Cumulative No Project Conditions

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		0.91		1.00	0.91					0.95	0.91	0.95
Frt		0.98		1.00	1.00					1.00	0.91	0.85
Flt Protected		1.00		0.95	1.00					0.95	0.98	1.00
Satd. Flow (prot)		4977		1770	5085					1681	1512	1504
Flt Permitted		1.00		0.95	1.00					0.95	0.98	1.00
Satd. Flow (perm)		4977		1770	5085					1681	1512	1504
Volume (vph)	0	2110	350	480	1010	0	0	0	0	430	0	600
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	2293	380	522	1098	0	0	0	0	467	0	652
RTOR Reduction (vph)	0	19	0	0	0	0	0	0	0	0	45	130
Lane Group Flow (vph)	0	2654	0	522	1098	0	0	0	0	317	330	297
Turn Type				Prot						Split		Perm
Protected Phases		2		1	6					4	4	
Permitted Phases												4
Actuated Green, G (s)		56.0		30.0	90.0					22.0	22.0	22.0
Effective Green, g (s)		56.0		30.0	90.0					22.0	22.0	22.0
Actuated g/C Ratio		0.47		0.25	0.75					0.18	0.18	0.18
Clearance Time (s)		4.0		4.0	4.0					4.0	4.0	4.0
Vehicle Extension (s)		3.0		3.0	3.0					3.0	3.0	3.0
Lane Grp Cap (vph)		2323		443	3814					308	277	276
v/s Ratio Prot		c0.53		c0.29	0.22					0.19	c0.22	
v/s Ratio Perm												0.20
v/c Ratio		1.14		1.18	0.29					1.03	1.19	1.08
Uniform Delay, d1		32.0		45.0	4.8					49.0	49.0	49.0
Progression Factor		1.00		0.24	0.37					1.00	1.00	1.00
Incremental Delay, d2		69.8		82.6	0.0					59.0	116.2	76.0
Delay (s)		101.8		93.5	1.8					108.0	165.2	125.0
Level of Service		F		F	A					F	F	F
Approach Delay (s)		101.8			31.4			0.0			133.7	
Approach LOS		F			C			A			F	

Intersection Summary			
HCM Average Control Delay	87.3	HCM Level of Service	F
HCM Volume to Capacity ratio	1.16		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	107.0%	ICU Level of Service	G
Analysis Period (min)	15		
c Critical Lane Group			

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	0.91			0.91		0.95	0.91	0.95			
Frt	1.00	1.00			0.95		1.00	0.90	0.85			
Flt Protected	0.95	1.00			1.00		0.95	0.98	1.00			
Satd. Flow (prot)	1770	5085			4853		1681	1502	1504			
Flt Permitted	0.95	1.00			1.00		0.95	0.98	1.00			
Satd. Flow (perm)	1770	5085			4853		1681	1502	1504			
Volume (vph)	900	1640	0	0	1190	520	300	0	410	0	0	0
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)	978	1783	0	0	1293	565	326	0	446	0	0	0
RTOR Reduction (vph)	0	0	0	0	66	0	0	48	48	0	0	0
Lane Group Flow (vph)	978	1783	0	0	1792	0	228	238	210	0	0	0
Turn Type	Prot						Split		Perm			
Protected Phases	5	2			6		8	8				
Permitted Phases									8			
Actuated Green, G (s)	50.0	96.0			42.0		16.0	16.0	16.0			
Effective Green, g (s)	50.0	96.0			42.0		16.0	16.0	16.0			
Actuated g/C Ratio	0.42	0.80			0.35		0.13	0.13	0.13			
Clearance Time (s)	4.0	4.0			4.0		4.0	4.0	4.0			
Vehicle Extension (s)	3.0	3.0			3.0		3.0	3.0	3.0			
Lane Grp Cap (vph)	738	4068			1699		224	200	201			
v/s Ratio Prot	c0.55	0.35			c0.37		0.14	c0.16				
v/s Ratio Perm									0.14			
v/c Ratio	1.33	0.44			1.05		1.02	1.19	1.05			
Uniform Delay, d1	35.0	3.7			39.0		52.0	52.0	52.0			
Progression Factor	0.10	0.17			1.00		1.00	1.00	1.00			
Incremental Delay, d2	147.2	0.0			38.0		64.8	124.9	76.2			
Delay (s)	150.8	0.7			77.0		116.8	176.9	128.2			
Level of Service	F	A			E		F	F	F			
Approach Delay (s)		53.9			77.0			142.9			0.0	
Approach LOS		D			E			F			A	

Intersection Summary			
HCM Average Control Delay	74.6	HCM Level of Service	E
HCM Volume to Capacity ratio	1.20		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	107.0%	ICU Level of Service	G
Analysis Period (min)	15		
c Critical Lane Group			

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		0.91	1.00	1.00	0.95					1.00		1.00
Frt		1.00	0.85	1.00	1.00					1.00		0.85
Flt Protected		1.00	1.00	0.95	1.00					0.95		1.00
Satd. Flow (prot)		5085	1583	1770	3539					1770		1583
Flt Permitted		1.00	1.00	0.95	1.00					0.95		1.00
Satd. Flow (perm)		5085	1583	1770	3539					1770		1583
Volume (vph)	0	1280	660	260	1050	0	0	0	0	160	0	640
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	1391	717	283	1141	0	0	0	0	174	0	696
RTOR Reduction (vph)	0	0	500	0	0	0	0	0	0	0	0	31
Lane Group Flow (vph)	0	1391	217	283	1141	0	0	0	0	174	0	665
Turn Type			Perm	Prot						custom		custom
Protected Phases		2		1	6							
Permitted Phases			2							4		4
Actuated Green, G (s)		36.3	36.3	20.7	61.0					51.0		51.0
Effective Green, g (s)		36.3	36.3	20.7	61.0					51.0		51.0
Actuated g/C Ratio		0.30	0.30	0.17	0.51					0.42		0.42
Clearance Time (s)		4.0	4.0	4.0	4.0					4.0		4.0
Vehicle Extension (s)		3.0	3.0	3.0	3.0					3.0		3.0
Lane Grp Cap (vph)		1538	479	305	1799					752		673
v/s Ratio Prot		c0.27		c0.16	0.32							
v/s Ratio Perm			0.14							0.10		c0.42
v/c Ratio		0.90	0.45	0.93	0.63					0.23		0.99
Uniform Delay, d1		40.2	33.8	48.9	21.4					22.0		34.2
Progression Factor		1.00	1.00	1.55	1.28					1.00		1.00
Incremental Delay, d2		9.1	3.1	5.1	0.2					0.2		31.3
Delay (s)		49.3	36.9	81.2	27.6					22.2		65.5
Level of Service		D	D	F	C					C		E
Approach Delay (s)		45.1			38.3			0.0			56.9	
Approach LOS		D			D			A			E	

Intersection Summary			
HCM Average Control Delay	45.2	HCM Level of Service	D
HCM Volume to Capacity ratio	0.95		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	97.5%	ICU Level of Service	F
Analysis Period (min)	15		
c Critical Lane Group			

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	0.95			0.95	1.00	1.00		1.00			
Frt	1.00	1.00			1.00	0.85	1.00		0.85			
Flt Protected	0.95	1.00			1.00	1.00	0.95		1.00			
Satd. Flow (prot)	1770	3539			3539	1583	1770		1583			
Flt Permitted	0.95	1.00			1.00	1.00	0.95		1.00			
Satd. Flow (perm)	1770	3539			3539	1583	1770		1583			
Volume (vph)	700	740	0	0	860	290	450	0	230	0	0	0
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)	761	804	0	0	935	315	489	0	250	0	0	0
RTOR Reduction (vph)	0	0	0	0	0	134	0	0	176	0	0	0
Lane Group Flow (vph)	761	804	0	0	935	181	489	0	74	0	0	0
Turn Type	Prot					Perm	custom		custom			
Protected Phases	5	2			6							
Permitted Phases						6	8		8			
Actuated Green, G (s)	47.0	82.0			31.0	31.0	30.0		30.0			
Effective Green, g (s)	47.0	82.0			31.0	31.0	30.0		30.0			
Actuated g/C Ratio	0.39	0.68			0.26	0.26	0.25		0.25			
Clearance Time (s)	4.0	4.0			4.0	4.0	4.0		4.0			
Vehicle Extension (s)	3.0	3.0			3.0	3.0	3.0		3.0			
Lane Grp Cap (vph)	693	2418			914	409	443		396			
v/s Ratio Prot	c0.43	0.23			c0.26							
v/s Ratio Perm						0.11	c0.28		0.05			
v/c Ratio	1.10	0.33			1.02	0.44	1.10		0.19			
Uniform Delay, d1	36.5	7.8			44.5	37.3	45.0		35.4			
Progression Factor	2.11	0.91			1.00	1.00	1.00		1.00			
Incremental Delay, d2	53.9	0.2			35.7	3.4	74.0		0.2			
Delay (s)	131.0	7.3			80.2	40.7	119.0		35.6			
Level of Service	F	A			F	D	F		D			
Approach Delay (s)		67.5			70.3			90.8			0.0	
Approach LOS		E			E			F			A	

Intersection Summary			
HCM Average Control Delay	73.3	HCM Level of Service	E
HCM Volume to Capacity ratio	1.08		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	97.5%	ICU Level of Service	F
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Volume (veh/h)	500	170	160	40	40	560
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	543	185	174	43	43	609
Pedestrians			100			
Lane Width (ft)			12.0			
Walking Speed (ft/s)			4.0			
Percent Blockage			8			
Right turn flare (veh)						
Median type					None	
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	217				1567	196
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	217				1567	196
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	60				35	28
cM capacity (veh/h)	1352				67	846

Direction, Lane #	EB 1	EB 2	WB 1	SB 1
Volume Total	543	185	217	652
Volume Left	543	0	0	43
Volume Right	0	0	43	609
cSH	1352	1700	1700	476
Volume to Capacity	0.40	0.11	0.13	1.37
Queue Length 95th (ft)	49	0	0	752
Control Delay (s)	9.4	0.0	0.0	203.0
Lane LOS	A			F
Approach Delay (s)	7.0		0.0	203.0
Approach LOS				F

Intersection Summary			
Average Delay	86.1		
Intersection Capacity Utilization	85.4%	ICU Level of Service	E
Analysis Period (min)	15		

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Volume (veh/h)	10	10	10	160	180	20
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	11	11	11	174	196	22
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None					
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	402	207	217			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	402	207	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 %	98	99	99			
cM capacity (veh/h)	599	834	1352			

Direction, Lane #	EB 1	NB 1	SB 1
Volume Total	22	185	217
Volume Left	11	11	0
Volume Right	11	0	22
cSH	697	1352	1700
Volume to Capacity	0.03	0.01	0.13
Queue Length 95th (ft)	2	1	0
Control Delay (s)	10.3	0.5	0.0
Lane LOS	B	A	
Approach Delay (s)	10.3	0.5	0.0
Approach LOS	B		

Intersection Summary			
Average Delay	0.8		
Intersection Capacity Utilization	26.6%	ICU Level of Service	A
Analysis Period (min)	15		

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	4.0	4.0	4.0	4.0
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1770	1863	1583	1770	1863	1583	1770	1863	1583	1770	1863	1583
Flt Permitted	0.74	1.00	1.00	0.73	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	1384	1863	1583	1358	1863	1583	1770	1863	1583	1770	1863	1583
Volume (vph)	110	40	180	20	20	20	150	350	20	60	720	80
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)	120	43	196	22	22	22	163	380	22	65	783	87
RTOR Reduction (vph)	0	0	169	0	0	19	0	0	8	0	0	32
Lane Group Flow (vph)	120	43	27	22	22	3	163	380	14	65	783	55
Turn Type	Perm		Perm	Perm		Perm	Prot		Perm	Prot		Perm
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4		4	8		8			2			6
Actuated Green, G (s)	9.3	9.3	9.3	9.3	9.3	9.3	8.7	41.4	41.4	3.8	36.5	36.5
Effective Green, g (s)	9.3	9.3	9.3	9.3	9.3	9.3	8.7	41.4	41.4	3.8	36.5	36.5
Actuated g/C Ratio	0.14	0.14	0.14	0.14	0.14	0.14	0.13	0.62	0.62	0.06	0.55	0.55
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	194	261	221	190	261	221	232	1160	986	101	1023	869
v/s Ratio Prot		0.02			0.01		c0.09	0.20		0.04	c0.42	
v/s Ratio Perm	c0.09		0.02	0.02		0.00			0.01			0.03
v/c Ratio	0.62	0.16	0.12	0.12	0.08	0.01	0.70	0.33	0.01	0.64	0.77	0.06
Uniform Delay, d1	26.9	25.2	25.0	25.0	24.9	24.6	27.7	6.0	4.8	30.7	11.7	7.0
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	5.8	0.3	0.3	0.3	0.1	0.0	9.3	0.2	0.0	13.2	3.5	0.0
Delay (s)	32.7	25.5	25.3	25.3	25.0	24.7	36.9	6.1	4.8	43.9	15.1	7.0
Level of Service	C	C	C	C	C	C	D	A	A	D	B	A
Approach Delay (s)		27.8			25.0			15.0			16.4	
Approach LOS		C			C			B			B	

Intersection Summary			
HCM Average Control Delay	18.4	HCM Level of Service	B
HCM Volume to Capacity ratio	0.73		
Actuated Cycle Length (s)	66.5	Sum of lost time (s)	12.0
Intersection Capacity Utilization	69.0%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	
Frt	1.00	0.85	1.00	1.00	0.99	
Flt Protected	1.00	1.00	0.95	1.00	0.96	
Satd. Flow (prot)	1863	1583	1770	1863	1764	
Flt Permitted	1.00	1.00	0.52	1.00	0.96	
Satd. Flow (perm)	1863	1583	973	1863	1764	
Volume (vph)	340	150	10	480	150	10
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	370	163	11	522	163	11
RTOR Reduction (vph)	0	61	0	0	7	0
Lane Group Flow (vph)	370	102	11	522	167	0
Turn Type		Perm	Perm			
Protected Phases	4			8	2	
Permitted Phases		4	8			
Actuated Green, G (s)	33.3	33.3	33.3	33.3	12.0	
Effective Green, g (s)	33.3	33.3	33.3	33.3	12.0	
Actuated g/C Ratio	0.62	0.62	0.62	0.62	0.23	
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	1164	989	608	1164	397	
v/s Ratio Prot	0.20			c0.28	c0.09	
v/s Ratio Perm		0.06	0.01			
v/c Ratio	0.32	0.10	0.02	0.45	0.42	
Uniform Delay, d1	4.7	4.0	3.8	5.2	17.7	
Progression Factor	1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	0.2	0.0	0.0	0.3	0.7	
Delay (s)	4.8	4.1	3.8	5.5	18.4	
Level of Service	A	A	A	A	B	
Approach Delay (s)	4.6			5.5	18.4	
Approach LOS	A			A	B	

Intersection Summary			
HCM Average Control Delay	6.9	HCM Level of Service	A
HCM Volume to Capacity ratio	0.44		
Actuated Cycle Length (s)	53.3	Sum of lost time (s)	8.0
Intersection Capacity Utilization	40.8%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

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	4.0
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00		1.00			1.00	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85		0.95			1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00		0.98			0.96	1.00
Satd. Flow (prot)	1770	1845	1615	1805	1863	1583		1785			1788	1583
Flt Permitted	0.95	1.00	1.00	0.60	1.00	1.00		0.90			0.73	1.00
Satd. Flow (perm)	1770	1845	1615	1148	1863	1583		1639			1356	1583
Volume (vph)	90	230	10	10	570	50	10	10	10	80	10	140
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)	98	250	11	11	620	54	11	11	11	87	11	152
RTOR Reduction (vph)	0	0	3	0	0	13	0	9	0	0	0	126
Lane Group Flow (vph)	98	250	8	11	620	41	0	24	0	0	98	26
Heavy Vehicles (%)	2%	3%	0%	0%	2%	2%	0%	0%	0%	2%	0%	2%
Turn Type	Prot		Perm	Perm		Perm	Perm			Perm		Perm
Protected Phases	7	4			8			2			6	
Permitted Phases			4	8		8	2			6		6
Actuated Green, G (s)	3.9	41.0	41.0	33.1	33.1	33.1		10.2			10.2	10.2
Effective Green, g (s)	3.9	41.0	41.0	33.1	33.1	33.1		10.2			10.2	10.2
Actuated g/C Ratio	0.07	0.69	0.69	0.56	0.56	0.56		0.17			0.17	0.17
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0	4.0		4.0			4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0		3.0			3.0	3.0
Lane Grp Cap (vph)	117	1278	1118	642	1042	885		282			234	273
v/s Ratio Prot	c0.06	0.14			c0.33							
v/s Ratio Perm			0.00	0.01		0.03		0.01			c0.07	0.02
v/c Ratio	0.84	0.20	0.01	0.02	0.60	0.05		0.08			0.42	0.10
Uniform Delay, d1	27.3	3.2	2.8	5.8	8.6	5.9		20.6			21.9	20.6
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00		1.00			1.00	1.00
Incremental Delay, d2	38.0	0.1	0.0	0.0	0.9	0.0		0.1			1.2	0.2
Delay (s)	65.3	3.3	2.8	5.8	9.5	5.9		20.7			23.1	20.8
Level of Service	E	A	A	A	A	A		C			C	C
Approach Delay (s)		20.2			9.2			20.7			21.7	
Approach LOS		C			A			C			C	

Intersection Summary			
HCM Average Control Delay	14.8	HCM Level of Service	B
HCM Volume to Capacity ratio	0.58		
Actuated Cycle Length (s)	59.2	Sum of lost time (s)	12.0
Intersection Capacity Utilization	56.4%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Free			Free			Stop			Stop	
Grade		-4%			4%			0%			0%	
Volume (veh/h)	50	190	0	0	320	440	40	0	230	0	0	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
Hourly flow rate (vph)	54	207	0	0	348	478	43	0	250	0	0	0
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (ft)					739							
pX, platoon unblocked	0.76						0.76	0.76		0.76	0.76	0.76
vC, conflicting volume	826			207			902	1141	207	1152	902	587
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	772			207			872	1185	207	1199	872	459
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	92			100			78	100	70	100	100	100
cM capacity (veh/h)	643			1377			194	132	831	82	203	463

Direction, Lane #	EB 1	WB 1	NB 1
Volume Total	261	826	293
Volume Left	54	0	43
Volume Right	0	478	250
cSH	643	1700	559
Volume to Capacity	0.08	0.49	0.53
Queue Length 95th (ft)	7	0	76
Control Delay (s)	3.2	0.0	18.4
Lane LOS	A		C
Approach Delay (s)	3.2	0.0	18.4
Approach LOS			C

Intersection Summary			
Average Delay	4.5		
Intersection Capacity Utilization	76.3%	ICU Level of Service	D
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Free			Free			Stop			Stop	
Grade		4%			-4%			0%			0%	
Volume (veh/h)	0	70	30	280	80	0	0	0	0	170	0	80
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
Hourly flow rate (vph)	0	76	33	304	87	0	0	0	0	185	0	87
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	87			109			875	788	92	788	804	87
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	87			109			875	788	92	788	804	87
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.5	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.9	4.0	3.3
p0 queue free %	100			80			100	100	100	18	100	91
cM capacity (veh/h)	1522			1488			209	259	970	226	253	972

Direction, Lane #	EB 1	WB 1	SB 1
Volume Total	109	391	272
Volume Left	0	304	185
Volume Right	33	0	87
cSH	1700	1488	300
Volume to Capacity	0.06	0.20	0.91
Queue Length 95th (ft)	0	19	212
Control Delay (s)	0.0	6.6	69.0
Lane LOS		A	F
Approach Delay (s)	0.0	6.6	69.0
Approach LOS			F

Intersection Summary			
Average Delay	27.7		
Intersection Capacity Utilization	47.4%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Volume (vph)	10	20	10	120	30	10	10	10	70	10	10	10
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
Hourly flow rate (vph)	11	22	11	130	33	11	11	11	76	11	11	11

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total (vph)	43	174	98	33
Volume Left (vph)	11	130	11	11
Volume Right (vph)	11	11	76	11
Hadj (s)	-0.07	0.14	-0.41	-0.12
Departure Headway (s)	4.3	4.4	4.0	4.4
Degree Utilization, x	0.05	0.21	0.11	0.04
Capacity (veh/h)	800	799	843	764
Control Delay (s)	7.5	8.5	7.5	7.6
Approach Delay (s)	7.5	8.5	7.5	7.6
Approach LOS	A	A	A	A

Intersection Summary			
Delay	8.0		
HCM Level of Service	A		
Intersection Capacity Utilization	27.9%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Volume (veh/h)	0	460	180	470	400	0	0	0	0	120	0	290
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
Hourly flow rate (vph)	0	500	196	511	435	0	0	0	0	130	0	315
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												6
Median type								None			None	
Median storage veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	435			500			2054	2054	598	2054	1957	435
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	435			500			2054	2054	598	2054	1957	435
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	100			52			100	100	100	0	100	49
cM capacity (veh/h)	1125			1064			13	29	502	25	33	621

Direction, Lane #	EB 1	WB 1	WB 2	SB 1
Volume Total	696	511	435	446
Volume Left	0	511	0	130
Volume Right	196	0	0	315
cSH	1700	1064	1700	80
Volume to Capacity	0.41	0.48	0.26	5.60
Queue Length 95th (ft)	0	67	0	Err
Control Delay (s)	0.0	11.5	0.0	Err
Lane LOS		B		F
Approach Delay (s)	0.0	6.2		9999.0
Approach LOS				F

Intersection Summary			
Average Delay	2138.0		
Intersection Capacity Utilization	77.9%	ICU Level of Service	D
Analysis Period (min)	15		

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Volume (veh/h)	330	250	80	730	140	240
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	359	272	87	793	152	261
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						6
Median type					None	
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume			359		1326	359
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			359		1326	359
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			93		4	62
cM capacity (veh/h)			1200		159	686

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1
Volume Total	359	272	87	793	413
Volume Left	0	0	87	0	152
Volume Right	0	272	0	0	261
cSH	1700	1700	1200	1700	432
Volume to Capacity	0.21	0.16	0.07	0.47	0.96
Queue Length 95th (ft)	0	0	6	0	283
Control Delay (s)	0.0	0.0	8.2	0.0	51.6
Lane LOS			A		F
Approach Delay (s)	0.0		0.8		51.6
Approach LOS					F

Intersection Summary			
Average Delay	11.4		
Intersection Capacity Utilization	52.8%	ICU Level of Service	A
Analysis Period (min)	15		

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		0.91		1.00	0.91					0.95	0.91	0.95
Frt		0.99		1.00	1.00					1.00	0.97	0.85
Flt Protected		1.00		0.95	1.00					0.95	0.96	1.00
Satd. Flow (prot)		5034		1770	5085					1681	1581	1504
Flt Permitted		1.00		0.95	1.00					0.95	0.96	1.00
Satd. Flow (perm)		5034		1770	5085					1681	1581	1504
Volume (vph)	0	1950	140	150	1540	0	0	0	0	440	0	290
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	2120	152	163	1674	0	0	0	0	478	0	315
RTOR Reduction (vph)	0	6	0	0	0	0	0	0	0	0	8	33
Lane Group Flow (vph)	0	2266	0	163	1674	0	0	0	0	258	267	227
Turn Type				Prot						Split		Perm
Protected Phases		2		1	6					4	4	
Permitted Phases												4
Actuated Green, G (s)		69.1		14.6	87.7					24.3	24.3	24.3
Effective Green, g (s)		69.1		14.6	87.7					24.3	24.3	24.3
Actuated g/C Ratio		0.58		0.12	0.73					0.20	0.20	0.20
Clearance Time (s)		4.0		4.0	4.0					4.0	4.0	4.0
Vehicle Extension (s)		3.0		3.0	3.0					3.0	3.0	3.0
Lane Grp Cap (vph)		2899		215	3716					340	320	305
v/s Ratio Prot		c0.45		c0.09	0.33					0.15	c0.17	
v/s Ratio Perm												0.15
v/c Ratio		0.78		0.76	0.45					0.76	0.83	0.74
Uniform Delay, d1		19.6		51.0	6.5					45.1	45.9	44.9
Progression Factor		1.00		1.12	1.02					1.00	1.00	1.00
Incremental Delay, d2		2.2		1.4	0.0					9.4	16.8	9.4
Delay (s)		21.8		58.8	6.6					54.4	62.8	54.3
Level of Service		C		E	A					D	E	D
Approach Delay (s)		21.8			11.3			0.0			57.3	
Approach LOS		C			B			A			E	

Intersection Summary			
HCM Average Control Delay	23.6	HCM Level of Service	C
HCM Volume to Capacity ratio	0.79		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	104.4%	ICU Level of Service	G
Analysis Period (min)	15		
c Critical Lane Group			

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	0.91			0.91		0.95	0.91	0.95			
Frt	1.00	1.00			0.96		1.00	1.00	0.85			
Flt Protected	0.95	1.00			1.00		0.95	0.95	1.00			
Satd. Flow (prot)	1770	5085			4859		1681	1610	1504			
Flt Permitted	0.95	1.00			1.00		0.95	0.95	1.00			
Satd. Flow (perm)	1770	5085			4859		1681	1610	1504			
Volume (vph)	1090	1300	0	0	1330	560	360	0	30	0	0	0
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)	1185	1413	0	0	1446	609	391	0	33	0	0	0
RTOR Reduction (vph)	0	0	0	0	63	0	0	0	29	0	0	0
Lane Group Flow (vph)	1185	1413	0	0	1992	0	196	195	4	0	0	0
Turn Type	Prot						Split		Perm			
Protected Phases	5	2			6		8	8				
Permitted Phases									8			
Actuated Green, G (s)	55.0	96.1			37.1		15.9	15.9	15.9			
Effective Green, g (s)	55.0	96.1			37.1		15.9	15.9	15.9			
Actuated g/C Ratio	0.46	0.80			0.31		0.13	0.13	0.13			
Clearance Time (s)	4.0	4.0			4.0		4.0	4.0	4.0			
Vehicle Extension (s)	3.0	3.0			3.0		3.0	3.0	3.0			
Lane Grp Cap (vph)	811	4072			1502		223	213	199			
v/s Ratio Prot	c0.67	0.28			c0.41		0.12	c0.12				
v/s Ratio Perm									0.00			
v/c Ratio	1.46	0.35			1.33		0.88	0.92	0.02			
Uniform Delay, d1	32.5	3.3			41.5		51.1	51.4	45.3			
Progression Factor	1.47	1.03			1.00		1.00	1.00	1.00			
Incremental Delay, d2	211.6	0.1			151.6		29.9	38.8	0.0			
Delay (s)	259.5	3.5			193.0		81.1	90.2	45.3			
Level of Service	F	A			F		F	F	D			
Approach Delay (s)		120.3			193.0			82.5			0.0	
Approach LOS		F			F			F			A	

Intersection Summary			
HCM Average Control Delay	146.6	HCM Level of Service	F
HCM Volume to Capacity ratio	1.33		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	104.4%	ICU Level of Service	G
Analysis Period (min)	15		
c Critical Lane Group			

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		0.91	1.00	1.00	0.95					1.00		1.00
Frt		1.00	0.85	1.00	1.00					1.00		0.85
Flt Protected		1.00	1.00	0.95	1.00					0.95		1.00
Satd. Flow (prot)		5085	1583	1770	3539					1770		1583
Flt Permitted		1.00	1.00	0.95	1.00					0.95		1.00
Satd. Flow (perm)		5085	1583	1770	3539					1770		1583
Volume (vph)	0	1300	350	290	880	0	0	0	0	180	0	690
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	1413	380	315	957	0	0	0	0	196	0	750
RTOR Reduction (vph)	0	0	266	0	0	0	0	0	0	0	0	56
Lane Group Flow (vph)	0	1413	114	315	957	0	0	0	0	196	0	694
Turn Type			Perm	Prot						custom		custom
Protected Phases		2		1	6							
Permitted Phases			2							4		4
Actuated Green, G (s)		33.0	33.0	20.0	57.0					45.0		45.0
Effective Green, g (s)		33.0	33.0	20.0	57.0					45.0		45.0
Actuated g/C Ratio		0.30	0.30	0.18	0.52					0.41		0.41
Clearance Time (s)		4.0	4.0	4.0	4.0					4.0		4.0
Vehicle Extension (s)		3.0	3.0	3.0	3.0					3.0		3.0
Lane Grp Cap (vph)		1526	475	322	1834					724		648
v/s Ratio Prot		c0.28		c0.18	0.27							
v/s Ratio Perm			0.07							0.11		c0.44
v/c Ratio		0.93	0.24	0.98	0.52					0.27		1.07
Uniform Delay, d1		37.3	29.0	44.8	17.5					21.6		32.5
Progression Factor		1.00	1.00	1.59	1.23					1.00		1.00
Incremental Delay, d2		11.1	1.2	23.4	0.3					0.2		56.1
Delay (s)		48.4	30.2	94.5	21.9					21.8		88.6
Level of Service		D	C	F	C					C		F
Approach Delay (s)		44.5			39.9			0.0			74.8	
Approach LOS		D			D			A			E	

Intersection Summary			
HCM Average Control Delay	50.2	HCM Level of Service	D
HCM Volume to Capacity ratio	1.00		
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	89.7%	ICU Level of Service	E
Analysis Period (min)	15		
c Critical Lane Group			

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	0.95			0.95	1.00	1.00		1.00			
Frt	1.00	1.00			1.00	0.85	1.00		0.85			
Flt Protected	0.95	1.00			1.00	1.00	0.95		1.00			
Satd. Flow (prot)	1770	3539			3539	1583	1770		1583			
Flt Permitted	0.95	1.00			1.00	1.00	0.95		1.00			
Satd. Flow (perm)	1770	3539			3539	1583	1770		1583			
Volume (vph)	690	790	0	0	840	220	330	0	330	0	0	0
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)	750	859	0	0	913	239	359	0	359	0	0	0
RTOR Reduction (vph)	0	0	0	0	0	114	0	0	187	0	0	0
Lane Group Flow (vph)	750	859	0	0	913	125	359	0	172	0	0	0
Turn Type	Prot					Perm	custom		custom			
Protected Phases	5	2			6							
Permitted Phases						6	8		8			
Actuated Green, G (s)	46.0	80.0			30.0	30.0	22.0		22.0			
Effective Green, g (s)	46.0	80.0			30.0	30.0	22.0		22.0			
Actuated g/C Ratio	0.42	0.73			0.27	0.27	0.20		0.20			
Clearance Time (s)	4.0	4.0			4.0	4.0	4.0		4.0			
Vehicle Extension (s)	3.0	3.0			3.0	3.0	3.0		3.0			
Lane Grp Cap (vph)	740	2574			965	432	354		317			
v/s Ratio Prot	c0.42	0.24			c0.26							
v/s Ratio Perm						0.08	c0.20		0.11			
v/c Ratio	1.01	0.33			0.95	0.29	1.01		0.54			
Uniform Delay, d1	32.0	5.4			39.2	31.6	44.0		39.5			
Progression Factor	2.06	1.16			1.00	1.00	1.00		1.00			
Incremental Delay, d2	23.5	0.2			18.6	1.7	51.5		1.9			
Delay (s)	89.4	6.5			57.8	33.3	95.5		41.4			
Level of Service	F	A			E	C	F		D			
Approach Delay (s)		45.1			52.7			68.4			0.0	
Approach LOS		D			D			E			A	

Intersection Summary			
HCM Average Control Delay	52.4	HCM Level of Service	D
HCM Volume to Capacity ratio	0.99		
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	89.7%	ICU Level of Service	E
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Volume (veh/h)	290	230	230	10	30	320
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	315	250	250	11	33	348
Pedestrians			100			
Lane Width (ft)			12.0			
Walking Speed (ft/s)			4.0			
Percent Blockage			8			
Right turn flare (veh)						
Median type					None	
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	261				1236	255
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	261				1236	255
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	76				76	56
cM capacity (veh/h)	1304				135	783

Direction, Lane #	EB 1	EB 2	WB 1	SB 1
Volume Total	315	250	261	380
Volume Left	315	0	0	33
Volume Right	0	0	11	348
cSH	1304	1700	1700	555
Volume to Capacity	0.24	0.15	0.15	0.69
Queue Length 95th (ft)	24	0	0	132
Control Delay (s)	8.6	0.0	0.0	24.4
Lane LOS	A			C
Approach Delay (s)	4.8		0.0	24.4
Approach LOS				C

Intersection Summary			
Average Delay	10.0		
Intersection Capacity Utilization	60.2%	ICU Level of Service	B
Analysis Period (min)	15		

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Volume (veh/h)	20	20	20	140	140	20
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	22	22	22	152	152	22
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None					
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	359	163	174			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	359	163	174			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	97	98	98			
cM capacity (veh/h)	630	882	1403			

Direction, Lane #	EB 1	NB 1	SB 1
Volume Total	43	174	174
Volume Left	22	22	0
Volume Right	22	0	22
cSH	735	1403	1700
Volume to Capacity	0.06	0.02	0.10
Queue Length 95th (ft)	5	1	0
Control Delay (s)	10.2	1.1	0.0
Lane LOS	B	A	
Approach Delay (s)	10.2	1.1	0.0
Approach LOS	B		

Intersection Summary			
Average Delay	1.6		
Intersection Capacity Utilization	30.4%	ICU Level of Service	A
Analysis Period (min)	15		

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	4.0	4.0	4.0	4.0
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1770	1863	1583	1770	1863	1583	1770	1863	1583	1770	1863	1583
Flt Permitted	0.74	1.00	1.00	0.74	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	1370	1863	1583	1370	1863	1583	1770	1863	1583	1770	1863	1583
Volume (vph)	50	30	110	20	30	30	80	420	30	50	490	50
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)	54	33	120	22	33	33	87	457	33	54	533	54
RTOR Reduction (vph)	0	0	106	0	0	29	0	0	12	0	0	21
Lane Group Flow (vph)	54	33	14	22	33	4	87	457	21	54	533	33
Turn Type	Perm		Perm	Perm		Perm	Prot		Perm	Prot		Perm
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4		4	8		8			2			6
Actuated Green, G (s)	7.2	7.2	7.2	7.2	7.2	7.2	4.3	38.5	38.5	2.7	36.9	36.9
Effective Green, g (s)	7.2	7.2	7.2	7.2	7.2	7.2	4.3	38.5	38.5	2.7	36.9	36.9
Actuated g/C Ratio	0.12	0.12	0.12	0.12	0.12	0.12	0.07	0.64	0.64	0.04	0.61	0.61
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	163	222	189	163	222	189	126	1188	1009	79	1138	967
v/s Ratio Prot		0.02			0.02		c0.05	0.25		0.03	c0.29	
v/s Ratio Perm	c0.04		0.01	0.02		0.00			0.01			0.02
v/c Ratio	0.33	0.15	0.08	0.13	0.15	0.02	0.69	0.38	0.02	0.68	0.47	0.03
Uniform Delay, d1	24.4	23.9	23.6	23.8	23.9	23.5	27.4	5.3	4.0	28.4	6.4	4.7
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	1.2	0.3	0.2	0.4	0.3	0.0	15.1	0.2	0.0	21.7	0.3	0.0
Delay (s)	25.6	24.2	23.8	24.2	24.2	23.5	42.5	5.5	4.0	50.1	6.7	4.7
Level of Service	C	C	C	C	C	C	D	A	A	D	A	A
Approach Delay (s)		24.3			23.9			11.0			10.2	
Approach LOS		C			C			B			B	

Intersection Summary			
HCM Average Control Delay	13.2	HCM Level of Service	B
HCM Volume to Capacity ratio	0.47		
Actuated Cycle Length (s)	60.4	Sum of lost time (s)	12.0
Intersection Capacity Utilization	49.7%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	
Frt	1.00	0.85	1.00	1.00	0.99	
Flt Protected	1.00	1.00	0.95	1.00	0.96	
Satd. Flow (prot)	1863	1583	1770	1863	1760	
Flt Permitted	1.00	1.00	0.64	1.00	0.96	
Satd. Flow (perm)	1863	1583	1194	1863	1760	
Volume (vph)	170	150	10	150	200	20
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	185	163	11	163	217	22
RTOR Reduction (vph)	0	83	0	0	10	0
Lane Group Flow (vph)	185	80	11	163	229	0
Turn Type		Perm	Perm			
Protected Phases	4			8	2	
Permitted Phases		4	8			
Actuated Green, G (s)	16.6	16.6	16.6	16.6	9.3	
Effective Green, g (s)	16.6	16.6	16.6	16.6	9.3	
Actuated g/C Ratio	0.49	0.49	0.49	0.49	0.27	
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	912	775	585	912	483	
v/s Ratio Prot	c0.10			0.09	c0.13	
v/s Ratio Perm		0.05	0.01			
v/c Ratio	0.20	0.10	0.02	0.18	0.47	
Uniform Delay, d1	4.9	4.6	4.5	4.8	10.3	
Progression Factor	1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	0.1	0.1	0.0	0.1	0.7	
Delay (s)	5.0	4.7	4.5	4.9	11.0	
Level of Service	A	A	A	A	B	
Approach Delay (s)	4.9			4.9	11.0	
Approach LOS	A			A	B	

Intersection Summary			
HCM Average Control Delay	6.8	HCM Level of Service	A
HCM Volume to Capacity ratio	0.30		
Actuated Cycle Length (s)	33.9	Sum of lost time (s)	8.0
Intersection Capacity Utilization	27.9%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

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	4.0
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00		1.00			1.00	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85		0.95			1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00		0.98			0.96	1.00
Satd. Flow (prot)	1770	1845	1615	1805	1863	1583		1785			1788	1583
Flt Permitted	0.95	1.00	1.00	0.65	1.00	1.00		0.91			0.73	1.00
Satd. Flow (perm)	1770	1845	1615	1230	1863	1583		1650			1356	1583
Volume (vph)	40	160	10	10	330	30	10	10	10	80	10	60
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)	43	174	11	11	359	33	11	11	11	87	11	65
RTOR Reduction (vph)	0	0	4	0	0	14	0	9	0	0	0	52
Lane Group Flow (vph)	43	174	7	11	359	19	0	24	0	0	98	13
Heavy Vehicles (%)	2%	3%	0%	0%	2%	2%	0%	0%	0%	2%	0%	2%
Turn Type	Prot		Perm	Perm		Perm	Perm			Perm		Perm
Protected Phases	7	4			8			2			6	
Permitted Phases			4	8		8	2			6		6
Actuated Green, G (s)	2.4	37.6	37.6	31.2	31.2	31.2		11.2			11.2	11.2
Effective Green, g (s)	2.4	37.6	37.6	31.2	31.2	31.2		11.2			11.2	11.2
Actuated g/C Ratio	0.04	0.66	0.66	0.55	0.55	0.55		0.20			0.20	0.20
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0	4.0		4.0			4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0		3.0			3.0	3.0
Lane Grp Cap (vph)	75	1221	1069	676	1023	870		325			267	312
v/s Ratio Prot	c0.02	0.09			c0.19							
v/s Ratio Perm			0.00	0.01		0.01		0.01			c0.07	0.01
v/c Ratio	0.57	0.14	0.01	0.02	0.35	0.02		0.07			0.37	0.04
Uniform Delay, d1	26.7	3.6	3.3	5.8	7.1	5.8		18.6			19.7	18.5
Progression Factor	1.00	1.01	1.04	1.00	1.00	1.00		1.00			1.00	1.00
Incremental Delay, d2	10.2	0.1	0.0	0.0	0.2	0.0		0.1			0.9	0.1
Delay (s)	36.9	3.7	3.4	5.8	7.4	5.9		18.7			20.6	18.5
Level of Service	D	A	A	A	A	A		B			C	B
Approach Delay (s)		9.9			7.2			18.7			19.8	
Approach LOS		A			A			B			B	

Intersection Summary			
HCM Average Control Delay	10.9	HCM Level of Service	B
HCM Volume to Capacity ratio	0.37		
Actuated Cycle Length (s)	56.8	Sum of lost time (s)	12.0
Intersection Capacity Utilization	42.1%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Free			Free			Stop			Stop	
Grade		-4%			4%			0%			0%	
Volume (veh/h)	110	190	0	0	140	230	30	0	20	0	0	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
Hourly flow rate (vph)	120	207	0	0	152	250	33	0	22	0	0	0
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (ft)					739							
pX, platoon unblocked	0.95						0.95	0.95		0.95	0.95	0.95
vC, conflicting volume	402			207			723	848	207	745	723	277
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	368			207			707	839	207	730	707	236
tC, single (s)	4.1			4.1			7.1	6.5	6.4	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.4	3.5	4.0	3.3
p0 queue free %	89			100			89	100	97	100	100	100
cM capacity (veh/h)	1126			1377			304	255	802	288	306	764

Direction, Lane #	EB 1	WB 1	NB 1
Volume Total	326	402	54
Volume Left	120	0	33
Volume Right	0	250	22
cSH	1126	1700	405
Volume to Capacity	0.11	0.24	0.13
Queue Length 95th (ft)	9	0	12
Control Delay (s)	3.8	0.0	15.3
Lane LOS	A		C
Approach Delay (s)	3.8	0.0	15.3
Approach LOS			C

Intersection Summary			
Average Delay	2.6		
Intersection Capacity Utilization	50.9%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Free			Free			Stop			Stop	
Grade		4%			-4%			0%			0%	
Volume (veh/h)	0	100	20	50	120	0	0	0	0	200	0	60
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
Hourly flow rate (vph)	0	109	22	54	130	0	0	0	0	217	0	65
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	130			130			424	359	120	359	370	130
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	130			130			424	359	120	359	370	130
tC, single (s)	4.1			4.6			7.1	6.5	6.2	7.3	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.7			3.5	4.0	3.3	3.7	4.0	3.3
p0 queue free %	100			95			100	100	100	60	100	93
cM capacity (veh/h)	1467			1202			488	545	937	550	538	919

Direction, Lane #	EB 1	WB 1	SB 1
Volume Total	130	185	283
Volume Left	0	54	217
Volume Right	22	0	65
cSH	1700	1202	606
Volume to Capacity	0.08	0.05	0.47
Queue Length 95th (ft)	0	4	62
Control Delay (s)	0.0	2.7	16.0
Lane LOS		A	C
Approach Delay (s)	0.0	2.7	16.0
Approach LOS			C

Intersection Summary			
Average Delay	8.4		
Intersection Capacity Utilization	37.2%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Volume (vph)	0	20	0	130	40	10	0	0	90	10	0	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
Hourly flow rate (vph)	0	22	0	141	43	11	0	0	98	11	0	0

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total (vph)	22	196	98	11
Volume Left (vph)	0	141	0	11
Volume Right (vph)	0	11	98	0
Hadj (s)	0.03	0.14	-0.57	0.22
Departure Headway (s)	4.4	4.3	3.8	4.7
Degree Utilization, x	0.03	0.23	0.10	0.01
Capacity (veh/h)	791	818	882	713
Control Delay (s)	7.5	8.6	7.3	7.8
Approach Delay (s)	7.5	8.6	7.3	7.8
Approach LOS	A	A	A	A

Intersection Summary			
Delay	8.1		
HCM Level of Service	A		
Intersection Capacity Utilization	30.5%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Volume (veh/h)	0	620	130	70	420	0	0	0	0	180	0	180
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
Hourly flow rate (vph)	0	674	141	76	457	0	0	0	0	196	0	196
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												6
Median type								None			None	
Median storage veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	457			674			1353	1353	745	1353	1283	457
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	457			674			1353	1353	745	1353	1283	457
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	100			92			100	100	100	0	100	68
cM capacity (veh/h)	1104			917			80	137	414	119	151	604

Direction, Lane #	EB 1	WB 1	WB 2	SB 1
Volume Total	815	76	457	391
Volume Left	0	76	0	196
Volume Right	141	0	0	196
cSH	1700	917	1700	209
Volume to Capacity	0.48	0.08	0.27	1.87
Queue Length 95th (ft)	0	7	0	700
Control Delay (s)	0.0	9.3	0.0	447.4
Lane LOS		A		F
Approach Delay (s)	0.0	1.3		447.4
Approach LOS				F

Intersection Summary			
Average Delay	101.1		
Intersection Capacity Utilization	64.4%	ICU Level of Service	C
Analysis Period (min)	15		

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Volume (veh/h)	340	460	120	340	150	20
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	370	500	130	370	163	22
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						6
Median type					None	
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume			370		1000	370
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			370		1000	370
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			89		32	97
cM capacity (veh/h)			1189		240	676

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1
Volume Total	370	500	130	370	185
Volume Left	0	0	130	0	163
Volume Right	0	500	0	0	22
cSH	1700	1700	1189	1700	272
Volume to Capacity	0.22	0.29	0.11	0.22	0.68
Queue Length 95th (ft)	0	0	9	0	113
Control Delay (s)	0.0	0.0	8.4	0.0	42.6
Lane LOS			A		E
Approach Delay (s)	0.0		2.2		42.6
Approach LOS					E

Intersection Summary			
Average Delay	5.8		
Intersection Capacity Utilization	42.9%	ICU Level of Service	A
Analysis Period (min)	15		

HCM 2000 Basic Freeway Segm Capacity Analysis | **HCM 2000 Basic Freeway Segments Capacity Analysis**

Jurisdiction: CalTrans
Analysis Year: Cumulative
Analyst: Fehr & Peers

Agency or Company:
Date: 6/12/2009
Project Description: Knighton and Churn Creek Commons

General Information **Cumulative No Project** | *Flow Rate Calculation*

1	2	3	4	5	6	7	8	9	10	11	12	13	14	17	18	19
	Freeway/ Direction	From/To	Analysis Time Period	Volume (vph)	PHF	Lanes	HOV Lane?	HOV Lane Volume	Terrain	Grade %	Length (mi)	Truck/ Bus %	RV %	E_T	E_R	f_{HV}
1013	I-5 NB	North Street - Balls Ferry Road / Riverside Avenue	PM	3,260	0.92	2	No		Level			10.0%	0.0%	1.5	1.2	0.95
1011	I-5 NB	Riverside Avenue / Knighton Road	PM	3,210	0.92	2	No		Level			10.0%	0.0%	1.5	1.2	0.95
1009	I-5 NB	Knighton Road / S Bonneview Road	PM	3,430	0.92	2	No		Level			10.0%	0.0%	1.5	1.2	0.95
1007	I-5 NB	Bonnyview Road / Cypress Avenue	PM	3,740	0.92	2	No		Level			10.0%	0.0%	1.5	1.2	0.95
1005	I-5 NB	Cypress Avenue / CA Highway 44	PM	4,450	0.92	2	No		Level			10.0%	0.0%	1.5	1.2	0.95
1006	I-5 SB	CA Highway 44 / Cypress Avenue	PM	4,430	0.92	2	No		Level			10.0%	0.0%	1.5	1.2	0.95
1008	I-5 SB	Cypress Avenue / Bonnyview Road	PM	4,230	0.92	2	No		Level			10.0%	0.0%	1.5	1.2	0.95
1010	I-5 SB	S Bonneview Road / Knighton Road	PM	4,350	0.92	2	No		Level			10.0%	0.0%	1.5	1.2	0.95
1012	I-5 SB	Knighton Road / Riverside Avenue	PM	4,410	0.92	2	No		Level			10.0%	0.0%	1.5	1.2	0.95
1014	I-5 SB	Riverside Avenue / North Street-Balls Ferry Road	PM	4,650	0.92	2	No		Level			10.0%	0.0%	1.5	1.2	0.95
2013	I-5 NB	North Street - Balls Ferry Road / Riverside Avenue	Saturday	3,260	0.92	2	No		Level			10.0%	0.0%	1.5	1.2	0.95
2011	I-5 NB	Riverside Avenue / Knighton Road	Saturday	3,670	0.92	2	No		Level			10.0%	0.0%	1.5	1.2	0.95
2009	I-5 NB	Knighton Road / S Bonneview Road	Saturday	3,960	0.92	2	No		Level			10.0%	0.0%	1.5	1.2	0.95
2007	I-5 NB	Bonnyview Road / Cypress Avenue	Saturday	4,210	0.92	2	No		Level			10.0%	0.0%	1.5	1.2	0.95
2005	I-5 NB	Cypress Avenue / CA Highway 44	Saturday	5,470	0.92	2	No		Level			10.0%	0.0%	1.5	1.2	0.95
2006	I-5 SB	CA Highway 44 / Cypress Avenue	Saturday	3,380	0.92	2	No		Level			10.0%	0.0%	1.5	1.2	0.95
2008	I-5 SB	Cypress Avenue / Bonnyview Road	Saturday	2,940	0.92	2	No		Level			10.0%	0.0%	1.5	1.2	0.95
2010	I-5 SB	S Bonneview Road / Knighton Road	Saturday	2,710	0.92	2	No		Level			10.0%	0.0%	1.5	1.2	0.95
2012	I-5 SB	Knighton Road / Riverside Avenue	Saturday	2,520	0.92	2	No		Level			10.0%	0.0%	1.5	1.2	0.95
2014	I-5 SB	Riverside Avenue / North Street-Balls Ferry Road	Saturday	2,360	0.92	2	No		Level			10.0%	0.0%	1.5	1.2	0.95

HCM 2000 Basic Freeway Segr Capacity Analysis | **HCM 2000 Basic Freeway Segments Capacity Analysis**

1 2 3 4 20 21

General Information **Cumulative No Project**

	Freeway/ Direction	From/To	Analysis Time Period	f_P	Flow Rate v_p (pcphpl)
1013	I-5 NB	North Street - Balls Ferry Road / Riverside Avenue	PM	1.00	1,860
1011	I-5 NB	Riverside Avenue / Knighton Road	PM	1.00	1,832
1009	I-5 NB	Knighton Road / S Bonneview Road	PM	1.00	1,957
1007	I-5 NB	Bonnyview Road / Cypress Avenue	PM	1.00	2,134
1005	I-5 NB	Cypress Avenue / CA Highway 44	PM	1.00	2,539
1006	I-5 SB	CA Highway 44 / Cypress Avenue	PM	1.00	2,528
1008	I-5 SB	Cypress Avenue / Bonnyview Road	PM	1.00	2,414
1010	I-5 SB	S Bonneview Road / Knighton Road	PM	1.00	2,482
1012	I-5 SB	Knighton Road / Riverside Avenue	PM	1.00	2,517
1014	I-5 SB	Riverside Avenue / North Street-Balls Ferry Road	PM	1.00	2,654
2013	I-5 NB	North Street - Balls Ferry Road / Riverside Avenue	Saturday	1.00	1,860
2011	I-5 NB	Riverside Avenue / Knighton Road	Saturday	1.00	2,094
2009	I-5 NB	Knighton Road / S Bonneview Road	Saturday	1.00	2,260
2007	I-5 NB	Bonnyview Road / Cypress Avenue	Saturday	1.00	2,402
2005	I-5 NB	Cypress Avenue / CA Highway 44	Saturday	1.00	3,121
2006	I-5 SB	CA Highway 44 / Cypress Avenue	Saturday	1.00	1,929
2008	I-5 SB	Cypress Avenue / Bonnyview Road	Saturday	1.00	1,678
2010	I-5 SB	S Bonneview Road / Knighton Road	Saturday	1.00	1,546
2012	I-5 SB	Knighton Road / Riverside Avenue	Saturday	1.00	1,438
2014	I-5 SB	Riverside Avenue / North Street-Balls Ferry Road	Saturday	1.00	1,347

HCM 2000 Basic Freeway Segments Capacity Analysis | **HCM 2000 Basic Freeway Segments Capacity Analysis**

1 2 3 4 22

General Information **Cumulative No Project** *Speed Calculation* *Results*

	Freeway/ Direction	From/To	Analysis Time Period	BFFS (mph)	Lane Width (ft)	f_{LW}	R. Shoulder Width (ft)	f_{LC}	f_N	IC Density (per mi)	f_{ID}	Calculated FFS (mph)	Measured FFS (mph)	FFS (mph)	S (mph)	Density, D (pcplpm)
1013	I-5 NB	North Street - Balls Ferry Road / Riverside Avenue	PM										65.0	65.0	63.3	**29.4**
1011	I-5 NB	Riverside Avenue / Knighton Road	PM										65.0	65.0	63.6	**28.8**
1009	I-5 NB	Knighton Road / S Bonneview Road	PM										65.0	65.0	62.1	**31.5**
1007	I-5 NB	Bonnyview Road / Cypress Avenue	PM										65.0	65.0	58.7	**36.3**
1005	I-5 NB	Cypress Avenue / CA Highway 44	PM										65.0	65.0	-	-
1006	I-5 SB	CA Highway 44 / Cypress Avenue	PM										65.0	65.0	-	-
1008	I-5 SB	Cypress Avenue / Bonnyview Road	PM										65.0	65.0	-	-
1010	I-5 SB	S Bonneview Road / Knighton Road	PM										65.0	65.0	-	-
1012	I-5 SB	Knighton Road / Riverside Avenue	PM										65.0	65.0	-	-
1014	I-5 SB	Riverside Avenue / North Street-Balls Ferry Road	PM										65.0	65.0	-	-
2013	I-5 NB	North Street - Balls Ferry Road / Riverside Avenue	Saturday										65.0	65.0	63.3	**29.4**
2011	I-5 NB	Riverside Avenue / Knighton Road	Saturday										65.0	65.0	59.6	**35.1**
2009	I-5 NB	Knighton Road / S Bonneview Road	Saturday										65.0	65.0	55.3	**40.9**
2007	I-5 NB	Bonnyview Road / Cypress Avenue	Saturday										65.0	65.0	-	-
2005	I-5 NB	Cypress Avenue / CA Highway 44	Saturday										65.0	65.0	-	-
2006	I-5 SB	CA Highway 44 / Cypress Avenue	Saturday										65.0	65.0	62.5	**30.8**
2008	I-5 SB	Cypress Avenue / Bonnyview Road	Saturday										65.0	65.0	64.6	**26.0**
2010	I-5 SB	S Bonneview Road / Knighton Road	Saturday										65.0	65.0	65.0	**23.8**
2012	I-5 SB	Knighton Road / Riverside Avenue	Saturday										65.0	65.0	65.0	**22.1**
2014	I-5 SB	Riverside Avenue / North Street-Balls Ferry Road	Saturday										65.0	65.0	65.0	**20.7**

HCM 2000 Basic Freeway Segm Capacity Analysis | **HCM 2000 Basic Freeway Segments Capacity Analysis** | *F*

1 | 2 | 3 | 4

General Information **Cumulative No Project**

	Freeway/ Direction	From/To	Analysis Time Period	Level of Service
1013	I-5 NB	North Street - Balls Ferry Road / Riverside Avenue	PM	D
1011	I-5 NB	Riverside Avenue / Knighton Road	PM	D
1009	I-5 NB	Knighton Road / S Bonneview Road	PM	D
1007	I-5 NB	Bonnyview Road / Cypress Avenue	PM	E
1005	I-5 NB	Cypress Avenue / CA Highway 44	PM	F
1006	I-5 SB	CA Highway 44 / Cypress Avenue	PM	F
1008	I-5 SB	Cypress Avenue / Bonnyview Road	PM	F
1010	I-5 SB	S Bonneview Road / Knighton Road	PM	F
1012	I-5 SB	Knighton Road / Riverside Avenue	PM	F
1014	I-5 SB	Riverside Avenue / North Street-Balls Ferry Road	PM	F
2013	I-5 NB	North Street - Balls Ferry Road / Riverside Avenue	Saturday	D
2011	I-5 NB	Riverside Avenue / Knighton Road	Saturday	E
2009	I-5 NB	Knighton Road / S Bonneview Road	Saturday	E
2007	I-5 NB	Bonnyview Road / Cypress Avenue	Saturday	F
2005	I-5 NB	Cypress Avenue / CA Highway 44	Saturday	F
2006	I-5 SB	CA Highway 44 / Cypress Avenue	Saturday	D
2008	I-5 SB	Cypress Avenue / Bonnyview Road	Saturday	C
2010	I-5 SB	S Bonneview Road / Knighton Road	Saturday	C
2012	I-5 SB	Knighton Road / Riverside Avenue	Saturday	C
2014	I-5 SB	Riverside Avenue / North Street-Balls Ferry Road	Saturday	C

HCM 2000 **HCM 2000**
Merge Ramp Junct **Merge Ramp Junctions**
Capacity Analysis **Capacity Analysis**

Jurisdiction CalTrans
Analysis Year Cumulative
Analyst Fehr & Peers

Agency or Company 0
Date 6/12/2009
Project Description Knighton and Churn Creek Commons

General Information **Cumulative No Project**

Freeway Data *Freeway Volume Adjustment*

ID	Freeway/ Direction	On-ramp	Analysis Time Period	Lanes	S_{FF} (mph)	V (vph)	HOV Lane?	HOV Lane Volume	PHF	Terrain	Grade %	Length (mi)	Truck/ Bus %	RV %	E_T	E_R	f_{HV}	f_P	Flow Rate v_p (pcph)
1013	I-5 NB	Riverside Avenue	PM	#N/A	#N/A	2,880	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	1.5	1.2	0.95	#N/A	#N/A
1011	I-5 NB	Knighton Road	PM	#N/A	#N/A	2,940	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	1.5	1.2	0.95	#N/A	#N/A
1009	I-5 NB	Bonnyview Road	PM	#N/A	#N/A	2,750	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	1.5	1.2	0.95	#N/A	#N/A
1007	I-5 NB	Cypress Avenue	PM	#N/A	#N/A	3,030	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	1.5	1.2	0.95	#N/A	#N/A
1006	I-5 SB	Cypress Avenue	PM	2	0	3,400	No	0	0.92	Level	0	0	0.1	0	1.5	1.2	0.95	1	3,880
1008	I-5 SB	Bonnyview Road	PM	2	0	3,430	No	0	0.92	Level	0	0	0.1	0	1.5	1.2	0.95	1	3,915
1010	I-5 SB	Knighton Road	PM	2	0	4,100	No	0	0.92	Level	0	0	0.1	0	1.5	1.2	0.95	1	4,679
1012	I-5 SB	Riverside Avenue	PM	2	0	4,000	No	0	0.92	Level	0	0	0.1	0	1.5	1.2	0.95	1	4,565
2013	I-5 NB	Riverside Avenue	Saturday	2	0	3,090	No	0	0.92	Level	0	0	0.1	0	1.5	1.2	0.95	1	3,527
2011	I-5 NB	Knighton Road	Saturday	2	0	3,620	No	0	0.92	Level	0	0	0.1	0	1.5	1.2	0.95	1	4,132
2009	I-5 NB	Bonnyview Road	Saturday	2	0	3,300	No	0	0.92	Level	0	0	0.1	0	1.5	1.2	0.95	1	3,766
2007	I-5 NB	Cypress Avenue	Saturday	2	0	3,820	No	0	0.92	Level	0	0	0.1	0	1.5	1.2	0.95	1	4,360
2006	I-5 SB	Cypress Avenue	Saturday	2	0	2,650	No	0	0.92	Level	0	0	0.1	0	1.5	1.2	0.95	1	3,024
2008	I-5 SB	Bonnyview Road	Saturday	2	0	2,070	No	0	0.92	Level	0	0	0.1	0	1.5	1.2	0.95	1	2,363
2010	I-5 SB	Knighton Road	Saturday	2	0	2,450	No	0	0.92	Level	0	0	0.1	0	1.5	1.2	0.95	1	2,796
2012	I-5 SB	Riverside Avenue	Saturday	2	0	2,160	No	0	0.92	Level	0	0	0.1	0	1.5	1.2	0.95	1	2,465

General Information **Cumulative No Project** *On-Ramp Data* *On-Ramp Volume Adjustment*

ID	Freeway/ Direction	On-ramp	Analysis Time Period	Type	Lanes	S_{FR} (mph)	V_R (vph)	Accel Lane (ft) L_{A1}	L_{A2}	L_{Aeff}	PHF	Terrain	Grade %	Length (mi)	Truck/ Bus %	RV %	E_T	E_R	f_{HV}	f_P	Flow Rate v_p (pcph)
1013	I-5 NB	Riverside Avenue	PM	Right	1	35.0	330	100	0	100	#N/A	Level			10.0%	0.0%	1.5	1.2	0.95	1.00	#N/A
1011	I-5 NB	Knighton Road	PM	Right	1	35.0	490	100	0	100	#N/A	Level			10.0%	0.0%	1.5	1.2	0.95	1.00	#N/A
1009	I-5 NB	Bonnyview Road	PM	Right	1	35.0	990	100	0	100	#N/A	Level			10.0%	0.0%	1.5	1.2	0.95	1.00	#N/A
1007	I-5 NB	Cypress Avenue	PM	Right	1	35.0	1,420	100	0	100	#N/A	Level			10.0%	0.0%	1.5	1.2	0.95	1.00	#N/A
1006	I-5 SB	Cypress Avenue	PM	Right	1	35.0	830	100	0	100	0.92	Level			10.0%	0.0%	1.5	1.2	0.95	1.00	947
1008	I-5 SB	Bonnyview Road	PM	Right	1	35.0	920	100	0	100	0.92	Level			10.0%	0.0%	1.5	1.2	0.95	1.00	1,050
1010	I-5 SB	Knighton Road	PM	Right	1	35.0	310	100	0	100	0.92	Level			10.0%	0.0%	1.5	1.2	0.95	1.00	354
1012	I-5 SB	Riverside Avenue	PM	Right	1	35.0	650	100	0	100	0.92	Level			10.0%	0.0%	1.5	1.2	0.95	1.00	742
2013	I-5 NB	Riverside Avenue	Saturday	Right	1	35.0	580	100	0	100	0.92	Level			10.0%	0.0%	1.5	1.2	0.95	1.00	662
2011	I-5 NB	Knighton Road	Saturday	Right	1	35.0	340	100	0	100	0.92	Level			10.0%	0.0%	1.5	1.2	0.95	1.00	388
2009	I-5 NB	Bonnyview Road	Saturday	Right	1	35.0	910	100	0	100	0.92	Level			10.0%	0.0%	1.5	1.2	0.95	1.00	1,039
2007	I-5 NB	Cypress Avenue	Saturday	Right	1	35.0	1,650	100	0	100	0.92	Level			10.0%	0.0%	1.5	1.2	0.95	1.00	1,883
2006	I-5 SB	Cypress Avenue	Saturday	Right	1	35.0	290	100	0	100	0.92	Level			10.0%	0.0%	1.5	1.2	0.95	1.00	331
2008	I-5 SB	Bonnyview Road	Saturday	Right	1	35.0	640	100	0	100	0.92	Level			10.0%	0.0%	1.5	1.2	0.95	1.00	730
2010	I-5 SB	Knighton Road	Saturday	Right	1	35.0	70	100	0	100	0.92	Level			10.0%	0.0%	1.5	1.2	0.95	1.00	80
2012	I-5 SB	Riverside Avenue	Saturday	Right	1	35.0	200	100	0	100	0.92	Level			10.0%	0.0%	1.5	1.2	0.95	1.00	228

HCM 2000 Merge Ramp Junct Capacity Analysis | **HCM 2000 Merge Ramp Junctions Capacity Analysis** | Juri Analy

General Information **Cumulative No Project** | *Adjacent Upstream Ramp Data*

ID	Freeway/ Direction	On-ramp	Analysis Time Period	Exists?	Distance	Volume (vph)	PHF	Terrain	Grade %	Length (mi)	Truck/ Bus %	RV %	E_T	E_R	f_{HV}	f_P	Flow Rate v_p (pcph)
1013	I-5 NB	Riverside Avenue	PM	Off	600	380	#N/A	Level	4.0%	0.70	10.0%	0.0%	1.5	1.2	0.95	1.00	#N/A
1011	I-5 NB	Knighton Road	PM	Off	1,400	270	#N/A	Level	4.0%	0.70	10.0%	0.0%	1.5	1.2	0.95	1.00	#N/A
1009	I-5 NB	Bonnyview Road	PM	Off	1,450	680	#N/A	Level	4.0%	0.70	10.0%	0.0%	1.5	1.2	0.95	1.00	#N/A
1007	I-5 NB	Cypress Avenue	PM	Off	1,650	710	#N/A	Level	4.0%	0.70	10.0%	0.0%	1.5	1.2	0.95	1.00	#N/A
1006	I-5 SB	Cypress Avenue	PM	Off	1,650	1,030	0.92	Level	4.0%	0.70	10.0%	0.0%	1.5	1.2	0.95	1.00	1,176
1008	I-5 SB	Bonnyview Road	PM	Off	1,450	800	0.92	Level	4.0%	0.70	10.0%	0.0%	1.5	1.2	0.95	1.00	913
1010	I-5 SB	Knighton Road	PM	Off	1,400	250	0.92	Level	4.0%	0.70	10.0%	0.0%	1.5	1.2	0.95	1.00	285
1012	I-5 SB	Riverside Avenue	PM	Off	1,150	410	0.92	Level	4.0%	0.70	10.0%	0.0%	1.5	1.2	0.95	1.00	468
2013	I-5 NB	Riverside Avenue	Saturday	Off	600	170	0.92	Level	4.0%	0.70	10.0%	0.0%	1.5	1.2	0.95	1.00	194
2011	I-5 NB	Knighton Road	Saturday	Off	1,400	50	0.92	Level	4.0%	0.70	10.0%	0.0%	1.5	1.2	0.95	1.00	57
2009	I-5 NB	Bonnyview Road	Saturday	Off	1,450	660	0.92	Level	4.0%	0.70	10.0%	0.0%	1.5	1.2	0.95	1.00	753
2007	I-5 NB	Cypress Avenue	Saturday	Off	1,650	390	0.92	Level	4.0%	0.70	10.0%	0.0%	1.5	1.2	0.95	1.00	445
2006	I-5 SB	Cypress Avenue	Saturday	Off	1,650	730	0.92	Level	4.0%	0.70	10.0%	0.0%	1.5	1.2	0.95	1.00	833
2008	I-5 SB	Bonnyview Road	Saturday	Off	1,450	870	0.92	Level	4.0%	0.70	10.0%	0.0%	1.5	1.2	0.95	1.00	993
2010	I-5 SB	Knighton Road	Saturday	Off	1,400	260	0.92	Level	4.0%	0.70	10.0%	0.0%	1.5	1.2	0.95	1.00	297
2012	I-5 SB	Riverside Avenue	Saturday	Off	1,150	380	0.92	Level	4.0%	0.70	10.0%	0.0%	1.5	1.2	0.95	1.00	411
				No													
				No													
				No													
				No													
				No													
				No													
				No													
				No													
				No													
				No													
				No													
				No													
				No													
				No													
				No													
				No													
				No													
				No													
				No													
				No													
				No													
				No													

General Information **Cumulative No Project** | *Adjacent Downstream Ramp Data* | *v_{12} Estimation*

ID	Freeway/ Direction	On-ramp	Analysis Time Period	Exists?	Distance	Volume (vph)	PHF	Terrain	Grade %	Length (mi)	Truck/ Bus %	RV %	E_T	E_R	f_{HV}	f_P	Flow Rate v_p (pcph)	L_{EQ} 25-2	L_{EQ} 25-3	P_{FM} Equations 1	2	3
1013	I-5 NB	Riverside Avenue	PM	No														#N/A	9,487	0.580	#N/A	
1011	I-5 NB	Knighton Road	PM	No														#N/A	9,487	0.580	#N/A	
1009	I-5 NB	Bonnyview Road	PM	No														#N/A	9,487	0.580	#N/A	
1007	I-5 NB	Cypress Avenue	PM	No														#N/A	9,487	0.580	#N/A	
1006	I-5 SB	Cypress Avenue	PM	No														506	9,487	0.580	0.764	
1008	I-5 SB	Bonnyview Road	PM	No														535	9,487	0.580	0.750	
1010	I-5 SB	Knighton Road	PM	No														550	9,487	0.580	0.746	
1012	I-5 SB	Riverside Avenue	PM	No														608	9,487	0.580	0.726	
2013	I-5 NB	Riverside Avenue	Saturday	No														369	9,487	0.580	0.707	
2011	I-5 NB	Knighton Road	Saturday	No														440	9,487	0.580	0.753	
2009	I-5 NB	Bonnyview Road	Saturday	No														501	9,487	0.580	0.752	
2007	I-5 NB	Cypress Avenue	Saturday	No														609	9,487	0.580	0.745	
2006	I-5 SB	Cypress Avenue	Saturday	No														191	9,487	0.580	0.784	
2008	I-5 SB	Bonnyview Road	Saturday	No														134	9,487	0.580	0.775	
2010	I-5 SB	Knighton Road	Saturday	No														88	9,487	0.580	0.775	
2012	I-5 SB	Riverside Avenue	Saturday	No														49	9,487	0.580	0.762	
				No																		
				No																		
				No																		
				No																		
				No																		
				No																		
				No																		
				No																		
				No																		
				No																		
				No																		
				No																		
				No																		
				No																		
				No																		
				No																		
				No																		
				No																		
				No																		
				No																		
				No																		
				No																		
				No																		

General Information **Cumulative No Project**

ID	Freeway/ Direction	On-ramp	Analysis Time Period	P_{FM}	v_{12} (pcph)
1013	I-5 NB	Riverside Avenue	PM	#N/A	#N/A
1011	I-5 NB	Knighton Road	PM	#N/A	#N/A
1009	I-5 NB	Bonnyview Road	PM	#N/A	#N/A
1007	I-5 NB	Cypress Avenue	PM	#N/A	#N/A
1006	I-5 SB	Cypress Avenue	PM	1.000	3,880
1008	I-5 SB	Bonnyview Road	PM	1.000	3,915
1010	I-5 SB	Knighton Road	PM	1.000	4,679
1012	I-5 SB	Riverside Avenue	PM	1.000	4,565
2013	I-5 NB	Riverside Avenue	Saturday	1.000	3,527
2011	I-5 NB	Knighton Road	Saturday	1.000	4,132
2009	I-5 NB	Bonnyview Road	Saturday	1.000	3,766
2007	I-5 NB	Cypress Avenue	Saturday	1.000	4,360
2006	I-5 SB	Cypress Avenue	Saturday	1.000	3,024
2008	I-5 SB	Bonnyview Road	Saturday	1.000	2,363
2010	I-5 SB	Knighton Road	Saturday	1.000	2,796
2012	I-5 SB	Riverside Avenue	Saturday	1.000	2,465

HCM 2000 **HCM 2000** Juri
Merge Ramp Junct **Merge Ramp Junctions** Analys
Capacity Analysis **Capacity Analysis**

General Information **Cumulative No Project** *Capacity Checks*

ID	Freeway/ Direction	On-ramp	Analysis Time Period	v_{Fi} (pcph)	Max v_{Fi} (pcph)	LOS F?	v_{FO} (pcph)	Max v_{FO} (pcph)	LOS F?	v_3, v_{av34} (pcphpl)	v_3, v_{av34} > 2,700?	v_3, v_{av34} >1.5*v_{12}/2?	v_{12a} (pcph)	v_{R12a} (pcph)	Max v_{R12a} (pcph)	LOS F?	v_R (pcph)	Max v_R (pcph)	LOS F?
1013	I-5 NB	Riverside Avenue	PM	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
1011	I-5 NB	Knighton Road	PM	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
1009	I-5 NB	Bonnyview Road	PM	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
1007	I-5 NB	Cypress Avenue	PM	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
1006	I-5 SB	Cypress Avenue	PM	3,880	4,500	No	4,828	4,500	Yes	0	No	No	3,880	4,828	4,600	Yes	947	2,000	No
1008	I-5 SB	Bonnyview Road	PM	3,915	4,500	No	4,965	4,500	Yes	0	No	No	3,915	4,965	4,600	Yes	1,050	2,000	No
1010	I-5 SB	Knighton Road	PM	4,679	4,500	Yes	5,033	4,500	Yes	0	No	No	4,679	5,033	4,600	Yes	354	2,000	No
1012	I-5 SB	Riverside Avenue	PM	4,565	4,500	Yes	5,307	4,500	Yes	0	No	No	4,565	5,307	4,600	Yes	742	2,000	No
2013	I-5 NB	Riverside Avenue	Saturday	3,527	4,500	No	4,189	4,500	No	0	No	No	3,527	4,189	4,600	No	662	2,000	No
2011	I-5 NB	Knighton Road	Saturday	4,132	4,500	No	4,520	4,500	Yes	0	No	No	4,132	4,520	4,600	No	388	2,000	No
2009	I-5 NB	Bonnyview Road	Saturday	3,766	4,500	No	4,805	4,500	Yes	0	No	No	3,766	4,805	4,600	Yes	1,039	2,000	No
2007	I-5 NB	Cypress Avenue	Saturday	4,360	4,500	No	6,243	4,500	Yes	0	No	No	4,360	6,243	4,600	Yes	1,883	2,000	No
2006	I-5 SB	Cypress Avenue	Saturday	3,024	4,500	No	3,355	4,500	No	0	No	No	3,024	3,355	4,600	No	331	2,000	No
2008	I-5 SB	Bonnyview Road	Saturday	2,363	4,500	No	3,093	4,500	No	0	No	No	2,363	3,093	4,600	No	730	2,000	No
2010	I-5 SB	Knighton Road	Saturday	2,796	4,500	No	2,876	4,500	No	0	No	No	2,796	2,876	4,600	No	80	2,000	No
2012	I-5 SB	Riverside Avenue	Saturday	2,465	4,500	No	2,693	4,500	No	0	No	No	2,465	2,693	4,600	No	228	2,000	No

HCM 2000 Merge Ramp Junct Capacity Analysis | **HCM 2000 Merge Ramp Junctions Capacity Analysis** | Juri Analys

General Information **Cumulative No Project**

ID	Freeway/ Direction	On-ramp	Analysis Time Period	*Results* Density, D (pcplpm)	Level of Service	*Speed Estimation* Int. Var. M_S	Inf. Area S_R (mph)	Out Lns. S_O (mph)	All vehs. S (mph)
1013	I-5 NB	Riverside Avenue	PM	**#N/A**	**#N/A**	#N/A	#N/A	#N/A	#N/A
1011	I-5 NB	Knighton Road	PM	**#N/A**	**#N/A**	#N/A	#N/A	#N/A	#N/A
1009	I-5 NB	Bonnyview Road	PM	**#N/A**	**#N/A**	#N/A	#N/A	#N/A	#N/A
1007	I-5 NB	Cypress Avenue	PM	**#N/A**	**#N/A**	#N/A	#N/A	#N/A	#N/A
1006	I-5 SB	Cypress Avenue	PM	-	**F**	0.801	33.7	0.0	33.7
1008	I-5 SB	Bonnyview Road	PM	-	**F**	0.873	36.7	0.0	36.7
1010	I-5 SB	Knighton Road	PM	-	**F**	0.912	38.3	0.0	38.3
1012	I-5 SB	Riverside Avenue	PM	-	**F**	1.101	46.2	0.0	46.2
2013	I-5 NB	Riverside Avenue	Saturday	**37.2**	**E**	0.571	24.0	0.0	24.0
2011	I-5 NB	Knighton Road	Saturday	-	**F**	0.672	28.2	0.0	28.2
2009	I-5 NB	Bonnyview Road	Saturday	-	**F**	0.790	33.2	0.0	33.2
2007	I-5 NB	Cypress Avenue	Saturday	-	**F**	2.320	97.4	0.0	97.4
2006	I-5 SB	Cypress Avenue	Saturday	**30.9**	**D**	0.426	17.9	0.0	17.9
2008	I-5 SB	Bonnyview Road	Saturday	**28.6**	**D**	0.400	16.8	0.0	16.8
2010	I-5 SB	Knighton Road	Saturday	**27.2**	**C**	0.383	16.1	0.0	16.1
2012	I-5 SB	Riverside Avenue	Saturday	**25.8**	**C**	0.372	15.6	0.0	15.6

HCM 2000 HCM 2000
Diverge Ramp Jun Diverge Ramp Junctions
Capacity Analysis Capacity Analysis

Jurisdiction CalTrans
Analysis Year Cumulative
Analyst Fehr & Peers

Agency or Company 0
Date 6/12/2009
Project Description Knighton and Churn Creek Commons

General Information **Cumulative No Project**

ID	Freeway/ Direction	Off-ramp	Analysis Time Period	Lanes	S_{FF} (mph)	V (vph)	HOV Lane?	HOV Lane Volume	PHF	Terrain	Grade %	Length (mi)	Truck/ Bus %	RV %	E_T	E_R	f_{HV}	f_P	Flow Rate v_p (pcph)
				Freeway Data					*Freeway Volume Adjustment*										
1013	I-5 NB	Riverside Avenue	PM	#N/A	#N/A	3260	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	1.5	1.2	0.95	#N/A	#N/A
1011	I-5 NB	Knighton Road	PM	#N/A	#N/A	3210	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	1.5	1.2	0.95	#N/A	#N/A
1009	I-5 NB	Bonnyview Road	PM	#N/A	#N/A	3430	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	1.5	1.2	0.95	#N/A	#N/A
1007	I-5 NB	Cypress Avenue	PM	#N/A	#N/A	3740	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	1.5	1.2	0.95	#N/A	#N/A
1006	I-5 SB	Cypress Avenue	PM	2	0	4430	No	0	0.92	Level	0	0	0.1	0	1.5	1.2	0.95	1	5,056
1008	I-5 SB	Bonnyview Road	PM	2	0	4230	No	0	0.92	Level	0	0	0.1	0	1.5	1.2	0.95	1	4,828
1010	I-5 SB	Knighton Road	PM	2	0	4350	No	0	0.92	Level	0	0	0.1	0	1.5	1.2	0.95	1	4,965
1012	I-5 SB	Riverside Avenue	PM	2	0	4410	No	0	0.92	Level	0	0	0.1	0	1.5	1.2	0.95	1	5,033
2013	I-5 NB	Riverside Avenue	Saturday	2	0	3260	No	0	0.92	Level	0	0	0.1	0	1.5	1.2	0.95	1	3,721
2011	I-5 NB	Knighton Road	Saturday	2	0	3670	No	0	0.92	Level	0	0	0.1	0	1.5	1.2	0.95	1	4,189
2009	I-5 NB	Bonnyview Road	Saturday	2	0	3960	No	0	0.92	Level	0	0	0.1	0	1.5	1.2	0.95	1	4,520
2007	I-5 NB	Cypress Avenue	Saturday	2	0	4210	No	0	0.92	Level	0	0	0.1	0	1.5	1.2	0.95	1	4,805
2006	I-5 SB	Cypress Avenue	Saturday	2	0	3380	No	0	0.92	Level	0	0	0.1	0	1.5	1.2	0.95	1	3,858
2008	I-5 SB	Bonnyview Road	Saturday	2	0	2940	No	0	0.92	Level	0	0	0.1	0	1.5	1.2	0.95	1	3,355
2010	I-5 SB	Knighton Road	Saturday	2	0	2710	No	0	0.92	Level	0	0	0.1	0	1.5	1.2	0.95	1	3,093
2012	I-5 SB	Riverside Avenue	Saturday	2	0	2520	No	0	0.92	Level	0	0	0.1	0	1.5	1.2	0.95	1	2,876

General Information **Cumulative No Project**

ID	Freeway/ Direction	Off-ramp	Analysis Time Period	Effective Flow Rate v_p (pcph)
1013	I-5 NB	Riverside Avenue	PM	#N/A
1011	I-5 NB	Knighton Road	PM	#N/A
1009	I-5 NB	Bonnyview Road	PM	#N/A
1007	I-5 NB	Cypress Avenue	PM	#N/A
1006	I-5 SB	Cypress Avenue	PM	5,056
1008	I-5 SB	Bonnyview Road	PM	4,828
1010	I-5 SB	Knighton Road	PM	4,965
1012	I-5 SB	Riverside Avenue	PM	5,033
2013	I-5 NB	Riverside Avenue	Saturday	3,721
2011	I-5 NB	Knighton Road	Saturday	4,189
2009	I-5 NB	Bonnyview Road	Saturday	4,520
2007	I-5 NB	Cypress Avenue	Saturday	4,805
2006	I-5 SB	Cypress Avenue	Saturday	3,858
2008	I-5 SB	Bonnyview Road	Saturday	3,355
2010	I-5 SB	Knighton Road	Saturday	3,093
2012	I-5 SB	Riverside Avenue	Saturday	2,876

General Information **Cumulative No Project**

ID	Freeway/ Direction	Off-ramp	Analysis Time Period	Type	Lanes	S_{FR} (mph)	V_R (vph)	Decel Lane (ft) L_{D1}	L_{D2}	L_{Deff}	PHF	Terrain	Grade %	Length (mi)	Truck/ Bus %	RV %	E_T	E_R	f_{HV}	f_P	Flow Rate v_p (pcph)
				Off-Ramp Data							*Off-Ramp Volume Adjustment*										
1013	I-5 NB	Riverside Avenue	PM	Right	1	45.0	380	100	0	100	#N/A	Level			10.0%	0.0%	1.5	1.2	0.95	1.00	#N/A
1011	I-5 NB	Knighton Road	PM	Right	1	45.0	270	100	0	100	#N/A	Level			10.0%	0.0%	1.5	1.2	0.95	1.00	#N/A
1009	I-5 NB	Bonnyview Road	PM	Right	1	45.0	680	100	0	100	#N/A	Level			10.0%	0.0%	1.5	1.2	0.95	1.00	#N/A
1007	I-5 NB	Cypress Avenue	PM	Right	1	45.0	710	100	0	100	#N/A	Level			10.0%	0.0%	1.5	1.2	0.95	1.00	#N/A
1006	I-5 SB	Cypress Avenue	PM	Right	1	45.0	1,030	100	0	100	0.92	Level			10.0%	0.0%	1.5	1.2	0.95	1.00	1,176
1008	I-5 SB	Bonnyview Road	PM	Right	1	45.0	800	100	0	100	0.92	Level			10.0%	0.0%	1.5	1.2	0.95	1.00	913
1010	I-5 SB	Knighton Road	PM	Right	1	45.0	250	100	0	100	0.92	Level			10.0%	0.0%	1.5	1.2	0.95	1.00	285
1012	I-5 SB	Riverside Avenue	PM	Right	1	45.0	410	100	0	100	0.92	Level			10.0%	0.0%	1.5	1.2	0.95	1.00	468
2013	I-5 NB	Riverside Avenue	Saturday	Right	1	45.0	170	100	0	100	0.92	Level			10.0%	0.0%	1.5	1.2	0.95	1.00	194
2011	I-5 NB	Knighton Road	Saturday	Right	1	45.0	50	100	0	100	0.92	Level			10.0%	0.0%	1.5	1.2	0.95	1.00	57
2009	I-5 NB	Bonnyview Road	Saturday	Right	1	45.0	660	100	0	100	0.92	Level			10.0%	0.0%	1.5	1.2	0.95	1.00	753
2007	I-5 NB	Cypress Avenue	Saturday	Right	1	45.0	390	100	0	100	0.92	Level			10.0%	0.0%	1.5	1.2	0.95	1.00	445
2006	I-5 SB	Cypress Avenue	Saturday	Right	1	45.0	730	100	0	100	0.92	Level			10.0%	0.0%	1.5	1.2	0.95	1.00	833
2008	I-5 SB	Bonnyview Road	Saturday	Right	1	45.0	870	100	0	100	0.92	Level			10.0%	0.0%	1.5	1.2	0.95	1.00	993
2010	I-5 SB	Knighton Road	Saturday	Right	1	45.0	260	100	0	100	0.92	Level			10.0%	0.0%	1.5	1.2	0.95	1.00	297
2012	I-5 SB	Riverside Avenue	Saturday	Right	1	45.0	360	100	0	100	0.92	Level			10.0%	0.0%	1.5	1.2	0.95	1.00	411

HCM 2000 Diverge Ramp Jun Capacity Analysis **HCM 2000 Diverge Ramp Junctions Capacity Analysis** Jun Analy

General Information **Cumulative No Project** *Adjacent Upstream Ramp Data*

ID	Freeway/ Direction	Off-ramp	Analysis Time Period	Exists?	Distance	Volume (vph)	PHF	Terrain	Grade %	Length (mi)	Truck/ Bus %	RV %	E_T	E_R	f_{HV}	f_P	Flow Rate v_p (pcph)
1013	I-5 NB	Riverside Avenue	PM	No													
1011	I-5 NB	Knighton Road	PM	No													
1009	I-5 NB	Bonnyview Road	PM	No													
1007	I-5 NB	Cypress Avenue	PM	No													
1006	I-5 SB	Cypress Avenue	PM	No													
1008	I-5 SB	Bonnyview Road	PM	No													
1010	I-5 SB	Knighton Road	PM	No													
1012	I-5 SB	Riverside Avenue	PM	No													
2013	I-5 NB	Riverside Avenue	Saturday	No													
2011	I-5 NB	Knighton Road	Saturday	No													
2009	I-5 NB	Bonnyview Road	Saturday	No													
2007	I-5 NB	Cypress Avenue	Saturday	No													
2006	I-5 SB	Cypress Avenue	Saturday	No													
2008	I-5 SB	Bonnyview Road	Saturday	No													
2010	I-5 SB	Knighton Road	Saturday	No													
2012	I-5 SB	Riverside Avenue	Saturday	No													

General Information **Cumulative No Project** *Adjacent Downstream Ramp Data* *v_{12} Estimation*

ID	Freeway/ Direction	Off-ramp	Analysis Time Period	Exists?	Distance	Volume (vph)	PHF	Terrain	Grade %	Length (mi)	Truck/ Bus %	RV %	E_T	E_R	f_{HV}	f_P	Flow Rate v_p (pcph)	L_{EQ} 25-13	L_{EQ} 25-14	P_{FD}
1013	I-5 NB	Riverside Avenue	PM	On	600	330	#N/A	Level	4.0%	0.70	10.0%	0.0%	1.5	1.2	0.95	1.00	1,141	#N/A	#N/A	#N/A
1011	I-5 NB	Knighton Road	PM	On	1,400	490	#N/A	Level	4.0%	0.70	10.0%	0.0%	1.5	1.2	0.95	1.00	1,141	#N/A	#N/A	#N/A
1009	I-5 NB	Bonnyview Road	PM	On	1,450	990	#N/A	Level	4.0%	0.70	10.0%	0.0%	1.5	1.2	0.95	1.00	1,141	#N/A	#N/A	#N/A
1007	I-5 NB	Cypress Avenue	PM	On	1,650	1,420	#N/A	Level	4.0%	0.70	10.0%	0.0%	1.5	1.2	0.95	1.00	1,141	#N/A	#N/A	#N/A
1006	I-5 SB	Cypress Avenue	PM	On	1,650	830	0.92	Level	4.0%	0.70	10.0%	0.0%	1.5	1.2	0.95	1.00	1,141	5,826	2,059	1.000
1008	I-5 SB	Bonnyview Road	PM	On	1,450	920	0.92	Level	4.0%	0.70	10.0%	0.0%	1.5	1.2	0.95	1.00	1,141	5,066	1,733	1.000
1010	I-5 SB	Knighton Road	PM	On	1,400	310	0.92	Level	4.0%	0.70	10.0%	0.0%	1.5	1.2	0.95	1.00	1,141	3,490	1,288	1.000
1012	I-5 SB	Riverside Avenue	PM	On	1,150	650	0.92	Level	4.0%	0.70	10.0%	0.0%	1.5	1.2	0.95	1.00	1,141	3,774	1,398	1.000
2013	I-5 NB	Riverside Avenue	Saturday	On	600	580	0.92	Level	4.0%	0.70	10.0%	0.0%	1.5	1.2	0.95	1.00	1,141	4,024	1,190	1.000
2011	I-5 NB	Knighton Road	Saturday	On	1,400	340	0.92	Level	4.0%	0.70	10.0%	0.0%	1.5	1.2	0.95	1.00	1,141	3,501	1,147	1.000
2009	I-5 NB	Bonnyview Road	Saturday	On	1,450	910	0.92	Level	4.0%	0.70	10.0%	0.0%	1.5	1.2	0.95	1.00	1,141	4,848	1,569	1.000
2007	I-5 NB	Cypress Avenue	Saturday	On	1,650	1,650	0.92	Level	4.0%	0.70	10.0%	0.0%	1.5	1.2	0.95	1.00	1,141	3,864	1,372	1.000
2006	I-5 SB	Cypress Avenue	Saturday	On	1,650	290	0.92	Level	4.0%	0.70	10.0%	0.0%	1.5	1.2	0.95	1.00	1,141	5,919	1,587	1.000
2008	I-5 SB	Bonnyview Road	Saturday	On	1,450	640	0.92	Level	4.0%	0.70	10.0%	0.0%	1.5	1.2	0.95	1.00	1,141	7,848	1,688	1.000
2010	I-5 SB	Knighton Road	Saturday	On	1,400	70	0.92	Level	4.0%	0.70	10.0%	0.0%	1.5	1.2	0.95	1.00	1,141	4,772	1,212	1.000
2012	I-5 SB	Riverside Avenue	Saturday	On	1,150	200	0.92	Level	4.0%	0.70	10.0%	0.0%	1.5	1.2	0.95	1.00	1,141	5,387	1,259	1.000

HCM 2000 Diverge Ramp Jun Capacity Analysis **HCM 2000 Diverge Ramp Junctions Capacity Analysis** Juri Analy

General Information **Cumulative No Project**

ID	Freeway/ Direction	Off-ramp	Analysis Time Period	v_{12} (pcph)
1013	I-5 NB	Riverside Avenue	PM	#N/A
1011	I-5 NB	Knighton Road	PM	#N/A
1009	I-5 NB	Bonnyview Road	PM	#N/A
1007	I-5 NB	Cypress Avenue	PM	#N/A
1006	I-5 SB	Cypress Avenue	PM	5,056
1008	I-5 SB	Bonnyview Road	PM	4,828
1010	I-5 SB	Knighton Road	PM	4,965
1012	I-5 SB	Riverside Avenue	PM	5,033
2013	I-5 NB	Riverside Avenue	Saturday	3,721
2011	I-5 NB	Knighton Road	Saturday	4,189
2009	I-5 NB	Bonnyview Road	Saturday	4,520
2007	I-5 NB	Cypress Avenue	Saturday	4,805
2006	I-5 SB	Cypress Avenue	Saturday	3,858
2008	I-5 SB	Bonnyview Road	Saturday	3,355
2010	I-5 SB	Knighton Road	Saturday	3,093
2012	I-5 SB	Riverside Avenue	Saturday	2,876

General Information **Cumulative No Project** *Capacity Checks*

ID	Freeway/ Direction	Off-ramp	Analysis Time Period	v_{Fi} (pcph)	Max v_{Fi} (pcph)	LOS F?	v_3, v_{av34} (pcphpl)	v_3, v_{av34} > 2,700?	v_3, v_{av34} >1.5*v_{12}/2?	v_{12a} (pcph)	Max v_{12} (pcph)	LOS F?	v_{FO} (pcph)	Max v_{FO} (pcph)	LOS F?	v_R (pcph)	Max v_R (pcph)	LOS F?
1013	I-5 NB	Riverside Avenue	PM	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
1011	I-5 NB	Knighton Road	PM	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
1009	I-5 NB	Bonnyview Road	PM	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
1007	I-5 NB	Cypress Avenue	PM	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
1006	I-5 SB	Cypress Avenue	PM	5,056	4,500	Yes	0	No	No	5,056	4,400	Yes	3,880	4,500	No	1,176	2,100	No
1008	I-5 SB	Bonnyview Road	PM	4,828	4,500	Yes	0	No	No	4,828	4,400	Yes	3,915	4,500	No	913	2,100	No
1010	I-5 SB	Knighton Road	PM	4,965	4,500	Yes	0	No	No	4,965	4,400	Yes	4,679	4,500	Yes	285	2,100	No
1012	I-5 SB	Riverside Avenue	PM	5,033	4,500	Yes	0	No	No	5,033	4,400	Yes	4,565	4,500	Yes	468	2,100	No
2013	I-5 NB	Riverside Avenue	Saturday	3,721	4,500	No	0	No	No	3,721	4,400	No	3,527	4,500	No	194	2,100	No
2011	I-5 NB	Knighton Road	Saturday	4,189	4,500	No	0	No	No	4,189	4,400	No	4,132	4,500	No	57	2,100	No
2009	I-5 NB	Bonnyview Road	Saturday	4,520	4,500	Yes	0	No	No	4,520	4,400	Yes	3,766	4,500	No	753	2,100	No
2007	I-5 NB	Cypress Avenue	Saturday	4,805	4,500	Yes	0	No	No	4,805	4,400	Yes	4,360	4,500	No	445	2,100	No
2006	I-5 SB	Cypress Avenue	Saturday	3,858	4,500	No	0	No	No	3,858	4,400	No	3,024	4,500	No	833	2,100	No
2008	I-5 SB	Bonnyview Road	Saturday	3,355	4,500	No	0	No	No	3,355	4,400	No	2,363	4,500	No	993	2,100	No
2010	I-5 SB	Knighton Road	Saturday	3,093	4,500	No	0	No	No	3,093	4,400	No	2,796	4,500	No	297	2,100	No
2012	I-5 SB	Riverside Avenue	Saturday	2,876	4,500	No	0	No	No	2,876	4,400	No	2,465	4,500	No	411	2,100	No

HCM 2000 Diverge Ramp Jun Capacity Analysis | **HCM 2000 Diverge Ramp Junctions Capacity Analysis** | Juri Analy

General Information **Cumulative No Project**

ID	Freeway/ Direction	Off-ramp	Analysis Time Period	Density, D (pcplpm)	Level of Service	Int. Var. D_S	Inf. Area S_R (mph)	Out Lns. S_O (mph)	All vehs. S (mph)
				Results		*Speed Estimation*			
1013	I-5 NB	Riverside Avenue	PM	**#N/A**	**#N/A**	#N/A	#N/A	#N/A	#N/A
1011	I-5 NB	Knighton Road	PM	**#N/A**	**#N/A**	#N/A	#N/A	#N/A	#N/A
1009	I-5 NB	Bonnyview Road	PM	**#N/A**	**#N/A**	#N/A	#N/A	#N/A	#N/A
1007	I-5 NB	Cypress Avenue	PM	**#N/A**	**#N/A**	#N/A	#N/A	#N/A	#N/A
1006	I-5 SB	Cypress Avenue	PM	-	**F**	0.404	17.0	0.0	17.0
1008	I-5 SB	Bonnyview Road	PM	-	**F**	0.380	16.0	0.0	16.0
1010	I-5 SB	Knighton Road	PM	-	**F**	0.324	13.6	0.0	13.6
1012	I-5 SB	Riverside Avenue	PM	-	**F**	0.340	14.3	0.0	14.3
2013	I-5 NB	Riverside Avenue	Saturday	**35.3**	**E**	0.315	13.2	0.0	13.2
2011	I-5 NB	Knighton Road	Saturday	**39.4**	**E**	0.303	12.7	0.0	12.7
2009	I-5 NB	Bonnyview Road	Saturday	-	**F**	0.366	15.4	0.0	15.4
2007	I-5 NB	Cypress Avenue	Saturday	-	**F**	0.338	14.2	0.0	14.2
2006	I-5 SB	Cypress Avenue	Saturday	**36.5**	**E**	0.373	15.7	0.0	15.7
2008	I-5 SB	Bonnyview Road	Saturday	**32.2**	**D**	0.387	16.3	0.0	16.3
2010	I-5 SB	Knighton Road	Saturday	**30.0**	**D**	0.325	13.6	0.0	13.6
2012	I-5 SB	Riverside Avenue	Saturday	**28.1**	**D**	0.335	14.1	0.0	14.1

Leisch Method for Weaving Analysis

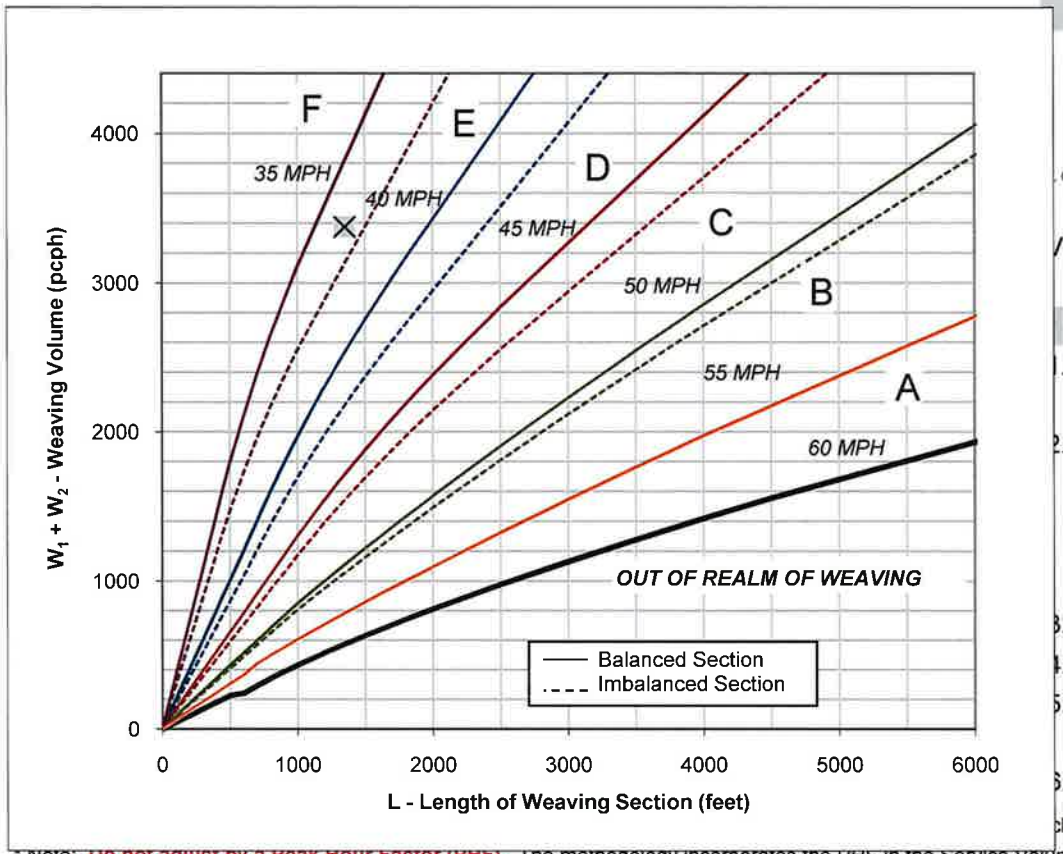
Data Input

Number of Entering Mainline Lanes	N_b	2
Number of Lanes in Weaving Section	N	3
Length of Weaving Section (feet)	L	1,350

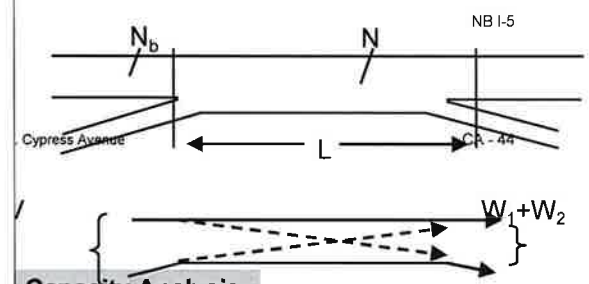
Total Weaving Section (V)		On-ramp to Mainline (W_1)		Mainline to Off-ramp (W_2)	
Volume (vph)*	4,450	Volume (vph)*	1,420	Volume (vph)*	1,760
Truck Percentage	20%	Truck Percentage	15%	Truck Percentage	10%
PCE for Trucks	1.5	PCE for Trucks	1.5	PCE for Trucks	1.5
Volume (pcph)	4,895	Volume (pcph)	1,527	Volume (pcph)	1,848

Project Information

Project	Knighton & Churn Creek
Scenario	Cumulative NP Conditions - PM
Freeway	NB I-5
On-ramp	E. Cypress Avenue
Off-ramp	CA - 44



Figure



Capacity Analysis

1. Is the weaving section balanced (Y / N)? **N**
   [If optional exit lane, then "Y". Otherwise "N".]
2. In the Weaving Speed Chart to the left, which two speed curves is the black "x" between?
   30 MPH and **35 MPH** -
   If below the 55 MPH curve, out of the realm of weaving.
   If left of the 30 MPH curve, LOS is F.
3. Interpolated Weaving Speed (S_w, mph) -
4. Weaving Intensity Factor (k) -
5. Service Volume (SV, pcph)
   $SV = (1/N)*[V + (k - 1)*\min(W_1, W_2)]$ -
6. Level of Service (LOS) F

cluded.

* Note: Do not adjust by a Peak Hour Factor (PHF). The methodology incorporates the PHF in the Service Volume tables.

Sources: *Completion of Procedures for Analysis and Design of Traffic Weaving Sections*, Jack E. Leisch & Associates, September 1983; *Highway Design Manual*, California Department of Transportation, July 24, 2009; and Freeway and Interchange Geometric Design Handbook, Institue of Transportation Engineers, 2005.

Leisch Method for Weaving Analysis

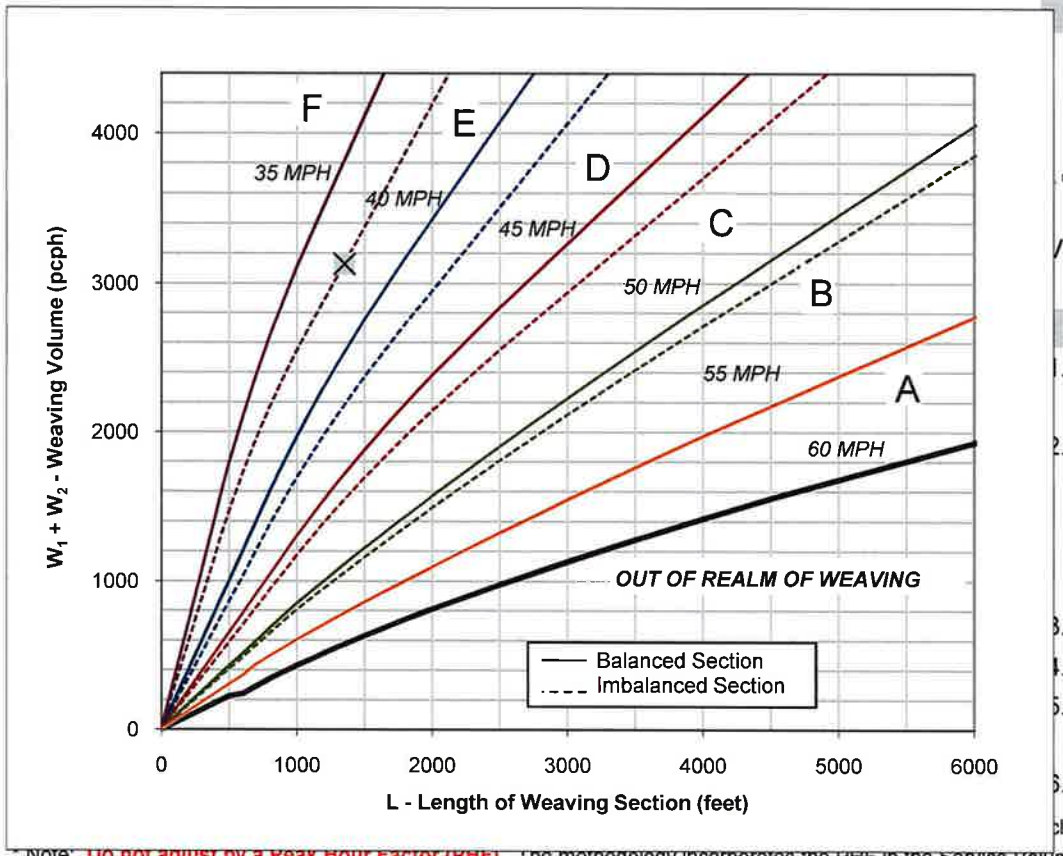
Data Input

Number of Entering Mainline Lanes	N_b	2
Number of Lanes in Weaving Section	N	3
Length of Weaving Section (feet)	L	1,350

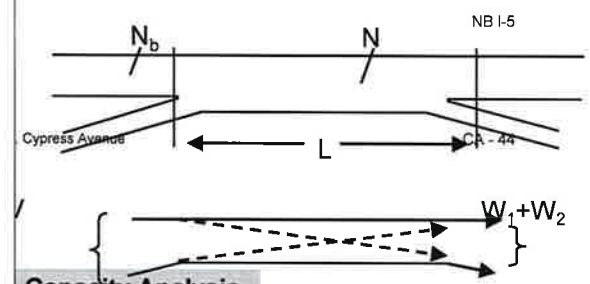
Total Weaving Section (V)		On-ramp to Mainline (W_1)		Mainline to Off-ramp (W_2)	
Volume (vph)*	5,470	Volume (vph)*	1,650	Volume (vph)*	1,290
Truck Percentage	20%	Truck Percentage	15%	Truck Percentage	10%
PCE for Trucks	1.5	PCE for Trucks	1.5	PCE for Trucks	1.5
Volume (pcph)	6,017	Volume (pcph)	1,774	Volume (pcph)	1,355

Project Information

Project	Knighton & Churn Creek
Scenario	Cumulative NP Conditions - SAT
Freeway	NB I-5
On-ramp	E. Cypress Avenue
Off-ramp	CA - 44



Figure



Capacity Analysis

1. Is the weaving section balanced (Y / N)? **N**
   [If optional exit lane, then "Y". Otherwise "N".]
2. In the Weaving Speed Chart to the left, which two speed curves is the black "x" between?
   35 MPH and **40 MPH**
   If below the 55 MPH curve, out of the realm of weaving.
   If left of the 30 MPH curve, LOS is F.
3. Interpolated Weaving Speed (S_w, mph) **30.0**
4. Weaving Intensity Factor (k) **3.00**
5. Service Volume (SV, pcph)
   $SV = (1/N)*[V + (k - 1)*\min(W_1, W_2)]$ **2,909**
6. Level of Service (LOS) **F**

cluded.

* Note: Do not adjust by a Peak Hour Factor (PHF). The methodology incorporates the PHF in the Service Volume tables.

Sources: *Completion of Procedures for Analysis and Design of Traffic Weaving Sections*, Jack E. Leisch & Associates, September 1983; *Highway Design Manual*, California Department of Transportation, July 24, 2009; and Freeway and Interchange Geometric Design Handbook, Institue of Transportation Engineers, 2005.

Leisch Method for Weaving Analysis

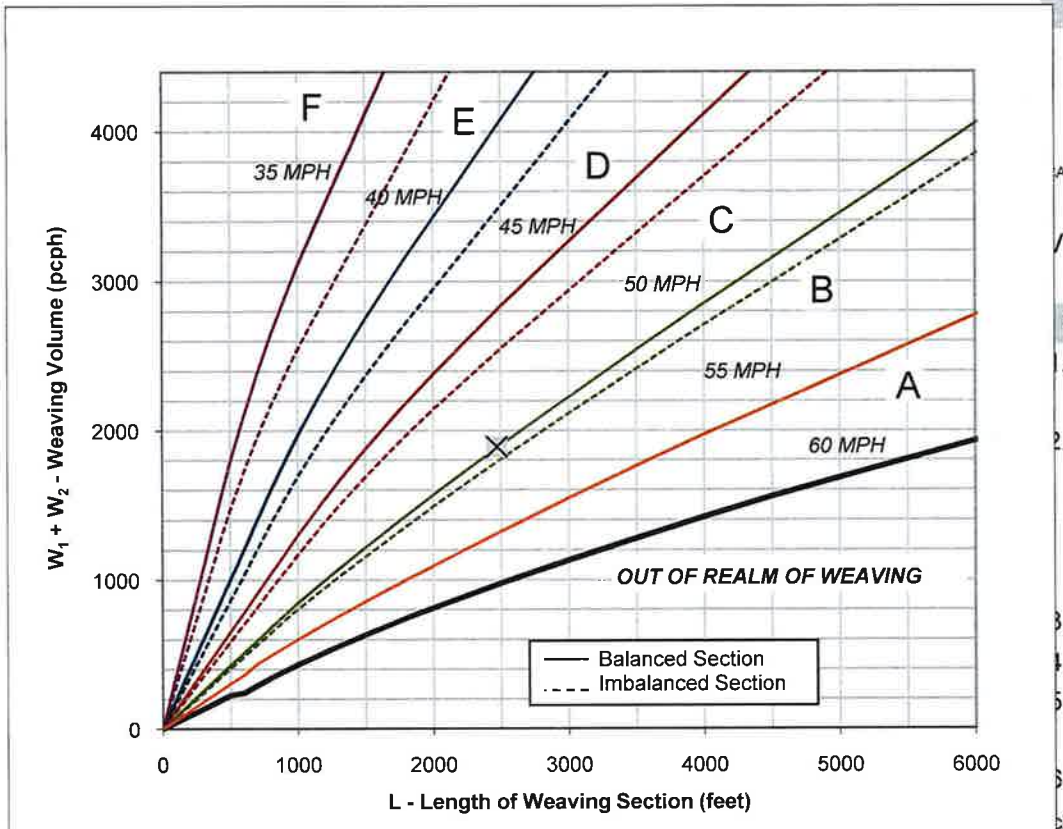
Data Input

Number of Entering Mainline Lanes	N_b	2
Number of Lanes in Weaving Section	N	3
Length of Weaving Section (feet)	L	2,470

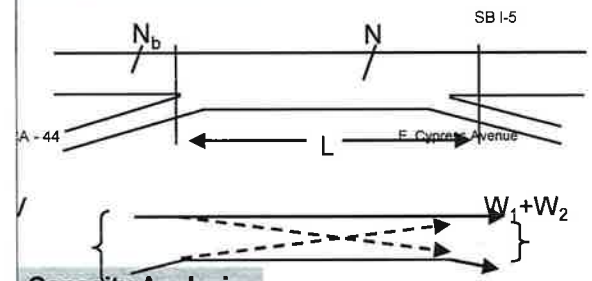
Total Weaving Section (V)		On-ramp to Mainline (W_1)		Mainline to Off-ramp (W_2)	
Volume (vph)*	4,430	Volume (vph)*	750	Volume (vph)*	1,030
Truck Percentage	20%	Truck Percentage	15%	Truck Percentage	10%
PCE for Trucks	1.5	PCE for Trucks	1.5	PCE for Trucks	1.5
Volume (pcph)	4,873	Volume (pcph)	806	Volume (pcph)	1,082

Project Information

Project	Knighton & Churn Creek
Scenario	Cumulative NP Conditions - PM
Freeway	SB I-5
On-ramp	CA - 44
Off-ramp	E. Cypress Avenue



Figure



Capacity Analysis

1. Is the weaving section balanced (Y / N)? **N**
   [If optional exit lane, then "Y". Otherwise "N".]
2. In the Weaving Speed Chart to the left, which two speed curves is the black "x" between?
   45 MPH and **50 MPH**
   If below the 55 MPH curve, out of the realm of weaving.
   If left of the 30 MPH curve, LOS is F.
3. Interpolated Weaving Speed (S_w, mph) **44.3**
4. Weaving Intensity Factor (k) **2.06**
5. Service Volume (SV, pcph)
   $SV = (1/N)*[V + (k - 1)*\min(W_1, W_2)]$ **1,909**
6. Level of Service (LOS) **D**

cluded.

* Note: Do not adjust by a Peak Hour Factor (PHF). The methodology incorporates the PHF in the Service Volume tables.

Sources: *Completion of Procedures for Analysis and Design of Traffic Weaving Sections*, Jack E. Leisch & Associates, September 1983; *Highway Design Manual*, California Department of Transportation, July 24, 2009; and Freeway and Interchange Geometric Design Handbook, Institue of Transportation Engineers, 2005.

Leisch Method for Weaving Analysis

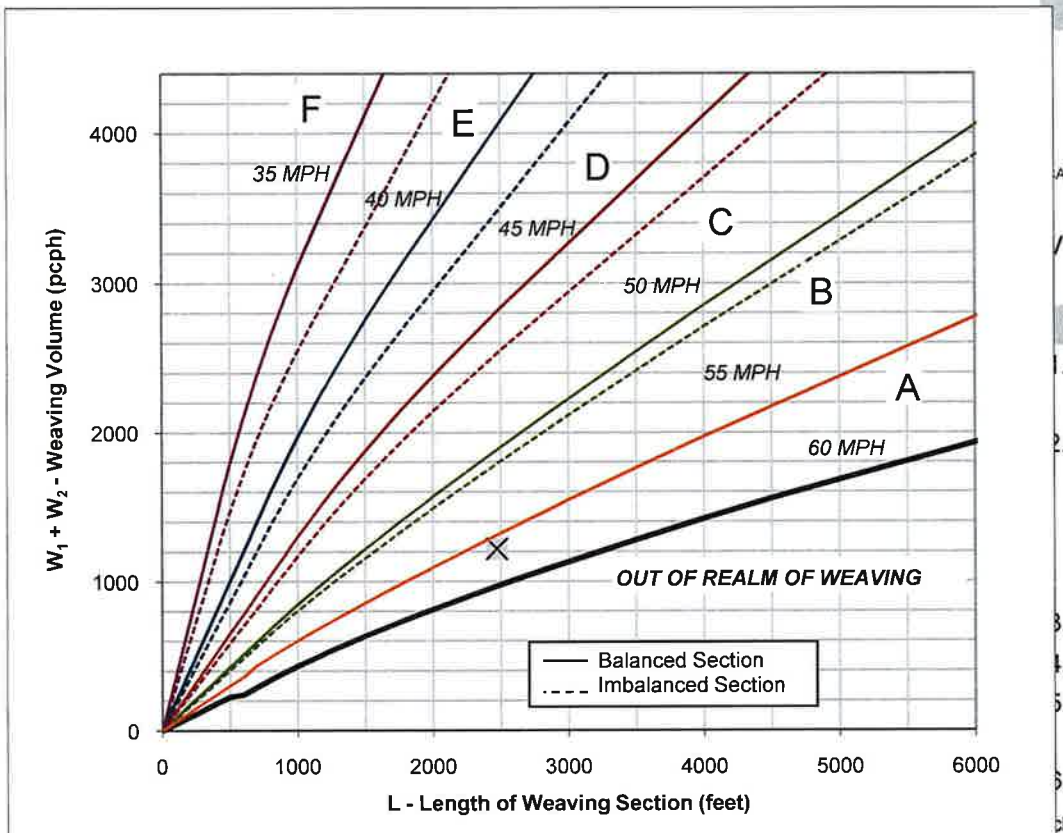
Data Input

Number of Entering Mainline Lanes	N_b	2
Number of Lanes in Weaving Section	N	3
Length of Weaving Section (feet)	L	2,470

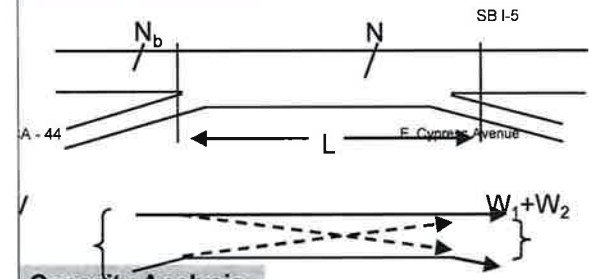
Total Weaving Section (V)		On-ramp to Mainline (W_1)		Mainline to Off-ramp (W_2)	
Volume (vph)*	3,380	Volume (vph)*	420	Volume (vph)*	730
Truck Percentage	20%	Truck Percentage	15%	Truck Percentage	10%
PCE for Trucks	1.5	PCE for Trucks	1.5	PCE for Trucks	1.5
Volume (pcph)	3,718	Volume (pcph)	452	Volume (pcph)	767

Project Information

Project	Knighton & Churn Creek
Scenario	Cumulative NP Conditions - SAT
Freeway	SB I-5
On-ramp	CA - 44
Off-ramp	E. Cypress Avenue



Figure



Capacity Analysis

1. Is the weaving section balanced (Y / N)? **N**
   [If optional exit lane, then "Y". Otherwise "N".]
2. In the Weaving Speed Chart to the left, which two speed curves is the black "x" between?
   55 MPH and **60 MPH**
   If below the 55 MPH curve, out of the realm of weaving.
   If left of the 30 MPH curve, LOS is F.
3. Interpolated Weaving Speed (S_w, mph) **51.3**
4. Weaving Intensity Factor (k) **1.00**
5. Service Volume (SV, pcph)
   $SV = (1/N)*[V + (k - 1)*\min(W_1, W_2)]$ **1,239**
6. Level of Service (LOS) **C**

cluded.

* Note: **Do not adjust by a Peak Hour Factor (PHF).** The methodology incorporates the PHF in the Service Volume tables.

Sources: *Completion of Procedures for Analysis and Design of Traffic Weaving Sections*, Jack E. Leisch & Associates, September 1983; *Highway Design Manual*, California Department of Transportation, July 24, 2009; and Freeway and Interchange Geometric Design Handbook, Institue of Transportation Engineers, 2005.