

Appendix I: Scenario Analysis Output

Scenario A Analysis Output

Lanes, Volumes, Timings
1: S. Limestone Street & Leffel Lane

Limestone Street Corridor Study
Scenario A

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	100	150	170	230	120	60	180	600	710	190	360	120
Lane Util. Factor	1.00	1.00	1.00	0.97	1.00	1.00	1.00	1.00	1.00	1.00	0.95	0.95
Frt			0.850		0.950				0.850		0.963	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1703	1792	1524	3213	1656	0	1736	1827	1553	1770	3408	0
Flt Permitted	0.559			0.518			0.434			0.182		
Satd. Flow (perm)	1002	1792	1524	1752	1656	0	793	1827	1553	339	3408	0
Satd. Flow (RTOR)			185		24				252		64	
Adj. Flow (vph)	109	163	185	250	130	65	196	652	772	207	391	130
Lane Group Flow (vph)	109	163	185	250	195	0	196	652	772	207	521	0
Turn Type	pm+pt	NA	pm+ov	pm+pt	NA		pm+pt	NA	pm+ov	pm+pt	NA	
Protected Phases	7	4	5	3	8		5	2	3	1	6	
Permitted Phases	4		4	8			2		2	6		
Total Split (s)	12.0	20.0	12.0	12.0	20.0		12.0	46.0	12.0	12.0	46.0	
Total Lost Time (s)	4.5	6.0	5.5	4.5	6.0		5.5	6.9	4.5	5.5	6.9	
Act Effect Green (s)	21.4	12.6	25.5	22.5	15.0		48.3	40.0	54.4	48.6	40.1	
Actuated g/C Ratio	0.24	0.14	0.28	0.25	0.17		0.54	0.44	0.60	0.54	0.45	
v/c Ratio	0.37	0.65	0.33	0.45	0.66		0.39	0.80	0.74	0.70	0.34	
Control Delay	27.8	49.1	5.6	27.2	43.6		11.6	31.4	13.8	32.0	10.6	
Queue Delay	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	
Total Delay	27.8	49.1	5.6	27.2	43.6		11.6	31.4	13.8	32.0	10.6	
LOS	C	D	A	C	D		B	C	B	C	B	
Approach Delay		26.4			34.4			20.6			16.7	
Approach LOS		C			C			C			B	

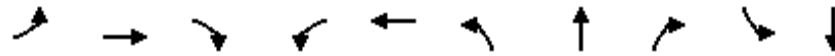
Intersection Summary

Cycle Length: 90
 Actuated Cycle Length: 90
 Offset: 41 (46%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 0.80
 Intersection Signal Delay: 22.4
 Intersection LOS: C
 Intersection Capacity Utilization 76.7%
 ICU Level of Service D
 Analysis Period (min) 15

Splits and Phases: 1: S. Limestone Street & Leffel Lane



Queues
1: S. Limestone Street & Leffel Lane



























Lane Group	EBL	EBT	EBR	WBL	WBT	NBL	NBT	NBR	SBL	SBT
Lane Group Flow (vph)	109	163	185	250	195	196	652	772	207	521
v/c Ratio	0.37	0.65	0.33	0.45	0.66	0.39	0.80	0.74	0.70	0.34
Control Delay	27.8	49.1	5.6	27.2	43.6	11.6	31.4	13.8	32.0	10.6
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	27.8	49.1	5.6	27.2	43.6	11.6	31.4	13.8	32.0	10.6
Queue Length 50th (ft)	46	87	0	54	93	48	316	199	57	54
Queue Length 95th (ft)	87	152	47	85	#188	82	#513	360	#126	75
Internal Link Dist (ft)		1055			1032		571			2708
Turn Bay Length (ft)	160			330		340			270	
Base Capacity (vph)	298	278	563	559	300	497	811	1038	294	1555
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.37	0.59	0.33	0.45	0.65	0.39	0.80	0.74	0.70	0.34

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

HCM 2010 Signalized Intersection Summary
 1: S. Limestone Street & Leffel Lane

Limestone Street Corridor Study
 Scenario A

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations				 							 	
Volume (veh/h)	100	150	170	230	120	60	180	600	710	190	360	120
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1792	1792	1792	1743	1743	1900	1827	1827	1827	1863	1863	1900
Adj Flow Rate, veh/h	109	163	185	250	130	65	196	652	772	207	391	130
Adj No. of Lanes	1	1	1	2	1	0	1	1	1	1	2	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	6	6	6	9	9	9	4	4	4	2	2	2
Cap, veh/h	243	248	321	525	165	82	510	825	831	263	1184	389
Arrive On Green	0.07	0.14	0.14	0.08	0.15	0.15	0.07	0.45	0.45	0.07	0.45	0.45
Sat Flow, veh/h	1707	1792	1524	3221	1098	549	1740	1827	1553	1774	2620	861
Grp Volume(v), veh/h	109	163	185	250	0	195	196	652	772	207	263	258
Grp Sat Flow(s),veh/h/ln	1707	1792	1524	1610	0	1646	1740	1827	1553	1774	1770	1711
Q Serve(g_s), s	4.9	7.8	9.8	5.9	0.0	10.3	5.4	27.4	40.7	5.7	8.6	8.8
Cycle Q Clear(g_c), s	4.9	7.8	9.8	5.9	0.0	10.3	5.4	27.4	40.7	5.7	8.6	8.8
Prop In Lane	1.00		1.00	1.00		0.33	1.00		1.00	1.00		0.50
Lane Grp Cap(c), veh/h	243	248	321	525	0	247	510	825	831	263	800	773
V/C Ratio(X)	0.45	0.66	0.58	0.48	0.00	0.79	0.38	0.79	0.93	0.79	0.33	0.33
Avail Cap(c_a), veh/h	263	279	347	525	0	256	510	825	831	263	800	773
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	0.00	1.00	1.00	1.00	1.00	0.91	0.91	0.91
Uniform Delay (d), s/veh	30.6	36.8	31.9	30.0	0.0	36.9	12.0	21.0	19.3	19.0	15.9	15.9
Incr Delay (d2), s/veh	1.3	4.7	2.0	0.7	0.0	14.7	0.5	7.6	18.1	13.4	1.0	1.1
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	2.4	4.2	4.3	2.7	0.0	5.7	2.6	15.5	21.7	3.7	4.4	4.4
LnGrp Delay(d),s/veh	31.9	41.5	34.0	30.6	0.0	51.6	12.5	28.6	37.4	32.3	16.9	17.0
LnGrp LOS	C	D	C	C		D	B	C	D	C	B	B
Approach Vol, veh/h		457			445			1620			728	
Approach Delay, s/veh		36.1			39.8			30.9			21.3	
Approach LOS		D			D			C			C	
Timer	1	2	3	4	5	6	7	8				
Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	12.0	47.6	12.0	18.4	12.0	47.6	10.9	19.5				
Change Period (Y+Rc), s	5.5	* 6.9	4.5	6.0	5.5	* 6.9	4.5	6.0				
Max Green Setting (Gmax), s	6.5	* 39	7.5	14.0	6.5	* 39	7.5	14.0				
Max Q Clear Time (g_c+I1), s	7.7	42.7	7.9	11.8	7.4	10.8	6.9	12.3				
Green Ext Time (p_c), s	0.0	0.0	0.0	0.6	0.0	1.0	0.0	0.5				
Intersection Summary												
HCM 2010 Ctrl Delay			30.7									
HCM 2010 LOS			C									
Notes												
* HCM 2010 computational engine requires equal clearance times for the phases crossing the barrier.												

Lanes, Volumes, Timings
2: S. Limestone Street & John Street

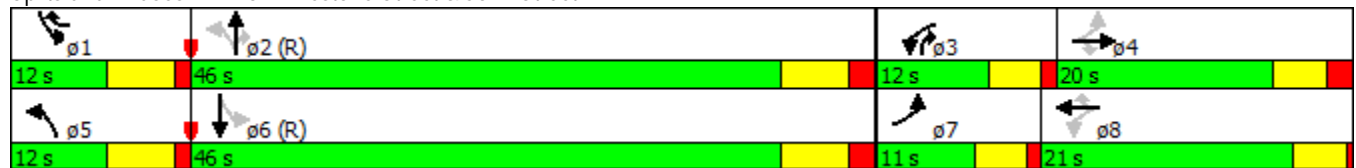


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↖	↗	↘	↖	↗	↘	↖	↗	↘	↖	↗	↘
Volume (vph)	80	160	90	160	150	60	70	570	130	80	520	70
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95	0.95
Frt			0.850			0.850			0.850		0.982	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1736	1827	1553	1736	1827	1553	1770	1863	1583	1752	3442	0
Flt Permitted	0.613			0.460			0.363			0.234		
Satd. Flow (perm)	1120	1827	1553	840	1827	1553	676	1863	1583	432	3442	0
Satd. Flow (RTOR)			165			97			141		21	
Adj. Flow (vph)	87	174	98	174	163	65	76	620	141	87	565	76
Lane Group Flow (vph)	87	174	98	174	163	65	76	620	141	87	641	0
Turn Type	pm+pt	NA	Perm	pm+pt	NA	pm+ov	pm+pt	NA	pm+ov	pm+pt	NA	
Protected Phases	7	4		3	8	1	5	2	3	1	6	
Permitted Phases	4		4	8		8	2		2	6		
Total Split (s)	11.0	20.0	20.0	12.0	21.0	12.0	12.0	46.0	12.0	12.0	46.0	
Total Lost Time (s)	4.5	5.5	5.5	4.5	4.1	5.6	5.6	6.5	4.5	5.6	6.5	
Act Effect Green (s)	20.0	12.6	12.6	22.8	17.2	27.8	49.7	43.6	57.6	49.9	43.6	
Actuated g/C Ratio	0.22	0.14	0.14	0.25	0.19	0.31	0.55	0.48	0.64	0.55	0.48	
v/c Ratio	0.30	0.68	0.27	0.61	0.47	0.12	0.17	0.69	0.13	0.26	0.38	
Control Delay	26.5	50.3	2.7	35.6	37.9	2.7	5.9	13.2	0.4	10.3	16.1	
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Total Delay	26.5	50.3	2.7	35.6	37.9	2.7	5.9	13.2	0.4	10.3	16.1	
LOS	C	D	A	D	D	A	A	B	A	B	B	
Approach Delay		31.6			31.2			10.4			15.4	
Approach LOS		C			C			B			B	

Intersection Summary

Cycle Length: 90
 Actuated Cycle Length: 90
 Offset: 0 (0%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 0.69
 Intersection Signal Delay: 18.8
 Intersection LOS: B
 Intersection Capacity Utilization 70.4%
 ICU Level of Service C
 Analysis Period (min) 15

Splits and Phases: 2: S. Limestone Street & John Street



Queues
2: S. Limestone Street & John Street



























Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT
Lane Group Flow (vph)	87	174	98	174	163	65	76	620	141	87	641
v/c Ratio	0.30	0.68	0.27	0.61	0.47	0.12	0.17	0.69	0.13	0.26	0.38
Control Delay	26.5	50.3	2.7	35.6	37.9	2.7	5.9	13.2	0.4	10.3	16.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	26.5	50.3	2.7	35.6	37.9	2.7	5.9	13.2	0.4	10.3	16.1
Queue Length 50th (ft)	36	94	0	77	84	0	11	99	0	20	123
Queue Length 95th (ft)	72	160	8	131	145	15	m17	m167	m0	40	168
Internal Link Dist (ft)		892			573			2708			3361
Turn Bay Length (ft)	100		100	75			290			200	
Base Capacity (vph)	295	294	388	287	364	548	453	902	1063	336	1679
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.29	0.59	0.25	0.61	0.45	0.12	0.17	0.69	0.13	0.26	0.38

Intersection Summary

m Volume for 95th percentile queue is metered by upstream signal.

HCM 2010 Signalized Intersection Summary
2: S. Limestone Street & John Street

Limestone Street Corridor Study
Scenario A

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	80	160	90	160	150	60	70	570	130	80	520	70
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1827	1827	1827	1827	1827	1827	1863	1863	1863	1845	1845	1900
Adj Flow Rate, veh/h	87	174	98	174	163	65	76	620	141	87	565	76
Adj No. of Lanes	1	1	1	1	1	1	1	1	1	1	2	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	4	4	4	4	4	4	2	2	2	3	3	3
Cap, veh/h	257	229	194	261	273	324	475	907	903	344	1520	204
Arrive On Green	0.06	0.13	0.13	0.08	0.15	0.15	0.06	0.49	0.49	0.06	0.49	0.49
Sat Flow, veh/h	1740	1827	1553	1740	1827	1553	1774	1863	1583	1757	3107	417
Grp Volume(v), veh/h	87	174	98	174	163	65	76	620	141	87	318	323
Grp Sat Flow(s),veh/h/ln	1740	1827	1553	1740	1827	1553	1774	1863	1583	1757	1752	1771
Q Serve(g_s), s	3.9	8.3	5.3	7.5	7.5	3.1	1.8	23.0	3.8	2.1	10.2	10.3
Cycle Q Clear(g_c), s	3.9	8.3	5.3	7.5	7.5	3.1	1.8	23.0	3.8	2.1	10.2	10.3
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		0.24
Lane Grp Cap(c), veh/h	257	229	194	261	273	324	475	907	903	344	857	867
V/C Ratio(X)	0.34	0.76	0.50	0.67	0.60	0.20	0.16	0.68	0.16	0.25	0.37	0.37
Avail Cap(c_a), veh/h	280	294	250	261	343	383	501	907	903	365	857	867
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	0.59	0.59	0.59	1.00	1.00	1.00
Uniform Delay (d), s/veh	31.7	38.1	36.8	32.2	35.8	29.4	10.4	17.8	9.1	13.1	14.3	14.4
Incr Delay (d2), s/veh	0.8	8.4	2.0	6.4	2.1	0.3	0.1	2.5	0.2	0.4	1.2	1.2
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.9	4.7	2.4	1.1	4.0	1.4	0.9	12.3	1.7	1.1	5.2	5.3
LnGrp Delay(d),s/veh	32.5	46.4	38.8	38.6	37.8	29.7	10.5	20.2	9.3	13.5	15.6	15.6
LnGrp LOS	C	D	D	D	D	C	B	C	A	B	B	B
Approach Vol, veh/h		359			402			837			728	
Approach Delay, s/veh		41.0			36.8			17.5			15.3	
Approach LOS		D			D			B			B	
Timer	1	2	3	4	5	6	7	8				
Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	10.9	50.3	12.0	16.8	10.7	50.5	9.8	18.9				
Change Period (Y+Rc), s	5.6	* 6.5	4.5	* 5.5	5.6	* 6.5	4.5	* 5.5				
Max Green Setting (Gmax), s	6.4	* 40	7.5	* 15	6.4	* 40	6.5	* 17				
Max Q Clear Time (g_c+I1), s	4.1	25.0	9.5	10.3	3.8	12.3	5.9	9.5				
Green Ext Time (p_c), s	0.0	7.2	0.0	1.0	0.0	9.8	0.0	1.5				
Intersection Summary												
HCM 2010 Ctrl Delay			23.8									
HCM 2010 LOS			C									
Notes												
* HCM 2010 computational engine requires equal clearance times for the phases crossing the barrier.												

Lanes, Volumes, Timings
3: Limestone Street & Clark Street/Selma Road



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕	↕	↕	↕↕		↕	↕	
Volume (vph)	10	20	20	60	10	460	20	630	50	360	620	10
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95	0.95	1.00	1.00	1.00
Frt		0.946				0.850		0.989			0.998	
Flt Protected		0.990			0.959		0.950			0.950		
Satd. Flow (prot)	0	1745	0	0	1786	1583	1770	3500	0	1770	1859	0
Flt Permitted		0.924			0.814		0.405			0.287		
Satd. Flow (perm)	0	1628	0	0	1516	1583	754	3500	0	535	1859	0
Satd. Flow (RTOR)		22				127		10			1	
Adj. Flow (vph)	11	22	22	65	11	500	22	685	54	391	674	11
Lane Group Flow (vph)	0	55	0	0	76	500	22	739	0	391	685	0
Turn Type	Perm	NA		Perm	NA	pm+ov	pm+pt	NA		pm+pt	NA	
Protected Phases		4			8	1	5	2		1	6	
Permitted Phases	4			8		8	2			6		
Total Split (s)	26.0	26.0		26.0	26.0	27.0	12.0	47.0		27.0	62.0	
Total Lost Time (s)		5.0			5.0	5.0	5.0	5.0		5.0	5.0	
Act Effct Green (s)		11.1			11.1	36.5	60.5	53.5		81.3	77.5	
Actuated g/C Ratio		0.11			0.11	0.36	0.60	0.54		0.81	0.78	
v/c Ratio		0.28			0.45	0.76	0.04	0.39		0.55	0.48	
Control Delay		29.9			49.3	27.1	6.0	16.2		19.4	11.6	
Queue Delay		0.0			0.0	0.0	0.0	0.0		0.3	0.5	
Total Delay		29.9			49.3	27.1	6.0	16.2		19.7	12.0	
LOS		C			D	C	A	B		B	B	
Approach Delay		29.9			30.0			15.9			14.8	
Approach LOS		C			C			B			B	

Intersection Summary

Cycle Length: 100
 Actuated Cycle Length: 100
 Offset: 11 (11%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 0.76
 Intersection Signal Delay: 19.0
 Intersection LOS: B
 Intersection Capacity Utilization 65.8%
 ICU Level of Service C
 Analysis Period (min) 15

Splits and Phases: 3: Limestone Street & Clark Street/Selma Road






















Queues
3: Limestone Street & Clark Street/Selma Road



Lane Group	EBT	WBT	WBR	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	55	76	500	22	739	391	685
v/c Ratio	0.28	0.45	0.76	0.04	0.39	0.55	0.48
Control Delay	29.9	49.3	27.1	6.0	16.2	19.4	11.6
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.3	0.5
Total Delay	29.9	49.3	27.1	6.0	16.2	19.7	12.0
Queue Length 50th (ft)	20	46	203	2	142	140	121
Queue Length 95th (ft)	54	88	274	9	229	233	282
Internal Link Dist (ft)	406	396			1987		380
Turn Bay Length (ft)				100		100	
Base Capacity (vph)	359	318	674	527	1878	730	1441
Starvation Cap Reductn	0	0	0	0	0	64	338
Spillback Cap Reductn	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0
Reduced v/c Ratio	0.15	0.24	0.74	0.04	0.39	0.59	0.62

Intersection Summary

HCM 2010 Signalized Intersection Summary
 3: Limestone Street & Clark Street/Selma Road

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	10	20	20	60	10	460	20	630	50	360	620	10
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1900	1863	1900	1900	1863	1863	1863	1863	1900	1863	1863	1900
Adj Flow Rate, veh/h	11	22	22	65	11	500	22	685	54	391	674	11
Adj No. of Lanes	0	1	0	0	1	1	1	2	0	1	1	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	83	155	130	324	50	531	414	1711	135	573	1111	18
Arrive On Green	0.21	0.21	0.21	0.21	0.21	0.21	0.03	0.51	0.51	0.13	0.61	0.61
Sat Flow, veh/h	189	738	618	1223	237	1583	1774	3324	262	1774	1828	30
Grp Volume(v), veh/h	55	0	0	76	0	500	22	364	375	391	0	685
Grp Sat Flow(s),veh/h/ln	1545	0	0	1459	0	1583	1774	1770	1817	1774	0	1857
Q Serve(g_s), s	0.0	0.0	0.0	1.2	0.0	21.0	0.6	12.6	12.6	9.6	0.0	22.9
Cycle Q Clear(g_c), s	2.6	0.0	0.0	3.8	0.0	21.0	0.6	12.6	12.6	9.6	0.0	22.9
Prop In Lane	0.20		0.40	0.86		1.00	1.00		0.14	1.00		0.02
Lane Grp Cap(c), veh/h	368	0	0	373	0	531	414	911	935	573	0	1129
V/C Ratio(X)	0.15	0.00	0.00	0.20	0.00	0.94	0.05	0.40	0.40	0.68	0.00	0.61
Avail Cap(c_a), veh/h	368	0	0	373	0	531	482	911	935	741	0	1129
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	0.00	1.00	0.00	1.00	1.00	1.00	1.00	0.77	0.00	0.77
Uniform Delay (d), s/veh	32.2	0.0	0.0	32.6	0.0	32.3	11.3	14.8	14.8	9.8	0.0	12.2
Incr Delay (d2), s/veh	0.2	0.0	0.0	0.3	0.0	25.4	0.1	1.3	1.3	1.3	0.0	1.9
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.3	0.0	0.0	1.8	0.0	17.1	0.3	6.4	6.6	4.8	0.0	12.2
LnGrp Delay(d),s/veh	32.4	0.0	0.0	32.9	0.0	57.7	11.4	16.1	16.1	11.1	0.0	14.0
LnGrp LOS	C			C		E	B	B	B	B		B
Approach Vol, veh/h		55			576			761			1076	
Approach Delay, s/veh		32.4			54.4			16.0			13.0	
Approach LOS		C			D			B			B	
Timer	1	2	3	4	5	6	7	8				
Assigned Phs	1	2		4	5	6		8				
Phs Duration (G+Y+Rc), s	17.5	56.5		26.0	8.2	65.8		26.0				
Change Period (Y+Rc), s	5.0	5.0		5.0	5.0	5.0		5.0				
Max Green Setting (Gmax), s	22.0	42.0		21.0	7.0	57.0		21.0				
Max Q Clear Time (g_c+I1), s	11.6	14.6		4.6	2.6	24.9		23.0				
Green Ext Time (p_c), s	0.9	10.8		2.6	0.0	11.5		0.0				
Intersection Summary												
HCM 2010 Ctrl Delay			24.0									
HCM 2010 LOS			C									



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	10	100	210	670	160	20	130	250	720	10	110	10
Lane Util. Factor	1.00	1.00	1.00	0.97	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt			0.850		0.983				0.850		0.987	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1770	1863	1583	3433	1831	0	1770	1863	1583	1770	1839	0
Flt Permitted	0.634			0.950			0.523			0.592		
Satd. Flow (perm)	1181	1863	1583	3433	1831	0	974	1863	1583	1103	1839	0
Satd. Flow (RTOR)			229		6				681		4	
Adj. Flow (vph)	11	109	228	728	174	22	141	272	783	11	120	11
Lane Group Flow (vph)	11	109	228	728	196	0	141	272	783	11	131	0
Turn Type	pm+pt	NA	pm+ov	Prot	NA		pm+pt	NA	pm+ov	pm+pt	NA	
Protected Phases	7	4	5	3	8		5	2	3	1	6	
Permitted Phases	4		4				2		2	6		
Total Split (s)	22.0	22.0	15.0	31.0	31.0		15.0	25.0	31.0	22.0	32.0	
Total Lost Time (s)	6.0	6.0	6.0	6.0	6.0		6.0	6.0	6.0	6.0	6.0	
Act Effect Green (s)	19.8	15.2	26.2	29.4	44.4		40.2	38.4	75.0	33.4	26.4	
Actuated g/C Ratio	0.20	0.15	0.26	0.29	0.44		0.40	0.38	0.75	0.33	0.26	
v/c Ratio	0.04	0.39	0.39	0.72	0.24		0.31	0.38	0.58	0.03	0.27	
Control Delay	17.5	42.2	5.6	38.4	19.0		25.3	29.7	3.8	18.1	30.3	
Queue Delay	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	
Total Delay	17.5	42.2	5.6	38.4	19.0		25.3	29.7	3.9	18.1	30.3	
LOS	B	D	A	D	B		C	C	A	B	C	
Approach Delay		17.4			34.3			12.3			29.3	
Approach LOS		B			C			B			C	

Intersection Summary

Cycle Length: 100

Actuated Cycle Length: 100

Offset: 0 (0%), Referenced to phase 2:NBTL, Start of Green

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.72

Intersection Signal Delay: 21.7

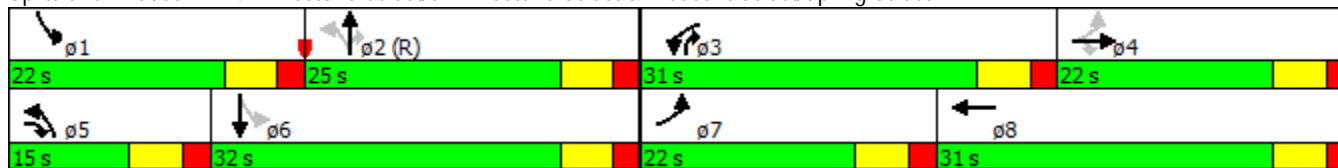
Intersection LOS: C

Intersection Capacity Utilization 75.4%

ICU Level of Service D

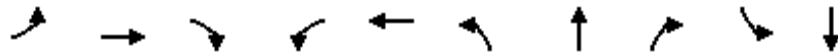
Analysis Period (min) 15

Splits and Phases: 14: Limestone Street/S. Limestone Street & Pleasant Street/Spring Street



Queues

14: Limestone Street/S. Limestone Street & Pleasant Street/Spring Street



Lane Group	EBL	EBT	EBR	WBL	WBT	NBL	NBT	NBR	SBL	SBT
Lane Group Flow (vph)	11	109	228	728	196	141	272	783	11	131
v/c Ratio	0.04	0.39	0.39	0.72	0.24	0.31	0.38	0.58	0.03	0.27
Control Delay	17.5	42.2	5.6	38.4	19.0	25.3	29.7	3.8	18.1	30.3
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	17.5	42.2	5.6	38.4	19.0	25.3	29.7	3.9	18.1	30.3
Queue Length 50th (ft)	4	63	0	228	69	50	107	50	4	64
Queue Length 95th (ft)	13	115	52	#320	147	m112	m252	84	15	116
Internal Link Dist (ft)		434			542		380			488
Turn Bay Length (ft)			200			100				
Base Capacity (vph)	434	298	588	1009	816	462	715	1357	558	488
Starvation Cap Reductn	0	0	0	0	0	0	0	29	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.03	0.37	0.39	0.72	0.24	0.31	0.38	0.59	0.02	0.27

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.

Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	10	100	210	670	160	20	130	250	720	10	110	10
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1863	1863	1863	1900	1863	1863	1863	1863	1863	1900
Adj Flow Rate, veh/h	11	109	228	728	174	22	141	272	783	11	120	11
Adj No. of Lanes	1	1	1	2	1	0	1	1	1	1	1	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	376	283	357	804	512	65	512	567	852	295	506	46
Arrive On Green	0.07	0.15	0.15	0.23	0.32	0.32	0.07	0.30	0.30	0.07	0.30	0.30
Sat Flow, veh/h	1774	1863	1583	3442	1622	205	1774	1863	1583	1774	1681	154
Grp Volume(v), veh/h	11	109	228	728	0	196	141	272	783	11	0	131
Grp Sat Flow(s),veh/h/ln	1774	1863	1583	1721	0	1827	1774	1863	1583	1774	0	1836
Q Serve(g_s), s	0.5	5.3	13.0	20.6	0.0	8.2	5.4	11.9	30.4	0.4	0.0	5.4
Cycle Q Clear(g_c), s	0.5	5.3	13.0	20.6	0.0	8.2	5.4	11.9	30.4	0.4	0.0	5.4
Prop In Lane	1.00		1.00	1.00		0.11	1.00		1.00	1.00		0.08
Lane Grp Cap(c), veh/h	376	283	357	804	0	577	512	567	852	295	0	553
V/C Ratio(X)	0.03	0.38	0.64	0.91	0.00	0.34	0.28	0.48	0.92	0.04	0.00	0.24
Avail Cap(c_a), veh/h	536	298	369	860	0	577	542	567	852	455	0	553
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	0.00	1.00	0.82	0.82	0.82	1.00	0.00	1.00
Uniform Delay (d), s/veh	30.4	38.2	35.1	37.2	0.0	26.2	21.4	28.3	21.1	20.6	0.0	26.3
Incr Delay (d2), s/veh	0.0	0.9	3.5	12.5	0.0	1.6	0.2	2.4	14.3	0.1	0.0	0.2
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.2	2.8	6.0	11.2	0.0	4.4	2.7	6.5	23.0	0.2	0.0	2.8
LnGrp Delay(d),s/veh	30.5	39.0	38.6	49.8	0.0	27.8	21.7	30.7	35.4	20.6	0.0	26.5
LnGrp LOS	C	D	D	D		C	C	C	D	C		C
Approach Vol, veh/h		348			924			1196			142	
Approach Delay, s/veh		38.5			45.1			32.7			26.1	
Approach LOS		D			D			C			C	
Timer	1	2	3	4	5	6	7	8				
Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	13.0	36.4	29.4	21.2	13.3	36.1	13.0	37.6				
Change Period (Y+Rc), s	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0				
Max Green Setting (Gmax), s	16.0	19.0	25.0	16.0	9.0	26.0	16.0	25.0				
Max Q Clear Time (g_c+I1), s	2.4	32.4	22.6	15.0	7.4	7.4	2.5	10.2				
Green Ext Time (p_c), s	0.0	0.0	0.8	0.2	0.1	5.7	0.0	2.3				
Intersection Summary												
HCM 2010 Ctrl Delay			37.5									
HCM 2010 LOS			D									

MOVEMENT SUMMARY

Site: Limestone and Grand - AM
Peak - NEW HCM

Limestone Street and Grand Avenue
Roundabout

Movement Performance - Vehicles											
Mov ID	Turn	Demand Flow veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Queue Distance ft	Prop. Queued	Effective Stop Rate per veh	Average Speed mph
South: Limestone Street											
3	L	22	3.0	0.603	10.0	LOS B	5.5	141.8	0.31	0.81	25.3
8	T	717	3.0	0.603	10.0	LOS B	5.5	141.8	0.31	0.43	27.7
18	R	33	3.0	0.603	10.0	LOS B	5.5	141.8	0.31	0.50	27.3
Approach		772	3.0	0.603	10.0	LOS B	5.5	141.8	0.31	0.44	27.6
East: Grand Avenue											
1	L	33	3.0	0.107	7.2	LOS A	0.4	10.4	0.62	0.92	26.5
6	T	11	3.0	0.107	7.2	LOS A	0.4	10.4	0.62	0.76	28.9
16	R	22	3.0	0.107	7.2	LOS A	0.4	10.4	0.62	0.80	28.6
Approach		65	3.0	0.107	7.2	LOS A	0.4	10.4	0.62	0.85	27.5
North: Limestone Street											
7	L	11	3.0	0.582	9.7	LOS A	5.0	127.3	0.37	0.81	25.5
4	T	707	3.0	0.582	9.7	LOS A	5.0	127.3	0.37	0.45	27.9
14	R	11	3.0	0.582	9.7	LOS A	5.0	127.3	0.37	0.52	27.5
Approach		728	3.0	0.582	9.7	LOS A	5.0	127.3	0.37	0.46	27.9
West: Grand Avenue											
5	L	11	3.0	0.089	6.9	LOS A	0.3	8.6	0.62	0.94	26.8
2	T	22	3.0	0.089	6.9	LOS A	0.3	8.6	0.62	0.75	29.3
12	R	22	3.0	0.089	6.9	LOS A	0.3	8.6	0.62	0.79	29.0
Approach		54	3.0	0.089	6.9	LOS A	0.3	8.6	0.62	0.81	28.6
All Vehicles		1620	3.0	0.603	9.7	LOS A	5.5	141.8	0.36	0.48	27.8

Level of Service (LOS) Method: Delay & v/c (HCM 2010).

Roundabout LOS Method: Same as Sign Control.

Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement

LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).

Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 2010).

Roundabout Capacity Model: US HCM 2010.

HCM Delay Model used. Geometric Delay not included.

Lanes, Volumes, Timings

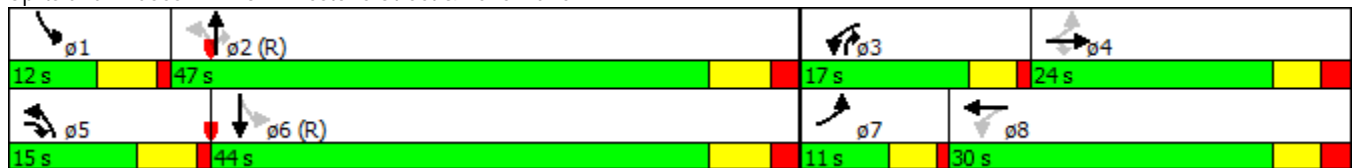
1: S. Limestone Street & Leffel Lane

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	150	150	220	580	200	180	180	590	370	120	730	120
Lane Util. Factor	1.00	1.00	1.00	0.97	1.00	1.00	1.00	1.00	1.00	1.00	0.95	0.95
Frt			0.850		0.929				0.850		0.979	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1752	1845	1568	3467	1748	0	1752	1845	1568	1752	3431	0
Flt Permitted	0.231			0.452			0.168			0.165		
Satd. Flow (perm)	426	1845	1568	1650	1748	0	310	1845	1568	304	3431	0
Satd. Flow (RTOR)			141		43				328		21	
Adj. Flow (vph)	163	163	239	630	217	196	196	641	402	130	793	130
Lane Group Flow (vph)	163	163	239	630	413	0	196	641	402	130	923	0
Turn Type	pm+pt	NA	pm+ov	pm+pt	NA		pm+pt	NA	pm+ov	pm+pt	NA	
Protected Phases	7	4	5	3	8		5	2	3	1	6	
Permitted Phases	4		4	8			2		2	6		
Total Split (s)	11.0	24.0	15.0	17.0	30.0		15.0	47.0	17.0	12.0	44.0	
Total Lost Time (s)	4.5	6.0	5.5	4.5	6.0		5.5	6.9	4.5	5.5	6.9	
Act Effect Green (s)	25.3	17.3	32.5	35.8	23.3		51.4	40.8	60.2	46.0	38.1	
Actuated g/C Ratio	0.25	0.17	0.32	0.36	0.23		0.51	0.41	0.60	0.46	0.38	
v/c Ratio	0.84	0.51	0.40	0.77	0.94		0.67	0.85	0.37	0.56	0.70	
Control Delay	61.9	43.5	12.6	32.8	64.5		24.7	40.1	3.1	22.6	21.0	
Queue Delay	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	
Total Delay	61.9	43.5	12.6	32.8	64.5		24.7	40.1	3.1	22.6	21.0	
LOS	E	D	B	C	E		C	D	A	C	C	
Approach Delay		35.7			45.3			25.7			21.2	
Approach LOS		D			D			C			C	

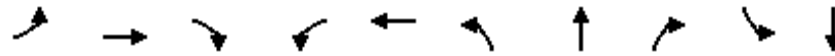
Intersection Summary

Cycle Length: 100
 Actuated Cycle Length: 100
 Offset: 56 (56%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 0.94
 Intersection Signal Delay: 31.2 Intersection LOS: C
 Intersection Capacity Utilization 86.6% ICU Level of Service E
 Analysis Period (min) 15

Splits and Phases: 1: S. Limestone Street & Leffel Lane



Queues
1: S. Limestone Street & Leffel Lane



Lane Group	EBL	EBT	EBR	WBL	WBT	NBL	NBT	NBR	SBL	SBT
Lane Group Flow (vph)	163	163	239	630	413	196	641	402	130	923
v/c Ratio	0.84	0.51	0.40	0.77	0.94	0.67	0.85	0.37	0.56	0.70
Control Delay	61.9	43.5	12.6	32.8	64.5	24.7	40.1	3.1	22.6	21.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	61.9	43.5	12.6	32.8	64.5	24.7	40.1	3.1	22.6	21.0
Queue Length 50th (ft)	72	94	44	158	233	62	367	19	26	275
Queue Length 95th (ft)	#157	160	108	210	#416	#110	#576	59	m61	m307
Internal Link Dist (ft)		1055			1032		571			2708
Turn Bay Length (ft)	160			330		340			270	
Base Capacity (vph)	193	332	609	818	452	297	751	1073	233	1319
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.84	0.49	0.39	0.77	0.91	0.66	0.85	0.37	0.56	0.70

Intersection Summary
























95th percentile volume exceeds capacity, queue may be longer.

Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.

HCM 2010 Signalized Intersection Summary
1: S. Limestone Street & Leffel Lane

Limestone Street Corridor Study
Scenario A

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	150	150	220	580	200	180	180	590	370	120	730	120
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1845	1845	1845	1881	1881	1900	1845	1845	1845	1845	1845	1900
Adj Flow Rate, veh/h	163	163	239	630	217	196	196	641	402	130	793	130
Adj No. of Lanes	1	1	1	2	1	0	1	1	1	1	2	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	3	3	3	1	1	1	3	3	3	3	3	3
Cap, veh/h	189	332	419	771	219	198	319	744	828	228	1143	187
Arrive On Green	0.06	0.18	0.18	0.13	0.24	0.24	0.09	0.40	0.40	0.06	0.38	0.38
Sat Flow, veh/h	1757	1845	1568	3476	912	824	1757	1845	1568	1757	3016	494
Grp Volume(v), veh/h	163	163	239	630	0	413	196	641	402	130	461	462
Grp Sat Flow(s),veh/h/ln	1757	1845	1568	1738	0	1736	1757	1845	1568	1757	1752	1757
Q Serve(g_s), s	6.5	7.9	13.2	12.5	0.0	23.7	6.7	31.8	16.3	4.5	22.2	22.2
Cycle Q Clear(g_c), s	6.5	7.9	13.2	12.5	0.0	23.7	6.7	31.8	16.3	4.5	22.2	22.2
Prop In Lane	1.00		1.00	1.00		0.47	1.00		1.00	1.00		0.28
Lane Grp Cap(c), veh/h	189	332	419	771	0	417	319	744	828	228	664	666
V/C Ratio(X)	0.86	0.49	0.57	0.82	0.00	0.99	0.61	0.86	0.49	0.57	0.69	0.69
Avail Cap(c_a), veh/h	189	332	419	771	0	417	333	744	828	232	664	666
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	0.00	1.00	1.00	1.00	1.00	0.78	0.78	0.78
Uniform Delay (d), s/veh	35.1	36.9	31.7	30.4	0.0	37.9	19.7	27.3	15.0	22.5	26.2	26.2
Incr Delay (d2), s/veh	31.3	1.1	1.8	6.9	0.0	41.7	3.1	12.6	2.0	2.5	4.6	4.6
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	3.0	4.1	5.9	3.4	0.0	16.2	3.5	18.6	7.4	2.3	11.6	11.6
LnGrp Delay(d),s/veh	66.5	38.0	33.5	37.2	0.0	79.6	22.8	39.9	17.0	25.0	30.8	30.8
LnGrp LOS	E	D	C	D		E	C	D	B	C	C	C
Approach Vol, veh/h		565			1043			1239			1053	
Approach Delay, s/veh		44.3			54.0			29.8			30.1	
Approach LOS		D			D			C			C	
Timer	1	2	3	4	5	6	7	8				
Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	11.8	47.2	17.0	24.0	14.2	44.8	11.0	30.0				
Change Period (Y+Rc), s	5.5	* 6.9	4.5	6.0	5.5	* 6.9	4.5	6.0				
Max Green Setting (Gmax), s	6.5	* 40	12.5	18.0	9.5	* 37	6.5	24.0				
Max Q Clear Time (g_c+I1), s	6.5	33.8	14.5	15.2	8.7	24.2	8.5	25.7				
Green Ext Time (p_c), s	0.0	1.3	0.0	1.2	0.0	1.4	0.0	0.0				
Intersection Summary												
HCM 2010 Ctrl Delay			38.4									
HCM 2010 LOS			D									
Notes												
* HCM 2010 computational engine requires equal clearance times for the phases crossing the barrier.												

Lanes, Volumes, Timings
2: S. Limestone Street & John Street

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	100	190	130	210	200	110	160	730	110	100	740	90
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95	0.95
Frt			0.850			0.850			0.850		0.984	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1787	1881	1599	1787	1881	1599	1787	1881	1599	1787	3517	0
Flt Permitted	0.379			0.328			0.215			0.122		
Satd. Flow (perm)	713	1881	1599	617	1881	1599	404	1881	1599	230	3517	0
Satd. Flow (RTOR)			148			120			120		17	
Adj. Flow (vph)	109	207	141	228	217	120	174	793	120	109	804	98
Lane Group Flow (vph)	109	207	141	228	217	120	174	793	120	109	902	0
Turn Type	pm+pt	NA	Perm	pm+pt	NA	pm+ov	pm+pt	NA	pm+ov	pm+pt	NA	
Protected Phases	7	4		3	8	1	5	2	3	1	6	
Permitted Phases	4		4	8		8	2		2	6		
Total Split (s)	12.0	19.0	19.0	14.0	21.0	12.0	16.0	55.0	14.0	12.0	51.0	
Total Lost Time (s)	4.5	5.5	5.5	4.5	4.1	5.6	5.6	6.5	4.5	5.6	6.5	
Act Effect Green (s)	21.4	13.1	13.1	25.8	16.7	27.1	59.0	49.0	65.0	53.4	46.1	
Actuated g/C Ratio	0.21	0.13	0.13	0.26	0.17	0.27	0.59	0.49	0.65	0.53	0.46	
v/c Ratio	0.47	0.84	0.42	0.84	0.69	0.23	0.48	0.86	0.11	0.49	0.55	
Control Delay	35.0	71.6	10.1	59.1	52.0	6.5	9.6	22.6	1.0	17.1	21.0	
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Total Delay	35.0	71.6	10.1	59.1	52.0	6.5	9.6	22.6	1.0	17.1	21.0	
LOS	D	E	B	E	D	A	A	C	A	B	C	
Approach Delay		43.9			45.2			18.1			20.6	
Approach LOS		D			D			B			C	

Intersection Summary

Cycle Length: 100
 Actuated Cycle Length: 100
 Offset: 0 (0%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 0.86
 Intersection Signal Delay: 27.6
 Intersection LOS: C
 Intersection Capacity Utilization 83.7%
 ICU Level of Service E
 Analysis Period (min) 15

Splits and Phases: 2: S. Limestone Street & John Street



Queues
2: S. Limestone Street & John Street



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT
Lane Group Flow (vph)	109	207	141	228	217	120	174	793	120	109	902
v/c Ratio	0.47	0.84	0.42	0.84	0.69	0.23	0.48	0.86	0.11	0.49	0.55
Control Delay	35.0	71.6	10.1	59.1	52.0	6.5	9.6	22.6	1.0	17.1	21.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	35.0	71.6	10.1	59.1	52.0	6.5	9.6	22.6	1.0	17.1	21.0
Queue Length 50th (ft)	53	130	0	119	131	0	36	215	1	26	211
Queue Length 95th (ft)	97	#250	50	#201	#223	42	m43	m#453	m3	49	276
Internal Link Dist (ft)		892			573			2708			3361
Turn Bay Length (ft)	100		100	75			290			200	
Base Capacity (vph)	234	253	343	270	317	521	387	921	1080	222	1631
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.47	0.82	0.41	0.84	0.68	0.23	0.45	0.86	0.11	0.49	0.55

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.

Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.

HCM 2010 Signalized Intersection Summary
 2: S. Limestone Street & John Street

Limestone Street Corridor Study
 Scenario A

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	100	190	130	210	200	110	160	730	110	100	740	90
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1881	1881	1881	1881	1881	1881	1881	1881	1881	1881	1881	1900
Adj Flow Rate, veh/h	109	207	141	228	217	120	174	793	120	109	804	98
Adj No. of Lanes	1	1	1	1	1	1	1	1	1	1	2	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	1	1	1	1	1	1	1	1	1	1	1	1
Cap, veh/h	244	245	209	266	295	342	390	934	946	254	1555	190
Arrive On Green	0.07	0.13	0.13	0.09	0.16	0.16	0.07	0.50	0.50	0.06	0.48	0.48
Sat Flow, veh/h	1792	1881	1599	1792	1881	1599	1792	1881	1599	1792	3208	391
Grp Volume(v), veh/h	109	207	141	228	217	120	174	793	120	109	448	454
Grp Sat Flow(s),veh/h/ln	1792	1881	1599	1792	1881	1599	1792	1881	1599	1792	1787	1812
Q Serve(g_s), s	5.2	10.8	8.4	9.5	11.0	6.4	4.8	36.7	3.3	3.0	17.2	17.2
Cycle Q Clear(g_c), s	5.2	10.8	8.4	9.5	11.0	6.4	4.8	36.7	3.3	3.0	17.2	17.2
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		0.22
Lane Grp Cap(c), veh/h	244	245	209	266	295	342	390	934	946	254	866	878
V/C Ratio(X)	0.45	0.84	0.68	0.86	0.74	0.35	0.45	0.85	0.13	0.43	0.52	0.52
Avail Cap(c_a), veh/h	256	254	216	266	318	362	452	934	946	266	866	878
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	0.41	0.41	0.41	1.00	1.00	1.00
Uniform Delay (d), s/veh	34.6	42.5	41.5	36.5	40.2	33.4	13.1	21.9	9.0	18.8	17.7	17.7
Incr Delay (d2), s/veh	1.3	21.5	7.8	23.2	8.0	0.6	0.3	4.2	0.1	1.1	2.2	2.2
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	2.6	7.0	4.2	3.3	6.4	2.9	2.4	20.0	1.5	1.5	9.0	9.1
LnGrp Delay(d),s/veh	35.8	64.0	49.3	59.7	48.1	34.0	13.4	26.1	9.1	20.0	19.9	19.9
LnGrp LOS	D	E	D	E	D	C	B	C	A	B	B	B
Approach Vol, veh/h		457			565			1087			1011	
Approach Delay, s/veh		52.8			49.8			22.2			19.9	
Approach LOS		D			D			C			B	
Timer	1	2	3	4	5	6	7	8				
Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	11.3	56.2	14.0	18.5	12.5	55.0	11.3	21.2				
Change Period (Y+Rc), s	5.6	* 6.5	4.5	* 5.5	5.6	* 6.5	4.5	* 5.5				
Max Green Setting (Gmax), s	6.4	* 49	9.5	* 14	10.4	* 45	7.5	* 17				
Max Q Clear Time (g_c+I1), s	5.0	38.7	11.5	12.8	6.8	19.2	7.2	13.0				
Green Ext Time (p_c), s	0.0	7.1	0.0	0.3	0.1	13.7	0.0	1.3				

Intersection Summary												
HCM 2010 Ctrl Delay			30.9									
HCM 2010 LOS			C									

Notes

* HCM 2010 computational engine requires equal clearance times for the phases crossing the barrier.

Lanes, Volumes, Timings
3: Limestone Street & Clark Street/Selma Road

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	10	10	30	70	20	470	20	760	40	530	750	20
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95	0.95	1.00	1.00	1.00
Frt		0.919				0.850		0.993				0.996
Flt Protected		0.990			0.963		0.950			0.950		
Satd. Flow (prot)	0	1729	0	0	1830	1615	1787	3549	0	1787	1874	0
Flt Permitted		0.929			0.780		0.351			0.229		
Satd. Flow (perm)	0	1622	0	0	1482	1615	660	3549	0	431	1874	0
Satd. Flow (RTOR)		33				87		5			2	
Adj. Flow (vph)	11	11	33	76	22	511	22	826	43	576	815	22
Lane Group Flow (vph)	0	55	0	0	98	511	22	869	0	576	837	0
Turn Type	Perm	NA		Perm	NA	pm+ov	pm+pt	NA		pm+pt	NA	
Protected Phases		4			8	1	5	2		1	6	
Permitted Phases	4			8		8	2			6		
Total Split (s)	26.0	26.0		26.0	26.0	37.0	12.0	57.0		37.0	82.0	
Total Lost Time (s)		5.0			5.0	5.0	5.0	5.0		5.0	5.0	
Act Effct Green (s)		13.3			13.3	48.5	68.5	61.5		96.7	89.5	
Actuated g/C Ratio		0.11			0.11	0.40	0.57	0.51		0.81	0.75	
v/c Ratio		0.26			0.60	0.73	0.05	0.48		0.84	0.60	
Control Delay		26.4			64.9	30.0	7.8	21.6		33.2	15.4	
Queue Delay		0.0			0.0	0.0	0.0	0.0		2.5	1.1	
Total Delay		26.4			64.9	30.0	7.8	21.6		35.7	16.5	
LOS		C			E	C	A	C		D	B	
Approach Delay		26.4			35.6			21.2			24.3	
Approach LOS		C			D			C			C	

Intersection Summary

Cycle Length: 120
 Actuated Cycle Length: 120
 Offset: 23 (19%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 0.84
 Intersection Signal Delay: 25.7
 Intersection LOS: C
 Intersection Capacity Utilization 75.7%
 ICU Level of Service D
 Analysis Period (min) 15

Splits and Phases: 3: Limestone Street & Clark Street/Selma Road



Queues
3: Limestone Street & Clark Street/Selma Road






















Lane Group	EBT	WBT	WBR	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	55	98	511	22	869	576	837
v/c Ratio	0.26	0.60	0.73	0.05	0.48	0.84	0.60
Control Delay	26.4	64.9	30.0	7.8	21.6	33.2	15.4
Queue Delay	0.0	0.0	0.0	0.0	0.0	2.5	1.1
Total Delay	26.4	64.9	30.0	7.8	21.6	35.7	16.5
Queue Length 50th (ft)	16	73	264	4	231	326	294
Queue Length 95th (ft)	53	125	354	11	323	m430	423
Internal Link Dist (ft)	406	396			1987		380
Turn Bay Length (ft)				100		100	
Base Capacity (vph)	311	259	749	442	1822	728	1398
Starvation Cap Reductn	0	0	0	0	0	69	316
Spillback Cap Reductn	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0
Reduced v/c Ratio	0.18	0.38	0.68	0.05	0.48	0.87	0.77

Intersection Summary

m Volume for 95th percentile queue is metered by upstream signal.

HCM 2010 Signalized Intersection Summary
 3: Limestone Street & Clark Street/Selma Road

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	10	10	30	70	20	470	20	760	40	530	750	20
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1900	1900	1900	1900	1900	1900	1881	1881	1900	1881	1881	1900
Adj Flow Rate, veh/h	11	11	33	76	22	511	22	826	43	576	815	22
Adj No. of Lanes	0	1	0	0	1	1	1	2	0	1	1	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	0	0	0	0	0	0	1	1	1	1	1	1
Cap, veh/h	69	74	160	254	67	563	380	1820	95	613	1221	33
Arrive On Green	0.17	0.17	0.17	0.17	0.17	0.17	0.03	0.53	0.53	0.17	0.67	0.67
Sat Flow, veh/h	187	423	915	1147	384	1615	1792	3457	180	1792	1823	49
Grp Volume(v), veh/h	55	0	0	98	0	511	22	427	442	576	0	837
Grp Sat Flow(s),veh/h/ln	1525	0	0	1531	0	1615	1792	1787	1849	1792	0	1873
Q Serve(g_s), s	0.0	0.0	0.0	2.9	0.0	21.0	0.7	17.8	17.8	17.2	0.0	32.0
Cycle Q Clear(g_c), s	3.3	0.0	0.0	6.2	0.0	21.0	0.7	17.8	17.8	17.2	0.0	32.0
Prop In Lane	0.20		0.60	0.78		1.00	1.00		0.10	1.00		0.03
Lane Grp Cap(c), veh/h	303	0	0	321	0	563	380	941	974	613	0	1254
V/C Ratio(X)	0.18	0.00	0.00	0.31	0.00	0.91	0.06	0.45	0.45	0.94	0.00	0.67
Avail Cap(c_a), veh/h	303	0	0	321	0	563	430	941	974	780	0	1254
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	0.00	1.00	0.00	1.00	1.00	1.00	1.00	0.59	0.00	0.59
Uniform Delay (d), s/veh	42.2	0.0	0.0	43.2	0.0	37.3	12.9	17.7	17.7	16.2	0.0	11.8
Incr Delay (d2), s/veh	0.3	0.0	0.0	0.5	0.0	18.6	0.1	1.6	1.5	11.3	0.0	1.7
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.6	0.0	0.0	2.9	0.0	19.0	0.3	9.2	9.5	20.3	0.0	16.9
LnGrp Delay(d),s/veh	42.5	0.0	0.0	43.8	0.0	55.9	12.9	19.2	19.2	27.5	0.0	13.5
LnGrp LOS	D			D		E	B	B	B	C		B
Approach Vol, veh/h		55			609			891			1413	
Approach Delay, s/veh		42.5			54.0			19.1			19.2	
Approach LOS		D			D			B			B	
Timer	1	2	3	4	5	6	7	8				
Assigned Phs	1	2		4	5	6		8				
Phs Duration (G+Y+Rc), s	25.8	68.2		26.0	8.6	85.4		26.0				
Change Period (Y+Rc), s	5.0	5.0		5.0	5.0	5.0		5.0				
Max Green Setting (Gmax), s	32.0	52.0		21.0	7.0	77.0		21.0				
Max Q Clear Time (g_c+I1), s	19.2	19.8		5.3	2.7	34.0		23.0				
Green Ext Time (p_c), s	1.6	15.1		2.7	0.0	16.9		0.0				
Intersection Summary												
HCM 2010 Ctrl Delay			26.7									
HCM 2010 LOS			C									



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↖	↑	↗	↖↗	↖		↖	↑	↗	↖	↗	
Volume (vph)	10	130	290	850	130	10	200	240	800	20	160	30
Lane Util. Factor	1.00	1.00	1.00	0.97	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt			0.850		0.989				0.850		0.976	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1770	1863	1583	3433	1842	0	1770	1863	1583	1770	1818	0
Flt Permitted	0.660			0.950			0.308			0.598		
Satd. Flow (perm)	1229	1863	1583	3433	1842	0	574	1863	1583	1114	1818	0
Satd. Flow (RTOR)			136		4				624		7	
Adj. Flow (vph)	11	141	315	924	141	11	217	261	870	22	174	33
Lane Group Flow (vph)	11	141	315	924	152	0	217	261	870	22	207	0
Turn Type	pm+pt	NA	pm+ov	Prot	NA		pm+pt	NA	pm+ov	pm+pt	NA	
Protected Phases	7	4	5	3	8		5	2	3	1	6	
Permitted Phases	4		4				2		2	6		
Total Split (s)	22.0	23.0	26.0	45.0	46.0		26.0	30.0	45.0	22.0	26.0	
Total Lost Time (s)	6.0	6.0	6.0	6.0	6.0		6.0	6.0	6.0	6.0	6.0	
Act Effect Green (s)	25.4	18.4	40.0	37.6	59.4		46.0	38.0	81.6	31.6	24.4	
Actuated g/C Ratio	0.21	0.15	0.33	0.31	0.50		0.38	0.32	0.68	0.26	0.20	
v/c Ratio	0.04	0.49	0.51	0.86	0.17		0.58	0.44	0.68	0.07	0.55	
Control Delay	20.6	53.9	20.6	47.9	17.9		37.0	41.2	7.2	24.9	49.0	
Queue Delay	0.0	0.0	0.3	0.0	0.0		0.0	0.0	0.1	0.0	0.0	
Total Delay	20.6	53.9	20.9	47.9	17.9		37.0	41.2	7.3	24.9	49.0	
LOS	C	D	C	D	B		D	D	A	C	D	
Approach Delay		30.8			43.7			18.7			46.6	
Approach LOS		C			D			B			D	

Intersection Summary

Cycle Length: 120

Actuated Cycle Length: 120

Offset: 14 (12%), Referenced to phase 2:NRTL, Start of Green

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.86

Intersection Signal Delay: 31.2

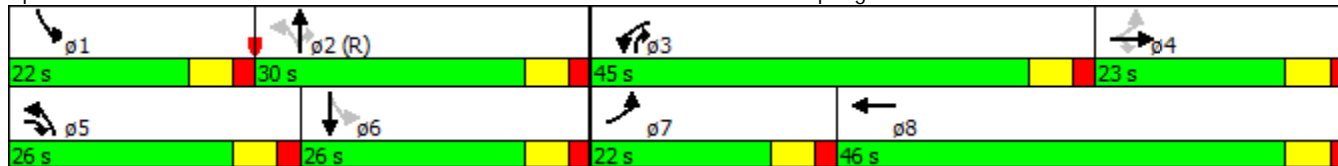
Intersection LOS: C

Intersection Capacity Utilization 80.4%

ICU Level of Service D

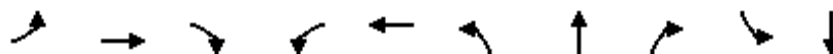
Analysis Period (min) 15

Splits and Phases: 14: Limestone Street/S. Limestone Street & Pleasant Street/Spring Street



Queues

14: Limestone Street/S. Limestone Street & Pleasant Street/Spring Street



Lane Group	EBL	EBT	EBR	WBL	WBT	NBL	NBT	NBR	SBL	SBT
Lane Group Flow (vph)	11	141	315	924	152	217	261	870	22	207
v/c Ratio	0.04	0.49	0.51	0.86	0.17	0.58	0.44	0.68	0.07	0.55
Control Delay	20.6	53.9	20.6	47.9	17.9	37.0	41.2	7.2	24.9	49.0
Queue Delay	0.0	0.0	0.3	0.0	0.0	0.0	0.0	0.1	0.0	0.0
Total Delay	20.6	53.9	20.9	47.9	17.9	37.0	41.2	7.3	24.9	49.0
Queue Length 50th (ft)	4	103	110	339	58	117	151	106	11	140
Queue Length 95th (ft)	14	171	190	422	121	214	266	145	28	232
Internal Link Dist (ft)		434			542		380			488
Turn Bay Length (ft)			200			100				
Base Capacity (vph)	425	285	671	1115	913	419	590	1287	462	375
Starvation Cap Reductn	0	0	0	0	0	0	0	23	0	0
Spillback Cap Reductn	0	0	73	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.03	0.49	0.53	0.83	0.17	0.52	0.44	0.69	0.05	0.55

Intersection Summary

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	10	130	290	850	130	10	200	240	800	20	160	30
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1863	1863	1863	1900	1863	1863	1863	1863	1863	1900
Adj Flow Rate, veh/h	11	141	315	924	141	11	217	261	870	22	174	33
Adj No. of Lanes	1	1	1	2	1	0	1	1	1	1	1	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	338	264	392	1010	643	50	439	571	950	259	394	75
Arrive On Green	0.06	0.14	0.14	0.29	0.38	0.38	0.11	0.31	0.31	0.06	0.26	0.26
Sat Flow, veh/h	1774	1863	1583	3442	1706	133	1774	1863	1583	1774	1523	289
Grp Volume(v), veh/h	11	141	315	924	0	152	217	261	870	22	0	207
Grp Sat Flow(s),veh/h/ln	1774	1863	1583	1721	0	1839	1774	1863	1583	1774	0	1812
Q Serve(g_s), s	0.6	8.4	17.0	31.1	0.0	6.7	10.4	13.6	36.8	1.0	0.0	11.5
Cycle Q Clear(g_c), s	0.6	8.4	17.0	31.1	0.0	6.7	10.4	13.6	36.8	1.0	0.0	11.5
Prop In Lane	1.00		1.00	1.00		0.07	1.00		1.00	1.00		0.16
Lane Grp Cap(c), veh/h	338	264	392	1010	0	693	439	571	950	259	0	469
V/C Ratio(X)	0.03	0.53	0.80	0.92	0.00	0.22	0.49	0.46	0.92	0.08	0.00	0.44
Avail Cap(c_a), veh/h	471	264	392	1119	0	693	547	571	950	393	0	469
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	0.00	1.00	0.80	0.80	0.80	1.00	0.00	1.00
Uniform Delay (d), s/veh	38.6	47.8	42.4	41.0	0.0	25.4	27.2	33.5	21.3	28.6	0.0	37.2
Incr Delay (d2), s/veh	0.0	2.1	11.5	10.9	0.0	0.7	0.7	2.1	12.4	0.1	0.0	0.7
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.3	4.5	11.1	16.3	0.0	3.6	5.1	7.3	28.6	0.5	0.0	5.8
LnGrp Delay(d),s/veh	38.7	49.9	53.9	51.8	0.0	26.1	27.9	35.6	33.7	28.7	0.0	37.9
LnGrp LOS	D	D	D	D		C	C	D	C	C		D
Approach Vol, veh/h		467			1076			1348			229	
Approach Delay, s/veh		52.3			48.2			33.2			37.0	
Approach LOS		D			D			C			D	
Timer	1	2	3	4	5	6	7	8				
Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	13.0	42.8	41.2	23.0	18.7	37.1	13.0	51.2				
Change Period (Y+Rc), s	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0				
Max Green Setting (Gmax), s	16.0	24.0	39.0	17.0	20.0	20.0	16.0	40.0				
Max Q Clear Time (g_c+I1), s	3.0	38.8	33.1	19.0	12.4	13.5	2.6	8.7				
Green Ext Time (p_c), s	0.0	0.0	2.1	0.0	0.4	3.6	0.0	2.9				
Intersection Summary												
HCM 2010 Ctrl Delay			41.5									
HCM 2010 LOS			D									

MOVEMENT SUMMARY

Site: Limestone and Grand - PM
Peak - NEW HCM

Limestone Street and Grand Avenue
Roundabout

Movement Performance - Vehicles											
Mov ID	Turn	Demand Flow veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Queue Distance ft	Prop. Queued	Effective Stop Rate per veh	Average Speed mph
South: Limestone Street											
3	L	22	3.0	0.722	13.2	LOS B	9.1	232.3	0.36	0.77	24.0
8	T	880	3.0	0.722	13.2	LOS B	9.1	232.3	0.36	0.41	26.0
18	R	33	3.0	0.722	13.2	LOS B	9.1	232.3	0.36	0.48	25.7
Approach		935	3.0	0.722	13.2	LOS B	9.1	232.3	0.36	0.42	26.0
East: Grand Avenue											
1	L	22	3.0	0.127	8.7	LOS A	0.5	12.0	0.66	0.95	25.9
6	T	22	3.0	0.127	8.7	LOS A	0.5	12.0	0.66	0.80	28.1
16	R	22	3.0	0.127	8.7	LOS A	0.5	12.0	0.66	0.83	27.8
Approach		65	3.0	0.127	8.7	LOS A	0.5	12.0	0.66	0.86	27.2
North: Limestone Street											
7	L	11	3.0	0.747	14.6	LOS B	9.3	239.2	0.54	0.72	23.6
4	T	902	3.0	0.747	14.6	LOS B	9.3	239.2	0.54	0.47	25.4
14	R	22	3.0	0.747	14.6	LOS B	9.3	239.2	0.54	0.52	25.1
Approach		935	3.0	0.747	14.6	LOS B	9.3	239.2	0.54	0.47	25.4
West: Grand Avenue											
5	L	11	3.0	0.108	8.6	LOS A	0.4	10.1	0.66	0.95	26.0
2	T	11	3.0	0.108	8.6	LOS A	0.4	10.1	0.66	0.80	28.2
12	R	33	3.0	0.108	8.6	LOS A	0.4	10.1	0.66	0.83	27.9
Approach		54	3.0	0.108	8.6	LOS A	0.4	10.1	0.66	0.85	27.5
All Vehicles		1989	3.0	0.747	13.6	LOS B	9.3	239.2	0.46	0.47	25.8

Level of Service (LOS) Method: Delay & v/c (HCM 2010).

Roundabout LOS Method: Same as Sign Control.

Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement

LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).

Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 2010).

Roundabout Capacity Model: US HCM 2010.

HCM Delay Model used. Geometric Delay not included.

Processed: Friday, July 08, 2016 9:08:26 AM

SIDRA INTERSECTION 5.1.13.2093

Project: P:\PR54693\Intersection Alternatives\Limestone_Grand.sip

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INTERSECTION

Scenario B Analysis Output

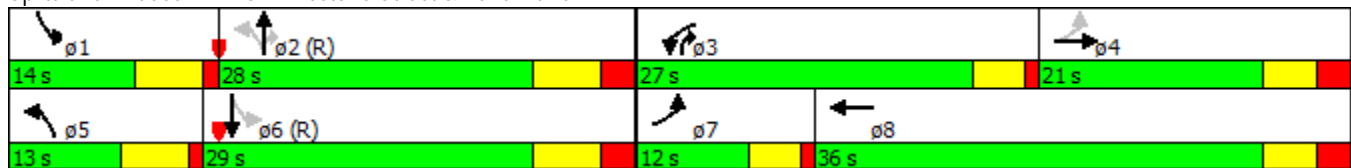
Lanes, Volumes, Timings
1: S. Limestone Street & Leffel Lane

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	100	150	170	230	120	60	180	600	710	190	360	120
Lane Util. Factor	1.00	0.95	0.95	0.97	0.95	0.95	1.00	0.95	1.00	1.00	0.95	0.95
Fr _t		0.920			0.950				0.850		0.963	
Fl _t Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1703	3133	0	3213	3146	0	1736	3471	1553	1770	3408	0
Fl _t Permitted	0.629			0.950			0.410			0.289		
Satd. Flow (perm)	1127	3133	0	3213	3146	0	749	3471	1553	538	3408	0
Satd. Flow (RTOR)		185			65				281		48	
Adj. Flow (vph)	109	163	185	250	130	65	196	652	772	207	391	130
Lane Group Flow (vph)	109	348	0	250	195	0	196	652	772	207	521	0
Turn Type	pm+pt	NA		Prot	NA		pm+pt	NA	pm+ov	pm+pt	NA	
Protected Phases	7	4		3	8		5	2	3	1	6	
Permitted Phases	4						2		2	6		
Total Split (s)	12.0	21.0		27.0	36.0		13.0	28.0	27.0	14.0	29.0	
Total Lost Time (s)	4.5	6.0		4.5	6.0		5.5	6.9	4.5	5.5	6.9	
Act Effct Green (s)	19.3	10.5		17.0	22.4		40.0	29.5	53.5	41.9	30.5	
Actuated g/C Ratio	0.21	0.12		0.19	0.25		0.44	0.33	0.59	0.47	0.34	
v/c Ratio	0.38	0.66		0.41	0.23		0.45	0.57	0.75	0.53	0.44	
Control Delay	22.4	23.4		32.9	17.3		19.2	30.0	14.1	23.7	22.3	
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	
Total Delay	22.4	23.4		32.9	17.3		19.2	30.0	14.1	23.7	22.3	
LOS	C	C		C	B		B	C	B	C	C	
Approach Delay		23.1			26.0			21.1			22.7	
Approach LOS		C			C			C			C	

Intersection Summary

Cycle Length: 90
 Actuated Cycle Length: 90
 Offset: 64 (71%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 0.75
 Intersection Signal Delay: 22.4
 Intersection LOS: C
 Intersection Capacity Utilization 77.4%
 ICU Level of Service D
 Analysis Period (min) 15

Splits and Phases: 1: S. Limestone Street & Leffel Lane



Queues
1: S. Limestone Street & Leffel Lane



Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	NBR	SBL	SBT
Lane Group Flow (vph)	109	348	250	195	196	652	772	207	521
v/c Ratio	0.38	0.66	0.41	0.23	0.45	0.57	0.75	0.53	0.44
Control Delay	22.4	23.4	32.9	17.3	19.2	30.0	14.1	23.7	22.3
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	22.4	23.4	32.9	17.3	19.2	30.0	14.1	23.7	22.3
Queue Length 50th (ft)	39	46	62	30	61	173	198	42	50
Queue Length 95th (ft)	63	86	92	52	123	#254	378	m#144	144
Internal Link Dist (ft)		1055		1032		571			2708
Turn Bay Length (ft)	160		330		340			270	
Base Capacity (vph)	292	676	803	1092	434	1138	1113	390	1185
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.37	0.51	0.31	0.18	0.45	0.57	0.69	0.53	0.44

Intersection Summary




























95th percentile volume exceeds capacity, queue may be longer.

Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.

HCM 2010 Signalized Intersection Summary
 1: S. Limestone Street & Leffel Lane

Limestone Street Corridor Study
 Scenario B

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		 		 	 			 			 	
Volume (veh/h)	100	150	170	230	120	60	180	600	710	190	360	120
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1792	1792	1900	1743	1743	1900	1827	1827	1827	1863	1863	1900
Adj Flow Rate, veh/h	109	163	185	250	130	65	196	652	772	207	391	130
Adj No. of Lanes	1	2	0	2	2	0	1	2	1	1	2	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	6	6	6	9	9	9	4	4	4	2	2	2
Cap, veh/h	346	253	226	338	398	189	486	1399	789	337	1071	352
Arrive On Green	0.07	0.15	0.15	0.11	0.18	0.18	0.08	0.40	0.40	0.09	0.41	0.41
Sat Flow, veh/h	1707	1703	1524	3221	2181	1035	1740	3471	1553	1774	2620	861
Grp Volume(v), veh/h	109	163	185	250	97	98	196	652	772	207	263	258
Grp Sat Flow(s),veh/h/ln	1707	1703	1524	1610	1656	1560	1740	1736	1553	1774	1770	1711
Q Serve(g_s), s	4.8	8.1	10.6	6.8	4.6	4.9	5.9	12.4	36.3	6.0	9.3	9.5
Cycle Q Clear(g_c), s	4.8	8.1	10.6	6.8	4.6	4.9	5.9	12.4	36.3	6.0	9.3	9.5
Prop In Lane	1.00		1.00	1.00		0.66	1.00		1.00	1.00		0.50
Lane Grp Cap(c), veh/h	346	253	226	338	303	285	486	1399	789	337	723	699
V/C Ratio(X)	0.31	0.65	0.82	0.74	0.32	0.34	0.40	0.47	0.98	0.61	0.36	0.37
Avail Cap(c_a), veh/h	368	284	254	805	552	520	486	1399	789	347	723	699
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.88	0.88	0.88
Uniform Delay (d), s/veh	29.3	36.1	37.1	39.1	31.9	32.1	14.0	19.7	21.7	15.1	18.5	18.5
Incr Delay (d2), s/veh	0.5	4.2	17.1	3.2	0.6	0.7	0.5	1.1	27.2	2.7	1.2	1.3
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	2.3	4.1	5.5	3.2	2.2	2.2	2.8	6.2	24.5	3.1	4.8	4.7
LnGrp Delay(d),s/veh	29.9	40.3	54.2	42.3	32.5	32.8	14.5	20.9	48.9	17.8	19.7	19.8
LnGrp LOS	C	D	D	D	C	C	B	C	D	B	B	B
Approach Vol, veh/h		457			445			1620			728	
Approach Delay, s/veh		43.4			38.0			33.4			19.2	
Approach LOS		D			D			C			B	
Timer	1	2	3	4	5	6	7	8				
Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	13.5	43.2	14.0	19.4	13.0	43.7	10.9	22.4				
Change Period (Y+Rc), s	5.5	* 6.9	4.5	6.0	5.5	* 6.9	4.5	6.0				
Max Green Setting (Gmax), s	8.5	* 21	22.5	15.0	7.5	* 22	7.5	30.0				
Max Q Clear Time (g_c+I1), s	8.0	38.3	8.8	12.6	7.9	11.5	6.8	6.9				
Green Ext Time (p_c), s	0.0	0.0	0.7	0.8	0.0	1.1	0.0	3.2				
Intersection Summary												
HCM 2010 Ctrl Delay			32.3									
HCM 2010 LOS			C									
Notes												
* HCM 2010 computational engine requires equal clearance times for the phases crossing the barrier.												

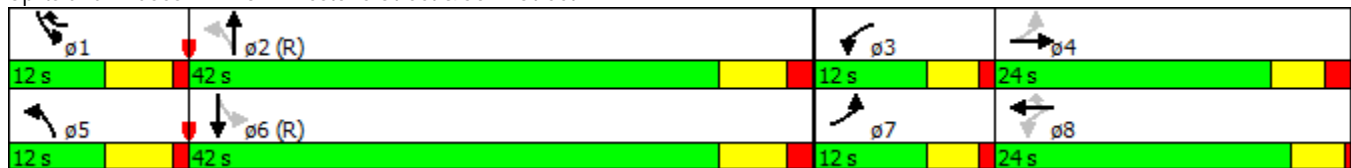
Lanes, Volumes, Timings
2: S. Limestone Street & John Street

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	80	160	90	160	150	60	70	570	130	80	520	70
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95	0.95	1.00	0.95	0.95
Frt		0.946				0.850		0.972			0.982	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1736	1728	0	1736	1827	1553	1770	3440	0	1752	3442	0
Flt Permitted	0.603			0.332			0.349			0.282		
Satd. Flow (perm)	1102	1728	0	607	1827	1553	650	3440	0	520	3442	0
Satd. Flow (RTOR)		28				97		36			19	
Adj. Flow (vph)	87	174	98	174	163	65	76	620	141	87	565	76
Lane Group Flow (vph)	87	272	0	174	163	65	76	761	0	87	641	0
Turn Type	pm+pt	NA		pm+pt	NA	pm+ov	pm+pt	NA		pm+pt	NA	
Protected Phases	7	4		3	8	1	5	2		1	6	
Permitted Phases	4			8		8	2			6		
Total Split (s)	12.0	24.0		12.0	24.0	12.0	12.0	42.0		12.0	42.0	
Total Lost Time (s)	4.5	5.5		4.5	4.1	5.6	5.6	6.5		5.6	6.5	
Act Effect Green (s)	24.7	16.5		25.9	20.3	30.8	45.9	39.8		46.0	39.9	
Actuated g/C Ratio	0.27	0.18		0.29	0.23	0.34	0.51	0.44		0.51	0.44	
v/c Ratio	0.25	0.80		0.65	0.40	0.11	0.19	0.49		0.25	0.42	
Control Delay	22.6	49.8		35.3	33.5	2.4	8.3	11.7		6.0	7.9	
Queue Delay	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Total Delay	22.6	49.8		35.3	33.5	2.4	8.3	11.7		6.0	7.9	
LOS	C	D		D	C	A	A	B		A	A	
Approach Delay		43.2			29.3			11.4			7.7	
Approach LOS		D			C			B			A	

Intersection Summary

Cycle Length: 90
 Actuated Cycle Length: 90
 Offset: 9 (10%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 0.80
 Intersection Signal Delay: 18.2
 Intersection LOS: B
 Intersection Capacity Utilization 65.8%
 ICU Level of Service C
 Analysis Period (min) 15

Splits and Phases: 2: S. Limestone Street & John Street



Queues
2: S. Limestone Street & John Street



Lane Group	EBL	EBT	WBL	WBT	WBR	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	87	272	174	163	65	76	761	87	641
v/c Ratio	0.25	0.80	0.65	0.40	0.11	0.19	0.49	0.25	0.42
Control Delay	22.6	49.8	35.3	33.5	2.4	8.3	11.7	6.0	7.9
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	22.6	49.8	35.3	33.5	2.4	8.3	11.7	6.0	7.9
Queue Length 50th (ft)	34	131	71	80	0	10	54	5	21
Queue Length 95th (ft)	67	#239	#124	139	14	m25	114	21	47
Internal Link Dist (ft)		892		573			2708		3361
Turn Bay Length (ft)	100		75			290		200	
Base Capacity (vph)	358	377	268	423	596	411	1542	354	1535
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.24	0.72	0.65	0.39	0.11	0.18	0.49	0.25	0.42

Intersection Summary






















95th percentile volume exceeds capacity, queue may be longer.

Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.

HCM 2010 Signalized Intersection Summary
2: S. Limestone Street & John Street

Limestone Street Corridor Study
Scenario B

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	80	160	90	160	150	60	70	570	130	80	520	70
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1827	1827	1900	1827	1827	1827	1863	1863	1900	1845	1845	1900
Adj Flow Rate, veh/h	87	174	98	174	163	65	76	620	141	87	565	76
Adj No. of Lanes	1	1	0	1	1	1	1	2	0	1	2	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	4	4	4	4	4	4	2	2	2	3	3	3
Cap, veh/h	330	202	114	258	380	415	419	1227	279	371	1337	179
Arrive On Green	0.06	0.18	0.18	0.08	0.21	0.21	0.06	0.43	0.43	0.06	0.43	0.43
Sat Flow, veh/h	1740	1099	619	1740	1827	1553	1774	2867	651	1757	3107	417
Grp Volume(v), veh/h	87	0	272	174	163	65	76	382	379	87	318	323
Grp Sat Flow(s),veh/h/ln	1740	0	1718	1740	1827	1553	1774	1770	1748	1757	1752	1771
Q Serve(g_s), s	3.6	0.0	13.8	7.3	7.0	2.9	2.1	14.2	14.2	2.4	11.4	11.4
Cycle Q Clear(g_c), s	3.6	0.0	13.8	7.3	7.0	2.9	2.1	14.2	14.2	2.4	11.4	11.4
Prop In Lane	1.00		0.36	1.00		1.00	1.00		0.37	1.00		0.24
Lane Grp Cap(c), veh/h	330	0	316	258	380	415	419	757	748	371	754	762
V/C Ratio(X)	0.26	0.00	0.86	0.67	0.43	0.16	0.18	0.50	0.51	0.23	0.42	0.42
Avail Cap(c_a), veh/h	372	0	353	258	404	435	444	757	748	393	754	762
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	1.00	1.00	0.82	0.82	0.82	0.97	0.97	0.97
Uniform Delay (d), s/veh	27.3	0.0	35.6	28.1	31.0	25.2	13.3	18.8	18.8	13.7	17.8	17.9
Incr Delay (d2), s/veh	0.4	0.0	17.6	6.8	0.8	0.2	0.2	2.0	2.0	0.3	1.7	1.7
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.8	0.0	8.1	4.0	3.6	1.2	1.0	7.3	7.3	1.2	5.8	5.9
LnGrp Delay(d),s/veh	27.7	0.0	53.2	34.9	31.7	25.4	13.4	20.7	20.8	14.1	19.5	19.5
LnGrp LOS	C		D	C	C	C	B	C	C	B	B	B
Approach Vol, veh/h		359			402			837			728	
Approach Delay, s/veh		47.0			32.1			20.1			18.9	
Approach LOS		D			C			C			B	
Timer	1	2	3	4	5	6	7	8				
Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	10.9	45.0	12.0	22.1	10.7	45.2	9.8	24.2				
Change Period (Y+Rc), s	5.6	* 6.5	4.5	* 5.5	5.6	* 6.5	4.5	* 5.5				
Max Green Setting (Gmax), s	6.4	* 36	7.5	* 19	6.4	* 36	7.5	* 20				
Max Q Clear Time (g_c+I1), s	4.4	16.2	9.3	15.8	4.1	13.4	5.6	9.0				
Green Ext Time (p_c), s	0.0	8.6	0.0	0.7	0.0	9.2	0.0	2.1				
Intersection Summary												
HCM 2010 Ctrl Delay			25.9									
HCM 2010 LOS			C									
Notes												
* HCM 2010 computational engine requires equal clearance times for the phases crossing the barrier.												

Lanes, Volumes, Timings
3: S. Limestone Street & Grand Avenue

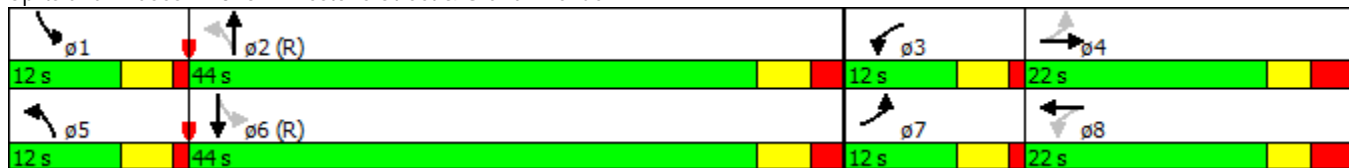


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↖	↗		↖	↗		↖	↕		↖	↗	
Volume (vph)	10	20	20	30	10	20	20	660	30	10	650	10
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95	0.95	1.00	0.95	0.95
Frt		0.925			0.900			0.993			0.998	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1656	1612	0	1612	1527	0	1752	3480	0	1736	3464	0
Flt Permitted	0.736			0.503			0.349			0.353		
Satd. Flow (perm)	1283	1612	0	853	1527	0	644	3480	0	645	3464	0
Satd. Flow (RTOR)		22			22			6			2	
Adj. Flow (vph)	11	22	22	33	11	22	22	717	33	11	707	11
Lane Group Flow (vph)	11	44	0	33	33	0	22	750	0	11	718	0
Turn Type	pm+pt	NA		pm+pt	NA		pm+pt	NA		pm+pt	NA	
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases	4			8			2			6		
Total Split (s)	12.0	22.0		12.0	22.0		12.0	44.0		12.0	44.0	
Total Lost Time (s)	4.5	5.8		4.5	5.8		4.5	5.9		4.5	5.9	
Act Effect Green (s)	12.0	7.7		14.4	12.5		69.2	68.9		68.1	66.7	
Actuated g/C Ratio	0.13	0.09		0.16	0.14		0.77	0.77		0.76	0.74	
v/c Ratio	0.06	0.28		0.17	0.14		0.04	0.28		0.02	0.28	
Control Delay	26.9	27.9		29.8	19.7		11.7	13.7		11.7	17.9	
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay	26.9	27.9		29.8	19.7		11.7	13.7		11.7	17.9	
LOS	C	C		C	B		B	B		B	B	
Approach Delay		27.7			24.8			13.6			17.9	
Approach LOS		C			C			B			B	

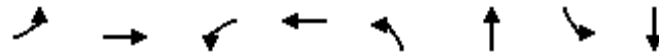
Intersection Summary

Cycle Length: 90
 Actuated Cycle Length: 90
 Offset: 54 (60%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 0.28
 Intersection Signal Delay: 16.4
 Intersection LOS: B
 Intersection Capacity Utilization 37.3%
 ICU Level of Service A
 Analysis Period (min) 15

Splits and Phases: 3: S. Limestone Street & Grand Avenue



Queues
3: S. Limestone Street & Grand Avenue























Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	11	44	33	33	22	750	11	718
v/c Ratio	0.06	0.28	0.17	0.14	0.04	0.28	0.02	0.28
Control Delay	26.9	27.9	29.8	19.7	11.7	13.7	11.7	17.9
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	26.9	27.9	29.8	19.7	11.7	13.7	11.7	17.9
Queue Length 50th (ft)	5	12	15	5	8	172	5	195
Queue Length 95th (ft)	18	43	38	33	m16	201	m9	275
Internal Link Dist (ft)		727		835		3361		2364
Turn Bay Length (ft)	25		25		150		100	
Base Capacity (vph)	219	308	205	312	589	2664	583	2566
Starvation Cap Reductn	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.05	0.14	0.16	0.11	0.04	0.28	0.02	0.28

Intersection Summary

m Volume for 95th percentile queue is metered by upstream signal.

HCM 2010 Signalized Intersection Summary
3: S. Limestone Street & Grand Avenue

Limestone Street Corridor Study
Scenario B

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	10	20	20	30	10	20	20	660	30	10	650	10
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1743	1743	1900	1696	1696	1900	1845	1845	1900	1827	1827	1900
Adj Flow Rate, veh/h	11	22	22	33	11	22	22	717	33	11	707	11
Adj No. of Lanes	1	1	0	1	1	0	1	2	0	1	2	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	9	9	9	12	12	12	3	3	3	4	4	4
Cap, veh/h	195	55	55	193	46	92	522	2209	102	493	2222	35
Arrive On Green	0.02	0.07	0.07	0.04	0.09	0.09	0.03	0.65	0.65	0.02	0.64	0.64
Sat Flow, veh/h	1660	801	801	1616	506	1012	1757	3412	157	1740	3498	54
Grp Volume(v), veh/h	11	0	44	33	0	33	22	368	382	11	351	367
Grp Sat Flow(s),veh/h/ln	1660	0	1602	1616	0	1518	1757	1752	1817	1740	1736	1817
Q Serve(g_s), s	0.5	0.0	2.4	1.7	0.0	1.8	0.4	8.4	8.4	0.2	8.3	8.3
Cycle Q Clear(g_c), s	0.5	0.0	2.4	1.7	0.0	1.8	0.4	8.4	8.4	0.2	8.3	8.3
Prop In Lane	1.00		0.50	1.00		0.67	1.00		0.09	1.00		0.03
Lane Grp Cap(c), veh/h	195	0	111	193	0	137	522	1134	1176	493	1102	1154
V/C Ratio(X)	0.06	0.00	0.40	0.17	0.00	0.24	0.04	0.32	0.32	0.02	0.32	0.32
Avail Cap(c_a), veh/h	307	0	288	268	0	273	619	1134	1176	610	1102	1154
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	0.00	1.00	0.90	0.90	0.90	0.76	0.76	0.76
Uniform Delay (d), s/veh	37.9	0.0	40.1	36.7	0.0	38.0	5.6	7.1	7.1	5.8	7.5	7.5
Incr Delay (d2), s/veh	0.1	0.0	2.3	0.4	0.0	0.9	0.0	0.7	0.7	0.0	0.6	0.6
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.3	0.0	1.1	0.8	0.0	0.8	0.2	4.2	4.4	0.1	4.1	4.3
LnGrp Delay(d),s/veh	38.0	0.0	42.4	37.1	0.0	38.9	5.6	7.8	7.7	5.8	8.1	8.1
LnGrp LOS	D		D	D		D	A	A	A	A	A	A
Approach Vol, veh/h		55			66			772			729	
Approach Delay, s/veh		41.5			38.0			7.7			8.0	
Approach LOS		D			D			A			A	
Timer	1	2	3	4	5	6	7	8				
Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	5.9	64.2	7.9	12.0	7.0	63.1	5.9	14.0				
Change Period (Y+Rc), s	4.5	* 5.9	4.5	* 5.8	4.5	* 5.9	4.5	* 5.8				
Max Green Setting (Gmax), s	7.5	* 38	7.5	* 16	7.5	* 38	7.5	* 16				
Max Q Clear Time (g_c+I1), s	2.2	10.4	3.7	4.4	2.4	10.3	2.5	3.8				
Green Ext Time (p_c), s	0.0	10.5	0.0	0.2	0.0	10.6	0.0	0.2				
Intersection Summary												
HCM 2010 Ctrl Delay			10.2									
HCM 2010 LOS			B									
Notes												
* HCM 2010 computational engine requires equal clearance times for the phases crossing the barrier.												

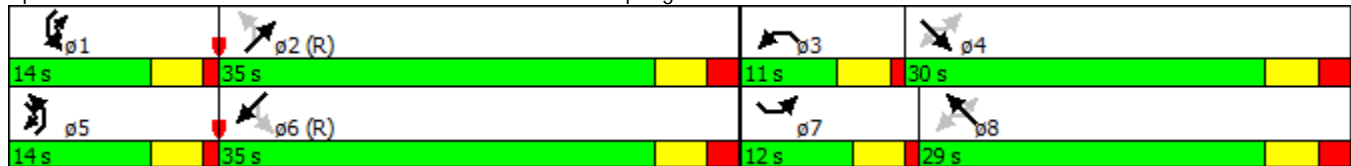
Lanes, Volumes, Timings
 4: S. Limestone Street & Selma Road & Spring Street

Lane Group	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Volume (vph)	110	250	70	60	270	190	110	530	50	110	560	180
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95	0.95	1.00	0.95	0.95
Frt			0.850			0.850		0.987			0.963	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1752	1845	1568	1736	1827	1553	1770	3493	0	1752	3375	0
Flt Permitted	0.382			0.510			0.196			0.302		
Satd. Flow (perm)	705	1845	1568	932	1827	1553	365	3493	0	557	3375	0
Satd. Flow (RTOR)			88			176		12			51	
Adj. Flow (vph)	120	272	76	65	293	207	120	576	54	120	609	196
Lane Group Flow (vph)	120	272	76	65	293	207	120	630	0	120	805	0
Turn Type	pm+pt	NA	pm+ov	pm+pt	NA	pm+ov	pm+pt	NA		pm+pt	NA	
Protected Phases	7	4	5	3	8	1	5	2		1	6	
Permitted Phases	4		4	8		8	2			6		
Total Split (s)	12.0	30.0	14.0	11.0	29.0	14.0	14.0	35.0		14.0	35.0	
Total Lost Time (s)	4.5	5.9	4.5	4.5	5.9	4.5	4.5	5.8		4.5	5.8	
Act Effect Green (s)	33.7	26.3	40.6	31.1	23.3	37.6	40.0	30.3		40.0	30.3	
Actuated g/C Ratio	0.37	0.29	0.45	0.35	0.26	0.42	0.44	0.34		0.44	0.34	
v/c Ratio	0.34	0.50	0.10	0.17	0.62	0.28	0.41	0.53		0.34	0.69	
Control Delay	20.2	31.5	3.2	18.0	36.2	4.9	15.7	24.2		15.3	27.9	
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Total Delay	20.2	31.5	3.2	18.0	36.2	4.9	15.7	24.2		15.3	27.9	
LOS	C	C	A	B	D	A	B	C		B	C	
Approach Delay		24.0			22.7			22.8			26.3	
Approach LOS		C			C			C			C	

Intersection Summary

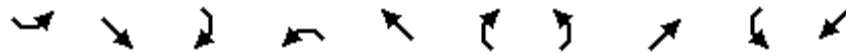
Cycle Length: 90
 Actuated Cycle Length: 90
 Offset: 51 (57%), Referenced to phase 2:NETL and 6:SWTL, Start of Green
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 0.69
 Intersection Signal Delay: 24.2
 Intersection LOS: C
 Intersection Capacity Utilization 64.9%
 ICU Level of Service C
 Analysis Period (min) 15

Splits and Phases: 4: S. Limestone Street & Selma Road & Spring Street



Queues
























4: S. Limestone Street & Selma Road & Spring Street



Lane Group	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	SWL	SWT
Lane Group Flow (vph)	120	272	76	65	293	207	120	630	120	805
v/c Ratio	0.34	0.50	0.10	0.17	0.62	0.28	0.41	0.53	0.34	0.69
Control Delay	20.2	31.5	3.2	18.0	36.2	4.9	15.7	24.2	15.3	27.9
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	20.2	31.5	3.2	18.0	36.2	4.9	15.7	24.2	15.3	27.9
Queue Length 50th (ft)	43	133	0	22	148	10	55	192	35	194
Queue Length 95th (ft)	79	212	20	48	234	51	76	256	66	264
Internal Link Dist (ft)		168			702			2364		1238
Turn Bay Length (ft)				150		150	75		240	
Base Capacity (vph)	351	539	773	381	473	768	315	1185	380	1171
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.34	0.50	0.10	0.17	0.62	0.27	0.38	0.53	0.32	0.69

Intersection Summary

HCM 2010 Signalized Intersection Summary
 4: S. Limestone Street & Selma Road & Spring Street

												
Movement	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Volume (veh/h)	110	250	70	60	270	190	110	530	50	110	560	180
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1845	1845	1845	1827	1827	1827	1863	1863	1900	1845	1845	1900
Adj Flow Rate, veh/h	120	272	76	65	293	207	120	576	54	120	609	196
Adj No. of Lanes	1	1	1	1	1	1	1	2	0	1	2	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	3	3	3	4	4	4	2	2	2	3	3	3
Cap, veh/h	302	501	525	320	469	497	322	1249	117	387	996	320
Arrive On Green	0.07	0.27	0.27	0.05	0.26	0.26	0.06	0.38	0.38	0.06	0.38	0.38
Sat Flow, veh/h	1757	1845	1568	1740	1827	1553	1774	3272	306	1757	2610	839
Grp Volume(v), veh/h	120	272	76	65	293	207	120	311	319	120	409	396
Grp Sat Flow(s),veh/h/ln	1757	1845	1568	1740	1827	1553	1774	1770	1809	1757	1752	1697
Q Serve(g_s), s	4.5	11.3	3.0	2.4	12.8	9.4	3.6	11.9	11.9	3.7	16.9	17.0
Cycle Q Clear(g_c), s	4.5	11.3	3.0	2.4	12.8	9.4	3.6	11.9	11.9	3.7	16.9	17.0
Prop In Lane	1.00		1.00	1.00		1.00	1.00		0.17	1.00		0.49
Lane Grp Cap(c), veh/h	302	501	525	320	469	497	322	675	690	387	669	647
V/C Ratio(X)	0.40	0.54	0.14	0.20	0.62	0.42	0.37	0.46	0.46	0.31	0.61	0.61
Avail Cap(c_a), veh/h	328	501	525	353	469	497	397	675	690	461	669	647
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	0.97	0.97	0.97	1.00	1.00	1.00
Uniform Delay (d), s/veh	23.0	28.0	20.9	22.8	29.6	24.0	16.8	20.9	20.9	15.8	22.4	22.5
Incr Delay (d2), s/veh	0.8	4.2	0.6	0.3	6.2	2.6	0.7	2.2	2.2	0.5	4.1	4.3
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	2.2	6.3	1.4	1.2	7.2	4.4	1.8	6.2	6.4	1.8	8.9	8.7
LnGrp Delay(d),s/veh	23.9	32.2	21.5	23.1	35.8	26.6	17.5	23.1	23.1	16.3	26.6	26.7
LnGrp LOS	C	C	C	C	D	C	B	C	C	B	C	C
Approach Vol, veh/h		468			565			750			925	
Approach Delay, s/veh		28.3			31.0			22.2			25.3	
Approach LOS		C			C			C			C	
Timer	1	2	3	4	5	6	7	8				
Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	10.2	40.1	9.3	30.3	10.2	40.1	10.7	29.0				
Change Period (Y+Rc), s	4.5	* 5.8	4.5	* 5.9	4.5	* 5.8	4.5	* 5.9				
Max Green Setting (Gmax), s	9.5	* 29	6.5	* 24	9.5	* 29	7.5	* 23				
Max Q Clear Time (g_c+I1), s	5.7	13.9	4.4	13.3	5.6	19.0	6.5	14.8				
Green Ext Time (p_c), s	0.1	8.4	0.0	3.4	0.1	6.4	0.0	2.9				
Intersection Summary												
HCM 2010 Ctrl Delay			26.1									
HCM 2010 LOS			C									
Notes												
* HCM 2010 computational engine requires equal clearance times for the phases crossing the barrier.												

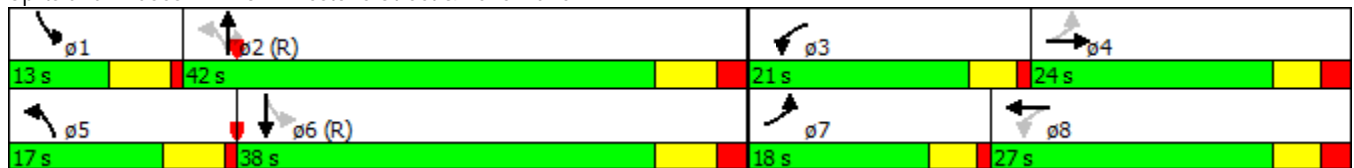
Lanes, Volumes, Timings
1: S. Limestone Street & Leffel Lane

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	150	150	220	580	200	180	180	590	370	120	730	120
Lane Util. Factor	1.00	0.95	0.95	0.97	0.95	0.95	1.00	0.95	1.00	1.00	0.95	0.95
Fr _t		0.911			0.929				0.850		0.979	
Fl _t Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1752	3193	0	3467	3320	0	1752	3505	1568	1752	3431	0
Fl _t Permitted	0.488			0.234			0.160			0.362		
Satd. Flow (perm)	900	3193	0	854	3320	0	295	3505	1568	668	3431	0
Satd. Flow (RTOR)		184			196				402		19	
Adj. Flow (vph)	163	163	239	630	217	196	196	641	402	130	793	130
Lane Group Flow (vph)	163	402	0	630	413	0	196	641	402	130	923	0
Turn Type	pm+pt	NA		pm+pt	NA		pm+pt	NA	Perm	pm+pt	NA	
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases	4			8			2		2	6		
Total Split (s)	18.0	24.0		21.0	27.0		17.0	42.0	42.0	13.0	38.0	
Total Lost Time (s)	4.5	6.0		4.5	6.0		5.5	6.9	6.9	5.5	6.9	
Act Effect Green (s)	25.6	12.6		34.3	17.4		52.4	39.9	39.9	46.7	37.0	
Actuated g/C Ratio	0.26	0.13		0.34	0.17		0.52	0.40	0.40	0.47	0.37	
v/c Ratio	0.50	0.72		0.87	0.56		0.62	0.46	0.46	0.32	0.72	
Control Delay	28.3	29.5		40.0	22.2		22.1	24.4	4.3	10.4	20.5	
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	
Total Delay	28.3	29.5		40.0	22.2		22.1	24.4	4.3	10.4	20.5	
LOS	C	C		D	C		C	C	A	B	C	
Approach Delay		29.1			33.0			17.5			19.3	
Approach LOS		C			C			B			B	

Intersection Summary

Cycle Length: 100
 Actuated Cycle Length: 100
 Offset: 85 (85%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 0.87
 Intersection Signal Delay: 23.8 Intersection LOS: C
 Intersection Capacity Utilization 80.8% ICU Level of Service D
 Analysis Period (min) 15

Splits and Phases: 1: S. Limestone Street & Leffel Lane



Queues
1: S. Limestone Street & Leffel Lane



Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	NBR	SBL	SBT
Lane Group Flow (vph)	163	402	630	413	196	641	402	130	923
v/c Ratio	0.50	0.72	0.87	0.56	0.62	0.46	0.46	0.32	0.72
Control Delay	28.3	29.5	40.0	22.2	22.1	24.4	4.3	10.4	20.5
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	28.3	29.5	40.0	22.2	22.1	24.4	4.3	10.4	20.5
Queue Length 50th (ft)	74	70	162	65	60	157	0	27	159
Queue Length 95th (ft)	114	114	#211	108	118	223	62	m41	#354
Internal Link Dist (ft)		1055		1032		571			2708
Turn Bay Length (ft)	160		330		340			270	
Base Capacity (vph)	363	725	724	852	335	1397	867	404	1281
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.45	0.55	0.87	0.48	0.59	0.46	0.46	0.32	0.72

Intersection Summary























95th percentile volume exceeds capacity, queue may be longer.

Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.

HCM 2010 Signalized Intersection Summary
 1: S. Limestone Street & Leffel Lane

Limestone Street Corridor Study
 Scenario B

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	150	150	220	580	200	180	180	590	370	120	730	120
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1845	1845	1900	1881	1881	1900	1845	1845	1845	1845	1845	1900
Adj Flow Rate, veh/h	163	163	239	630	217	196	196	641	402	130	793	130
Adj No. of Lanes	1	2	0	2	2	0	1	2	1	1	2	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	3	3	3	1	1	1	3	3	3	3	3	3
Cap, veh/h	365	301	269	756	437	376	299	1298	581	310	1038	170
Arrive On Green	0.10	0.17	0.17	0.16	0.24	0.24	0.09	0.37	0.37	0.07	0.34	0.34
Sat Flow, veh/h	1757	1752	1568	3476	1823	1568	1757	3505	1568	1757	3016	494
Grp Volume(v), veh/h	163	163	239	630	212	201	196	641	402	130	461	462
Grp Sat Flow(s),veh/h/ln	1757	1752	1568	1738	1787	1604	1757	1752	1568	1757	1752	1757
Q Serve(g_s), s	7.5	8.5	14.9	14.3	10.3	10.9	7.1	14.1	21.7	4.7	23.4	23.4
Cycle Q Clear(g_c), s	7.5	8.5	14.9	14.3	10.3	10.9	7.1	14.1	21.7	4.7	23.4	23.4
Prop In Lane	1.00		1.00	1.00		0.98	1.00		1.00	1.00		0.28
Lane Grp Cap(c), veh/h	365	301	269	756	429	385	299	1298	581	310	603	605
V/C Ratio(X)	0.45	0.54	0.89	0.83	0.50	0.52	0.66	0.49	0.69	0.42	0.76	0.76
Avail Cap(c_a), veh/h	435	315	282	761	429	385	340	1298	581	326	603	605
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.65	0.65	0.65
Uniform Delay (d), s/veh	29.7	37.8	40.5	27.2	32.8	33.0	22.0	24.3	26.7	19.7	29.2	29.2
Incr Delay (d2), s/veh	0.9	1.7	26.4	7.9	0.9	1.3	3.8	1.3	6.7	0.6	6.0	6.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	3.7	4.3	8.4	7.6	5.2	4.9	3.7	7.0	10.5	2.3	12.3	12.3
LnGrp Delay(d),s/veh	30.6	39.5	66.8	35.0	33.7	34.3	25.8	25.6	33.3	20.3	35.1	35.1
LnGrp LOS	C	D	E	D	C	C	C	C	C	C	D	D
Approach Vol, veh/h		565			1043			1239			1053	
Approach Delay, s/veh		48.5			34.6			28.1			33.3	
Approach LOS		D			C			C			C	
Timer	1	2	3	4	5	6	7	8				
Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	12.1	43.9	20.8	23.2	14.7	41.3	14.0	30.0				
Change Period (Y+Rc), s	5.5	* 6.9	4.5	6.0	5.5	* 6.9	4.5	6.0				
Max Green Setting (Gmax), s	7.5	* 35	16.5	18.0	11.5	* 31	13.5	21.0				
Max Q Clear Time (g_c+I1), s	6.7	23.7	16.3	16.9	9.1	25.4	9.5	12.9				
Green Ext Time (p_c), s	0.0	1.6	0.1	0.3	0.1	1.3	0.1	3.0				
Intersection Summary												
HCM 2010 Ctrl Delay			34.2									
HCM 2010 LOS			C									
Notes												
* HCM 2010 computational engine requires equal clearance times for the phases crossing the barrier.												

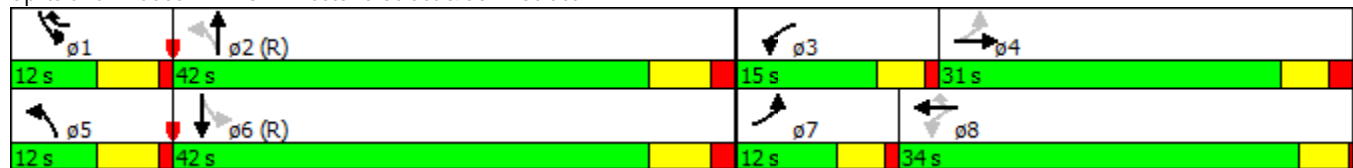
Lanes, Volumes, Timings
2: S. Limestone Street & John Street

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	100	190	130	210	200	110	160	730	110	100	740	90
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95	0.95	1.00	0.95	0.95
Fr _t		0.939				0.850		0.980			0.984	
Fl _t Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1787	1766	0	1787	1881	1599	1787	3503	0	1787	3517	0
Fl _t Permitted	0.544			0.212			0.179			0.187		
Satd. Flow (perm)	1023	1766	0	399	1881	1599	337	3503	0	352	3517	0
Satd. Flow (RTOR)		33				120		19			15	
Adj. Flow (vph)	109	207	141	228	217	120	174	793	120	109	804	98
Lane Group Flow (vph)	109	348	0	228	217	120	174	913	0	109	902	0
Turn Type	pm+pt	NA		pm+pt	NA	pm+ov	pm+pt	NA		pm+pt	NA	
Protected Phases	7	4		3	8	1	5	2		1	6	
Permitted Phases	4			8		8	2			6		
Total Split (s)	12.0	31.0		15.0	34.0	12.0	12.0	42.0		12.0	42.0	
Total Lost Time (s)	4.5	5.5		4.5	4.1	5.6	5.6	6.5		5.6	6.5	
Act Effect Green (s)	30.3	22.0		36.6	26.6	37.6	47.1	38.4		45.5	37.6	
Actuated g/C Ratio	0.30	0.22		0.37	0.27	0.38	0.47	0.38		0.46	0.38	
v/c Ratio	0.30	0.84		0.78	0.43	0.18	0.64	0.67		0.42	0.68	
Control Delay	22.0	51.8		41.9	32.7	4.3	31.0	19.6		16.6	16.5	
Queue Delay	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Total Delay	22.0	51.8		41.9	32.7	4.3	31.0	19.6		16.6	16.5	
LOS	C	D		D	C	A	C	B		B	B	
Approach Delay		44.7			30.4			21.4			16.5	
Approach LOS		D			C			C			B	

Intersection Summary

Cycle Length: 100
 Actuated Cycle Length: 100
 Offset: 26 (26%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 0.84
 Intersection Signal Delay: 24.9
 Intersection LOS: C
 Intersection Capacity Utilization 79.8%
 ICU Level of Service D
 Analysis Period (min) 15

Splits and Phases: 2: S. Limestone Street & John Street



Queues
2: S. Limestone Street & John Street


























Lane Group	EBL	EBT	WBL	WBT	WBR	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	109	348	228	217	120	174	913	109	902
v/c Ratio	0.30	0.84	0.78	0.43	0.18	0.64	0.67	0.42	0.68
Control Delay	22.0	51.8	41.9	32.7	4.3	31.0	19.6	16.6	16.5
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	22.0	51.8	41.9	32.7	4.3	31.0	19.6	16.6	16.5
Queue Length 50th (ft)	44	191	99	113	0	44	133	22	115
Queue Length 95th (ft)	78	#293	#167	176	34	#100	163	51	110
Internal Link Dist (ft)		892		573			2708		3361
Turn Bay Length (ft)	100		75			290		200	
Base Capacity (vph)	369	474	292	562	677	272	1358	261	1332
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.30	0.73	0.78	0.39	0.18	0.64	0.67	0.42	0.68

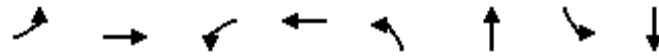
Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

HCM 2010 Signalized Intersection Summary
2: S. Limestone Street & John Street

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	100	190	130	210	200	110	160	730	110	100	740	90
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1881	1881	1900	1881	1881	1881	1881	1881	1900	1881	1881	1900
Adj Flow Rate, veh/h	109	207	141	228	217	120	174	793	120	109	804	98
Adj No. of Lanes	1	1	0	1	1	1	1	2	0	1	2	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	1	1	1	1	1	1	1	1	1	1	1	1
Cap, veh/h	367	237	161	297	505	521	297	1215	184	286	1230	150
Arrive On Green	0.06	0.23	0.23	0.10	0.27	0.27	0.06	0.39	0.39	0.06	0.38	0.38
Sat Flow, veh/h	1792	1044	711	1792	1881	1599	1792	3114	471	1792	3208	391
Grp Volume(v), veh/h	109	0	348	228	217	120	174	455	458	109	448	454
Grp Sat Flow(s),veh/h/ln	1792	0	1756	1792	1881	1599	1792	1787	1798	1792	1787	1812
Q Serve(g_s), s	4.6	0.0	19.1	9.5	9.5	5.5	5.9	20.8	20.8	3.6	20.6	20.6
Cycle Q Clear(g_c), s	4.6	0.0	19.1	9.5	9.5	5.5	5.9	20.8	20.8	3.6	20.6	20.6
Prop In Lane	1.00		0.41	1.00		1.00	1.00		0.26	1.00		0.22
Lane Grp Cap(c), veh/h	367	0	398	297	505	521	297	697	702	286	685	695
V/C Ratio(X)	0.30	0.00	0.87	0.77	0.43	0.23	0.59	0.65	0.65	0.38	0.65	0.65
Avail Cap(c_a), veh/h	388	0	448	297	562	569	297	697	702	299	685	695
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	1.00	1.00	0.88	0.88	0.88	0.96	0.96	0.96
Uniform Delay (d), s/veh	27.0	0.0	37.3	27.0	30.2	24.6	19.9	24.9	24.9	19.1	25.4	25.4
Incr Delay (d2), s/veh	0.4	0.0	16.0	11.5	0.6	0.2	2.6	4.2	4.1	0.8	4.6	4.5
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	2.3	0.0	11.0	5.6	5.0	2.4	3.1	11.0	11.1	1.8	11.0	11.2
LnGrp Delay(d),s/veh	27.5	0.0	53.3	38.5	30.8	24.8	22.5	29.1	29.1	19.9	30.0	29.9
LnGrp LOS	C		D	D	C	C	C	C	C	B	C	C
Approach Vol, veh/h		457			565			1087			1011	
Approach Delay, s/veh		47.1			32.6			28.0			28.9	
Approach LOS		D			C			C			C	
Timer	1	2	3	4	5	6	7	8				
Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	11.3	45.5	15.0	28.2	12.0	44.8	10.8	32.4				
Change Period (Y+Rc), s	5.6	* 6.5	4.5	* 5.5	5.6	* 6.5	4.5	* 5.5				
Max Green Setting (Gmax), s	6.4	* 36	10.5	* 26	6.4	* 36	7.5	* 30				
Max Q Clear Time (g_c+I1), s	5.6	22.8	11.5	21.1	7.9	22.6	6.6	11.5				
Green Ext Time (p_c), s	0.0	8.5	0.0	1.5	0.0	8.6	0.0	3.6				
Intersection Summary												
HCM 2010 Ctrl Delay			31.9									
HCM 2010 LOS			C									
Notes												
* HCM 2010 computational engine requires equal clearance times for the phases crossing the barrier.												

Queues
3: S. Limestone Street & Grand Avenue























Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	11	44	22	44	22	913	11	924
v/c Ratio	0.06	0.28	0.13	0.23	0.04	0.32	0.02	0.33
Control Delay	34.0	24.5	35.8	27.3	3.4	3.9	2.0	2.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	34.0	24.5	35.8	27.3	3.4	3.9	2.0	2.2
Queue Length 50th (ft)	7	7	13	14	1	24	0	13
Queue Length 95th (ft)	20	40	31	47	m6	126	m2	59
Internal Link Dist (ft)		727		835		3361		2364
Turn Bay Length (ft)	25		25		150		100	
Base Capacity (vph)	190	300	188	312	522	2897	543	2822
Starvation Cap Reductn	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.06	0.15	0.12	0.14	0.04	0.32	0.02	0.33

Intersection Summary

m Volume for 95th percentile queue is metered by upstream signal.

HCM 2010 Signalized Intersection Summary
3: S. Limestone Street & Grand Avenue

Limestone Street Corridor Study
Scenario B

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	10	10	30	20	20	20	20	810	30	10	830	20
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1900	1900	1900	1900	1900	1900	1881	1881	1900	1881	1881	1900
Adj Flow Rate, veh/h	11	11	33	22	22	22	22	880	33	11	902	22
Adj No. of Lanes	1	1	0	1	1	0	1	2	0	1	2	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	0	0	0	0	0	0	1	1	1	1	1	1
Cap, veh/h	174	27	82	177	67	67	463	2404	90	456	2399	58
Arrive On Green	0.02	0.07	0.07	0.03	0.08	0.08	0.03	0.68	0.68	0.02	0.67	0.67
Sat Flow, veh/h	1810	419	1258	1810	873	873	1792	3513	132	1792	3566	87
Grp Volume(v), veh/h	11	0	44	22	0	44	22	448	465	11	452	472
Grp Sat Flow(s),veh/h/ln	1810	0	1678	1810	0	1746	1792	1787	1858	1792	1787	1866
Q Serve(g_s), s	0.6	0.0	2.5	1.1	0.0	2.4	0.4	10.6	10.6	0.2	11.1	11.1
Cycle Q Clear(g_c), s	0.6	0.0	2.5	1.1	0.0	2.4	0.4	10.6	10.6	0.2	11.1	11.1
Prop In Lane	1.00		0.75	1.00		0.50	1.00		0.07	1.00		0.05
Lane Grp Cap(c), veh/h	174	0	110	177	0	135	463	1223	1271	456	1202	1255
V/C Ratio(X)	0.06	0.00	0.40	0.12	0.00	0.33	0.05	0.37	0.37	0.02	0.38	0.38
Avail Cap(c_a), veh/h	281	0	272	264	0	283	548	1223	1271	562	1202	1255
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	0.00	1.00	0.78	0.78	0.78	0.81	0.81	0.81
Uniform Delay (d), s/veh	42.5	0.0	44.8	41.7	0.0	43.7	5.2	6.7	6.7	5.3	7.2	7.2
Incr Delay (d2), s/veh	0.2	0.0	2.3	0.3	0.0	1.4	0.0	0.7	0.6	0.0	0.7	0.7
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.3	0.0	1.2	0.6	0.0	1.2	0.2	5.3	5.5	0.1	5.6	5.9
LnGrp Delay(d),s/veh	42.6	0.0	47.2	42.0	0.0	45.1	5.2	7.3	7.3	5.4	7.9	7.9
LnGrp LOS	D		D	D		D	A	A	A	A	A	A
Approach Vol, veh/h		55			66			935			935	
Approach Delay, s/veh		46.3			44.0			7.3			7.9	
Approach LOS		D			D			A			A	
Timer	1	2	3	4	5	6	7	8				
Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	6.1	74.3	7.2	12.4	7.2	73.2	6.1	13.5				
Change Period (Y+Rc), s	4.5	* 5.9	4.5	* 5.8	4.5	* 5.9	4.5	* 5.8				
Max Green Setting (Gmax), s	7.5	* 48	7.5	* 16	7.5	* 48	7.5	* 16				
Max Q Clear Time (g_c+I1), s	2.2	12.6	3.1	4.5	2.4	13.1	2.6	4.4				
Green Ext Time (p_c), s	0.0	15.8	0.0	0.3	0.0	15.7	0.0	0.3				
Intersection Summary												
HCM 2010 Ctrl Delay			9.8									
HCM 2010 LOS			A									
Notes												
* HCM 2010 computational engine requires equal clearance times for the phases crossing the barrier.												

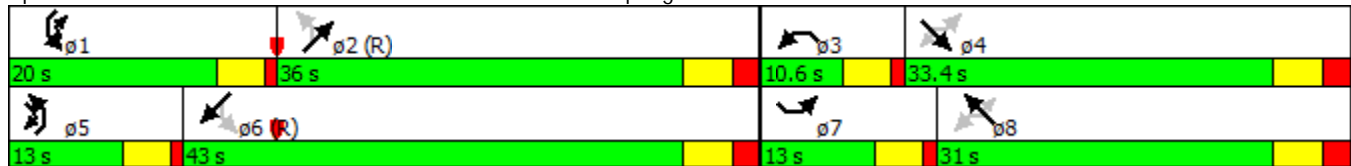
Lanes, Volumes, Timings
 4: S. Limestone Street & Selma Road & Spring Street

Lane Group	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Volume (vph)	150	310	140	70	310	160	130	640	40	220	630	140
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95	0.95	1.00	0.95	0.95
Frt			0.850			0.850		0.991			0.973	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1719	1810	1538	1687	1776	1509	1736	3440	0	1736	3377	0
Flt Permitted	0.282			0.412			0.231			0.193		
Satd. Flow (perm)	510	1810	1538	732	1776	1509	422	3440	0	353	3377	0
Satd. Flow (RTOR)			152			94		6			30	
Adj. Flow (vph)	163	337	152	76	337	174	141	696	43	239	685	152
Lane Group Flow (vph)	163	337	152	76	337	174	141	739	0	239	837	0
Turn Type	pm+pt	NA	pm+ov	pm+pt	NA	pm+ov	pm+pt	NA		pm+pt	NA	
Protected Phases	7	4	5	3	8	1	5	2		1	6	
Permitted Phases	4		4	8		8	2			6		
Total Split (s)	13.0	33.4	13.0	10.6	31.0	20.0	13.0	36.0		20.0	43.0	
Total Lost Time (s)	4.5	5.9	4.5	4.5	5.9	4.5	4.5	5.8		4.5	5.8	
Act Effect Green (s)	37.8	29.6	43.7	32.7	25.2	44.0	42.3	32.8		50.7	37.5	
Actuated g/C Ratio	0.38	0.30	0.44	0.33	0.25	0.44	0.42	0.33		0.51	0.38	
v/c Ratio	0.56	0.63	0.20	0.26	0.75	0.24	0.49	0.65		0.67	0.65	
Control Delay	28.5	37.6	3.8	21.8	46.7	8.7	32.7	49.3		23.7	27.8	
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Total Delay	28.5	37.6	3.8	21.8	46.7	8.7	32.7	49.3		23.7	27.8	
LOS	C	D	A	C	D	A	C	D		C	C	
Approach Delay		27.4			32.2			46.6			26.9	
Approach LOS		C			C			D			C	

Intersection Summary

Cycle Length: 100
 Actuated Cycle Length: 100
 Offset: 29 (29%), Referenced to phase 2:NETL and 6:SWTL, Start of Green
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 0.75
 Intersection Signal Delay: 33.4
 Intersection LOS: C
 Intersection Capacity Utilization 73.0%
 ICU Level of Service D
 Analysis Period (min) 15

Splits and Phases: 4: S. Limestone Street & Selma Road & Spring Street



Queues

4: S. Limestone Street & Selma Road & Spring Street


























Lane Group	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	SWL	SWT
Lane Group Flow (vph)	163	337	152	76	337	174	141	739	239	837
v/c Ratio	0.56	0.63	0.20	0.26	0.75	0.24	0.49	0.65	0.67	0.65
Control Delay	28.5	37.6	3.8	21.8	46.7	8.7	32.7	49.3	23.7	27.8
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	28.5	37.6	3.8	21.8	46.7	8.7	32.7	49.3	23.7	27.8
Queue Length 50th (ft)	68	191	0	30	199	29	86	262	82	221
Queue Length 95th (ft)	116	290	37	61	#324	68	103	325	131	290
Internal Link Dist (ft)		167			702			2364		1238
Turn Bay Length (ft)				150		150	75		240	
Base Capacity (vph)	295	535	761	297	448	753	291	1133	396	1286
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.55	0.63	0.20	0.26	0.75	0.23	0.48	0.65	0.60	0.65

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
 Queue shown is maximum after two cycles.

HCM 2010 Signalized Intersection Summary
 4: S. Limestone Street & Selma Road & Spring Street

												
Movement	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Volume (veh/h)	150	310	140	70	310	160	130	640	40	220	630	140
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1810	1810	1810	1776	1776	1776	1827	1827	1900	1827	1827	1900
Adj Flow Rate, veh/h	163	337	152	76	337	174	141	696	43	239	685	152
Adj No. of Lanes	1	1	1	1	1	1	1	2	0	1	2	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	5	5	5	7	7	7	4	4	4	4	4	4
Cap, veh/h	283	513	544	264	446	541	316	1161	72	383	1093	242
Arrive On Green	0.09	0.28	0.28	0.05	0.25	0.25	0.07	0.35	0.35	0.11	0.39	0.39
Sat Flow, veh/h	1723	1810	1538	1691	1776	1509	1740	3321	205	1740	2825	627
Grp Volume(v), veh/h	163	337	152	76	337	174	141	364	375	239	421	416
Grp Sat Flow(s),veh/h/ln	1723	1810	1538	1691	1776	1509	1740	1736	1791	1740	1736	1716
Q Serve(g_s), s	6.9	16.4	7.1	3.3	17.5	8.4	5.1	17.2	17.3	8.5	19.6	19.6
Cycle Q Clear(g_c), s	6.9	16.4	7.1	3.3	17.5	8.4	5.1	17.2	17.3	8.5	19.6	19.6
Prop In Lane	1.00		1.00	1.00		1.00	1.00		0.11	1.00		0.37
Lane Grp Cap(c), veh/h	283	513	544	264	446	541	316	607	626	383	671	664
V/C Ratio(X)	0.58	0.66	0.28	0.29	0.76	0.32	0.45	0.60	0.60	0.62	0.63	0.63
Avail Cap(c_a), veh/h	283	513	544	278	446	541	342	607	626	466	671	664
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	0.96	0.96	0.96	1.00	1.00	1.00
Uniform Delay (d), s/veh	25.9	31.6	23.2	26.3	34.6	23.3	19.9	26.8	26.8	18.9	24.8	24.8
Incr Delay (d2), s/veh	2.8	6.5	1.3	0.6	11.3	1.6	0.9	4.2	4.0	1.8	4.4	4.4
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	3.5	9.1	3.2	1.6	10.0	3.7	2.5	9.0	9.3	4.2	10.2	10.1
LnGrp Delay(d),s/veh	28.7	38.0	24.5	26.9	46.0	24.8	20.9	30.9	30.8	20.7	29.2	29.3
LnGrp LOS	C	D	C	C	D	C	C	C	C	C	C	C
Approach Vol, veh/h		652			587			880			1076	
Approach Delay, s/veh		32.5			37.2			29.3			27.3	
Approach LOS		C			D			C			C	
Timer	1	2	3	4	5	6	7	8				
Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	15.3	40.7	9.8	34.2	11.5	44.5	13.0	31.0				
Change Period (Y+Rc), s	4.5	* 5.8	4.5	* 5.9	4.5	* 5.8	4.5	* 5.9				
Max Green Setting (Gmax), s	15.5	* 30	6.1	* 28	8.5	* 37	8.5	* 25				
Max Q Clear Time (g_c+I1), s	10.5	19.3	5.3	18.4	7.1	21.6	8.9	19.5				
Green Ext Time (p_c), s	0.3	7.2	0.0	3.6	0.0	9.3	0.0	2.6				
Intersection Summary												
HCM 2010 Ctrl Delay			30.8									
HCM 2010 LOS			C									
Notes												
* HCM 2010 computational engine requires equal clearance times for the phases crossing the barrier.												