

# APPENDIX B

















## Traffic Data



# HCM Signalized Intersection Capacity Analysis

1: I-895 #1 & Devoe Ave.

8/16/2004

										
Movement	EBL2	EBL	EBT	WBT	WBR	WBR2	SBL	SBR	SEL	SER
Lane Configurations										
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	12	12	12	10	12	10	10	10	12	12
Total Lost time (s)		3.0	3.0	3.0	3.0				3.0	3.0
Lane Util. Factor		1.00	1.00	0.95	1.00				1.00	0.88
Flt		1.00	1.00	1.00	0.85				1.00	0.85
Flt Protected		0.95	1.00	1.00	1.00				0.95	1.00
Satd. Flow (prot)		1703	1792	3179	1524				1703	2682
Flt Permitted		0.95	1.00	1.00	1.00				0.95	1.00
Satd. Flow (perm)		1703	1792	3179	1524				1703	2682
Volume (vph)	245	155	150	1790	155	120	0	0	130	700
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	272	172	167	1989	172	133	0	0	144	778
Lane Group Flow (vph)	0	444	167	1989	305	0	0	0	144	778
Bus Blockages (#/hr)	0	0	0	0	0	6	0	0	0	0
Turn Type	Split	Split		Split						custom
Protected Phases	7	7	7	8	8				4	4
Permitted Phases					4					4
Actuated Green, G (s)		45.0	45.0	30.0	60.0				30.0	30.0
Effective Green, g (s)		47.0	47.0	32.0	64.0				32.0	32.0
Actuated g/C Ratio		0.39	0.39	0.27	0.53				0.27	0.27
Clearance Time (s)		5.0	5.0	5.0	5.0				5.0	5.0
Lane Grp Cap (vph)		667	702	848	851				454	715
v/s Ratio Prot		c0.26	0.09	c0.63	0.10				0.08	c0.29
v/s Ratio Perm					0.10					
v/c Ratio		0.67	0.24	2.35	0.36				0.32	1.09
Uniform Delay, d1		30.0	24.5	44.0	16.2				35.2	44.0
Progression Factor		1.00	1.00	1.00	1.00				0.92	0.91
Incremental Delay, d2		5.2	0.8	609.2	1.2				0.6	48.0
Delay (s)		35.2	25.3	653.2	17.3				33.2	88.2
Level of Service		D	C	F	B				C	F
Approach Delay (s)			32.5	568.6			0.0		79.6	
Approach LOS			C	F			A		E	

## Intersection Summary

HCM Average Control Delay	365.2	HCM Level of Service	F
HCM Volume to Capacity ratio	1.27		
Cycle Length (s)	120.0	Sum of lost time (s)	9.0
Intersection Capacity Utilization	97.6%	ICU Level of Service	E
c Critical Lane Group			

# HCM Signalized Intersection Capacity Analysis

2: E. Tremont Ave. & 177th St.


















8/16/2004

	→	↘	↙	←	↖	↗
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑			↑↑		↑↑↑
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.0			3.0		3.0
Lane Util. Factor	0.95			0.95		0.97
Frbp, ped/bikes	1.00			1.00		1.00
Flpb, ped/bikes	1.00			1.00		1.00
Frt	1.00			1.00		1.00
Flt Protected	1.00			0.98		0.95
Satd. Flow (prot)	3406			3159		3299
Flt Permitted	1.00			0.98		0.95
Satd. Flow (perm)	3406			3159		3299
Volume (vph)	425	0	450	825	355	10
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	472	0	500	917	394	11
Lane Group Flow (vph)	472	0	0	1417	405	0
Confl. Peds. (#/hr)		112	112		12	5
Bus Blockages (#/hr)	0	6	0	28	0	0
Turn Type			Perm			
Protected Phases	2			2	3	
Permitted Phases	2		2	2	3	
Actuated Green, G (s)	55.0			55.0	55.0	
Effective Green, g (s)	57.0			57.0	57.0	
Actuated g/C Ratio	0.48			0.48	0.48	
Clearance Time (s)	5.0			5.0	5.0	
Lane Grp Cap (vph)	1618			1501	1567	
v/s Ratio Prot	0.14			c0.45	c0.12	
v/s Ratio Perm						
v/c Ratio	0.29			0.94	0.26	
Uniform Delay, d1	19.2			30.0	18.9	
Progression Factor	1.59			0.43	0.62	
Incremental Delay, d2	0.1			9.9	0.3	
Delay (s)	30.6			22.9	12.0	
Level of Service	C			C	B	
Approach Delay (s)	30.6			22.9	12.0	
Approach LOS	C			C	B	
<b>Intersection Summary</b>						
HCM Average Control Delay			22.6		HCM Level of Service	C
HCM Volume to Capacity ratio			0.60			
Cycle Length (s)			120.0		Sum of lost time (s)	6.0
Intersection Capacity Utilization			76.5%		ICU Level of Service	C
c Critical Lane Group						

# HCM Signalized Intersection Capacity Analysis

3: E. Tremont Ave. & Devoe Ave.













8/16/2004

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		3.0			3.0			3.0		3.0		3.0
Lane Util. Factor		0.95			0.95			1.00		1.00		1.00
Frbp, ped/bikes		1.00			1.00			0.93		1.00		0.98
Flpb, ped/bikes		1.00			1.00			1.00		0.94		1.00
Frt		1.00			1.00			0.95		1.00		0.85
Flt Protected		1.00			1.00			0.99		0.95		1.00
Satd. Flow (prot)		3396			3389			1570		643		595
Flt Permitted		1.00			1.00			0.99		0.47		1.00
Satd. Flow (perm)		3396			3389			1570		315		595
Volume (vph)	25	410	0	0	1050	10	50	150	130	15	0	175
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	28	456	0	0	1167	11	56	167	144	17	0	194
Lane Group Flow (vph)	0	484	0	0	1178	0	0	367	0	17	0	194
Confl. Peds. (#/hr)	97		112				97	5		73	73	5
Bus Blockages (#/hr)	0	0	28	0	0	28	0	0	6	0	0	0
Parking (#/hr)						20	20		20	100		100
Turn Type	Perm						Perm			D.Pm		custom
Protected Phases		2			2			4				
Permitted Phases	2	2			2		4	4		4		4
Actuated Green, G (s)		55.0			55.0			55.0		55.0		55.0
Effective Green, g (s)		57.0			57.0			57.0		57.0		57.0
Actuated g/C Ratio		0.48			0.48			0.48		0.48		0.48
Clearance Time (s)		5.0			5.0			5.0		5.0		5.0
Lane Grp Cap (vph)		1613			1610			746		150		283
v/s Ratio Prot		0.14			c0.35			0.23				
v/s Ratio Perm										0.05		c0.33
v/c Ratio		0.30			0.73			0.49		0.11		0.69
Uniform Delay, d1		19.3			25.3			21.6		17.5		24.5
Progression Factor		0.19			1.91			0.78		1.00		1.00
Incremental Delay, d2		0.5			2.5			2.2		1.5		12.7
Delay (s)		4.1			51.0			19.0		19.0		37.2
Level of Service		A			D			B		B		D
Approach Delay (s)		4.1			51.0			19.0			35.8	
Approach LOS		A			D			B			D	
<b>Intersection Summary</b>												
HCM Average Control Delay			34.2								C	
HCM Volume to Capacity ratio			0.71									
Cycle Length (s)			120.0							6.0		
Intersection Capacity Utilization			78.7%								C	
c Critical Lane Group												

# HCM Signalized Intersection Capacity Analysis

## 4: E. Tremont Ave. & Bronx Park Ave.

8/16/2004

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↑↑			↑↑						↑↑	
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	12	12	12	12	12	12	12	12	12	12	15	12
Total Lost time (s)		3.0			3.0						3.0	
Lane Util. Factor		0.95			0.95						0.95	
Frbp, ped/bikes		0.99			1.00						0.87	
Flpb, ped/bikes		1.00			1.00						1.00	
Frt		0.99			1.00						0.91	
Flt Protected		1.00			1.00						1.00	
Satd. Flow (prot)		3012			3056						2658	
Flt Permitted		1.00			1.00						1.00	
Satd. Flow (perm)		3012			3056						2658	
Volume (vph)	0	530	25	60	925	0	0	0	0	20	80	135
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	0	589	28	67	1028	0	0	0	0	22	89	150
Lane Group Flow (vph)	0	617	0	0	1095	0	0	0	0	0	261	0
Confl. Peds. (#/hr)			100	100			100		100	100		100
Bus Blockages (#/hr)	0	0	28	0	0	28	0	0	0	0	0	0
Parking (#/hr)		20	20		20					20	20	20
Turn Type				Perm							Split	
Protected Phases		4			4					6	6	
Permitted Phases		4		4	4							
Actuated Green, G (s)		69.0			69.0						41.0	
Effective Green, g (s)		71.0			71.0						43.0	
Actuated g/C Ratio		0.59			0.59						0.36	
Clearance Time (s)		5.0			5.0						5.0	
Lane Grp Cap (vph)		1782			1808						952	
v/s Ratio Prot		0.20			c0.36						c0.10	
v/s Ratio Perm												
v/c Ratio		0.35			0.61						0.27	
Uniform Delay, d1		12.6			15.6						27.4	
Progression Factor		1.98			1.00						1.00	
Incremental Delay, d2		0.5			1.5						0.7	
Delay (s)		25.4			17.1						28.1	
Level of Service		C			B						C	
Approach Delay (s)		25.4			17.1			0.0			28.1	
Approach LOS		C			B			A			C	

### Intersection Summary

HCM Average Control Delay	21.2	HCM Level of Service	C
HCM Volume to Capacity ratio	0.48		
Cycle Length (s)	120.0	Sum of lost time (s)	6.0
Intersection Capacity Utilization	71.1%	ICU Level of Service	C

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis

5: E. Tremont Ave. & Boston Rd.












8/16/2004

Movement	EBL	EBT	EBR	EBR2	WBL2	WBL	WBT	WBR	NBL2	NBL	NBR	NBR2
Lane Configurations		↑	↑			↑	↑↑	↑		↑	↑	↑
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	12	12	12	12	11	11	11	11	11	11	11	11
Total Lost time (s)		3.0	3.0			3.0	3.0	3.0		3.0	3.0	
Lane Util. Factor		1.00	1.00			0.91	0.91	1.00		1.00	0.95	
Flt		1.00	0.85			1.00	1.00	0.85		0.91	0.85	
Flt Protected		1.00	1.00			0.95	0.98	1.00		0.98	1.00	
Satd. Flow (prot)		1784	914			1498	3102	884		1549	1399	
Flt Permitted		1.00	1.00			0.95	0.98	1.00		0.89	1.00	
Satd. Flow (perm)		1784	914			1498	3102	884		1405	1399	
Volume (vph)	25	255	45	25	165	425	490	100	10	30	55	170
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	28	283	50	28	183	472	544	111	11	33	61	189
Lane Group Flow (vph)	0	311	78	0	0	386	813	111	0	105	189	0
Bus Blockages (#/hr)	0	0	100	100	0	0	0	100	0	0	0	0
Turn Type	Split		Prot		Split	Split		Prot	custom		custom	
Protected Phases	8	8	8		4	4	4	4				2
Permitted Phases									2	2	2	
Actuated Green, G (s)		27.0	27.0			29.0	29.0	29.0		22.0	22.0	
Effective Green, g (s)		29.0	29.0			31.0	31.0	31.0		24.0	24.0	
Actuated g/C Ratio		0.24	0.24			0.26	0.26	0.26		0.20	0.20	
Clearance Time (s)		5.0	5.0			5.0	5.0	5.0		5.0	5.0	
Lane Grp Cap (vph)		431	221			387	801	228		281	280	
v/s Ratio Prot		c0.17	0.09			0.26	c0.26	0.13			0.14	
v/s Ratio Perm										0.07		
v/c Ratio		0.72	0.35			1.00	1.01	0.49		0.37	0.68	
Uniform Delay, d1		41.8	37.7			44.5	44.5	37.8		41.5	44.4	
Progression Factor		1.00	1.00			1.23	1.22	1.27		1.00	1.00	
Incremental Delay, d2		10.0	4.4			36.4	29.5	4.8		3.8	12.3	
Delay (s)		51.8	42.1			90.9	83.9	52.6		45.3	56.7	
Level of Service		D	D			F	F	D		D	E	
Approach Delay (s)		49.9					83.3			52.6		
Approach LOS		D					F			D		
<b>Intersection Summary</b>												
HCM Average Control Delay			91.2			HCM Level of Service				F		
HCM Volume to Capacity ratio			1.04									
Cycle Length (s)			120.0			Sum of lost time (s)				12.0		
Intersection Capacity Utilization			102.1%			ICU Level of Service				F		
c Critical Lane Group												

HCM Signalized Intersection Capacity Analysis

5: E. Tremont Ave. & Boston Rd.

8/16/2004


















								
Movement	NEL	NET	NER	NER2	SWL2	SWL	SWT	SWR
Lane Configurations								
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	12	12	12	12	10	10	10	10
Total Lost time (s)		3.0			3.0		3.0	
Lane Util. Factor		1.00			1.00		1.00	
Frt		0.90			1.00		0.98	
Flt Protected		1.00			0.95		0.98	
Satd. Flow (prot)		1603			1589		1595	
Flt Permitted		1.00			0.40		0.98	
Satd. Flow (perm)		1603			665		1595	
Volume (vph)	25	45	200	15	180	110	80	35
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	28	50	222	17	200	122	89	39
Lane Group Flow (vph)	0	317	0	0	200	0	250	0
Bus Blockages (#/hr)	0	0	23	23	0	0	0	21
Turn Type	custom				Perm	Perm		
Protected Phases	6	6					2	
Permitted Phases	6				2	2	2	
Actuated Green, G (s)		22.0			22.0		22.0	
Effective Green, g (s)		24.0			24.0		24.0	
Actuated g/C Ratio		0.20			0.20		0.20	
Clearance Time (s)		5.0			5.0		5.0	
Lane Grp Cap (vph)		321			133		319	
v/s Ratio Prot		c0.20					0.16	
v/s Ratio Perm					c0.30			
v/c Ratio		0.99			1.50		0.78	
Uniform Delay, d1		47.9			48.0		45.5	
Progression Factor		1.00			1.00		1.00	
Incremental Delay, d2		47.2			261.7		17.4	
Delay (s)		95.0			309.7		62.9	
Level of Service		F			F		E	
Approach Delay (s)		95.0					172.6	
Approach LOS		F					F	
Intersection Summary								



# HCM Signalized Intersection Capacity Analysis







1: I-895 #1 & Devoe Ave.

8/16/2004

											
Movement	EBL2	EBL	EBT	WBT	WBR	WBR2	SBL	SBR	SEL	SER	
Lane Configurations											
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	
Lane Width	12	12	12	10	12	10	10	10	12	12	
Total Lost time (s)		3.0	3.0	3.0	3.0				3.0	3.0	
Lane Util. Factor		1.00	1.00	0.95	1.00				1.00	0.88	
Fr't		1.00	1.00	1.00	0.85				1.00	0.85	
Flt Protected		0.95	1.00	1.00	1.00				0.95	1.00	
Satd. Flow (prot)		1703	1792	3179	1524				1703	2682	
Flt Permitted		0.95	1.00	1.00	1.00				0.95	1.00	
Satd. Flow (perm)		1703	1792	3179	1524				1703	2682	
Volume (vph)	340	215	265	1320	185	145	0	0	195	500	
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	
Adj. Flow (vph)	378	239	294	1467	206	161	0	0	217	556	
Lane Group Flow (vph)	0	617	294	1467	367	0	0	0	217	556	
Bus Blockages (#/hr)	0	0	0	0	0	6	0	0	0	0	
Turn Type	Split	Split		Split						custom	
Protected Phases	7	7	7	8	8				4	4	
Permitted Phases					4					4	
Actuated Green, G (s)		45.0	45.0	30.0	60.0				30.0	30.0	
Effective Green, g (s)		47.0	47.0	32.0	64.0				32.0	32.0	
Actuated g/C Ratio		0.39	0.39	0.27	0.53				0.27	0.27	
Clearance Time (s)		5.0	5.0	5.0	5.0				5.0	5.0	
Lane Grp Cap (vph)		667	702	848	851				454	715	
v/s Ratio Prot		c0.36	0.16	c0.46	0.12				0.13	c0.21	
v/s Ratio Perm					0.13						
v/c Ratio		0.93	0.42	1.73	0.43				0.48	0.78	
Uniform Delay, d1		34.8	26.6	44.0	17.0				37.0	40.7	
Progression Factor		1.00	1.00	1.00	1.00				0.88	0.87	
Incremental Delay, d2		20.7	1.8	333.4	1.6				0.9	2.1	
Delay (s)		55.5	28.4	377.4	18.6				33.6	37.7	
Level of Service		E	C	F	B				C	D	
Approach Delay (s)			46.7	305.6			0.0		36.6		
Approach LOS			D	F			A		D		
<b>Intersection Summary</b>											
HCM Average Control Delay			179.5			HCM Level of Service			F		
HCM Volume to Capacity ratio			1.11								
Cycle Length (s)			120.0			Sum of lost time (s)			9.0		
Intersection Capacity Utilization			96.7%			ICU Level of Service			E		
c Critical Lane Group											

HCM Signalized Intersection Capacity Analysis  
 2: E. Tremont Ave. & 177th St.


















8/16/2004

						
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑			↑↑	↑↑	
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.0			3.0	3.0	
Lane Util. Factor	0.95			0.95	0.97	
Frbp, ped/bikes	1.00			1.00	1.00	
Fipb, ped/bikes	1.00			1.00	1.00	
Frt	1.00			1.00	1.00	
Flt Protected	1.00			0.98	0.95	
Satd. Flow (prot)	3406			3165	3293	
Flt Permitted	1.00			0.98	0.95	
Satd. Flow (perm)	3406			3165	3293	
Volume (vph)	665	0	345	750	345	10
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	739	0	383	833	383	11
Lane Group Flow (vph)	739	0	0	1216	394	0
Confl. Peds. (#/hr)		280	280		47	22
Bus Blockages (#/hr)	0	6	0	28	0	0
Turn Type			Perm			
Protected Phases	2			2	3	
Permitted Phases	2		2	2	3	
Actuated Green, G (s)	55.0			55.0	55.0	
Effective Green, g (s)	57.0			57.0	57.0	
Actuated g/C Ratio	0.48			0.48	0.48	
Clearance Time (s)	5.0			5.0	5.0	
Lane Grp Cap (vph)	1618			1503	1564	
v/s Ratio Prot	0.22			c0.38	c0.12	
v/s Ratio Perm						
v/c Ratio	0.46			0.81	0.25	
Uniform Delay, d1	21.1			26.9	18.8	
Progression Factor	1.76			0.40	0.61	
Incremental Delay, d2	0.1			3.7	0.2	
Delay (s)	37.2			14.4	11.8	
Level of Service	D			B	B	
Approach Delay (s)	37.2			14.4	11.8	
Approach LOS	D			B	B	
<b>Intersection Summary</b>						
HCM Average Control Delay			21.1		HCM Level of Service	C
HCM Volume to Capacity ratio			0.53			
Cycle Length (s)			120.0		Sum of lost time (s)	6.0
Intersection Capacity Utilization			77.9%		ICU Level of Service	C
c Critical Lane Group						

# HCM Signalized Intersection Capacity Analysis

3: E. Tremont Ave. & Devoe Ave.













8/16/2004

Movement												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		3.0			3.0			3.0		3.0		3.0
Lane Util. Factor		0.95			0.95			1.00		1.00		1.00
Frbp, ped/bikes		1.00			1.00			0.92		1.00		0.94
Flpb, ped/bikes		1.00			1.00			1.00		1.00		1.00
Frt		1.00			1.00			0.94		1.00		0.85
Flt Protected		1.00			1.00			1.00		0.95		1.00
Satd. Flow (prot)		3401			3392			1540		681		573
Flt Permitted		1.00			1.00			1.00		0.34		1.00
Satd. Flow (perm)		3401			3392			1540		243		573
Volume (vph)	20	655	0	0	925	5	25	235	240	15	0	145
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	22	728	0	0	1028	6	28	261	267	17	0	161
Lane Group Flow (vph)	0	750	0	0	1034	0	0	556	0	17	0	161
Confl. Peds. (#/hr)	198		280			198	22		69	69		22
Bus Blockages (#/hr)	0	0	28	0	0	28	0	0	6	0	0	0
Parking (#/hr)						20	20		20	100		100
Turn Type	Perm						Perm			D.Pm		custom
Protected Phases		2			2			4				
Permitted Phases	2	2			2		4	4		4		4
Actuated Green, G (s)		55.0			55.0			55.0		55.0		55.0
Effective Green, g (s)		57.0			57.0			57.0		57.0		57.0
Actuated g/C Ratio		0.48			0.48			0.48		0.48		0.48
Clearance Time (s)		5.0			5.0			5.0		5.0		5.0
Lane Grp Cap (vph)		1615			1611			732		115		272
v/s Ratio Prot		0.22			c0.30			c0.36				
v/s Ratio Perm										0.07		0.28
v/c Ratio		0.46			0.64			0.76		0.15		0.59
Uniform Delay, d1		21.2			23.8			25.9		17.8		23.0
Progression Factor		0.15			2.14			0.82		1.00		1.00
Incremental Delay, d2		0.9			1.7			6.8		2.7		9.1
Delay (s)		4.1			52.5			28.2		20.5		32.1
Level of Service		A			D			C		C		C
Approach Delay (s)		4.1			52.5			28.2			31.0	
Approach LOS		A			D			C			C	
<b>Intersection Summary</b>												
HCM Average Control Delay			31.2				HCM Level of Service			C		
HCM Volume to Capacity ratio			0.70									
Cycle Length (s)			120.0				Sum of lost time (s)		6.0			
Intersection Capacity Utilization			85.9%				ICU Level of Service		D			
c Critical Lane Group												

# HCM Signalized Intersection Capacity Analysis

4: E. Tremont Ave. & Bronx Park Ave.

8/16/2004

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↑↑			↑↑						↑↑	
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	12	12	12	12	12	12	12	12	12	12	15	12
Total Lost time (s)		3.0			3.0						3.0	
Lane Util. Factor		0.95			0.95						0.95	
Frbp, ped/bikes		0.99			1.00						0.91	
Flpb, ped/bikes		1.00			1.00						1.00	
Frft		1.00			1.00						0.94	
Flt Protected		1.00			1.00						0.99	
Satd. Flow (prot)		3027			3059						2885	
Flt Permitted		1.00			1.00						0.99	
Satd. Flow (perm)		3027			3059						2885	
Volume (vph)	0	880	30	40	880	0	0	0	0	20	65	50
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	0	978	33	44	978	0	0	0	0	22	72	56
Lane Group Flow (vph)	0	1011	0	0	1022	0	0	0	0	0	150	0
Confl. Peds. (#/hr)			100	100			100		100	100		100
Bus Blockages (#/hr)	0	0	28	0	0	28	0	0	0	0	0	0
Parking (#/hr)		20	20		20					20	20	20
Turn Type				Perm						Split		
Protected Phases		4			4					6	6	
Permitted Phases		4		4	4							
Actuated Green, G (s)		69.0			69.0						41.0	
Effective Green, g (s)		71.0			71.0						43.0	
Actuated g/C Ratio		0.59			0.59						0.36	
Clearance Time (s)		5.0			5.0						5.0	
Lane Grp Cap (vph)		1791			1810						1034	
v/s Ratio Prot		0.33			c0.33						c0.05	
v/s Ratio Perm												
v/c Ratio		0.56			0.56						0.15	
Uniform Delay, d1		15.0			15.0						26.1	
Progression Factor		1.74			1.00						1.00	
Incremental Delay, d2		1.1			1.3						0.3	
Delay (s)		27.2			16.3						26.4	
Level of Service		C			B						C	
Approach Delay (s)		27.2			16.3			0.0			26.4	
Approach LOS		C			B			A			C	
<b>Intersection Summary</b>												
HCM Average Control Delay			22.0			HCM Level of Service				C		
HCM Volume to Capacity ratio			0.41									
Cycle Length (s)			120.0			Sum of lost time (s)			6.0			
Intersection Capacity Utilization			62.9%			ICU Level of Service			B			
c Critical Lane Group												

HCM Signalized Intersection Capacity Analysis  
 5: E. Tremont Ave. & Boston Rd.

8/16/2004



Movement	EBL	EBT	EBR	EBR2	WBL2	WBL	WBT	WBR	NBL2	NBL	NBR	NBR2
Lane Configurations		↕	↕			↕	↕↕	↕		↕	↕	↕
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	12	12	12	12	11	11	11	11	11	11	11	11
Total Lost time (s)		3.0	3.0			3.0	3.0	3.0		3.0	3.0	
Lane Util. Factor		1.00	1.00			0.91	0.91	1.00		1.00	0.95	
Frt		1.00	0.85			1.00	1.00	0.85		0.88	0.85	
Flt Protected		1.00	1.00			0.95	0.99	1.00		0.99	1.00	
Satd. Flow (prot)		1786	914			1498	3137	884		1513	1399	
Flt Permitted		1.00	1.00			0.95	0.99	1.00		0.95	1.00	
Satd. Flow (perm)		1786	914			1498	3137	884		1457	1399	
Volume (vph)	35	420	55	5	95	275	575	150	5	10	55	175
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	39	467	61	6	106	306	639	167	6	11	61	194
Lane Group Flow (vph)	0	506	67	0	0	338	713	167	0	78	194	0
Bus Blockages (#/hr)	0	0	100	100	0	0	0	100	0	0	0	0
Turn Type	Split		Prot		Split	Split		Protcustom			custom	
Protected Phases	8	8	8		4	4	4	4				2
Permitted Phases									2	2	2	
Actuated Green, G (s)		27.0	27.0			29.0	29.0	29.0		22.0	22.0	
Effective Green, g (s)		29.0	29.0			31.0	31.0	31.0		24.0	24.0	
Actuated g/C Ratio		0.24	0.24			0.26	0.26	0.26		0.20	0.20	
Clearance Time (s)		5.0	5.0			5.0	5.0	5.0		5.0	5.0	
Lane Grp Cap (vph)		432	221			387	810	228		291	280	
v/s Ratio Prot		c0.28	0.07			0.23	c0.23	0.19			0.14	
v/s Ratio Perm										0.05		
v/c Ratio		1.17	0.30			0.87	0.88	0.73		0.27	0.69	
Uniform Delay, d1		45.5	37.2			42.6	42.7	40.7		40.6	44.6	
Progression Factor		1.00	1.00			1.19	1.19	1.21		1.00	1.00	
Incremental Delay, d2		99.2	3.5			18.7	10.6	14.9		2.2	13.2	
Delay (s)		144.7	40.7			69.5	61.4	63.9		42.8	57.8	
Level of Service		F	D			E	E	E		D	E	
Approach Delay (s)		132.6					64.0			53.5		
Approach LOS		F					E			D		

Intersection Summary			
HCM Average Control Delay	108.3	HCM Level of Service	F
HCM Volume to Capacity ratio	1.18		
Cycle Length (s)	120.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	109.2%	ICU Level of Service	F
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis  
 5: E. Tremont Ave. & Boston Rd.

8/16/2004



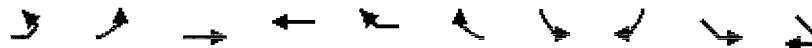
Movement	NEL	NET	NER	NER2	SWL2	SWL	SWT	SWR
Lane Configurations		↕			↙		↕	
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	12	12	12	12	10	10	10	10
Total Lost time (s)		3.0			3.0		3.0	
Lane Util. Factor		1.00			1.00		1.00	
Fr <sub>t</sub>		0.90			1.00		0.97	
Fl <sub>t</sub> Protected		1.00			0.95		0.98	
Satd. Flow (prot)		1606			1589		1588	
Fl <sub>t</sub> Permitted		1.00			0.39		0.98	
Satd. Flow (perm)		1606			646		1588	
Volume (vph)	5	65	220	10	200	60	65	35
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	6	72	244	11	222	67	72	39
Lane Group Flow (vph)	0	333	0	0	222	0	178	0
Bus Blockages (#/hr)	0	0	23	23	0	0	0	21
Turn Type	custom				Perm	Perm		
Protected Phases	6	6					2	
Permitted Phases	6				2	2	2	
Actuated Green, G (s)		22.0			22.0		22.0	
Effective Green, g (s)		24.0			24.0		24.0	
Actuated g/C Ratio		0.20			0.20		0.20	
Clearance Time (s)		5.0			5.0		5.0	
Lane Grp Cap (vph)		321			129		318	
v/s Ratio Prot		c0.21					0.11	
v/s Ratio Perm					c0.34			
v/c Ratio		1.04			1.72		0.56	
Uniform Delay, d1		48.0			48.0		43.2	
Progression Factor		1.00			1.00		1.00	
Incremental Delay, d2		60.3			354.9		7.0	
Delay (s)		108.3			402.9		50.2	
Level of Service		F			F		D	
Approach Delay (s)		108.3					245.9	
Approach LOS		F					F	

Intersection Summary

# HCM Signalized Intersection Capacity Analysis

1: I-895 #1 & Devoe Ave.

8/16/2004



Movement	EBL2	EBL	EBT	WBT	WBR	WBR2	SBL	SBR	SEL	SER
Lane Configurations		↔	↑	↑↑	↔				↔	↔↔
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	12	12	12	10	12	10	10	10	12	12
Total Lost time (s)		3.0	3.0	3.0	3.0				3.0	3.0
Lane Util. Factor		1.00	1.00	0.95	1.00				1.00	0.88
Flt		1.00	1.00	1.00	0.85				1.00	0.85
Flt Protected		0.95	1.00	1.00	1.00				0.95	1.00
Satd. Flow (prot)		1703	1792	3179	1524				1703	2682
Flt Permitted		0.95	1.00	1.00	1.00				0.95	1.00
Satd. Flow (perm)		1703	1792	3179	1524				1703	2682
Volume (vph)	245	155	150	1790	155	120	0	0	130	700
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Growth Factor (vph)	103%	103%	103%	103%	103%	103%	103%	103%	103%	103%
Adj. Flow (vph)	280	177	172	2049	177	137	0	0	149	801
Lane Group Flow (vph)	0	457	172	2049	314	0	0	0	149	801
Bus Blockages (#/hr)	0	0	0	0	0	6	0	0	0	0
Turn Type	Split	Split		Split						custom
Protected Phases	7	7	7	8	8				4	4
Permitted Phases					4					4
Actuated Green, G (s)		45.0	45.0	30.0	60.0				30.0	30.0
Effective Green, g (s)		47.0	47.0	32.0	64.0				32.0	32.0
Actuated g/C Ratio		0.39	0.39	0.27	0.53				0.27	0.27
Clearance Time (s)		5.0	5.0	5.0	5.0				5.0	5.0
Lane Grp Cap (vph)		667	702	848	851				454	715
v/s Ratio Prot		c0.27	0.10	c0.64	0.10				0.09	c0.30
v/s Ratio Perm					0.11					
v/c Ratio		0.69	0.25	2.42	0.37				0.33	1.12
Uniform Delay, d1		30.3	24.6	44.0	16.3				35.4	44.0
Progression Factor		1.00	1.00	1.00	1.00				0.93	0.92
Incremental Delay, d2		5.6	0.8	640.9	1.2				0.5	59.6
Delay (s)		36.0	25.4	684.9	17.5				33.5	100.2
Level of Service		D	C	F	B				C	F
Approach Delay (s)			33.1	596.2		0.0			89.8	
Approach LOS			C	F		A			F	

## Intersection Summary

HCM Average Control Delay	384.3	HCM Level of Service	F
HCM Volume to Capacity ratio	1.31		
Cycle Length (s)	120.0	Sum of lost time (s)	9.0
Intersection Capacity Utilization	100.2%	ICU Level of Service	F
c Critical Lane Group			

# HCM Signalized Intersection Capacity Analysis

2: E. Tremont Ave. & 177th St.

8/16/2004



Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑			↑↑	↑↑	
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.0			3.0	3.0	
Lane Util. Factor	0.95			0.95	0.97	
Frbp, ped/bikes	1.00			1.00	1.00	
Flpb, ped/bikes	1.00			1.00	1.00	
Frt	1.00			1.00	1.00	
Flt Protected	1.00			0.98	0.95	
Satd. Flow (prot)	3406			3159	3299	
Flt Permitted	1.00			0.98	0.95	
Satd. Flow (perm)	3406			3159	3299	
Volume (vph)	425	0	450	825	355	10
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90
Growth Factor (vph)	103%	103%	103%	103%	103%	103%
Adj. Flow (vph)	486	0	515	944	406	11
Lane Group Flow (vph)	486	0	0	1459	417	0
Confl. Peds. (#/hr)		112	112		12	5
Bus Blockages (#/hr)	0	6	0	28	0	0
Turn Type			Perm			
Protected Phases	2			2	3	
Permitted Phases	2		2	2	3	
Actuated Green, G (s)	55.0			55.0	55.0	
Effective Green, g (s)	57.0			57.0	57.0	
Actuated g/C Ratio	0.48			0.48	0.48	
Clearance Time (s)	5.0			5.0	5.0	
Lane Grp Cap (vph)	1618			1501	1567	
v/s Ratio Prot	0.14			c0.46	c0.13	
v/s Ratio Perm						
v/c Ratio	0.30			0.97	0.27	
Uniform Delay, d1	19.3			30.7	18.9	
Progression Factor	1.59			0.42	0.63	
Incremental Delay, d2	0.1			13.3	0.3	
Delay (s)	30.8			26.3	12.3	
Level of Service	C			C	B	
Approach Delay (s)	30.8			26.3	12.3	
Approach LOS	C			C	B	

Intersection Summary			
HCM Average Control Delay	24.8	HCM Level of Service	C
HCM Volume to Capacity ratio	0.62		
Cycle Length (s)	120.0	Sum of lost time (s)	6.0
Intersection Capacity Utilization	77.8%	ICU Level of Service	C
c Critical Lane Group			



# HCM Signalized Intersection Capacity Analysis

3: E. Tremont Ave. & Devoe Ave.

8/16/2004



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕↕			↕↔			↕↔		↕		↕
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		3.0			3.0			3.0		3.0		3.0
Lane Util. Factor		0.95			0.95			1.00		1.00		1.00
Frb, ped/bikes		1.00			1.00			0.93		1.00		0.98
Flpb, ped/bikes		1.00			1.00			1.00		0.95		1.00
Frt		1.00			1.00			0.95		1.00		0.85
Flt Protected		1.00			1.00			0.99		0.95		1.00
Satd. Flow (prot)		3396			3389			1570		644		595
Flt Permitted		1.00			1.00			0.99		0.46		1.00
Satd. Flow (perm)		3396			3389			1570		311		595
Volume (vph)	25	410	0	0	1050	10	50	150	130	15	0	175
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Growth Factor (vph)	103%	103%	103%	103%	103%	103%	103%	103%	103%	103%	103%	103%
Adj. Flow (vph)	29	469	0	0	1202	11	57	172	149	17	0	200
Lane Group Flow (vph)	0	498	0	0	1213	0	0	378	0	17	0	200
Confl. Peds. (#/hr)	97		112			97	5		73	73		5
Bus Blockages (#/hr)	0	0	28	0	0	28	0	0	6	0	0	0
Parking (#/hr)						20	20		20	100		100
Turn Type	Perm			Perm			D.Pm			custom		
Protected Phases		2			2			4				
Permitted Phases	2	2			2		4	4		4		4
Actuated Green, G (s)		55.0			55.0			55.0		55.0		55.0
Effective Green, g (s)		57.0			57.0			57.0		57.0		57.0
Actuated g/C Ratio		0.48			0.48			0.48		0.48		0.48
Clearance Time (s)		5.0			5.0			5.0		5.0		5.0
Lane Grp Cap (vph)		1613			1610			746		148		283
v/s Ratio Prot		0.15			c0.36			0.24				
v/s Ratio Perm										0.05		c0.34
v/c Ratio		0.31			0.75			0.51		0.11		0.71
Uniform Delay, d1		19.4			25.8			21.8		17.5		24.9
Progression Factor		0.18			1.90			0.78		1.00		1.00
Incremental Delay, d2		0.5			2.7			2.3		1.6		13.9
Delay (s)		4.1			51.6			19.3		19.1		38.8
Level of Service		A			D			B		B		D
Approach Delay (s)		4.1			51.6			19.3			37.2	
Approach LOS		A			D			B			D	

## Intersection Summary

HCM Average Control Delay	34.7	HCM Level of Service	C
HCM Volume to Capacity ratio	0.73		
Cycle Length (s)	120.0	Sum of lost time (s)	6.0
Intersection Capacity Utilization	80.2%	ICU Level of Service	D
c Critical Lane Group			

# HCM Signalized Intersection Capacity Analysis

4: E. Tremont Ave. & Bronx Park Ave.

8/16/2004



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↑↑			↑↑						↑↑	
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	12	12	12	12	12	12	12	12	12	12	15	12
Total Lost time (s)		3.0			3.0						3.0	
Lane Util. Factor		0.95			0.95						0.95	
Frbp, ped/bikes		0.99			1.00						0.87	
Flpb, ped/bikes		1.00			1.00						1.00	
Frt		0.99			1.00						0.91	
Flt Protected		1.00			1.00						1.00	
Satd. Flow (prot)		3012			3056						2660	
Flt Permitted		1.00			1.00						1.00	
Satd. Flow (perm)		3012			3056						2660	
Volume (vph)	0	530	25	60	925	0	0	0	0	20	80	135
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Growth Factor (vph)	103%	103%	103%	103%	103%	103%	103%	103%	103%	103%	103%	103%
Adj. Flow (vph)	0	607	29	69	1059	0	0	0	0	23	92	154
Lane Group Flow (vph)	0	636	0	0	1128	0	0	0	0	0	269	0
Confl. Peds. (#/hr)			100	100			100		100	100		100
Bus Blockages (#/hr)	0	0	28	0	0	28	0	0	0	0	0	0
Parking (#/hr)		20	20		20					20	20	20
Turn Type				Perm						Split		
Protected Phases		4			4					6	6	
Permitted Phases		4		4	4							
Actuated Green, G (s)		69.0			69.0						41.0	
Effective Green, g (s)		71.0			71.0						43.0	
Actuated g/C Ratio		0.59			0.59						0.36	
Clearance Time (s)		5.0			5.0						5.0	
Lane Grp Cap (vph)		1782			1808						953	
v/s Ratio Prot		0.21			c0.37						c0.10	
v/s Ratio Perm												
v/c Ratio		0.36			0.62						0.28	
Uniform Delay, d1		12.7			15.9						27.5	
Progression Factor		1.97			1.00						1.00	
Incremental Delay, d2		0.5			1.6						0.7	
Delay (s)		25.5			17.5						28.2	
Level of Service		C			B						C	
Approach Delay (s)		25.5			17.5			0.0			28.2	
Approach LOS		C			B			A			C	

## Intersection Summary

HCM Average Control Delay	21.4	HCM Level of Service	C
HCM Volume to Capacity ratio	0.49		
Cycle Length (s)	120.0	Sum of lost time (s)	6.0
Intersection Capacity Utilization	72.5%	ICU Level of Service	C
c Critical Lane Group			

# HCM Signalized Intersection Capacity Analysis

5: E. Tremont Ave. & Boston Rd.

8/16/2004



Movement	EBL	EBT	EBR	EBR2	WBL2	WBL	WBT	WBR	NBL2	NBL	NBR	NBR2
Lane Configurations		↕	↕			↕	↕↕	↕		↕	↕	
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	12	12	12	12	11	11	11	11	11	11	11	11
Total Lost time (s)		3.0	3.0			3.0	3.0	3.0		3.0	3.0	
Lane Util. Factor		1.00	1.00			0.91	0.91	1.00		1.00	0.95	
Frt		1.00	0.85			1.00	1.00	0.85		0.91	0.85	
Flt Protected		1.00	1.00			0.95	0.98	1.00		0.98	1.00	
Satd. Flow (prot)		1784	914			1498	3102	884		1549	1399	
Flt Permitted		1.00	1.00			0.95	0.98	1.00		0.89	1.00	
Satd. Flow (perm)		1784	914			1498	3102	884		1405	1399	
Volume (vph)	25	255	45	25	165	425	490	100	10	30	55	170
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Growth Factor (vph)	103%	103%	103%	103%	103%	103%	103%	103%	103%	103%	103%	103%
Adj. Flow (vph)	29	292	52	29	189	486	561	114	11	34	63	195
Lane Group Flow (vph)	0	321	81	0	0	398	838	114	0	108	195	0
Bus Blockages (#/hr)	0	0	100	100	0	0	0	100	0	0	0	0
Turn Type	Split		Prot		Split	Split		Prot	custom		custom	
Protected Phases	8	8	8		4	4	4	4				2
Permitted Phases									2	2	2	
Actuated Green, G (s)		27.0	27.0			29.0	29.0	29.0		22.0	22.0	
Effective Green, g (s)		29.0	29.0			31.0	31.0	31.0		24.0	24.0	
Actuated g/C Ratio		0.24	0.24			0.26	0.26	0.26		0.20	0.20	
Clearance Time (s)		5.0	5.0			5.0	5.0	5.0		5.0	5.0	
Lane Grp Cap (vph)		431	221			387	801	228		281	280	
v/s Ratio Prot		c0.18	0.09			0.27	c0.27	0.13				0.14
v/s Ratio Perm										0.08		
v/c Ratio		0.74	0.37			1.03	1.05	0.50		0.38	0.70	
Uniform Delay, d1		42.1	37.9			44.5	44.5	37.9		41.6	44.6	
Progression Factor		1.00	1.00			1.23	1.22	1.26		1.00	1.00	
Incremental Delay, d2		11.1	4.6			43.7	38.2	4.9		3.9	13.4	
Delay (s)		53.2	42.5			98.3	92.5	52.7		45.5	58.0	
Level of Service		D	D			F	F	D		D	E	
Approach Delay (s)		51.0					90.9			53.6		
Approach LOS		D					F			D		

## Intersection Summary

HCM Average Control Delay	99.5	HCM Level of Service	F
HCM Volume to Capacity ratio	1.08		
Cycle Length (s)	120.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	104.7%	ICU Level of Service	F
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis  
 5: E. Tremont Ave. & Boston Rd.

8/16/2004



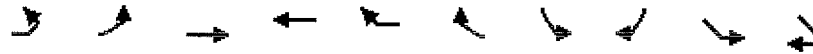
Movement	NEL	NET	NER	NER2	SWL2	SWL	SWT	SWR
Lane Configurations		↕			↕		↕	
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	12	12	12	12	10	10	10	10
Total Lost time (s)		3.0			3.0		3.0	
Lane Util. Factor		1.00			1.00		1.00	
Fr <sub>t</sub>		0.90			1.00		0.98	
Fl <sub>t</sub> Protected		1.00			0.95		0.98	
Satd. Flow (prot)		1603			1589		1595	
Fl <sub>t</sub> Permitted		1.00			0.38		0.98	
Satd. Flow (perm)		1603			642		1595	
Volume (vph)	25	45	200	15	180	110	80	35
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Growth Factor (vph)	103%	103%	103%	103%	103%	103%	103%	103%
Adj. Flow (vph)	29	52	229	17	206	126	92	40
Lane Group Flow (vph)	0	327	0	0	206	0	258	0
Bus Blockages (#/hr)	0	0	23	23	0	0	0	21
Turn Type	custom				Perm	Perm		
Protected Phases	6	6					2	
Permitted Phases	6				2	2	2	
Actuated Green, G (s)		22.0			22.0		22.0	
Effective Green, g (s)		24.0			24.0		24.0	
Actuated g/C Ratio		0.20			0.20		0.20	
Clearance Time (s)		5.0			5.0		5.0	
Lane Grp Cap (vph)		321			128		319	
v/s Ratio Prot		c0.20					0.16	
v/s Ratio Perm					c0.32			
v/c Ratio		1.02			1.61		0.81	
Uniform Delay, d1		48.0			48.0		45.8	
Progression Factor		1.00			1.00		1.00	
Incremental Delay, d2		55.1			307.4		19.5	
Delay (s)		103.1			355.4		65.3	
Level of Service		F			F		E	
Approach Delay (s)		103.1					194.1	
Approach LOS		F					F	

Intersection Summary

# HCM Signalized Intersection Capacity Analysis

1: I-895 #1 & Devoe Ave.

8/16/2004



Movement	EBL2	EBL	EBT	WBT	WBR	WBR2	SBL	SBR	SEL	SER
Lane Configurations		↔	↑	↑↑	↔				↔	↔↔
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	12	12	12	10	12	10	10	10	12	12
Total Lost time (s)		3.0	3.0	3.0	3.0				3.0	3.0
Lane Util. Factor		1.00	1.00	0.95	1.00				1.00	0.88
Fr <sub>t</sub>		1.00	1.00	1.00	0.85				1.00	0.85
Fl <sub>t</sub> Protected		0.95	1.00	1.00	1.00				0.95	1.00
Satd. Flow (prot)		1703	1792	3179	1524				1703	2682
Fl <sub>t</sub> Permitted		0.95	1.00	1.00	1.00				0.95	1.00
Satd. Flow (perm)		1703	1792	3179	1524				1703	2682
Volume (vph)	340	215	265	1320	185	145	0	0	195	500
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Growth Factor (vph)	103%	103%	103%	103%	103%	103%	103%	103%	103%	103%
Adj. Flow (vph)	389	246	303	1511	212	166	0	0	223	572
Lane Group Flow (vph)	0	635	303	1511	378	0	0	0	223	572
Bus Blockages (#/hr)	0	0	0	0	0	6	0	0	0	0
Turn Type	Split	Split		Split						custom
Protected Phases	7	7	7	8	8				4	4
Permitted Phases					4					4
Actuated Green, G (s)		45.0	45.0	30.0	60.0				30.0	30.0
Effective Green, g (s)		47.0	47.0	32.0	64.0				32.0	32.0
Actuated g/C Ratio		0.39	0.39	0.27	0.53				0.27	0.27
Clearance Time (s)		5.0	5.0	5.0	5.0				5.0	5.0
Lane Grp Cap (vph)		667	702	848	851				454	715
v/s Ratio Prot		c0.37	0.17	c0.48	0.12				0.13	c0.21
v/s Ratio Perm					0.13					
v/c Ratio		0.95	0.43	1.78	0.44				0.49	0.80
Uniform Delay, d1		35.4	26.7	44.0	17.1				37.1	41.0
Progression Factor		1.00	1.00	1.00	1.00				0.91	0.90
Incremental Delay, d2		24.9	1.9	356.6	1.7				0.3	0.9
Delay (s)		60.3	28.7	400.6	18.8				34.0	37.6
Level of Service		E	C	F	B				C	D
Approach Delay (s)			50.1	324.2		0.0			36.6	
Approach LOS			D	F		A			D	

## Intersection Summary

HCM Average Control Delay	190.1	HCM Level of Service	F
HCM Volume to Capacity ratio	1.15		
Cycle Length (s)	120.0	Sum of lost time (s)	9.0
Intersection Capacity Utilization	99.3%	ICU Level of Service	E
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis  
 2: E. Tremont Ave. & 177th St.

8/16/2004



Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑			↑↑	↑↑	
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.0			3.0	3.0	
Lane Util. Factor	0.95			0.95	0.97	
Frbp, ped/bikes	1.00			1.00	1.00	
Flpb, ped/bikes	1.00			1.00	1.00	
Frt	1.00			1.00	1.00	
Flt Protected	1.00			0.98	0.95	
Satd. Flow (prot)	3406			3165	3294	
Flt Permitted	1.00			0.98	0.95	
Satd. Flow (perm)	3406			3165	3294	
Volume (vph)	665	0	345	750	345	10
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90
Growth Factor (vph)	103%	103%	103%	103%	103%	103%
Adj. Flow (vph)	761	0	395	858	395	11
Lane Group Flow (vph)	761	0	0	1253	406	0
Confl. Peds. (#/hr)		280	280		47	22
Bus Blockages (#/hr)	0	6	0	28	0	0
Turn Type			Perm			
Protected Phases	2			2	3	
Permitted Phases	2		2	2	3	
Actuated Green, G (s)	55.0			55.0	55.0	
Effective Green, g (s)	57.0			57.0	57.0	
Actuated g/C Ratio	0.48			0.48	0.48	
Clearance Time (s)	5.0			5.0	5.0	
Lane Grp Cap (vph)	1618			1503	1565	
v/s Ratio Prot	0.22			c0.40	c0.12	
v/s Ratio Perm						
v/c Ratio	0.47			0.83	0.26	
Uniform Delay, d1	21.3			27.4	18.9	
Progression Factor	1.76			0.39	0.62	
Incremental Delay, d2	0.1			4.2	0.2	
Delay (s)	37.5			15.1	11.9	
Level of Service	D			B	B	
Approach Delay (s)	37.5			15.1	11.9	
Approach LOS	D			B	B	

Intersection Summary			
HCM Average Control Delay	21.6	HCM Level of Service	C
HCM Volume to Capacity ratio	0.55		
Cycle Length (s)	120.0	Sum of lost time (s)	6.0
Intersection Capacity Utilization	79.6%	ICU Level of Service	C
c Critical Lane Group			

# HCM Signalized Intersection Capacity Analysis

3: E. Tremont Ave. & Devoe Ave.

8/16/2004



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕↕			↕↕			↕↕		↕		↕
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		3.0			3.0			3.0		3.0		3.0
Lane Util. Factor		0.95			0.95			1.00		1.00		1.00
Frbp, ped/bikes		1.00			1.00			0.92		1.00		0.94
Flpb, ped/bikes		1.00			1.00			1.00		1.00		1.00
Frt		1.00			1.00			0.94		1.00		0.85
Flt Protected		1.00			1.00			1.00		0.95		1.00
Satd. Flow (prot)		3401			3392			1540		681		573
Flt Permitted		1.00			1.00			1.00		0.33		1.00
Satd. Flow (perm)		3401			3392			1540		237		573
Volume (vph)	20	655	0	0	925	5	25	235	240	15	0	145
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Growth Factor (vph)	103%	103%	103%	103%	103%	103%	103%	103%	103%	103%	103%	103%
Adj. Flow (vph)	23	750	0	0	1059	6	29	269	275	17	0	166
Lane Group Flow (vph)	0	773	0	0	1065	0	0	573	0	17	0	166
Confl. Peds. (#/hr)	198		280			198	22		69	69		22
Bus Blockages (#/hr)	0	0	28	0	0	28	0	0	6	0	0	0
Parking (#/hr)						20	20		20	100		100
Turn Type	Perm			Perm			D.Pm			custom		
Protected Phases		2			2			4				
Permitted Phases	2	2			2		4	4		4		4
Actuated Green, G (s)		55.0			55.0			55.0		55.0		55.0
Effective Green, g (s)		57.0			57.0			57.0		57.0		57.0
Actuated g/C Ratio		0.48			0.48			0.48		0.48		0.48
Clearance Time (s)		5.0			5.0			5.0		5.0		5.0
Lane Grp Cap (vph)		1615			1611			732		113		272
v/s Ratio Prot		0.23			c0.31			c0.37				
v/s Ratio Perm										0.07		0.29
v/c Ratio		0.48			0.66			0.78		0.15		0.61
Uniform Delay, d1		21.4			24.1			26.3		17.8		23.3
Progression Factor		0.15			2.12			0.83		1.00		1.00
Incremental Delay, d2		0.9			1.8			7.7		2.8		9.8
Delay (s)		4.1			52.9			29.5		20.6		33.1
Level of Service		A			D			C		C		C
Approach Delay (s)		4.1			52.9			29.5			31.9	
Approach LOS		A			D			C			C	

## Intersection Summary

HCM Average Control Delay	31.7	HCM Level of Service	C
HCM Volume to Capacity ratio	0.72		
Cycle Length (s)	120.0	Sum of lost time (s)	6.0
Intersection Capacity Utilization	87.7%	ICU Level of Service	D
c Critical Lane Group			

# HCM Signalized Intersection Capacity Analysis

4: E. Tremont Ave. & Bronx Park Ave.

8/16/2004



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↑↑			↑↑						↑↑	
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	12	12	12	12	12	12	12	12	12	12	15	12
Total Lost time (s)		3.0			3.0						3.0	
Lane Util. Factor		0.95			0.95						0.95	
Frbp, ped/bikes		0.99			1.00						0.91	
Flpb, ped/bikes		1.00			1.00						1.00	
Frt		1.00			1.00						0.94	
Flt Protected		1.00			1.00						0.99	
Satd. Flow (prot)		3027			3058						2889	
Flt Permitted		1.00			1.00						0.99	
Satd. Flow (perm)		3027			3058						2889	
Volume (vph)	0	880	30	40	880	0	0	0	0	20	65	50
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Growth Factor (vph)	103%	103%	103%	103%	103%	103%	103%	103%	103%	103%	103%	103%
Adj. Flow (vph)	0	1007	34	46	1007	0	0	0	0	23	74	57
Lane Group Flow (vph)	0	1041	0	0	1053	0	0	0	0	0	154	0
Confl. Peds. (#/hr)			100	100			100		100	100		100
Bus Blockages (#/hr)	0	0	28	0	0	28	0	0	0	0	0	0
Parking (#/hr)		20	20		20					20	20	20
Turn Type				Perm						Split		
Protected Phases		4			4					6	6	
Permitted Phases		4		4	4							
Actuated Green, G (s)		69.0			69.0						41.0	
Effective Green, g (s)		71.0			71.0						43.0	
Actuated g/C Ratio		0.59			0.59						0.36	
Clearance Time (s)		5.0			5.0						5.0	
Lane Grp Cap (vph)		1791			1809						1035	
v/s Ratio Prot		0.34			c0.34						c0.05	
v/s Ratio Perm												
v/c Ratio		0.58			0.58						0.15	
Uniform Delay, d1		15.2			15.3						26.1	
Progression Factor		1.72			1.00						1.00	
Incremental Delay, d2		1.2			1.4						0.3	
Delay (s)		27.4			16.6						26.4	
Level of Service		C			B						C	
Approach Delay (s)		27.4			16.6			0.0			26.4	
Approach LOS		C			B			A			C	

## Intersection Summary

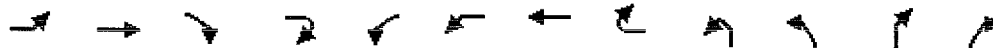
HCM Average Control Delay	22.3	HCM Level of Service	C
HCM Volume to Capacity ratio	0.42		
Cycle Length (s)	120.0	Sum of lost time (s)	6.0
Intersection Capacity Utilization	65.0%	ICU Level of Service	B
c Critical Lane Group			



# HCM Signalized Intersection Capacity Analysis

5: E. Tremont Ave. & Boston Rd.

8/16/2004



Movement	EBL	EBT	EBR	EBR2	WBL2	WBL	WBT	WBR	NBL2	NBL	NBR	NBR2
Lane Configurations		↕	↕			↕	↕↕	↕		↕↕	↕	↕
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	12	12	12	12	11	11	11	11	11	11	11	11
Total Lost time (s)		3.0	3.0			3.0	3.0	3.0		3.0	3.0	
Lane Util. Factor		1.00	1.00			0.91	0.91	1.00		1.00	0.95	
Frt		1.00	0.85			1.00	1.00	0.85		0.88	0.85	
Flt Protected		1.00	1.00			0.95	0.99	1.00		0.99	1.00	
Satd. Flow (prot)		1786	914			1498	3137	884		1512	1399	
Flt Permitted		1.00	1.00			0.95	0.99	1.00		0.95	1.00	
Satd. Flow (perm)		1786	914			1498	3137	884		1458	1399	
Volume (vph)	35	420	55	5	95	275	575	150	5	10	55	175
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Growth Factor (vph)	103%	103%	103%	103%	103%	103%	103%	103%	103%	103%	103%	103%
Adj. Flow (vph)	40	481	63	6	109	315	658	172	6	11	63	200
Lane Group Flow (vph)	0	521	69	0	0	348	734	172	0	80	200	0
Bus Blockages (#/hr)	0	0	100	100	0	0	0	100	0	0	0	0
Turn Type	Split		Prot		Split	Split		Protcustom			custom	
Protected Phases	8	8	8		4	4	4	4				2
Permitted Phases									2	2	2	
Actuated Green, G (s)		27.0	27.0			29.0	29.0	29.0		22.0	22.0	
Effective Green, g (s)		29.0	29.0			31.0	31.0	31.0		24.0	24.0	
Actuated g/C Ratio		0.24	0.24			0.26	0.26	0.26		0.20	0.20	
Clearance Time (s)		5.0	5.0			5.0	5.0	5.0		5.0	5.0	
Lane Grp Cap (vph)		432	221			387	810	228		292	280	
v/s Ratio Prot		c0.29	0.08			0.23	c0.23	0.19				0.14
v/s Ratio Perm										0.05		
v/c Ratio		1.21	0.31			0.90	0.91	0.75		0.27	0.71	
Uniform Delay, d1		45.5	37.3			43.0	43.1	41.0		40.6	44.8	
Progression Factor		1.00	1.00			1.20	1.19	1.21		1.00	1.00	
Incremental Delay, d2		112.8	3.7			21.3	12.5	16.0		2.3	14.4	
Delay (s)		158.3	41.0			72.7	63.9	65.5		42.9	59.2	
Level of Service		F	D			E	E	E		D	E	
Approach Delay (s)		144.5					66.5			54.6		
Approach LOS		F					E			D		

## Intersection Summary

HCM Average Control Delay	117.1	HCM Level of Service	F
HCM Volume to Capacity ratio	1.23		
Cycle Length (s)	120.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	112.0%	ICU Level of Service	G
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis  
 5: E. Tremont Ave. & Boston Rd.

8/16/2004



Movement	NEL	NET	NER	NER2	SWL2	SWL	SWT	SWR
Lane Configurations		↕			↙		↕	
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	12	12	12	12	10	10	10	10
Total Lost time (s)		3.0			3.0		3.0	
Lane Util. Factor		1.00			1.00		1.00	
Frt		0.90			1.00		0.97	
Flt Protected		1.00			0.95		0.98	
Satd. Flow (prot)		1606			1589		1588	
Flt Permitted		1.00			0.37		0.98	
Satd. Flow (perm)		1606			623		1588	
Volume (vph)	5	65	220	10	200	60	65	35
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Growth Factor (vph)	103%	103%	103%	103%	103%	103%	103%	103%
Adj. Flow (vph)	6	74	252	11	229	69	74	40
Lane Group Flow (vph)	0	343	0	0	229	0	183	0
Bus Blockages (#/hr)	0	0	23	23	0	0	0	21
Turn Type	custom				Perm	Perm		
Protected Phases	6	6					2	
Permitted Phases	6				2	2	2	
Actuated Green, G (s)		22.0			22.0		22.0	
Effective Green, g (s)		24.0			24.0		24.0	
Actuated g/C Ratio		0.20			0.20		0.20	
Clearance Time (s)		5.0			5.0		5.0	
Lane Grp Cap (vph)		321			125		318	
v/s Ratio Prot		c0.21					0.12	
v/s Ratio Perm					c0.37			
v/c Ratio		1.07			1.83		0.58	
Uniform Delay, d1		48.0			48.0		43.4	
Progression Factor		1.00			1.00		1.00	
Incremental Delay, d2		69.6			403.8		7.4	
Delay (s)		117.6			451.8		50.8	
Level of Service		F			F		D	
Approach Delay (s)		117.6					273.7	
Approach LOS		F					F	

Intersection Summary

# HCM Signalized Intersection Capacity Analysis

1: I-895 #1 & Devoe Ave.

8/16/2004



Movement	EBL2	EBL	EBT	WBT	WBR	WBR2	SBL	SBR	SEL	SER
Lane Configurations		↔	↑	↑↑	↔				↔	↔↔
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	12	12	12	10	12	10	10	10	12	12
Total Lost time (s)		3.0	3.0	3.0	3.0				3.0	3.0
Lane Util. Factor		1.00	1.00	0.95	1.00				1.00	0.88
Flt		1.00	1.00	1.00	0.85				1.00	0.85
Flt Protected		0.95	1.00	1.00	1.00				0.95	1.00
Satd. Flow (prot)		1703	1792	3179	1524				1703	2682
Flt Permitted		0.95	1.00	1.00	1.00				0.95	1.00
Satd. Flow (perm)		1703	1792	3179	1524				1703	2682
Volume (vph)	245	155	150	1790	155	120	0	0	130	700
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Growth Factor (vph)	113%	113%	113%	113%	113%	113%	113%	113%	113%	113%
Adj. Flow (vph)	308	195	188	2247	195	151	0	0	163	879
Lane Group Flow (vph)	0	503	188	2247	346	0	0	0	163	879
Bus Blockages (#/hr)	0	0	0	0	0	6	0	0	0	0
Turn Type	Split	Split		Split						custom
Protected Phases	7	7	7	8	8				4	4
Permitted Phases					4					4
Actuated Green, G (s)		45.0	45.0	30.0	60.0				30.0	30.0
Effective Green, g (s)		47.0	47.0	32.0	64.0				32.0	32.0
Actuated g/C Ratio		0.39	0.39	0.27	0.53				0.27	0.27
Clearance Time (s)		5.0	5.0	5.0	5.0				5.0	5.0
Lane Grp Cap (vph)		667	702	848	851				454	715
v/s Ratio Prot		c0.30	0.10	c0.71	0.11				0.10	c0.33
v/s Ratio Perm					0.12					
v/c Ratio		0.75	0.27	2.65	0.41				0.36	1.23
Uniform Delay, d1		31.5	24.8	44.0	16.7				35.7	44.0
Progression Factor		1.00	1.00	1.00	1.00				0.95	0.95
Incremental Delay, d2		7.7	0.9	745.8	1.4				0.2	104.4
Delay (s)		39.2	25.7	789.8	18.1				34.1	146.1
Level of Service		D	C	F	B				C	F
Approach Delay (s)			35.6	686.8		0.0		128.6		
Approach LOS			D	F		A		F		

## Intersection Summary

HCM Average Control Delay	448.3	HCM Level of Service	F
HCM Volume to Capacity ratio	1.44		
Cycle Length (s)	120.0	Sum of lost time (s)	9.0
Intersection Capacity Utilization	109.0%	ICU Level of Service	F
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis  
 2: E. Tremont Ave. & 177th St.

8/16/2004



Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑			↑↑	↑↑	
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.0			3.0	3.0	
Lane Util. Factor	0.95			0.95	0.97	
Frbp, ped/bikes	1.00			1.00	1.00	
Fipb, ped/bikes	1.00			1.00	1.00	
Frt	1.00			1.00	1.00	
Flt Protected	1.00			0.98	0.95	
Satd. Flow (prot)	3406			3159	3299	
Flt Permitted	1.00			0.98	0.95	
Satd. Flow (perm)	3406			3159	3299	
Volume (vph)	425	0	450	825	355	10
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90
Growth Factor (vph)	113%	113%	113%	113%	113%	113%
Adj. Flow (vph)	534	0	565	1036	446	13
Lane Group Flow (vph)	534	0	0	1601	459	0
Confl. Peds. (#/hr)		112	112		12	5
Bus Blockages (#/hr)	0	6	0	28	0	0
Turn Type			Perm			
Protected Phases	2			2	3	
Permitted Phases	2		2	2	3	
Actuated Green, G (s)	55.0			55.0	55.0	
Effective Green, g (s)	57.0			57.0	57.0	
Actuated g/C Ratio	0.48			0.48	0.48	
Clearance Time (s)	5.0			5.0	5.0	
Lane Grp Cap (vph)	1618			1501	1567	
v/s Ratio Prot	0.16			c0.51	c0.14	
v/s Ratio Perm						
v/c Ratio	0.33			1.07	0.29	
Uniform Delay, d1	19.6			31.5	19.2	
Progression Factor	1.61			0.41	0.66	
Incremental Delay, d2	0.0			38.4	0.4	
Delay (s)	31.5			51.4	13.0	
Level of Service	C			D	B	
Approach Delay (s)	31.5			51.4	13.0	
Approach LOS	C			D	B	

Intersection Summary

HCM Average Control Delay	40.5	HCM Level of Service	D
HCM Volume to Capacity ratio	0.68		
Cycle Length (s)	120.0	Sum of lost time (s)	6.0
Intersection Capacity Utilization	83.1%	ICU Level of Service	D
c Critical Lane Group			

# HCM Signalized Intersection Capacity Analysis

## 3: E. Tremont Ave. & Devoe Ave.

8/16/2004



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↑↑			↑↑			↑		↑		↑
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		3.0			3.0			3.0		3.0		3.0
Lane Util. Factor		0.95			0.95			1.00		1.00		1.00
Frbp, ped/bikes		1.00			1.00			0.93		1.00		0.98
Flpb, ped/bikes		1.00			1.00			1.00		0.95		1.00
Frt		1.00			1.00			0.95		1.00		0.85
Flt Protected		1.00			1.00			0.99		0.95		1.00
Satd. Flow (prot)		3396			3388			1570		649		595
Flt Permitted		1.00			1.00			0.99		0.44		1.00
Satd. Flow (perm)		3396			3388			1570		298		595
Volume (vph)	25	410	0	0	1050	10	50	150	130	15	0	175
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Growth Factor (vph)	113%	113%	113%	113%	113%	113%	113%	113%	113%	113%	113%	113%
Adj. Flow (vph)	31	515	0	0	1318	13	63	188	163	19	0	220
Lane Group Flow (vph)	0	546	0	0	1331	0	0	414	0	19	0	220
Confl. Peds. (#/hr)	97		112			97	5		73	73		5
Bus Blockages (#/hr)	0	0	28	0	0	28	0	0	6	0	0	0
Parking (#/hr)						20	20		20	100		100
Turn Type	Perm						Perm			D.Pm		custom
Protected Phases		2			2			4				
Permitted Phases	2	2			2		4	4		4		4
Actuated Green, G (s)		55.0			55.0			55.0		55.0		55.0
Effective Green, g (s)		57.0			57.0			57.0		57.0		57.0
Actuated g/C Ratio		0.48			0.48			0.48		0.48		0.48
Clearance Time (s)		5.0			5.0			5.0		5.0		5.0
Lane Grp Cap (vph)		1613			1609			746		142		283
v/s Ratio Prot		0.16			c0.39			0.26				
v/s Ratio Perm										0.06		c0.37
v/c Ratio		0.34			0.83			0.55		0.13		0.78
Uniform Delay, d1		19.7			27.2			22.5		17.7		26.2
Progression Factor		0.17			1.83			0.80		1.00		1.00
Incremental Delay, d2		0.5			3.9			2.7		1.9		18.7
Delay (s)		3.9			53.7			20.7		19.6		44.9
Level of Service		A			D			C		B		D
Approach Delay (s)		3.9			53.7			20.7			42.9	
Approach LOS		A			D			C			D	

### Intersection Summary

HCM Average Control Delay	36.6	HCM Level of Service	D
HCM Volume to Capacity ratio	0.80		
Cycle Length (s)	120.0	Sum of lost time (s)	6.0
Intersection Capacity Utilization	86.4%	ICU Level of Service	D
c Critical Lane Group			

# HCM Signalized Intersection Capacity Analysis

4: E. Tremont Ave. & Bronx Park Ave.

8/16/2004



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↑↑			↑↑						↑↑	
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	12	12	12	12	12	12	12	12	12	12	15	12
Total Lost time (s)		3.0			3.0						3.0	
Lane Util. Factor		0.95			0.95						0.95	
Frbp, ped/bikes		0.99			1.00						0.87	
Flpb, ped/bikes		1.00			1.00						1.00	
Frt		0.99			1.00						0.91	
Flt Protected		1.00			1.00						1.00	
Satd. Flow (prot)		3013			3056						2656	
Flt Permitted		1.00			1.00						1.00	
Satd. Flow (perm)		3013			3056						2656	
Volume (vph)	0	530	25	60	925	0	0	0	0	20	80	135
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Growth Factor (vph)	113%	113%	113%	113%	113%	113%	113%	113%	113%	113%	113%	113%
Adj. Flow (vph)	0	665	31	75	1161	0	0	0	0	25	100	170
Lane Group Flow (vph)	0	696	0	0	1236	0	0	0	0	0	295	0
Confl. Peds. (#/hr)			100	100			100		100	100		100
Bus Blockages (#/hr)	0	0	28	0	0	28	0	0	0	0	0	0
Parking (#/hr)		20	20		20					20	20	20
Turn Type				Perm						Split		
Protected Phases		4			4					6	6	
Permitted Phases		4		4	4							
Actuated Green, G (s)		69.0			69.0						41.0	
Effective Green, g (s)		71.0			71.0						43.0	
Actuated g/C Ratio		0.59			0.59						0.36	
Clearance Time (s)		5.0			5.0						5.0	
Lane Grp Cap (vph)		1783			1808						952	
v/s Ratio Prot		0.23			c0.40						c0.11	
v/s Ratio Perm												
v/c Ratio		0.39			0.68						0.31	
Uniform Delay, d1		13.0			16.8						27.8	
Progression Factor		1.93			1.00						1.00	
Incremental Delay, d2		0.6			2.1						0.8	
Delay (s)		25.7			18.9						28.6	
Level of Service		C			B						C	
Approach Delay (s)		25.7			18.9			0.0			28.6	
Approach LOS		C			B			A			C	

Intersection Summary			
HCM Average Control Delay	22.3	HCM Level of Service	C
HCM Volume to Capacity ratio	0.54		
Cycle Length (s)	120.0	Sum of lost time (s)	6.0
Intersection Capacity Utilization	77.8%	ICU Level of Service	C
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis  
 5: E. Tremont Ave. & Boston Rd.

8/16/2004

Movement	EBL	EBT	EBR	EBR2	WBL2	WBL	WBT	WBR	NBL2	NBL	NBR	NBR2
Lane Configurations		↕	↕			↕	↕↕	↕		↕	↕	
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	12	12	12	12	11	11	11	11	11	11	11	11
Total Lost time (s)		3.0	3.0			3.0	3.0	3.0		3.0	3.0	
Lane Util. Factor		1.00	1.00			0.91	0.91	1.00		1.00	0.95	
Fr <sub>t</sub>		1.00	0.85			1.00	1.00	0.85		0.91	0.85	
Fl <sub>t</sub> Protected		1.00	1.00			0.95	0.98	1.00		0.98	1.00	
Satd. Flow (prot)		1785	914			1498	3102	884		1550	1399	
Fl <sub>t</sub> Permitted		1.00	1.00			0.95	0.98	1.00		0.88	1.00	
Satd. Flow (perm)		1785	914			1498	3102	884		1398	1399	
Volume (vph)	25	255	45	25	165	425	490	100	10	30	55	170
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Growth Factor (vph)	113%	113%	113%	113%	113%	113%	113%	113%	113%	113%	113%	113%
Adj. Flow (vph)	31	320	56	31	207	534	615	126	13	38	69	213
Lane Group Flow (vph)	0	351	87	0	0	437	919	126	0	120	213	0
Bus Blockages (#/hr)	0	0	100	100	0	0	0	100	0	0	0	0
Turn Type	Split		Prot		Split	Split		Protcustom			custom	
Protected Phases	8	8	8		4	4	4	4				2
Permitted Phases									2	2	2	
Actuated Green, G (s)		27.0	27.0			29.0	29.0	29.0		22.0	22.0	
Effective Green, g (s)		29.0	29.0			31.0	31.0	31.0		24.0	24.0	
Actuated g/C Ratio		0.24	0.24			0.26	0.26	0.26		0.20	0.20	
Clearance Time (s)		5.0	5.0			5.0	5.0	5.0		5.0	5.0	
Lane Grp Cap (vph)		431	221			387	801	228		280	280	
v/s Ratio Prot		c0.20	0.10			0.29	c0.30	0.14				0.15
v/s Ratio Perm										0.09		
v/c Ratio		0.81	0.39			1.13	1.15	0.55		0.43	0.76	
Uniform Delay, d <sub>1</sub>		43.0	38.1			44.5	44.5	38.5		42.0	45.3	
Progression Factor		1.00	1.00			1.22	1.22	1.26		1.00	1.00	
Incremental Delay, d <sub>2</sub>		15.5	5.2			74.7	74.4	5.0		4.7	17.6	
Delay (s)		58.4	43.3			129.1	128.8	53.4		46.7	62.9	
Level of Service		E	D			F	F	D		D	E	
Approach Delay (s)		55.4					122.5			57.0		
Approach LOS		E					F			E		

Intersection Summary			
HCM Average Control Delay	131.2	HCM Level of Service	F
HCM Volume to Capacity ratio	1.23		
Cycle Length (s)	120.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	113.2%	ICU Level of Service	G
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis  
 5: E. Tremont Ave. & Boston Rd.

8/16/2004



Movement	NEL	NET	NER	NER2	SWL2	SWL	SWT	SWR
Lane Configurations		↕			↙		↕	
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	12	12	12	12	10	10	10	10
Total Lost time (s)		3.0			3.0		3.0	
Lane Util. Factor		1.00			1.00		1.00	
Flt		0.90			1.00		0.98	
Flt Protected		1.00			0.95		0.98	
Satd. Flow (prot)		1602			1589		1595	
Flt Permitted		1.00			0.34		0.98	
Satd. Flow (perm)		1602			575		1595	
Volume (vph)	25	45	200	15	180	110	80	35
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Growth Factor (vph)	113%	113%	113%	113%	113%	113%	113%	113%
Adj. Flow (vph)	31	56	251	19	226	138	100	44
Lane Group Flow (vph)	0	357	0	0	226	0	282	0
Bus Blockages (#/hr)	0	0	23	23	0	0	0	21
Turn Type	custom				Perm	Perm		
Protected Phases	6	6					2	
Permitted Phases	6				2	2	2	
Actuated Green, G (s)		22.0			22.0		22.0	
Effective Green, g (s)		24.0			24.0		24.0	
Actuated g/C Ratio		0.20			0.20		0.20	
Clearance Time (s)		5.0			5.0		5.0	
Lane Grp Cap (vph)		320			115		319	
v/s Ratio Prot		c0.22					0.18	
v/s Ratio Perm					c0.39			
v/c Ratio		1.12			1.97		0.88	
Uniform Delay, d1		48.0			48.0		46.6	
Progression Factor		1.00			1.00		1.00	
Incremental Delay, d2		85.2			464.2		28.0	
Delay (s)		133.2			512.2		74.6	
Level of Service		F			F		E	
Approach Delay (s)		133.2					269.3	
Approach LOS		F					F	

Intersection Summary



# HCM Signalized Intersection Capacity Analysis

1: I-895 #1 & Devoe Ave.

8/16/2004



Movement	EBL2	EBL	EBT	WBT	WBR	WBR2	SBL	SBR	SEL	SER
Lane Configurations		↔	↑	↑↑	↔				↔	↔↔
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	12	12	12	10	12	10	10	10	12	12
Total Lost time (s)		3.0	3.0	3.0	3.0				3.0	3.0
Lane Util. Factor		1.00	1.00	0.95	1.00				1.00	0.88
Frt		1.00	1.00	1.00	0.85				1.00	0.85
Flt Protected		0.95	1.00	1.00	1.00				0.95	1.00
Satd. Flow (prot)		1703	1792	3179	1524				1703	2682
Flt Permitted		0.95	1.00	1.00	1.00				0.95	1.00
Satd. Flow (perm)		1703	1792	3179	1524				1703	2682
Volume (vph)	340	215	265	1320	185	145	0	0	195	500
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Growth Factor (vph)	113%	113%	113%	113%	113%	113%	113%	113%	113%	113%
Adj. Flow (vph)	427	270	333	1657	232	182	0	0	245	628
Lane Group Flow (vph)	0	697	333	1657	414	0	0	0	245	628
Bus Blockages (#/hr)	0	0	0	0	0	6	0	0	0	0
Turn Type	Split	Split		Split						custom
Protected Phases	7	7	7	8	8				4	4
Permitted Phases					4					4
Actuated Green, G (s)		45.0	45.0	30.0	60.0				30.0	30.0
Effective Green, g (s)		47.0	47.0	32.0	64.0				32.0	32.0
Actuated g/C Ratio		0.39	0.39	0.27	0.53				0.27	0.27
Clearance Time (s)		5.0	5.0	5.0	5.0				5.0	5.0
Lane Grp Cap (vph)		667	702	848	851				454	715
v/s Ratio Prot		c0.41	0.19	c0.52	0.13				0.14	c0.23
v/s Ratio Perm					0.14					
v/c Ratio		1.04	0.47	1.95	0.49				0.54	0.88
Uniform Delay, d1		36.5	27.3	44.0	17.6				37.7	42.1
Progression Factor		1.00	1.00	1.00	1.00				0.95	0.95
Incremental Delay, d2		47.2	2.3	433.6	2.0				0.4	1.6
Delay (s)		83.7	29.6	477.6	19.6				36.4	41.4
Level of Service		F	C	F	B				D	D
Approach Delay (s)			66.2	386.1		0.0			40.0	
Approach LOS			E	F		A			D	

Intersection Summary			
HCM Average Control Delay	227.1	HCM Level of Service	F
HCM Volume to Capacity ratio	1.26		
Cycle Length (s)	120.0	Sum of lost time (s)	9.0
Intersection Capacity Utilization	108.0%	ICU Level of Service	F
c Critical Lane Group			

# HCM Signalized Intersection Capacity Analysis

2: E. Tremont Ave. & 177th St.

8/16/2004



Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑			↑↑	↑↑	
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.0			3.0	3.0	
Lane Util. Factor	0.95			0.95	0.97	
Frbp, ped/bikes	1.00			1.00	1.00	
Flpb, ped/bikes	1.00			1.00	1.00	
Frt	1.00			1.00	1.00	
Flt Protected	1.00			0.98	0.95	
Satd. Flow (prot)	3406			3165	3292	
Flt Permitted	1.00			0.98	0.95	
Satd. Flow (perm)	3406			3165	3292	
Volume (vph)	665	0	345	750	345	10
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90
Growth Factor (vph)	113%	113%	113%	113%	113%	113%
Adj. Flow (vph)	835	0	433	942	433	13
Lane Group Flow (vph)	835	0	0	1375	446	0
Confl. Peds. (#/hr)		280	280		47	22
Bus Blockages (#/hr)	0	6	0	28	0	0
Turn Type			Perm			
Protected Phases	2			2	3	
Permitted Phases	2		2	2	3	
Actuated Green, G (s)	55.0			55.0	55.0	
Effective Green, g (s)	57.0			57.0	57.0	
Actuated g/C Ratio	0.48			0.48	0.48	
Clearance Time (s)	5.0			5.0	5.0	
Lane Grp Cap (vph)	1618			1503	1564	
v/s Ratio Prot	0.25			c0.43	c0.14	
v/s Ratio Perm						
v/c Ratio	0.52			0.91	0.29	
Uniform Delay, d1	21.9			29.2	19.1	
Progression Factor	1.75			0.38	0.63	
Incremental Delay, d2	0.1			7.3	0.2	
Delay (s)	38.4			18.4	12.3	
Level of Service	D			B	B	
Approach Delay (s)	38.4			18.4	12.3	
Approach LOS	D			B	B	

Intersection Summary			
HCM Average Control Delay	23.7	HCM Level of Service	C
HCM Volume to Capacity ratio	0.60		
Cycle Length (s)	120.0	Sum of lost time (s)	6.0
Intersection Capacity Utilization	85.0%	ICU Level of Service	D
c Critical Lane Group			

# HCM Signalized Intersection Capacity Analysis

3: E. Tremont Ave. & Devoe Ave.

8/16/2004

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↑↑			↑↑			↑↑		↑		↑
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		3.0			3.0			3.0		3.0		3.0
Lane Util. Factor		0.95			0.95			1.00		1.00		1.00
Frbp, ped/bikes		1.00			1.00			0.92		1.00		0.94
Flpb, ped/bikes		1.00			1.00			1.00		1.00		1.00
Frt		1.00			1.00			0.94		1.00		0.85
Flt Protected		1.00			1.00			1.00		0.95		1.00
Satd. Flow (prot)		3401			3393			1540		681		573
Flt Permitted		1.00			1.00			1.00		0.30		1.00
Satd. Flow (perm)		3401			3393			1540		218		573
Volume (vph)	20	655	0	0	925	5	25	235	240	15	0	145
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Growth Factor (vph)	113%	113%	113%	113%	113%	113%	113%	113%	113%	113%	113%	113%
Adj. Flow (vph)	25	822	0	0	1161	6	31	295	301	19	0	182
Lane Group Flow (vph)	0	847	0	0	1167	0	0	627	0	19	0	182
Confl. Peds. (#/hr)	198		280			198	22		69	69		22
Bus Blockages (#/hr)	0	0	28	0	0	28	0	0	6	0	0	0
Parking (#/hr)						20	20		20	100		100
Turn Type	Perm			Perm				D.Pm		custom		
Protected Phases		2			2			4				
Permitted Phases	2	2			2		4	4		4		4
Actuated Green, G (s)		55.0			55.0			55.0		55.0		55.0
Effective Green, g (s)		57.0			57.0			57.0		57.0		57.0
Actuated g/C Ratio		0.48			0.48			0.48		0.48		0.48
Clearance Time (s)		5.0			5.0			5.0		5.0		5.0
Lane Grp Cap (vph)		1615			1612			732		104		272
v/s Ratio Prot		0.25			0.34			0.41				
v/s Ratio Perm										0.09		0.32
v/c Ratio		0.52			0.72			0.86		0.18		0.67
Uniform Delay, d1		22.0			25.2			27.9		18.1		24.2
Progression Factor		0.14			2.06			0.84		1.00		1.00
Incremental Delay, d2		1.1			2.3			11.4		3.8		12.4
Delay (s)		4.2			54.2			34.8		21.9		36.6
Level of Service		A			D			C		C		D
Approach Delay (s)		4.2			54.2			34.8			35.2	
Approach LOS		A			D			C			D	

## Intersection Summary

HCM Average Control Delay	33.7	HCM Level of Service	C
HCM Volume to Capacity ratio	0.79		
Cycle Length (s)	120.0	Sum of lost time (s)	6.0
Intersection Capacity Utilization	93.8%	ICU Level of Service	E
c Critical Lane Group			

# HCM Signalized Intersection Capacity Analysis

4: E. Tremont Ave. & Bronx Park Ave.

8/16/2004



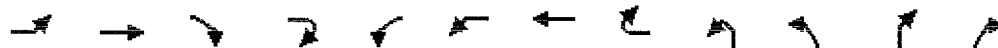
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↑↑			↑↑						↑↑	
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	12	12	12	12	12	12	12	12	12	12	15	12
Total Lost time (s)		3.0			3.0						3.0	
Lane Util. Factor		0.95			0.95						0.95	
Frbp, ped/bikes		0.99			1.00						0.91	
Flpb, ped/bikes		1.00			1.00						1.00	
Frt		1.00			1.00						0.94	
Flt Protected		1.00			1.00						0.99	
Satd. Flow (prot)		3026			3058						2889	
Flt Permitted		1.00			1.00						0.99	
Satd. Flow (perm)		3026			3058						2889	
Volume (vph)	0	880	30	40	880	0	0	0	0	20	65	50
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Growth Factor (vph)	113%	113%	113%	113%	113%	113%	113%	113%	113%	113%	113%	113%
Adj. Flow (vph)	0	1105	38	50	1105	0	0	0	0	25	82	63
Lane Group Flow (vph)	0	1143	0	0	1155	0	0	0	0	0	170	0
Confl. Peds. (#/hr)			100	100			100		100	100		100
Bus Blockages (#/hr)	0	0	28	0	0	28	0	0	0	0	0	0
Parking (#/hr)		20	20		20					20	20	20
Turn Type				Perm						Split		
Protected Phases		4			4					6	6	
Permitted Phases		4		4	4							
Actuated Green, G (s)		69.0			69.0						41.0	
Effective Green, g (s)		71.0			71.0						43.0	
Actuated g/C Ratio		0.59			0.59						0.36	
Clearance Time (s)		5.0			5.0						5.0	
Lane Grp Cap (vph)		1790			1809						1035	
v/s Ratio Prot		c0.38			0.38						c0.06	
v/s Ratio Perm												
v/c Ratio		0.64			0.64						0.16	
Uniform Delay, d1		16.1			16.1						26.2	
Progression Factor		1.68			1.00						1.00	
Incremental Delay, d2		1.4			1.7						0.3	
Delay (s)		28.5			17.8						26.6	
Level of Service		C			B						C	
Approach Delay (s)		28.5			17.8			0.0			26.6	
Approach LOS		C			B			A			C	

Intersection Summary			
HCM Average Control Delay	23.4	HCM Level of Service	C
HCM Volume to Capacity ratio	0.46		
Cycle Length (s)	120.0	Sum of lost time (s)	6.0
Intersection Capacity Utilization	72.5%	ICU Level of Service	C
c Critical Lane Group			

# HCM Signalized Intersection Capacity Analysis

5: E. Tremont Ave. & Boston Rd.

8/16/2004



Movement	EBL	EBT	EBR	EBR2	WBL2	WBL	WBT	WBR	NBL2	NBL	NBR	NBR2
Lane Configurations		↕	↕			↕	↕↕	↕		↕↕	↕	↕
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	12	12	12	12	11	11	11	11	11	11	11	11
Total Lost time (s)		3.0	3.0			3.0	3.0	3.0		3.0	3.0	
Lane Util. Factor		1.00	1.00			0.91	0.91	1.00		1.00	0.95	
Fr <sub>t</sub>		1.00	0.85			1.00	1.00	0.85		0.88	0.85	
Fl <sub>t</sub> Protected		1.00	1.00			0.95	0.99	1.00		0.99	1.00	
Satd. Flow (prot)		1786	914			1498	3138	884		1513	1399	
Fl <sub>t</sub> Permitted		1.00	1.00			0.95	0.99	1.00		0.95	1.00	
Satd. Flow (perm)		1786	914			1498	3138	884		1455	1399	
Volume (vph)	35	420	55	5	95	275	575	150	5	10	55	175
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Growth Factor (vph)	113%	113%	113%	113%	113%	113%	113%	113%	113%	113%	113%	113%
Adj. Flow (vph)	44	527	69	6	119	345	722	188	6	13	69	220
Lane Group Flow (vph)	0	571	75	0	0	382	804	188	0	88	220	0
Bus Blockages (#/hr)	0	0	100	100	0	0	0	100	0	0	0	0
Turn Type	Split		Prot		Split	Split		Protcustom			custom	
Protected Phases	8	8	8		4	4	4	4				2
Permitted Phases									2	2	2	
Actuated Green, G (s)		27.0	27.0			29.0	29.0	29.0		22.0	22.0	
Effective Green, g (s)		29.0	29.0			31.0	31.0	31.0		24.0	24.0	
Actuated g/C Ratio		0.24	0.24			0.26	0.26	0.26		0.20	0.20	
Clearance Time (s)		5.0	5.0			5.0	5.0	5.0		5.0	5.0	
Lane Grp Cap (vph)		432	221			387	811	228		291	280	
v/s Ratio Prot		c0.32	0.08			0.26	c0.26	0.21			0.16	
v/s Ratio Perm										0.06		
v/c Ratio		1.32	0.34			0.99	0.99	0.82		0.30	0.79	
Uniform Delay, d1		45.5	37.6			44.3	44.4	41.9		40.9	45.6	
Progression Factor		1.00	1.00			1.20	1.20	1.21		1.00	1.00	
Incremental Delay, d2		160.3	4.1			34.7	24.1	20.2		2.7	19.6	
Delay (s)		205.8	41.7			88.1	77.4	71.1		43.5	65.2	
Level of Service		F	D			F	E	E		D	E	
Approach Delay (s)		186.7					79.5			59.0		
Approach LOS		F					E			E		

## Intersection Summary

HCM Average Control Delay	152.3	HCM Level of Service	F
HCM Volume to Capacity ratio	1.41		
Cycle Length (s)	120.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	121.2%	ICU Level of Service	H
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis  
 5: E. Tremont Ave. & Boston Rd.

8/16/2004



Movement	NEL	NET	NER	NER2	SWL2	SWL	SWT	SWR
Lane Configurations		↕			↙		↕	
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	12	12	12	12	10	10	10	10
Total Lost time (s)		3.0			3.0		3.0	
Lane Util. Factor		1.00			1.00		1.00	
Fr <sub>t</sub>		0.90			1.00		0.97	
Fl <sub>t</sub> Protected		1.00			0.95		0.98	
Satd. Flow (prot)		1606			1589		1588	
Fl <sub>t</sub> Permitted		1.00			0.33		0.98	
Satd. Flow (perm)		1606			549		1588	
Volume (vph)	5	65	220	10	200	60	65	35
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Growth Factor (vph)	113%	113%	113%	113%	113%	113%	113%	113%
Adj. Flow (vph)	6	82	276	13	251	75	82	44
Lane Group Flow (vph)	0	377	0	0	251	0	201	0
Bus Blockages (#/hr)	0	0	23	23	0	0	0	21
Turn Type	custom				Perm	Perm		
Protected Phases	6	6					2	
Permitted Phases	6				2	2	2	
Actuated Green, G (s)		22.0			22.0		22.0	
Effective Green, g (s)		24.0			24.0		24.0	
Actuated g/C Ratio		0.20			0.20		0.20	
Clearance Time (s)		5.0			5.0		5.0	
Lane Grp Cap (vph)		321			110		318	
v/s Ratio Prot		c0.23					0.13	
v/s Ratio Perm					c0.46			
v/c Ratio		1.17			2.28		0.63	
Uniform Delay, d <sub>1</sub>		48.0			48.0		44.0	
Progression Factor		1.00			1.00		1.00	
Incremental Delay, d <sub>2</sub>		106.4			604.6		9.2	
Delay (s)		154.4			652.6		53.2	
Level of Service		F			F		D	
Approach Delay (s)		154.4					386.0	
Approach LOS		F					F	
<b>Intersection Summary</b>								

# HCM Signalized Intersection Capacity Analysis

1: I-895 #1 & Devoe Ave.

8/16/2004



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↵	↶			↶↶	↷		↶			↶	↷↷
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.0	3.0			3.0	3.0		3.0			3.0	3.0
Lane Util. Factor	0.95	0.95			0.95	1.00		1.00			1.00	0.88
Frt	1.00	1.00			1.00	0.85		0.93			1.00	0.85
Flt Protected	0.95	0.98			1.00	1.00		1.00			0.96	1.00
Satd. Flow (prot)	1618	1335			3404	1524		1671			1718	2682
Flt Permitted	0.95	0.98			1.00	1.00		1.00			0.96	1.00
Satd. Flow (perm)	1618	1335			3404	1524		1671			1718	2682
Volume (vph)	400	150	0	20	1790	275	0	20	20	130	20	700
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Growth Factor (vph)	103%	103%	103%	103%	103%	103%	103%	103%	103%	103%	103%	103%
Adj. Flow (vph)	458	172	0	23	2049	315	0	23	23	149	23	801
Lane Group Flow (vph)	342	288	0	0	2072	315	0	46	0	0	172	801
Parking (#/hr)		20										
Turn Type	Split			custom		custom				Perm		pm+ov
Protected Phases	7	7		8	8	8		4			4	7
Permitted Phases				8		4		4		4	4	4
Actuated Green, G (s)	25.0	25.0			64.0	80.0		16.0			16.0	41.0
Effective Green, g (s)	27.0	27.0			66.0	84.0		18.0			18.0	45.0
Actuated g/C Ratio	0.22	0.22			0.55	0.70		0.15			0.15	0.38
Clearance Time (s)	5.0	5.0			5.0	5.0		5.0			5.0	5.0
Lane Grp Cap (vph)	364	300			1872	1105		251			258	1073
v/s Ratio Prot	0.21	c0.22			c0.61	0.16		0.03			0.10	c0.17
v/s Ratio Perm						0.05						0.13
v/c Ratio	0.94	0.96			1.11	0.29		0.18			0.67	0.75
Uniform Delay, d1	45.7	46.0			27.0	6.7		44.6			48.2	32.5
Progression Factor	1.00	1.00			1.00	1.00		1.00			0.80	1.50
Incremental Delay, d2	34.1	42.7			56.5	0.6		1.6			10.2	3.7
Delay (s)	79.8	88.7			83.5	7.4		46.2			48.7	52.4
Level of Service	E	F			F	A		D			D	D
Approach Delay (s)		83.9			73.5			46.2			51.8	
Approach LOS		F			E			D			D	

## Intersection Summary

HCM Average Control Delay	69.6	HCM Level of Service	E
HCM Volume to Capacity ratio	1.02		
Cycle Length (s)	120.0	Sum of lost time (s)	9.0
Intersection Capacity Utilization	100.6%	ICU Level of Service	F

c Critical Lane Group

# HCM Signalized Intersection Capacity Analysis

2: E. Tremont Ave. & Ped Xing

8/16/2004



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↑↑			↑↑							
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		3.0			3.0							
Lane Util. Factor		0.95			0.95							
Frbp, ped/bikes		1.00			1.00							
Flpb, ped/bikes		1.00			1.00							
Frt		1.00			1.00							
Flt Protected		1.00			1.00							
Satd. Flow (prot)		3406			3406							
Flt Permitted		1.00			1.00							
Satd. Flow (perm)		3406			3406							
Volume (vph)	0	805	0	0	1195	0	0	0	0	0	0	0
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Growth Factor (vph)	103%	103%	103%	103%	103%	103%	103%	103%	103%	103%	103%	103%
Adj. Flow (vph)	0	921	0	0	1368	0	0	0	0	0	0	0
Lane Group Flow (vph)	0	921	0	0	1368	0	0	0	0	0	0	0
Confl. Peds. (#/hr)	300		300	300		300	300		300	300		300
Confl. Bikes (#/hr)			50			50			50			50

Turn Type												
Protected Phases		2			2							
Permitted Phases												
Actuated Green, G (s)		90.0			90.0							
Effective Green, g (s)		92.0			92.0							
Actuated g/C Ratio		0.77			0.77							
Clearance Time (s)		5.0			5.0							
Lane Grp Cap (vph)		2611			2611							
v/s Ratio Prot		0.27			0.40							
v/s Ratio Perm												
v/c Ratio		0.35			0.52							
Uniform Delay, d1		4.5			5.5							
Progression Factor		1.80			1.73							
Incremental Delay, d2		0.0			0.6							
Delay (s)		8.1			10.0							
Level of Service		A			A							
Approach Delay (s)		8.1			10.0			0.0			0.0	
Approach LOS		A			A			A			A	

Intersection Summary			
HCM Average Control Delay	9.2	HCM Level of Service	A
HCM Volume to Capacity ratio	0.52		
Cycle Length (s)	120.0	Sum of lost time (s)	28.0
Intersection Capacity Utilization	41.1%	ICU Level of Service	A
c Critical Lane Group			



# HCM Signalized Intersection Capacity Analysis

3: E. Tremont Ave. & Devoe Ave.

8/16/2004



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕↕		↙	↕↕		↘	↕↕	↗			↗
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		3.0		3.0	3.0		3.0	3.0	3.0			3.0
Lane Util. Factor		0.95		0.91	0.91		0.95	0.91	0.95			1.00
Frbp, ped/bikes		1.00		1.00	1.00		1.00	1.00	0.83			0.98
Flpb, ped/bikes		1.00		1.00	1.00		0.99	0.99	1.00			1.00
Frt		1.00		1.00	1.00		1.00	1.00	0.85			0.86
Flt Protected		1.00		0.95	0.99		0.95	0.97	1.00			1.00
Satd. Flow (prot)		3396		1550	3222		1280	1581	935			1515
Flt Permitted		1.00		0.95	0.99		0.95	0.97	1.00			1.00
Satd. Flow (perm)		3396		1550	3222		1280	1581	935			1515
Volume (vph)	25	400	0	470	600	10	405	150	160	0	0	190
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Growth Factor (vph)	103%	103%	103%	103%	103%	103%	103%	103%	103%	103%	103%	103%
Adj. Flow (vph)	29	458	0	538	687	11	464	172	183	0	0	217
Lane Group Flow (vph)	0	487	0	399	837	0	280	356	183	0	0	217
Confl. Peds. (#/hr)	97		112			97	5		73	73		5
Bus Blockages (#/hr)	0	0	28	0	0	28	0	0	6	0	0	0
Parking (#/hr)						20	20		20	0		
Turn Type	Split			Split		custom		custom				custom
Protected Phases	2	2		1	1							
Permitted Phases							4	4	4			4
Actuated Green, G (s)		25.0		35.0	35.0		45.0	45.0	45.0			45.0
Effective Green, g (s)		27.0		37.0	37.0		47.0	47.0	47.0			47.0
Actuated g/C Ratio		0.22		0.31	0.31		0.39	0.39	0.39			0.39
Clearance Time (s)		5.0		5.0	5.0		5.0	5.0	5.0			5.0
Lane Grp Cap (vph)		764		478	993		501	619	366			593
v/s Ratio Prot		c0.14		0.26	c0.26							
v/s Ratio Perm							0.22	c0.23	0.20			0.14
v/c Ratio		0.64		0.83	0.84		0.56	0.58	0.50			0.37
Uniform Delay, d1		42.1		38.7	38.8		28.4	28.7	27.6			25.9
Progression Factor		0.64		0.74	0.74		0.68	0.68	0.69			1.00
Incremental Delay, d2		3.9		13.1	7.1		3.6	3.1	3.9			1.7
Delay (s)		30.6		41.7	36.0		22.9	22.5	22.8			27.7
Level of Service		C		D	D		C	C	C			C
Approach Delay (s)		30.6			37.8			22.7			27.7	
Approach LOS		C			D			C			C	

Intersection Summary		
HCM Average Control Delay	31.3	HCM Level of Service
HCM Volume to Capacity ratio	0.68	C
Cycle Length (s)	120.0	Sum of lost time (s)
Intersection Capacity Utilization	73.2%	9.0
c Critical Lane Group		ICU Level of Service
		C

# HCM Signalized Intersection Capacity Analysis

4: E. Tremont Ave. & Bronx Park Ave.

8/16/2004



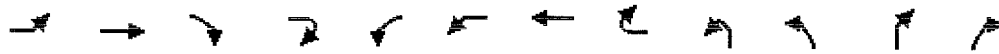
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↑↑			↑↑						↑↑	
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	12	12	12	12	12	12	12	12	12	12	15	12
Total Lost time (s)		3.0			3.0						3.0	
Lane Util. Factor		0.95			0.95						0.95	
Frbp, ped/bikes		0.99			1.00						0.87	
Fipb, ped/bikes		1.00			1.00						1.00	
Frt		0.99			1.00						0.91	
Flt Protected		1.00			1.00						1.00	
Satd. Flow (prot)		3012			3056						2660	
Flt Permitted		1.00			1.00						1.00	
Satd. Flow (perm)		3012			3056						2660	
Volume (vph)	0	535	25	60	945	0	0	0	0	20	80	135
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Growth Factor (vph)	103%	103%	103%	103%	103%	103%	103%	103%	103%	103%	103%	103%
Adj. Flow (vph)	0	612	29	69	1082	0	0	0	0	23	92	154
Lane Group Flow (vph)	0	641	0	0	1151	0	0	0	0	0	269	0
Confl. Peds. (#/hr)			100	100			100		100	100		100
Bus Blockages (#/hr)	0	0	28	0	0	28	0	0	0	0	0	0
Parking (#/hr)		20	20		20					20	20	20
Turn Type				Perm						Split		
Protected Phases		4			4					6	6	
Permitted Phases		4		4	4							
Actuated Green, G (s)		69.0			69.0						41.0	
Effective Green, g (s)		71.0			71.0						43.0	
Actuated g/C Ratio		0.59			0.59						0.36	
Clearance Time (s)		5.0			5.0						5.0	
Lane Grp Cap (vph)		1782			1808						953	
v/s Ratio Prot		0.21			c0.38						c0.10	
v/s Ratio Perm												
v/c Ratio		0.36			0.64						0.28	
Uniform Delay, d1		12.7			16.0						27.5	
Progression Factor		2.16			1.00						1.00	
Incremental Delay, d2		0.5			1.7						0.7	
Delay (s)		28.0			17.8						28.2	
Level of Service		C			B						C	
Approach Delay (s)		28.0			17.8			0.0			28.2	
Approach LOS		C			B			A			C	

## Intersection Summary

HCM Average Control Delay	22.3	HCM Level of Service	C
HCM Volume to Capacity ratio	0.50		
Cycle Length (s)	120.0	Sum of lost time (s)	6.0
Intersection Capacity Utilization	73.3%	ICU Level of Service	C
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis  
5: E. Tremont Ave. & Boston Rd.

8/16/2004



Movement	EBL	EBT	EBR	EBR2	WBL2	WBL	WBT	WBR	NBL2	NBL	NBR	NBR2
Lane Configurations		↕	↕			↕	↕↕	↕		↕↕	↕	
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	12	12	12	12	11	11	11	11	11	11	11	11
Total Lost time (s)		3.0	3.0			3.0	3.0	3.0		3.0	3.0	
Lane Util. Factor		1.00	1.00			0.91	0.91	1.00		1.00	0.95	
Frt		1.00	0.85			1.00	1.00	0.85		0.91	0.85	
Flt Protected		1.00	1.00			0.95	0.98	1.00		0.98	1.00	
Satd. Flow (prot)		1784	914			1498	3102	884		1549	1399	
Flt Permitted		1.00	1.00			0.95	0.98	1.00		0.98	1.00	
Satd. Flow (perm)		1784	914			1498	3102	884		1549	1399	
Volume (vph)	25	255	45	25	165	425	490	115	10	30	55	170
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Growth Factor (vph)	103%	103%	103%	103%	103%	103%	103%	103%	103%	103%	103%	103%
Adj. Flow (vph)	29	292	52	29	189	486	561	132	11	34	63	195
Lane Group Flow (vph)	0	321	81	0	0	398	838	132	0	108	195	0
Bus Blockages (#/hr)	0	0	100	100	0	0	0	100	0	0	0	0
Turn Type	Split		Perm		custom	Split		Perm	custom		custom	
Protected Phases	8	8			4	4	4		2!	2!	2	
Permitted Phases			8		4			4	2	2	2	
Actuated Green, G (s)		27.0	27.0			29.0	29.0	29.0		22.0	22.0	
Effective Green, g (s)		29.0	29.0			31.0	31.0	31.0		24.0	24.0	
Actuated g/C Ratio		0.24	0.24			0.26	0.26	0.26		0.20	0.20	
Clearance Time (s)		5.0	5.0			5.0	5.0	5.0		5.0	5.0	
Lane Grp Cap (vph)		431	221			387	801	228		310	280	
v/s Ratio Prot		c0.18				0.27	c0.27			0.07	0.14	
v/s Ratio Perm			0.09					0.15				
v/c Ratio		0.74	0.37			1.03	1.05	0.58		0.35	0.70	
Uniform Delay, d1		42.1	37.9			44.5	44.5	38.8		41.3	44.6	
Progression Factor		1.00	1.00			0.95	0.94	1.00		1.00	1.00	
Incremental Delay, d2		11.1	4.6			50.0	42.3	8.9		3.1	13.4	
Delay (s)		53.2	42.5			92.1	84.2	47.7		44.3	58.0	
Level of Service		D	D			F	F	D		D	E	
Approach Delay (s)		51.0					83.0			53.2		
Approach LOS		D					F			D		

Intersection Summary

HCM Average Control Delay	97.2	HCM Level of Service	F
HCM Volume to Capacity ratio	1.09		
Cycle Length (s)	120.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	104.7%	ICU Level of Service	F

- ! Phase conflict between lane groups.
- c Critical Lane Group

HCM Signalized Intersection Capacity Analysis  
 5: E. Tremont Ave. & Boston Rd.

8/16/2004



Movement	NEL	NET	NER	NER2	SWL2	SWL	SWT	SWR
Lane Configurations		↕			↙		↕	
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	12	12	12	12	10	10	10	10
Total Lost time (s)		3.0			3.0		3.0	
Lane Util. Factor		1.00			1.00		1.00	
Fr <sub>t</sub>		0.90			1.00		0.98	
Fl <sub>t</sub> Protected		1.00			0.95		0.98	
Satd. Flow (prot)		1603			1589		1595	
Fl <sub>t</sub> Permitted		0.95			0.38		1.00	
Satd. Flow (perm)		1532			642		1634	
Volume (vph)	25	45	200	15	180	110	80	35
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Growth Factor (vph)	103%	103%	103%	103%	103%	103%	103%	103%
Adj. Flow (vph)	29	52	229	17	206	126	92	40
Lane Group Flow (vph)	0	327	0	0	206	0	258	0
Bus Blockages (#/hr)	0	0	23	23	0	0	0	21
Turn Type	Perm				Perm	Perm		
Protected Phases		6					2!	
Permitted Phases	6				2	2!		
Actuated Green, G (s)		22.0			22.0		22.0	
Effective Green, g (s)		24.0			24.0		24.0	
Actuated g/C Ratio		0.20			0.20		0.20	
Clearance Time (s)		5.0			5.0		5.0	
Lane Grp Cap (vph)		306			128		327	
v/s Ratio Prot								
v/s Ratio Perm		c0.21			c0.32		0.16	
v/c Ratio		1.07			1.61		0.79	
Uniform Delay, d1		48.0			48.0		45.6	
Progression Factor		1.00			1.00		1.00	
Incremental Delay, d2		70.8			307.4		17.4	
Delay (s)		118.8			355.4		63.0	
Level of Service		F			F		E	
Approach Delay (s)		118.8					192.8	
Approach LOS		F					F	

Intersection Summary

# HCM Signalized Intersection Capacity Analysis

1: I-895 #1 & Devoe Ave.

8/16/2004

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.0	3.0			3.0	3.0		3.0			3.0	3.0
Lane Util. Factor	0.95	0.95			0.95	1.00		1.00			1.00	0.88
Fr <sub>t</sub>	1.00	1.00			1.00	0.85		0.93			1.00	0.85
Fl <sub>t</sub> Protected	0.95	0.99			1.00	1.00		1.00			0.96	1.00
Satd. Flow (prot)	1681	1395			3539	1583		1737			1782	2787
Fl <sub>t</sub> Permitted	0.95	0.99			1.00	1.00		1.00			0.96	1.00
Satd. Flow (perm)	1681	1395			3539	1583		1737			1782	2787
Volume (vph)	555	265	0	0	1320	330	0	20	20	195	20	500
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Growth Factor (vph)	103%	103%	103%	103%	103%	103%	103%	103%	103%	103%	103%	103%
Adj. Flow (vph)	635	303	0	0	1511	378	0	23	23	223	23	572
Lane Group Flow (vph)	509	429	0	0	1511	378	0	46	0	0	246	572
Parking (#/hr)		20										
Turn Type	Split			custom		custom				Perm		pm+ov
Protected Phases	7	7		8	8	8		4			4	7
Permitted Phases				8		4		4		4	4	4
Actuated Green, G (s)	25.0	25.0			64.0	80.0		16.0			16.0	41.0
Effective Green, g (s)	27.0	27.0			66.0	84.0		18.0			18.0	45.0
Actuated g/C Ratio	0.22	0.22			0.55	0.70		0.15			0.15	0.38
Clearance Time (s)	5.0	5.0			5.0	5.0		5.0			5.0	5.0
Lane Grp Cap (vph)	378	314			1946	1148		261			267	1115
v/s Ratio Prot	0.30	c0.31			c0.43	0.18		0.03			c0.14	0.12
v/s Ratio Perm						0.06						0.09
v/c Ratio	1.35	1.37			0.78	0.33		0.18			0.92	0.51
Uniform Delay, d <sub>1</sub>	46.5	46.5			21.2	7.0		44.5			50.3	29.0
Progression Factor	1.00	1.00			1.00	1.00		1.00			0.94	1.40
Incremental Delay, d <sub>2</sub>	172.7	184.0			3.1	0.8		1.5			36.8	1.6
Delay (s)	219.2	230.5			24.3	7.8		46.0			84.2	42.2
Level of Service	F	F			C	A		D			F	D
Approach Delay (s)		224.3			21.0			46.0			54.8	
Approach LOS		F			C			D			D	

## Intersection Summary

HCM Average Control Delay	80.5	HCM Level of Service	F
HCM Volume to Capacity ratio	0.94		
Cycle Length (s)	120.0	Sum of lost time (s)	9.0
Intersection Capacity Utilization	97.6%	ICU Level of Service	E
c Critical Lane Group			

# HCM Signalized Intersection Capacity Analysis

2: E. Tremont Ave. & Ped Xing

8/16/2004



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↑↑			↑↑							
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		3.0			3.0							
Lane Util. Factor		0.95			0.95							
Frbp, ped/bikes		1.00			1.00							
Flpb, ped/bikes		1.00			1.00							
Frt		1.00			1.00							
Flt Protected		1.00			1.00							
Satd. Flow (prot)		3539			3539							
Flt Permitted		1.00			1.00							
Satd. Flow (perm)		3539			3539							
Volume (vph)	0	1015	0	0	1110	0	0	0	0	0	0	0
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Growth Factor (vph)	103%	103%	103%	103%	103%	103%	103%	103%	103%	103%	103%	103%
Adj. Flow (vph)	0	1162	0	0	1270	0	0	0	0	0	0	0
Lane Group Flow (vph)	0	1162	0	0	1270	0	0	0	0	0	0	0
Confl. Peds. (#/hr)	300		300	300		300	300		300	300		300
Confl. Bikes (#/hr)			50			50			50			50
Turn Type												
Protected Phases		2			2							
Permitted Phases												
Actuated Green, G (s)		90.0			90.0							
Effective Green, g (s)		92.0			92.0							
Actuated g/C Ratio		0.77			0.77							
Clearance Time (s)		5.0			5.0							
Lane Grp Cap (vph)		2713			2713							
v/s Ratio Prot		0.33			0.36							
v/s Ratio Perm												
v/c Ratio		0.43			0.47							
Uniform Delay, d1		4.9			5.1							
Progression Factor		1.45			1.84							
Incremental Delay, d2		0.0			0.5							
Delay (s)		7.1			9.8							
Level of Service		A			A							
Approach Delay (s)		7.1			9.8			0.0			0.0	
Approach LOS		A			A			A			A	

## Intersection Summary

HCM Average Control Delay	8.5	HCM Level of Service	A
HCM Volume to Capacity ratio	0.47		
Cycle Length (s)	120.0	Sum of lost time (s)	28.0
Intersection Capacity Utilization	38.4%	ICU Level of Service	A
c Critical Lane Group			

# HCM Signalized Intersection Capacity Analysis

3: E. Tremont Ave. & Devoe Ave.

8/16/2004



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕↕		↙	↕↕		↙	↕↕	↗			↗
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		3.0		3.0	3.0		3.0	3.0	3.0			3.0
Lane Util. Factor		0.95		0.91	0.91		0.95	0.91	0.95			1.00
Frbp, ped/bikes		1.00		1.00	1.00		1.00	0.97	0.83			0.98
Flpb, ped/bikes		1.00		1.00	1.00		0.99	1.00	1.00			1.00
Frt		1.00		1.00	1.00		1.00	0.98	0.85			0.86
Flt Protected		1.00		0.95	1.00		0.95	0.99	1.00			1.00
Satd. Flow (prot)		3534		1610	3366		1330	1593	971			1574
Flt Permitted		1.00		0.95	1.00		0.95	0.99	1.00			1.00
Satd. Flow (perm)		3534		1610	3366		1330	1593	971			1574
Volume (vph)	20	645	0	365	580	5	370	235	270	0	0	160
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Growth Factor (vph)	103%	103%	103%	103%	103%	103%	103%	103%	103%	103%	103%	103%
Adj. Flow (vph)	23	738	0	418	664	6	423	269	309	0	0	183
Lane Group Flow (vph)	0	761	0	351	737	0	328	428	245	0	0	183
Confl. Peds. (#/hr)	97		112			97	5		73	73		5
Bus Blockages (#/hr)	0	0	28	0	0	28	0	0	6	0	0	0
Parking (#/hr)						20	20		20	0		
Turn Type	Split			Split		custom		custom				custom
Protected Phases	2	2		1	1							
Permitted Phases							4	4	4			4
Actuated Green, G (s)		25.0		35.0	35.0		45.0	45.0	45.0			45.0
Effective Green, g (s)		27.0		37.0	37.0		47.0	47.0	47.0			47.0
Actuated g/C Ratio		0.22		0.31	0.31		0.39	0.39	0.39			0.39
Clearance Time (s)		5.0		5.0	5.0		5.0	5.0	5.0			5.0
Lane Grp Cap (vph)		795		496	1038		521	624	380			616
v/s Ratio Prot		c0.22		0.22	c0.22							
v/s Ratio Perm							0.25	c0.27	0.25			0.12
v/c Ratio		0.96		0.71	0.71		0.63	0.69	0.64			0.30
Uniform Delay, d1		45.9		36.7	36.7		29.5	30.4	29.7			25.1
Progression Factor		0.75		0.66	0.66		0.66	0.65	0.66			1.00
Incremental Delay, d2		21.8		7.0	3.5		3.1	3.3	4.5			1.2
Delay (s)		56.4		31.2	27.7		22.6	23.2	24.0			26.4
Level of Service		E		C	C		C	C	C			C
Approach Delay (s)		56.4			28.8			23.2			26.4	
Approach LOS		E			C			C			C	













## Intersection Summary

HCM Average Control Delay	33.7	HCM Level of Service	C
HCM Volume to Capacity ratio	0.76		
Cycle Length (s)	120.0	Sum of lost time (s)	9.0
Intersection Capacity Utilization	80.8%	ICU Level of Service	D
c Critical Lane Group			

# HCM Signalized Intersection Capacity Analysis

4: E. Tremont Ave. & Bronx Park Ave.

8/16/2004

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↑↑			↑↑						↑↑	
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	12	12	12	12	12	12	12	12	12	12	15	12
Total Lost time (s)		3.0			3.0						3.0	
Lane Util. Factor		0.95			0.95						0.95	
Frbp, ped/bikes		0.99			1.00						0.91	
Flpb, ped/bikes		1.00			1.00						1.00	
Frt		1.00			1.00						0.94	
Flt Protected		1.00			1.00						0.99	
Satd. Flow (prot)		3146			3178						3002	
Flt Permitted		1.00			1.00						0.99	
Satd. Flow (perm)		3146			3178						3002	
Volume (vph)	0	885	30	40	900	0	0	0	0	20	65	50
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Growth Factor (vph)	103%	103%	103%	103%	103%	103%	103%	103%	103%	103%	103%	103%
Adj. Flow (vph)	0	1013	34	46	1030	0	0	0	0	23	74	57
Lane Group Flow (vph)	0	1047	0	0	1076	0	0	0	0	0	154	0
Confl. Peds. (#/hr)			100	100			100		100	100		100
Bus Blockages (#/hr)	0	0	28	0	0	28	0	0	0	0	0	0
Parking (#/hr)		20	20		20					20	20	20
Turn Type				Perm						Split		
Protected Phases		4			4					6	6	
Permitted Phases		4		4	4							
Actuated Green, G (s)		69.0			69.0						41.0	
Effective Green, g (s)		71.0			71.0						43.0	
Actuated g/C Ratio		0.59			0.59						0.36	
Clearance Time (s)		5.0			5.0						5.0	
Lane Grp Cap (vph)		1861			1880						1076	
v/s Ratio Prot		0.33			c0.34						c0.05	
v/s Ratio Perm												
v/c Ratio		0.56			0.57						0.14	
Uniform Delay, d1		15.0			15.1						26.0	
Progression Factor		2.05			1.00						1.00	
Incremental Delay, d2		0.6			1.3						0.3	
Delay (s)		31.3			16.4						26.3	
Level of Service		C			B						C	
Approach Delay (s)		31.3			16.4			0.0			26.3	
Approach LOS		C			B			A			C	

## Intersection Summary

HCM Average Control Delay	23.9	HCM Level of Service	C
HCM Volume to Capacity ratio	0.41		
Cycle Length (s)	120.0	Sum of lost time (s)	6.0
Intersection Capacity Utilization	66.0%	ICU Level of Service	B
c Critical Lane Group			



HCM Signalized Intersection Capacity Analysis  
 5: E. Tremont Ave. & Boston Rd.

8/16/2004



Movement	EBL	EBT	EBR	EBR2	WBL2	WBL	WBT	WBR	NBL2	NBL	NBR	NBR2
Lane Configurations		↕	↕			↕	↕↕	↕		↕	↕	
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	12	12	12	12	11	11	11	11	11	11	11	11
Total Lost time (s)		3.0	3.0			3.0	3.0	3.0		3.0	3.0	
Lane Util. Factor		1.00	1.00			0.91	0.91	1.00		1.00	0.95	
Frt		1.00	0.85			1.00	1.00	0.85		0.88	0.85	
Flt Protected		1.00	1.00			0.95	0.99	1.00		0.99	1.00	
Satd. Flow (prot)		1856	950			1557	3260	918		1571	1454	
Flt Permitted		1.00	1.00			0.95	0.99	1.00		0.99	1.00	
Satd. Flow (perm)		1856	950			1557	3260	918		1571	1454	
Volume (vph)	35	420	55	5	95	275	575	165	5	10	55	175
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Growth Factor (vph)	103%	103%	103%	103%	103%	103%	103%	103%	103%	103%	103%	103%
Adj. Flow (vph)	40	481	63	6	109	315	658	189	6	11	63	200
Lane Group Flow (vph)	0	521	69	0	0	348	734	189	0	80	200	0
Bus Blockages (#/hr)	0	0	100	100	0	0	0	100	0	0	0	0
Turn Type	Split		Perm		custom	Split		Perm	custom		custom	
Protected Phases	8	8			4	4	4		2!	2!	2	
Permitted Phases			8		4			4	2	2	2	
Actuated Green, G (s)		27.0	27.0			29.0	29.0	29.0		22.0	22.0	
Effective Green, g (s)		29.0	29.0			31.0	31.0	31.0		24.0	24.0	
Actuated g/C Ratio		0.24	0.24			0.26	0.26	0.26		0.20	0.20	
Clearance Time (s)		5.0	5.0			5.0	5.0	5.0		5.0	5.0	
Lane Grp Cap (vph)		449	230			402	842	237		314	291	
v/s Ratio Prot		c0.28				0.22	c0.23			0.05	0.14	
v/s Ratio Perm			0.07					0.21				
v/c Ratio		1.16	0.30			0.87	0.87	0.80		0.25	0.69	
Uniform Delay, d1		45.5	37.2			42.5	42.6	41.6		40.5	44.5	
Progression Factor		1.00	1.00			0.87	0.87	0.88		1.00	1.00	
Incremental Delay, d2		94.3	3.3			19.6	11.0	21.7		1.9	12.5	
Delay (s)		139.8	40.5			56.6	47.9	58.3		42.4	57.0	
Level of Service		F	D			E	D	E		D	E	
Approach Delay (s)		128.2					51.8			52.8		
Approach LOS		F					D			D		

Intersection Summary

HCM Average Control Delay	102.9	HCM Level of Service	F
HCM Volume to Capacity ratio	1.18		
Cycle Length (s)	120.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	112.0%	ICU Level of Service	G

- ! Phase conflict between lane groups.
- c Critical Lane Group

# HCM Signalized Intersection Capacity Analysis

5: E. Tremont Ave. & Boston Rd.

8/16/2004



Movement	NEL	NET	NER	NER2	SWL2	SWL	SWT	SWR
Lane Configurations		⇕			↙		⇕	
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	12	12	12	12	10	10	10	10
Total Lost time (s)		3.0			3.0		3.0	
Lane Util. Factor		1.00			1.00		1.00	
Frt		0.90			1.00		0.97	
Flt Protected		1.00			0.95		0.98	
Satd. Flow (prot)		1668			1652		1650	
Flt Permitted		0.99			0.37		1.00	
Satd. Flow (perm)		1661			648		1682	
Volume (vph)	5	65	220	10	200	60	65	35
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Growth Factor (vph)	103%	103%	103%	103%	103%	103%	103%	103%
Adj. Flow (vph)	6	74	252	11	229	69	74	40
Lane Group Flow (vph)	0	343	0	0	229	0	183	0
Bus Blockages (#/hr)	0	0	23	23	0	0	0	21
Turn Type	Perm				Perm	Perm		
Protected Phases		6					2!	
Permitted Phases	6				2	2!		
Actuated Green, G (s)		22.0			22.0		22.0	
Effective Green, g (s)		24.0			24.0		24.0	
Actuated g/C Ratio		0.20			0.20		0.20	
Clearance Time (s)		5.0			5.0		5.0	
Lane Grp Cap (vph)		332			130		336	
v/s Ratio Prot								
v/s Ratio Perm		c0.21			c0.35		0.11	
v/c Ratio		1.03			1.76		0.54	
Uniform Delay, d1		48.0			48.0		43.1	
Progression Factor		1.00			1.00		1.00	
Incremental Delay, d2		58.2			372.2		6.2	
Delay (s)		106.2			420.2		49.3	
Level of Service		F			F		D	
Approach Delay (s)		106.2					255.5	
Approach LOS		F					F	

**Intersection Summary**

# HCM Signalized Intersection Capacity Analysis

1: I-895 #1 & Devoe Ave.

8/16/2004



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↙	↖			↕	↗		↕			↖	↗
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.0	3.0			3.0	3.0		3.0			3.0	3.0
Lane Util. Factor	0.95	0.95			0.95	1.00		1.00			1.00	0.88
Frt	1.00	1.00			1.00	0.85		0.93			1.00	0.85
Flt Protected	0.95	0.98			1.00	1.00		1.00			0.96	1.00
Satd. Flow (prot)	1618	1335			3404	1524		1671			1718	2682
Flt Permitted	0.95	0.98			1.00	1.00		1.00			0.96	1.00
Satd. Flow (perm)	1618	1335			3404	1524		1671			1718	2682
Volume (vph)	400	150	0	20	1790	275	0	20	20	130	20	700
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Growth Factor (vph)	113%	113%	113%	113%	113%	113%	113%	113%	113%	113%	113%	113%
Adj. Flow (vph)	502	188	0	25	2247	345	0	25	25	163	25	879
Lane Group Flow (vph)	375	315	0	0	2272	345	0	50	0	0	188	879
Parking (#/hr)		20										
Turn Type	Split		custom		custom				Perm		pm+ov	
Protected Phases	7	7		8	8	8		4			4	7
Permitted Phases				8		4		4		4	4	4
Actuated Green, G (s)	25.0	25.0			64.0	80.0		16.0			16.0	41.0
Effective Green, g (s)	27.0	27.0			66.0	84.0		18.0			18.0	45.0
Actuated g/C Ratio	0.22	0.22			0.55	0.70		0.15			0.15	0.38
Clearance Time (s)	5.0	5.0			5.0	5.0		5.0			5.0	5.0
Lane Grp Cap (vph)	364	300			1872	1105		251			258	1073
v/s Ratio Prot	0.23	c0.24			c0.67	0.17		0.03			0.11	c0.18
v/s Ratio Perm						0.05						0.14
v/c Ratio	1.03	1.05			1.21	0.31		0.20			0.73	0.82
Uniform Delay, d1	46.5	46.5			27.0	6.9		44.7			48.7	33.8
Progression Factor	1.00	1.00			1.00	1.00		1.00			0.79	1.46
Incremental Delay, d2	55.2	65.7			101.3	0.7		1.8			12.3	5.2
Delay (s)	101.7	112.2			128.3	7.6		46.5			50.5	54.7
Level of Service	F	F			F	A		D			D	D
Approach Delay (s)		106.5			112.4			46.5			54.0	
Approach LOS		F			F			D			D	

## Intersection Summary

HCM Average Control Delay	96.7	HCM Level of Service	F
HCM Volume to Capacity ratio	1.11		
Cycle Length (s)	120.0	Sum of lost time (s)	9.0
Intersection Capacity Utilization	108.7%	ICU Level of Service	F
c Critical Lane Group			

# HCM Signalized Intersection Capacity Analysis

2: E. Tremont Ave. & Ped Xing

8/16/2004



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↑↑			↑↑							
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		3.0			3.0							
Lane Util. Factor		0.95			0.95							
Frbp, ped/bikes		1.00			1.00							
Flpb, ped/bikes		1.00			1.00							
Frt		1.00			1.00							
Flt Protected		1.00			1.00							
Satd. Flow (prot)		3406			3406							
Flt Permitted		1.00			1.00							
Satd. Flow (perm)		3406			3406							
Volume (vph)	0	805	0	0	1195	0	0	0	0	0	0	0
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Growth Factor (vph)	113%	113%	113%	113%	113%	113%	113%	113%	113%	113%	113%	113%
Adj. Flow (vph)	0	1011	0	0	1500	0	0	0	0	0	0	0
Lane Group Flow (vph)	0	1011	0	0	1500	0	0	0	0	0	0	0
Confl. Peds. (#/hr)	300		300	300		300	300		300	300		300
Confl. Bikes (#/hr)			50			50			50			50




















Turn Type												
Protected Phases		2			2							
Permitted Phases												
Actuated Green, G (s)		90.0			90.0							
Effective Green, g (s)		92.0			92.0							
Actuated g/C Ratio		0.77			0.77							
Clearance Time (s)		5.0			5.0							
Lane Grp Cap (vph)		2611			2611							
v/s Ratio Prot		0.30			0.44							
v/s Ratio Perm												
v/c Ratio		0.39			0.57							
Uniform Delay, d1		4.6			5.8							
Progression Factor		1.85			1.66							
Incremental Delay, d2		0.0			0.6							
Delay (s)		8.6			10.3							
Level of Service		A			B							
Approach Delay (s)		8.6			10.3			0.0			0.0	
Approach LOS		A			B			A			A	

Intersection Summary			
HCM Average Control Delay	9.6	HCM Level of Service	A
HCM Volume to Capacity ratio	0.57		
Cycle Length (s)	120.0	Sum of lost time (s)	28.0
Intersection Capacity Utilization	44.8%	ICU Level of Service	A
c Critical Lane Group			

# HCM Signalized Intersection Capacity Analysis

3: E. Tremont Ave. & Devoe Ave.

8/16/2004

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		3.0		3.0	3.0		3.0	3.0	3.0			3.0
Lane Util. Factor		0.95		0.91	0.91		0.95	0.91	0.95			1.00
Frbp, ped/bikes		1.00		1.00	1.00		1.00	1.00	0.83			0.98
Flpb, ped/bikes		1.00		1.00	1.00		0.99	0.99	1.00			1.00
Frt		1.00		1.00	1.00		1.00	1.00	0.85			0.86
Flt Protected		1.00		0.95	0.99		0.95	0.97	1.00			1.00
Satd. Flow (prot)		3396		1550	3221		1280	1581	935			1515
Flt Permitted		1.00		0.95	0.99		0.95	0.97	1.00			1.00
Satd. Flow (perm)		3396		1550	3221		1280	1581	935			1515
Volume (vph)	25	400	0	470	600	10	405	150	160	0	0	190
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Growth Factor (vph)	113%	113%	113%	113%	113%	113%	113%	113%	113%	113%	113%	113%
Adj. Flow (vph)	31	502	0	590	753	13	508	188	201	0	0	239
Lane Group Flow (vph)	0	533	0	439	917	0	306	390	201	0	0	239
Confl. Peds. (#/hr)	97		112			97	5		73	73		5
Bus Blockages (#/hr)	0	0	28	0	0	28	0	0	6	0	0	0
Parking (#/hr)						20	20		20	0		
Turn Type	Split			Split		custom		custom				custom
Protected Phases	2	2		1	1							
Permitted Phases							4	4	4			4
Actuated Green, G (s)		25.0		35.0	35.0		45.0	45.0	45.0			45.0
Effective Green, g (s)		27.0		37.0	37.0		47.0	47.0	47.0			47.0
Actuated g/C Ratio		0.22		0.31	0.31		0.39	0.39	0.39			0.39
Clearance Time (s)		5.0		5.0	5.0		5.0	5.0	5.0			5.0
Lane Grp Cap (vph)		764		478	993		501	619	366			593
v/s Ratio Prot		c0.16		0.28	c0.28							
v/s Ratio Perm							0.24	c0.25	0.22			0.16
v/c Ratio		0.70		0.92	0.92		0.61	0.63	0.55			0.40
Uniform Delay, d1		42.7		40.0	40.1		29.2	29.5	28.3			26.4
Progression Factor		0.62		0.72	0.73		0.68	0.68	0.69			1.00
Incremental Delay, d2		4.9		20.6	12.2		4.1	3.6	4.4			2.0
Delay (s)		31.5		49.6	41.4		24.0	23.7	24.0			28.4
Level of Service		C		D	D		C	C	C			C
Approach Delay (s)		31.5			44.1			23.9			28.4	
Approach LOS		C			D			C			C	
<b>Intersection Summary</b>												
HCM Average Control Delay			34.6			HCM Level of Service			C			
HCM Volume to Capacity ratio			0.74									
Cycle Length (s)			120.0			Sum of lost time (s)			9.0			
Intersection Capacity Utilization			78.6%			ICU Level of Service			C			
c Critical Lane Group												

# HCM Signalized Intersection Capacity Analysis

4: E. Tremont Ave. & Bronx Park Ave.

8/16/2004



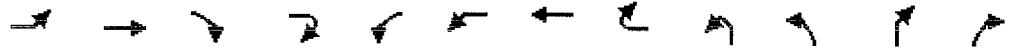
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↑↑			↑↑						↑↑	
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	12	12	12	12	12	12	12	12	12	12	15	12
Total Lost time (s)		3.0			3.0						3.0	
Lane Util. Factor		0.95			0.95						0.95	
Frbp, ped/bikes		0.99			1.00						0.87	
Ftpb, ped/bikes		1.00			1.00						1.00	
Frt		0.99			1.00						0.91	
Flt Protected		1.00			1.00						1.00	
Satd. Flow (prot)		3014			3056						2656	
Flt Permitted		1.00			1.00						1.00	
Satd. Flow (perm)		3014			3056						2656	
Volume (vph)	0	535	25	60	945	0	0	0	0	20	80	135
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Growth Factor (vph)	113%	113%	113%	113%	113%	113%	113%	113%	113%	113%	113%	113%
Adj. Flow (vph)	0	672	31	75	1186	0	0	0	0	25	100	170
Lane Group Flow (vph)	0	703	0	0	1261	0	0	0	0	0	295	0
Confl. Peds. (#/hr)			100	100			100		100	100		100
Bus Blockages (#/hr)	0	0	28	0	0	28	0	0	0	0	0	0
Parking (#/hr)		20	20		20					20	20	20
Turn Type				Perm						Split		
Protected Phases		4			4					6	6	
Permitted Phases		4		4	4							
Actuated Green, G (s)		69.0			69.0						41.0	
Effective Green, g (s)		71.0			71.0						43.0	
Actuated g/C Ratio		0.59			0.59						0.36	
Clearance Time (s)		5.0			5.0						5.0	
Lane Grp Cap (vph)		1783			1808						952	
v/s Ratio Prot		0.23			c0.41						c0.11	
v/s Ratio Perm												
v/c Ratio		0.39			0.70						0.31	
Uniform Delay, d1		13.0			17.0						27.8	
Progression Factor		2.13			1.00						1.00	
Incremental Delay, d2		0.5			2.3						0.8	
Delay (s)		28.3			19.3						28.6	
Level of Service		C			B						C	
Approach Delay (s)		28.3			19.3			0.0			28.6	
Approach LOS		C			B			A			C	

## Intersection Summary

HCM Average Control Delay	23.3	HCM Level of Service	C
HCM Volume to Capacity ratio	0.55		
Cycle Length (s)	120.0	Sum of lost time (s)	6.0
Intersection Capacity Utilization	78.7%	ICU Level of Service	C
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis  
 5: E. Tremont Ave. & Boston Rd.

8/16/2004



Movement	EBL	EBT	EBR	EBR2	WBL2	WBL	WBT	WBR	NBL2	NBL	NBR	NBR2
Lane Configurations		↕	↕			↕	↕↕	↕		↕	↕	
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	12	12	12	12	11	11	11	11	11	11	11	11
Total Lost time (s)		3.0	3.0			3.0	3.0	3.0		3.0	3.0	
Lane Util. Factor		1.00	1.00			0.91	0.91	1.00		1.00	0.95	
Frt		1.00	0.85			1.00	1.00	0.85		0.91	0.85	
Flt Protected		1.00	1.00			0.95	0.98	1.00		0.98	1.00	
Satd. Flow (prot)		1785	914			1498	3102	884		1550	1399	
Flt Permitted		1.00	1.00			0.95	0.98	1.00		0.98	1.00	
Satd. Flow (perm)		1785	914			1498	3102	884		1550	1399	
Volume (vph)	25	255	45	25	165	425	490	115	10	30	55	170
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Growth Factor (vph)	113%	113%	113%	113%	113%	113%	113%	113%	113%	113%	113%	113%
Adj. Flow (vph)	31	320	56	31	207	534	615	144	13	38	69	213
Lane Group Flow (vph)	0	351	87	0	0	437	919	144	0	120	213	0
Bus Blockages (#/hr)	0	0	100	100	0	0	0	100	0	0	0	0
Turn Type	Split		Perm		custom	Split		Perm custom		custom		
Protected Phases	8	8			4	4	4		2!	2!	2	
Permitted Phases			8		4			4	2	2	2	
Actuated Green, G (s)		27.0	27.0			29.0	29.0	29.0		22.0	22.0	
Effective Green, g (s)		29.0	29.0			31.0	31.0	31.0		24.0	24.0	
Actuated g/C Ratio		0.24	0.24			0.26	0.26	0.26		0.20	0.20	
Clearance Time (s)		5.0	5.0			5.0	5.0	5.0		5.0	5.0	
Lane Grp Cap (vph)		431	221			387	801	228		310	280	
v/s Ratio Prot		c0.20				0.29	c0.30			0.08	0.15	
v/s Ratio Perm			0.10					0.16				
v/c Ratio		0.81	0.39			1.13	1.15	0.63		0.39	0.76	
Uniform Delay, d1		43.0	38.1			44.5	44.5	39.4		41.6	45.3	
Progression Factor		1.00	1.00			1.00	0.99	1.06		1.00	1.00	
Incremental Delay, d2		15.5	5.2			81.9	78.5	10.5		3.6	17.6	
Delay (s)		58.4	43.3			126.5	122.7	52.2		45.2	62.9	
Level of Service		E	D			F	F	D		D	E	
Approach Delay (s)		55.4					117.1			56.5		
Approach LOS		E					F			E		

Intersection Summary

HCM Average Control Delay	130.6	HCM Level of Service	F
HCM Volume to Capacity ratio	1.24		
Cycle Length (s)	120.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	113.2%	ICU Level of Service	G

- ! Phase conflict between lane groups.
- c Critical Lane Group

HCM Signalized Intersection Capacity Analysis  
 5: E. Tremont Ave. & Boston Rd.

8/16/2004



Movement	NEL	NET	NER	NER2	SWL2	SWL	SWT	SWR
Lane Configurations		↕			↙		↕	
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	12	12	12	12	10	10	10	10
Total Lost time (s)		3.0			3.0		3.0	
Lane Util. Factor		1.00			1.00		1.00	
Frt		0.90			1.00		0.98	
Flt Protected		1.00			0.95		0.98	
Satd. Flow (prot)		1602			1589		1595	
Flt Permitted		0.95			0.34		1.00	
Satd. Flow (perm)		1527			575		1634	
Volume (vph)	25	45	200	15	180	110	80	35
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Growth Factor (vph)	113%	113%	113%	113%	113%	113%	113%	113%
Adj. Flow (vph)	31	56	251	19	226	138	100	44
Lane Group Flow (vph)	0	357	0	0	226	0	282	0
Bus Blockages (#/hr)	0	0	23	23	0	0	0	21
Turn Type	Perm				Perm	Perm		
Protected Phases		6					2!	
Permitted Phases	6				2	2!		
Actuated Green, G (s)		22.0			22.0		22.0	
Effective Green, g (s)		24.0			24.0		24.0	
Actuated g/C Ratio		0.20			0.20		0.20	
Clearance Time (s)		5.0			5.0		5.0	
Lane Grp Cap (vph)		305			115		327	
v/s Ratio Prot								
v/s Ratio Perm		c0.23			c0.39		0.17	
v/c Ratio		1.17			1.97		0.86	
Uniform Delay, d1		48.0			48.0		46.4	
Progression Factor		1.00			1.00		1.00	
Incremental Delay, d2		106.0			464.2		24.7	
Delay (s)		154.0			512.2		71.1	
Level of Service		F			F		E	
Approach Delay (s)		154.0					267.3	
Approach LOS		F					F	

Intersection Summary



# HCM Signalized Intersection Capacity Analysis

1: I-895 #1 & Devoe Ave.

8/16/2004



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↖	↗			↕	↗		↕			↖	↗
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.0	3.0			3.0	3.0		3.0			3.0	3.0
Lane Util. Factor	0.95	0.95			0.95	1.00		1.00			1.00	0.88
Frt	1.00	1.00			1.00	0.85		0.93			1.00	0.85
Flt Protected	0.95	0.99			1.00	1.00		1.00			0.96	1.00
Satd. Flow (prot)	1681	1395			3539	1583		1737			1782	2787
Flt Permitted	0.95	0.99			1.00	1.00		1.00			0.96	1.00
Satd. Flow (perm)	1681	1395			3539	1583		1737			1782	2787
Volume (vph)	555	265	0	0	1320	330	0	20	20	195	20	500
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Growth Factor (vph)	113%	113%	113%	113%	113%	113%	113%	113%	113%	113%	113%	113%
Adj. Flow (vph)	697	333	0	0	1657	414	0	25	25	245	25	628
Lane Group Flow (vph)	559	471	0	0	1657	414	0	50	0	0	270	628
Parking (#/hr)		20										
Turn Type	Split			custom		custom				Perm		pm+ov
Protected Phases	7	7		8	8	8		4			4	7
Permitted Phases				8		4		4		4	4	4
Actuated Green, G (s)	25.0	25.0			64.0	80.0		16.0			16.0	41.0
Effective Green, g (s)	27.0	27.0			66.0	84.0		18.0			18.0	45.0
Actuated g/C Ratio	0.22	0.22			0.55	0.70		0.15			0.15	0.38
Clearance Time (s)	5.0	5.0			5.0	5.0		5.0			5.0	5.0
Lane Grp Cap (vph)	378	314			1946	1148		261			267	1115
v/s Ratio Prot	0.33	c0.34			c0.47	0.20		0.03			c0.15	0.13
v/s Ratio Perm						0.06						0.10
v/c Ratio	1.48	1.50			0.85	0.36		0.19			1.01	0.56
Uniform Delay, d1	46.5	46.5			22.9	7.2		44.6			51.0	29.7
Progression Factor	1.00	1.00			1.00	1.00		1.00			0.94	1.38
Incremental Delay, d2	229.3	241.1			4.9	0.9		1.6			56.2	1.9
Delay (s)	275.8	287.6			27.8	8.1		46.3			103.9	42.9
Level of Service	F	F			C	A		D			F	D
Approach Delay (s)		281.2			23.9			46.3			61.3	
Approach LOS		F			C			D			E	

## Intersection Summary

HCM Average Control Delay	97.9	HCM Level of Service	F
HCM Volume to Capacity ratio	1.03		
Cycle Length (s)	120.0	Sum of lost time (s)	9.0
Intersection Capacity Utilization	105.4%	ICU Level of Service	F
c Critical Lane Group			

# HCM Signalized Intersection Capacity Analysis

2: E. Tremont Ave. & Ped Xing

8/16/2004



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↑↑			↑↑							
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		3.0			3.0							
Lane Util. Factor		0.95			0.95							
Frbp, ped/bikes		1.00			1.00							
Flpb, ped/bikes		1.00			1.00							
Frt		1.00			1.00							
Flt Protected		1.00			1.00							
Satd. Flow (prot)		3539			3539							
Flt Permitted		1.00			1.00							
Satd. Flow (perm)		3539			3539							
Volume (vph)	0	1015	0	0	1110	0	0	0	0	0	0	0
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Growth Factor (vph)	113%	113%	113%	113%	113%	113%	113%	113%	113%	113%	113%	113%
Adj. Flow (vph)	0	1274	0	0	1394	0	0	0	0	0	0	0
Lane Group Flow (vph)	0	1274	0	0	1394	0	0	0	0	0	0	0
Confl. Peds. (#/hr)	300		300	300		300	300		300	300		300
Confl. Bikes (#/hr)			50			50			50			50
Turn Type												
Protected Phases		2			2							
Permitted Phases												
Actuated Green, G (s)		90.0			90.0							
Effective Green, g (s)		92.0			92.0							
Actuated g/C Ratio		0.77			0.77							
Clearance Time (s)		5.0			5.0							
Lane Grp Cap (vph)		2713			2713							
v/s Ratio Prot		0.36			0.39							
v/s Ratio Perm												
v/c Ratio		0.47			0.51							
Uniform Delay, d1		5.1			5.4							
Progression Factor		1.47			1.81							
Incremental Delay, d2		0.1			0.5							
Delay (s)		7.6			10.2							
Level of Service		A			B							
Approach Delay (s)		7.6			10.2			0.0			0.0	
Approach LOS		A			B			A			A	

## Intersection Summary

HCM Average Control Delay	9.0	HCM Level of Service	A
HCM Volume to Capacity ratio	0.51		
Cycle Length (s)	120.0	Sum of lost time (s)	28.0
Intersection Capacity Utilization	41.9%	ICU Level of Service	A
c. Critical Lane Group			

# HCM Signalized Intersection Capacity Analysis

3: E. Tremont Ave. & Devoe Ave.

8/16/2004

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕↕		↔	↕↕		↔	↕↕	↔			↔
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		3.0		3.0	3.0		3.0	3.0	3.0			3.0
Lane Util. Factor		0.95		0.91	0.91		0.95	0.91	0.95			1.00
Frbp, ped/bikes		1.00		1.00	1.00		1.00	0.97	0.83			0.98
Flpb, ped/bikes		1.00		1.00	1.00		0.99	1.00	1.00			1.00
Frt		1.00		1.00	1.00		1.00	0.98	0.85			0.86
Flt Protected		1.00		0.95	1.00		0.95	0.99	1.00			1.00
Satd. Flow (prot)		3534		1610	3367		1330	1593	971			1574
Flt Permitted		1.00		0.95	1.00		0.95	0.99	1.00			1.00
Satd. Flow (perm)		3534		1610	3367		1330	1593	971			1574
Volume (vph)	20	645	0	365	580	5	370	235	270	0	0	160
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Growth Factor (vph)	113%	113%	113%	113%	113%	113%	113%	113%	113%	113%	113%	113%
Adj. Flow (vph)	25	810	0	458	728	6	465	295	339	0	0	201
Lane Group Flow (vph)	0	835	0	384	808	0	361	469	269	0	0	201
Confl. Peds. (#/hr)	97		112			97	5		73	73		5
Bus Blockages (#/hr)	0	0	28	0	0	28	0	0	6	0	0	0
Parking (#/hr)						20	20		20	0		
Turn Type	Split			Split		custom		custom				custom
Protected Phases	2	2		1	1							
Permitted Phases							4	4	4			4
Actuated Green, G (s)		25.0		35.0	35.0		45.0	45.0	45.0			45.0
Effective Green, g (s)		27.0		37.0	37.0		47.0	47.0	47.0			47.0
Actuated g/C Ratio		0.22		0.31	0.31		0.39	0.39	0.39			0.39
Clearance Time (s)		5.0		5.0	5.0		5.0	5.0	5.0			5.0
Lane Grp Cap (vph)		795		496	1038		521	624	380			616
v/s Ratio Prot		c0.24		0.24	c0.24							
v/s Ratio Perm							0.27	c0.29	0.28			0.13
v/c Ratio		1.05		0.77	0.78		0.69	0.75	0.71			0.33
Uniform Delay, d1		46.5		37.7	37.8		30.5	31.5	30.7			25.5
Progression Factor		0.74		0.65	0.65		0.66	0.65	0.65			1.00
Incremental Delay, d2		44.3		9.1	4.7		3.1	3.5	4.6			1.4
Delay (s)		78.8		33.5	29.1		23.1	23.9	24.6			26.9
Level of Service		E		C	C		C	C	C			C
Approach Delay (s)		78.8			30.5			23.8			26.9	
Approach LOS		E			C			C			C	

## Intersection Summary

HCM Average Control Delay	40.2	HCM Level of Service	D
HCM Volume to Capacity ratio	0.83		
Cycle Length (s)	120.0	Sum of lost time (s)	9.0
Intersection Capacity Utilization	87.0%	ICU Level of Service	D
c Critical Lane Group			

# HCM Signalized Intersection Capacity Analysis

4: E. Tremont Ave. & Bronx Park Ave.

8/16/2004



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↑↑			↑↑						↑↑	
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	12	12	12	12	12	12	12	12	12	12	15	12
Total Lost time (s)		3.0			3.0						3.0	
Lane Util. Factor		0.95			0.95						0.95	
Frbp, ped/bikes		0.99			1.00						0.91	
Flpb, ped/bikes		1.00			1.00						1.00	
Frt		1.00			1.00						0.94	
Flt Protected		1.00			1.00						0.99	
Satd. Flow (prot)		3145			3179						3002	
Flt Permitted		1.00			1.00						0.99	
Satd. Flow (perm)		3145			3179						3002	
Volume (vph)	0	885	30	40	900	0	0	0	0	20	65	50
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Growth Factor (vph)	113%	113%	113%	113%	113%	113%	113%	113%	113%	113%	113%	113%
Adj. Flow (vph)	0	1111	38	50	1130	0	0	0	0	25	82	63
Lane Group Flow (vph)	0	1149	0	0	1180	0	0	0	0	0	170	0
Confl. Peds. (#/hr)			100	100			100		100	100		100
Bus Blockages (#/hr)	0	0	28	0	0	28	0	0	0	0	0	0
Parking (#/hr)		20	20		20					20	20	20
Turn Type				Perm						Split		
Protected Phases		4			4					6	6	
Permitted Phases		4		4	4							
Actuated Green, G (s)		69.0			69.0						41.0	
Effective Green, g (s)		71.0			71.0						43.0	
Actuated g/C Ratio		0.59			0.59						0.36	
Clearance Time (s)		5.0			5.0						5.0	
Lane Grp Cap (vph)		1861			1881						1076	
v/s Ratio Prot		0.37			c0.37						c0.06	
v/s Ratio Perm												
v/c Ratio		0.62			0.63						0.16	
Uniform Delay, d1		15.8			15.9						26.2	
Progression Factor		2.03			1.00						1.00	
Incremental Delay, d2		0.5			1.6						0.3	
Delay (s)		32.6			17.5						26.5	
Level of Service		C			B						C	
Approach Delay (s)		32.6			17.5		0.0				26.5	
Approach LOS		C			B		A				C	

## Intersection Summary

HCM Average Control Delay	25.0	HCM Level of Service	C
HCM Volume to Capacity ratio	0.45		
Cycle Length (s)	120.0	Sum of lost time (s)	6.0
Intersection Capacity Utilization	73.7%	ICU Level of Service	C
c Critical Lane Group			

# HCM Signalized Intersection Capacity Analysis

5: E. Tremont Ave. & Boston Rd.

8/16/2004

Movement	EBL	EBT	EBR	EBR2	WBL2	WBL	WBT	WBR	NBL2	NBL	NBR	NBR2
Lane Configurations		↔	↔			↔	↔	↔		↔	↔	
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	12	12	12	12	11	11	11	11	11	11	11	11
Total Lost time (s)		3.0	3.0			3.0	3.0	3.0		3.0	3.0	
Lane Util. Factor		1.00	1.00			0.91	0.91	1.00		1.00	0.95	
Frt		1.00	0.85			1.00	1.00	0.85		0.88	0.85	
Flt Protected		1.00	1.00			0.95	0.99	1.00		0.99	1.00	
Satd. Flow (prot)		1856	950			1557	3261	918		1572	1454	
Flt Permitted		1.00	1.00			0.95	0.99	1.00		0.99	1.00	
Satd. Flow (perm)		1856	950			1557	3261	918		1572	1454	
Volume (vph)	35	420	55	5	95	275	575	165	5	10	55	175
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Growth Factor (vph)	113%	113%	113%	113%	113%	113%	113%	113%	113%	113%	113%	113%
Adj. Flow (vph)	44	527	69	6	119	345	722	207	6	13	69	220
Lane Group Flow (vph)	0	571	75	0	0	382	804	207	0	88	220	0
Bus Blockages (#/hr)	0	0	100	100	0	0	0	100	0	0	0	0
Turn Type	Split		Perm		custom	Split		Perm	custom		custom	
Protected Phases	8	8			4	4	4		2!	2!	2	
Permitted Phases			8		4			4	2	2	2	
Actuated Green, G (s)		27.0	27.0			29.0	29.0	29.0		22.0	22.0	
Effective Green, g (s)		29.0	29.0			31.0	31.0	31.0		24.0	24.0	
Actuated g/C Ratio		0.24	0.24			0.26	0.26	0.26		0.20	0.20	
Clearance Time (s)		5.0	5.0			5.0	5.0	5.0		5.0	5.0	
Lane Grp Cap (vph)		449	230			402	842	237		314	291	
v/s Ratio Prot		c0.31				0.25	c0.25			0.06	0.15	
v/s Ratio Perm			0.08					0.23				
v/c Ratio		1.27	0.33			0.95	0.95	0.87		0.28	0.76	
Uniform Delay, d1		45.5	37.5			43.7	43.8	42.6		40.7	45.2	
Progression Factor		1.00	1.00			0.93	0.92	0.94		1.00	1.00	
Incremental Delay, d2		138.8	3.7			31.1	19.9	29.9		2.2	16.6	
Delay (s)		184.3	41.2			71.7	60.2	70.0		42.9	61.9	
Level of Service		F	D			E	E	E		D	E	
Approach Delay (s)		167.7					64.8			56.5		
Approach LOS		F					E			E		

## Intersection Summary

HCM Average Control Delay	136.5	HCM Level of Service	F
HCM Volume to Capacity ratio	1.36		
Cycle Length (s)	120.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	121.2%	ICU Level of Service	H

! Phase conflict between lane groups.

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis  
 5: E. Tremont Ave. & Boston Rd.

8/16/2004



Movement	NEL	NET	NER	NER2	SWL2	SWL	SWT	SWR
Lane Configurations		↕			↙		↕	
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	12	12	12	12	10	10	10	10
Total Lost time (s)		3.0			3.0		3.0	
Lane Util. Factor		1.00			1.00		1.00	
Flt		0.90			1.00		0.97	
Flt Protected		1.00			0.95		0.98	
Satd. Flow (prot)		1669			1652		1651	
Flt Permitted		0.99			0.33		1.00	
Satd. Flow (perm)		1662			571		1681	
Volume (vph)	5	65	220	10	200	60	65	35
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Growth Factor (vph)	113%	113%	113%	113%	113%	113%	113%	113%
Adj. Flow (vph)	6	82	276	13	251	75	82	44
Lane Group Flow (vph)	0	377	0	0	251	0	201	0
Bus Blockages (#/hr)	0	0	23	23	0	0	0	21
Turn Type	Perm				Perm	Perm		
Protected Phases		6					2!	
Permitted Phases	6				2	2!		
Actuated Green, G (s)		22.0			22.0		22.0	
Effective Green, g (s)		24.0			24.0		24.0	
Actuated g/C Ratio		0.20			0.20		0.20	
Clearance Time (s)		5.0			5.0		5.0	
Lane Grp Cap (vph)		332			114		336	
v/s Ratio Prot								
v/s Ratio Perm		c0.23			c0.44		0.12	
v/c Ratio		1.14			2.20		0.60	
Uniform Delay, d1		48.0			48.0		43.6	
Progression Factor		1.00			1.00		1.00	
Incremental Delay, d2		91.3			568.3		7.7	
Delay (s)		139.3			616.3		51.3	
Level of Service		F			F		D	
Approach Delay (s)		139.3					365.0	
Approach LOS		F					F	

**Intersection Summary**