



WELLS & ASSOCIATES, LLC

TRAFFIC, TRANSPORTATION, and PARKING CONSULTANTS

MEMORANDUM

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FROM: Martin J. Wells, P.E.
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DATE: January 25, 2006

SUBJECT: Revised Transportation Impact Analysis for Atlantic North and Atlantic South;
Washington, D.C.

Introduction

This memorandum presents a revised transportation impact analysis for Atlantic North located at 945 Florida Avenue, N.W., and Atlantic South located at 800-801 V Street (Parcels A and D) and 2047 9th Street (Parcel B), in Washington, D.C.

This study has been updated to reflect the revised site plan for both projects, which includes the following updated residential units:

	Original Number of Units	Revised Number of Units
Parcel A	303	348
Parcel B	71	76
Parcel C	248	266
Parcel D	10	10
Total	632	700

The retail-space development quantities are not proposed to be modified. For convenience purposes, all tables, figures and analyses for Atlantic North are contained in Appendix A, and all figures, tables and analyses for Atlantic South are contained in Appendix B.

Note: similarly to the original transportation impact studies for Atlantic North and Atlantic South, dated January 6, 2006, the analyses for Atlantic North included Atlantic South as a pipeline development and vice versa.

Pipeline Development Trip Generation

The number of peak hour trips that will be generated by the pipeline developments in the vicinity of Atlantic North and Atlantic South were updated based on the revised site plan, and are shown on Table 3-2. For Atlantic North, it is estimated that the pipeline developments will generate 165 AM peak hour trips and 245 PM peak hour trips, upon completion. For Atlantic South, it is estimated that the pipeline developments will generate 127 AM peak hour trips and 184 PM peak hour trips, upon completion.

ZONING COMMISSION
District of Columbia

Site Trip Generation Analysis

The number of peak hour trips that will be generated by the development of Atlantic North and Atlantic South were updated based on the revised site plan, and are shown on Table 3-3.

Atlantic North (Parcel C) is anticipated to generate 56 net additional AM peak hour trips and 100 net additional PM peak hour trips.

Atlantic South (Parcels A and D) is anticipated to generate 69 net additional AM peak hour trips and 117 net additional PM peak hour trips, and Parcel B is anticipated to generate 25 net additional AM peak hour trips and 45 net additional PM peak hour trips.

The revised site-generated traffic volumes for Atlantic North were assigned to the public road network and are shown on Figure 3-3 in Appendix A. The revised site-generated traffic volumes for Atlantic South were assigned to the public road network and are shown on Figure 3-3 in Appendix B.

Background Traffic Forecasts

Background peak hour traffic forecasts, without the development of Atlantic North and Atlantic South, were estimated based on the existing traffic counts, traffic generated by the pipeline developments and the background traffic growth. The background traffic forecasts for Atlantic North are shown on Figure 3-2 in Appendix A, and the background traffic forecasts for Atlantic South are shown on Figure 3-2 in Appendix B.

Background Future Levels of Service

Future peak hour levels of service, without the development of Atlantic North and Atlantic South, were estimated at the key intersections in the study area for the year of project buildout (2007) based on the intersection lane usage and traffic control shown on Figure 2-1 of the original report, dated January 6, 2006; the updated background traffic forecasts shown on Figure 3-2; and the Highway Capacity Manual.

The results for Atlantic North are summarized on Table 3-1, located in Appendix A. The results indicate that the addition of residential units on Parcels A and B for Atlantic South will have virtually no effects on the levels of service included in the original transportation impact study.

The results for Atlantic South are summarized on Table 3-1, located in Appendix B. The results indicate that the addition of residential units on Parcel C for Atlantic North will have virtually no effects on the levels of service included in the original transportation impact study.

Total Future Traffic Forecasts

Total future peak hour traffic forecasts, with the development of Atlantic North and Atlantic South, were estimated based on the background traffic forecasts and the revised site traffic assignments. The total future traffic forecasts for Atlantic North are shown on Figure 3-4 in Appendix A, and the total future traffic forecasts for Atlantic South are shown on Figure 3-4 in Appendix B.

Total Future Levels of Service

Future peak hour levels of service, with the development of Atlantic North and Atlantic South, were estimated at the key intersections in the study area for the year of project buildout (2007) based on the intersection lane usage and traffic control shown on Figure 2-1 of the original report, dated January 6, 2006; the revised total future forecasts shown on Figure 3-4; and the Highway Capacity Manual.

The results for Atlantic North are summarized on Table 3-1, located in Appendix A. The results indicate that the addition of residential units on Parcel C for Atlantic North will have virtually no effects on the levels of service included in the original transportation impact study. The driveway access to the underground parking garage will continue to operate at acceptable LOS "A" during both the AM and PM peak hours.

The results for Atlantic South are summarized on Table 3-1, located in Appendix B. The results indicate that the addition of residential units on Parcels A and B for Atlantic South will have virtually no effects on the levels of service included in the original transportation impact study. The driveway accesses to the underground parking garages for Parcels A and B will operate at acceptable LOS "A" and "B" during both the AM and PM peak hours.

Parking Analysis

Per the District of Columbia zoning ordinance minimum parking requirements, Atlantic North would require 97 parking spaces (89 residential spaces and 8 retail spaces). The subject will be served by underground parking with 274 approximately parking spaces. This is 177 more spaces than the minimum number of spaces required by the zoning ordinance.

Per the District of Columbia zoning ordinance minimum parking requirements, Atlantic South (Parcel A) would require 121 parking spaces (116 residential spaces and 5 retail spaces), Atlantic South (Parcel B) would require 28 parking spaces (26 residential spaces and 2 retail spaces), and Atlantic South (Parcel D) would require 4 residential parking spaces. Parcels A and D will be served by underground parking with approximately 363 parking spaces. This is 238 more spaces than the minimum number of spaces required by the zoning ordinance. Parcel B will be served by underground parking with approximately 78 parking spaces. This is 50 more spaces than the minimum number of spaces required by the zoning ordinance.

In summary, the proposed on-site parking supply for Atlantic North and Atlantic South would exceed the minimum zoning parking requirements.

Traffic Circle Feasibility Analysis

The revised pipeline and site-generated trips for Atlantic North and Atlantic South were redistributed based on the extension of Bryant and W Streets, and were added to the redistributed existing traffic contained in the original transportation impact study. Appendix C contains figures showing the revised redistributed background and total future peak hour volumes for the proposed traffic circle.

Using AASidra, the traffic circle was analyzed under background and total future conditions and the results are shown on Table 4-1 in Appendix C. The results indicate that with the addition of residential units on Parcels A, B, and C, the traffic circle will continue to operate at overall acceptable LOS "B" and "A" during the AM and PM peak hours during background conditions, and at LOS "C" and "A" during total future conditions, as demonstrated in the original transportation impact study.

Appendix A

Atlantic North Tables, Figures, And Analyses

Table 3-1
Atlantic North (Addendum)
Peak Hour Intersection Levels of Service ¹

Intersection	Type of Control	2005 Existing Conditions		2007 Background Conditions		2007 Total Future Conditions	
		AM	PM	AM	PM	AM	PM
1 Florida Ave./10th Ave./Barry Place Eastbound LTR Westbound LTR Northbound LTR Southbound LTR	Stop Sign	A[9.6] B[12.3] B[11.3] B[10.6]	A[9.5] B[10.5] B[11.5] B[12.0]	A[9.9] B[12.8] B[12.2] B[11.0]	A[9.7] B[10.8] B[12.3] B[12.4]	B[10.0] B[13.1] B[12.9] B[11.2]	A[9.9] B[11.1] B[13.0] B[12.7]
2 Barry Place/Sherman Avenue Eastbound Westbound Northbound Southbound Overall	Signal	A(7.4) A(6.7) D(50.6) F(307.9) F(205.9)	A(8.2) A(6.9) F(169.5) F(126.2) F(120.0)	A(7.4) A(6.7) D(50.0) F(317.3) F(211.8)	A(8.2) A(6.9) F(174.6) F(124.8) F(125.0)	A(7.4) A(6.7) D(49.1) F(312.3) F(211.7)	A(8.2) A(6.9) F(174.1) F(124.8) F(124.8)
3 9th Street/Barry Place Eastbound LTR Westbound LTR Southbound LTR	Stop Sign	A[9.0] A[8.6] A[7.5]	A[9.5] A[8.7] A[7.6]	A[9.1] A[8.6] A[7.5]	A[9.5] A[8.7] A[7.6]	A[9.1] A[8.6] A[7.5]	A[9.5] A[8.7] A[7.6]
4 8th Street/Barry Place Westbound TL Northbound LR	Stop Sign	A[0.5] B[10.8]	A[0.6] B[10.9]	A[0.5] B[10.8]	A[0.7] B[10.9]	A[0.5] B[10.8]	A[0.6] B[10.9]
5 Barry Place/Georgia Avenue Eastbound Northbound Southbound Overall	Signal	E(57.4) A(5.2) C(22.5) C(20.7)	F(148.6) A(5.9) C(28.2) C(30.0)	E(58.7) A(5.3) C(22.2) C(21.1)	F(153.1) A(5.9) C(21.1) C(30.7)	E(58.1) A(5.3) C(22.2) C(21.0)	F(153.1) A(6.0) C(21.1) C(30.7)
6 Florida Avenue/Sherman Avenue Northbound Southbound Southwestbound Overall	Signal	D(41.3) C(27.5) F(95.2) F(79.4)	D(45.7) C(26.7) C(29.6) C(33.3)	D(41.8) C(27.8) E(100.0) F(82.0)	D(46.2) C(27.9) C(29.2) C(33.7)	D(41.9) C(28.0) F(100.0) F(81.3)	D(46.4) C(28.8) C(29.2) C(34.0)
7 Bryant Street/Georgia Avenue Northbound Southbound Overall	Signal	A(9.6) A(2.3) A(4.6)	B(11.1) A(2.4) A(6.1)	A(9.7) A(2.4) A(4.7)	B(11.2) A(2.5) A(6.1)	A(9.7) A(2.3) A(4.7)	B(11.2) A(2.5) A(6.2)
8 Florida Avenue/Parcel C/W Street Eastbound LR Westbound LR	Stop Sign	D[31.3] E[43.0]	F[103.6] A[0.0]	D[26.9] N/A	F[70.9] N/A	D[27.7] N/A	F[80.7] N/A
9 W Street/Georgia Avenue Westbound Northbound Southbound Overall	Signal	C(32.6) A(8.8) B[15.1] B(16.9)	C(30.8) A(9.3) B[12.6] B(14.5)	C(32.9) A(8.8) B[15.2] B(17.0)	C(31.0) A(9.3) B[12.7] B(14.6)	C(32.9) A(8.8) B[15.2] B(17.0)	C(31.0) A(9.1) B[12.7] B(14.5)
11 9th Street/V Street/Florida Avenue ² Eastbound LTR Westbound LTR Northbound LTR Southbound LTR	Stop Sign	C[17.53] B[11.51] B[12.80] A[9.92]	C[15.56] C[17.52] D[29.25] B[11.40]	C[19.60] B[12.55] B[13.14] B[10.16]	C[17.81] C[21.86] D[24.40] B[12.03]	C[22.89] B[13.53] B[13.80] B[11.00]	C[20.13] D[26.47] E[43.87] B[13.69]
12 8th Street/V Street Eastbound LTR Westbound LTR Northbound LTR Southbound LTR	Stop Sign	A[1.8] A[0.7] B[11.5] B[11.4]	A[0.7] A[0.6] B[12.2] B[13.3]	A[1.3] A[0.7] B[12.3] B[11.8]	A[0.5] A[0.6] C[15.7] B[14.1]	A[1.3] A[0.6] B[12.0] B[11.6]	A[0.5] A[0.6] C[15.4] B[13.7]
14 9th Street/U Street/Florida Avenue Eastbound Westbound Northbound Southbound Overall	Signal	C(22.8) C(24.4) C(28.6) B(11.6) B(19.5)	C(26.1) C(22.5) D(44.4) C(33.8) C(32.0)	C(23.0) C(24.8) C(29.2) B(12.6) C(23.0)	C(26.7) C(22.7) D(50.5) D(37.1) C(34.6)	C(23.0) C(24.8) C(29.2) B(12.9) C(20.2)	C(26.7) C(22.7) D(51.5) D(41.6) D(36.0)
15 8th Street/Florida Avenue Eastbound LTR Westbound LTR Northbound LTR Southbound LTR	Stop Sign	A[0.8] A[0.2] F[111.3] F[140.0]	A[1.1] A[0.4] F[239.3] F[374.2]	A[1.0] A[0.2] F[156.8] F[313.8]	A[1.7] A[0.4] F[*] F[*]	A[1.0] A[0.2] F[77.2] F[193.5]	A[1.7] A[0.4] F[437.3] F[*]
16 9th Street/New Parcel C Driveway Eastbound LR Northbound TL	Stop Sign	N/A N/A	N/A N/A	N/A N/A	N/A N/A	A[8.6] A[1.7]	A[8.7] A[5.2]
17 Georgia Avenue/V Street Eastbound Westbound Northbound Southbound Overall	Signal	D(42.9) D(36.1) A(4.4) A(2.1) A(7.2)	D(47.5) D(41.4) A(5.8) A(2.2) B(11.5)	D(43.3) D(36.2) A(4.4) A(2.1) A(7.4)	E(57.5) D(42.2) A(5.8) A(2.1) B(12.7)	D(44.3) D(38.8) A(4.4) A(2.1) A(7.7)	E(59.9) E(77.0) A(5.9) A(2.1) B(16.6)
18 Sherman Avenue/University Dorms Westbound R	Stop Sign	A[0.0]	B[12.4]	A[0.0]	B[12.5]	A[0.0]	B[12.5]

NOTES:
1 Analysis performed using Synchro/SimTraffic Version 6.0
2 An asterisk (*) indicates delays greater than 999.9 seconds.
3 Intersection analyzed using HCM version 4.1e. 4 four-way stop sign.

Table 3-2
Atlantic North
Pipeline Developments Site Trip Generation Analysis ¹ (Addendum)

Land Use	Land Use Code	Size	Units	AM Peak Hour			PM Peak Hour		
				In	Out	Total	In	Out	Total
The Lincoln Condominium									
Condominiums	230	147	D.U.	12	58	70	55	27	82
Reduction for Transit Use ²		67%		8	39	47	37	18	55
Net New Residential Trips				4	19	23	18	9	27
The Floridian									
Condominiums	230	118	D.U.	10	49	59	46	23	69
Reduction for Transit Use ²		67%		7	33	39	31	15	46
Net New Residential Trips				3	16	20	15	8	23
The Rhapsody									
Condominiums	230	162	D.U.	13	63	76	60	29	89
Reduction for Transit Use ²		67%		9	42	51	40	20	59
Net New Residential Trips				4	21	25	20	9	30
The Brandon									
Condominiums	230	12	D.U.	2	7	9	7	4	11
Reduction for Transit Use ²		67%		1	5	6	5	2	7
Net New Residential Trips				1	2	3	2	2	4
Atlantic South									
Parcel A									
Existing Atlantic Plumbing Warehouse ³				13	5	18	1	12	13
Proposed Residential Condominium	230	348	D.U.	24	116	140	112	55	167
Reduction for Transit Use ³		50%		12	58	70	56	28	84
Net New Residential Trips				12	58	70	56	27	84
Proposed Retail	820	6,245	S.F.	18	12	30	48	52	100
Reduction Transit Use ³		70%		13	8	21	34	36	70
Net New Residential Trips				5	4	9	14	16	30
Net New Parcel A Site Trips				5	56	61	69	31	101
Parcel B									
Existing Garage Building ³				1	2	3	2	1	3
Proposed Residential Condominium	230	76	D.U.	7	34	41	32	16	48
Reduction for Transit Use ³		50%		3	17	21	16	8	24
Net New Residential Trips				4	17	21	16	8	24
Proposed Retail	820	4,306	S.F.	15	9	24	38	41	79
Reduction Transit Use ³		70%		10	7	17	27	29	55
Net New Residential Trips				4	3	7	11	12	24
Net New Parcel B Site Trips				7	18	25	25	19	45
Parcel D									
Dumpster Gated Area				0	0	0	0	0	0
Proposed Residential Condominium	230	10	D.U.	1	7	8	6	3	9
Reduction for Transit Use ³		50%		1	3	4	3	1	5
Net New Residential Trips				0	4	4	3	2	5
Proposed Retail	820	1,444	S.F.	7	5	12	18	20	38
Reduction Transit Use ³		70%		5	3	8	13	14	27
Net New Residential Trips				2	1	4	5	6	11
Net New Parcel D Site Trips				3	5	8	8	7	16
Total Pipeline Site Generated Trips				27	138	165	159	86	245

Notes: ¹ Based on Trip Generation, 7th Edition, Institute of Transportation Engineers.

² Transit reduction based on "Development-Related Ridership Survey II", by JHK & Associates, 1989.

³ Trips observed during peak hour traffic counts conducted on Tuesday, April 12, 2005.

Table 3-3
Atlantic North Plumbing Site
Site Trip Generation Analysis ¹ (Addendum)

Land Use	Land Use Code	Size	Units	AM Peak Hour			PM Peak Hour		
				In	Out	Total	In	Out	Total
Existing Development ²									
Parcel C									
Existing Atlantic Plumbing Warehouse				7	5	12	5	0	5
Proposed Development									
Parcel C									
Residential Condominium	230	266 D.U.		19	94	113	90	44	134
Reduction for Transit Use ³		50%		10	47	57	45	22	67
Net New Residential Trips				9	47	57	45	22	67
Retail	820	8,839 S.F.		23	14	37	60	66	126
Reduction Transit Use ³		70%		16	10	26	42	46	88
Net New Residential Trips				7	4	11	18	20	38
Total Net New Site-Generated Trips for Parcel C				9	46	56	58	42	100

Notes: ¹ Based on Trip Generation, 7th Edition, Institute of Transportation Engineers.

² Trips observed during peak hour traffic counts conducted on Tuesday, April 12, 2005.

³ Transit reduction based on "Development-Related Ridership Survey II", by JHK & Associates, 1989 and the 2000 US Census.

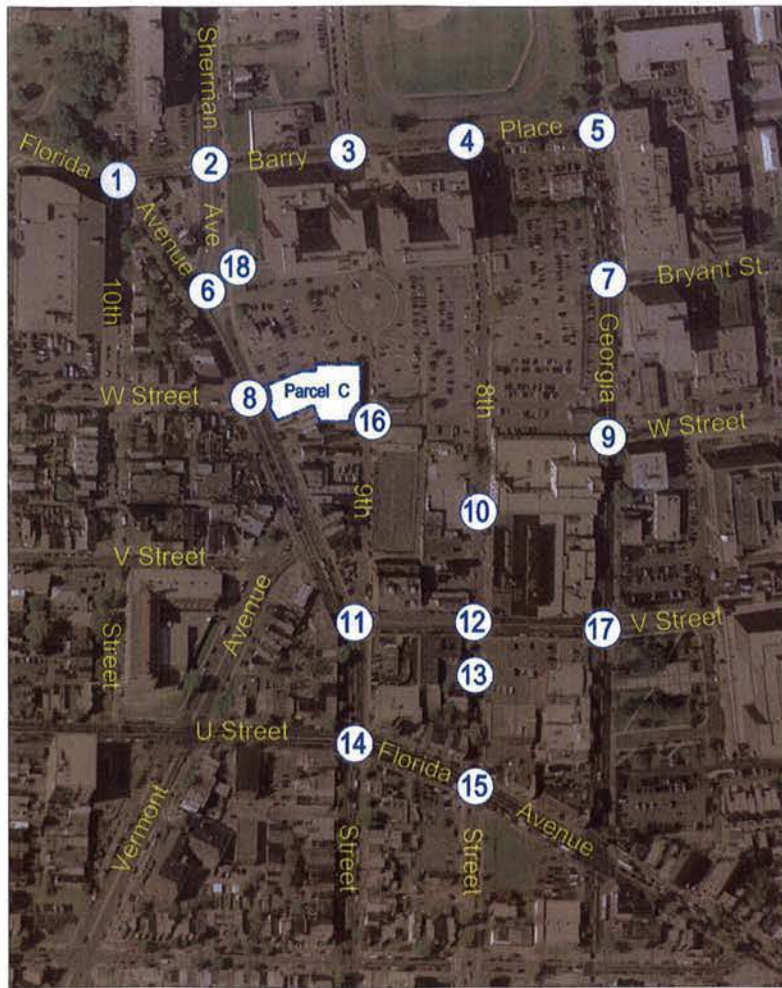
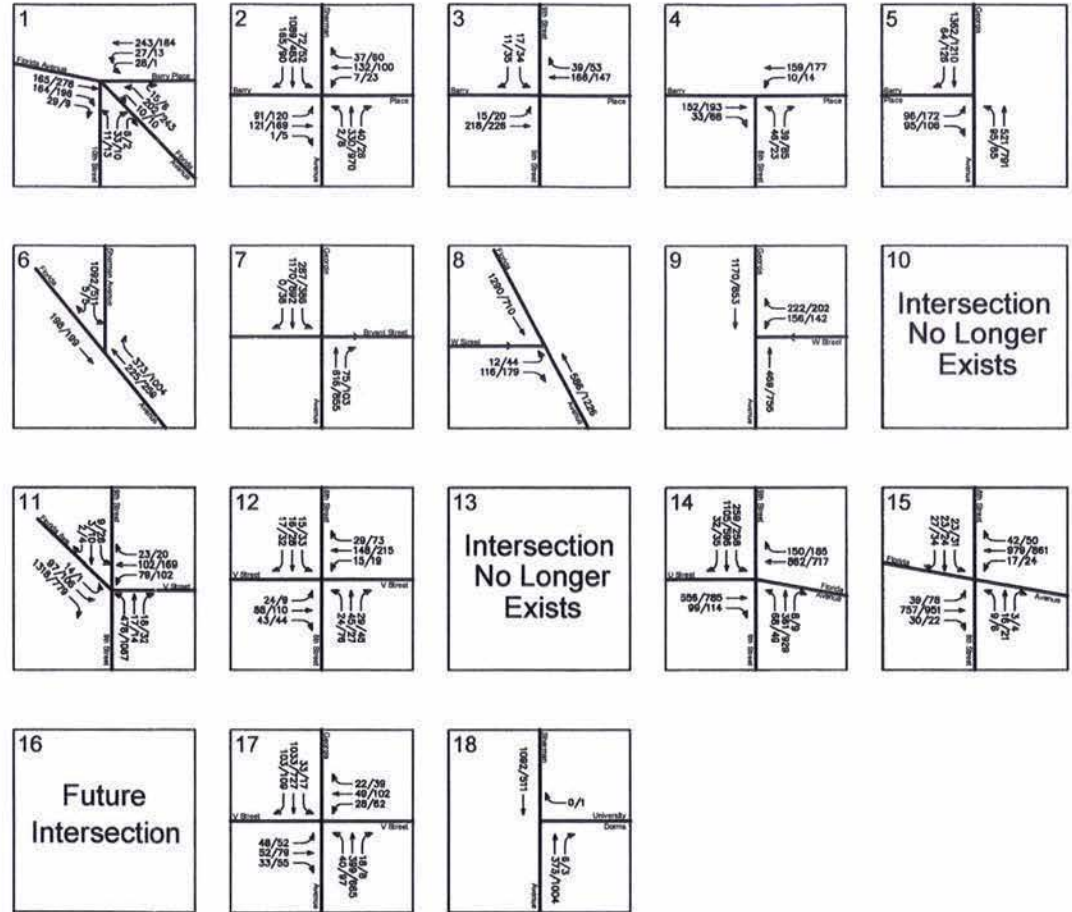


Figure 3-2
Background Peak Hour Traffic Volumes
(Atlantic North – Addendum)

AM PEAK HOUR
PM PEAK HOUR
000/000
North

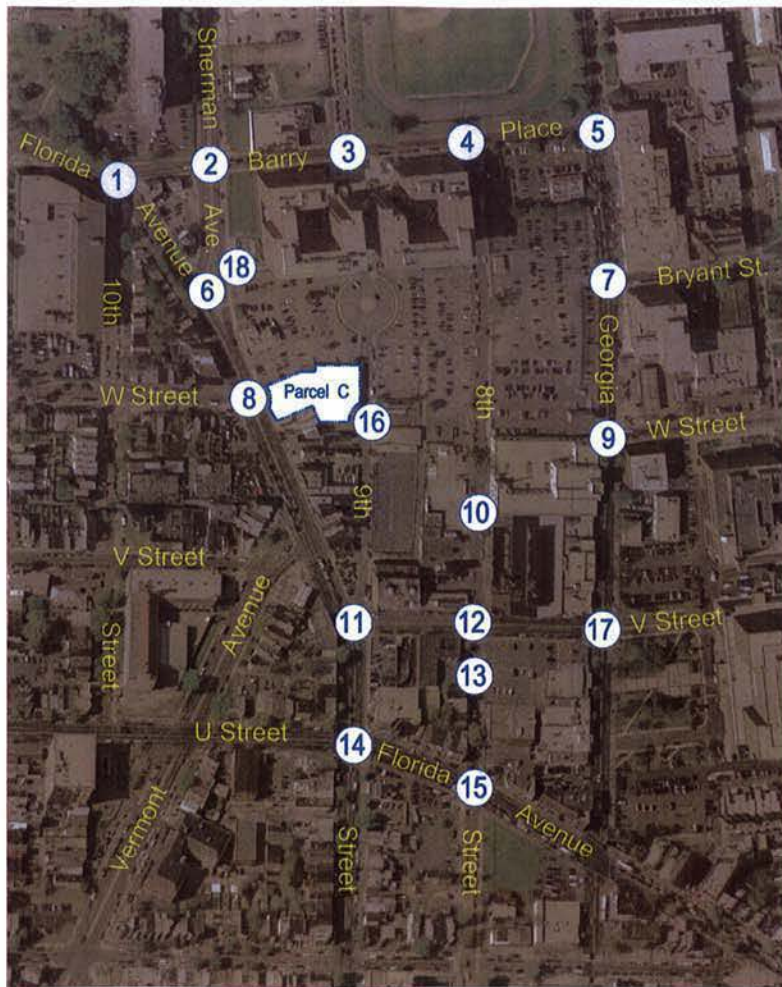
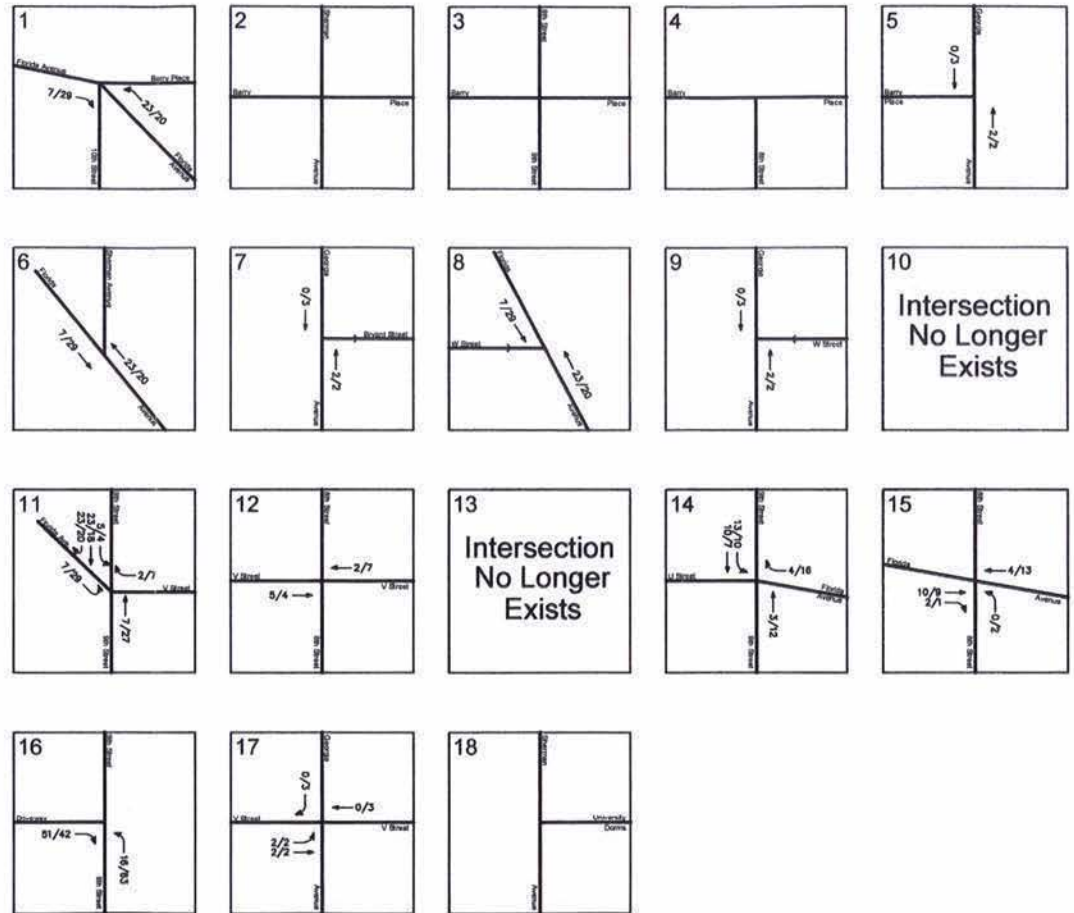


Figure 3-3
Site-Generated Trips
(Atlantic North - Addendum)

AM PEAK HOUR
PM PEAK HOUR
000/000



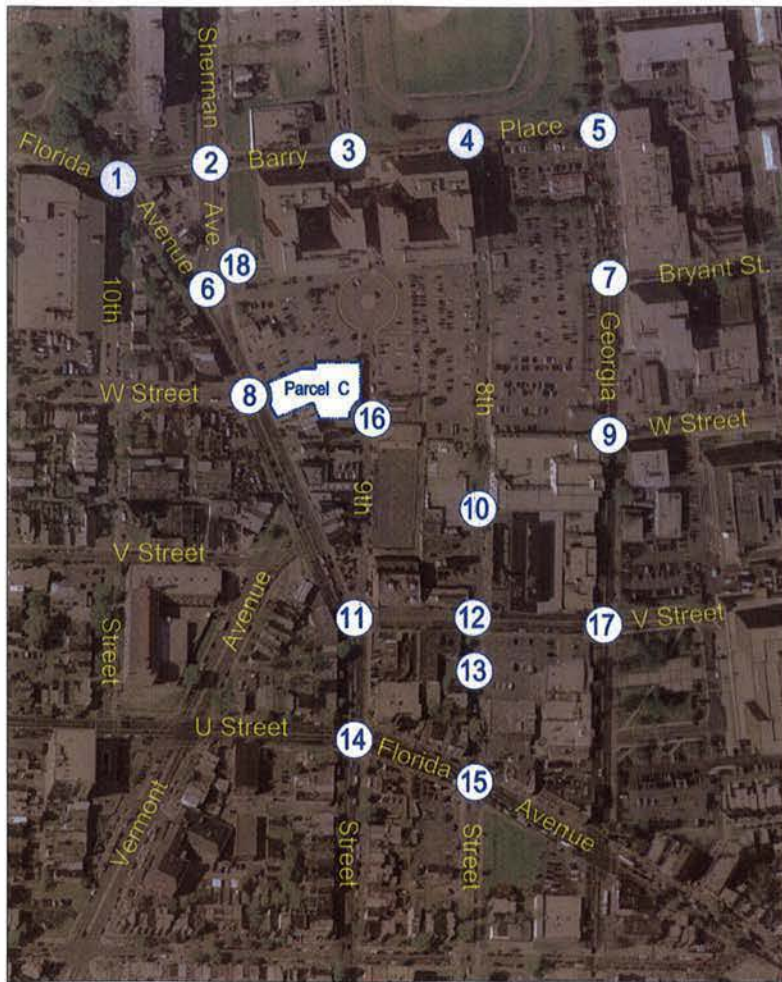
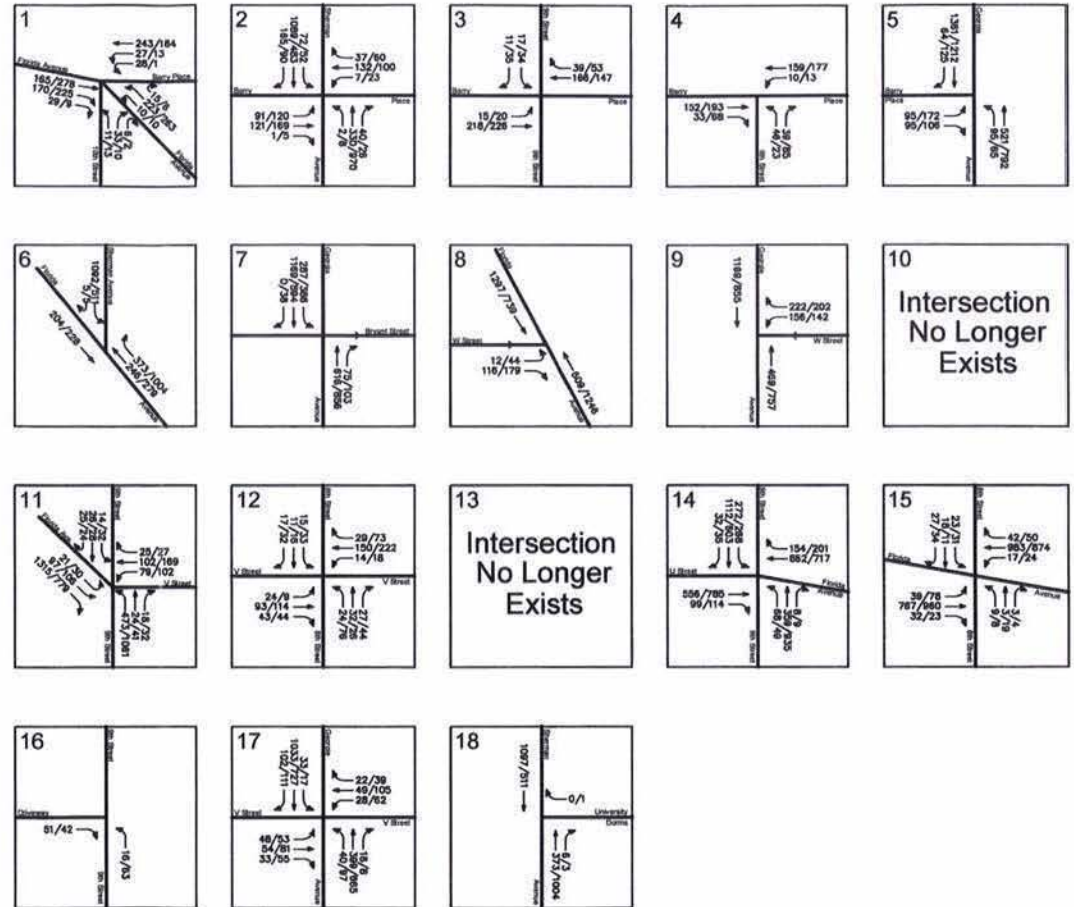


Figure 3-4
Total Future Peak Hour Traffic Volumes
(Atlantic North - Addendum)

AM PEAK HOUR
PM PEAK HOUR
000/000





Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL2	NBL	NBR	SEL	SER	SER2
Lane Configurations		↕			↕			↕		↕	↕	
Sign Control		Stop			Stop			Stop		Stop		
Volume (vph)	11	33	6	28	27	243	10	202	15	165	164	29
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)	12	36	7	30	29	264	11	220	16	179	178	32

Direction, Lane #	EB 1	WB 1	NB 1	SE 1	SE 2
Volume Total (vph)	54	324	247	179	210
Volume Left (vph)	12	30	11	179	0
Volume Right (vph)	7	264	16	0	32
Hadj (s)	0.01	-0.44	0.00	0.53	-0.07
Departure Headway (s)	6.2	5.2	5.7	6.5	5.9
Degree Utilization, x	0.09	0.47	0.39	0.32	0.34
Capacity (veh/h)	496	642	587	529	584
Control Delay (s)	9.9	12.8	12.2	11.3	10.7
Approach Delay (s)	9.9	12.8	12.2	11.0	
Approach LOS	A	B	B	B	

Intersection Summary				
Delay		11.8		
HCM Level of Service		B		
Intersection Capacity Utilization	51.8%		ICU Level of Service	A
Analysis Period (min)		15		

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL2	NBL	NBR	SEL	SER	SER2
Lane Configurations												
Sign Control		Stop			Stop			Stop		Stop		
Volume (vph)	13	10	2	1	13	184	10	243	6	278	196	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
Hourly flow rate (vph)	14	11	2	1	14	200	11	264	7	302	213	10
Direction, Lane #	EB 1	WB 1	NB 1	SE 1	SE 2							
Volume Total (vph)	27	215	282	302	223							
Volume Left (vph)	14	1	11	302	0							
Volume Right (vph)	2	200	7	0	10							
Hadj (s)	0.09	-0.52	0.03	0.53	0.00							
Departure Headway (s)	6.4	5.3	5.4	6.1	5.5							
Degree Utilization, x	0.05	0.32	0.42	0.51	0.34							
Capacity (veh/h)	482	617	639	576	631							
Control Delay (s)	9.7	10.8	12.3	14.0	10.2							
Approach Delay (s)	9.7	10.8	12.3	12.4								
Approach LOS	A	B	B	B								
Intersection Summary												
Delay			12.0									
HCM Level of Service			B									
Intersection Capacity Utilization			51.9%			ICU Level of Service			A			
Analysis Period (min)			15									



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	↗
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0			4.0			4.0			4.0	4.0
Lane Util. Factor		1.00			1.00			0.95			0.95	1.00
Frt		1.00			0.97			0.98			1.00	0.85
Flt Protected		0.98			1.00			1.00			1.00	1.00
Satd. Flow (prot)		1823			1806			3482			3528	1583
Flt Permitted		0.80			0.99			0.81			0.81	1.00
Satd. Flow (perm)		1498			1790			2815			2852	1583
Volume (vph)	91	121	1	7	132	37	2	330	40	72	1089	165
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	99	132	1	8	143	40	2	359	43	78	1184	179
RTOR Reduction (vph)	0	0	0	0	10	0	0	9	0	0	0	107
Lane Group Flow (vph)	0	232	0	0	181	0	0	395	0	0	1262	72
Turn Type	Perm		Perm		Perm		Perm		Perm		Perm	
Protected Phases	4		8		2		6		6		6	
Permitted Phases	4		8		2		6		6		6	
Actuated Green, G (s)	65.0		65.0		25.0		25.0		25.0		25.0	
Effective Green, g (s)	66.0		66.0		26.0		26.0		26.0		26.0	
Actuated g/C Ratio	0.66		0.66		0.26		0.26		0.26		0.26	
Clearance Time (s)	5.0		5.0		5.0		5.0		5.0		5.0	
Lane Grp Cap (vph)	989		1181		732		742		412		412	
v/s Ratio Prot												
v/s Ratio Perm	c0.15		0.10		0.14		c0.44		0.05			
v/c Ratio	0.23		0.15		0.54		1.70		0.18			
Uniform Delay, d1	6.8		6.4		31.8		37.0		28.7			
Progression Factor	1.00		1.00		1.48		1.00		1.00			
Incremental Delay, d2	0.6		0.3		2.7		321.1		0.9			
Delay (s)	7.4		6.7		50.0		358.1		29.6			
Level of Service	A		A		D		F		C			
Approach Delay (s)	7.4		6.7		50.0		317.3					
Approach LOS	A		A		D		F					

Intersection Summary

HCM Average Control Delay	211.8	HCM Level of Service	F
HCM Volume to Capacity ratio	0.65		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	77.0%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	↗
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0			4.0			4.0			4.0	4.0
Lane Util. Factor		1.00			1.00			0.95			0.95	1.00
Frt		1.00			0.96			1.00			1.00	0.85
Flt Protected		0.98			0.99			1.00			1.00	1.00
Satd. Flow (prot)		1822			1769			3524			3522	1583
Flt Permitted		0.80			0.94			0.95			0.52	1.00
Satd. Flow (perm)		1482			1677			3345			1837	1583
Volume (vph)	120	169	5	23	100	60	8	970	26	52	483	90
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	130	184	5	25	109	65	9	1054	28	57	525	98
RTOR Reduction (vph)	0	1	0	0	1	0	0	1	0	0	0	73
Lane Group Flow (vph)	0	318	0	0	198	0	0	1090	0	0	582	25
Turn Type	Perm			Perm			Perm			Perm		Perm
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2			6		6
Actuated Green, G (s)		65.0			65.0			25.0			25.0	25.0
Effective Green, g (s)		66.0			66.0			26.0			26.0	26.0
Actuated g/C Ratio		0.66			0.66			0.26			0.26	0.26
Clearance Time (s)		5.0			5.0			5.0			5.0	5.0
Lane Grp Cap (vph)		978			1107			870			478	412
v/s Ratio Prot												
v/s Ratio Perm		c0.21			0.12			c0.33			0.32	0.02
v/c Ratio		0.33			0.18			1.25			1.22	0.06
Uniform Delay, d1		7.4			6.6			37.0			37.0	27.8
Progression Factor		1.00			1.00			1.47			1.00	1.00
Incremental Delay, d2		0.9			0.4			120.3			115.7	0.3
Delay (s)		8.2			6.9			174.6			152.7	28.1
Level of Service		A			A			F			F	C
Approach Delay (s)		8.2			6.9			174.6			134.8	
Approach LOS		A			A			F			F	
Intersection Summary												
HCM Average Control Delay		125.0						HCM Level of Service		F		
HCM Volume to Capacity ratio		0.59										
Actuated Cycle Length (s)		100.0						Sum of lost time (s)		8.0		
Intersection Capacity Utilization		82.1%						ICU Level of Service		E		
Analysis Period (min)		15										

c Critical Lane Group

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Volume (vph)	15	218	0	0	166	39	0	0	0	17	0	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
Hourly flow rate (vph)	16	237	0	0	180	42	0	0	0	18	0	12
Direction, Lane #	EB 1	WB 1	SB 1	SB 2								
Volume Total (vph)	253	223	18	12								
Volume Left (vph)	16	0	18	0								
Volume Right (vph)	0	42	0	12								
Hadj (s)	0.05	-0.08	0.53	-0.67								
Departure Headway (s)	4.3	4.2	6.1	4.9								
Degree Utilization, x	0.30	0.26	0.03	0.02								
Capacity (veh/h)	832	840	548	672								
Control Delay (s)	9.1	8.6	8.1	6.7								
Approach Delay (s)	9.1	8.6	7.5									
Approach LOS	A	A	A									
Intersection Summary												
Delay			8.8									
HCM Level of Service			A									
Intersection Capacity Utilization		33.8%			ICU Level of Service				A			
Analysis Period (min)		15										

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Volume (vph)	20	226	0	0	147	53	0	0	0	34	0	35
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)	22	246	0	0	160	58	0	0	0	37	0	38
Direction, Lane #	EB 1	WB 1	SB 1	SB 2								
Volume Total (vph)	267	217	37	38								
Volume Left (vph)	22	0	37	0								
Volume Right (vph)	0	58	0	38								
Hadj (s)	0.05	-0.12	0.53	-0.67								
Departure Headway (s)	4.4	4.3	6.1	4.9								
Degree Utilization, x	0.33	0.26	0.06	0.05								
Capacity (veh/h)	802	812	546	669								
Control Delay (s)	9.5	8.7	8.3	7.0								
Approach Delay (s)	9.5	8.7	7.6									
Approach LOS	A	A	A									
Intersection Summary												
Delay			9.0									
HCM Level of Service			A									
Intersection Capacity Utilization			37.3%		ICU Level of Service				A			
Analysis Period (min)			15									

						
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Volume (veh/h)	152	33	10	159	46	39
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	165	36	11	173	50	42
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type					None	
Median storage (veh)						
Upstream signal (ft)				282		
pX, platoon unblocked						
vC, conflicting volume			201		378	183
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			201		378	183
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			99		92	95
cM capacity (veh/h)			1371		619	859
Direction, Lane #	EB 1	WB 1	NB 1			
Volume Total	201	184	92			
Volume Left	0	11	50			
Volume Right	36	0	42			
cSH	1700	1371	710			
Volume to Capacity	0.12	0.01	0.13			
Queue Length 95th (ft)	0	1	11			
Control Delay (s)	0.0	0.5	10.8			
Lane LOS		A	B			
Approach Delay (s)	0.0	0.5	10.8			
Approach LOS			B			
Intersection Summary						
Average Delay		2.3				
Intersection Capacity Utilization		28.2%		ICU Level of Service		A
Analysis Period (min)		15				

	→	↘	↙	←	↖	↗
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↰			↱	↗	↘
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Volume (veh/h)	193	68	14	177	23	85
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	210	74	15	192	25	92
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type					None	
Median storage veh						
Upstream signal (ft)				282		
pX, platoon unblocked						
vC, conflicting volume			284		470	247
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			284		470	247
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			99		95	88
cM capacity (veh/h)			1279		546	792
Direction, Lane #	EB 1	WB 1	NB 1			
Volume Total	284	208	117			
Volume Left	0	15	25			
Volume Right	74	0	92			
cSH	1700	1279	723			
Volume to Capacity	0.17	0.01	0.16			
Queue Length 95th (ft)	0	1	14			
Control Delay (s)	0.0	0.7	10.9			
Lane LOS		A	B			
Approach Delay (s)	0.0	0.7	10.9			
Approach LOS			B			
Intersection Summary						
Average Delay		2.3				
Intersection Capacity Utilization		34.0%		ICU Level of Service		A
Analysis Period (min)		15				

						
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations	YY			↑↑	↑↑	
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0			4.0	4.0	
Lane Util. Factor	1.00			0.95	0.95	
Frt	0.93			1.00	0.99	
Flt Protected	0.98			0.99	1.00	
Satd. Flow (prot)	1695			3512	3515	
Flt Permitted	0.98			0.56	1.00	
Satd. Flow (perm)	1695			1977	3515	
Volume (vph)	96	95	95	521	1362	64
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	104	103	103	566	1480	70
RTOR Reduction (vph)	35	0	0	0	3	0
Lane Group Flow (vph)	172	0	0	669	1547	0
Turn Type	D.P+P					
Protected Phases	4		3	2 3	2	
Permitted Phases			2			
Actuated Green, G (s)	14.0			74.0	54.0	
Effective Green, g (s)	14.0			74.0	54.0	
Actuated g/C Ratio	0.14			0.74	0.54	
Clearance Time (s)	4.0				4.0	
Lane Grp Cap (vph)	237			1770	1898	
v/s Ratio Prot	c0.10			c0.08	c0.44	
v/s Ratio Perm				0.20		
v/c Ratio	0.72			0.38	0.81	
Uniform Delay, d1	41.2			4.7	18.9	
Progression Factor	1.00			1.00	1.00	
Incremental Delay, d2	17.5			0.6	4.0	
Delay (s)	58.7			5.3	22.9	
Level of Service	E			A	C	
Approach Delay (s)	58.7			5.3	22.9	
Approach LOS	E			A	C	
Intersection Summary						
HCM Average Control Delay		21.1		HCM Level of Service		C
HCM Volume to Capacity ratio		0.70				
Actuated Cycle Length (s)		100.0		Sum of lost time (s)		12.0
Intersection Capacity Utilization		78.0%		ICU Level of Service		D
Analysis Period (min)		15				
c Critical Lane Group						

						
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0			4.0	4.0	
Lane Util. Factor	1.00			0.95	0.95	
Frt	0.95			1.00	0.99	
Flt Protected	0.97			1.00	1.00	
Satd. Flow (prot)	1714			3526	3489	
Flt Permitted	0.97			0.68	1.00	
Satd. Flow (perm)	1714			2389	3489	
Volume (vph)	172	106	65	791	1210	126
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	187	115	71	860	1315	137
RTOR Reduction (vph)	22	0	0	0	8	0
Lane Group Flow (vph)	280	0	0	931	1444	0
Turn Type	D.P+P					
Protected Phases	4		3	2 3	2	
Permitted Phases			2			
Actuated Green, G (s)	14.0			74.0	54.0	
Effective Green, g (s)	14.0			74.0	54.0	
Actuated g/C Ratio	0.14			0.74	0.54	
Clearance Time (s)	4.0				4.0	
Lane Grp Cap (vph)	240			1995	1884	
v/s Ratio Prot	c0.16			c0.09	c0.41	
v/s Ratio Perm				0.25		
v/c Ratio	1.17			0.47	0.77	
Uniform Delay, d1	43.0			5.2	18.1	
Progression Factor	1.00			1.00	1.00	
Incremental Delay, d2	110.1			0.8	3.0	
Delay (s)	153.1			5.9	21.1	
Level of Service	F			A	C	
Approach Delay (s)	153.1			5.9	21.1	
Approach LOS	F			A	C	
Intersection Summary						
HCM Average Control Delay	30.7		HCM Level of Service		C	
HCM Volume to Capacity ratio	0.76					
Actuated Cycle Length (s)	100.0		Sum of lost time (s)		12.0	
Intersection Capacity Utilization	87.2%		ICU Level of Service		E	
Analysis Period (min)	15					
c Critical Lane Group						

	↑	↖	↗	↓	↙	↘
Movement	NBT	NBR	SBL	SBT	SWL	SWR
Lane Configurations	↑			↑	↖	↗
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0			4.0	4.0	4.0
Lane Util. Factor	1.00			1.00	1.00	1.00
Frt	1.00			1.00	1.00	0.85
Flt Protected	1.00			1.00	0.95	1.00
Satd. Flow (prot)	1863			1863	1770	1583
Flt Permitted	1.00			1.00	0.95	1.00
Satd. Flow (perm)	1863			1863	1770	1583
Volume (vph)	225	0	0	198	1092	5
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	245	0	0	215	1187	5
RTOR Reduction (vph)	0	0	0	0	0	2
Lane Group Flow (vph)	245	0	0	215	1187	3
Turn Type					Perm	
Protected Phases	2			6	8	
Permitted Phases						8
Actuated Green, G (s)	32.0			32.0	60.0	60.0
Effective Green, g (s)	32.0			32.0	60.0	60.0
Actuated g/C Ratio	0.32			0.32	0.60	0.60
Clearance Time (s)	4.0			4.0	4.0	4.0
Lane Grp Cap (vph)	596			596	1062	950
v/s Ratio Prot	c0.13			0.12	c0.67	
v/s Ratio Perm						0.00
v/c Ratio	0.41			0.36	1.12	0.00
Uniform Delay, d1	26.6			26.1	20.0	8.0
Progression Factor	1.50			1.00	2.30	2.64
Incremental Delay, d2	2.0			1.7	54.4	0.0
Delay (s)	41.8			27.8	100.3	21.1
Level of Service	D			C	F	C
Approach Delay (s)	41.8			27.8	100.0	
Approach LOS	D			C	F	
Intersection Summary						
HCM Average Control Delay		82.0		HCM Level of Service		F
HCM Volume to Capacity ratio		0.87				
Actuated Cycle Length (s)		100.0		Sum of lost time (s)		8.0
Intersection Capacity Utilization		79.0%		ICU Level of Service		D
Analysis Period (min)		15				

c Critical Lane Group

	↑	↗	↘	↓	↙	↖
Movement	NBT	NBR	SBL	SBT	SWL	SWR
Lane Configurations	↑			↑	↗	↖
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0			4.0	4.0	4.0
Lane Util. Factor	1.00			1.00	1.00	1.00
Frt	1.00			1.00	1.00	0.85
Flt Protected	1.00			1.00	0.95	1.00
Satd. Flow (prot)	1863			1863	1770	1583
Flt Permitted	1.00			1.00	0.95	1.00
Satd. Flow (perm)	1863			1863	1770	1583
Volume (vph)	259	0	0	199	511	5
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	282	0	0	216	555	5
RTOR Reduction (vph)	0	0	0	0	0	2
Lane Group Flow (vph)	282	0	0	216	555	3
Turn Type					Perm	
Protected Phases	2			6	8	
Permitted Phases						8
Actuated Green, G (s)	32.0			32.0	60.0	60.0
Effective Green, g (s)	32.0			32.0	60.0	60.0
Actuated g/C Ratio	0.32			0.32	0.60	0.60
Clearance Time (s)	4.0			4.0	4.0	4.0
Lane Grp Cap (vph)	596			596	1062	950
v/s Ratio Prot	c0.15			0.12	c0.31	
v/s Ratio Perm						0.00
v/c Ratio	0.47			0.36	0.52	0.00
Uniform Delay, d1	27.2			26.2	11.7	8.0
Progression Factor	1.63			1.00	2.54	2.70
Incremental Delay, d2	1.9			1.7	0.2	0.0
Delay (s)	46.2			27.9	29.7	21.6
Level of Service	D			C	C	C
Approach Delay (s)	46.2			27.9	29.7	
Approach LOS	D			C	C	
Intersection Summary						
HCM Average Control Delay		33.7		HCM Level of Service		C
HCM Volume to Capacity ratio		0.51				
Actuated Cycle Length (s)		100.0		Sum of lost time (s)		8.0
Intersection Capacity Utilization		48.6%		ICU Level of Service		A
Analysis Period (min)		15				
c Critical Lane Group						

Synchro 6 Report
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Synchro 6 Report
Page 2



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations	↰	↱		↑	↑↑	
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Volume (veh/h)	12	116	0	586	1290	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	13	126	0	637	1402	0
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None					
Median storage veh)						
Upstream signal (ft)					318	
pX, platoon unblocked						
vC, conflicting volume	2039	701	1402			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	2039	701	1402			
tC, single (s)	6.8	6.9	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	73	67	100			
cM capacity (veh/h)	49	381	483			
Direction, Lane #	EB 1	EB 2	NB 1	SB 1	SB 2	
Volume Total	13	126	637	701	701	
Volume Left	13	0	0	0	0	
Volume Right	0	126	0	0	0	
cSH	49	381	1700	1700	1700	
Volume to Capacity	0.27	0.33	0.37	0.41	0.41	
Queue Length 95th (ft)	23	35	0	0	0	
Control Delay (s)	103.2	19.0	0.0	0.0	0.0	
Lane LOS	F	C				
Approach Delay (s)	26.9		0.0	0.0		
Approach LOS	D					
Intersection Summary						
Average Delay			1.7			
Intersection Capacity Utilization			49.5%	ICU Level of Service		A
Analysis Period (min)			15			

						
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Volume (veh/h)	44	179	0	1226	710	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	48	195	0	1333	772	0
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None					
Median storage (veh)						
Upstream signal (ft)					318	
pX, platoon unblocked						
vC, conflicting volume	2104	386	772			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	2104	386	772			
tC, single (s)	6.8	6.9	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	0	68	100			
cM capacity (veh/h)	44	612	839			
Direction, Lane #	EB 1	EB 2	NB 1	SB 1	SB 2	
Volume Total	48	195	1333	386	386	
Volume Left	48	0	0	0	0	
Volume Right	0	195	0	0	0	
cSH	44	612	1700	1700	1700	
Volume to Capacity	1.08	0.32	0.78	0.23	0.23	
Queue Length 95th (ft)	112	34	0	0	0	
Control Delay (s)	304.1	13.6	0.0	0.0	0.0	
Lane LOS	F	B				
Approach Delay (s)	70.9		0.0	0.0		
Approach LOS	F					
Intersection Summary						
Average Delay			7.3			
Intersection Capacity Utilization			74.5%	ICU Level of Service		D
Analysis Period (min)			15			



Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations	↰		↑↑			↑↑
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0		4.0			4.0
Lane Util. Factor	1.00		0.95			0.95
Frt	0.92		1.00			1.00
Flt Protected	0.98		1.00			1.00
Satd. Flow (prot)	1681		3539			3539
Flt Permitted	0.98		1.00			1.00
Satd. Flow (perm)	1681		3539			3539
Volume (vph)	156	222	469	0	0	1170
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	170	241	510	0	0	1272
RTOR Reduction (vph)	51	0	0	0	0	0
Lane Group Flow (vph)	360	0	510	0	0	1272
Turn Type						
Protected Phases	3		2			2
Permitted Phases						
Actuated Green, G (s)	34.0		58.0			58.0
Effective Green, g (s)	34.0		58.0			58.0
Actuated g/C Ratio	0.34		0.58			0.58
Clearance Time (s)	4.0		4.0			4.0
Lane Grp Cap (vph)	572		2053			2053
v/s Ratio Prot	c0.21		0.14			c0.36
v/s Ratio Perm						
v/c Ratio	0.63		0.25			0.62
Uniform Delay, d1	27.7		10.3			13.8
Progression Factor	1.00		0.83			1.00
Incremental Delay, d2	5.2		0.3			1.4
Delay (s)	32.9		8.8			15.2
Level of Service	C		A			B
Approach Delay (s)	32.9		8.8			15.2
Approach LOS	C		A			B
Intersection Summary						
HCM Average Control Delay			17.0		HCM Level of Service	B
HCM Volume to Capacity ratio			0.62			
Actuated Cycle Length (s)			100.0		Sum of lost time (s)	8.0
Intersection Capacity Utilization			61.3%		ICU Level of Service	B
Analysis Period (min)			15			
c Critical Lane Group						



Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations	↰		↑↑			↑↑
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0		4.0			4.0
Lane Util. Factor	1.00		0.95			0.95
Frt	0.92		1.00			1.00
Flt Protected	0.98		1.00			1.00
Satd. Flow (prot)	1680		3539			3539
Flt Permitted	0.98		1.00			1.00
Satd. Flow (perm)	1680		3539			3539
Volume (vph)	142	202	756	0	0	853
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	154	220	822	0	0	927
RTOR Reduction (vph)	51	0	0	0	0	0
Lane Group Flow (vph)	323	0	822	0	0	927
Turn Type						
Protected Phases	3		2			2
Permitted Phases						
Actuated Green, G (s)	34.0		58.0			58.0
Effective Green, g (s)	34.0		58.0			58.0
Actuated g/C Ratio	0.34		0.58			0.58
Clearance Time (s)	4.0		4.0			4.0
Lane Grp Cap (vph)	571		2053			2053
v/s Ratio Prot	c0.19		0.23			c0.26
v/s Ratio Perm						
v/c Ratio	0.56		0.40			0.45
Uniform Delay, d1	27.0		11.5			11.9
Progression Factor	1.00		0.76			1.00
Incremental Delay, d2	4.0		0.5			0.7
Delay (s)	31.0		9.3			12.7
Level of Service	C		A			B
Approach Delay (s)	31.0		9.3			12.7
Approach LOS	C		A			B

Intersection Summary			
HCM Average Control Delay	14.6	HCM Level of Service	B
HCM Volume to Capacity ratio	0.49		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	50.5%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

HCS2000: Unsignalized Intersections Release 4.1d

ALL-WAY STOP CONTROL(AWSC) ANALYSIS

Analyst: CFP
 Agency/Co.: Wells & Associates, LLC
 Date Performed: 1/24/2006
 Analysis Time Period: AM Peak Period
 Intersection: Florida/9th/V Streets
 Jurisdiction: Washington DC
 Units: U. S. Customary
 Analysis Year: 2007 BG Conditions
 Project ID: 2799 Atlantic North (Addendum)
 East/West Street: 9th Street/V Street
 North/South Street: Florida/9th Street

Worksheet 2 - Volume Adjustments and Site Characteristics

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume	14	97	439	79	102	23	159	17	18	9	3	2
% Thrus Left Lane			55						45			

	Eastbound		Westbound		Northbound		Southbound	
	L1	L2	L1	L2	L1	L2	L1	L2
Configuration	LT	TR	LTR		LT	TR	LTR	
PHF	0.90	0.90	0.90		0.90	0.90	0.90	
Flow Rate	73	535	225		183	31	15	
% Heavy Veh	2	2	2		2	2	2	
No. Lanes		2		1		2		1
Opposing-Lanes		1		2		1		2
Conflicting-lanes		2		2		2		2
Geometry group		5		4b		5		4b
Duration, T	0.25 hrs.							

Worksheet 5 - Capacity and Level of Service

	Eastbound		Westbound		Northbound		Southbound	
	L1	L2	L1	L2	L1	L2	L1	L2
Flow Rate	73	535	225		183	31	15	
Service Time	3.5	2.7	3.8		4.8	3.9	4.9	
Utilization, x	0.12	0.75	0.38		0.36	0.05	0.03	
Dep. headway, hd	5.77	5.03	6.12		7.12	6.18	7.23	
Capacity	323	707	475		433	281	265	
Delay	9.23	21.01	12.55		13.80	9.22	10.16	
LOS	A	C	B		B	A	B	
Approach:								
Delay		19.60	12.55		13.14		10.16	
LOS		C	B		B		B	
Intersection Delay	16.67		Intersection LOS C					

HCS2000: Unsignalized Intersections Release 4.1d

ALL-WAY STOP CONTROL(AWSC) ANALYSIS

Analyst: CFP
 Agency/Co.: Wells & Associates, LLC
 Date Performed: 1/24/2006
 Analysis Time Period: PM Peak Period
 Intersection: Florida/9th/V Streets
 Jurisdiction: Washington DC
 Units: U. S. Customary
 Analysis Year: 2007 BG Conditions
 Project ID: 2799 Atlantic North (Addendum)
 East/West Street: 9th Street/V Street
 North/South Street: Florida/9th Street

Worksheet 2 - Volume Adjustments and Site Characteristics

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume	1	106	260	102	169	20	356	14	32	28	10	4
% Thrus Left Lane			55						45			

	Eastbound		Westbound		Northbound		Southbound	
	L1	L2	L1	L2	L1	L2	L1	L2
Configuration	LT	TR	LTR		LT	TR	LTR	
PHF	0.90	0.90	0.90		0.90	0.90	0.90	
Flow Rate	65	341	322		401	43	46	
% Heavy Veh	2	2	2		2	2	2	
No. Lanes		2		1		2		1
Opposing-Lanes		1		2		1		2
Conflicting-lanes		2		2		2		2
Geometry group		5		4b		5		4b
Duration, T	0.25 hrs.							

Worksheet 5 - Capacity and Level of Service

	Eastbound		Westbound		Northbound		Southbound	
	L1	L2	L1	L2	L1	L2	L1	L2
Flow Rate	65	341	322		401	43	46	
Service Time	4.8	4.2	4.9		5.2	4.1	6.0	
Utilization, x	0.13	0.62	0.64		0.83	0.08	0.11	
Dep. headway, hd	7.12	6.51	7.18		7.45	6.37	8.34	
Capacity	315	532	484		475	293	296	
Delay	10.87	19.13	21.86		37.06	9.60	12.03	
LOS	B	C	C		E	A	B	
Approach:								
Delay		17.81		21.86		34.40		12.03
LOS		C		C		D		B
Intersection Delay	24.71		Intersection LOS C					

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↕			↕			↕			↕		
Sign Control	Free			Free			Stop			Stop		
Grade	0%			0%			0%			0%		
Volume (veh/h)	24	88	43	15	148	29	24	45	29	15	16	17
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	96	47	16	161	32	26	49	32	16	17	18
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type	None						None					
Median storage veh												
Upstream signal (ft)	311											
pX, platoon unblocked												
vC, conflicting volume	192			142			408	396	119	436	404	177
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	192			142			408	396	119	436	404	177
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	98			99			95	91	97	96	97	98
cM capacity (veh/h)	1381			1440			516	525	933	465	520	866
Direction, Lane #	EB 1	WB 1	NB 1	SB 1								
Volume Total	168	209	107	52								
Volume Left	26	16	26	16								
Volume Right	47	32	32	18								
cSH	1381	1440	600	581								
Volume to Capacity	0.02	0.01	0.18	0.09								
Queue Length 95th (ft)	1	1	16	7								
Control Delay (s)	1.3	0.7	12.3	11.8								
Lane LOS	A	A	B	B								
Approach Delay (s)	1.3	0.7	12.3	11.8								
Approach LOS			B	B								
Intersection Summary												
Average Delay			4.3									
Intersection Capacity Utilization			27.6%	ICU Level of Service					A			
Analysis Period (min)			15									

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↕			↕			↕			↕		
Sign Control	Free			Free			Stop			Stop		
Grade	0%			0%			0%			0%		
Volume (veh/h)	9	110	44	19	215	73	76	27	45	33	28	32
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)	10	120	48	21	234	79	83	29	49	36	30	35
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type	None						None					
Median storage veh												
Upstream signal (ft)	305											
pX, platoon unblocked	0.96						0.96	0.96		0.96	0.96	0.96
vC, conflicting volume	313			167			528	517	143	541	502	273
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	285			167			508	497	143	522	481	243
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	99			99			80	93	95	91	93	95
cM capacity (veh/h)	1227			1410			406	445	904	394	455	764
Direction, Lane #	EB 1	WB 1	NB 1	SB 1								
Volume Total	177	334	161	101								
Volume Left	10	21	83	36								
Volume Right	48	79	49	35								
cSH	1227	1410	497	497								
Volume to Capacity	0.01	0.01	0.32	0.20								
Queue Length 95th (ft)	1	1	35	19								
Control Delay (s)	0.5	0.6	15.7	14.1								
Lane LOS	A	A	C	B								
Approach Delay (s)	0.5	0.6	15.7	14.1								
Approach LOS			C	B								
Intersection Summary												
Average Delay			5.5									
Intersection Capacity Utilization			41.6%	ICU Level of Service					A			
Analysis Period (min)			15									

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↑↑			↑↑	↑		↑↑		↑	↑↑	
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0			4.0	4.0		4.0		4.0	4.0	
Lane Util. Factor		0.95			0.95	1.00		0.95		1.00	0.95	
Frt		0.98			1.00	0.85		1.00		1.00	1.00	
Flt Protected		1.00			1.00	1.00		0.99		0.95	1.00	
Satd. Flow (prot)		3459			3539	1583		3502		1770	3524	
Flt Permitted		1.00			1.00	1.00		0.63		0.36	1.00	
Satd. Flow (perm)		3459			3539	1583		2228		664	3524	
Volume (vph)	0	556	99	0	862	150	68	361	8	259	1105	32
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	604	108	0	937	163	74	392	9	282	1201	35
RTOR Reduction (vph)	0	15	0	0	0	96	0	1	0	0	2	0
Lane Group Flow (vph)	0	697	0	0	937	67	0	474	0	282	1234	0
Turn Type						Perm	Perm			pm+pt		
Protected Phases		4			8			2		1	6	
Permitted Phases						8	2			6		
Actuated Green, G (s)		41.0			41.0	41.0		36.0		51.0	51.0	
Effective Green, g (s)		41.0			41.0	41.0		36.0		51.0	51.0	
Actuated g/C Ratio		0.41			0.41	0.41		0.36		0.51	0.51	
Clearance Time (s)		4.0			4.0	4.0		4.0		4.0	4.0	
Lane Grp Cap (vph)		1418			1451	649		802		460	1797	
v/s Ratio Prot		0.20			c0.26					0.07	c0.35	
v/s Ratio Perm						0.04		0.21		0.25		
v/c Ratio		0.49			0.65	0.10		0.59		0.61	0.69	
Uniform Delay, d1		21.8			23.7	18.2		26.0		15.1	18.5	
Progression Factor		1.00			1.00	1.00		1.00		0.93	0.94	
Incremental Delay, d2		1.2			2.2	0.3		3.2		6.0	2.2	
Delay (s)		23.0			25.9	18.5		29.2		20.0	19.6	
Level of Service		C			C	B		C		C	B	
Approach Delay (s)		23.0			24.8			29.2			19.6	
Approach LOS		C			C			C			B	
Intersection Summary												
HCM Average Control Delay		23.0					HCM Level of Service			C		
HCM Volume to Capacity ratio		0.67										
Actuated Cycle Length (s)		100.0					Sum of lost time (s)			8.0		
Intersection Capacity Utilization		77.6%					ICU Level of Service			D		
Analysis Period (min)		15										

c Critical Lane Group

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↑↑			↑↑	↑		↑↑		↑	↑↑	
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0			4.0	4.0		4.0		4.0	4.0	
Lane Util. Factor		0.95			0.95	1.00		0.95		1.00	0.95	
Frt		0.98			1.00	0.85		1.00		1.00	0.99	
Flt Protected		1.00			1.00	1.00		1.00		0.95	1.00	
Satd. Flow (prot)		3472			3539	1583		3526		1770	3510	
Flt Permitted		1.00			1.00	1.00		0.88		0.10	1.00	
Satd. Flow (perm)		3472			3539	1583		3097		186	3510	
Volume (vph)	0	785	114	0	717	185	49	929	9	258	596	35
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	853	124	0	779	201	53	1010	10	280	648	38
RTOR Reduction (vph)	0	11	0	0	0	119	0	1	0	0	4	0
Lane Group Flow (vph)	0	966	0	0	779	82	0	1072	0	280	682	0
Turn Type						Perm	Perm			pm+pt		
Protected Phases		4			8			2		1	6	
Permitted Phases						8	2			6		
Actuated Green, G (s)		41.0			41.0	41.0		36.0		51.0	51.0	
Effective Green, g (s)		41.0			41.0	41.0		36.0		51.0	51.0	
Actuated g/C Ratio		0.41			0.41	0.41		0.36		0.51	0.51	
Clearance Time (s)		4.0			4.0	4.0		4.0		4.0	4.0	
Lane Grp Cap (vph)		1424			1451	649		1115		269	1790	
v/s Ratio Prot		c0.28			0.22					c0.11	0.19	
v/s Ratio Perm						0.05		0.35		c0.42		
v/c Ratio		0.68			0.54	0.13		0.96		1.04	0.38	
Uniform Delay, d1		24.1			22.3	18.4		31.3		27.9	14.9	
Progression Factor		1.00			1.00	1.00		1.00		0.88	0.99	
Incremental Delay, d2		2.6			1.4	0.4		19.2		65.9	0.6	
Delay (s)		26.7			23.7	18.8		50.5		90.4	15.4	
Level of Service		C			C	B		D		F	B	
Approach Delay (s)		26.7			22.7			50.5			37.1	
Approach LOS		C			C			D			D	
Intersection Summary												
HCM Average Control Delay		34.6					HCM Level of Service			C		
HCM Volume to Capacity ratio		0.86										
Actuated Cycle Length (s)		100.0					Sum of lost time (s)			8.0		
Intersection Capacity Utilization		80.3%					ICU Level of Service			D		
Analysis Period (min)		15										
c Critical Lane Group												

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control	Free			Free			Stop			Stop		
Grade	0%			0%			0%			0%		
Volume (veh/h)	39	757	30	17	979	42	9	16	3	23	23	27
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)	42	823	33	18	1064	46	10	17	3	25	25	29
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type	None						None					
Median storage veh												
Upstream signal (ft)	301											
pX, platoon unblocked				0.86			0.86			0.86		
vC, conflicting volume	1110				855			1357			2071	
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	1110				676			1257			2082	
tC, single (s)	4.1				4.1			7.5			6.5	
tC, 2 stage (s)												
tF (s)	2.2				2.2			3.5			4.0	
p0 queue free %	93				98			81			58	
cM capacity (veh/h)	625				788			52			41	
Direction, Lane #	EB 1	EB 2	WB 1	WB 2	WB 3	NB 1	SB 1					
Volume Total	454	444	285	532	312	30	79					
Volume Left	42	0	18	0	0	10	25					
Volume Right	0	33	0	0	46	3	29					
cSH	625	1700	788	1700	1700	50	63					
Volume to Capacity	0.07	0.26	0.02	0.31	0.18	0.61	1.27					
Queue Length 95th (ft)	5	0	2	0	0	60	165					
Control Delay (s)	2.0	0.0	0.9	0.0	0.0	156.8	313.8					
Lane LOS	A		A			F	F					
Approach Delay (s)	1.0		0.2			156.8	313.8					
Approach LOS						F	F					
Intersection Summary												
Average Delay	14.4											
Intersection Capacity Utilization	58.6%			ICU Level of Service			B					
Analysis Period (min)	15											

															
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR			
Lane Configurations	↔↔			↕↕↕			↕			↕					
Sign Control	Free			Free			Stop			Stop					
Grade	0%			0%			0%			0%					
Volume (veh/h)	78	951	22	24	861	50	6	21	4	31	24	34			
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)	85	1034	24	26	936	54	7	23	4	34	26	37			
Pedestrians															
Lane Width (ft)															
Walking Speed (ft/s)															
Percent Blockage															
Right turn flare (veh)															
Median type	None						None								
Median storage veh															
Upstream signal (ft)	301														
pX, platoon unblocked				0.78			0.78			0.78	0.78	0.78			
vC, conflicting volume	990				1058			1629			2258	529	1717	2242	339
vC1, stage 1 conf vol															
vC2, stage 2 conf vol															
vCu, unblocked vol	990				793			1525			2330	116	1638	2310	339
tC, single (s)	4.1				4.1			7.5			6.5	6.9	7.5	6.5	6.9
tC, 2 stage (s)															
tF (s)	2.2				2.2			3.5			4.0	3.3	3.5	4.0	3.3
p0 queue free %	88				96			0			5	99	0	0	94
cM capacity (veh/h)	694				643			0			24	714	7	25	657
Direction, Lane #	EB 1	EB 2	WB 1	WB 2	WB 3	NB 1	SB 1								
Volume Total	602	541	260	468	288	34	97								
Volume Left	85	0	26	0	0	7	34								
Volume Right	0	24	0	0	54	4	37								
cSH	694	1700	643	1700	1700	0	16								
Volume to Capacity	0.12	0.32	0.04	0.28	0.17	Err	5.91								
Queue Length 95th (ft)	10	0	3	0	0	Err	Err								
Control Delay (s)	3.2	0.0	1.5	0.0	0.0	Err	Err								
Lane LOS	A		A			F	F								
Approach Delay (s)	1.7		0.4			Err	Err								
Approach LOS						F	F								
Intersection Summary															
Average Delay	Err														
Intersection Capacity Utilization	66.3%			ICU Level of Service			C								
Analysis Period (min)	15														

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0		4.0	4.0			4.0			4.0	
Lane Util. Factor		1.00		1.00	1.00			0.95			0.95	
Frt		0.97		1.00	0.95			0.99			0.99	
Flt Protected		0.98		0.95	1.00			1.00			1.00	
Satd. Flow (prot)		1769		1770	1776			3503			3487	
Flt Permitted		0.87		0.57	1.00			0.78			0.93	
Satd. Flow (perm)		1561		1062	1776			2735			3239	
Volume (vph)	48	52	33	28	49	22	40	399	18	33	1033	103
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	52	57	36	30	53	24	43	434	20	36	1123	112
RTOR Reduction (vph)	0	11	0	0	16	0	0	3	0	0	7	0
Lane Group Flow (vph)	0	134	0	30	61	0	0	494	0	0	1264	0
Turn Type	Perm			Perm			Perm			Perm		
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)		18.0		18.0	18.0			74.0			74.0	
Effective Green, g (s)		18.0		18.0	18.0			74.0			74.0	
Actuated g/C Ratio		0.18		0.18	0.18			0.74			0.74	
Clearance Time (s)		4.0		4.0	4.0			4.0			4.0	
Lane Grp Cap (vph)		281		191	320			2024			2397	
v/s Ratio Prot					0.03							
v/s Ratio Perm		c0.09		0.03				0.18			c0.39	
v/c Ratio		0.48		0.16	0.19			0.24			0.53	
Uniform Delay, d1		36.8		34.6	34.8			4.1			5.5	
Progression Factor		1.02		1.00	1.00			1.00			0.26	
Incremental Delay, d2		5.7		1.7	1.3			0.3			0.7	
Delay (s)		43.3		36.3	36.1			4.4			2.1	
Level of Service		D		D	D			A			A	
Approach Delay (s)		43.3			36.2			4.4			2.1	
Approach LOS		D			D			A			A	
Intersection Summary												
HCM Average Control Delay		7.4						HCM Level of Service		A		
HCM Volume to Capacity ratio		0.52										
Actuated Cycle Length (s)		100.0						Sum of lost time (s)		8.0		
Intersection Capacity Utilization		69.6%						ICU Level of Service		C		
Analysis Period (min)		15										
c Critical Lane Group												

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0		4.0	4.0			4.0			4.0	
Lane Util. Factor		1.00		1.00	1.00			0.95			0.95	
Frt		0.96		1.00	0.96			1.00			0.98	
Flt Protected		0.99		0.95	1.00			0.99			1.00	
Satd. Flow (prot)		1764		1770	1786			3511			3468	
Flt Permitted		0.78		0.45	1.00			0.71			0.93	
Satd. Flow (perm)		1388		840	1786			2517			3236	
Volume (vph)	52	79	55	62	102	39	97	665	8	17	727	109
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	57	86	60	67	111	42	105	723	9	18	790	118
RTOR Reduction (vph)	0	15	0	0	14	0	0	1	0	0	11	0
Lane Group Flow (vph)	0	188	0	67	139	0	0	836	0	0	915	0
Turn Type	Perm			Perm			Perm			Perm		
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)		18.0		18.0	18.0			74.0			74.0	
Effective Green, g (s)		18.0		18.0	18.0			74.0			74.0	
Actuated g/C Ratio		0.18		0.18	0.18			0.74			0.74	
Clearance Time (s)		4.0		4.0	4.0			4.0			4.0	
Lane Grp Cap (vph)		250		151	321			1863			2395	
v/s Ratio Prot					0.08							
v/s Ratio Perm		c0.14		0.08				c0.33			0.28	
v/c Ratio		0.75		0.44	0.43			0.45			0.38	
Uniform Delay, d1		38.9		36.5	36.5			5.1			4.7	
Progression Factor		1.00		1.00	1.00			1.00			0.37	
Incremental Delay, d2		18.7		9.2	4.2			0.8			0.4	
Delay (s)		57.5		45.7	40.7			5.8			2.1	
Level of Service		E		D	D			A			A	
Approach Delay (s)		57.5			42.2			5.8			2.1	
Approach LOS		E			D			A			A	
Intersection Summary												
HCM Average Control Delay		12.7						HCM Level of Service		B		
HCM Volume to Capacity ratio		0.51										
Actuated Cycle Length (s)		100.0						Sum of lost time (s)		8.0		
Intersection Capacity Utilization		77.0%						ICU Level of Service		D		
Analysis Period (min)		15										
c Critical Lane Group												



Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations		↗	↕			
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Volume (veh/h)	0	0	373	6	0	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	0	405	7	0	0
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None					
Median storage (veh)						
Upstream signal (ft)					299	
pX, platoon unblocked						
vC, conflicting volume	409	206			412	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	409	206			412	
tC, single (s)	6.8	6.9			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	100	100			100	
cM capacity (veh/h)	571	800			1143	
Direction, Lane #	WB 1	NB 1	NB 2			
Volume Total	0	270	142			
Volume Left	0	0	0			
Volume Right	0	0	7			
cSH	1700	1700	1700			
Volume to Capacity	0.00	0.16	0.08			
Queue Length 95th (ft)	0	0	0			
Control Delay (s)	0.0	0.0	0.0			
Lane LOS	A					
Approach Delay (s)	0.0	0.0				
Approach LOS	A					
Intersection Summary						
Average Delay		0.0				
Intersection Capacity Utilization		13.8%		ICU Level of Service	A	
Analysis Period (min)		15				



Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations		↗	↕			
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Volume (veh/h)	0	1	1004	3	0	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	1	1091	3	0	0
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None					
Median storage veh						
Upstream signal (ft)					299	
pX, platoon unblocked						
vC, conflicting volume	1093	547			1095	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1093	547			1095	
tC, single (s)	6.8	6.9			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	100	100			100	
cM capacity (veh/h)	209	481			633	
Direction, Lane #	WB 1	NB 1	NB 2			
Volume Total	1	728	367			
Volume Left	0	0	0			
Volume Right	1	0	3			
cSH	481	1700	1700			
Volume to Capacity	0.00	0.43	0.22			
Queue Length 95th (ft)	0	0	0			
Control Delay (s)	12.5	0.0	0.0			
Lane LOS	B					
Approach Delay (s)	12.5	0.0				
Approach LOS	B					
Intersection Summary						
Average Delay		0.0				
Intersection Capacity Utilization		37.8%		ICU Level of Service	A	
Analysis Period (min)		15				

																			
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL2	NBL	NBR	SEL	SER	SER2							
Lane Configurations																			
Sign Control		Stop			Stop			Stop		Stop									
Volume (vph)	11	33	6	28	27	243	10	223	15	165	170	29							
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)	12	36	7	30	29	264	11	242	16	179	185	32							
Direction, Lane #	EB 1	WB 1	NB 1	SE 1	SE 2														
Volume Total (vph)	54	324	270	179	216														
Volume Left (vph)	12	30	11	179	0														
Volume Right (vph)	7	264	16	0	32														
Hadj (s)	0.01	-0.44	0.01	0.53	-0.07														
Departure Headway (s)	6.3	5.3	5.7	6.5	5.9														
Degree Utilization, x	0.10	0.48	0.43	0.33	0.36														
Capacity (veh/h)	473	631	586	525	578														
Control Delay (s)	10.0	13.1	12.9	11.4	10.9														
Approach Delay (s)	10.0	13.1	12.9	11.2															
Approach LOS	B	B	B	B															
Intersection Summary																			
Delay	12.2																		
HCM Level of Service	B																		
Intersection Capacity Utilization	53.0%			ICU Level of Service			A												
Analysis Period (min)	15																		

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL2	NBL	NBR	SEL	SER	SER2
Lane Configurations												
Sign Control		Stop			Stop			Stop		Stop		
Volume (vph)	13	10	2	1	13	184	10	263	6	278	225	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
Hourly flow rate (vph)	14	11	2	1	14	200	11	286	7	302	245	10
Direction, Lane #	EB 1	WB 1	NB 1	SE 1	SE 2							
Volume Total (vph)	27	215	303	302	254							
Volume Left (vph)	14	1	11	302	0							
Volume Right (vph)	2	200	7	0	10							
Hadj (s)	0.09	-0.52	0.03	0.53	0.01							
Departure Headway (s)	6.5	5.4	5.4	6.1	5.6							
Degree Utilization, x	0.05	0.33	0.46	0.51	0.40							
Capacity (veh/h)	462	605	636	573	627							
Control Delay (s)	9.9	11.1	13.0	14.2	11.0							
Approach Delay (s)	9.9	11.1	13.0	12.7								
Approach LOS	A	B	B	B								
Intersection Summary												
Delay			12.4									
HCM Level of Service			B									
Intersection Capacity Utilization			53.0%			ICU Level of Service			A			
Analysis Period (min)			15									

2007 Total Future Condition
12: Barry Place & Sherman Street

AM Peak Period
1/24/2006

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0			4.0			4.0			4.0	4.0
Lane Util. Factor		1.00			1.00			0.95			0.95	1.00
Frt		1.00			0.97			0.98			1.00	0.85
Flt Protected		0.98			1.00			1.00			1.00	1.00
Satd. Flow (prot)		1823			1806			3482			3528	1583
Flt Permitted		0.80			0.99			0.81			0.81	1.00
Satd. Flow (perm)		1498			1790			2815			2852	1583
Volume (vph)	91	121	1	7	132	37	2	330	40	72	1089	165
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	99	132	1	8	143	40	2	359	43	78	1184	179
RTOR Reduction (vph)	0	0	0	0	10	0	0	9	0	0	0	107
Lane Group Flow (vph)	0	232	0	0	181	0	0	395	0	0	1262	72
Turn Type	Perm			Perm			Perm			Perm		
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2			6		6
Actuated Green, G (s)		65.0			65.0			25.0			25.0	25.0
Effective Green, g (s)		66.0			66.0			26.0			26.0	26.0
Actuated g/C Ratio		0.66			0.66			0.26			0.26	0.26
Clearance Time (s)		5.0			5.0			5.0			5.0	5.0
Lane Grp Cap (vph)		989			1181			732			742	412
v/s Ratio Prot												
v/s Ratio Perm		c0.15			0.10			0.14			c0.44	0.05
v/c Ratio		0.23			0.15			0.54			1.70	0.18
Uniform Delay, d1		6.8			6.4			31.8			37.0	28.7
Progression Factor		1.00			1.00			1.46			1.00	1.00
Incremental Delay, d2		0.6			0.3			2.7			321.1	0.9
Delay (s)		7.4			6.7			49.1			358.1	29.6
Level of Service		A			A			D			F	C
Approach Delay (s)		7.4			6.7			49.1			317.3	
Approach LOS		A			A			D			F	

Intersection Summary			
HCM Average Control Delay	211.7	HCM Level of Service	F
HCM Volume to Capacity ratio	0.65		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	77.0%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

2007 Total Future Condition
12: Barry Place & Sherman Street

PM Peak Period
1/24/2006

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0			4.0			4.0			4.0	4.0
Lane Util. Factor		1.00			1.00			0.95			0.95	1.00
Frt		1.00			0.96			1.00			1.00	0.85
Flt Protected		0.98			0.99			1.00			1.00	1.00
Satd. Flow (prot)		1822			1769			3524			3522	1583
Flt Permitted		0.80			0.94			0.95			0.52	1.00
Satd. Flow (perm)		1482			1677			3345			1837	1583
Volume (vph)	120	169	5	23	100	60	8	970	26	52	483	90
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	130	184	5	25	109	65	9	1054	28	57	525	98
RTOR Reduction (vph)	0	1	0	0	1	0	0	1	0	0	0	73
Lane Group Flow (vph)	0	318	0	0	198	0	0	1090	0	0	582	25
Turn Type	Perm			Perm			Perm			Perm		
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2			6		6
Actuated Green, G (s)		65.0			65.0			25.0			25.0	25.0
Effective Green, g (s)		66.0			66.0			26.0			26.0	26.0
Actuated g/C Ratio		0.66			0.66			0.26			0.26	0.26
Clearance Time (s)		5.0			5.0			5.0			5.0	5.0
Lane Grp Cap (vph)		978			1107			870			478	412
v/s Ratio Prot												
v/s Ratio Perm		c0.21			0.12			c0.33			0.32	0.02
v/c Ratio		0.33			0.18			1.25			1.22	0.06
Uniform Delay, d1		7.4			6.6			37.0			37.0	27.8
Progression Factor		1.00			1.00			1.45			1.00	1.00
Incremental Delay, d2		0.9			0.4			120.5			115.7	0.3
Delay (s)		8.2			6.9			174.1			152.7	28.1
Level of Service		A			A			F			F	C
Approach Delay (s)		8.2			6.9			174.1			134.8	
Approach LOS		A			A			F			F	
Intersection Summary												
HCM Average Control Delay		124.8						HCM Level of Service		F		
HCM Volume to Capacity ratio		0.59										
Actuated Cycle Length (s)		100.0						Sum of lost time (s)		8.0		
Intersection Capacity Utilization		82.1%						ICU Level of Service		E		
Analysis Period (min)		15										

c Critical Lane Group

2007 Total Future Condition
9: Barry Place & 9th Street

AM Peak Period
1/24/2006

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Volume (vph)	15	218	0	0	166	39	0	0	0	17	0	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
Hourly flow rate (vph)	16	237	0	0	180	42	0	0	0	18	0	12
Direction, Lane #	EB 1	WB 1	SB 1	SB 2								
Volume Total (vph)	253	223	18	12								
Volume Left (vph)	16	0	18	0								
Volume Right (vph)	0	42	0	12								
Hadj (s)	0.05	-0.08	0.53	-0.67								
Departure Headway (s)	4.3	4.2	6.1	4.9								
Degree Utilization, x	0.30	0.26	0.03	0.02								
Capacity (veh/h)	832	840	548	672								
Control Delay (s)	9.1	8.6	8.1	6.7								
Approach Delay (s)	9.1	8.6	7.5									
Approach LOS	A	A	A									
Intersection Summary												
Delay			8.8									
HCM Level of Service			A									
Intersection Capacity Utilization		33.8%			ICU Level of Service				A			
Analysis Period (min)			15									

2007 Total Future Condition
9: Barry Place & 9th Street

PM Peak Period
1/24/2006

																				
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR								
Lane Configurations																				
Sign Control		Stop			Stop			Stop			Stop									
Volume (vph)	20	226	0	0	147	53	0	0	0	34	0	35								
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)	22	246	0	0	160	58	0	0	0	37	0	38								
Direction, Lane #	EB 1	WB 1	SB 1	SB 2																
Volume Total (vph)	267	217	37	38																
Volume Left (vph)	22	0	37	0																
Volume Right (vph)	0	58	0	38																
Hadj (s)	0.05	-0.12	0.53	-0.67																
Departure Headway (s)	4.4	4.3	6.1	4.9																
Degree Utilization, x	0.33	0.26	0.06	0.05																
Capacity (veh/h)	802	812	546	669																
Control Delay (s)	9.5	8.7	8.3	7.0																
Approach Delay (s)	9.5	8.7	7.6																	
Approach LOS	A	A	A																	
Intersection Summary																				
Delay			9.0																	
HCM Level of Service			A																	
Intersection Capacity Utilization			37.3%	ICU Level of Service	A															
Analysis Period (min)			15																	

						
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Volume (veh/h)	152	33	10	159	46	39
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	165	36	11	173	50	42
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None					
Median storage veh						
Upstream signal (ft)	282					
pX, platoon unblocked						
vC, conflicting volume			201		378	183
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			201		378	183
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			99		92	95
cM capacity (veh/h)			1371		619	859
Direction, Lane #	EB 1	WB 1	NB 1			
Volume Total	201	184	92			
Volume Left	0	11	50			
Volume Right	36	0	42			
cSH	1700	1371	710			
Volume to Capacity	0.12	0.01	0.13			
Queue Length 95th (ft)	0	1	11			
Control Delay (s)	0.0	0.5	10.8			
Lane LOS		A	B			
Approach Delay (s)	0.0	0.5	10.8			
Approach LOS			B			
Intersection Summary						
Average Delay			2.3			
Intersection Capacity Utilization			28.2%	ICU Level of Service	A	
Analysis Period (min)			15			

	→	↘	↙	←	↖	↗
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑			↑	↖	
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Volume (veh/h)	193	68	13	177	23	85
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	210	74	14	192	25	92
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None		
Median storage veh						
Upstream signal (ft)				282		
pX, platoon unblocked						
vC, conflicting volume			284		467	247
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			284		467	247
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			99		95	88
cM capacity (veh/h)			1279		548	792
Direction, Lane #	EB 1	WB 1	NB 1			
Volume Total	284	207	117			
Volume Left	0	14	25			
Volume Right	74	0	92			
cSH	1700	1279	723			
Volume to Capacity	0.17	0.01	0.16			
Queue Length 95th (ft)	0	1	14			
Control Delay (s)	0.0	0.6	10.9			
Lane LOS		A	B			
Approach Delay (s)	0.0	0.6	10.9			
Approach LOS			B			
Intersection Summary						
Average Delay		2.3				
Intersection Capacity Utilization		33.2%	ICU Level of Service	A		
Analysis Period (min)		15				