
























HCM Signalized Intersection Capacity Analysis

1: Woodruff Road & Roper Mountain Road

2015 AM Woodruff Improvements

7/6/2011























												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	119	381	210	216	258	37	261	818	162	164	860	92
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	0.50	1.00		0.29	1.00	1.00	0.30	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	902	3255		517	3438	1538	542	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)	132	423	233	240	287	41	290	909	180	182	956	102
RTOR Reduction (vph)	0	75	0	0	0	35	0	0	92	0	0	41
Lane Group Flow (vph)	132	581	0	240	287	6	290	909	88	182	956	61
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)	24.0	14.0		24.0	14.0	14.0	49.0	49.0	49.0	6.0	60.0	60.0
Effective Green, g (s)	24.0	14.0		24.0	14.0	14.0	49.0	49.0	49.0	6.0	60.0	60.0
Actuated g/C Ratio	0.24	0.14		0.24	0.14	0.14	0.49	0.49	0.49	0.06	0.60	0.60
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)	298	456		244	481	215	266	1685	754	200	2063	923
v/s Ratio Prot	0.04	c0.18		c0.10	0.08			0.26		c0.05	0.28	
v/s Ratio Perm	0.06			0.14		0.00	c0.54		0.06			0.04
v/c Ratio	0.44	1.27		0.98	0.60	0.03	1.09	0.54	0.12	0.91	0.46	0.07
Uniform Delay, d1	31.3	43.0		35.8	40.4	37.1	25.5	17.7	13.8	46.7	11.1	8.3
Progression Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	0.79	1.38	2.05
Incremental Delay, d2	1.7	139.7		52.8	3.3	0.1	81.4	1.2	0.3	34.5	0.6	0.1
Delay (s)	33.0	182.7		88.6	43.7	37.2	106.9	18.9	14.1	71.3	15.9	17.2
Level of Service	C	F		F	D	D	F	B	B	E	B	B
Approach Delay (s)		157.6			62.2			36.8			24.1	
Approach LOS		F			E			D			C	
Intersection Summary												
HCM Average Control Delay			60.4			HCM Level of Service			E			
HCM Volume to Capacity ratio			1.10									
Actuated Cycle Length (s)			100.0			Sum of lost time (s)			21.0			
Intersection Capacity Utilization			85.8%			ICU Level of Service			E			
Analysis Period (min)			15									
c Critical Lane Group												

HCM Signalized Intersection Capacity Analysis

2: Woodruff Road & Costco Driveway

2015 AM Woodruff Improvements

7/6/2011





















												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Volume (vph)	18	736	25	56	551	28	25	1	53	7	1	11
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	1543		1719	1810	1538
Flt Permitted	0.39	1.00		0.33	1.00	1.00	0.76	1.00		0.72	1.00	1.00
Satd. Flow (perm)	697	3421		604	3438	1538	1370	1543		1299	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)	20	818	28	62	612	31	28	1	59	8	1	12
RTOR Reduction (vph)	0	1	0	0	0	9	0	54	0	0	0	10
Lane Group Flow (vph)	20	845	0	62	612	22	28	6	0	8	1	2
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)	96.5	96.5		85.2	85.2	85.2	10.5	10.5		10.5	10.5	15.3
Effective Green, g (s)	96.5	96.5		85.2	85.2	85.2	10.5	10.5		10.5	10.5	15.3
Actuated g/C Ratio	0.80	0.80		0.71	0.71	0.71	0.09	0.09		0.09	0.09	0.13
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)	601	2751		429	2441	1092	120	135		114	158	279
v/s Ratio Prot	0.00	c0.25			0.18			0.00			0.00	0.00
v/s Ratio Perm	0.03			0.10		0.01	c0.02			0.01		0.00
v/c Ratio	0.03	0.31		0.14	0.25	0.02	0.23	0.05		0.07	0.01	0.01
Uniform Delay, d1	2.6	3.1		5.6	6.1	5.1	51.0	50.2		50.3	50.0	45.7
Progression Factor	1.00	1.00		0.18	0.18	0.04	1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	0.0	0.3		0.7	0.2	0.0	2.4	0.3		0.6	0.0	0.0
Delay (s)	2.6	3.3		1.7	1.3	0.3	53.4	50.5		50.9	50.0	45.7
Level of Service	A	A		A	A	A	D	D		D	D	D
Approach Delay (s)		3.3			1.3			51.4			47.9	
Approach LOS		A			A			D			D	
Intersection Summary												
HCM Average Control Delay			5.6			HCM Level of Service				A		
HCM Volume to Capacity ratio			0.30									
Actuated Cycle Length (s)			120.0			Sum of lost time (s)				13.0		
Intersection Capacity Utilization			65.4%			ICU Level of Service				C		
Analysis Period (min)			15									
c Critical Lane Group												

HCM Signalized Intersection Capacity Analysis

3: Green Heron Road & Woodruff Road

2015 AM Woodruff Improvements

7/6/2011





















												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	SEL	SET	SER	NWL	NWT	NWR
Lane Configurations												
Volume (vph)	4	1	26	1	1	6	8	576	45	54	834	4
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		0.88			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)		1592			1765	1538	1719	3401		1719	3438	1538
Flt Permitted		0.96			0.87	1.00	0.31	1.00		0.39	1.00	1.00
Satd. Flow (perm)		1543			1578	1538	553	3401		704	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)	4	1	29	1	1	7	9	640	50	60	927	4
RTOR Reduction (vph)	0	27	0	0	0	7	0	3	0	0	0	1
Lane Group Flow (vph)	0	7	0	0	2	0	9	687	0	60	927	3
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)		7.9			7.9	7.9	100.8	100.8		100.8	100.8	100.8
Effective Green, g (s)		7.9			7.9	7.9	100.8	100.8		100.8	100.8	100.8
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)		102			104	101	465	2857		591	2888	1292
v/s Ratio Prot								0.20			c0.27	
v/s Ratio Perm		c0.00			0.00	0.00	0.02			0.09		0.00
v/c Ratio		0.07			0.02	0.00	0.02	0.24		0.10	0.32	0.00
Uniform Delay, d1		52.6			52.4	52.4	1.6	1.9		1.7	2.1	1.5
Progression Factor		1.00			1.00	1.00	0.98	0.98		0.04	0.08	0.00
Incremental Delay, d2		0.4			0.1	0.0	0.1	0.2		0.3	0.3	0.0
Delay (s)		53.0			52.5	52.4	1.6	2.1		0.4	0.4	0.0
Level of Service		D			D	D	A	A		A	A	A
Approach Delay (s)		53.0			52.4			2.1			0.4	
Approach LOS		D			D			A			A	
Intersection Summary												
HCM Average Control Delay		2.4					HCM Level of Service			A		
HCM Volume to Capacity ratio		0.30										
Actuated Cycle Length (s)		120.0					Sum of lost time (s)			11.3		
Intersection Capacity Utilization		68.8%					ICU Level of Service			C		
Analysis Period (min)		15										
c Critical Lane Group												

HCM Signalized Intersection Capacity Analysis

4: Woodruff Industrial Lane & Woodruff Road

2015 AM Woodruff Improvements

7/6/2011


















												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	SEL	SET	SER	NWL	NWT	NWR
Lane Configurations												
Volume (vph)	36	5	58	21	5	2	12	512	79	156	854	35
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	0.96		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	1561		1719	1742		1719	3369		1719	3418	
Flt Permitted	0.66	1.00		0.71	1.00		0.27	1.00		0.34	1.00	
Satd. Flow (perm)	1197	1561		1287	1742		493	3369		616	3418	
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)	40	6	64	23	6	2	13	569	88	173	949	39
RTOR Reduction (vph)	0	58	0	0	2	0	0	7	0	0	2	0
Lane Group Flow (vph)	40	12	0	23	6	0	13	650	0	173	986	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)	17.2	11.6		14.4	10.2		73.3	70.7		86.2	77.6	
Effective Green, g (s)	17.2	11.6		14.4	10.2		73.3	70.7		86.2	77.6	
Actuated g/C Ratio	0.14	0.10		0.12	0.08		0.61	0.59		0.72	0.65	
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)	196	151		170	148		328	1985		530	2210	
v/s Ratio Prot	c0.01	0.01		0.00	0.00		0.00	0.19		c0.03	c0.29	
v/s Ratio Perm	c0.02			0.01			0.02			0.21		
v/c Ratio	0.20	0.08		0.14	0.04		0.04	0.33		0.33	0.45	
Uniform Delay, d1	45.1	49.3		47.1	50.4		9.2	12.5		6.0	10.5	
Progression Factor	1.00	1.00		1.00	1.00		0.65	0.90		0.49	0.49	
Incremental Delay, d2	0.8	0.4		0.6	0.2		0.1	0.4		0.5	0.6	
Delay (s)	45.9	49.7		47.7	50.6		6.1	11.7		3.5	5.8	
Level of Service	D	D		D	D		A	B		A	A	
Approach Delay (s)		48.3			48.4			11.6			5.4	
Approach LOS		D			D			B			A	
Intersection Summary												
HCM Average Control Delay			10.6			HCM Level of Service				B		
HCM Volume to Capacity ratio			0.39									
Actuated Cycle Length (s)			120.0			Sum of lost time (s)				18.0		
Intersection Capacity Utilization			61.5%			ICU Level of Service				B		
Analysis Period (min)			15									
c Critical Lane Group												

HCM Signalized Intersection Capacity Analysis

5: I-85 SB Ramps & Woodruff Road

2015 AM Woodruff Improvements

7/6/2011












																		
Movement	WBL2	WBL	WBR	SEL	SET	SER	NWL	NWT	NWR	NEL	NER							
Lane Configurations																		
Volume (vph)	346	0	232	0	509	82	464	813	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	0.35	1.00										
Satd. Flow (perm)	3335		2707		3438	1538	636	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)	384	0	258	0	566	91	516	903	0	0	0							
RTOR Reduction (vph)	0	0	214	0	0	48	0	0	0	0	0							
Lane Group Flow (vph)	384	0	44	0	566	43	516	903	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)	20.3		20.3		56.8		56.8		88.6									
Effective Green, g (s)	20.3		20.3		56.8		56.8		88.6									
Actuated g/C Ratio	0.17		0.17		0.47		0.47		0.74									
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)	564		458		1627		728		696									
v/s Ratio Prot					0.16		c0.16		0.26									
v/s Ratio Perm	c0.12		0.02				0.03		c0.39									
v/c Ratio	0.68		0.10		0.35		0.06		0.74									
Uniform Delay, d1	46.8		42.1		19.9		17.1		7.8									
Progression Factor	1.00		1.00		0.53		0.56		1.54									
Incremental Delay, d2	3.8		0.1		0.6		0.2		4.3									
Delay (s)	50.6		42.2		11.1		9.8		16.2									
Level of Service	D		D		B		A		B									
Approach Delay (s)			47.3				10.9		6.9		0.0							
Approach LOS			D				B		A		A							
Intersection Summary																		
HCM Average Control Delay			17.4		HCM Level of Service		B											
HCM Volume to Capacity ratio			0.72															
Actuated Cycle Length (s)			120.0		Sum of lost time (s)		11.5											
Intersection Capacity Utilization			74.2%		ICU Level of Service		D											
Analysis Period (min)			15															
c Critical Lane Group																		

HCM Signalized Intersection Capacity Analysis

6: I-85 NB Ramps & Woodruff Road

2015 AM Woodruff Improvements

7/6/2011

						
Movement	NBL	NBR	SET	SER	NWL	NWT
Lane Configurations						
Volume (vph)	331	583	698	157	0	946
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	0.88	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	2707	3438	1538		3438
Flt Permitted	0.95	1.00	1.00	1.00		1.00
Satd. Flow (perm)	3335	2707	3438	1538		3438
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	368	648	776	174	0	1051
RTOR Reduction (vph)	0	387	0	82	0	0
Lane Group Flow (vph)	368	261	776	92	0	1051
Turn Type		Prot		Perm		
Protected Phases	3	3	2			2 4
Permitted Phases				2		
Actuated Green, G (s)	27.4	27.4	63.5	63.5		80.5
Effective Green, g (s)	27.4	27.4	63.5	63.5		73.5
Actuated g/C Ratio	0.23	0.23	0.53	0.53		0.61
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)	761	618	1819	814		2106
v/s Ratio Prot	c0.11	0.10	0.23			c0.31
v/s Ratio Perm				0.06		
v/c Ratio	0.48	0.42	0.43	0.11		0.50
Uniform Delay, d1	40.2	39.5	17.2	14.1		13.0
Progression Factor	1.00	1.00	0.61	1.72		1.27
Incremental Delay, d2	0.8	0.7	0.7	0.3		0.2
Delay (s)	40.9	40.3	11.2	24.5		16.7
Level of Service	D	D	B	C		B
Approach Delay (s)	40.5		13.6			16.7
Approach LOS	D		B			B
Intersection Summary						
HCM Average Control Delay			23.7		HCM Level of Service	C
HCM Volume to Capacity ratio			0.49			
Actuated Cycle Length (s)			120.0		Sum of lost time (s)	18.6
Intersection Capacity Utilization			49.8%		ICU Level of Service	A
Analysis Period (min)			15			
c Critical Lane Group						

HCM Signalized Intersection Capacity Analysis

7: Carolina Point Pkwy & Woodruff Road

2015 AM Woodruff Improvements

7/6/2011



Movement	EBL	EBR	SET	SER	NWL	NWT
Lane Configurations	↰↱	↱	↰↱	↱	↰	↰↱
Volume (vph)	113	86	1116	165	123	1441
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	7.0	7.0	6.5	6.5	6.5	6.5
Lane Util. Factor	0.97	1.00	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	1538	3438	1538	1719	3438
Flt Permitted	0.95	1.00	1.00	1.00	0.21	1.00
Satd. Flow (perm)	3335	1538	3438	1538	381	3438
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	126	96	1240	183	137	1601
RTOR Reduction (vph)	0	88	0	34	0	0
Lane Group Flow (vph)	126	8	1240	149	137	1601
Turn Type		Prot		Perm	Perm	
Protected Phases	4	4	2 3 6			2 3 6
Permitted Phases	4			2 3 6	2 3 6	
Actuated Green, G (s)	10.0	10.0	97.4	97.4	97.4	97.4
Effective Green, g (s)	10.0	10.0	97.4	97.4	97.4	97.4
Actuated g/C Ratio	0.08	0.08	0.81	0.81	0.81	0.81
Clearance Time (s)	7.0	7.0				
Vehicle Extension (s)	4.3	4.3				
Lane Grp Cap (vph)	278	128	2791	1248	309	2791
v/s Ratio Prot	c0.04	0.01	0.36			c0.47
v/s Ratio Perm				0.10	0.36	
v/c Ratio	0.45	0.06	0.44	0.12	0.44	0.57
Uniform Delay, d1	52.4	50.7	3.3	2.4	3.3	4.0
Progression Factor	1.00	1.00	0.31	0.00	0.15	0.13
Incremental Delay, d2	1.9	0.3	0.2	0.1	1.0	0.2
Delay (s)	54.2	51.0	1.2	0.1	1.5	0.7
Level of Service	D	D	A	A	A	A
Approach Delay (s)	52.8		1.0			0.8
Approach LOS	D		A			A

Intersection Summary























HCM Average Control Delay	4.3	HCM Level of Service	A
HCM Volume to Capacity ratio	0.57		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	13.5
Intersection Capacity Utilization	60.0%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis

8: Woodruff Road & Market Point Drive

2015 AM Woodruff Improvements

7/6/2011
























													
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	
Lane Configurations													
Volume (vph)	100	1048	54	24	1468	60	33	1	34	27	1	63	
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	6.1	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)	111	1164	60	27	1631	67	37	1	38	30	1	70	
RTOR Reduction (vph)	0	0	19	0	0	26	0	0	33	0	0	66	
Lane Group Flow (vph)	111	1164	41	27	1631	41	37	1	5	30	1	4	
Turn Type	Prot	pm+ov		Prot	Perm		Prot	pm+ov		Prot	Perm		
Protected Phases	5	2	3	1	6	3		8	1	7	4		
Permitted Phases	2			6						8			4
Actuated Green, G (s)	8.5	75.8	82.7	6.2	73.5	73.5	6.9	10.0	16.2	4.2	7.3	7.3	
Effective Green, g (s)	8.5	75.8	82.7	6.2	73.5	73.5	6.9	10.0	16.2	4.2	7.3	7.3	
Actuated g/C Ratio	0.07	0.63	0.69	0.05	0.61	0.61	0.06	0.08	0.13	0.04	0.06	0.06	
Clearance Time (s)	6.1	6.1	5.8	6.1	6.1	6.1	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)	236	2172	1060	89	2106	942	99	151	208	117	209	94	
v/s Ratio Prot	0.03	c0.34	0.00	0.02	c0.47	c0.02		0.00	c0.00	0.01	0.00		
v/s Ratio Perm	0.02			0.03				0.00			c0.00		
v/c Ratio	0.47	0.54	0.04	0.30	0.77	0.04	0.37	0.01	0.02	0.26	0.00	0.05	
Uniform Delay, d1	53.6	12.3	6.0	54.8	17.1	9.3	54.5	50.4	45.0	56.4	52.9	53.1	
Progression Factor	1.22	0.51	0.47	0.70	0.19	0.04	1.00	1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	2.1	0.9	0.0	2.3	2.2	0.1	3.7	0.0	0.1	1.8	0.0	0.3	
Delay (s)	67.6	7.2	2.8	40.7	5.5	0.4	58.2	50.5	45.1	58.2	53.0	53.4	
Level of Service	E	A	A	D	A	A	E	D	D	E	D	D	
Approach Delay (s)	12.0		5.9				51.6			54.8			
Approach LOS	B		A				D			D			
Intersection Summary													
HCM Average Control Delay			11.0		HCM Level of Service				B				
HCM Volume to Capacity ratio			0.74										
Actuated Cycle Length (s)			120.0		Sum of lost time (s)				29.9				
Intersection Capacity Utilization			62.6%		ICU Level of Service				B				
Analysis Period (min)			15										
c Critical Lane Group													

HCM Signalized Intersection Capacity Analysis

9: Woodruff Road & Garlington Road

2015 AM Woodruff Improvements

7/6/2011


















												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	220	773	116	103	1018	465	253	243	66	140	112	281
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.2	6.1	6.1	5.2	6.1	6.1	5.2	5.2		5.2	5.2	4.0
Lane Util. Factor	0.97	0.95	1.00	1.00	0.95	1.00	0.97	1.00		0.97	1.00	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.97		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)	3335	3438	1538	1719	3438	1538	3335	1752		3335	1810	1538
Flt Permitted	0.95	1.00	1.00	0.25	1.00	1.00	0.95	1.00		0.95	1.00	1.00
Satd. Flow (perm)	3335	3438	1538	454	3438	1538	3335	1752		3335	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)	244	859	129	114	1131	517	281	270	73	156	124	312
RTOR Reduction (vph)	0	0	70	0	0	214	0	9	0	0	0	0
Lane Group Flow (vph)	244	859	59	114	1131	303	281	334	0	156	124	312
Turn Type	Prot		Perm	pm+pt		Perm	Prot			Prot		Free
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases			2	6		6						Free
Actuated Green, G (s)	12.0	54.9	54.9	59.9	51.4	51.4	15.2	26.7		8.2	19.7	120.0
Effective Green, g (s)	12.0	54.9	54.9	59.9	51.4	51.4	15.2	26.7		8.2	19.7	120.0
Actuated g/C Ratio	0.10	0.46	0.46	0.50	0.43	0.43	0.13	0.22		0.07	0.16	1.00
Clearance Time (s)	5.2	6.1	6.1	5.2	6.1	6.1	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	4.3	
Lane Grp Cap (vph)	334	1573	704	316	1473	659	422	390		228	297	1538
v/s Ratio Prot	c0.07	0.25		0.03	c0.33		c0.08	c0.19		0.05	0.07	
v/s Ratio Perm			0.04	0.15		0.20						c0.20
v/c Ratio	0.73	0.55	0.08	0.36	0.77	0.46	0.67	0.86		0.68	0.42	0.20
Uniform Delay, d1	52.4	23.5	18.4	16.9	29.2	24.4	50.0	44.8		54.6	45.0	0.0
Progression Factor	1.19	0.71	0.68	0.75	0.60	0.27	1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	7.7	1.2	0.2	0.9	3.3	2.0	4.6	17.6		9.3	1.5	0.3
Delay (s)	70.3	17.8	12.7	13.7	20.9	8.6	54.5	62.4		63.9	46.5	0.3
Level of Service	E	B	B	B	C	A	D	E		E	D	A
Approach Delay (s)		27.7			16.8			58.9			26.7	
Approach LOS		C			B			E			C	
Intersection Summary												
HCM Average Control Delay			27.6			HCM Level of Service				C		
HCM Volume to Capacity ratio			0.80									
Actuated Cycle Length (s)			120.0			Sum of lost time (s)			21.7			
Intersection Capacity Utilization			73.5%			ICU Level of Service			D			
Analysis Period (min)			15									
c Critical Lane Group												

HCM Signalized Intersection Capacity Analysis

10: Woodruff Road & I-385 SB Ramps

2015 AM Woodruff Improvements

7/6/2011



















												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	0	830	149	64	1091	0	0	0	0	832	0	495
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		4.0
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)		3359		1719	3438					3335		1538
Flt Permitted		1.00		0.13	1.00					0.95		1.00
Satd. Flow (perm)		3359		240	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	922	166	71	1212	0	0	0	0	924	0	550
RTOR Reduction (vph)	0	11	0	0	0	0	0	0	0	0	0	0
Lane Group Flow (vph)	0	1077	0	71	1212	0	0	0	0	924	0	550
Turn Type				pm+pt						Prot		Free
Protected Phases		2		1	6					4		
Permitted Phases				6								Free
Actuated Green, G (s)		54.9		67.5	67.5					40.2		120.0
Effective Green, g (s)		54.9		67.5	67.5					40.2		120.0
Actuated g/C Ratio		0.46		0.56	0.56					0.34		1.00
Clearance Time (s)		6.6		6.6	6.6					5.7		
Vehicle Extension (s)		4.3		4.3	4.3					4.3		
Lane Grp Cap (vph)		1537		209	1934					1117		1538
v/s Ratio Prot		c0.32		0.02	c0.35					c0.28		
v/s Ratio Perm				0.17								0.36
v/c Ratio		0.70		0.34	0.63					0.83		0.36
Uniform Delay, d1		26.0		16.5	17.7					36.7		0.0
Progression Factor		0.70		0.17	0.34					1.03		1.00
Incremental Delay, d2		2.2		0.5	0.5					5.5		0.7
Delay (s)		20.5		3.4	6.5					43.2		0.7
Level of Service		C		A	A					D		A
Approach Delay (s)		20.5			6.4			0.0			27.3	
Approach LOS		C			A			A			C	
Intersection Summary												
HCM Average Control Delay			18.4			HCM Level of Service				B		
HCM Volume to Capacity ratio			0.77									
Actuated Cycle Length (s)			120.0			Sum of lost time (s)				18.9		
Intersection Capacity Utilization			114.8%			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

2015 AM Woodruff Improvements

7/6/2011





















												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	605	1057	0	0	632	614	523	0	254	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	0.15	1.00			1.00	1.00	0.95		1.00			
Satd. Flow (perm)	263	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)	672	1174	0	0	702	682	581	0	282	0	0	0
RTOR Reduction (vph)	0	0	0	0	0	436	0	0	59	0	0	0
Lane Group Flow (vph)	672	1174	0	0	702	246	581	0	223	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)	72.9	72.9			30.9	30.9	36.0		36.0			
Effective Green, g (s)	72.9	72.9			30.9	30.9	36.0		36.0			
Actuated g/C Ratio	0.61	0.61			0.26	0.26	0.30		0.30			
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)	595	2089			885	396	516		461			
v/s Ratio Prot	c0.34	0.34			0.20		c0.34					
v/s Ratio Perm	c0.35					0.16			0.15			
v/c Ratio	1.13	0.56			0.79	0.62	1.13		0.48			
Uniform Delay, d1	32.2	14.0			41.6	39.4	42.0		34.4			
Progression Factor	1.12	0.64			0.83	1.18	1.00		1.00			
Incremental Delay, d2	72.6	0.7			5.8	5.7	79.0		1.3			
Delay (s)	108.7	9.7			40.1	51.9	121.0		35.7			
Level of Service	F	A			D	D	F		D			
Approach Delay (s)		45.7			46.0			93.1			0.0	
Approach LOS		D			D			F			A	
Intersection Summary												
HCM Average Control Delay			55.8			HCM Level of Service			E			
HCM Volume to Capacity ratio			1.10									
Actuated Cycle Length (s)			120.0			Sum of lost time (s)			11.1			
Intersection Capacity Utilization			114.8%			ICU Level of Service			H			
Analysis Period (min)			15									
c Critical Lane Group												

HCM Signalized Intersection Capacity Analysis

12: Woodruff Road & Commercial Drive

2015 AM Woodruff Improvements

7/6/2011



















												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	116	1102	93	21	1099	44	85	5	7	78	20	62
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	3398		1719	3418		1719	1654		1719	1604	
Flt Permitted	0.13	1.00		0.20	1.00		0.49	1.00		0.75	1.00	
Satd. Flow (perm)	230	3398		354	3418		891	1654		1354	1604	
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)	129	1224	103	23	1221	49	94	6	8	87	22	69
RTOR Reduction (vph)	0	5	0	0	2	0	0	6	0	0	61	0
Lane Group Flow (vph)	129	1322	0	23	1268	0	94	8	0	87	30	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)	82.5	82.5		67.8	67.8		26.6	26.6		13.6	13.6	
Effective Green, g (s)	82.5	82.5		67.8	67.8		26.6	26.6		13.6	13.6	
Actuated g/C Ratio	0.69	0.69		0.56	0.56		0.22	0.22		0.11	0.11	
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)	275	2336		200	1931		251	367		153	182	
v/s Ratio Prot	0.04	c0.39			c0.37		c0.02	0.00			0.02	
v/s Ratio Perm	0.29			0.06			0.06			c0.06		
v/c Ratio	0.47	0.57		0.12	0.66		0.37	0.02		0.57	0.16	
Uniform Delay, d1	12.1	9.6		12.1	18.0		38.6	36.5		50.4	48.1	
Progression Factor	1.38	0.37		0.15	0.19		1.00	1.00		1.00	1.00	
Incremental Delay, d2	1.7	0.8		1.0	1.6		1.5	0.0		6.4	0.7	
Delay (s)	18.4	4.4		2.8	5.0		40.1	36.6		56.8	48.7	
Level of Service	B	A		A	A		D	D		E	D	
Approach Delay (s)		5.6			5.0			39.6			52.7	
Approach LOS		A			A			D			D	
Intersection Summary												
HCM Average Control Delay			9.3			HCM Level of Service				A		
HCM Volume to Capacity ratio			0.64									
Actuated Cycle Length (s)			120.0			Sum of lost time (s)			21.7			
Intersection Capacity Utilization			71.8%			ICU Level of Service			C			
Analysis Period (min)			15									
c Critical Lane Group												

HCM Signalized Intersection Capacity Analysis

13: Woodruff Road & Smith Hines Road

2015 AM Woodruff Improvements

7/6/2011




















												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	6	1017	164	124	1088	1	74	1	104	1	1	2
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	3367		1719	3438			1633			1667	
Flt Permitted	0.21	1.00		0.18	1.00			0.86			0.96	
Satd. Flow (perm)	376	3367		331	3438			1441			1621	
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	1130	182	138	1209	1	82	1	116	1	1	2
RTOR Reduction (vph)	0	10	0	0	0	0	0	44	0	0	2	0
Lane Group Flow (vph)	7	1302	0	138	1210	0	0	155	0	0	2	0
Turn Type	Perm			Perm			Perm			Perm		
Protected Phases	2			6			8			4		
Permitted Phases	2			6			8			4		
Actuated Green, G (s)	91.1	91.1		91.4	91.4			17.6			17.6	
Effective Green, g (s)	91.1	91.1		91.4	91.4			17.6			17.6	
Actuated g/C Ratio	0.76	0.76		0.76	0.76			0.15			0.15	
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)	285	2556		252	2619			211			238	
v/s Ratio Prot	0.39			0.35								
v/s Ratio Perm	0.02			c0.42				c0.11			0.00	
v/c Ratio	0.02	0.51		0.55	0.46			0.74			0.01	
Uniform Delay, d1	3.5	5.7		5.8	5.3			49.0			43.8	
Progression Factor	0.12	0.10		0.72	0.49			1.00			1.00	
Incremental Delay, d2	0.1	0.6		0.8	0.1			13.8			0.0	
Delay (s)	0.6	1.2		5.0	2.6			62.8			43.8	
Level of Service	A	A		A	A			E			D	
Approach Delay (s)	1.2			2.9				62.8			43.8	
Approach LOS	A			A				E			D	
Intersection Summary												
HCM Average Control Delay	6.3			HCM Level of Service			A					
HCM Volume to Capacity ratio	0.58											
Actuated Cycle Length (s)	120.0			Sum of lost time (s)			11.0					
Intersection Capacity Utilization	90.0%			ICU Level of Service			E					
Analysis Period (min)	15											
c Critical Lane Group												

HCM Signalized Intersection Capacity Analysis

14: Woodruff Road & Walmart Driveway

2015 AM Woodruff Improvements

7/6/2011























												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	21	1445	17	14	3250	83	49	2	25	84	1	8
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	1556			1711	
Flt Permitted	0.04	1.00		0.14	1.00		0.77	1.00			0.73	
Satd. Flow (perm)	81	3432		250	3425		1395	1556			1296	
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	1606	19	16	3611	92	54	2	28	93	1	9
RTOR Reduction (vph)	0	0	0	0	1	0	0	24	0	0	3	0
Lane Group Flow (vph)	23	1625	0	16	3702	0	54	6	0	0	100	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)	93.0	93.0		82.6	82.6		15.7	15.7			15.7	
Effective Green, g (s)	93.0	93.0		82.6	82.6		15.7	15.7			15.7	
Actuated g/C Ratio	0.78	0.78		0.69	0.69		0.13	0.13			0.13	
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)	119	2660		172	2358		183	204			170	
v/s Ratio Prot	0.01	c0.47			c1.08			0.00				
v/s Ratio Perm	0.14			0.06			0.04				c0.08	
v/c Ratio	0.19	0.61		0.09	1.57		0.30	0.03			0.59	
Uniform Delay, d1	33.5	5.8		6.2	18.7		47.1	45.5			49.1	
Progression Factor	1.44	1.24		0.55	0.53		1.00	1.00			1.00	
Incremental Delay, d2	1.2	1.0		0.5	257.4		1.4	0.1			6.5	
Delay (s)	49.3	8.1		3.9	267.2		48.6	45.6			55.6	
Level of Service	D	A		A	F		D	D			E	
Approach Delay (s)		8.7			266.1			47.5			55.6	
Approach LOS		A			F			D			E	
Intersection Summary												
HCM Average Control Delay			182.5			HCM Level of Service			F			
HCM Volume to Capacity ratio			1.40									
Actuated Cycle Length (s)			120.0			Sum of lost time (s)			17.6			
Intersection Capacity Utilization			113.8%			ICU Level of Service			H			
Analysis Period (min)			15									
c Critical Lane Group												

HCM Signalized Intersection Capacity Analysis

15: Woodruff Road & Verdin Road

2015 AM Woodruff Improvements

7/6/2011




















												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	40	746	20	94	2081	54	337	247	27	47	200	71
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	3425		1719	3425		1719	1810	1538	1719	1738	
Flt Permitted	0.06	1.00		0.29	1.00		0.19	1.00	1.00	0.59	1.00	
Satd. Flow (perm)	102	3425		516	3425		341	1810	1538	1069	1738	
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)	44	829	22	104	2312	60	374	274	30	52	222	79
RTOR Reduction (vph)	0	2	0	0	2	0	0	0	21	0	10	0
Lane Group Flow (vph)	44	849	0	104	2370	0	374	274	10	52	291	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)	70.7	70.7		70.7	70.7		38.0	38.0	38.0	15.8	15.8	
Effective Green, g (s)	70.7	70.7		70.7	70.7		38.0	38.0	38.0	15.8	15.8	
Actuated g/C Ratio	0.59	0.59		0.59	0.59		0.32	0.32	0.32	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	2018		304	2018		301	573	487	141	229	
v/s Ratio Prot		0.25			c0.69		c0.17	0.15			0.17	
v/s Ratio Perm	0.43			0.20			c0.22		0.01	0.05		
v/c Ratio	0.73	0.42		0.34	1.17		1.24	0.48	0.02	0.37	1.27	
Uniform Delay, d1	17.8	13.5		12.7	24.6		35.9	33.0	28.2	47.5	52.1	
Progression Factor	0.74	0.83		0.58	0.69		1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	47.9	0.5		1.8	82.0		134.1	1.0	0.0	2.6	150.8	
Delay (s)	61.1	11.7		9.2	99.0		170.0	34.0	28.2	50.1	202.9	
Level of Service	E	B		A	F		F	C	C	D	F	
Approach Delay (s)		14.2			95.2			108.8			180.4	
Approach LOS		B			F			F			F	
Intersection Summary												
HCM Average Control Delay	87.7			HCM Level of Service			F					
HCM Volume to Capacity ratio	1.18											
Actuated Cycle Length (s)	120.0			Sum of lost time (s)			11.5					
Intersection Capacity Utilization	125.4%			ICU Level of Service			H					
Analysis Period (min)	15											
c Critical Lane Group												

HCM Signalized Intersection Capacity Analysis

16: Woodruff Road & Butler Road

2015 AM Woodruff Improvements

7/6/2011



















												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	5	708	52	533	1893	1	162	28	390	22	29	8
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	1750	
Flt Permitted		0.93		0.18	1.00			0.73	1.00	0.40	1.00	
Satd. Flow (perm)		3153		328	3438			1318	1538	733	1750	
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)	6	787	58	592	2103	1	180	31	433	24	32	9
RTOR Reduction (vph)	0	4	0	0	0	0	0	0	37	0	7	0
Lane Group Flow (vph)	0	847	0	592	2104	0	0	211	396	24	34	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)		46.9		86.2	86.2			22.5	55.5	22.5	22.5	
Effective Green, g (s)		46.9		86.2	86.2			22.5	55.5	22.5	22.5	
Actuated g/C Ratio		0.39		0.72	0.72			0.19	0.46	0.19	0.19	
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)		1232		618	2470			247	711	137	328	
v/s Ratio Prot				c0.26	0.61				0.15		0.02	
v/s Ratio Perm		0.27		c0.43				c0.16	0.10	0.03		
v/c Ratio		0.69		0.96	0.85			0.85	0.56	0.18	0.10	
Uniform Delay, d1		30.4		26.9	12.3			47.2	23.3	41.0	40.4	
Progression Factor		0.87		1.24	0.67			1.00	1.00	1.00	1.00	
Incremental Delay, d2		2.9		4.5	0.4			25.0	1.3	1.0	0.2	
Delay (s)		29.5		37.9	8.6			72.2	24.6	41.9	40.6	
Level of Service		C		D	A			E	C	D	D	
Approach Delay (s)		29.5			15.1			40.2			41.1	
Approach LOS		C			B			D			D	
Intersection Summary												
HCM Average Control Delay			22.2			HCM Level of Service				C		
HCM Volume to Capacity ratio			0.91									
Actuated Cycle Length (s)			120.0			Sum of lost time (s)			11.3			
Intersection Capacity Utilization			109.1%			ICU Level of Service			H			
Analysis Period (min)			15									
c Critical Lane Group												

HCM Signalized Intersection Capacity Analysis

17: Woodruff Road & Bell Road

2015 AM Woodruff Improvements

7/6/2011
























												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	25	1105	90	28	2672	17	139	1	34	14	1	59
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			1694			1600	
Flt Permitted	0.04	1.00		0.18	1.00			0.69			0.95	
Satd. Flow (perm)	78	3399		329	3435			1218			1532	
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	28	1228	100	31	2969	19	154	1	38	16	1	66
RTOR Reduction (vph)	0	5	0	0	0	0	0	7	0	0	4	0
Lane Group Flow (vph)	28	1323	0	31	2988	0	0	186	0	0	79	0
Turn Type	Perm			Perm			Perm			Perm		
Protected Phases	2			6			8			4		
Permitted Phases	2			6			8			4		
Actuated Green, G (s)	92.8	92.8		92.8	92.8			15.6			15.6	
Effective Green, g (s)	92.8	92.8		92.8	92.8			15.6			15.6	
Actuated g/C Ratio	0.77	0.77		0.77	0.77			0.13			0.13	
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)	60	2629		254	2656			158			199	
v/s Ratio Prot	0.39			c0.87								
v/s Ratio Perm	0.36			0.09				c0.15			0.05	
v/c Ratio	0.47	0.50		0.12	1.12			1.18			0.40	
Uniform Delay, d1	4.8	5.0		3.4	13.6			52.2			47.9	
Progression Factor	1.79	1.30		0.73	0.54			1.00			1.00	
Incremental Delay, d2	20.0	0.6		0.4	58.3			127.3			2.0	
Delay (s)	28.6	7.1		2.8	65.7			179.5			49.9	
Level of Service	C	A		A	E			F			D	
Approach Delay (s)	7.6			65.1				179.5			49.9	
Approach LOS	A			E				F			D	
Intersection Summary												
HCM Average Control Delay			52.8		HCM Level of Service				D			
HCM Volume to Capacity ratio			1.13									
Actuated Cycle Length (s)			120.0		Sum of lost time (s)				11.6			
Intersection Capacity Utilization			100.6%		ICU Level of Service				G			
Analysis Period (min)			15									
c Critical Lane Group												

HCM Signalized Intersection Capacity Analysis

18: Woodruff Road & SC 14

2015 AM Woodruff Improvements

7/6/2011
























												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	151	598	92	50	1477	199	369	384	132	132	229	319
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	0.98		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	0.07	1.00	1.00	0.35	1.00		0.20	1.00	1.00	0.27	1.00	1.00
Satd. Flow (perm)	127	3438	1538	627	3377		362	1810	1538	483	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)	168	664	102	56	1641	221	410	427	147	147	254	354
RTOR Reduction (vph)	0	0	38	0	9	0	0	0	88	0	0	14
Lane Group Flow (vph)	168	664	64	56	1853	0	410	427	59	147	254	340
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)	65.9	57.2	75.2	62.9	55.7		38.0	26.0	33.2	22.0	15.0	23.7
Effective Green, g (s)	65.9	57.2	75.2	62.9	55.7		38.0	26.0	33.2	22.0	15.0	23.7
Actuated g/C Ratio	0.55	0.48	0.63	0.52	0.46		0.32	0.22	0.28	0.18	0.12	0.20
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)	185	1639	964	394	1567		318	392	426	161	226	304
v/s Ratio Prot	0.07	0.19	0.01	0.01	c0.55		c0.19	0.24	0.01	0.05	0.14	c0.08
v/s Ratio Perm	0.43		0.03	0.07			c0.21		0.03	0.11		0.14
v/c Ratio	0.91	0.41	0.07	0.14	1.18		1.29	1.09	0.14	0.91	1.12	1.12
Uniform Delay, d1	33.6	20.4	8.7	14.3	32.1		36.1	47.0	32.6	46.6	52.5	48.1
Progression Factor	1.47	0.94	0.06	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	37.8	0.6	0.0	0.3	89.1		151.8	71.6	0.2	47.1	97.2	87.8
Delay (s)	87.2	19.7	0.5	14.5	121.3		187.9	118.6	32.9	93.7	149.7	135.9
Level of Service	F	B	A	B	F		F	F	C	F	F	F
Approach Delay (s)		29.7			118.1			134.7			132.4	
Approach LOS		C			F			F			F	
Intersection Summary												
HCM Average Control Delay			106.0			HCM Level of Service			F			
HCM Volume to Capacity ratio			1.19									
Actuated Cycle Length (s)			120.0			Sum of lost time (s)			17.6			
Intersection Capacity Utilization			106.9%			ICU Level of Service			G			
Analysis Period (min)			15									
c Critical Lane Group												

HCM Signalized Intersection Capacity Analysis

19: E Parkins Mill Road & US 276

2015 AM Woodruff Improvements

7/6/2011

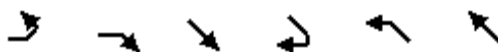
												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	105	100	49	136	23	103	97	1419	75	84	1240	89
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	6.0		4.0	6.0	6.0	4.0	7.0	7.0	4.0	7.0	7.0
Lane Util. 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	3269		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)	1327	3269		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)	117	111	54	151	26	114	108	1577	83	93	1378	99
RTOR Reduction (vph)	0	48	0	0	0	102	0	0	40	0	0	45
Lane Group Flow (vph)	117	117	0	151	26	12	108	1577	43	93	1378	54
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)	20.7	10.4		10.2	10.3	10.3	11.6	51.6	51.6	6.9	46.9	46.9
Effective Green, g (s)	20.7	10.4		10.2	10.3	10.3	11.6	51.6	51.6	6.9	46.9	46.9
Actuated g/C Ratio	0.21	0.10		0.10	0.10	0.10	0.12	0.52	0.52	0.07	0.47	0.47
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)	315	340		340	186	158	199	2546	793	230	2315	721
v/s Ratio Prot	0.04	0.04		c0.05	0.01		c0.06	c0.32		0.03	0.28	
v/s Ratio Perm	c0.04					0.01			0.03			0.04
v/c Ratio	0.37	0.34		0.44	0.14	0.07	0.54	0.62	0.05	0.40	0.60	0.08
Uniform Delay, d1	33.8	41.7		42.3	40.9	40.6	41.7	17.3	12.1	44.6	19.6	14.7
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	1.2	1.2		1.5	0.7	0.4	4.2	0.6	0.1	1.8	0.6	0.1
Delay (s)	35.0	42.9		43.7	41.6	41.0	45.9	17.9	12.1	46.5	20.2	14.7
Level of Service	C	D		D	D	D	D	B	B	D	C	B
Approach Delay (s)		39.6			42.5			19.3			21.4	
Approach LOS		D			D			B			C	
Intersection Summary												
HCM Average Control Delay			23.4				HCM Level of Service			C		
HCM Volume to Capacity ratio			0.49									
Actuated Cycle Length (s)			100.1				Sum of lost time (s)			8.0		
Intersection Capacity Utilization			58.2%				ICU Level of Service			B		
Analysis Period (min)			15									
c Critical Lane Group												

HCM Signalized Intersection Capacity Analysis

20: Duvall Drive & US 276

2015 AM Woodruff Improvements

7/6/2011



























Movement	EBL	EBR	SET	SER	NWL	NWT
Lane Configurations						
Volume (vph)	346	96	1198	227	104	1245
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	4822		1719	4940
Flt Permitted	0.95	1.00	1.00		0.12	1.00
Satd. Flow (perm)	1719	1538	4822		221	4940
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	384	107	1331	252	116	1383
RTOR Reduction (vph)	0	38	42	0	0	0
Lane Group Flow (vph)	384	69	1541	0	116	1383
Turn Type	Perm				Perm	
Protected Phases	8		2			6
Permitted Phases		8			6	
Actuated Green, G (s)	15.0	15.0	37.7		37.7	37.7
Effective Green, g (s)	15.0	15.0	37.7		37.7	37.7
Actuated g/C Ratio	0.23	0.23	0.58		0.58	0.58
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)	397	355	2797		128	2865
v/s Ratio Prot	c0.22		0.32			0.28
v/s Ratio Perm		0.04			c0.52	
v/c Ratio	0.97	0.19	0.55		0.91	0.48
Uniform Delay, d1	24.8	20.1	8.4		12.1	8.0
Progression Factor	1.00	1.00	1.00		1.00	1.00
Incremental Delay, d2	36.7	0.5	0.4		53.6	0.3
Delay (s)	61.5	20.7	8.8		65.7	8.2
Level of Service	E	C	A		E	A
Approach Delay (s)	52.6		8.8			12.7
Approach LOS	D		A			B
Intersection Summary						
HCM Average Control Delay			16.4		HCM Level of Service	B
HCM Volume to Capacity ratio			0.92			
Actuated Cycle Length (s)			65.0		Sum of lost time (s)	12.3
Intersection Capacity Utilization			76.2%		ICU Level of Service	D
Analysis Period (min)			15			
c Critical Lane Group						

HCM Signalized Intersection Capacity Analysis

23: US 276 & Millennium Blvd

2015 AM Woodruff Improvements

7/6/2011





















												
Movement	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Volume (vph)	102	1205	210	24	1680	57	71	75	61	4	14	38
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	0.05	1.00	1.00	0.17	1.00	1.00	0.95	1.00		0.66	1.00	1.00
Satd. Flow (perm)	82	3438	1538	304	3438	1538	3335	3206		1188	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)	113	1339	233	27	1867	63	79	83	68	4	16	42
RTOR Reduction (vph)	0	0	74	0	0	22	0	60	0	0	0	36
Lane Group Flow (vph)	113	1339	159	27	1867	41	79	91	0	4	16	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)	102.3	94.3	94.3	91.8	88.3	88.3	8.0	16.7		9.9	9.3	19.3
Effective Green, g (s)	102.3	94.3	94.3	91.8	88.3	88.3	8.0	16.7		9.9	9.3	19.3
Actuated g/C Ratio	0.74	0.68	0.68	0.66	0.64	0.64	0.06	0.12		0.07	0.07	0.14
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)	179	2348	1050	238	2198	983	193	388		87	122	378
v/s Ratio Prot	c0.05	0.39		0.00	c0.54		c0.02	c0.03		0.00	0.01	0.00
v/s Ratio Perm	0.42		0.10	0.07		0.03				0.00		0.00
v/c Ratio	0.63	0.57	0.15	0.11	0.85	0.04	0.41	0.24		0.05	0.13	0.02
Uniform Delay, d1	34.7	11.4	7.7	8.8	19.7	9.2	62.8	54.9		59.6	60.6	51.2
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	8.4	0.5	0.1	0.3	3.6	0.0	2.2	1.0		0.3	1.5	0.0
Delay (s)	43.1	11.9	7.9	9.2	23.3	9.3	65.0	55.9		60.0	62.1	51.2
Level of Service	D	B	A	A	C	A	E	E		E	E	D
Approach Delay (s)		13.4			22.6			59.0			54.6	
Approach LOS		B			C			E			D	
Intersection Summary												
HCM Average Control Delay			21.3			HCM Level of Service				C		
HCM Volume to Capacity ratio			0.72									
Actuated Cycle Length (s)			138.1			Sum of lost time (s)				16.5		
Intersection Capacity Utilization			75.5%			ICU Level of Service				D		
Analysis Period (min)			15									
c Critical Lane Group												

HCM Signalized Intersection Capacity Analysis

2015 AM Woodruff Improvements

24: Pelham Road & The Parkway

7/6/2011

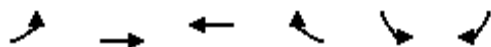
												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	234	936	955	0	1657	774	0	0	0	276	502	180
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.8	5.8	5.8		5.8	5.3				5.3	5.3	5.3
Lane Util. Factor	0.97	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)	260	1040	1061	0	1841	860	0	0	0	307	558	200
RTOR Reduction (vph)	0	0	30	0	0	2	0	0	0	0	0	110
Lane Group Flow (vph)	260	1040	1031	0	1841	858	0	0	0	307	558	90
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)	9.8	78.2	78.2		62.6	98.3				35.7	35.7	35.7
Effective Green, g (s)	9.8	78.2	78.2		62.6	98.3				35.7	35.7	35.7
Actuated g/C Ratio	0.08	0.63	0.63		0.50	0.79				0.29	0.29	0.29
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)	261	2151	962		1722	1209				491	517	439
v/s Ratio Prot	0.08	0.30			0.54	0.20					c0.31	
v/s Ratio Perm			c0.67			0.36				0.18		0.06
v/c Ratio	1.00	0.48	1.07		1.07	0.71				0.63	1.08	0.20
Uniform Delay, d1	57.6	12.6	23.4		31.2	6.4				38.8	44.6	33.9
Progression Factor	1.00	1.00	1.00		0.83	0.86				1.00	1.00	1.00
Incremental Delay, d2	54.4	0.8	50.1		35.2	0.6				3.0	62.7	0.4
Delay (s)	112.0	13.3	73.5		61.2	6.2				41.8	107.3	34.2
Level of Service	F	B	E		E	A				D	F	C
Approach Delay (s)		51.2			43.7			0.0			74.7	
Approach LOS		D			D			A			E	
Intersection Summary												
HCM Average Control Delay			52.0		HCM Level of Service					D		
HCM Volume to Capacity ratio			1.07									
Actuated Cycle Length (s)			125.0		Sum of lost time (s)					11.1		
Intersection Capacity Utilization			145.4%		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

2015 AM Woodruff Improvements

7/6/2011



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↑↑	↑↑		↑	↑↑
Volume (vph)	0	1212	1222	0	649	1209
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	1347	1358	0	721	1343
RTOR Reduction (vph)	0	0	0	0	0	11
Lane Group Flow (vph)	0	1347	1358	0	721	1332
Turn Type					Perm	
Protected Phases		2	6		4	
Permitted Phases						4
Actuated Green, G (s)		51.8	51.8		62.3	62.3
Effective Green, g (s)		51.8	51.8		62.3	62.3
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)		1425	1425		857	1349
v/s Ratio Prot		0.39	c0.39		0.42	
v/s Ratio Perm						c0.49
v/c Ratio		0.95	0.95		0.84	0.99
Uniform Delay, d1		35.2	35.4		27.1	31.0
Progression Factor		0.95	0.77		1.00	1.00
Incremental Delay, d2		12.5	13.1		8.0	21.4
Delay (s)		46.0	40.4		35.0	52.3
Level of Service		D	D		D	D
Approach Delay (s)		46.0	40.4		46.3	
Approach LOS		D	D		D	
Intersection Summary						
HCM Average Control Delay			44.5		HCM Level of Service	D
HCM Volume to Capacity ratio			0.97			
Actuated Cycle Length (s)			125.0		Sum of lost time (s)	10.9
Intersection Capacity Utilization			122.0%		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

2015 AM Woodruff Improvements

7/6/2011




















Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑			↑↑	↔	↔
Volume (vph)	1110	0	0	647	910	948
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)	1233	0	0	719	1011	1053
RTOR Reduction (vph)	0	0	0	0	0	3
Lane Group Flow (vph)	1233	0	0	719	1011	1050
Turn Type					Perm	
Protected Phases	2			6	8	
Permitted Phases						8
Actuated Green, G (s)	42.2			42.2	72.0	72.0
Effective Green, g (s)	42.2			42.2	72.0	72.0
Actuated g/C Ratio	0.34			0.34	0.58	0.58
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)	1161			1161	1921	886
v/s Ratio Prot	c0.36			0.21	0.30	
v/s Ratio Perm						c0.68
v/c Ratio	1.06			0.62	0.53	1.19
Uniform Delay, d1	41.4			34.7	16.1	26.5
Progression Factor	1.26			0.90	1.00	1.00
Incremental Delay, d2	36.1			2.0	0.4	94.7
Delay (s)	88.1			33.2	16.5	121.2
Level of Service	F			C	B	F
Approach Delay (s)	88.1			33.2	69.9	
Approach LOS	F			C	E	
Intersection Summary						
HCM Average Control Delay			68.9		HCM Level of Service	E
HCM Volume to Capacity ratio			1.14			
Actuated Cycle Length (s)			125.0		Sum of lost time (s)	10.8
Intersection Capacity Utilization			135.4%		ICU Level of Service	H
Analysis Period (min)			15			
c Critical Lane Group						

HCM Signalized Intersection Capacity Analysis

27: Pelham Road & Boland Court

2015 AM Woodruff Improvements

7/6/2011






















												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	33	1425	600	141	869	8	305	2	148	26	2	12
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	0.96		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	3285		1719	3433			1724	1538		1682	
Flt Permitted	0.29	1.00		0.05	1.00			0.69	1.00		0.47	
Satd. Flow (perm)	532	3285		97	3433			1258	1538		814	
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)	37	1583	667	157	966	9	339	2	164	29	2	13
RTOR Reduction (vph)	0	37	0	0	1	0	0	0	106	0	10	0
Lane Group Flow (vph)	37	2213	0	157	974	0	0	341	58	0	34	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)	68.3	68.3		83.3	83.3			28.7	28.7		28.7	
Effective Green, g (s)	68.3	68.3		83.3	83.3			28.7	28.7		28.7	
Actuated g/C Ratio	0.55	0.55		0.67	0.67			0.23	0.23		0.23	
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)	291	1795		172	2288			289	353		187	
v/s Ratio Prot		c0.67		c0.06	0.28							
v/s Ratio Perm	0.07			0.55				c0.27	0.04		0.04	
v/c Ratio	0.13	1.23		0.91	0.43			1.18	0.17		0.18	
Uniform Delay, d1	13.8	28.4		40.4	9.7			48.1	38.6		38.7	
Progression Factor	0.63	0.55		1.00	1.00			1.00	1.00		1.00	
Incremental Delay, d2	0.1	105.2		45.1	0.6			110.8	0.4		0.7	
Delay (s)	8.7	120.9		85.5	10.3			159.0	38.9		39.5	
Level of Service	A	F		F	B			F	D		D	
Approach Delay (s)		119.1			20.7			120.0			39.5	
Approach LOS		F			C			F			D	
Intersection Summary												
HCM Average Control Delay			90.2			HCM Level of Service			F			
HCM Volume to Capacity ratio			1.20									
Actuated Cycle Length (s)			125.0			Sum of lost time (s)			19.7			
Intersection Capacity Utilization			106.5%			ICU Level of Service			G			
Analysis Period (min)			15									
c Critical Lane Group												

HCM Signalized Intersection Capacity Analysis

28: Forsythia Dr & E Butler Road

2015 AM Woodruff Improvements

7/6/2011


















												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	19	0	16	16	0	118	2	978	11	41	882	10
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		1585		1719	3432		1719	3432	
Flt Permitted		0.66	1.00		0.96		0.26	1.00		0.26	1.00	
Satd. Flow (perm)		1198	1538		1529		470	3432		470	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)	21	0	18	18	0	131	2	1087	12	46	980	11
RTOR Reduction (vph)	0	0	13	0	14	0	0	2	0	0	2	0
Lane Group Flow (vph)	0	21	5	0	135	0	2	1097	0	46	989	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)		9.7	9.7		9.7		15.4	15.4		15.4	15.4	
Effective Green, g (s)		9.7	9.7		9.7		15.4	15.4		15.4	15.4	
Actuated g/C Ratio		0.26	0.26		0.26		0.42	0.42		0.42	0.42	
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)		313	402		400		195	1425		195	1425	
v/s Ratio Prot								c0.32				0.29
v/s Ratio Perm		0.02	0.00		c0.09		0.00			0.10		
v/c Ratio		0.07	0.01		0.34		0.01	0.77		0.24	0.69	
Uniform Delay, d1		10.3	10.1		11.1		6.4	9.3		7.0	8.9	
Progression Factor		1.00	1.00		1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2		0.1	0.0		0.8		0.0	2.8		1.0	1.7	
Delay (s)		10.4	10.2		11.9		6.4	12.2		8.0	10.6	
Level of Service		B	B		B		A	B		A	B	
Approach Delay (s)		10.3			11.9			12.1			10.5	
Approach LOS		B			B			B			B	
Intersection Summary												
HCM Average Control Delay			11.4			HCM Level of Service				B		
HCM Volume to Capacity ratio			0.60									
Actuated Cycle Length (s)			37.1			Sum of lost time (s)				12.0		
Intersection Capacity Utilization			58.9%			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

2015 AM Woodruff Improvements

7/6/2011





















												
Movement	NBL	NBT	NBR	SBL	SBT	SBR	SEL	SET	SER	NWL	NWT	NWR
Lane Configurations												
Volume (vph)	0	1052	65	179	714	0	557	0	245	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		134	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	1169	72	199	793	0	619	0	272	0	0	0
RTOR Reduction (vph)	0	3	0	0	0	0	0	0	99	0	0	0
Lane Group Flow (vph)	0	1238	0	199	793	0	0	619	173	0	0	0
Turn Type				pm+pt			Perm		Perm			
Protected Phases				1	6			4				
Permitted Phases		2		6			4		4			
Actuated Green, G (s)		48.0		68.5	68.5			47.7	47.7			
Effective Green, g (s)		48.0		68.5	68.5			47.7	47.7			
Actuated g/C Ratio		0.37		0.53	0.53			0.37	0.37			
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)		1276		251	1837			640	572			
v/s Ratio Prot				c0.09	0.23							
v/s Ratio Perm		c0.36		0.33				0.36	0.11			
v/c Ratio		0.97		0.79	0.43			0.97	0.30			
Uniform Delay, d1		39.4		35.4	18.1			39.5	28.5			
Progression Factor		1.00		1.00	1.00			1.00	1.00			
Incremental Delay, d2		18.5		17.0	0.3			27.5	0.5			
Delay (s)		57.9		52.3	18.3			67.0	29.0			
Level of Service		E		D	B			E	C			
Approach Delay (s)		57.9			25.1			55.4			0.0	
Approach LOS		E			C			E			A	
Intersection Summary												
HCM Average Control Delay			46.8			HCM Level of Service			D			
HCM Volume to Capacity ratio			0.95									
Actuated Cycle Length (s)			128.2			Sum of lost time (s)			18.0			
Intersection Capacity Utilization			86.9%			ICU Level of Service			E			
Analysis Period (min)			15									
c Critical Lane Group												

HCM Signalized Intersection Capacity Analysis

31: E Butler Road & I-385 NB Ramps

2015 AM Woodruff Improvements

7/6/2011
























												
Movement	NBL	NBT	NBR	SBL	SBT	SBR	SEL	SET	SER	NWL	NWT	NWR
Lane Configurations		 			 							
Volume (vph)	413	1196	0	0	875	512	0	0	0	18	0	304
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	0.11	1.00			1.00	1.00				0.95		1.00
Satd. Flow (perm)	204	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)	459	1329	0	0	972	569	0	0	0	20	0	338
RTOR Reduction (vph)	0	0	0	0	0	335	0	0	0	0	0	63
Lane Group Flow (vph)	459	1329	0	0	972	234	0	0	0	20	0	275
Turn Type	pm+pt				custom				custom			custom
Protected Phases	5	2										8
Permitted Phases	2				6	6				8		
Actuated Green, G (s)	81.8	81.8			43.1	43.1				25.6		25.6
Effective Green, g (s)	81.8	81.8			43.1	43.1				25.6		25.6
Actuated g/C Ratio	0.69	0.69			0.36	0.36				0.21		0.21
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)	555	2355			1241	555				369		330
v/s Ratio Prot	c0.23	0.39										c0.18
v/s Ratio Perm	c0.34				0.28	0.15				0.01		
v/c Ratio	0.83	0.56			0.78	0.42				0.05		0.83
Uniform Delay, d1	29.3	9.7			34.0	28.8				37.3		44.9
Progression Factor	1.00	1.00			1.00	1.00				1.00		1.00
Incremental Delay, d2	10.5	0.4			3.6	0.8				0.1		17.4
Delay (s)	39.8	10.1			37.6	29.6				37.4		62.2
Level of Service	D	B			D	C				D		E
Approach Delay (s)		17.7			34.6			0.0			60.8	
Approach LOS		B			C			A			E	
Intersection Summary												
HCM Average Control Delay			29.0				HCM Level of Service			C		
HCM Volume to Capacity ratio			0.81									
Actuated Cycle Length (s)			119.4				Sum of lost time (s)			12.0		
Intersection Capacity Utilization			86.9%				ICU Level of Service			E		
Analysis Period (min)			15									
c Critical Lane Group												

HCM Signalized Intersection Capacity Analysis

34: Frontage Road & Roper Mountain Road

2015 AM Woodruff Improvements

7/6/2011




















												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	2	61	94	69	14	11	526	766	647	61	1087	23
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	1664	1538	1719	3438	1538	1719	3427	
Flt Permitted	0.95	1.00		0.95	0.97	1.00	0.10	1.00	1.00	0.33	1.00	
Satd. Flow (perm)	1719	1645		1633	1664	1538	172	3438	1538	601	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)	2	68	104	77	16	12	584	851	719	68	1208	26
RTOR Reduction (vph)	0	55	0	0	0	12	0	0	182	0	1	0
Lane Group Flow (vph)	2	117	0	46	47	0	584	851	537	68	1233	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)	8.0	8.0		4.0	4.0	4.0	70.0	70.0	70.0	36.0	36.0	
Effective Green, g (s)	8.0	8.0		4.0	4.0	4.0	70.0	70.0	70.0	36.0	36.0	
Actuated g/C Ratio	0.08	0.08		0.04	0.04	0.04	0.70	0.70	0.70	0.36	0.36	
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)	138	132		65	67	62	554	2407	1077	216	1234	
v/s Ratio Prot	0.00	c0.07		0.03	c0.03		c0.30	0.25			0.36	
v/s Ratio Perm						0.00	c0.44		0.35	0.11		
v/c Ratio	0.01	0.88		0.71	0.70	0.01	1.05	0.35	0.50	0.31	1.00	
Uniform Delay, d1	42.4	45.5		47.4	47.4	46.1	29.9	6.0	6.9	23.1	32.0	
Progression Factor	1.00	1.00		1.00	1.00	1.00	0.99	1.05	2.05	1.00	1.00	
Incremental Delay, d2	0.1	47.6		35.3	33.7	0.1	44.6	0.2	1.0	3.8	25.4	
Delay (s)	42.5	93.2		82.7	81.1	46.2	74.2	6.5	15.1	26.9	57.4	
Level of Service	D	F		F	F	D	E	A	B	C	E	
Approach Delay (s)		92.6			77.8			27.7			55.8	
Approach LOS		F			E			C			E	
Intersection Summary												
HCM Average Control Delay			41.9				HCM Level of Service			D		
HCM Volume to Capacity ratio			0.98									
Actuated Cycle Length (s)			100.0				Sum of lost time (s)			18.0		
Intersection Capacity Utilization			92.2%				ICU Level of Service			F		
Analysis Period (min)			15									
c Critical Lane Group												

HCM Signalized Intersection Capacity Analysis

35: I-385 NB Ramps & Roper Mountain Road

2015 AM Woodruff Improvements

7/6/2011




















												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	0	0	0	659	0	934	164	1005	0	0	963	287
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	732	0	1038	182	1117	0	0	1070	319
RTOR Reduction (vph)	0	0	0	0	0	55	0	0	0	0	0	205
Lane Group Flow (vph)	0	0	0	366	366	983	182	1117	0	0	1070	114
Turn Type				Perm		Perm	Prot					Perm
Protected Phases					8		5	2			6	
Permitted Phases				8		8						6
Actuated Green, G (s)				39.3	39.3	39.3	7.1	48.7			35.6	35.6
Effective Green, g (s)				39.3	39.3	39.3	7.1	48.7			35.6	35.6
Actuated g/C Ratio				0.39	0.39	0.39	0.07	0.49			0.36	0.36
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)				642	642	1064	237	1674			1224	548
v/s Ratio Prot							0.05	c0.32			c0.31	
v/s Ratio Perm				0.22	0.22	c0.36						0.07
v/c Ratio				0.57	0.57	0.92	0.77	0.67			0.87	0.21
Uniform Delay, d1				23.7	23.7	28.9	45.6	19.5			30.1	22.4
Progression Factor				1.00	1.00	1.00	1.40	0.62			0.75	1.52
Incremental Delay, d2				1.9	1.9	13.5	12.1	1.7			2.6	0.2
Delay (s)				25.6	25.6	42.5	75.8	13.7			25.2	34.3
Level of Service				C	C	D	E	B			C	C
Approach Delay (s)		0.0			35.5			22.4			27.3	
Approach LOS		A			D			C			C	
Intersection Summary												
HCM Average Control Delay			29.1			HCM Level of Service				C		
HCM Volume to Capacity ratio			0.91									
Actuated Cycle Length (s)			100.0			Sum of lost time (s)			18.0			
Intersection Capacity Utilization			88.0%			ICU Level of Service			E			
Analysis Period (min)			15									
c Critical Lane Group												

HCM Signalized Intersection Capacity Analysis

36: Roper Mountain Road & I-385 SB Ramps

2015 AM Woodruff Improvements

7/6/2011





















												
Movement	NBL	NBT	NBR	SBL	SBT	SBR	SEL	SET	SER	NWL	NWT	NWR
Lane Configurations												
Volume (vph)	0	661	236	608	1014	0	508	0	284	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	0.31	1.00		0.95	0.95	1.00			
Satd. Flow (perm)		4940	1538	569	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	734	262	676	1127	0	564	0	316	0	0	0
RTOR Reduction (vph)	0	0	173	0	0	0	0	0	170	0	0	0
Lane Group Flow (vph)	0	734	89	676	1127	0	282	282	146	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)		33.8	33.8	68.3	67.7		19.8	19.8	19.8			
Effective Green, g (s)		33.8	33.8	68.3	67.7		19.8	19.8	19.8			
Actuated g/C Ratio		0.34	0.34	0.68	0.68		0.20	0.20	0.20			
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)		1670	520	712	2328		323	323	536			
v/s Ratio Prot		0.15		c0.27	0.33							
v/s Ratio Perm			0.06	c0.38			c0.17	0.17	0.05			
v/c Ratio		0.44	0.17	0.95	0.48		0.87	0.87	0.27			
Uniform Delay, d1		25.7	23.3	18.1	7.8		38.9	38.9	34.0			
Progression Factor		0.36	0.19	0.67	0.24		1.00	1.00	1.00			
Incremental Delay, d2		0.8	0.7	16.5	0.5		23.4	23.4	0.6			
Delay (s)		10.2	5.2	28.7	2.4		62.3	62.3	34.6			
Level of Service		B	A	C	A		E	E	C			
Approach Delay (s)		8.9			12.2			52.3			0.0	
Approach LOS		A			B			D			A	
Intersection Summary												
HCM Average Control Delay			20.9			HCM Level of Service			C			
HCM Volume to Capacity ratio			0.91									
Actuated Cycle Length (s)			100.0			Sum of lost time (s)			11.9			
Intersection Capacity Utilization			88.0%			ICU Level of Service			E			
Analysis Period (min)			15									
c Critical Lane Group												

HCM Signalized Intersection Capacity Analysis

37: Roper Mountain Road & Congaree Road

2015 AM Woodruff Improvements

7/6/2011












												
Movement	NBL	NBT	NBR	SBL	SBT	SBR	SEL	SET	SER	NWL	NWT	NWR
Lane Configurations												
Volume (vph)	273	700	1	4	913	381	196	2	202	1	2	1
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	1540			1780	1538
Flt Permitted	0.17	1.00			0.95	1.00	0.76	1.00			0.92	1.00
Satd. Flow (perm)	304	4939			3274	1538	1368	1540			1673	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)	303	778	1	4	1014	423	218	2	224	1	2	1
RTOR Reduction (vph)	0	0	0	0	0	221	0	177	0	0	0	1
Lane Group Flow (vph)	303	779	0	0	1018	202	218	49	0	0	3	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)	66.6	66.6			47.7	47.7	20.9	20.9			20.9	20.9
Effective Green, g (s)	66.6	66.6			47.7	47.7	20.9	20.9			20.9	20.9
Actuated g/C Ratio	0.67	0.67			0.48	0.48	0.21	0.21			0.21	0.21
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)	388	3289			1562	734	286	322			350	321
v/s Ratio Prot	c0.10	0.16						0.03				
v/s Ratio Perm	c0.42				0.31	0.13	c0.16			0.00	0.00	
v/c Ratio	0.78	0.24			0.65	0.27	0.76	0.15		0.01	0.00	
Uniform Delay, d1	12.5	6.6			19.8	15.7	37.2	32.3		31.3	31.3	
Progression Factor	1.31	1.62			0.66	1.02	1.00	1.00		1.00	1.00	
Incremental Delay, d2	9.4	0.1			1.9	0.8	13.2	0.4		0.0	0.0	
Delay (s)	25.9	10.9			15.0	16.9	50.4	32.8		31.4	31.3	
Level of Service	C	B			B	B	D	C		C	C	
Approach Delay (s)		15.1			15.6			41.4			31.3	
Approach LOS		B			B			D			C	
Intersection Summary												
HCM Average Control Delay			19.3			HCM Level of Service				B		
HCM Volume to Capacity ratio			0.75									
Actuated Cycle Length (s)			100.0			Sum of lost time (s)			11.9			
Intersection Capacity Utilization			83.6%			ICU Level of Service			E			
Analysis Period (min)			15									
c Critical Lane Group												

HCM Unsignalized Intersection Capacity Analysis

21: Frontage Rd & US 276

2015 AM Woodruff Improvements

7/6/2011










						
Movement	WBL	WBR	SEL	SET	NWT	NWR
Lane Configurations						
Volume (veh/h)	125	20	74	1555	1906	72
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)	139	22	82	1728	2118	80
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage (veh)						
Upstream signal (ft)					1013	
pX, platoon unblocked	0.57	0.57	0.57			
vC, conflicting volume	3186	1099	2198			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	3327	0	1592			
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	96	63			
cM capacity (veh/h)	2	612	225			
Direction, Lane #	WB 1	SE 1	SE 2	SE 3	NW 1	NW 2
Volume Total	161	82	864	864	1412	786
Volume Left	139	82	0	0	0	0
Volume Right	22	0	0	0	0	80
cSH	2	225	1700	1700	1700	1700
Volume to Capacity	65.40	0.37	0.51	0.51	0.83	0.46
Queue Length 95th (ft)	Err	40	0	0	0	0
Control Delay (s)	Err	30.0	0.0	0.0	0.0	0.0
Lane LOS	F	D				
Approach Delay (s)	Err	1.4			0.0	
Approach LOS	F					
Intersection Summary						
Average Delay		387.0				
Intersection Capacity Utilization		76.3%		ICU Level of Service		D
Analysis Period (min)		15				

HCM Unsignalized Intersection Capacity Analysis

22: US 276 & St Josephs Dr

2015 AM Woodruff Improvements

7/6/2011












						
Movement	SET	SER	NWL	NWT	NEL	NER
Lane Configurations						
Volume (veh/h)	1419	261	264	1525	453	98
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)	1577	290	293	1694	503	109
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage (veh)						
Upstream signal (ft)				860		
pX, platoon unblocked					0.51	
vC, conflicting volume			1867		3156	933
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			1867		3305	933
tC, single (s)			4.2		6.9	7.0
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			4		0	58
cM capacity (veh/h)			307		0	262
Direction, Lane #	SE 1	SE 2	NW 1	NW 2	NE 1	
Volume Total	1051	816	858	1130	612	
Volume Left	0	0	293	0	503	
Volume Right	0	290	0	0	109	
cSH	1700	1700	307	1700	0	
Volume to Capacity	0.62	0.48	0.96	0.66	3612.25	
Queue Length 95th (ft)	0	0	242	0	Err	
Control Delay (s)	0.0	0.0	78.3	0.0	Err	
Lane LOS			F		F	
Approach Delay (s)	0.0		33.8		Err	
Approach LOS					F	
Intersection Summary						
Average Delay			1385.6			
Intersection Capacity Utilization			138.4%	ICU Level of Service		H
Analysis Period (min)			15			

HCM Unsignalized Intersection Capacity Analysis

29: Rothwell Dr & E Butler Road

2015 AM Woodruff Improvements

7/6/2011











						
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (veh/h)	6	1	4	1111	932	27
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)	7	1	4	1234	1036	30
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)				1176	378	
pX, platoon unblocked	0.84	0.86	0.86			
vC, conflicting volume	1677	533	1066			
vC1, stage 1 conf vol	1051					
vC2, stage 2 conf vol	626					
vCu, unblocked vol	694	137	755			
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 %	98	100	99			
cM capacity (veh/h)	358	756	717			
Direction, Lane #	EB 1	NB 1	NB 2	NB 3	SB 1	SB 2
Volume Total	8	4	617	617	690	375
Volume Left	7	4	0	0	0	0
Volume Right	1	0	0	0	0	30
cSH	417	717	1700	1700	1700	1700
Volume to Capacity	0.02	0.01	0.36	0.36	0.41	0.22
Queue Length 95th (ft)	1	0	0	0	0	0
Control Delay (s)	14.5	10.1	0.0	0.0	0.0	0.0
Lane LOS	B	B				
Approach Delay (s)	14.5	0.0			0.0	
Approach LOS	B					
Intersection Summary						
Average Delay		0.1				
Intersection Capacity Utilization		40.7%		ICU Level of Service		A
Analysis Period (min)		15				

HCM Unsignalized Intersection Capacity Analysis

32: New Commerce Ct & E Butler Road

2015 AM Woodruff Improvements

7/6/2011




















						
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Volume (veh/h)	53	58	1479	21	36	1334
Sign Control	Stop		Free		Free	Free
Grade	0%		0%		0%	0%
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	59	64	1643	23	40	1482
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			None		None	
Median storage (veh)						
Upstream signal (ft)			371			
pX, platoon unblocked	0.79	0.79			0.79	
vC, conflicting volume	2476	833			1667	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	2340	272			1321	
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			90	
cM capacity (veh/h)	21	569			400	
Direction, Lane #	WB 1	NB 1	NB 2	SB 1	SB 2	SB 3
Volume Total	123	1096	571	40	741	741
Volume Left	59	0	0	40	0	0
Volume Right	64	0	23	0	0	0
cSH	42	1700	1700	400	1700	1700
Volume to Capacity	2.93	0.64	0.34	0.10	0.44	0.44
Queue Length 95th (ft)	339	0	0	8	0	0
Control Delay (s)	1072.0	0.0	0.0	15.0	0.0	0.0
Lane LOS	F			C		
Approach Delay (s)	1072.0	0.0		0.4		
Approach LOS	F					
Intersection Summary						
Average Delay			40.1			
Intersection Capacity Utilization			54.7%		ICU Level of Service	A
Analysis Period (min)			15			

HCM Unsignalized Intersection Capacity Analysis

33: E Butler Road & Brookfield Pkwy

2015 AM Woodruff Improvements

7/6/2011

															
Movement	NBL	NBT	NBR	SBL	SBT	SBR	SEL	SET	SER	NWL	NWT	NWR			
Lane Configurations															
Volume (veh/h)	96	1420	21	17	1337	18	1	0	13	20	0	10			
Sign Control	Free				Free				Stop		Stop				
Grade	0%				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)	107	1578	23	19	1486	20	1	0	14	22	0	11			
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				0.81					0.81	0.81			0.81		
vC, conflicting volume	1506				1601				2547	3348	753	2598	3346	801	
vC1, stage 1 conf vol															
vC2, stage 2 conf vol															
vCu, unblocked vol	1506				1274				2441	3429	753	2504	3427	287	
tC, single (s)	4.2				4.2				7.6	6.6	7.0	7.6	6.6	7.0	
tC, 2 stage (s)															
tF (s)	2.2				2.2				3.5	4.0	3.3	3.5	4.0	3.3	
p0 queue free %	75				96				88	100	96	0	100	98	
cM capacity (veh/h)	426				425				10	4	346	8	4	568	
Direction, Lane #	NB 1	NB 2	NB 3	SB 1	SB 2	SE 1	SE 2	NW 1	NW 2						
Volume Total	107	1052	549	762	763	1	14	22	11						
Volume Left	107	0	0	19	0	1	0	22	0						
Volume Right	0	0	23	0	20	0	14	0	11						
cSH	426	1700	1700	425	1700	10	346	8	568						
Volume to Capacity	0.25	0.62	0.32	0.04	0.45	0.12	0.04	2.65	0.02						
Queue Length 95th (ft)	24	0	0	3	0	8	3	97	1						
Control Delay (s)	16.2	0.0	0.0	1.4	0.0	422.9	15.9	1608.5	11.5						
Lane LOS	C				A				F	C	F	B			
Approach Delay (s)	1.0				0.7				44.9						
Approach LOS							E				F				
Intersection Summary															
Average Delay				12.0											
Intersection Capacity Utilization				94.2%		ICU Level of Service				F					
Analysis Period (min)				15											