

APPENDIX N

2009 Total Future Queue Analyses

JOB: The Village at Washington Gateway
 JOB NUMBER: 2921
 CALCULATED BY: JMR
 DATE: 8/8/2006
 CHECKED BY:
 DATE:

N-S ROADWAY: Bladensburg Road
 E-W ROADWAY: Fort Lincoln Drive/Eastern Avenue
 CYCLE LENGTH: 100
 TIME PERIOD: AM
 SCENARIO: 2009 Background Conditions (growth and pipelines)

REQUIRED TURN LANE LENGTHS FOR SIGNALIZED INTERSECTIONS
 REFERENCE: A Policy on Geometric Design of Highways and Streets, p. 715, AASHTO, 2004.

APPROACH/ MOVEMENT	VOLUME (vph) (V)	g / C	HEAVY VEHICLES (%) (HV)	NUMBER OF LANES (N)	QUEUE (Q)
EBL	152	0.380	2%	1	85
EBTR	426	0.380	2%	1	235
WBL	52	0.380	2%	1	30
WBTR	392	0.380	2%	1	220
NBL	120	0.500	2%	1	55
NBTR	264	0.410	2%	2	70
SBL	46	0.500	2%	1	25
SBTR	1403	0.410	2%	2	370

$$Q = \frac{V * 1.25 * 25 * (1 - g/C) * (1 + \%HV)}{\# \text{ of Cycles/Hour} * N}$$

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 REFERENCE: A Policy on Geometric Design of Highways and Streets, p. 715, AASHTO, 2004.

APPROACH/ MOVEMENT	VOLUME (vph) (V)	g / C	HEAVY VEHICLES (%) (HV)	NUMBER OF LANES (N)	QUEUE (Q)
EBL	364	0.380	2%	1	200
EBTR	438	0.380	2%	1	255
WBL	24	0.380	2%	1	15
WBTR	372	0.380	2%	1	205
NBL	199	0.500	2%	1	90
NBTR	675	0.370	2%	2	190
SBL	103	0.500	2%	1	50
SBTR	485	0.370	2%	2	140

$$Q = \frac{V * 1.25 * 25 * (1 - g/C) * (1 + \%HV)}{\# \text{ of Cycles/Hour} * N}$$

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 SCENARIO: 2009 Total Future with Improvements Condition

REQUIRED TURN LANE LENGTHS FOR SIGNALIZED INTERSECTIONS
 REFERENCE: A Policy on Geometric Design of Highways and Streets, p. 715, AASHTO, 2004.

APPROACH/ MOVEMENT	VOLUME (vph) (V)	g / C	HEAVY VEHICLES (%) (HV)	NUMBER OF LANES (N)	QUEUE (Q)
EBL	152	0.390	2%	1	85
EBTR	430	0.390	2%	1	235
WBL	52	0.390	2%	1	30
WBTR	437	0.390	2%	1	240
NBL	120	0.490	2%	1	55
NBTR	264	0.410	2%	2	70
SBL	50	0.490	2%	1	25
SBTR	1403	0.410	2%	2	370

$$Q = \frac{V * 1.25 * 25 * (1 - g/C)^4 * (1 + \%HV)}{\# \text{ of Cycles/Hour} * N}$$

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REFERENCE: A Policy on Geometric Design of Highways and Streets, p. 715, AASHTO, 2004.

APPROACH/ MOVEMENT	VOLUME (vph) (V)	g / C	HEAVY VEHICLES (%) (HV)	NUMBER OF LANES (N)	QUEUE (Q)
EBL	364	0.380	2%	1	200
EBTR	470	0.380	2%	1	260
WBL	24	0.380	2%	1	15
WBTR	380	0.380	2%	1	210
NBL	199	0.500	2%	1	90
NBTR	675	0.370	2%	2	190
SBL	118	0.500	2%	1	55
SBTR	485	0.370	2%	2	140

$$Q = \frac{V * 1.25 * 25 * (1 - g/C) * (1 + \%HV)}{\# \text{ of Cycles/Hour} * N}$$

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 CYCLE LENGTH: 100
 TIME PERIOD: AM
 SCENARIO: 2009 Background Conditions (growth and pipelines)

REQUIRED TURN LANE LENGTHS FOR SIGNALIZED INTERSECTIONS
 REFERENCE: A Policy on Geometric Design of Highways and Streets, p. 715, AASHTO, 2004.

APPROACH/ MOVEMENT	VOLUME (vph) (V)	g / C	HEAVY VEHICLES (%) (HV)	NUMBER OF LANES (N)	QUEUE (Q)
EBL	93	0.480	2%	1	45
EBTR	980	0.520	2%	2	210
WBLTR	1894	0.430	2%	3	320
NBL	145	0.360	2%	1	85
NBTR	286	0.300	2%	2	90
SBL	66	0.360	2%	1	40
SBTR	1083	0.300	2%	2	340

$$Q = \frac{V * 1.25 * 25 * (1 - g/C) * (1 + \%HV)}{\# \text{ of Cycles/Hour} * N}$$

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APPROACH/ MOVEMENT	VOLUME (vph) (V)	g / C	HEAVY VEHICLES (%) (HV)	NUMBER OF LANES (N)	QUEUE (Q)
EBL	211	0.460	2%	1	105
EBTR	1473	0.500	2%	2	330
WBLTR	1267	0.380	2%	3	235
NBL	132	0.380	2%	1	75
NBTR	513	0.320	2%	2	155
SBL	60	0.380	2%	1	35
SBTR	397	0.320	2%	2	120

$$Q = \frac{V * 1.25 * 25 * (1 - g/C)^*(1 + \%HV)}{\text{\# of Cycles/Hour} * N}$$

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REQUIRED TURN LANE LENGTHS FOR SIGNALIZED INTERSECTIONS
 REFERENCE: A Policy on Geometric Design of Highways and Streets, p. 715, AASHTO, 2004.

APPROACH/ MOVEMENT	VOLUME (vph) (V)	g / C	HEAVY VEHICLES (%) (HV)	NUMBER OF LANES (N)	QUEUE (Q)
EBL	93	0.480	2%	1	45
EBTR	980	0.520	2%	2	210
WBLTR	1913	0.440	2%	3	320
NBL	145	0.360	2%	1	85
NBTR	290	0.300	2%	2	90
SBL	66	0.360	2%	1	40
SBTR	1083	0.300	2%	2	340

$$Q = \frac{V * 1.25 * 2.5 * (1 - g/C)^{(1 + \%HV)}}{\# \text{ of Cycles/Hour} * N}$$

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APPROACH/ MOVEMENT	VOLUME (vph) (V)	g / C	HEAVY VEHICLES (%) (HV)	NUMBER OF LANES (N)	QUEUE (Q)
EBL	211	0.460	2%	1	105
EBTR	1469	0.500	2%	2	330
WBLTR	1259	0.380	2%	3	235
NBL	132	0.380	2%	1	75
NBTR	525	0.320	2%	2	160
SBL	60	0.380	2%	1	35
SBTR	397	0.320	2%	2	120

$$Q = \frac{V * 1.25 * 25 * (1 - g/C) * (1 + \%HV)}{\# \text{ of Cycles/Hour} * N}$$

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 CYCLE LENGTH: 100
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 SCENARIO: 2009 Background Conditions (growth and pipelines)

REQUIRED TURN LANE LENGTHS FOR SIGNALIZED INTERSECTIONS
REFERENCE: A Policy on Geometric Design of Highways and Streets, p. 715, AASHTO, 2004.

APPROACH/ MOVEMENT	VOLUME (vph) (V)	g / C	HEAVY VEHICLES (%) (HV)	NUMBER OF LANES (N)	QUEUE (Q)
EBL	50	0.650	2%	1	20
EBTR	985	0.650	2%	2	155
WBLT	1721	0.650	2%	2	270
WBR	126	0.650	2%	1	40
NBLTR	10	0.060	2%	1	10
SBL	172	0.170	2%	1	130
SBLT	177	0.170	2%	1	135
SBR	88	0.170	2%	1	65

$$Q = \frac{V * 1.25 * 25 * (1 - g/C)^* (1 + \%HV)}{\# \text{ of Cycles/Hour} * N}$$

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APPROACH/ MOVEMENT	VOLUME (vph) (V)	g / C	HEAVY VEHICLES (%) (HV)	NUMBER OF LANES (N)	QUEUE (Q)
EBL	211	0.590	2%	1	80
EBTR	1342	0.590	2%	2	245
WBLT	879	0.590	2%	2	160
WBR	270	0.590	2%	1	100
NBLTR	64	0.060	2%	1	55
SBL	324	0.230	2%	1	225
SBLT	326	0.230	2%	1	225
SBR	378	0.230	2%	1	260

$$Q = \frac{V * 1.25 * 25 * (1 - g/C) * (1 + \%HV)}{\# \text{ of Cycles/Hour} * N}$$

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APPROACH/ MOVEMENT	VOLUME (vph) (V)	g / C	HEAVY VEHICLES (%) (HV)	NUMBER OF LANES (N)	QUEUE (Q)
EBL	54	0.640	2%	1	20
EBTR	985	0.640	2%	2	160
WBLT	1721	0.560	2%	2	340
WBR	126	0.560	2%	1	50
NBLTR	10	0.060	2%	1	10
SBL	196	0.180	2%	1	145
SBLT	201	0.180	2%	1	150
SBR	107	0.180	2%	1	80

$$Q = \frac{V * 1.25 * 25 * (1 - g/C) * (1 + \%HV)}{\# \text{ of Cycles/Hour} * N}$$

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APPROACH/ MOVEMENT	VOLUME (vph) (V)	g / C	HEAVY VEHICLES (%) (HV)	NUMBER OF LANES (N)	QUEUE (Q)
EBL	215	0.590	2%	1	80
EBTR	1346	0.590	2%	2	245
WBLT	882	0.590	2%	2	165
WBR	262	0.590	2%	1	100
NBLTR	64	0.060	2%	1	55
SBL	322	0.230	2%	1	220
SBLT	324	0.230	2%	1	225
SBR	366	0.230	2%	1	250

$$Q = \frac{V * 1.25 * 25 * (1 - g/C) * (1 + \%HV)}{\# \text{ of Cycles/Hour} * N}$$

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APPROACH/ MOVEMENT	VOLUME (vph) (V)	g / C	HEAVY VEHICLES (%) (HV)	NUMBER OF LANES (N)	QUEUE (Q)
EBL	29	0.060	2%	1	25
EBTR	981	0.630	2%	2	165
WBTR	1813	0.530	2%	2	380
NBLTR	35	0.290	2%	1	25
SBLTR	186	0.290	2%	1	120

$$Q = \frac{V * 1.25 * 25 * (1 - g/C) * (1 + \%HV)}{\# \text{ of Cycles/Hour} * N}$$

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APPROACH/ MOVEMENT	VOLUME (vph) (V)	g / C	HEAVY VEHICLES (%) (HV)	NUMBER OF LANES (N)	QUEUE (Q)
EBL	83	0.070	2%	1	70
EBTR	1367	0.710	2%	2	180
WBTR	1180	0.600	2%	2	210
NBLTR	61	0.210	2%	1	45
SBLTR	84	0.210	2%	1	60

$$Q = \frac{V * 1.25 * 25 * (1 - g/C) * (1 + \%HV)}{\# \text{ of Cycles/Hour} * N}$$

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APPROACH/ MOVEMENT	VOLUME (vph) (V)	g / C	HEAVY VEHICLES (%) (HV)	NUMBER OF LANES (N)	QUEUE (Q)
EBL	29	0.060	2%	1	25
EBTR	984	0.630	2%	2	165
WBTR	1832	0.530	2%	2	385
NBLTR	35	0.290	2%	1	25
SBLTR	186	0.290	2%	1	120

$$Q = \frac{V * 1.25 * 25 * (1 - g/C) * (1 + \%HV)}{\# \text{ of Cycles/Hour} * N}$$

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APPROACH/ MOVEMENT	VOLUME (vph) (V)	g / C	HEAVY VEHICLES (%) (HV)	NUMBER OF LANES (N)	QUEUE (Q)
EBL	83	0.070	2%	1	70
EBTR	1375	0.710	2%	2	180
WBTR	1171	0.600	2%	2	210
NBLTR	61	0.210	2%	1	45
SBLTR	84	0.210	2%	1	60

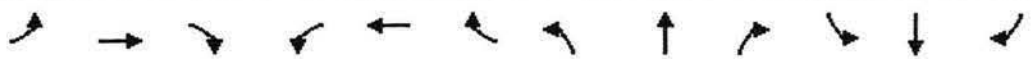
$$Q = \frac{V * 1.25 * 25 * (1 - g/C) * (1 + \%HV)}{\# \text{ of Cycles/Hour} * N}$$

APPENDIX O

2009 Future Background Capacity Analyses Impact on Fort Lincoln Area

HCM Signalized Intersection Capacity Analysis
1: Eastern Avenue & Bladensburg Road

2921 Fort Lincoln Phase 2
7/6/2006

												
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
Lane Width	10	10	10	11	12	12	11	11	11	15	13	13
Total Lost time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	0.95		1.00	0.95	
Frpb, ped/bikes	1.00	0.99		1.00	1.00		1.00	1.00		1.00	0.99	
Flpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Frt	1.00	0.94		1.00	0.99		1.00	0.99		1.00	0.95	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1652	1629		1709	1841		1711	3367		1944	3435	
Flt Permitted	0.35	1.00		0.28	1.00		0.10	1.00		0.56	1.00	
Satd. Flow (perm)	604	1629		512	1841		176	3367		1147	3435	
Volume (vph)	152	252	160	51	331	28	118	235	25	30	909	493
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)	165	274	174	55	360	30	128	255	27	33	988	536
RTOR Reduction (vph)	0	23	0	0	3	0	0	8	0	0	73	0
Lane Group Flow (vph)	165	425	0	55	387	0	128	274	0	33	1451	0
Confl. Peds. (#/hr)			2	2			3		4	4		3
Turn Type	Perm			Perm			pm+pt			pm+pt		
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)	37.0	37.0		37.0	37.0		48.0	40.0		48.0	40.0	
Effective Green, g (s)	38.0	38.0		38.0	38.0		50.0	41.0		50.0	41.0	
Actuated g/C Ratio	0.38	0.38		0.38	0.38		0.50	0.41		0.50	0.41	
Clearance Time (s)	5.0	5.0		5.0	5.0		5.0	5.0		5.0	5.0	
Lane Grp Cap (vph)	230	619		195	700		226	1380		645	1408	
v/s Ratio Prot		0.26			0.21		c0.05	0.08		0.00	c0.42	
v/s Ratio Perm	c0.27			0.11			0.23			0.02		
v/c Ratio	0.72	0.69		0.28	0.55		0.57	0.20		0.05	1.03	
Uniform Delay, d1	26.4	26.0		21.5	24.3		44.8	18.9		12.7	29.5	
Progression Factor	1.00	1.00		1.00	1.00		2.09	1.93		1.00	1.00	
Incremental Delay, d2	17.5	6.1		3.6	3.1		9.0	0.3		0.2	32.3	
Delay (s)	43.9	32.1		25.1	27.5		102.8	36.8		12.9	61.8	
Level of Service	D	C		C	C		F	D		B	E	
Approach Delay (s)		35.3			27.2			57.4			60.7	
Approach LOS		D			C			E			E	
Intersection Summary												
HCM Average Control Delay		50.2		HCM Level of Service						D		
HCM Volume to Capacity ratio		0.85										
Actuated Cycle Length (s)		100.0		Sum of lost time (s)						12.0		
Intersection Capacity Utilization		95.1%		ICU Level of Service						F		
Analysis Period (min)		15										

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
2: South Dakota Avenue & Bladensburg Road

2921 Fort Lincoln Phase 2
7/6/2006

												
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
Lane Width	11	11	11	12	12	12	11	11	11	11	11	11
Total Lost time (s)	4.0	4.0			4.0		4.0	4.0		4.0	4.0	
Lane Util. Factor	1.00	0.95			0.91		1.00	0.95		1.00	0.95	
Frpb, ped/bikes	1.00	1.00			1.00		1.00	1.00		1.00	0.98	
Flpb, ped/bikes	1.00	1.00			1.00		1.00	1.00		1.00	1.00	
Frt	1.00	0.99			1.00		1.00	0.99		1.00	0.94	
Flt Protected	0.95	1.00			1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1710	3402			5065		1711	3380		1702	3038	
Flt Permitted	0.09	1.00			0.83		0.13	1.00		0.51	1.00	
Satd. Flow (perm)	167	3402			4215		240	3380		916	3038	
Volume (vph)	93	903	32	5	1768	35	145	262	19	66	671	411
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)	101	982	35	5	1922	38	158	285	21	72	729	447
RTOR Reduction (vph)	0	2	0	0	2	0	0	6	0	0	85	0
Lane Group Flow (vph)	101	1015	0	0	1963	0	158	300	0	72	1091	0
Confl. Peds. (#/hr)	59		7	7		59	47		15	15		47
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	18	18
Turn Type	custom			Perm			pm+pt			pm+pt		
Protected Phases	5	2 5			6		3	8		7	4	
Permitted Phases	2			6			8			4		
Actuated Green, G (s)	46.0	50.0			41.0		34.0	28.0		34.0	28.0	
Effective Green, g (s)	48.0	52.0			43.0		36.0	30.0		36.0	30.0	
Actuated g/C Ratio	0.48	0.52			0.43		0.36	0.30		0.36	0.30	
Clearance Time (s)	4.0				6.0		4.0	6.0		4.0	6.0	
Lane Grp Cap (vph)	157	1769			1812		175	1014		377	911	
v/s Ratio Prot	0.03	c0.30					c0.05	0.09		0.01	c0.36	
v/s Ratio Perm	0.28				c0.47		0.27			0.06		
v/c Ratio	0.64	0.57			1.08		0.90	0.30		0.19	1.20	
Uniform Delay, d1	21.0	16.4			28.5		48.7	26.9		21.4	35.0	
Progression Factor	1.00	1.00			0.41		1.33	1.25		1.07	0.83	
Incremental Delay, d2	18.5	1.4			40.5		45.9	0.7		0.4	93.0	
Delay (s)	39.5	17.8			52.2		110.7	34.3		23.3	121.9	
Level of Service	D	B			D		F	C		C	F	
Approach Delay (s)		19.7			52.2			60.3			116.3	
Approach LOS		B			D			E			F	
Intersection Summary												
HCM Average Control Delay		62.1					HCM Level of Service			E		
HCM Volume to Capacity ratio		1.09										
Actuated Cycle Length (s)		100.0					Sum of lost time (s)			16.0		
Intersection Capacity Utilization		123.8%					ICU Level of Service			H		
Analysis Period (min)		15										
c Critical Lane Group												

HCM Signalized Intersection Capacity Analysis 3: V Street & Bladensburg Road

2921 Fort Lincoln Phase 2

7/6/2006

												
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
Lane Width	15	15	15	12	12	12	10	11	11	11	11	11
Total Lost time (s)	4.0			4.0			4.0			4.0		
Lane Util. Factor	1.00			1.00			0.91			0.91		
Frpb, ped/bikes	1.00			1.00			1.00			1.00		
Flpb, ped/bikes	1.00			1.00			1.00			1.00		
Frt	0.99			0.98			0.96			1.00		
Flt Protected	0.98			0.96			1.00			1.00		
Satd. Flow (prot)	1970			1747			4734			4860		
Flt Permitted	0.85			0.75			0.94			0.91		
Satd. Flow (perm)	1724			1366			4428			4449		
Volume (vph)	8	7	2	234	8	42	4	382	124	23	816	12
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)	9	8	2	254	9	46	4	415	135	25	887	13
RTOR Reduction (vph)	0	1	0	0	7	0	0	46	0	0	1	0
Lane Group Flow (vph)	0	18	0	0	302	0	0	508	0	0	924	0
Confl. Peds. (#/hr)				3	3							
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	6	6
Turn Type	Perm			Perm			Perm			Perm		
Protected Phases	8			4			2			6		
Permitted Phases	8			4			2			6		
Actuated Green, G (s)	27.3			27.3			61.7			61.7		
Effective Green, g (s)	29.3			29.3			62.7			62.7		
Actuated g/C Ratio	0.29			0.29			0.63			0.63		
Clearance Time (s)	6.0			6.0			5.0			5.0		
Vehicle Extension (s)	3.0			3.0			1.0			1.0		
Lane Grp Cap (vph)	505			400			2776			2790		
v/s Ratio Prot												
v/s Ratio Perm	0.01			c0.22			0.11			c0.21		
v/c Ratio	0.03			0.75			0.18			0.33		
Uniform Delay, d1	25.3			32.1			7.9			8.8		
Progression Factor	1.00			1.04			1.00			1.73		
Incremental Delay, d2	0.0			7.9			0.1			0.1		
Delay (s)	25.3			41.3			8.0			15.3		
Level of Service	C			D			A			B		
Approach Delay (s)	25.3			41.3			8.0			15.3		
Approach LOS	C			D			A			B		
Intersection Summary												
HCM Average Control Delay	17.6			HCM Level of Service			B					
HCM Volume to Capacity ratio	0.47											
Actuated Cycle Length (s)	100.0			Sum of lost time (s)			8.0					
Intersection Capacity Utilization	59.3%			ICU Level of Service			B					
Analysis Period (min)	15											
c Critical Lane Group												

TWO-WAY STOP CONTROL SUMMARY								
General Information				Site Information				
Analyst		JMR		Intersection		4-South Dakota/New York Ramp		
Agency/Co.		Wells and Associates, LLC		Jurisdiction		Washington, D.C.		
Date Performed		6/26/06		Analysis Year		2009 Bckgd Cond (growth only)		
Analysis Time Period		AM Peak						
Project Description 2921 Fort Lincoln Phase 2								
East/West Street: South Dakota Avenue				North/South Street: New York Avenue Off-Ramp				
Intersection Orientation: East-West				Study Period (hrs): 0.25				
Vehicle Volumes and Adjustments								
Major Street		Eastbound			Westbound			
Movement		1	2	3	4	5	6	
		L	T	R	L	T	R	
Volume (veh/h)		0	1239	0	0	1735	0	
Peak-hour factor, PHF		0.90	0.90	0.90	0.90	0.90	0.90	
Hourly Flow Rate (veh/h)		0	1376	0	0	1927	0	
Proportion of heavy vehicles, P_{HV}		0	-	-	0	-	-	
Median type		Undivided						
RT Channelized?				0			0	
Lanes		0	2	0	0	2	0	
Configuration			T			T		
Upstream Signal			0			0		
Minor Street		Northbound			Southbound			
Movement		7	8	9	10	11	12	
		L	T	R	L	T	R	
Volume (veh/h)		0	0	0	0	0	17	
Peak-hour factor, PHF		0.90	0.90	0.90	0.90	0.90	0.90	
Hourly Flow Rate (veh/h)		0	0	0	0	0	18	
Proportion of heavy vehicles, P_{HV}		0	0	0	0	0	2	
Percent grade (%)		0			0			
Flared approach			N			N		
Storage			0			0		
RT Channelized?				0			0	
Lanes		0	0	0	0	0	1	
Configuration							R	
Control Delay, Queue Length, Level of Service								
Approach		EB	WB	Northbound			Southbound	
Movement		1	4	7	8	9	10	11
Lane Configuration								R
Volume, v (vph)								18
Capacity, c_m (vph)								255
v/c ratio								0.07
Queue length (95%)								0.23
Control Delay (s/veh)								20.2
LOS								C

Approach delay (s/veh)	-	-		20.2
Approach LOS	-	-		C

TWO-WAY STOP CONTROL SUMMARY								
General Information				Site Information				
Analyst		JMR		Intersection		4a-South Dakota/NY Ramp/V St		
Agency/Co.		Wells & Associates, LLC		Jurisdiction		Washington, D.C.		
Date Performed		6/26/06		Analysis Year		2009 Bckgd Cond (growth only)		
Analysis Time Period		AM Peak						
Project Description 2921 Fort Lincoln Phase 2								
East/West Street: South Dakota Avenue				North/South Street: New York Ave Off-Ramp/V Street				
Intersection Orientation: East-West				Study Period (hrs): 0.25				
Vehicle Volumes and Adjustments								
Major Street	Eastbound			Westbound				
Movement	1	2	3	4	5	6		
	L	T	R	L	T	R		
Volume (veh/h)	0	1206	33	0	0	0		
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90		
Hourly Flow Rate (veh/h)	0	1340	36	0	0	0		
Proportion of heavy vehicles, P _{HV}	0	-	-	0	-	-		
Median type	Undivided							
RT Channelized?			0			0		
Lanes	0	2	0	0	0	0		
Configuration		T	TR					
Upstream Signal		0			0			
Minor Street	Northbound			Southbound				
Movement	7	8	9	10	11	12		
	L	T	R	L	T	R		
Volume (veh/h)	24	0	69	3	267	0		
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90		
Hourly Flow Rate (veh/h)	26	0	76	3	296	0		
Proportion of heavy vehicles, P _{HV}	2	2	2	2	2	0		
Percent grade (%)	0			0				
Flared approach		N			N			
Storage		0			0			
RT Channelized?			1			0		
Lanes	1	0	1	0	1	0		
Configuration	L		R	LT				
Control Delay, Queue Length, Level of Service								
Approach	EB	WB	Northbound			Southbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration			L		R	LT		
Volume, v (vph)			26		76	299		
Capacity, c _m (vph)			0		446	146		
v/c ratio					0.17	2.05		
Queue length (95%)					0.61	23.83		
Control Delay (s/veh)					14.7	545.3		
LOS			F		B	F		

Approach delay (s/veh)	-	-		545.3
Approach LOS	-	-		F

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TWO-WAY STOP CONTROL SUMMARY								
General Information				Site Information				
Analyst	JMR			Intersection	4b-South Dakota/NY Ramp/V St			
Agency/Co.	Wells & Associates, LLC			Jurisdiction	Washington, D.C.			
Date Performed	6/26/06			Analysis Year	2009 Bckgd Cond (growth only)			
Analysis Time Period	AM Peak							
Project Description 2921 Fort Lincoln Phase 2								
East/West Street: South Dakota Avenue				North/South Street: New York Ave Off-Ramp/V Street				
Intersection Orientation: East-West				Study Period (hrs): 0.25				
Vehicle Volumes and Adjustments								
Major Street	Eastbound			Westbound				
Movement	1	2	3	4	5	6		
	L	T	R	L	T	R		
Volume (veh/h)	0	1206	33	0	0	0		
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90		
Hourly Flow Rate (veh/h)	0	1340	36	0	0	0		
Proportion of heavy vehicles, P _{HV}	0	-	-	0	-	-		
Median type	Undivided							
RT Channelized?			0			0		
Lanes	0	2	0	0	0	0		
Configuration		T	TR					
Upstream Signal		0			0			
Minor Street	Northbound			Southbound				
Movement	7	8	9	10	11	12		
	L	T	R	L	T	R		
Volume (veh/h)	271	0	69	0	6	7		
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90		
Hourly Flow Rate (veh/h)	301	0	76	0	6	7		
Proportion of heavy vehicles, P _{HV}	2	2	2	0	0	2		
Percent grade (%)	0			0				
Flared approach		N			N			
Storage		0			0			
RT Channelized?			1			0		
Lanes	1	0	1	0	1	0		
Configuration	L		R			TR		
Control Delay, Queue Length, Level of Service								
Approach	EB	WB	Northbound			Southbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration			L		R			TR
Volume, v (vph)			301		76			13
Capacity, c _m (vph)			120		446			273
v/c ratio			2.51		0.17			0.05
Queue length (95%)			26.83		0.61			0.15
Control Delay (s/veh)			760.4		14.7			18.8
LOS			F		B			C

Approach delay (s/veh)	-	-	610.1	18.8
Approach LOS	-	-	F	C

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TWO-WAY STOP CONTROL SUMMARY								
General Information				Site Information				
Analyst	JMR			Intersection	4c-South Dakota/NY Ramp/V St			
Agency/Co.	Wells & Associates, LLC			Jurisdiction	Washington, D.C.			
Date Performed	6/26/06			Analysis Year	2009 Bckgd Cond (growth only)			
Analysis Time Period	AM Peak							
Project Description 2921 Fort Lincoln Phase 2								
East/West Street: South Dakota Avenue				North/South Street: New York Ave Off-Ramp/V Street				
Intersection Orientation: East-West				Study Period (hrs): 0.25				
Vehicle Volumes and Adjustments								
Major Street	Eastbound			Westbound				
Movement	1	2	3	4	5	6		
	L	T	R	L	T	R		
Volume (veh/h)	0	1206	33	0	0	0		
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90		
Hourly Flow Rate (veh/h)	0	1340	36	0	0	0		
Proportion of heavy vehicles, P _{HV}	0	—	—	0	—	—		
Median type	Undivided							
RT Channelized?			0			0		
Lanes	0	2	0	0	0	0		
Configuration		T	TR					
Upstream Signal		0			0			
Minor Street	Northbound			Southbound				
Movement	7	8	9	10	11	12		
	L	T	R	L	T	R		
Volume (veh/h)	11	0	69	3	267	13		
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90		
Hourly Flow Rate (veh/h)	12	0	76	3	296	14		
Proportion of heavy vehicles, P _{HV}	2	0	2	2	2	2		
Percent grade (%)	0			0				
Flared approach		N			N			
Storage		0			0			
RT Channelized?			1			0		
Lanes	1	0	1	0	1	1		
Configuration	L		R	LT		R		
Control Delay, Queue Length, Level of Service								
Approach	EB	WB	Northbound			Southbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration			L		R	LT		R
Volume, v (vph)			12		76	299		14
Capacity, c _m (vph)			0		446	146		1085
v/c ratio					0.17	2.05		0.01
Queue length (95%)					0.61	23.83		0.04
Control Delay (s/veh)					14.7	545.3		8.4
LOS			F		B	F		A

Approach delay (s/veh)	-	-		521.3
Approach LOS	-	-		F

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HCM Signalized Intersection Capacity Analysis
5: South Dakota Avenue & 33rd Place

2921 Fort Lincoln Phase 2
7/6/2006

												
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
Lane Width	12	11	12	11	12	12	12	15	12	12	12	12
Total Lost time (s)	4.0	4.0			4.0	4.0		4.0		4.0	4.0	4.0
Lane Util. Factor	1.00	0.95			0.95	1.00		1.00		0.95	0.95	1.00
Frpb, ped/bikes	1.00	1.00			1.00	0.99		0.99		1.00	1.00	1.00
Flpb, ped/bikes	1.00	1.00			1.00	1.00		1.00		1.00	1.00	1.00
Frt	1.00	1.00			1.00	0.85		0.98		1.00	1.00	0.85
Flt Protected	0.95	1.00			1.00	1.00		0.96		0.95	0.95	1.00
Satd. Flow (prot)	1770	3414			3536	1564		1911		1681	1580	1482
Flt Permitted	0.06	1.00			0.91	1.00		0.96		0.95	0.95	1.00
Satd. Flow (perm)	115	3414			3207	1564		1911		1681	1580	1482
Volume (vph)	5	959	14	34	1685	33	7	1	2	278	5	23
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)	5	1042	15	37	1832	36	8	1	2	302	5	25
RTOR Reduction (vph)	0	1	0	0	0	13	0	2	0	0	0	21
Lane Group Flow (vph)	5	1056	0	0	1869	23	0	9	0	155	152	4
Confl. Peds. (#/hr)	1					1	1		8	8		1
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	16	16
Turn Type	Perm		Perm		Perm		Split		Split		Prot	
Protected Phases	2				6		3		3		4	
Permitted Phases	2		6		6							
Actuated Green, G (s)	64.0	64.0			64.0	64.0		5.0		16.0	16.0	16.0
Effective Green, g (s)	65.0	65.0			65.0	65.0		6.0		17.0	17.0	17.0
Actuated g/C Ratio	0.65	0.65			0.65	0.65		0.06		0.17	0.17	0.17
Clearance Time (s)	5.0	5.0			5.0	5.0		5.0		5.0	5.0	5.0
Lane Grp Cap (vph)	75	2219			2085	1017		115		286	269	252
v/s Ratio Prot		0.31						c0.00		0.09	c0.10	0.00
v/s Ratio Perm	0.04				c0.58	0.01						
v/c Ratio	0.07	0.48			0.90	0.02		0.08		0.54	0.57	0.02
Uniform Delay, d1	6.4	8.9			14.7	6.2		44.4		37.9	38.1	34.5
Progression Factor	0.18	0.76			1.00	1.00		1.00		1.00	1.00	1.00
Incremental Delay, d2	1.5	0.7			6.5	0.0		1.3		7.2	8.3	0.1
Delay (s)	2.7	7.4			21.2	6.3		45.7		45.1	46.4	34.7
Level of Service	A	A			C	A		D		D	D	C
Approach Delay (s)		7.4			20.9			45.7			44.9	
Approach LOS		A			C			D			D	
Intersection Summary												
HCM Average Control Delay	19.1				HCM Level of Service				B			
HCM Volume to Capacity ratio	0.78											
Actuated Cycle Length (s)	100.0				Sum of lost time (s)				12.0			
Intersection Capacity Utilization	105.3%				ICU Level of Service				G			
Analysis Period (min)	15											
c Critical Lane Group												

HCM Signalized Intersection Capacity Analysis
6: South Dakota Avenue & 31st Place

2921 Fort Lincoln Phase 2
7/6/2006



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
Lane Width	13	11	14	12	12	12	16	16	16	10	12	10
Total Lost time (s)	4.0	4.0			4.0			4.0			4.0	
Lane Util. Factor	1.00	0.95			0.95			1.00			1.00	
Frt	1.00	1.00			1.00			0.95			0.89	
Flt Protected	0.95	1.00			1.00			0.99			0.99	
Satd. Flow (prot)	1829	3420			3446			1766			1647	
Flt Permitted	0.95	1.00			1.00			0.93			0.94	
Satd. Flow (perm)	1829	3420			3446			1665			1564	
Volume (vph)	25	932	3	0	1716	29	9	12	14	32	0	121
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)	27	1013	3	0	1865	32	10	13	15	35	0	132
RTOR Reduction (vph)	0	0	0	0	1	0	0	11	0	0	86	0
Lane Group Flow (vph)	27	1016	0	0	1896	0	0	27	0	0	81	0
Bus Blockages (#/hr)	0	0	0	0	12	12	0	0	0	0	0	0
Parking (#/hr)							1	1	1			
Turn Type	Prot						Perm			Perm		
Protected Phases	5	2			6			8			4	
Permitted Phases							8			4		
Actuated Green, G (s)	6.0	62.0			52.0			28.0			28.0	
Effective Green, g (s)	6.0	63.0			53.0			29.0			29.0	
Actuated g/C Ratio	0.06	0.63			0.53			0.29			0.29	
Clearance Time (s)	4.0	5.0			5.0			5.0			5.0	
Lane Grp Cap (vph)	110	2155			1826			483			454	
v/s Ratio Prot	0.01	c0.30			c0.55							
v/s Ratio Perm								0.02			c0.05	
v/c Ratio	0.25	0.47			1.04			0.06			0.18	
Uniform Delay, d1	44.8	9.7			23.5			25.6			26.6	
Progression Factor	0.69	2.94			0.59			1.00			1.00	
Incremental Delay, d2	4.5	0.6			25.6			0.2			0.9	
Delay (s)	35.2	29.3			39.4			25.8			27.4	
Level of Service	D	C			D			C			C	
Approach Delay (s)		29.4			39.4			25.8			27.4	
Approach LOS		C			D			C			C	
Intersection Summary												
HCM Average Control Delay		35.3			HCM Level of Service			D				
HCM Volume to Capacity ratio		0.72										
Actuated Cycle Length (s)		100.0			Sum of lost time (s)			12.0				
Intersection Capacity Utilization		66.6%			ICU Level of Service			C				
Analysis Period (min)		15										
c Critical Lane Group												

	→	↘	↙	←	↖	↗
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑			↑↑	↑	↑
Sign Control	Stop			Stop	Stop	
Volume (vph)	260	30	55	281	30	26
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	283	33	60	305	33	28
Direction Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	
Volume Total (vph)	188	127	162	204	61	
Volume Left (vph)	0	0	60	0	33	
Volume Right (vph)	0	33	0	0	28	
Hadj (s)	0.03	-0.15	0.22	0.03	-0.14	
Departure Headway (s)	5.0	4.9	5.2	5.0	5.2	
Degree Utilization, x	0.26	0.17	0.23	0.28	0.09	
Capacity (veh/h)	702	722	678	707	632	
Control Delay (s)	8.6	7.6	8.5	8.7	8.7	
Approach Delay (s)	8.2		8.6		8.7	
Approach LOS	A		A		A	
Intersection Summary						
Delay			8.5			
HCM Level of Service			A			
Intersection Capacity Utilization			30.8%		ICU Level of Service	A
Analysis Period (min)			15			

HCM Unsignalized Intersection Capacity Analysis
8: Fort Lincoln Drive & 33rd Place

2921 Fort Lincoln Phase 2
7/6/2006



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations	↖	↗	↖	↑	↕	
Sign Control	Stop			Stop	Stop	
Volume (vph)	6	285	35	4	21	362
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	7	310	38	4	23	393
Direction Lane #	EB 1	EB 2	NB 1	NB 2	SB 1	SB 2
Volume Total (vph)	7	310	38	4	15	401
Volume Left (vph)	7	0	38	0	0	0
Volume Right (vph)	0	310	0	0	0	393
Hadj (s)	0.53	-0.67	0.53	0.03	0.03	-0.65
Departure Headway (s)	6.1	4.9	6.3	5.8	5.4	4.7
Degree Utilization, x	0.01	0.42	0.07	0.01	0.02	0.53
Capacity (veh/h)	552	693	530	571	626	733
Control Delay (s)	8.0	10.3	8.6	7.6	7.3	11.7
Approach Delay (s)	10.2		8.5		11.5	
Approach LOS	B		A		B	
Intersection Summary						
Delay	10.8					
HCM Level of Service	B					
Intersection Capacity Utilization	37.1%			ICU Level of Service		
Analysis Period (min)	15					

HCM Unsignalized Intersection Capacity Analysis
12: Unnamed Road & Fort Lincoln Drive

2921 Fort Lincoln Phase 2
7/6/2006

								
Movement	EBL	EBR	NBL	NBT	SBT	SBR		
Lane Configurations								
Sign Control	Stop			Stop	Stop			
Volume (vph)	0	12	10	0	370	11		
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92		
Hourly flow rate (vph)	0	13	11	0	402	12		
Direction, Lane #	EB 1	NB 1	SB 1	SB 2				
Volume Total (vph)	13	11	268	146				
Volume Left (vph)	0	11	0	0				
Volume Right (vph)	13	0	0	12				
Hadj (s)	-0.57	0.23	0.03	-0.02				
Departure Headway (s)	4.2	4.6	4.6	4.5				
Degree Utilization, x	0.02	0.01	0.34	0.18				
Capacity (veh/h)	786	758	774	786				
Control Delay (s)	7.3	7.7	8.7	7.3				
Approach Delay (s)	7.3	7.7	8.2					
Approach LOS	A	A	A					
Intersection Summary								
Delay	8.2							
HCM Level of Service	A							
Intersection Capacity Utilization	20.6%			ICU Level of Service	A			
Analysis Period (min)	15							

HCM Signalized Intersection Capacity Analysis 1: Eastern Avenue & Bladensburg Road

2921 Fort Lincoln Phase 2
7/6/2006

												
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
Lane Width	10	10	10	11	12	12	11	11	11	15	13	13
Total Lost time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	0.95		1.00	0.95	
Frpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00		1.00	0.99	
Flpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Frt	1.00	0.94		1.00	0.97		1.00	0.99		1.00	0.94	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1650	1642		1711	1795		1710	3390		1946	3405	
Flt Permitted	0.40	1.00		0.27	1.00		0.37	1.00		0.24	1.00	
Satd. Flow (perm)	699	1642		485	1795		658	3390		493	3405	
Volume (vph)	364	268	157	24	244	70	199	637	37	68	287	196
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)	396	291	171	26	265	76	216	692	40	74	312	213
RTOR Reduction (vph)	0	21	0	0	11	0	0	4	0	0	122	0
Lane Group Flow (vph)	396	441	0	26	330	0	216	728	0	74	403	0
Confl. Peds. (#/hr)	2						2	1		7	7	1
Turn Type	Perm			Perm			pm+pt			pm+pt		
Protected Phases	4			8			5		2	1		6
Permitted Phases	4			8			2			6		
Actuated Green, G (s)	37.0	37.0		37.0	37.0		48.0	36.0		48.0	36.0	
Effective Green, g (s)	38.0	38.0		38.0	38.0		50.0	37.0		50.0	37.0	
Actuated g/C Ratio	0.38	0.38		0.38	0.38		0.50	0.37		0.50	0.37	
Clearance Time (s)	5.0	5.0		5.0	5.0		5.0	5.0		5.0	5.0	
Lane Grp Cap (vph)	266	624		184	682		466	1254		435	1260	
v/s Ratio Prot		0.27			0.18		c0.06	c0.21		0.02	0.12	
v/s Ratio Perm	c0.57			0.05			0.17			0.06		
v/c Ratio	1.49	0.71		0.14	0.48		0.46	0.58		0.17	0.32	
Uniform Delay, d1	31.0	26.3		20.3	23.6		14.7	25.3		14.0	22.5	
Progression Factor	1.00	1.00		1.00	1.00		1.15	1.18		1.00	1.00	
Incremental Delay, d2	238.9	6.6		1.6	2.5		2.8	1.6		0.8	0.7	
Delay (s)	269.9	32.9		21.9	26.0		19.7	31.6		14.8	23.2	
Level of Service	F	C		C	C		B	C		B	C	
Approach Delay (s)	142.3			25.7			28.9			22.1		
Approach LOS	F			C			C			C		

Intersection Summary			
HCM Average Control Delay	62.1	HCM Level of Service	E
HCM Volume to Capacity ratio	0.96		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	105.4%	ICU Level of Service	G
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
2: South Dakota Avenue & Bladensburg Road

2921 Fort Lincoln Phase 2
7/6/2006

												
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
Lane Width	11	11	11	12	12	12	11	11	11	11	11	11
Total Lost time (s)	4.0	4.0			4.0		4.0	4.0		4.0	4.0	
Lane Util. Factor	1.00	0.95			0.91		1.00	0.95		1.00	0.95	
Frpb, ped/bikes	1.00	1.00			1.00		1.00	1.00		1.00	0.99	
Flpb, ped/bikes	1.00	1.00			1.00		1.00	1.00		1.00	1.00	
Frt	1.00	0.99			0.99		1.00	0.99		1.00	0.96	
Flt Protected	0.95	1.00			1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1710	3397			5010		1707	3394		1707	3158	
Flt Permitted	0.17	1.00			0.74		0.41	1.00		0.33	1.00	
Satd. Flow (perm)	297	3397			3719		736	3394		587	3158	
Volume (vph)	211	1314	56	20	887	80	132	476	22	60	285	112
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)	229	1428	61	22	964	87	143	517	24	65	310	122
RTOR Reduction (vph)	0	3	0	0	11	0	0	3	0	0	42	0
Lane Group Flow (vph)	229	1486	0	0	1062	0	143	538	0	65	390	0
Confl. Peds. (#/hr)	9		11	11		9	11		16	16		11
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	15	15
Turn Type	custom		Perm			pm+pt			pm+pt			
Protected Phases	5	2 5			6		3	8		7	4	
Permitted Phases	2			6			8			4		
Actuated Green, G (s)	44.0	48.0			36.0		36.0	30.0		36.0	30.0	
Effective Green, g (s)	46.0	50.0			38.0		38.0	32.0		38.0	32.0	
Actuated g/C Ratio	0.46	0.50			0.38		0.38	0.32		0.38	0.32	
Clearance Time (s)	4.0				6.0		4.0	6.0		4.0	6.0	
Lane Grp Cap (vph)	250	1699			1413		338	1086		290	1011	
v/s Ratio Prot	0.07	c0.44					c0.03	c0.16		0.01	0.12	
v/s Ratio Perm	0.35				0.29		0.14			0.07		
v/c Ratio	0.92	0.87			0.75		0.42	0.50		0.22	0.39	
Uniform Delay, d1	19.2	22.2			26.9		21.2	27.5		20.4	26.4	
Progression Factor	1.00	1.00			0.70		1.00	1.00		0.99	1.04	
Incremental Delay, d2	38.8	6.6			3.5		3.8	1.6		1.6	1.0	
Delay (s)	58.0	28.8			22.3		25.0	29.1		21.7	28.3	
Level of Service	E	C			C		C	C		C	C	
Approach Delay (s)		32.7			22.3			28.2			27.5	
Approach LOS		C			C			C			C	
Intersection Summary												
HCM Average Control Delay		28.5			HCM Level of Service			C				
HCM Volume to Capacity ratio		0.71										
Actuated Cycle Length (s)		100.0			Sum of lost time (s)			12.0				
Intersection Capacity Utilization		113.8%			ICU Level of Service			H				
Analysis Period (min)		15										
c Critical Lane Group												

HCM Signalized Intersection Capacity Analysis 3: V Street & Bladensburg Road

2921 Fort Lincoln Phase 2
7/6/2006

												
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
Lane Width	15	15	15	12	12	12	10	11	11	11	11	11
Total Lost time (s)		4.0			4.0			4.0			4.0	
Lane Util. Factor		1.00			1.00			0.91			0.91	
Frpb, ped/bikes		1.00			1.00			0.99			1.00	
Flpb, ped/bikes		1.00			1.00			1.00			1.00	
Frt		0.99			0.96			0.97			0.99	
Flt Protected		0.97			0.96			1.00			1.00	
Satd. Flow (prot)		1957			1722			4723			4830	
Flt Permitted		0.83			0.77			0.94			0.88	
Satd. Flow (perm)		1673			1369			4435			4240	
Volume (vph)	15	6	2	100	0	36	3	564	147	23	395	15
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)	16	7	2	109	0	39	3	613	160	25	429	16
RTOR Reduction (vph)	0	2	0	0	15	0	0	19	0	0	1	0
Lane Group Flow (vph)	0	23	0	0	133	0	0	757	0	0	469	0
Confl. Peds. (#/hr)	4		1	1		4	7		6	6		7
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	6	6
Turn Type	Perm			Perm			Perm			Perm		
Protected Phases	8			4			2			6		
Permitted Phases	8			4			2			6		
Actuated Green, G (s)	15.5			15.5			93.5			93.5		
Effective Green, g (s)	17.5			17.5			94.5			94.5		
Actuated g/C Ratio	0.15			0.15			0.79			0.79		
Clearance Time (s)	6.0			6.0			5.0			5.0		
Vehicle Extension (s)	3.0			3.0			1.0			1.0		
Lane Grp Cap (vph)	244			200			3493			3339		
v/s Ratio Prot												
v/s Ratio Perm	0.01			c0.10			c0.17			0.11		
v/c Ratio	0.10			0.67			0.22			0.14		
Uniform Delay, d1	44.4			48.5			3.3			3.0		
Progression Factor	1.00			1.00			1.00			1.00		
Incremental Delay, d2	0.2			8.2			0.1			0.1		
Delay (s)	44.6			56.6			3.4			3.1		
Level of Service	D			E			A			A		
Approach Delay (s)	44.6			56.6			3.4			3.1		
Approach LOS	D			E			A			A		
Intersection Summary												
HCM Average Control Delay	9.6			HCM Level of Service			A					
HCM Volume to Capacity ratio	0.29											
Actuated Cycle Length (s)	120.0			Sum of lost time (s)			8.0					
Intersection Capacity Utilization	42.8%			ICU Level of Service			A					
Analysis Period (min)	15											
c Critical Lane Group												

TWO-WAY STOP CONTROL SUMMARY									
General Information				Site Information					
Analyst		JMR		Intersection		4-South Dakota/New York Ramp			
Agency/Co.		Wells and Associates, LLC		Jurisdiction		Washington, D.C.			
Date Performed		6/26/06		Analysis Year		2009 Bckgd Cond (growth only)			
Analysis Time Period		PM Peak							
Project Description 2921 Fort Lincoln Phase 2									
East/West Street: South Dakota Avenue				North/South Street: New York Avenue Off-Ramp					
Intersection Orientation: East-West				Study Period (hrs): 0.25					
Vehicle Volumes and Adjustments									
Major Street		Eastbound			Westbound				
Movement		1	2	3	4	5	6		
		L	T	R	L	T	R		
Volume (veh/h)		0	1789	0	0	971	0		
Peak-hour factor, PHF		0.90	0.90	0.90	0.90	0.90	0.90		
Hourly Flow Rate (veh/h)		0	1987	0	0	1078	0		
Proportion of heavy vehicles, P_{HV}		0	—	—	0	—	—		
Median type		Undivided							
RT Channelized?				0			0		
Lanes		0	2	0	0	2	0		
Configuration			T			T			
Upstream Signal			0			0			
Minor Street		Northbound			Southbound				
Movement		7	8	9	10	11	12		
		L	T	R	L	T	R		
Volume (veh/h)		0	0	0	0	0	30		
Peak-hour factor, PHF		0.90	0.90	0.90	0.90	0.90	0.90		
Hourly Flow Rate (veh/h)		0	0	0	0	0	33		
Proportion of heavy vehicles, P_{HV}		0	0	0	0	0	2		
Percent grade (%)		0			0				
Flared approach			N			N			
Storage			0			0			
RT Channelized?				0			0		
Lanes		0	0	0	0	0	1		
Configuration							R		
Control Delay, Queue Length, Level of Service									
Approach		EB	WB	Northbound			Southbound		
Movement		1	4	7	8	9	10	11	12
Lane Configuration									R
Volume, v (vph)									33
Capacity, c_m (vph)									487
v/c ratio									0.07
Queue length (95%)									0.22
Control Delay (s/veh)									12.9
LOS									B

Approach delay (s/veh)	-	-		12.9
Approach LOS	-	-		B

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Version 4.1d

TWO-WAY STOP CONTROL SUMMARY									
General Information				Site Information					
Analyst		JMR		Intersection		4a-South Dakota/NY Ramp/V St			
Agency/Co.		Wells & Associates, LLC		Jurisdiction		Washington, D.C.			
Date Performed		6/26/06		Analysis Year		2009 Bckgd Cond (growth only)			
Analysis Time Period		PM Peak							
Project Description 2921 Fort Lincoln Phase 2									
East/West Street: South Dakota Avenue				North/South Street: New York Ave Off-Ramp/V Street					
Intersection Orientation: East-West				Study Period (hrs): 0.25					
Vehicle Volumes and Adjustments									
Major Street		Eastbound			Westbound				
Movement		1	2	3	4	5	6		
		L	T	R	L	T	R		
Volume (veh/h)		0	1761	28	0	0	0		
Peak-hour factor, PHF		0.90	0.90	0.90	0.90	0.90	0.90		
Hourly Flow Rate (veh/h)		0	1956	31	0	0	0		
Proportion of heavy vehicles, P_{HV}		0	--	--	0	--	--		
Median type		Undivided							
RT Channelized?				0			0		
Lanes		0	2	0	0	0	0		
Configuration			T	TR					
Upstream Signal			0			0			
Minor Street		Northbound			Southbound				
Movement		7	8	9	10	11	12		
		L	T	R	L	T	R		
Volume (veh/h)		32	0	290	7	26	0		
Peak-hour factor, PHF		0.90	0.90	0.90	0.90	0.90	0.90		
Hourly Flow Rate (veh/h)		35	0	322	7	28	0		
Proportion of heavy vehicles, P_{HV}		2	2	2	2	2	0		
Percent grade (%)		0			0				
Flared approach			N			N			
Storage			0			0			
RT Channelized?				1			0		
Lanes		1	0	1	0	1	0		
Configuration		L		R	LT				
Control Delay, Queue Length, Level of Service									
Approach		EB	WB	Northbound			Southbound		
Movement		1	4	7	8	9	10	11	12
Lane Configuration				L		R	LT		
Volume, v (vph)				35		322	35		
Capacity, c_m (vph)				29		297	0		
v/c ratio				1.21		1.08			
Queue length (95%)				4.02		12.66			
Control Delay (s/veh)				439.5		115.3			
LOS				F		F	F		

Approach delay (s/veh)	—	—	147.0	
Approach LOS	—	—	F	

TWO-WAY STOP CONTROL SUMMARY								
General Information				Site Information				
Analyst	JMR			Intersection	4b-South Dakota/NY Ramp/V St			
Agency/Co.	Wells & Associates, LLC			Jurisdiction	Washington, D.C.			
Date Performed	6/26/06			Analysis Year	2009 Bckgd Cond (growth only)			
Analysis Time Period	PM Peak							
Project Description 2921 Fort Lincoln Phase 2								
East/West Street: South Dakota Avenue				North/South Street: New York Ave Off-Ramp/V Street				
Intersection Orientation: East-West				Study Period (hrs): 0.25				
Vehicle Volumes and Adjustments								
Major Street	Eastbound			Westbound				
Movement	1	2	3	4	5	6		
	L	T	R	L	T	R		
Volume (veh/h)	0	1761	28	0	0	0		
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90		
Hourly Flow Rate (veh/h)	0	1956	31	0	0	0		
Proportion of heavy vehicles, P_{HV}	0	-	-	0	-	-		
Median type	Undivided							
RT Channelized?			0			0		
Lanes	0	2	0	0	0	0		
Configuration		T	TR					
Upstream Signal		0			0			
Minor Street	Northbound			Southbound				
Movement	7	8	9	10	11	12		
	L	T	R	L	T	R		
Volume (veh/h)	47	0	290	0	2	16		
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90		
Hourly Flow Rate (veh/h)	52	0	322	0	2	17		
Proportion of heavy vehicles, P_{HV}	2	2	2	0	0	2		
Percent grade (%)	0			0				
Flared approach		N			N			
Storage		0			0			
RT Channelized?			1			0		
Lanes	1	0	1	0	1	0		
Configuration	L		R			TR		
Control Delay, Queue Length, Level of Service								
Approach	EB	WB	Northbound			Southbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration			L		R			TR
Volume, v (vph)			52		322			19
Capacity, c_m (vph)			44		297			396
v/c ratio			1.18		1.08			0.05
Queue length (95%)			4.94		12.66			0.15
Control Delay (s/veh)			340.3		115.3			14.5
LOS			F		F			B

Approach delay (s/veh)	—	—	146.5	14.5
Approach LOS	—	—	F	B

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Version 4.1d

TWO-WAY STOP CONTROL SUMMARY								
General Information				Site Information				
Analyst	JMR			Intersection	4c-South Dakota/NY Ramp/V St			
Agency/Co.	Wells & Associates, LLC			Jurisdiction	Washington, D.C.			
Date Performed	6/26/06			Analysis Year	2009 Bckgd Cond (growth only)			
Analysis Time Period	PM Peak							
Project Description 2921 Fort Lincoln Phase 2								
East/West Street: South Dakota Avenue				North/South Street: New York Ave Off-Ramp/V Street				
Intersection Orientation: East-West				Study Period (hrs): 0.25				
Vehicle Volumes and Adjustments								
Major Street	Eastbound			Westbound				
Movement	1	2	3	4	5	6		
	L	T	R	L	T	R		
Volume (veh/h)	0	1761	28	0	0	0		
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90		
Hourly Flow Rate (veh/h)	0	1956	31	0	0	0		
Proportion of heavy vehicles, P_{HV}	0	—	—	0	—	—		
Median type	Undivided							
RT Channelized?			0			0		
Lanes	0	2	0	0	0	0		
Configuration		T	TR					
Upstream Signal		0			0			
Minor Street	Northbound			Southbound				
Movement	7	8	9	10	11	12		
	L	T	R	L	T	R		
Volume (veh/h)	14	0	290	7	26	18		
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90		
Hourly Flow Rate (veh/h)	15	0	322	7	28	20		
Proportion of heavy vehicles, P_{HV}	2	0	2	2	2	2		
Percent grade (%)	0			0				
Flared approach		N			N			
Storage		0			0			
RT Channelized?			1			0		
Lanes	1	0	1	0	1	1		
Configuration	L		R	LT		R		
Control Delay, Queue Length, Level of Service								
Approach	EB	WB	Northbound			Southbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration			L		R	LT		R
Volume, v (vph)			15		322	35		20
Capacity, c_m (vph)			28		297	0		1085
v/c ratio			0.54		1.08			0.02
Queue length (95%)			1.69		12.66			0.06
Control Delay (s/veh)			233.8		115.3			8.4
LOS			F		F	F		A

Approach delay (s/veh)	-	-	120.5	
Approach LOS	--	--	F	

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HCM Signalized Intersection Capacity Analysis
5: South Dakota Avenue & 33rd Place

2921 Fort Lincoln Phase 2
7/6/2006

												
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
Lane Width	12	11	12	11	12	12	12	15	12	12	12	12
Total Lost time (s)	4.0	4.0			4.0	4.0		4.0		4.0	4.0	4.0
Lane Util. Factor	1.00	0.95			0.95	1.00		1.00		0.95	0.95	1.00
Frpb, ped/bikes	1.00	1.00			1.00	1.00		1.00		1.00	1.00	1.00
Flpb, ped/bikes	1.00	1.00			1.00	1.00		1.00		1.00	1.00	1.00
Frt	1.00	1.00			1.00	0.85		0.91		1.00	1.00	0.85
Flt Protected	0.95	1.00			1.00	1.00		0.99		0.95	0.95	1.00
Satd. Flow (prot)	1770	3416			3539	1583		1845		1681	1585	1488
Flt Permitted	0.22	1.00			0.95	1.00		0.99		0.95	0.95	1.00
Satd. Flow (perm)	401	3416			3366	1583		1845		1681	1585	1488
Volume (vph)	9	1425	14	3	941	56	16	6	42	323	2	29
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)	10	1549	15	3	1023	61	17	7	46	351	2	32
RTOR Reduction (vph)	0	1	0	0	0	25	0	43	0	0	0	25
Lane Group Flow (vph)	10	1563	0	0	1026	36	0	27	0	178	175	7
Confl. Peds. (#/hr)			1	1			4					4
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	15	15
Turn Type	Perm			Perm		Perm	Split			Split		Prot
Protected Phases		2			6		3	3		4	4	4
Permitted Phases	2			6		6						
Actuated Green, G (s)	58.0	58.0			58.0	58.0		5.0		22.0	22.0	22.0
Effective Green, g (s)	59.0	59.0			59.0	59.0		6.0		23.0	23.0	23.0
Actuated g/C Ratio	0.59	0.59			0.59	0.59		0.06		0.23	0.23	0.23
Clearance Time (s)	5.0	5.0			5.0	5.0		5.0		5.0	5.0	5.0
Lane Grp Cap (vph)	237	2015			1986	934		111		387	365	342
v/s Ratio Prot		c0.46						c0.01		0.11	c0.11	0.00
v/s Ratio Perm	0.02				0.30	0.02						
v/c Ratio	0.04	0.78			0.52	0.04		0.24		0.46	0.48	0.02
Uniform Delay, d1	8.6	15.5			12.1	8.6		44.8		33.2	33.3	29.8
Progression Factor	0.96	1.09			1.00	1.00		1.00		1.00	1.00	1.00
Incremental Delay, d2	0.3	2.7			1.0	0.1		5.1		3.9	4.5	0.1
Delay (s)	8.6	19.5			13.1	8.7		49.9		37.1	37.8	29.9
Level of Service	A	B			B	A		D		D	D	C
Approach Delay (s)		19.4			12.8			49.9			36.8	
Approach LOS		B			B			D			D	
Intersection Summary												
HCM Average Control Delay	19.9				HCM Level of Service				B			
HCM Volume to Capacity ratio	0.66											
Actuated Cycle Length (s)	100.0				Sum of lost time (s)				12.0			
Intersection Capacity Utilization	81.7%				ICU Level of Service				D			
Analysis Period (min)	15											
c Critical Lane Group												

HCM Signalized Intersection Capacity Analysis
6: South Dakota Avenue & 31st Place

2921 Fort Lincoln Phase 2
7/6/2006

												
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
Lane Width	13	11	14	12	12	12	16	16	16	10	12	10
Total Lost time (s)	4.0	4.0			4.0			4.0			4.0	
Lane Util. Factor	1.00	0.95			0.95			1.00			1.00	
Frt	1.00	1.00			0.99			0.99			0.92	
Flt Protected	0.95	1.00			1.00			0.99			0.98	
Satd. Flow (prot)	1829	3420			3429			1848			1681	
Flt Permitted	0.95	1.00			1.00			0.92			0.87	
Satd. Flow (perm)	1829	3420			3429			1726			1495	
Volume (vph)	69	1260	4	0	829	67	17	40	4	32	0	45
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)	75	1370	4	0	901	73	18	43	4	35	0	49
RTOR Reduction (vph)	0	0	0	0	6	0	0	2	0	0	39	0
Lane Group Flow (vph)	75	1374	0	0	968	0	0	63	0	0	45	0
Bus Blockages (#/hr)	0	0	0	0	10	10	0	0	0	0	0	0
Parking (#/hr)							1	1	1			
Turn Type	Prot						Perm			Perm		
Protected Phases	5	2			6			8			4	
Permitted Phases							8			4		
Actuated Green, G (s)	7.0	70.0			59.0			20.0			20.0	
Effective Green, g (s)	7.0	71.0			60.0			21.0			21.0	
Actuated g/C Ratio	0.07	0.71			0.60			0.21			0.21	
Clearance Time (s)	4.0	5.0			5.0			5.0			5.0	
Lane Grp Cap (vph)	128	2428			2057			362			314	
v/s Ratio Prot	0.04	c0.40			0.28							
v/s Ratio Perm								c0.04			0.03	
v/c Ratio	0.59	0.57			0.47			0.17			0.14	
Uniform Delay, d1	45.1	7.0			11.1			32.4			32.2	
Progression Factor	0.92	0.90			1.61			1.00			1.00	
Incremental Delay, d2	9.7	0.5			0.7			1.0			1.0	
Delay (s)	51.2	6.8			18.7			33.4			33.1	
Level of Service	D	A			B			C			C	
Approach Delay (s)		9.1			18.7			33.4			33.1	
Approach LOS		A			B			C			C	
Intersection Summary												
HCM Average Control Delay	14.1				HCM Level of Service				B			
HCM Volume to Capacity ratio	0.48											
Actuated Cycle Length (s)	100.0				Sum of lost time (s)				8.0			
Intersection Capacity Utilization	48.8%				ICU Level of Service				A			
Analysis Period (min)	15											
c Critical Lane Group												

	→	↘	↙	←	↖	↗
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑			↑↑	↑	
Sign Control	Stop			Stop	Stop	
Volume (vph)	288	23	29	337	37	27
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	313	25	32	366	40	29
Direction Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	
Volume Total (vph)	209	129	154	244	70	
Volume Left (vph)	0	0	32	0	40	
Volume Right (vph)	0	25	0	0	29	
Hadj (s)	0.03	-0.10	0.14	0.03	-0.10	
Departure Headway (s)	5.1	5.0	5.1	5.0	5.3	
Degree Utilization, x	0.30	0.18	0.22	0.34	0.10	
Capacity (veh/h)	692	705	680	699	614	
Control Delay (s)	9.0	7.8	8.4	9.4	8.9	
Approach Delay (s)	8.6		9.0		8.9	
Approach LOS	A		A		A	
Intersection Summary						
Delay	8.8					
HCM Level of Service	A					
Intersection Capacity Utilization	32.6%			ICU Level of Service		A
Analysis Period (min)	15					

						
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Sign Control	Stop			Stop	Stop	
Volume (vph)	0	338	70	2	16	251
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	367	76	2	17	273
Direction Lane #	EB 1	EB 2	NB 1	NB 2	SB 1	SB 2
Volume Total (vph)	0	367	76	2	12	279
Volume Left (vph)	0	0	76	0	0	0
Volume Right (vph)	0	367	0	0	0	273
Hadj (s)	0.00	-0.67	0.53	0.03	0.03	-0.65
Departure Headway (s)	5.4	4.8	6.4	5.8	5.6	4.9
Degree Utilization, x	0.00	0.49	0.13	0.00	0.02	0.38
Capacity (veh/h)	641	723	527	566	597	692
Control Delay (s)	7.2	10.9	9.1	7.7	7.5	9.7
Approach Delay (s)	10.9		9.1		9.6	
Approach LOS	B		A		A	
Intersection Summary						
Delay	10.2					
HCM Level of Service	B					
Intersection Capacity Utilization	36.4%			ICU Level of Service		
Analysis Period (min)	15					

								
Movement	EBL	EBR	NBL	NBT	SBT	SBR		
Lane Configurations								
Sign Control	Stop			Stop	Stop			
Volume (vph)	0	3	2	0	263	2		
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92		
Hourly flow rate (vph)	0	3	2	0	286	2		
Direction Lane #	EB 1	NB 1	SB 1	SB 2				
Volume Total (vph)	3	2	191	97				
Volume Left (vph)	0	2	0	0				
Volume Right (vph)	3	0	0	2				
Hadj (s)	-0.57	0.23	0.03	0.02				
Departure Headway (s)	4.0	4.5	4.5	4.5				
Degree Utilization, x	0.00	0.00	0.24	0.12				
Capacity (veh/h)	855	782	779	784				
Control Delay (s)	7.0	7.5	7.8	7.0				
Approach Delay (s)	7.0	7.5	7.5					
Approach LOS	A	A	A					
Intersection Summary								
Delay	7.5							
HCM Level of Service	A							
Intersection Capacity Utilization	17.3%			ICU Level of Service	A			
Analysis Period (min)	15							