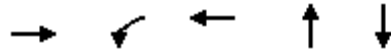


# Queues

## 7: N. Delaware Ave & Shackamaxon Ave

05/18/2007



Lane Group	EBT	WBL	WBT	NBT	SBT
Lane Group Flow (vph)	2250	12	541	39	87
v/c Ratio	0.65	0.16	0.16	0.13	0.23
Control Delay	6.8	10.0	4.7	26.9	16.9
Queue Delay	0.0	0.0	0.0	0.0	0.0
Total Delay	6.8	10.0	4.7	26.9	16.9
Queue Length 50th (ft)	135	2	32	15	18
Queue Length 95th (ft)	136	2	42	30	34
Internal Link Dist (ft)	690		321	214	1237
Turn Bay Length (ft)		80			
Base Capacity (vph)	3455	77	3458	289	386
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	0.65	0.16	0.16	0.13	0.23

### Intersection Summary

\* 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	2040	6	3	476	0	22	0	3	23	0	32
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			4.0	
Lane Util. Factor		0.91		1.00	0.91			1.00			1.00	
Frt		1.00		1.00	1.00			0.98			0.92	
Flt Protected		1.00		0.95	1.00			0.96			0.98	
Satd. Flow (prot)		4937		1662	4940			1700			1854	
Flt Permitted		1.00		0.06	1.00			0.76			0.87	
Satd. Flow (perm)		4937		111	4940			1349			1647	
Peak-hour factor, PHF	0.91	0.91	0.75	0.25	0.88	0.88	0.67	0.67	0.50	0.61	0.65	0.65
Adj. Flow (vph)	0	2242	8	12	541	0	33	0	6	38	0	49
RTOR Reduction (vph)	0	0	0	0	0	0	0	5	0	0	39	0
Lane Group Flow (vph)	0	2250	0	12	541	0	0	34	0	0	48	0
Heavy Vehicles (%)	5%	5%	5%	5%	5%	5%	5%	5%	5%	5%	5%	5%
Parking (#/hr)			10			10				10		10
Turn Type				Perm			Perm			Perm		
Protected Phases					8			2			2	
Permitted Phases		4		8			2			2		
Actuated Green, G (s)		62.0		62.0	62.0			17.0			17.0	
Effective Green, g (s)		63.0		63.0	63.0			19.0			19.0	
Actuated g/C Ratio		0.70		0.70	0.70			0.21			0.21	
Clearance Time (s)		5.0		5.0	5.0			6.0			6.0	
Lane Grp Cap (vph)		3456		78	3458			285			348	
v/s Ratio Prot					0.11							
v/s Ratio Perm		c0.46		0.11				0.03			c0.03	
v/c Ratio		0.65		0.15	0.16			0.12			0.14	
Uniform Delay, d1		7.4		4.5	4.5			28.7			28.9	
Progression Factor		0.79		1.00	1.00			1.00			1.00	
Incremental Delay, d2		0.8		4.2	0.1			0.9			0.8	
Delay (s)		6.7		8.7	4.6			29.6			29.7	
Level of Service		A		A	A			C			C	
Approach Delay (s)		6.7			4.7			29.6			29.7	
Approach LOS		A			A			C			C	

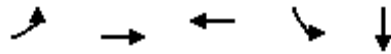
### Intersection Summary

HCM Average Control Delay	7.3	HCM Level of Service	A
HCM Volume to Capacity ratio	0.53		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	49.5%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

# Queues

## 8: N. Delaware Ave & Frankford Ave

05/18/2007



Lane Group	EBL	EBT	WBT	SBL	SBT
Lane Group Flow (vph)	392	1829	559	131	203
v/c Ratio	0.70	0.58	0.22	0.47	0.41
Control Delay	18.9	15.6	8.6	35.6	8.2
Queue Delay	0.0	0.0	0.0	0.0	0.0
Total Delay	18.9	15.6	8.6	35.6	8.2
Queue Length 50th (ft)	139	298	38	67	7
Queue Length 95th (ft)	m200	352	53	100	34
Internal Link Dist (ft)		1382	690		19
Turn Bay Length (ft)	320				
Base Capacity (vph)	563	3129	2552	279	498
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	0.70	0.58	0.22	0.47	0.41

### Intersection Summary

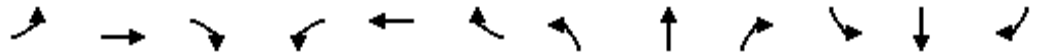
m Volume for 95th percentile queue is metered by upstream signal.

\* 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)	341	1664	0	0	459	55	0	0	0	108	0	156
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	
Lane Util. Factor	1.00	0.91			0.91					0.95	0.95	
Frt	1.00	1.00			0.98					1.00	0.86	
Flt Protected	0.95	1.00			1.00					0.95	1.00	
Satd. Flow (prot)	1719	4693			4846					1434	1475	
Flt Permitted	0.38	1.00			1.00					0.76	0.98	
Satd. Flow (perm)	692	4693			4846					1143	1456	
Peak-hour factor, PHF	0.87	0.91	0.91	0.92	0.94	0.78	0.92	0.92	0.92	0.74	0.74	0.83
Adj. Flow (vph)	392	1829	0	0	488	71	0	0	0	146	0	188
RTOR Reduction (vph)	0	0	0	0	21	0	0	0	0	0	142	0
Lane Group Flow (vph)	392	1829	0	0	538	0	0	0	0	131	61	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		
Protected Phases	7	4			8			2				6
Permitted Phases	4			8			2			6		
Actuated Green, G (s)	58.0	58.0			45.0					20.0	20.0	
Effective Green, g (s)	57.0	60.0			47.0					22.0	22.0	
Actuated g/C Ratio	0.63	0.67			0.52					0.24	0.24	
Clearance Time (s)	3.0	6.0			6.0					6.0	6.0	
Lane Grp Cap (vph)	541	3129			2531					279	356	
v/s Ratio Prot	c0.07	0.39			0.11							
v/s Ratio Perm	c0.39									c0.11	0.04	
v/c Ratio	0.72	0.58			0.21					0.47	0.17	
Uniform Delay, d1	8.5	8.2			11.6					29.0	26.8	
Progression Factor	2.02	1.82			0.79					1.00	1.00	
Incremental Delay, d2	4.7	0.4			0.2					5.6	1.0	
Delay (s)	21.9	15.4			9.3					34.6	27.9	
Level of Service	C	B			A					C	C	
Approach Delay (s)		16.5			9.3			0.0			30.5	
Approach LOS		B			A			A			C	

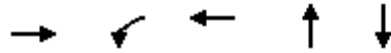
### Intersection Summary

HCM Average Control Delay	16.7	HCM Level of Service	B
HCM Volume to Capacity ratio	0.62		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	53.3%	ICU Level of Service	A
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)	1969	15	628	112	203
v/c Ratio	0.92	0.19	0.29	0.30	0.52
Control Delay	18.1	10.5	5.4	24.0	29.8
Queue Delay	0.0	0.0	0.0	0.0	0.0
Total Delay	18.1	10.5	5.4	24.0	29.8
Queue Length 50th (ft)	634	2	50	42	86
Queue Length 95th (ft)	#731	m7	64	80	140
Internal Link Dist (ft)	288		577	81	623
Turn Bay Length (ft)		105			
Base Capacity (vph)	2139	80	2139	379	388
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	0.92	0.19	0.29	0.30	0.52

Intersection Summary

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

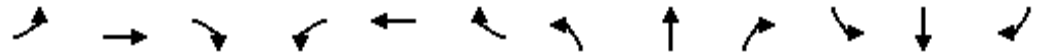
Queue shown is maximum after two cycles.

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

\* 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	1827	4	13	546	0	62	0	32	115	8	45
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		0.07	1.00			0.74			0.74	
Satd. Flow (perm)		3437		129	3438			1276			1293	
Peak-hour factor, PHF	0.93	0.93	0.93	0.87	0.87	0.87	0.84	0.84	0.84	0.83	0.83	0.83
Adj. Flow (vph)	0	1965	4	15	628	0	74	0	38	139	10	54
RTOR Reduction (vph)	0	0	0	0	0	0	0	11	0	0	14	0
Lane Group Flow (vph)	0	1969	0	15	628	0	0	101	0	0	189	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)		55.0		55.0	55.0			24.0			24.0	
Effective Green, g (s)		56.0		56.0	56.0			26.0			26.0	
Actuated g/C Ratio		0.62		0.62	0.62			0.29			0.29	
Clearance Time (s)		5.0		5.0	5.0			6.0			6.0	
Lane Grp Cap (vph)		2139		80	2139			369			374	
v/s Ratio Prot		c0.57			0.18							
v/s Ratio Perm				0.12				0.08			c0.15	
v/c Ratio		0.92		0.19	0.29			0.27			0.50	
Uniform Delay, d1		15.0		7.3	7.9			24.7			26.6	
Progression Factor		0.72		0.61	0.64			1.00			1.00	
Incremental Delay, d2		6.3		5.0	0.3			1.8			4.8	
Delay (s)		17.1		9.4	5.4			26.6			31.4	
Level of Service		B		A	A			C			C	
Approach Delay (s)		17.1			5.5			26.6			31.4	
Approach LOS		B			A			C			C	

Intersection Summary

HCM Average Control Delay	15.9	HCM Level of Service	B
HCM Volume to Capacity ratio	0.79		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	68.6%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

# Queues

## 10: Richmond St & N. Delaware Ave

05/18/2007



Lane Group	WBL	NET	SWT
Lane Group Flow (vph)	270	1801	304
v/c Ratio	0.64	0.65	0.11
Control Delay	44.8	12.5	2.3
Queue Delay	0.0	0.0	0.0
Total Delay	44.8	12.5	2.3
Queue Length 50th (ft)	75	454	15
Queue Length 95th (ft)	94	m503	22
Internal Link Dist (ft)	285	551	107
Turn Bay Length (ft)	180		
Base Capacity (vph)	422	2792	2792
Starvation Cap Reductn	0	0	0
Spillback Cap Reductn	0	0	0
Storage Cap Reductn	0	0	0
Reduced v/c Ratio	0.64	0.65	0.11

### Intersection Summary

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

HCM Signalized Intersection Capacity Analysis  
 10: Richmond St & N. Delaware Ave

05/18/2007



Movement	WBL	WBR	NET	NER	SWL	SWT
Lane Configurations	↔↔		↑↑			↑↑
Volume (vph)	196	7	1765	0	0	258
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0		4.0			4.0
Lane Util. Factor	0.97		0.95			0.95
Frt	1.00		1.00			1.00
Flt Protected	0.95		1.00			1.00
Satd. Flow (prot)	3430		3539			3539
Flt Permitted	0.95		1.00			1.00
Satd. Flow (perm)	3430		3539			3539
Peak-hour factor, PHF	0.75	0.75	0.98	0.98	0.85	0.85
Adj. Flow (vph)	261	9	1801	0	0	304
RTOR Reduction (vph)	3	0	0	0	0	0
Lane Group Flow (vph)	267	0	1801	0	0	304
Turn Type						
Protected Phases	8		2			6
Permitted Phases						
Actuated Green, G (s)	9.0		70.0			70.0
Effective Green, g (s)	11.0		71.0			71.0
Actuated g/C Ratio	0.12		0.79			0.79
Clearance Time (s)	6.0		5.0			5.0
Lane Grp Cap (vph)	419		2792			2792
v/s Ratio Prot	c0.08		c0.51			0.09
v/s Ratio Perm						
v/c Ratio	0.64		0.65			0.11
Uniform Delay, d1	37.6		4.1			2.2
Progression Factor	1.00		2.83			1.00
Incremental Delay, d2	7.3		0.5			0.1
Delay (s)	44.9		12.1			2.3
Level of Service	D		B			A
Approach Delay (s)	44.9		12.1			2.3
Approach LOS	D		B			A

Intersection Summary

HCM Average Control Delay	14.6	HCM Level of Service	B
HCM Volume to Capacity ratio	0.64		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	61.3%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group

# Queues

## 11: Penn St & N. Delaware Ave

05/18/2007



Lane Group	WBL	NBT	SBL	SBT
Lane Group Flow (vph)	243	2664	54	726
v/c Ratio	0.59	0.82	0.68	0.22
Control Delay	37.7	12.1	55.9	4.2
Queue Delay	0.0	1.5	0.0	0.0
Total Delay	37.7	13.5	55.9	4.2
Queue Length 50th (ft)	121	329	9	37
Queue Length 95th (ft)	84	401	#93	47
Internal Link Dist (ft)	171	483		1382
Turn Bay Length (ft)			95	
Base Capacity (vph)	411	3264	80	3285
Starvation Cap Reductn	0	388	0	0
Spillback Cap Reductn	0	0	0	0
Storage Cap Reductn	0	0	0	0
Reduced v/c Ratio	0.59	0.93	0.68	0.22

### 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	2304	147	49	661
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		4651		1719	4693
Flt Permitted	0.96		1.00		0.06	1.00
Satd. Flow (perm)	1916		4651		115	4693
Peak-hour factor, PHF	0.44	0.44	0.92	0.92	0.91	0.91
Adj. Flow (vph)	191	52	2504	160	54	726
RTOR Reduction (vph)	6	0	8	0	0	0
Lane Group Flow (vph)	237	0	2656	0	54	726
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		c0.57			0.15
v/s Ratio Perm					0.47	
v/c Ratio	0.59		0.82		0.67	0.22
Uniform Delay, d1	32.0		9.4		7.6	4.8
Progression Factor	1.00		1.00		1.21	0.84
Incremental Delay, d2	6.1		2.4		35.4	0.2
Delay (s)	38.1		11.8		44.6	4.2
Level of Service	D		B		D	A
Approach Delay (s)	38.1		11.8			7.0
Approach LOS	D		B			A

### Intersection Summary

HCM Average Control Delay	12.5	HCM Level of Service	B
HCM Volume to Capacity ratio	0.76		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	60.5%	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)	961	423	384	1797	919
v/c Ratio	0.79	0.41	0.96	0.65	0.65
Control Delay	29.8	7.8	71.8	14.3	24.3
Queue Delay	0.0	0.0	0.0	0.0	0.0
Total Delay	29.8	7.8	71.8	14.3	24.3
Queue Length 50th (ft)	221	73	199	226	130
Queue Length 95th (ft)	328	157	#412	272	153
Internal Link Dist (ft)				1261	483
Turn Bay Length (ft)	160		215		
Base Capacity (vph)	1254	1036	399	2781	1729
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	0.77	0.41	0.96	0.65	0.53

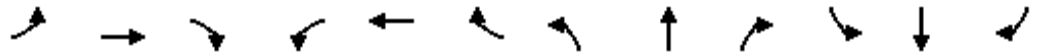
Intersection Summary

# 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)	903	0	398	0	0	0	357	1671	0	0	528	235
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			4850	
Flt Permitted	0.95		1.00				0.95	1.00			1.00	
Satd. Flow (perm)	3433		1583				1770	5085			4850	
Peak-hour factor, PHF	0.94	0.94	0.94	0.92	0.92	0.92	0.93	0.93	0.93	0.83	0.83	0.83
Adj. Flow (vph)	961	0	423	0	0	0	384	1797	0	0	636	283
RTOR Reduction (vph)	0	0	32	0	0	0	0	0	0	0	98	0
Lane Group Flow (vph)	961	0	391	0	0	0	384	1797	0	0	821	0
Turn Type	custom		custom				Prot			Prot		
Protected Phases			4 5				5	2		1	6	
Permitted Phases	4											
Actuated Green, G (s)	26.6		48.9				16.3	42.3			20.0	
Effective Green, g (s)	28.6		50.9				18.3	44.3			22.0	
Actuated g/C Ratio	0.35		0.63				0.23	0.55			0.27	
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)	1214		996				400	2784			1319	
v/s Ratio Prot			0.25				c0.22	c0.35			0.17	
v/s Ratio Perm	c0.28											
v/c Ratio	0.79		0.39				0.96	0.65			0.62	
Uniform Delay, d1	23.5		7.4				30.9	12.8			25.8	
Progression Factor	1.00		1.00				1.00	1.00			1.00	
Incremental Delay, d2	3.6		0.3				34.6	1.2			0.9	
Delay (s)	27.1		7.6				65.5	14.0			26.7	
Level of Service	C		A				E	B			C	
Approach Delay (s)		21.1			0.0			23.1			26.7	
Approach LOS		C			A			C			C	

### Intersection Summary

HCM Average Control Delay	23.2	HCM Level of Service	C
HCM Volume to Capacity ratio	0.80		
Actuated Cycle Length (s)	80.9	Sum of lost time (s)	12.0
Intersection Capacity Utilization	71.4%	ICU Level of Service	C
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	91	2649	990
v/c Ratio	0.15	0.31	0.67	0.25
Control Delay	36.3	11.3	5.7	2.9
Queue Delay	0.0	0.0	0.0	0.0
Total Delay	36.3	11.3	5.7	2.9
Queue Length 50th (ft)	18	0	197	43
Queue Length 95th (ft)	38	27	234	54
Internal Link Dist (ft)	147		1206	1261
Turn Bay Length (ft)				
Base Capacity (vph)	236	290	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	0.31	0.67	0.25

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	68	0	2437	921	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	91	0	2649	990	0
RTOR Reduction (vph)	0	79	0	0	0	0
Lane Group Flow (vph)	35	12	0	2649	990	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			c0.52	0.19	
v/s Ratio Perm	0.01					
v/c Ratio	0.15	0.06		0.67	0.25	
Uniform Delay, d1	34.5	34.1		4.6	2.8	
Progression Factor	1.00	1.00		1.00	1.00	
Incremental Delay, d2	1.3	0.5		0.9	0.2	
Delay (s)	35.8	34.6		5.6	2.9	
Level of Service	D	C		A	A	
Approach Delay (s)	34.9			5.6	2.9	
Approach LOS	C			A	A	

### Intersection Summary

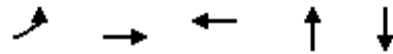
HCM Average Control Delay	5.8	HCM Level of Service	A
HCM Volume to Capacity ratio	0.59		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	57.1%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group

Queues

14: Race St & Columbus Blvd

05/18/2007



Lane Group	EBL	EBT	WBT	NBT	SBT
Lane Group Flow (vph)	279	188	2	2136	1065
v/c Ratio	0.77	0.43	0.02	0.62	0.31
Control Delay	48.9	8.8	42.5	9.5	6.5
Queue Delay	0.0	0.0	0.0	0.0	0.0
Total Delay	48.9	8.8	42.5	9.5	6.5
Queue Length 50th (ft)	138	1	1	187	68
Queue Length 95th (ft)	#305	59	8	358	138
Internal Link Dist (ft)		497	85	1197	1206
Turn Bay Length (ft)					
Base Capacity (vph)	369	446	187	3436	3436
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	0.76	0.42	0.01	0.62	0.31

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)	257	2	171	2	0	0	0	1965	0	0	980	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)	279	2	186	2	0	0	0	2136	0	0	1065	0
RTOR Reduction (vph)	0	154	0	0	0	0	0	0	0	0	0	0
Lane Group Flow (vph)	279	34	0	0	2	0	0	2136	0	0	1065	0
Turn Type	Split		Perm									
Protected Phases	4	4			8			2			6	
Permitted Phases			8									
Actuated Green, G (s)	15.7	15.7			1.2			56.2			56.2	
Effective Green, g (s)	17.7	15.7			1.2			58.2			58.2	
Actuated g/C Ratio	0.19	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)	344	273			25			3249			3249	
v/s Ratio Prot	c0.16	0.02						c0.42			0.21	
v/s Ratio Perm					c0.00							
v/c Ratio	0.81	0.12			0.08			0.66			0.33	
Uniform Delay, d1	35.1	31.9			44.4			10.2			7.5	
Progression Factor	1.00	1.00			1.00			1.00			1.00	
Incremental Delay, d2	13.5	0.2			1.4			1.1			0.3	
Delay (s)	48.6	32.1			45.8			11.3			7.8	
Level of Service	D	C			D			B			A	
Approach Delay (s)		42.0			45.8			11.3			7.8	
Approach LOS		D			D			B			A	

### Intersection Summary

HCM Average Control Delay	14.2	HCM Level of Service	B
HCM Volume to Capacity ratio	0.68		
Actuated Cycle Length (s)	91.1	Sum of lost time (s)	14.0
Intersection Capacity Utilization	59.6%	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)	337	1819	8	1212
v/c Ratio	0.64	0.69	0.07	0.39
Control Delay	26.4	17.7	40.9	8.5
Queue Delay	0.0	0.0	0.0	0.0
Total Delay	26.4	17.7	40.9	8.5
Queue Length 50th (ft)	119	266	4	110
Queue Length 95th (ft)	156	319	18	136
Internal Link Dist (ft)	281	402		1197
Turn Bay Length (ft)			200	
Base Capacity (vph)	527	2653	118	3113
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	0.69	0.07	0.39

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)	48	205	1631	6	7	1127
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	4916
Flt Permitted	0.99		1.00		0.95	1.00
Satd. Flow (perm)	1643		5082		1770	4916
Peak-hour factor, PHF	0.75	0.75	0.90	0.90	0.93	0.93
Adj. Flow (vph)	64	273	1812	7	8	1212
RTOR Reduction (vph)	70	0	0	0	0	0
Lane Group Flow (vph)	267	0	1819	0	8	1212
Parking (#/hr)						0
Turn Type					Prot	
Protected Phases	8		2		1	6
Permitted Phases						
Actuated Green, G (s)	23.0		45.0		4.0	55.0
Effective Green, g (s)	25.0		47.0		6.0	57.0
Actuated g/C Ratio	0.28		0.52		0.07	0.63
Clearance Time (s)	6.0		6.0		6.0	6.0
Lane Grp Cap (vph)	456		2654		118	3113
v/s Ratio Prot	c0.16		c0.36		0.00	c0.25
v/s Ratio Perm						
v/c Ratio	0.59		0.69		0.07	0.39
Uniform Delay, d1	28.0		16.0		39.4	8.0
Progression Factor	1.00		1.00		1.00	1.00
Incremental Delay, d2	5.4		1.5		1.1	0.4
Delay (s)	33.4		17.5		40.5	8.4
Level of Service	C		B		D	A
Approach Delay (s)	33.4		17.5			8.6
Approach LOS	C		B			A

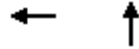
### Intersection Summary

HCM Average Control Delay	15.9	HCM Level of Service	B
HCM Volume to Capacity ratio	0.64		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	53.6%	ICU Level of Service	A
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)	2290	428
v/c Ratio	0.51	0.39
Control Delay	10.8	25.3
Queue Delay	0.0	0.0
Total Delay	10.8	25.3
Queue Length 50th (ft)	169	98
Queue Length 95th (ft)	192	134
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	0.51	0.39

Intersection Summary

# HCM Signalized Intersection Capacity Analysis

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

05/18/2007

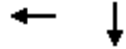


Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations								↑↑				
Volume (vph)	0	0	0	0	2093	36	79	293	0	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)					4.0			4.0				
Lane Util. Factor					0.81			0.95				
Frt					1.00			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	2251	39	91	337	0	0	0	0
RTOR Reduction (vph)	0	0	0	0	3	0	0	4	0	0	0	0
Lane Group Flow (vph)	0	0	0	0	2287	0	0	424	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					c0.30							
v/s Ratio Perm								0.12				
v/c Ratio					0.51			0.39				
Uniform Delay, d1					10.3			24.3				
Progression Factor					1.00			1.00				
Incremental Delay, d2					0.4			1.0				
Delay (s)					10.8			25.3				
Level of Service					B			C				
Approach Delay (s)		0.0			10.8			25.3			0.0	
Approach LOS		A			B			C			A	

### Intersection Summary

HCM Average Control Delay	13.0	HCM Level of Service	B
HCM Volume to Capacity ratio	0.47		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	41.8%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

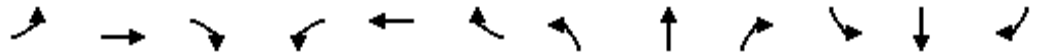


Lane Group	WBT	SBT
Lane Group Flow (vph)	2427	474
v/c Ratio	0.54	0.45
Control Delay	4.7	26.2
Queue Delay	0.0	0.0
Total Delay	4.7	26.2
Queue Length 50th (ft)	55	111
Queue Length 95th (ft)	60	132
Internal Link Dist (ft)	367	1136
Turn Bay Length (ft)		
Base Capacity (vph)	4525	1048
Starvation Cap Reductn	11	0
Spillback Cap Reductn	0	0
Storage Cap Reductn	0	0
Reduced v/c Ratio	0.54	0.45
<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	135	2122	0	0	0	0	0	242	128
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	145	2282	0	0	0	0	0	310	164
RTOR Reduction (vph)	0	0	0	0	13	0	0	0	0	0	4	0
Lane Group Flow (vph)	0	0	0	0	2414	0	0	0	0	0	470	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						0.32						
v/c Ratio						0.53						0.45
Uniform Delay, d1						10.6						24.8
Progression Factor						0.41						1.00
Incremental Delay, d2						0.4						1.4
Delay (s)						4.7						26.2
Level of Service						A						C
Approach Delay (s)		0.0				4.7		0.0				26.2
Approach LOS		A				A		A				C

## Intersection Summary

HCM Average Control Delay	8.2	HCM Level of Service	A
HCM Volume to Capacity ratio	0.51		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	43.7%	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)	2596	81	904
v/c Ratio	0.59	0.15	0.82
Control Delay	14.1	21.6	36.2
Queue Delay	0.8	0.0	0.0
Total Delay	15.0	21.6	36.2
Queue Length 50th (ft)	317	30	248
Queue Length 95th (ft)	359	65	324
Internal Link Dist (ft)	369		252
Turn Bay Length (ft)			
Base Capacity (vph)	4435	555	1101
Starvation Cap Reductn	1385	0	0
Spillback Cap Reductn	0	0	0
Storage Cap Reductn	0	0	0
Reduced v/c Ratio	0.85	0.15	0.82

Intersection Summary

# 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	2067	347	73	814	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				
Frt					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	2223	373	81	904	0	0	0	0
RTOR Reduction (vph)	0	0	0	0	8	0	4	0	0	0	0	0
Lane Group Flow (vph)	0	0	0	0	2588	0	77	904	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					c0.35			c0.26				
v/s Ratio Perm							0.04					
v/c Ratio					0.58		0.14	0.82				
Uniform Delay, d1					11.1		22.3	28.7				
Progression Factor					1.23		1.00	1.00				
Incremental Delay, d2					0.5		0.5	6.9				
Delay (s)					14.1		22.9	35.6				
Level of Service					B		C	D				
Approach Delay (s)		0.0			14.1			34.5			0.0	
Approach LOS		A			B			C			A	

### Intersection Summary

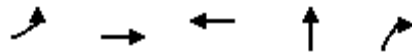
HCM Average Control Delay	19.8	HCM Level of Service	B
HCM Volume to Capacity ratio	0.67		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	57.8%	ICU Level of Service	B
Analysis Period (min)	15		

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)	153	1038	866	1068	312
v/c Ratio	0.63	0.55	0.57	0.92	0.59
Control Delay	22.9	10.6	5.1	33.7	18.2
Queue Delay	0.0	0.0	0.0	0.0	0.0
Total Delay	22.9	10.6	5.1	33.7	18.2
Queue Length 50th (ft)	26	118	53	191	67
Queue Length 95th (ft)	#66	166	73	#308	140
Internal Link Dist (ft)		356	392	1122	
Turn Bay Length (ft)	155				30
Base Capacity (vph)	243	1887	1525	1166	532
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	0.63	0.55	0.57	0.92	0.59

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)	150	1017	0	0	749	91	249	766	296	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			3482			3496	1583			
Flt Permitted	0.20	1.00			1.00			0.99	1.00			
Satd. Flow (perm)	367	3539			3482			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)	153	1038	0	0	772	94	262	806	312	0	0	0
RTOR Reduction (vph)	0	0	0	0	15	0	0	0	57	0	0	0
Lane Group Flow (vph)	153	1038	0	0	851	0	0	1068	255	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)	236	1887			1509			1165	475			
v/s Ratio Prot	0.02	c0.29			0.24			c0.31				
v/s Ratio Perm	c0.31								0.16			
v/c Ratio	0.65	0.55			0.56			0.92	0.54			
Uniform Delay, d1	11.3	9.2			12.7			19.2	17.5			
Progression Factor	1.00	1.00			0.29			1.00	1.00			
Incremental Delay, d2	13.0	1.2			1.4			12.7	4.3			
Delay (s)	24.3	10.4			5.1			31.9	21.8			
Level of Service	C	B			A			C	C			
Approach Delay (s)		12.2			5.1			29.6			0.0	
Approach LOS		B			A			C			A	

### Intersection Summary

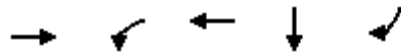
HCM Average Control Delay	17.4	HCM Level of Service	B
HCM Volume to Capacity ratio	0.73		
Actuated Cycle Length (s)	60.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	70.3%	ICU Level of Service	C
Analysis Period (min)	15		

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)	1556	59	848	280	79
v/c Ratio	0.88	0.31	0.40	0.57	0.19
Control Delay	18.9	10.8	4.1	24.4	9.8
Queue Delay	0.0	0.0	0.0	0.0	0.0
Total Delay	18.9	10.8	4.1	24.4	9.8
Queue Length 50th (ft)	179	6	42	87	6
Queue Length 95th (ft)	#275	m17	55	154	35
Internal Link Dist (ft)	392		378	276	
Turn Bay Length (ft)		170			40
Base Capacity (vph)	1761	191	2123	491	413
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	0.88	0.31	0.40	0.57	0.19

Intersection Summary

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

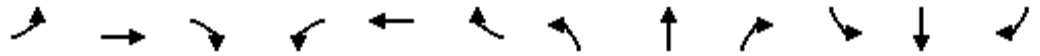
Queue shown is maximum after two cycles.

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	1349	83	54	780	0	0	0	0	55	202	73
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)		3509		1770	3539						1843	1583
Flt Permitted		1.00		0.12	1.00						0.99	1.00
Satd. Flow (perm)		3509		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	1466	90	59	848	0	0	0	0	60	220	79
RTOR Reduction (vph)	0	8	0	0	0	0	0	0	0	0	0	44
Lane Group Flow (vph)	0	1549	0	59	848	0	0	0	0	0	280	35
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		c0.44		0.01	c0.24							
v/s Ratio Perm				0.17							0.15	0.02
v/c Ratio		0.88		0.32	0.40						0.57	0.10
Uniform Delay, d1		13.4		11.4	6.3						19.0	18.0
Progression Factor		0.86		1.40	0.55						1.00	1.00
Incremental Delay, d2		6.1		4.1	0.5						4.7	0.5
Delay (s)		17.7		20.0	4.0						23.8	18.6
Level of Service		B		B	A						C	B
Approach Delay (s)		17.7			5.0			0.0			22.6	
Approach LOS		B			A			A			C	

### Intersection Summary

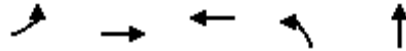
HCM Average Control Delay	14.3	HCM Level of Service	B
HCM Volume to Capacity ratio	0.77		
Actuated Cycle Length (s)	60.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	66.9%	ICU Level of Service	C
Analysis Period (min)	15		

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)	161	1245	882	105	417
v/c Ratio	0.62	0.62	0.54	0.20	0.74
Control Delay	17.9	10.5	8.2	16.9	26.5
Queue Delay	0.0	0.0	0.0	0.0	0.0
Total Delay	17.9	10.5	8.2	16.9	26.5
Queue Length 50th (ft)	28	114	64	28	117
Queue Length 95th (ft)	m28	m115	85	60	#241
Internal Link Dist (ft)		378	448		1140
Turn Bay Length (ft)	126				
Base Capacity (vph)	261	2005	1640	531	563
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	0.62	0.62	0.54	0.20	0.74

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)	148	1145	0	0	727	85	97	241	143	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			0.98		1.00	0.94				
Flt Protected	0.95	1.00			1.00		0.95	1.00				
Satd. Flow (prot)	1770	3539			3484		1770	1759				
Flt Permitted	0.20	1.00			1.00		0.95	1.00				
Satd. Flow (perm)	378	3539			3484		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)	161	1245	0	0	790	92	105	262	155	0	0	0
RTOR Reduction (vph)	0	0	0	0	15	0	0	36	0	0	0	0
Lane Group Flow (vph)	161	1245	0	0	867	0	105	381	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)	248	2005			1626		531	528				
v/s Ratio Prot	0.02	c0.35			0.25		0.06	c0.22				
v/s Ratio Perm	0.32											
v/c Ratio	0.65	0.62			0.53		0.20	0.72				
Uniform Delay, d1	10.8	8.7			11.4		15.6	18.8				
Progression Factor	1.42	1.10			0.62		1.00	1.00				
Incremental Delay, d2	6.0	0.7			1.2		0.8	8.3				
Delay (s)	21.3	10.2			8.2		16.5	27.1				
Level of Service	C	B			A		B	C				
Approach Delay (s)		11.5			8.2		24.9				0.0	
Approach LOS		B			A		C				A	

### Intersection Summary

HCM Average Control Delay	13.0	HCM Level of Service	B
HCM Volume to Capacity ratio	0.66		
Actuated Cycle Length (s)	60.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	66.9%	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)	1568	82	668	756
v/c Ratio	0.95	0.43	0.33	0.72
Control Delay	26.2	13.4	7.5	21.7
Queue Delay	0.0	0.0	0.0	0.0
Total Delay	26.2	13.4	7.5	21.7
Queue Length 50th (ft)	136	12	60	116
Queue Length 95th (ft)	#412	27	87	172
Internal Link Dist (ft)	448		1146	338
Turn Bay Length (ft)		67		
Base Capacity (vph)	1644	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	0.95	0.43	0.33	0.72

Intersection Summary

# 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	1349	94	75	615	0	0	0	0	157	390	148
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)		3505		1770	3539						3388	
Flt Permitted		1.00		0.13	1.00						0.99	
Satd. Flow (perm)		3505		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	1466	102	82	668	0	0	0	0	171	424	161
RTOR Reduction (vph)	0	9	0	0	0	0	0	0	0	0	41	0
Lane Group Flow (vph)	0	1559	0	82	668	0	0	0	0	0	715	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		c0.44		0.01	c0.19						c0.21	
v/s Ratio Perm				0.22								
v/c Ratio		0.95		0.45	0.33						0.70	
Uniform Delay, d1		15.4		13.2	6.9						18.6	
Progression Factor		0.79		1.00	1.00						1.00	
Incremental Delay, d2		11.9		7.7	0.4						4.1	
Delay (s)		24.1		20.9	7.4						22.7	
Level of Service		C		C	A						C	
Approach Delay (s)		24.1			8.9			0.0			22.7	
Approach LOS		C			A			A			C	

### Intersection Summary

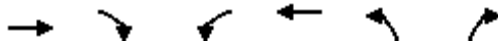
HCM Average Control Delay	20.0	HCM Level of Service	C
HCM Volume to Capacity ratio	0.84		
Actuated Cycle Length (s)	60.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	74.5%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

# HCM Unsignalized Intersection Capacity Analysis

## 23: Richmond St & Schirra Dr

05/18/2007



Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↩		↩	↩	↩	↩
Volume (veh/h)	958	4	2	394	11	10
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.96	0.50	0.50	0.96	0.69	0.63
Hourly flow rate (vph)	998	8	4	410	16	16
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage (veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume			1006	1420	1002	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			1006	1420	1002	
tC, single (s)			4.1	6.4	6.2	
tC, 2 stage (s)						
tF (s)			2.2	3.5	3.3	
p0 queue free %			99	89	95	
cM capacity (veh/h)			689	149	294	

Direction, Lane #	EB 1	WB 1	WB 2	NB 1
Volume Total	1006	4	410	32
Volume Left	0	4	0	16
Volume Right	8	0	0	16
cSH	1700	689	1700	198
Volume to Capacity	0.59	0.01	0.24	0.16
Queue Length 95th (ft)	0	0	0	14
Control Delay (s)	0.0	10.3	0.0	26.6
Lane LOS		B		D
Approach Delay (s)	0.0	0.1		26.6
Approach LOS				D

Intersection Summary			
Average Delay		0.6	
Intersection Capacity Utilization		60.7%	ICU Level of Service B
Analysis Period (min)		15	

# 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	67	0	396	264	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	79	0	430	287	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	717	143	287			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	627	143	287			
tC, single (s)	6.9	7.0	4.2			
tC, 2 stage (s)						
tF (s)	3.6	3.4	2.2			
p0 queue free %	96	91	100			
cM capacity (veh/h)	366	868	1251			

Direction, Lane #	EB 1	NB 1	SB 1	SB 2
Volume Total	93	430	191	96
Volume Left	14	0	0	0
Volume Right	79	0	0	0
cSH	718	1251	1700	1700
Volume to Capacity	0.13	0.00	0.11	0.06
Queue Length 95th (ft)	11	0	0	0
Control Delay (s)	10.8	0.0	0.0	0.0
Lane LOS	B			
Approach Delay (s)	10.8	0.0	0.0	
Approach LOS	B			

Intersection Summary			
Average Delay		1.2	
Intersection Capacity Utilization	32.0%		ICU Level of Service
Analysis Period (min)		15	A