

HCM Unsignalized Intersection Capacity Analysis
 1: Pulaski St & Greenwich Ave

2009 Weekday AM Peak Hour
 5/5/2010



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↔	↔			↔
Sign Control		Stop	Stop		Stop	
Volume (vph)	314	237	347	0	0	500
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	341	258	377	0	0	543
Direction, Lane #	EB 1	WB 1	SB 1			
Volume Total (vph)	599	377	543			
Volume Left (vph)	341	0	0			
Volume Right (vph)	0	0	543			
Hadj (s)	0.15	0.03	-0.57			
Departure Headway (s)	6.7	6.9	6.1			
Degree Utilization, x	1.12	0.72	0.92			
Capacity (veh/h)	541	510	580			
Control Delay (s)	101.5	25.4	44.1			
Approach Delay (s)	101.5	25.4	44.1			
Approach LOS	F	D	E			
Intersection Summary						
Delay			62.1			
HCM Level of Service			F			
Intersection Capacity Utilization			55.9%	ICU Level of Service	B	
Analysis Period (min)			15			

HCM Unsignalized Intersection Capacity Analysis
 2: Pulaski St & Pulaski Street/Waterside PI

2009 Weekday AM Peak Hour
 5/5/2010



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Sign Control		Stop			Stop			Stop			Stop	
Volume (vph)	0	237	0	0	347	81	0	0	0	220	0	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	258	0	0	377	88	0	0	0	239	0	0

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total (vph)	258	465	0	239
Volume Left (vph)	0	0	0	239
Volume Right (vph)	0	88	0	0
Hadj (s)	0.03	-0.08	0.00	0.23
Departure Headway (s)	5.3	5.0	6.3	5.9
Degree Utilization, x	0.38	0.64	0.00	0.39
Capacity (veh/h)	635	703	468	557
Control Delay (s)	11.6	16.5	9.3	12.8
Approach Delay (s)	11.6	16.5	0.0	12.8
Approach LOS	B	C	A	B

Intersection Summary			
Delay		14.2	
HCM Level of Service		B	
Intersection Capacity Utilization	42.0%		ICU Level of Service A
Analysis Period (min)		15	

HCM Unsignalized Intersection Capacity Analysis
 3: Greenwich Ave & Pulaski St

2009 Weekday AM Peak Hour
 5/5/2010

	↑	↖	↙	↓	↘	↗
Movement	NBT	NBR	SBL	SBT	NWL	NWR
Lane Configurations	↑			↖		↗
Sign Control	Stop			Stop	Stop	
Volume (vph)	314	0	220	0	0	81
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	341	0	239	0	0	88
Direction, Lane #	NB 1	SB 1	NW 1			
Volume Total (vph)	341	239	88			
Volume Left (vph)	0	239	0			
Volume Right (vph)	0	0	88			
Hadj (s)	0.03	0.23	-0.57			
Departure Headway (s)	4.4	4.7	4.6			
Degree Utilization, x	0.42	0.31	0.11			
Capacity (veh/h)	793	735	688			
Control Delay (s)	10.6	9.9	8.2			
Approach Delay (s)	10.6	9.9	8.2			
Approach LOS	B	A	A			
Intersection Summary						
Delay			10.0			
HCM Level of Service			B			
Intersection Capacity Utilization			35.4%	ICU Level of Service	A	
Analysis Period (min)			15			

Queues
4: First Stamford Place & Greenwich Ave

2009 Weekday AM Peak Hour
5/5/2010

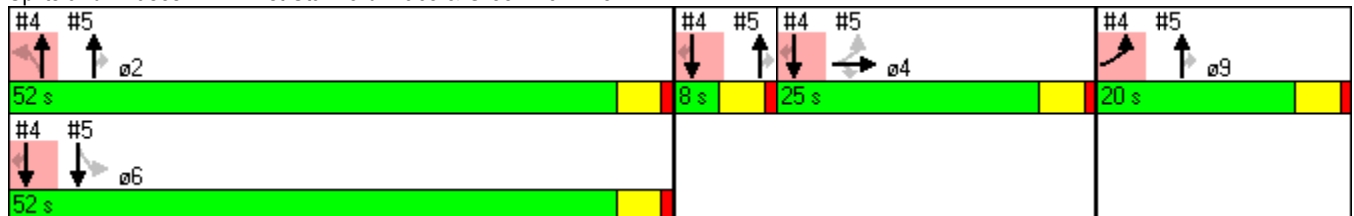


Lane Group	EBL	NBL	NBT	SBT	SBR	ø3	ø4	ø6
Lane Configurations								
Volume (vph)	200	50	320	670	300			
Lane Group Flow (vph)	271	0	402	761	293			
Turn Type		Perm			Perm			
Protected Phases	9		2	6 3 4		3	4	6
Permitted Phases		2			6 3 4			
Detector Phase	9	2	2	6 3 4	6 3 4			
Switch Phase								
Minimum Initial (s)	8.0	12.0	12.0			2.0	12.0	12.0
Minimum Split (s)	20.0	24.5	24.5			6.5	24.5	24.5
Total Split (s)	20.0	52.0	52.0	85.0	85.0	8.0	25.0	52.0
Total Split (%)	19.0%	49.5%	49.5%	81.0%	81.0%	8%	24%	50%
Yellow Time (s)	3.5	3.5	3.5			3.5	3.5	3.5
All-Red Time (s)	1.0	1.0	1.0			1.0	1.0	1.0
Lost Time Adjust (s)	-0.5	-0.5	-0.5	-0.5	-0.5			
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0			
Lead/Lag						Lead	Lag	
Lead-Lag Optimize?						Yes	Yes	
Recall Mode	Min	C-Min	C-Min			None	None	C-Min
v/c Ratio	0.59		0.55	0.54	0.23			
Control Delay	44.1		23.6	5.1	0.4			
Queue Delay	0.0		0.0	0.5	0.7			
Total Delay	44.1		23.6	5.6	1.1			
Queue Length 50th (ft)	80		188	330	0			
Queue Length 95th (ft)	120		294	428	0			
Internal Link Dist (ft)	173		89	64				
Turn Bay Length (ft)								
Base Capacity (vph)	535		725	1397	1255			
Starvation Cap Reductn	0		0	273	647			
Spillback Cap Reductn	0		0	0	0			
Storage Cap Reductn	0		0	0	0			
Reduced v/c Ratio	0.51		0.55	0.68	0.48			

Intersection Summary

Cycle Length: 105
 Actuated Cycle Length: 105
 Offset: 0 (0%), Referenced to phase 2:NBTL and 6:SBT, Start of Yellow
 Natural Cycle: 90
 Control Type: Actuated-Coordinated

Splits and Phases: 4: First Stamford Place & Greenwich Ave



HCM Signalized Intersection Capacity Analysis
4: First Stamford Place & Greenwich Ave

2009 Weekday AM Peak Hour
5/5/2010



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations	WT			↑	↓	↑
Volume (vph)	200	50	50	320	670	300
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0			4.0	4.0	4.0
Lane Util. Factor	0.97			1.00	0.95	0.95
Fr _t	0.97			1.00	0.99	0.85
Fl _t Protected	0.96			0.99	1.00	1.00
Satd. Flow (prot)	3371			1850	1758	1504
Fl _t Permitted	0.96			0.81	1.00	1.00
Satd. Flow (perm)	3371			1510	1758	1504
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	217	54	54	348	728	326
RTOR Reduction (vph)	22	0	0	0	1	60
Lane Group Flow (vph)	249	0	0	402	760	233
Turn Type			Perm			Perm
Protected Phases	9			2	6 3 4	
Permitted Phases			2			6 3 4
Actuated Green, G (s)	13.1			49.9	82.9	82.9
Effective Green, g (s)	13.6			50.4	83.4	83.4
Actuated g/C Ratio	0.13			0.48	0.79	0.79
Clearance Time (s)	4.5			4.5		
Vehicle Extension (s)	3.0			3.5		
Lane Grp Cap (vph)	437			725	1396	1195
v/s Ratio Prot	c0.07				c0.43	
v/s Ratio Perm				0.27		0.15
v/c Ratio	0.57			0.55	0.54	0.19
Uniform Delay, d ₁	43.0			19.3	3.9	2.6
Progression Factor	1.00			1.00	0.85	0.00
Incremental Delay, d ₂	1.8			3.0	0.4	0.1
Delay (s)	44.8			22.4	3.7	0.1
Level of Service	D			C	A	A
Approach Delay (s)	44.8			22.4	2.7	
Approach LOS	D			C	A	

Intersection Summary

HCM Average Control Delay	13.9	HCM Level of Service	B
HCM Volume to Capacity ratio	0.55		
Actuated Cycle Length (s)	105.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	73.1%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			

Queues
5: I-95 NB Off-Ramp & Greenwich Ave

2009 Weekday AM Peak Hour
5/5/2010

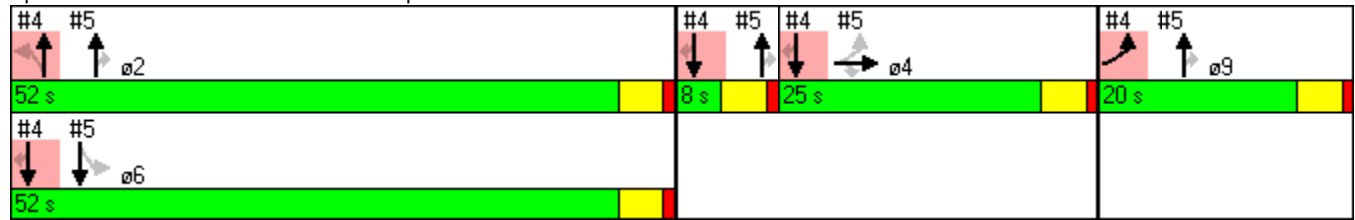


Lane Group	EBL	EBT	EBR	NBT	NBR	SBL	SBT	ø2	ø3	ø9
Lane Configurations	↶	↷	↷	↷	↷	↶	↷			
Volume (vph)	220	560	400	280	240	150	570			
Lane Group Flow (vph)	239	609	435	304	261	163	620			
Turn Type	Perm		Perm		Perm	Perm				
Protected Phases		4		2 9 3			6	2	3	9
Permitted Phases	4		4		2 9 3	6				
Detector Phase	4	4	4	2 9 3	2 9 3	6	6			
Switch Phase										
Minimum Initial (s)	12.0	12.0	12.0			12.0	12.0	12.0	2.0	8.0
Minimum Split (s)	24.5	24.5	24.5			24.5	24.5	24.5	6.5	20.0
Total Split (s)	25.0	25.0	25.0	80.0	80.0	52.0	52.0	52.0	8.0	20.0
Total Split (%)	23.8%	23.8%	23.8%	76.2%	76.2%	49.5%	49.5%	50%	8%	19%
Yellow Time (s)	3.5	3.5	3.5			3.5	3.5	3.5	3.5	3.5
All-Red Time (s)	1.0	1.0	1.0			1.0	1.0	1.0	1.0	1.0
Lost Time Adjust (s)	-0.5	-0.5	-0.5	-0.5	-0.5	-0.5	-0.5			
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0			
Lead/Lag	Lag	Lag	Lag						Lead	
Lead-Lag Optimize?	Yes	Yes	Yes						Yes	
Recall Mode	None	None	None			C-Min	C-Min	C-Min	None	Min
v/c Ratio	0.68	0.86	0.65	0.23	0.23	2.33	0.36			
Control Delay	49.5	54.1	8.8	0.5	0.4	653.8	18.4			
Queue Delay	0.0	0.0	0.1	0.8	0.9	0.0	0.0			
Total Delay	49.5	54.1	8.9	1.3	1.3	653.8	18.4			
Queue Length 50th (ft)	150	210	0	2	0	~136	135			
Queue Length 95th (ft)	235	#301	88	2	0	#274	184			
Internal Link Dist (ft)		744		64			707			
Turn Bay Length (ft)	300		300			100				
Base Capacity (vph)	354	708	665	1340	1143	70	1699			
Starvation Cap Reductn	0	0	0	742	623	0	0			
Spillback Cap Reductn	0	0	7	0	0	0	13			
Storage Cap Reductn	0	0	0	0	0	0	0			
Reduced v/c Ratio	0.68	0.86	0.66	0.51	0.50	2.33	0.37			

Intersection Summary

Cycle Length: 105
 Actuated Cycle Length: 105
 Offset: 0 (0%), Referenced to phase 2:NBTL and 6:SBT, Start of Yellow
 Natural Cycle: 90
 Control Type: Actuated-Coordinated
 ~ 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.

Splits and Phases: 5: I-95 NB Off-Ramp & Greenwich Ave



HCM Signalized Intersection Capacity Analysis
5: I-95 NB Off-Ramp & Greenwich Ave

2009 Weekday AM Peak Hour
5/5/2010



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	220	560	400	0	0	0	0	280	240	150	570	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	4.0	4.0	
Lane Util. Factor	1.00	0.95	1.00					1.00	1.00	1.00	0.95	
Frt	1.00	1.00	0.85					1.00	0.85	1.00	1.00	
Flt Protected	0.95	1.00	1.00					1.00	1.00	0.95	1.00	
Satd. Flow (prot)	1770	3539	1583					1863	1583	1770	3539	
Flt Permitted	0.95	1.00	1.00					1.00	1.00	0.08	1.00	
Satd. Flow (perm)	1770	3539	1583					1863	1583	148	3539	
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)	239	609	435	0	0	0	0	304	261	163	620	0
RTOR Reduction (vph)	0	0	348	0	0	0	0	0	5	0	0	0
Lane Group Flow (vph)	239	609	87	0	0	0	0	304	256	163	620	0
Turn Type	Perm		Perm						Perm	Perm		
Protected Phases		4						2 9 3			6	
Permitted Phases	4		4						2 9 3	6		
Actuated Green, G (s)	20.5	20.5	20.5					75.5	75.5	49.9	49.9	
Effective Green, g (s)	21.0	21.0	21.0					76.0	76.0	50.4	50.4	
Actuated g/C Ratio	0.20	0.20	0.20					0.72	0.72	0.48	0.48	
Clearance Time (s)	4.5	4.5	4.5							4.5	4.5	
Vehicle Extension (s)	4.0	4.0	4.0							3.5	3.5	
Lane Grp Cap (vph)	354	708	317					1348	1146	71	1699	
v/s Ratio Prot		c0.17						c0.16			0.18	
v/s Ratio Perm	0.14		0.05						0.16	c1.10		
v/c Ratio	0.68	0.86	0.27					0.23	0.22	2.30	0.36	
Uniform Delay, d1	38.8	40.6	35.6					4.8	4.8	27.3	17.2	
Progression Factor	1.00	1.00	1.00					0.03	0.00	1.00	1.00	
Incremental Delay, d2	5.5	10.7	0.6					0.1	0.1	625.0	0.6	
Delay (s)	44.3	51.3	36.2					0.2	0.1	652.3	17.8	
Level of Service	D	D	D					A	A	F	B	
Approach Delay (s)		44.9			0.0			0.2			149.9	
Approach LOS		D			A			A			F	

Intersection Summary

HCM Average Control Delay	66.5	HCM Level of Service	E
HCM Volume to Capacity ratio	1.49		
Actuated Cycle Length (s)	105.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	50.3%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

Queues
6: North State St & Washington Blvd

2009 Weekday AM Peak Hour
5/5/2010

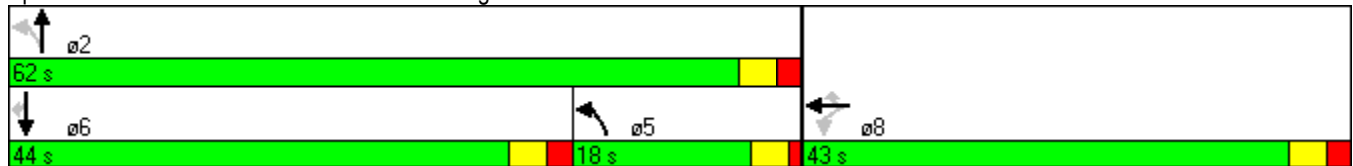


Lane Group	WBL	WBT	WBR	NBL	NBT	SBT	SBR
Lane Configurations	↵	↑	↗↘	↵	↑↑	↑↑	↗
Volume (vph)	300	100	710	200	620	710	610
Lane Group Flow (vph)	326	109	772	217	674	772	663
Turn Type	Perm		Perm	pm+pt			Perm
Protected Phases		8		5	2	6	
Permitted Phases	8		8	2			6
Detector Phase	8	8	8	5	2	6	6
Switch Phase							
Minimum Initial (s)	5.0	5.0	5.0	5.0	20.0	20.0	20.0
Minimum Split (s)	29.0	29.0	29.0	9.0	25.0	25.0	25.0
Total Split (s)	43.0	43.0	43.0	18.0	62.0	44.0	44.0
Total Split (%)	41.0%	41.0%	41.0%	17.1%	59.0%	41.9%	41.9%
Yellow Time (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0
All-Red Time (s)	2.0	2.0	2.0	1.0	2.0	2.0	2.0
Lost Time Adjust (s)	-1.0	-1.0	-1.0	0.0	-1.0	-1.0	-1.0
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Lead/Lag				Lag		Lead	Lead
Lead-Lag Optimize?				Yes		Yes	Yes
Recall Mode	None	None	None	Min	C-Max	C-Max	C-Max
v/c Ratio	0.59	0.19	0.86	0.58	0.38	0.62	0.69
Control Delay	39.8	30.9	47.8	23.7	12.8	28.1	6.5
Queue Delay	0.0	0.0	0.0	1.0	2.4	2.9	0.8
Total Delay	39.8	30.9	47.8	24.7	15.2	31.0	7.3
Queue Length 50th (ft)	219	68	304	78	135	222	7
Queue Length 95th (ft)	m260	m82	m354	m102	m157	290	104
Internal Link Dist (ft)		134			155	253	
Turn Bay Length (ft)							
Base Capacity (vph)	592	623	963	372	1776	1248	962
Starvation Cap Reductn	0	0	0	39	937	354	98
Spillback Cap Reductn	0	0	0	0	0	86	0
Storage Cap Reductn	0	0	0	0	0	0	0
Reduced v/c Ratio	0.55	0.17	0.80	0.65	0.80	0.86	0.77

Intersection Summary

Cycle Length: 105
 Actuated Cycle Length: 105
 Offset: 1 (1%), Referenced to phase 2:NBTL and 6:SBT, Start of Yellow
 Natural Cycle: 65
 Control Type: Actuated-Coordinated
 m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 6: North State St & Washington Blvd



HCM Signalized Intersection Capacity Analysis
6: North State St & Washington Blvd

2009 Weekday AM Peak Hour

5/5/2010



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations				↖	↑	↗	↖	↑↑			↑↑	↗
Volume (vph)	0	0	0	300	100	710	200	620	0	0	710	610
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	12	12	12	12	12	13	10	11	11	11	11	12
Total Lost time (s)				4.0	4.0	4.0	4.0	4.0			4.0	4.0
Lane Util. Factor				1.00	1.00	0.88	1.00	0.95			0.95	1.00
Frt				1.00	1.00	0.85	1.00	1.00			1.00	0.85
Flt Protected				0.95	1.00	1.00	0.95	1.00			1.00	1.00
Satd. Flow (prot)				1593	1676	2592	1486	3079			3079	1425
Flt Permitted				0.95	1.00	1.00	0.25	1.00			1.00	1.00
Satd. Flow (perm)				1593	1676	2592	391	3079			3079	1425
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	0	0	326	109	772	217	674	0	0	772	663
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	0	0	385
Lane Group Flow (vph)	0	0	0	326	109	772	217	674	0	0	772	278
Turn Type				Perm		Perm	pm+pt					Perm
Protected Phases					8		5	2			6	
Permitted Phases				8		8	2					6
Actuated Green, G (s)				35.4	35.4	35.4	60.6	59.6			41.6	41.6
Effective Green, g (s)				36.4	36.4	36.4	60.6	60.6			42.6	42.6
Actuated g/C Ratio				0.35	0.35	0.35	0.58	0.58			0.41	0.41
Clearance Time (s)				5.0	5.0	5.0	4.0	5.0			5.0	5.0
Vehicle Extension (s)				2.0	2.0	2.0	2.0	0.2			0.2	0.2
Lane Grp Cap (vph)				552	581	899	372	1777			1249	578
v/s Ratio Prot					0.07		c0.08	0.22			c0.25	
v/s Ratio Perm				0.20		c0.30	0.26					0.20
v/c Ratio				0.59	0.19	0.86	0.58	0.38			0.62	0.48
Uniform Delay, d1				28.2	24.0	31.9	25.6	12.0			24.7	23.0
Progression Factor				1.33	1.31	1.31	0.85	0.98			1.00	1.00
Incremental Delay, d2				0.6	0.0	4.5	0.8	0.3			2.3	2.9
Delay (s)				38.1	31.5	46.4	22.5	12.2			27.0	25.9
Level of Service				D	C	D	C	B			C	C
Approach Delay (s)		0.0			42.8			14.7			26.5	
Approach LOS		A			D			B			C	

Intersection Summary			
HCM Average Control Delay	29.1	HCM Level of Service	C
HCM Volume to Capacity ratio	0.68		
Actuated Cycle Length (s)	105.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	112.7%	ICU Level of Service	H
Analysis Period (min)	15		

c Critical Lane Group

Queues
7: South State St & Washington Blvd

2009 Weekday AM Peak Hour
5/5/2010



Lane Group	EBL	EBT	EBR	NBT	SBL	SBT	ø3
Lane Configurations	↶	↑	↷	↑↑↑	↶	↑↑	
Volume (vph)	400	250	300	420	350	660	
Lane Group Flow (vph)	435	272	326	674	380	717	
Turn Type	Prot		custom		Prot		
Protected Phases	4			2	1	6	3
Permitted Phases		4	4				
Detector Phase	4	4	4	2	1	6	
Switch Phase							
Minimum Initial (s)	4.0	4.0	4.0	7.0	7.0	4.0	4.0
Minimum Split (s)	20.0	20.0	20.0	17.0	11.0	20.0	30.0
Total Split (s)	30.0	30.0	30.0	20.0	25.0	45.0	30.0
Total Split (%)	28.6%	28.6%	28.6%	19.0%	23.8%	42.9%	29%
Yellow Time (s)	3.0	3.0	3.0	3.0	3.0	3.0	2.0
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0	1.0	0.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	
Lead/Lag	Lag	Lag	Lag	Lag	Lead		Lead
Lead-Lag Optimize?				Yes	Yes		
Recall Mode	None	None	None	C-Min	None	C-Min	Ped
v/c Ratio	0.71	0.42	0.44	0.90	1.28	0.60	
Control Delay	18.2	13.2	0.8	49.8	173.8	15.0	
Queue Delay	0.3	0.0	0.1	0.2	49.5	1.4	
Total Delay	18.5	13.2	1.0	49.9	223.3	16.5	
Queue Length 50th (ft)	104	65	0	92	~309	103	
Queue Length 95th (ft)	m122	m78	m0	#197	#497	151	
Internal Link Dist (ft)		350		225		155	
Turn Bay Length (ft)	150						
Base Capacity (vph)	616	648	746	745	297	1202	
Starvation Cap Reductn	0	0	0	0	24	287	
Spillback Cap Reductn	17	0	50	2	0	0	
Storage Cap Reductn	0	0	0	0	0	0	
Reduced v/c Ratio	0.73	0.42	0.47	0.91	1.39	0.78	






Intersection Summary

Cycle Length: 105
 Actuated Cycle Length: 105
 Offset: 8 (8%), Referenced to phase 2:NBT and 6:SBT, Start of Yellow
 Natural Cycle: 120
 Control Type: Actuated-Coordinated
 ~ 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.

Queues
7: South State St & Washington Blvd

2009 Weekday AM Peak Hour
5/5/2010

Splits and Phases: 7: South State St & Washington Blvd

 ø1 25 s	 ø2 20 s	 ø3 30 s	 ø4 30 s
 ø6 45 s			

HCM Signalized Intersection Capacity Analysis
7: South State St & Washington Blvd

2009 Weekday AM Peak Hour
5/5/2010



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	400	250	300	0	0	0	0	420	200	350	660	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	11	11	11	12	12	12	12	12	12	10	11	11
Total Lost time (s)	4.0	4.0	4.0					4.0		4.0	4.0	
Lane Util. Factor	1.00	1.00	1.00					0.91		1.00	0.95	
Frt	1.00	1.00	0.85					0.95		1.00	1.00	
Flt Protected	0.95	1.00	1.00					1.00		0.95	1.00	
Satd. Flow (prot)	1540	1621	1378					4356		1486	3079	
Flt Permitted	0.95	1.00	1.00					1.00		0.95	1.00	
Satd. Flow (perm)	1540	1621	1378					4356		1486	3079	
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)	435	272	326	0	0	0	0	457	217	380	717	0
RTOR Reduction (vph)	0	0	196	0	0	0	0	81	0	0	0	0
Lane Group Flow (vph)	435	272	130	0	0	0	0	593	0	380	717	0
Turn Type	Prot		custom							Prot		
Protected Phases	4							2		1	6	
Permitted Phases		4	4									
Actuated Green, G (s)	42.0	42.0	42.0					16.0		21.0	41.0	
Effective Green, g (s)	42.0	42.0	42.0					16.0		21.0	41.0	
Actuated g/C Ratio	0.40	0.40	0.40					0.15		0.20	0.39	
Clearance Time (s)	4.0	4.0	4.0					4.0		4.0	4.0	
Vehicle Extension (s)	3.0	3.0	3.0					3.0		3.0	3.0	
Lane Grp Cap (vph)	616	648	551					664		297	1202	
v/s Ratio Prot	c0.28							c0.14		c0.26	0.23	
v/s Ratio Perm		0.17	0.09									
v/c Ratio	0.71	0.42	0.24					0.89		1.28	0.60	
Uniform Delay, d1	26.3	22.7	20.9					43.7		42.0	25.4	
Progression Factor	0.58	0.54	0.06					0.92		0.69	0.52	
Incremental Delay, d2	1.4	0.2	0.1					14.7		145.1	1.8	
Delay (s)	16.5	12.4	1.3					54.9		174.2	14.9	
Level of Service	B	B	A					D		F	B	
Approach Delay (s)		10.7			0.0			54.9			70.1	
Approach LOS		B			A			D			E	

Intersection Summary

HCM Average Control Delay	44.5	HCM Level of Service	D
HCM Volume to Capacity ratio	0.90		
Actuated Cycle Length (s)	105.0	Sum of lost time (s)	26.0
Intersection Capacity Utilization	112.7%	ICU Level of Service	H
Analysis Period (min)	15		

c Critical Lane Group

Queues
8: Station Place & Washington Blvd

2009 Weekday AM Peak Hour
5/5/2010

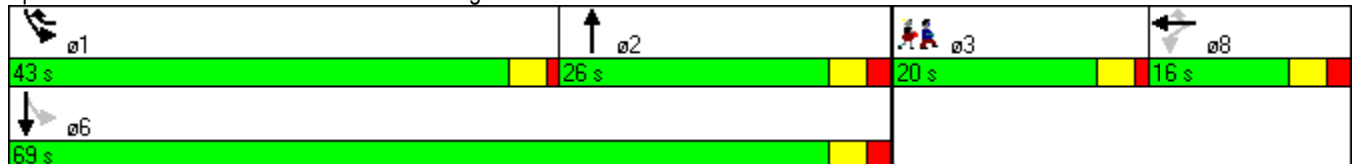


Lane Group	WBT	WBR	NBT	SBL	SBT	ø3
Lane Configurations	↔	↗	↕	↖	↕	
Volume (vph)	0	200	420	560	400	
Lane Group Flow (vph)	150	143	511	609	435	
Turn Type		pm+ov		pm+pt		
Protected Phases	8	1	2	1	6	3
Permitted Phases		8		6		
Detector Phase	8	1	2	1	6	
Switch Phase						
Minimum Initial (s)	9.0	7.0	15.0	7.0	15.0	4.0
Minimum Split (s)	14.0	11.0	20.0	11.0	20.0	20.0
Total Split (s)	16.0	43.0	26.0	43.0	69.0	20.0
Total Split (%)	15.2%	41.0%	24.8%	41.0%	65.7%	19%
Yellow Time (s)	3.0	3.0	3.0	3.0	3.0	3.0
All-Red Time (s)	2.0	1.0	2.0	1.0	2.0	1.0
Lost Time Adjust (s)	-1.0	-1.0	-1.0	0.0	-1.0	
Total Lost Time (s)	4.0	3.0	4.0	4.0	4.0	
Lead/Lag		Lead	Lag	Lead		
Lead-Lag Optimize?		Yes	Yes	Yes		
Recall Mode	None	None	C-Max	None	C-Max	Ped
v/c Ratio	0.65	0.20	0.63	0.91	0.21	
Control Delay	58.9	11.7	39.6	43.6	2.0	
Queue Delay	0.0	0.0	0.0	5.8	0.2	
Total Delay	58.9	11.7	39.6	49.3	2.2	
Queue Length 50th (ft)	107	31	168	198	20	
Queue Length 95th (ft)	177	112	#243	#471	27	
Internal Link Dist (ft)	179		86		225	
Turn Bay Length (ft)						
Base Capacity (vph)	234	774	807	709	2037	
Starvation Cap Reductn	0	0	0	64	815	
Spillback Cap Reductn	0	0	0	0	0	
Storage Cap Reductn	0	0	0	0	0	
Reduced v/c Ratio	0.64	0.18	0.63	0.94	0.36	

Intersection Summary

Cycle Length: 105
 Actuated Cycle Length: 105
 Offset: 13 (12%), Referenced to phase 2:NBT and 6:SBTL, Start of Yellow
 Natural Cycle: 90
 Control Type: Actuated-Coordinated
 # 95th percentile volume exceeds capacity, queue may be longer.
 Queue shown is maximum after two cycles.

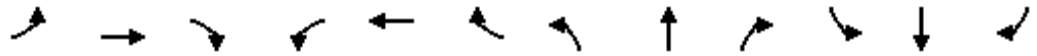
Splits and Phases: 8: Station Place & Washington Blvd



HCM Signalized Intersection Capacity Analysis
8: Station Place & Washington Blvd

2009 Weekday AM Peak Hour

5/5/2010



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations					↔	↗		↕		↖	↕	
Volume (vph)	0	0	0	70	0	200	0	420	50	560	400	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	12	12	12	12	14	12	12	11	12	12	12	12
Total Lost time (s)					4.0	3.0		4.0		4.0	4.0	
Lane Util. Factor					0.95	0.95		0.95		1.00	0.95	
Frt					0.93	0.85		0.98		1.00	1.00	
Flt Protected					0.98	1.00		1.00		0.95	1.00	
Satd. Flow (prot)					1534	1354		3030		1593	3185	
Flt Permitted					0.98	1.00		1.00		0.26	1.00	
Satd. Flow (perm)					1534	1354		3030		432	3185	
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	0	0	76	0	217	0	457	54	609	435	0
RTOR Reduction (vph)	0	0	0	0	0	0	0	8	0	0	0	0
Lane Group Flow (vph)	0	0	0	0	150	143	0	503	0	609	435	0
Turn Type				Perm		pm+ov				pm+pt		
Protected Phases					8	1		2		1	6	
Permitted Phases				8		8				6		
Actuated Green, G (s)					14.9	50.4		26.6		66.1	66.1	
Effective Green, g (s)					15.9	52.4		27.6		66.1	67.1	
Actuated g/C Ratio					0.15	0.50		0.26		0.63	0.64	
Clearance Time (s)					5.0	4.0		5.0		4.0	5.0	
Vehicle Extension (s)					2.0	2.0		2.0		2.0	2.0	
Lane Grp Cap (vph)					232	676		796		664	2035	
v/s Ratio Prot						0.07		0.17		c0.31	0.14	
v/s Ratio Perm					0.10	0.03				c0.27		
v/c Ratio					0.65	0.21		0.63		0.92	0.21	
Uniform Delay, d1					41.9	14.7		34.2		19.9	7.9	
Progression Factor					1.11	0.97		1.00		1.51	0.22	
Incremental Delay, d2					4.3	0.1		3.8		15.1	0.2	
Delay (s)					50.9	14.3		38.0		45.2	1.9	
Level of Service					D	B		D		D	A	
Approach Delay (s)		0.0			33.1			38.0			27.1	
Approach LOS		A			C			D			C	

Intersection Summary

HCM Average Control Delay	31.1	HCM Level of Service	C
HCM Volume to Capacity ratio	0.84		
Actuated Cycle Length (s)	105.0	Sum of lost time (s)	22.0
Intersection Capacity Utilization	68.0%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

Queues
9: North State St & Atlantic St

2009 Weekday AM Peak Hour
5/5/2010

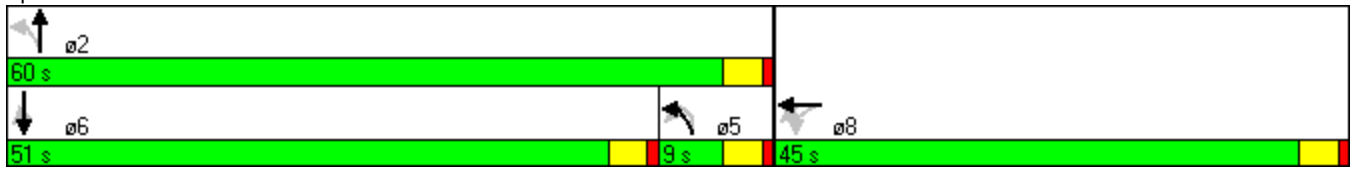


Lane Group	WBL	WBT	NBL2	NBL	NBT	SBT	SBR
Lane Configurations							
Volume (vph)	860	910	200	100	700	280	200
Lane Group Flow (vph)	1152	1206	0	0	1087	365	319
Turn Type	Perm		custom	pm+pt			Perm
Protected Phases		8		5	2	6	
Permitted Phases	8		5	2			6
Detector Phase	8	8	5	5	2	6	6
Switch Phase							
Minimum Initial (s)	12.0	12.0	5.0	5.0	15.0	15.0	15.0
Minimum Split (s)	26.0	26.0	9.0	9.0	22.0	22.0	22.0
Total Split (s)	45.0	45.0	9.0	9.0	60.0	51.0	51.0
Total Split (%)	42.9%	42.9%	8.6%	8.6%	57.1%	48.6%	48.6%
Yellow Time (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Lead/Lag			Lag	Lag		Lead	Lead
Lead-Lag Optimize?			Yes	Yes		Yes	Yes
Recall Mode	None	None	None	None	C-Max	C-Max	C-Max
v/c Ratio	0.86	0.89			0.86	0.40	0.38
Control Delay	18.2	18.6			16.9	16.1	12.8
Queue Delay	0.0	0.0			0.9	4.2	2.3
Total Delay	18.2	18.6			17.8	20.3	15.0
Queue Length 50th (ft)	222	108			347	145	97
Queue Length 95th (ft)	m260	m116			#406	217	163
Internal Link Dist (ft)		1065			128	237	
Turn Bay Length (ft)							
Base Capacity (vph)	1341	1362			1259	920	832
Starvation Cap Reductn	0	0			45	465	375
Spillback Cap Reductn	0	0			0	221	0
Storage Cap Reductn	0	0			0	0	0
Reduced v/c Ratio	0.86	0.89			0.90	0.80	0.70

Intersection Summary

Cycle Length: 105
 Actuated Cycle Length: 105
 Offset: 41 (39%), Referenced to phase 2:NBT and 6:SBT, Start of Yellow
 Natural Cycle: 60
 Control Type: Actuated-Coordinated
 # 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.

Splits and Phases: 9: North State St & Atlantic St



HCM Signalized Intersection Capacity Analysis
 9: North State St & Atlantic St

2009 Weekday AM Peak Hour
 5/5/2010



Movement	WBL2	WBL	WBT	WBR	NBL2	NBL	NBT	SBT	SBR	SBR2
Lane Configurations		57	11				41	11	5	
Volume (vph)	200	860	910	200	200	100	700	280	200	150
Ideal Flow (vphpl)	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	0.95				0.95	0.95	0.95	
Fr _t		1.00	0.97				1.00	0.97	0.85	
Fl _t Protected		0.95	1.00				0.99	1.00	1.00	
Satd. Flow (prot)		3433	3444				3487	1725	1504	
Fl _t Permitted		0.95	1.00				0.67	1.00	1.00	
Satd. Flow (perm)		3433	3444				2361	1725	1504	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	217	935	989	217	217	109	761	304	217	163
RTOR Reduction (vph)	0	0	18	0	0	0	0	0	30	0
Lane Group Flow (vph)	0	1152	1188	0	0	0	1087	365	289	0
Turn Type	Perm	Perm			custom	pm+pt			Perm	
Protected Phases			8			5	2	6		
Permitted Phases	8	8			5	2			6	
Actuated Green, G (s)		41.0	41.0				56.0	56.0	56.0	
Effective Green, g (s)		41.0	41.0				56.0	56.0	56.0	
Actuated g/C Ratio		0.39	0.39				0.53	0.53	0.53	
Clearance Time (s)		4.0	4.0				4.0	4.0	4.0	
Vehicle Extension (s)		3.0	3.0				3.0	3.0	3.0	
Lane Grp Cap (vph)		1341	1345				1259	920	802	
v/s Ratio Prot			c0.35					0.21		
v/s Ratio Perm		0.34					c0.46		0.19	
v/c Ratio		0.86	0.88				0.86	0.40	0.36	
Uniform Delay, d1		29.4	29.8				21.2	14.5	14.1	
Progression Factor		0.51	0.50				0.49	1.00	1.00	
Incremental Delay, d2		2.1	2.7				4.5	1.3	1.3	
Delay (s)		16.9	17.5				14.8	15.8	15.4	
Level of Service		B	B				B	B	B	
Approach Delay (s)			17.2				14.8	15.6		
Approach LOS			B				B	B		

Intersection Summary

HCM Average Control Delay	16.3	HCM Level of Service	B
HCM Volume to Capacity ratio	0.87		
Actuated Cycle Length (s)	105.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	90.4%	ICU Level of Service	E
Analysis Period (min)	15		
c Critical Lane Group			

Queues
10: South State St & Atlantic St

2009 Weekday AM Peak Hour
5/5/2010

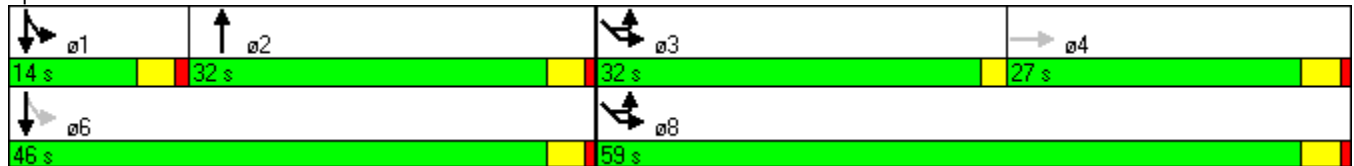


Lane Group	EBT	NBT	SBL	SBT	SEL2	SEL	ø3	ø6	ø8
Lane Configurations	↑↑	↑	↙↘	↑	↙	↘↙			
Volume (vph)	400	200	100	380	800	900			
Lane Group Flow (vph)	707	326	109	413	618	1230			
Turn Type			pm+pt		Split				
Protected Phases		2	1	16	38	38	3	6	8
Permitted Phases	4		16						
Detector Phase	4	2	1	16	38	38			
Switch Phase									
Minimum Initial (s)	12.0	15.0	6.0				3.0	4.0	4.0
Minimum Split (s)	20.0	25.0	10.0				5.0	25.0	29.0
Total Split (s)	27.0	32.0	14.0	60.0	91.0	91.0	32.0	46.0	59.0
Total Split (%)	25.7%	30.5%	13.3%	57.1%	86.7%	86.7%	30%	44%	56%
Yellow Time (s)	3.0	3.0	3.0				2.0	3.0	3.0
All-Red Time (s)	1.0	1.0	1.0				0.0	1.0	1.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	2.0	0.0			
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	2.0			
Lead/Lag	Lag	Lag	Lead				Lead		
Lead-Lag Optimize?	Yes	Yes	Yes				Yes		
Recall Mode	None	C-Max	None				None	C-Max	None
v/c Ratio	0.88	0.66	0.17	0.54	0.74	0.71			
Control Delay	39.0	39.4	23.4	29.6	26.4	21.0			
Queue Delay	0.0	20.3	0.0	89.2	3.5	0.4			
Total Delay	39.0	59.6	23.4	118.8	29.9	21.4			
Queue Length 50th (ft)	211	182	23	190	337	318			
Queue Length 95th (ft)	m207	281	m38	m277	496	402			
Internal Link Dist (ft)	392	25		128		750			
Turn Bay Length (ft)					250	250			
Base Capacity (vph)	823	491	641	758	843	1749			
Starvation Cap Reductn	0	158	0	408	0	0			
Spillback Cap Reductn	0	2	0	0	142	142			
Storage Cap Reductn	0	0	0	0	0	0			
Reduced v/c Ratio	0.86	0.98	0.17	1.18	0.88	0.77			

Intersection Summary

Cycle Length: 105
 Actuated Cycle Length: 105
 Offset: 91 (87%), Referenced to phase 2:NBT and 6:SBTL, Start of Yellow
 Natural Cycle: 70
 Control Type: Actuated-Coordinated
 m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 10: South State St & Atlantic St



HCM Signalized Intersection Capacity Analysis
 10: South State St & Atlantic St

2009 Weekday AM Peak Hour
 5/5/2010



Movement	EBT	EBR	NBT	NBR	SBL	SBT	SEL2	SEL
Lane Configurations	↑↑		↑		↑↑	↑	↑	↑↑
Volume (vph)	400	250	200	100	100	380	800	900
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0		4.0		4.0	4.0	4.0	2.0
Lane Util. Factor	0.95		1.00		0.97	1.00	0.91	0.91
Frt	0.94		0.95		1.00	1.00	1.00	1.00
Flt Protected	1.00		1.00		0.95	1.00	0.95	0.95
Satd. Flow (prot)	3335		1779		3433	1863	1610	3221
Flt Permitted	1.00		1.00		0.26	1.00	0.95	0.95
Satd. Flow (perm)	3335		1779		953	1863	1610	3221
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	435	272	217	109	109	413	870	978
RTOR Reduction (vph)	94	0	17	0	0	0	0	0
Lane Group Flow (vph)	613	0	309	0	109	413	618	1230
Turn Type					pm+pt		Split	
Protected Phases			2		1	1 6	3 8	3 8
Permitted Phases	4				1 6			
Actuated Green, G (s)	22.3		28.0		42.7	42.7	54.3	54.3
Effective Green, g (s)	22.3		28.0		42.7	42.7	52.3	54.3
Actuated g/C Ratio	0.21		0.27		0.41	0.41	0.50	0.52
Clearance Time (s)	4.0		4.0		4.0			
Vehicle Extension (s)	3.0		3.0		3.0			
Lane Grp Cap (vph)	708		474		640	758	802	1666
v/s Ratio Prot			c0.17		0.02	c0.22	c0.38	0.38
v/s Ratio Perm	c0.18				0.05			
v/c Ratio	0.87		0.65		0.17	0.54	0.77	0.74
Uniform Delay, d1	39.9		34.2		20.5	23.7	21.5	19.8
Progression Factor	0.99		1.00		1.17	1.11	1.00	1.00
Incremental Delay, d2	4.6		6.8		0.1	0.7	4.6	1.7
Delay (s)	43.9		41.0		24.2	27.0	26.1	21.5
Level of Service	D		D		C	C	C	C
Approach Delay (s)	43.9		41.0			26.4		23.1
Approach LOS	D		D			C		C

Intersection Summary

HCM Average Control Delay	29.6	HCM Level of Service	C
HCM Volume to Capacity ratio	0.75		
Actuated Cycle Length (s)	105.0	Sum of lost time (s)	16.0
Intersection Capacity Utilization	86.4%	ICU Level of Service	E
Analysis Period (min)	15		
c Critical Lane Group			

Queues
11: Station Place & Atlantic St

2009 Weekday AM Peak Hour

5/5/2010

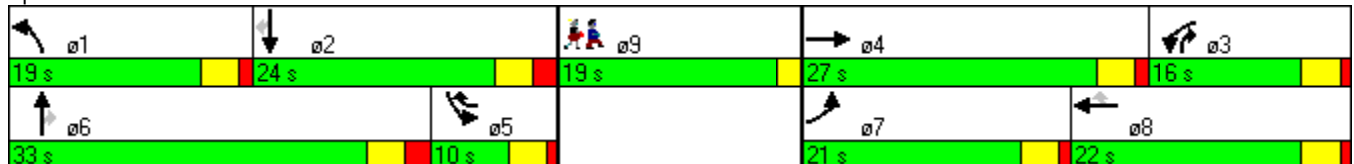


Lane Group	EBL	EBT	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	ø9
Lane Configurations												
Volume (vph)	60	30	90	170	80	50	160	20	40	310	250	
Lane Group Flow (vph)	65	66	98	185	87	54	174	22	43	337	272	
Turn Type	Prot		Prot		pm+ov	Prot		pm+ov	Prot		Perm	
Protected Phases	7	4	3	8	5	1	6	3	5	2		9
Permitted Phases					8			6				2
Detector Phase	7	4	3	8	5	1	6	3	5	2		2
Switch Phase												
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0	15.0	15.0	5.0	5.0	15.0	15.0	7.0
Minimum Split (s)	21.0	21.0	9.0	20.0	9.0	19.0	21.0	9.0	9.0	21.0	21.0	19.0
Total Split (s)	21.0	27.0	16.0	22.0	10.0	19.0	33.0	16.0	10.0	24.0	24.0	19.0
Total Split (%)	20.0%	25.7%	15.2%	21.0%	9.5%	18.1%	31.4%	15.2%	9.5%	22.9%	22.9%	18%
Yellow Time (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	2.0
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0	1.0	2.0	1.0	1.0	2.0	2.0	0.0
Lost Time Adjust (s)	-1.0	0.0	0.0	0.0	0.0	-1.0	-1.0	0.0	0.0	-1.0	-1.0	
Total Lost Time (s)	3.0	4.0	4.0	4.0	4.0	3.0	4.0	4.0	4.0	4.0	4.0	
Lead/Lag	Lead	Lead	Lag	Lag	Lag	Lead	Lead	Lag	Lag	Lag	Lag	
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	
Recall Mode	None	None	None	None	None	None	C-Max	None	None	C-Max	C-Max	None
v/c Ratio	0.38	0.38	0.36	0.67	0.22	0.20	0.09	0.02	0.43	0.20	0.31	
Control Delay	40.2	31.3	41.5	53.7	5.1	38.8	13.2	2.5	61.6	21.4	9.6	
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.5	
Total Delay	40.2	31.3	41.5	53.7	5.1	38.8	13.2	2.5	61.6	21.4	10.1	
Queue Length 50th (ft)	41	29	59	119	0	29	22	0	28	67	28	
Queue Length 95th (ft)	m56	m42	102	181	18	60	63	8	65	151	128	
Internal Link Dist (ft)		765		481			121			95		
Turn Bay Length (ft)			150			100		100	50		50	
Base Capacity (vph)	303	403	292	330	406	270	1966	1207	101	1724	871	
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	269	
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	
Reduced v/c Ratio	0.21	0.16	0.34	0.56	0.21	0.20	0.09	0.02	0.43	0.20	0.45	

Intersection Summary

Cycle Length: 105
 Actuated Cycle Length: 105
 Offset: 2 (2%), Referenced to phase 2:SBT and 6:NBT, Start of Green
 Natural Cycle: 100
 Control Type: Actuated-Coordinated
 m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 11: Station Place & Atlantic St



HCM Signalized Intersection Capacity Analysis
11: Station Place & Atlantic St

2009 Weekday AM Peak Hour

5/5/2010

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	60	30	30	90	170	80	50	160	20	40	310	250
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.0	4.0		4.0	4.0	4.0	3.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	1.00	1.00		1.00	1.00	1.00	1.00	0.95	1.00	1.00	0.95	1.00
Frt	1.00	0.93		1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1770	1723		1770	1863	1583	1770	3539	1583	1770	3539	1583
Flt Permitted	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	1770	1723		1770	1863	1583	1770	3539	1583	1770	3539	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)	65	33	33	98	185	87	54	174	22	43	337	272
RTOR Reduction (vph)	0	30	0	0	0	70	0	0	8	0	0	106
Lane Group Flow (vph)	65	36	0	98	185	17	54	174	14	43	337	166
Turn Type	Prot			Prot		pm+ov	Prot		pm+ov	Prot		Perm
Protected Phases	7	4		3	8	5	1	6	3	5	2	
Permitted Phases						8			6			2
Actuated Green, G (s)	8.1	8.7		15.0	15.6	20.4	12.0	54.1	69.1	4.8	46.9	46.9
Effective Green, g (s)	9.1	8.7		15.0	15.6	20.4	13.0	55.1	69.1	4.8	47.9	47.9
Actuated g/C Ratio	0.09	0.08		0.14	0.15	0.19	0.12	0.52	0.66	0.05	0.46	0.46
Clearance Time (s)	4.0	4.0		4.0	4.0	4.0	4.0	5.0	4.0	4.0	5.0	5.0
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	153	143		253	277	308	219	1857	1102	81	1614	722
v/s Ratio Prot	c0.04	0.02		0.06	c0.10	0.00	c0.03	0.05	0.00	c0.02	0.10	
v/s Ratio Perm						0.01			0.01			c0.10
v/c Ratio	0.42	0.25		0.39	0.67	0.05	0.25	0.09	0.01	0.53	0.21	0.23
Uniform Delay, d1	45.5	45.1		40.8	42.3	34.4	41.6	12.5	6.2	49.0	17.2	17.3
Progression Factor	0.85	1.06		1.00	1.00	1.00	0.94	0.82	0.66	1.00	1.00	1.00
Incremental Delay, d2	1.0	0.5		1.0	6.0	0.1	0.6	0.1	0.0	6.5	0.3	0.7
Delay (s)	39.5	48.4		41.8	48.2	34.5	39.7	10.3	4.1	55.5	17.5	18.1
Level of Service	D	D		D	D	C	D	B	A	E	B	B
Approach Delay (s)		44.0			43.3			16.1			20.2	
Approach LOS		D			D			B			C	

Intersection Summary

HCM Average Control Delay	27.8	HCM Level of Service	C
HCM Volume to Capacity ratio	0.34		
Actuated Cycle Length (s)	105.0	Sum of lost time (s)	19.4
Intersection Capacity Utilization	51.4%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

Queues
12: Parking Garage & Atlantic St

2009 Weekday AM Peak Hour
5/5/2010



Lane Group	EBL	NBL	NBT	SBT	SBR
Lane Configurations					
Volume (vph)	50	30	180	290	140
Lane Group Flow (vph)	65	0	229	315	152
Turn Type		pm+pt			Perm
Protected Phases	4	5	2	6	
Permitted Phases		2			6
Detector Phase	4	5	2	6	6
Switch Phase					
Minimum Initial (s)	5.0	5.0	20.0	20.0	20.0
Minimum Split (s)	24.0	9.0	25.0	25.0	25.0
Total Split (s)	33.0	9.0	72.0	63.0	63.0
Total Split (%)	31.4%	8.6%	68.6%	60.0%	60.0%
Yellow Time (s)	3.0	3.0	3.0	3.0	3.0
All-Red Time (s)	2.0	1.0	2.0	2.0	2.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	5.0	4.0	5.0	5.0	5.0
Lead/Lag		Lead		Lag	Lag
Lead-Lag Optimize?		Yes		Yes	Yes
Recall Mode	None	Min	C-Max	C-Max	C-Max
v/c Ratio	0.39		0.16	0.23	0.12
Control Delay	43.8		2.8	2.9	0.9
Queue Delay	0.0		0.0	0.3	0.0
Total Delay	43.8		2.8	3.2	0.9
Queue Length 50th (ft)	36		21	3	0
Queue Length 95th (ft)	71		66	74	10
Internal Link Dist (ft)	170		445	110	
Turn Bay Length (ft)					
Base Capacity (vph)	473		1449	1394	1223
Starvation Cap Reductn	0		0	550	0
Spillback Cap Reductn	0		0	0	0
Storage Cap Reductn	0		0	0	0
Reduced v/c Ratio	0.14		0.16	0.37	0.12

Intersection Summary

Cycle Length: 105
 Actuated Cycle Length: 105
 Offset: 0 (0%), Referenced to phase 2:NBT and 6:SBT, Start of Green
 Natural Cycle: 60
 Control Type: Actuated-Coordinated

Splits and Phases: 12: Parking Garage & Atlantic St



HCM Signalized Intersection Capacity Analysis
 12: Parking Garage & Atlantic St

2009 Weekday AM Peak Hour
 5/5/2010



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (vph)	50	10	30	180	290	140
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0			5.0	5.0	5.0
Lane Util. Factor	1.00			1.00	1.00	1.00
Fr _t	0.98			1.00	1.00	0.85
Fl _t Protected	0.96			0.99	1.00	1.00
Satd. Flow (prot)	1748			1849	1863	1583
Fl _t Permitted	0.96			0.93	1.00	1.00
Satd. Flow (perm)	1748			1732	1863	1583
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	54	11	33	196	315	152
RTOR Reduction (vph)	9	0	0	0	0	40
Lane Group Flow (vph)	56	0	0	229	315	112
Turn Type			pm+pt			Perm
Protected Phases	4		5	2	6	
Permitted Phases			2			6
Actuated Green, G (s)	8.4			86.6	77.6	77.6
Effective Green, g (s)	8.4			86.6	77.6	77.6
Actuated g/C Ratio	0.08			0.82	0.74	0.74
Clearance Time (s)	5.0			5.0	5.0	5.0
Vehicle Extension (s)	2.0			0.2	0.2	0.2
Lane Grp Cap (vph)	140			1434	1377	1170
v/s Ratio Prot	c0.03			c0.01	c0.17	
v/s Ratio Perm				0.12		0.07
v/c Ratio	0.40			0.16	0.23	0.10
Uniform Delay, d ₁	45.9			1.9	4.3	3.8
Progression Factor	1.00			1.00	0.49	0.68
Incremental Delay, d ₂	0.7			0.0	0.4	0.2
Delay (s)	46.6			1.9	2.5	2.8
Level of Service	D			A	A	A
Approach Delay (s)	46.6			1.9	2.6	
Approach LOS	D			A	A	

Intersection Summary

HCM Average Control Delay	6.1	HCM Level of Service	A
HCM Volume to Capacity ratio	0.25		
Actuated Cycle Length (s)	105.0	Sum of lost time (s)	15.0
Intersection Capacity Utilization	47.4%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

Queues
13: North State St & Canal St

2009 Weekday AM Peak Hour
5/5/2010

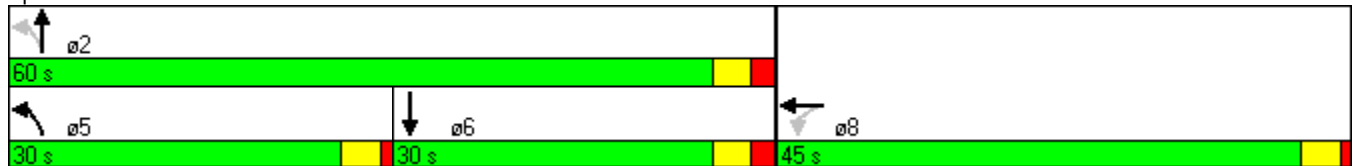


Lane Group	WBT	NBL	NBT	SBT
Lane Configurations	←←←←	↖	↑↑	↑↑
Volume (vph)	1720	400	420	600
Lane Group Flow (vph)	2414	435	457	815
Turn Type		pm+pt		
Protected Phases	8	5	2	6
Permitted Phases		2		
Detector Phase	8	5	2	6
Switch Phase				
Minimum Initial (s)	12.0	6.0	15.0	15.0
Minimum Split (s)	22.0	19.0	27.0	27.0
Total Split (s)	45.0	30.0	60.0	30.0
Total Split (%)	42.9%	28.6%	57.1%	28.6%
Yellow Time (s)	3.0	3.0	3.0	3.0
All-Red Time (s)	1.0	1.0	2.0	2.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.0	4.0	5.0	5.0
Lead/Lag		Lead		Lag
Lead-Lag Optimize?		Yes		Yes
Recall Mode	None	None	C-Min	C-Min
v/c Ratio	0.96	0.95	0.25	0.88
Control Delay	42.3	63.6	12.7	49.5
Queue Delay	1.9	156.2	1.5	0.3
Total Delay	44.2	219.8	14.2	49.8
Queue Length 50th (ft)	452	246	81	276
Queue Length 95th (ft)	#553	#394	90	#408
Internal Link Dist (ft)	377		118	106
Turn Bay Length (ft)				
Base Capacity (vph)	2506	505	1854	921
Starvation Cap Reductn	0	182	1173	0
Spillback Cap Reductn	43	0	0	8
Storage Cap Reductn	0	0	0	0
Reduced v/c Ratio	0.98	1.35	0.67	0.89

Intersection Summary

Cycle Length: 105
 Actuated Cycle Length: 105
 Offset: 101 (96%), Referenced to phase 2:NBT and 6:SBT, Start of Green
 Natural Cycle: 80
 Control Type: Actuated-Coordinated
 # 95th percentile volume exceeds capacity, queue may be longer.
 Queue shown is maximum after two cycles.

Splits and Phases: 13: North State St & Canal St



HCM Signalized Intersection Capacity Analysis
13: North State St & Canal St

2009 Weekday AM Peak Hour
5/5/2010



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations					← ← ← ←		←	↑↑			↑↑	
Volume (vph)	0	0	0	250	1720	250	400	420	0	0	600	150
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)					4.0		4.0	5.0			5.0	
Lane Util. Factor					0.86		1.00	0.95			0.95	
Frt					0.98		1.00	1.00			0.97	
Flt Protected					0.99		0.95	1.00			1.00	
Satd. Flow (prot)					6264		1770	3539			3433	
Flt Permitted					0.99		0.13	1.00			1.00	
Satd. Flow (perm)					6264		237	3539			3433	
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	0	0	272	1870	272	435	457	0	0	652	163
RTOR Reduction (vph)	0	0	0	0	22	0	0	0	0	0	21	0
Lane Group Flow (vph)	0	0	0	0	2392	0	435	457	0	0	794	0
Turn Type				Perm			pm+pt					
Protected Phases					8		5	2			6	
Permitted Phases				8			2					
Actuated Green, G (s)					41.7		54.3	54.3			27.5	
Effective Green, g (s)					41.7		54.3	54.3			27.5	
Actuated g/C Ratio					0.40		0.52	0.52			0.26	
Clearance Time (s)					4.0		4.0	5.0			5.0	
Vehicle Extension (s)					5.0		1.0	0.2			0.2	
Lane Grp Cap (vph)					2488		455	1830			899	
v/s Ratio Prot							c0.21	0.13			0.23	
v/s Ratio Perm					0.38		c0.29					
v/c Ratio					0.96		0.96	0.25			0.88	
Uniform Delay, d1					30.9		29.8	14.1			37.2	
Progression Factor					1.00		1.25	0.88			1.00	
Incremental Delay, d2					10.7		29.1	0.3			12.3	
Delay (s)					41.6		66.4	12.7			49.5	
Level of Service					D		E	B			D	
Approach Delay (s)		0.0			41.6			38.9			49.5	
Approach LOS		A			D			D			D	

Intersection Summary			
HCM Average Control Delay	42.6	HCM Level of Service	D
HCM Volume to Capacity ratio	0.94		
Actuated Cycle Length (s)	105.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	87.3%	ICU Level of Service	E
Analysis Period (min)	15		
c Critical Lane Group			

Queues
14: South State St & Canal St

2009 Weekday AM Peak Hour
5/5/2010

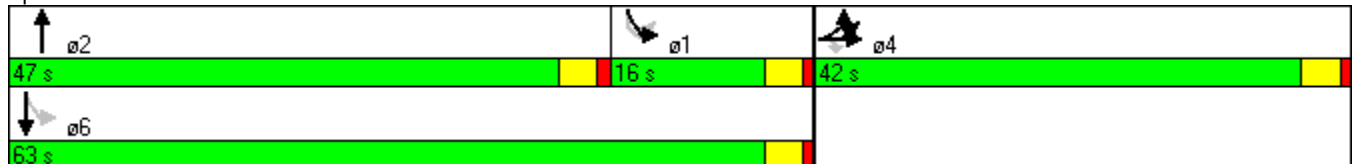


Lane Group	EBL2	EBL	EBT	EBR	NBT	SBL2	SBL	SBT
Lane Configurations								
Volume (vph)	350	430	260	460	470	180	100	570
Lane Group Flow (vph)	342	388	400	500	674	0	0	925
Turn Type	Split	Split		Perm		custom	pm+pt	
Protected Phases	4	4	4		2		1	6
Permitted Phases				4		1	6	
Detector Phase	4	4	4	4	2	1	1	6
Switch Phase								
Minimum Initial (s)	5.0	5.0	5.0	5.0	25.0	5.0	5.0	25.0
Minimum Split (s)	29.0	29.0	29.0	29.0	29.0	16.0	16.0	29.0
Total Split (s)	42.0	42.0	42.0	42.0	47.0	16.0	16.0	63.0
Total Split (%)	40.0%	40.0%	40.0%	40.0%	44.8%	15.2%	15.2%	60.0%
Yellow Time (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Lead/Lag					Lead	Lag	Lag	
Lead-Lag Optimize?								
Recall Mode	None	None	None	None	C-Min	None	None	C-Min
v/c Ratio	0.58	0.69	0.68	0.69	0.34			0.77
Control Delay	22.7	26.2	25.8	11.6	5.9			14.5
Queue Delay	1.7	4.3	0.0	0.0	0.0			5.0
Total Delay	24.4	30.4	25.8	11.6	6.0			19.6
Queue Length 50th (ft)	150	200	205	121	103			92
Queue Length 95th (ft)	m300	m381	m392	m326	108			m81
Internal Link Dist (ft)			1037		363			118
Turn Bay Length (ft)								
Base Capacity (vph)	630	604	627	762	1961			1236
Starvation Cap Reductn	0	0	0	0	0			245
Spillback Cap Reductn	150	144	0	0	156			0
Storage Cap Reductn	0	0	0	0	0			0
Reduced v/c Ratio	0.71	0.84	0.64	0.66	0.37			0.93

Intersection Summary

Cycle Length: 105
 Actuated Cycle Length: 105
 Offset: 28 (27%), Referenced to phase 2:NBT and 6:SBTL, Start of Yellow
 Natural Cycle: 75
 Control Type: Actuated-Coordinated
 m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 14: South State St & Canal St



HCM Signalized Intersection Capacity Analysis
 14: South State St & Canal St

2009 Weekday AM Peak Hour

5/5/2010



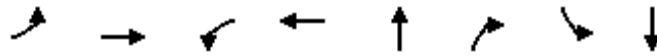
Movement	EBL2	EBL	EBT	EBR	NBT	NBR	NBR2	SBL2	SBL	SBT
Lane Configurations										
Volume (vph)	350	430	260	460	470	120	30	180	100	570
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0					4.0
Lane Util. Factor	0.95	0.91	0.91	1.00	0.95					0.95
Frt	1.00	1.00	1.00	0.85	0.96					1.00
Flt Protected	0.95	0.95	0.99	1.00	1.00					0.98
Satd. Flow (prot)	1681	1610	1671	1583	3411					3482
Flt Permitted	0.95	0.95	0.99	1.00	1.00					0.59
Satd. Flow (perm)	1681	1610	1671	1583	3411					2104
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	380	467	283	500	511	130	33	196	109	620
RTOR Reduction (vph)	0	0	0	175	3	0	0	0	0	0
Lane Group Flow (vph)	342	388	400	325	671	0	0	0	0	925
Turn Type	Split	Split		Perm				custom	pm+pt	
Protected Phases	4	4	4		2				1	6
Permitted Phases				4				1	6	
Actuated Green, G (s)	36.7	36.7	36.7	36.7	60.3					60.3
Effective Green, g (s)	36.7	36.7	36.7	36.7	60.3					60.3
Actuated g/C Ratio	0.35	0.35	0.35	0.35	0.57					0.57
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0					4.0
Vehicle Extension (s)	3.5	3.5	3.5	3.5	0.2					0.2
Lane Grp Cap (vph)	588	563	584	553	1959					1208
v/s Ratio Prot	0.20	c0.24	0.24		0.20					
v/s Ratio Perm				0.21						c0.44
v/c Ratio	0.58	0.69	0.68	0.59	0.34					0.77
Uniform Delay, d1	27.9	29.3	29.2	28.0	11.8					17.0
Progression Factor	0.71	0.73	0.73	0.63	0.45					0.68
Incremental Delay, d2	1.1	2.6	2.4	1.2	0.4					1.1
Delay (s)	21.0	24.0	23.8	18.8	5.7					12.6
Level of Service	C	C	C	B	A					B
Approach Delay (s)			21.7		5.7					12.6
Approach LOS			C		A					B

Intersection Summary

HCM Average Control Delay	15.8	HCM Level of Service	B
HCM Volume to Capacity ratio	0.74		
Actuated Cycle Length (s)	105.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	73.7%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			

Queues
15: Dock Street & Canal St

2009 Weekday AM Peak Hour
5/5/2010

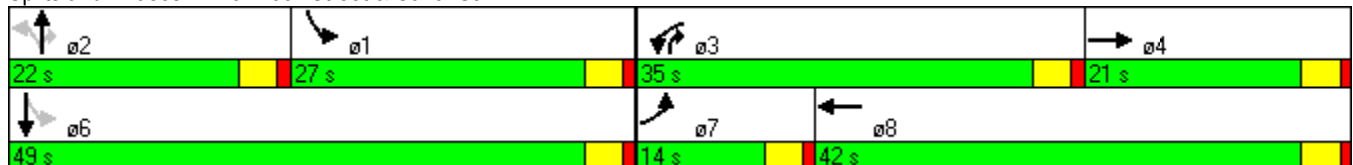


Lane Group	EBL	EBT	WBL	WBT	NBT	NBR	SBL	SBT
Lane Configurations	↖	↗↘	↖	↗↘	↗↘	↗	↖	↗↘
Volume (vph)	42	263	335	580	343	200	373	675
Lane Group Flow (vph)	46	286	364	1100	373	217	405	871
Turn Type	Prot		Prot			pm+ov	pm+pt	
Protected Phases	7	4	3	8	2	3	1	6
Permitted Phases						2	6	
Detector Phase	7	4	3	8	2	3	1	6
Switch Phase								
Minimum Initial (s)	10.0	10.0	5.0	10.0	10.0	5.0	5.0	10.0
Minimum Split (s)	14.0	20.0	14.0	20.0	21.0	14.0	15.0	15.0
Total Split (s)	14.0	21.0	35.0	42.0	22.0	35.0	27.0	49.0
Total Split (%)	13.3%	20.0%	33.3%	40.0%	21.0%	33.3%	25.7%	46.7%
Yellow Time (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	-1.0	-1.0	-1.0	-1.0
Total Lost Time (s)	4.0	4.0	4.0	4.0	3.0	3.0	3.0	3.0
Lead/Lag	Lead	Lag	Lead	Lag	Lead	Lead	Lag	
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	
Recall Mode	None	None	None	None	C-Max	None	None	C-Max
v/c Ratio	0.27	0.54	0.79	0.81	0.47	0.25	0.69	0.52
Control Delay	48.7	44.9	48.6	30.1	39.0	3.1	30.7	18.3
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.4
Total Delay	48.7	44.9	48.6	30.1	39.0	3.1	30.7	18.8
Queue Length 50th (ft)	29	91	223	293	122	10	156	176
Queue Length 95th (ft)	65	136	323	383	171	30	263	255
Internal Link Dist (ft)		841		1377	257			363
Turn Bay Length (ft)			150			100		
Base Capacity (vph)	169	586	523	1362	801	916	585	1684
Starvation Cap Reductn	0	0	0	0	0	0	0	350
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	0.27	0.49	0.70	0.81	0.47	0.24	0.69	0.65

Intersection Summary

Cycle Length: 105
 Actuated Cycle Length: 105
 Offset: 103 (98%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green
 Natural Cycle: 75
 Control Type: Actuated-Coordinated

Splits and Phases: 15: Dock Street & Canal St



HCM Signalized Intersection Capacity Analysis
15: Dock Street & Canal St

2009 Weekday AM Peak Hour

5/5/2010



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	42	263	0	335	580	432	0	343	200	373	675	126
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			3.0	3.0	3.0	3.0	
Lane Util. Factor	1.00	0.95		1.00	0.95			0.95	1.00	1.00	0.95	
Frt	1.00	1.00		1.00	0.94			1.00	0.85	1.00	0.98	
Flt Protected	0.95	1.00		0.95	1.00			1.00	1.00	0.95	1.00	
Satd. Flow (prot)	1770	3539		1770	3312			3539	1583	1770	3456	
Flt Permitted	0.95	1.00		0.95	1.00			1.00	1.00	0.38	1.00	
Satd. Flow (perm)	1770	3539		1770	3312			3539	1583	708	3456	
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)	46	286	0	364	630	470	0	373	217	405	734	137
RTOR Reduction (vph)	0	0	0	0	126	0	0	0	83	0	14	0
Lane Group Flow (vph)	46	286	0	364	974	0	0	373	134	405	857	0
Turn Type	Prot			Prot			Perm		pm+ov	pm+pt		
Protected Phases	7	4		3	8			2	3	1	6	
Permitted Phases							2		2	6		
Actuated Green, G (s)	6.0	17.4		27.4	38.8			21.2	48.6	48.2	48.2	
Effective Green, g (s)	6.0	17.4		27.4	38.8			22.2	50.6	49.2	49.2	
Actuated g/C Ratio	0.06	0.17		0.26	0.37			0.21	0.48	0.47	0.47	
Clearance Time (s)	4.0	4.0		4.0	4.0			4.0	4.0	4.0	4.0	
Vehicle Extension (s)	5.0	5.0		5.0	5.0			0.2	5.0	5.0	0.2	
Lane Grp Cap (vph)	101	586		462	1224			748	763	574	1619	
v/s Ratio Prot	0.03	0.08		c0.21	c0.29			0.11	0.05	c0.16	0.25	
v/s Ratio Perm									0.04	c0.17		
v/c Ratio	0.46	0.49		0.79	0.80			0.50	0.18	0.71	0.53	
Uniform Delay, d1	47.9	39.8		36.1	29.6			36.5	15.4	26.3	19.7	
Progression Factor	1.00	1.00		1.00	1.00			1.00	1.00	0.90	0.90	
Incremental Delay, d2	6.7	1.3		10.0	4.2			2.4	0.2	3.9	1.0	
Delay (s)	54.6	41.1		46.1	33.8			38.9	15.6	27.5	18.8	
Level of Service	D	D		D	C			D	B	C	B	
Approach Delay (s)		43.0			36.8			30.3			21.5	
Approach LOS		D			D			C			C	

Intersection Summary

HCM Average Control Delay	31.0	HCM Level of Service	C
HCM Volume to Capacity ratio	0.73		
Actuated Cycle Length (s)	105.0	Sum of lost time (s)	7.0
Intersection Capacity Utilization	83.7%	ICU Level of Service	E
Analysis Period (min)	15		
c Critical Lane Group			

Queues
16: North State St & Elm Street

2009 Weekday AM Peak Hour
5/5/2010



Lane Group	WBL	WBT	WBR	NBL	NBT	SBT
Lane Configurations	↶	↶↷	↶	↶	↷↷	↷↷↷
Volume (vph)	247	536	611	361	757	926
Lane Group Flow (vph)	268	862	385	392	823	1294
Turn Type	Perm		Perm	pm+pt		
Protected Phases		8		5	2	6
Permitted Phases	8		8	2		
Detector Phase	8	8	8	5	2	6
Switch Phase						
Minimum Initial (s)	7.0	7.0	7.0	6.0	20.0	20.0
Minimum Split (s)	22.0	22.0	22.0	10.0	24.0	24.0
Total Split (s)	37.0	37.0	37.0	31.0	68.0	37.0
Total Split (%)	35.2%	35.2%	35.2%	29.5%	64.8%	35.2%
Yellow Time (s)	3.0	3.0	3.0	3.0	3.0	3.0
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0	1.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Lead/Lag				Lead		Lag
Lead-Lag Optimize?				Yes		Yes
Recall Mode	None	None	None	None	C-Min	C-Min
v/c Ratio	0.52	0.87	0.70	0.91	0.37	0.65
Control Delay	34.5	42.5	23.5	64.8	8.1	27.7
Queue Delay	0.3	0.0	0.0	5.8	0.5	0.0
Total Delay	34.8	42.5	23.5	70.6	8.6	27.7
Queue Length 50th (ft)	146	270	126	239	91	254
Queue Length 95th (ft)	224	352	247	m286	122	335
Internal Link Dist (ft)		759			227	555
Turn Bay Length (ft)	500		500			
Base Capacity (vph)	560	1070	583	527	2246	2005
Starvation Cap Reductn	0	0	0	88	930	0
Spillback Cap Reductn	56	0	0	0	0	3
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.53	0.81	0.66	0.89	0.63	0.65

Intersection Summary

Cycle Length: 105
 Actuated Cycle Length: 105
 Offset: 70 (67%), Referenced to phase 2:NBT and 6:SBT, Start of Yellow
 Natural Cycle: 60
 Control Type: Actuated-Coordinated
 m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 16: North State St & Elm Street



HCM Signalized Intersection Capacity Analysis
 16: North State St & Elm Street

2009 Weekday AM Peak Hour
 5/5/2010



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations				↖	↕	↗	↖	↕			↕	↗
Volume (vph)	0	0	0	247	536	611	361	757	0	0	926	264
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)				4.0	4.0	4.0	4.0	4.0			4.0	
Lane Util. Factor				1.00	0.91	0.91	1.00	0.95			0.91	
Frt				1.00	0.95	0.85	1.00	1.00			0.97	
Flt Protected				0.95	1.00	1.00	0.95	1.00			1.00	
Satd. Flow (prot)				1770	3226	1441	1770	3539			4916	
Flt Permitted				0.95	1.00	1.00	0.10	1.00			1.00	
Satd. Flow (perm)				1770	3226	1441	191	3539			4916	
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	0	0	268	583	664	392	823	0	0	1007	287
RTOR Reduction (vph)	0	0	0	0	51	132	0	0	0	0	43	0
Lane Group Flow (vph)	0	0	0	268	811	253	392	823	0	0	1251	0
Turn Type				Perm		Perm	pm+pt					
Protected Phases					8		5	2			6	
Permitted Phases				8		8	2					
Actuated Green, G (s)				30.6	30.6	30.6	66.4	66.4			41.9	
Effective Green, g (s)				30.6	30.6	30.6	66.4	66.4			41.9	
Actuated g/C Ratio				0.29	0.29	0.29	0.63	0.63			0.40	
Clearance Time (s)				4.0	4.0	4.0	4.0	4.0			4.0	
Vehicle Extension (s)				1.0	1.0	1.0	1.0	0.2			0.2	
Lane Grp Cap (vph)				516	940	420	429	2238			1962	
v/s Ratio Prot					c0.25		c0.18	0.23			0.25	
v/s Ratio Perm				0.15		0.18	c0.40					
v/c Ratio				0.52	0.86	0.60	0.91	0.37			0.64	
Uniform Delay, d1				31.1	35.2	32.0	28.5	9.2			25.4	
Progression Factor				1.00	1.00	1.00	1.82	0.80			1.00	
Incremental Delay, d2				0.4	8.0	1.7	16.5	0.3			1.6	
Delay (s)				31.4	43.2	33.7	68.5	7.7			27.0	
Level of Service				C	D	C	E	A			C	
Approach Delay (s)		0.0			38.7			27.3			27.0	
Approach LOS		A			D			C			C	

Intersection Summary			
HCM Average Control Delay	31.5	HCM Level of Service	C
HCM Volume to Capacity ratio	0.88		
Actuated Cycle Length (s)	105.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	75.1%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			

Queues
 17: South State St & Elm Street I-95 NB on-ramp

2009 Weekday AM Peak Hour
 5/5/2010



Lane Group	EBL2	EBT	NBT	SBL	SBT
Lane Configurations					
Volume (vph)	149	210	969	183	774
Lane Group Flow (vph)	162	667	1399	434	841
Turn Type	Perm			Prot	
Protected Phases		4	2	1	6
Permitted Phases	4				
Detector Phase	4	4	2	1	6
Switch Phase					
Minimum Initial (s)	12.0	12.0	15.0	6.0	15.0
Minimum Split (s)	22.0	22.0	22.0	10.0	22.0
Total Split (s)	28.0	28.0	55.0	22.0	77.0
Total Split (%)	26.7%	26.7%	52.4%	21.0%	73.3%
Yellow Time (s)	3.0	3.0	3.0	3.0	3.0
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0
Lead/Lag			Lag	Lead	
Lead-Lag Optimize?			Yes	Yes	
Recall Mode	None	None	C-Min	None	C-Min
v/c Ratio	0.38	0.79	0.83	0.88dl	0.66
Control Delay	34.1	38.1	18.0	64.3	15.5
Queue Delay	0.5	0.0	0.0	0.0	2.1
Total Delay	34.6	38.1	18.0	64.3	17.6
Queue Length 50th (ft)	69	142	429	162	140
Queue Length 95th (ft)	m140	#275	m283	214	341
Internal Link Dist (ft)		1681	420		227
Turn Bay Length (ft)					
Base Capacity (vph)	433	854	1711	589	1300
Starvation Cap Reductn	0	0	0	0	305
Spillback Cap Reductn	74	0	0	0	0
Storage Cap Reductn	0	0	0	0	0
Reduced v/c Ratio	0.45	0.78	0.82	0.74	0.85

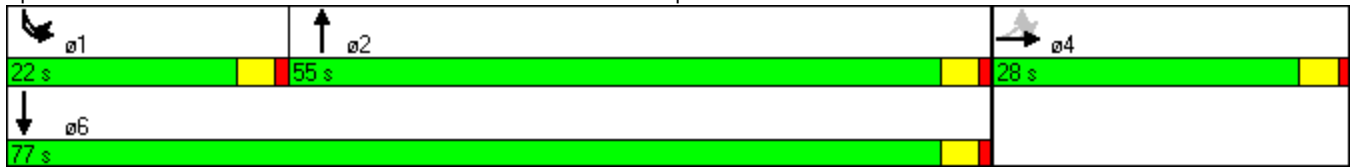
Intersection Summary

Cycle Length: 105
 Actuated Cycle Length: 105
 Offset: 74 (70%), Referenced to phase 2:NBT and 6:SBT, Start of Yellow
 Natural Cycle: 70
 Control Type: Actuated-Coordinated
 # 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.
 dl Defacto Left Lane. Recode with 1 though lane as a left lane.

Queues
17: South State St & Elm Street I-95 NB on-ramp

2009 Weekday AM Peak Hour
5/5/2010

Splits and Phases: 17: South State St & Elm Street I-95 NB on-ramp



HCM Signalized Intersection Capacity Analysis
 17: South State St & Elm Street I-95 NB on-ramp

2009 Weekday AM Peak Hour
 5/5/2010



Movement	EBL2	EBL	EBT	EBR	NBT	NBR	NBR2	SBL2	SBL	SBT
Lane Configurations	↶		↷↶		↷↶				↷↶	↷
Volume (vph)	149	227	210	177	969	208	110	216	183	774
Ideal Flow (vphpl)	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				0.97	1.00
Frt	1.00		0.96		0.96				1.00	1.00
Flt Protected	0.95		0.98		1.00				0.95	1.00
Satd. Flow (prot)	1770		3325		3408				3433	1863
Flt Permitted	0.95		0.98		1.00				0.95	1.00
Satd. Flow (perm)	1770		3325		3408				3433	1863
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	162	247	228	192	1053	226	120	235	199	841
RTOR Reduction (vph)	0	0	41	0	7	0	0	0	0	0
Lane Group Flow (vph)	162	0	626	0	1392	0	0	0	434	841
Turn Type	Perm	Perm						Prot	Prot	
Protected Phases			4		2			1	1	6
Permitted Phases	4	4								
Actuated Green, G (s)	25.4		25.4		51.8				15.8	71.6
Effective Green, g (s)	25.4		25.4		51.8				15.8	71.6
Actuated g/C Ratio	0.24		0.24		0.49				0.15	0.68
Clearance Time (s)	4.0		4.0		4.0				4.0	4.0
Vehicle Extension (s)	5.0		5.0		0.2				1.0	0.2
Lane Grp Cap (vph)	428		804		1681				517	1270
v/s Ratio Prot					c0.41				c0.13	0.45
v/s Ratio Perm	0.09		0.19							
v/c Ratio	0.38		0.78		0.83				0.88dl	0.66
Uniform Delay, d1	33.2		37.2		22.8				43.4	9.7
Progression Factor	0.94		0.89		0.74				1.21	1.32
Incremental Delay, d2	1.1		5.4		0.5				8.9	2.2
Delay (s)	32.2		38.4		17.4				61.3	15.0
Level of Service	C		D		B				E	B
Approach Delay (s)			37.2		17.4					30.7
Approach LOS			D		B					C

Intersection Summary

HCM Average Control Delay	26.9	HCM Level of Service	C
HCM Volume to Capacity ratio	0.82		
Actuated Cycle Length (s)	105.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	76.4%	ICU Level of Service	D
Analysis Period (min)	15		

dl Defacto Left Lane. Recode with 1 though lane as a left lane.

c Critical Lane Group

HCM Unsignalized Intersection Capacity Analysis
18: Cherry Street & Elm Street

2009 Weekday AM Peak Hour
5/5/2010



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations					↔			↔			↔	
Volume (veh/h)	0	0	0	3	10	5	38	1290	6	16	707	196
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	0	0	3	11	5	41	1402	7	17	768	213
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type							None			None		
Median storage (veh)												
Upstream signal (ft)							336			500		
pX, platoon unblocked	0.85	0.85	0.70	0.85	0.85	0.71	0.70			0.71		
vC, conflicting volume	1704	2401	875	2398	2504	704	982			1409		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	460	1281	612	1277	1403	0	763			759		
tC, single (s)	7.5	6.5	6.9	7.5	6.5	6.9	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	100	100	100	97	90	99	93			97		
cM capacity (veh/h)	349	126	307	97	106	770	595			602		

Direction, Lane #	WB 1	NB 1	NB 2	SB 1
Volume Total	20	742	708	999
Volume Left	3	41	0	17
Volume Right	5	0	7	213
cSH	137	595	1700	602
Volume to Capacity	0.14	0.07	0.42	0.03
Queue Length 95th (ft)	12	6	0	2
Control Delay (s)	35.6	1.9	0.0	0.9
Lane LOS	E	A		A
Approach Delay (s)	35.6	1.0		0.9
Approach LOS	E			

Intersection Summary			
Average Delay		1.2	
Intersection Capacity Utilization	72.3%	ICU Level of Service	C
Analysis Period (min)		15	

Queues
19: Jefferson St & Elm Street

2009 Weekday AM Peak Hour
5/5/2010

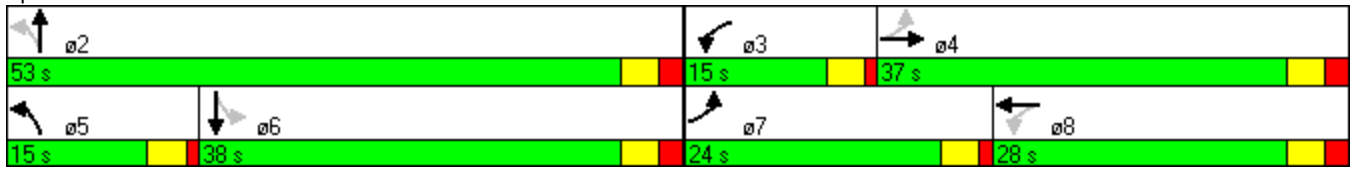


Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations	↖	↗	↖	↗		↕		↕
Volume (vph)	343	301	9	539	229	881	44	429
Lane Group Flow (vph)	373	406	10	706	0	1250	0	772
Turn Type	pm+pt		pm+pt		pm+pt		Perm	
Protected Phases	7	4	3	8	5	2		6
Permitted Phases	4		8		2		6	
Detector Phase	7	4	3	8	5	2	6	6
Switch Phase								
Minimum Initial (s)	5.0	5.0	5.0	5.0	10.0	10.0	10.0	10.0
Minimum Split (s)	9.0	21.0	14.0	21.0	14.0	21.0	21.0	21.0
Total Split (s)	24.0	37.0	15.0	28.0	15.0	53.0	38.0	38.0
Total Split (%)	22.9%	35.2%	14.3%	26.7%	14.3%	50.5%	36.2%	36.2%
Yellow Time (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
All-Red Time (s)	1.0	2.0	1.0	2.0	1.0	2.0	2.0	2.0
Lost Time Adjust (s)	0.0	-1.0	0.0	-1.0	0.0	-1.0	0.0	-1.0
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	5.0	4.0
Lead/Lag	Lead	Lag	Lead	Lag	Lead		Lag	Lag
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes		Yes	Yes
Recall Mode	None	None	None	None	None	C-Max	C-Max	C-Max
v/c Ratio	0.93	0.51	0.03	1.67		1.30		0.71
Control Delay	58.5	24.4	19.1	340.7		169.0		24.2
Queue Delay	0.0	3.6	0.0	0.0		0.0		0.0
Total Delay	58.5	28.0	19.1	340.7		169.0		24.2
Queue Length 50th (ft)	199	180	3	~690		~571		213
Queue Length 95th (ft)	#378	322	m10	m#874		#707		255
Internal Link Dist (ft)		290		495		389		256
Turn Bay Length (ft)	200		150					
Base Capacity (vph)	403	797	409	422		963		1084
Starvation Cap Reductn	0	294	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	0.93	0.81	0.02	1.67		1.30		0.71

Intersection Summary

Cycle Length: 105
 Actuated Cycle Length: 105
 Offset: 34 (32%), Referenced to phase 2:NBT and 6:SBTL, Start of Yellow
 Natural Cycle: 120
 Control Type: Actuated-Coordinated
 ~ 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.

Splits and Phases: 19: Jefferson St & Elm Street



HCM Signalized Intersection Capacity Analysis
 19: Jefferson St & Elm Street

2009 Weekday AM Peak Hour
 5/5/2010



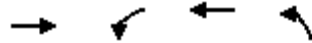
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↖	↗		↖	↗			↕			↕	
Volume (vph)	343	301	73	9	539	110	229	881	40	44	429	237
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0			4.0			4.0	
Lane Util. Factor	1.00	1.00		1.00	1.00			0.95			0.95	
Frt	1.00	0.97		1.00	0.97			0.99			0.95	
Flt Protected	0.95	1.00		0.95	1.00			0.99			1.00	
Satd. Flow (prot)	1770	1808		1770	1815			3486			3351	
Flt Permitted	0.13	1.00		0.52	1.00			0.58			0.66	
Satd. Flow (perm)	247	1808		975	1815			2059			2222	
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)	373	327	79	10	586	120	249	958	43	48	466	258
RTOR Reduction (vph)	0	7	0	0	7	0	0	2	0	0	50	0
Lane Group Flow (vph)	373	399	0	10	699	0	0	1248	0	0	722	0
Turn Type	pm+pt			pm+pt			pm+pt			Perm		
Protected Phases	7	4		3	8		5	2			6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)	50.2	44.9		27.5	26.2			44.8			44.8	
Effective Green, g (s)	50.2	45.9		27.5	27.2			45.8			45.8	
Actuated g/C Ratio	0.48	0.44		0.26	0.26			0.44			0.44	
Clearance Time (s)	4.0	5.0		4.0	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)	408	790		265	470			898			969	
v/s Ratio Prot	c0.17	0.22		0.00	c0.39							
v/s Ratio Perm	0.26			0.01				c0.61			0.33	
v/c Ratio	0.91	0.51		0.04	1.49			1.39			0.75	
Uniform Delay, d1	29.0	21.3		28.8	38.9			29.6			24.7	
Progression Factor	1.00	1.00		1.10	0.97			1.00			1.06	
Incremental Delay, d2	24.6	0.5		0.1	230.0			182.1			3.9	
Delay (s)	53.6	21.9		31.6	267.8			211.7			30.1	
Level of Service	D	C		C	F			F			C	
Approach Delay (s)		37.0			264.5			211.7			30.1	
Approach LOS		D			F			F			C	

Intersection Summary

HCM Average Control Delay	143.9	HCM Level of Service	F
HCM Volume to Capacity ratio	1.32		
Actuated Cycle Length (s)	105.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	120.4%	ICU Level of Service	H
Analysis Period (min)	15		
c Critical Lane Group			

Queues
20: East Main Street & North State Street

2009 Weekday AM Peak Hour
5/5/2010



Lane Group	EBT	WBL	WBT	NBL
Lane Configurations	↑↑		↑↑	↔
Volume (vph)	765	18	976	5
Lane Group Flow (vph)	837	0	1081	65
Turn Type	Perm			
Protected Phases	2		6	8
Permitted Phases		6		
Detector Phase	2	6	6	8
Switch Phase				
Minimum Initial (s)	5.0	5.0	5.0	7.0
Minimum Split (s)	20.0	20.0	20.0	22.0
Total Split (s)	78.0	78.0	78.0	27.0
Total Split (%)	74.3%	74.3%	74.3%	25.7%
Yellow Time (s)	3.0	3.0	3.0	3.0
All-Red Time (s)	1.0	1.0	1.0	1.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.0	4.0	4.0	4.0
Lead/Lag				
Lead-Lag Optimize?				
Recall Mode	C-Min	C-Min	C-Min	None
v/c Ratio	0.24		0.33	0.33
Control Delay	2.0		1.6	17.3
Queue Delay	0.0		0.1	0.0
Total Delay	2.0		1.7	17.3
Queue Length 50th (ft)	34		23	3
Queue Length 95th (ft)	93		84	41
Internal Link Dist (ft)	848		136	779
Turn Bay Length (ft)				
Base Capacity (vph)	3470		3237	402
Starvation Cap Reductn	0		959	0
Spillback Cap Reductn	0		0	0
Storage Cap Reductn	0		0	0
Reduced v/c Ratio	0.24		0.47	0.16

Intersection Summary

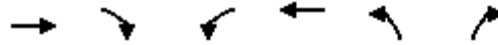
Cycle Length: 105
 Actuated Cycle Length: 105
 Offset: 45 (43%), Referenced to phase 2:EBT and 6:WBTL, Start of Yellow
 Natural Cycle: 45
 Control Type: Actuated-Coordinated

Splits and Phases: 20: East Main Street & North State Street



HCM Signalized Intersection Capacity Analysis
 20: East Main Street & North State Street

2009 Weekday AM Peak Hour
 5/5/2010



Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑			↑↑	↑↑	
Volume (vph)	765	5	18	976	5	55
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width	16	16	16	16	12	12
Total Lost time (s)	4.0			4.0	4.0	
Lane Util. Factor	0.95			0.95	1.00	
Frt	1.00			1.00	0.88	
Flt Protected	1.00			1.00	1.00	
Satd. Flow (prot)	4008			4007	1624	
Flt Permitted	1.00			0.93	1.00	
Satd. Flow (perm)	4008			3736	1624	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	832	5	20	1061	5	60
RTOR Reduction (vph)	0	0	0	0	56	0
Lane Group Flow (vph)	837	0	0	1081	9	0
Turn Type			Perm			
Protected Phases	2			6	8	
Permitted Phases			6			
Actuated Green, G (s)	89.3			89.3	7.7	
Effective Green, g (s)	89.3			89.3	7.7	
Actuated g/C Ratio	0.85			0.85	0.07	
Clearance Time (s)	4.0			4.0	4.0	
Vehicle Extension (s)	0.2			0.2	3.0	
Lane Grp Cap (vph)	3409			3177	119	
v/s Ratio Prot	0.21				c0.01	
v/s Ratio Perm				c0.29		
v/c Ratio	0.25			0.34	0.08	
Uniform Delay, d1	1.5			1.7	45.3	
Progression Factor	1.00			0.66	1.00	
Incremental Delay, d2	0.2			0.3	0.3	
Delay (s)	1.7			1.4	45.6	
Level of Service	A			A	D	
Approach Delay (s)	1.7			1.4	45.6	
Approach LOS	A			A	D	

Intersection Summary			
HCM Average Control Delay	2.9	HCM Level of Service	A
HCM Volume to Capacity ratio	0.32		
Actuated Cycle Length (s)	105.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	52.3%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

HCM Unsignalized Intersection Capacity Analysis
 21: East Main Street & Crystal Street

2009 Weekday AM Peak Hour
 5/5/2010



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↕↕	↕↕			
Volume (veh/h)	5	815	876	25	0	100
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	5	886	952	27	0	109
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage (veh)						
Upstream signal (ft)		216	192			
pX, platoon unblocked	0.92				0.94	0.92
vC, conflicting volume	979				1420	490
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	811				1127	280
tC, single (s)	4.1				6.8	6.9
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	99				100	84
cM capacity (veh/h)	749				186	662

Direction, Lane #	EB 1	EB 2	WB 1	WB 2
Volume Total	301	591	635	345
Volume Left	5	0	0	0
Volume Right	0	0	0	27
cSH	749	1700	1700	1700
Volume to Capacity	0.01	0.35	0.37	0.20
Queue Length 95th (ft)	1	0	0	0
Control Delay (s)	0.3	0.0	0.0	0.0
Lane LOS	A			
Approach Delay (s)	0.1		0.0	
Approach LOS				

Intersection Summary			
Average Delay		Err	
Intersection Capacity Utilization		Err%	ICU Level of Service H
Analysis Period (min)		15	

Queues
22: East Main Street & Myrtle Avenue

2009 Weekday AM Peak Hour
5/5/2010



Lane Group	EBT	WBL	WBT	NBL	NBR
Lane Configurations	↑↑		↑↑	↑	↑
Volume (vph)	612	111	701	218	123
Lane Group Flow (vph)	891	0	883	237	134
Turn Type		Perm			Perm
Protected Phases	2		6	8	
Permitted Phases		6			8
Detector Phase	2	6	6	8	8
Switch Phase					
Minimum Initial (s)	7.0	5.0	5.0	7.0	7.0
Minimum Split (s)	22.0	20.0	20.0	22.0	22.0
Total Split (s)	72.0	72.0	72.0	33.0	33.0
Total Split (%)	68.6%	68.6%	68.6%	31.4%	31.4%
Yellow Time (s)	3.0	3.0	3.0	3.0	3.0
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0
Lead/Lag					
Lead-Lag Optimize?					
Recall Mode	C-Min	C-Min	C-Min	None	None
v/c Ratio	0.35		0.49	0.73	0.34
Control Delay	3.8		6.5	37.7	2.0
Queue Delay	0.1		0.0	0.0	0.0
Total Delay	3.9		6.5	37.7	2.0
Queue Length 50th (ft)	25		100	78	0
Queue Length 95th (ft)	154		107	m101	m1
Internal Link Dist (ft)	112		226	1534	
Turn Bay Length (ft)				250	
Base Capacity (vph)	2543		1812	489	534
Starvation Cap Reductn	628		0	0	0
Spillback Cap Reductn	0		0	0	0
Storage Cap Reductn	0		0	0	0
Reduced v/c Ratio	0.47		0.49	0.48	0.25

Intersection Summary

Cycle Length: 105
 Actuated Cycle Length: 105
 Offset: 27 (26%), Referenced to phase 2:EBT and 6:WBTL, Start of Yellow
 Natural Cycle: 50
 Control Type: Actuated-Coordinated
 m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 22: East Main Street & Myrtle Avenue



HCM Signalized Intersection Capacity Analysis
 22: East Main Street & Myrtle Avenue

2009 Weekday AM Peak Hour
 5/5/2010



Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑			↑↑	↵	↵
Volume (vph)	612	208	111	701	218	123
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0			4.0	4.0	4.0
Lane Util. Factor	0.95			0.95	1.00	1.00
Fr _t	0.96			1.00	1.00	0.85
Fl _t Protected	1.00			0.99	0.95	1.00
Satd. Flow (prot)	3405			3515	1770	1583
Fl _t Permitted	1.00			0.69	0.95	1.00
Satd. Flow (perm)	3405			2448	1770	1583
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	665	226	121	762	237	134
RTOR Reduction (vph)	23	0	0	0	0	109
Lane Group Flow (vph)	868	0	0	883	237	25
Turn Type			Perm			Perm
Protected Phases	2			6	8	
Permitted Phases			6			8
Actuated Green, G (s)	77.7			77.7	19.3	19.3
Effective Green, g (s)	77.7			77.7	19.3	19.3
Actuated g/C Ratio	0.74			0.74	0.18	0.18
Clearance Time (s)	4.0			4.0	4.0	4.0
Vehicle Extension (s)	0.2			0.2	3.0	3.0
Lane Grp Cap (vph)	2520			1812	325	291
v/s Ratio Prot	0.25				c0.13	
v/s Ratio Perm				c0.36		0.02
v/c Ratio	0.34			0.49	0.73	0.08
Uniform Delay, d ₁	4.8			5.6	40.4	35.5
Progression Factor	0.72			0.87	0.68	0.04
Incremental Delay, d ₂	0.4			0.9	6.4	0.1
Delay (s)	3.8			5.8	33.8	1.5
Level of Service	A			A	C	A
Approach Delay (s)	3.8			5.8	22.2	
Approach LOS	A			A	C	

Intersection Summary			
HCM Average Control Delay	7.8	HCM Level of Service	A
HCM Volume to Capacity ratio	0.54		
Actuated Cycle Length (s)	105.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	68.2%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

HCM Unsignalized Intersection Capacity Analysis
 23: East Main Street & Maple Avenue

2009 Weekday AM Peak Hour
 5/5/2010



Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑			↑↑	↑↑	
Volume (veh/h)	695	40	30	776	36	38
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	755	43	33	843	39	41
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage (veh)						
Upstream signal (ft)	306			405		
pX, platoon unblocked				0.94	0.96	0.94
vC, conflicting volume				799	1264	399
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol				662	911	238
tC, single (s)				4.1	6.8	6.9
tC, 2 stage (s)						
tF (s)				2.2	3.5	3.3
p0 queue free %				96	84	94
cM capacity (veh/h)				868	252	719

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1
Volume Total	504	295	314	562	80
Volume Left	0	0	33	0	39
Volume Right	0	43	0	0	41
cSH	1700	1700	868	1700	378
Volume to Capacity	0.30	0.17	0.04	0.33	0.21
Queue Length 95th (ft)	0	0	3	0	20
Control Delay (s)	0.0	0.0	1.3	0.0	17.1
Lane LOS	A			C	
Approach Delay (s)	0.0		0.5		17.1
Approach LOS					C

Intersection Summary					
Average Delay			1.0		
Intersection Capacity Utilization			54.4%	ICU Level of Service	A
Analysis Period (min)			15		

Queues
24: East Main Street & Lincoln Avenue

2009 Weekday AM Peak Hour
5/5/2010



Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	NBR	SBL	SBT
Lane Configurations									
Volume (vph)	48	605	138	597	133	8	159	38	20
Lane Group Flow (vph)	52	745	150	666	0	154	173	0	146
Turn Type	pm+pt		pm+pt		Perm		Perm	Perm	
Protected Phases	5	2	1	6		8			4
Permitted Phases	2		6		8		8	4	
Detector Phase	5	2	1	6	8	8	8	4	4
Switch Phase									
Minimum Initial (s)	4.0	8.0	4.0	8.0	12.0	12.0	12.0	12.0	12.0
Minimum Split (s)	8.0	20.0	8.0	20.0	23.0	23.0	23.0	23.0	23.0
Total Split (s)	10.0	48.0	19.0	57.0	38.0	38.0	38.0	38.0	38.0
Total Split (%)	9.5%	45.7%	18.1%	54.3%	36.2%	36.2%	36.2%	36.2%	36.2%
Yellow Time (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Lead/Lag	Lead	Lag	Lead	Lag					
Lead-Lag Optimize?	Yes	Yes	Yes	Yes					
Recall Mode	None	C-Min	None	C-Min	None	None	None	None	None
v/c Ratio	0.10	0.35	0.29	0.29		0.80	0.39		0.43
Control Delay	5.0	8.3	6.6	9.2		68.0	7.5		23.0
Queue Delay	0.0	0.0	0.0	0.0		0.0	0.0		0.0
Total Delay	5.0	8.3	6.6	9.2		68.0	7.5		23.0
Queue Length 50th (ft)	7	77	25	92		100	0		46
Queue Length 95th (ft)	20	126	60	163		159	50		94
Internal Link Dist (ft)		325		1546		1598			1086
Turn Bay Length (ft)	120		180						
Base Capacity (vph)	553	2150	594	2326		327	630		527
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	0.09	0.35	0.25	0.29		0.47	0.27		0.28

Intersection Summary

Cycle Length: 105
 Actuated Cycle Length: 105
 Offset: 3 (3%), Referenced to phase 2:EBTL and 6:WBTL, Start of Yellow
 Natural Cycle: 55
 Control Type: Actuated-Coordinated

Splits and Phases: 24: East Main Street & Lincoln Avenue



HCM Signalized Intersection Capacity Analysis
 24: East Main Street & Lincoln Avenue

2009 Weekday AM Peak Hour
 5/5/2010



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	48	605	80	138	597	16	133	8	159	38	20	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			4.0	4.0		4.0	
Lane Util. Factor	1.00	0.95		1.00	0.95			1.00	1.00		1.00	
Frt	1.00	0.98		1.00	1.00			1.00	0.85		0.92	
Flt Protected	0.95	1.00		0.95	1.00			0.96	1.00		0.99	
Satd. Flow (prot)	1770	3477		1770	3526			1779	1583		1696	
Flt Permitted	0.39	1.00		0.31	1.00			0.54	1.00		0.87	
Satd. Flow (perm)	729	3477		577	3526			1012	1583		1489	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	52	658	87	150	649	17	145	9	173	41	22	83
RTOR Reduction (vph)	0	7	0	0	1	0	0	0	140	0	54	0
Lane Group Flow (vph)	52	738	0	150	665	0	0	154	33	0	92	0
Turn Type	pm+pt			pm+pt			Perm		Perm	Perm		
Protected Phases	5	2		1	6			8				4
Permitted Phases	2			6			8		8	4		
Actuated Green, G (s)	69.3	64.7		76.7	68.4			20.0	20.0		20.0	
Effective Green, g (s)	69.3	64.7		76.7	68.4			20.0	20.0		20.0	
Actuated g/C Ratio	0.66	0.62		0.73	0.65			0.19	0.19		0.19	
Clearance Time (s)	4.0	4.0		4.0	4.0			4.0	4.0		4.0	
Vehicle Extension (s)	2.0	0.2		2.0	0.2			3.0	3.0		3.0	
Lane Grp Cap (vph)	527	2142		516	2297			193	302		284	
v/s Ratio Prot	0.00	c0.21		c0.02	0.19							
v/s Ratio Perm	0.06			0.19				c0.15	0.02		0.06	
v/c Ratio	0.10	0.34		0.29	0.29			0.80	0.11		0.32	
Uniform Delay, d1	6.3	9.8		4.9	7.9			40.6	35.1		36.7	
Progression Factor	0.83	0.72		1.00	1.00			1.00	1.00		1.00	
Incremental Delay, d2	0.0	0.4		0.1	0.3			20.1	0.2		0.7	
Delay (s)	5.2	7.5		5.0	8.2			60.7	35.3		37.3	
Level of Service	A	A		A	A			E	D		D	
Approach Delay (s)		7.3			7.6			47.2			37.3	
Approach LOS		A			A			D			D	

Intersection Summary

HCM Average Control Delay	15.8	HCM Level of Service	B
HCM Volume to Capacity ratio	0.46		
Actuated Cycle Length (s)	105.0	Sum of lost time (s)	16.0
Intersection Capacity Utilization	51.4%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			