3	1	33	4	
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)	0	18	3	1	36	4	
Pedestrians	8					4	
Lane Width (m)	3.6					3.6	
Walking Speed (m/s)	1.2					1.2	
Percent Blockage	1					0	
Right turn flare (veh)							
Median type			None			None	
Median storage veh)							
Upstream signal (m)							
pX, platoon unblocked							
vC, conflicting volume	88	16			12		
vC1, stage 1 conf vol							
vC2, stage 2 conf vol							
vCu, unblocked vol	88	16			12		
tC, single (s)	6.4	6.3			4.1		
tC, 2 stage (s)							
tF (s)	3.5	3.4			2.2		
p0 queue free %	100	98			98		
cM capacity (veh/h)	891	1041			1609		
Direction, Lane #	WB 1	NB 1	SB 1				
Volume Total	18	4	40				
Volume Left	0	0	36				
Volume Right	18	1	0				
cSH	1041	1700	1609				
Volume to Capacity	0.02	0.00	0.02				
Queue Length 95th (m)	0.4	0.0	0.5				
Control Delay (s)	8.5	0.0	6.5				
Lane LOS	Α		Α				
Approach Delay (s)	8.5	0.0	6.5				
Approach LOS	Α						
Intersection Summary							
Average Delay			6.7				
Intersection Capacity Utiliza	ation		20.1%	IC	U Level o	of Service	
Analysis Period (min)			15				
, , , , ,							

2: Stone Street Sou	uth										15/1	0/2013
	•	-	•	•	•	•	4	<b>†</b>	-	-	<b>↓</b>	1
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations			7		4			<b>^</b>			ĥ	
Volume (veh/h)	36	0	20	0	2	2	13	20	0	0	29	19
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	39	0	22	0	2	2	14	22	0	0	32	21
Pedestrians		17			7			5			3	
Lane Width (m)		3.6			3.6			3.6			3.6	
Walking Speed (m/s)		1.2			1.2			1.2			1.2	
Percent Blockage		1			1			0			0	
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	115	116	64	126	126	32	69			29		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	115	116	64	126	126	32	69			29		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.7	4.2			4.1		
tC, 2 stage (s)						•						
tF (s)	3.5	4.0	3.3	3.5	4.0	3.8	2.3			2.2		
p0 queue free %	95	100	98	100	100	100	99			100		
cM capacity (veh/h)	829	755	988	807	746	912	1473			1588		
Direction, Lane #	EB 1	WB 1	NB 1	SB 1								
Volume Total	61	4	36	52								
Volume Left	39	0	14	0								
Volume Right	22	2	0	21								
cSH	880	821	1473	1700								
Volume to Capacity	0.07	0.01	0.01	0.03								
Queue Length 95th (m)	1.8	0.1	0.2	0.0								
Control Delay (s)	9.4	9.4	3.0	0.0								
Lane LOS	J.4	3. <del>4</del>	A.0	0.0								
Approach Delay (s)	9.4	9.4	3.0	0.0								
Approach LOS	Α.	Α.	0.0	0.0								
Intersection Summary												
Average Delay			4.7									
Intersection Capacity Utilizat	tion		Err%	IC	U Level o	of Service			Н			
Analysis Period (min)			15	- 10	LOTOI	J. 301 1100			- 11			
			.0									

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Synchro 8 Report Page 2 30/09/2013 Existing PM

## APPENDIX D

# Intersection Capacity Analysis Future Background Conditions

3: Stone Street South

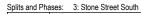
	۶	<b>→</b>	•	•	<b>←</b>	•	4	†	~	<b>/</b>	ļ	-√
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	*	<b>^</b>		ሻ	<b>1</b>		ሻ	<b>1</b>		ሻ	<b>1</b>	
Volume (vph)	67	151	30	20	174	77	17	54	21	65	46	72
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Storage Length (m)	30.0		0.0	35.0		0.0	30.0		0.0	35.0		0.0
Storage Lanes	1		0	1		0	1		0	1		0
Taper Length (m)	7.5			7.5			7.5			7.5		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor	0.98	0.99		0.99	0.99		0.97	0.99		0.98	0.97	
Frt		0.975			0.954			0.958			0.909	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1629	1662	0	1710	1614	0	1613	1632	0	1676	1476	0
Flt Permitted	0.535			0.614			0.652			0.704		
Satd. Flow (perm)	902	1662	0	1095	1614	0	1073	1632	0	1215	1476	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		14			30			18			74	
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		96.1			200.4			528.8			53.5	
Travel Time (s)		6.9			14.4			38.1			3.9	
Confl. Peds. (#/hr)	9		4	4		9	12		8	8		12
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	5%	6%	0%	0%	7%	0%	6%	6%	0%	2%	7%	7%
Adj. Flow (vph)	73	164	33	22	189	84	18	59	23	71	50	78
Shared Lane Traffic (%)												
Lane Group Flow (vph)	73	197	0	22	273	0	18	82	0	71	128	0
Turn Type	pm+pt	NA		pm+pt	NA		pm+pt	NA		pm+pt	NA	
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases	2			6			8			4		
Minimum Split (s)	10.0	52.0		10.0	52.0		9.0	29.0		9.0	29.0	
Total Split (s)	10.0	52.0		10.0	52.0		9.0	29.0		9.0	29.0	
Total Split (%)	10.0%	52.0%		10.0%	52.0%		9.0%	29.0%		9.0%	29.0%	
Maximum Green (s)	6.0	47.0		6.0	47.0		5.0	24.0		5.0	24.0	
Yellow Time (s)	4.0	3.0		4.0	3.0		4.0	3.0		4.0	3.0	
All-Red Time (s)	0.0	2.0		0.0	2.0		0.0	2.0		0.0	2.0	
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	
Walk Time (s)		5.0			5.0			5.0			5.0	
Flash Dont Walk (s)		11.0			11.0			11.0			11.0	
Pedestrian Calls (#/hr)		0			0			0			0	
Act Effct Green (s)	54.0	47.0		54.0	47.0		30.0	24.0		30.0	24.0	
Actuated g/C Ratio	0.54	0.47		0.54	0.47		0.30	0.24		0.30	0.24	
v/c Ratio	0.14	0.25		0.04	0.35		0.05	0.20		0.18	0.31	
Control Delay	10.0	15.8		16.1	28.3		22.6	25.6		24.4	16.7	
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay	10.0	15.8		16.1	28.3		22.6	25.6		24.4	16.7	
LOS	В	В		В	С		С	С		С	В	
Approach Delay		14.2			27.4			25.0			19.5	
Approach LOS		В			С			С			В	

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Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Queue Length 50th (m)	6.1	21.5		2.9	45.8		2.4	10.4		9.9	8.7	
Queue Length 95th (m)	12.4	36.6		m8.3	72.8		7.4	23.1		20.2	24.7	
Internal Link Dist (m)		72.1			176.4			504.8			29.5	
Turn Bay Length (m)	30.0			35.0			30.0			35.0		
Base Capacity (vph)	530	788		628	774		348	405		387	410	
Starvation Cap Reductn	0	0		0	0		0	0		0	0	
Spillback Cap Reductn	0	0		0	0		0	0		0	0	
Storage Cap Reductn	0	0		0	0		0	0		0	0	
Reduced v/c Ratio	0.14	0.25		0.04	0.35		0.05	0.20		0.18	0.31	
Intersection Summary												
Area Type:	Other											
Cycle Length: 100												
Actuated Cycle Length: 100	)											
Offset: 87 (87%), Reference	ed to phase	2:EBTL a	nd 6:WB	TL, Start	of Green							
Natural Cycle: 100												
Control Type: Pretimed												
Maximum v/c Ratio: 0.35												
Intersection Signal Delay: 2	21.2			In	tersection	LOS: C						
Intersection Capacity Utiliza	ation 58.3%			IC	U Level o	of Service	В					
Analysis Desiral (sais) 45												

Analysis Period (min) 15 m Volume for 95th percentile queue is metered by upstream signal.





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# Lanes, Volumes, Timings 4: King Street

4. King Street											.07	0,20.0
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Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		4		7	ĵ»			4			4	
Volume (vph)	8	233	11	12	245	84	11	29	18	74	21	20
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Storage Length (m)	0.0		0.0	60.0		0.0	0.0		0.0	0.0		0.0
Storage Lanes	0		0	1		0	0		0	0		0
Taper Length (m)	7.5			7.5			7.5			7.5		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor		1.00		1.00	0.99			0.99			0.99	
Frt		0.994			0.962			0.958			0.976	
Flt Protected		0.998		0.950				0.991			0.969	
Satd. Flow (prot)	0	1735	0	1569	1652	0	0	1662	0	0	1660	0
Flt Permitted		0.988		0.600				0.946			0.775	
Satd. Flow (perm)	0	1717	0	986	1652	0	0	1582	0	0	1320	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		5			36			20			10	
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		200.4			204.6			117.4			55.1	
Travel Time (s)		14.4			14.7			8.5			4.0	
Confl. Peds. (#/hr)	11		4	4		11	9		5	5		9
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	0%	3%	0%	9%	4%	3%	0%	0%	6%	0%	10%	0%
Adj. Flow (vph)	9	253	12	13	266	91	12	32	20	80	23	22
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	274	0	13	357	0	0	64	0	0	125	0
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		2			6			8			4	
Permitted Phases	2			6			8			4		
Minimum Split (s)	71.0	71.0		71.0	71.0		29.0	29.0		29.0	29.0	
Total Split (s)	71.0	71.0		71.0	71.0		29.0	29.0		29.0	29.0	
Total Split (%)	71.0%	71.0%		71.0%	71.0%		29.0%	29.0%		29.0%	29.0%	
Maximum Green (s)	66.0	66.0		66.0	66.0		24.0	24.0		24.0	24.0	
Yellow Time (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
All-Red Time (s)	2.0	2.0		2.0	2.0		2.0	2.0		2.0	2.0	
Lost Time Adjust (s)		0.0		0.0	0.0			0.0			0.0	
Total Lost Time (s)		5.0		5.0	5.0			5.0			5.0	
Lead/Lag												
Lead-Lag Optimize?												
Walk Time (s)	11.0	11.0		11.0	11.0		8.0	8.0		8.0	8.0	
Flash Dont Walk (s)	16.0	16.0		16.0	16.0		16.0	16.0		16.0	16.0	
Pedestrian Calls (#/hr)	0	0		0	0		0	0		0	0	
Act Effct Green (s)		66.0		66.0	66.0			24.0			24.0	
Actuated g/C Ratio		0.66		0.66	0.66			0.24			0.24	
v/c Ratio		0.24		0.02	0.32			0.16			0.39	
Control Delay		8.5		4.7	4.9			23.5			33.4	
Queue Delay		0.0		0.0	0.0			0.0			0.0	
Total Delay		8.5		4.7	4.9			23.5			33.4	
LOS		Α		Α	Α			С			С	
Approach Delay		8.5			4.9			23.5			33.4	
Approach LOS		Α			Α			С			С	

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Lanes, Volumes, Timings 4: King Street 15/10/2013

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Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Queue Length 50th (m)		27.1		0.6	13.5			7.1			19.6	
Queue Length 95th (m)		41.3		m1.9	20.4			18.2			37.3	
Internal Link Dist (m)	1	176.4			180.6			93.4			31.1	
Turn Bay Length (m)				60.0								
Base Capacity (vph)		1134		650	1102			394			324	
Starvation Cap Reductn		0		0	0			0			0	
Spillback Cap Reductn		0		0	0			0			0	
Storage Cap Reductn		0		0	0			0			0	
Reduced v/c Ratio		0.24		0.02	0.32			0.16			0.39	
Intersection Summary												
Area Type: Othe	er											
Cycle Length: 100												
Actuated Cycle Length: 100												
Offset: 20 (20%), Referenced to	phase 2:I	EBTL a	nd 6:WBT	L, Start	of Green							
Natural Cycle: 100												
Control Type: Pretimed												
Maximum v/c Ratio: 0.39												
Intersection Signal Delay: 11.8				In	tersection	n LOS: B						
Intersection Capacity Utilization 5	50.8%			IC	U Level o	of Service A	١.					
Analysis Period (min) 15												
m Volume for 95th percentile q	ueue is n	netered	by upstre	eam signa	al.							

Splits and Phases: 4: King Street



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## Lanes, Volumes, Timings 5: King Street

+ 4 4 Lane Group EBL EBT EBR WBL WBT WBR NBT NBR Lane Configurations Volume (vph) 303 319 23 20 19 Ideal Flow (vphpl) 1800 1800 1800 1800 1800 1800 1800 1800 1800 1800 1800 1800 Storage Length (m) 85.0 0.0 25.0 0.0 0.0 0.0 0.0 0.0 Storage Lanes 0 0 Λ 0 Λ Λ Taper Length (m) 7.5 Lane Util. Factor 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 0.99 Ped Bike Factor 1.00 0.99 1.00 0.96 0.96 0.943 0.982 Frt 0.991 0.990 Flt Protected 0.950 0.950 0.985 0.971 Satd. Flow (prot) 1425 1742 1583 0 1729 0 0 1551 0 0 1683 0 Flt Permitted 0.509 0.524 0.905 0.806 Satd. Flow (perm) 756 1742 869 1729 0 1423 0 1352 0 0 0 Right Turn on Red Yes Yes Yes 35 Satd. Flow (RTOR) 8 Link Speed (k/h) 50 50 50 50 Link Distance (m) 204.6 68.0 118.0 53.5 Travel Time (s) 14.7 4.9 8.5 3.9 Confl. Peds. (#/hr) 10 5 5 10 2 28 28 Peak Hour Factor 0.92 0.92 0.92 0.92 0.92 0.92 0.92 0.92 0.92 0.92 0.92 0.92 Heavy Vehicles (%) 20% 2% 6% 8% 3% 0% 9% 0% 3% 0% 6% 0% Adj. Flow (vph) 329 21 45 347 25 26 22 35 21 7 46 10 Shared Lane Traffic (%) Lane Group Flow (vph) 350 45 372 0 83 Perm Turn Type NA Perm NA Perm NA Perm NA Protected Phases Permitted Phases 2 6 8 Minimum Split (s) 71.0 71.0 71.0 71.0 29.0 29.0 29.0 29.0 71.0 71.0 71.0 71.0 29.0 29.0 29.0 29.0 Total Split (s) Total Split (%) 71.0% 71.0% 71.0% 71.0% 29.0% 29.0% 29.0% 29.0% Maximum Green (s) 66.0 66.0 66.0 66.0 24.0 24.0 24.0 24.0 3.0 3.0 3.0 3.0 3.0 3.0 Yellow Time (s) 3.0 3.0 All-Red Time (s) 2.0 2.0 2.0 2.0 2.0 2.0 2.0 2.0 Lost Time Adjust (s) 0.0 0.0 0.0 0.0 0.0 0.0 Total Lost Time (s) 5.0 5.0 5.0 5.0 5.0 5.0 Lead/Lag Lead-Lag Optimize? 16.0 16.0 16.0 16.0 7.0 7.0 7.0 7.0 Walk Time (s) 15.0 Flash Dont Walk (s) 13.0 13.0 13.0 13.0 15.0 15.0 15.0 Pedestrian Calls (#/hr) 0 Act Effct Green (s) 66.0 66.0 66.0 66.0 24.0 24.0 0.66 Actuated g/C Ratio 0.66 0.66 0.66 0.24 0.24 v/c Ratio 0.01 0.30 0.08 0.33 0.23 0.23 Control Delay 3.7 5.2 8.1 20.9 30.0 Queue Delay 0.0 0.0 0.0 0.0 0.0 0.0 Total Delay 3.7 5.2 6.6 8.1 20.9 30.0 LOS Α Α Α Α С С 20.9 30.0 Approach Delay 5.2 7.9 Approach LOS Α Α С С

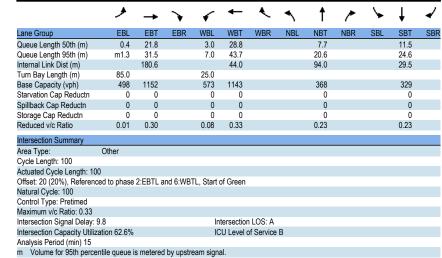
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#### Lanes, Volumes, Timings

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•	Stone	Street	South

Analysis Period (min)

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Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBF
Lane Configurations			7		4			<b>^</b>			f)	
Volume (veh/h)	25	0	11	3	4	6	11	16	0	0	12	2
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.9
Hourly flow rate (vph)	27	0	12	3	4	7	12	17	0	0	13	2
Pedestrians		10			5			6			4	
Lane Width (m)		3.6			3.6			3.6			3.6	
Walking Speed (m/s)		1.2			1.2			1.2			1.2	
Percent Blockage		1			0			1			0	
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	91	83	43	91	97	26	50			22		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	91	83	43	91	97	26	50			22		
tC, single (s)	7.1	6.5	6.2	7.6	6.5	6.4	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	4.0	4.0	3.5	2.2			2.2		
p0 queue free %	97	100	99	100	99	99	99			100		
cM capacity (veh/h)	856	795	1020	762	781	992	1556			1599		
Direction, Lane #	EB 1	WB 1	NB 1	SB 1								
Volume Total	39	14	29	40								
Volume Left	27	3	12	0								
Volume Right	12	7	0	27								
cSH	900	861	1556	1700								
Volume to Capacity	0.04	0.02	0.01	0.02								
Queue Length 95th (m)	1.1	0.4	0.2	0.0								
Control Delay (s)	9.2	9.3	3.0	0.0								
Lane LOS	Α	Α	Α									
Approach Delay (s)	9.2	9.3	3.0	0.0								
Approach LOS	Α	Α										
Intersection Summary												
Average Delay			4.7									
Intersection Capacity Utiliza	ition		Err%	IC	U Level o	of Service			Н			

	•	•	<b>†</b>	~	-	<b>↓</b>	
Movement	WBL	WBR	NBT	NBR	SBL	SBT	
Lane Configurations	¥		<b>1</b> >			4	-
Volume (veh/h)	0	16	0	0	14	0	
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)	0	17	0	0	15	0	
Pedestrians	•		1			10	
Lane Width (m)			3.6			3.6	
Walking Speed (m/s)			1.2			1.2	
Percent Blockage			0			1	
Right turn flare (veh)			•			•	
Median type			None			None	
Median storage veh)							
Upstream signal (m)							
pX, platoon unblocked							
vC, conflicting volume	31	10			0		
vC1, stage 1 conf vol	- UI	10					
vC2, stage 2 conf vol							
vCu, unblocked vol	31	10			0		
tC, single (s)	6.4	6.2			4.1		
tC, 2 stage (s)	υ.τ	J.Z			-r. ı		
tF (s)	3.5	3.3			2.2		
p0 queue free %	100	98			99		
cM capacity (veh/h)	978	1068			1636		
,					1000		
Direction, Lane #	WB 1	NB 1	SB 1				
Volume Total	17	0	15				
Volume Left	0	0	15				
Volume Right	17	0	0				
cSH	1068	1700	1636				
Volume to Capacity	0.02	0.00	0.01				
Queue Length 95th (m)	0.4	0.0	0.2				
Control Delay (s)	8.4	0.0	7.2				
Lane LOS	Α		Α				
Approach Delay (s)	8.4	0.0	7.2				
Approach LOS	Α						
Intersection Summary							
Average Delay			7.9				_
Intersection Capacity Utiliza	ation		16.2%	IC	CU Level of	Service	
Analysis Period (min)			15				

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3: Stone Street South

Lane Group         EBL         EBT         EBR         WBL         WBT         WBR         NBL         NBT         NBR         SBL         SBT           Lane Configurations         1         0         1800	73 1800 0.0 0 1.00 0 Yes
Volume (vph)         86         272         36         29         251         112         26         51         49         106         49           Ideal Flow (vphpl)         1800 <t< th=""><th>1800 0.0 0 1.00</th></t<>	1800 0.0 0 1.00
Ideal Flow (vphpl)	1800 0.0 0 1.00
Storage Length (m)         30.0         0.0         35.0         0.0         30.0         0.0         35.0           Storage Lanes         1         0         1         0         1         0         1           Taper Length (m)         7.5         7.5         7.5         7.5         7.5           Lane Util. Factor         1.00	0.0 0 1.00
Storage Lanes         1         0         1         0         1         0         1         0         1           Taper Length (m)         7.5         7.5         7.5         7.5         7.5         7.5           Lane Util. Factor         1.00	0 1.00
Taper Length (m)         7.5         7.5         7.5         7.5           Lane Util. Factor         1.00         1.0	1.00
Lane Util. Factor         1.00 <td>0</td>	0
Ped Bike Factor         0.99         0.99         0.97         0.99         0.97         0.99         0.97         0.95         0.93         0.96           Frt         0.983         0.950         1.971         0.971         0.972         0.972         1.972         1.972         0.972         0.972         1.972         0.972         0.972         0.972         0.972         0.972         0.972         0.972         0.972	0
Frt         0.983         0.954         0.926         0.910           Fit Protected         0.950         0.950         0.950         0.950           Satd. Flow (prot)         1676         1693         0         1644         1642         0         1533         1569         0         1676         1571           Fit Permitted         0.417         0.474         0.644         0.684         0.687           Satd. Flow (perm)         731         1693         0         794         1642         0         1039         1569         0         1128         1571           Right Turn on Red         Yes         Yes         Yes         Yes         Yes         71           Satd. Flow (RTOR)         9         30         46         71           Link Speed (k/h)         50         50         50         50           Link Distance (m)         96.1         200.4         528.8         53.5	0
Fit Protected   0.950   0.95	0
Satd. Flow (prot)         1676         1693         0         1644         1642         0         1583         1569         0         1676         1571           Flt Permitted         0.417         0.474         0.644         0.644         0.687	0
Fit Permitted         0.417         0.474         0.644         0.687           Satd. Flow (perm)         731         1693         0         794         1642         0         1039         1569         0         1128         1571           Right Turn on Red         Yes         Yes         Yes         Yes         168         71           Link Speed (k/h)         50         50         50           Link Distance (m)         96.1         200.4         528.8         53.5	0
Satd. Flow (perm)         731         1693         0         794         1642         0         1039         1569         0         1128         1571           Right Turn on Red         Yes         Yes         Yes         Yes         Yes         71           Satd. Flow (RTOR)         9         30         46         71           Link Speed (k/h)         50         50         50           Link Distance (m)         96.1         200.4         528.8         53.5	
Right Turn on Red         Yes         Yes         Yes           Satd. Flow (RTOR)         9         30         46         71           Link Speed (k/h)         50         50         50         50           Link Distance (m)         96.1         200.4         528.8         53.5	
Satd. Flow (RTOR)         9         30         46         71           Link Speed (k/h)         50         50         50           Link Distance (m)         96.1         200.4         528.8         53.5	Yes
Link Speed (k/h)         50         50         50           Link Distance (m)         96.1         200.4         528.8         53.5	
Link Distance (m) 96.1 200.4 528.8 53.5	
Travel Time (s) 6.9 1/1 / 38.1 3.0	
110.00 111.00 00.1 0.3	
Confl. Peds. (#/hr) 8 32 32 8 19 39 39	19
Peak Hour Factor 0.92 0.92 0.92 0.92 0.92 0.92 0.92 0.92	0.92
Heavy Vehicles (%) 2% 4% 0% 4% 5% 0% 8% 2% 0% 2% 0%	1%
Adj. Flow (vph) 93 296 39 32 273 122 28 55 53 115 53	79
Shared Lane Traffic (%)	
Lane Group Flow (vph) 93 335 0 32 395 0 28 108 0 115 132	0
Tum Type pm+pt NA pm+pt NA pm+pt NA pm+pt NA	
Protected Phases 5 2 1 6 3 8 7 4	
Permitted Phases 2 6 8 4	
Minimum Split (s) 10.0 52.0 10.0 52.0 9.0 29.0 9.0 29.0	
Total Split (s) 10.0 52.0 10.0 52.0 9.0 29.0 9.0 29.0	
Total Split (%) 10.0% 52.0% 10.0% 52.0% 9.0% 29.0% 9.0% 29.0%	
Maximum Green (s) 6.0 47.0 6.0 47.0 5.0 24.0 5.0 24.0	
Yellow Time (s) 4.0 3.0 4.0 3.0 4.0 3.0 4.0 3.0	
All-Red Time (s) 0.0 2.0 0.0 2.0 0.0 2.0 0.0 2.0	
Lost Time Adjust (s) 0.0 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 Optimize? Yes Yes Yes Yes Yes Yes Yes Yes Yes	
Walk Time (s) 13.0 13.0 7.0 7.0	
Flash Dont Walk (s) 14.0 14.0 17.0 17.0	
Pedestrian Calls (#/hr) 0 0 0	
Act Effct Green (s) 54.0 47.0 54.0 47.0 30.0 24.0 30.0 24.0	
Actuated g/C Ratio 0.54 0.47 0.54 0.47 0.30 0.24 0.30 0.24	
v/c Ratio 0.21 0.42 0.07 0.50 0.08 0.26 0.32 0.31	
Control Delay 10.6 19.0 13.0 22.1 23.0 20.4 26.9 17.5	
Queue Delay 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.	
Total Delay 10.6 19.0 13.0 22.1 23.0 20.4 26.9 17.5	
LOS B B B C C C B	
Approach Delay 17.2 21.4 20.9 21.9	
Approach LOS B C C C	

30/09/2013 FB PM Synchro 8 Report Page 1 Lanes, Volumes, Timings

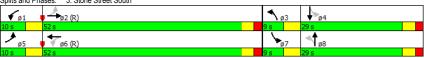
3: Stone Street South

	•	-	•	•	<b>—</b>	•	1	<b>†</b>	~	-	ţ	4
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Queue Length 50th (m)	7.9	42.3		2.7	41.4		3.8	10.1		16.5	9.9	
Queue Length 95th (m)	15.0	65.4		m8.5	71.4		10.1	24.8		30.1	26.1	
Internal Link Dist (m)		72.1			176.4			504.8			29.5	
Turn Bay Length (m)	30.0			35.0			30.0			35.0		
Base Capacity (vph)	451	800		479	787		338	411		365	431	
Starvation Cap Reductn	0	0		0	0		0	0		0	0	
Spillback Cap Reductn	0	0		0	0		0	0		0	0	
Storage Cap Reductn	0	0		0	0		0	0		0	0	
Reduced v/c Ratio	0.21	0.42		0.07	0.50		0.08	0.26		0.32	0.31	
Intersection Summary												
Area Type:	Other											
Cycle Length: 100												
Actuated Cycle Length: 100												
Offset: 20 (20%), Reference	d to phase	2:EBTL a	nd 6:WB	TL, Start	of Green							
Natural Cycle: 100												
Control Type: Pretimed												
Maximum v/c Ratio: 0.50												
Intersection Signal Delay: 20	۱ ۸			In	tareaction	I OS: B						

Intersection Signal Delay: 20.0
Intersection Capacity Utilization 62.0% Intersection LOS: B ICU Level of Service B

Analysis Period (min) 15 m Volume for 95th percentile queue is metered by upstream signal.





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Lanes, Volumes, Timings 4: King Street

4: King Street											10/	10/2013
	۶	<b>→</b>	•	•	<b>←</b>	•	4	<b>†</b>	/	-	ţ	4
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		4		7	<b>1</b>			4			4	
Volume (vph)	19	377	32	25	344	63	9	14	19	130	22	33
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Storage Length (m)	0.0		0.0	60.0		0.0	0.0		0.0	0.0		0.0
Storage Lanes	0		0	1		0	0		0	0		0
Taper Length (m)	7.5			7.5			7.5			7.5		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor		0.99		0.95	1.00			0.96			0.95	
Frt		0.990			0.977			0.938			0.976	
Flt Protected		0.998		0.950				0.989			0.966	
Satd. Flow (prot)	0	1711	0	1710	1702	0	0	1541	0	0	1642	0
Flt Permitted		0.973		0.482				0.930			0.762	
Satd. Flow (perm)	0	1668	0	823	1702	0	0	1425	0	0	1261	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		9			19			21			10	
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		200.4			204.6			117.4			55.1	
Travel Time (s)		14.4			14.7			8.5			4.0	
Confl. Peds. (#/hr)	6		60	60		6	61		19	19		61
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	6%	3%	0%	0%	3%	2%	13%	8%	0%	1%	0%	0%
Adj. Flow (vph)	21	410	35	27	374	68	10	15	21	141	24	36
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	466	0	27	442	0	0	46	0	0	201	0
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		2			6			8			4	
Permitted Phases	2			6			8			4		
Minimum Split (s)	71.0	71.0		71.0	71.0		29.0	29.0		29.0	29.0	
Total Split (s)	71.0	71.0		71.0	71.0		29.0	29.0		29.0	29.0	
Total Split (%)	71.0%	71.0%		71.0%	71.0%		29.0%	29.0%		29.0%	29.0%	
Maximum Green (s)	66.0	66.0		66.0	66.0		24.0	24.0		24.0	24.0	
Yellow Time (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
All-Red Time (s)	2.0	2.0		2.0	2.0		2.0	2.0		2.0	2.0	
Lost Time Adjust (s)		0.0		0.0	0.0			0.0			0.0	
Total Lost Time (s)		5.0		5.0	5.0			5.0			5.0	
Lead/Lag												
Lead-Lag Optimize?												
Walk Time (s)	11.0	11.0		11.0	11.0		8.0	8.0		8.0	8.0	
Flash Dont Walk (s)	16.0	16.0		16.0	16.0		16.0	16.0		16.0	16.0	
Pedestrian Calls (#/hr)	0	0		0	0		0	0		0	0	
Act Effct Green (s)		66.0		66.0	66.0			24.0			24.0	
Actuated g/C Ratio		0.66		0.66	0.66			0.24			0.24	
v/c Ratio		0.42		0.05	0.39			0.13			0.65	
Control Delay		6.4		2.4	5.2			20.1			43.5	
Queue Delay		0.0		0.0	0.0			0.0			0.0	_
Total Delay		6.4		2.4	5.2			20.1			43.5	
LOS		Α		Α	Α			С			D	
Approach Delay		6.4			5.0			20.1			43.5	
Approach LOS		Α			Α			С			D	

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Lanes, Volumes, Timings 4: King Street 15/10/2013

)	-	•	•	<b>←</b>	•	<b>1</b>	<b>†</b>	~	-	ļ	1
Lane Group EBI	L EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Queue Length 50th (m)	50.0		0.5	45.2			4.0			35.2	
Queue Length 95th (m)	69.9		m1.5	58.7			13.4			60.9	
Internal Link Dist (m)	176.4			180.6			93.4			31.1	
Turn Bay Length (m)			60.0								
Base Capacity (vph)	1103		543	1129			357			310	
Starvation Cap Reductn	0		0	0			0			0	
Spillback Cap Reductn	0		0	0			0			0	
Storage Cap Reductn	0		0	0			0			0	
Reduced v/c Ratio	0.42		0.05	0.39			0.13			0.65	
Intersection Summary											
Area Type: Other											
Cycle Length: 100											
Actuated Cycle Length: 100											
Offset: 42 (42%), Referenced to pha	se 2:EBTL a	ind 6:WB	TL, Start	of Green							
Natural Cycle: 100											
Control Type: Pretimed											
Maximum v/c Ratio: 0.65											
Intersection Signal Delay: 12.7			In	tersection	LOS: B						
Intersection Capacity Utilization 68.1	%		IC	U Level	of Service (	0					
Analysis Period (min) 15											
m Volume for 95th percentile queu	e is metered	by upstr	eam sign	al.							

Splits and Phases: 4: King Street



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## Lanes, Volumes, Timings 5: King Street

Approach LOS

+ 4 4 Lane Group EBL EBT EBR WBL WBT WBR NBT NBR Lane Configurations Volume (vph) 499 422 12 22 Ideal Flow (vphpl) 1800 1800 1800 1800 1800 1800 1800 1800 1800 1800 1800 1800 Storage Length (m) 85.0 0.0 25.0 0.0 0.0 0.0 0.0 0.0 Storage Lanes 0 0 Λ 0 Λ Λ Taper Length (m) 7.5 Lane Util. Factor 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 0.99 Ped Bike Factor 1.00 0.98 1.00 0.94 0.96 0.919 0.983 Frt 0.995 0.988 Flt Protected 0.950 0.950 0.992 0.969 Satd. Flow (prot) 1710 0 1710 1737 0 1739 0 1528 0 0 1705 0 Flt Permitted 0.423 0.384 0.950 0 744 Satd. Flow (perm) 751 1737 680 1739 0 1459 0 1263 0 0 0 Right Turn on Red Yes Yes Yes Satd. Flow (RTOR) 3 9 71 Link Speed (k/h) 50 50 50 50 Link Distance (m) 204.6 68.0 118.0 53.5 Travel Time (s) 14.7 4.9 8.5 3.9 Confl. Peds. (#/hr) 18 25 25 18 11 33 33 11 Peak Hour Factor 0.92 0.92 0.92 0.92 0.92 0.92 0.92 0.92 0.92 0.92 0.92 0.92 Heavy Vehicles (%) 0% 3% 0% 0% 2% 0% 0% 3% 1% 0% 0% 0% 12 542 17 37 459 39 21 34 83 24 13 Adj. Flow (vph) 66 Shared Lane Traffic (%) Lane Group Flow (vph) 12 559 37 498 0 138 103 Perm Turn Type NA Perm NA Perm NA Perm NA Protected Phases Permitted Phases 2 6 8 Minimum Split (s) 71.0 71.0 71.0 71.0 29.0 29.0 29.0 29.0 71.0 71.0 71.0 29.0 29.0 29.0 29.0 Total Split (s) 71.0 Total Split (%) 71.0% 71.0% 71.0% 71.0% 29.0% 29.0% 29.0% 29.0% Maximum Green (s) 66.0 66.0 66.0 66.0 24.0 24.0 24.0 24.0 3.0 3.0 3.0 3.0 3.0 3.0 Yellow Time (s) 3.0 3.0 All-Red Time (s) 2.0 2.0 2.0 2.0 2.0 2.0 2.0 2.0 Lost Time Adjust (s) 0.0 0.0 0.0 0.0 0.0 0.0 Total Lost Time (s) 5.0 5.0 5.0 5.0 5.0 5.0 Lead/Lag Lead-Lag Optimize? 16.0 16.0 16.0 16.0 7.0 7.0 7.0 Walk Time (s) 7.0 15.0 Flash Dont Walk (s) 13.0 13.0 13.0 13.0 15.0 15.0 15.0 Pedestrian Calls (#/hr) 0 Act Effct Green (s) 66.0 66.0 66.0 66.0 24.0 24.0 0.66 Actuated q/C Ratio 0.66 0.66 0.66 0.24 0.24 v/c Ratio 0.02 0.49 0.08 0.43 0.34 0.33 Control Delay 4.1 6.7 9.3 18.6 32.9 Queue Delay 0.0 0.0 0.0 0.0 0.0 0.0 Total Delay 4.1 6.7 6.7 9.3 18.6 32.9 LOS Α Α Α Α В С 18.6 32.9 Approach Delay 6.7 9.2

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В

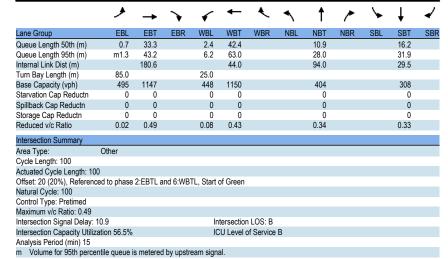
С

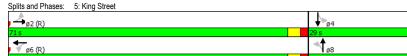
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#### Lanes, Volumes, Timings

15/10/2013

5: King Street 15/10/2013





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Movement	WBL	WBR	NBT	NBR	SBL	SBT	
Lane Configurations	W		14			ની	
Volume (veh/h)	0	18	4	2	35	5	
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)	0	20	4	2	38	5	
Pedestrians	8					4	
Lane Width (m)	3.6					3.6	
Walking Speed (m/s)	1.2					1.2	
Percent Blockage	1					0	
Right turn flare (veh)							
Median type			None			None	
Median storage veh)							
Upstream signal (m)							
pX, platoon unblocked							
vC, conflicting volume	95	17			15		
vC1, stage 1 conf vol							
vC2, stage 2 conf vol							
vCu, unblocked vol	95	17			15		
tC, single (s)	6.4	6.3			4.1		
tC, 2 stage (s)							
tF (s)	3.5	3.4			2.2		
p0 queue free %	100	98			98		
cM capacity (veh/h)	882	1039			1606		
Direction, Lane #	WB 1	NB 1	SB 1				
Volume Total	20	7	43				
Volume Left	0	0	38				
Volume Right	20	2	0				
cSH	1039	1700	1606				
Volume to Capacity	0.02	0.00	0.02				
Queue Length 95th (m)	0.5	0.0	0.6				
Control Delay (s)	8.5	0.0	6.4				
Lane LOS	A		A				
Approach Delay (s)	8.5	0.0	6.4				
Approach LOS	Α						
Intersection Summary							
Average Delay			6.4				
Intersection Capacity Utiliza	ation		20.2%	IC	U Level	of Service	
Analysis Period (min)			15				

	ၨ	<b>→</b>	`	•	<b>←</b>	4	•	<b>†</b>	<i>&gt;</i>	<b>\</b>	Ţ	1
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	LDL	LDI	7	1100	4	WER	HUL	<u> </u>	HUIT	ODL	<u>\$</u>	ODI
Volume (veh/h)	38	0	21	0	3	3	14	21	0	0	31	20
Sign Control	00	Stop		Ū	Stop	Ū		Free	Ū	U	Free	20
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	41	0	23	0	3	3	15	23	0	0	34	22
Pedestrians		17			7			5			3	
Lane Width (m)		3.6			3.6			3.6			3.6	
Walking Speed (m/s)		1.2			1.2			1.2			1.2	
Percent Blockage		1			1			0			0	
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	123	122	67	133	133	33	72			30		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	123	122	67	133	133	33	72			30		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.7	4.2			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.8	2.3			2.2		
p0 queue free %	95	100	98	100	100	100	99			100		
cM capacity (veh/h)	817	749	984	797	739	911	1469			1587		
Direction, Lane #	EB 1	WB 1	NB 1	SB 1								
Volume Total	64	7	38	55								
Volume Left	41	0	15	0								
Volume Right	23	3	0	22								
cSH	870	816	1469	1700								
Volume to Capacity	0.07	0.01	0.01	0.03								
Queue Length 95th (m)	1.9	0.2	0.3	0.0								
Control Delay (s)	9.5	9.4	3.0	0.0								
Lane LOS	Α	Α	Α									
Approach Delay (s)	9.5	9.4	3.0	0.0								
Approach LOS	Α	Α										
Intersection Summary												
Average Delay			4.8									
Intersection Capacity Utilization	1		Err%	IC	U Level o	of Service			Н			
Analysis Period (min)			15									

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## APPENDIX E

## Intersection Capacity Analysis Total Future Traffic Conditions

3: Stone Street South

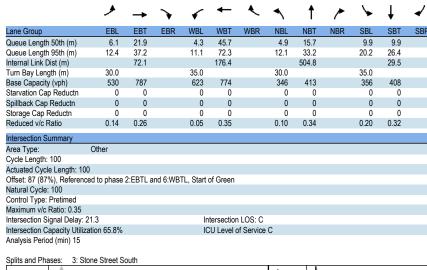
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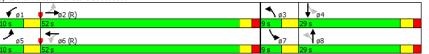
Lane Corongurations		•	<b>→</b>	$\rightarrow$	•	<b>←</b>	•	<b>1</b>	<b>†</b>	1	-	ţ	4
Volume (uph)	Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Volume (uph)	Lane Configurations	Ť	ĵ.		Ť	ĵ,		7	ĵ.		7	ĵ.	
Storage Length (m)   30.0   0.0   35.0   0.0   30.0   0.0   35.0   0.0	Volume (vph)		151	34	29		77	33		62	65	49	72
Storage Lanes	Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Taper Length (m)	Storage Length (m)	30.0		0.0	35.0		0.0	30.0		0.0	35.0		0.0
Lane Util. Factor   1.00   1	Storage Lanes	1		0	1		0	1		0	1		0
Ped Bike Factor   0.98   0.99   0.99   0.99   0.99   0.98   0.97   0.98   0.97   0.91	Taper Length (m)	7.5			7.5			7.5			7.5		
Fith Protected	Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Fit Protected	Ped Bike Factor	0.98	0.99		0.99	0.99		0.97	0.98		0.98	0.97	
Satd. Flow (prot)   1629   1658   0   1710   1614   0   1613   1585   0   1676   1481   0	Frt		0.972			0.954			0.928			0.911	
Fit Permitted	Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (perm)   902   1658   0   1086   1614   0   1064   1585   0   1090   1481   0     Right Turn on Red   Yes	Satd. Flow (prot)	1629	1658	0	1710	1614	0	1613	1585	0	1676	1481	0
Right Turn on Red   Yes   Ye	Flt Permitted	0.535			0.609			0.646			0.630		
Satd. Flow (RTOR)	Satd. Flow (perm)	902	1658	0	1086	1614	0	1064	1585	0	1090	1481	0
Link Speed (k/h)         50         50         50         50           Link Distance (m)         96.1         200.4         528.8         53.5           Travel Time (s)         6.9         14.4         38.1         3.9           Confl. Peds. (#/hr)         9         4         4         9         12         8         8         12           Peak Hour Factor         0.92	Right Turn on Red			Yes			Yes			Yes			Yes
Link Distance (m)         96.1         200.4         528.8         53.5           Travel Time (s)         6.9         14.4         38.1         3.9           Confl. Peds. (#hr)         9         4         4         9         12         8         8         12           Peak Hour Factor         0.92         0.93         77         76         76         74         78         74         78         74         74         74         74         74         74         74         74         90.0         10.0         10.0         10.0	Satd. Flow (RTOR)		15			30			44			70	
Travel Time (s)         6.9         14.4         9         12         8         8         12           Confl. Peds. (#hr)         9         4         4         9         12         8         8         12           Peak Hour Factor         0.92         0.93         7%	Link Speed (k/h)		50			50			50			50	
Confi. Peds. (#/hr)	Link Distance (m)		96.1			200.4			528.8			53.5	
Peak Hour Factor   0.92   0.93   0.94   0.	Travel Time (s)		6.9			14.4			38.1			3.9	
Heavy Vehicles (%)	Confl. Peds. (#/hr)	9		4	4		9	12		8	8		12
Adj. Flow (vph)         73         164         37         32         189         84         36         72         67         71         53         78           Shared Lane Traffic (%)         Shared Lane Lane Lane Lane Lane Lane Lane Lane	Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Shared Lane Traffic (%)   Lane Group Flow (vph)   73   201   0   32   273   0   36   139   0   71   131   0   17m Type   pm+pt   NA   pm+pt   NA   pm+pt   NA   pm+pt   NA   pm+pt   NA   pm+pt   NA   Protected Phases   5   2   1   6   3   8   7   4   Permitted Phases   5   2   1   6   3   8   7   4   Permitted Phases   2   6   8   4   Minimum Split (s)   10.0   52.0   10.0   52.0   9.0   29.0   9.0   29.0   29.0   29.0   Total Split (s)   10.0   52.0   10.0   52.0   9.0   29.0   9.0   29.0   29.0   Total Split (s)   10.0   52.0   10.0   52.0   9.0   29.0   9.0   29.0   29.0   Total Split (%)   10.0   52.0   10.0   52.0   9.0   29.0   9.0   29.0   29.0   Maximum Green (s)   6.0   47.0   6.0   47.0   5.0   24.0   5.0   24	Heavy Vehicles (%)	5%	6%	0%	0%	7%	0%	6%	6%	0%	2%	7%	7%
Lane Group Flow (vph)         73         201         0         32         273         0         36         139         0         71         131         0           Turn Type         pm+pt         NA         pm+pt         NA         pm+pt         NA         pm+pt         NA           Protected Phases         5         2         1         6         3         8         7         4           Permitted Phases         2         6         8         4         4           Minimum Split (s)         10.0         52.0         10.0         52.0         9.0         29.0         9.0         29.0           Total Split (%)         10.0         52.0         10.0         52.0         9.0         29.0         9.0         29.0           Maximum Green (s)         6.0         47.0         6.0         47.0         5.0         9.0         29.0         9.0         29.0           Yellow Time (s)         4.0         3.0         4.0         3.0         4.0         3.0         4.0         3.0         4.0         3.0         4.0         3.0         4.0         3.0         4.0         3.0         4.0         3.0         4.0         3.0	Adj. Flow (vph)	73	164	37	32	189	84	36	72	67	71	53	78
Turn Type         pm+pt         NA         pm-pt         Na           Maximum Chall         10.0	Shared Lane Traffic (%)												
Protected Phases 5 2 1 6 8 8 4    Permitted Phases 2 6 6 8 8 4     Minimum Split (s) 10.0 52.0 10.0 52.0 9.0 29.0 9.0 29.0     Total Split (s) 10.0 52.0 10.0 52.0 9.0 29.0 9.0 29.0     Total Split (s) 10.0 52.0 10.0 52.0 9.0 29.0 9.0 29.0     Total Split (s) 10.0 52.0 10.0 52.0 9.0 29.0 9.0 29.0     Total Split (s) 10.0 52.0 10.0 52.0 9.0 29.0 9.0 29.0     Maximum Green (s) 6.0 47.0 6.0 47.0 5.0 24.0 5.0 24.0     Maximum Green (s) 4.0 3.0 4.0 3.0 4.0 3.0 4.0 3.0     All-Red Time (s) 0.0 2.0 0.0 2.0 0.0 2.0 0.0 2.0     Lost Time Adjust (s) 0.0 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 Dptimize? Yes	Lane Group Flow (vph)	73	201	0	32	273	0	36	139	0	71	131	0
Permitted Phases   2	Turn Type	pm+pt	NA		pm+pt	NA		pm+pt	NA		pm+pt	NA	
Minimum Split (s)         10.0         52.0         10.0         52.0         9.0         29.0         9.0         29.0           Total Split (s)         10.0         52.0         10.0         52.0         9.0         29.0         9.0         29.0           Total Split (%)         10.0%         52.0%         10.0%         52.0%         9.0%         29.0%         9.0%         29.0%           Maximum Green (s)         6.0         47.0         6.0         47.0         5.0         24.0         5.0         24.0           Yellow Time (s)         4.0         3.0         4.0         3.0         4.0         3.0         4.0         3.0           All-Red Time (s)         0.0         2.0         0.0         2.0         0.0         2.0         0.0         2.0           Lost Time Adjust (s)         0.0         0.0         0.0         0.0         0.0         0.0         0.0         0.0         0.0         0.0         0.0         1.0         0.0         0.0         0.0         0.0         0.0         0.0         0.0         0.0         0.0         0.0         0.0         0.0         0.0         0.0         0.0         0.0         0.0         0.0	Protected Phases	5	2		1	6		3	8		7	4	
Total Split (s)         10.0         52.0         10.0         52.0         9.0         29.0         9.0         29.0           Total Split (%)         10.0%         52.0%         10.0%         52.0%         9.0%         29.0%         9.0%         29.0%           Maximum Green (s)         6.0         47.0         6.0         47.0         5.0         24.0         5.0         24.0           Yellow Time (s)         4.0         3.0         4.0         3.0         4.0         3.0         4.0         3.0           All-Red Time (s)         0.0         2.0         0.0         2.0         0.0         2.0         0.0         2.0         0.0         2.0         0.0         2.0         0.0         2.0         0.0         2.0         0.0         2.0         0.0         2.0         0.0         2.0         0.0         2.0         0.0         2.0         0.0         2.0         0.0         2.0         0.0	Permitted Phases	2			6			8			4		
Total Split (%)         10.0%         52.0%         10.0%         52.0%         9.0%         29.0%         9.0%         29.0%           Maximum Green (s)         6.0         47.0         6.0         47.0         5.0         24.0         5.0         24.0           Yellow Time (s)         4.0         3.0         4.0         3.0         4.0         3.0         4.0         3.0           All-Red Time (s)         0.0         2.0         0.0         2.0         0.0         2.0         0.0         2.0         0.0         2.0         0.0         2.0         0.0         2.0         0.0         2.0         0.0         2.0         0.0         2.0         0.0         2.0         0.0         2.0         0.0         2.0         0.0         2.0         0.0         2.0         0.0         2.0         0.0 <td>Minimum Split (s)</td> <td>10.0</td> <td>52.0</td> <td></td> <td>10.0</td> <td>52.0</td> <td></td> <td>9.0</td> <td>29.0</td> <td></td> <td>9.0</td> <td>29.0</td> <td></td>	Minimum Split (s)	10.0	52.0		10.0	52.0		9.0	29.0		9.0	29.0	
Maximum Green (s)         6.0         47.0         6.0         47.0         5.0         24.0         5.0         24.0           Yellow Time (s)         4.0         3.0         4.0         3.0         4.0         3.0         4.0         3.0         4.0         3.0         4.0         3.0         4.0         3.0         4.0         3.0         4.0         3.0         4.0         3.0         4.0         3.0         4.0         3.0         4.0         3.0         4.0         3.0         4.0         3.0         2.0         0.0         2.0         0.0         2.0         0.0         2.0         0.0         2.0         0.0         2.0         0.0         2.0         0.0         2.0         0.0	Total Split (s)	10.0	52.0		10.0	52.0		9.0	29.0		9.0	29.0	
Yellow Time (s)         4.0         3.0         4.0         3.0         4.0         3.0         4.0         3.0           All-Red Time (s)         0.0         2.0         0.0         2.0         0.0         2.0         0.0         2.0           Lost Time (s)         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	Total Split (%)	10.0%	52.0%		10.0%	52.0%		9.0%	29.0%		9.0%	29.0%	
All-Red Time (s) 0.0 2.0 0.0 2.0 0.0 2.0 0.0 2.0 0.0 2.0 0.0 2.0 Lost Time Adjust (s) 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.	Maximum Green (s)	6.0	47.0		6.0	47.0		5.0	24.0		5.0	24.0	
Lost Time Adjust (s)         0.0         5.0	Yellow Time (s)	4.0	3.0		4.0	3.0		4.0	3.0		4.0	3.0	
Total Lost Time (s)         4.0         5.0         4.0         5.0         4.0         5.0           Lead/Lag         Lead         Lag	All-Red Time (s)	0.0	2.0		0.0	2.0		0.0	2.0		0.0	2.0	
Lead/Lag         Lead         Lag         Lag         Lead         Lag         Lag         Lead         Lag	Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Lead-Lag Optimize?         Yes	Total Lost Time (s)	4.0	5.0		4.0	5.0		4.0	5.0		4.0	5.0	
Walk Time (s)         5.0         5.0         5.0         5.0           Flash Dont Walk (s)         11.0         11.0         11.0         11.0         11.0           Pedestrian Calls (#/hr)         0         0         0         0         0         0           Act Effct Green (s)         54.0         47.0         54.0         47.0         30.0         24.0         30.0         24.0           Actuated g/C Ratio         0.54         0.47         0.54         0.47         0.30         0.24         0.30         0.24           v/c Ratio         0.14         0.26         0.05         0.35         0.10         0.34         0.20         0.32           Control Delay         10.0         15.8         16.2         28.3         23.3         23.9         24.7         17.9           Queue Delay         10.0         15.8         16.2         28.3         23.3         23.9         24.7         17.9           LOS         B         B         B         C         C         C         C         C         B           Approach Delay         14.2         27.0         23.7         20.3	Lead/Lag	Lead	Lag		Lead	Lag		Lead	Lag		Lead	Lag	
Flash Dont Walk (s)         11.0         11.0         11.0         11.0           Pedestrian Calls (#hr)         0         0         0         0         0           Act Effct Green (s)         54.0         47.0         54.0         47.0         30.0         24.0         30.0         24.0           Actuated g/C Ratio         0.54         0.47         0.54         0.47         0.30         0.24         0.30         0.24           v/c Ratio         0.14         0.26         0.05         0.35         0.10         0.34         0.20         0.32           Control Delay         10.0         15.8         16.2         28.3         23.3         23.9         24.7         17.9           Queue Delay         10.0         15.8         16.2         28.3         23.3         23.9         24.7         17.9           LOS         B         B         B         C         C         C         C         B           Approach Delay         14.2         27.0         23.7         20.3	Lead-Lag Optimize?	Yes	Yes		Yes	Yes		Yes	Yes		Yes	Yes	
Pedestrian Calls (#/hr)         0         0         0         0           Act Effct Green (s)         54.0         47.0         54.0         47.0         30.0         24.0         30.0         24.0           Actuated g/C Ratio         0.54         0.47         0.54         0.47         0.30         0.24         0.30         0.24           v/c Ratio         0.14         0.26         0.05         0.35         0.10         0.34         0.20         0.32           Control Delay         10.0         15.8         16.2         28.3         23.3         23.9         24.7         17.9           Queue Delay         10.0         15.8         16.2         28.3         23.3         23.9         24.7         17.9           LOS         B         B         B         C         C         C         C         B           Approach Delay         14.2         27.0         23.7         20.3	Walk Time (s)		5.0			5.0			5.0			5.0	
Act Effct Green (s)         54.0         47.0         54.0         47.0         30.0         24.0         30.0         24.0           Actuated g/C Ratio         0.54         0.47         0.54         0.47         0.30         0.24         0.30         0.24           V <sub>C</sub> Ratio         0.14         0.26         0.05         0.35         0.10         0.34         0.20         0.32           Control Delay         10.0         15.8         16.2         28.3         23.3         23.9         24.7         17.9           Queue Delay         10.0         15.8         16.2         28.3         23.3         23.9         24.7         17.9           LOS         B         B         B         C         C         C         C         B           Approach Delay         14.2         27.0         23.7         20.3	Flash Dont Walk (s)		11.0			11.0			11.0			11.0	
Actuated g/C Ratio         0.54         0.47         0.54         0.47         0.30         0.24         0.30         0.24           v/c Ratio         0.14         0.26         0.05         0.35         0.10         0.34         0.20         0.32           Control Delay         10.0         15.8         16.2         28.3         23.3         23.9         24.7         17.9           Queue Delay         0.0         0.0         0.0         0.0         0.0         0.0         0.0           Total Delay         10.0         15.8         16.2         28.3         23.3         23.9         24.7         17.9           LOS         B         B         B         C         C         C         C         C         B           Approach Delay         14.2         27.0         23.7         20.3	Pedestrian Calls (#/hr)		0			0			0			0	
v/c Ratio         0.14         0.26         0.05         0.35         0.10         0.34         0.20         0.32           Control Delay         10.0         15.8         16.2         28.3         23.3         23.9         24.7         17.9           Queue Delay         0.0	Act Effct Green (s)	54.0	47.0		54.0	47.0		30.0	24.0		30.0	24.0	
Control Delay         10.0         15.8         16.2         28.3         23.3         23.9         24.7         17.9           Queue Delay         0.0<	Actuated g/C Ratio	0.54	0.47		0.54	0.47		0.30	0.24		0.30	0.24	
Queue Delay         0.0 <th< td=""><td>v/c Ratio</td><td>0.14</td><td>0.26</td><td></td><td>0.05</td><td>0.35</td><td></td><td>0.10</td><td>0.34</td><td></td><td>0.20</td><td>0.32</td><td></td></th<>	v/c Ratio	0.14	0.26		0.05	0.35		0.10	0.34		0.20	0.32	
Total Delay         10.0         15.8         16.2         28.3         23.3         23.9         24.7         17.9           LOS         B         B         B         C         C         C         C         B           Approach Delay         14.2         27.0         23.7         20.3	Control Delay	10.0	15.8		16.2	28.3		23.3	23.9		24.7	17.9	
LOS B B B C C C C B Approach Delay 14.2 27.0 23.7 20.3	Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
LOS B B B C C C C B Approach Delay 14.2 27.0 23.7 20.3		10.0	15.8		16.2	28.3		23.3	23.9		24.7	17.9	
FF		В	В		В	С		С	С		С	В	
	Approach Delay		14.2			27.0			23.7			20.3	
			В			С			С			С	

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Lanes, Volumes, Timings

3: Stone Street South





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# Lanes, Volumes, Timings 4: King Street

4. King Street												
	•	-	$\rightarrow$	•	<b>←</b>	•	4	<b>†</b>	~	-	ţ	4
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		4		7	- 1>			4			4	
Volume (vph)	15	264	14	12	252	84	11	29	18	74	21	22
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Storage Length (m)	0.0		0.0	60.0		0.0	0.0		0.0	0.0		0.0
Storage Lanes	0		0	1		0	0		0	0		0
Taper Length (m)	7.5			7.5			7.5			7.5		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor		1.00		1.00	0.99			0.99			0.99	
Frt		0.994			0.963			0.958			0.974	
Flt Protected		0.997		0.950				0.991			0.969	
Satd. Flow (prot)	0	1735	0	1569	1654	0	0	1662	0	0	1657	0
FIt Permitted		0.977		0.570				0.946			0.778	
Satd. Flow (perm)	0	1699	0	937	1654	0	0	1582	0	0	1322	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		5			35			20			11	
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		200.4			204.6			117.4			55.1	
Travel Time (s)		14.4			14.7			8.5			4.0	
Confl. Peds. (#/hr)	11		4	4		11	9		5	5		9
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	0%	3%	0%	9%	4%	3%	0%	0%	6%	0%	10%	0%
Adj. Flow (vph)	16	287	15	13	274	91	12	32	20	80	23	24
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	318	0	13	365	0	0	64	0	0	127	0
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		2			6			8			4	
Permitted Phases	2			6			8			4		
Minimum Split (s)	71.0	71.0		71.0	71.0		29.0	29.0		29.0	29.0	
Total Split (s)	71.0	71.0		71.0	71.0		29.0	29.0		29.0	29.0	
Total Split (%)	71.0%	71.0%		71.0%	71.0%		29.0%	29.0%		29.0%	29.0%	
Maximum Green (s)	66.0	66.0		66.0	66.0		24.0	24.0		24.0	24.0	
Yellow Time (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
All-Red Time (s)	2.0	2.0		2.0	2.0		2.0	2.0		2.0	2.0	
Lost Time Adjust (s)		0.0		0.0	0.0			0.0			0.0	
Total Lost Time (s)		5.0		5.0	5.0			5.0			5.0	
Lead/Lag												
Lead-Lag Optimize?												
Walk Time (s)	11.0	11.0		11.0	11.0		8.0	8.0		8.0	8.0	
Flash Dont Walk (s)	16.0	16.0		16.0	16.0		16.0	16.0		16.0	16.0	
Pedestrian Calls (#/hr)	0	0		0	0		0	0		0	0	
Act Effct Green (s)		66.0		66.0	66.0			24.0			24.0	
Actuated g/C Ratio		0.66		0.66	0.66			0.24			0.24	
v/c Ratio		0.28		0.02	0.33			0.16			0.39	
Control Delay		7.9		4.6	5.0			23.5			33.2	
Queue Delay		0.0		0.0	0.0			0.0			0.0	
Total Delay		7.9		4.6	5.0			23.5			33.2	
LOS		Α.		Α.	Α.			C			C	
Approach Delay		7.9		- '	5.0			23.5			33.2	
Approach LOS		Α.			Α.			C			C	

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Lanes, Volumes, Timings 4: King Street 15/10/2013

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Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Queue Length 50th (m)		28.5		0.6	13.9			7.1			19.8	
Queue Length 95th (m)		41.6		m1.8	20.9			18.2			37.6	
Internal Link Dist (m)		176.4			180.6			93.4			31.1	
Turn Bay Length (m)				60.0								
Base Capacity (vph)		1123		618	1103			394			325	
Starvation Cap Reductn		0		0	0			0			0	
Spillback Cap Reductn		0		0	0			0			0	
Storage Cap Reductn		0		0	0			0			0	
Reduced v/c Ratio		0.28		0.02	0.33			0.16			0.39	
Intersection Summary												
Area Type: C	Other											
Cycle Length: 100												
Actuated Cycle Length: 100												
Offset: 20 (20%), Referenced	d to phase 2:	EBTL a	nd 6:WB1	ΓL, Start o	of Green							
Natural Cycle: 100												
Control Type: Pretimed												
Maximum v/c Ratio: 0.39												
Intersection Signal Delay: 11.				In	tersection	LOS: B						
Intersection Capacity Utilizati	ion 56.9%			IC	U Level o	of Service	В					
Analysis Period (min) 15												
m Volume for 95th percenti	ile queue is r	netered	by upstre	eam signa	al.							



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## Lanes, Volumes, Timings 5: King Street

EBL NBT Lane Group EBT EBR WBL WBT WBR NBR Lane Configurations 326 325 23 20 32 19 10 Volume (vph) Ideal Flow (vphpl) 1800 1800 1800 1800 1800 1800 1800 1800 1800 1800 1800 1800 Storage Length (m) 85.0 0.0 25.0 0.0 0.0 0.0 0.0 0.0 Storage Lanes 0 0 Λ 0 0 0 Taper Length (m) 7.5 Lane Util. Factor 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 0.99 Ped Bike Factor 1.00 1.00 1.00 0.96 0.96 0.943 0.981 Frt 0.990 0.990 Flt Protected 0.950 0.950 0.985 0.971 Satd. Flow (prot) 1425 1739 1583 0 0 1729 0 1551 0 0 1682 0 Flt Permitted 0.504 0.503 0.904 0.808 Satd. Flow (perm) 749 1739 834 1729 0 1421 0 0 1355 0 0 0 Right Turn on Red Yes Yes Yes 35 Satd. Flow (RTOR) 8 7 8 Link Speed (k/h) 50 50 50 50 Link Distance (m) 204.6 68.0 118.0 53.5 14.7 Travel Time (s) 4.9 8.5 3.9 Confl. Peds. (#/hr) 10 5 5 10 2 28 28 Peak Hour Factor 0.92 0.92 0.92 0.92 0.92 0.92 0.92 0.92 0.92 0.92 0.92 0.92 Heavy Vehicles (%) 20% 2% 6% 8% 3% 0% 9% 0% 3% 0% 6% 0% 10 354 45 353 25 26 22 35 46 21 Adj. Flow (vph) 26 11 Shared Lane Traffic (%) Lane Group Flow (vph) 10 380 45 378 0 83 78 Perm Turn Type NA Perm NA Perm NA Perm NA Protected Phases Permitted Phases 2 6 8 71.0 71.0 71.0 71.0 29.0 29.0 29.0 29.0 Minimum Split (s) 71.0 71.0 71.0 71.0 29.0 29.0 29.0 29.0 Total Split (s) Total Split (%) 71.0% 71.0% 71.0% 71.0% 29.0% 29.0% 29.0% 29.0% Maximum Green (s) 66.0 66.0 66.0 66.0 24.0 24.0 24.0 24.0 3.0 3.0 3.0 3.0 3.0 3.0 Yellow Time (s) 3.0 3.0 All-Red Time (s) 2.0 2.0 2.0 2.0 2.0 2.0 2.0 2.0 Lost Time Adjust (s) 0.0 0.0 0.0 0.0 0.0 0.0 Total Lost Time (s) 5.0 5.0 5.0 5.0 5.0 5.0 Lead/Lag Lead-Lag Optimize? 16.0 16.0 16.0 16.0 7.0 7.0 7.0 7.0 Walk Time (s) 13.0 15.0 Flash Dont Walk (s) 13.0 13.0 13.0 15.0 15.0 15.0 Pedestrian Calls (#/hr) 0 0 Act Effct Green (s) 66.0 66.0 66.0 66.0 24.0 24.0 0.66 Actuated g/C Ratio 0.66 0.66 0.66 0.24 0.24 0.02 0.33 v/c Ratio 0.33 0.08 0.23 0.24 Control Delay 4.0 5.5 6.6 8.2 20.9 29.7 0.0 0.0 0.0 Queue Delay 0.0 0.0 0.0 Total Delay 4.0 5.5 6.6 8.2 20.9 29.7 LOS С Α Α Α Α С 20.9 29.7 Approach Delay 5.4 8.0 С Approach LOS Α Α С

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#### Lanes, Volumes, Timings

15/10/2013

5: King Street 15/10/2013

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Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Queue Length 50th (m)	0.6	22.6		3.0	29.5			7.7			11.5	
Queue Length 95th (m)	m1.6	34.1		7.1	44.7			20.6			24.5	
Internal Link Dist (m)		180.6			44.0			94.0			29.5	
Turn Bay Length (m)	85.0			25.0								
Base Capacity (vph)	494	1150		550	1143			367			331	
Starvation Cap Reductn	0	0		0	0			0			0	
Spillback Cap Reductn	0	0		0	0			0			0	
Storage Cap Reductn	0	0		0	0			0			0	
Reduced v/c Ratio	0.02	0.33		0.08	0.33			0.23			0.24	
Intersection Summary												
Area Type:	Other											
Cycle Length: 100												
Actuated Cycle Length: 100	)											
Offset: 20 (20%), Reference	ed to phase	2:EBTL a	nd 6:WB	TL, Start o	of Green							
Natural Cycle: 100												
Control Type: Pretimed												
Maximum v/c Ratio: 0.33												
Intersection Signal Delay: 9	9.8			In	tersection	LOS: A						
Intersection Capacity Utiliza	ation 62.6%			IC	U Level o	f Service	В					
Analysis Period (min) 15												
m Volume for 95th percer	ntile queue i	s metered	by upstr	eam signa	al.							

Splits and Phases: 5: King Street



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	•	•	<b>†</b>	-	-	Ţ	
Movement	WBL	WBR	NBT	NBR	SBL	SBT	
Lane Configurations	¥		14			ની	
Volume (veh/h)	0	87	0	0	31	Ö	
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)	0	95	0	0	34	0	
Pedestrians			1			10	
Lane Width (m)			3.6			3.6	
Walking Speed (m/s)			1.2			1.2	
Percent Blockage			0			1	
Right turn flare (veh)							
Median type			None			None	
Median storage veh)							
Upstream signal (m)							
pX, platoon unblocked							
vC, conflicting volume	68	10			0		
vC1, stage 1 conf vol							
vC2, stage 2 conf vol							
vCu, unblocked vol	68	10			0		
tC, single (s)	6.4	6.2			4.1		
tC, 2 stage (s)							
tF (s)	3.5	3.3			2.2		
p0 queue free %	100	91			98		
cM capacity (veh/h)	921	1068			1636		
Direction, Lane #	WB 1	NB 1	SB 1				
Volume Total	95	0	34				
Volume Left	0	0	34				
Volume Right	95	0	0				
cSH	1068	1700	1636				
Volume to Capacity	0.09	0.00	0.02				
Queue Length 95th (m)	2.3	0.0	0.5				
Control Delay (s)	8.7	0.0	7.2				
Lane LOS	Α		Α				
Approach Delay (s)	8.7	0.0	7.2				
Approach LOS	Α						
Intersection Summary							
Average Delay			8.3				
Intersection Capacity Utiliza	ation		18.6%	IC	U Level o	of Service	
Analysis Period (min)			15				

	→ → ↓ ← ↑ ↑ ↑ ↓ ↓  EBL EBT EBR WBL WBT WBR NBL NBT NBR SBL SBT						7					
		<b>→</b>	*	•		`	7	- 1		•	*	*
Movement	EBL	EBT		WBL		WBR	NBL		NBR	SBL		SBF
Lane Configurations			7		4			<b>•</b>			î,	
Volume (veh/h)	25	0	12	3	4	6	13	85	0	0	28	25
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	27	0	13	3	4	7	14	92	0	0	30	2
Pedestrians		10			5			6			4	
Lane Width (m)		3.6			3.6			3.6			3.6	
Walking Speed (m/s)		1.2			1.2			1.2			1.2	
Percent Blockage		1			0			1			0	
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	187	180	60	189	193	101	68			97		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	187	180	60	189	193	101	68			97		
tC, single (s)	7.1	6.5	6.2	7.6	6.5	6.4	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	4.0	4.0	3.5	2.2			2.2		
p0 queue free %	96	100	99	99	99	99	99			100		
cM capacity (veh/h)	738	702	998	652	690	900	1534			1502		
Direction, Lane #	EB 1	WB 1	NB 1	SB 1								
Volume Total	40	14	107	58								
Volume Left	27	3	14	0								
Volume Right	13	7	0	27								
cSH	806	762	1534	1700								
Volume to Capacity	0.05	0.02	0.01	0.03								
Queue Length 95th (m)	1.3	0.5	0.2	0.0								
Control Delay (s)	9.7	9.8	1.0	0.0								
Lane LOS	Α	Α	Α									
Approach Delay (s)	9.7	9.8	1.0	0.0								
Approach LOS	Α	Α										
Intersection Summary												
Average Delay			2.9									
Intersection Capacity Utilization	on		Err%	IC	U Level o	of Service			Н			
Analysis Period (min)			15									

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3: Stone Str

treet Sou	ith										15/1	0/2013
	۶	<b>→</b>	•	•	+	•	4	†	~	<b>/</b>	ţ	4
	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBF
tions	7	ĵ»		٦	ĵ.		*	ĵ»		٦	f)	
	86	272	54	63	251	112	34	57	72	106	59	73
pl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
ı (m)	30.0		0.0	35.0		0.0	30.0		0.0	35.0		0.0
	- 4		^	- 4		^	4		^	4		_

	-	-	•	*		-	- 7	ı		_	*	-
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	*	ĵ»		Ť	ĵ.		7	f)		*	ĵ»	
Volume (vph)	86	272	54	63	251	112	34	57	72	106	59	73
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Storage Length (m)	30.0		0.0	35.0		0.0	30.0		0.0	35.0		0.0
Storage Lanes	1		0	1		0	1		0	1		0
Taper Length (m)	7.5			7.5			7.5			7.5		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor	0.99	0.99		0.97	0.99		0.97	0.94		0.94	0.97	
Frt		0.975			0.954			0.916			0.917	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1676	1676	0	1644	1642	0	1583	1544	0	1676	1588	0
Flt Permitted	0.417			0.455			0.623			0.628		
Satd. Flow (perm)	731	1676	0	763	1642	0	1006	1544	0	1036	1588	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		14			30			60			58	
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		96.1			200.4			528.8			53.5	
Travel Time (s)		6.9			14.4			38.1			3.9	
Confl. Peds. (#/hr)	8		32	32		8	19		39	39		19
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	2%	4%	0%	4%	5%	0%	8%	2%	0%	2%	0%	1%
Adj. Flow (vph)	93	296	59	68	273	122	37	62	78	115	64	79
Shared Lane Traffic (%)	00	200	00	00	210	122	01	UL.	70	110	01	10
Lane Group Flow (vph)	93	355	0	68	395	0	37	140	0	115	143	0
Turn Type	pm+pt	NA	v	pm+pt	NA		pm+pt	NA	·	pm+pt	NA	v
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases	2	_		6			8	Ū		4	•	
Minimum Split (s)	10.0	52.0		10.0	52.0		9.0	29.0		9.0	29.0	
Total Split (s)	10.0	52.0		10.0	52.0		9.0	29.0		9.0	29.0	
Total Split (%)	10.0%	52.0%		10.0%	52.0%		9.0%	29.0%		9.0%	29.0%	
Maximum Green (s)	6.0	47.0		6.0	47.0		5.0	24.0		5.0	24.0	
Yellow Time (s)	4.0	3.0		4.0	3.0		4.0	3.0		4.0	3.0	
All-Red Time (s)	0.0	2.0		0.0	2.0		0.0	2.0		0.0	2.0	
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 Optimize?	Yes	Yes										
Walk Time (s)	100	13.0		100	13.0		100	7.0		100	7.0	
Flash Dont Walk (s)		14.0			14.0			17.0			17.0	
Pedestrian Calls (#/hr)		0			0			0			0	
Act Effct Green (s)	54.0	47.0		54.0	47.0		30.0	24.0		30.0	24.0	
Actuated g/C Ratio	0.54	0.47		0.54	0.47		0.30	0.24		0.30	0.24	
v/c Ratio	0.34	0.45		0.15	0.50		0.11	0.24		0.34	0.24	
Control Delay	10.6	19.2		13.9	22.9		23.4	20.7		27.4	21.2	
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay	10.6	19.2		13.9	22.9		23.4	20.7		27.4	21.2	
LOS	10.0 B	19.2 B		13.9 B	22.9 C		23.4 C	20.7 C		27.4 C	21.2 C	
Approach Delay	Б	17.5		ь	21.6		U	21.3		U	24.0	
Approach LOS		17.5 B			21.0 C			21.3 C			24.0 C	
πρρισαστι Ευσ		O			U			U			U	

30/09/2013 TF PM Synchro 8 Report Page 1 Lanes, Volumes, Timings

3: Stone Street South

EBL WBL WBT NBL NBT Lane Group 13.1 16.5 Queue Length 50th (m) 7.9 44.9 6.1 43.1 5.1 14.0 Queue Length 95th (m) 15.0 69.4 m15.6 72.5 12.3 30.4 30.1 31.4 Internal Link Dist (m) 72.1 176.4 504.8 29.5 Turn Bay Length (m) 30.0 35.0 30.0 35.0 Base Capacity (vph) 451 795 464 787 330 416 342 425 Starvation Cap Reductn 0 0 0 0 0 0 0 0 Spillback Cap Reductn 0 0 0

0

0.11 0.34

0

0.15 0.50

#### Reduced v/c Ratio Intersection Summary

Storage Cap Reductn

Other Area Type:

Cycle Length: 100

Actuated Cycle Length: 100

Offset: 20 (20%), Referenced to phase 2:EBTL and 6:WBTL, Start of Green

0

0.21 0.45

0

Natural Cycle: 100

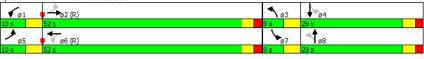
Control Type: Pretimed Maximum v/c Ratio: 0.50

Intersection LOS: C Intersection Signal Delay: 20.6 Intersection Capacity Utilization 68.7% ICU Level of Service C

Analysis Period (min) 15

m Volume for 95th percentile queue is metered by upstream signal.

#### Splits and Phases: 3: Stone Street South



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0

0.34 0.34

0

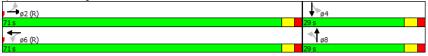
4: King Street											15/1	10/2013
	•	<b>→</b>	•	•	•	•	4	<b>†</b>	<i>&gt;</i>	-	ļ	1
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		4		*	ĵ»			4			4	
Volume (vph)	21	396	34	25	370	63	9	14	19	130	22	41
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Storage Length (m)	0.0		0.0	60.0		0.0	0.0		0.0	0.0		0.0
Storage Lanes	0		0	1		0	0		0	0		0
Taper Length (m)	7.5			7.5			7.5			7.5		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor		0.99		0.95	1.00			0.96			0.94	
Frt		0.990			0.978			0.938			0.971	
Flt Protected		0.998		0.950				0.989			0.968	
Satd. Flow (prot)	0	1711	0	1710	1704	0	0	1541	0	0	1629	0
Flt Permitted		0.970		0.469				0.929			0.770	
Satd. Flow (perm)	0	1663	0	802	1704	0	0	1424	0	0	1263	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		9			18			21			13	
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		200.4			204.6			117.4			55.1	
Travel Time (s)		14.4			14.7			8.5			4.0	
Confl. Peds. (#/hr)	6		60	60		6	61		19	19		61
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	6%	3%	0%	0%	3%	2%	13%	8%	0%	1%	0%	0%
Adj. Flow (vph)	23	430	37	27	402	68	10	15	21	141	24	45
Shared Lane Traffic (%)												-
Lane Group Flow (vph)	0	490	0	27	470	0	0	46	0	0	210	0
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	-
Protected Phases		2			6			8			4	
Permitted Phases	2			6			8			4		
Minimum Split (s)	71.0	71.0		71.0	71.0		29.0	29.0		29.0	29.0	
Total Split (s)	71.0	71.0		71.0	71.0		29.0	29.0		29.0	29.0	
Total Split (%)	71.0%	71.0%		71.0%	71.0%		29.0%	29.0%		29.0%	29.0%	
Maximum Green (s)	66.0	66.0		66.0	66.0		24.0	24.0		24.0	24.0	
Yellow Time (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
All-Red Time (s)	2.0	2.0		2.0	2.0		2.0	2.0		2.0	2.0	
Lost Time Adjust (s)		0.0		0.0	0.0			0.0			0.0	
Total Lost Time (s)		5.0		5.0	5.0			5.0			5.0	
Lead/Lag												
Lead-Lag Optimize?												
Walk Time (s)	11.0	11.0		11.0	11.0		8.0	8.0		8.0	8.0	
Flash Dont Walk (s)	16.0	16.0		16.0	16.0		16.0	16.0		16.0	16.0	
Pedestrian Calls (#/hr)	0	0		0	0		0	0		0	0	
Act Effct Green (s)		66.0		66.0	66.0			24.0			24.0	
Actuated g/C Ratio		0.66		0.66	0.66			0.24			0.24	
v/c Ratio		0.45		0.05	0.42			0.13			0.67	
Control Delay		6.5		2.4	5.5			20.1			44.2	
Queue Delay		0.0		0.0	0.0			0.0			0.0	
Total Delay		6.5		2.4	5.5			20.1			44.2	
LOS		A		A	A			C			D	
Approach Delay		6.5		- '	5.4			20.1			44.2	
Approach LOS		A			A			C			D	

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Lanes, Volumes, Timings 4: King Street 15/10/2013

	۶	<b>→</b>	$\rightarrow$	•	<b>←</b>	•	4	<b>†</b>	<b>/</b>	<b>&gt;</b>	<b>↓</b>	4
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Queue Length 50th (m)		51.4		0.6	49.8			4.0			36.6	
Queue Length 95th (m)		60.3		m1.4	65.4			13.4			#64.7	
Internal Link Dist (m)		176.4			180.6			93.4			31.1	
Turn Bay Length (m)				60.0								
Base Capacity (vph)		1100		529	1130			357			313	
Starvation Cap Reductn		0		0	0			0			0	
Spillback Cap Reductn		0		0	0			0			0	
Storage Cap Reductn		0		0	0			0			0	
Reduced v/c Ratio		0.45		0.05	0.42			0.13			0.67	
Intersection Summary												
Area Type:	Other											
Cycle Length: 100												
Actuated Cycle Length: 10												
Offset: 42 (42%), Referen	ced to phase	2:EBTL a	nd 6:WB	TL, Start	of Green							
Natural Cycle: 100												
Control Type: Pretimed												
Maximum v/c Ratio: 0.67												
Intersection Signal Delay:	12.9			In	tersection	LOS: B						
Intersection Capacity Utiliz	zation 71.1%			IC	U Level o	f Service	С					
Analysis Period (min) 15												
# 95th percentile volume			eue may l	be longer								
Queue shown is maxin	num after two	cycles.										
m Volume for 95th perce	entile queue i	s metered	by upstr	eam signa	al.							

Splits and Phases: 4: King Street



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Approach LOS

5: King Street 15/10/2013 NBT Lane Group EBL **EBT** EBR WBL WBT WBR NBR Lane Configurations 514 444 31 Volume (vph) 22 Ideal Flow (vphpl) 1800 1800 1800 1800 1800 1800 1800 1800 1800 1800 1800 1800 Storage Length (m) 85.0 0.0 25.0 0.0 0.0 0.0 0.0 0.0 Storage Lanes 0 0 Λ 0 0 0 Taper Length (m) 7.5 Lane Util. Factor 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 0.99 Ped Bike Factor 1.00 0.98 1.00 0.94 0.96 0.919 Frt 0.995 0.989 0.979 Flt Protected 0.950 0.950 0.992 0.970 Satd. Flow (prot) 1710 1710 1737 0 1741 0 0 1528 0 0 1697 0 Flt Permitted 0.407 0.371 0.949 0.751 Satd. Flow (perm) 723 1737 657 1741 0 1458 0 0 1270 0 0 0 Right Turn on Red Yes Yes Yes Satd. Flow (RTOR) 4 9 71 q Link Speed (k/h) 50 50 50 50 Link Distance (m) 204.6 68.0 118.0 53.5 Travel Time (s) 14.7 4.9 8.5 3.9 Confl. Peds. (#/hr) 18 25 25 18 11 33 33 11 0.92 0.92 0.92 0.92 0.92 0.92 0.92 0.92 0.92 0.92 0.92 0.92 Peak Hour Factor Heavy Vehicles (%) 0% 3% 0% 0% 2% 0% 0% 3% 1% 0% 0% 0% 14 559 20 37 483 39 21 34 83 24 Adj. Flow (vph) 66 17 Shared Lane Traffic (%) Lane Group Flow (vph) 14 579 37 522 0 138 107 Perm Turn Type NA Perm NA Perm NA Perm NA Protected Phases Permitted Phases 2 6 8 71.0 71.0 71.0 71.0 29.0 29.0 29.0 29.0 Minimum Split (s) 71.0 71.0 71.0 71.0 29.0 29.0 29.0 29.0 Total Split (s) Total Split (%) 71.0% 71.0% 71.0% 71.0% 29.0% 29.0% 29.0% 29.0% Maximum Green (s) 66.0 66.0 66.0 66.0 24.0 24.0 24.0 24.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 Yellow Time (s) All-Red Time (s) 2.0 2.0 2.0 2.0 2.0 2.0 2.0 2.0 Lost Time Adjust (s) 0.0 0.0 0.0 0.0 0.0 0.0 Total Lost Time (s) 5.0 5.0 5.0 5.0 5.0 5.0 Lead/Lag Lead-Lag Optimize? 16.0 16.0 16.0 16.0 7.0 7.0 7.0 7.0 Walk Time (s) 15.0 Flash Dont Walk (s) 13.0 13.0 13.0 13.0 15.0 15.0 15.0 Pedestrian Calls (#/hr) 0 0 Act Effct Green (s) 66.0 66.0 66.0 66.0 24.0 24.0 0.66 Actuated g/C Ratio 0.66 0.66 0.66 0.24 0.24 0.03 v/c Ratio 0.50 0.09 0.45 0.34 0.34 Control Delay 4.2 7.1 9.6 18.6 32.5 0.0 0.0 0.0 Queue Delay 0.1 0.0 0.0 Total Delay 4.2 7.3 6.8 9.6 18.6 32.5 LOS Α Α Α Α В С 18.6 32.5 Approach Delay 7.2 9.4

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Α

В

С

Α

#### Lanes, Volumes, Timings

5: King Street

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Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Queue Length 50th (m)	0.8	36.5		2.4	45.4			10.9			16.6	
Queue Length 95th (m)	m1.4	47.3		6.2	67.3			28.0			32.6	
Internal Link Dist (m)		180.6			44.0			94.0			29.5	
Turn Bay Length (m)	85.0			25.0								
Base Capacity (vph)	477	1147		433	1152			403			311	
Starvation Cap Reductn	0	95		0	0			0			0	
Spillback Cap Reductn	0	0		0	0			0			0	
Storage Cap Reductn	0	0		0	0			0			0	
Reduced v/c Ratio	0.03	0.55		0.09	0.45			0.34			0.34	
Intersection Summary												
Area Type: (	Other											
Cycle Length: 100												
Actuated Cycle Length: 100												
Offset: 20 (20%), Referenced	to phase	2:EBTL a	nd 6:WB	TL, Start o	of Green							
Natural Cycle: 100												
Control Type: Pretimed												
Maximum v/c Ratio: 0.50												
Intersection Signal Delay: 11	.2			In	tersection	LOS: B						
Intersection Capacity Utilizati	ion 56.5%			IC	U Level o	of Service B	3					
Analysis Period (min) 15												
m Volume for 95th percenti	ile queue is	s metered	by upstr	eam signa	al.							

Splits and Phases: 5: King Street



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Movement	WBL	WBR	NBT	NBR	SBL	SBT	
Lane Configurations	W		1>			4	
Volume (veh/h)	0	56	4	2	100	5	
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)	0	61	4	2	109	5	
Pedestrians	8					4	
Lane Width (m)	3.6					3.6	
Walking Speed (m/s)	1.2					1.2	
Percent Blockage	1					0	
Right turn flare (veh)							
Median type			None			None	
Median storage veh)							
Upstream signal (m)							
pX, platoon unblocked							
vC, conflicting volume	236	17			15		
vC1, stage 1 conf vol							
vC2, stage 2 conf vol							
vCu, unblocked vol	236	17			15		
tC, single (s)	6.4	6.3			4.1		
tC, 2 stage (s)							
tF (s)	3.5	3.4			2.2		
p0 queue free %	100	94			93		
cM capacity (veh/h)	700	1039			1606		
Direction, Lane #	WB 1	NB 1	SB 1				
Volume Total	61	7	114				
Volume Left	0	0	109				
Volume Right	61	2	0				
cSH	1039	1700	1606				
Volume to Capacity	0.06	0.00	0.07				
Queue Length 95th (m)	1.5	0.0	1.7				
Control Delay (s)	8.7	0.0	7.1				
Lane LOS	Α		Α				
Approach Delay (s)	8.7	0.0	7.1				
Approach LOS	Α						
Intersection Summary							
Average Delay			7.4				
Intersection Capacity Utilization 2		24.7%	IC	CU Level	of Service		
Analysis Period (min)			15				
, ,							

2: Stone Street Sou							15/10/2013					
	•	<b>→</b>	•	•	<b>←</b>	•	4	<b>†</b>	<i>&gt;</i>	<b>&gt;</b>	ļ	4
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations			7		4			<b>†</b>			ĥ	
Volume (veh/h)	38	0	24	0	3	3	15	58	0	0	93	20
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	41	0	26	0	3	3	16	63	0	0	101	22
Pedestrians		17			7			5			3	
Lane Width (m)		3.6			3.6			3.6			3.6	
Walking Speed (m/s)		1.2			1.2			1.2			1.2	
Percent Blockage		1			1			0			0	
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	232	232	134	246	242	73	140			70		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	232	232	134	246	242	73	140			70		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.7	4.2			4.1		
tC, 2 stage (s)	• • • • • • • • • • • • • • • • • • • •	0.0	0.2	• • • • • • • • • • • • • • • • • • • •	0.0	0.,						
tF (s)	3.5	4.0	3.3	3.5	4.0	3.8	2.3			2.2		
p0 queue free %	94	100	97	100	99	100	99			100		
cM capacity (veh/h)	692	651	904	668	642	863	1387			1534		
Direction, Lane #	EB 1	WB 1	NB 1	SB 1	0.2	000	1001			1001		
	67	7		123								
Volume Total			79									
Volume Left	41	0	16	0 22								
Volume Right	26	3	0									
cSH	761	736	1387	1700								
Volume to Capacity	0.09	0.01	0.01	0.07								
Queue Length 95th (m)	2.3	0.2	0.3	0.0								
Control Delay (s)	10.2	9.9	1.6	0.0								
Lane LOS	В	Α	Α									
Approach Delay (s)	10.2	9.9	1.6	0.0								
Approach LOS	В	Α										
Intersection Summary												
Average Delay			3.2									
Intersection Capacity Utilizat	tion		Err%	IC	U Level o	of Service			Н			
Analysis Period (min)			15									

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