
























# HCM Signalized Intersection Capacity Analysis

## 1: Woodruff Road & Roper Mountain Road

2035 AM

7/6/2011

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	192	614	339	348	362	59	420	1317	261	263	1386	149
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	6.0		4.0	6.0	6.0	6.0	6.0	6.0	5.0	6.0	6.0
Lane Util. Factor	1.00	0.95		1.00	0.95	1.00	1.00	0.95	1.00	0.97	0.95	1.00
Frt	1.00	0.95		1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1719	3255		1719	3438	1538	1719	3438	1538	3335	3438	1538
Flt Permitted	0.38	1.00		0.24	1.00	1.00	0.10	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	696	3255		426	3438	1538	182	3438	1538	3335	3438	1538
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)	213	682	377	387	402	66	467	1463	290	292	1540	166
RTOR Reduction (vph)	0	25	0	0	0	55	0	0	111	0	0	71
Lane Group Flow (vph)	213	1034	0	387	402	11	467	1463	179	292	1540	95
Turn Type	pm+pt			pm+pt		Perm	Perm		Perm	Prot		Perm
Protected Phases	7	4		3	8			2		1	6	
Permitted Phases	4			8		8	2		2			6
Actuated Green, G (s)	26.0	16.0		28.0	17.0	17.0	46.0	46.0	46.0	6.0	57.0	57.0
Effective Green, g (s)	26.0	16.0		28.0	17.0	17.0	46.0	46.0	46.0	6.0	57.0	57.0
Actuated g/C Ratio	0.26	0.16		0.28	0.17	0.17	0.46	0.46	0.46	0.06	0.57	0.57
Clearance Time (s)	4.0	6.0		4.0	6.0	6.0	6.0	6.0	6.0	5.0	6.0	6.0
Vehicle Extension (s)	4.3	5.5		4.3	5.5	5.5	4.9	4.9	4.9	4.3	4.9	4.9
Lane Grp Cap (vph)	283	521		262	584	261	84	1581	707	200	1960	877
v/s Ratio Prot	0.08	c0.32		c0.16	0.12			0.43		c0.09	0.45	
v/s Ratio Perm	0.12			0.25		0.01	c2.57		0.12			0.06
v/c Ratio	0.75	1.98		1.48	0.69	0.04	5.56	0.93	0.25	1.46	0.79	0.11
Uniform Delay, d1	31.5	42.0		33.2	39.0	34.7	27.0	25.4	16.5	47.0	16.7	9.9
Progression Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.05	0.76	0.72
Incremental Delay, d2	11.8	449.8		234.2	4.7	0.2	2077.6	10.7	0.9	213.5	0.8	0.1
Delay (s)	43.3	491.8		267.4	43.7	34.9	2104.6	36.1	17.4	263.0	13.5	7.1
Level of Service	D	F		F	D	C	F	D	B	F	B	A
Approach Delay (s)		416.7			144.3			468.8			49.5	
Approach LOS		F			F			F			D	

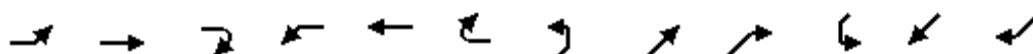
### Intersection Summary

HCM Average Control Delay	282.6	HCM Level of Service	F
HCM Volume to Capacity ratio	3.97		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	21.0
Intersection Capacity Utilization	127.0%	ICU Level of Service	H
Analysis Period (min)	15		
c Critical Lane Group			

# HCM Signalized Intersection Capacity Analysis

## 2: Woodruff Road & Costco Driveway

2035 AM  
7/6/2011



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Volume (vph)	29	1186	40	90	888	46	40	2	86	12	2	18
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.5	6.5		6.5	6.5	6.5	6.5	6.5		6.5	6.5	6.5
Lane Util. Factor	1.00	0.95		1.00	0.95	1.00	1.00	1.00		1.00	1.00	1.00
Frt	1.00	1.00		1.00	1.00	0.85	1.00	0.85		1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	1719	3421		1719	3438	1538	1719	1544		1719	1810	1538
Flt Permitted	0.24	1.00		0.20	1.00	1.00	0.76	1.00		0.69	1.00	1.00
Satd. Flow (perm)	437	3421		361	3438	1538	1369	1544		1255	1810	1538
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)	32	1318	44	100	987	51	44	2	96	13	2	20
RTOR Reduction (vph)	0	2	0	0	0	16	0	87	0	0	0	17
Lane Group Flow (vph)	32	1360	0	100	987	35	44	11	0	13	2	3
Turn Type	pm+pt			Perm		Perm	Perm			Perm		pm+ov
Protected Phases	5	2			6			8			4	5
Permitted Phases	2			6		6	8			4		4
Actuated Green, G (s)	95.7	95.7		82.8	82.8	82.8	11.3	11.3		11.3	11.3	17.7
Effective Green, g (s)	95.7	95.7		82.8	82.8	82.8	11.3	11.3		11.3	11.3	17.7
Actuated g/C Ratio	0.80	0.80		0.69	0.69	0.69	0.09	0.09		0.09	0.09	0.15
Clearance Time (s)	6.5	6.5		6.5	6.5	6.5	6.5	6.5		6.5	6.5	6.5
Vehicle Extension (s)	4.3	5.5		5.5	5.5	5.5	5.5	5.5		5.5	5.5	4.3
Lane Grp Cap (vph)	417	2728		249	2372	1061	129	145		118	170	310
v/s Ratio Prot	0.00	c0.40			0.29			0.01			0.00	0.00
v/s Ratio Perm	0.06			0.28		0.02	c0.03			0.01		0.00
v/c Ratio	0.08	0.50		0.40	0.42	0.03	0.34	0.08		0.11	0.01	0.01
Uniform Delay, d1	3.5	4.1		8.0	8.1	5.9	50.9	49.6		49.7	49.3	43.7
Progression Factor	1.00	1.00		0.16	0.21	0.05	1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	0.1	0.7		4.2	0.5	0.1	3.9	0.6		1.0	0.1	0.0
Delay (s)	3.6	4.7		5.5	2.2	0.4	54.7	50.1		50.8	49.4	43.7
Level of Service	A	A		A	A	A	D	D		D	D	D
Approach Delay (s)		4.7			2.4			51.6			46.6	
Approach LOS		A			A			D			D	

### Intersection Summary

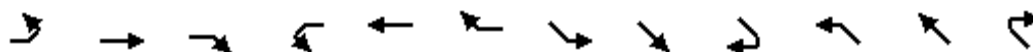
HCM Average Control Delay	6.7	HCM Level of Service	A
HCM Volume to Capacity ratio	0.48		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	13.0
Intersection Capacity Utilization	84.2%	ICU Level of Service	E
Analysis Period (min)	15		
c Critical Lane Group			

# HCM Signalized Intersection Capacity Analysis

## 3: Green Heron Road & Woodruff Road

2035 AM

7/6/2011



Movement	EBL	EBT	EBR	WBL	WBT	WBR	SEL	SET	SER	NWL	NWT	NWR
Lane Configurations		↔			↔	↔	↔	↔		↔	↔	↔
Volume (vph)	6	2	42	2	2	10	14	909	73	87	1267	6
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		5.0			5.0	5.0	6.3	6.3		6.3	6.3	6.3
Lane Util. Factor		1.00			1.00	1.00	1.00	0.95		1.00	0.95	1.00
Frt		0.89			1.00	0.85	1.00	0.99		1.00	1.00	0.85
Flt Protected		0.99			0.98	1.00	0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)		1595			1765	1538	1719	3400		1719	3438	1538
Flt Permitted		0.96			0.89	1.00	0.18	1.00		0.25	1.00	1.00
Satd. Flow (perm)		1539			1612	1538	319	3400		460	3438	1538
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)	7	2	47	2	2	11	16	1010	81	97	1408	7
RTOR Reduction (vph)	0	44	0	0	0	10	0	4	0	0	0	1
Lane Group Flow (vph)	0	12	0	0	4	1	16	1087	0	97	1408	6
Turn Type	Perm			Perm		Perm	Perm			Perm		Perm
Protected Phases		8			4			2			6	
Permitted Phases	8			4		4	2			6		6
Actuated Green, G (s)		8.3			8.3	8.3	100.4	100.4		100.4	100.4	100.4
Effective Green, g (s)		8.3			8.3	8.3	100.4	100.4		100.4	100.4	100.4
Actuated g/C Ratio		0.07			0.07	0.07	0.84	0.84		0.84	0.84	0.84
Clearance Time (s)		5.0			5.0	5.0	6.3	6.3		6.3	6.3	6.3
Vehicle Extension (s)		4.3			4.3	4.3	5.5	5.5		5.5	5.5	5.5
Lane Grp Cap (vph)		106			111	106	267	2845		385	2876	1287
v/s Ratio Prot								0.32			c0.41	
v/s Ratio Perm		c0.01			0.00	0.00	0.05			0.21		0.00
v/c Ratio		0.12			0.04	0.01	0.06	0.38		0.25	0.49	0.00
Uniform Delay, d1		52.4			52.1	52.0	1.7	2.4		2.0	2.7	1.6
Progression Factor		1.00			1.00	1.00	0.98	0.98		0.09	0.11	0.00
Incremental Delay, d2		0.8			0.2	0.0	0.4	0.3		1.2	0.5	0.0
Delay (s)		53.2			52.3	52.1	2.0	2.6		1.4	0.8	0.0
Level of Service		D			D	D	A	A		A	A	A
Approach Delay (s)		53.2			52.1			2.6			0.8	
Approach LOS		D			D			A			A	

### Intersection Summary





















HCM Average Control Delay	2.9	HCM Level of Service	A
HCM Volume to Capacity ratio	0.46		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	11.3
Intersection Capacity Utilization	83.1%	ICU Level of Service	E
Analysis Period (min)	15		
c Critical Lane Group			

# HCM Signalized Intersection Capacity Analysis

## 4: Woodruff Industrial Lane & Woodruff Road

2035 AM

7/6/2011




















												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	SEL	SET	SER	NWL	NWT	NWR
Lane Configurations												
Volume (vph)	55	7	93	33	7	4	19	811	123	250	1301	56
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.0	6.0		6.0	6.0		6.0	6.0		6.0	6.0	
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	0.95		1.00	0.95	
Frt	1.00	0.86		1.00	0.95		1.00	0.98		1.00	0.99	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1719	1558		1719	1719		1719	3370		1719	3417	
Flt Permitted	0.69	1.00		0.68	1.00		0.14	1.00		0.19	1.00	
Satd. Flow (perm)	1240	1558		1226	1719		246	3370		336	3417	
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)	61	8	103	37	8	4	21	901	137	278	1446	62
RTOR Reduction (vph)	0	93	0	0	4	0	0	8	0	0	2	0
Lane Group Flow (vph)	61	18	0	37	8	0	21	1030	0	278	1506	0
Turn Type	pm+pt			pm+pt			pm+pt			pm+pt		
Protected Phases	3	8		7	4		5	2		1	6	
Permitted Phases	8			4			2			6		
Actuated Green, G (s)	15.6	11.6		13.6	10.6		68.6	65.9		87.4	78.7	
Effective Green, g (s)	15.6	11.6		13.6	10.6		68.6	65.9		87.4	78.7	
Actuated g/C Ratio	0.13	0.10		0.11	0.09		0.57	0.55		0.73	0.66	
Clearance Time (s)	6.0	6.0		6.0	6.0		6.0	6.0		6.0	6.0	
Vehicle Extension (s)	4.3	4.3		4.3	4.3		4.3	5.5		4.3	5.5	
Lane Grp Cap (vph)	177	151		151	152		174	1851		423	2241	
v/s Ratio Prot	c0.01	0.01		0.01	0.00		0.00	0.31		c0.08	c0.44	
v/s Ratio Perm	c0.03			0.02			0.07			0.39		
v/c Ratio	0.34	0.12		0.25	0.05		0.12	0.56		0.66	0.67	
Uniform Delay, d1	47.1	49.5		48.2	50.1		12.0	17.6		10.5	12.7	
Progression Factor	1.00	1.00		1.00	1.00		0.63	0.87		1.10	0.80	
Incremental Delay, d2	1.8	0.6		1.3	0.2		0.5	1.1		3.5	1.3	
Delay (s)	48.9	50.1		49.5	50.4		8.1	16.4		15.1	11.5	
Level of Service	D	D		D	D		A	B		B	B	
Approach Delay (s)		49.7			49.7			16.2			12.1	
Approach LOS		D			D			B			B	
<b>Intersection Summary</b>												
HCM Average Control Delay			16.2			HCM Level of Service				B		
HCM Volume to Capacity ratio			0.61									
Actuated Cycle Length (s)			120.0			Sum of lost time (s)			18.0			
Intersection Capacity Utilization			67.7%			ICU Level of Service				C		
Analysis Period (min)			15									
c Critical Lane Group												

# HCM Signalized Intersection Capacity Analysis

## 5: I-85 SB Ramps & Woodruff Road

2035 AM

7/6/2011












												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	SEL	SET	SER	NWL	NWT	NWR
Lane Configurations												
Volume (vph)	0	0	0	570	0	346	0	813	124	712	1261	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)				5.0		5.0		6.3	6.3	6.5	6.1	
Lane Util. Factor				0.97		0.88		0.95	1.00	1.00	0.95	
Frt				1.00		0.85		1.00	0.85	1.00	1.00	
Flt Protected				0.95		1.00		1.00	1.00	0.95	1.00	
Satd. Flow (prot)				3335		2707		3438	1538	1719	3438	
Flt Permitted				0.95		1.00		1.00	1.00	0.10	1.00	
Satd. Flow (perm)				3335		2707		3438	1538	186	3438	
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	0	0	633	0	384	0	903	138	791	1401	0
RTOR Reduction (vph)	0	0	0	0	0	120	0	0	96	0	0	0
Lane Group Flow (vph)	0	0	0	633	0	264	0	903	42	791	1401	0
Turn Type				custom		custom			Perm	pm+pt		
Protected Phases								2		1	6	
Permitted Phases				4		4			2	6		
Actuated Green, G (s)				22.0		22.0		32.2	32.2	86.9	86.9	
Effective Green, g (s)				22.0		22.0		32.2	32.2	86.9	86.9	
Actuated g/C Ratio				0.18		0.18		0.27	0.27	0.72	0.72	
Clearance Time (s)				5.0		5.0		6.3	6.3	6.5	6.1	
Vehicle Extension (s)				4.3		4.3		4.3	4.3	4.3	4.3	
Lane Grp Cap (vph)				611		496		923	413	748	2490	
v/s Ratio Prot								0.26		c0.42	0.41	
v/s Ratio Perm				c0.19		0.10			0.03	c0.34		
v/c Ratio				1.04		0.53		0.98	0.10	1.06	0.56	
Uniform Delay, d1				49.0		44.3		43.6	33.0	31.1	7.7	
Progression Factor				1.00		1.00		0.61	0.48	1.25	0.64	
Incremental Delay, d2				46.0		1.6		22.9	0.4	43.2	0.6	
Delay (s)				95.0		45.9		49.7	16.3	82.0	5.5	
Level of Service				F		D		D	B	F	A	
Approach Delay (s)		0.0			76.5			45.2			33.1	
Approach LOS		A			E			D			C	
<b>Intersection Summary</b>												
HCM Average Control Delay			46.5			HCM Level of Service			D			
HCM Volume to Capacity ratio			1.02									
Actuated Cycle Length (s)			120.0			Sum of lost time (s)			11.5			
Intersection Capacity Utilization			94.4%			ICU Level of Service			F			
Analysis Period (min)			15									
c Critical Lane Group												

# HCM Signalized Intersection Capacity Analysis

## 6: I-85 NB Ramps & Woodruff Road

2035 AM

7/6/2011





















						
Movement	NBL	NBR	SET	SER	NWL	NWT
Lane Configurations						
Volume (vph)	489	816	1128	255	0	1484
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.6	5.6	6.5	6.5		6.5
Lane Util. Factor	0.97	1.00	0.95	1.00		0.95
Frt	1.00	0.85	1.00	0.85		1.00
Flt Protected	0.95	1.00	1.00	1.00		1.00
Satd. Flow (prot)	3335	1538	3438	1538		3438
Flt Permitted	0.95	1.00	1.00	1.00		1.00
Satd. Flow (perm)	3335	1538	3438	1538		3438
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	543	907	1253	283	0	1649
RTOR Reduction (vph)	0	144	0	157	0	0
Lane Group Flow (vph)	543	763	1253	126	0	1649
Turn Type	Perm		Perm			
Protected Phases	3		2			2 4
Permitted Phases		3		2		
Actuated Green, G (s)	36.4	36.4	53.5	53.5		71.5
Effective Green, g (s)	36.4	36.4	53.5	53.5		64.5
Actuated g/C Ratio	0.30	0.30	0.45	0.45		0.54
Clearance Time (s)	5.6	5.6	6.5	6.5		
Vehicle Extension (s)	4.3	4.3	4.3	4.3		
Lane Grp Cap (vph)	1012	467	1533	686		1848
v/s Ratio Prot	0.16		0.36			c0.48
v/s Ratio Perm		c0.50		0.08		
v/c Ratio	0.54	1.63	0.82	0.18		0.89
Uniform Delay, d1	34.8	41.8	29.0	20.1		24.7
Progression Factor	1.00	1.00	0.84	2.82		0.47
Incremental Delay, d2	0.8	295.3	0.5	0.1		5.2
Delay (s)	35.6	337.1	24.7	56.6		16.7
Level of Service	D	F	C	E		B
Approach Delay (s)	224.2		30.6			16.7
Approach LOS	F		C			B
Intersection Summary						
HCM Average Control Delay			86.2	HCM Level of Service		F
HCM Volume to Capacity ratio			1.16			
Actuated Cycle Length (s)			120.0	Sum of lost time (s)		18.6
Intersection Capacity Utilization			91.8%	ICU Level of Service		F
Analysis Period (min)			15			
c Critical Lane Group						

# HCM Signalized Intersection Capacity Analysis

## 7: Carolina Point Pkwy & Woodruff Road

2035 AM

7/6/2011

























												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	SEL	SET	SER	NWL	NWT	NWR
Lane Configurations												
Volume (vph)	109	67	139	0	0	0	0	1683	261	196	1375	904
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	7.0	7.0	7.0					6.5	6.5	6.5	6.5	6.5
Lane Util. Factor	1.00	1.00	1.00					0.95	1.00	1.00	0.95	1.00
Frt	1.00	1.00	0.85					1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00					1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1719	1810	1538					3438	1538	1719	3438	1538
Flt Permitted	0.95	1.00	1.00					1.00	1.00	0.09	1.00	1.00
Satd. Flow (perm)	1719	1810	1538					3438	1538	166	3438	1538
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)	121	74	154	0	0	0	0	1870	290	218	1528	1004
RTOR Reduction (vph)	0	0	42	0	0	0	0	0	57	0	0	76
Lane Group Flow (vph)	121	74	112	0	0	0	0	1870	233	218	1528	928
Turn Type	custom		Perm						Perm	Perm		
Protected Phases	4	4						2 3 6			2 3 6	
Permitted Phases	4		4						2 3 6	2 3 6		2 3 6
Actuated Green, G (s)	11.0	11.0	11.0					96.4	96.4	96.4	96.4	96.4
Effective Green, g (s)	11.0	11.0	11.0					96.4	96.4	96.4	96.4	96.4
Actuated g/C Ratio	0.09	0.09	0.09					0.80	0.80	0.80	0.80	0.80
Clearance Time (s)	7.0	7.0	7.0									
Vehicle Extension (s)	4.3	4.3	4.3									
Lane Grp Cap (vph)	158	166	141					2762	1236	133	2762	1236
v/s Ratio Prot	0.07	0.04						0.54			0.44	
v/s Ratio Perm			c0.07						0.15	c1.31		0.60
v/c Ratio	0.77	0.45	0.80					0.68	0.19	1.64	0.55	0.75
Uniform Delay, d1	53.2	51.6	53.4					5.1	2.7	11.8	4.2	5.9
Progression Factor	1.00	1.00	1.00					0.36	0.23	1.98	2.14	3.07
Incremental Delay, d2	21.3	3.0	27.9					0.1	0.0	290.7	0.0	0.3
Delay (s)	74.6	54.6	81.3					1.9	0.7	314.0	9.0	18.2
Level of Service	E	D	F					A	A	F	A	B
Approach Delay (s)		73.3			0.0			1.7			36.5	
Approach LOS		E			A			A			D	
<b>Intersection Summary</b>												
HCM Average Control Delay			24.7			HCM Level of Service				C		
HCM Volume to Capacity ratio			1.56									
Actuated Cycle Length (s)			120.0			Sum of lost time (s)			13.5			
Intersection Capacity Utilization			80.1%			ICU Level of Service			D			
Analysis Period (min)			15									
c Critical Lane Group												

# HCM Signalized Intersection Capacity Analysis

## 8: Woodruff Road & Market Point Drive

2035 AM

7/6/2011

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	258	1417	147	34	2178	86	100	2	48	39	2	197
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.1	6.1	5.8	6.1	6.1	5.8	5.8	5.8	6.1	5.8	5.8	5.8
Lane Util. Factor	0.97	0.95	1.00	1.00	0.95	1.00	1.00	1.00	1.00	0.97	0.95	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	3335	3438	1538	1719	3438	1538	1719	1810	1538	3335	3438	1538
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	3335	3438	1538	1719	3438	1538	1719	1810	1538	3335	3438	1538
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)	287	1574	163	38	2420	96	111	2	53	43	2	219
RTOR Reduction (vph)	0	0	56	0	0	16	0	0	42	0	0	122
Lane Group Flow (vph)	287	1574	107	38	2420	80	111	2	11	43	2	97
Turn Type	Prot	pm+ov		Prot	pm+ov		Prot	pm+ov		Prot	Perm	
Protected Phases	5	2	3	1	6	7	3	8	1	7	4	
Permitted Phases			2			6			8			4
Actuated Green, G (s)	8.9	71.3	78.5	10.5	72.9	77.5	7.2	9.8	20.3	4.6	7.2	7.2
Effective Green, g (s)	8.9	71.3	78.5	10.5	72.9	77.5	7.2	9.8	20.3	4.6	7.2	7.2
Actuated g/C Ratio	0.07	0.59	0.65	0.09	0.61	0.65	0.06	0.08	0.17	0.04	0.06	0.06
Clearance Time (s)	6.1	6.1	5.8	6.1	6.1	5.8	5.8	5.8	6.1	5.8	5.8	5.8
Vehicle Extension (s)	4.3	4.3	4.3	4.3	4.3	4.3	4.3	4.3	4.3	4.3	4.3	4.3
Lane Grp Cap (vph)	247	2043	1006	150	2089	993	103	148	260	128	206	92
v/s Ratio Prot	c0.09	0.46	0.01	0.02	c0.70	0.00	c0.06	0.00	c0.00	0.01	0.00	
v/s Ratio Perm			0.06			0.05			0.00			c0.06
v/c Ratio	1.16	0.77	0.11	0.25	1.16	0.08	1.08	0.01	0.04	0.34	0.01	1.05
Uniform Delay, d1	55.5	18.2	7.7	51.1	23.5	7.9	56.4	50.7	41.7	56.2	53.0	56.4
Progression Factor	0.99	0.98	1.98	0.80	0.54	0.82	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	99.8	2.0	0.1	0.1	71.9	0.0	111.2	0.1	0.1	2.5	0.0	108.7
Delay (s)	154.6	19.8	15.4	41.0	84.5	6.5	167.6	50.7	41.8	58.7	53.1	165.1
Level of Service	F	B	B	D	F	A	F	D	D	E	D	F
Approach Delay (s)		38.6			80.9			126.0			146.9	
Approach LOS		D			F			F			F	
<b>Intersection Summary</b>												
HCM Average Control Delay			68.8				HCM Level of Service			E		
HCM Volume to Capacity ratio			1.22									
Actuated Cycle Length (s)			120.0				Sum of lost time (s)			29.9		
Intersection Capacity Utilization			94.8%				ICU Level of Service			F		
Analysis Period (min)			15									
c Critical Lane Group												
























# HCM Signalized Intersection Capacity Analysis

## 9: Woodruff Road & Garlington Road

2035 AM

7/6/2011


















												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	314	1024	166	147	1539	661	360	346	94	199	160	399
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.2	6.1		5.2	6.1		5.2	5.2		5.2	5.2	5.2
Lane Util. Factor	1.00	0.95		1.00	0.95		1.00	1.00		1.00	1.00	1.00
Frt	1.00	0.98		1.00	0.95		1.00	0.97		1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	1719	3366		1719	3283		1719	1752		1719	1810	1538
Flt Permitted	0.07	1.00		0.09	1.00		0.38	1.00		0.21	1.00	1.00
Satd. Flow (perm)	125	3366		166	3283		690	1752		385	1810	1538
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)	349	1138	184	163	1710	734	400	384	104	221	178	443
RTOR Reduction (vph)	0	11	0	0	40	0	0	8	0	0	0	148
Lane Group Flow (vph)	349	1311	0	163	2404	0	400	480	0	221	178	295
Turn Type	pm+pt			pm+pt			pm+pt			pm+pt		Perm
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases	2			6			8			4		4
Actuated Green, G (s)	69.9	58.1		67.5	56.9		32.6	21.8		26.6	18.8	18.8
Effective Green, g (s)	69.9	58.1		67.5	56.9		32.6	21.8		26.6	18.8	18.8
Actuated g/C Ratio	0.58	0.48		0.56	0.47		0.27	0.18		0.22	0.16	0.16
Clearance Time (s)	5.2	6.1		5.2	6.1		5.2	5.2		5.2	5.2	5.2
Vehicle Extension (s)	4.3	4.3		4.3	4.3		4.3	4.3		4.3	4.3	4.3
Lane Grp Cap (vph)	230	1630		231	1557		280	318		172	284	241
v/s Ratio Prot	c0.15	0.39		0.06	0.73		c0.13	c0.27		0.08	0.10	
v/s Ratio Perm	c0.74			0.33			0.26			0.20		0.19
v/c Ratio	1.52	0.80		0.71	1.54		1.43	1.51		1.28	0.63	1.22
Uniform Delay, d1	38.9	26.1		20.1	31.6		42.1	49.1		44.6	47.3	50.6
Progression Factor	1.80	0.28		1.15	0.90		1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	247.8	3.0		1.0	245.1		212.3	244.7		164.9	5.2	131.3
Delay (s)	317.8	10.4		24.1	273.6		254.4	293.8		209.4	52.5	181.9
Level of Service	F	B		C	F		F	F		F	D	F
Approach Delay (s)		74.6			258.0			276.1			161.8	
Approach LOS		E			F			F			F	
<b>Intersection Summary</b>												
HCM Average Control Delay		196.2			HCM Level of Service			F				
HCM Volume to Capacity ratio		1.48										
Actuated Cycle Length (s)		120.0			Sum of lost time (s)			15.6				
Intersection Capacity Utilization		134.1%			ICU Level of Service			H				
Analysis Period (min)		15										
c Critical Lane Group												

# HCM Signalized Intersection Capacity Analysis

## 10: Woodruff Road & I-385 SB Ramps

2035 AM

7/6/2011





















												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	0	1105	212	91	1642	0	0	0	0	1184	0	705
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		6.6		6.6	6.6					5.7		5.7
Lane Util. Factor		0.95		1.00	0.95					0.97		1.00
Frt		0.98		1.00	1.00					1.00		0.85
Flt Protected		1.00		0.95	1.00					0.95		1.00
Satd. Flow (prot)		3355		1719	3438					3335		1538
Flt Permitted		1.00		0.07	1.00					0.95		1.00
Satd. Flow (perm)		3355		133	3438					3335		1538
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	1228	236	101	1824	0	0	0	0	1316	0	783
RTOR Reduction (vph)	0	13	0	0	0	0	0	0	0	0	0	4
Lane Group Flow (vph)	0	1451	0	101	1824	0	0	0	0	1316	0	779
Turn Type				pm+pt						Prot		custom
Protected Phases		2		1	6					4		
Permitted Phases				6								4
Actuated Green, G (s)		47.8		58.4	58.4					49.3		49.3
Effective Green, g (s)		47.8		58.4	58.4					49.3		49.3
Actuated g/C Ratio		0.40		0.49	0.49					0.41		0.41
Clearance Time (s)		6.6		6.6	6.6					5.7		5.7
Vehicle Extension (s)		4.3		4.3	4.3					4.3		4.3
Lane Grp Cap (vph)		1336		118	1673					1370		632
v/s Ratio Prot		0.43		0.03	c0.53					0.39		
v/s Ratio Perm				0.39								c0.51
v/c Ratio		1.09		0.86	1.09					0.96		1.23
Uniform Delay, d1		36.1		28.0	30.8					34.4		35.4
Progression Factor		0.64		1.83	0.76					1.00		1.00
Incremental Delay, d2		44.1		6.0	41.8					16.0		118.4
Delay (s)		67.3		57.3	65.1					50.2		153.6
Level of Service		E		E	E					D		F
Approach Delay (s)		67.3			64.7			0.0			88.8	
Approach LOS		E			E			A			F	
<b>Intersection Summary</b>												
HCM Average Control Delay			74.6			HCM Level of Service				E		
HCM Volume to Capacity ratio			1.16									
Actuated Cycle Length (s)			120.0			Sum of lost time (s)			12.3			
Intersection Capacity Utilization			181.3%			ICU Level of Service			H			
Analysis Period (min)			15									
c Critical Lane Group												

# HCM Signalized Intersection Capacity Analysis

## 11: Woodruff Road & I-385 NB Ramps

2035 AM

7/6/2011





















												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		 			 							
Volume (vph)	861	1428	0	0	989	903	744	0	361	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.1	6.1			6.1	6.1	5.0		5.0			
Lane Util. Factor	1.00	0.95			0.95	1.00	1.00		1.00			
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)	1719	3438			3438	1538	1719		1538			
Flt Permitted	0.10	1.00			1.00	1.00	0.95		1.00			
Satd. Flow (perm)	172	3438			3438	1538	1719		1538			
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)	957	1587	0	0	1099	1003	827	0	401	0	0	0
RTOR Reduction (vph)	0	0	0	0	0	383	0	0	27	0	0	0
Lane Group Flow (vph)	957	1587	0	0	1099	620	827	0	374	0	0	0
Turn Type	pm+pt					Perm	Prot		custom			
Protected Phases	5	2			6		8					
Permitted Phases	2					6			8			
Actuated Green, G (s)	75.9	75.9			35.9	35.9	33.0		33.0			
Effective Green, g (s)	75.9	75.9			35.9	35.9	33.0		33.0			
Actuated g/C Ratio	0.63	0.63			0.30	0.30	0.28		0.28			
Clearance Time (s)	6.1	6.1			6.1	6.1	5.0		5.0			
Vehicle Extension (s)	4.3	4.3			4.3	4.3	4.3		4.3			
Lane Grp Cap (vph)	546	2175			1029	460	473		423			
v/s Ratio Prot	c0.50	0.46			0.32		c0.48					
v/s Ratio Perm	c0.61					0.40			0.24			
v/c Ratio	1.75	0.73			1.07	1.35	1.75		0.88			
Uniform Delay, d1	36.1	15.0			42.0	42.0	43.5		41.7			
Progression Factor	0.99	1.17			0.57	1.29	1.00		1.00			
Incremental Delay, d2	339.4	0.2			38.1	161.2	345.5		19.9			
Delay (s)	375.0	17.7			62.2	215.2	389.0		61.6			
Level of Service	F	B			E	F	F		E			
Approach Delay (s)		152.1			135.2			282.1			0.0	
Approach LOS		F			F			F			A	
<b>Intersection Summary</b>												
HCM Average Control Delay		173.2			HCM Level of Service			F				
HCM Volume to Capacity ratio		1.70										
Actuated Cycle Length (s)		120.0			Sum of lost time (s)			11.1				
Intersection Capacity Utilization		181.3%			ICU Level of Service			H				
Analysis Period (min)		15										
c Critical Lane Group												

# HCM Signalized Intersection Capacity Analysis

## 12: Woodruff Road & Commercial Drive

2035 AM

7/6/2011



















												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	165	1492	132	31	1683	62	121	7	10	111	29	88
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.3	5.5		5.5	5.5		5.3	5.4		5.4	5.4	
Lane Util. Factor	1.00	0.95		1.00	0.95		1.00	1.00		1.00	1.00	
Frt	1.00	0.99		1.00	0.99		1.00	0.91		1.00	0.89	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1719	3396		1719	3420		1719	1652		1719	1605	
Flt Permitted	0.05	1.00		0.09	1.00		0.36	1.00		0.75	1.00	
Satd. Flow (perm)	97	3396		171	3420		649	1652		1348	1605	
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)	183	1658	147	34	1870	69	134	8	11	123	32	98
RTOR Reduction (vph)	0	6	0	0	2	0	0	9	0	0	88	0
Lane Group Flow (vph)	183	1799	0	34	1937	0	134	10	0	123	42	0
Turn Type	pm+pt			Perm			pm+pt			Perm		
Protected Phases	5	2			6		3	8			4	
Permitted Phases	2			6			8			4		
Actuated Green, G (s)	85.1	85.1		69.3	69.3		24.0	24.0		12.4	12.4	
Effective Green, g (s)	85.1	85.1		69.3	69.3		24.0	24.0		12.4	12.4	
Actuated g/C Ratio	0.71	0.71		0.58	0.58		0.20	0.20		0.10	0.10	
Clearance Time (s)	5.3	5.5		5.5	5.5		5.3	5.4		5.4	5.4	
Vehicle Extension (s)	4.3	4.3		4.3	4.3		4.3	4.3		4.3	4.3	
Lane Grp Cap (vph)	211	2408		99	1975		186	330		139	166	
v/s Ratio Prot	0.08	c0.53			c0.57		c0.04	0.01			0.03	
v/s Ratio Perm	0.54			0.20			0.11			c0.09		
v/c Ratio	0.87	0.75		0.34	0.98		0.72	0.03		0.88	0.25	
Uniform Delay, d1	39.5	10.8		13.4	24.7		43.7	38.6		53.1	49.5	
Progression Factor	1.14	0.70		0.19	0.25		1.00	1.00		1.00	1.00	
Incremental Delay, d2	21.1	1.4		6.3	12.8		14.2	0.1		45.1	1.3	
Delay (s)	66.3	8.9		8.9	19.0		57.9	38.7		98.2	50.8	
Level of Service	E	A		A	B		E	D		F	D	
Approach Delay (s)		14.2			18.9			55.5			73.8	
Approach LOS		B			B			E			E	
<b>Intersection Summary</b>												
HCM Average Control Delay			21.2			HCM Level of Service				C		
HCM Volume to Capacity ratio			0.96									
Actuated Cycle Length (s)			120.0			Sum of lost time (s)			21.7			
Intersection Capacity Utilization			85.8%			ICU Level of Service			E			
Analysis Period (min)			15									
c Critical Lane Group												

# HCM Signalized Intersection Capacity Analysis

## 13: Woodruff Road & Smith Hines Road

2035 AM

7/6/2011




















												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	8	1371	234	177	1667	2	105	2	148	2	2	4
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.3	6.3		6.0	6.0			5.0			5.0	
Lane Util. Factor	1.00	0.95		1.00	0.95			1.00			1.00	
Frt	1.00	0.98		1.00	1.00			0.92			0.93	
Flt Protected	0.95	1.00		0.95	1.00			0.98			0.99	
Satd. Flow (prot)	1719	3363		1719	3438			1634			1667	
Flt Permitted	0.09	1.00		0.10	1.00			0.86			0.89	
Satd. Flow (perm)	170	3363		189	3438			1438			1495	
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)	9	1523	260	197	1852	2	117	2	164	2	2	4
RTOR Reduction (vph)	0	11	0	0	0	0	0	41	0	0	4	0
Lane Group Flow (vph)	9	1772	0	197	1854	0	0	242	0	0	4	0
Turn Type	Perm			Perm			Perm			Perm		
Protected Phases	2			6			8			4		
Permitted Phases	2			6			8			4		
Actuated Green, G (s)	96.7	96.7		97.0	97.0			12.0			12.0	
Effective Green, g (s)	96.7	96.7		97.0	97.0			12.0			12.0	
Actuated g/C Ratio	0.81	0.81		0.81	0.81			0.10			0.10	
Clearance Time (s)	6.3	6.3		6.0	6.0			5.0			5.0	
Vehicle Extension (s)	4.3	4.3		4.3	4.3			4.3			4.3	
Lane Grp Cap (vph)	137	2710		153	2779			144			150	
v/s Ratio Prot	0.53			0.54								
v/s Ratio Perm	0.05			c1.04				c0.17			0.00	
v/c Ratio	0.07	0.65		1.29	0.67			1.68			0.03	
Uniform Delay, d1	2.4	4.8		11.5	4.8			54.0			48.7	
Progression Factor	0.05	0.05		1.37	0.57			1.00			1.00	
Incremental Delay, d2	0.6	0.8		134.0	0.1			333.3			0.1	
Delay (s)	0.7	1.1		149.7	2.8			387.3			48.9	
Level of Service	A	A		F	A			F			D	
Approach Delay (s)	1.1			16.9				387.3			48.9	
Approach LOS	A			B				F			D	
Intersection Summary												
HCM Average Control Delay	35.5			HCM Level of Service			D					
HCM Volume to Capacity ratio	1.33											
Actuated Cycle Length (s)	120.0			Sum of lost time (s)			11.0					
Intersection Capacity Utilization	107.2%			ICU Level of Service			G					
Analysis Period (min)	15											
c Critical Lane Group												

# HCM Signalized Intersection Capacity Analysis

## 14: Woodruff Road & Walmart Driveway

2035 AM

7/6/2011























												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	31	2055	24	20	4623	118	70	4	35	120	2	12
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.3	6.3		6.3	6.3		5.0	5.0			5.0	
Lane Util. Factor	1.00	0.95		1.00	0.95		1.00	1.00			1.00	
Frt	1.00	1.00		1.00	1.00		1.00	0.86			0.99	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00			0.96	
Satd. Flow (prot)	1719	3432		1719	3425		1719	1563			1711	
Flt Permitted	0.05	1.00		0.05	1.00		0.77	1.00			0.72	
Satd. Flow (perm)	85	3432		92	3425		1389	1563			1281	
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)	34	2283	27	22	5137	131	78	4	39	133	2	13
RTOR Reduction (vph)	0	1	0	0	1	0	0	9	0	0	3	0
Lane Group Flow (vph)	34	2309	0	22	5267	0	78	34	0	0	145	0
Turn Type	pm+pt			Perm			Perm			Perm		
Protected Phases	5	2			6			8			4	
Permitted Phases	2			6			8			4		
Actuated Green, G (s)	88.9	88.9		78.8	78.8		19.8	19.8			19.8	
Effective Green, g (s)	88.9	88.9		78.8	78.8		19.8	19.8			19.8	
Actuated g/C Ratio	0.74	0.74		0.66	0.66		0.17	0.17			0.17	
Clearance Time (s)	6.3	6.3		6.3	6.3		5.0	5.0			5.0	
Vehicle Extension (s)	4.3	4.3		4.3	4.3		4.3	4.3			4.3	
Lane Grp Cap (vph)	115	2543		60	2249		229	258			211	
v/s Ratio Prot	0.01	c0.67			c1.54			0.02				
v/s Ratio Perm	0.21			0.24			0.06				c0.11	
v/c Ratio	0.30	0.91		0.37	2.34		0.34	0.13			0.69	
Uniform Delay, d1	32.0	12.3		9.3	20.6		44.3	42.8			47.2	
Progression Factor	1.01	0.95		0.57	0.50		1.00	1.00			1.00	
Incremental Delay, d2	1.9	5.3		1.6	603.9		1.4	0.4			10.0	
Delay (s)	34.4	17.0		6.8	614.2		45.7	43.1			57.2	
Level of Service	C	B		A	F		D	D			E	
Approach Delay (s)		17.2			611.7			44.8			57.2	
Approach LOS		B			F			D			E	
<b>Intersection Summary</b>												
HCM Average Control Delay			416.3			HCM Level of Service				F		
HCM Volume to Capacity ratio			2.00									
Actuated Cycle Length (s)			120.0			Sum of lost time (s)			17.6			
Intersection Capacity Utilization			155.1%			ICU Level of Service			H			
Analysis Period (min)			15									
c Critical Lane Group												

# HCM Signalized Intersection Capacity Analysis

## 15: Woodruff Road & Verdin Road

2035 AM

7/6/2011




















												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	58	1061	29	134	2960	77	479	352	39	67	285	101
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.3	6.3		6.3	6.3		5.2	5.0	5.0	5.2	5.2	
Lane Util. Factor	1.00	0.95		1.00	0.95		1.00	1.00	1.00	1.00	1.00	
Frt	1.00	1.00		1.00	1.00		1.00	1.00	0.85	1.00	0.96	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)	1719	3424		1719	3425		1719	1810	1538	1719	1739	
Flt Permitted	0.06	1.00		0.17	1.00		0.19	1.00	1.00	0.53	1.00	
Satd. Flow (perm)	101	3424		302	3425		341	1810	1538	961	1739	
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)	64	1179	32	149	3289	86	532	391	43	74	317	112
RTOR Reduction (vph)	0	2	0	0	2	0	0	0	30	0	3	0
Lane Group Flow (vph)	64	1209	0	149	3373	0	532	391	13	74	426	0
Turn Type	Perm			Perm			pm+pt			Perm	Perm	
Protected Phases	2			6			3		8		4	
Permitted Phases	2			6			8		8		4	
Actuated Green, G (s)	71.7	71.7		71.7	71.7		37.0	37.0	37.0	15.8	15.8	
Effective Green, g (s)	71.7	71.7		71.7	71.7		37.0	37.0	37.0	15.8	15.8	
Actuated g/C Ratio	0.60	0.60		0.60	0.60		0.31	0.31	0.31	0.13	0.13	
Clearance Time (s)	6.3	6.3		6.3	6.3		5.2	5.0	5.0	5.2	5.2	
Vehicle Extension (s)	4.3	4.3		4.3	4.3		4.3	4.3	4.3	4.3	4.3	
Lane Grp Cap (vph)	60	2046		180	2046		287	558	474	127	229	
v/s Ratio Prot		0.35			c0.98		c0.24	0.22			0.25	
v/s Ratio Perm	0.63			0.49			c0.33		0.01	0.08		
v/c Ratio	1.07	0.59		0.83	1.65		1.85	0.70	0.03	0.58	1.86	
Uniform Delay, d1	24.1	15.0		19.2	24.1		36.6	36.6	29.0	49.0	52.1	
Progression Factor	1.02	1.11		0.75	0.76		1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	97.6	0.6		4.1	292.1		397.3	4.4	0.0	8.5	404.2	
Delay (s)	122.2	17.3		18.5	310.5		433.9	41.0	29.0	57.5	456.3	
Level of Service	F	B		B	F		F	D	C	E	F	
Approach Delay (s)		22.6			298.1			256.9			397.6	
Approach LOS		C			F			F			F	
Intersection Summary												
HCM Average Control Delay	243.7			HCM Level of Service			F					
HCM Volume to Capacity ratio	1.69											
Actuated Cycle Length (s)	120.0			Sum of lost time (s)			11.5					
Intersection Capacity Utilization	172.8%			ICU Level of Service			H					
Analysis Period (min)	15											
c Critical Lane Group												

# HCM Signalized Intersection Capacity Analysis

## 16: Woodruff Road & Butler Road

2035 AM

7/6/2011

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	7	1007	74	759	2693	2	231	40	555	32	42	12
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		6.3		6.3	6.3			5.0	6.3	5.0	5.0	
Lane Util. Factor		0.95		1.00	0.95			1.00	1.00	1.00	1.00	
Frt		0.99		1.00	1.00			1.00	0.85	1.00	0.97	
Flt Protected		1.00		0.95	1.00			0.96	1.00	0.95	1.00	
Satd. Flow (prot)		3402		1719	3438			1735	1538	1719	1751	
Flt Permitted		0.75		0.08	1.00			0.72	1.00	0.21	1.00	
Satd. Flow (perm)		2546		141	3438			1294	1538	381	1751	
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)	8	1119	82	843	2992	2	257	44	617	36	47	13
RTOR Reduction (vph)	0	5	0	0	0	0	0	0	17	0	3	0
Lane Group Flow (vph)	0	1204	0	843	2994	0	0	301	600	36	57	0
Turn Type	Perm			pm+pt			Perm		pm+ov		Perm	
Protected Phases		2		1	6			8	1		4	
Permitted Phases	2			6			8		8	4		
Actuated Green, G (s)		50.7		89.7	89.7			19.0	51.7	19.0	19.0	
Effective Green, g (s)		50.7		89.7	89.7			19.0	51.7	19.0	19.0	
Actuated g/C Ratio		0.42		0.75	0.75			0.16	0.43	0.16	0.16	
Clearance Time (s)		6.3		6.3	6.3			5.0	6.3	5.0	5.0	
Vehicle Extension (s)		4.3		4.3	4.3			4.3	4.3	4.3	4.3	
Lane Grp Cap (vph)		1076		535	2570			205	663	60	277	
v/s Ratio Prot				c0.43	0.87				0.25		0.03	
v/s Ratio Perm		0.47		c0.75				c0.23	0.14	0.09		
v/c Ratio		1.12		1.58	1.16			1.47	0.90	0.60	0.20	
Uniform Delay, d1		34.6		36.6	15.1			50.5	31.9	47.0	43.9	
Progression Factor		0.83		1.15	0.94			1.00	1.00	1.00	1.00	
Incremental Delay, d2		64.5		259.9	74.7			235.4	16.3	18.9	0.6	
Delay (s)		93.3		302.1	88.9			285.9	48.2	65.8	44.5	
Level of Service		F		F	F			F	D	E	D	
Approach Delay (s)		93.3			135.7			126.1			52.5	
Approach LOS		F			F			F			D	
Intersection Summary												
HCM Average Control Delay			124.5		HCM Level of Service				F			
HCM Volume to Capacity ratio			1.51									
Actuated Cycle Length (s)			120.0		Sum of lost time (s)				11.3			
Intersection Capacity Utilization			141.1%		ICU Level of Service				H			
Analysis Period (min)			15									
c Critical Lane Group												





















# HCM Signalized Intersection Capacity Analysis

## 17: Woodruff Road & Bell Road

2035 AM

7/6/2011
























												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	35	1572	128	40	3801	24	198	2	48	20	2	85
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.2	6.2		6.2	6.2			5.4			5.4	
Lane Util. Factor	1.00	0.95		1.00	0.95			1.00			1.00	
Frt	1.00	0.99		1.00	1.00			0.97			0.89	
Flt Protected	0.95	1.00		0.95	1.00			0.96			0.99	
Satd. Flow (prot)	1719	3399		1719	3435			1695			1600	
Flt Permitted	0.05	1.00		0.07	1.00			0.61			0.95	
Satd. Flow (perm)	82	3399		134	3435			1082			1537	
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	1747	142	44	4223	27	220	2	53	22	2	94
RTOR Reduction (vph)	0	5	0	0	0	0	0	8	0	0	0	0
Lane Group Flow (vph)	39	1884	0	44	4250	0	0	267	0	0	118	0
Turn Type	Perm			Perm			Perm			Perm		
Protected Phases	2			6			8			4		
Permitted Phases	2			6			8			4		
Actuated Green, G (s)	88.8	88.8		88.8	88.8			19.6			19.6	
Effective Green, g (s)	88.8	88.8		88.8	88.8			19.6			19.6	
Actuated g/C Ratio	0.74	0.74		0.74	0.74			0.16			0.16	
Clearance Time (s)	6.2	6.2		6.2	6.2			5.4			5.4	
Vehicle Extension (s)	4.3	4.3		4.3	4.3			4.3			4.3	
Lane Grp Cap (vph)	61	2515		99	2542			177			251	
v/s Ratio Prot	0.55			c1.24								
v/s Ratio Perm	0.48			0.33				c0.25			0.08	
v/c Ratio	0.64	0.75		0.44	1.67			1.51			0.47	
Uniform Delay, d1	7.7	9.1		6.0	15.6			50.2			45.5	
Progression Factor	0.75	0.68		0.58	0.69			1.00			1.00	
Incremental Delay, d2	17.3	0.8		1.3	302.5			256.9			2.2	
Delay (s)	23.1	7.0		4.8	313.3			307.1			47.7	
Level of Service	C	A		A	F			F			D	
Approach Delay (s)	7.3			310.1				307.1			47.7	
Approach LOS	A			F				F			D	
Intersection Summary												
HCM Average Control Delay	217.1			HCM Level of Service			F					
HCM Volume to Capacity ratio	1.64											
Actuated Cycle Length (s)	120.0			Sum of lost time (s)			11.6					
Intersection Capacity Utilization	136.2%			ICU Level of Service			H					
Analysis Period (min)	15											
c Critical Lane Group												

# HCM Signalized Intersection Capacity Analysis

## 18: Woodruff Road & SC 14

2035 AM

7/6/2011
























												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	215	851	131	72	2101	284	525	546	188	188	326	454
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.3	6.3	5.0	6.3	6.3		5.0	5.0	6.3	5.0	5.0	6.3
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95		1.00	1.00	1.00	1.00	1.00	1.00
Flt	1.00	1.00	0.85	1.00	0.98		1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1719	3438	1538	1719	3377		1719	1810	1538	1719	1810	1538
Flt Permitted	0.08	1.00	1.00	0.19	1.00		0.17	1.00	1.00	0.22	1.00	1.00
Satd. Flow (perm)	140	3438	1538	344	3377		315	1810	1538	402	1810	1538
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)	239	946	146	80	2334	316	583	607	209	209	362	504
RTOR Reduction (vph)	0	0	60	0	9	0	0	0	34	0	0	3
Lane Group Flow (vph)	239	946	86	80	2641	0	583	607	175	209	362	501
Turn Type	pm+pt		pm+ov	pm+pt			pm+pt		pm+ov	pm+pt		pm+ov
Protected Phases	5	2	3	1	6		3	8	1	7	4	5
Permitted Phases	2		2	6			8		8	4		4
Actuated Green, G (s)	61.4	51.7	70.7	59.4	50.7		42.0	29.0	37.7	26.0	18.0	27.7
Effective Green, g (s)	61.4	51.7	70.7	59.4	50.7		42.0	29.0	37.7	26.0	18.0	27.7
Actuated g/C Ratio	0.51	0.43	0.59	0.49	0.42		0.35	0.24	0.31	0.22	0.15	0.23
Clearance Time (s)	6.3	6.3	5.0	6.3	6.3		5.0	5.0	6.3	5.0	5.0	6.3
Vehicle Extension (s)	4.3	4.3	4.3	4.3	4.3		4.3	4.3	4.3	4.3	4.3	4.3
Lane Grp Cap (vph)	199	1481	906	270	1427		333	437	483	175	272	355
v/s Ratio Prot	0.10	0.28	0.02	0.02	c0.78		c0.28	0.34	0.03	0.08	0.20	c0.11
v/s Ratio Perm	0.52		0.04	0.13			c0.34		0.09	0.18		0.21
v/c Ratio	1.20	0.64	0.09	0.30	1.85		1.75	1.39	0.36	1.19	1.33	1.41
Uniform Delay, d1	35.3	26.8	10.7	17.8	34.6		34.3	45.5	31.8	44.9	51.0	46.1
Progression Factor	1.12	1.05	1.91	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	116.4	1.3	0.0	1.0	385.7		350.0	188.7	0.7	130.0	171.9	201.0
Delay (s)	155.9	29.5	20.5	18.8	420.3		384.3	234.2	32.6	174.9	222.9	247.1
Level of Service	F	C	C	B	F		F	F	C	F	F	F
Approach Delay (s)		51.2			408.5			266.6			224.9	
Approach LOS		D			F			F			F	
<b>Intersection Summary</b>												
HCM Average Control Delay			275.2			HCM Level of Service			F			
HCM Volume to Capacity ratio			1.73									
Actuated Cycle Length (s)			120.0			Sum of lost time (s)			17.6			
Intersection Capacity Utilization			144.1%			ICU Level of Service			H			
Analysis Period (min)			15									
c Critical Lane Group												

# HCM Signalized Intersection Capacity Analysis

## 19: E Parkins Mill Road & US 276

2035 AM

7/6/2011

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	142	135	67	182	31	139	131	1888	101	114	1648	120
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	6.0		4.0	6.0	6.0	4.0	7.0	7.0	4.0	7.0	7.0
Lane Util. Factor	1.00	0.95		0.97	1.00	1.00	1.00	0.91	1.00	0.97	0.91	1.00
Frt	1.00	0.95		1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1719	3268		3335	1810	1538	1719	4940	1538	3335	4940	1538
Flt Permitted	0.73	1.00		0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	1330	3268		3335	1810	1538	1719	4940	1538	3335	4940	1538
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)	158	150	74	202	34	154	146	2098	112	127	1831	133
RTOR Reduction (vph)	0	57	0	0	0	139	0	0	44	0	0	45
Lane Group Flow (vph)	158	167	0	202	34	15	146	2098	68	127	1831	88
Turn Type	pm+pt			Prot		Perm	Prot		Perm	Prot		Perm
Protected Phases	3	8		7	4		1	6		5	2	
Permitted Phases	8					4			6			2
Actuated Green, G (s)	19.8	9.8		10.7	10.5	10.5	13.6	56.0	56.0	7.8	50.2	50.2
Effective Green, g (s)	19.8	9.8		10.7	10.5	10.5	13.6	56.0	56.0	7.8	50.2	50.2
Actuated g/C Ratio	0.19	0.09		0.10	0.10	0.10	0.13	0.53	0.53	0.07	0.48	0.48
Clearance Time (s)	4.0	6.0		4.0	6.0	6.0	4.0	7.0	7.0	4.0	7.0	7.0
Vehicle Extension (s)	4.3	4.9		4.3	4.9	4.9	4.3	4.9	4.9	4.3	4.9	4.9
Lane Grp Cap (vph)	287	304		339	180	153	222	2627	818	247	2355	733
v/s Ratio Prot	0.05	0.05		c0.06	0.02		c0.08	c0.42		0.04	0.37	
v/s Ratio Perm	c0.05					0.01			0.04			0.06
v/c Ratio	0.55	0.55		0.60	0.19	0.10	0.66	0.80	0.08	0.51	0.78	0.12
Uniform Delay, d1	38.2	45.6		45.2	43.5	43.1	43.6	20.1	12.1	46.9	22.9	15.3
Progression Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	3.1	3.4		3.6	1.0	0.6	8.0	2.0	0.1	2.7	1.9	0.1
Delay (s)	41.3	49.1		48.8	44.5	43.7	51.6	22.1	12.2	49.7	24.9	15.4
Level of Service	D	D		D	D	D	D	C	B	D	C	B
Approach Delay (s)		45.9			46.4			23.5			25.8	
Approach LOS		D			D			C			C	
<b>Intersection Summary</b>												
HCM Average Control Delay			27.7			HCM Level of Service			C			
HCM Volume to Capacity ratio			0.67									
Actuated Cycle Length (s)			105.3			Sum of lost time (s)			12.0			
Intersection Capacity Utilization			69.3%			ICU Level of Service			C			
Analysis Period (min)			15									
c Critical Lane Group												

# HCM Signalized Intersection Capacity Analysis

## 20: Duvall Drive & US 276

2035 AM  
7/6/2011



























Movement	EBL	EBR	SET	SER	NWL	NWT
Lane Configurations						
Volume (vph)	459	129	1592	305	138	1661
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.0	6.0	6.3		6.3	6.3
Lane Util. Factor	1.00	1.00	0.91		1.00	0.91
Frt	1.00	0.85	0.98		1.00	1.00
Flt Protected	0.95	1.00	1.00		0.95	1.00
Satd. Flow (prot)	1719	1538	4821		1719	4940
Flt Permitted	0.95	1.00	1.00		0.10	1.00
Satd. Flow (perm)	1719	1538	4821		182	4940
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	510	143	1769	339	153	1846
RTOR Reduction (vph)	0	17	43	0	0	0
Lane Group Flow (vph)	510	126	2065	0	153	1846
Turn Type	Perm			Perm		
Protected Phases	8		2			6
Permitted Phases		8			6	
Actuated Green, G (s)	13.0	13.0	39.7		39.7	39.7
Effective Green, g (s)	13.0	13.0	39.7		39.7	39.7
Actuated g/C Ratio	0.20	0.20	0.61		0.61	0.61
Clearance Time (s)	6.0	6.0	6.3		6.3	6.3
Vehicle Extension (s)	4.9	4.9	4.9		4.9	4.9
Lane Grp Cap (vph)	344	308	2945		111	3017
v/s Ratio Prot	c0.30		0.43			0.37
v/s Ratio Perm		0.08			c0.84	
v/c Ratio	1.48	0.41	0.70		1.38	0.61
Uniform Delay, d1	26.0	22.7	8.6		12.6	7.9
Progression Factor	1.00	1.00	1.00		1.00	1.00
Incremental Delay, d2	232.2	1.8	1.0		216.7	0.5
Delay (s)	258.2	24.4	9.6		229.3	8.4
Level of Service	F	C	A		F	A
Approach Delay (s)	207.0		9.6			25.3
Approach LOS	F		A			C
<b>Intersection Summary</b>						
HCM Average Control Delay			43.3		HCM Level of Service	D
HCM Volume to Capacity ratio			1.40			
Actuated Cycle Length (s)			65.0		Sum of lost time (s)	12.3
Intersection Capacity Utilization			91.8%		ICU Level of Service	F
Analysis Period (min)			15			
c Critical Lane Group						

# HCM Signalized Intersection Capacity Analysis

## 23: US 276 & Millennium Blvd

2035 AM

7/6/2011





















												
Movement	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Volume (vph)	137	1603	283	33	2233	77	96	101	83	6	20	52
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	6.5	6.5	4.5	6.5	6.5	6.0	6.0		6.0	6.0	4.0
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	0.97	0.95		1.00	1.00	0.88
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.93		1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	1719	3438	1538	1719	3438	1538	3335	3206		1719	1810	2707
Flt Permitted	0.04	1.00	1.00	0.08	1.00	1.00	0.95	1.00		0.62	1.00	1.00
Satd. Flow (perm)	75	3438	1538	136	3438	1538	3335	3206		1129	1810	2707
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)	152	1781	314	37	2481	86	107	112	92	7	22	58
RTOR Reduction (vph)	0	0	100	0	0	23	0	81	0	0	0	16
Lane Group Flow (vph)	152	1781	214	37	2481	63	107	123	0	7	22	42
Turn Type	pm+pt		Perm	pm+pt		Perm	Prot			pm+pt		pm+ov
Protected Phases	5	2		1	6		3	8		7	4	5
Permitted Phases	2		2	6		6				4		4
Actuated Green, G (s)	104.1	96.1	96.1	98.2	93.4	93.4	8.0	16.2		9.4	8.8	16.8
Effective Green, g (s)	104.1	96.1	96.1	98.2	93.4	93.4	8.0	16.2		9.4	8.8	16.8
Actuated g/C Ratio	0.74	0.68	0.68	0.70	0.66	0.66	0.06	0.12		0.07	0.06	0.12
Clearance Time (s)	4.0	6.5	6.5	4.5	6.5	6.5	6.0	6.0		6.0	6.0	4.0
Vehicle Extension (s)	4.3	4.9	4.9	4.3	4.9	4.9	4.3	6.4		4.3	6.4	4.3
Lane Grp Cap (vph)	149	2348	1050	149	2282	1021	190	369		78	113	323
v/s Ratio Prot	c0.06	0.52		0.01	c0.72		c0.03	c0.04		0.00	0.01	0.01
v/s Ratio Perm	0.69		0.14	0.16		0.04				0.01		0.01
v/c Ratio	1.02	0.76	0.20	0.25	1.09	0.06	0.56	0.33		0.09	0.19	0.13
Uniform Delay, d1	51.6	14.7	8.2	13.1	23.6	8.3	64.6	57.3		61.5	62.6	55.4
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	79.1	1.7	0.2	1.4	47.4	0.1	5.1	1.7		0.8	2.6	0.3
Delay (s)	130.8	16.4	8.4	14.4	71.0	8.3	69.7	58.9		62.3	65.2	55.7
Level of Service	F	B	A	B	E	A	E	E		E	E	E
Approach Delay (s)		23.0			68.2			62.6			58.6	
Approach LOS		C			E			E			E	
<b>Intersection Summary</b>												
HCM Average Control Delay			48.3			HCM Level of Service				D		
HCM Volume to Capacity ratio			0.98									
Actuated Cycle Length (s)			140.7			Sum of lost time (s)				20.5		
Intersection Capacity Utilization			92.5%			ICU Level of Service				F		
Analysis Period (min)			15									
c Critical Lane Group												

# HCM Signalized Intersection Capacity Analysis

## 24: Pelham Road & The Parkway

2035 AM

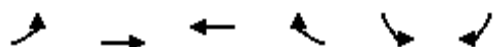
7/6/2011

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	275	1294	1254	0	2248	1068	0	0	0	379	695	199
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.8	5.8	5.8		5.8	5.3				5.3	5.3	5.3
Lane Util. Factor	0.97	0.95	1.00		0.95	1.00				1.00	1.00	1.00
Frt	1.00	1.00	0.85		1.00	0.85				1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00		1.00	1.00				0.95	1.00	1.00
Satd. Flow (prot)	3335	3438	1538		3438	1538				1719	1810	1538
Flt Permitted	0.95	1.00	1.00		1.00	1.00				0.95	1.00	1.00
Satd. Flow (perm)	3335	3438	1538		3438	1538				1719	1810	1538
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)	306	1438	1393	0	2498	1187	0	0	0	421	772	221
RTOR Reduction (vph)	0	0	9	0	0	1	0	0	0	0	0	100
Lane Group Flow (vph)	306	1438	1384	0	2498	1186	0	0	0	421	772	121
Turn Type	Prot		Perm	Perm		custom				Perm		Perm
Protected Phases	5	2			6	4					4	
Permitted Phases			2	6		6				4		4
Actuated Green, G (s)	9.2	79.2	79.2		64.2	98.9				34.7	34.7	34.7
Effective Green, g (s)	9.2	79.2	79.2		64.2	98.9				34.7	34.7	34.7
Actuated g/C Ratio	0.07	0.63	0.63		0.51	0.79				0.28	0.28	0.28
Clearance Time (s)	5.8	5.8	5.8		5.8	5.3				5.3	5.3	5.3
Vehicle Extension (s)	4.3	4.3	4.3		4.3	4.3				4.3	4.3	4.3
Lane Grp Cap (vph)	245	2178	974		1766	1217				477	502	427
v/s Ratio Prot	0.09	0.42			0.73	0.27					c0.43	
v/s Ratio Perm			c0.90			0.50				0.24		0.08
v/c Ratio	1.25	0.66	1.42		1.41	0.97				0.88	1.54	0.28
Uniform Delay, d1	57.9	14.4	22.9		30.4	11.9				43.2	45.1	35.4
Progression Factor	1.00	1.00	1.00		0.94	1.07				1.00	1.00	1.00
Incremental Delay, d2	141.3	1.6	195.4		186.8	3.7				17.9	251.9	0.6
Delay (s)	199.2	16.0	218.3		215.4	16.5				61.1	297.0	36.0
Level of Service	F	B	F		F	B				E	F	D
Approach Delay (s)		123.7			151.3			0.0			186.0	
Approach LOS		F			F			A			F	
<b>Intersection Summary</b>												
HCM Average Control Delay			146.8				HCM Level of Service			F		
HCM Volume to Capacity ratio			1.46									
Actuated Cycle Length (s)			125.0				Sum of lost time (s)			11.1		
Intersection Capacity Utilization			190.4%				ICU Level of Service			H		
Analysis Period (min)			15									
c Critical Lane Group												

# HCM Signalized Intersection Capacity Analysis

## 25: Pelham Road & I-85 SB off ramp

2035 AM  
7/6/2011









Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↑↑	↑↑		↑	↑↑
Volume (vph)	0	1673	1531	0	998	1785
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)		5.6	5.6		5.3	5.3
Lane Util. Factor		0.95	0.95		1.00	0.88
Frt		1.00	1.00		1.00	0.85
Flt Protected		1.00	1.00		0.95	1.00
Satd. Flow (prot)		3438	3438		1719	2707
Flt Permitted		1.00	1.00		0.95	1.00
Satd. Flow (perm)		3438	3438		1719	2707
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	0	1859	1701	0	1109	1983
RTOR Reduction (vph)	0	0	0	0	0	3
Lane Group Flow (vph)	0	1859	1701	0	1109	1980
Turn Type					Perm	
Protected Phases		2	6		4	
Permitted Phases						4
Actuated Green, G (s)		51.4	51.4		62.7	62.7
Effective Green, g (s)		51.4	51.4		62.7	62.7
Actuated g/C Ratio		0.41	0.41		0.50	0.50
Clearance Time (s)		5.6	5.6		5.3	5.3
Vehicle Extension (s)		4.3	4.3		4.3	4.3
Lane Grp Cap (vph)		1414	1414		862	1358
v/s Ratio Prot		c0.54	0.49		0.65	
v/s Ratio Perm						c0.73
v/c Ratio		1.31	1.20		1.29	1.46
Uniform Delay, d1		36.8	36.8		31.1	31.1
Progression Factor		0.96	0.88		1.00	1.00
Incremental Delay, d2		145.2	96.3		137.7	210.3
Delay (s)		180.4	128.7		168.9	241.4
Level of Service		F	F		F	F
Approach Delay (s)		180.4	128.7		215.4	
Approach LOS		F	F		F	
Intersection Summary						
HCM Average Control Delay			183.4	HCM Level of Service		F
HCM Volume to Capacity ratio			1.39			
Actuated Cycle Length (s)			125.0	Sum of lost time (s)		10.9
Intersection Capacity Utilization			163.4%	ICU Level of Service		H
Analysis Period (min)			15			
c Critical Lane Group						

# HCM Signalized Intersection Capacity Analysis

## 26: Pelham Road & I-85 NB off ramp

2035 AM  
7/6/2011

						
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑			↑↑	↔	↔
Volume (vph)	1540	0	0	782	1192	1268
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.8			5.8	5.0	5.0
Lane Util. Factor	0.95			0.95	0.97	1.00
Frt	1.00			1.00	1.00	0.85
Flt Protected	1.00			1.00	0.95	1.00
Satd. Flow (prot)	3438			3438	3335	1538
Flt Permitted	1.00			1.00	0.95	1.00
Satd. Flow (perm)	3438			3438	3335	1538
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	1711	0	0	869	1324	1409
RTOR Reduction (vph)	0	0	0	0	0	0
Lane Group Flow (vph)	1711	0	0	869	1324	1409
Turn Type					Perm	
Protected Phases	2			6	8	
Permitted Phases						8
Actuated Green, G (s)	44.2			44.2	70.0	70.0
Effective Green, g (s)	44.2			44.2	70.0	70.0
Actuated g/C Ratio	0.35			0.35	0.56	0.56
Clearance Time (s)	5.8			5.8	5.0	5.0
Vehicle Extension (s)	4.3			4.3	4.3	4.3
Lane Grp Cap (vph)	1216			1216	1868	861
v/s Ratio Prot	c0.50			0.25	0.40	
v/s Ratio Perm						c0.92
v/c Ratio	1.41			0.71	0.71	1.64
Uniform Delay, d1	40.4			34.9	20.1	27.5
Progression Factor	0.69			1.19	1.00	1.00
Incremental Delay, d2	183.6			1.8	1.4	291.5
Delay (s)	211.5			43.4	21.5	319.0
Level of Service	F			D	C	F
Approach Delay (s)	211.5			43.4	174.8	
Approach LOS	F			D	F	
<b>Intersection Summary</b>						
HCM Average Control Delay		165.1		HCM Level of Service		F
HCM Volume to Capacity ratio		1.55				
Actuated Cycle Length (s)		125.0		Sum of lost time (s)		10.8
Intersection Capacity Utilization		182.5%		ICU Level of Service		H
Analysis Period (min)		15				
c Critical Lane Group						






















# HCM Signalized Intersection Capacity Analysis

## 27: Pelham Road & Boland Court

2035 AM

7/6/2011






















												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	45	1933	830	157	1185	10	438	2	164	35	3	16
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.7	6.7		6.7	6.7			6.3	6.3		6.3	
Lane Util. Factor	1.00	0.95		1.00	0.95			1.00	1.00		1.00	
Frt	1.00	0.95		1.00	1.00			1.00	0.85		0.96	
Flt Protected	0.95	1.00		0.95	1.00			0.95	1.00		0.97	
Satd. Flow (prot)	1719	3283		1719	3434			1724	1538		1682	
Flt Permitted	0.20	1.00		0.06	1.00			0.72	1.00		0.15	
Satd. Flow (perm)	353	3283		100	3434			1305	1538		259	
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)	50	2148	922	174	1317	11	487	2	182	39	3	18
RTOR Reduction (vph)	0	38	0	0	0	0	0	0	88	0	12	0
Lane Group Flow (vph)	50	3032	0	174	1328	0	0	489	94	0	48	0
Turn Type	Perm			pm+pt			Perm			Perm	Perm	
Protected Phases	2			1		6	8			8		4
Permitted Phases	2			6			8			8	4	
Actuated Green, G (s)	65.4	65.4		82.3	82.3			29.7	29.7		29.7	
Effective Green, g (s)	65.4	65.4		82.3	82.3			29.7	29.7		29.7	
Actuated g/C Ratio	0.52	0.52		0.66	0.66			0.24	0.24		0.24	
Clearance Time (s)	6.7	6.7		6.7	6.7			6.3	6.3		6.3	
Vehicle Extension (s)	4.9	4.9		4.3	4.9			4.3	4.3		4.3	
Lane Grp Cap (vph)	185	1718		198	2261			310	365		62	
v/s Ratio Prot	c0.92			c0.07		0.39	c0.37		0.06	0.18		
v/s Ratio Perm	0.14			0.51			1.58		0.26	0.77		
v/c Ratio	0.27	1.76		0.88	0.59			1.58	0.26		0.77	
Uniform Delay, d1	16.5	29.8		40.3	11.9			47.6	38.7		44.5	
Progression Factor	1.30	1.26		1.00	1.00			1.00	1.00		1.00	
Incremental Delay, d2	0.3	344.4		33.9	1.1			274.8	0.6		47.1	
Delay (s)	21.8	382.0		74.1	13.0			322.5	39.3		91.6	
Level of Service	C	F		E	B			F	D		F	
Approach Delay (s)	376.2			20.1			245.7			91.6		
Approach LOS	F			C			F			F		
Intersection Summary												
HCM Average Control Delay			256.7		HCM Level of Service			F				
HCM Volume to Capacity ratio			1.63									
Actuated Cycle Length (s)			125.0		Sum of lost time (s)			19.7				
Intersection Capacity Utilization			136.1%		ICU Level of Service			H				
Analysis Period (min)			15									
c Critical Lane Group												

# HCM Signalized Intersection Capacity Analysis

## 28: Forsythia Dr & E Butler Road

2035 AM

7/6/2011


















												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	27	0	22	22	0	166	3	1372	16	58	1240	14
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		6.0	6.0		6.0		6.0	6.0		6.0	6.0	
Lane Util. Factor		1.00	1.00		1.00		1.00	0.95		1.00	0.95	
Frt		1.00	0.85		0.88		1.00	1.00		1.00	1.00	
Flt Protected		0.95	1.00		0.99		0.95	1.00		0.95	1.00	
Satd. Flow (prot)		1719	1538		1584		1719	3432		1719	3432	
Flt Permitted		0.77	1.00		0.96		0.25	1.00		0.25	1.00	
Satd. Flow (perm)		1393	1538		1532		450	3432		450	3432	
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)	30	0	24	24	0	184	3	1524	18	64	1378	16
RTOR Reduction (vph)	0	0	4	0	2	0	0	2	0	0	2	0
Lane Group Flow (vph)	0	30	20	0	206	0	3	1540	0	64	1392	0
Turn Type	Perm		Perm	Perm			Perm			Perm		
Protected Phases		4			8			2			6	
Permitted Phases	4		4	8			2			6		
Actuated Green, G (s)		11.4	11.4		11.4		16.1	16.1		16.1	16.1	
Effective Green, g (s)		11.4	11.4		11.4		16.1	16.1		16.1	16.1	
Actuated g/C Ratio		0.29	0.29		0.29		0.41	0.41		0.41	0.41	
Clearance Time (s)		6.0	6.0		6.0		6.0	6.0		6.0	6.0	
Vehicle Extension (s)		4.3	4.3		4.3		4.3	4.3		4.3	4.3	
Lane Grp Cap (vph)		402	444		442		183	1399		183	1399	
v/s Ratio Prot								c0.45				0.41
v/s Ratio Perm		0.02	0.01		c0.13		0.01			0.14		
v/c Ratio		0.07	0.04		0.47		0.02	1.10		0.35	1.00	
Uniform Delay, d1		10.2	10.1		11.5		7.0	11.7		8.1	11.7	
Progression Factor		1.00	1.00		1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2		0.1	0.1		1.2		0.1	56.7		1.8	22.8	
Delay (s)		10.3	10.2		12.8		7.0	68.4		9.9	34.4	
Level of Service		B	B		B		A	E		A	C	
Approach Delay (s)		10.3			12.8			68.3			33.4	
Approach LOS		B			B			E			C	
<b>Intersection Summary</b>												
HCM Average Control Delay			48.2			HCM Level of Service				D		
HCM Volume to Capacity ratio			0.84									
Actuated Cycle Length (s)			39.5			Sum of lost time (s)			12.0			
Intersection Capacity Utilization			74.9%			ICU Level of Service				D		
Analysis Period (min)			15									
c Critical Lane Group												

# HCM Signalized Intersection Capacity Analysis

## 30: E Butler Road & I-385 SB Ramps

2035 AM

7/6/2011





















												
Movement	NBL	NBT	NBR	SBL	SBT	SBR	SEL	SET	SER	NWL	NWT	NWR
Lane Configurations												
Volume (vph)	0	1476	91	251	1003	0	783	0	344	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		6.0		6.0	6.0			6.0	6.0			
Lane Util. Factor		0.95		1.00	0.95			1.00	1.00			
Flt		0.99		1.00	1.00			1.00	0.85			
Flt Protected		1.00		0.95	1.00			0.95	1.00			
Satd. Flow (prot)		3408		1719	3438			1719	1538			
Flt Permitted		1.00		0.07	1.00			0.95	1.00			
Satd. Flow (perm)		3408		127	3438			1719	1538			
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	1640	101	279	1114	0	870	0	382	0	0	0
RTOR Reduction (vph)	0	4	0	0	0	0	0	0	39	0	0	0
Lane Group Flow (vph)	0	1737	0	279	1114	0	0	870	343	0	0	0
Turn Type				pm+pt			Perm		Perm			
Protected Phases				1	6			4				
Permitted Phases		2		6			4		4			
Actuated Green, G (s)		51.0		68.0	68.0			50.0	50.0			
Effective Green, g (s)		51.0		68.0	68.0			50.0	50.0			
Actuated g/C Ratio		0.39		0.52	0.52			0.38	0.38			
Clearance Time (s)		6.0		6.0	6.0			6.0	6.0			
Vehicle Extension (s)		4.3		4.3	4.3			4.3	4.3			
Lane Grp Cap (vph)		1337		201	1798			661	592			
v/s Ratio Prot				c0.12	0.32							
v/s Ratio Perm		0.51		c0.61				0.51	0.22			
v/c Ratio		1.30		1.39	0.62			1.32	0.58			
Uniform Delay, d1		39.5		40.2	21.9			40.0	31.7			
Progression Factor		1.00		1.00	1.00			1.00	1.00			
Incremental Delay, d2		140.4		202.3	0.8			152.8	1.8			
Delay (s)		179.9		242.5	22.7			192.8	33.5			
Level of Service		F		F	C			F	C			
Approach Delay (s)		179.9			66.7			144.2			0.0	
Approach LOS		F			E			F			A	
<b>Intersection Summary</b>												
HCM Average Control Delay			133.7			HCM Level of Service			F			
HCM Volume to Capacity ratio			1.32									
Actuated Cycle Length (s)			130.0			Sum of lost time (s)			12.0			
Intersection Capacity Utilization			116.0%			ICU Level of Service			H			
Analysis Period (min)			15									
c Critical Lane Group												

# HCM Signalized Intersection Capacity Analysis

## 31: E Butler Road & I-385 NB Ramps

2035 AM

7/6/2011
























												
Movement	NBL	NBT	NBR	SBL	SBT	SBR	SEL	SET	SER	NWL	NWT	NWR
Lane Configurations		 			 							
Volume (vph)	580	1679	0	0	1229	719	0	0	0	25	0	426
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.0	6.0			6.0	6.0				6.0		6.0
Lane Util. Factor	1.00	0.95			0.95	1.00				1.00		1.00
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)	1719	3438			3438	1538				1719		1538
Flt Permitted	0.08	1.00			1.00	1.00				0.95		1.00
Satd. Flow (perm)	142	3438			3438	1538				1719		1538
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)	644	1866	0	0	1366	799	0	0	0	28	0	473
RTOR Reduction (vph)	0	0	0	0	0	339	0	0	0	0	0	18
Lane Group Flow (vph)	644	1866	0	0	1366	460	0	0	0	28	0	455
Turn Type	pm+pt				custom				custom			custom
Protected Phases	5	2										8
Permitted Phases	2				6	6				8		
Actuated Green, G (s)	86.0	86.0			45.0	45.0				32.0		32.0
Effective Green, g (s)	86.0	86.0			45.0	45.0				32.0		32.0
Actuated g/C Ratio	0.66	0.66			0.35	0.35				0.25		0.25
Clearance Time (s)	6.0	6.0			6.0	6.0				6.0		6.0
Vehicle Extension (s)	4.3	4.3			4.3	4.3				4.3		4.3
Lane Grp Cap (vph)	519	2274			1190	532				423		379
v/s Ratio Prot	c0.33	0.54										c0.30
v/s Ratio Perm	c0.49				0.40	0.30				0.02		
v/c Ratio	1.24	0.82			1.15	0.87				0.07		1.20
Uniform Delay, d1	40.7	16.3			42.5	39.7				37.6		49.0
Progression Factor	1.00	1.00			1.00	1.00				1.00		1.00
Incremental Delay, d2	124.0	2.7			76.7	14.4				0.1		112.9
Delay (s)	164.7	19.0			119.2	54.1				37.7		161.9
Level of Service	F	B			F	D				D		F
Approach Delay (s)		56.4			95.2			0.0			154.9	
Approach LOS		E			F			A			F	
<b>Intersection Summary</b>												
HCM Average Control Delay			82.1				HCM Level of Service			F		
HCM Volume to Capacity ratio			1.20									
Actuated Cycle Length (s)			130.0				Sum of lost time (s)			12.0		
Intersection Capacity Utilization			116.0%				ICU Level of Service			H		
Analysis Period (min)			15									
c Critical Lane Group												

# HCM Signalized Intersection Capacity Analysis

## 34: Frontage Road & Roper Mountain Road

2035 AM

7/6/2011




















												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	4	99	151	111	23	18	848	1234	1042	99	1751	37
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.0	6.0		6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	
Lane Util. Factor	1.00	1.00		0.95	0.95	1.00	1.00	0.95	1.00	1.00	0.95	
Frt	1.00	0.91		1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	
Flt Protected	0.95	1.00		0.95	0.97	1.00	0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)	1719	1645		1633	1665	1538	1719	3438	1538	1719	3427	
Flt Permitted	0.95	1.00		0.95	0.97	1.00	0.09	1.00	1.00	0.20	1.00	
Satd. Flow (perm)	1719	1645		1633	1665	1538	157	3438	1538	358	3427	
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)	4	110	168	123	26	20	942	1371	1158	110	1946	41
RTOR Reduction (vph)	0	55	0	0	0	19	0	0	140	0	1	0
Lane Group Flow (vph)	4	223	0	74	75	1	942	1371	1018	110	1986	0
Turn Type	Split			Split		Perm	pm+pt		Perm	Perm		
Protected Phases	4	4		8	8		5	2			6	
Permitted Phases						8	2		2	6		
Actuated Green, G (s)	7.0	7.0		4.0	4.0	4.0	71.0	71.0	71.0	40.0	40.0	
Effective Green, g (s)	7.0	7.0		4.0	4.0	4.0	71.0	71.0	71.0	40.0	40.0	
Actuated g/C Ratio	0.07	0.07		0.04	0.04	0.04	0.71	0.71	0.71	0.40	0.40	
Clearance Time (s)	6.0	6.0		6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	
Vehicle Extension (s)	4.9	4.9		4.9	4.9	4.9	4.3	4.9	4.9	4.9	4.9	
Lane Grp Cap (vph)	120	115		65	67	62	502	2441	1092	143	1371	
v/s Ratio Prot	0.00	c0.14		c0.05	0.05		c0.47	0.40			0.58	
v/s Ratio Perm						0.00	c0.86		0.66	0.31		
v/c Ratio	0.03	1.94		1.14	1.12	0.01	1.88	0.56	0.93	0.77	1.45	
Uniform Delay, d1	43.3	46.5		48.0	48.0	46.1	31.2	7.0	12.4	26.0	30.0	
Progression Factor	1.00	1.00		1.00	1.00	1.00	0.99	0.99	1.26	1.00	1.00	
Incremental Delay, d2	0.2	453.3		154.3	146.3	0.2	395.1	0.1	1.9	32.1	205.9	
Delay (s)	43.6	499.8		202.3	194.3	46.3	426.0	7.0	17.6	58.1	235.9	
Level of Service	D	F		F	F	D	F	A	B	E	F	
Approach Delay (s)		493.3			180.3			124.3			226.6	
Approach LOS		F			F			F			F	
<b>Intersection Summary</b>												
HCM Average Control Delay			178.8			HCM Level of Service			F			
HCM Volume to Capacity ratio			1.77									
Actuated Cycle Length (s)			100.0			Sum of lost time (s)			18.0			
Intersection Capacity Utilization			134.7%			ICU Level of Service			H			
Analysis Period (min)			15									
c Critical Lane Group												

# HCM Signalized Intersection Capacity Analysis

## 35: I-385 NB Ramps & Roper Mountain Road

2035 AM

7/6/2011




















												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	0	0	0	1061	0	1506	265	1618	0	0	1551	462
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)				6.0	6.0	6.0	6.0	6.0			6.0	6.0
Lane Util. Factor				0.95	0.95	0.88	0.97	0.95			0.95	1.00
Frt				1.00	1.00	0.85	1.00	1.00			1.00	0.85
Flt Protected				0.95	0.95	1.00	0.95	1.00			1.00	1.00
Satd. Flow (prot)				1633	1633	2707	3335	3438			3438	1538
Flt Permitted				0.95	0.95	1.00	0.95	1.00			1.00	1.00
Satd. Flow (perm)				1633	1633	2707	3335	3438			3438	1538
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	0	0	1179	0	1673	294	1798	0	0	1723	513
RTOR Reduction (vph)	0	0	0	0	0	10	0	0	0	0	0	224
Lane Group Flow (vph)	0	0	0	589	590	1663	294	1798	0	0	1723	289
Turn Type				Perm		Perm	Prot					Perm
Protected Phases					8		5	2			6	
Permitted Phases				8		8						6
Actuated Green, G (s)				36.0	36.0	36.0	7.0	52.0			39.0	39.0
Effective Green, g (s)				36.0	36.0	36.0	7.0	52.0			39.0	39.0
Actuated g/C Ratio				0.36	0.36	0.36	0.07	0.52			0.39	0.39
Clearance Time (s)				6.0	6.0	6.0	6.0	6.0			6.0	6.0
Vehicle Extension (s)				4.9	4.9	4.9	4.3	4.9			4.9	4.9
Lane Grp Cap (vph)				588	588	975	233	1788			1341	600
v/s Ratio Prot							0.09	c0.52			c0.50	
v/s Ratio Perm				0.36	0.36	c0.61						0.19
v/c Ratio				1.00	1.00	1.71	1.26	1.01			1.28	0.48
Uniform Delay, d1				32.0	32.0	32.0	46.5	24.0			30.5	22.9
Progression Factor				1.00	1.00	1.00	1.45	0.59			0.67	0.64
Incremental Delay, d2				37.5	38.0	321.8	121.1	7.8			128.7	0.3
Delay (s)				69.5	70.0	353.8	188.5	21.9			149.0	14.9
Level of Service				E	E	F	F	C			F	B
Approach Delay (s)		0.0			236.4			45.3			118.2	
Approach LOS		A			F			D			F	
<b>Intersection Summary</b>												
HCM Average Control Delay			143.9			HCM Level of Service			F			
HCM Volume to Capacity ratio			1.49									
Actuated Cycle Length (s)			100.0			Sum of lost time (s)			18.0			
Intersection Capacity Utilization			146.5%			ICU Level of Service			H			
Analysis Period (min)			15									
c Critical Lane Group												

# HCM Signalized Intersection Capacity Analysis

## 36: Roper Mountain Road & I-385 SB Ramps

2035 AM

7/6/2011





















												
Movement	NBL	NBT	NBR	SBL	SBT	SBR	SEL	SET	SER	NWL	NWT	NWR
Lane Configurations												
Volume (vph)	0	1065	380	979	1633	0	818	0	458	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		6.4	6.4	5.8	6.4		6.1	6.1	6.1			
Lane Util. Factor		0.91	1.00	1.00	0.95		0.95	0.95	0.88			
Frt		1.00	0.85	1.00	1.00		1.00	1.00	0.85			
Flt Protected		1.00	1.00	0.95	1.00		0.95	0.95	1.00			
Satd. Flow (prot)		4940	1538	1719	3438		1633	1633	2707			
Flt Permitted		1.00	1.00	0.14	1.00		0.95	0.95	1.00			
Satd. Flow (perm)		4940	1538	245	3438		1633	1633	2707			
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	1183	422	1088	1814	0	909	0	509	0	0	0
RTOR Reduction (vph)	0	0	279	0	0	0	0	0	47	0	0	0
Lane Group Flow (vph)	0	1183	143	1088	1814	0	454	455	462	0	0	0
Turn Type		Perm		pm+pt			Perm		Perm			
Protected Phases		2		1	6			4				
Permitted Phases			2	6			4		4			
Actuated Green, G (s)		31.6	31.6	70.2	69.6		17.9	17.9	17.9			
Effective Green, g (s)		31.6	31.6	70.2	69.6		17.9	17.9	17.9			
Actuated g/C Ratio		0.32	0.32	0.70	0.70		0.18	0.18	0.18			
Clearance Time (s)		6.4	6.4	5.8	6.4		6.1	6.1	6.1			
Vehicle Extension (s)		4.9	4.9	4.3	4.9		4.9	4.9	4.9			
Lane Grp Cap (vph)		1561	486	647	2393		292	292	485			
v/s Ratio Prot		0.24		c0.54	0.53							
v/s Ratio Perm			0.09	c0.64			0.28	0.28	0.17			
v/c Ratio		0.76	0.29	1.68	0.76		1.55	1.56	0.95			
Uniform Delay, d1		30.8	25.8	24.0	9.8		41.0	41.0	40.6			
Progression Factor		0.38	0.50	0.77	0.48		1.00	1.00	1.00			
Incremental Delay, d2		2.9	1.3	307.3	0.2		265.9	267.4	29.7			
Delay (s)		14.7	14.2	325.8	4.9		306.9	308.4	70.3			
Level of Service		B	B	F	A		F	F	E			
Approach Delay (s)		14.6			125.2			222.5			0.0	
Approach LOS		B			F			F			A	
Intersection Summary												
HCM Average Control Delay		118.5		HCM Level of Service			F					
HCM Volume to Capacity ratio		1.62										
Actuated Cycle Length (s)		100.0		Sum of lost time (s)			11.9					
Intersection Capacity Utilization		146.5%		ICU Level of Service			H					
Analysis Period (min)		15										
c Critical Lane Group												

# HCM Signalized Intersection Capacity Analysis

## 37: Roper Mountain Road & Congaree Road

2035 AM

7/6/2011

												
Movement	NBL	NBT	NBR	SBL	SBT	SBR	SEL	SET	SER	NWL	NWT	NWR
Lane Configurations												
Volume (vph)	439	1127	2	6	1471	614	316	4	325	2	4	2
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.8	6.4			6.4	6.4	6.1	6.1			6.1	6.1
Lane Util. Factor	1.00	0.91			0.95	1.00	1.00	1.00			1.00	1.00
Frt	1.00	1.00			1.00	0.85	1.00	0.85			1.00	0.85
Flt Protected	0.95	1.00			1.00	1.00	0.95	1.00			0.98	1.00
Satd. Flow (prot)	1719	4939			3437	1538	1719	1541			1780	1538
Flt Permitted	0.07	1.00			0.95	1.00	0.75	1.00			0.72	1.00
Satd. Flow (perm)	136	4939			3257	1538	1364	1541			1303	1538
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)	488	1252	2	7	1634	682	351	4	361	2	4	2
RTOR Reduction (vph)	0	0	0	0	0	313	0	220	0	0	0	2
Lane Group Flow (vph)	488	1254	0	0	1641	369	351	145	0	0	6	0
Turn Type	pm+pt			Perm		Perm	Perm			Perm		Perm
Protected Phases	5	2			6			4			8	
Permitted Phases	2			6		6	4			8		8
Actuated Green, G (s)	68.6	68.6			47.6	47.6	18.9	18.9			18.9	18.9
Effective Green, g (s)	68.6	68.6			47.6	47.6	18.9	18.9			18.9	18.9
Actuated g/C Ratio	0.69	0.69			0.48	0.48	0.19	0.19			0.19	0.19
Clearance Time (s)	5.8	6.4			6.4	6.4	6.1	6.1			6.1	6.1
Vehicle Extension (s)	4.3	4.9			4.9	4.9	4.9	4.9			4.9	4.9
Lane Grp Cap (vph)	334	3388			1550	732	258	291			246	291
v/s Ratio Prot	c0.22	0.25						0.09				
v/s Ratio Perm	c0.78				0.50	0.24	c0.26				0.00	0.00
v/c Ratio	1.46	0.37			1.06	0.50	1.36	0.50			0.02	0.00
Uniform Delay, d1	33.3	6.6			26.2	18.1	40.5	36.3			33.0	32.9
Progression Factor	0.55	2.23			0.89	0.42	1.00	1.00			1.00	1.00
Incremental Delay, d2	215.1	0.1			35.3	1.4	185.3	2.7			0.1	0.0
Delay (s)	233.3	14.9			58.7	8.9	225.8	39.0			33.1	32.9
Level of Service	F	B			E	A	F	D			C	C
Approach Delay (s)		76.1			44.1			130.6			33.1	
Approach LOS		E			D			F			C	
<b>Intersection Summary</b>												
HCM Average Control Delay		68.6			HCM Level of Service			E				
HCM Volume to Capacity ratio		1.38										
Actuated Cycle Length (s)		100.0			Sum of lost time (s)			11.9				
Intersection Capacity Utilization		105.8%			ICU Level of Service			G				
Analysis Period (min)		15										
c Critical Lane Group												