
























# HCM Signalized Intersection Capacity Analysis

## 1: Woodruff Road & Roper Mountain Road

Existing PM

7/6/2011

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	241	271	40	106	569	333	30	397	93	382	397	55
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
Flt Protected	1.00	0.98		1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Permitted	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1719	3372		1719	3438	1538	1719	3438	1538	3335	3438	1538
Satd. Flow (perm)	334	3372		985	3438	1538	898	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)	268	301	44	118	632	370	33	441	103	424	441	61
RTOR Reduction (vph)	0	12	0	0	0	282	0	0	80	0	0	34
Lane Group Flow (vph)	268	333	0	118	632	88	33	441	23	424	441	27
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)	44.1	30.1		33.7	23.7	23.7	22.7	22.7	22.7	16.2	43.9	43.9
Effective Green, g (s)	44.1	30.1		33.7	23.7	23.7	22.7	22.7	22.7	16.2	43.9	43.9
Actuated g/C Ratio	0.44	0.30		0.34	0.24	0.24	0.23	0.23	0.23	0.16	0.44	0.44
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)	374	1015		405	815	365	204	780	349	540	1509	675
v/s Ratio Prot	c0.12	0.10		0.03	0.18			c0.13		c0.13	0.13	
v/s Ratio Perm	c0.20			0.07		0.06	0.04		0.02			0.02
v/c Ratio	0.72	0.33		0.29	0.78	0.24	0.16	0.57	0.07	0.79	0.29	0.04
Uniform Delay, d1	20.3	27.1		23.6	35.7	30.9	31.0	34.3	30.3	40.2	18.1	16.0
Progression Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	0.55	0.43	0.22
Incremental Delay, d2	7.1	0.5		0.6	5.6	0.8	1.7	3.0	0.4	7.2	0.4	0.1
Delay (s)	27.5	27.6		24.2	41.3	31.7	32.7	37.2	30.7	29.1	8.2	3.6
Level of Service	C	C		C	D	C	C	D	C	C	A	A
Approach Delay (s)		27.5			36.3			35.8			17.5	
Approach LOS		C			D			D			B	

### Intersection Summary























HCM Average Control Delay	29.2	HCM Level of Service	C
HCM Volume to Capacity ratio	0.66		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	15.0
Intersection Capacity Utilization	68.5%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

# HCM Signalized Intersection Capacity Analysis

## 2: Woodruff Road & Costco Driveway

Existing PM

7/6/2011

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Volume (vph)	11	652	72	160	953	34	79	3	170	31	2	25
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	0.99		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	3387		1719	3438	1538	1719	1542		1719	1810	1538
Flt Permitted	0.22	1.00		0.35	1.00	1.00	0.76	1.00		0.39	1.00	1.00
Satd. Flow (perm)	389	3387		630	3438	1538	1369	1542		700	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)	12	724	80	178	1059	38	88	3	189	34	2	28
RTOR Reduction (vph)	0	6	0	0	0	12	0	165	0	0	0	23
Lane Group Flow (vph)	12	798	0	178	1059	26	88	27	0	34	2	5
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)	91.7	91.7		80.4	80.4	80.4	15.3	15.3		15.3	15.3	20.1
Effective Green, g (s)	91.7	91.7		80.4	80.4	80.4	15.3	15.3		15.3	15.3	20.1
Actuated g/C Ratio	0.76	0.76		0.67	0.67	0.67	0.13	0.13		0.13	0.13	0.17
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)	350	2588		422	2303	1030	175	197		89	231	341
v/s Ratio Prot	0.00	c0.24			c0.31			0.02			0.00	0.00
v/s Ratio Perm	0.02			0.28		0.02	c0.06			0.05		0.00
v/c Ratio	0.03	0.31		0.42	0.46	0.03	0.50	0.14		0.38	0.01	0.01
Uniform Delay, d1	4.7	4.4		9.1	9.4	6.6	48.8	46.5		48.0	45.7	41.7
Progression Factor	1.00	1.00		0.63	0.58	0.19	1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	0.1	0.3		3.0	0.7	0.0	5.5	0.8		6.6	0.0	0.0
Delay (s)	4.8	4.7		8.7	6.1	1.3	54.3	47.3		54.6	45.8	41.7
Level of Service	A	A		A	A	A	D	D		D	D	D
Approach Delay (s)		4.7			6.3			49.5			48.7	
Approach LOS		A			A			D			D	

### Intersection Summary





















HCM Average Control Delay	11.9	HCM Level of Service	B
HCM Volume to Capacity ratio	0.47		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	19.5
Intersection Capacity Utilization	89.0%	ICU Level of Service	E
Analysis Period (min)	15		
c Critical Lane Group			

# HCM Signalized Intersection Capacity Analysis

## 3: Green Heron Road & Woodruff Road

Existing PM





















7/6/2011

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	SEL	SET	SER	NWL	NWT	NWR
Lane Configurations												
Volume (vph)	18	1	51	10	2	71	59	1152	9	2	798	2
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		0.90			1.00	0.85	1.00	1.00		1.00	1.00	0.85
Flt Protected		0.99			0.96	1.00	0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)		1610			1736	1538	1719	3434		1719	3438	1538
Flt Permitted		0.91			0.71	1.00	0.32	1.00		0.20	1.00	1.00
Satd. Flow (perm)		1481			1292	1538	575	3434		364	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)	20	1	57	11	2	79	66	1280	10	2	887	2
RTOR Reduction (vph)	0	53	0	0	0	73	0	0	0	0	0	0
Lane Group Flow (vph)	0	25	0	0	13	6	66	1290	0	2	887	2
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)		9.2			9.2	9.2	99.5	99.5		99.5	99.5	99.5
Effective Green, g (s)		9.2			9.2	9.2	99.5	99.5		99.5	99.5	99.5
Actuated g/C Ratio		0.08			0.08	0.08	0.83	0.83		0.83	0.83	0.83
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)		114			99	118	477	2847		302	2851	1275
v/s Ratio Prot								c0.38			0.26	
v/s Ratio Perm		c0.02			0.01	0.00	0.11			0.01		0.00
v/c Ratio		0.22			0.13	0.05	0.14	0.45		0.01	0.31	0.00
Uniform Delay, d1		52.0			51.7	51.4	2.0	2.8		1.8	2.4	1.8
Progression Factor		1.00			1.00	1.00	0.93	0.93		0.24	0.33	0.15
Incremental Delay, d2		1.6			1.0	0.3	0.6	0.5		0.0	0.3	0.0
Delay (s)		53.6			52.6	51.6	2.4	3.1		0.5	1.0	0.3
Level of Service		D			D	D	A	A		A	A	A
Approach Delay (s)		53.6			51.8			3.1			1.0	
Approach LOS		D			D			A			A	
<b>Intersection Summary</b>												
HCM Average Control Delay		5.8			HCM Level of Service			A				
HCM Volume to Capacity ratio		0.43										
Actuated Cycle Length (s)		120.0			Sum of lost time (s)			11.3				
Intersection Capacity Utilization		69.3%			ICU Level of Service			C				
Analysis Period (min)		15										
c Critical Lane Group												

# HCM Signalized Intersection Capacity Analysis

## 4: Woodruff Industrial Lane & Woodruff Road


















Existing PM  
7/6/2011

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	SEL	SET	SER	NWL	NWT	NWR
Lane Configurations												
Volume (vph)	124	28	233	170	25	24	45	1104	64	187	654	202
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	0.87		1.00	0.93		1.00	0.99		1.00	0.96	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1719	1567		1719	1676		1719	3410		1719	3317	
Flt Permitted	0.72	1.00		0.26	1.00		0.27	1.00		0.08	1.00	
Satd. Flow (perm)	1305	1567		473	1676		492	3410		152	3317	
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)	138	31	259	189	28	27	50	1227	71	208	727	224
RTOR Reduction (vph)	0	170	0	0	24	0	0	3	0	0	22	0
Lane Group Flow (vph)	138	120	0	189	31	0	50	1295	0	208	929	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)	20.3	11.3		28.3	15.3		62.6	57.4		77.7	66.5	
Effective Green, g (s)	20.3	11.3		28.3	15.3		62.6	57.4		77.7	66.5	
Actuated g/C Ratio	0.17	0.09		0.24	0.13		0.52	0.48		0.65	0.55	
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)	252	148		247	214		310	1631		285	1838	
v/s Ratio Prot	0.04	0.08		c0.08	0.02		0.01	c0.38		c0.09	0.28	
v/s Ratio Perm	0.05			c0.10			0.08			0.38		
v/c Ratio	0.55	0.81		0.77	0.15		0.16	0.79		0.73	0.51	
Uniform Delay, d1	45.0	53.3		40.0	46.5		14.3	26.3		27.3	16.6	
Progression Factor	1.00	1.00		1.00	1.00		0.83	0.89		0.83	0.72	
Incremental Delay, d2	3.4	28.7		14.4	0.5		0.4	3.7		9.6	1.0	
Delay (s)	48.4	82.0		54.3	47.1		12.3	27.1		32.2	12.9	
Level of Service	D	F		D	D		B	C		C	B	
Approach Delay (s)		71.2			52.7			26.6			16.4	
Approach LOS		E			D			C			B	
<b>Intersection Summary</b>												
HCM Average Control Delay			30.9			HCM Level of Service				C		
HCM Volume to Capacity ratio			0.80									
Actuated Cycle Length (s)			120.0			Sum of lost time (s)			24.0			
Intersection Capacity Utilization			88.2%			ICU Level of Service			E			
Analysis Period (min)			15									
c Critical Lane Group												

# HCM Signalized Intersection Capacity Analysis

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












Existing PM  
7/6/2011

											
Movement	WBL2	WBL	WBR	SEL	SET	SER	NWL	NWT	NWR	NEL	NER
Lane Configurations											
Volume (vph)	285	0	171	0	1270	237	565	872	0	0	0
Ideal Flow (vphpl)	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	0.07	1.00			
Satd. Flow (perm)	3335		2707		3438	1538	124	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
Adj. Flow (vph)	317	0	190	0	1411	263	628	969	0	0	0
RTOR Reduction (vph)	0	0	173	0	0	117	0	0	0	0	0
Lane Group Flow (vph)	317	0	17	0	1411	146	628	969	0	0	0
Turn Type	custom		custom		Perm		pm+pt				
Protected Phases					2		1		6		
Permitted Phases	4		4		2		6				
Actuated Green, G (s)	11.0		11.0		51.7		51.7		97.9		
Effective Green, g (s)	11.0		11.0		51.7		51.7		97.9		
Actuated g/C Ratio	0.09		0.09		0.43		0.43		0.82		
Clearance Time (s)	5.0		5.0		6.3		6.3		6.5		
Vehicle Extension (s)	4.3		4.3		4.3		4.3		4.3		
Lane Grp Cap (vph)	306		248		1481		663		626		
v/s Ratio Prot					0.41		c0.33		0.28		
v/s Ratio Perm	c0.10		0.01				0.10		c0.49		
v/c Ratio	1.04		0.07		0.95		0.22		1.00		
Uniform Delay, d1	54.5		49.8		33.0		21.5		35.7		
Progression Factor	1.00		1.00		0.58		0.18		1.04		
Incremental Delay, d2	61.1		0.2		9.9		0.5		34.1		
Delay (s)	115.6		50.0		29.0		4.3		71.1		
Level of Service	F		D		C		A		E		
Approach Delay (s)			91.0		25.1				32.5		
Approach LOS			F		C				C		
Intersection Summary											
HCM Average Control Delay			37.1		HCM Level of Service			D			
HCM Volume to Capacity ratio			0.98								
Actuated Cycle Length (s)			120.0		Sum of lost time (s)			11.5			
Intersection Capacity Utilization			88.2%		ICU Level of Service			E			
Analysis Period (min)			15								
c Critical Lane Group											

# HCM Signalized Intersection Capacity Analysis

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

Existing PM  
7/6/2011





















						
Movement	NBL	NBR	SET	SER	NWL	NWT
Lane Configurations						
Volume (vph)	437	522	709	846	0	1000
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)	486	580	788	940	0	1111
RTOR Reduction (vph)	0	184	0	537	0	0
Lane Group Flow (vph)	486	396	788	403	0	1111
Turn Type	Perm		Perm			
Protected Phases	3		2			2 4
Permitted Phases		3		2		
Actuated Green, G (s)	38.4	38.4	51.5	51.5		69.5
Effective Green, g (s)	38.4	38.4	51.5	51.5		62.5
Actuated g/C Ratio	0.32	0.32	0.43	0.43		0.52
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)	1067	492	1475	660		1791
v/s Ratio Prot	0.15		0.23			c0.32
v/s Ratio Perm		c0.26		0.26		
v/c Ratio	0.46	0.80	0.53	0.61		0.62
Uniform Delay, d1	32.5	37.4	25.4	26.5		20.4
Progression Factor	1.00	1.00	1.33	11.99		1.38
Incremental Delay, d2	0.5	10.0	0.4	1.2		0.8
Delay (s)	33.0	47.4	34.1	318.9		28.9
Level of Service	C	D	C	F		C
Approach Delay (s)	40.8		189.0			28.9
Approach LOS	D		F			C
Intersection Summary						
HCM Average Control Delay			103.0	HCM Level of Service		F
HCM Volume to Capacity ratio			0.69			
Actuated Cycle Length (s)			120.0	Sum of lost time (s)		18.6
Intersection Capacity Utilization			62.0%	ICU Level of Service		B
Analysis Period (min)			15			
c Critical Lane Group						

# HCM Signalized Intersection Capacity Analysis

## 7: Carolina Point Pkwy & Woodruff Road

Existing PM

7/6/2011

























												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	SEL	SET	SER	NWL	NWT	NWR
Lane Configurations												
Volume (vph)	75	103	62	0	0	0	0	1151	80	15	925	800
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	0.20	1.00	1.00
Satd. Flow (perm)	1719	1810	1538					3438	1538	361	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)	83	114	69	0	0	0	0	1279	89	17	1028	889
RTOR Reduction (vph)	0	0	63	0	0	0	0	0	18	0	0	42
Lane Group Flow (vph)	83	114	6	0	0	0	0	1279	71	17	1028	847
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	290	2762	1236
v/s Ratio Prot	0.05	c0.06						0.37			0.30	
v/s Ratio Perm			0.00						0.05	0.05		c0.55
v/c Ratio	0.53	0.69	0.04					0.46	0.06	0.06	0.37	0.69
Uniform Delay, d1	52.0	52.8	49.7					3.7	2.4	2.4	3.3	5.2
Progression Factor	1.00	1.00	1.00					0.35	0.18	0.34	0.21	0.58
Incremental Delay, d2	4.6	12.6	0.2					0.1	0.0	0.1	0.1	0.9
Delay (s)	56.6	65.4	49.9					1.5	0.5	0.9	0.8	3.9
Level of Service	E	E	D					A	A	A	A	A
Approach Delay (s)		58.7			0.0			1.4			2.2	
Approach LOS		E			A			A			A	
<b>Intersection Summary</b>												
HCM Average Control Delay			6.1									HCM Level of Service
HCM Volume to Capacity ratio			0.69									A
Actuated Cycle Length (s)			120.0									Sum of lost time (s)
Intersection Capacity Utilization			66.2%									13.5
Analysis Period (min)			15									ICU Level of Service
c Critical Lane Group												C

# HCM Signalized Intersection Capacity Analysis

## 8: Woodruff Road & Market Point Drive

Existing PM

7/6/2011

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	339	842	32	68	1407	146	103	26	67	211	26	230
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)	377	936	36	76	1563	162	114	29	74	234	29	256
RTOR Reduction (vph)	0	0	14	0	0	42	0	0	62	0	0	219
Lane Group Flow (vph)	377	936	23	76	1563	120	114	29	12	234	29	37
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)	15.0	64.8	75.0	12.0	61.8	73.3	10.2	7.9	19.9	11.5	9.2	9.2
Effective Green, g (s)	15.0	64.8	75.0	12.0	61.8	73.3	10.2	7.9	19.9	11.5	9.2	9.2
Actuated g/C Ratio	0.12	0.54	0.62	0.10	0.51	0.61	0.08	0.07	0.17	0.10	0.08	0.08
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)	417	1857	961	172	1771	939	146	119	255	320	264	118
v/s Ratio Prot	c0.11	0.27	0.00	0.04	c0.45	0.01	0.07	0.02	0.00	c0.07	0.01	
v/s Ratio Perm			0.01			0.07			0.00			c0.02
v/c Ratio	0.90	0.50	0.02	0.44	0.88	0.13	0.78	0.24	0.05	0.73	0.11	0.31
Uniform Delay, d1	51.8	17.4	8.6	50.8	25.9	9.9	53.8	53.2	42.1	52.7	51.6	52.4
Progression Factor	1.24	0.45	0.55	0.64	0.35	0.04	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	21.4	0.9	0.0	0.9	2.3	0.0	25.1	1.7	0.1	9.2	0.3	2.4
Delay (s)	85.5	8.8	4.7	33.5	11.4	0.4	78.9	54.9	42.2	61.9	51.9	54.8
Level of Service	F	A	A	C	B	A	E	D	D	E	D	D
Approach Delay (s)	30.1			11.3			63.2			57.9		
Approach LOS	C			B			E			E		

### Intersection Summary

HCM Average Control Delay	27.0	HCM Level of Service	C
HCM Volume to Capacity ratio	0.78		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	18.0
Intersection Capacity Utilization	76.3%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			
























# HCM Signalized Intersection Capacity Analysis

## 9: Woodruff Road & Garlington Road

Existing PM

7/6/2011


















												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	163	794	163	150	1220	147	238	134	106	301	248	163
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	0.97		1.00	0.98		1.00	0.93		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	3350		1719	3383		1719	1690		1719	1810	1538
Flt Permitted	0.08	1.00		0.14	1.00		0.38	1.00		0.17	1.00	1.00
Satd. Flow (perm)	142	3350		246	3383		687	1690		312	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)	181	882	181	167	1356	163	264	149	118	334	276	181
RTOR Reduction (vph)	0	14	0	0	8	0	0	24	0	0	0	143
Lane Group Flow (vph)	181	1049	0	167	1511	0	264	243	0	334	276	38
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)	60.8	51.1		62.2	51.8		31.0	18.0		42.0	23.8	23.8
Effective Green, g (s)	60.8	51.1		62.2	51.8		31.0	18.0		42.0	23.8	23.8
Actuated g/C Ratio	0.51	0.43		0.52	0.43		0.26	0.15		0.35	0.20	0.20
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)	199	1427		255	1460		289	254		330	359	305
v/s Ratio Prot	c0.07	0.31		0.06	c0.45		0.10	0.14		c0.16	0.15	
v/s Ratio Perm	0.39			0.28			0.14			c0.20		0.02
v/c Ratio	0.91	0.73		0.65	1.03		0.91	0.96		1.01	0.77	0.12
Uniform Delay, d1	32.7	28.8		19.6	34.1		40.6	50.6		34.1	45.5	39.5
Progression Factor	1.38	0.75		1.36	0.74		1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	36.1	2.9		5.3	30.2		32.0	44.7		52.6	10.4	0.3
Delay (s)	81.3	24.5		32.0	55.5		72.6	95.4		86.8	55.9	39.8
Level of Service	F	C		C	E		E	F		F	E	D
Approach Delay (s)		32.8			53.2			84.0			65.3	
Approach LOS		C			D			F			E	
<b>Intersection Summary</b>												
HCM Average Control Delay			53.3			HCM Level of Service				D		
HCM Volume to Capacity ratio			0.94									
Actuated Cycle Length (s)			120.0			Sum of lost time (s)				10.4		
Intersection Capacity Utilization			95.7%			ICU Level of Service				F		
Analysis Period (min)			15									
c Critical Lane Group												

# HCM Signalized Intersection Capacity Analysis

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

Existing PM

7/6/2011





















												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	0	810	391	164	1170	0	0	0	0	573	0	347
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		0.95		1.00	1.00					1.00		0.85
Flt Protected		1.00		0.95	1.00					0.95		1.00
Satd. Flow (prot)		3270		1719	3438					3335		1538
Flt Permitted		1.00		0.08	1.00					0.95		1.00
Satd. Flow (perm)		3270		141	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	900	434	182	1300	0	0	0	0	637	0	386
RTOR Reduction (vph)	0	46	0	0	0	0	0	0	0	0	0	48
Lane Group Flow (vph)	0	1288	0	182	1300	0	0	0	0	637	0	338
Turn Type				pm+pt						Prot		custom
Protected Phases		2		1	6					4		
Permitted Phases				6								4
Actuated Green, G (s)		57.7		76.5	76.5					31.2		31.2
Effective Green, g (s)		57.7		76.5	76.5					31.2		31.2
Actuated g/C Ratio		0.48		0.64	0.64					0.26		0.26
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)		1572		250	2192					867		400
v/s Ratio Prot		c0.39		0.07	c0.38					0.19		
v/s Ratio Perm				0.39								c0.22
v/c Ratio		0.82		0.73	0.59					0.73		0.84
Uniform Delay, d1		26.7		26.9	12.7					40.6		42.1
Progression Factor		0.77		1.01	0.27					1.03		1.03
Incremental Delay, d2		2.7		3.8	0.4					3.6		15.8
Delay (s)		23.3		31.0	3.8					45.3		59.2
Level of Service		C		C	A					D		E
Approach Delay (s)		23.3			7.1			0.0			50.5	
Approach LOS		C			A			A			D	
<b>Intersection Summary</b>												
HCM Average Control Delay			24.3			HCM Level of Service				C		
HCM Volume to Capacity ratio			0.82									
Actuated Cycle Length (s)			120.0			Sum of lost time (s)				18.9		
Intersection Capacity Utilization			100.1%			ICU Level of Service				G		
Analysis Period (min)			15									
c Critical Lane Group												

# HCM Signalized Intersection Capacity Analysis

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

Existing PM

7/6/2011





















												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		 			 							
Volume (vph)	431	952	0	0	855	571	479	0	227	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)	174	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)	479	1058	0	0	950	634	532	0	252	0	0	0
RTOR Reduction (vph)	0	0	0	0	0	418	0	0	70	0	0	0
Lane Group Flow (vph)	479	1058	0	0	950	216	532	0	182	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)	70.9	70.9			35.5	35.5	38.0		38.0			
Effective Green, g (s)	70.9	70.9			35.5	35.5	38.0		38.0			
Actuated g/C Ratio	0.59	0.59			0.30	0.30	0.32		0.32			
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)	480	2031			1017	455	544		487			
v/s Ratio Prot	c0.24	0.31			0.28		c0.31					
v/s Ratio Perm	c0.35					0.14			0.12			
v/c Ratio	1.00	0.52			0.93	0.47	0.98		0.37			
Uniform Delay, d1	36.7	14.5			41.1	34.6	40.6		31.8			
Progression Factor	1.06	0.93			0.76	0.71	1.00		1.00			
Incremental Delay, d2	31.7	0.6			12.0	2.4	32.8		0.8			
Delay (s)	70.5	14.1			43.2	26.8	73.4		32.6			
Level of Service	E	B			D	C	E		C			
Approach Delay (s)		31.6			36.6			60.2			0.0	
Approach LOS		C			D			E			A	
<b>Intersection Summary</b>												
HCM Average Control Delay			39.4			HCM Level of Service			D			
HCM Volume to Capacity ratio			0.96									
Actuated Cycle Length (s)			120.0			Sum of lost time (s)			11.1			
Intersection Capacity Utilization			100.1%			ICU Level of Service			G			
Analysis Period (min)			15									
c Critical Lane Group												

# HCM Signalized Intersection Capacity Analysis

## 12: Woodruff Road & Commercial Drive

Existing PM

7/6/2011



















												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	151	988	40	9	1139	49	187	17	9	84	11	100
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	0.95		1.00	0.86	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1719	3418		1719	3417		1719	1716		1719	1565	
Flt Permitted	0.09	1.00		0.25	1.00		0.38	1.00		0.74	1.00	
Satd. Flow (perm)	168	3418		450	3417		690	1716		1336	1565	
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)	168	1098	44	10	1266	54	208	19	10	93	12	111
RTOR Reduction (vph)	0	2	0	0	2	0	0	7	0	0	99	0
Lane Group Flow (vph)	168	1140	0	10	1318	0	208	22	0	93	24	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)	77.8	77.8		61.2	61.2		31.3	31.3		12.5	12.5	
Effective Green, g (s)	77.8	77.8		61.2	61.2		31.3	31.3		12.5	12.5	
Actuated g/C Ratio	0.65	0.65		0.51	0.51		0.26	0.26		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)	255	2216		230	1743		296	448		139	163	
v/s Ratio Prot	c0.06	0.33			c0.39		c0.08	0.01			0.02	
v/s Ratio Perm	0.36			0.02			c0.10			0.07		
v/c Ratio	0.66	0.51		0.04	0.76		0.70	0.05		0.67	0.14	
Uniform Delay, d1	18.4	11.1		14.7	23.4		37.6	33.2		51.8	48.9	
Progression Factor	2.45	0.28		0.66	0.72		1.00	1.00		1.00	1.00	
Incremental Delay, d2	6.2	0.7		0.3	2.7		8.2	0.1		13.3	0.6	
Delay (s)	51.3	3.8		10.1	19.6		45.8	33.3		65.0	49.5	
Level of Service	D	A		B	B		D	C		E	D	
Approach Delay (s)		9.9			19.5			44.2			56.2	
Approach LOS		A			B			D			E	
<b>Intersection Summary</b>												
HCM Average Control Delay			19.9			HCM Level of Service				B		
HCM Volume to Capacity ratio			0.72									
Actuated Cycle Length (s)			120.0			Sum of lost time (s)			16.1			
Intersection Capacity Utilization			72.6%			ICU Level of Service			C			
Analysis Period (min)			15									
c Critical Lane Group												

# HCM Signalized Intersection Capacity Analysis

## 13: Woodruff Road & Smith Hines Road

Existing PM

7/6/2011




















												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	9	1016	56	54	1037	1	151	1	119	4	1	9
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	0.99		1.00	1.00			0.94			0.91	
Flt Protected	0.95	1.00		0.95	1.00			0.97			0.99	
Satd. Flow (prot)	1719	3411		1719	3438			1656			1625	
Flt Permitted	0.20	1.00		0.19	1.00			0.82			0.93	
Satd. Flow (perm)	362	3411		343	3438			1393			1527	
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)	10	1129	62	60	1152	1	168	1	132	4	1	10
RTOR Reduction (vph)	0	2	0	0	0	0	0	28	0	0	8	0
Lane Group Flow (vph)	10	1189	0	60	1153	0	0	273	0	0	7	0
Turn Type	Perm			Perm			Perm			Perm		
Protected Phases	2			6			8			4		
Permitted Phases	2			6			8			4		
Actuated Green, G (s)	78.8	78.8		79.1	79.1			29.9			29.9	
Effective Green, g (s)	78.8	78.8		79.1	79.1			29.9			29.9	
Actuated g/C Ratio	0.66	0.66		0.66	0.66			0.25			0.25	
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)	238	2240		226	2266			347			380	
v/s Ratio Prot	c0.35			0.34								
v/s Ratio Perm	0.03			0.17				c0.20			0.00	
v/c Ratio	0.04	0.53		0.27	0.51			0.79			0.02	
Uniform Delay, d1	7.3	10.9		8.4	10.5			42.1			34.0	
Progression Factor	0.26	0.17		0.80	0.76			1.00			1.00	
Incremental Delay, d2	0.3	0.8		0.3	0.1			12.2			0.0	
Delay (s)	2.2	2.7		7.0	8.1			54.3			34.0	
Level of Service	A	A		A	A			D			C	
Approach Delay (s)	2.7			8.0				54.3			34.0	
Approach LOS	A			A				D			C	
Intersection Summary												
HCM Average Control Delay			10.9	HCM Level of Service			B					
HCM Volume to Capacity ratio			0.60									
Actuated Cycle Length (s)			120.0	Sum of lost time (s)			11.3					
Intersection Capacity Utilization			76.4%	ICU Level of Service			D					
Analysis Period (min)			15									
c Critical Lane Group												

# HCM Signalized Intersection Capacity Analysis

## 14: Woodruff Road & Walmart Driveway

Existing PM

7/6/2011























												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	20	1393	122	20	2079	38	333	6	5	35	1	33
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	0.99		1.00	1.00		1.00	0.93			0.94	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00			0.98	
Satd. Flow (prot)	1719	3396		1719	3429		1719	1684			1650	
Flt Permitted	0.05	1.00		0.10	1.00		0.72	1.00			0.87	
Satd. Flow (perm)	94	3396		173	3429		1302	1684			1464	
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	1548	136	22	2310	42	370	7	6	39	1	37
RTOR Reduction (vph)	0	5	0	0	1	0	0	5	0	0	28	0
Lane Group Flow (vph)	22	1679	0	22	2351	0	370	8	0	0	49	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)	79.7	79.7		70.4	70.4		29.0	29.0			29.0	
Effective Green, g (s)	79.7	79.7		70.4	70.4		29.0	29.0			29.0	
Actuated g/C Ratio	0.66	0.66		0.59	0.59		0.24	0.24			0.24	
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)	103	2256		101	2012		315	407			354	
v/s Ratio Prot	0.01	c0.49			c0.69			0.01				
v/s Ratio Perm	0.14			0.13			c0.28				0.03	
v/c Ratio	0.21	0.74		0.22	1.17		1.17	0.02			0.14	
Uniform Delay, d1	29.1	13.4		11.8	24.8		45.5	34.7			35.7	
Progression Factor	1.02	0.78		0.77	0.62		1.00	1.00			1.00	
Incremental Delay, d2	1.5	2.1		4.2	80.8		106.8	0.0			0.3	
Delay (s)	31.2	12.5		13.3	96.3		152.3	34.7			36.0	
Level of Service	C	B		B	F		F	C			D	
Approach Delay (s)		12.8			95.5			148.3			36.0	
Approach LOS		B			F			F			D	
<b>Intersection Summary</b>												
HCM Average Control Delay			67.9			HCM Level of Service			E			
HCM Volume to Capacity ratio			1.19									
Actuated Cycle Length (s)			120.0			Sum of lost time (s)			17.6			
Intersection Capacity Utilization			93.2%			ICU Level of Service			F			
Analysis Period (min)			15									
c Critical Lane Group												

# HCM Signalized Intersection Capacity Analysis

## 15: Woodruff Road & Verdin Road

Existing PM




















7/6/2011

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	90	1699	38	56	1099	66	228	183	112	48	195	150
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	0.99		1.00	1.00	0.85	1.00	0.93	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)	1719	3427		1719	3409		1719	1810	1538	1719	1691	
Flt Permitted	0.13	1.00		0.06	1.00		0.14	1.00	1.00	0.63	1.00	
Satd. Flow (perm)	233	3427		109	3409		248	1810	1538	1141	1691	
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)	100	1888	42	62	1221	73	253	203	124	53	217	167
RTOR Reduction (vph)	0	1	0	0	4	0	0	0	6	0	23	0
Lane Group Flow (vph)	100	1929	0	62	1290	0	253	203	118	53	361	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)	66.3	66.3		66.3	66.3		42.4	42.4	42.4	23.8	23.8	
Effective Green, g (s)	66.3	66.3		66.3	66.3		42.4	42.4	42.4	23.8	23.8	
Actuated g/C Ratio	0.55	0.55		0.55	0.55		0.35	0.35	0.35	0.20	0.20	
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)	129	1893		60	1883		249	640	543	226	335	
v/s Ratio Prot		0.56			0.38		c0.11	0.11			0.21	
v/s Ratio Perm	0.43			c0.57			c0.25		0.08	0.05		
v/c Ratio	0.78	1.02		1.03	0.69		1.02	0.32	0.22	0.23	1.08	
Uniform Delay, d1	21.0	26.9		26.9	19.3		32.5	28.3	27.2	40.4	48.1	
Progression Factor	0.79	0.79		1.51	1.56		1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	30.5	23.7		99.2	1.2		61.2	0.5	0.3	0.8	71.2	
Delay (s)	47.1	44.8		139.9	31.3		93.7	28.7	27.5	41.3	119.3	
Level of Service	D	D		F	C		F	C	C	D	F	
Approach Delay (s)		44.9			36.3			56.8			109.8	
Approach LOS		D			D			E			F	
Intersection Summary												
HCM Average Control Delay	50.3			HCM Level of Service			D					
HCM Volume to Capacity ratio	1.00											
Actuated Cycle Length (s)	120.0			Sum of lost time (s)			11.5					
Intersection Capacity Utilization	120.6%			ICU Level of Service			H					
Analysis Period (min)	15											
c Critical Lane Group												

# HCM Signalized Intersection Capacity Analysis

## 16: Woodruff Road & Butler Road

Existing PM  
7/6/2011

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	18	1505	105	332	1054	16	166	17	410	278	347	90
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)		3403		1719	3430			1731	1538	1719	1754	
Flt Permitted		0.92		0.07	1.00			0.18	1.00	0.55	1.00	
Satd. Flow (perm)		3149		127	3430			324	1538	993	1754	
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)	20	1672	117	369	1171	18	184	19	456	309	386	100
RTOR Reduction (vph)	0	4	0	0	1	0	0	0	2	0	8	0
Lane Group Flow (vph)	0	1805	0	369	1188	0	0	203	454	309	478	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		68.7	68.7			40.0	51.7	40.0	40.0	
Effective Green, g (s)		50.7		68.7	68.7			40.0	51.7	40.0	40.0	
Actuated g/C Ratio		0.42		0.57	0.57			0.33	0.43	0.33	0.33	
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)		1330		228	1964			108	663	331	585	
v/s Ratio Prot				c0.16	0.35				0.07		0.27	
v/s Ratio Perm		0.57		c0.77				c0.63	0.23	0.31		
v/c Ratio		1.36		1.62	0.60			1.88	0.68	0.93	0.82	
Uniform Delay, d1		34.6		38.5	16.8			40.0	27.6	38.7	36.6	
Progression Factor		0.42		1.25	1.08			1.00	1.00	1.00	1.00	
Incremental Delay, d2		162.3		292.6	1.0			428.7	3.3	33.0	9.3	
Delay (s)		176.8		340.5	19.2			468.7	30.9	71.8	46.0	
Level of Service		F		F	B			F	C	E	D	
Approach Delay (s)		176.8			95.3			165.8			56.0	
Approach LOS		F			F			F			E	
<b>Intersection Summary</b>												
HCM Average Control Delay			129.0			HCM Level of Service				F		
HCM Volume to Capacity ratio			1.66									
Actuated Cycle Length (s)			120.0			Sum of lost time (s)			11.3			
Intersection Capacity Utilization			127.8%			ICU Level of Service			H			
Analysis Period (min)			15									
c Critical Lane Group												





















# HCM Signalized Intersection Capacity Analysis

## 17: Woodruff Road & Bell Road

Existing PM

7/6/2011
























												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	60	2149	98	33	1549	10	131	1	36	13	1	55
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	3416		1719	3435			1691			1599	
Flt Permitted	0.10	1.00		0.04	1.00			0.73			0.94	
Satd. Flow (perm)	180	3416		80	3435			1277			1520	
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)	67	2388	109	37	1721	11	146	1	40	14	1	61
RTOR Reduction (vph)	0	3	0	0	0	0	0	8	0	0	42	0
Lane Group Flow (vph)	67	2494	0	37	1732	0	0	179	0	0	34	0
Turn Type	Perm			Perm			Perm			Perm		
Protected Phases	2			6			8			4		
Permitted Phases	2			6			8			4		
Actuated Green, G (s)	90.0	90.0		90.0	90.0			18.4			18.4	
Effective Green, g (s)	90.0	90.0		90.0	90.0			18.4			18.4	
Actuated g/C Ratio	0.75	0.75		0.75	0.75			0.15			0.15	
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)	135	2562		60	2576			196			233	
v/s Ratio Prot	c0.73			0.50								
v/s Ratio Perm	0.37			0.46				c0.14			0.02	
v/c Ratio	0.50	0.97		0.62	0.67			0.91			0.14	
Uniform Delay, d1	6.0	13.9		7.0	7.6			50.0			44.0	
Progression Factor	0.67	0.61		1.13	1.05			1.00			1.00	
Incremental Delay, d2	1.2	2.0		36.8	1.3			41.0			0.5	
Delay (s)	5.2	10.5		44.6	9.2			91.0			44.4	
Level of Service	A	B		D	A			F			D	
Approach Delay (s)	10.3			10.0				91.0			44.4	
Approach LOS	B			A				F			D	
Intersection Summary												
HCM Average Control Delay			14.1	HCM Level of Service			B					
HCM Volume to Capacity ratio			0.96									
Actuated Cycle Length (s)			120.0	Sum of lost time (s)			11.6					
Intersection Capacity Utilization			88.4%	ICU Level of Service			E					
Analysis Period (min)			15									
c Critical Lane Group												

# HCM Signalized Intersection Capacity Analysis

## 18: Woodruff Road & SC 14

Existing PM

7/6/2011
























												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	140	1155	325	89	763	66	166	247	48	181	368	105
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
Frt	1.00	1.00	0.85	1.00	0.99		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	3397		1719	1810	1538	1719	1810	1538
Flt Permitted	0.18	1.00	1.00	0.08	1.00		0.14	1.00	1.00	0.36	1.00	1.00
Satd. Flow (perm)	319	3438	1538	146	3397		252	1810	1538	645	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)	156	1283	361	99	848	73	184	274	53	201	409	117
RTOR Reduction (vph)	0	0	66	0	5	0	0	0	38	0	0	55
Lane Group Flow (vph)	156	1283	295	99	916	0	184	274	15	201	409	62
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)	61.6	52.4	62.4	55.8	49.5		38.7	28.7	35.0	38.7	28.7	37.9
Effective Green, g (s)	61.6	52.4	62.4	55.8	49.5		38.7	28.7	35.0	38.7	28.7	37.9
Actuated g/C Ratio	0.51	0.44	0.52	0.46	0.41		0.32	0.24	0.29	0.32	0.24	0.32
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)	271	1501	800	150	1401		204	433	449	298	433	486
v/s Ratio Prot	c0.04	c0.37	0.03	0.03	0.27		c0.08	0.15	0.00	0.06	c0.23	0.01
v/s Ratio Perm	0.25		0.16	0.27			0.22		0.01	0.16		0.03
v/c Ratio	0.58	0.85	0.37	0.66	0.65		0.90	0.63	0.03	0.67	0.94	0.13
Uniform Delay, d1	18.6	30.4	17.1	23.7	28.4		33.2	40.9	30.4	32.5	44.9	29.3
Progression Factor	0.43	0.56	0.89	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	1.1	2.0	0.1	11.9	2.4		38.0	3.6	0.0	6.8	29.8	0.2
Delay (s)	9.2	18.9	15.4	35.6	30.7		71.3	44.5	30.5	39.3	74.7	29.4
Level of Service	A	B	B	D	C		E	D	C	D	E	C
Approach Delay (s)		17.4			31.2			52.7			57.6	
Approach LOS		B			C			D			E	
<b>Intersection Summary</b>												
HCM Average Control Delay			32.5			HCM Level of Service			C			
HCM Volume to Capacity ratio			0.89									
Actuated Cycle Length (s)			120.0			Sum of lost time (s)			22.6			
Intersection Capacity Utilization			84.3%			ICU Level of Service			E			
Analysis Period (min)			15									
c Critical Lane Group												

# HCM Signalized Intersection Capacity Analysis

## 19: E Parkins Mill Road & US 276

Existing PM

7/6/2011

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	99	110	61	93	66	76	142	1071	181	78	1334	214
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	3254		3335	1810	1538	1719	4940	1538	3335	4940	1538
Flt Permitted	0.60	1.00		0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	1079	3254		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)	110	122	68	103	73	84	158	1190	201	87	1482	238
RTOR Reduction (vph)	0	60	0	0	0	76	0	0	92	0	0	101
Lane Group Flow (vph)	110	130	0	103	73	8	158	1190	109	87	1482	137
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)	20.1	11.3		7.0	9.5	9.5	14.4	53.9	53.9	6.0	45.5	45.5
Effective Green, g (s)	20.1	11.3		7.0	9.5	9.5	14.4	53.9	53.9	6.0	45.5	45.5
Actuated g/C Ratio	0.20	0.11		0.07	0.10	0.10	0.15	0.54	0.54	0.06	0.46	0.46
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)	275	371		235	173	147	250	2684	836	202	2266	705
v/s Ratio Prot	c0.04	0.04		0.03	0.04		c0.09	0.24		0.03	c0.30	
v/s Ratio Perm	c0.05					0.01			0.07			0.09
v/c Ratio	0.40	0.35		0.44	0.42	0.05	0.63	0.44	0.13	0.43	0.65	0.19
Uniform Delay, d1	33.7	40.6		44.2	42.3	40.8	39.9	13.6	11.1	45.0	20.8	16.0
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	1.5	1.2		2.1	3.3	0.3	6.1	0.2	0.1	2.3	0.9	0.3
Delay (s)	35.2	41.7		46.3	45.6	41.1	46.0	13.9	11.3	47.3	21.7	16.2
Level of Service	D	D		D	D	D	D	B	B	D	C	B
Approach Delay (s)		39.3			44.4			16.8			22.2	
Approach LOS		D			D			B			C	
<b>Intersection Summary</b>												
HCM Average Control Delay			22.8				HCM Level of Service			C		
HCM Volume to Capacity ratio			0.58									
Actuated Cycle Length (s)			99.2				Sum of lost time (s)			19.0		
Intersection Capacity Utilization			60.8%				ICU Level of Service			B		
Analysis Period (min)			15									
c Critical Lane Group												

# HCM Signalized Intersection Capacity Analysis

## 20: Duvall Drive & US 276

Existing PM  
7/6/2011


























Movement	EBL	EBR	SET	SER	NWL	NWT
Lane Configurations						
Volume (vph)	361	139	1150	338	130	1033
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	0.97		1.00	1.00
Flt Protected	0.95	1.00	1.00		0.95	1.00
Satd. Flow (prot)	1719	1538	4772		1719	4940
Flt Permitted	0.95	1.00	1.00		0.12	1.00
Satd. Flow (perm)	1719	1538	4772		212	4940
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	401	154	1278	376	144	1148
RTOR Reduction (vph)	0	59	81	0	0	0
Lane Group Flow (vph)	401	95	1573	0	144	1148
Turn Type	Perm			Perm		
Protected Phases	8		2			6
Permitted Phases		8			6	
Actuated Green, G (s)	12.0	12.0	40.7		40.7	40.7
Effective Green, g (s)	12.0	12.0	40.7		40.7	40.7
Actuated g/C Ratio	0.18	0.18	0.63		0.63	0.63
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)	317	284	2988		133	3093
v/s Ratio Prot	c0.23		0.33			0.23
v/s Ratio Perm		0.06			c0.68	
v/c Ratio	1.26	0.34	0.53		1.08	0.37
Uniform Delay, d1	26.5	23.0	6.8		12.1	5.9
Progression Factor	1.00	1.00	1.00		1.00	1.00
Incremental Delay, d2	142.0	1.4	0.3		101.9	0.2
Delay (s)	168.5	24.4	7.1		114.1	6.1
Level of Service	F	C	A		F	A
Approach Delay (s)	128.5		7.1			18.1
Approach LOS	F		A			B
<b>Intersection Summary</b>						
HCM Average Control Delay			30.4		HCM Level of Service	C
HCM Volume to Capacity ratio			1.13			
Actuated Cycle Length (s)			65.0		Sum of lost time (s)	12.3
Intersection Capacity Utilization			78.6%		ICU Level of Service	D
Analysis Period (min)			15			
c Critical Lane Group						

# HCM Signalized Intersection Capacity Analysis

## 23: US 276 & Millennium Blvd

Existing PM

7/6/2011





















												
Movement	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Volume (vph)	85	1618	107	28	1184	9	80	48	62	57	19	46
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	0.92		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	3146		1719	1810	2707
Flt Permitted	0.15	1.00	1.00	0.07	1.00	1.00	0.95	1.00		0.67	1.00	1.00
Satd. Flow (perm)	266	3438	1538	134	3438	1538	3335	3146		1221	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)	94	1798	119	31	1316	10	89	53	69	63	21	51
RTOR Reduction (vph)	0	0	38	0	0	4	0	64	0	0	0	45
Lane Group Flow (vph)	94	1798	81	31	1316	6	89	58	0	63	21	6
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)	94.6	86.5	86.5	86.1	82.5	82.5	8.1	9.7		10.8	6.2	14.3
Effective Green, g (s)	94.6	86.5	86.5	86.1	82.5	82.5	8.1	9.7		10.8	6.2	14.3
Actuated g/C Ratio	0.74	0.68	0.68	0.68	0.65	0.65	0.06	0.08		0.08	0.05	0.11
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)	290	2334	1044	135	2226	996	212	240		121	88	304
v/s Ratio Prot	c0.02	c0.52		0.01	0.38		c0.03	c0.02		0.02	0.01	0.00
v/s Ratio Perm	0.22		0.05	0.15		0.00				c0.03		0.00
v/c Ratio	0.32	0.77	0.08	0.23	0.59	0.01	0.42	0.24		0.52	0.24	0.02
Uniform Delay, d1	7.9	13.8	6.9	12.3	12.8	7.9	57.4	55.4		55.4	58.3	50.3
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	1.0	1.9	0.1	1.4	0.6	0.0	2.1	1.6		5.9	4.3	0.0
Delay (s)	8.9	15.7	7.0	13.7	13.4	8.0	59.5	57.0		61.3	62.7	50.3
Level of Service	A	B	A	B	B	A	E	E		E	E	D
Approach Delay (s)		14.8			13.4			58.1			57.4	
Approach LOS		B			B			E			E	
<b>Intersection Summary</b>												
HCM Average Control Delay			18.3			HCM Level of Service				B		
HCM Volume to Capacity ratio			0.76									
Actuated Cycle Length (s)			127.4			Sum of lost time (s)				28.5		
Intersection Capacity Utilization			74.8%			ICU Level of Service				D		
Analysis Period (min)			15									
c Critical Lane Group												

# HCM Signalized Intersection Capacity Analysis

## 24: Pelham Road & The Parkway

Existing PM

7/6/2011

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	195	724	624	0	844	664	0	0	0	260	433	269
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)	217	804	693	0	938	738	0	0	0	289	481	299
RTOR Reduction (vph)	0	0	84	0	0	20	0	0	0	0	0	183
Lane Group Flow (vph)	217	804	609	0	938	718	0	0	0	289	481	116
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)	12.9	71.3	71.3		52.6	95.2				42.6	42.6	42.6
Effective Green, g (s)	12.9	71.3	71.3		52.6	95.2				42.6	42.6	42.6
Actuated g/C Ratio	0.10	0.57	0.57		0.42	0.76				0.34	0.34	0.34
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)	344	1961	877		1447	1171				586	617	524
v/s Ratio Prot	0.07	0.23			0.27	0.21					c0.27	
v/s Ratio Perm			c0.40			0.26				0.17		0.08
v/c Ratio	0.63	0.41	0.69		0.65	0.61				0.49	0.78	0.22
Uniform Delay, d1	53.8	15.1	19.1		28.8	6.7				32.6	37.0	29.4
Progression Factor	1.00	1.00	1.00		0.63	1.47				1.00	1.00	1.00
Incremental Delay, d2	4.5	0.6	4.5		1.8	1.0				1.0	6.8	0.3
Delay (s)	58.2	15.7	23.6		20.0	10.7				33.7	43.8	29.7
Level of Service	E	B	C		C	B				C	D	C
Approach Delay (s)		24.3			15.9			0.0			37.1	
Approach LOS		C			B			A			D	
<b>Intersection Summary</b>												
HCM Average Control Delay			24.2				HCM Level of Service			C		
HCM Volume to Capacity ratio			0.73									
Actuated Cycle Length (s)			125.0				Sum of lost time (s)			11.1		
Intersection Capacity Utilization			98.8%				ICU Level of Service			F		
Analysis Period (min)			15									
c Critical Lane Group												

# HCM Signalized Intersection Capacity Analysis

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

Existing PM  
7/6/2011









Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↑↑	↑↑		↑	↑↑
Volume (vph)	0	984	1233	0	387	275
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	1093	1370	0	430	306
RTOR Reduction (vph)	0	0	0	0	0	41
Lane Group Flow (vph)	0	1093	1370	0	430	265
Turn Type					Perm	
Protected Phases		2	6		4	
Permitted Phases						4
Actuated Green, G (s)		75.4	75.4		38.7	38.7
Effective Green, g (s)		75.4	75.4		38.7	38.7
Actuated g/C Ratio		0.60	0.60		0.31	0.31
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)		2074	2074		532	838
v/s Ratio Prot		0.32	c0.40		c0.25	
v/s Ratio Perm						0.10
v/c Ratio		0.53	0.66		0.81	0.32
Uniform Delay, d1		14.4	16.4		39.7	33.0
Progression Factor		0.90	1.04		1.00	1.00
Incremental Delay, d2		0.9	1.3		9.6	0.3
Delay (s)		13.8	18.4		49.3	33.4
Level of Service		B	B		D	C
Approach Delay (s)		13.8	18.4		42.7	
Approach LOS		B	B		D	
<b>Intersection Summary</b>						
HCM Average Control Delay			22.4		HCM Level of Service	C
HCM Volume to Capacity ratio			0.71			
Actuated Cycle Length (s)			125.0		Sum of lost time (s)	10.9
Intersection Capacity Utilization			95.2%		ICU Level of Service	F
Analysis Period (min)			15			
c Critical Lane Group						

# HCM Signalized Intersection Capacity Analysis

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

Existing PM  
7/6/2011




















						
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑			↑↑	↑↑	↑
Volume (vph)	493	0	0	572	1213	669
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)	548	0	0	636	1348	743
RTOR Reduction (vph)	0	0	0	0	0	34
Lane Group Flow (vph)	548	0	0	636	1348	709
Turn Type					Perm	
Protected Phases	2			6	8	
Permitted Phases						8
Actuated Green, G (s)	40.6			40.6	73.6	73.6
Effective Green, g (s)	40.6			40.6	73.6	73.6
Actuated g/C Ratio	0.32			0.32	0.59	0.59
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)	1117			1117	1964	906
v/s Ratio Prot	0.16			c0.18	0.40	
v/s Ratio Perm						c0.46
v/c Ratio	0.49			0.57	0.69	0.78
Uniform Delay, d1	33.9			35.0	17.7	19.6
Progression Factor	0.81			0.91	1.00	1.00
Incremental Delay, d2	1.3			1.8	1.2	4.9
Delay (s)	28.6			33.5	18.9	24.5
Level of Service	C			C	B	C
Approach Delay (s)	28.6			33.5	20.9	
Approach LOS	C			C	C	
<b>Intersection Summary</b>						
HCM Average Control Delay			24.6		HCM Level of Service	C
HCM Volume to Capacity ratio			0.71			
Actuated Cycle Length (s)			125.0		Sum of lost time (s)	10.8
Intersection Capacity Utilization			123.9%		ICU Level of Service	H
Analysis Period (min)			15			
c Critical Lane Group						



# HCM Signalized Intersection Capacity Analysis

## 27: Pelham Road & Boland Court






















Existing PM  
7/6/2011

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	51	776	335	295	1051	19	195	16	277	25	12	27
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		0.94	
Flt Protected	0.95	1.00		0.95	1.00			0.96	1.00		0.98	
Satd. Flow (prot)	1719	3283		1719	3429			1730	1538		1673	
Flt Permitted	0.24	1.00		0.09	1.00			0.72	1.00		0.70	
Satd. Flow (perm)	429	3283		169	3429			1311	1538		1196	
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)	57	862	372	328	1168	21	217	18	308	28	13	30
RTOR Reduction (vph)	0	37	0	0	1	0	0	0	244	0	21	0
Lane Group Flow (vph)	57	1197	0	328	1188	0	0	235	64	0	50	0
Turn Type	Perm			pm+pt			Perm			Perm		Perm
Protected Phases		2		1	6			8				4
Permitted Phases	2			6			8		8	4		
Actuated Green, G (s)	57.8	57.8		86.1	86.1			25.9	25.9		25.9	
Effective Green, g (s)	57.8	57.8		86.1	86.1			25.9	25.9		25.9	
Actuated g/C Ratio	0.46	0.46		0.69	0.69			0.21	0.21		0.21	
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)	198	1518		384	2362			272	319		248	
v/s Ratio Prot		0.36		c0.15	0.35							
v/s Ratio Perm	0.13			c0.44				c0.18	0.04		0.04	
v/c Ratio	0.29	0.79		0.85	0.50			0.86	0.20		0.20	
Uniform Delay, d1	20.8	28.4		33.5	9.3			47.8	41.0		41.0	
Progression Factor	0.70	0.67		1.00	1.00			1.00	1.00		1.00	
Incremental Delay, d2	2.8	3.3		17.5	0.8			24.6	0.5		0.6	
Delay (s)	17.3	22.4		51.0	10.0			72.5	41.5		41.6	
Level of Service	B	C		D	B			E	D		D	
Approach Delay (s)		22.1			18.9			54.9			41.6	
Approach LOS		C			B			D			D	
<b>Intersection Summary</b>												
HCM Average Control Delay			26.3			HCM Level of Service				C		
HCM Volume to Capacity ratio			0.83									
Actuated Cycle Length (s)			125.0			Sum of lost time (s)			13.0			
Intersection Capacity Utilization			83.2%			ICU Level of Service			E			
Analysis Period (min)			15									
c Critical Lane Group												

# HCM Signalized Intersection Capacity Analysis

## 28: Forsythia Dr & E Butler Road

Existing PM  
7/6/2011


















												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	11	0	4	31	0	89	6	606	15	71	891	15
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		0.90		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		1607		1719	3425		1719	3429	
Flt Permitted		0.88	1.00		0.91		0.25	1.00		0.32	1.00	
Satd. Flow (perm)		1598	1538		1479		449	3425		574	3429	
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)	12	0	4	34	0	99	7	673	17	79	990	17
RTOR Reduction (vph)	0	0	3	0	83	0	0	2	0	0	1	0
Lane Group Flow (vph)	0	12	1	0	50	0	7	688	0	79	1006	0
Turn Type	Perm		Perm	Perm			pm+pt			pm+pt		
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4		4	8			2			6		
Actuated Green, G (s)		7.5	7.5		7.5		19.0	18.3		24.2	20.9	
Effective Green, g (s)		7.5	7.5		7.5		19.0	18.3		24.2	20.9	
Actuated g/C Ratio		0.16	0.16		0.16		0.40	0.39		0.51	0.44	
Clearance Time (s)		6.0	6.0		6.0		6.0	6.0		6.0	6.0	
Vehicle Extension (s)		3.0	3.0		3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)		254	245		236		200	1331		375	1522	
v/s Ratio Prot							0.00	0.20		c0.01	c0.29	
v/s Ratio Perm		0.01	0.00		c0.03		0.01			0.09		
v/c Ratio		0.05	0.00		0.21		0.04	0.52		0.21	0.66	
Uniform Delay, d1		16.8	16.7		17.2		8.5	11.0		6.0	10.3	
Progression Factor		1.00	1.00		1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2		0.1	0.0		0.4		0.1	0.3		0.3	1.1	
Delay (s)		16.9	16.7		17.7		8.5	11.4		6.3	11.4	
Level of Service		B	B		B		A	B		A	B	
Approach Delay (s)		16.8			17.7			11.3			11.0	
Approach LOS		B			B			B			B	
<b>Intersection Summary</b>												
HCM Average Control Delay			11.6				HCM Level of Service				B	
HCM Volume to Capacity ratio			0.55									
Actuated Cycle Length (s)			47.1				Sum of lost time (s)			18.0		
Intersection Capacity Utilization			57.3%				ICU Level of Service			B		
Analysis Period (min)			15									
c Critical Lane Group												

# HCM Signalized Intersection Capacity Analysis

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

Existing PM

7/6/2011





















												
Movement	NBL	NBT	NBR	SBL	SBT	SBR	SEL	SET	SER	NWL	NWT	NWR
Lane Configurations												
Volume (vph)	0	657	67	349	596	0	370	0	377	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Grade (%)		0%			0%			2%			-2%	
Total Lost time (s)		5.6		5.6	5.6			5.7	5.7			
Lane Util. Factor		0.95		1.00	0.95			1.00	1.00			
Frt		0.99		1.00	1.00			1.00	0.85			
Flt Protected		1.00		0.95	1.00			0.95	1.00			
Satd. Flow (prot)		3391		1719	3438			1702	1523			
Flt Permitted		1.00		0.13	1.00			0.95	1.00			
Satd. Flow (perm)		3391		233	3438			1702	1523			
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	730	74	388	662	0	411	0	419	0	0	0
RTOR Reduction (vph)	0	7	0	0	0	0	0	0	175	0	0	0
Lane Group Flow (vph)	0	797	0	388	662	0	0	411	244	0	0	0
Turn Type				pm+pt			Perm		Perm			
Protected Phases		2		1	6			4				
Permitted Phases				6			4		4			
Actuated Green, G (s)		25.8		51.8	51.8			27.0	27.0			
Effective Green, g (s)		25.8		51.8	51.8			27.0	27.0			
Actuated g/C Ratio		0.29		0.57	0.57			0.30	0.30			
Clearance Time (s)		5.6		5.6	5.6			5.7	5.7			
Vehicle Extension (s)		2.5		2.5	2.0			2.8	2.8			
Lane Grp Cap (vph)		971		470	1977			510	456			
v/s Ratio Prot		0.24		c0.19	0.19							
v/s Ratio Perm				c0.29				0.24	0.16			
v/c Ratio		0.82		0.83	0.33			0.81	0.53			
Uniform Delay, d1		30.0		21.9	10.1			29.1	26.3			
Progression Factor		1.00		1.00	1.00			1.00	1.00			
Incremental Delay, d2		5.5		11.1	0.0			8.9	1.1			
Delay (s)		35.5		32.9	10.1			38.1	27.4			
Level of Service		D		C	B			D	C			
Approach Delay (s)		35.5			18.6			32.7			0.0	
Approach LOS		D			B			C			A	
<b>Intersection Summary</b>												
HCM Average Control Delay			28.0			HCM Level of Service			C			
HCM Volume to Capacity ratio			0.79									
Actuated Cycle Length (s)			90.1			Sum of lost time (s)			11.3			
Intersection Capacity Utilization			74.2%			ICU Level of Service			D			
Analysis Period (min)			15									
c Critical Lane Group												

# HCM Signalized Intersection Capacity Analysis

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

Existing PM

7/6/2011
























												
Movement	NBL	NBT	NBR	SBL	SBT	SBR	SEL	SET	SER	NWL	NWT	NWR
Lane Configurations		 			 							
Volume (vph)	241	786	0	0	907	680	0	0	0	38	0	198
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Grade (%)		0%			0%			-2%			2%	
Total Lost time (s)	5.3	5.3			5.3	5.3				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				1702		1523
Flt Permitted	0.17	1.00			1.00	1.00				0.95		1.00
Satd. Flow (perm)	305	3438			3438	1538				1702		1523
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)	268	873	0	0	1008	756	0	0	0	42	0	220
RTOR Reduction (vph)	0	0	0	0	0	358	0	0	0	0	0	194
Lane Group Flow (vph)	268	873	0	0	1008	398	0	0	0	42	0	26
Turn Type	pm+pt				Perm				custom			custom
Protected Phases	5	2			6							
Permitted Phases	2					6				8		8
Actuated Green, G (s)	55.5	55.5			35.8	35.8				9.1		9.1
Effective Green, g (s)	55.5	55.5			35.8	35.8				9.1		9.1
Actuated g/C Ratio	0.73	0.73			0.47	0.47				0.12		0.12
Clearance Time (s)	5.3	5.3			5.3	5.3				6.0		6.0
Vehicle Extension (s)	2.0	3.0			3.0	3.0				4.3		4.3
Lane Grp Cap (vph)	491	2514			1622	725				204		183
v/s Ratio Prot	c0.10	0.25			c0.29							
v/s Ratio Perm	0.30					0.26				c0.02		0.02
v/c Ratio	0.55	0.35			0.62	0.55				0.21		0.14
Uniform Delay, d1	7.1	3.7			15.0	14.3				30.1		29.9
Progression Factor	1.00	1.00			1.00	1.00				1.00		1.00
Incremental Delay, d2	0.7	0.1			0.7	0.9				0.8		0.6
Delay (s)	7.8	3.8			15.7	15.1				30.9		30.5
Level of Service	A	A			B	B				C		C
Approach Delay (s)		4.7			15.5			0.0			30.6	
Approach LOS		A			B			A			C	
<b>Intersection Summary</b>												
HCM Average Control Delay			12.8			HCM Level of Service				B		
HCM Volume to Capacity ratio			0.54									
Actuated Cycle Length (s)			75.9			Sum of lost time (s)				16.6		
Intersection Capacity Utilization			74.2%			ICU Level of Service				D		
Analysis Period (min)			15									
c Critical Lane Group												

# HCM Signalized Intersection Capacity Analysis

## 34: Frontage Road & Roper Mountain Road

Existing PM

7/6/2011




















												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	21	10	310	502	42	46	147	1038	160	11	805	21
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	0.85		1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	
Flt Protected	0.95	1.00		0.95	0.96	1.00	0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)	1719	1547		1633	1649	1538	1719	3438	1538	1719	3425	
Flt Permitted	0.95	1.00		0.95	0.96	1.00	0.11	1.00	1.00	0.18	1.00	
Satd. Flow (perm)	1719	1547		1633	1649	1538	193	3438	1538	327	3425	
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)	23	11	344	558	47	51	163	1153	178	12	894	23
RTOR Reduction (vph)	0	127	0	0	0	22	0	0	98	0	2	0
Lane Group Flow (vph)	23	228	0	301	304	29	163	1153	80	12	915	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)	16.2	16.2		20.7	20.7	20.7	45.1	45.1	45.1	31.6	31.6	
Effective Green, g (s)	16.2	16.2		20.7	20.7	20.7	45.1	45.1	45.1	31.6	31.6	
Actuated g/C Ratio	0.16	0.16		0.21	0.21	0.21	0.45	0.45	0.45	0.32	0.32	
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)	278	251		338	341	318	201	1551	694	103	1082	
v/s Ratio Prot	0.01	c0.15		0.18	c0.18		0.06	c0.34			0.27	
v/s Ratio Perm						0.02	c0.30		0.05	0.04		
v/c Ratio	0.08	0.91		0.89	0.89	0.09	0.81	0.74	0.12	0.12	0.85	
Uniform Delay, d1	35.6	41.2		38.5	38.6	32.0	21.0	22.7	15.9	24.3	31.9	
Progression Factor	1.00	1.00		1.00	1.00	1.00	0.78	0.90	1.01	1.00	1.00	
Incremental Delay, d2	0.3	35.2		25.3	25.3	0.3	20.7	2.9	0.3	2.3	8.2	
Delay (s)	35.8	76.4		63.9	63.8	32.3	37.1	23.4	16.3	26.6	40.1	
Level of Service	D	E		E	E	C	D	C	B	C	D	
Approach Delay (s)		73.9			61.4			24.0			39.9	
Approach LOS		E			E			C			D	
<b>Intersection Summary</b>												
HCM Average Control Delay			40.8			HCM Level of Service			D			
HCM Volume to Capacity ratio			0.84									
Actuated Cycle Length (s)			100.0			Sum of lost time (s)			18.0			
Intersection Capacity Utilization			104.2%			ICU Level of Service			G			
Analysis Period (min)			15									
c Critical Lane Group												

# HCM Signalized Intersection Capacity Analysis

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

Existing PM

7/6/2011













												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	0	0	0	361	0	398	282	947	0	0	1200	417
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	401	0	442	313	1052	0	0	1333	463
RTOR Reduction (vph)	0	0	0	0	0	213	0	0	0	0	0	224
Lane Group Flow (vph)	0	0	0	200	201	229	313	1052	0	0	1333	239
Turn Type				Perm		Perm	Prot					Perm
Protected Phases					8		5	2			6	
Permitted Phases				8		8						6
Actuated Green, G (s)				17.6	17.6	17.6	12.7	70.4			51.7	51.7
Effective Green, g (s)				17.6	17.6	17.6	12.7	70.4			51.7	51.7
Actuated g/C Ratio				0.18	0.18	0.18	0.13	0.70			0.52	0.52
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)				287	287	476	424	2420			1777	795
v/s Ratio Prot							c0.09	0.31			c0.39	
v/s Ratio Perm				0.12	0.12	0.08						0.16
v/c Ratio				0.70	0.70	0.48	0.74	0.43			0.75	0.30
Uniform Delay, d1				38.7	38.7	37.1	42.0	6.3			19.1	13.8
Progression Factor				1.00	1.00	1.00	0.81	1.28			0.64	1.32
Incremental Delay, d2				8.9	9.2	1.6	4.1	0.3			1.4	0.5
Delay (s)				47.6	47.9	38.6	38.1	8.4			13.5	18.7
Level of Service				D	D	D	D	A			B	B
Approach Delay (s)		0.0			43.0			15.2			14.9	
Approach LOS		A			D			B			B	
<b>Intersection Summary</b>												
HCM Average Control Delay			20.9			HCM Level of Service					C	
HCM Volume to Capacity ratio			0.74									
Actuated Cycle Length (s)			100.0			Sum of lost time (s)				18.0		
Intersection Capacity Utilization			97.2%			ICU Level of Service				F		
Analysis Period (min)			15									
c Critical Lane Group												

# HCM Signalized Intersection Capacity Analysis

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

Existing PM

7/6/2011

























												
Movement	NBL	NBT	NBR	SBL	SBT	SBR	SEL	SET	SER	NWL	NWT	NWR
Lane Configurations		↑↑↑	↑	↑	↑↑		↑	↑	↑↑			
Volume (vph)	0	856	562	960	601	0	373	0	280	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	0.21	1.00		0.95	0.95	1.00			
Satd. Flow (perm)		4940	1538	385	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	951	624	1067	668	0	414	0	311	0	0	0
RTOR Reduction (vph)	0	0	181	0	0	0	0	0	280	0	0	0
Lane Group Flow (vph)	0	951	443	1067	668	0	207	207	31	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	78.2	77.6		9.9	9.9	9.9			
Effective Green, g (s)		31.6	31.6	78.2	77.6		9.9	9.9	9.9			
Actuated g/C Ratio		0.32	0.32	0.78	0.78		0.10	0.10	0.10			
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	837	2668		162	162	268			
v/s Ratio Prot		0.19		c0.51	0.19							
v/s Ratio Perm			0.29	c0.48			c0.13	0.13	0.01			
v/c Ratio		0.61	0.91	1.27	0.25		1.28	1.28	0.11			
Uniform Delay, d1		29.0	32.8	18.2	3.1		45.0	45.0	41.1			
Progression Factor		0.50	0.39	0.67	0.92		1.00	1.00	1.00			
Incremental Delay, d2		1.4	19.4	130.0	0.2		164.0	164.0	0.4			
Delay (s)		15.7	32.2	142.2	3.0		209.0	209.0	41.4			
Level of Service		B	C	F	A		F	F	D			
Approach Delay (s)		22.3			88.6			137.1			0.0	
Approach LOS		C			F			F			A	
<b>Intersection Summary</b>												
HCM Average Control Delay			71.4			HCM Level of Service			E			
HCM Volume to Capacity ratio			1.25									
Actuated Cycle Length (s)			100.0			Sum of lost time (s)			11.9			
Intersection Capacity Utilization			97.2%			ICU Level of Service			F			
Analysis Period (min)			15									
c Critical Lane Group												

# HCM Signalized Intersection Capacity Analysis

## 37: Roper Mountain Road & Congaree Road

Existing PM

7/6/2011











												
Movement	NBL	NBT	NBR	SBL	SBT	SBR	SEL	SET	SER	NWL	NWT	NWR
Lane Configurations		  			 						 	
Volume (vph)	88	882	1	5	558	318	530	1	273	3	1	6
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			0.96	1.00
Satd. Flow (prot)	1719	4939			3436	1538	1719	1539			1744	1538
Flt Permitted	0.26	1.00			0.94	1.00	0.76	1.00			0.88	1.00
Satd. Flow (perm)	479	4939			3241	1538	1366	1539			1591	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)	98	980	1	6	620	353	589	1	303	3	1	7
RTOR Reduction (vph)	0	0	0	0	0	234	0	112	0	0	0	4
Lane Group Flow (vph)	98	981	0	0	626	119	589	192	0	0	4	3
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)	42.9	42.9			33.7	33.7	44.6	44.6			44.6	44.6
Effective Green, g (s)	42.9	42.9			33.7	33.7	44.6	44.6			44.6	44.6
Actuated g/C Ratio	0.43	0.43			0.34	0.34	0.45	0.45			0.45	0.45
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)	248	2119			1092	518	609	686			710	686
v/s Ratio Prot	0.01	c0.20						0.12				
v/s Ratio Perm	0.16				c0.19	0.08	c0.43				0.00	0.00
v/c Ratio	0.40	0.46			0.57	0.23	0.97	0.28			0.01	0.00
Uniform Delay, d1	18.6	20.3			27.2	23.8	27.0	17.5			15.4	15.4
Progression Factor	1.08	1.18			1.26	3.10	1.00	1.00			1.00	1.00
Incremental Delay, d2	1.3	0.6			2.1	1.0	28.5	0.5			0.0	0.0
Delay (s)	21.4	24.6			36.3	74.9	55.5	18.0			15.4	15.4
Level of Service	C	C			D	E	E	B			B	B
Approach Delay (s)		24.3			50.2			42.7			15.4	
Approach LOS		C			D			D			B	
<b>Intersection Summary</b>												
HCM Average Control Delay			38.4			HCM Level of Service				D		
HCM Volume to Capacity ratio			0.81									
Actuated Cycle Length (s)			100.0			Sum of lost time (s)			18.9			
Intersection Capacity Utilization			101.8%			ICU Level of Service			G			
Analysis Period (min)			15									
c Critical Lane Group												



# HCM Unsignalized Intersection Capacity Analysis

## 21: Frontage Rd & US 276










Existing PM  
7/6/2011

						
Movement	WBL	WBR	SEL	SET	NWT	NWR
Lane Configurations						
Volume (veh/h)	49	109	34	1891	1516	49
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	54	121	38	2101	1684	54
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage (veh)						
Upstream signal (ft)					1011	
pX, platoon unblocked	0.78	0.78	0.78			
vC, conflicting volume	2838	869	1739			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	2793	279	1389			
tC, single (s)	6.9	7.0	4.2			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	0	78	90			
cM capacity (veh/h)	10	556	371			
Direction, Lane #	WB 1	SE 1	SE 2	SE 3	NW 1	NW 2
Volume Total	176	38	1051	1051	1123	616
Volume Left	54	38	0	0	0	0
Volume Right	121	0	0	0	0	54
cSH	31	371	1700	1700	1700	1700
Volume to Capacity	5.70	0.10	0.62	0.62	0.66	0.36
Queue Length 95th (ft)	Err	8	0	0	0	0
Control Delay (s)	Err	15.8	0.0	0.0	0.0	0.0
Lane LOS	F	C				
Approach Delay (s)	Err	0.3			0.0	
Approach LOS	F					
Intersection Summary						
Average Delay		433.2				
Intersection Capacity Utilization		68.4%		ICU Level of Service		C
Analysis Period (min)		15				

# HCM Unsignalized Intersection Capacity Analysis

## 22: US 276 & St Josephs Dr

Existing PM  
7/6/2011

						
Movement	SET	SER	NWL	NWT	NEL	NER
Lane Configurations						
Volume (veh/h)	1565	375	80	1230	335	245
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	1739	417	89	1367	372	272
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage (veh)						
Upstream signal (ft)				863		
pX, platoon unblocked					0.77	
vC, conflicting volume			2156		2808	1078
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			2156		2751	1078
tC, single (s)			4.2		6.9	7.0
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			62		0	0
cM capacity (veh/h)			236		7	209
Direction, Lane #	SE 1	SE 2	NW 1	NW 2	NE 1	
Volume Total	1159	996	544	911	644	
Volume Left	0	0	89	0	372	
Volume Right	0	417	0	0	272	
cSH	1700	1700	236	1700	12	
Volume to Capacity	0.68	0.59	0.38	0.54	52.64	
Queue Length 95th (ft)	0	0	42	0	Err	
Control Delay (s)	0.0	0.0	17.4	0.0	Err	
Lane LOS			C		F	
Approach Delay (s)	0.0		6.5		Err	
Approach LOS					F	
Intersection Summary						
Average Delay			1516.4			
Intersection Capacity Utilization			134.4%	ICU Level of Service		H
Analysis Period (min)			15			

# HCM Unsignalized Intersection Capacity Analysis

## 29: Rothwell Dr & E Butler Road

Existing PM  
7/6/2011













Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (veh/h)	19	5	1	705	972	1
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	21	6	1	783	1080	1
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)		5				
Median type				TWLTL	TWLTL	
Median storage (veh)				2	2	
Upstream signal (ft)				1175	377	
pX, platoon unblocked	0.93	0.90	0.90			
vC, conflicting volume	1474	541	1081			
vC1, stage 1 conf vol	1081					
vC2, stage 2 conf vol	394					
vCu, unblocked vol	1063	273	872			
tC, single (s)	6.9	7.0	4.2			
tC, 2 stage (s)	5.9					
tF (s)	3.5	3.3	2.2			
p0 queue free %	93	99	100			
cM capacity (veh/h)	313	645	677			
Direction, Lane #	EB 1	NB 1	NB 2	NB 3	SB 1	SB 2
Volume Total	27	1	392	392	720	361
Volume Left	21	1	0	0	0	0
Volume Right	6	0	0	0	0	1
cSH	396	677	1700	1700	1700	1700
Volume to Capacity	0.07	0.00	0.23	0.23	0.42	0.21
Queue Length 95th (ft)	5	0	0	0	0	0
Control Delay (s)	15.9	10.3	0.0	0.0	0.0	0.0
Lane LOS	C	B				
Approach Delay (s)	15.9	0.0			0.0	
Approach LOS	C					
Intersection Summary						
Average Delay			0.2			
Intersection Capacity Utilization			36.9%		ICU Level of Service	A
Analysis Period (min)			15			

# HCM Unsignalized Intersection Capacity Analysis

## 32: New Commerce Ct & E Butler Road

Existing PM  
7/6/2011




















						
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Volume (veh/h)	51	58	980	4	51	1536
Sign Control	Stop		Free		Free	Free
Grade	0%		0%			0%
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	57	64	1089	4	57	1707
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			None		None	
Median storage (veh)						
Upstream signal (ft)			369			
pX, platoon unblocked	0.92	0.92			0.92	
vC, conflicting volume	2058	547			1093	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1974	328			924	
tC, single (s)	6.9	7.0			4.2	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	0	89			91	
cM capacity (veh/h)	44	605			658	
Direction, Lane #	WB 1	NB 1	NB 2	SB 1	SB 2	SB 3
Volume Total	121	726	367	57	853	853
Volume Left	57	0	0	57	0	0
Volume Right	64	0	4	0	0	0
cSH	87	1700	1700	658	1700	1700
Volume to Capacity	1.40	0.43	0.22	0.09	0.50	0.50
Queue Length 95th (ft)	230	0	0	7	0	0
Control Delay (s)	319.8	0.0	0.0	11.0	0.0	0.0
Lane LOS	F			B		
Approach Delay (s)	319.8	0.0		0.4		
Approach LOS	F					
<b>Intersection Summary</b>						
Average Delay			13.2			
Intersection Capacity Utilization			55.5%		ICU Level of Service	B
Analysis Period (min)			15			

# HCM Unsignalized Intersection Capacity Analysis

## 33: E Butler Road & Brookfield Pkwy

Existing PM

7/6/2011

																					
Movement	NBL	NBT	NBR	SBL	SBT	SBR	SEL	SET	SER	NWL	NWT	NWR									
Lane Configurations																					
Volume (veh/h)	15	1019	4	1	1400	9	2	0	171	16	0	4									
Sign Control	Free				Free				Stop												
Grade	0%				0%				0%												
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90									
Hourly flow rate (vph)	17	1132	4	1	1556	10	2	0	190	18	0	4									
Pedestrians																					
Lane Width (ft)																					
Walking Speed (ft/s)																					
Percent Blockage																					
Right turn flare (veh)																					
Median type	None				None																
Median storage veh																					
Upstream signal (ft)	939																				
pX, platoon unblocked				1.00			1.00		1.00		1.00										
vC, conflicting volume	1566			1137			2167		2733		783										
vC1, stage 1 conf vol																					
vC2, stage 2 conf vol																					
vCu, unblocked vol	1566			1131			2164		2732		783										
tC, single (s)	4.2			4.2			7.6		6.6		7.0										
tC, 2 stage (s)																					
tF (s)	2.2			2.2			3.5		4.0		3.3										
p0 queue free %	96			100			91		100		42										
cM capacity (veh/h)	404			595			24		18		330										
Direction, Lane #	NB 1	NB 2	NB 3	SB 1	SB 2	SE 1	SE 2	NW 1	NW 2												
Volume Total	17	755	382	779	788	2	190	18	4												
Volume Left	17	0	0	1	0	2	0	18	0												
Volume Right	0	0	4	0	10	0	190	0	4												
cSH	404	1700	1700	595	1700	24	330	11	462												
Volume to Capacity	0.04	0.44	0.22	0.00	0.46	0.09	0.58	1.62	0.01												
Queue Length 95th (ft)	3	0	0	0	0	7	85	76	1												
Control Delay (s)	14.3	0.0	0.0	0.1	0.0	167.5	29.7	981.0	12.9												
Lane LOS	B			A		F	D	F	B												
Approach Delay (s)	0.2			0.0			31.3		787.4												
Approach LOS							D		F												
<b>Intersection Summary</b>																					
Average Delay	8.1																				
Intersection Capacity Utilization	62.9%			ICU Level of Service					B												
Analysis Period (min)	15																				