HCM Unsignalized Intersection Capacity Analysis
6: Brian Street & LC 111

5/26/2009

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (veh/h)	116	20	8	405	137	56
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.81	0.81	0.67	0.67	0.89	0.89
Hourly flow rate (vph)	143	25	12	604	154	63
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	782	154	217			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	782	154	217			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	60	97	99			
cM capacity (veh/h)	360	892	1353			

Direction, Lane #	EB 1	EB 2	NB 1	SB 1	SB 2
Volume Total	143	25	616	154	63
Volume Left	143	0	12	0	0
Volume Right	0	25	0	0	63
cSH	360	892	1353	1700	1700
Volume to Capacity	0.40	0.03	0.01	0.09	0.04
Queue Length 95th (ft)	46	2	1	0	0
Control Delay (s)	21.5	9.2	0.3	0.0	0.0
Lane LOS	C	A	A		
Approach Delay (s)	19.7		0.3	0.0	
Approach LOS	C				

Intersection Summary			
Average Delay	3.5		
Intersection Capacity Utilization	40.8%	ICU Level of Service	A
Analysis Period (min)	15		

HCM Signalized Intersection Capacity Analysis
3: 271st Street & LC 111

5/26/2009

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	35	284	16	129	101	41	10	75	462	62	91	33
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0		4.0	4.0			4.0	4.0		4.0	
Lane Util. Factor		1.00		1.00	1.00			1.00	1.00		1.00	
Frt		0.99		1.00	0.96			1.00	0.85		0.98	
Flt Protected		0.99		0.95	1.00			0.99	1.00		0.98	
Satd. Flow (prot)		1841		1770	1782			1852	1583		1789	
Flt Permitted		0.95		0.33	1.00			0.96	1.00		0.87	
Satd. Flow (perm)		1767		624	1782			1788	1583		1583	
Peak-hour factor, PHF	0.83	0.83	0.83	0.81	0.81	0.81	0.76	0.76	0.76	0.73	0.73	0.73
Adj. Flow (vph)	42	342	19	159	125	51	13	99	608	85	125	45
RTOR Reduction (vph)	0	3	0	0	27	0	0	0	279	0	15	0
Lane Group Flow (vph)	0	400	0	159	149	0	0	112	329	0	240	0
Turn Type	Perm			pm+pt			Perm		Perm	Perm		
Protected Phases		4		3	8			2			6	
Permitted Phases	4			8			2		2	6		
Actuated Green, G (s)		16.0		24.0	24.0			18.0	18.0		18.0	
Effective Green, g (s)		16.0		24.0	24.0			18.0	18.0		18.0	
Actuated g/C Ratio		0.32		0.48	0.48			0.36	0.36		0.36	
Clearance Time (s)		4.0		4.0	4.0			4.0	4.0		4.0	
Lane Grp Cap (vph)		565		391	855			644	570		570	
v/s Ratio Prot				c0.03	0.08							
v/s Ratio Perm		c0.23		0.16				0.06	c0.21		0.15	
v/c Ratio		0.71		0.41	0.17			0.17	0.58		0.42	
Uniform Delay, d1		14.9		9.1	7.4			10.9	12.9		12.1	
Progression Factor		1.00		1.00	1.00			1.00	1.00		1.00	
Incremental Delay, d2		7.3		3.1	0.4			0.6	4.2		2.3	
Delay (s)		22.2		12.2	7.8			11.5	17.1		14.3	
Level of Service		C		B	A			B	B		B	
Approach Delay (s)		22.2			9.9			16.3			14.3	
Approach LOS		C			A			B			B	

Intersection Summary			
HCM Average Control Delay	16.1	HCM Level of Service	B
HCM Volume to Capacity ratio	0.62		
Actuated Cycle Length (s)	50.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	66.7%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

HCM Unsignalized Intersection Capacity Analysis
12: First Street & LC 111

5/26/2009

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Volume (vph)	144	11	28	4	22	5	44	64	1	4	89	276
Peak Hour Factor	0.74	0.74	0.74	0.60	0.60	0.60	0.76	0.76	0.76	0.84	0.84	0.84
Hourly flow rate (vph)	195	15	38	7	37	8	58	84	1	5	106	329

Direction, Lane #	EB 1	EB 2	WB 1	NB 1	SB 1
Volume Total (vph)	195	53	52	143	439
Volume Left (vph)	195	0	7	58	5
Volume Right (vph)	0	38	8	1	329
Hadj (s)	0.53	-0.47	-0.04	0.11	-0.41
Departure Headway (s)	6.6	5.6	5.9	5.5	4.6
Degree Utilization, x	0.36	0.08	0.09	0.22	0.56
Capacity (veh/h)	513	598	527	605	748
Control Delay (s)	12.0	7.8	9.5	10.1	13.4
Approach Delay (s)	11.1		9.5	10.1	13.4
Approach LOS	B		A	B	B

Intersection Summary			
Delay	12.0		
HCM Level of Service	B		
Intersection Capacity Utilization	52.4%	ICU Level of Service	A
Analysis Period (min)	15		

HCM Unsignalized Intersection Capacity Analysis
9: Kevin Drive & LC 111

5/26/2009

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	51	0	14	7	1	9	10	259	3	10	428	100
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.68	0.68	0.68	0.85	0.85	0.85	0.93	0.93	0.93	0.87	0.87	0.87
Hourly flow rate (vph)	75	0	21	8	1	11	11	278	3	11	492	115
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (ft)											1173	
pX, platoon unblocked												
vC, conflicting volume	828	818	492	837	931	280	607			282		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	828	818	492	837	931	280	607			282		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	73	100	96	97	100	99	99			99		
cM capacity (veh/h)	281	304	577	272	261	759	971			1281		

Direction, Lane #	EB 1	WB 1	NB 1	SB 1	SB 2
Volume Total	96	20	292	503	115
Volume Left	75	8	11	11	0
Volume Right	21	11	3	0	115
cSH	316	410	971	1281	1700
Volume to Capacity	0.30	0.05	0.01	0.01	0.07
Queue Length 95th (ft)	31	4	1	1	0
Control Delay (s)	21.3	14.2	0.4	0.3	0.0
Lane LOS	C	B	A	A	
Approach Delay (s)	21.3	14.2	0.4	0.2	
Approach LOS	C	B			

Intersection Summary				
Average Delay		2.5		
Intersection Capacity Utilization		39.6%	ICU Level of Service	A
Analysis Period (min)		15		

HCM Unsignalized Intersection Capacity Analysis
6: Brian Street & LC 111

5/26/2009

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (veh/h)	74	42	44	233	509	102
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.94	0.94	0.95	0.95	0.90	0.90
Hourly flow rate (vph)	79	45	46	245	566	113
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	903	566	679			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	903	566	679			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	73	91	95			
cM capacity (veh/h)	292	524	913			

Direction, Lane #	EB 1	EB 2	NB 1	SB 1	SB 2
Volume Total	79	45	292	566	113
Volume Left	79	0	46	0	0
Volume Right	0	45	0	0	113
cSH	292	524	913	1700	1700
Volume to Capacity	0.27	0.09	0.05	0.33	0.07
Queue Length 95th (ft)	27	7	4	0	0
Control Delay (s)	21.8	12.5	1.9	0.0	0.0
Lane LOS	C	B	A		
Approach Delay (s)	18.4		1.9	0.0	
Approach LOS	C				

Intersection Summary			
Average Delay	2.6		
Intersection Capacity Utilization	55.6%	ICU Level of Service	B
Analysis Period (min)	15		

HCM Signalized Intersection Capacity Analysis
3: 271st Street & LC 111

5/26/2009

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	35	114	23	483	264	65	22	110	199	38	120	42
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0		4.0	4.0			4.0	4.0		4.0	
Lane Util. Factor		1.00		1.00	1.00			1.00	1.00		1.00	
Frt		0.98		1.00	0.97			1.00	0.85		0.97	
Flt Protected		0.99		0.95	1.00			0.99	1.00		0.99	
Satd. Flow (prot)		1810		1770	1807			1847	1583		1793	
Flt Permitted		0.87		0.51	1.00			0.93	1.00		0.92	
Satd. Flow (perm)		1597		950	1807			1741	1583		1667	
Peak-hour factor, PHF	0.93	0.93	0.93	0.87	0.87	0.87	0.92	0.92	0.92	0.83	0.83	0.83
Adj. Flow (vph)	38	123	25	555	303	75	24	120	216	46	145	51
RTOR Reduction (vph)	0	10	0	0	15	0	0	0	158	0	16	0
Lane Group Flow (vph)	0	176	0	555	363	0	0	144	58	0	226	0
Turn Type	Perm			pm+pt			Perm		Perm	Perm		
Protected Phases		4		3	8			2			6	
Permitted Phases	4			8			2		2	6		
Actuated Green, G (s)		16.0		36.0	36.0			16.0	16.0		16.0	
Effective Green, g (s)		16.0		36.0	36.0			16.0	16.0		16.0	
Actuated g/C Ratio		0.27		0.60	0.60			0.27	0.27		0.27	
Clearance Time (s)		4.0		4.0	4.0			4.0	4.0		4.0	
Lane Grp Cap (vph)		426		789	1084			464	422		445	
v/s Ratio Prot				c0.19	0.20							
v/s Ratio Perm		0.11		c0.23				0.08	0.04		c0.14	
v/c Ratio		0.41		0.70	0.34			0.31	0.14		0.51	
Uniform Delay, d1		18.1		7.9	6.0			17.6	16.7		18.7	
Progression Factor		1.00		1.00	1.00			1.00	1.00		1.00	
Incremental Delay, d2		3.0		5.2	0.8			1.7	0.7		4.1	
Delay (s)		21.1		13.1	6.8			19.3	17.4		22.8	
Level of Service		C		B	A			B	B		C	
Approach Delay (s)		21.1			10.6			18.2			22.8	
Approach LOS		C			B			B			C	

Intersection Summary			
HCM Average Control Delay	15.0	HCM Level of Service	B
HCM Volume to Capacity ratio	0.63		
Actuated Cycle Length (s)	60.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	63.7%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group

HCM Unsignalized Intersection Capacity Analysis
12: First Street & LC 111

6/4/2009

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Volume (vph)	180	30	30	5	10	30	100	150	20	35	85	220
Peak Hour Factor	0.74	0.74	0.74	0.60	0.60	0.60	0.76	0.76	0.76	0.84	0.84	0.84
Hourly flow rate (vph)	243	41	41	8	17	50	132	197	26	42	101	262

Direction, Lane #	EB 1	EB 2	WB 1	NB 1	SB 1
Volume Total (vph)	243	81	75	355	405
Volume Left (vph)	243	0	8	132	42
Volume Right (vph)	0	41	50	26	262
Hadj (s)	0.53	-0.32	-0.34	0.06	-0.33
Departure Headway (s)	7.4	6.5	6.8	6.0	5.6
Degree Utilization, x	0.50	0.15	0.14	0.59	0.63
Capacity (veh/h)	449	513	429	566	617
Control Delay (s)	16.3	9.4	10.9	17.5	17.5
Approach Delay (s)	14.6		10.9	17.5	17.5
Approach LOS	B		B	C	C

Intersection Summary			
Delay	16.2		
HCM Level of Service	C		
Intersection Capacity Utilization	60.1%	ICU Level of Service	B
Analysis Period (min)	15		

HCM Unsignalized Intersection Capacity Analysis
9: Kevin Drive & LC 111

6/4/2009

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	70	5	15	5	5	15	20	320	20	25	320	50
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.68	0.68	0.68	0.85	0.85	0.85	0.93	0.93	0.93	0.87	0.87	0.87
Hourly flow rate (vph)	103	7	22	6	6	18	22	344	22	29	368	57
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	844	834	368	849	881	355	425			366		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	844	834	368	849	881	355	425			366		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	61	97	97	98	98	97	98			98		
cM capacity (veh/h)	263	291	678	258	273	689	1134			1193		

Direction, Lane #	EB 1	WB 1	NB 1	SB 1	SB 2
Volume Total	132	29	387	397	57
Volume Left	103	6	22	29	0
Volume Right	22	18	22	0	57
cSH	294	421	1134	1193	1700
Volume to Capacity	0.45	0.07	0.02	0.02	0.03
Queue Length 95th (ft)	55	6	1	2	0
Control Delay (s)	26.9	14.2	0.6	0.8	0.0
Lane LOS	D	B	A	A	
Approach Delay (s)	26.9	14.2	0.6	0.7	
Approach LOS	D	B			

Intersection Summary			
Average Delay	4.5		
Intersection Capacity Utilization	52.9%	ICU Level of Service	A
Analysis Period (min)	15		

HCM Unsignalized Intersection Capacity Analysis
6: Brian Street & LC 111

6/4/2009

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	190	15	20	25	20	110	45	320	40	50	350	100
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.94	0.92	0.94	0.92	0.92	0.92	0.95	0.95	0.92	0.92	0.90	0.90
Hourly flow rate (vph)	202	16	21	27	22	120	47	337	43	54	389	111
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	1081	973	389	980	1062	359	500			380		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	1081	973	389	980	1062	359	500			380		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	0	93	97	86	89	83	96			95		
cM capacity (veh/h)	138	230	659	195	204	686	1064			1178		

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	SB 1	SB 2
Volume Total	202	38	27	141	428	443	111
Volume Left	202	0	27	0	47	54	0
Volume Right	0	21	0	120	43	0	111
cSH	138	364	195	503	1064	1178	1700
Volume to Capacity	1.46	0.10	0.14	0.28	0.04	0.05	0.07
Queue Length 95th (ft)	339	9	12	29	3	4	0
Control Delay (s)	302.4	16.0	26.4	14.9	1.4	1.4	0.0
Lane LOS	F	C	D	B	A	A	
Approach Delay (s)	257.5		16.8		1.4	1.1	
Approach LOS	F		C				

Intersection Summary			
Average Delay	47.3		
Intersection Capacity Utilization	74.6%	ICU Level of Service	D
Analysis Period (min)	15		