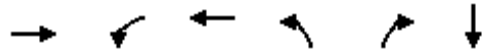


# Queues

## 7: N. Delaware Ave & Shackamaxon Ave

05/18/2007



Lane Group	EBT	WBL	WBT	NBL	NBR	SBT
Lane Group Flow (vph)	2469	448	773	132	604	63
v/c Ratio	0.94	0.74	0.20	0.66	0.61	0.21
Control Delay	15.0	42.6	3.0	54.1	26.3	19.8
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	15.0	42.6	3.0	54.1	26.3	19.8
Queue Length 50th (ft)	87	124	34	72	155	13
Queue Length 95th (ft)	#198	177	45	#152	217	49
Internal Link Dist (ft)	690		321			1237
Turn Bay Length (ft)		200				
Base Capacity (vph)	2627	609	3787	199	994	299
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.94	0.74	0.20	0.66	0.61	0.21

### Intersection Summary

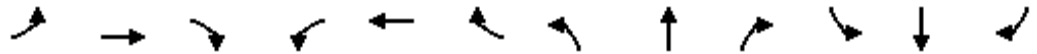
# 95th percentile volume exceeds capacity, queue may be longer.  
 Queue shown is maximum after two cycles.

\* In the Synchro Analysis for this intersection, Delaware Avenue is layed out as an east-west roadway.

# HCM Signalized Intersection Capacity Analysis

## 7: N. Delaware Ave & Shackamaxon Ave

05/18/2007



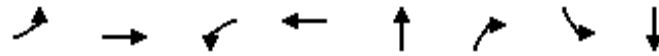
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↑↑↑		↑↑	↑↑↑		↑		↑↑		↑	
Volume (vph)	0	2218	53	412	711	0	121	0	556	24	0	34
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	13	12	13	11	12	12	12	12	12	16	16	16
Total Lost time (s)		4.0		4.0	4.0		4.0		5.0		4.0	
Lane Util. Factor		0.91		0.97	0.91		1.00		0.88		1.00	
Frt		1.00		1.00	1.00		1.00		0.85		0.92	
Flt Protected		1.00		0.95	1.00		0.95		1.00		0.98	
Satd. Flow (prot)		4923		3224	4940		1719		2707		1850	
Flt Permitted		1.00		0.95	1.00		0.76		1.00		0.98	
Satd. Flow (perm)		4923		3224	4940		1380		2707		1850	
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	2411	58	448	773	0	132	0	604	26	0	37
RTOR Reduction (vph)	0	3	0	0	0	0	0	0	2	0	32	0
Lane Group Flow (vph)	0	2466	0	448	773	0	132	0	602	0	31	0
Heavy Vehicles (%)	5%	5%	5%	5%	5%	5%	5%	5%	5%	5%	5%	5%
Parking (#/hr)			10			10				10		10
Turn Type				Prot		custom		custom		Perm		
Protected Phases				3	8				3 2		6	
Permitted Phases		4					2		2	6		
Actuated Green, G (s)		47.0		16.0	68.0		11.0		32.0		11.0	
Effective Green, g (s)		48.0		17.0	69.0		13.0		32.0		13.0	
Actuated g/C Ratio		0.53		0.19	0.77		0.14		0.36		0.14	
Clearance Time (s)		5.0		5.0	5.0		6.0				6.0	
Lane Grp Cap (vph)		2626		609	3787		199		962		267	
v/s Ratio Prot				c0.14	0.16				0.22			
v/s Ratio Perm		c0.50					c0.10				0.02	
v/c Ratio		0.94		0.74	0.20		0.66		0.63		0.12	
Uniform Delay, d1		19.6		34.4	2.9		36.4		24.0		33.5	
Progression Factor		0.38		1.00	1.00		1.00		1.00		1.00	
Incremental Delay, d2		6.4		7.7	0.1		16.1		3.1		0.9	
Delay (s)		13.9		42.1	3.0		52.5		27.1		34.4	
Level of Service		B		D	A		D		C		C	
Approach Delay (s)		13.9			17.4			31.7			34.4	
Approach LOS		B			B			C			C	

Intersection Summary			
HCM Average Control Delay	18.0	HCM Level of Service	B
HCM Volume to Capacity ratio	0.85		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	79.2%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			

Queues

8: N. Delaware Ave & Frankford Ave

05/18/2007



Lane Group	EBL	EBT	WBL	WBT	NBT	NBR	SBL	SBT
Lane Group Flow (vph)	393	2037	226	685	58	58	125	220
v/c Ratio	0.58	0.78	0.61	0.35	0.36	0.16	0.52	0.46
Control Delay	6.0	8.2	46.8	14.7	37.6	9.8	40.3	11.3
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	6.0	8.2	46.8	14.7	37.6	9.8	40.3	11.3
Queue Length 50th (ft)	10	247	65	67	28	0	63	19
Queue Length 95th (ft)	m22	248	m103	86	66	31	121	81
Internal Link Dist (ft)		1382		690	35			19
Turn Bay Length (ft)	320		175					
Base Capacity (vph)	673	2598	371	1959	163	354	241	477
Starvation Cap Reductn	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.58	0.78	0.61	0.35	0.36	0.16	0.52	0.46

Intersection Summary

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

\* In the Synchro Analysis for this intersection, Delaware Avenue is layed out as an east-west roadway.

# HCM Signalized Intersection Capacity Analysis

## 8: N. Delaware Ave & Frankford Ave

05/18/2007



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↗	↑↑↑		↘↗	↑↑↑			↑	↗	↘	↓	↘
Volume (vph)	362	1812	62	208	545	97	53	0	53	115	38	165
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	12	12	12	12	12	12	12	12	12	13	12	15
Total Lost time (s)	4.0	4.0		3.0	4.0			4.0	5.0	4.0	4.0	
Lane Util. Factor	1.00	0.91		0.97	0.91			1.00	1.00	1.00	1.00	
Frt	1.00	1.00		1.00	0.98			1.00	0.85	1.00	0.88	
Flt Protected	0.95	1.00		0.95	1.00			0.95	1.00	0.95	1.00	
Satd. Flow (prot)	1719	4670		3335	4826			1719	1538	1510	1589	
Flt Permitted	0.29	1.00		0.95	1.00			0.43	1.00	0.72	1.00	
Satd. Flow (perm)	525	4670		3335	4826			775	1538	1143	1589	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.94	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	393	1970	67	226	580	105	58	0	58	125	41	179
RTOR Reduction (vph)	0	4	0	0	29	0	0	0	46	0	141	0
Lane Group Flow (vph)	393	2033	0	226	656	0	0	58	12	125	79	0
Heavy Vehicles (%)	5%	5%	5%	5%	5%	5%	5%	5%	5%	5%	5%	5%
Parking (#/hr)		10								10		10
Turn Type	pm+pt			Prot			Perm		Perm	Perm		
Protected Phases	7	4		3	8			2				6
Permitted Phases	4						2		2	6		
Actuated Green, G (s)	61.0	48.0		8.0	34.0			18.0	18.0	17.0		17.0
Effective Green, g (s)	60.0	50.0		10.0	36.0			19.0	18.0	19.0		19.0
Actuated g/C Ratio	0.67	0.56		0.11	0.40			0.21	0.20	0.21		0.21
Clearance Time (s)	3.0	6.0		5.0	6.0			5.0	5.0	6.0		6.0
Lane Grp Cap (vph)	655	2594		371	1930			164	308	241		335
v/s Ratio Prot	c0.15	c0.44		0.07	0.14							0.05
v/s Ratio Perm	0.25							0.07	0.01	c0.11		
v/c Ratio	0.60	0.78		0.61	0.34			0.35	0.04	0.52		0.24
Uniform Delay, d1	7.5	15.7		38.1	18.8			30.3	29.0	31.4		29.5
Progression Factor	0.77	0.44		1.03	0.81			1.00	1.00	1.00		1.00
Incremental Delay, d2	1.7	1.0		7.1	0.5			5.9	0.2	7.8		1.6
Delay (s)	7.5	8.0		46.4	15.6			36.2	29.2	39.2		31.1
Level of Service	A	A		D	B			D	C	D		C
Approach Delay (s)		8.0			23.3			32.7				34.1
Approach LOS		A			C			C				C

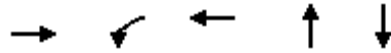
### Intersection Summary

HCM Average Control Delay	14.7	HCM Level of Service	B
HCM Volume to Capacity ratio	0.71		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	71.2%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

# Queues

## 9: N. Delaware Ave & Columbia Ave

05/18/2007



Lane Group	EBT	WBL	WBT	NBT	SBT
Lane Group Flow (vph)	2739	15	1298	109	195
v/c Ratio	1.12	0.19	0.53	0.42	0.71
Control Delay	70.4	8.7	5.6	35.8	46.2
Queue Delay	0.0	0.0	0.0	0.0	0.0
Total Delay	70.4	8.7	5.6	35.8	46.2
Queue Length 50th (ft)	~940	2	150	52	95
Queue Length 95th (ft)	m#1065	m5	186	103	#194
Internal Link Dist (ft)	288		550	50	623
Turn Bay Length (ft)		105			
Base Capacity (vph)	2445	80	2445	258	275
Starvation Cap Reductn	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0
Reduced v/c Ratio	1.12	0.19	0.53	0.42	0.71

### Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.

Queue shown is maximum after two cycles.

# 95th percentile volume exceeds capacity, queue may be longer.

Queue shown is maximum after two cycles.

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

\* In the Synchro Analysis for this intersection, Delaware Avenue is layed out as an east-west roadway.

# HCM Signalized Intersection Capacity Analysis

## 9: N. Delaware Ave & Columbia Ave

05/18/2007



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↑↑		↖	↑↑			↕			↕	
Volume (vph)	0	2544	4	14	1194	0	66	0	34	122	9	48
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		0.95		1.00	0.95			1.00			1.00	
Frt		1.00		1.00	1.00			0.95			0.96	
Flt Protected		1.00		0.95	1.00			0.97			0.97	
Satd. Flow (prot)		3437		1719	3438			1671			1687	
Flt Permitted		1.00		0.06	1.00			0.74			0.75	
Satd. Flow (perm)		3437		113	3438			1271			1301	
Peak-hour factor, PHF	0.93	0.93	0.93	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	2735	4	15	1298	0	72	0	37	133	10	52
RTOR Reduction (vph)	0	0	0	0	0	0	0	4	0	0	14	0
Lane Group Flow (vph)	0	2739	0	15	1298	0	0	105	0	0	181	0
Heavy Vehicles (%)	5%	5%	5%	5%	5%	5%	5%	5%	5%	5%	5%	5%
Turn Type				Perm			Perm			Perm		
Protected Phases		4			8			2			6	
Permitted Phases				8			2			6		
Actuated Green, G (s)		63.0		63.0	63.0			16.0			16.0	
Effective Green, g (s)		64.0		64.0	64.0			18.0			18.0	
Actuated g/C Ratio		0.71		0.71	0.71			0.20			0.20	
Clearance Time (s)		5.0		5.0	5.0			6.0			6.0	
Lane Grp Cap (vph)		2444		80	2445			254			260	
v/s Ratio Prot		c0.80			0.38							
v/s Ratio Perm				0.13				0.08			c0.14	
v/c Ratio		1.12		0.19	0.53			0.41			0.69	
Uniform Delay, d1		13.0		4.3	6.0			31.4			33.4	
Progression Factor		0.53		0.74	0.79			1.00			1.00	
Incremental Delay, d2		59.0		4.6	0.7			4.9			14.3	
Delay (s)		65.9		7.8	5.5			36.3			47.7	
Level of Service		E		A	A			D			D	
Approach Delay (s)		65.9			5.5			36.3			47.7	
Approach LOS		E			A			D			D	

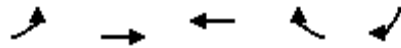
### Intersection Summary

HCM Average Control Delay	46.2	HCM Level of Service	D
HCM Volume to Capacity ratio	1.03		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	89.1%	ICU Level of Service	E
Analysis Period (min)	15		
c Critical Lane Group			

# Queues

## 10: N. Delaware Ave & Aramingo Ave

05/18/2007



Lane Group	EBL	EBT	WBT	WBR	SBR
Lane Group Flow (vph)	445	1984	735	1077	642
v/c Ratio	0.51	0.97	0.49	0.88	0.44
Control Delay	5.1	18.0	20.4	18.1	11.2
Queue Delay	0.0	0.0	0.0	1.6	0.0
Total Delay	5.1	18.0	20.4	19.6	11.2
Queue Length 50th (ft)	42	634	155	325	86
Queue Length 95th (ft)	m40	m480	163	312	119
Internal Link Dist (ft)		566	626		
Turn Bay Length (ft)					
Base Capacity (vph)	867	2045	1494	1222	1461
Starvation Cap Reductn	0	0	0	51	0
Spillback Cap Reductn	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0
Reduced v/c Ratio	0.51	0.97	0.49	0.92	0.44

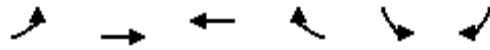
### Intersection Summary

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

# HCM Signalized Intersection Capacity Analysis

## 10: N. Delaware Ave & Aramingo Ave

05/18/2007



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations	↖↗	↕	↕	↖	↖	↖↗
Volume (vph)	436	1944	551	808	0	546
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	6.0	4.0	6.0		4.0
Lane Util. Factor	0.97	0.95	0.95	1.00		0.88
Frt	1.00	1.00	1.00	0.85		0.85
Flt Protected	0.95	1.00	1.00	1.00		1.00
Satd. Flow (prot)	3433	3539	3539	1583		2787
Flt Permitted	0.24	1.00	1.00	1.00		1.00
Satd. Flow (perm)	879	3539	3539	1583		2787
Peak-hour factor, PHF	0.98	0.98	0.75	0.75	0.85	0.85
Adj. Flow (vph)	445	1984	735	1077	0	642
RTOR Reduction (vph)	0	0	0	33	0	109
Lane Group Flow (vph)	445	1984	735	1044	0	533
Turn Type	pm+pt			pm+ov		pm+ov
Protected Phases	5	2	6	7	7	5
Permitted Phases	2			6		7
Actuated Green, G (s)	52.0	52.0	36.0	62.0		37.0
Effective Green, g (s)	53.0	52.0	38.0	62.0		39.0
Actuated g/C Ratio	0.59	0.58	0.42	0.69		0.43
Clearance Time (s)	5.0	6.0	6.0	6.0		5.0
Lane Grp Cap (vph)	858	2045	1494	1196		1208
v/s Ratio Prot	0.07	c0.56	0.21	c0.25		0.06
v/s Ratio Perm	0.24			0.41		0.13
v/c Ratio	0.52	0.97	0.49	0.87		0.44
Uniform Delay, d1	10.4	18.3	19.0	10.9		17.9
Progression Factor	0.59	0.79	1.00	1.00		1.00
Incremental Delay, d2	0.2	2.2	1.2	8.9		1.2
Delay (s)	6.4	16.7	20.1	19.9		19.0
Level of Service	A	B	C	B		B
Approach Delay (s)		14.8	20.0		19.0	
Approach LOS		B	B		B	

### Intersection Summary

HCM Average Control Delay	17.3	HCM Level of Service	B
HCM Volume to Capacity ratio	0.90		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	6.0
Intersection Capacity Utilization	70.8%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

# Queues

## 11: Penn St & N. Delaware Ave

05/18/2007



Lane Group	WBL	NBT	SBL	SBT
Lane Group Flow (vph)	243	2944	54	895
v/c Ratio	0.60	0.90	0.68	0.27
Control Delay	38.4	16.1	50.0	1.7
Queue Delay	0.0	8.3	0.0	0.0
Total Delay	38.4	24.4	50.0	1.7
Queue Length 50th (ft)	123	424	8	17
Queue Length 95th (ft)	87	520	#95	17
Internal Link Dist (ft)	171	483		1382
Turn Bay Length (ft)			95	
Base Capacity (vph)	408	3263	80	3285
Starvation Cap Reductn	0	327	0	0
Spillback Cap Reductn	0	0	0	0
Storage Cap Reductn	0	0	0	0
Reduced v/c Ratio	0.60	1.00	0.68	0.27

### Intersection Summary

# 95th percentile volume exceeds capacity, queue may be longer.  
 Queue shown is maximum after two cycles.

# HCM Signalized Intersection Capacity Analysis

## 11: Penn St & N. Delaware Ave

05/18/2007



Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations	W	W	T	T	W	T
Volume (vph)	84	23	2554	155	49	814
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width	16	12	12	12	12	12
Total Lost time (s)	4.0		4.0		4.0	4.0
Lane Util. Factor	1.00		0.91		1.00	0.91
Frt	0.97		0.99		1.00	1.00
Flt Protected	0.96		1.00		0.95	1.00
Satd. Flow (prot)	1916		4653		1719	4693
Flt Permitted	0.96		1.00		0.06	1.00
Satd. Flow (perm)	1916		4653		115	4693
Peak-hour factor, PHF	0.44	0.44	0.92	0.92	0.91	0.91
Adj. Flow (vph)	191	52	2776	168	54	895
RTOR Reduction (vph)	3	0	8	0	0	0
Lane Group Flow (vph)	240	0	2937	0	54	895
Heavy Vehicles (%)	5%	5%	5%	5%	5%	5%
Parking (#/hr)		10	10	10		10
Turn Type					Perm	
Protected Phases	8		2			6
Permitted Phases					6	
Actuated Green, G (s)	17.0		61.0		61.0	61.0
Effective Green, g (s)	19.0		63.0		63.0	63.0
Actuated g/C Ratio	0.21		0.70		0.70	0.70
Clearance Time (s)	6.0		6.0		6.0	6.0
Lane Grp Cap (vph)	404		3257		81	3285
v/s Ratio Prot	c0.13		c0.63			0.19
v/s Ratio Perm					0.47	
v/c Ratio	0.59		0.90		0.67	0.27
Uniform Delay, d1	32.0		11.0		7.6	5.0
Progression Factor	1.00		1.00		0.68	0.29
Incremental Delay, d2	6.3		4.6		34.7	0.2
Delay (s)	38.3		15.6		39.9	1.7
Level of Service	D		B		D	A
Approach Delay (s)	38.3		15.6			3.8
Approach LOS	D		B			A

### Intersection Summary

HCM Average Control Delay	14.2	HCM Level of Service	B
HCM Volume to Capacity ratio	0.83		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	65.5%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

Queues

12: Spring Garden St. & N. Delaware Ave

05/18/2007



Lane Group	EBL	EBR	NBL	NBT	SBT
Lane Group Flow (vph)	1100	449	408	1941	1002
v/c Ratio	0.87	0.41	0.85	0.70	0.84
Control Delay	35.5	7.1	48.7	16.7	35.8
Queue Delay	0.0	0.0	0.0	0.0	0.0
Total Delay	35.5	7.1	48.7	16.7	35.8
Queue Length 50th (ft)	295	90	217	279	174
Queue Length 95th (ft)	#413	142	#371	334	#231
Internal Link Dist (ft)				1261	483
Turn Bay Length (ft)	160		215		
Base Capacity (vph)	1279	1100	497	2756	1204
Starvation Cap Reductn	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0
Reduced v/c Ratio	0.86	0.41	0.82	0.70	0.83

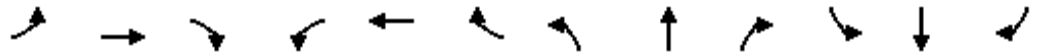
Intersection Summary

# 95th percentile volume exceeds capacity, queue may be longer.  
 Queue shown is maximum after two cycles.

# HCM Signalized Intersection Capacity Analysis

## 12: Spring Garden St. & N. Delaware Ave

05/18/2007



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↖↗		↖				↖	↑↑↑		↖	↑↑↑	↖
Volume (vph)	1034	0	422	0	0	0	379	1805	0	0	596	326
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	0.97		1.00				1.00	0.91			0.91	
Frt	1.00		0.85				1.00	1.00			0.95	
Flt Protected	0.95		1.00				0.95	1.00			1.00	
Satd. Flow (prot)	3433		1583				1770	5085			4816	
Flt Permitted	0.95		1.00				0.95	1.00			1.00	
Satd. Flow (perm)	3433		1583				1770	5085			4816	
Peak-hour factor, PHF	0.94	0.94	0.94	0.92	0.92	0.92	0.93	0.93	0.93	0.92	0.92	0.92
Adj. Flow (vph)	1100	0	449	0	0	0	408	1941	0	0	648	354
RTOR Reduction (vph)	0	0	7	0	0	0	0	0	0	0	109	0
Lane Group Flow (vph)	1100	0	442	0	0	0	408	1941	0	0	893	0
Turn Type	custom		custom				Prot			Prot		
Protected Phases			4 5				5	2		1	6	
Permitted Phases	4											
Actuated Green, G (s)	30.3		58.1				21.8	45.7			17.9	
Effective Green, g (s)	32.3		60.1				23.8	47.7			19.9	
Actuated g/C Ratio	0.37		0.68				0.27	0.54			0.23	
Clearance Time (s)	6.0						6.0	6.0			6.0	
Vehicle Extension (s)	3.0						3.0	3.0			3.0	
Lane Grp Cap (vph)	1260		1081				479	2756			1089	
v/s Ratio Prot			0.28				c0.23	0.38			c0.19	
v/s Ratio Perm	c0.32											
v/c Ratio	0.87		0.41				0.85	0.70			0.82	
Uniform Delay, d1	25.9		6.1				30.4	14.9			32.3	
Progression Factor	1.00		1.00				1.00	1.00			1.00	
Incremental Delay, d2	6.9		0.3				13.6	0.8			4.9	
Delay (s)	32.9		6.4				44.1	15.8			37.3	
Level of Service	C		A				D	B			D	
Approach Delay (s)		25.2			0.0			20.7			37.3	
Approach LOS		C			A			C			D	

### Intersection Summary

HCM Average Control Delay	25.5	HCM Level of Service	C
HCM Volume to Capacity ratio	0.85		
Actuated Cycle Length (s)	88.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	79.3%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			

Queues

13: Callowhill St. & Columbus Blvd

05/18/2007



Lane Group	EBL	EBR	NBT	SBT
Lane Group Flow (vph)	36	97	2847	1089
v/c Ratio	0.18	0.37	0.70	0.27
Control Delay	38.9	12.7	5.2	2.5
Queue Delay	0.0	0.0	0.0	0.0
Total Delay	38.9	12.7	5.2	2.5
Queue Length 50th (ft)	19	0	198	42
Queue Length 95th (ft)	40	28	235	53
Internal Link Dist (ft)	147		1206	1261
Turn Bay Length (ft)				
Base Capacity (vph)	197	262	4068	4068
Starvation Cap Reductn	0	0	0	0
Spillback Cap Reductn	0	0	0	0
Storage Cap Reductn	0	0	0	0
Reduced v/c Ratio	0.18	0.37	0.70	0.27

Intersection Summary

# HCM Signalized Intersection Capacity Analysis

## 13: Callowhill St. & Columbus Blvd

05/18/2007



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (vph)	27	73	0	2619	1013	0
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		0.91	0.91	
Frt	1.00	0.85		1.00	1.00	
Flt Protected	0.95	1.00		1.00	1.00	
Satd. Flow (prot)	1770	1583		5085	5085	
Flt Permitted	0.95	1.00		1.00	1.00	
Satd. Flow (perm)	1770	1583		5085	5085	
Peak-hour factor, PHF	0.75	0.75	0.92	0.92	0.93	0.93
Adj. Flow (vph)	36	97	0	2847	1089	0
RTOR Reduction (vph)	0	86	0	0	0	0
Lane Group Flow (vph)	36	11	0	2847	1089	0
Turn Type	Perm					
Protected Phases	4			2	6	
Permitted Phases	4					
Actuated Green, G (s)	8.0	8.0		70.0	70.0	
Effective Green, g (s)	10.0	10.0		72.0	72.0	
Actuated g/C Ratio	0.11	0.11		0.80	0.80	
Clearance Time (s)	6.0	6.0		6.0	6.0	
Lane Grp Cap (vph)	197	176		4068	4068	
v/s Ratio Prot	c0.02			c0.56	0.21	
v/s Ratio Perm		0.01				
v/c Ratio	0.18	0.06		0.70	0.27	
Uniform Delay, d1	36.3	35.8		4.1	2.3	
Progression Factor	1.00	1.00		1.00	1.00	
Incremental Delay, d2	2.0	0.7		1.0	0.2	
Delay (s)	38.3	36.5		5.1	2.5	
Level of Service	D	D		A	A	
Approach Delay (s)	37.0			5.1	2.5	
Approach LOS	D			A	A	

### Intersection Summary

HCM Average Control Delay	5.4	HCM Level of Service	A
HCM Volume to Capacity ratio	0.64		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	60.6%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group

Queues

14: Race St & Columbus Blvd

05/18/2007



Lane Group	EBL	EBT	EBR	WBT	NBT	SBT
Lane Group Flow (vph)	297	2	198	2	2302	1170
v/c Ratio	0.80	0.01	0.44	0.02	0.67	0.34
Control Delay	51.5	31.0	8.5	42.5	10.3	6.8
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	51.5	31.0	8.5	42.5	10.3	6.8
Queue Length 50th (ft)	149	1	0	1	214	77
Queue Length 95th (ft)	#330	7	60	8	406	153
Internal Link Dist (ft)		497		85	1197	1206
Turn Bay Length (ft)						
Base Capacity (vph)	369	346	455	186	3421	3421
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.80	0.01	0.44	0.01	0.67	0.34

Intersection Summary

# 95th percentile volume exceeds capacity, queue may be longer.  
 Queue shown is maximum after two cycles.

# HCM Signalized Intersection Capacity Analysis

## 14: Race St & Columbus Blvd

05/18/2007

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	273	2	182	2	0	0	0	2118	0	0	1076	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	6.0	6.0		6.0			4.0			4.0	
Lane Util. Factor	1.00	1.00	1.00		1.00			0.91			0.91	
Frt	1.00	1.00	0.85		1.00			1.00			1.00	
Flt Protected	0.95	1.00	1.00		0.95			1.00			1.00	
Satd. Flow (prot)	1770	1863	1583		1770			5085			5085	
Flt Permitted	0.95	1.00	1.00		1.00			1.00			1.00	
Satd. Flow (perm)	1770	1863	1583		1863			5085			5085	
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)	297	2	198	2	0	0	0	2302	0	0	1170	0
RTOR Reduction (vph)	0	0	163	0	0	0	0	0	0	0	0	0
Lane Group Flow (vph)	297	2	35	0	2	0	0	2302	0	0	1170	0
Turn Type	Split		Perm	Perm								
Protected Phases	4	4			8			2			6	
Permitted Phases			4	8								
Actuated Green, G (s)	16.0	16.0	16.0		1.1			56.2			56.2	
Effective Green, g (s)	18.0	16.0	16.0		1.1			58.2			58.2	
Actuated g/C Ratio	0.20	0.18	0.18		0.01			0.64			0.64	
Clearance Time (s)	6.0	6.0	6.0		6.0			6.0			6.0	
Vehicle Extension (s)	3.0	3.0	3.0		3.0			3.0			3.0	
Lane Grp Cap (vph)	349	326	277		22			3241			3241	
v/s Ratio Prot	c0.17	0.00						c0.45			0.23	
v/s Ratio Perm			0.02		c0.00							
v/c Ratio	0.85	0.01	0.13		0.09			0.71			0.36	
Uniform Delay, d1	35.4	31.1	31.7		44.6			11.0			7.8	
Progression Factor	1.00	1.00	1.00		1.00			1.00			1.00	
Incremental Delay, d2	17.7	0.0	0.2		1.8			1.3			0.3	
Delay (s)	53.1	31.1	32.0		46.4			12.3			8.1	
Level of Service	D	C	C		D			B			A	
Approach Delay (s)		44.6			46.4			12.3			8.1	
Approach LOS		D			D			B			A	
<b>Intersection Summary</b>												
HCM Average Control Delay			15.1		HCM Level of Service			B				
HCM Volume to Capacity ratio			0.73									
Actuated Cycle Length (s)			91.3		Sum of lost time (s)			14.0				
Intersection Capacity Utilization			63.4%		ICU Level of Service			B				
Analysis Period (min)			15									
c	Critical Lane Group											

Queues

15: Penn's Landing & Columbus Blvd

05/18/2007



Lane Group	WBL	NBT	SBL	SBT
Lane Group Flow (vph)	359	1966	9	1325
v/c Ratio	0.64	0.77	0.08	0.43
Control Delay	25.7	21.0	41.0	9.7
Queue Delay	0.0	0.0	0.0	0.0
Total Delay	25.7	21.0	41.0	9.7
Queue Length 50th (ft)	128	318	5	132
Queue Length 95th (ft)	164	380	20	162
Internal Link Dist (ft)	281	402		1197
Turn Bay Length (ft)			200	
Base Capacity (vph)	561	2541	118	3108
Starvation Cap Reductn	0	0	0	0
Spillback Cap Reductn	0	0	0	0
Storage Cap Reductn	0	0	0	0
Reduced v/c Ratio	0.64	0.77	0.08	0.43

Intersection Summary

# HCM Signalized Intersection Capacity Analysis

## 15: Penn's Landing & Columbus Blvd

05/18/2007



Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Volume (vph)	51	218	1763	6	8	1232
Ideal Flow (vphp)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0		4.0		4.0	4.0
Lane Util. Factor	1.00		0.91		1.00	0.91
Frt	0.89		1.00		1.00	1.00
Flt Protected	0.99		1.00		0.95	1.00
Satd. Flow (prot)	1643		5083		1770	5085
Flt Permitted	0.99		1.00		0.95	1.00
Satd. Flow (perm)	1643		5083		1770	5085
Peak-hour factor, PHF	0.75	0.75	0.90	0.90	0.93	0.93
Adj. Flow (vph)	68	291	1959	7	9	1325
RTOR Reduction (vph)	68	0	1	0	0	0
Lane Group Flow (vph)	291	0	1966	0	9	1325
Turn Type					Prot	
Protected Phases	8		2		1	6
Permitted Phases						
Actuated Green, G (s)	25.0		43.0		4.0	53.0
Effective Green, g (s)	27.0		45.0		6.0	55.0
Actuated g/C Ratio	0.30		0.50		0.07	0.61
Clearance Time (s)	6.0		6.0		6.0	6.0
Lane Grp Cap (vph)	493		2542		118	3108
v/s Ratio Prot	c0.18		c0.39		0.01	c0.26
v/s Ratio Perm						
v/c Ratio	0.59		0.77		0.08	0.43
Uniform Delay, d1	26.8		18.3		39.4	9.2
Progression Factor	1.00		1.00		1.00	1.00
Incremental Delay, d2	5.1		2.4		1.3	0.4
Delay (s)	31.9		20.7		40.7	9.6
Level of Service	C		C		D	A
Approach Delay (s)	31.9		20.7			9.8
Approach LOS	C		C			A

### Intersection Summary

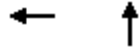
HCM Average Control Delay	17.8	HCM Level of Service	B
HCM Volume to Capacity ratio	0.69		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	57.1%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group

# Queues

## 16: Callowhill St. & 3rd St.

05/18/2007



Lane Group	WBT	NBT
Lane Group Flow (vph)	2429	452
v/c Ratio	0.54	0.41
Control Delay	11.1	25.7
Queue Delay	0.0	0.0
Total Delay	11.1	25.7
Queue Length 50th (ft)	184	105
Queue Length 95th (ft)	210	143
Internal Link Dist (ft)	309	280
Turn Bay Length (ft)		
Base Capacity (vph)	4515	1093
Starvation Cap Reductn	0	0
Spillback Cap Reductn	0	0
Storage Cap Reductn	0	0
Reduced v/c Ratio	0.54	0.41

### Intersection Summary

# HCM Signalized Intersection Capacity Analysis

## 16: Callowhill St. & 3rd St.

05/18/2007



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations								↑↑				
Volume (vph)	0	0	0	0	2221	38	83	311	0	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)					4.0			4.0				
Lane Util. Factor					0.81			0.95				
Frt					1.00			1.00				
Flt Protected					1.00			0.99				
Satd. Flow (prot)					7525			3502				
Flt Permitted					1.00			0.99				
Satd. Flow (perm)					7525			3502				
Peak-hour factor, PHF	0.92	0.92	0.92	0.93	0.93	0.93	0.87	0.87	0.87	0.92	0.92	0.92
Adj. Flow (vph)	0	0	0	0	2388	41	95	357	0	0	0	0
RTOR Reduction (vph)	0	0	0	0	3	0	0	3	0	0	0	0
Lane Group Flow (vph)	0	0	0	0	2426	0	0	449	0	0	0	0
Turn Type								Perm				
Protected Phases					6			8				
Permitted Phases							8					
Actuated Green, G (s)					52.0			26.0				
Effective Green, g (s)					54.0			28.0				
Actuated g/C Ratio					0.60			0.31				
Clearance Time (s)					6.0			6.0				
Lane Grp Cap (vph)					4515			1090				
v/s Ratio Prot					0.32							
v/s Ratio Perm								0.13				
v/c Ratio					0.54			0.41				
Uniform Delay, d1					10.6			24.5				
Progression Factor					1.00			1.00				
Incremental Delay, d2					0.5			1.2				
Delay (s)					11.1			25.6				
Level of Service					B			C				
Approach Delay (s)		0.0			11.1			25.6			0.0	
Approach LOS		A			B			C			A	

### Intersection Summary

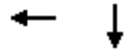
HCM Average Control Delay	13.4	HCM Level of Service	B
HCM Volume to Capacity ratio	0.49		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	43.9%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

Queues

17: Callowhill St. & 4th St.

05/18/2007



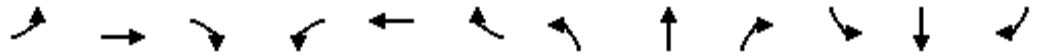
Lane Group	WBT	SBT
Lane Group Flow (vph)	2574	502
v/c Ratio	0.57	0.48
Control Delay	2.3	26.8
Queue Delay	0.0	0.0
Total Delay	2.3	26.8
Queue Length 50th (ft)	22	120
Queue Length 95th (ft)	24	140
Internal Link Dist (ft)	367	1136
Turn Bay Length (ft)		
Base Capacity (vph)	4525	1047
Starvation Cap Reductn	9	0
Spillback Cap Reductn	0	0
Storage Cap Reductn	0	0
Reduced v/c Ratio	0.57	0.48

Intersection Summary

# HCM Signalized Intersection Capacity Analysis

## 17: Callowhill St. & 4th St.

05/18/2007



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations					←←←←						↑↑	
Volume (vph)	0	0	0	143	2251	0	0	0	0	0	257	135
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)					4.0						4.0	
Lane Util. Factor					0.81						0.95	
Frt					1.00						0.95	
Flt Protected					1.00						1.00	
Satd. Flow (prot)					7522						3356	
Flt Permitted					1.00						1.00	
Satd. Flow (perm)					7522						3356	
Peak-hour factor, PHF	0.92	0.92	0.92	0.93	0.93	0.93	0.92	0.92	0.92	0.78	0.78	0.78
Adj. Flow (vph)	0	0	0	154	2420	0	0	0	0	0	329	173
RTOR Reduction (vph)	0	0	0	0	13	0	0	0	0	0	3	0
Lane Group Flow (vph)	0	0	0	0	2561	0	0	0	0	0	499	0
Turn Type					Perm							
Protected Phases						8						6
Permitted Phases					8							
Actuated Green, G (s)						52.0						26.0
Effective Green, g (s)						54.0						28.0
Actuated g/C Ratio						0.60						0.31
Clearance Time (s)						6.0						6.0
Lane Grp Cap (vph)						4513						1044
v/s Ratio Prot												c0.15
v/s Ratio Perm						0.34						
v/c Ratio						0.57						0.48
Uniform Delay, d1						10.9						25.1
Progression Factor						0.17						1.00
Incremental Delay, d2						0.5						1.6
Delay (s)						2.4						26.7
Level of Service						A						C
Approach Delay (s)		0.0				2.4		0.0				26.7
Approach LOS		A				A		A				C

### Intersection Summary

HCM Average Control Delay	6.3	HCM Level of Service	A
HCM Volume to Capacity ratio	0.54		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	45.9%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

# Queues

## 18: Callowhill St. & 5th St.

05/18/2007



Lane Group	WBT	NBL	NBT
Lane Group Flow (vph)	2754	87	960
v/c Ratio	0.62	0.16	0.87
Control Delay	9.4	22.1	39.6
Queue Delay	0.2	0.0	0.0
Total Delay	9.7	22.1	39.6
Queue Length 50th (ft)	293	34	269
Queue Length 95th (ft)	335	69	#379
Internal Link Dist (ft)	369		252
Turn Bay Length (ft)			
Base Capacity (vph)	4433	554	1101
Starvation Cap Reductn	731	0	0
Spillback Cap Reductn	0	0	0
Storage Cap Reductn	0	0	0
Reduced v/c Ratio	0.74	0.16	0.87

### Intersection Summary

# 95th percentile volume exceeds capacity, queue may be longer.  
 Queue shown is maximum after two cycles.

# HCM Signalized Intersection Capacity Analysis

## 18: Callowhill St. & 5th St.

05/18/2007



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations							↖	↑↑				
Volume (vph)	0	0	0	0	2194	367	78	864	0	0	0	0
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				
Lane Util. Factor					0.81		1.00	0.95				
Flt					0.98		1.00	1.00				
Flt Protected					1.00		0.95	1.00				
Satd. Flow (prot)					7382		1770	3539				
Flt Permitted					1.00		0.95	1.00				
Satd. Flow (perm)					7382		1770	3539				
Peak-hour factor, PHF	0.92	0.92	0.92	0.93	0.93	0.93	0.90	0.90	0.90	0.92	0.92	0.92
Adj. Flow (vph)	0	0	0	0	2359	395	87	960	0	0	0	0
RTOR Reduction (vph)	0	0	0	0	6	0	3	0	0	0	0	0
Lane Group Flow (vph)	0	0	0	0	2748	0	84	960	0	0	0	0
Turn Type							Perm					
Protected Phases					8			2				
Permitted Phases							2					
Actuated Green, G (s)					52.0		26.0	26.0				
Effective Green, g (s)					54.0		28.0	28.0				
Actuated g/C Ratio					0.60		0.31	0.31				
Clearance Time (s)					6.0		6.0	6.0				
Lane Grp Cap (vph)					4429		551	1101				
v/s Ratio Prot					c0.37			c0.27				
v/s Ratio Perm							0.05					
v/c Ratio					0.62		0.15	0.87				
Uniform Delay, d1					11.5		22.4	29.3				
Progression Factor					0.77		1.00	1.00				
Incremental Delay, d2					0.6		0.6	9.5				
Delay (s)					9.4		23.0	38.9				
Level of Service					A		C	D				
Approach Delay (s)		0.0			9.4			37.5			0.0	
Approach LOS		A			A			D			A	

### Intersection Summary

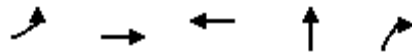
HCM Average Control Delay	17.2	HCM Level of Service	B
HCM Volume to Capacity ratio	0.71		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	60.9%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group

Queues

19: Spring Garden St. & 5th St

05/18/2007



Lane Group	EBL	EBT	WBT	NBT	NBR
Lane Group Flow (vph)	162	1179	997	1134	329
v/c Ratio	0.82	0.62	0.65	0.97	0.64
Control Delay	45.6	11.6	7.3	42.7	21.6
Queue Delay	0.0	0.0	0.0	0.0	0.0
Total Delay	45.6	11.6	7.3	42.7	21.6
Queue Length 50th (ft)	27	142	25	208	83
Queue Length 95th (ft)	#90	198	97	#337	160
Internal Link Dist (ft)		356	392	1122	
Turn Bay Length (ft)	155				30
Base Capacity (vph)	198	1887	1525	1166	515
Starvation Cap Reductn	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0
Reduced v/c Ratio	0.82	0.62	0.65	0.97	0.64

Intersection Summary

# 95th percentile volume exceeds capacity, queue may be longer.  
 Queue shown is maximum after two cycles.

# HCM Signalized Intersection Capacity Analysis

## 19: Spring Garden St. & 5th St

05/18/2007



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↘	↗↗			↗↗			↗↗	↘			
Volume (vph)	159	1155	0	0	871	96	264	813	313	0	0	0
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	6.0			
Lane Util. Factor	1.00	0.95			0.95			0.95	1.00			
Frt	1.00	1.00			0.99			1.00	0.85			
Flt Protected	0.95	1.00			1.00			0.99	1.00			
Satd. Flow (prot)	1770	3539			3487			3496	1583			
Flt Permitted	0.15	1.00			1.00			0.99	1.00			
Satd. Flow (perm)	277	3539			3487			3496	1583			
Peak-hour factor, PHF	0.98	0.98	0.98	0.97	0.97	0.97	0.95	0.95	0.95	0.92	0.92	0.92
Adj. Flow (vph)	162	1179	0	0	898	99	278	856	329	0	0	0
RTOR Reduction (vph)	0	0	0	0	14	0	0	0	40	0	0	0
Lane Group Flow (vph)	162	1179	0	0	983	0	0	1134	289	0	0	0
Turn Type	pm+pt						Split		Perm			
Protected Phases	7	4			8		2	2				
Permitted Phases	4								2			
Actuated Green, G (s)	30.0	30.0			24.0			18.0	18.0			
Effective Green, g (s)	31.0	32.0			26.0			20.0	18.0			
Actuated g/C Ratio	0.52	0.53			0.43			0.33	0.30			
Clearance Time (s)	5.0	6.0			6.0			6.0	6.0			
Lane Grp Cap (vph)	193	1887			1511			1165	475			
v/s Ratio Prot	0.03	c0.33			0.28			c0.32				
v/s Ratio Perm	c0.41								0.18			
v/c Ratio	0.84	0.62			0.65			0.97	0.61			
Uniform Delay, d1	13.3	9.8			13.4			19.7	18.0			
Progression Factor	1.00	1.00			0.40			1.00	1.00			
Incremental Delay, d2	33.4	1.6			2.0			20.7	5.7			
Delay (s)	46.7	11.4			7.3			40.4	23.7			
Level of Service	D	B			A			D	C			
Approach Delay (s)		15.6			7.3			36.7			0.0	
Approach LOS		B			A			D			A	

### Intersection Summary

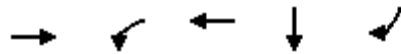
HCM Average Control Delay	21.6	HCM Level of Service	C
HCM Volume to Capacity ratio	0.86		
Actuated Cycle Length (s)	60.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	76.1%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

Queues

20: Spring Garden St. & 4th St

05/18/2007



Lane Group	EBT	WBL	WBT	SBT	SBR
Lane Group Flow (vph)	1734	62	984	296	85
v/c Ratio	0.98	0.32	0.46	0.60	0.21
Control Delay	28.3	8.7	3.1	25.3	10.2
Queue Delay	0.0	0.0	0.0	0.0	0.0
Total Delay	28.3	8.7	3.1	25.3	10.2
Queue Length 50th (ft)	158	4	30	93	8
Queue Length 95th (ft)	#455	m6	38	164	37
Internal Link Dist (ft)	392		378	276	
Turn Bay Length (ft)		170			40
Base Capacity (vph)	1763	191	2123	491	414
Starvation Cap Reductn	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0
Reduced v/c Ratio	0.98	0.32	0.46	0.60	0.21

Intersection Summary

# 95th percentile volume exceeds capacity, queue may be longer.

Queue shown is maximum after two cycles.

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

# HCM Signalized Intersection Capacity Analysis

## 20: Spring Garden St. & 4th St

05/18/2007



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↑↑		↖	↑↑						↖	↖
Volume (vph)	0	1507	88	57	905	0	0	0	0	58	214	78
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	6.0
Lane Util. Factor		0.95		1.00	0.95						1.00	1.00
Frt		0.99		1.00	1.00						1.00	0.85
Flt Protected		1.00		0.95	1.00						0.99	1.00
Satd. Flow (prot)		3510		1770	3539						1843	1583
Flt Permitted		1.00		0.12	1.00						0.99	1.00
Satd. Flow (perm)		3510		233	3539						1843	1583
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	1638	96	62	984	0	0	0	0	63	233	85
RTOR Reduction (vph)	0	7	0	0	0	0	0	0	0	0	0	44
Lane Group Flow (vph)	0	1727	0	62	984	0	0	0	0	0	296	41
Turn Type				pm+pt						Perm		Perm
Protected Phases		4		3	8						6	
Permitted Phases				8						6		6
Actuated Green, G (s)		28.0		34.0	34.0						14.0	14.0
Effective Green, g (s)		30.0		34.0	36.0						16.0	14.0
Actuated g/C Ratio		0.50		0.57	0.60						0.27	0.23
Clearance Time (s)		6.0		4.0	6.0						6.0	6.0
Lane Grp Cap (vph)		1755		183	2123						491	369
v/s Ratio Prot		c0.49		0.01	c0.28							
v/s Ratio Perm				0.18							0.16	0.03
v/c Ratio		0.98		0.34	0.46						0.60	0.11
Uniform Delay, d1		14.8		13.8	6.6						19.2	18.1
Progression Factor		0.65		0.97	0.36						1.00	1.00
Incremental Delay, d2		16.3		4.1	0.6						5.4	0.6
Delay (s)		25.9		17.6	3.0						24.6	18.7
Level of Service		C		B	A						C	B
Approach Delay (s)		25.9			3.9			0.0			23.3	
Approach LOS		C			A			A			C	

### Intersection Summary

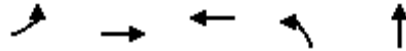
HCM Average Control Delay	18.3	HCM Level of Service	B
HCM Volume to Capacity ratio	0.85		
Actuated Cycle Length (s)	60.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	72.3%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

# Queues

## 21: Spring Garden St. & 3rd St.

05/18/2007



Lane Group	EBL	EBT	WBT	NBL	NBT
Lane Group Flow (vph)	171	1402	1020	112	443
v/c Ratio	0.81	0.70	0.62	0.21	0.80
Control Delay	30.5	15.0	9.3	17.0	31.0
Queue Delay	0.0	0.1	0.0	0.0	0.0
Total Delay	30.5	15.1	9.3	17.0	31.0
Queue Length 50th (ft)	46	190	84	30	133
Queue Length 95th (ft)	m48	m195	102	64	#273
Internal Link Dist (ft)		378	448		1140
Turn Bay Length (ft)	126				
Base Capacity (vph)	212	2005	1642	531	555
Starvation Cap Reductn	0	45	0	0	0
Spillback Cap Reductn	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0
Reduced v/c Ratio	0.81	0.72	0.62	0.21	0.80

### Intersection Summary

# 95th percentile volume exceeds capacity, queue may be longer.

Queue shown is maximum after two cycles.

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

# HCM Signalized Intersection Capacity Analysis

## 21: Spring Garden St. & 3rd St.

05/18/2007



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↖	↗↗			↖↖		↖	↗				
Volume (vph)	157	1290	0	0	848	90	103	256	152	0	0	0
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	0.95			0.95		1.00	1.00				
Frt	1.00	1.00			0.99		1.00	0.94				
Flt Protected	0.95	1.00			1.00		0.95	1.00				
Satd. Flow (prot)	1770	3539			3488		1770	1759				
Flt Permitted	0.15	1.00			1.00		0.95	1.00				
Satd. Flow (perm)	286	3539			3488		1770	1759				
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)	171	1402	0	0	922	98	112	278	165	0	0	0
RTOR Reduction (vph)	0	0	0	0	13	0	0	27	0	0	0	0
Lane Group Flow (vph)	171	1402	0	0	1007	0	112	416	0	0	0	0
Turn Type	pm+pt						Split					
Protected Phases	7	4			8		2	2				
Permitted Phases	4											
Actuated Green, G (s)	32.0	32.0			26.0		16.0	16.0				
Effective Green, g (s)	32.0	34.0			28.0		18.0	18.0				
Actuated g/C Ratio	0.53	0.57			0.47		0.30	0.30				
Clearance Time (s)	4.0	6.0			6.0		6.0	6.0				
Lane Grp Cap (vph)	202	2005			1628		531	528				
v/s Ratio Prot	0.03	c0.40			0.29		0.06	c0.24				
v/s Ratio Perm	c0.42											
v/c Ratio	0.85	0.70			0.62		0.21	0.79				
Uniform Delay, d1	12.9	9.3			12.0		15.7	19.2				
Progression Factor	2.02	1.49			0.64		1.00	1.00				
Incremental Delay, d2	11.9	0.6			1.6		0.9	11.3				
Delay (s)	38.1	14.5			9.3		16.6	30.5				
Level of Service	D	B			A		B	C				
Approach Delay (s)		17.1			9.3		27.7				0.0	
Approach LOS		B			A		C				A	

### Intersection Summary

HCM Average Control Delay	16.4	HCM Level of Service	B
HCM Volume to Capacity ratio	0.78		
Actuated Cycle Length (s)	60.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	72.3%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

# Queues

## 22: Spring Garden St. & 2nd St.

05/18/2007



Lane Group	EBT	WBL	WBT	SBT
Lane Group Flow (vph)	1747	87	792	803
v/c Ratio	1.06	0.46	0.40	0.76
Control Delay	54.8	14.3	8.0	23.3
Queue Delay	0.0	0.0	0.0	0.0
Total Delay	54.8	14.3	8.0	23.3
Queue Length 50th (ft)	~361	13	74	127
Queue Length 95th (ft)	#488	29	107	186
Internal Link Dist (ft)	448		1146	338
Turn Bay Length (ft)		67		
Base Capacity (vph)	1645	191	2005	1057
Starvation Cap Reductn	0	0	0	0
Spillback Cap Reductn	0	0	0	0
Storage Cap Reductn	0	0	0	0
Reduced v/c Ratio	1.06	0.46	0.40	0.76

### Intersection Summary

- ~ Volume exceeds capacity, queue is theoretically infinite.  
Queue shown is maximum after two cycles.
- # 95th percentile volume exceeds capacity, queue may be longer.  
Queue shown is maximum after two cycles.

# HCM Signalized Intersection Capacity Analysis

## 22: Spring Garden St. & 2nd St.

05/18/2007



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↑↑		↖	↑↑						↑↑	
Volume (vph)	0	1507	100	80	729	0	0	0	0	167	414	157
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	
Lane Util. Factor		0.95		1.00	0.95						0.95	
Frt		0.99		1.00	1.00						0.97	
Flt Protected		1.00		0.95	1.00						0.99	
Satd. Flow (prot)		3506		1770	3539						3388	
Flt Permitted		1.00		0.13	1.00						0.99	
Satd. Flow (perm)		3506		248	3539						3388	
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	1638	109	87	792	0	0	0	0	182	450	171
RTOR Reduction (vph)	0	8	0	0	0	0	0	0	0	0	41	0
Lane Group Flow (vph)	0	1739	0	87	792	0	0	0	0	0	762	0
Turn Type				pm+pt						Split		
Protected Phases		4		3	8					6	6	
Permitted Phases				8								
Actuated Green, G (s)		26.0		32.0	32.0						16.0	
Effective Green, g (s)		28.0		32.0	34.0						18.0	
Actuated g/C Ratio		0.47		0.53	0.57						0.30	
Clearance Time (s)		6.0		4.0	6.0						6.0	
Lane Grp Cap (vph)		1636		183	2005						1016	
v/s Ratio Prot		c0.50		0.02	c0.22						c0.23	
v/s Ratio Perm				0.24								
v/c Ratio		1.06		0.48	0.40						0.75	
Uniform Delay, d1		16.0		29.5	7.3						19.0	
Progression Factor		0.82		1.00	1.00						1.00	
Incremental Delay, d2		38.8		8.6	0.6						5.1	
Delay (s)		51.9		38.1	7.8						24.1	
Level of Service		D		D	A						C	
Approach Delay (s)		51.9			10.8			0.0			24.1	
Approach LOS		D			B			A			C	

### Intersection Summary

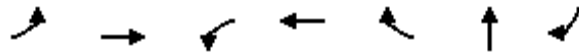
HCM Average Control Delay	34.9	HCM Level of Service	C
HCM Volume to Capacity ratio	0.93		
Actuated Cycle Length (s)	60.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	80.6%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

# Queues

## 23: Richmond St & I95 Ramp

05/18/2007



Lane Group	EBL	EBT	WBL	WBT	WBR	NBT	SBR
Lane Group Flow (vph)	1338	1109	2	454	397	25	1242
v/c Ratio	0.98	0.54	0.03	0.65	0.71	0.05	1.02
Control Delay	52.0	14.8	41.0	48.9	12.1	17.3	44.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	52.0	14.8	41.0	48.9	12.1	17.3	44.0
Queue Length 50th (ft)	471	230	1	110	0	6	-928
Queue Length 95th (ft)	#630	286	9	147	93	26	#1190
Internal Link Dist (ft)		626		336		135	
Turn Bay Length (ft)	450		95				
Base Capacity (vph)	1370	2077	74	746	571	536	1226
Starvation Cap Reductn	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0
Reduced v/c Ratio	0.98	0.53	0.03	0.61	0.70	0.05	1.01

### Intersection Summary

- ~ Volume exceeds capacity, queue is theoretically infinite.  
Queue shown is maximum after two cycles.
- # 95th percentile volume exceeds capacity, queue may be longer.  
Queue shown is maximum after two cycles.

# HCM Signalized Intersection Capacity Analysis

## 23: Richmond St & I95 Ramp

05/18/2007



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	1231	1017	4	2	418	365	12	0	11	0	0	1143
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	5.0		5.0	5.0	5.0		5.0				5.0
Lane Util. Factor	0.97	0.95		1.00	0.91	1.00		1.00				1.00
Frt	1.00	1.00		1.00	1.00	0.85		0.94				0.85
Flt Protected	0.95	1.00		0.95	1.00	1.00		0.97				1.00
Satd. Flow (prot)	3433	3537		1770	5085	1583		1698				1583
Flt Permitted	0.95	1.00		0.27	1.00	1.00		0.91				1.00
Satd. Flow (perm)	3433	3537		507	5085	1583		1593				1583
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)	1338	1105	4	2	454	397	13	0	12	0	0	1242
RTOR Reduction (vph)	0	0	0	0	0	343	0	8	0	0	0	3
Lane Group Flow (vph)	1338	1109	0	2	454	54	0	17	0	0	0	1239
Turn Type	Prot		Perm			Perm	Perm	Perm			Perm	pt+ov
Protected Phases	5	2			6			8			4	4 5
Permitted Phases				6	6	6	8			4		
Actuated Green, G (s)	43.0	62.7		14.7	14.7	14.7		35.0				83.0
Effective Green, g (s)	43.0	62.7		14.7	14.7	14.7		35.0				83.0
Actuated g/C Ratio	0.40	0.58		0.14	0.14	0.14		0.32				0.77
Clearance Time (s)	5.0	5.0		5.0	5.0	5.0		5.0				5.0
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0		3.0				3.0
Lane Grp Cap (vph)	1371	2059		69	694	216		518				1220
v/s Ratio Prot	0.39	0.31			c0.09							c0.78
v/s Ratio Perm				0.00		0.03		0.01				
v/c Ratio	0.98	0.54		0.03	0.65	0.25		0.03				1.02
Uniform Delay, d1	31.8	13.7		40.3	44.1	41.6		24.8				12.4
Progression Factor	1.00	1.00		1.00	1.00	1.00		1.00				1.00
Incremental Delay, d2	18.6	1.0		0.2	2.2	0.6		0.0				29.6
Delay (s)	50.5	14.7		40.5	46.3	42.2		24.8				42.0
Level of Service	D	B		D	D	D		C				D
Approach Delay (s)		34.3			44.4			24.8			42.0	
Approach LOS		C			D			C			D	

### Intersection Summary

HCM Average Control Delay	38.2	HCM Level of Service	D
HCM Volume to Capacity ratio	0.96		
Actuated Cycle Length (s)	107.7	Sum of lost time (s)	10.0
Intersection Capacity Utilization	94.7%	ICU Level of Service	F
Analysis Period (min)	15		
c Critical Lane Group			

# HCM Unsignalized Intersection Capacity Analysis

## 31: Laurel Ave & Frankford Ave

05/18/2007



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (veh/h)	7	71	0	458	318	0
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.42	0.85	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	17	84	0	498	346	0
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage (veh)						
Upstream signal (ft)				99		
pX, platoon unblocked	0.86					
vC, conflicting volume	843	173	346			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	736	173	346			
tC, single (s)	6.9	7.0	4.2			
tC, 2 stage (s)						
tF (s)	3.6	3.4	2.2			
p0 queue free %	94	90	100			
cM capacity (veh/h)	299	831	1189			

Direction, Lane #	EB 1	NB 1	SB 1	SB 2
Volume Total	100	498	230	115
Volume Left	17	0	0	0
Volume Right	84	0	0	0
cSH	641	1189	1700	1700
Volume to Capacity	0.16	0.00	0.14	0.07
Queue Length 95th (ft)	14	0	0	0
Control Delay (s)	11.6	0.0	0.0	0.0
Lane LOS	B			
Approach Delay (s)	11.6	0.0	0.0	
Approach LOS	B			

Intersection Summary			
Average Delay		1.2	
Intersection Capacity Utilization		35.5%	ICU Level of Service
Analysis Period (min)		15	A