

APPENDIX E

Capacity Analysis

Level of Service Worksheets

HCM Signalized Intersection Capacity Analysis
 1: Fireweed Ln & New Seward Hwy

Existing - 2005
 2/8/2006

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
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		4.0	4.0	
Lane Util. Factor	0.95	0.95	1.00			1.00	1.00	0.91		1.00	0.91	
Flt	1.00	1.00	0.85			0.86	1.00	1.00		1.00	0.99	
Flt Protected	0.95	0.97	1.00			1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1681	1711	1583			1611	1770	5063		1770	5035	
Flt Permitted	0.95	0.97	1.00			1.00	0.95	1.00		0.95	1.00	
Satd. Flow (perm)	1681	1711	1583			1611	1770	5063		1770	5035	
Volume (vph)	527	99	450	0	0	82	168	1772	52	266	1779	125
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	573	108	489	0	0	89	183	1926	57	289	1934	136
RTOR Reduction (vph)	0	0	201	0	0	0	0	2	0	0	5	0
Lane Group Flow (vph)	332	349	288	0	0	89	183	1981	0	289	2065	0
Turn Type	Perm		Perm			Free	Prot			Prot		
Protected Phases		4					5	2		1	6	
Permitted Phases	4		4			Free						
Actuated Green, G (s)	36.8	36.8	36.8			160.0	28.1	69.4		38.1	79.4	
Effective Green, g (s)	38.4	38.4	38.4			160.0	28.6	71.0		38.6	81.0	
Actuated g/C Ratio	0.24	0.24	0.24			1.00	0.18	0.44		0.24	0.51	
Clearance Time (s)	5.6	5.6	5.6				4.5	5.6		4.5	5.6	
Vehicle Extension (s)	3.0	3.0	3.0				3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	403	411	380			1611	316	2247		427	2549	
v/s Ratio Prot							0.10	c0.39		c0.16	c0.41	
v/s Ratio Perm	0.20	0.20	0.31			0.06						
v/c Ratio	0.82	0.85	0.76			0.06	0.58	0.88		0.68	0.81	
Uniform Delay, d1	57.6	58.0	56.5			0.0	60.2	40.7		55.0	33.1	
Progression Factor	1.00	1.00	1.00			1.00	1.00	1.00		1.00	1.00	
Incremental Delay, d2	12.8	15.0	8.4			0.1	7.5	5.4		8.3	2.9	
Delay (s)	70.4	73.1	64.8			0.1	67.7	46.1		63.4	36.0	
Level of Service	E	E	E			A	E	D		E	D	
Approach Delay (s)		68.9			0.1			47.9			39.3	
Approach LOS		E			A			D			D	

Intersection Summary

HCM Average Control Delay	47.9	HCM Level of Service	D
HCM Volume to Capacity ratio	0.96		
Actuated Cycle Length (s)	160.0	Sum of lost time (s)	16.0
Intersection Capacity Utilization	77.3%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
 4: Northern Lights Blvd & Latouche St

Existing - 2005
 2/8/2006



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations				↔	↑↓			↑↓			↑↓	
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	
Lane Util. Factor				1.00	0.86			0.95			0.95	
Frts				1.00	1.00			1.00			0.94	
Flt Protected				0.95	1.00			0.97			1.00	
Satd. Flow (prot)				1770	6398			3431			3327	
Flt Permitted				0.95	1.00			0.60			1.00	
Satd. Flow (perm)				1770	6398			2130			3327	
Volume (vph)	0	0	0	52	2137	21	132	77	0	0	155	103
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	0	0	57	2323	23	143	84	0	0	168	112
RTOR Reduction (vph)	0	0	0	0	1	0	0	0	0	0	11	0
Lane Group Flow (vph)	0	0	0	57	2345	0	0	227	0	0	269	0
Turn Type				Perm		Perm						
Protected Phases					8			2				6
Permitted Phases				8			2					
Actuated Green, G (s)				120.3	120.3			29.2			29.2	
Effective Green, g (s)				121.5	121.5			30.5			30.5	
Actuated g/C Ratio				0.76	0.76			0.19			0.19	
Clearance Time (s)				5.2	5.2			5.3			5.3	
Vehicle Extension (s)				3.0	3.0			3.0			3.0	
Lane Grp Cap (vph)				1344	4858			406			634	
v/s Ratio Prot					c0.37						0.08	
v/s Ratio Perm				0.03				c0.11				
v/c Ratio				0.04	0.48			0.87dl			0.42	
Uniform Delay, d1				4.8	7.3			58.7			57.0	
Progression Factor				0.16	0.12			0.62			1.00	
Incremental Delay, d2				0.0	0.3			1.5			0.5	
Delay (s)				0.8	1.1			38.1			57.5	
Level of Service				A	A			D			E	
Approach Delay (s)		0.0			1.1			38.1			57.5	
Approach LOS		A			A			D			E	

Intersection Summary

HCM Average Control Delay	9.4	HCM Level of Service	A
HCM Volume to Capacity ratio	0.50		
Actuated Cycle Length (s)	160.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	56.2%	ICU Level of Service	B
Analysis Period (min)	15		

dl - Defacto Left Lane. Recode with 1 though lane as a left lane.

c - Critical Lane Group

HCM Unsignalized Intersection Capacity Analysis
 2: Fireweed Ln & Bannister

Existing - 2005
 2/8/2006



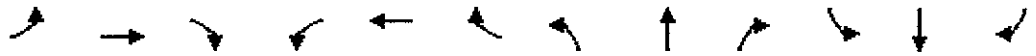
Movement	EBL	EBR	NWL	NWR	SWL	SWR
Lane Configurations	Y		Y		Y	
Sign Control	Stop		Stop		Stop	
Volume (vph)	63	219	56	21	20	14
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	68	238	61	23	22	15

Direction, Lane #	EB 1	NW 1	SW 1
Volume Total (vph)	307	84	37
Volume Left (vph)	0	61	22
Volume Right (vph)	238	23	0
Hadj (s)	-0.4	0.0	0.2
Departure Headway (s)	3.7	4.6	4.6
Degree Utilization, x	0.32	0.11	0.05
Capacity (veh/h)	953	736	555
Control Delay (s)	7.1	7.7	7.7
Approach Delay (s)	7.1	7.7	7.7
Approach LOS	A	A	A

Intersection Summary			
Delay		7.3	
HCM Level of Service		A	
Intersection Capacity Utilization	34.7%		ICU Level of Service A
Analysis Period (min)		15	

HCM Signalized Intersection Capacity Analysis
 4: Northern Lights Blvd & Latouche St

Alt NLB/LaTouche - Recommended
 2/14/2006



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations				↙	↑↑↑		↘	↑			↑	↗
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	0.86		1.00	1.00			1.00	1.00
Fr _t				1.00	1.00		1.00	1.00			1.00	0.85
Fl _t Protected				0.95	1.00		0.95	1.00			1.00	1.00
Satd. Flow (prot)				1770	6398		1770	1863			1863	1583
Fl _t Permitted				0.95	1.00		0.47	1.00			1.00	1.00
Satd. Flow (perm)				1770	6398		876	1863			1863	1583
Volume (vph)	0	0	0	52	2137	21	132	77	0	0	155	103
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	0	0	57	2323	23	143	84	0	0	168	112
RTOR Reduction (vph)	0	0	0	0	1	0	0	0	0	0	0	11
Lane Group Flow (vph)	0	0	0	57	2345	0	143	84	0	0	168	101
Turn Type				Perm			Perm					Perm
Protected Phases					8			2			6	
Permitted Phases				8			2					6
Actuated Green, G (s)				118.0	118.0		31.5	31.5			31.5	31.5
Effective Green, g (s)				119.2	119.2		32.8	32.8			32.8	32.8
Actuated g/C Ratio				0.75	0.75		0.20	0.20			0.20	0.20
Clearance Time (s)				5.2	5.2		5.3	5.3			5.3	5.3
Vehicle Extension (s)				3.0	3.0		3.0	3.0			3.0	3.0
Lane Grp Cap (vph)				1319	4767		180	382			382	325
v/s Ratio Prot					c0.37			0.05			0.09	
v/s Ratio Perm				0.03			c0.16					0.07
v/c Ratio				0.04	0.49		0.79	0.22			0.44	0.31
Uniform Delay, d ₁				5.4	8.2		60.4	52.9			55.6	54.0
Progression Factor				0.16	0.13		0.56	0.58			1.00	1.00
Incremental Delay, d ₂				0.0	0.3		19.6	0.3			0.8	0.5
Delay (s)				0.9	1.4		53.2	31.2			56.4	54.5
Level of Service				A	A		D	C			E	D
Approach Delay (s)		0.0			1.4			45.1			55.6	
Approach LOS		A			A			D			E	

Intersection Summary

HCM Average Control Delay	10.0	HCM Level of Service	A
HCM Volume to Capacity ratio	0.56		
Actuated Cycle Length (s)	160.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	57.7%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			