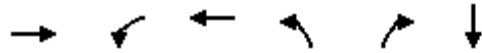


# Queues

## 7: N. Delaware Ave & Shackamaxon Ave

05/18/2007



Lane Group	EBT	WBL	WBT	NBL	NBR	SBT
Lane Group Flow (vph)	2388	404	737	120	539	61
v/c Ratio	0.84	0.75	0.19	0.70	0.64	0.24
Control Delay	18.2	45.8	2.5	61.1	30.3	21.4
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	18.2	45.8	2.5	61.1	30.3	21.4
Queue Length 50th (ft)	519	114	28	67	146	13
Queue Length 95th (ft)	572	#174	37	#150	207	49
Internal Link Dist (ft)	690		321			1237
Turn Bay Length (ft)		200				
Base Capacity (vph)	2848	537	3897	171	847	258
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	0.84	0.75	0.19	0.70	0.64	0.24

### Intersection Summary

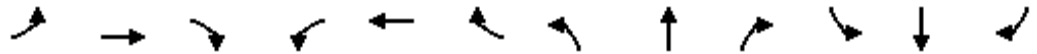
# 95th percentile volume exceeds capacity, queue may be longer.  
 Queue shown is maximum after two cycles.

\* 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



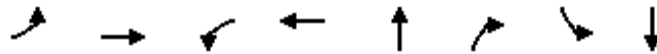
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↑↑↑		↔↔	↑↑↑		↔		↔↔		↔	
Volume (vph)	0	2149	48	372	678	0	110	0	496	23	0	33
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	13	12	13	11	12	12	12	12	12	16	16	16
Total Lost time (s)		4.0		4.0	4.0		4.0		6.0		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)		4924		3224	4940		1719		2707		1850	
Flt Permitted		1.00		0.95	1.00		0.77		1.00		0.98	
Satd. Flow (perm)		4924		3224	4940		1396		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	2336	52	404	737	0	120	0	539	25	0	36
RTOR Reduction (vph)	0	3	0	0	0	0	0	0	5	0	32	0
Lane Group Flow (vph)	0	2385	0	404	737	0	120	0	534	0	29	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							6
Permitted Phases		4					2		2 3		6	
Actuated Green, G (s)		51.0		14.0	70.0		9.0		28.0		9.0	
Effective Green, g (s)		52.0		15.0	71.0		11.0		23.0		11.0	
Actuated g/C Ratio		0.58		0.17	0.79		0.12		0.26		0.12	
Clearance Time (s)		5.0		5.0	5.0		6.0				6.0	
Lane Grp Cap (vph)		2845		537	3897		171		692		226	
v/s Ratio Prot				c0.13	0.15							
v/s Ratio Perm		c0.48					c0.09		0.20		0.02	
v/c Ratio		0.84		0.75	0.19		0.70		0.77		0.13	
Uniform Delay, d1		15.6		35.7	2.4		37.9		31.1		35.2	
Progression Factor		0.97		1.00	1.00		1.00		1.00		1.00	
Incremental Delay, d2		2.7		9.4	0.1		21.4		8.1		1.2	
Delay (s)		17.9		45.1	2.5		59.3		39.2		36.4	
Level of Service		B		D	A		E		D		D	
Approach Delay (s)		17.9			17.6			42.9			36.4	
Approach LOS		B			B			D			D	

Intersection Summary		
HCM Average Control Delay	21.9	HCM Level of Service C
HCM Volume to Capacity ratio	0.80	
Actuated Cycle Length (s)	90.0	Sum of lost time (s) 12.0
Intersection Capacity Utilization	76.0%	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)	382	1970	205	659	51	51	122	212
v/c Ratio	0.74	0.63	2.38	0.26	0.24	0.14	0.43	0.41
Control Delay	19.9	16.4	674.1	9.0	30.9	19.1	34.5	9.8
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	19.9	16.4	674.1	9.0	30.9	19.1	34.5	9.8
Queue Length 50th (ft)	141	330	~197	50	23	13	59	17
Queue Length 95th (ft)	m159	384	m#333	67	56	42	113	74
Internal Link Dist (ft)		1382		690	35			19
Turn Bay Length (ft)	320		100					
Base Capacity (vph)	516	3117	86	2548	213	376	281	519
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	0.74	0.63	2.38	0.26	0.24	0.14	0.43	0.41

### 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.

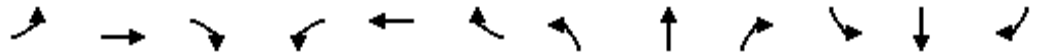
m Volume for 95th percentile queue is metered by upstream signal.

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

# HCM Signalized Intersection Capacity Analysis

## 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)	351	1756	56	189	526	91	47	0	47	112	35	160
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		4.0	4.0			4.0	5.0	4.0	4.0	
Lane Util. Factor	1.00	0.91		1.00	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	4671		1719	4829			1719	1538	1510	1587	
Flt Permitted	0.34	1.00		0.09	1.00			0.48	1.00	0.72	1.00	
Satd. Flow (perm)	608	4671		166	4829			870	1538	1150	1587	
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)	382	1909	61	205	560	99	51	0	51	122	38	174
RTOR Reduction (vph)	0	4	0	0	28	0	0	0	17	0	131	0
Lane Group Flow (vph)	382	1966	0	205	631	0	0	51	34	122	81	0
Heavy Vehicles (%)	5%	5%	5%	5%	5%	5%	5%	5%	5%	5%	5%	5%
Parking (#/hr)		10								10		10
Turn Type	pm+pt			Perm			Perm		Perm	Perm		
Protected Phases	7	4			8			2				6
Permitted Phases	4			8			2		2	6		
Actuated Green, G (s)	58.0	58.0		45.0	45.0			21.0	21.0	20.0	20.0	
Effective Green, g (s)	57.0	60.0		47.0	47.0			22.0	21.0	22.0	22.0	
Actuated g/C Ratio	0.63	0.67		0.52	0.52			0.24	0.23	0.24	0.24	
Clearance Time (s)	3.0	6.0		6.0	6.0			5.0	5.0	6.0	6.0	
Lane Grp Cap (vph)	496	3114		87	2522			213	359	281	388	
v/s Ratio Prot	c0.08	0.42			0.13							0.05
v/s Ratio Perm	0.41			c1.24				0.06	0.02	c0.11		
v/c Ratio	0.77	0.63		2.36	0.25			0.24	0.10	0.43	0.21	
Uniform Delay, d1	8.6	8.6		21.5	11.8			27.3	27.1	28.7	27.1	
Progression Factor	2.05	1.83		0.88	0.81			1.00	1.00	1.00	1.00	
Incremental Delay, d2	5.4	0.5		643.7	0.2			2.6	0.5	4.8	1.2	
Delay (s)	23.0	16.2		662.5	9.8			29.9	27.6	33.6	28.3	
Level of Service	C	B		F	A			C	C	C	C	
Approach Delay (s)		17.3			164.6			28.8			30.2	
Approach LOS		B			F			C			C	

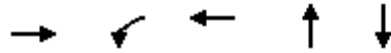
### Intersection Summary

HCM Average Control Delay	53.7	HCM Level of Service	D
HCM Volume to Capacity ratio	1.64		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	74.0%	ICU Level of Service	D
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)	2607	15	1216	106	188
v/c Ratio	1.07	0.19	0.50	0.41	0.68
Control Delay	47.9	11.2	7.6	34.7	44.4
Queue Delay	0.0	0.0	0.0	0.0	0.0
Total Delay	47.9	11.2	7.6	34.7	44.4
Queue Length 50th (ft)	~858	2	142	49	90
Queue Length 95th (ft)	#998	m9	179	99	#184
Internal Link Dist (ft)	288		550	50	623
Turn Bay Length (ft)		105			
Base Capacity (vph)	2445	80	2445	261	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	1.07	0.19	0.50	0.41	0.68

### 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.

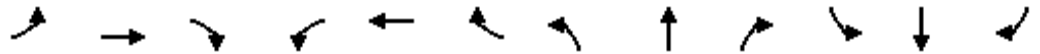
m Volume for 95th percentile queue is metered by upstream signal.

\* 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	2421	4	14	1119	0	64	0	33	119	8	46
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			1277			1303	
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	2603	4	15	1216	0	70	0	36	129	9	50
RTOR Reduction (vph)	0	0	0	0	0	0	0	6	0	0	14	0
Lane Group Flow (vph)	0	2607	0	15	1216	0	0	100	0	0	174	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			255			261	
v/s Ratio Prot		c0.76			0.35							
v/s Ratio Perm				0.13				0.08			c0.13	
v/c Ratio		1.07		0.19	0.50			0.39			0.67	
Uniform Delay, d1		13.0		4.3	5.8			31.3			33.2	
Progression Factor		0.56		1.17	1.16			1.00			1.00	
Incremental Delay, d2		37.4		4.8	0.7			4.5			12.6	
Delay (s)		44.7		9.8	7.4			35.8			45.9	
Level of Service		D		A	A			D			D	
Approach Delay (s)		44.7			7.5			35.8			45.9	
Approach LOS		D			A			D			D	

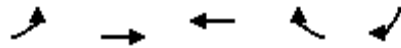
### Intersection Summary

HCM Average Control Delay	33.4	HCM Level of Service	C
HCM Volume to Capacity ratio	0.98		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	85.4%	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)	405	1902	688	1045	599
v/c Ratio	0.41	0.78	0.32	0.78	0.52
Control Delay	6.1	15.5	9.4	8.5	8.7
Queue Delay	0.0	0.0	0.0	0.7	0.0
Total Delay	6.1	15.5	9.4	9.2	8.7
Queue Length 50th (ft)	45	466	93	158	39
Queue Length 95th (ft)	m43	m430	99	154	75
Internal Link Dist (ft)		566	626		
Turn Bay Length (ft)					
Base Capacity (vph)	993	2438	2123	1333	1163
Starvation Cap Reductn	0	0	0	86	0
Spillback Cap Reductn	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0
Reduced v/c Ratio	0.41	0.78	0.32	0.84	0.52

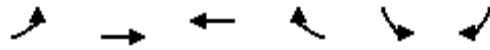
### Intersection Summary

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)	397	1864	516	784	0	509
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	0.33	1.00	1.00	1.00		1.00
Satd. Flow (perm)	1185	3539	3539	1583		2787
Peak-hour factor, PHF	0.98	0.98	0.75	0.75	0.85	0.85
Adj. Flow (vph)	405	1902	688	1045	0	599
RTOR Reduction (vph)	0	0	0	43	0	320
Lane Group Flow (vph)	405	1902	688	1002	0	279
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)	62.0	62.0	52.0	68.0		21.0
Effective Green, g (s)	63.0	62.0	54.0	68.0		23.0
Actuated g/C Ratio	0.70	0.69	0.60	0.76		0.26
Clearance Time (s)	5.0	6.0	6.0	6.0		5.0
Lane Grp Cap (vph)	979	2438	2123	1302		712
v/s Ratio Prot	0.03	c0.54	0.19	c0.14		0.03
v/s Ratio Perm	0.26			0.50		0.07
v/c Ratio	0.41	0.78	0.32	0.77		0.39
Uniform Delay, d1	5.2	9.4	8.9	6.4		27.7
Progression Factor	1.38	1.56	1.00	1.00		1.00
Incremental Delay, d2	0.1	0.2	0.4	4.4		1.6
Delay (s)	7.4	14.9	9.3	10.9		29.3
Level of Service	A	B	A	B		C
Approach Delay (s)		13.6	10.3		29.3	
Approach LOS		B	B		C	

### Intersection Summary

HCM Average Control Delay	14.4	HCM Level of Service	B
HCM Volume to Capacity ratio	0.81		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	68.2%	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	2854	54	859
v/c Ratio	0.60	0.87	0.68	0.26
Control Delay	38.3	14.5	55.0	4.2
Queue Delay	0.0	4.3	0.0	0.0
Total Delay	38.3	18.7	55.0	4.2
Queue Length 50th (ft)	123	390	10	50
Queue Length 95th (ft)	86	478	#92	56
Internal Link Dist (ft)	171	483		1382
Turn Bay Length (ft)			95	
Base Capacity (vph)	408	3263	80	3285
Starvation Cap Reductn	0	346	0	0
Spillback Cap Reductn	0	0	0	0
Storage Cap Reductn	0	0	0	0
Reduced v/c Ratio	0.60	0.98	0.68	0.26

### 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						
Volume (vph)	84	23	2472	154	49	782
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		4652		1719	4693
Flt Permitted	0.96		1.00		0.06	1.00
Satd. Flow (perm)	1916		4652		115	4693
Peak-hour factor, PHF	0.44	0.44	0.92	0.92	0.91	0.91
Adj. Flow (vph)	191	52	2687	167	54	859
RTOR Reduction (vph)	4	0	8	0	0	0
Lane Group Flow (vph)	239	0	2847	0	54	859
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		3256		81	3285
v/s Ratio Prot	c0.12		c0.61			0.18
v/s Ratio Perm					0.47	
v/c Ratio	0.59		0.87		0.67	0.26
Uniform Delay, d1	32.0		10.4		7.6	5.0
Progression Factor	1.00		1.00		1.13	0.80
Incremental Delay, d2	6.2		3.6		35.3	0.2
Delay (s)	38.2		14.0		43.9	4.1
Level of Service	D		B		D	A
Approach Delay (s)	38.2		14.0			6.5
Approach LOS	D		B			A

### Intersection Summary

HCM Average Control Delay	13.8	HCM Level of Service	B
HCM Volume to Capacity ratio	0.81		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	63.9%	ICU Level of Service	B
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)	1064	436	396	1885	966
v/c Ratio	0.85	0.40	0.83	0.68	0.81
Control Delay	33.6	6.9	46.4	16.2	33.9
Queue Delay	0.0	0.0	0.0	0.0	0.0
Total Delay	33.6	6.9	46.4	16.2	33.9
Queue Length 50th (ft)	281	86	209	266	165
Queue Length 95th (ft)	#367	136	#355	319	216
Internal Link Dist (ft)				1261	483
Turn Bay Length (ft)	160		215		
Base Capacity (vph)	1284	1101	500	2760	1210
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	0.83	0.40	0.79	0.68	0.80

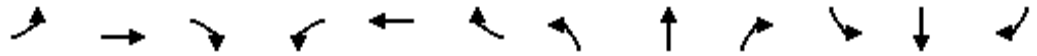
Intersection Summary

# 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)	1000	0	410	0	0	0	368	1753	0	0	577	312
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			4818	
Flt Permitted	0.95		1.00				0.95	1.00			1.00	
Satd. Flow (perm)	3433		1583				1770	5085			4818	
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)	1064	0	436	0	0	0	396	1885	0	0	627	339
RTOR Reduction (vph)	0	0	8	0	0	0	0	0	0	0	107	0
Lane Group Flow (vph)	1064	0	428	0	0	0	396	1885	0	0	859	0
Turn Type	custom		custom				Prot			Prot		
Protected Phases			4 5				5	2		1	6	
Permitted Phases	4		4									
Actuated Green, G (s)	29.9		57.5				21.6	45.4			17.8	
Effective Green, g (s)	31.9		59.5				23.6	47.4			19.8	
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)	1254		1079				478	2761			1093	
v/s Ratio Prot			0.27				c0.22	0.37			c0.18	
v/s Ratio Perm	c0.31											
v/c Ratio	0.85		0.40				0.83	0.68			0.79	
Uniform Delay, d1	25.5		6.1				29.9	14.5			31.8	
Progression Factor	1.00		1.00				1.00	1.00			1.00	
Incremental Delay, d2	5.5		0.2				11.3	1.4			3.8	
Delay (s)	31.0		6.3				41.2	15.9			35.5	
Level of Service	C		A				D	B			D	
Approach Delay (s)		23.8			0.0			20.3			35.5	
Approach LOS		C			A			C			D	

### Intersection Summary

HCM Average Control Delay	24.5	HCM Level of Service	C
HCM Volume to Capacity ratio	0.83		
Actuated Cycle Length (s)	87.3	Sum of lost time (s)	12.0
Intersection Capacity Utilization	77.0%	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)	35	93	2763	1056
v/c Ratio	0.15	0.32	0.70	0.27
Control Delay	36.3	11.2	6.1	3.0
Queue Delay	0.0	0.0	0.0	0.0
Total Delay	36.3	11.2	6.1	3.0
Queue Length 50th (ft)	18	0	216	47
Queue Length 95th (ft)	38	27	256	59
Internal Link Dist (ft)	147		1206	1261
Turn Bay Length (ft)				
Base Capacity (vph)	236	292	3955	3955
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	0.15	0.32	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)	26	70	0	2542	982	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)	35	93	0	2763	1056	0
RTOR Reduction (vph)	0	81	0	0	0	0
Lane Group Flow (vph)	35	12	0	2763	1056	0
Turn Type	Perm					
Protected Phases	4			2	6	
Permitted Phases	4					
Actuated Green, G (s)	10.0	10.0		68.0	68.0	
Effective Green, g (s)	12.0	12.0		70.0	70.0	
Actuated g/C Ratio	0.13	0.13		0.78	0.78	
Clearance Time (s)	6.0	6.0		6.0	6.0	
Lane Grp Cap (vph)	236	211		3955	3955	
v/s Ratio Prot	c0.02			c0.54	0.21	
v/s Ratio Perm	0.01					
v/c Ratio	0.15	0.06		0.70	0.27	
Uniform Delay, d1	34.5	34.1		4.9	2.8	
Progression Factor	1.00	1.00		1.00	1.00	
Incremental Delay, d2	1.3	0.5		1.0	0.2	
Delay (s)	35.8	34.6		5.9	3.0	
Level of Service	D	C		A	A	
Approach Delay (s)	34.9			5.9	3.0	
Approach LOS	C			A	A	

### Intersection Summary

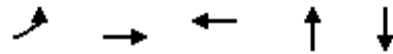
HCM Average Control Delay	6.1	HCM Level of Service	A
HCM Volume to Capacity ratio	0.62		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	59.1%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group

Queues

14: Race St & Columbus Blvd

05/18/2007



Lane Group	EBL	EBT	WBT	NBT	SBT
Lane Group Flow (vph)	288	194	2	2236	1134
v/c Ratio	0.79	0.43	0.02	0.65	0.33
Control Delay	50.2	8.8	42.5	10.0	6.7
Queue Delay	0.0	0.0	0.0	0.0	0.0
Total Delay	50.2	8.8	42.5	10.0	6.7
Queue Length 50th (ft)	143	1	1	204	74
Queue Length 95th (ft)	#319	61	8	388	147
Internal Link Dist (ft)		497	85	1197	1206
Turn Bay Length (ft)					
Base Capacity (vph)	369	451	186	3428	3428
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	0.78	0.43	0.01	0.65	0.33

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)	265	2	177	2	0	0	0	2057	0	0	1043	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			4.0			4.0	
Lane Util. Factor	1.00	1.00			1.00			0.91			0.91	
Frt	1.00	0.85			1.00			1.00			1.00	
Flt Protected	0.95	1.00			0.95			1.00			1.00	
Satd. Flow (prot)	1770	1586			1770			5085			5085	
Flt Permitted	0.95	1.00			1.00			1.00			1.00	
Satd. Flow (perm)	1770	1586			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)	288	2	192	2	0	0	0	2236	0	0	1134	0
RTOR Reduction (vph)	0	159	0	0	0	0	0	0	0	0	0	0
Lane Group Flow (vph)	288	35	0	0	2	0	0	2236	0	0	1134	0
Turn Type	Split		Perm									
Protected Phases	4	4			8			2			6	
Permitted Phases				8								
Actuated Green, G (s)	15.9	15.9			1.2			56.2			56.2	
Effective Green, g (s)	17.9	15.9			1.2			58.2			58.2	
Actuated g/C Ratio	0.20	0.17			0.01			0.64			0.64	
Clearance Time (s)	6.0	6.0			6.0			6.0			6.0	
Vehicle Extension (s)	3.0	3.0			3.0			3.0			3.0	
Lane Grp Cap (vph)	347	276			24			3241			3241	
v/s Ratio Prot	c0.16	0.02						c0.44			0.22	
v/s Ratio Perm					c0.00							
v/c Ratio	0.83	0.13			0.08			0.69			0.35	
Uniform Delay, d1	35.2	31.8			44.5			10.7			7.7	
Progression Factor	1.00	1.00			1.00			1.00			1.00	
Incremental Delay, d2	15.1	0.2			1.5			1.2			0.3	
Delay (s)	50.3	32.1			46.0			11.9			8.0	
Level of Service	D	C			D			B			A	
Approach Delay (s)		43.0			46.0			11.9			8.0	
Approach LOS		D			D			B			A	

### Intersection Summary

HCM Average Control Delay	14.7	HCM Level of Service	B
HCM Volume to Capacity ratio	0.71		
Actuated Cycle Length (s)	91.3	Sum of lost time (s)	14.0
Intersection Capacity Utilization	61.8%	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)	346	1909	8	1284
v/c Ratio	0.73	0.68	0.07	0.38
Control Delay	33.2	15.8	40.9	7.1
Queue Delay	0.0	0.0	0.0	0.0
Total Delay	33.2	15.8	40.9	7.1
Queue Length 50th (ft)	133	264	4	105
Queue Length 95th (ft)	173	316	18	129
Internal Link Dist (ft)	281	402		1197
Turn Bay Length (ft)			200	
Base Capacity (vph)	472	2823	118	3390
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	0.73	0.68	0.07	0.38

### 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)	49	211	1712	6	7	1194
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		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		5082		1770	5085
Flt Permitted	0.99		1.00		0.95	1.00
Satd. Flow (perm)	1643		5082		1770	5085
Peak-hour factor, PHF	0.75	0.75	0.90	0.90	0.93	0.93
Adj. Flow (vph)	65	281	1902	7	8	1284
RTOR Reduction (vph)	70	0	0	0	0	0
Lane Group Flow (vph)	276	0	1909	0	8	1284
Turn Type					Prot	
Protected Phases	8		2		1	6
Permitted Phases						
Actuated Green, G (s)	20.0		48.0		4.0	58.0
Effective Green, g (s)	22.0		50.0		6.0	60.0
Actuated g/C Ratio	0.24		0.56		0.07	0.67
Clearance Time (s)	6.0		6.0		6.0	6.0
Lane Grp Cap (vph)	402		2823		118	3390
v/s Ratio Prot	c0.17		c0.38		0.00	c0.25
v/s Ratio Perm						
v/c Ratio	0.69		0.68		0.07	0.38
Uniform Delay, d1	30.9		14.2		39.4	6.7
Progression Factor	1.00		1.00		1.00	1.00
Incremental Delay, d2	9.2		1.3		1.1	0.3
Delay (s)	40.0		15.6		40.5	7.0
Level of Service	D		B		D	A
Approach Delay (s)	40.0		15.6			7.2
Approach LOS	D		B			A

### Intersection Summary

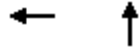
HCM Average Control Delay	14.9	HCM Level of Service	B
HCM Volume to Capacity ratio	0.66		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	55.6%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group

Queues

16: Callowhill St. & 3rd St.

05/18/2007



Lane Group	WBT	NBT
Lane Group Flow (vph)	2358	440
v/c Ratio	0.52	0.40
Control Delay	11.0	25.5
Queue Delay	0.0	0.0
Total Delay	11.0	25.5
Queue Length 50th (ft)	176	101
Queue Length 95th (ft)	201	138
Internal Link Dist (ft)	309	280
Turn Bay Length (ft)		
Base Capacity (vph)	4515	1094
Starvation Cap Reductn	0	0
Spillback Cap Reductn	0	0
Storage Cap Reductn	0	0
Reduced v/c Ratio	0.52	0.40

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					TTTT			TT				
Volume (vph)	0	0	0	0	2156	37	81	302	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	2318	40	93	347	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	2355	0	0	437	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					c0.31							
v/s Ratio Perm								0.12				
v/c Ratio					0.52			0.40				
Uniform Delay, d1					10.5			24.4				
Progression Factor					1.00			1.00				
Incremental Delay, d2					0.4			1.1				
Delay (s)					10.9			25.5				
Level of Service					B			C				
Approach Delay (s)		0.0			10.9			25.5			0.0	
Approach LOS		A			B			C			A	

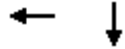
### Intersection Summary

HCM Average Control Delay	13.2	HCM Level of Service	B
HCM Volume to Capacity ratio	0.48		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	42.9%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

Queues  
17: 4th St &

05/18/2007



Lane Group	WBT	SBT
Lane Group Flow (vph)	2498	487
v/c Ratio	0.55	0.47
Control Delay	4.7	26.5
Queue Delay	0.0	0.0
Total Delay	4.7	26.5
Queue Length 50th (ft)	57	115
Queue Length 95th (ft)	62	135
Internal Link Dist (ft)	367	1136
Turn Bay Length (ft)		
Base Capacity (vph)	4525	1047
Starvation Cap Reductn	10	0
Spillback Cap Reductn	56	0
Storage Cap Reductn	0	0
Reduced v/c Ratio	0.56	0.47
<b>Intersection Summary</b>		

# HCM Signalized Intersection Capacity Analysis

17: 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	139	2185	0	0	0	0	0	249	131
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	149	2349	0	0	0	0	0	319	168
RTOR Reduction (vph)	0	0	0	0	13	0	0	0	0	0	3	0
Lane Group Flow (vph)	0	0	0	0	2485	0	0	0	0	0	484	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												c0.14
v/s Ratio Perm						0.33						
v/c Ratio						0.55						0.46
Uniform Delay, d1						10.8						25.0
Progression Factor						0.40						1.00
Incremental Delay, d2						0.4						1.5
Delay (s)						4.8						26.4
Level of Service						A						C
Approach Delay (s)		0.0				4.8		0.0				26.4
Approach LOS		A				A		A				C

## Intersection Summary

HCM Average Control Delay	8.3	HCM Level of Service	A
HCM Volume to Capacity ratio	0.52		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	44.8%	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)	2673	84	932
v/c Ratio	0.60	0.15	0.85
Control Delay	14.5	21.7	37.7
Queue Delay	1.0	0.0	0.0
Total Delay	15.5	21.7	37.7
Queue Length 50th (ft)	331	32	258
Queue Length 95th (ft)	373	66	#348
Internal Link Dist (ft)	369		252
Turn Bay Length (ft)			
Base Capacity (vph)	4434	555	1101
Starvation Cap Reductn	1378	0	0
Spillback Cap Reductn	0	0	0
Storage Cap Reductn	0	0	0
Reduced v/c Ratio	0.87	0.15	0.85

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	2129	357	76	839	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	2289	384	84	932	0	0	0	0
RTOR Reduction (vph)	0	0	0	0	7	0	4	0	0	0	0	0
Lane Group Flow (vph)	0	0	0	0	2666	0	80	932	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					c0.36			c0.26				
v/s Ratio Perm							0.05					
v/c Ratio					0.60		0.14	0.85				
Uniform Delay, d1					11.3		22.4	29.0				
Progression Factor					1.23		1.00	1.00				
Incremental Delay, d2					0.5		0.6	8.1				
Delay (s)					14.4		22.9	37.1				
Level of Service					B		C	D				
Approach Delay (s)		0.0			14.4			35.9			0.0	
Approach LOS		A			B			D			A	

### Intersection Summary

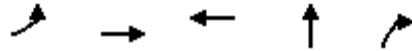
HCM Average Control Delay	20.3	HCM Level of Service	C
HCM Volume to Capacity ratio	0.69		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	59.3%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group

Queues

19: Spring Garden St. & 5th St

05/18/2007



Lane Group	EBL	EBT	WBT	NBT	NBR
Lane Group Flow (vph)	157	1140	964	1100	320
v/c Ratio	0.75	0.60	0.63	0.94	0.62
Control Delay	36.0	11.4	5.8	37.5	20.4
Queue Delay	0.0	0.0	0.0	0.0	0.0
Total Delay	36.0	11.4	5.8	37.5	20.4
Queue Length 50th (ft)	26	135	58	199	77
Queue Length 95th (ft)	#82	189	94	#323	152
Internal Link Dist (ft)		356	392	1122	
Turn Bay Length (ft)	155				30
Base Capacity (vph)	208	1887	1525	1166	519
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	0.75	0.60	0.63	0.94	0.62

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)	154	1117	0	0	841	94	256	789	304	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			0.98			1.00	0.85			
Flt Protected	0.95	1.00			1.00			0.99	1.00			
Satd. Flow (prot)	1770	3539			3486			3496	1583			
Flt Permitted	0.16	1.00			1.00			0.99	1.00			
Satd. Flow (perm)	299	3539			3486			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)	157	1140	0	0	867	97	269	831	320	0	0	0
RTOR Reduction (vph)	0	0	0	0	14	0	0	0	44	0	0	0
Lane Group Flow (vph)	157	1140	0	0	950	0	0	1100	276	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)	204	1887			1511			1165	475			
v/s Ratio Prot	0.03	c0.32			0.27			c0.31				
v/s Ratio Perm	c0.37								0.17			
v/c Ratio	0.77	0.60			0.63			0.94	0.58			
Uniform Delay, d1	12.6	9.6			13.2			19.5	17.8			
Progression Factor	1.00	1.00			0.30			1.00	1.00			
Incremental Delay, d2	23.9	1.4			1.8			16.0	5.1			
Delay (s)	36.5	11.1			5.8			35.4	22.9			
Level of Service	D	B			A			D	C			
Approach Delay (s)		14.2			5.8			32.6			0.0	
Approach LOS		B			A			C			A	

### Intersection Summary

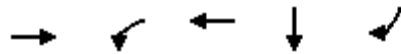
HCM Average Control Delay	19.1	HCM Level of Service	B
HCM Volume to Capacity ratio	0.81		
Actuated Cycle Length (s)	60.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	74.0%	ICU Level of Service	D
Analysis Period (min)	15		

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)	1678	61	950	288	83
v/c Ratio	0.95	0.32	0.45	0.59	0.20
Control Delay	26.2	10.8	4.6	24.9	9.9
Queue Delay	0.0	0.0	0.0	0.0	0.0
Total Delay	26.2	10.8	4.6	24.9	9.9
Queue Length 50th (ft)	211	6	47	90	7
Queue Length 95th (ft)	#429	m14	73	159	36
Internal Link Dist (ft)	392		378	276	
Turn Bay Length (ft)		170			40
Base Capacity (vph)	1763	191	2123	491	415
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	0.95	0.32	0.45	0.59	0.20

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	1459	85	56	874	0	0	0	0	57	208	76
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	1586	92	61	950	0	0	0	0	62	226	83
RTOR Reduction (vph)	0	7	0	0	0	0	0	0	0	0	0	45
Lane Group Flow (vph)	0	1671	0	61	950	0	0	0	0	0	288	38
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		c0.48		0.01	c0.27							
v/s Ratio Perm				0.18							0.16	0.02
v/c Ratio		0.95		0.33	0.45						0.59	0.10
Uniform Delay, d1		14.3		13.0	6.6						19.1	18.1
Progression Factor		0.91		1.40	0.60						1.00	1.00
Incremental Delay, d2		11.5		4.1	0.6						5.1	0.6
Delay (s)		24.5		22.3	4.5						24.2	18.6
Level of Service		C		C	A						C	B
Approach Delay (s)		24.5			5.6			0.0			22.9	
Approach LOS		C			A			A			C	

### Intersection Summary

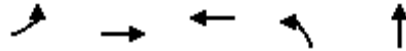
HCM Average Control Delay	18.0	HCM Level of Service	B
HCM Volume to Capacity ratio	0.82		
Actuated Cycle Length (s)	60.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	70.5%	ICU Level of Service	C
Analysis Period (min)	15		

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)	165	1358	985	109	430
v/c Ratio	0.74	0.68	0.60	0.21	0.77
Control Delay	24.2	10.3	8.7	17.0	28.9
Queue Delay	0.0	0.1	0.0	0.0	0.0
Total Delay	24.2	10.3	8.7	17.0	28.9
Queue Length 50th (ft)	26	115	70	29	126
Queue Length 95th (ft)	m31	m116	91	62	#259
Internal Link Dist (ft)		378	448		1140
Turn Bay Length (ft)	126				
Base Capacity (vph)	223	2005	1642	531	558
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	0.74	0.69	0.60	0.21	0.77

### 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)	152	1249	0	0	819	87	100	248	147	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	0.17	1.00			1.00		0.95	1.00				
Satd. Flow (perm)	308	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)	165	1358	0	0	890	95	109	270	160	0	0	0
RTOR Reduction (vph)	0	0	0	0	13	0	0	30	0	0	0	0
Lane Group Flow (vph)	165	1358	0	0	972	0	109	400	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)	213	2005			1628		531	528				
v/s Ratio Prot	0.03	c0.38			0.28		0.06	c0.23				
v/s Ratio Perm	c0.39											
v/c Ratio	0.77	0.68			0.60		0.21	0.76				
Uniform Delay, d1	12.1	9.1			11.8		15.7	19.0				
Progression Factor	1.59	1.02			0.61		1.00	1.00				
Incremental Delay, d2	9.2	0.6			1.5		0.9	9.8				
Delay (s)	28.4	9.9			8.7		16.5	28.8				
Level of Service	C	A			A		B	C				
Approach Delay (s)		11.9			8.7		26.3				0.0	
Approach LOS		B			A		C				A	

### Intersection Summary

HCM Average Control Delay	13.4	HCM Level of Service	B
HCM Volume to Capacity ratio	0.73		
Actuated Cycle Length (s)	60.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	70.5%	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)	1691	85	764	777
v/c Ratio	1.03	0.45	0.38	0.74
Control Delay	43.5	13.9	7.9	22.3
Queue Delay	0.0	0.0	0.0	0.0
Total Delay	43.5	13.9	7.9	22.3
Queue Length 50th (ft)	~295	12	71	121
Queue Length 95th (ft)	#464	28	102	179
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	1.03	0.45	0.38	0.74

### 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	1459	97	78	703	0	0	0	0	162	401	152
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	1586	105	85	764	0	0	0	0	176	436	165
RTOR Reduction (vph)	0	8	0	0	0	0	0	0	0	0	41	0
Lane Group Flow (vph)	0	1683	0	85	764	0	0	0	0	0	736	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		c0.48		0.02	c0.22						c0.22	
v/s Ratio Perm				0.23								
v/c Ratio		1.03		0.46	0.38						0.72	
Uniform Delay, d1		16.0		29.4	7.2						18.8	
Progression Factor		0.84		1.00	1.00						1.00	
Incremental Delay, d2		27.5		8.2	0.6						4.5	
Delay (s)		40.9		37.7	7.7						23.3	
Level of Service		D		D	A						C	
Approach Delay (s)		40.9			10.7			0.0			23.3	
Approach LOS		D			B			A			C	

### Intersection Summary

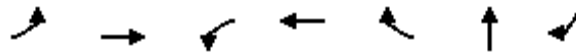
HCM Average Control Delay	29.1	HCM Level of Service	C
HCM Volume to Capacity ratio	0.90		
Actuated Cycle Length (s)	60.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	78.4%	ICU Level of Service	D
Analysis Period (min)	15		

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)	1274	1077	2	441	385	25	1186
v/c Ratio	0.93	0.52	0.03	0.64	0.70	0.05	0.97
Control Delay	43.9	14.6	41.0	48.7	12.1	17.3	32.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	43.9	14.6	41.0	48.7	12.1	17.3	32.1
Queue Length 50th (ft)	431	220	1	106	0	6	630
Queue Length 95th (ft)	#581	275	9	143	91	26	#1105
Internal Link Dist (ft)		626		336		135	
Turn Bay Length (ft)	450		95				
Base Capacity (vph)	1373	2077	75	746	561	537	1229
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	0.93	0.52	0.03	0.59	0.69	0.05	0.97

Intersection Summary

# 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)	1172	987	4	2	406	354	12	0	11	0	0	1091
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		0.28	1.00	1.00		0.91				1.00
Satd. Flow (perm)	3433	3537		514	5085	1583		1594				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)	1274	1073	4	2	441	385	13	0	12	0	0	1186
RTOR Reduction (vph)	0	0	0	0	0	333	0	8	0	0	0	4
Lane Group Flow (vph)	1274	1077	0	2	441	52	0	17	0	0	0	1182
Turn Type	Prot			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	62.5		14.5	14.5	14.5		35.0				83.0
Effective Green, g (s)	43.0	62.5		14.5	14.5	14.5		35.0				83.0
Actuated g/C Ratio	0.40	0.58		0.13	0.13	0.13		0.33				0.77
Clearance Time (s)	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				
Lane Grp Cap (vph)	1373	2056		69	686	214		519				1222
v/s Ratio Prot	0.37	0.30			c0.09							c0.75
v/s Ratio Perm				0.00		0.03		0.01				
v/c Ratio	0.93	0.52		0.03	0.64	0.24		0.03				0.97
Uniform Delay, d1	30.8	13.5		40.4	44.0	41.6		24.7				11.0
Progression Factor	1.00	1.00		1.00	1.00	1.00		1.00				1.00
Incremental Delay, d2	11.0	1.0		0.2	2.1	0.6		0.0				18.2
Delay (s)	41.8	14.5		40.6	46.1	42.2		24.7				29.3
Level of Service	D	B		D	D	D		C				C
Approach Delay (s)		29.3			44.3			24.7			29.3	
Approach LOS		C			D			C			C	

### Intersection Summary

HCM Average Control Delay	32.1	HCM Level of Service	C
HCM Volume to Capacity ratio	0.92		
Actuated Cycle Length (s)	107.5	Sum of lost time (s)	10.0
Intersection Capacity Utilization	91.2%	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)	6	69	0	442	307	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)	14	81	0	480	334	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	0.90					
vC, conflicting volume	814	167	334			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	735	167	334			
tC, single (s)	6.9	7.0	4.2			
tC, 2 stage (s)						
tF (s)	3.6	3.4	2.2			
p0 queue free %	95	90	100			
cM capacity (veh/h)	312	839	1201			

Direction, Lane #	EB 1	NB 1	SB 1	SB 2
Volume Total	95	480	222	111
Volume Left	14	0	0	0
Volume Right	81	0	0	0
cSH	670	1201	1700	1700
Volume to Capacity	0.14	0.00	0.13	0.07
Queue Length 95th (ft)	12	0	0	0
Control Delay (s)	11.3	0.0	0.0	0.0
Lane LOS	B			
Approach Delay (s)	11.3	0.0	0.0	
Approach LOS	B			

Intersection Summary			
Average Delay		1.2	
Intersection Capacity Utilization	34.5%		ICU Level of Service A
Analysis Period (min)		15	