

APPENDIX G
TRANSPORTATION TECHNICAL DATA

Technical Appendix A
Existing Conditions
Intersection LOS Reports

HCM Signalized Intersection Capacity Analysis
 1: SR 120 WB Ramp & Main Street

11/6/2009



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	1.00	1.00	1.00			1.00	1.00
Frbp, ped/bikes					1.00	0.99	1.00	1.00			1.00	0.98
Flpb, ped/bikes					1.00	1.00	1.00	1.00			1.00	1.00
Frt					1.00	0.85	1.00	1.00			1.00	0.85
Flt Protected					0.95	1.00	0.95	1.00			1.00	1.00
Satd. Flow (prot)					1736	1504	1736	1792			1792	1491
Flt Permitted					0.95	1.00	0.95	1.00			1.00	1.00
Satd. Flow (perm)					1736	1504	1736	1792			1792	1491
Volume (vph)	0	0	0	30	0	209	185	406	0	0	243	264
Peak-hour factor, PHF	0.25	0.25	0.25	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	0	0	0	33	0	232	206	451	0	0	270	293
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	0	0	145
Lane Group Flow (vph)	0	0	0	0	33	232	206	451	0	0	270	148
Confl. Peds. (#/hr)			2			2			2			2
Heavy Vehicles (%)	2%	2%	2%	4%	2%	6%	4%	6%	2%	2%	6%	6%
Turn Type				Split		Free	Prot					Perm
Protected Phases				8	8		5	2			6	
Permitted Phases						Free						6
Actuated Green, G (s)					1.1	47.2	10.3	38.1			23.8	23.8
Effective Green, g (s)					1.1	47.2	10.3	38.1			23.8	23.8
Actuated g/C Ratio					0.02	1.00	0.22	0.81			0.50	0.50
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)					40	1504	379	1447			904	752
v/s Ratio Prot					c0.02		c0.12	c0.25			0.15	
v/s Ratio Perm						0.15						0.10
v/c Ratio					0.82	0.15	0.54	0.31			0.30	0.20
Uniform Delay, d1					23.0	0.0	16.4	1.2			6.8	6.4
Progression Factor					1.00	1.00	1.00	1.00			1.00	1.00
Incremental Delay, d2					76.6	0.2	1.6	0.1			0.2	0.1
Delay (s)					99.5	0.2	18.0	1.3			7.0	6.6
Level of Service					F	A	B	A			A	A
Approach Delay (s)		0.0			12.6			6.5			6.8	
Approach LOS		A			B			A			A	

Intersection Summary

HCM Average Control Delay	7.7	HCM Level of Service	A
HCM Volume to Capacity ratio	0.37		
Actuated Cycle Length (s)	47.2	Sum of lost time (s)	8.0
Intersection Capacity Utilization	49.6%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis

2: SR 120 EB Ramps & Main Street


















11/6/2009



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	1.00					1.00	1.00	1.00	1.00		
Frbp, ped/bikes		1.00	0.98					1.00	0.98	1.00	1.00		
Flpb, ped/bikes		1.00	1.00					1.00	1.00	1.00	1.00		
Frt		1.00	0.85					1.00	0.85	1.00	1.00		
Flt Protected		0.95	1.00					1.00	1.00	0.95	1.00		
Satd. Flow (prot)		1703	1515					1827	1517	1703	1827		
Flt Permitted		0.95	1.00					1.00	1.00	0.95	1.00		
Satd. Flow (perm)		1703	1515					1827	1517	1703	1827		
Volume (vph)	240	0	52	0	0	0	0	351	37	142	131	0	
Peak-hour factor, PHF	0.80	0.80	0.80	0.25	0.25	0.25	0.95	0.95	0.95	0.85	0.85	0.85	
Adj. Flow (vph)	300	0	65	0	0	0	0	369	39	167	154	0	
RTOR Reduction (vph)	0	0	51	0	0	0	0	0	6	0	0	0	
Lane Group Flow (vph)	0	300	14	0	0	0	0	369	33	167	154	0	
Confl. Peds. (#/hr)			2				2		2			2	
Heavy Vehicles (%)	6%	2%	4%	2%	2%	2%	2%	4%	4%	6%	4%	2%	
Turn Type	Split		Perm						Perm		Prot		
Protected Phases	4	4						2		1	6		
Permitted Phases			4						2				
Actuated Green, G (s)		12.6	12.6					23.3	23.3	9.0	36.3		
Effective Green, g (s)		12.6	12.6					23.3	23.3	9.0	36.3		
Actuated g/C Ratio		0.22	0.22					0.41	0.41	0.16	0.64		
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)		377	335					748	621	269	1166		
v/s Ratio Prot		c0.18						c0.20		c0.10	0.08		
v/s Ratio Perm			0.01						0.02				
v/c Ratio		0.80	0.04					0.49	0.05	0.62	0.13		
Uniform Delay, d1		20.9	17.4					12.4	10.1	22.4	4.1		
Progression Factor		1.00	1.00					1.00	1.00	1.00	1.00		
Incremental Delay, d2		11.1	0.1					0.5	0.0	4.4	0.1		
Delay (s)		32.0	17.5					12.9	10.2	26.8	4.1		
Level of Service		C	B					B	B	C	A		
Approach Delay (s)		29.4			0.0			12.7			15.9		
Approach LOS		C			A			B			B		
Intersection Summary													
HCM Average Control Delay			19.2									HCM Level of Service	B
HCM Volume to Capacity ratio			0.60										
Actuated Cycle Length (s)			56.9									Sum of lost time (s)	12.0
Intersection Capacity Utilization			49.6%									ICU Level of Service	A
Analysis Period (min)			15										
c	Critical Lane Group												

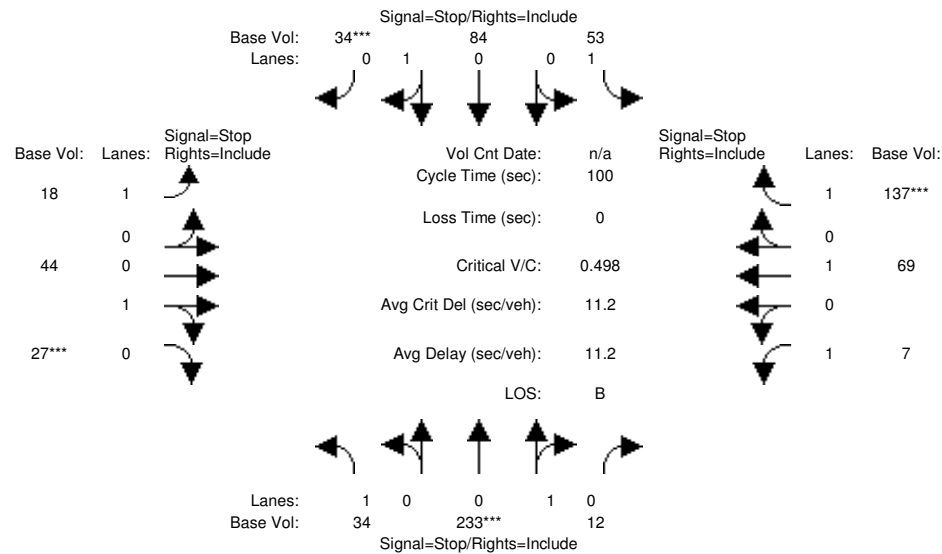
HCM Unsignalized Intersection Capacity Analysis
 3: Atherton Drive & Main Street

11/6/2009

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control	Stop			Stop				Stop			Stop	
Volume (vph)	14	0	9	0	0	0	12	374	0	0	162	21
Peak Hour Factor	0.25	0.25	0.25	0.25	0.25	0.25	0.95	0.95	0.95	0.85	0.85	0.85
Hourly flow rate (vph)	56	0	36	0	0	0	13	394	0	0	191	25
Direction, Lane #	EB 1	EB 2	NB 1	SB 1	SB 2							
Volume Total (vph)	56	36	406	191	25							
Volume Left (vph)	56	0	13	0	0							
Volume Right (vph)	0	36	0	0	25							
Hadj (s)	0.53	-0.67	0.04	0.03	-0.67							
Departure Headway (s)	6.6	5.4	5.1	5.2	4.5							
Degree Utilization, x	0.10	0.05	0.57	0.27	0.03							
Capacity (veh/h)	500	604	697	670	770							
Control Delay (s)	9.1	7.5	14.7	8.9	6.4							
Approach Delay (s)	8.5		14.7		8.7							
Approach LOS	A		B		A							
Intersection Summary												
Delay			12.1									
HCM Level of Service			B									
Intersection Capacity Utilization			39.4%		ICU Level of Service	A						
Analysis Period (min)			15									

Level Of Service Computation Report
 2000 HCM 4-Way Stop (Base Volume Alternative)
 Default Scenario

Intersection #1: Woodward Ave / Main Street Ex AM



Approach:	North Bound			South Bound			East Bound			West Bound		
Movement:	L	T	R	L	T	R	L	T	R	L	T	R
Min. Green:	0	0	0	0	0	0	0	0	0	0	0	0
Volume Module:												
Base Vol:	34	233	12	53	84	34	18	44	27	7	69	137
Growth Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Initial Bse:	34	233	12	53	84	34	18	44	27	7	69	137
User Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PHF Adj:	0.80	0.80	0.80	0.95	0.95	0.95	0.70	0.70	0.70	0.95	0.95	0.95
PHF Volume:	43	291	15	56	88	36	26	63	39	7	73	144
Reduct Vol:	0	0	0	0	0	0	0	0	0	0	0	0
Reduced Vol:	43	291	15	56	88	36	26	63	39	7	73	144
PCE Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
MLF Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
FinalVolume:	43	291	15	56	88	36	26	63	39	7	73	144

Saturation Flow Module:	North Bound			South Bound			East Bound			West Bound		
Adjustment:	L	T	R	L	T	R	L	T	R	L	T	R
Adjustment:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Lanes:	1.00	0.95	0.05	1.00	0.71	0.29	1.00	0.62	0.38	1.00	1.00	1.00
Final Sat.:	557	585	30	533	424	172	498	346	213	492	530	592

Capacity Analysis Module:	North Bound			South Bound			East Bound			West Bound		
Vol/Sat:	L	T	R	L	T	R	L	T	R	L	T	R
Vol/Sat:	0.08	0.50	0.50	0.10	0.21	0.21	0.05	0.18	0.18	0.01	0.14	0.24
Crit Moves:	****					****			****			****
Delay/Veh:	9.4	13.6	13.6	9.8	9.8	9.8	9.8	9.9	9.9	9.7	10.0	10.0
Delay Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
AdjDel/Veh:	9.4	13.6	13.6	9.8	9.8	9.8	9.8	9.9	9.9	9.7	10.0	10.0
LOS by Move:	A	B	B	A	A	A	A	A	A	A	B	B
ApproachDel:	13.1			9.8			9.9			10.0		
Delay Adj:	1.00			1.00			1.00			1.00		
ApprAdjDel:	13.1			9.8			9.9			10.0		
LOS by Appr:	B			A			A			B		
AllWayAvgQ:	0.1	0.9	0.9	0.1	0.2	0.2	0.0	0.2	0.2	0.0	0.1	0.3

Note: Queue reported is the number of cars per lane.

Peak Hour Volume Signal Warrant Report [Urban]

 Intersection #1 Woodward Ave / Main Street Ex AM

Base Volume Alternative: Peak Hour Warrant NOT Met

Approach:	North Bound			South Bound			East Bound			West Bound		
Movement:	L	T	R	L	T	R	L	T	R	L	T	R
Control:	Stop Sign			Stop Sign			Stop Sign			Stop Sign		
Lanes:	1	0	0	1	0	0	1	0	0	1	0	1
Initial Vol:	34	233	12	53	84	34	18	44	27	7	69	137
Major Street Volume:							450					
Minor Approach Volume:							213					
Minor Approach Volume Threshold:							717					

SIGNAL WARRANT DISCLAIMER
 This peak hour signal warrant analysis should be considered solely as an "indicator" of the likelihood of an unsignalized intersection warranting a traffic signal in the future. Intersections that exceed this warrant are probably more likely to meet one or more of the other volume based signal warrant (such as the 4-hour or 8-hour warrants).

The peak hour warrant analysis in this report is not intended to replace a rigorous and complete traffic signal warrant analysis by the responsible jurisdiction. Consideration of the other signal warrants, which is beyond the scope of this software, may yield different results.

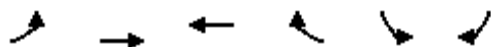
HCM Unsignalized Intersection Capacity Analysis
 5: Industrial Park Dr & VanRyn (Spreckles)

11/6/2009

	→	↘	↙	←	↖	↗				
Movement	EBT	EBR	WBL	WBT	NBL	NBR				
Lane Configurations	↑	↗	↙	↑↑	↖	↗				
Sign Control	Free			Free	Stop					
Grade	0%			0%	0%					
Volume (veh/h)	134	7	50	118	28	83				
Peak Hour Factor	0.75	0.75	0.85	0.85	0.85	0.85				
Hourly flow rate (vph)	179	9	59	139	33	98				
Pedestrians										
Lane Width (ft)										
Walking Speed (ft/s)										
Percent Blockage										
Right turn flare (veh)										
Median type	None									
Median storage (veh)										
Upstream signal (ft)	225									
pX, platoon unblocked										
vC, conflicting volume			188			366	179			
vC1, stage 1 conf vol										
vC2, stage 2 conf vol										
vCu, unblocked vol			188			366	179			
tC, single (s)			4.1			6.8	6.9			
tC, 2 stage (s)										
tF (s)			2.2			3.5	3.3			
p0 queue free %			96			94	88			
cM capacity (veh/h)			1384			581	833			
Direction, Lane #	EB 1	EB 2	WB 1	WB 2	WB 3	NB 1	NB 2			
Volume Total	179	9	59	69	69	33	98			
Volume Left	0	0	59	0	0	33	0			
Volume Right	0	9	0	0	0	0	98			
cSH	1700	1700	1384	1700	1700	581	833			
Volume to Capacity	0.11	0.01	0.04	0.04	0.04	0.06	0.12			
Queue Length 95th (ft)	0	0	3	0	0	4	10			
Control Delay (s)	0.0	0.0	7.7	0.0	0.0	11.6	9.9			
Lane LOS			A			B	A			
Approach Delay (s)	0.0	2.3				10.3				
Approach LOS							B			
Intersection Summary										
Average Delay			3.5							
Intersection Capacity Utilization			23.7%		ICU Level of Service		A			
Analysis Period (min)			15							

HCM Unsignalized Intersection Capacity Analysis
6: Woodward Avenue & VanRyn (Spreckles)

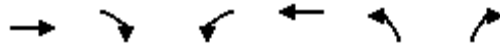
11/6/2009



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations	↶	↷	↷↶		↶	↷
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Volume (veh/h)	73	87	76	10	16	64
Peak Hour Factor	0.90	0.90	0.80	0.80	0.80	0.80
Hourly flow rate (vph)	81	97	95	12	20	80
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type					TWLTL	
Median storage veh					0	
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	108				360	54
vC1, stage 1 conf vol					101	
vC2, stage 2 conf vol					259	
vCu, unblocked vol	108				360	54
tC, single (s)	4.1				6.8	6.9
tC, 2 stage (s)					5.8	
tF (s)	2.2				3.5	3.3
p0 queue free %	95				96	92
cM capacity (veh/h)	1481				461	1002
Direction, Lane #	EB 1	EB 2	WB 1	WB 2	SB 1	SB 2
Volume Total	81	97	63	44	20	80
Volume Left	81	0	0	0	20	0
Volume Right	0	0	0	12	0	80
cSH	1481	1700	1700	1700	461	1002
Volume to Capacity	0.05	0.06	0.04	0.03	0.04	0.08
Queue Length 95th (ft)	4	0	0	0	3	6
Control Delay (s)	7.6	0.0	0.0	0.0	13.2	8.9
Lane LOS	A				B	A
Approach Delay (s)	3.5		0.0		9.8	
Approach LOS					A	
Intersection Summary						
Average Delay			4.1			
Intersection Capacity Utilization			20.7%		ICU Level of Service	A
Analysis Period (min)			15			

HCM Unsignalized Intersection Capacity Analysis
7: Woodward Avenue & Pillsbury Road

11/6/2009



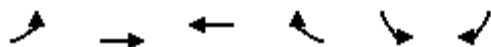
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↻		↻	↻↻	↻↻	
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Volume (veh/h)	97	6	12	78	8	33
Peak Hour Factor	0.80	0.80	0.70	0.70	0.80	0.80
Hourly flow rate (vph)	121	8	17	111	10	41
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				TWLTL		
Median storage veh					1	
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume			129		215	125
vC1, stage 1 conf vol					125	
vC2, stage 2 conf vol					90	
vCu, unblocked vol			129		215	125
tC, single (s)			4.1		6.8	6.9
tC, 2 stage (s)					5.8	
tF (s)			2.2		3.5	3.3
p0 queue free %			99		99	95
cM capacity (veh/h)			1455		750	902

Direction, Lane #	EB 1	WB 1	WB 2	WB 3	NB 1
Volume Total	129	17	56	56	51
Volume Left	0	17	0	0	10
Volume Right	8	0	0	0	41
cSH	1700	1455	1700	1700	868
Volume to Capacity	0.08	0.01	0.03	0.03	0.06
Queue Length 95th (ft)	0	1	0	0	5
Control Delay (s)	0.0	7.5	0.0	0.0	9.4
Lane LOS		A			A
Approach Delay (s)	0.0	1.0			9.4
Approach LOS					A

Intersection Summary					
Average Delay			2.0		
Intersection Capacity Utilization		17.3%		ICU Level of Service	A
Analysis Period (min)		15			

HCM Unsignalized Intersection Capacity Analysis
8: Woodward Avenue & Atherton Dr.

11/6/2009



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations	↖	↑	↗		↖	↗
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Volume (veh/h)	2	128	89	11	23	1
Peak Hour Factor	0.70	0.70	0.80	0.80	0.75	0.75
Hourly flow rate (vph)	3	183	111	14	31	1
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				TWLTL		
Median storage veh				1		
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	125				307	118
vC1, stage 1 conf vol					118	
vC2, stage 2 conf vol					189	
vCu, unblocked vol	125				307	118
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)					5.4	
tF (s)	2.2				3.5	3.3
p0 queue free %	100				96	100
cM capacity (veh/h)	1462				709	934

Direction, Lane #	EB 1	EB 2	WB 1	SB 1	SB 2
Volume Total	3	183	125	31	1
Volume Left	3	0	0	31	0
Volume Right	0	0	14	0	1
cSH	1462	1700	1700	709	934
Volume to Capacity	0.00	0.11	0.07	0.04	0.00
Queue Length 95th (ft)	0	0	0	3	0
Control Delay (s)	7.5	0.0	0.0	10.3	8.9
Lane LOS	A			B	A
Approach Delay (s)	0.1		0.0	10.2	
Approach LOS				B	

Intersection Summary					
Average Delay			1.0		
Intersection Capacity Utilization		16.7%		ICU Level of Service	A
Analysis Period (min)		15			

HCM Unsignalized Intersection Capacity Analysis
 9: Woodward Avenue & Moffat Blvd.

11/6/2009



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations	W		W	W	W	
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Volume (veh/h)	4	147	98	289	114	2
Peak Hour Factor	0.85	0.85	0.80	0.80	0.65	0.65
Hourly flow rate (vph)	5	173	122	361	175	3
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	783	177	178			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	783	177	178			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	99	80	91			
cM capacity (veh/h)	331	866	1397			

Direction, Lane #	EB 1	NB 1	NB 2	SB 1
Volume Total	178	122	361	178
Volume Left	5	122	0	0
Volume Right	173	0	0	3
cSH	831	1397	1700	1700
Volume to Capacity	0.21	0.09	0.21	0.10
Queue Length 95th (ft)	20	7	0	0
Control Delay (s)	10.5	7.8	0.0	0.0
Lane LOS	B	A		
Approach Delay (s)	10.5	2.0		0.0
Approach LOS	B			

Intersection Summary			
Average Delay		3.4	
Intersection Capacity Utilization	31.2%		ICU Level of Service A
Analysis Period (min)		15	

HCM Unsignalized Intersection Capacity Analysis
 10: SR 99 SB & Moffat Blvd.

11/6/2009



Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations	↔		↑			↑
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Volume (veh/h)	26	41	346	0	0	261
Peak Hour Factor	0.95	0.95	0.85	0.85	0.90	0.90
Hourly flow rate (vph)	27	43	407	0	0	290
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	697	407			407	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	697	407			407	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	93	93			100	
cM capacity (veh/h)	403	638			1152	

Direction, Lane #	WB 1	NB 1	SB 1
Volume Total	71	407	290
Volume Left	27	0	0
Volume Right	43	0	0
cSH	520	1700	1700
Volume to Capacity	0.14	0.24	0.17
Queue Length 95th (ft)	12	0	0
Control Delay (s)	13.0	0.0	0.0
Lane LOS	B		
Approach Delay (s)	13.0	0.0	0.0
Approach LOS	B		

Intersection Summary			
Average Delay		1.2	
Intersection Capacity Utilization	28.8%	ICU Level of Service	A
Analysis Period (min)		15	

HCM Unsignalized Intersection Capacity Analysis
 11: Graves Road & Austin Rd.

11/6/2009



Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations	↔		↔		↔	
Sign Control	Stop		Free		Free	
Grade	0%		0%		0%	
Volume (veh/h)	10	14	120	4	12	148
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	11	15	130	4	13	161
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	320	133			135	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	320	133			135	
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	98			99	
cM capacity (veh/h)	668	917			1450	

Direction, Lane #	WB 1	NB 1	SB 1
Volume Total	26	135	174
Volume Left	11	0	13
Volume Right	15	4	0
cSH	793	1700	1450
Volume to Capacity	0.03	0.08	0.01
Queue Length 95th (ft)	3	0	1
Control Delay (s)	9.7	0.0	0.6
Lane LOS	A		A
Approach Delay (s)	9.7	0.0	0.6
Approach LOS	A		

Intersection Summary			
Average Delay		1.1	
Intersection Capacity Utilization	27.7%	ICU Level of Service	A
Analysis Period (min)	15		

HCM Unsignalized Intersection Capacity Analysis
 12: SR 99 NB & Austin Rd.

11/6/2009



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations						↕	↗	↕			↖	↕
Sign Control	Stop			Stop			Stop			Stop		
Volume (vph)	0	0	0	247	4	49	68	75	0	0	134	24
Peak Hour Factor	0.25	0.25	0.25	0.85	0.85	0.85	0.90	0.90	0.90	0.85	0.85	0.85
Hourly flow rate (vph)	0	0	0	291	5	58	76	83	0	0	158	28
Direction, Lane #	WB 1	WB 2	NB 1	SB 1								
Volume Total (vph)	295	58	159	186								
Volume Left (vph)	291	0	76	0								
Volume Right (vph)	0	58	0	28								
Hadj (s)	0.58	-0.61	0.15	-0.01								
Departure Headway (s)	6.0	4.8	5.3	5.1								
Degree Utilization, x	0.49	0.08	0.24	0.27								
Capacity (veh/h)	577	715	634	656								
Control Delay (s)	13.5	7.0	10.0	10.0								
Approach Delay (s)	12.4		10.0	10.0								
Approach LOS	B		A	A								
Intersection Summary												
Delay			11.2									
HCM Level of Service			B									
Intersection Capacity Utilization			40.1%	ICU Level of Service	A							
Analysis Period (min)			15									

HCM Unsignalized Intersection Capacity Analysis
 13: Moffat Blvd. & Austin Rd.

11/6/2009



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕	↕		↕	
Sign Control		Stop			Stop			Stop	↕		Stop	
Volume (vph)	83	173	31	0	1	3	54	57	15	42	48	291
Peak Hour Factor	0.95	0.95	0.95	0.50	0.50	0.50	0.85	0.85	0.85	0.90	0.90	0.90
Hourly flow rate (vph)	87	182	33	0	2	6	64	67	18	47	53	323

Direction, Lane #	EB 1	WB 1	NB 1	NB 2	SB 1
Volume Total (vph)	302	8	131	18	423
Volume Left (vph)	87	0	64	0	47
Volume Right (vph)	33	6	0	18	323
Hadj (s)	0.07	-0.42	0.13	-0.57	-0.36
Departure Headway (s)	5.4	5.4	5.5	3.2	4.6
Degree Utilization, x	0.45	0.01	0.20	0.02	0.54
Capacity (veh/h)	631	556	608	1121	739
Control Delay (s)	12.6	8.5	9.8	6.3	13.0
Approach Delay (s)	12.6	8.5	9.4		13.0
Approach LOS	B	A	A		B

Intersection Summary	
Delay	12.2
HCM Level of Service	B
Intersection Capacity Utilization	58.4%
ICU Level of Service	B
Analysis Period (min)	15

HCM Signalized Intersection Capacity Analysis

14: Yosemite Avenue & Austin Rd.

11/6/2009

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	0.95		1.00	1.00		1.00	1.00	
Frt	1.00	1.00	0.85	1.00	0.99		1.00	0.94		1.00	0.94	
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770	1863	1583	1770	3507		1770	1750		1770	1760	
Flt Permitted	0.95	1.00	1.00	0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (perm)	1770	1863	1583	1770	3507		1770	1750		1770	1760	
Volume (vph)	25	241	62	31	401	26	81	49	33	24	59	34
Peak-hour factor, PHF	0.90	0.90	0.90	0.95	0.95	0.95	0.85	0.85	0.85	0.95	0.95	0.95
Adj. Flow (vph)	28	268	69	33	422	27	95	58	39	25	62	36
RTOR Reduction (vph)	0	0	53	0	9	0	0	23	0	0	23	0
Lane Group Flow (vph)	28	268	16	33	440	0	95	74	0	25	75	0
Turn Type	Prot		Perm	Prot			Prot			Prot		
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases			4									
Actuated Green, G (s)	1.8	11.6	11.6	1.8	11.6		3.0	20.9		0.9	18.8	
Effective Green, g (s)	1.8	11.6	11.6	1.8	11.6		3.0	20.9		0.9	18.8	
Actuated g/C Ratio	0.04	0.23	0.23	0.04	0.23		0.06	0.41		0.02	0.37	
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)	62	422	359	62	795		104	714		31	646	
v/s Ratio Prot	0.02	c0.14		c0.02	0.13		c0.05	0.04		0.01	c0.04	
v/s Ratio Perm			0.01									
v/c Ratio	0.45	0.64	0.04	0.53	0.55		0.91	0.10		0.81	0.12	
Uniform Delay, d1	24.2	17.9	15.5	24.3	17.5		24.0	9.4		25.1	10.7	
Progression Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	5.2	3.1	0.1	8.5	0.8		61.0	0.3		83.8	0.4	
Delay (s)	29.4	21.0	15.5	32.8	18.4		84.9	9.7		108.9	11.1	
Level of Service	C	C	B	C	B		F	A		F	B	
Approach Delay (s)		20.6			19.3			46.9			31.0	
Approach LOS		C			B			D			C	
Intersection Summary												
HCM Average Control Delay			25.5				HCM Level of Service			C		
HCM Volume to Capacity ratio			0.36									
Actuated Cycle Length (s)			51.2				Sum of lost time (s)		16.0			
Intersection Capacity Utilization			37.2%				ICU Level of Service		A			
Analysis Period (min)			15									
c Critical Lane Group												

HCM Signalized Intersection Capacity Analysis
 15: Yosemite Avenue & Jack Tone Rd

11/6/2009



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	1.00	0.95		1.00	0.95		1.00	1.00		1.00	1.00	
Frt	1.00	0.99		1.00	0.99		1.00	0.96		1.00	0.96	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770	3487		1770	3493		1770	1783		1770	1794	
Flt Permitted	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (perm)	1770	3487		1770	3493		1770	1783		1770	1794	
Volume (vph)	15	189	21	53	347	33	39	92	37	23	127	42
Peak-hour factor, PHF	0.90	0.90	0.90	0.95	0.95	0.95	0.80	0.80	0.80	0.80	0.80	0.80
Adj. Flow (vph)	17	210	23	56	365	35	49	115	46	29	159	52
RTOR Reduction (vph)	0	8	0	0	6	0	0	13	0	0	11	0
Lane Group Flow (vph)	17	225	0	56	394	0	49	148	0	29	200	0
Turn Type	Prot		Prot		Prot		Prot		Prot			
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases												
Actuated Green, G (s)	0.9	10.5		2.3	11.9		2.2	11.8		1.9	11.5	
Effective Green, g (s)	0.9	10.5		2.3	11.9		2.2	11.8		1.9	11.5	
Actuated g/C Ratio	0.02	0.25		0.05	0.28		0.05	0.28		0.04	0.27	
Clearance Time (s)	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	
Lane Grp Cap (vph)	37	861		96	978		92	495		79	485	
v/s Ratio Prot	0.01	0.06		c0.03	c0.11		c0.03	0.08		0.02	c0.11	
v/s Ratio Perm												
v/c Ratio	0.46	0.26		0.58	0.40		0.53	0.30		0.37	0.41	
Uniform Delay, d1	20.6	12.9		19.6	12.4		19.6	12.1		19.7	12.7	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	8.8	0.2		8.7	0.3		5.8	0.3		2.9	0.6	
Delay (s)	29.3	13.0		28.4	12.7		25.5	12.4		22.6	13.3	
Level of Service	C	B		C	B		C	B		C	B	
Approach Delay (s)		14.2			14.6			15.5			14.4	
Approach LOS		B			B			B			B	

Intersection Summary

HCM Average Control Delay	14.6	HCM Level of Service	B
HCM Volume to Capacity ratio	0.40		
Actuated Cycle Length (s)	42.5	Sum of lost time (s)	12.0
Intersection Capacity Utilization	39.9%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

HCM Unsignalized Intersection Capacity Analysis
 16: Graves Road & Jack Tone Rd

11/6/2009



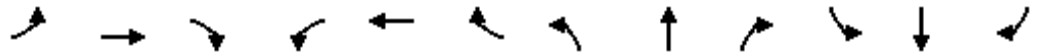
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Volume (veh/h)	4	12	14	164	191	10
Peak Hour Factor	0.80	0.80	0.85	0.85	0.75	0.75
Hourly flow rate (vph)	5	15	16	193	255	13
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None					
Median storage (veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	487	261	268			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	487	261	268			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	99	98	99			
cM capacity (veh/h)	533	777	1296			

Direction, Lane #	EB 1	NB 1	SB 1
Volume Total	20	209	268
Volume Left	5	16	0
Volume Right	15	0	13
cSH	697	1296	1700
Volume to Capacity	0.03	0.01	0.16
Queue Length 95th (ft)	2	1	0
Control Delay (s)	10.3	0.7	0.0
Lane LOS	B	A	
Approach Delay (s)	10.3	0.7	0.0
Approach LOS	B		

Intersection Summary			
Average Delay		0.7	
Intersection Capacity Utilization	30.2%	ICU Level of Service	A
Analysis Period (min)	15		

HCM Unsignalized Intersection Capacity Analysis
 17: Sedan Ave & Main Street

11/6/2009



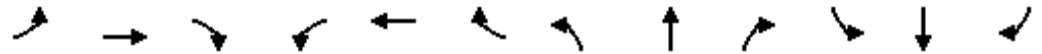
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Volume (veh/h)	1	1	2	1	3	0	1	76	0	4	59	1
Peak Hour Factor	1.00	1.00	1.00	0.50	0.50	0.50	0.70	0.70	0.70	0.85	0.85	0.85
Hourly flow rate (vph)	1	1	2	2	6	0	1	109	0	5	69	1
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	194	191	70	193	191	109	71			109		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	194	191	70	193	191	109	71			109		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	100	100	100	100	99	100	100			100		
cM capacity (veh/h)	758	701	993	761	701	945	1530			1482		

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	4	8	110	75
Volume Left	1	2	1	5
Volume Right	2	0	0	1
cSH	840	715	1530	1482
Volume to Capacity	0.00	0.01	0.00	0.00
Queue Length 95th (ft)	0	1	0	0
Control Delay (s)	9.3	10.1	0.1	0.5
Lane LOS	A	B	A	A
Approach Delay (s)	9.3	10.1	0.1	0.5
Approach LOS	A	B		

Intersection Summary			
Average Delay		0.8	
Intersection Capacity Utilization	15.6%	ICU Level of Service	A
Analysis Period (min)		15	

HCM Unsignalized Intersection Capacity Analysis
 18: Sedan Ave & Austin Rd.

11/6/2009



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Volume (veh/h)	6	0	0	0	1	0	1	115	0	1	51	9
Peak Hour Factor	0.50	0.50	0.50	0.25	0.25	0.25	0.80	0.80	0.80	1.00	1.00	1.00
Hourly flow rate (vph)	12	0	0	0	4	0	1	144	0	1	51	9
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	206	204	56	204	208	144	60			144		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	206	204	56	204	208	144	60			144		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	98	100	100	100	99	100	100			100		
cM capacity (veh/h)	748	692	1011	753	688	904	1544			1439		

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	12	4	145	61
Volume Left	12	0	1	1
Volume Right	0	0	0	9
cSH	748	688	1544	1439
Volume to Capacity	0.02	0.01	0.00	0.00
Queue Length 95th (ft)	1	0	0	0
Control Delay (s)	9.9	10.3	0.1	0.1
Lane LOS	A	B	A	A
Approach Delay (s)	9.9	10.3	0.1	0.1
Approach LOS	A	B		

Intersection Summary			
Average Delay		0.8	
Intersection Capacity Utilization	18.2%	ICU Level of Service	A
Analysis Period (min)		15	

HCM Unsignalized Intersection Capacity Analysis
 19: W. River Rd & Jack Tone Rd

11/6/2009



Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations	↶	↷	↶		↶	↷
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Volume (veh/h)	118	35	143	49	23	180
Peak Hour Factor	0.85	0.85	0.90	0.90	0.75	0.75
Hourly flow rate (vph)	139	41	159	54	31	240
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	487	186			213	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	487	186			213	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	74	95			98	
cM capacity (veh/h)	527	856			1357	
Direction, Lane #	WB 1	WB 2	NB 1	SB 1	SB 2	
Volume Total	139	41	213	31	240	
Volume Left	139	0	0	31	0	
Volume Right	0	41	54	0	0	
cSH	527	856	1700	1357	1700	
Volume to Capacity	0.26	0.05	0.13	0.02	0.14	
Queue Length 95th (ft)	26	4	0	2	0	
Control Delay (s)	14.3	9.4	0.0	7.7	0.0	
Lane LOS	B	A		A		
Approach Delay (s)	13.1		0.0	0.9		
Approach LOS	B					
Intersection Summary						
Average Delay			3.9			
Intersection Capacity Utilization			30.4%		ICU Level of Service	A
Analysis Period (min)			15			

HCM Signalized Intersection Capacity Analysis

20: Santos Ave & Jack Tone Rd

11/6/2009



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		1.00	1.00	1.00	1.00	1.00	1.00		0.95	
Frt		0.89		1.00	1.00	0.85	1.00	1.00	0.85		0.98	
Flt Protected		0.99		0.95	1.00	1.00	0.95	1.00	1.00		1.00	
Satd. Flow (prot)		3128		1770	1863	1583	1770	1863	1583		3461	
Flt Permitted		0.99		0.95	1.00	1.00	0.95	1.00	1.00		1.00	
Satd. Flow (perm)		3128		1770	1863	1583	1770	1863	1583		3461	
Volume (vph)	19	17	99	39	53	46	80	127	22	14	245	39
Peak-hour factor, PHF	0.85	0.85	0.85	0.75	0.75	0.75	0.85	0.85	0.85	0.80	0.80	0.80
Adj. Flow (vph)	22	20	116	52	71	61	94	149	26	18	306	49
RTOR Reduction (vph)	0	107	0	0	0	55	0	0	16	0	11	0
Lane Group Flow (vph)	0	51	0	52	71	6	94	149	10	0	362	0
Turn Type	Split		Split		Perm		Split		Perm		Split	
Protected Phases	4	4	8		8		2		2		6	
Permitted Phases					8				2			
Actuated Green, G (s)	5.2		6.4		6.4		24.7		24.7		11.6	
Effective Green, g (s)	5.2		6.4		6.4		24.7		24.7		11.6	
Actuated g/C Ratio	0.08		0.10		0.10		0.39		0.39		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)	255		177		187		684		720		612	
v/s Ratio Prot	c0.02		0.03		c0.04		0.05		c0.08		c0.10	
v/s Ratio Perm					0.00				0.01			
v/c Ratio	0.20		0.29		0.38		0.04		0.14		0.02	
Uniform Delay, d1	27.4		26.7		26.9		26.0		12.7		13.1	
Progression Factor	1.00		1.00		1.00		1.00		1.00		1.00	
Incremental Delay, d2	0.4		0.9		1.3		0.1		0.4		0.7	
Delay (s)	27.8		27.6		28.2		26.1		13.1		13.7	
Level of Service	C		C		C		C		B		B	
Approach Delay (s)	27.8				27.3				13.4		25.2	
Approach LOS	C				C				B		C	

Intersection Summary

HCM Average Control Delay	22.8	HCM Level of Service	C
HCM Volume to Capacity ratio	0.32		
Actuated Cycle Length (s)	63.9	Sum of lost time (s)	16.0
Intersection Capacity Utilization	33.9%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis

22: Colony Rd/SR 99 SB & Jack Tone Rd

11/6/2009



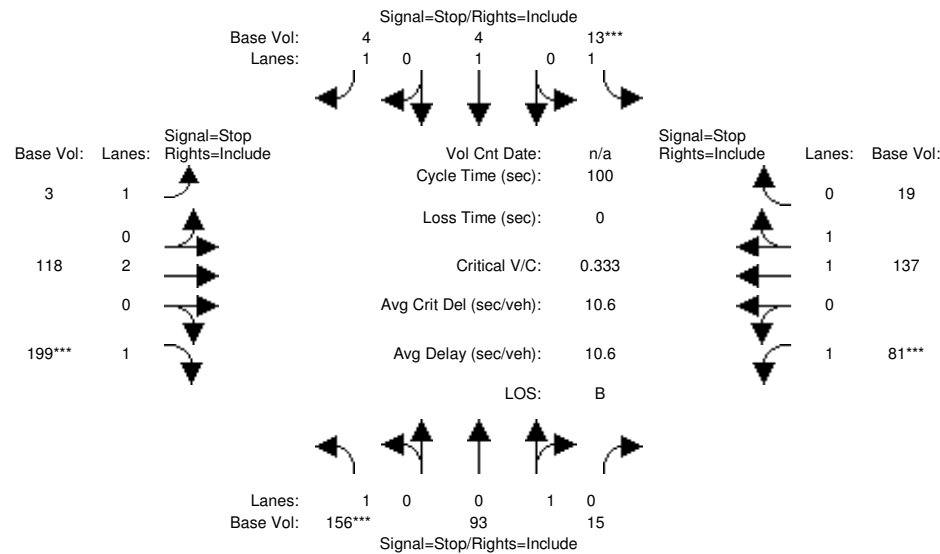
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations				↖	↖	↖		↕		↖	↕	↖
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)				4.0	4.0	4.0		4.0		4.0	4.0	4.0
Lane Util. Factor				0.95	0.95	1.00		0.95		1.00	0.95	1.00
Frt				1.00	1.00	0.85		0.90		1.00	1.00	0.85
Flt Protected				0.95	1.00	1.00		1.00		0.95	1.00	1.00
Satd. Flow (prot)				1681	1770	1583		3192		1770	3539	1583
Flt Permitted				0.95	1.00	1.00		1.00		0.95	1.00	1.00
Satd. Flow (perm)				1681	1770	1583		3192		1770	3539	1583
Volume (vph)	0	0	0	89	140	68	0	161	303	17	91	164
Peak-hour factor, PHF	0.25	0.25	0.25	0.95	0.95	0.95	0.90	0.90	0.90	0.85	0.85	0.85
Adj. Flow (vph)	0	0	0	94	147	72	0	179	337	20	107	193
RTOR Reduction (vph)	0	0	0	0	0	0	0	108	0	0	0	48
Lane Group Flow (vph)	0	0	0	94	147	72	0	408	0	20	107	145
Turn Type				Prot		Free				Prot		Perm
Protected Phases				3	8			2		1	6	
Permitted Phases						Free						6
Actuated Green, G (s)				16.1	16.1	97.5		66.2		3.2	73.4	73.4
Effective Green, g (s)				16.1	16.1	97.5		66.2		3.2	73.4	73.4
Actuated g/C Ratio				0.17	0.17	1.00		0.68		0.03	0.75	0.75
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)				278	292	1583		2167		58	2664	1192
v/s Ratio Prot				0.06	c0.08			c0.13		c0.01	0.03	
v/s Ratio Perm						0.05						0.09
v/c Ratio				0.34	0.50	0.05		0.19		0.34	0.04	0.12
Uniform Delay, d1				36.0	37.1	0.0		5.8		46.1	3.1	3.3
Progression Factor				1.00	0.99	1.00		1.00		1.00	1.00	1.00
Incremental Delay, d2				0.7	1.4	0.1		0.2		3.6	0.0	0.2
Delay (s)				36.8	38.2	0.1		6.0		49.7	3.1	3.5
Level of Service				D	D	A		A		D	A	A
Approach Delay (s)		0.0			29.0			6.0			6.2	
Approach LOS		A			C			A			A	

Intersection Summary

HCM Average Control Delay	12.3	HCM Level of Service	B
HCM Volume to Capacity ratio	0.25		
Actuated Cycle Length (s)	97.5	Sum of lost time (s)	12.0
Intersection Capacity Utilization	28.3%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

Level Of Service Computation Report
 2000 HCM 4-Way Stop (Base Volume Alternative)
 Default Scenario

Intersection #1: Colony Rd / Hoff Rd / SR 99 NB Ramps - Ex AM



Approach:	North Bound			South Bound			East Bound			West Bound		
Movement:	L	T	R	L	T	R	L	T	R	L	T	R
Min. Green:	0	0	0	0	0	0	0	0	0	0	0	0
Volume Module:												
Base Vol:	156	93	15	13	4	4	3	118	199	81	137	19
Growth Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Initial Bse:	156	93	15	13	4	4	3	118	199	81	137	19
User Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PHF Adj:	0.95	0.95	0.95	0.65	0.65	0.65	0.95	0.95	0.95	0.85	0.85	0.85
PHF Volume:	164	98	16	20	6	6	3	124	209	95	161	22
Reduct Vol:	0	0	0	0	0	0	0	0	0	0	0	0
Reduced Vol:	164	98	16	20	6	6	3	124	209	95	161	22
PCE Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
MLF Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
FinalVolume:	164	98	16	20	6	6	3	124	209	95	161	22

Saturation Flow Module:	North Bound			South Bound			East Bound			West Bound		
Adjustment:	L	T	R	L	T	R	L	T	R	L	T	R
Adjustment:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Lanes:	1.00	0.86	0.14	1.00	1.00	1.00	1.00	2.00	1.00	1.00	1.76	0.24
Final Sat.:	522	491	79	448	477	526	517	1116	630	512	978	138

Capacity Analysis Module:	North Bound			South Bound			East Bound			West Bound		
Vol/Sat:	L	T	R	L	T	R	L	T	R	L	T	R
Vol/Sat:	0.31	0.20	0.20	0.04	0.01	0.01	0.01	0.11	0.33	0.19	0.16	0.16
Crit Moves:	****	****	****	****	****	****	****	****	****	****	****	****
Delay/Veh:	12.1	10.1	10.1	10.4	9.7	9.0	9.4	9.6	10.7	10.9	10.0	9.9
Delay Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
AdjDel/Veh:	12.1	10.1	10.1	10.4	9.7	9.0	9.4	9.6	10.7	10.9	10.0	9.9
LOS by Move:	B	B	B	B	A	A	A	A	B	B	B	A
ApproachDel:	11.3			10.0			10.3			10.3		
Delay Adj:	1.00			1.00			1.00			1.00		
ApprAdjDel:	11.3			10.0			10.3			10.3		
LOS by Appr:	B			B			B			B		
AllWayAvgQ:	0.4	0.2	0.2	0.0	0.0	0.0	0.0	0.1	0.4	0.2	0.2	0.2

Note: Queue reported is the number of cars per lane.
 Peak Hour Volume Signal Warrant Report [Urban]

 Intersection #1 Colony Rd / Hoff Rd / SR 99 NB Ramps - Ex AM

 Base Volume Alternative: Peak Hour Warrant NOT Met

Approach:	North Bound			South Bound			East Bound			West Bound						
Movement:	L	T	R	L	T	R	L	T	R	L	T	R				
Control:	Stop Sign	Stop Sign	Stop Sign	Stop Sign	Stop Sign	Stop Sign	Stop Sign	Stop Sign	Stop Sign	Stop Sign	Stop Sign	Stop Sign				
Lanes:	1	0	0	1	0	1	1	0	2	0	1	1	0	1	1	0
Initial Vol:	156	93	15	13	4	4	3	118	199	81	137	19				
Major Street Volume:							557									
Minor Approach Volume:							264									
Minor Approach Volume Threshold:							626									

SIGNAL WARRANT DISCLAIMER
 This peak hour signal warrant analysis should be considered solely as an "indicator" of the likelihood of an unsignalized intersection warranting a traffic signal in the future. Intersections that exceed this warrant are probably more likely to meet one or more of the other volume based signal warrant (such as the 4-hour or 8-hour warrants).

The peak hour warrant analysis in this report is not intended to replace a rigorous and complete traffic signal warrant analysis by the responsible jurisdiction. Consideration of the other signal warrants, which is beyond the scope of this software, may yield different results.

HCM Signalized Intersection Capacity Analysis

24: SR 99 SB & Jack Tone Rd

11/6/2009



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	
Lane Util. Factor	0.95	0.95	1.00					0.95			0.95	
Frt	1.00	1.00	0.85					0.95			1.00	
Flt Protected	0.95	0.95	1.00					1.00			1.00	
Satd. Flow (prot)	1681	1688	1583					3363			3538	
Flt Permitted	0.95	0.95	1.00					1.00			0.95	
Satd. Flow (perm)	1681	1688	1583					3363			3376	
Volume (vph)	177	3	132	0	0	0	0	287	143	1	179	0
Peak-hour factor, PHF	1.00	1.00	1.00	0.25	0.25	0.25	0.85	0.85	0.85	0.90	0.90	0.90
Adj. Flow (vph)	177	3	132	0	0	0	0	338	168	1	199	0
RTOR Reduction (vph)	0	0	106	0	0	0	0	61	0	0	0	0
Lane Group Flow (vph)	89	91	26	0	0	0	0	445	0	0	200	0
Turn Type	Split		Perm					Perm				
Protected Phases	4	4						2			6	
Permitted Phases			4							6		
Actuated Green, G (s)	9.6	9.6	9.6					30.9			30.9	
Effective Green, g (s)	9.6	9.6	9.6					30.9			30.9	
Actuated g/C Ratio	0.20	0.20	0.20					0.64			0.64	
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)	333	334	313					2143			2151	
v/s Ratio Prot	0.05	c0.05						c0.13				
v/s Ratio Perm			0.02								0.06	
v/c Ratio	0.27	0.27	0.08					0.21			0.09	
Uniform Delay, d1	16.5	16.5	15.9					3.7			3.4	
Progression Factor	1.00	1.00	1.00					1.00			1.00	
Incremental Delay, d2	0.4	0.4	0.1					0.2			0.1	
Delay (s)	16.9	16.9	16.0					3.9			3.5	
Level of Service	B	B	B					A			A	
Approach Delay (s)		16.5			0.0			3.9			3.5	
Approach LOS		B			A			A			A	

Intersection Summary

HCM Average Control Delay	7.7	HCM Level of Service	A
HCM Volume to Capacity ratio	0.22		
Actuated Cycle Length (s)	48.5	Sum of lost time (s)	8.0
Intersection Capacity Utilization	24.2%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

HCM Unsignalized Intersection Capacity Analysis
 25: Ripon Rd & Austin Rd.

11/6/2009



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Sign Control		Stop			Stop			Stop			Stop	
Volume (vph)	4	118	2	12	113	93	3	19	22	26	13	12
Peak Hour Factor	0.75	0.75	0.75	0.80	0.80	0.80	0.70	0.70	0.70	0.85	0.85	0.85
Hourly flow rate (vph)	5	157	3	15	141	116	4	27	31	31	15	14























Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total (vph)	165	273	63	60
Volume Left (vph)	5	15	4	31
Volume Right (vph)	3	116	31	14
Hadj (s)	0.03	-0.21	-0.25	-0.01
Departure Headway (s)	4.5	4.2	4.7	5.0
Degree Utilization, x	0.21	0.32	0.08	0.08
Capacity (veh/h)	764	825	692	655
Control Delay (s)	8.7	9.1	8.1	8.4
Approach Delay (s)	8.7	9.1	8.1	8.4
Approach LOS	A	A	A	A

Intersection Summary			
Delay		8.8	
HCM Level of Service		A	
Intersection Capacity Utilization	33.3%	ICU Level of Service	A
Analysis Period (min)		15	

HCM Signalized Intersection Capacity Analysis

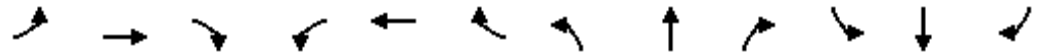
26: Ripon Rd & Jack Tone Rd

11/6/2009

												
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	0.95		1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Frt	1.00	0.99		1.00	1.00	0.85	1.00	0.94		1.00	0.90	
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770	3511		1770	1863	1583	1770	1760		1770	1685	
Flt Permitted	0.95	1.00		0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (perm)	1770	3511		1770	1863	1583	1770	1760		1770	1685	
Volume (vph)	130	171	10	48	156	104	28	113	66	85	56	99
Peak-hour factor, PHF	0.75	0.75	0.75	0.80	0.80	0.80	0.70	0.70	0.70	0.85	0.85	0.85
Adj. Flow (vph)	173	228	13	60	195	130	40	161	94	100	66	116
RTOR Reduction (vph)	0	4	0	0	0	108	0	15	0	0	45	0
Lane Group Flow (vph)	173	237	0	60	195	22	40	240	0	100	137	0
Turn Type	Prot			Prot		Perm	Prot			Prot		
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases	8											
Actuated Green, G (s)	11.1	20.3		5.2	14.4	14.4	4.6	35.0		8.3	38.7	
Effective Green, g (s)	11.1	20.3		5.2	14.4	14.4	4.6	35.0		8.3	38.7	
Actuated g/C Ratio	0.13	0.24		0.06	0.17	0.17	0.05	0.41		0.10	0.46	
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)	232	840		109	316	269	96	726		173	769	
v/s Ratio Prot	c0.10	0.07		0.03	c0.10		0.02	c0.14		c0.06	c0.08	
v/s Ratio Perm	0.01											
v/c Ratio	0.75	0.28		0.55	0.62	0.08	0.42	0.33		0.58	0.18	
Uniform Delay, d1	35.5	26.3		38.7	32.6	29.6	38.8	16.9		36.6	13.6	
Progression Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Incremental Delay, d2	12.2	0.2		5.9	3.6	0.1	2.9	1.2		4.6	0.5	
Delay (s)	47.7	26.5		44.6	36.2	29.8	41.7	18.1		41.2	14.1	
Level of Service	D	C		D	D	C	D	B		D	B	
Approach Delay (s)	35.4			35.3			21.3			23.7		
Approach LOS	D			D			C			C		
Intersection Summary												
HCM Average Control Delay	30.0			HCM Level of Service		C						
HCM Volume to Capacity ratio	0.50											
Actuated Cycle Length (s)	84.8			Sum of lost time (s)		20.0						
Intersection Capacity Utilization	43.4%			ICU Level of Service		A						
Analysis Period (min)	15											
c Critical Lane Group												

HCM Signalized Intersection Capacity Analysis
 1: SR 120 WB Ramp & Main Street

11/6/2009



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	1.00	1.00	1.00			1.00	1.00
Frbp, ped/bikes					1.00	0.99	1.00	1.00			1.00	0.98
Flpb, ped/bikes					1.00	1.00	1.00	1.00			1.00	1.00
Frt					1.00	0.85	1.00	1.00			1.00	0.85
Flt Protected					0.95	1.00	0.95	1.00			1.00	1.00
Satd. Flow (prot)					1736	1504	1736	1792			1792	1491
Flt Permitted					0.95	1.00	0.95	1.00			1.00	1.00
Satd. Flow (perm)					1736	1504	1736	1792			1792	1491
Volume (vph)	0	0	0	37	0	249	66	718	0	0	472	388
Peak-hour factor, PHF	0.25	0.25	0.25	0.95	0.95	0.95	0.90	0.90	0.90	0.95	0.95	0.95
Adj. Flow (vph)	0	0	0	39	0	262	73	798	0	0	497	408
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	0	0	231
Lane Group Flow (vph)	0	0	0	0	39	262	73	798	0	0	497	177
Confl. Peds. (#/hr)			2			2			2			2
Heavy Vehicles (%)	2%	2%	2%	4%	2%	6%	4%	6%	2%	2%	6%	6%
Turn Type				Split		Free	Prot					Perm
Protected Phases				8	8		5	2			6	
Permitted Phases						Free						6
Actuated Green, G (s)					8.0	51.0	8.9	35.0			22.1	22.1
Effective Green, g (s)					8.0	51.0	8.9	35.0			22.1	22.1
Actuated g/C Ratio					0.16	1.00	0.17	0.69			0.43	0.43
Clearance Time (s)					4.0		4.0	4.0			4.0	4.0
Vehicle Extension (s)					4.0		4.0	4.0			4.0	4.0
Lane Grp Cap (vph)					272	1504	303	1230			777	646
v/s Ratio Prot					0.02		0.04	c0.45			0.28	
v/s Ratio Perm						c0.17						0.12
v/c Ratio					0.14	0.17	0.24	0.65			0.64	0.27
Uniform Delay, d1					18.5	0.0	18.1	4.5			11.3	9.3
Progression Factor					1.00	1.00	1.00	1.00			1.00	1.00
Incremental Delay, d2					0.3	0.3	0.6	1.3			2.0	0.3
Delay (s)					18.9	0.3	18.7	5.9			13.3	9.6
Level of Service					B	A	B	A			B	A
Approach Delay (s)		0.0			2.7			6.9			11.6	
Approach LOS		A			A			A			B	

Intersection Summary

HCM Average Control Delay	8.4	HCM Level of Service	A
HCM Volume to Capacity ratio	0.53		
Actuated Cycle Length (s)	51.0	Sum of lost time (s)	4.0
Intersection Capacity Utilization	65.1%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis

2: SR 120 EB Ramps & Main Street


















11/6/2009



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	1.00					1.00	1.00	1.00	1.00	
Frbp, ped/bikes		1.00	0.98					1.00	0.98	1.00	1.00	
Flpb, ped/bikes		1.00	1.00					1.00	1.00	1.00	1.00	
Frt		1.00	0.85					1.00	0.85	1.00	1.00	
Flt Protected		0.95	1.00					1.00	1.00	0.95	1.00	
Satd. Flow (prot)		1703	1518					1827	1515	1703	1827	
Flt Permitted		0.95	1.00					1.00	1.00	0.95	1.00	
Satd. Flow (perm)		1703	1518					1827	1515	1703	1827	
Volume (vph)	420	0	183	0	0	0	0	364	27	228	281	0
Peak-hour factor, PHF	0.80	0.80	0.80	0.25	0.25	0.25	0.90	0.90	0.90	0.95	0.95	0.95
Adj. Flow (vph)	525	0	229	0	0	0	0	404	30	240	296	0
RTOR Reduction (vph)	0	0	141	0	0	0	0	0	5	0	0	0
Lane Group Flow (vph)	0	525	88	0	0	0	0	404	25	240	296	0
Confl. Peds. (#/hr)			2				2		2			2
Heavy Vehicles (%)	6%	2%	4%	2%	2%	2%	2%	4%	4%	6%	4%	2%
Turn Type	Split		Perm						Perm	Prot		
Protected Phases	4	4						2		1	6	
Permitted Phases			4						2			
Actuated Green, G (s)		30.6	30.6					23.8	23.8	13.4	41.2	
Effective Green, g (s)		30.6	30.6					23.8	23.8	13.4	41.2	
Actuated g/C Ratio		0.38	0.38					0.30	0.30	0.17	0.52	
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)		653	582					545	452	286	943	
v/s Ratio Prot		c0.31						c0.22		c0.14	0.16	
v/s Ratio Perm			0.06						0.02			
v/c Ratio		0.80	0.15					0.74	0.06	0.84	0.31	
Uniform Delay, d1		21.9	16.1					25.2	20.0	32.2	11.1	
Progression Factor		1.00	1.00					1.00	1.00	1.00	1.00	
Incremental Delay, d2		7.1	0.1					5.4	0.1	18.9	0.2	
Delay (s)		29.0	16.2					30.6	20.0	51.1	11.3	
Level of Service		C	B					C	C	D	B	
Approach Delay (s)		25.1			0.0			29.9			29.1	
Approach LOS		C			A			C			C	
Intersection Summary												
HCM Average Control Delay			27.6									HCM Level of Service C
HCM Volume to Capacity ratio			0.79									
Actuated Cycle Length (s)			79.8									Sum of lost time (s) 12.0
Intersection Capacity Utilization			65.1%									ICU Level of Service C
Analysis Period (min)			15									
c Critical Lane Group												

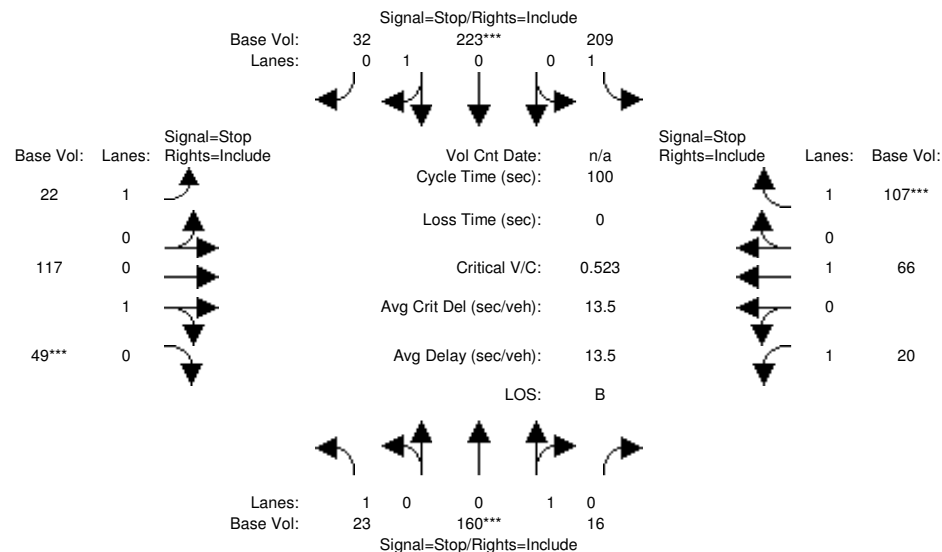
HCM Unsignalized Intersection Capacity Analysis
 3: Atherton Drive & Main Street

11/6/2009

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control	Stop			Stop				Stop			Stop	
Volume (vph)	92	0	33	0	0	0	15	299	0	0	379	85
Peak Hour Factor	0.25	0.25	0.25	0.25	0.25	0.25	0.90	0.90	0.90	0.85	0.85	0.85
Hourly flow rate (vph)	368	0	132	0	0	0	17	332	0	0	446	100
Direction, Lane #	EB 1	EB 2	NB 1	SB 1	SB 2							
Volume Total (vph)	368	132	349	446	100							
Volume Left (vph)	368	0	17	0	0							
Volume Right (vph)	0	132	0	0	100							
Hadj (s)	0.53	-0.67	0.04	0.03	-0.67							
Departure Headway (s)	7.8	6.5	7.2	7.1	6.3							
Degree Utilization, x	0.79	0.24	0.70	0.87	0.18							
Capacity (veh/h)	450	533	482	500	550							
Control Delay (s)	33.2	10.4	25.6	40.3	9.5							
Approach Delay (s)	27.2		25.6	34.6								
Approach LOS	D		D	D								
Intersection Summary												
Delay			29.7									
HCM Level of Service			D									
Intersection Capacity Utilization			39.7%		ICU Level of Service	A						
Analysis Period (min)			15									

Level Of Service Computation Report
 2000 HCM 4-Way Stop (Base Volume Alternative)
 Default Scenario

Intersection #2: Woodward Ave / Main Street Ex PM



Approach:	North Bound			South Bound			East Bound			West Bound		
Movement:	L	T	R	L	T	R	L	T	R	L	T	R
Min. Green:	0	0	0	0	0	0	0	0	0	0	0	0
Volume Module:												
Base Vol:	23	160	16	209	223	32	22	117	49	20	66	107
Growth Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Initial Bse:	23	160	16	209	223	32	22	117	49	20	66	107
User Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PHF Adj:	0.85	0.85	0.85	0.85	0.85	0.85	0.95	0.95	0.95	0.85	0.85	0.85
PHF Volume:	27	188	19	246	262	38	23	123	52	24	78	126
Reduct Vol:	0	0	0	0	0	0	0	0	0	0	0	0
Reduced Vol:	27	188	19	246	262	38	23	123	52	24	78	126
PCE Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
MLF Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Final Volume:	27	188	19	246	262	38	23	123	52	24	78	126

Saturation Flow Module:	North Bound			South Bound			East Bound			West Bound		
Adjustment:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Lanes:	1.00	0.91	0.09	1.00	0.87	0.13	1.00	0.70	0.30	1.00	1.00	1.00
Final Sat.:	479	476	48	523	502	72	453	352	148	429	458	504

Capacity Analysis Module:	North Bound			South Bound			East Bound			West Bound		
Vol/Sat:	0.06	0.40	0.40	0.47	0.52	0.52	0.05	0.35	0.35	0.05	0.17	0.25
Crit Moves:	****			****			****			****		
Delay/Veh:	10.2	13.2	13.2	14.9	15.0	15.0	10.6	12.8	12.8	11.0	11.4	11.4
Delay Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
AdjDel/Veh:	10.2	13.2	13.2	14.9	15.0	15.0	10.6	12.8	12.8	11.0	11.4	11.4
LOS by Move:	B	B	B	B	C	C	B	B	B	B	B	B
ApproachDel:	12.9			15.0			12.5			11.3		
Delay Adj:	1.00			1.00			1.00			1.00		
ApprAdjDel:	12.9			15.0			12.5			11.3		
LOS by Appr:	B			B			B			B		
AllWayAvgQ:	0.1	0.6	0.6	0.8	1.0	1.0	0.0	0.5	0.5	0.1	0.2	0.3

Note: Queue reported is the number of cars per lane.
 Peak Hour Volume Signal Warrant Report [Urban]

 Intersection #2 Woodward Ave / Main Street Ex PM

 Base Volume Alternative: Peak Hour Warrant NOT Met

Approach:	North Bound			South Bound			East Bound			West Bound		
Movement:	L	T	R	L	T	R	L	T	R	L	T	R
Control:	Stop Sign			Stop Sign			Stop Sign			Stop Sign		
Lanes:	1	0	0	1	0	0	1	0	0	1	0	1
Initial Vol:	23	160	16	209	223	32	22	117	49	20	66	107
Major Street Volume:	663											
Minor Approach Volume:	193											
Minor Approach Volume Threshold:	551											

SIGNAL WARRANT DISCLAIMER
 This peak hour signal warrant analysis should be considered solely as an "indicator" of the likelihood of an unsignalized intersection warranting a traffic signal in the future. Intersections that exceed this warrant are probably more likely to meet one or more of the other volume based signal warrant (such as the 4-hour or 8-hour warrants).

The peak hour warrant analysis in this report is not intended to replace a rigorous and complete traffic signal warrant analysis by the responsible jurisdiction. Consideration of the other signal warrants, which is beyond the scope of this software, may yield different results.

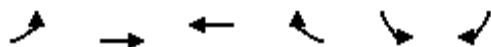
HCM Unsignalized Intersection Capacity Analysis
 5: Industrial Park Dr & VanRyn (Spreckles)

11/6/2009

	→	↘	↙	←	↖	↗	
Movement	EBT	EBR	WBL	WBT	NBL	NBR	
Lane Configurations	↑	↗	↙	↑↑	↖	↗	
Sign Control	Free			Free	Stop		
Grade	0%			0%	0%		
Volume (veh/h)	281	29	128	191	29	113	
Peak Hour Factor	0.95	0.95	0.95	0.95	0.85	0.85	
Hourly flow rate (vph)	296	31	135	201	34	133	
Pedestrians							
Lane Width (ft)							
Walking Speed (ft/s)							
Percent Blockage							
Right turn flare (veh)							
Median type	None						
Median storage (veh)							
Upstream signal (ft)	225						
pX, platoon unblocked							
vC, conflicting volume			326		666	296	
vC1, stage 1 conf vol							
vC2, stage 2 conf vol							
vCu, unblocked vol			326		666	296	
tC, single (s)			4.1		6.8	6.9	
tC, 2 stage (s)							
tF (s)			2.2		3.5	3.3	
p0 queue free %			89		90	81	
cM capacity (veh/h)			1230		350	701	
Direction, Lane #	EB 1	EB 2	WB 1	WB 2	WB 3	NB 1	NB 2
Volume Total	296	31	135	101	101	34	133
Volume Left	0	0	135	0	0	34	0
Volume Right	0	31	0	0	0	0	133
cSH	1700	1700	1230	1700	1700	350	701
Volume to Capacity	0.17	0.02	0.11	0.06	0.06	0.10	0.19
Queue Length 95th (ft)	0	0	9	0	0	8	17
Control Delay (s)	0.0	0.0	8.3	0.0	0.0	16.4	11.3
Lane LOS			A			C	B
Approach Delay (s)	0.0		3.3			12.4	
Approach LOS						B	
Intersection Summary							
Average Delay			3.8				
Intersection Capacity Utilization			35.2%	ICU Level of Service		A	
Analysis Period (min)			15				

HCM Unsignalized Intersection Capacity Analysis
6: Woodward Avenue & VanRyn (Spreckles)

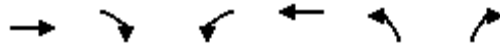
11/6/2009



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations	↶	↷	↷↶		↶	↷
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Volume (veh/h)	101	116	102	17	20	101
Peak Hour Factor	0.80	0.80	0.80	0.80	0.80	0.80
Hourly flow rate (vph)	126	145	128	21	25	126
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type					TWLTL	
Median storage veh					1	
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	149				536	74
vC1, stage 1 conf vol					138	
vC2, stage 2 conf vol					398	
vCu, unblocked vol	149				536	74
tC, single (s)	4.1				6.8	6.9
tC, 2 stage (s)					5.8	
tF (s)	2.2				3.5	3.3
p0 queue free %	91				95	87
cM capacity (veh/h)	1430				501	972
Direction, Lane #	EB 1	EB 2	WB 1	WB 2	SB 1	SB 2
Volume Total	126	145	85	64	25	126
Volume Left	126	0	0	0	25	0
Volume Right	0	0	0	21	0	126
cSH	1430	1700	1700	1700	501	972
Volume to Capacity	0.09	0.09	0.05	0.04	0.05	0.13
Queue Length 95th (ft)	7	0	0	0	4	11
Control Delay (s)	7.8	0.0	0.0	0.0	12.6	9.3
Lane LOS	A				B	A
Approach Delay (s)	3.6		0.0		9.8	
Approach LOS					A	
Intersection Summary						
Average Delay			4.3			
Intersection Capacity Utilization			22.3%		ICU Level of Service	A
Analysis Period (min)			15			

HCM Unsignalized Intersection Capacity Analysis
7: Woodward Avenue & Pillsbury Road

11/6/2009



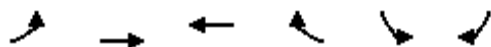
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↻		↻	↻↻	↻↻	
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Volume (veh/h)	119	17	18	112	7	14
Peak Hour Factor	0.90	0.90	0.70	0.70	0.65	0.65
Hourly flow rate (vph)	132	19	26	160	11	22
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				TWLTL		
Median storage veh					1	
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume			151		273	142
vC1, stage 1 conf vol					142	
vC2, stage 2 conf vol					131	
vCu, unblocked vol			151		273	142
tC, single (s)			4.1		6.8	6.9
tC, 2 stage (s)					5.8	
tF (s)			2.2		3.5	3.3
p0 queue free %			98		98	98
cM capacity (veh/h)			1427		707	880

Direction, Lane #	EB 1	WB 1	WB 2	WB 3	NB 1
Volume Total	151	26	80	80	32
Volume Left	0	26	0	0	11
Volume Right	19	0	0	0	22
cSH	1700	1427	1700	1700	814
Volume to Capacity	0.09	0.02	0.05	0.05	0.04
Queue Length 95th (ft)	0	1	0	0	3
Control Delay (s)	0.0	7.6	0.0	0.0	9.6
Lane LOS		A			A
Approach Delay (s)	0.0	1.0			9.6
Approach LOS					A

Intersection Summary					
Average Delay			1.4		
Intersection Capacity Utilization		24.0%		ICU Level of Service	A
Analysis Period (min)			15		

HCM Unsignalized Intersection Capacity Analysis
 8: Woodward Avenue & Atherton Dr.

11/6/2009



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations	↖	↑	↗		↙	↘
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Volume (veh/h)	3	130	129	19	15	1
Peak Hour Factor	0.90	0.90	0.85	0.85	0.80	0.80
Hourly flow rate (vph)	3	144	152	22	19	1
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				TWLTL		
Median storage veh				1		
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	174				314	163
vC1, stage 1 conf vol					163	
vC2, stage 2 conf vol					151	
vCu, unblocked vol	174				314	163
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)					5.4	
tF (s)	2.2				3.5	3.3
p0 queue free %	100				97	100
cM capacity (veh/h)	1402				706	882

Direction, Lane #	EB 1	EB 2	WB 1	SB 1	SB 2
Volume Total	3	144	174	19	1
Volume Left	3	0	0	19	0
Volume Right	0	0	22	0	1
cSH	1402	1700	1700	706	882
Volume to Capacity	0.00	0.08	0.10	0.03	0.00
Queue Length 95th (ft)	0	0	0	2	0
Control Delay (s)	7.6	0.0	0.0	10.2	9.1
Lane LOS	A			B	A
Approach Delay (s)	0.2		0.0	10.2	
Approach LOS				B	

Intersection Summary					
Average Delay			0.7		
Intersection Capacity Utilization		17.9%		ICU Level of Service	A
Analysis Period (min)		15			

HCM Unsignalized Intersection Capacity Analysis
 9: Woodward Avenue & Moffat Blvd.

11/6/2009












Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Volume (veh/h)	12	133	116	189	308	32
Peak Hour Factor	0.70	0.70	0.90	0.90	0.75	0.75
Hourly flow rate (vph)	17	190	129	210	411	43
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	900	432	453			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	900	432	453			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	94	70	88			
cM capacity (veh/h)	273	624	1107			

Direction, Lane #	EB 1	NB 1	NB 2	SB 1
Volume Total	207	129	210	453
Volume Left	17	129	0	0
Volume Right	190	0	0	43
cSH	564	1107	1700	1700
Volume to Capacity	0.37	0.12	0.12	0.27
Queue Length 95th (ft)	42	10	0	0
Control Delay (s)	15.0	8.7	0.0	0.0
Lane LOS	C	A		
Approach Delay (s)	15.0	3.3		0.0
Approach LOS	C			

Intersection Summary			
Average Delay		4.2	
Intersection Capacity Utilization	43.5%		ICU Level of Service A
Analysis Period (min)		15	

HCM Unsignalized Intersection Capacity Analysis
 10: SR 99 SB & Moffat Blvd.

11/6/2009

						
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Volume (veh/h)	47	41	264	0	0	442
Peak Hour Factor	0.85	0.85	1.00	1.00	0.90	0.90
Hourly flow rate (vph)	55	48	264	0	0	491
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	755	264			264	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	755	264			264	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	85	94			100	
cM capacity (veh/h)	372	767			1300	
Direction, Lane #	WB 1	NB 1	SB 1			
Volume Total	104	264	491			
Volume Left	55	0	0			
Volume Right	48	0	0			
cSH	490	1700	1700			
Volume to Capacity	0.21	0.16	0.29			
Queue Length 95th (ft)	20	0	0			
Control Delay (s)	14.3	0.0	0.0			
Lane LOS	B					
Approach Delay (s)	14.3	0.0	0.0			
Approach LOS	B					
Intersection Summary						
Average Delay			1.7			
Intersection Capacity Utilization			35.0%	ICU Level of Service	A	
Analysis Period (min)			15			

HCM Unsignalized Intersection Capacity Analysis
 11: Graves Rd. & Austin Rd.

11/6/2009



Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Sign Control	Stop		Free		Free	
Grade	0%		0%		0%	
Volume (veh/h)	6	23	128	26	25	152
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	7	25	139	28	27	165
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	373	153			167	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	373	153			167	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	99	97			98	
cM capacity (veh/h)	616	893			1410	

Direction, Lane #	WB 1	NB 1	SB 1
Volume Total	32	167	192
Volume Left	7	0	27
Volume Right	25	28	0
cSH	817	1700	1410
Volume to Capacity	0.04	0.10	0.02
Queue Length 95th (ft)	3	0	1
Control Delay (s)	9.6	0.0	1.2
Lane LOS	A		A
Approach Delay (s)	9.6	0.0	1.2
Approach LOS	A		

Intersection Summary			
Average Delay		1.4	
Intersection Capacity Utilization	31.0%	ICU Level of Service	A
Analysis Period (min)		15	

HCM Unsignalized Intersection Capacity Analysis
 12: SR 99 NB & Austin Rd.

11/6/2009




















Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations					↖	↗		↖			↗	
Sign Control	Stop			Stop			Stop			Stop		
Volume (vph)	0	0	0	198	3	51	80	103	0	0	122	36
Peak Hour Factor	0.25	0.25	0.25	0.90	0.90	0.90	0.85	0.85	0.85	0.75	0.75	0.75
Hourly flow rate (vph)	0	0	0	220	3	57	94	121	0	0	163	48

Direction, Lane #	WB 1	WB 2	NB 1	SB 1
Volume Total (vph)	223	57	215	211
Volume Left (vph)	220	0	94	0
Volume Right (vph)	0	57	0	48
Hadj (s)	0.58	-0.61	0.14	-0.05
Departure Headway (s)	6.2	5.0	5.2	5.0
Degree Utilization, x	0.38	0.08	0.31	0.29
Capacity (veh/h)	555	682	664	683
Control Delay (s)	11.7	7.2	10.4	10.0
Approach Delay (s)	10.8		10.4	10.0
Approach LOS	B		B	B

Intersection Summary			
Delay		10.5	
HCM Level of Service		B	
Intersection Capacity Utilization	39.6%	ICU Level of Service	A
Analysis Period (min)		15	

HCM Unsignalized Intersection Capacity Analysis
 13: Moffat Blvd. & Austin Rd.

11/6/2009

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Volume (vph)	127	292	70	1	0	2	44	54	17	61	39	220
Peak Hour Factor	0.90	0.90	0.90	0.25	0.25	0.25	0.85	0.85	0.85	0.85	0.85	0.85
Hourly flow rate (vph)	141	324	78	4	0	8	52	64	20	72	46	259
Direction, Lane #	EB 1	WB 1	NB 1	NB 2	SB 1							
Volume Total (vph)	543	12	115	20	376							
Volume Left (vph)	141	4	52	0	72							
Volume Right (vph)	78	8	0	20	259							
Hadj (s)	0.04	-0.30	0.12	-0.57	-0.30							
Departure Headway (s)	5.4	6.0	6.3	3.2	5.4							
Degree Utilization, x	0.81	0.02	0.20	0.02	0.57							
Capacity (veh/h)	654	517	524	1121	623							
Control Delay (s)	27.2	9.1	10.9	6.3	15.3							
Approach Delay (s)	27.2	9.1	10.2		15.3							
Approach LOS	D	A	B		C							
Intersection Summary												
Delay			20.6									
HCM Level of Service			C									
Intersection Capacity Utilization			64.7%	ICU Level of Service	C							
Analysis Period (min)			15									

HCM Signalized Intersection Capacity Analysis

14: Yosemite Avenue & Austin Rd.

11/6/2009

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	0.95		1.00	1.00		1.00	1.00	
Frt	1.00	1.00	0.85	1.00	0.99		1.00	0.94		1.00	0.93	
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770	1863	1583	1770	3507		1770	1748		1770	1723	
Flt Permitted	0.95	1.00	1.00	0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (perm)	1770	1863	1583	1770	3507		1770	1748		1770	1723	
Volume (vph)	49	501	77	34	332	21	57	50	35	22	35	35
Peak-hour factor, PHF	0.90	0.90	0.90	0.85	0.85	0.85	0.90	0.90	0.90	0.80	0.80	0.80
Adj. Flow (vph)	54	557	86	40	391	25	63	56	39	28	44	44
RTOR Reduction (vph)	0	0	59	0	8	0	0	26	0	0	30	0
Lane Group Flow (vph)	54	557	27	40	408	0	63	69	0	28	58	0
Turn Type	Prot		Perm	Prot			Prot			Prot		
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases			4									
Actuated Green, G (s)	3.1	17.6	17.6	2.0	16.5		3.1	18.4		2.0	17.3	
Effective Green, g (s)	3.1	17.6	17.6	2.0	16.5		3.1	18.4		2.0	17.3	
Actuated g/C Ratio	0.06	0.31	0.31	0.04	0.29		0.06	0.33		0.04	0.31	
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)	98	586	498	63	1033		98	574		63	532	
v/s Ratio Prot	c0.03	c0.30		0.02	0.12		c0.04	c0.04		0.02	0.03	
v/s Ratio Perm			0.02									
v/c Ratio	0.55	0.95	0.05	0.63	0.40		0.64	0.12		0.44	0.11	
Uniform Delay, d1	25.8	18.8	13.4	26.6	15.8		25.9	13.1		26.5	13.8	
Progression Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	6.6	25.4	0.0	19.1	0.3		13.5	0.4		4.9	0.4	
Delay (s)	32.3	44.1	13.4	45.7	16.0		39.4	13.6		31.4	14.2	
Level of Service	C	D	B	D	B		D	B		C	B	
Approach Delay (s)		39.4			18.6			23.9			18.4	
Approach LOS		D			B			C			B	
Intersection Summary												
HCM Average Control Delay			29.4			HCM Level of Service				C		
HCM Volume to Capacity ratio			0.47									
Actuated Cycle Length (s)			56.0			Sum of lost time (s)				8.0		
Intersection Capacity Utilization			49.5%			ICU Level of Service				A		
Analysis Period (min)			15									
c Critical Lane Group												

HCM Signalized Intersection Capacity Analysis
 15: Yosemite Avenue & Jack Tone Rd

11/6/2009



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	1.00	0.95		1.00	0.95		1.00	1.00		1.00	1.00	
Frt	1.00	0.98		1.00	0.99		1.00	0.96		1.00	0.98	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770	3486		1770	3491		1770	1795		1770	1823	
Flt Permitted	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (perm)	1770	3486		1770	3491		1770	1795		1770	1823	
Volume (vph)	48	433	49	33	236	24	33	120	38	41	164	27
Peak-hour factor, PHF	0.90	0.90	0.90	0.95	0.95	0.95	0.75	0.75	0.75	0.90	0.90	0.90
Adj. Flow (vph)	53	481	54	35	248	25	44	160	51	46	182	30
RTOR Reduction (vph)	0	7	0	0	6	0	0	10	0	0	5	0
Lane Group Flow (vph)	53	528	0	35	267	0	44	201	0	46	207	0
Turn Type	Prot		Prot		Prot		Prot		Prot			
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases												
Actuated Green, G (s)	2.2	13.0		2.0	12.8		2.1	11.3		2.1	11.3	
Effective Green, g (s)	2.2	13.0		2.0	12.8		2.1	11.3		2.1	11.3	
Actuated g/C Ratio	0.05	0.29		0.05	0.29		0.05	0.25		0.05	0.25	
Clearance Time (s)	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	
Lane Grp Cap (vph)	88	1021		80	1006		84	457		84	464	
v/s Ratio Prot	c0.03	c0.15		0.02	0.08		0.02	0.11		c0.03	c0.11	
v/s Ratio Perm												
v/c Ratio	0.60	0.52		0.44	0.27		0.52	0.44		0.55	0.45	
Uniform Delay, d1	20.7	13.1		20.7	12.2		20.7	13.9		20.7	13.9	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	11.1	0.4		3.8	0.1		5.8	0.7		7.1	0.7	
Delay (s)	31.8	13.5		24.4	12.3		26.4	14.6		27.8	14.6	
Level of Service	C	B		C	B		C	B		C	B	
Approach Delay (s)		15.2			13.7			16.6			17.0	
Approach LOS		B			B			B			B	

Intersection Summary

HCM Average Control Delay	15.4	HCM Level of Service	B
HCM Volume to Capacity ratio	0.44		
Actuated Cycle Length (s)	44.4	Sum of lost time (s)	12.0
Intersection Capacity Utilization	43.8%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

HCM Unsignalized Intersection Capacity Analysis
 16: Graves Rd. & Jack Tone Rd

11/6/2009



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Volume (veh/h)	26	25	23	165	240	6
Peak Hour Factor	0.60	0.60	0.90	0.90	1.00	1.00
Hourly flow rate (vph)	43	42	26	183	240	6
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	477	243	246			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	477	243	246			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	92	95	98			
cM capacity (veh/h)	536	796	1320			
Direction, Lane #	EB 1	NB 1	SB 1			
Volume Total	85	209	246			
Volume Left	43	26	0			
Volume Right	42	0	6			
cSH	638	1320	1700			
Volume to Capacity	0.13	0.02	0.14			
Queue Length 95th (ft)	11	1	0			
Control Delay (s)	11.5	1.1	0.0			
Lane LOS	B	A				
Approach Delay (s)	11.5	1.1	0.0			
Approach LOS	B					
Intersection Summary						
Average Delay			2.2			
Intersection Capacity Utilization		36.3%		ICU Level of Service		A
Analysis Period (min)			15			

HCM Unsignalized Intersection Capacity Analysis
 17: Sedan Ave & Main Street

11/6/2009



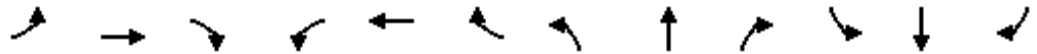
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Volume (veh/h)	2	5	1	2	4	5	0	94	2	3	120	1
Peak Hour Factor	0.50	0.50	0.50	0.70	0.70	0.70	0.85	0.85	0.85	0.80	0.80	0.80
Hourly flow rate (vph)	4	10	2	3	6	7	0	111	2	4	150	1
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	280	271	151	277	271	112	151			113		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	280	271	151	277	271	112	151			113		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	99	98	100	100	99	99	100			100		
cM capacity (veh/h)	661	634	896	665	634	941	1430			1476		

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	16	16	113	155
Volume Left	4	3	0	4
Volume Right	2	7	2	1
cSH	665	752	1430	1476
Volume to Capacity	0.02	0.02	0.00	0.00
Queue Length 95th (ft)	2	2	0	0
Control Delay (s)	10.5	9.9	0.0	0.2
Lane LOS	B	A		A
Approach Delay (s)	10.5	9.9	0.0	0.2
Approach LOS	B	A		

Intersection Summary			
Average Delay		1.2	
Intersection Capacity Utilization	18.8%	ICU Level of Service	A
Analysis Period (min)	15		

HCM Unsignalized Intersection Capacity Analysis
 18: Sedan Ave & Austin Rd.

11/6/2009



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Volume (veh/h)	24	0	2	0	0	1	0	109	0	1	106	14
Peak Hour Factor	0.55	0.55	0.55	0.25	0.25	0.25	0.60	0.60	0.60	0.95	0.95	0.95
Hourly flow rate (vph)	44	0	4	0	0	4	0	182	0	1	112	15
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	307	303	119	306	310	182	126			182		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	307	303	119	306	310	182	126			182		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	93	100	100	100	100	100	100			100		
cM capacity (veh/h)	642	610	933	643	604	861	1460			1394		

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	47	4	182	127
Volume Left	44	0	0	1
Volume Right	4	4	0	15
cSH	658	861	1460	1394
Volume to Capacity	0.07	0.00	0.00	0.00
Queue Length 95th (ft)	6	0	0	0
Control Delay (s)	10.9	9.2	0.0	0.1
Lane LOS	B	A		A
Approach Delay (s)	10.9	9.2	0.0	0.1
Approach LOS	B	A		

Intersection Summary			
Average Delay		1.6	
Intersection Capacity Utilization	22.0%	ICU Level of Service	A
Analysis Period (min)		15	

HCM Unsignalized Intersection Capacity Analysis
 19: W. River Rd & Jack Tone Rd

11/6/2009



Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations	↶	↷	↶		↶	↷
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Volume (veh/h)	66	27	161	114	32	233
Peak Hour Factor	0.75	0.75	0.90	0.90	0.85	0.85
Hourly flow rate (vph)	88	36	179	127	38	274
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	592	242			306	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	592	242			306	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	81	95			97	
cM capacity (veh/h)	455	797			1255	
Direction, Lane #	WB 1	WB 2	NB 1	SB 1	SB 2	
Volume Total	88	36	306	38	274	
Volume Left	88	0	0	38	0	
Volume Right	0	36	127	0	0	
cSH	455	797	1700	1255	1700	
Volume to Capacity	0.19	0.05	0.18	0.03	0.16	
Queue Length 95th (ft)	18	4	0	2	0	
Control Delay (s)	14.8	9.7	0.0	8.0	0.0	
Lane LOS	B	A		A		
Approach Delay (s)	13.3		0.0	1.0		
Approach LOS	B					
Intersection Summary						
Average Delay			2.6			
Intersection Capacity Utilization			32.4%		ICU Level of Service	A
Analysis Period (min)			15			

HCM Signalized Intersection Capacity Analysis

20: Santos Ave & Jack Tone Rd

11/6/2009



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		1.00	1.00	1.00	1.00	1.00	1.00		0.95	
Frt		0.90		1.00	1.00	0.85	1.00	1.00	0.85		0.99	
Flt Protected		0.99		0.95	1.00	1.00	0.95	1.00	1.00		1.00	
Satd. Flow (prot)		3158		1770	1863	1583	1770	1863	1583		3493	
Flt Permitted		0.99		0.95	1.00	1.00	0.95	1.00	1.00		1.00	
Satd. Flow (perm)		3158		1770	1863	1583	1770	1863	1583		3493	
Volume (vph)	35	16	93	45	33	58	102	182	21	13	264	22
Peak-hour factor, PHF	0.85	0.85	0.85	0.80	0.80	0.80	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	41	19	109	56	41	72	113	202	23	14	293	24
RTOR Reduction (vph)	0	100	0	0	0	65	0	0	14	0	6	0
Lane Group Flow (vph)	0	69	0	56	41	7	113	202	9	0	325	0
Turn Type	Split		Split		Perm		Split		Perm		Split	
Protected Phases	4	4	8		8		2		2		6	
Permitted Phases					8				2			
Actuated Green, G (s)	5.5		6.0		6.0		25.0		25.0		10.9	
Effective Green, g (s)	5.5		6.0		6.0		25.0		25.0		10.9	
Actuated g/C Ratio	0.09		0.09		0.09		0.39		0.39		0.17	
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)	274		168		176		150		698		601	
v/s Ratio Prot	c0.02		c0.03		0.02		0.06		c0.11		c0.09	
v/s Ratio Perm					0.00				0.01			
v/c Ratio	0.25		0.33		0.23		0.05		0.16		0.01	
Uniform Delay, d1	27.0		26.8		26.6		26.1		12.4		13.0	
Progression Factor	1.00		1.00		1.00		1.00		1.00		1.00	
Incremental Delay, d2	0.5		1.2		0.7		0.1		0.5		0.9	
Delay (s)	27.5		28.0		27.3		26.2		12.9		14.0	
Level of Service	C		C		C		C		B		B	
Approach Delay (s)	27.5				27.1				13.5		25.0	
Approach LOS	C				C				B		C	

Intersection Summary			
HCM Average Control Delay	21.9	HCM Level of Service	C
HCM Volume to Capacity ratio	0.34		
Actuated Cycle Length (s)	63.4	Sum of lost time (s)	16.0
Intersection Capacity Utilization	37.1%	ICU Level of Service	A
Analysis Period (min)	15		
c	Critical Lane Group		

HCM Signalized Intersection Capacity Analysis
 22: Colony Rd/SR 99 SB & Jack Tone Rd

11/6/2009

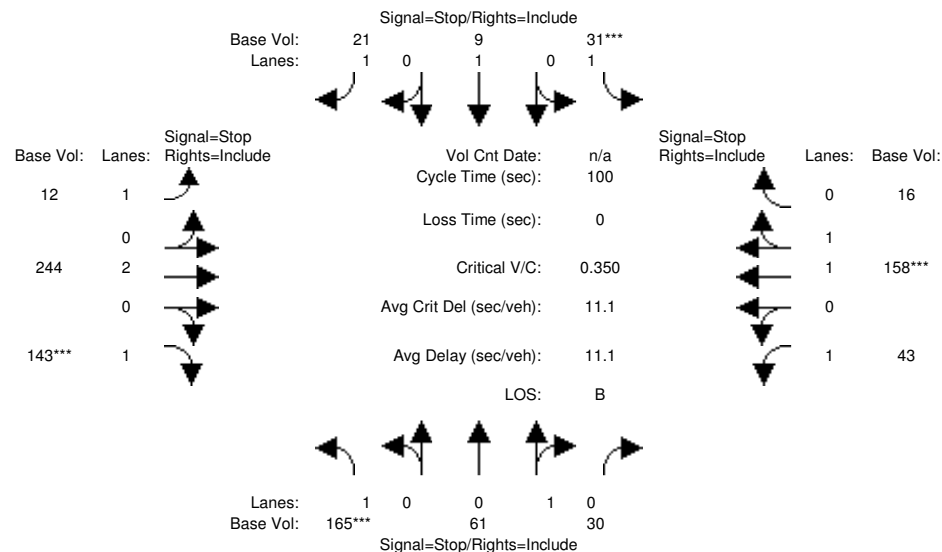


Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations				↰	↰	↰		↕		↰	↕	↰
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)				4.0	4.0	4.0		4.0		4.0	4.0	4.0
Lane Util. Factor				0.95	0.95	1.00		0.95		1.00	0.95	1.00
Frt				1.00	1.00	0.85		0.91		1.00	1.00	0.85
Flt Protected				0.95	1.00	1.00		1.00		0.95	1.00	1.00
Satd. Flow (prot)				1681	1770	1583		3205		1770	3539	1583
Flt Permitted				0.95	1.00	1.00		1.00		0.95	1.00	1.00
Satd. Flow (perm)				1681	1770	1583		3205		1770	3539	1583
Volume (vph)	0	0	0	119	138	87	0	218	369	30	116	191
Peak-hour factor, PHF	0.25	0.25	0.25	0.95	0.95	0.95	0.95	0.95	0.95	0.90	0.90	0.90
Adj. Flow (vph)	0	0	0	125	145	92	0	229	388	33	129	212
RTOR Reduction (vph)	0	0	0	0	0	0	0	134	0	0	0	53
Lane Group Flow (vph)	0	0	0	125	145	92	0	483	0	33	129	159
Turn Type				Prot		Free				Prot		Perm
Protected Phases				3	8			2		1	6	
Permitted Phases						Free						6
Actuated Green, G (s)				16.2	16.2	96.2		62.9		5.1	72.0	72.0
Effective Green, g (s)				16.2	16.2	96.2		62.9		5.1	72.0	72.0
Actuated g/C Ratio				0.17	0.17	1.00		0.65		0.05	0.75	0.75
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)				283	298	1583		2096		94	2649	1185
v/s Ratio Prot				0.07	c0.08			c0.15		c0.02	0.04	
v/s Ratio Perm						0.06						0.10
v/c Ratio				0.44	0.49	0.06		0.23		0.35	0.05	0.13
Uniform Delay, d1				35.9	36.2	0.0		6.8		44.0	3.2	3.4
Progression Factor				1.00	1.00	1.00		1.00		1.00	1.00	1.00
Incremental Delay, d2				1.1	1.3	0.1		0.3		2.3	0.0	0.2
Delay (s)				37.1	37.5	0.1		7.0		46.2	3.2	3.6
Level of Service				D	D	A		A		D	A	A
Approach Delay (s)		0.0			27.8			7.0			7.2	
Approach LOS		A			C			A			A	

Intersection Summary			
HCM Average Control Delay	12.7	HCM Level of Service	B
HCM Volume to Capacity ratio	0.29		
Actuated Cycle Length (s)	96.2	Sum of lost time (s)	12.0
Intersection Capacity Utilization	38.5%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

Level Of Service Computation Report
 2000 HCM 4-Way Stop (Base Volume Alternative)
 Default Scenario

Intersection #2: Colony Rd / Hoff Rd / SR 99 NB Ramps - Ex PM



Approach:	North Bound			South Bound			East Bound			West Bound		
Movement:	L	T	R	L	T	R	L	T	R	L	T	R
Min. Green:	0	0	0	0	0	0	0	0	0	0	0	0

Volume Module:

Base Vol:	165	61	30	31	9	21	12	244	143	43	158	16
Growth Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Initial Bse:	165	61	30	31	9	21	12	244	143	43	158	16
User Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PHF Adj:	0.95	0.95	0.95	0.80	0.80	0.80	0.90	0.90	0.90	0.80	0.80	0.80
PHF Volume:	174	64	32	39	11	26	13	271	159	54	198	20
Reduct Vol:	0	0	0	0	0	0	0	0	0	0	0	0
Reduced Vol:	174	64	32	39	11	26	13	271	159	54	198	20
PCE Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
MLF Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Final Volume:	174	64	32	39	11	26	13	271	159	54	198	20

Saturation Flow Module:

Adjustment:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Lanes:	1.00	0.67	0.33	1.00	1.00	1.00	1.00	2.00	1.00	1.00	1.82	0.18
Final Sat.:	496	368	181	431	457	503	503	1088	609	480	944	97

Capacity Analysis Module:

Vol/Sat:	0.35	0.17	0.17	0.09	0.02	0.05	0.03	0.25	0.26	0.11	0.21	0.21
Crit Moves:	****			****			****			****		
Delay/Veh:	13.1	10.2	10.2	11.1	10.1	9.6	9.7	11.1	10.3	10.7	10.9	10.8
Delay Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
AdjDel/Veh:	13.1	10.2	10.2	11.1	10.1	9.6	9.7	11.1	10.3	10.7	10.9	10.8
LOS by Move:	B	B	B	B	B	A	A	B	B	B	B	B
ApproachDel:	12.1			10.4			10.7			10.9		
Delay Adj:	1.00			1.00			1.00			1.00		
ApprAdjDel:	12.1			10.4			10.7			10.9		
LOS by Appr:	B			B			B			B		
AllWayAvgQ:	0.5	0.2	0.2	0.1	0.0	0.0	0.0	0.3	0.3	0.1	0.2	0.2

Note: Queue reported is the number of cars per lane.
 Peak Hour Volume Signal Warrant Report [Urban]

 Intersection #2 Colony Rd / Hoff Rd / SR 99 NB Ramps - Ex PM

 Base Volume Alternative: Peak Hour Warrant NOT Met

Approach:	North Bound			South Bound			East Bound			West Bound		
Movement:	L	T	R	L	T	R	L	T	R	L	T	R
Control:	Stop Sign			Stop Sign			Stop Sign			Stop Sign		
Lanes:	1	0	1	0	1	0	1	1	0	2	0	1
Initial Vol:	165	61	30	31	9	21	12	244	143	43	158	16

Major Street Volume: 616
 Minor Approach Volume: 256
 Minor Approach Volume Threshold: 582

SIGNAL WARRANT DISCLAIMER
 This peak hour signal warrant analysis should be considered solely as an "indicator" of the likelihood of an unsignalized intersection warranting a traffic signal in the future. Intersections that exceed this warrant are probably more likely to meet one or more of the other volume based signal warrant (such as the 4-hour or 8-hour warrants).

The peak hour warrant analysis in this report is not intended to replace a rigorous and complete traffic signal warrant analysis by the responsible jurisdiction. Consideration of the other signal warrants, which is beyond the scope of this software, may yield different results.

HCM Signalized Intersection Capacity Analysis

24: SR 99 SB & Jack Tone Rd

11/6/2009



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	
Lane Util. Factor	0.95	0.95	1.00					0.95			0.95	
Frt	1.00	1.00	0.85					0.96			1.00	
Flt Protected	0.95	0.95	1.00					1.00			1.00	
Satd. Flow (prot)	1681	1681	1583					3390			3536	
Flt Permitted	0.95	0.95	1.00					1.00			0.95	
Satd. Flow (perm)	1681	1681	1583					3390			3359	
Volume (vph)	290	0	228	0	0	0	0	297	116	4	231	0
Peak-hour factor, PHF	0.95	0.95	0.95	0.25	0.25	0.25	0.90	0.90	0.90	0.80	0.80	0.80
Adj. Flow (vph)	305	0	240	0	0	0	0	330	129	5	289	0
RTOR Reduction (vph)	0	0	185	0	0	0	0	56	0	0	0	0
Lane Group Flow (vph)	153	152	55	0	0	0	0	403	0	0	294	0
Turn Type	Split		Perm					Perm				
Protected Phases	4	4						2			6	
Permitted Phases			4							6		
Actuated Green, G (s)	8.9	8.9	8.9					21.9			21.9	
Effective Green, g (s)	8.9	8.9	8.9					21.9			21.9	
Actuated g/C Ratio	0.23	0.23	0.23					0.56			0.56	
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)	386	386	363					1913			1896	
v/s Ratio Prot	c0.09	0.09						c0.12				
v/s Ratio Perm			0.03								0.09	
v/c Ratio	0.40	0.39	0.15					0.21			0.16	
Uniform Delay, d1	12.7	12.7	11.9					4.2			4.0	
Progression Factor	1.00	1.00	1.00					1.00			1.00	
Incremental Delay, d2	0.7	0.7	0.2					0.3			0.2	
Delay (s)	13.3	13.3	12.1					4.4			4.2	
Level of Service	B	B	B					A			A	
Approach Delay (s)		12.8			0.0			4.4			4.2	
Approach LOS		B			A			A			A	

Intersection Summary

HCM Average Control Delay	7.9	HCM Level of Service	A
HCM Volume to Capacity ratio	0.26		
Actuated Cycle Length (s)	38.8	Sum of lost time (s)	8.0
Intersection Capacity Utilization	27.3%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

HCM Unsignalized Intersection Capacity Analysis
 25: Ripon Rd & Austin Rd.

11/6/2009



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Sign Control		Stop			Stop			Stop			Stop	
Volume (vph)	18	173	2	12	73	66	5	25	26	80	14	14
Peak Hour Factor	0.70	0.70	0.70	0.90	0.90	0.90	0.65	0.65	0.65	0.85	0.85	0.85
Hourly flow rate (vph)	26	247	3	13	81	73	8	38	40	94	16	16

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total (vph)	276	168	86	127
Volume Left (vph)	26	13	8	94
Volume Right (vph)	3	73	40	16
Hadj (s)	0.05	-0.21	-0.23	0.10
Departure Headway (s)	4.7	4.6	4.9	5.2
Degree Utilization, x	0.36	0.21	0.12	0.18
Capacity (veh/h)	723	732	656	630
Control Delay (s)	10.4	8.8	8.6	9.4
Approach Delay (s)	10.4	8.8	8.6	9.4
Approach LOS	B	A	A	A

Intersection Summary			
Delay		9.5	
HCM Level of Service		A	
Intersection Capacity Utilization	33.3%	ICU Level of Service	A
Analysis Period (min)		15	

HCM Signalized Intersection Capacity Analysis

26: Ripon Rd & Jack Tone Rd

11/6/2009



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	0.95		1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Frt	1.00	0.99		1.00	1.00	0.85	1.00	0.95		1.00	0.91	
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770	3488		1770	1863	1583	1770	1770		1770	1702	
Flt Permitted	0.95	1.00		0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (perm)	1770	3488		1770	1863	1583	1770	1770		1770	1702	
Volume (vph)	106	223	24	52	190	130	14	80	40	149	84	113
Peak-hour factor, PHF	0.85	0.85	0.85	0.90	0.90	0.90	0.80	0.80	0.80	0.90	0.90	0.90
Adj. Flow (vph)	125	262	28	58	211	144	18	100	50	166	93	126
RTOR Reduction (vph)	0	8	0	0	0	119	0	13	0	0	32	0
Lane Group Flow (vph)	125	282	0	58	211	25	18	137	0	166	187	0
Turn Type	Prot			Prot		Perm	Prot			Prot		
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases						8						
Actuated Green, G (s)	9.2	19.0		5.2	15.0	15.0	2.6	34.1		10.5	42.0	
Effective Green, g (s)	9.2	19.0		5.2	15.0	15.0	2.6	34.1		10.5	42.0	
Actuated g/C Ratio	0.11	0.22		0.06	0.18	0.18	0.03	0.40		0.12	0.50	
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)	192	782		109	330	280	54	712		219	843	
v/s Ratio Prot	c0.07	c0.08		0.03	c0.11		0.01	0.08		c0.09	c0.11	
v/s Ratio Perm						0.02						
v/c Ratio	0.65	0.36		0.53	0.64	0.09	0.33	0.19		0.76	0.22	
Uniform Delay, d1	36.3	27.8		38.6	32.4	29.2	40.3	16.4		35.9	12.1	
Progression Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Incremental Delay, d2	7.7	0.3		4.9	4.0	0.1	3.6	0.6		13.9	0.6	
Delay (s)	43.9	28.1		43.5	36.4	29.3	43.9	17.0		49.8	12.7	
Level of Service	D	C		D	D	C	D	B		D	B	
Approach Delay (s)		32.8			35.0			19.9			28.7	
Approach LOS		C			C			B			C	

Intersection Summary

HCM Average Control Delay	30.8	HCM Level of Service	C
HCM Volume to Capacity ratio	0.44		
Actuated Cycle Length (s)	84.8	Sum of lost time (s)	16.0
Intersection Capacity Utilization	40.8%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

Technical Appendix B

City of Manteca Draft Transportation Impact Analysis Guidelines



April 15, 2008

Mr. Mark Meissner, City of Manteca Planning Manager
Community Development Department, Planning Division
1001 West Center Street, Manteca, CA 95337

Cc: Mr. Mark Nelson, City of Manteca Community Development Director
Mr. Mark Houghton, City of Manteca Public Works Director
Mr. Scott Chad, City of Manteca Community Development Department

Re: Tesoro Apartments Traffic Impact Study

Dear Mark,

Based on our meeting on Tuesday, April 8th, we have prepared the following Transportation Impact Analysis (TIA) Guidelines and Significance Thresholds to be used for the proposed Tesoro 300 multi-family apartment homes project Transportation Impact Study. In addition, we have identified five "next steps" that we would recommend the City of Manteca undertake to provide decision makers with sufficient information regarding the potential impacts of any future project on the transportation system and to determine appropriate mitigation measures where impacts exist.

Proposed TIA Guidelines – Based on our experience working throughout the San Joaquin Valley, Sacramento Valley, and San Francisco Bay Area, and initial discussions with Mark Houghton, Public Works Director, we have developed the following guidelines to be used in identifying and scoping the traffic operations portion of a TIA. Separate criteria may be necessary to determine the scope and impacts associated with other forms of transportation.

A TIA is an important tool that identifies the need for any improvement to a transportation system to manage traffic congestion, improve safety, provide adequate site distance, and mitigate impacts to all travel modes associated with a proposed project.

Scope of Freeway Analysis – A freeway segment shall be included in a TIA if any of the following requirements are met:

- 1) The proposed development project is estimated to add traffic equal to at least one percent of the freeway segment's capacity.

Based on engineering judgment, City of Manteca staff determines that a freeway segment should be included in the analysis

For calculating the amount of added traffic based on freeway segment capacity, the capacities documented in the 2000 *Highway Capacity Manual* shall be used, defined as 2,200 vehicles per hour per lane. Auxiliary lanes shall not be considered for the purpose of this calculation.

Scope of Ramp Analysis – A ramp segment shall be included in a TIA if any of the following requirements are met:

- 1) The proposed development project is estimated to add traffic equal to at least one percent of the ramp's capacity.
- 2) Based on engineering judgment, City of Manteca staff determines that a ramp should be included in the analysis.

For calculating the amount of added traffic based on ramp capacity, the capacities documented in the 2000 *Highway Capacity Manual* shall be used, defined as 1,500 vehicles per hour per lane. Auxiliary lanes shall not be considered for the purpose of this calculation.

Scope of Intersection Analysis – An intersection shall be included in the TIA if any of the following requirements are met:

- 1) The proposed development project is estimated to add 10 or more peak hour vehicle trips per lane to any intersection movement.
- 2) The intersection is immediately adjacent to the proposed project.
- 3) Based on engineering judgment, City of Manteca staff determines that the intersection should be included in the analysis.

The 10 or more vehicle per lane requirement applies to any intersection movement (left-turn, through or right-turn). If a movement used a shared lane, the shared lane shall be considered a full lane. Please note that this calculation will be part of the initial scoping with the City of Manteca to determine inclusion of an intersection in the TIA.

Analysis Methodology

Project transportation impacts will be analyzed using software that employs the methodologies defined in the 2000 *Highway Capacity Manual*. Evaluation of impacts shall include, but are not limited to evaluation of morning and evening peak hour level of service analysis. Based on engineering judgment, City of Manteca staff may require weekend midday peak hour level of service analysis based on the proposed project description.

Level of Service Thresholds and Impact Criteria

Manteca's target for transportation level of service (LOS) is to provide a Citywide average LOS of C or better, and a minimum of LOS D at any individual location. This "C average, D minimum"

shall be accomplished by attempting to provide LOS C at all locations, but accepting LOS D under the following circumstances:

- Where constructing facilities with enough capacity to provide LOS C is found to be unreasonably expensive. This applies to facilities, for example, on which it would cost significantly more per dwelling unit equivalent (DUE) to provide LOS C than to provide LOS D.
- Where it is difficult or impossible to maintain LOS C because surrounding facilities in other jurisdictions operate at LOS D or worse.
- Where free-flowing roadways or interchange ramps would discourage use of alternate travel modes.
- Where maintaining LOS C will be a disincentive to use of existing alternative modes or to the implementation of new transportation modes that would reduce vehicle travel.

Based on engineering judgment, City of Manteca staff will define intersections and facilities where the LOS D threshold is applicable. Otherwise, all other intersections and facilities will use the LOS C standard.

If the analysis shows that the proposed project is will cause traffic LOS on a study facility (intersection or roadway) to change from an acceptable LOS (LOS C or better or D or better) under "No Project" conditions to an unacceptable LOS (LOS D or worse or LOS E or worse) under "With Project Conditions," then the project is said to impact the facility.

For facilities determined to operate at an unacceptable LOS under Existing or Cumulative No Project condition, a separate threshold shall be used. Under these conditions a project is said to impact the facility if the results of the analysis indicate that the project will cause LOS to deteriorate by a given threshold amount. The threshold amounts for each of the three facility types are described below:

- 1) **Freeway Segments:** A project is said to impact a freeway segment operating at an unacceptable LOS under Existing or Cumulative No Project Conditions, if ***the addition of project traffic increases the density by 0.1 pc/mi/ln.*** The calculation shall be conducted for each direction of travel.
- 2) **Ramp Segments:** A project is said to impact a ramp merge or diverge segment operating at an unacceptable LOS under Existing or Cumulative No Project Conditions, if ***the addition of project traffic increases the density by 0.1 pc/mi/ln.***
- 3) **Intersections:** A project is said to impact an intersection operating at an unacceptable LOS under Existing or Cumulative No Project Conditions, if:

- The addition of project traffic increases the average vehicle delay for a signalized intersection by three (3) seconds or more, or
- The addition of project traffic increases the average delay for an all-way stop-controlled intersection by three (3) seconds or more and the intersection meets the one hour peak hour signal warrant, or
- The addition of project traffic increases the highest delayed side-street movement for a side-street stop-controlled intersection by three (3) seconds or more and the intersection meets the one hour peak hour signal warrant.

Proposed TIA Guidelines and Tesoro Apartments

These TIA guidelines and impact criteria will reduce the scope of the Tesoro Apartments Project impacts to only include local roadway segments, local intersections and Caltrans ramp terminal intersections under Cumulative Conditions. The impacts to the local roadway segments can be mitigated if the Tesoro Apartments Project agrees to pay the full updated PFIP fee and the full fee is adopted by the City (see below). However, to mitigate the impacts at the ramp terminal intersections, the Community Development Department and Public Works Department should discuss the possibility of either including the interchange improvements in the updated PFIP or funding the interchanges through assessment districts developed to mitigate Cumulative impacts to the interchanges serving the City of Manteca. Without a guaranteed funding plan for the interchanges, the ramp terminal intersection impacts will remain significant and unavoidable.

Tesoro Apartments Sample Impact Mitigation Language

In order to mitigate Tesoro Apartments project-generated impacts to City of Manteca intersections and the Caltrans ramp terminal intersections, the following language would need to be agreed to by the project applicant.

The project applicant shall pay the full PFIP fee in place at time of building permit approval. If the PFIP fee at time of building permit approval is known to not cover the full cost of the necessary mitigation, the project applicant shall also agree to pay a fair-share for the portion of the project cost not included in the PFIP fee. If a fair share fee is required, the City will establish a fair share fee collection program to collect and allocate fees to fund the mitigation measures required by development projects.

This mitigation language takes care of the “cumulatively considerable” impact to intersection LOS caused by the Tesoro Apartments Project. It also provides for the additional improvements necessary to meet the City’s LOS policy.

Next Steps

This letter is the first step in a series of activities that we recommend that Community Development Department and Public Works Department undertake:

- 1) Update the Tesoro Apartments Traffic Impact Study using the guidelines and mitigation language documented in the previous sections;
- 2) Complete the updated PFIP and either include interchanges or develop assessment districts to mitigate Cumulative impacts to the interchanges serving the City of Manteca;
- 3) Develop and document the City of Manteca Transportation Impact Analysis Guidelines, which will include the following sections:
 - a. Initial Assessment Form;
 - b. Scope of the Transportation Impact Analysis;
 - c. Transportation Data;
 - d. Traffic Forecasts;
 - e. Technical Analysis (covering traffic, transit, bicycles, pedestrians, parking access management and driveway queuing, sight distance, and traffic calming);
 - f. Standards and Significance for Transportation System;
 - g. Mitigation Measures; and
 - h. Documentation.
- 4) Prepare an Update to the City of Manteca General Plan Chapter 15 Traffic and Circulation using the analysis being completed for the updated PFIP to also include impacts at Caltrans ramp terminal and freeway facilities. This will document in the General Plan the nexus between the updated PFIP and required interchange improvements and identify regional improvements on SR 120 and SR 99 as being beyond the control of the City of Manteca. The City of Manteca will continue to collect the San Joaquin County Regional traffic Impact fee of \$2,500 per dwelling unit, \$1.00 per square foot for retail development, and \$1.25 per square foot of office development to assist in funding regional transportation improvements.
- 5) Consider updating the City of Manteca LOS Threshold as part of the General Plan Traffic and Circulation Update. A less stringent LOS threshold citywide would reduce the cost associated with providing infrastructure to meet current City policies. Moreover, appropriate LOS thresholds for specific portions of the City (e.g., downtown, commercial corridors, areas near interchanges) should also be considered to preserve the character and economic vitality of these areas while encouraging other forms of transportation.

Sincerely,

FEHR & PEERS



Chris Breiland
Transportation Engineer



Fred Choa, P.E.
Principal

Technical Appendix C
Trip Generation Memorandum



MEMORANDUM

Date: September 11, 2009

To: Erika Durrer and Rochelle Henson, City of Manteca

Cc: Patrick Hindmarsh, PBS&J

From: David Carter and Chris Breiland, Fehr & Peers

Subject: *Trip Generation Assumptions and Estimate for the Austin Road Business Park and Residential Community – Full Buildout*

RS07-2528

The Austin Road Business Park and Residential Community (ARBPRC) is a proposed mixed-use development located on approximately 1,050 acres south of the State Route (SR) 99/Austin Road interchange in Manteca, California. This memorandum documents the assumptions used to calculate the trip generation potential of the project and presents the trip generation estimate based on the most recent site plan and land use data submitted by the project applicant.

To estimate the trip generation of the ARBPRC project, some of the land use designations shown on the site plan had to be further defined because the designations are generic and allow for a wide range of uses. To identify more discrete uses that have known trip generation characteristics, Fehr & Peers worked with City staff to define likely mixes of permitted uses within each of the land use designations. These assumptions are documented in a detailed trip generation memorandum prepared as part of the project's phasing analysis (see Attachment A) and in the City's comments to this previous memorandum (see Attachment B).

The agreed upon land use mixes were then paired with trip generation rates from *Trip Generation, 8th Edition* (Institute of Transportation Engineers, 2008). The land use quantities and trip rates for daily, AM peak hour, and PM peak hour conditions were entered into the detailed spreadsheet included in Attachment C. The land use summary and trip generation estimates created from this spreadsheet are presented in Table 1.

As shown in Table 1, the proposed project consists of 7.017 million square feet of commercial, office, and industrial uses in addition to 4,198 residential units. This diversity of land uses will result in a portion of the project's trips remaining internal to the site. The following calculations show how the project compares to two land use diversity ratios often recommended by economists:

- The project will provide approximately 500 square feet of retail space per dwelling unit. This is outside of the generally accepted "balanced" amount of 60 to 125 square feet of retail space per household. This suggests that while residents within the project will be well-served by retail, a significant portion of retail trips will come from the surrounding area and region.
- The project will have a ratio of approximately 1.5 jobs per household due to the substantial amounts of office and industrial land uses located on-site. This ratio is close to the regionally balanced ratio of about 1.2 jobs per household.

To estimate the project's internal trip capture, assumptions regarding internally paired trips were made for complementary land uses.¹ These assumptions regarding internally paired trips are contained in the spreadsheet in Attachment C. It should also be noted that an additional "pass-by" trip reduction was taken for retail land uses after internalized trips were calculated. These "pass-by" trips account for trip chaining activity within the large project site as well as for diverted linked trips from SR-99 to commercial land uses located adjacent to the freeway.

Table 1 provides a summary of the internal trips, pass-by trips, and gross trips for project buildout conditions. According to Table 1, approximately 20 percent of gross daily trips, 22 percent of AM peak hour trips, and 18 percent of PM peak hour trips will remain internal to the project site. Prior to the "pass-by" reduction, approximately 82 percent of retail trips on a daily basis will be external to the project. Similarly, approximately 83 percent of employment trips on a daily basis will be external to the project. These modest internalization assumptions are consistent with the land use diversity discussion above. Additionally, the results of the employment internalization calculations are consistent with census "journey to work" data obtained for newer development areas in the Lathrop/Manteca vicinity.

¹ Although an internal trip calculation methodology is contained in *Trip Generation Handbook* (ITE, 2004), it was not used for this analysis because the procedure is based on only a handful of studies in Florida, and has been found by Fehr & Peers through other applications to be unreliable.

TABLE 1: TOTAL LAND USE TRIP GENERATION

Land Use	Area KSF/Units	ITE Code	Daily				AM Peak Hour				PM Peak Hour			
			Rate ¹	Total Trips	In	Out	Rate ¹	Total Trips	In	Out	Rate ¹	Total Trips	In	Out
Heavy Industrial District: 83% High Cube Warehouse, 17% Light Industrial														
High-Cube Warehouse	4,304	152	2.25	10,028	5,014	5,014	0.12	518	337	181	0.11	482	159	323
Light Industrial	807	110	7.36	6,730	3,365	3,365	1.08	990	871	119	1.26	1,151	138	1,012
Subtotal	5,380	--	--	16,758	8,379	8,379	--	1,508	1,208	300	--	1,633	297	1,336
Business/Industrial/Professional Non-Heavy Industrial District: 80% Office Park, 10% Retail, 10% Mini-Storage Uses														
Office Park	203	750	12.44	2,522	1,261	1,261	1.98	402	358	44	1.69	343	48	295
Retail	608	110	7.30	4,443	2,221	2,221	1.03	629	553	75	1.17	713	86	627
Mini-Storage	203	151	2.39	486	243	243	0.15	30	18	12	0.26	53	27	26
Subtotal	1,014			7,451	3,725	3,725		1,061	929	132		1,109	161	948
General Commercial														
Shopping Center	1,178	820	28.64	33,743	16,871	16,871	0.56	660	403	257	2.82	3,321	1,627	1,694
Subtotal	1,178	820	28.64	33,743	16,871	16,871	0.56	660	403	257	2.82	3,321	1,627	1,694
Commercial Mixed Use														
Shopping Center	410	820	41.44	16,992	8,496	8,496	0.86	354	216	138	3.99	1,637	802	835
Office Park	91	750	14.91	1,357	679	679	2.74	249	222	27	2.27	207	29	178
Apartment	828	220	6.65	5,506	2,753	2,753	0.51	422	84	338	0.62	513	334	180
Subtotal	501/828			23,856	11,928	11,928		1,025	522	503		2,358	1,165	1,193
Residential														
Low/Medium Density Residential	2,358	210	9.57	22,566	11,283	11,283	0.75	1,769	442	1,326	1.01	2,382	1,500	881
High Density Residential	1,012	220	6.65	6,730	3,365	3,365	0.51	516	103	413	0.62	627	408	220
Subtotal	3,370	--	--	29,296	14,648	14,648	--	2,285	545	1,739	--	3,009	1,908	1,101
Public/Quasi-Public/EXPO Center														
Expo Center ²	122	N/A	5.84	712	356	356	0.65	79	63	16	1.75	214	65	149
Subtotal	122	--	--	712	356	356	--	79	63	16	--	214	65	149
Gross Trips				111,816	55,908	55,908	--	6,618	3,670	2,948	--	11,643	5,222	6,420
Internal Trips				22,417	11,209	11,209	--	1,465	732	732	--	2,051	1,025	1,025
Retail Pass-by Trips				6,370	3,185	3,185	--	66	38	28	--	875	429	447
Total Trip Generation				83,029	41,514	41,514	--	5,087	2,900	2,187	--	8,717	3,768	4,948

Notes: ¹ Trip Rates based on data published in *Trip Generation 8th Edition* (ITE, 2008). For non-residential uses these rates represent fitted curve, rather than average rate, where available.

² Trip rate estimated based on previous studies of similar facilities and represents a "non-event" day, see Appendix.

Source: Fehr & Peers, 2009

To further verify the reasonableness of the internalization/pass-by reductions, the ARBPRC project was compared to similar sized mixed-use projects contained in Fehr & Peers' Mixed-Use (MXD) Trip Generation Spreadsheet. Fehr & Peers worked with several academic researchers to develop this state-of-the-art spreadsheet which is based on surveys of residents and employees in 240 mixed-use projects/development areas in six major metropolitan areas (Sacramento, Houston, Boston, Atlanta, Portland, and Seattle) in the United States. The nine projects most closely resembling the ARBPRC (based on variables including number of households, population, employment, employment/households ratio, and size in acres) had an average daily internalization of 28 percent, and a range of 19 to 38 percent internalization. The combined daily internalization/"pass-by" reduction taken for the ARBPRC is 26 percent. Thus, the MXD model reaffirms the reasonableness of the estimates contained in Table 1.

We hope that you find this information helpful. Please do not hesitate to contact us if you have any questions or comments.

Attachment A



MEMORANDUM

Date: February 24, 2009

To: Erika Hollander and Rochelle Henson, City of Manteca

From: Chris Breiland & Kendra Breiland, Fehr & Peers

Subject: *Trip Generation Assumptions for Austin Road Business Park and Residential Community – Phase 1 Analysis*

RS07-2528

Fehr & Peers is developing the trip generation estimate for Phase 1 of the proposed Austin Road Business Park and Residential Community (ARBPRC) project. Based on the phasing map submitted by the project applicant, Phase 1 is expected to consist of the following uses:

- About 4.76 million square feet of Heavy Industrial
- 359,806 square feet of Business Industrial Park
- 121,968 square feet of Expo Center

This memorandum summarizes our trip generation estimates for the Business Industrial Park and Expo Center uses and requests feedback from the City on the appropriate land uses to assume within the Heavy Industrial zoned area.

Trip Generation

To estimate the trip generation for Phase 1 of the ARBPRC project, the land use designations shown on the phasing map had to be further defined because the phasing map's land uses are fairly generic and allow a wide range of uses. To identify more discrete uses that have known trip generation characteristics, we used information from the project applicant, the City's Zoning Code, and the City's General Plan.

Heavy Industrial

The Phase 1 land use category with the most uncertainty is Heavy Industrial. The project applicant indicates that the Heavy Industrial area will largely consist of high-cube distribution

centers, which are common along the I-5 and SR 99 corridors in the San Joaquin Valley. However, the City's zoning code provides some flexibility in the types of uses included in the Heavy Industrial zone:

M-2 Heavy Industrial District. *The primary purpose of the M-2 district is to provide areas appropriate for manufacturing, processing, assembling, research, wholesale, storage, trucking terminals, railroad and freight stations, public and quasi-public uses, and similar and compatible uses, and activities likely to have significant heavy truck traffic, potentially objectionable noise, odor or visual impact. Retail commercial or service activity shall be limited to twenty percent of the primary use building floor area.*

The City's zoning code includes a list of uses permitted within each zone. The project applicant has also proposed that additional uses be allowed within both the Heavy Industrial and Light Industrial zones.

To understand how trip generation might vary for the Heavy Industrial areas of Phase 1 based on which land uses are constructed, we developed trip generation estimates for five development scenarios. The trip generation estimate for each scenario was developed using rates published in *Trip Generation*, 8th Edition (ITE, 2008). Tables 1A and 1B at the end of this memo summarize the results.

- Scenario 1: 100% High Cube Warehouse – 10,700 daily trips
- Scenario 2: 80% High Cube Warehouse, 20% Light Industrial – 15,500 daily trips
- Scenario 3: 60% High Cube Warehouse, 20% Light Industrial, 20% Allowable Retail/Service Uses Under Heavy Industrial Zone – 24,200 daily trips
- Scenario 4: 80% Light Industrial, 20% Allowable Retail/Service Uses Under Heavy Industrial Zone – 36,800 daily trips
- Scenario 5: 80% Light Industrial, 20% Allowable Retail/Service Uses Under Light Industrial Zone – 37,600 daily trips

As the table shows, Scenario 1, which assumes 100% high cube warehouse development (which is the most marketable type of land use according to the applicant) would result in the lowest trip generation with approximately 10,700 daily trips. However, as a higher percentage of light industrial, office, and retail uses are assumed (as would be allowed under the City's zoning code and the modification to the permitted uses proposed by the applicant), trip generation increases substantially. Scenario 5 is included because the project applicant also requested changes to the permitted uses under the Light Industrial zoning category. While the project, as proposed, does

not have any Light Industrial zoning, this scenario shows the trip generation results assuming a worst-case buildout of the modified Light Industrial zoning scenario.

Before developing a final trip generation estimate for Phase I of the ARBPRC, we request that the City provide guidance on which land uses are appropriate to assume for the project's Heavy Industrial area. Based on our assessment, choosing Scenario 1 could limit the applicability of the phasing analysis and the EIR because more intense uses are allowed in the Heavy Industrial area. If these areas ultimately are built out with more intense uses or if high cube warehouses are converted into other uses at a later date, the impacts to the transportation system will have been underestimated, which could result in unacceptable levels of service and inadequate mitigation measures. Conversely, choosing Scenario 4 or 5 may overstate the ultimate trip generation of the project. While selecting this scenario would ensure that the transportation infrastructure would support any allowable mix of land uses, it would be overbuilt for a scenario where a large proportion of the land use is dedicated to high cube warehouses.

Our recommendation would be to select a land-use mix similar to that shown in Scenario 3 where the majority of the Heavy Industrial land is devoted to high cube warehouses, but a mix of other industrial and commercial uses are also present on the site.

Business Industrial Park

The Business Industrial Park, in the northwest portion of the Phase 1 development, is proposed as a mix of large office uses and light industrial facilities along with some commercial uses. Similar to Heavy Industrial uses, the City's zoning code provides some flexibility in the uses allowed in the Business Industrial Park zone:

BIP Business/Industrial Park District. *The primary purpose of the BIP district is to provide for business, professional and administrative offices, medical and dental laboratories, laboratories, financial institutions, wholesale, warehouses, distribution centers, light manufacturing, public and quasi-public uses, and similar and compatible uses, and to promote a business, industry and research area which is not dependent on rail transport and does not require outdoor storage; and to foster and encourage development of specialized manufacturing and research institutions. It is intended that the BIP district be characterized by high standards of cleanliness, quiet, open space and design quality, and that retail commercial or service activity shall be limited to twenty percent of the primary use building floor area.*

In order to provide the most conservative estimate of trip generation, we assume that 80 percent of the developable floor area is occupied by office-type uses, with the remaining 20 percent occupied by retail uses. The trip generation estimate for these uses is summarized in Table 2.

Expo Center

Based on information supplied by the project applicant, the Expo Center (located in the southwest portion of the Phase 1 development) is proposed to include an 32,000 square foot exposition hall, 5,000 seat amphitheater, and 10,000 square foot Agricultural Expo with office space. In total, the site plan shows that uses at the expo center will cover approximately 122,000 square feet. While *Trip Generation, 8th Edition* does not provide a specific trip rate for this land use type, we estimated the AM and PM peak hour trip generation rates for the Expo Center using data from previous studies of similarly sized convention/events centers (see Appendix).

The previous studies typically estimated trip generation on 'event' days, while noting that almost no traffic was generated on 'non-event' days. Using 'event' weekday trip generation rate for the ARBPRC would yield a very conservative estimate of traffic generated by the expo center. Considering that the amphitheater would not be used between November and March (based on information from the project applicant), many days would see low trip generation from office uses and small meetings. To account for the sporadic generation expected from the expo center, we recommend using a rate that is one-quarter that of the full 'event' scenario; however, we would appreciate City feedback on our approach. Prior to the expo center opening, it is also recommended that a separate special events traffic management plan be developed using the full 'event' trip generation rates.

The trip generation estimate for the Expo Center is shown in Table 2.

We hope that you find this information useful. Please give us a call if you have any questions.

TABLE 1A: PHASE ONE INDUSTRIAL LAND USE TRIP GENERATION SCENARIOS

Land Use	Area (1,000 sf) ¹	ITE Code	Daily				AM Peak Hour				PM Peak Hour			
			Rate ²	Total Trips	In	Out	Rate ²	Total Trips	In	Out	Rate ²	Total Trips	In	Out
Scenario 1: 100% High Cube Warehouse														
High-Cube Warehouse	4,759	152	2.25	10,718	5,359	5,359	0.12	553	359	194	0.11	515	170	345
Total	4,759			10,718	5,359	5,359		553	359	194		515	170	345
Scenario 2: 80% High Cube Warehouse, 20% Light Industrial														
High-Cube Warehouse	3,807	152	2.23	8,481	4,240	4,240	0.12	439	285	154	0.11	410	135	275
Light Industrial	952	110	7.36	7,010	3,505	3,505	1.09	1,034	910	124	1.26	1,204	144	1,060
Total	4,759			15,490	7,745	7,745		1,473	1,195	278		1,614	280	1,334
Scenario 3: 60% High Cube Warehouse, 20% Light Industrial, 20% Allowable Retail/Service Uses Under Heavy Industrial Zone														
High-Cube Warehouse	2,380	152	2.15	5,128	2,564	2,564	0.11	268	174	94	0.11	253	83	169
Light Industrial	793	110	7.34	5,822	2,911	2,911	1.07	846	745	102	1.23	977	117	859
Office Park	573	750	11.13	6,380	3,190	3,190	1.59	909	809	100	1.39	795	111	684
Home Improvement Superstore	200	862	29.80	5,960	2,980	2,980	1.26	252	144	108	2.37	474	228	246
Tire Store	10	848	24.87	249	124	124	2.89	29	18	11	4.15	42	18	24
Auto Parts	10	843	65.95	659	330	330	2.33	23	12	12	6.38	64	31	33
Total	3,966			24,197	12,099	12,099		2,328	1,902	426		2,604	589	2,016

Notes: ¹ Square footage assumes 0.50 floor area ratio (FAR), 0.25 FAR for retail/service uses, and a 0.10 FAR for auto dealerships.

² Trip Rates based on data published in *Trip Generation 8th Edition* (ITE, 2008). These rates represent fitted curve, rather than average rate, where data available.

Source: Fehr & Peers, 2009



TABLE 1B: PHASE ONE INDUSTRIAL LAND USE TRIP GENERATION SCENARIOS

Land Use	Area (1,000 sf) ¹	ITE Code	Daily				AM Peak Hour				PM Peak Hour			
			Rate ²	Total Trips	In	Out	Rate ²	Total Trips	In	Out	Rate ²	Total Trips	In	Out
Scenario 4: 80% Light Industrial, 20% Allowable Retail/Service Uses Under Heavy Industrial Zone														
Light Industrial	3,173	110	7.44	23,600	11,800	11,800	1.15	3,655	3,216	439	1.38	4,380	526	3,854
Office Park	573	750	11.13	6,380	3,190	3,190	1.59	909	809	100	1.39	795	111	684
Home Improvement Superstore	200	862	29.80	5,960	2,980	2,980	1.26	252	144	108	2.37	474	228	246
Tire Store	10	848	24.87	249	124	124	2.89	29	18	11	4.15	42	18	24
Auto Parts	10	843	65.95	659	330	330	2.33	23	12	12	6.38	64	31	33
Total	3,966			36,848	18,424	18,424		4,868	4,199	669		5,754	914	4,841
Scenario 5: 80% Light Industrial, 20% Allowable Retail/Service Uses Under Light Industrial Zone														
Light Industrial	3,173	110	7.44	23,600	11,800	11,800	1.15	3,655	3,216	439	1.38	4,380	526	3,854
Office Park	323	750	11.69	3,775	1,887	1,887	1.76	567	505	62	1.52	490	69	421
Home Improvement Superstore	200	862	29.80	5,960	2,980	2,980	1.26	252	144	108	2.37	474	228	246
Three Auto Dealerships	100	841	33.34	3,334	1,667	1,667	2.03	203	74	26	2.59	259	101	158
Tire Store	10	848	24.87	249	124	124	2.89	29	18	11	4.15	42	18	24
Auto Parts	10	843	65.95	659	330	330	2.33	23	12	12	6.38	64	31	33
Total	3,816			37,577	18,789	18,789		4,729	3,968	658		5,708	972	4,737

Notes: ¹ Square footage assumes 0.50 floor area ratio (FAR) for industrial uses, 0.25 FAR for retail/service uses, and a 0.10 FAR for auto dealerships.
² Trip Rates based on data published in *Trip Generation 8th Edition* (ITE, 2008). These rates represent fitted curve, rather than average rate, where data available.
 Source: Fehr & Peers, 2009

TABLE 2: PROJECT TRIP GENERATION FOR NON-HEAVY INDUSTRIAL USES IN PHASE 1

Land Use	Area (1,000 sf)	ITE Code	Daily				AM Peak Hour				PM Peak Hour			
			Rate	Total Trips	In	Out	Rate	Total Trips	In	Out	Rate	Total Trips	In	Out
Office Park ¹	305	750	11.76	3,587	1,794	1,794	1.78	542	483	60	1.53	468	66	402
Retail ¹	55	820	83.72	4,604	2,302	2,302	1.97	108	66	42	7.75	426	209	217
Expo Center ²	122		11.67	1,424	712	712	1.30	158	126	32	3.49	426	128	298
Gross Trips				9,615	4,808	4,808		808	675	134		1,320	403	917

Notes: ¹ Trip Rates based on data published in *Trip Generation 8th Edition* (ITE, 2008). These rates represent fitted curve, rather than average rate, where data available.

² Trip rate estimated based on previous similar studies, see Appendix. Average rate from previous studies reduced by 75% to account for sporadic trip generation from center.
 Source: Fehr & Peers, 2009

Appendix

FWCC Civic Center Trip Generation

Draft June 10, 2004

We have reviewed the “Traffic Impact Analysis” reports and trip generation estimation methodologies for several civic center/theater developments similar to what may be envisioned in the Federal Way City Center. These developments include:

- Olympia Arts and Conference Center (2003)
- Spokane Convention Center Expansion (2003)
- Edmonds Center for the Arts [expansion] (2003)
- Salem Conference Center (2003)
- Cowlitz Regional Conference and Special Events Center (2003)
- Meydenbauer Center (Bellevue) Expansion (1999)
- Bellevue Convention Center (1990)

The developments and their traffic studies have a couple key characteristics in common: (a) the “civic center” uses are “episodic” (traffic is generated by discrete events, not by regular, on-going use), and (b) there is no ITE Trip Generation information for such facilities, and as a consequence, traffic generation estimates were made for a “use scenario” (i.e., a representative event) defined specifically for the purposes of analysis.

For the various “use scenarios” attendance was defined by a market analysis or, in the case of the projects that involved an expansion of an existing facility, estimated attendance was derived from historical use of the facility being expanded. In each case, trip generation for the representative event was estimated by applying mode split (vehicle occupancy) and arrival time characteristics observed and documented at other similar facilities and for other similar activities. (There is a significant amount of cross-referencing and same-source references in the traffic generation estimating methodologies for the various projects reviewed.)

It should be noted that in none of these studies was the trip generation estimate based on facility size (floor area square footage); all trip generation estimates were based on estimated attendance. However, because attendance estimates are not available for the FWCC civic center land use, trip generation will need to be based on the forecasted square footage.

The information applicable to our FWCC needs is summarized in the following tables.

	facility size (sq ft)	a.m. peak trip gen	p.m. peak trip gen	Saturday trip gen
Olympia Arts and Conf Ctr	X		X	
Spokane Convention Ctr Exp	X	X	X	
Edmonds Ctr for the Arts	X		X	
Salem Conf Ctr	X	X	X	
Cowlitz Reg'l Conf Ctr	X		X	
Meydenbauer Ctr Exp		X	X	

Using the available facility size and trip generation information, the computed trip generation rates – in trips per 1,000 sq ft (ksf) of floor are compiled below.

	facility size (ksf)	a.m. peak trip gen rate	p.m. peak trip gen rate
Olympia Arts and Conf Ctr	42.3		3.0/ksf 25% in / 75% out
Spokane Convention Ctr Exp	243	6.6/ksf 80% in / 20% out	6.6/ksf 20% in / 80% out
Cowlitz Reg'l Conf Ctr	26		7.0/ksf 13% in / 87% out
Salem Conf Ctr	70	2.6/ksf 62% in / 38% out	0.6/ksf 53% in / 47% out

Civic Center Trip Generation Rates

For a “convention center” or “theater” type of use, trip generation for a future FWCC civic center development should use the following rates:

- Ø a.m. peak hour: 2.6 trips/ksf (62% in; 38% out)
- Ø p.m. peak hour: 7.0 trips/ksf (13% in; 87% out)
- Ø Saturday peak hour: 6.6 trips/ksf (80% in; 20% out)

Trip Generation Rates for Alternate Civic Center Use Type

An alternative to the convention center or theater type of use for the FWCC civic center development would be some sort of “day use” facility that gets regular, on-going use (as opposed to the episodic event use of a convention center). The ITE TGM has very few applicable land use types, but a.m., p.m. and Saturday peak trip generation rates are available for libraries (ITE Code 590), which is a reasonable representative of the type of civic use that could be developed in lieu of a convention center. For a FWCC civic center development scenario that comprises such an alternative to the convention center type of use, trip generation for the future development should use the following rates:

- Ø a.m. peak hour: 1.06 x floor area ksf (72% in, 28% out)
- Ø p.m. peak hour: 7.09 x floor area ksf (48% in, 52% out)
- Ø Saturday peak hour: 6.75 x floor area ksf (53% in, 47% out)

A comparison of the trip generation characteristics of the two land use types is compiled in the table below:

Peak Period	Convention Center/ Theater ^a : 100,000 sf	Alternate Use Type (Library): 100,000 sf
Weekday a.m. peak hour	260 trips 161 in / 99 out	106 trips 76 in / 30 out
Weekday p.m. peak hour	700 trips ^b 91 in / 609 out	709 trips 340 in / 369 out
Saturday peak hour	660 trips ^b 528 in / 132 out	675 trips 358 in / 317 out

^a Trip generation is compiled for a day/time when an event is scheduled; when no event is scheduled, trip generation would be close to zero
^b Depending on the schedule of the event that is generating the traffic, the entering and exiting percentages could be reversed

Source Documents

Cowlitz Regional Events Center

Table 5

Trip Generation for Cowlitz Regional Events Center									
	Occurrences	Attendance	Average Attendance Per Event	Number of Days	Auto Mode Split	Average Vehicle Occupancy	PM		
							% In	% Out	
Convention	22	11,198	509	1	1.3	392	5%	34%	
Trade Show	7	3,500	500	2	1.3	192	5%	34%	
Consumer Show	46	55,982	1217	2	1.3	468	5%	34%	
Meeting	100	5,000	50	1	1.3	38	0%	70%	
Events	66	53,394	809	1	2.5	324	5%	34%	
Banquet or Reception	60	12,000	200	1	2.5	80	90%	10%	

Note added by Mirai Associates: The event with the greatest attendance, a "consumer show," is estimated to generate 183 p.m. peak hour trips, of which 23 are inbound and 159 are outbound. For the 26,000-sf facility, this translates to 7.0 total p.m. peak hour trips per 1,000 sf, with 13% (23 of 183) inbound and 87% (159 of 183) outbound.

Salem

Table 3; Trip Generation for the Proposed Site (Phase 1)

Use	Size/Units	AM Peak		PM Peak	
		In/out	Total	In/out	Total
Hotel	200/Room	59/38	97	56/49	105
Conference Room	70,000/KSF	114/69	183	24/21	45
Total		173/107	280	80/70	150

Table 4 summarizes the vehicle trip generation forecast for the proposed project in the longer-term, with the size of the conference/meeting space approximately doubling by year 2020 (phase 2). By year 2020, the proposed development would generate approximately 463 total vehicle trips (entering and exiting combined) during the AM peak hour and approximately 195 total vehicle trips during the PM peak hour.

Table 4: Trip Generation for the Proposed Site (Phase 1 +Phase 2)

Use	Size/Units	AM Peak		PM Peak	
		In/out	Total	In/out	Total
Hotel	200/Room	59/38	97	56/49	105
Conference Room	140,000/KSF	228/138	366	48/42	90
Total		287/176	463	104/91	195

Trip Distribution and Assignment

Trip distribution was based on existing traffic patterns at the study area intersections and input from City of Salem staff ¹¹ Existing plus project volumes were developed by adding the phase 1 project-related trips (see Table 3) to the existing AM and PM peak hour counts. This assumes construction of phase 1 of the facility would be completed within the next two years (by 2005). Future (2020) plus project volumes were developed by adding both phase 1 and phase 2 project-related trips ¹² (see Tables 4) to the future baseline traffic volumes. The forecasted site-related traffic for phase 1 and phase 2 of the proposed project, along with assumed trip distribution percentages, is illustrated in Figures 3 and 4.

Near-Term Transportation Needs

Utilizing the prior assumptions and methodology outline in the previous sections, the following information summarizes the impacts to the transportation network study area intersections. Figure 5 shows the total forecasted traffic for Existing (2003) plus phase 1 of the proposed project.

Table 5 summarizes the AM and PM peak hour operating conditions with phase 1 of the proposed development in place.

Existing hotel has 114 rooms

¹¹ Phone conversation with Kevin Hottmann, City of Salem on 31/03

¹² Numbers reported for phase 2 include phase 1 trips.

Olympia Arts and Conference Center

For the Phoenix Inn hotel expansion, the City of Olympia Trip-generation Summary Table is used to estimate PM peak-hour trip-generation characteristics of a hotel (0.71 trips per room). As shown in the following table, the hotel was then added to the new trips from the Arts and Conference Center. This is the total new trips used to measure project traffic impact.

Trip-generation Summary Table				
		PM Peak-hour Average Trip-generation		
Land Use	Daily	Total	Inbound	Outbound
400-attendee Arts and Conference Center	427	128	26	102
100-room Hotel Expansion	237	71	14	57
Total	664	199	40	159

Spokane

The WSTC and "Live Theater" study resources were also used to identify a 80%/20% inbound/outbound vehicle split in the AM Peak hour and 20%/80% inbound/outbound vehicle split in the PM peak hour for the Convention Center, and a 60%/40% inbound/outbound vehicle split in the AM Peak hour and 90%/10% inbound/outbound vehicle split in the PM peak hour for the Opera House. Table 5 and Table 6 provides a summary of average and 85th percentile daily, AM peak hour, and PM peak hour trip generation for the existing Convention Center and Opera House. Pedestrian/bicycle trip generation has also been identified, even though these trips will not have much of an impact upon traffic conditions in the CBD.

Note added by Mirai Associates: The existing facility contains 120,600 sf , allocated as follows-- 60% (~70,000 sf) convention (exhibit hall, ballroom, mtg rooms, theater), 40% support (office, food svc, reception, engrg). The expansion is 173,000 sf, all for convention activities (expanded convention total 243,000 sf). Trip generation is based on convention activity space.

Table 5

Trip Generation Summary: Existing Convention Center							
	Daily Trips	AM Peak Hour Trips (30%)			PM Peak Hour Trips (30%)		
		In	Out	Tot.	In	Out	Tot.
Percent In/Out	--	80%	20%	100%	20%	80%	100%
Average	2,740	655	165	820	165	655	820
- Automobile	-1,640	-390	-100	-490	-100	-390	-490
- Pedestrian	-1,100	-265	-65a	-330	-65	-265	-330
85th Percentile	4,440	1,070	265	1,335	255	1,070	1,335
- Automobile	-2,660	-640	-160	-800	-160	-640	-800
Pedestrian	-1,780	-430	-105	-535	-105	-430	-535

Table 6

Trip Generation Summary: Existing Opera House							
	Daily Trips	AM Peak Hour Trips (30%)			PM Peak Hour Trips (30%)		
		In	Out	Tot.	In	Out	Tot.
Percent In/Out	--	80%	20%	100%	20%	80%	100%
Average	1,840	70	40	110	415	50	465
- Automobile	-1,570	-60	-35	-95	-355	-40	-395

- Pedestrian	-270	-10	-5	-15	-60	-10	-70
85th Percentile	2,650	95	65	160	600	65	665
- Automobile	-2,260	-80	-55	-135	-510	-55	-565
Pedestrian	-390	-15	-10	-25	-90	-10	-100

7. Trip generation rates were then determined for the Convention Center based upon a comparison of existing trip generation with attendance. These rates were developed to help estimate forecast trip generation with the expansion of the Convention facilities. Attendance is the most appropriate variable for measuring trip generation changes for this type of land use because traffic characteristics are most closely correlated with attendance versus other base variables such as building size, seating capacity, etc.

Attachment B

Memo

To: Chris Breiland, Kendra Breiland, Fehr & Peers
From: Erika Hollander and Rochelle Henson
CC: Patrick Hindmarsh and Steven Smith, PBS&J
Project File
Date: 2/25/09
Re: Trip Generation Assumptions for Austin Road Business Park – Phase 1 Analysis

We have reviewed the Memo on the Trip Generation Assumptions and having the following input:

For the Heavy Industrial we think based on the exercise that we did with CBRE and the proposal by the applicant it would be most appropriate to do a Scenario that is a hybrid of 2 and 3

80% High Cube Warehouse, 15% Light Industrial, and 5% Allowable Retail

Please give us feedback on whether this does not seem appropriate.

For the BIP Business/Industrial Park District the only concern with the assumptions outlined is that it might not be taking into account some language in the General Plan. The General Plan allows for warehouse storage and distribution to support industrial up to 20% of the total land area in any BIP. The question is whether this has or can be factored into the assumptions that you are using. For example mini-storage and uses which required outdoor storage (which are obviously not a office park) are permitted uses as outlined in the General Plan. The reason it should be accounted for is that the BIP district is one of the few areas where these types of uses are permitted.

We are all fine with the EXPO assumptions.

Please give us a call if you have any questions.

Attachment C

Full Buildout of Sept. 11, 2009 Land Use from Project Applicant																	
Land Use	Area (KSF) or Units	FAR	ITE Code	Daily				AM Peak				PM Peak					
				Rate	Trips	In	Out	Rate	Trips	In	Out	Rate	Trips	In	Out		
Heavy Industrial District																	
High-Cube Warehouse	4,465	0.5	152	2.25	10,028	5,014	5,014	0.12	518	337	181	0.11	482	159	323		
Light Industrial	915	0.5	110	7.36	6,730	3,365	3,365	1.08	990	871	119	1.26	1,151	138	1,012		
Total	5,380				16,758	8,379	8,379		1,508	1,208	300		1,633	297	1,336		
Business/Industrial/Professional District																	
Office Park	203	0.35	750	12.44	2,522	1,261	1,261	1.98	402	358	44	1.69	343	48	295		
Light Industrial	608	0.35	110	7.30	4,443	2,221	2,221	1.03	629	553	75	1.17	713	86	627		
Mini-Storage	203	0.35	151	2.39	486	243	243	0.15	30	18	12	0.26	53	27	26		
Total	1,014				7,451	3,725	3,725		1,061	929	132		1,109	161	948		
General Commercial																	
	1,178	0.25	820	28.64	33,743	16,871	16,871	0.56	660	403	257	2.82	3,321	1,627	1,694		
Commercial Mixed Use																	
Shopping Center	410	0.25	820	41.44	16,992	8,496	8,496	0.86	354	216	138	3.99	1,637	802	835		
Office Park	91	0.25	750	14.91	1,357	679	679	2.74	249	222	27	2.27	207	29	178		
Apartment	828		220	6.65	5,506	2,753	2,753	0.51	422	84	338	0.62	513	334	180		
Total					23,856	11,928	11,928		1,025	522	503		2,358	1,165	1,193		
Residential																	
Low/Medium Density Residential	2,358		210	9.57	22,566	11,283	11,283	0.75	1,769	442	1,326	1.01	2,382	1,500	881		
High Density Residential	1,012		220	6.65	6,730	3,365	3,365	0.51	516	103	413	0.62	627	408	220		
Total	3,370				29,296	14,648	14,648		2,285	545	1,739		3,009	1,908	1,101		
EXPO Center																	
	122	0.35		5.84	712	356	356	0.65	79	63	16	1.75	214	64	149		
Total Gross Trips					111,816	55,908	55,908		6,618	3,670	2,948		11,643	5,222	6,420		
Total Employment Trips						25,081	12,540	12,540		2,788	2,340	447		2,896	460	2,436	
Total Retail/Entertainment Trips					2,399	51,933	25,966	25,966		1,124	700	424		5,225	2,521	2,704	
Total Residential Trips						34,802	17,401	17,401		2,707	630	2,077		3,522	2,242	1,280	
Internal Trips																	
Percent of Residential to Retail/Entertainment On-Site					20%			3,480			94	312		448	256		
Percent of Residential to Employment On-Site					5%			870			63	208		112	64		
Percent of Employment to Retail/Entertainment on-Site					10%			1,254			47	9		23	122		
Other End of Internal Trips																	
Retail/Entertainment							4,734	4,734			321	141		378	471		
Employment							870	870			208	63		64	112		
External Trips																	
External Employment Trips						83%	10,416	10,416			2,086	375		373	2,202		
External Retail/Entertainment Trips						82%	21,232	21,232			379	283		2,143	2,233		
External Residential Trips						75%	13,051	13,051			472	1,558		1,681	960		
Total External Trips						89,398	44,699	44,699		5,153	2,938	2,216		9,592	4,197	5,395	
Total Internal Trips						22,417	11,209	11,209		1,465	732	732		2,051	1,025	1,025	
						20%				22%				18%			
Pass-by Trips																	
Retail Pass-by Trips					15%		6,370	3,185	3,185		66	38	28		875	429	447
Internalization/Pass-by Rate						26%		26%	26%		23%	21%	26%		25%	28%	23%
Net New Trips						83,029	41,514	41,514		5,087	2,900	2,187		8,717	3,768	4,948	

Technical Appendix D
Existing Plus Project Conditions
Intersection LOS Reports

SIMTRAFFIC LEVEL OF SERVICE REPORT Including Upstream Delays

Project: ARBPRC **HCM:** 2000
Scenario: E+P **PHF:** 0.95
TOD: AM Peak Hou **Analysis Period:** 15 Minutes **# of Runs:** 10

Intersection: 1: SR 120 WB Ramp & Main Street **Type:** Signalized

Approach	Movement	Demand Volume	Volume Served			Delay/Veh (sec)		
			Avg	%	Std Dev	Avg	LOS	Std Dev
NB	L	89	85	96	7	20.6	C	--
	T	108	106	98	5	9.5	A	--
	Subtotal	197	190	96	--	14.5	B	--
SB	T	92	87	95	10	10.5	B	--
	R	71	68	96	8	5.6	A	--
	Subtotal	163	155	95	--	8.4	A	--
WB	L	8	8	100	2	35.1	D	--
	R	89	95	106	10	11.0	B	--
	Subtotal	97	102	105	--	12.7	B	--
Total		458	447	98	--	12.0	B	--

Intersection: 2: SR 120 EB Ramps & Main Street **Type:** Signalized

Approach	Movement	Demand Volume	Volume Served			Delay/Veh (sec)		
			Avg	%	Std Dev	Avg	LOS	Std Dev
NB	T	132	132	100	13	20.8	C	--
	R	11	10	91	2	14.2	B	--
	Subtotal	142	141	99	--	20.3	C	--
SB	L	50	48	96	7	27.0	C	--
	T	50	50	100	7	9.6	A	--
	Subtotal	100	98	98	--	18.1	B	--
EB	L	66	64	97	7	29.5	C	--
	R	32	31	97	5	8.7	A	--
	Subtotal	97	94	97	--	22.7	C	--
Total		339	334	99	--	20.3	C	--

SIMTRAFFIC LEVEL OF SERVICE REPORT Including Upstream Delays

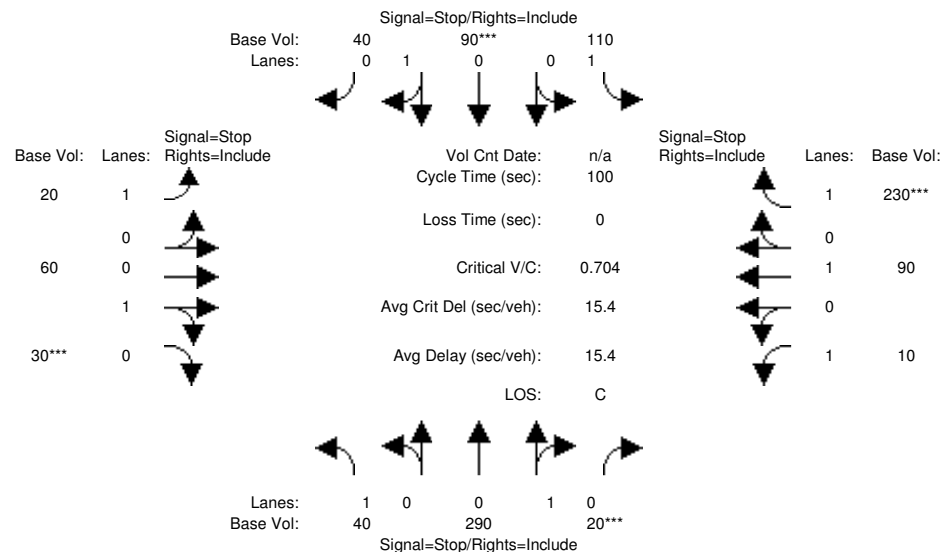
Project: ARBPRC **HCM:** 2000
Scenario: E+P **PHF:** 0.95
TOD: AM Peak Hou **Analysis Period:** 15 Minutes **# of Runs:** 10

Intersection: 3: Atherton Drive & Main Street **Type:** Un-Signalized

Approach	Movement	Demand Volume	Volume Served			Delay/Veh (sec)		
			Avg	%	Std Dev	Avg	LOS	Std Dev
NB	L	5	5	100	2	12.2	B	--
	T	137	135	99	12	13.5	B	--
	Subtotal	142	140	99	--	13.5	B	--
SB	T	61	60	98	7	9.0	A	--
	R	21	22	105	3	4.6	A	--
	Subtotal	82	82	100	--	7.9	A	--
EB	L	5	4	80	2	6.8	A	--
	R	3	3	100	2	2.7	A	--
	Subtotal	8	7	88	--	5.2	A	--
Total		232	229	99	--	11.2	B	--

Level Of Service Computation Report
 2000 HCM 4-Way Stop (Base Volume Alternative)
 Default Scenario

Intersection #3: Woodward Ave / Main Street E+P AM



Approach:	North Bound			South Bound			East Bound			West Bound		
Movement:	L	T	R	L	T	R	L	T	R	L	T	R
Min. Green:	0	0	0	0	0	0	0	0	0	0	0	0

Volume Module:	North Bound			South Bound			East Bound			West Bound		
Base Vol:	40	290	20	110	90	40	20	60	30	10	90	230
Growth Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Initial Bse:	40	290	20	110	90	40	20	60	30	10	90	230
User Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PHF Adj:	0.80	0.80	0.80	0.80	0.95	0.95	0.95	0.70	0.70	0.70	0.95	0.95
PHF Volume:	50	363	25	116	95	42	29	86	43	11	95	242
Reduct Vol:	0	0	0	0	0	0	0	0	0	0	0	0
Reduced Vol:	50	363	25	116	95	42	29	86	43	11	95	242
PCE Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
MLF Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Final Volume:	50	363	25	116	95	42	29	86	43	11	95	242

Saturation Flow Module:	North Bound			South Bound			East Bound			West Bound		
Adjustment:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Lanes:	1.00	0.94	0.06	1.00	0.69	0.31	1.00	0.67	0.33	1.00	1.00	1.00
Final Sat.:	500	515	36	472	361	160	438	322	161	446	477	529

Capacity Analysis Module:	North Bound			South Bound			East Bound			West Bound		
Vol/Sat:	0.10	0.70	0.70	0.25	0.26	0.26	0.07	0.27	0.27	0.02	0.20	0.46
Crit Moves:	****	****	****	****	****	****	****	****	****	****	****	****
Delay/Veh:	10.4	22.0	22.0	12.1	11.3	11.3	10.8	11.8	11.8	10.5	11.5	14.0
Delay Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
AdjDel/Veh:	10.4	22.0	22.0	12.1	11.3	11.3	10.8	11.8	11.8	10.5	11.5	14.0
LOS by Move:	B	C	C	B	B	B	B	B	B	B	B	B
ApproachDel:	20.6			11.7			11.6			13.2		
Delay Adj:	1.00			1.00			1.00			1.00		
ApprAdjDel:	20.6			11.7			11.6			13.2		
LOS by Appr:	C			B			B			B		
AllWayAvgQ:	0.1	2.0	2.0	0.3	0.3	0.3	0.1	0.3	0.3	0.0	0.2	0.7

Note: Queue reported is the number of cars per lane.

Peak Hour Volume Signal Warrant Report [Urban]

 Intersection #3 Woodward Ave / Main Street E+P AM

 Base Volume Alternative: Peak Hour Warrant NOT Met

Approach:	North Bound			South Bound			East Bound			West Bound		
Movement:	L	T	R	L	T	R	L	T	R	L	T	R
Control:	Stop Sign			Stop Sign			Stop Sign			Stop Sign		
Lanes:	1	0	1	0	1	0	1	0	1	1	0	1
Initial Vol:	40	290	20	110	90	40	20	60	30	10	90	230
Major Street Volume:	590			330			601					
Minor Approach Volume:												
Minor Approach Volume Threshold:	601											

SIGNAL WARRANT DISCLAIMER
 This peak hour signal warrant analysis should be considered solely as an "indicator" of the likelihood of an unsignalized intersection warranting a traffic signal in the future. Intersections that exceed this warrant are probably more likely to meet one or more of the other volume based signal warrant (such as the 4-hour or 8-hour warrants).

The peak hour warrant analysis in this report is not intended to replace a rigorous and complete traffic signal warrant analysis by the responsible jurisdiction. Consideration of the other signal warrants, which is beyond the scope of this software, may yield different results.

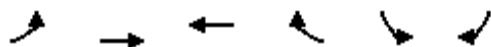
HCM Unsignalized Intersection Capacity Analysis
 5: Industrial Park Dr & VanRyn (Spreckles)

11/10/2009

	→	↘	↙	←	↖	↗	
Movement	EBT	EBR	WBL	WBT	NBL	NBR	
Lane Configurations	↑	↗	↙	↑↑	↖	↗	
Sign Control	Free			Free	Stop		
Grade	0%			0%	0%		
Volume (veh/h)	140	30	140	120	50	90	
Peak Hour Factor	0.75	0.75	0.92	0.92	0.85	0.85	
Hourly flow rate (vph)	187	40	152	130	59	106	
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			227		556	187	
vC1, stage 1 conf vol							
vC2, stage 2 conf vol							
vCu, unblocked vol			227		556	187	
tC, single (s)			4.2		6.9	7.0	
tC, 2 stage (s)							
tF (s)			2.2		3.6	3.4	
p0 queue free %			88		85	87	
cM capacity (veh/h)			1317		401	814	
Direction, Lane #	EB 1	EB 2	WB 1	WB 2	WB 3	NB 1	NB 2
Volume Total	187	40	152	65	65	59	106
Volume Left	0	0	152	0	0	59	0
Volume Right	0	40	0	0	0	0	106
cSH	1700	1700	1317	1700	1700	401	814
Volume to Capacity	0.11	0.02	0.12	0.04	0.04	0.15	0.13
Queue Length 95th (ft)	0	0	10	0	0	13	11
Control Delay (s)	0.0	0.0	8.1	0.0	0.0	15.5	10.1
Lane LOS			A			C	B
Approach Delay (s)	0.0		4.4			12.0	
Approach LOS						B	
Intersection Summary							
Average Delay			4.8				
Intersection Capacity Utilization			28.5%	ICU Level of Service		A	
Analysis Period (min)			15				

HCM Unsignalized Intersection Capacity Analysis
6: Woodward Avenue & VanRyn (Spreckles)

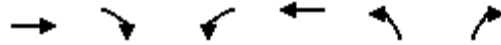
11/10/2009



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations	↶	↷	↷↶		↶	↷
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Volume (veh/h)	80	260	330	20	20	70
Peak Hour Factor	0.92	0.92	0.92	0.92	0.80	0.80
Hourly flow rate (vph)	87	283	359	22	25	88
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type					TWLTL	
Median storage veh					0	
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	380				826	190
vC1, stage 1 conf vol					370	
vC2, stage 2 conf vol					457	
vCu, unblocked vol	380				826	190
tC, single (s)	4.1				6.8	6.9
tC, 2 stage (s)					5.8	
tF (s)	2.2				3.5	3.3
p0 queue free %	93				92	89
cM capacity (veh/h)	1175				304	819
Direction, Lane #	EB 1	EB 2	WB 1	WB 2	SB 1	SB 2
Volume Total	87	283	239	141	25	88
Volume Left	87	0	0	0	25	0
Volume Right	0	0	0	22	0	88
cSH	1175	1700	1700	1700	304	819
Volume to Capacity	0.07	0.17	0.14	0.08	0.08	0.11
Queue Length 95th (ft)	6	0	0	0	7	9
Control Delay (s)	8.3	0.0	0.0	0.0	17.9	9.9
Lane LOS	A				C	A
Approach Delay (s)	2.0		0.0		11.7	
Approach LOS					B	
Intersection Summary						
Average Delay			2.4			
Intersection Capacity Utilization			27.5%		ICU Level of Service	A
Analysis Period (min)			15			

HCM Unsignalized Intersection Capacity Analysis
7: Woodward Avenue & Pillsbury Road

11/10/2009

























Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↶		↷	↶↶	↷↷	
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Volume (veh/h)	270	10	20	340	10	40
Peak Hour Factor	0.92	0.92	0.92	0.92	0.80	0.80
Hourly flow rate (vph)	293	11	22	370	12	50
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				TWLTL		
Median storage veh				1		
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume			304		527	299
vC1, stage 1 conf vol					299	
vC2, stage 2 conf vol					228	
vCu, unblocked vol			304		527	299
tC, single (s)			4.1		6.8	6.9
tC, 2 stage (s)					5.8	
tF (s)			2.2		3.5	3.3
p0 queue free %			98		98	93
cM capacity (veh/h)			1253		557	697

Direction, Lane #	EB 1	WB 1	WB 2	WB 3	NB 1
Volume Total	304	22	185	185	62
Volume Left	0	22	0	0	12
Volume Right	11	0	0	0	50
cSH	1700	1253	1700	1700	664
Volume to Capacity	0.18	0.02	0.11	0.11	0.09
Queue Length 95th (ft)	0	1	0	0	8
Control Delay (s)	0.0	7.9	0.0	0.0	11.0
Lane LOS		A			B
Approach Delay (s)	0.0	0.4			11.0
Approach LOS					B

Intersection Summary					
Average Delay			1.1		
Intersection Capacity Utilization		26.6%		ICU Level of Service	A
Analysis Period (min)			15		

HCM Unsignalized Intersection Capacity Analysis
8: Woodward Avenue & Atherton Dr.

11/10/2009

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control	Free		Free		Stop		Stop		Stop		Stop	
Grade	0%		0%		0%		0%		0%		0%	
Volume (veh/h)	10	140	160	630	90	20	260	10	250	30	120	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	152	174	685	98	22	283	11	272	33	130	11
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type	None						TWLTL					
Median storage veh												1
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	120			326			1717	1663	152	1929	1826	109
vC1, stage 1 conf vol											1478	1478
vC2, stage 2 conf vol											451	348
vCu, unblocked vol	120			326			1717	1663	152	1929	1826	109
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)											6.1	5.5
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	99			44			0	75	70	0	0	99
cM capacity (veh/h)	1468			1234			0	43	894	16	34	945
Direction, Lane #	EB 1	EB 2	EB 3	WB 1	WB 2	NB 1	NB 2	NB 3	SB 1	SB 2	SB 3	
Volume Total	11	152	174	685	120	283	7	275	33	87	54	
Volume Left	11	0	0	685	0	283	0	0	33	0	0	
Volume Right	0	0	174	0	22	0	0	272	0	0	11	
cSH	1468	1700	1700	1234	1700	0	43	709	16	34	42	
Volume to Capacity	0.01	0.09	0.10	0.56	0.07	Err	0.17	0.39	2.04	2.56	1.29	
Queue Length 95th (ft)	1	0	0	89	0	Err	14	46	117	248	134	
Control Delay (s)	7.5	0.0	0.0	11.5	0.0	Err	105.5	13.3	972.5	958.0	388.9	
Lane LOS	A			B			F	F	B	F	F	F
Approach Delay (s)	0.2			9.8			Err			782.9		
Approach LOS							F			F		
Intersection Summary												
Average Delay			Err									
Intersection Capacity Utilization			73.6%		ICU Level of Service						D	
Analysis Period (min)			15									

HCM Unsignalized Intersection Capacity Analysis
 9: Woodward Avenue & Moffat Blvd.

11/10/2009



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Volume (veh/h)	190	230	690	410	170	50
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	207	250	750	446	185	54
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	2158	212	239			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	2158	212	239			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	0	70	44			
cM capacity (veh/h)	23	828	1328			

Direction, Lane #	EB 1	NB 1	NB 2	SB 1
Volume Total	457	750	446	239
Volume Left	207	750	0	0
Volume Right	250	0	0	54
cSH	49	1328	1700	1700
Volume to Capacity	9.36	0.56	0.26	0.14
Queue Length 95th (ft)	Err	93	0	0
Control Delay (s)	Err	11.2	0.0	0.0
Lane LOS	F	B		
Approach Delay (s)	Err	7.0		0.0
Approach LOS	F			

Intersection Summary			
Average Delay		2418.0	
Intersection Capacity Utilization		84.9%	ICU Level of Service E
Analysis Period (min)		15	

SIMTRAFFIC LEVEL OF SERVICE REPORT Including Upstream Delays

Project: ARBPRC **HCM:** 2000
Scenario: E+P **PHF:** 0.95
TOD: AM Peak Hou **Analysis Period:** 15 Minutes **# of Runs:** 10

Intersection: 10: Moffat Blvd. & SR 99 SB **Type:** Un-Signalized

Approach	Movement	Demand Volume	Volume Served			Delay/Veh (sec)		
			Avg	%	Std Dev	Avg	LOS	Std Dev
SB	L	182	24	13	13	1717.4	F	--
	R	126	15	12	9	1752.6	F	--
	Subtotal	308	39	13	--	1731.3	F	--
EB	T	105	89	85	13	157.2	F	--
	Subtotal	105	89	85	--	157.2	F	--
WB	T	163	72	44	7	1.1	A	--
	Subtotal	163	72	44	--	1.1	A	--
Total		576	200	35	--	407.8	F	--

HCM Unsignalized Intersection Capacity Analysis
 11: Graves Road & Austin Rd.

11/10/2009



Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations	↔		↔		↔	
Sign Control	Stop		Free		Free	
Grade	0%		0%		0%	
Volume (veh/h)	110	20	180	10	20	250
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	120	22	196	11	22	272
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	516	201			207	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	516	201			207	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	77	97			98	
cM capacity (veh/h)	511	840			1365	

Direction, Lane #	WB 1	NB 1	SB 1
Volume Total	141	207	293
Volume Left	120	0	22
Volume Right	22	11	0
cSH	543	1700	1365
Volume to Capacity	0.26	0.12	0.02
Queue Length 95th (ft)	26	0	1
Control Delay (s)	13.9	0.0	0.7
Lane LOS	B		A
Approach Delay (s)	13.9	0.0	0.7
Approach LOS	B		

Intersection Summary			
Average Delay		3.4	
Intersection Capacity Utilization	41.7%	ICU Level of Service	A
Analysis Period (min)		15	

SIMTRAFFIC LEVEL OF SERVICE REPORT Including Upstream Delays

Project: ARBPRC **HCM:** 2000
Scenario: E+P **PHF:** 0.95
TOD: AM Peak Hou **Analysis Period:** 15 Minutes **# of Runs:** 10

Intersection: 12: SR 99 NB & Austin Rd. **Type:** Un-Signalized

Approach	Movement	Demand Volume	Volume Served			Delay/Veh (sec)		
			Avg	%	Std Dev	Avg	LOS	Std Dev
NB	L	176	89	50	9	19.7	C	--
	T	37	23	62	5	18.1	C	--
	Subtotal	213	111	52	--	19.4	C	--
SB	T	74	52	70	11	229.5	F	--
	R	21	16	76	4	238.8	F	--
	Subtotal	95	68	72	--	231.7	F	--
WB	L	279	63	23	11	1235.1	F	--
	R	13	3	23	1	1141.6	F	--
	Subtotal	292	66	23	--	1231.2	F	--
Total	600	245	41	--	402.7	F	--	























Intersection: 13: Moffat Blvd. & Austin Rd. **Type:** Un-Signalized

Approach	Movement	Demand Volume	Volume Served			Delay/Veh (sec)		
			Avg	%	Std Dev	Avg	LOS	Std Dev
NB	L	82	43	52	7	123.4	F	--
	T	182	94	52	10	125.2	F	--
	R	126	66	52	7	113.6	F	--
	Subtotal	389	203	52	--	121.0	F	--
SB	L	13	7	54	2	287.0	F	--
	T	261	84	32	3	243.9	F	--
	R	79	25	32	3	250.0	F	--
	Subtotal	353	116	33	--	247.8	F	--
EB	L	29	11	38	3	87.1	F	--
	T	42	19	45	4	82.3	F	--
	R	216	84	39	7	104.6	F	--
	Subtotal	287	114	40	--	99.2	F	--
WB	L	3	3	100	1	7.6	A	--
	T	3	3	100	1	11.8	B	--
	R	3	3	100	1	6.7	A	--
	Subtotal	8	9	113	--	8.7	A	--
Total	1037	442	43	--	146.5	F	--	

HCM Signalized Intersection Capacity Analysis

14: Yosemite Avenue & Austin Rd.

11/10/2009

												
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	0.95		1.00	1.00		1.00	1.00	
Frt	1.00	1.00	0.85	1.00	0.99		1.00	0.92		1.00	0.94	
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770	1863	1583	1770	3503		1770	1723		1770	1751	
Flt Permitted	0.95	1.00	1.00	0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (perm)	1770	1863	1583	1770	3503		1770	1723		1770	1751	
Volume (vph)	30	250	70	140	410	30	90	60	60	30	60	40
Peak-hour factor, PHF	0.90	0.90	0.90	0.95	0.95	0.95	0.85	0.85	0.85	0.95	0.95	0.95
Adj. Flow (vph)	33	278	78	147	432	32	106	71	71	32	63	42
RTOR Reduction (vph)	0	0	59	0	9	0	0	45	0	0	28	0
Lane Group Flow (vph)	33	278	19	147	455	0	106	97	0	32	77	0
Turn Type	Prot		Perm	Prot			Prot			Prot		
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases			4									
Actuated Green, G (s)	2.1	14.1	14.1	4.4	16.4		4.4	20.8		2.1	18.5	
Effective Green, g (s)	2.1	14.1	14.1	4.4	16.4		4.4	20.8		2.1	18.5	
Actuated g/C Ratio	0.04	0.25	0.25	0.08	0.29		0.08	0.36		0.04	0.32	
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)	65	458	389	136	1001		136	624		65	564	
v/s Ratio Prot	0.02	c0.15		c0.08	0.13		c0.06	c0.06		0.02	0.04	
v/s Ratio Perm			0.01									
v/c Ratio	0.51	0.61	0.05	1.08	0.45		0.78	0.16		0.49	0.14	
Uniform Delay, d1	27.1	19.2	16.5	26.5	16.8		26.0	12.4		27.1	13.8	
Progression Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	6.1	2.3	0.1	100.5	0.3		24.0	0.5		5.8	0.5	
Delay (s)	33.3	21.5	16.6	127.0	17.2		50.0	12.9		32.9	14.3	
Level of Service	C	C	B	F	B		D	B		C	B	
Approach Delay (s)		21.5			43.6			28.8			18.6	
Approach LOS		C			D			C			B	
Intersection Summary												
HCM Average Control Delay			32.3			HCM Level of Service				C		
HCM Volume to Capacity ratio			0.41									
Actuated Cycle Length (s)			57.4			Sum of lost time (s)		12.0				
Intersection Capacity Utilization			42.6%			ICU Level of Service		A				
Analysis Period (min)			15									
c Critical Lane Group												

HCM Signalized Intersection Capacity Analysis
 15: Yosemite Avenue & Jack Tone Rd

11/10/2009

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	1.00	0.95		1.00	0.95		1.00	1.00		1.00	1.00	
Frt	1.00	0.98		1.00	0.99		1.00	0.96		1.00	0.97	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770	3467		1770	3496		1770	1785		1770	1813	
Flt Permitted	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (perm)	1770	3467		1770	3496		1770	1785		1770	1813	
Volume (vph)	20	190	30	110	450	40	40	130	50	30	230	50
Peak-hour factor, PHF	0.90	0.90	0.90	0.95	0.95	0.95	0.80	0.80	0.80	0.80	0.80	0.80
Adj. Flow (vph)	22	211	33	116	474	42	50	162	62	38	288	62
RTOR Reduction (vph)	0	11	0	0	6	0	0	11	0	0	7	0
Lane Group Flow (vph)	22	233	0	116	510	0	50	213	0	38	343	0
Turn Type	Prot			Prot			Prot			Prot		
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases												
Actuated Green, G (s)	2.0	12.7		5.1	15.8		3.8	18.2		2.3	16.7	
Effective Green, g (s)	2.0	12.7		5.1	15.8		3.8	18.2		2.3	16.7	
Actuated g/C Ratio	0.04	0.23		0.09	0.29		0.07	0.34		0.04	0.31	
Clearance Time (s)	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	
Lane Grp Cap (vph)	65	811		166	1017		124	598		75	558	
v/s Ratio Prot	0.01	0.07		c0.07	c0.15		c0.03	0.12		0.02	c0.19	
v/s Ratio Perm												
v/c Ratio	0.34	0.29		0.70	0.50		0.40	0.36		0.51	0.61	
Uniform Delay, d1	25.5	17.1		23.9	16.0		24.2	13.6		25.4	16.1	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	3.1	0.2		12.1	0.4		2.1	0.4		5.3	2.0	
Delay (s)	28.6	17.3		36.0	16.4		26.3	14.0		30.7	18.1	
Level of Service	C	B		D	B		C	B		C	B	
Approach Delay (s)		18.2			20.0			16.2			19.3	
Approach LOS		B			B			B			B	
Intersection Summary												
HCM Average Control Delay			18.8			HCM Level of Service				B		
HCM Volume to Capacity ratio			0.58									
Actuated Cycle Length (s)			54.3			Sum of lost time (s)			16.0			
Intersection Capacity Utilization			48.9%			ICU Level of Service				A		
Analysis Period (min)			15									
c Critical Lane Group												

HCM Unsignalized Intersection Capacity Analysis
 16: Graves Road & Jack Tone Rd

11/10/2009



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations	↔			↑	↑	
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Volume (veh/h)	20	20	20	200	270	110
Peak Hour Factor	0.80	0.80	0.85	0.85	0.92	0.92
Hourly flow rate (vph)	25	25	24	235	293	120
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	636	353	413			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	636	353	413			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	94	96	98			
cM capacity (veh/h)	433	690	1146			
Direction, Lane #	EB 1	NB 1	SB 1			
Volume Total	50	259	413			
Volume Left	25	24	0			
Volume Right	25	0	120			
cSH	532	1146	1700			
Volume to Capacity	0.09	0.02	0.24			
Queue Length 95th (ft)	8	2	0			
Control Delay (s)	12.5	0.9	0.0			
Lane LOS	B	A				
Approach Delay (s)	12.5	0.9	0.0			
Approach LOS	B					
Intersection Summary						
Average Delay			1.2			
Intersection Capacity Utilization	37.2%		ICU Level of Service	A		
Analysis Period (min)			15			

HCM Unsignalized Intersection Capacity Analysis
 17: Sedan Ave & Main Street

11/10/2009



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Volume (veh/h)	10	10	10	10	10	10	10	90	10	10	70	10
Peak Hour Factor	1.00	1.00	1.00	0.50	0.50	0.50	0.70	0.70	0.70	0.85	0.85	0.85
Hourly flow rate (vph)	10	10	10	20	20	20	14	129	14	12	82	12
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	306	283	88	291	282	136	94			143		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	306	283	88	291	282	136	94			143		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	98	98	99	97	97	98	99			99		
cM capacity (veh/h)	608	615	970	638	616	913	1500			1440		
Direction, Lane #	EB 1	WB 1	NB 1	SB 1								
Volume Total	30	60	157	106								
Volume Left	10	20	14	12								
Volume Right	10	20	14	12								
cSH	697	700	1500	1440								
Volume to Capacity	0.04	0.09	0.01	0.01								
Queue Length 95th (ft)	3	7	1	1								
Control Delay (s)	10.4	10.6	0.7	0.9								
Lane LOS	B	B	A	A								
Approach Delay (s)	10.4	10.6	0.7	0.9								
Approach LOS	B	B										
Intersection Summary												
Average Delay			3.3									
Intersection Capacity Utilization			17.4%		ICU Level of Service					A		
Analysis Period (min)			15									

HCM Signalized Intersection Capacity Analysis












18: Sedan Ave & Austin Rd.

11/10/2009

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		
Lane Util. Factor	1.00	0.95		0.97	0.95	1.00	1.00	0.95	1.00	0.97	0.95		
Frt	1.00	0.97		1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.99		
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		
Satd. Flow (prot)	1770	3447		3433	3539	1583	1770	3539	1583	3433	3516		
Flt Permitted	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		
Satd. Flow (perm)	1770	3447		3433	3539	1583	1770	3539	1583	3433	3516		
Volume (vph)	90	380	80	80	20	160	20	500	490	300	220	10	
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	413	87	87	22	174	22	543	533	326	239	11	
RTOR Reduction (vph)	0	17	0	0	0	145	0	0	165	0	3	0	
Lane Group Flow (vph)	98	483	0	87	22	29	22	543	368	326	247	0	
Turn Type	Prot			Prot		Perm	Prot		Perm	Prot			
Protected Phases	7	4		3	8		5	2		1	6		
Permitted Phases						8			2				
Actuated Green, G (s)	7.6	15.6		4.4	12.4	12.4	1.8	25.4	25.4	12.5	36.1		
Effective Green, g (s)	7.6	15.6		4.4	12.4	12.4	1.8	25.4	25.4	12.5	36.1		
Actuated g/C Ratio	0.10	0.21		0.06	0.17	0.17	0.02	0.34	0.34	0.17	0.49		
Clearance Time (s)	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		
Lane Grp Cap (vph)	182	728		204	594	266	43	1216	544	581	1718		
v/s Ratio Prot	c0.06	c0.14		0.03	0.01		0.01	0.15		c0.09	0.07		
v/s Ratio Perm						0.02			c0.23				
v/c Ratio	0.54	0.66		0.43	0.04	0.11	0.51	0.45	0.68	0.56	0.14		
Uniform Delay, d1	31.5	26.7		33.5	25.8	26.1	35.6	18.8	20.7	28.2	10.4		
Progression Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		
Incremental Delay, d2	3.0	2.3		1.4	0.0	0.2	9.9	0.3	3.3	1.2	0.0		
Delay (s)	34.5	29.0		35.0	25.8	26.3	45.5	19.1	24.0	29.4	10.4		
Level of Service	C	C		C	C	C	D	B	C	C	B		
Approach Delay (s)		29.9			28.9			22.0			21.2		
Approach LOS		C			C			C			C		
Intersection Summary													
HCM Average Control Delay			24.4									HCM Level of Service	C
HCM Volume to Capacity ratio			0.65										
Actuated Cycle Length (s)			73.9									Sum of lost time (s)	16.0
Intersection Capacity Utilization			62.0%									ICU Level of Service	B
Analysis Period (min)			15										
c	Critical Lane Group												

HCM Unsignalized Intersection Capacity Analysis
 19: W. River Rd & Jack Tone Rd

11/10/2009

						
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Sign Control	Stop		Free		Free	
Grade	0%		0%		0%	
Volume (veh/h)	180	40	150	60	30	260
Peak Hour Factor	0.85	0.85	0.90	0.90	0.92	0.92
Hourly flow rate (vph)	212	47	167	67	33	283
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	548	200			233	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	548	200			233	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	56	94			98	
cM capacity (veh/h)	485	841			1334	
Direction, Lane #	WB 1	WB 2	NB 1	SB 1	SB 2	
Volume Total	212	47	233	33	283	
Volume Left	212	0	0	33	0	
Volume Right	0	47	67	0	0	
cSH	485	841	1700	1334	1700	
Volume to Capacity	0.44	0.06	0.14	0.02	0.17	
Queue Length 95th (ft)	55	4	0	2	0	
Control Delay (s)	18.0	9.5	0.0	7.8	0.0	
Lane LOS	C	A		A		
Approach Delay (s)	16.5		0.0	0.8		
Approach LOS	C					
Intersection Summary						
Average Delay			5.6			
Intersection Capacity Utilization			34.9%	ICU Level of Service	A	
Analysis Period (min)			15			

SIMTRAFFIC LEVEL OF SERVICE REPORT Including Upstream Delays

Project: ARBPRC **HCM:** 2000
Scenario: E+P **PHF:** 0.95
TOD: AM Peak Hou **Analysis Period:** 15 Minutes **# of Runs:** 10

Intersection: 20: Santos Ave & Jack Tone Rd **Type:** Signalized

Approach	Movement	Demand Volume	Volume Served			Delay/Veh (sec)		
			Avg	%	Std Dev	Avg	LOS	Std Dev
NB	L	21	19	90	3	15.1	B	--
	T	37	38	103	4	17.8	B	--
	R	8	7	88	1	3.4	A	--
	Subtotal	66	64	97	--	15.4	B	--
SB	L	5	6	120	3	29.7	C	--
	T	100	97	97	10	34.9	C	--
	R	11	9	82	3	25.6	C	--
	Subtotal	116	112	97	--	33.8	C	--
EB	L	5	5	100	2	31.7	C	--
	T	5	5	100	1	39.6	D	--
	R	26	26	100	4	4.6	A	--
	Subtotal	37	36	97	--	13.4	B	--
WB	L	13	13	100	4	41.5	D	--
	T	16	17	100	4	35.7	D	--
	R	13	14	108	5	2.9	A	--
	Subtotal	42	44	105	--	27.1	C	--
Total	261	255	98	--	25.2	C	--	

Intersection: 22: Colony Rd / SR 99 On-Ramps & Jack Tone Rd **Type:** Signalized

Approach	Movement	Demand Volume	Volume Served			Delay/Veh (sec)		
			Avg	%	Std Dev	Avg	LOS	Std Dev
NB	T	47	48	102	4	6.4	A	--
	R	82	83	101	11	4.6	A	--
	Subtotal	129	131	102	--	5.2	A	--
SB	L	5	6	120	2	51.8	D	--
	T	39	40	103	5	4.1	A	--
	R	61	57	93	9	5.7	A	--
	R2	34	33	97	5	1.8	A	--
	Subtotal	139	135	97	--	6.2	A	--
WB	L	39	40	103	6	40.1	D	--
	R	18	18	100	4	3.1	A	--
	L2	24	21	88	5	34.3	C	--
	Subtotal	82	80	98	--	30.1	C	--
Total	350	345	99	--	11.3	B	--	

SIMTRAFFIC LEVEL OF SERVICE REPORT Including Upstream Delays

Project: ARBPRC **HCM:** 2000
Scenario: E+P **PHF:** 0.95
TOD: AM Peak Hou **Analysis Period:** 15 Minutes **# of Runs:** 10

Intersection: 23: Colony Rd / SR 99 On-Ramps & Hoff Rd/SR 99 **Type:** Un-Signalized

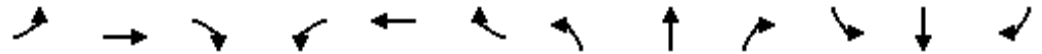
Approach	Movement	Demand Volume	Volume Served			Delay/Veh (sec)		
			Avg	%	Std Dev	Avg	LOS	Std Dev
NB	L	42	40	95	6	11.2	B	--
	T	26	27	104	5	8.6	A	--
	R	5	5	100	2	5.5	A	--
	Subtotal	74	71	96	--	9.8	A	--
SB	L	3	3	100	2	8.9	A	--
	T	3	2	67	1	7.2	A	--
	R	3	3	100	3	3.0	A	--
	Subtotal	8	9	113	--	6.4	A	--
EB	L	3	3	100	1	5.0	A	--
	T	32	33	100	6	8.4	A	--
	R	53	52	98	7	3.2	A	--
	Subtotal	87	88	101	--	5.2	A	--
WB	L	24	25	104	4	10.9	B	--
	T	37	35	95	3	8.0	A	--
	R	5	5	80	2	3.3	A	--
	Subtotal	66	65	98	--	8.8	A	--
Total	234	233	100	--	7.7	A	--	

Intersection: 24: SR 99 SB & Jack Tone Rd **Type:** Signalized

Approach	Movement	Demand Volume	Volume Served			Delay/Veh (sec)		
			Avg	%	Std Dev	Avg	LOS	Std Dev
NB	T	76	79	104	7	3.7	A	--
	R	39	39	100	5	1.9	A	--
	Subtotal	116	117	101	--	3.1	A	--
SB	T	63	61	97	6	4.4	A	--
	Subtotal	63	61	97	--	4.4	A	--
EB	L	53	51	96	7	27.8	C	--
	R	45	45	100	8	8.6	A	--
	Subtotal	97	96	99	--	18.9	B	--
Total	276	275	100	--	8.9	A	--	

HCM Unsignalized Intersection Capacity Analysis
 25: Ripon Rd & Austin Rd.

11/10/2009



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Sign Control		Stop			Stop			Stop			Stop	
Volume (vph)	10	120	10	20	130	800	10	30	30	40	20	20
Peak Hour Factor	0.75	0.75	0.75	0.92	0.92	0.92	0.70	0.70	0.70	0.85	0.85	0.85
Hourly flow rate (vph)	13	160	13	22	141	870	14	43	43	47	24	24

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total (vph)	187	1033	100	94
Volume Left (vph)	13	22	14	47
Volume Right (vph)	13	870	43	24
Hadj (s)	0.01	-0.47	-0.19	-0.02
Departure Headway (s)	5.5	4.3	6.2	6.4
Degree Utilization, x	0.28	1.25	0.17	0.17
Capacity (veh/h)	629	817	557	537
Control Delay (s)	10.6	137.0	10.5	10.6
Approach Delay (s)	10.6	137.0	10.5	10.6
Approach LOS	B	F	B	B

Intersection Summary			
Delay		102.9	
HCM Level of Service		F	
Intersection Capacity Utilization	79.8%	ICU Level of Service	D
Analysis Period (min)		15	

HCM Signalized Intersection Capacity Analysis

26: Ripon Rd & Jack Tone Rd

11/10/2009

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	0.95		1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Frt	1.00	0.98		1.00	1.00	0.85	1.00	0.94		1.00	0.89	
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770	3486		1770	1863	1583	1770	1760		1770	1665	
Flt Permitted	0.95	1.00		0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (perm)	1770	3486		1770	1863	1583	1770	1760		1770	1665	
Volume (vph)	140	180	20	50	680	110	130	120	70	100	70	170
Peak-hour factor, PHF	0.75	0.75	0.75	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	187	240	27	54	739	120	141	130	76	109	76	185
RTOR Reduction (vph)	0	8	0	0	0	61	0	18	0	0	78	0
Lane Group Flow (vph)	187	259	0	54	739	59	141	188	0	109	183	0
Turn Type	Prot			Prot		Perm	Prot			Prot		
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases						8						
Actuated Green, G (s)	13.6	52.1		5.9	44.4	44.4	11.0	20.3		8.7	18.0	
Effective Green, g (s)	13.6	52.1		5.9	44.4	44.4	11.0	20.3		8.7	18.0	
Actuated g/C Ratio	0.13	0.51		0.06	0.43	0.43	0.11	0.20		0.08	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)	234	1763		101	803	682	189	347		150	291	
v/s Ratio Prot	c0.11	0.07		0.03	c0.40		c0.08	0.11		0.06	c0.11	
v/s Ratio Perm						0.04						
v/c Ratio	0.80	0.15		0.53	0.92	0.09	0.75	0.54		0.73	0.63	
Uniform Delay, d1	43.4	13.6		47.2	27.6	17.3	44.6	37.2		46.0	39.4	
Progression Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Incremental Delay, d2	17.1	0.0		5.4	15.7	0.1	14.8	5.9		16.0	10.0	
Delay (s)	60.5	13.6		52.6	43.3	17.4	59.4	43.1		62.0	49.4	
Level of Service	E	B		D	D	B	E	D		E	D	
Approach Delay (s)		32.9			40.5			49.7			53.1	
Approach LOS		C			D			D			D	
Intersection Summary												
HCM Average Control Delay			42.6	HCM Level of Service				D				
HCM Volume to Capacity ratio			0.81									
Actuated Cycle Length (s)			103.0	Sum of lost time (s)				16.0				
Intersection Capacity Utilization			78.2%	ICU Level of Service				D				
Analysis Period (min)			15									
c Critical Lane Group												

SIMTRAFFIC LEVEL OF SERVICE REPORT Including Upstream Delays

Project: ARBPRC **HCM:** 2000
Scenario: E+P **PHF:** 0.95
TOD: PM Peak Hr **Analysis Period:** 15 Minutes **# of Runs:** 10

Intersection: 1: SR 120 WB Ramp & Main Street **Type:** Signalized

Approach	Movement	Demand Volume	Volume Served			Delay/Veh (sec)		
			Avg	%	Std Dev	Avg	LOS	Std Dev
NB	L	89	72	81	9	32.4	C	--
	T	216	191	88	8	12.0	B	--
	Subtotal	305	263	86	--	17.6	B	--
SB	T	153	155	101	13	12.7	B	--
	R	113	110	97	6	7.0	A	--
	Subtotal	266	266	100	--	10.3	B	--
WB	L	11	11	100	3	38.5	D	--
	R	66	65	98	7	10.0	B	--
	Subtotal	76	76	100	--	14.1	B	--
Total		647	604	93	--	13.9	B	--

Intersection: 2: SR 120 EB Ramps & Main Street **Type:** Signalized

Approach	Movement	Demand Volume	Volume Served			Delay/Veh (sec)		
			Avg	%	Std Dev	Avg	LOS	Std Dev
NB	T	192	155	81	7	63.0	E	--
	R	26	24	92	5	56.1	E	--
	Subtotal	218	179	82	--	62.1	E	--
SB	L	87	87	100	5	95.0	F	--
	T	76	76	100	7	33.9	C	--
	Subtotal	163	162	99	--	66.6	E	--
EB	L	113	101	89	7	143.8	F	--
	R	118	108	92	10	104.2	F	--
	Subtotal	232	209	90	--	123.4	F	--
Total		613	550	90	--	86.7	F	--

SIMTRAFFIC LEVEL OF SERVICE REPORT

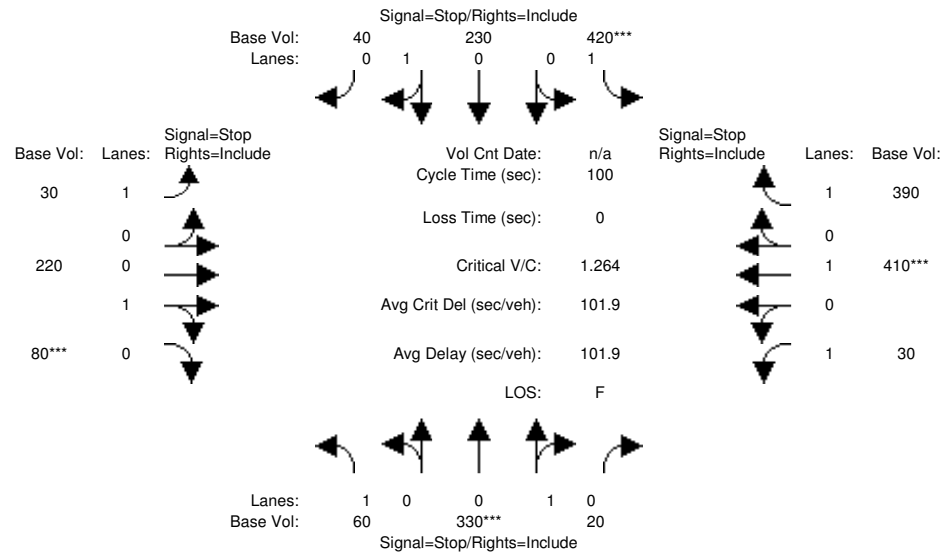
Project: ARBPRC **HCM:** 2000
Scenario: E+P **# of Runs:** 10
TOD: PM Peak Hr **Analysis Period:** 15 Minutes **PHF:** 0.95

Intersection: 3: Atherton Drive & Main Street **Type:** Un-Signalized

Approach	Movement	Demand Volume	Volume Served			Delay/Veh (sec)		
			Avg	%	Std Dev	Avg	LOS	Std Dev
NB	L	5	4	80	2	201.3	F	121.9
	T	192	153	80	7	194.3	F	89.8
	Subtotal	197	157	80	--	194.5	F	--
SB	T	171	159	93	6	22.2	C	3.5
	R	24	23	96	5	8.3	A	1.9
	Subtotal	195	182	93	--	20.4	C	--
EB	L	26	27	104	4	12.6	B	2.1
	R	11	11	100	3	6.1	A	2.8
	Subtotal	37	38	103	--	10.7	B	--
Total		429	376	88	--	91.9	F	--

Level Of Service Computation Report
 2000 HCM 4-Way Stop (Base Volume Alternative)
 Default Scenario

Intersection #4: Woodward Ave / Main Street E+P PM



Approach:	North Bound			South Bound			East Bound			West Bound		
Movement:	L	T	R	L	T	R	L	T	R	L	T	R
Min. Green:	0	0	0	0	0	0	0	0	0	0	0	0
Volume Module:	60	330	20	420	230	40	30	220	80	30	410	390
Growth Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Initial Bse:	60	330	20	420	230	40	30	220	80	30	410	390
User Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PHF Adj:	0.92	0.92	0.92	0.92	0.92	0.92	0.95	0.95	0.95	0.92	0.92	0.92
PHF Volume:	65	359	22	457	250	43	32	232	84	33	446	424
Reduct Vol:	0	0	0	0	0	0	0	0	0	0	0	0
Reduced Vol:	65	359	22	457	250	43	32	232	84	33	446	424
PCE Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
MLF Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Final Volume:	65	359	22	457	250	43	32	232	84	33	446	424

Saturation Flow Module:	North Bound			South Bound			East Bound			West Bound		
Adjustment:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Lanes:	1.00	0.94	0.06	1.00	0.85	0.15	1.00	0.73	0.27	1.00	1.00	1.00
Final Sat.:	354	357	22	371	336	58	347	274	100	330	353	379

Capacity Analysis Module:	North Bound			South Bound			East Bound			West Bound		
Vol/Sat:	0.18	1.00	1.00	1.23	0.74	0.74	0.09	0.85	0.85	0.10	1.26	1.12
Crit Moves:	****	****	****	****	****	****	****	****	****	****	****	****
Delay/Veh:	14.9	78.3	78.3	154.1	33.8	33.8	14.0	47.0	47.0	14.5	168	112.5
Delay Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
AdjDel/Veh:	14.9	78.3	78.3	154.1	33.8	33.8	14.0	47.0	47.0	14.5	168	112.5
LOS by Move:	B	F	F	F	D	D	B	E	E	B	F	F
ApproachDel:	69.0			107.0			44.0			136.2		
Delay Adj:	1.00			1.00			1.00			1.00		
ApprAdjDel:	69.0			107.0			44.0			136.2		
LOS by Appr:	F			F			E			F		
AllWayAvgQ:	0.2	7.0	7.0	14.6	2.4	2.4	0.1	3.6	3.6	0.1	15.2	10.6

Note: Queue reported is the number of cars per lane.

Peak Hour Volume Signal Warrant Report [Urban]

 Intersection #4 Woodward Ave / Main Street E+P PM

 Base Volume Alternative: Peak Hour Warrant Met

Approach:	North Bound			South Bound			East Bound			West Bound		
Movement:	L	T	R	L	T	R	L	T	R	L	T	R
Control:	Stop Sign			Stop Sign			Stop Sign			Stop Sign		
Lanes:	1	0	0	1	0	0	1	0	0	1	0	1
Initial Vol:	60	330	20	420	230	40	30	220	80	30	410	390
Major Street Volume:	1160											
Minor Approach Volume:	690											
Minor Approach Volume Threshold:	310											

SIGNAL WARRANT DISCLAIMER
 This peak hour signal warrant analysis should be considered solely as an "indicator" of the likelihood of an unsignalized intersection warranting a traffic signal in the future. Intersections that exceed this warrant are probably more likely to meet one or more of the other volume based signal warrant (such as the 4-hour or 8-hour warrants).

The peak hour warrant analysis in this report is not intended to replace a rigorous and complete traffic signal warrant analysis by the responsible jurisdiction. Consideration of the other signal warrants, which is beyond the scope of this software, may yield different results.

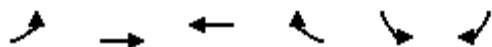
HCM Unsignalized Intersection Capacity Analysis
 5: Industrial Park Dr & VanRyn (Spreckles)

11/10/2009

	→	↘	↙	←	↖	↗	
Movement	EBT	EBR	WBL	WBT	NBL	NBR	
Lane Configurations	↑	↗	↙	↑↑	↖	↗	
Sign Control	Free			Free	Stop		
Grade	0%			0%	0%		
Volume (veh/h)	290	160	240	200	150	490	
Peak Hour Factor	0.95	0.95	0.95	0.95	0.92	0.92	
Hourly flow rate (vph)	305	168	253	211	163	533	
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			474		916	305	
vC1, stage 1 conf vol							
vC2, stage 2 conf vol							
vCu, unblocked vol			474		916	305	
tC, single (s)			4.1		6.8	6.9	
tC, 2 stage (s)							
tF (s)			2.2		3.5	3.3	
p0 queue free %			77		22	23	
cM capacity (veh/h)			1085		208	691	
Direction, Lane #	EB 1	EB 2	WB 1	WB 2	WB 3	NB 1	NB 2
Volume Total	305	168	253	105	105	163	533
Volume Left	0	0	253	0	0	163	0
Volume Right	0	168	0	0	0	0	533
cSH	1700	1700	1085	1700	1700	208	691
Volume to Capacity	0.18	0.10	0.23	0.06	0.06	0.78	0.77
Queue Length 95th (ft)	0	0	23	0	0	137	184
Control Delay (s)	0.0	0.0	9.3	0.0	0.0	65.4	25.5
Lane LOS			A			F	D
Approach Delay (s)	0.0		5.1			34.8	
Approach LOS						D	
Intersection Summary							
Average Delay			16.3				
Intersection Capacity Utilization			52.3%		ICU Level of Service		A
Analysis Period (min)			15				

HCM Unsignalized Intersection Capacity Analysis
 6: Woodward Avenue & VanRyn (Spreckles)

11/10/2009



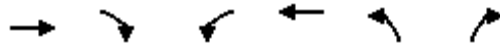
Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations	↶	↷	↷↶		↶	↷
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Volume (veh/h)	110	520	780	20	30	110
Peak Hour Factor	0.92	0.92	0.92	0.92	0.80	0.80
Hourly flow rate (vph)	120	565	848	22	38	138
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type					TWLTL	
Median storage veh					1	
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	870				1663	435
vC1, stage 1 conf vol					859	
vC2, stage 2 conf vol					804	
vCu, unblocked vol	870				1663	435
tC, single (s)	4.1				6.8	6.9
tC, 2 stage (s)					5.8	
tF (s)	2.2				3.5	3.3
p0 queue free %	84				81	76
cM capacity (veh/h)	771				196	569

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	SB 1	SB 2
Volume Total	120	565	565	304	38	138
Volume Left	120	0	0	0	38	0
Volume Right	0	0	0	22	0	138
cSH	771	1700	1700	1700	196	569
Volume to Capacity	0.16	0.33	0.33	0.18	0.19	0.24
Queue Length 95th (ft)	14	0	0	0	17	23
Control Delay (s)	10.5	0.0	0.0	0.0	27.6	13.3
Lane LOS	B				D	B
Approach Delay (s)	1.8		0.0		16.4	
Approach LOS					C	

Intersection Summary						
Average Delay			2.4			
Intersection Capacity Utilization		41.6%		ICU Level of Service		A
Analysis Period (min)			15			

HCM Unsignalized Intersection Capacity Analysis
7: Woodward Avenue & Pillsbury Road

11/10/2009



Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↻		↻	↻↻	↻↻	
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Volume (veh/h)	530	20	20	790	10	20
Peak Hour Factor	0.92	0.92	0.92	0.92	0.65	0.65
Hourly flow rate (vph)	576	22	22	859	15	31
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				TWLTL		
Median storage veh					1	
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume			598	1060	587	
vC1, stage 1 conf vol				587		
vC2, stage 2 conf vol				473		
vCu, unblocked vol			598	1060	587	
tC, single (s)			4.1	6.8	6.9	
tC, 2 stage (s)				5.8		
tF (s)			2.2	3.5	3.3	
p0 queue free %			98	96	93	
cM capacity (veh/h)			975	347	453	

Direction, Lane #	EB 1	WB 1	WB 2	WB 3	NB 1
Volume Total	598	22	429	429	46
Volume Left	0	22	0	0	15
Volume Right	22	0	0	0	31
cSH	1700	975	1700	1700	411
Volume to Capacity	0.35	0.02	0.25	0.25	0.11
Queue Length 95th (ft)	0	2	0	0	9
Control Delay (s)	0.0	8.8	0.0	0.0	14.9
Lane LOS		A			B
Approach Delay (s)	0.0	0.2			14.9
Approach LOS					B

Intersection Summary					
Average Delay			0.6		
Intersection Capacity Utilization		39.1%		ICU Level of Service	A
Analysis Period (min)		15			

HCM Unsignalized Intersection Capacity Analysis
 8: Woodward Avenue & Atherton Drive

11/10/2009



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↖	↑	↗	↖	↗		↖	↑↗		↖	↑↗	
Sign Control	Free		Free		Free		Stop		Stop		Stop	
Grade	0%		0%		0%		0%		0%		0%	
Volume (veh/h)	10	200	340	550	250	40	550	440	660	20	220	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	217	370	598	272	43	598	478	717	22	239	11
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type							None			TWLTL		
Median storage veh										1		
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	315			587			1837	1750	217	2685	2098	293
vC1, stage 1 conf vol											1489	1489
vC2, stage 2 conf vol											1196	609
vCu, unblocked vol	315			587			1837	1750	217	2685	2098	293
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)											6.1	5.5
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	99			39			0	0	13	0	0	99
cM capacity (veh/h)	1245			988			0	34	822	0	20	746

Direction, Lane #	EB 1	EB 2	EB 3	WB 1	WB 2	NB 1	NB 2	NB 3	SB 1	SB 2	SB 3
Volume Total	11	217	370	598	315	598	319	877	22	159	91
Volume Left	11	0	0	598	0	598	0	0	22	0	0
Volume Right	0	0	370	0	43	0	0	717	0	0	11
cSH	1245	1700	1700	988	1700	0	34	156	0	20	23
Volume to Capacity	0.01	0.13	0.22	0.61	0.19	Err	9.50	5.62	Err	7.84	3.93
Queue Length 95th (ft)	1	0	0	106	0	Err	Err	Err	Err	Err	Err
Control Delay (s)	7.9	0.0	0.0	14.1	0.0	Err	Err	Err	Err	Err	Err
Lane LOS	A			B			F	F	F	F	F
Approach Delay (s)	0.1			9.2			Err			Err	
Approach LOS							F			F	

Intersection Summary

Average Delay			Err									
Intersection Capacity Utilization			91.2%		ICU Level of Service						F	
Analysis Period (min)			15									

HCM Unsignalized Intersection Capacity Analysis
 9: Woodward Avenue & Moffat Blvd.

11/10/2009



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Volume (veh/h)	140	740	610	230	360	230
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	152	804	663	250	391	250
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	2092	516	641			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	2092	516	641			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	0	0	30			
cM capacity (veh/h)	17	559	943			

Direction, Lane #	EB 1	NB 1	NB 2	SB 1
Volume Total	957	663	250	641
Volume Left	152	663	0	0
Volume Right	804	0	0	250
cSH	93	943	1700	1700
Volume to Capacity	10.34	0.70	0.15	0.38
Queue Length 95th (ft)	Err	151	0	0
Control Delay (s)	Err	17.3	0.0	0.0
Lane LOS	F	C		
Approach Delay (s)	Err	12.6		0.0
Approach LOS	F			

Intersection Summary			
Average Delay		3813.7	
Intersection Capacity Utilization		130.2%	ICU Level of Service H
Analysis Period (min)		15	

SIMTRAFFIC LEVEL OF SERVICE REPORT

Project: ARBPRC **HCM:** 2000
Scenario: E+P **# of Runs:** 10
TOD: PM Peak Hr **Analysis Period:** 15 Minutes **PHF:** 0.95

Intersection: 10: Moffat Blvd. & SR 99 SB **Type:** Un-Signalized

Approach	Movement	Demand Volume	Volume Served			Delay/Veh (sec)		
			Avg	%	Std Dev	Avg	LOS	Std Dev
SB	L	182	16	9	16	3065.6	F	1364.1
	R	87	7	8	7	3186.8	F	1620.8
	Subtotal	268	23	9	--	3101.5	F	--
EB	T	289	95	33	17	395.0	F	21.8
	Subtotal	289	95	33	--	395.0	F	--
WB	T	134	43	32	7	0.9	A	0.1
	Subtotal	134	43	32	--	0.9	A	--
Total		692	161	23	--	669.9	F	--

HCM Unsignalized Intersection Capacity Analysis
 11: Graves Rd. & Austin Rd.

11/10/2009



Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations	↙		↔			↘
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Volume (veh/h)	40	30	340	120	80	320
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	43	33	370	130	87	348
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	957	435			500	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	957	435			500	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	83	95			92	
cM capacity (veh/h)	263	621			1064	

Direction, Lane #	WB 1	NB 1	SB 1
Volume Total	76	500	435
Volume Left	43	0	87
Volume Right	33	130	0
cSH	349	1700	1064
Volume to Capacity	0.22	0.29	0.08
Queue Length 95th (ft)	20	0	7
Control Delay (s)	18.2	0.0	2.5
Lane LOS	C		A
Approach Delay (s)	18.2	0.0	2.5
Approach LOS	C		

Intersection Summary			
Average Delay		2.4	
Intersection Capacity Utilization	60.5%	ICU Level of Service	B
Analysis Period (min)		15	

SIMTRAFFIC LEVEL OF SERVICE REPORT Including Upstream Delays

Project: ARBPRC **HCM:** 2000
Scenario: E+P **PHF:** 0.95
TOD: PM Peak Hr **Analysis Period:** 15 Minutes **# of Runs:** 10

Intersection: 12: SR 99 NB & Austin Rd. **Type:** Un-Signalized

Approach	Movement	Demand Volume	Volume Served			Delay/Veh (sec)		
			Avg	%	Std Dev	Avg	LOS	Std Dev
NB	L	237	76	32	6	15.8	C	--
	T	105	34	32	7	17.3	C	--
	Subtotal	342	110	32	--	16.3	C	--
SB	T	84	55	65	7	296.0	F	--
	R	11	7	64	3	300.3	F	--
	Subtotal	95	62	65	--	296.5	F	--
WB	L	303	65	21	7	1578.6	F	--
	R	16	4	25	2	1485.2	F	--
	Subtotal	318	69	21	--	1573.4	F	--
Total	755	240	32	--	532.8	F	--	

Intersection: 13: Moffat Blvd. & Austin Rd. **Type:** Un-Signalized

Approach	Movement	Demand Volume	Volume Served			Delay/Veh (sec)		
			Avg	%	Std Dev	Avg	LOS	Std Dev
NB	L	53	18	34	5	115.0	F	--
	T	303	96	32	10	120.4	F	--
	R	384	118	31	13	109.0	F	--
	Subtotal	739	233	32	--	114.2	F	--
SB	L	18	11	61	3	196.7	F	--
	T	289	87	30	4	207.4	F	--
	R	79	22	28	5	201.1	F	--
	Subtotal	387	119	31	--	205.3	F	--
EB	L	37	9	22	2	54.9	F	--
	T	163	39	24	5	58.5	F	--
	R	271	63	23	6	52.9	F	--
	Subtotal	471	110	23	--	55.0	F	--
WB	L	3	2	67	1	11.5	B	--
	T	3	2	67	2	11.8	B	--
	R	3	3	100	2	6.2	A	--
	Subtotal	8	7	88	--	9.7	A	--
Total	1605	470	29	--	121.8	F	--	

HCM Signalized Intersection Capacity Analysis























14: Yosemite Avenue & Austin Rd.

11/10/2009

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	0.95		1.00	1.00		1.00	1.00	
Frt	1.00	1.00	0.85	1.00	0.99		1.00	0.88		1.00	0.94	
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770	1863	1583	1770	3496		1770	1639		1770	1751	
Flt Permitted	0.95	1.00	1.00	0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (perm)	1770	1863	1583	1770	3496		1770	1639		1770	1751	
Volume (vph)	50	510	170	140	340	30	60	60	240	40	60	40
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.80	0.80	0.80
Adj. Flow (vph)	54	554	185	152	370	33	65	65	261	50	75	50
RTOR Reduction (vph)	0	0	129	0	10	0	0	190	0	0	36	0
Lane Group Flow (vph)	54	554	56	152	393	0	65	136	0	50	89	0
Turn Type	Prot		Perm	Prot			Prot			Prot		
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases			4									
Actuated Green, G (s)	3.4	18.0	18.0	6.0	20.6		3.4	16.1		3.4	16.1	
Effective Green, g (s)	3.4	18.0	18.0	6.0	20.6		3.4	16.1		3.4	16.1	
Actuated g/C Ratio	0.06	0.30	0.30	0.10	0.35		0.06	0.27		0.06	0.27	
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)	101	564	479	178	1210		101	443		101	474	
v/s Ratio Prot	0.03	c0.30		c0.09	c0.11		c0.04	c0.08		0.03	0.05	
v/s Ratio Perm			0.04									
v/c Ratio	0.53	0.98	0.12	0.85	0.32		0.64	0.31		0.50	0.19	
Uniform Delay, d1	27.3	20.6	15.0	26.3	14.3		27.5	17.3		27.2	16.7	
Progression Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	5.4	33.2	0.1	30.6	0.2		13.2	1.8		3.8	0.9	
Delay (s)	32.6	53.8	15.1	57.0	14.5		40.7	19.0		31.0	17.5	
Level of Service	C	D	B	E	B		D	B		C	B	
Approach Delay (s)		43.3			26.1			22.6			21.4	
Approach LOS		D			C			C			C	
Intersection Summary												
HCM Average Control Delay			32.1			HCM Level of Service				C		
HCM Volume to Capacity ratio			0.73									
Actuated Cycle Length (s)			59.5			Sum of lost time (s)			20.0			
Intersection Capacity Utilization			69.2%			ICU Level of Service				C		
Analysis Period (min)			15									
c Critical Lane Group												

HCM Signalized Intersection Capacity Analysis
 15: Yosemite Avenue & Jack Tone Rd

11/10/2009

												
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	1.00	0.95		1.00	0.95		1.00	1.00		1.00	1.00	
Frt	1.00	0.98		1.00	0.99		1.00	0.95		1.00	0.98	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770	3474		1770	3489		1770	1773		1770	1821	
Flt Permitted	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (perm)	1770	3474		1770	3489		1770	1773		1770	1821	
Volume (vph)	120	640	90	70	290	30	40	190	90	50	170	30
Peak-hour factor, PHF	0.92	0.92	0.92	0.95	0.95	0.95	0.92	0.92	0.92	0.90	0.90	0.90
Adj. Flow (vph)	130	696	98	74	305	32	43	207	98	56	189	33
RTOR Reduction (vph)	0	8	0	0	7	0	0	16	0	0	6	0
Lane Group Flow (vph)	130	786	0	74	330	0	43	289	0	56	216	0
Turn Type	Prot		Prot		Prot		Prot		Prot			
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases												
Actuated Green, G (s)	5.9	21.8		4.5	20.4		3.8	16.2		4.1	16.5	
Effective Green, g (s)	5.9	21.8		4.5	20.4		3.8	16.2		4.1	16.5	
Actuated g/C Ratio	0.09	0.35		0.07	0.33		0.06	0.26		0.07	0.26	
Clearance Time (s)	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	
Lane Grp Cap (vph)	167	1210		127	1137		107	459		116	480	
v/s Ratio Prot	c0.07	c0.23		0.04	0.09		0.02	c0.16		c0.03	0.12	
v/s Ratio Perm												
v/c Ratio	0.78	0.65		0.58	0.29		0.40	0.63		0.48	0.45	
Uniform Delay, d1	27.7	17.2		28.1	15.7		28.3	20.5		28.2	19.3	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	20.1	1.2		6.7	0.1		2.5	2.8		3.1	0.7	
Delay (s)	47.8	18.4		34.8	15.9		30.8	23.4		31.4	19.9	
Level of Service	D	B		C	B		C	C		C	B	
Approach Delay (s)		22.5			19.3			24.3			22.2	
Approach LOS		C			B			C			C	
Intersection Summary												
HCM Average Control Delay			22.1	HCM Level of Service				C				
HCM Volume to Capacity ratio			0.61									
Actuated Cycle Length (s)			62.6	Sum of lost time (s)				12.0				
Intersection Capacity Utilization			56.6%	ICU Level of Service				B				
Analysis Period (min)			15									
c Critical Lane Group												

HCM Unsignalized Intersection Capacity Analysis
 16: Graves Rd. & Jack Tone Rd

11/10/2009



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations	T			T	T	
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Volume (veh/h)	170	30	30	170	310	50
Peak Hour Factor	0.92	0.92	0.90	0.90	1.00	1.00
Hourly flow rate (vph)	185	33	33	189	310	50
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	591	335	360			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	591	335	360			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	60	95	97			
cM capacity (veh/h)	457	707	1199			

Direction, Lane #	EB 1	NB 1	SB 1
Volume Total	217	222	360
Volume Left	185	33	0
Volume Right	33	0	50
cSH	482	1199	1700
Volume to Capacity	0.45	0.03	0.21
Queue Length 95th (ft)	58	2	0
Control Delay (s)	18.4	1.4	0.0
Lane LOS	C	A	
Approach Delay (s)	18.4	1.4	0.0
Approach LOS	C		

Intersection Summary			
Average Delay			5.4
Intersection Capacity Utilization	51.2%	ICU Level of Service	A
Analysis Period (min)			15

HCM Unsignalized Intersection Capacity Analysis
 17: Sedan Ave & Main Street

11/10/2009



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Volume (veh/h)	10	10	10	10	90	310	10	100	10	110	130	10
Peak Hour Factor	0.50	0.50	0.50	0.92	0.92	0.92	0.85	0.85	0.85	0.92	0.92	0.92
Hourly flow rate (vph)	20	20	20	11	98	337	12	118	12	120	141	11
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	919	539	147	563	538	124	152			129		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	919	539	147	563	538	124	152			129		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	84	95	98	97	76	64	99			92		
cM capacity (veh/h)	122	409	900	383	409	927	1429			1456		

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	60	446	141	272
Volume Left	20	11	12	120
Volume Right	20	337	12	11
cSH	256	707	1429	1456
Volume to Capacity	0.23	0.63	0.01	0.08
Queue Length 95th (ft)	22	113	1	7
Control Delay (s)	23.4	18.4	0.7	3.8
Lane LOS	C	C	A	A
Approach Delay (s)	23.4	18.4	0.7	3.8
Approach LOS	C	C		

Intersection Summary			
Average Delay		11.7	
Intersection Capacity Utilization	51.5%	ICU Level of Service	A
Analysis Period (min)		15	

HCM Signalized Intersection Capacity Analysis

18: Sedan Ave & Austin Rd.

11/10/2009

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		
Lane Util. Factor	1.00	0.95		0.97	0.95	1.00	1.00	0.95	1.00	0.97	0.95		
Frt	1.00	0.99		1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.95		
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		
Satd. Flow (prot)	1770	3509		3433	3539	1583	1770	3539	1583	3433	3378		
Flt Permitted	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		
Satd. Flow (perm)	1770	3509		3433	3539	1583	1770	3539	1583	3433	3378		
Volume (vph)	30	170	10	710	590	530	130	370	280	250	550	240	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.95	0.95	0.95	
Adj. Flow (vph)	33	185	11	772	641	576	141	402	304	263	579	253	
RTOR Reduction (vph)	0	3	0	0	0	338	0	0	222	0	42	0	
Lane Group Flow (vph)	33	193	0	772	641	238	141	402	82	263	790	0	
Turn Type	Prot			Prot		Perm	Prot		Perm	Prot			
Protected Phases	7	4		3	8		5	2		1	6		
Permitted Phases						8			2				
Actuated Green, G (s)	4.4	12.4		25.0	33.0	33.0	10.5	24.3	24.3	12.1	25.9		
Effective Green, g (s)	4.4	12.4		25.0	33.0	33.0	10.5	24.3	24.3	12.1	25.9		
Actuated g/C Ratio	0.05	0.14		0.28	0.37	0.37	0.12	0.27	0.27	0.13	0.29		
Clearance Time (s)	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		
Lane Grp Cap (vph)	87	485		956	1301	582	207	958	428	463	974		
v/s Ratio Prot	0.02	0.05		c0.22	c0.18		c0.08	0.11		0.08	c0.23		
v/s Ratio Perm						0.15			0.05				
v/c Ratio	0.38	0.40		0.81	0.49	0.41	0.68	0.42	0.19	0.57	0.81		
Uniform Delay, d1	41.4	35.3		30.2	21.9	21.1	38.0	26.9	25.2	36.4	29.7		
Progression Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		
Incremental Delay, d2	2.8	0.5		5.1	0.3	0.5	8.9	0.3	0.2	1.6	5.2		
Delay (s)	44.1	35.8		35.2	22.2	21.6	46.9	27.2	25.4	38.0	34.9		
Level of Service	D	D		D	C	C	D	C	C	D	C		
Approach Delay (s)		37.0			27.1			29.9			35.6		
Approach LOS		D			C			C			D		
Intersection Summary													
HCM Average Control Delay			30.5									HCM Level of Service	C
HCM Volume to Capacity ratio			0.68										
Actuated Cycle Length (s)			89.8									Sum of lost time (s)	8.0
Intersection Capacity Utilization			68.7%									ICU Level of Service	C
Analysis Period (min)			15										
c	Critical Lane Group												

HCM Unsignalized Intersection Capacity Analysis
 19: W. River Rd & Jack Tone Rd

11/10/2009



Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations	↰	↱	↻		↰	↱
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Volume (veh/h)	80	30	200	120	110	280
Peak Hour Factor	0.75	0.75	0.90	0.90	0.92	0.92
Hourly flow rate (vph)	107	40	222	133	120	304
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	832	289			356	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	832	289			356	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	65	95			90	
cM capacity (veh/h)	305	750			1203	
Direction, Lane #	WB 1	WB 2	NB 1	SB 1	SB 2	
Volume Total	107	40	356	120	304	
Volume Left	107	0	0	120	0	
Volume Right	0	40	133	0	0	
cSH	305	750	1700	1203	1700	
Volume to Capacity	0.35	0.05	0.21	0.10	0.18	
Queue Length 95th (ft)	38	4	0	8	0	
Control Delay (s)	23.0	10.1	0.0	8.3	0.0	
Lane LOS	C	B		A		
Approach Delay (s)	19.5		0.0	2.3		
Approach LOS	C					
Intersection Summary						
Average Delay			4.2			
Intersection Capacity Utilization			38.4%		ICU Level of Service	A
Analysis Period (min)			15			

SIMTRAFFIC LEVEL OF SERVICE REPORT Including Upstream Delays

Project: ARBPRC **HCM:** 2000
Scenario: E+P **PHF:** 0.95
TOD: PM Peak Hr **Analysis Period:** 15 Minutes **# of Runs:** 10

Intersection: 20: Santos Ave & Jack Tone Rd **Type:** Signalized

Approach	Movement	Demand Volume	Volume Served			Delay/Veh (sec)		
			Avg	%	Std Dev	Avg	LOS	Std Dev
NB	L	26	27	104	4	18.1	B	--
	T	58	54	93	7	19.7	B	--
	R	8	8	100	3	3.4	A	--
	Subtotal	92	89	97	--	17.7	B	--
SB	L	5	5	100	1	27.4	C	--
	T	82	76	93	9	26.5	C	--
	R	8	8	100	2	15.3	B	--
	Subtotal	95	89	94	--	25.5	C	--
EB	L	11	10	91	2	33.1	C	--
	T	5	4	80	2	30.5	C	--
	R	26	27	100	4	3.6	A	--
	Subtotal	42	40	95	--	13.4	B	--
WB	L	13	15	115	3	32.7	C	--
	T	11	10	91	3	32.5	C	--
	R	16	17	106	2	3.8	A	--
	Subtotal	39	42	108	--	21.1	C	--
Total	268	261	97	--	20.3	C	--	

Intersection: 22: Colony Rd / SR 99 On-Ramps & Jack Tone Rd **Type:** Signalized

Approach	Movement	Demand Volume	Volume Served			Delay/Veh (sec)		
			Avg	%	Std Dev	Avg	LOS	Std Dev
NB	T	68	67	99	8	7.8	A	--
	R	97	98	101	11	6.4	A	--
	Subtotal	166	165	99	--	7.0	A	--
SB	L	11	10	91	2	44.6	D	--
	T	34	33	97	10	4.5	A	--
	R	53	52	98	8	5.7	A	--
	R2	24	23	96	4	1.7	A	--
	Subtotal	121	118	98	--	7.9	A	--
WB	L	37	36	97	5	42.7	D	--
	R	24	23	96	3	3.3	A	--
	L2	32	32	100	7	39.1	D	--
	Subtotal	92	92	100	--	31.5	C	--
Total	379	374	99	--	13.3	B	--	

SIMTRAFFIC LEVEL OF SERVICE REPORT Including Upstream Delays

Project: ARBPRC **HCM:** 2000
Scenario: E+P **PHF:** 0.95
TOD: PM Peak Hr **Analysis Period:** 15 Minutes **# of Runs:** 10

Intersection: 23: Colony Rd / SR 99 On-Ramps & Hoff Rd/SR 99 **Type:** Un-Signalized

Approach	Movement	Demand Volume	Volume Served			Delay/Veh (sec)		
			Avg	%	Std Dev	Avg	LOS	Std Dev
NB	L	45	45	100	6	11.6	B	--
	T	16	15	94	5	9.2	A	--
	R	11	12	109	2	5.3	A	--
	Subtotal	71	72	101	--	10.1	B	--
SB	L	8	8	100	3	9.6	A	--
	T	3	2	67	2	9.1	A	--
	R	5	4	80	2	3.3	A	--
	Subtotal	16	14	88	--	7.9	A	--
EB	L	3	4	133	2	5.8	A	--
	T	66	68	103	6	8.5	A	--
	R	39	35	90	7	3.1	A	--
	Subtotal	108	107	99	--	6.6	A	--
WB	L	13	13	100	4	10.8	B	--
	T	42	43	102	6	8.1	A	--
	R	5	6	120	3	3.5	A	--
	Subtotal	61	61	100	--	8.2	A	--
Total	255	254	100	--	8.1	A	--	

Intersection: 24: SR 99 SB & Jack Tone Rd **Type:** Signalized

Approach	Movement	Demand Volume	Volume Served			Delay/Veh (sec)		
			Avg	%	Std Dev	Avg	LOS	Std Dev
NB	T	87	89	102	6	6.0	A	--
	R	63	65	103	7	4.0	A	--
	Subtotal	150	153	102	--	5.2	A	--
SB	T	66	67	102	11	5.4	A	--
	Subtotal	66	67	102	--	5.4	A	--
EB	L	79	74	94	9	27.3	C	--
	R	61	61	100	8	9.7	A	--
	Subtotal	139	135	97	--	19.4	B	--
Total	355	355	100	--	10.6	B	--	

HCM Unsignalized Intersection Capacity Analysis
 25: Ripon Rd & Austin Rd.

11/10/2009



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Sign Control		Stop			Stop			Stop			Stop	
Volume (vph)	30	180	10	20	80	230	10	50	30	1020	30	40
Peak Hour Factor	0.70	0.70	0.70	0.92	0.92	0.92	0.65	0.65	0.65	0.92	0.92	0.92
Hourly flow rate (vph)	43	257	14	22	87	250	15	77	46	1109	33	43

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total (vph)	314	359	138	1185
Volume Left (vph)	43	22	15	1109
Volume Right (vph)	14	250	46	43
Hadj (s)	0.03	-0.37	-0.14	0.20
Departure Headway (s)	7.2	6.8	7.7	6.9
Degree Utilization, x	0.63	0.67	0.29	2.26
Capacity (veh/h)	477	516	416	526
Control Delay (s)	21.9	22.6	13.8	589.5
Approach Delay (s)	21.9	22.6	13.8	589.5
Approach LOS	C	C	B	F

Intersection Summary			
Delay		358.4	
HCM Level of Service		F	
Intersection Capacity Utilization	95.9%		ICU Level of Service F
Analysis Period (min)		15	

HCM Signalized Intersection Capacity Analysis

26: Ripon Rd & Jack Tone Rd

11/10/2009

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	0.95		1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Frt	1.00	0.99		1.00	1.00	0.85	1.00	0.95		1.00	0.93	
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770	3519		1770	1863	1583	1770	1763		1770	1741	
Flt Permitted	0.95	1.00		0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (perm)	1770	3519		1770	1863	1583	1770	1763		1770	1741	
Volume (vph)	340	750	30	60	290	140	40	90	50	150	180	140
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.80	0.80	0.80	0.92	0.92	0.92
Adj. Flow (vph)	370	815	33	65	315	152	50	112	62	163	196	152
RTOR Reduction (vph)	0	3	0	0	0	119	0	16	0	0	23	0
Lane Group Flow (vph)	370	845	0	65	315	33	50	158	0	163	325	0
Turn Type	Prot			Prot		Perm	Prot			Prot		
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases						8						
Actuated Green, G (s)	23.3	37.7		6.4	20.8	20.8	3.7	24.7		11.2	32.2	
Effective Green, g (s)	23.3	37.7		6.4	20.8	20.8	3.7	24.7		11.2	32.2	
Actuated g/C Ratio	0.24	0.39		0.07	0.22	0.22	0.04	0.26		0.12	0.34	
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)	430	1382		118	404	343	68	454		207	584	
v/s Ratio Prot	c0.21	0.24		0.04	c0.17		0.03	0.09		c0.09	c0.19	
v/s Ratio Perm						0.02						
v/c Ratio	0.86	0.61		0.55	0.78	0.10	0.74	0.35		0.79	0.56	
Uniform Delay, d1	34.8	23.3		43.4	35.4	30.1	45.7	29.1		41.2	26.1	
Progression Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Incremental Delay, d2	16.0	0.8		5.5	9.2	0.1	33.4	2.1		17.7	3.8	
Delay (s)	50.8	24.1		48.9	44.6	30.2	79.1	31.2		59.0	29.8	
Level of Service	D	C		D	D	C	E	C		E	C	
Approach Delay (s)		32.2			41.0			41.9			39.1	
Approach LOS		C			D			D			D	
Intersection Summary												
HCM Average Control Delay			36.4				HCM Level of Service				D	
HCM Volume to Capacity ratio			0.72									
Actuated Cycle Length (s)			96.0				Sum of lost time (s)			12.0		
Intersection Capacity Utilization			68.8%				ICU Level of Service			C		
Analysis Period (min)			15									
c Critical Lane Group												

Technical Appendix E
Existing Plus Project Conditions
Signal Warrant Analysis

Major Street **Main St.**
 Minor Street **Woodward Ave.**

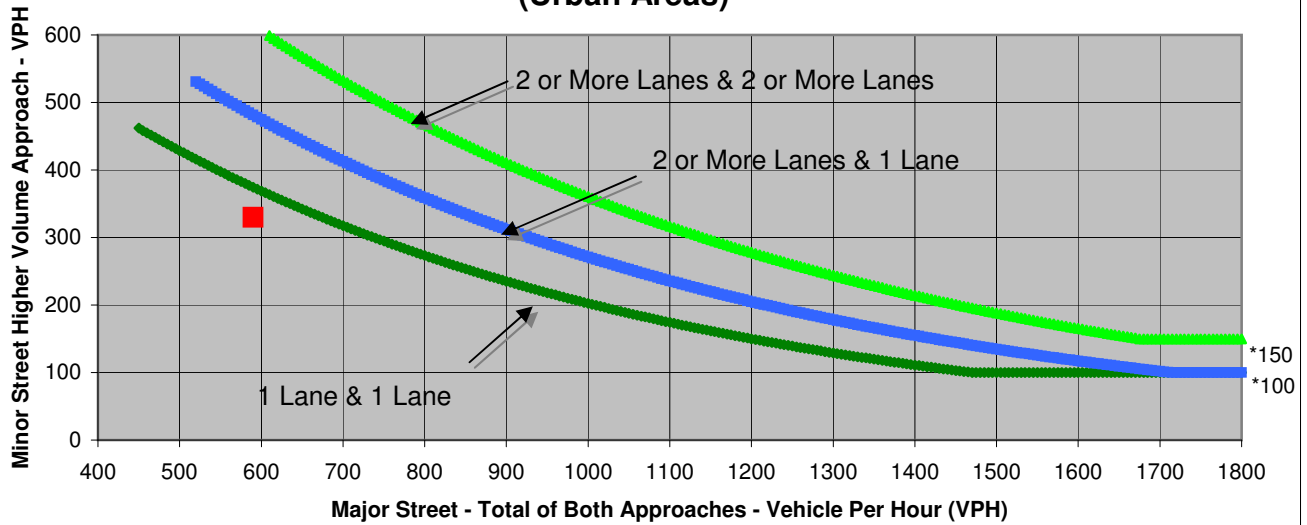
 Project **Austin Road Business Park**
 Scenario **Existing Plus Project Conditions**
 Peak Hour **AM**
Turn Movement Volumes

	NB	SB	EB	WB
Left	40	110	20	10
Through	290	90	60	90
Right	20	40	30	230
Total	350	240	110	330

Major Street Direction

x	North/South
	East/West

**Figure 4C-3
Warrant 3, Peak Hour
(Urban Areas)**



* Note: 150 VPH APPLIES AS THE LOWER THRESHOLD VOLUME FOR A MINOR STREET APPROACH WITH TWO OR MORE LANES AND 100 VPH APPLIES AS THE LOWER THRESHOLD VOLUME FOR A MINOR STREET APPROACHING WITH ONE LANE.

Source: *California Manual on Uniform Traffic Control Devices*, Caltrans, 2006

	Major Street Main St.	Minor Street Woodward Ave.	Warrant Met
Number of Approach Lanes	1	1	NO
Traffic Volume (VPH) *	590	330	

* Note: Traffic Volume for Major Street is Total Volume of Both Approaches.
 Traffic Volume for Minor Street is the Volume of High Volume Approach.

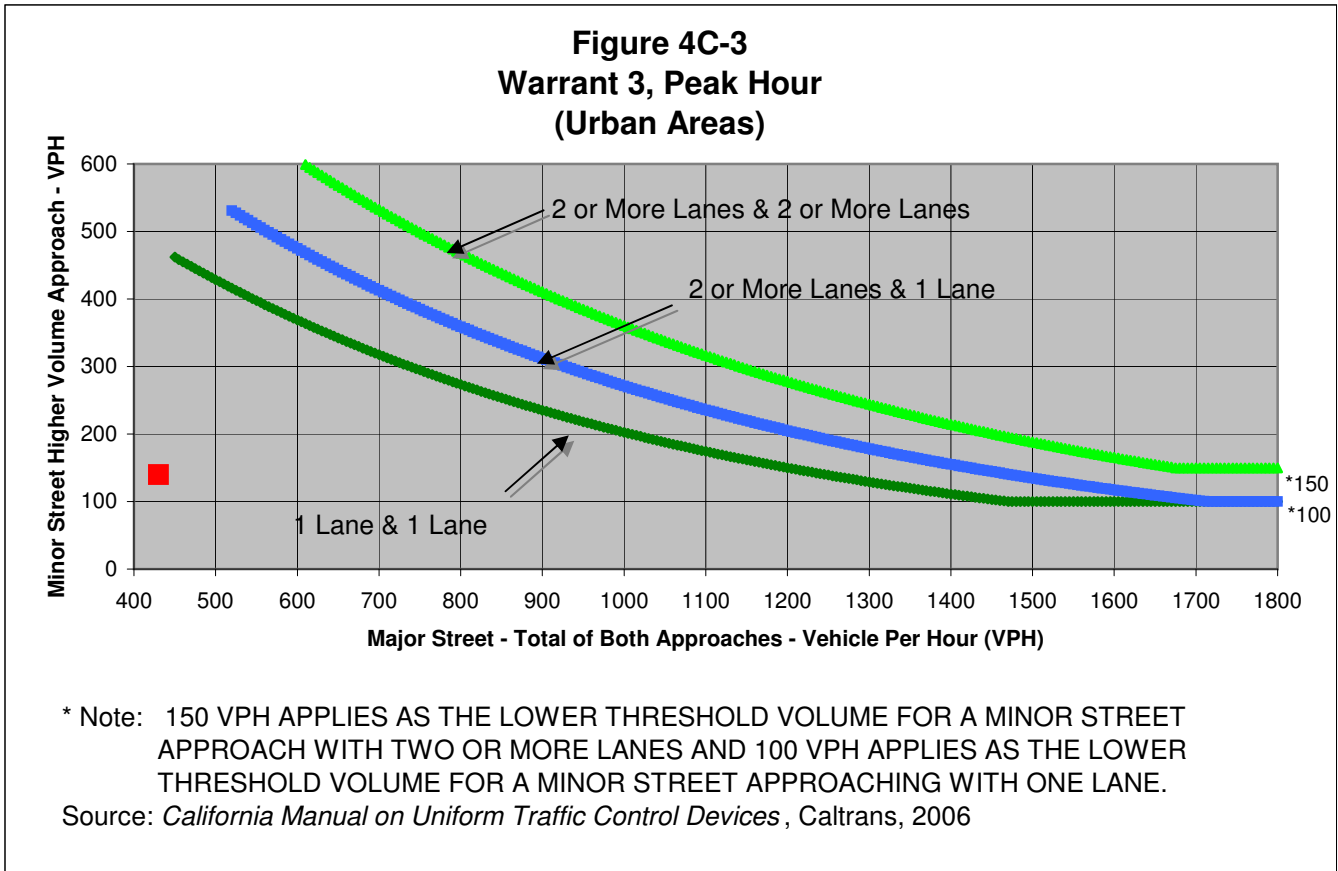
Major Street **Industrial Park Dr.**
 Minor Street **Van Ryn Ave.**

 Project **Austin Road Business Park**
 Scenario **Existing Plus Project Conditions**
 Peak Hour **AM**
Turn Movement Volumes

	NB	SB	EB	WB
Left	50	0	0	140
Through	0	0	140	120
Right	90	0	30	0
Total	140	0	170	260

Major Street Direction

	North/South
x	East/West



	Major Street Industrial Park Dr.	Minor Street Van Ryn Ave.	<u>Warrant Met</u>
Number of Approach Lanes	1	1	<u>NO</u>
Traffic Volume (VPH) *	430	140	

* Note: Traffic Volume for Major Street is Total Volume of Both Approaches.
 Traffic Volume for Minor Street is the Volume of High Volume Approach.

Major Street **Woodward Ave.**
 Minor Street **Van Ryn Ave.**

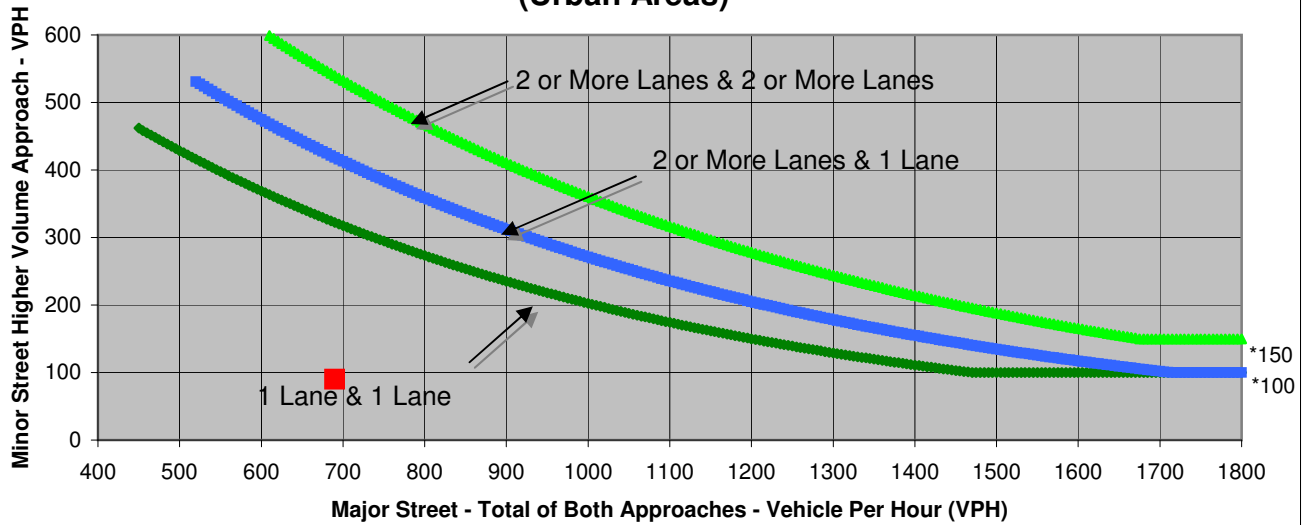
 Project **Austin Road Business Park**
 Scenario **Existing Plus Project Conditions**
 Peak Hour **AM**
Turn Movement Volumes

	NB	SB	EB	WB
Left	0	20	80	0
Through	0	0	260	330
Right	0	70	0	20
Total	0	90	340	350

Major Street Direction

	North/South
x	East/West

**Figure 4C-3
Warrant 3, Peak Hour
(Urban Areas)**



* Note: 150 VPH APPLIES AS THE LOWER THRESHOLD VOLUME FOR A MINOR STREET APPROACH WITH TWO OR MORE LANES AND 100 VPH APPLIES AS THE LOWER THRESHOLD VOLUME FOR A MINOR STREET APPROACHING WITH ONE LANE.

Source: *California Manual on Uniform Traffic Control Devices*, Caltrans, 2006

	Major Street Woodward Ave.	Minor Street Van Ryn Ave.	Warrant Met
Number of Approach Lanes	1	1	<u>NO</u>
Traffic Volume (VPH) *	690	90	

* Note: Traffic Volume for Major Street is Total Volume of Both Approaches.
 Traffic Volume for Minor Street is the Volume of High Volume Approach.

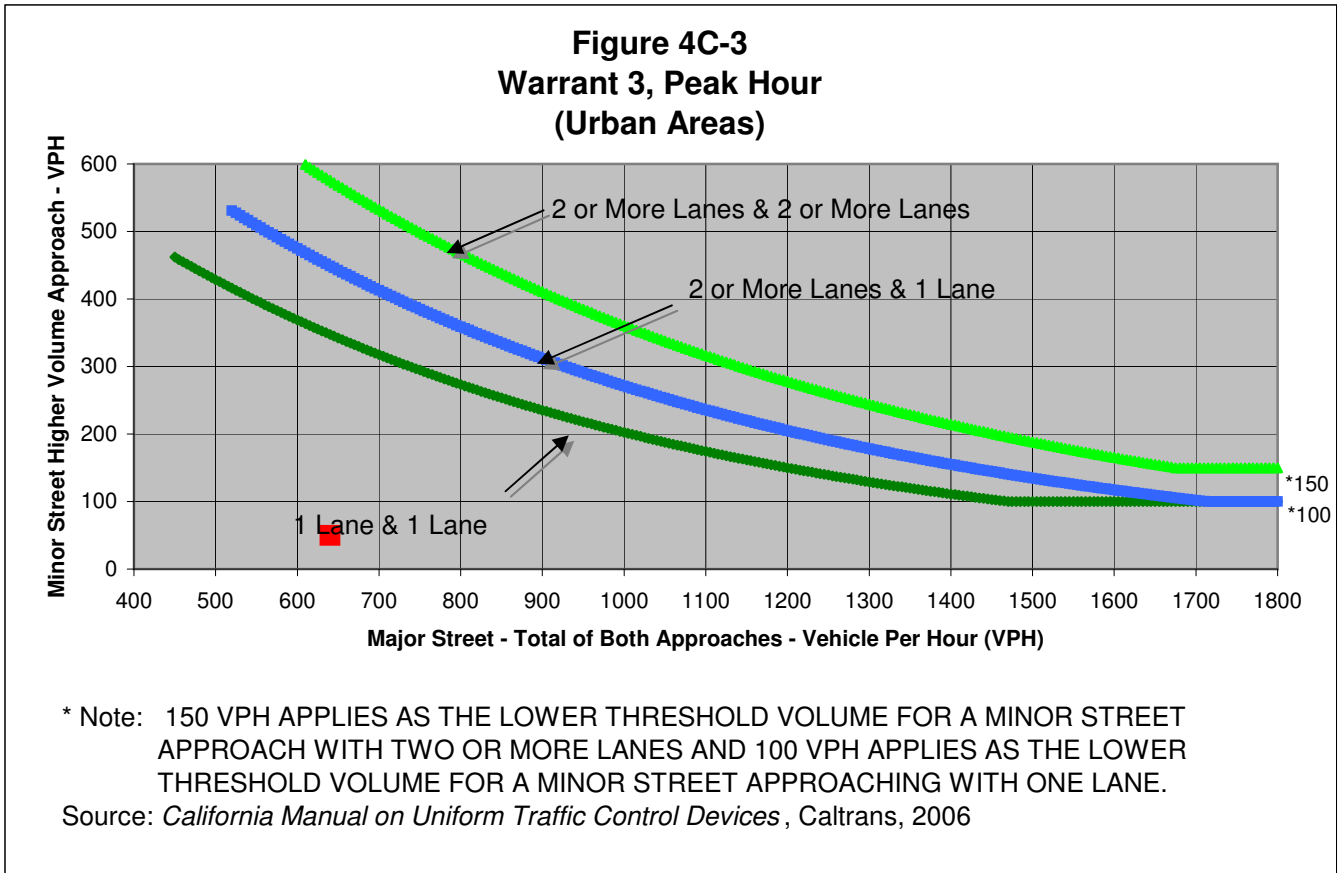
Major Street **Woodward Ave.**
 Minor Street **Pillsbury Rd.**

 Project **Austin Road Business Park**
 Scenario **Existing Plus Project Conditions**
 Peak Hour **AM**
Turn Movement Volumes

	NB	SB	EB	WB
Left	10	0	0	20
Through	0	0	270	340
Right	40	0	10	0
Total	50	0	280	360

Major Street Direction

	North/South
x	East/West



	Major Street Woodward Ave.	Minor Street Pillsbury Rd.	<u>Warrant Met</u>
Number of Approach Lanes	1	1	<u>NO</u>
Traffic Volume (VPH) *	640	50	

* Note: Traffic Volume for Major Street is Total Volume of Both Approaches.
 Traffic Volume for Minor Street is the Volume of High Volume Approach.

Major Street **Atherton Dr.**
 Minor Street **Woodward Ave.**

Project **Austin Road Business Park**
 Scenario **Existing Plus Project Conditions**
 Peak Hour **AM**

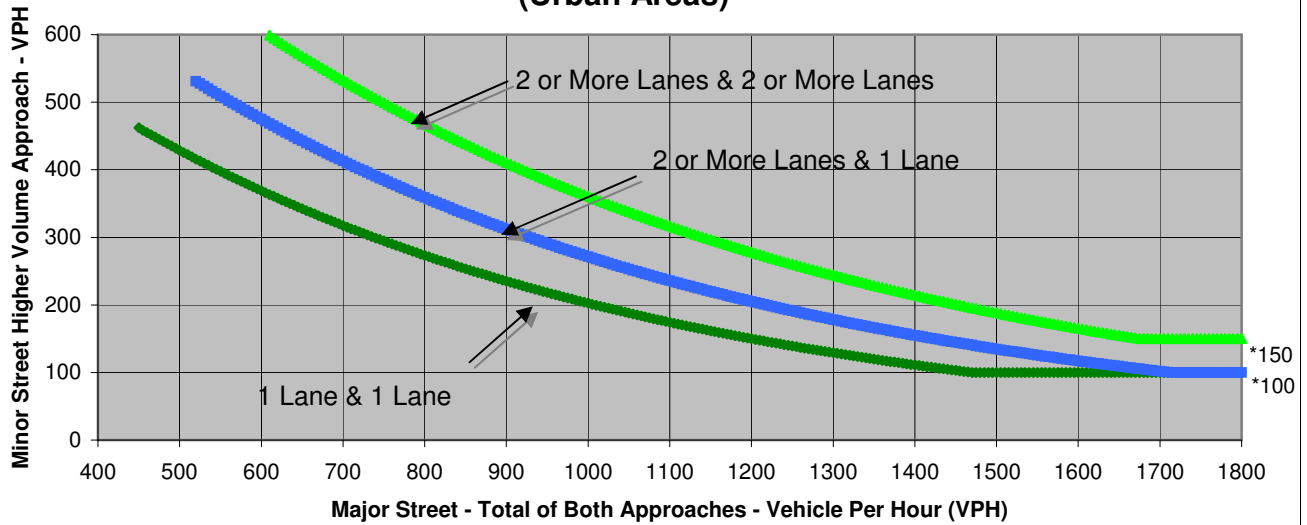
Turn Movement Volumes

	NB	SB	EB	WB
Left	260	30	10	630
Through	10	120	140	90
Right	250	10	160	20
Total	520	160	310	740

Major Street Direction

x	North/South
	East/West

**Figure 4C-3
 Warrant 3, Peak Hour
 (Urban Areas)**



* Note: 150 VPH APPLIES AS THE LOWER THRESHOLD VOLUME FOR A MINOR STREET APPROACH WITH TWO OR MORE LANES AND 100 VPH APPLIES AS THE LOWER THRESHOLD VOLUME FOR A MINOR STREET APPROACHING WITH ONE LANE.

Source: *California Manual on Uniform Traffic Control Devices*, Caltrans, 2006

	Major Street Atherton Dr.	Minor Street Woodward Ave.	Warrant Met
Number of Approach Lanes	2	1	<u>YES</u>
Traffic Volume (VPH) *	680	740	

* Note: Traffic Volume for Major Street is Total Volume of Both Approches.
 Traffic Volume for Minor Street is the Volume of High Volume Approach.

Major Street **Moffat Blvd.**
 Minor Street **Woodward Ave.**

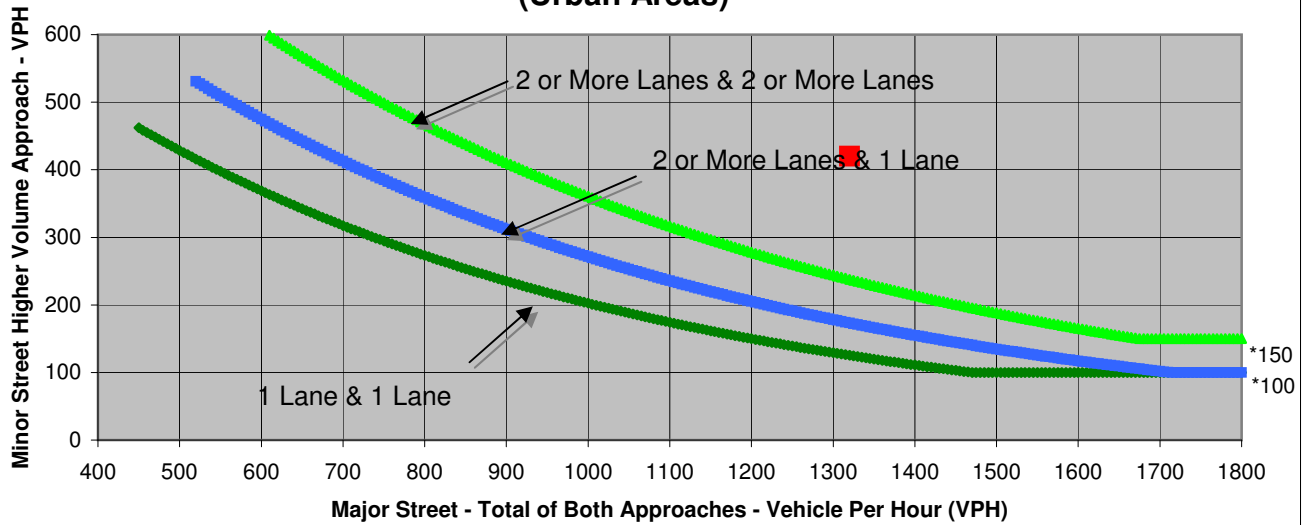
 Project **Austin Road Business Park**
 Scenario **Existing Plus Project Conditions**
 Peak Hour **AM**
Turn Movement Volumes

	NB	SB	EB	WB
Left	690	0	190	0
Through	410	170	0	0
Right	0	50	230	0
Total	1,100	220	420	0

Major Street Direction

x	North/South
	East/West

**Figure 4C-3
Warrant 3, Peak Hour
(Urban Areas)**



* Note: 150 VPH APPLIES AS THE LOWER THRESHOLD VOLUME FOR A MINOR STREET APPROACH WITH TWO OR MORE LANES AND 100 VPH APPLIES AS THE LOWER THRESHOLD VOLUME FOR A MINOR STREET APPROACHING WITH ONE LANE.

Source: *California Manual on Uniform Traffic Control Devices*, Caltrans, 2006

	Major Street Moffat Blvd.	Minor Street Woodward Ave.	Warrant Met
Number of Approach Lanes	1	1	YES
Traffic Volume (VPH) *	1,320	420	

* Note: Traffic Volume for Major Street is Total Volume of Both Approaches.
 Traffic Volume for Minor Street is the Volume of High Volume Approach.

Major Street **SR-99 SB Off-Ramp**
 Minor Street **Moffat Blvd.**

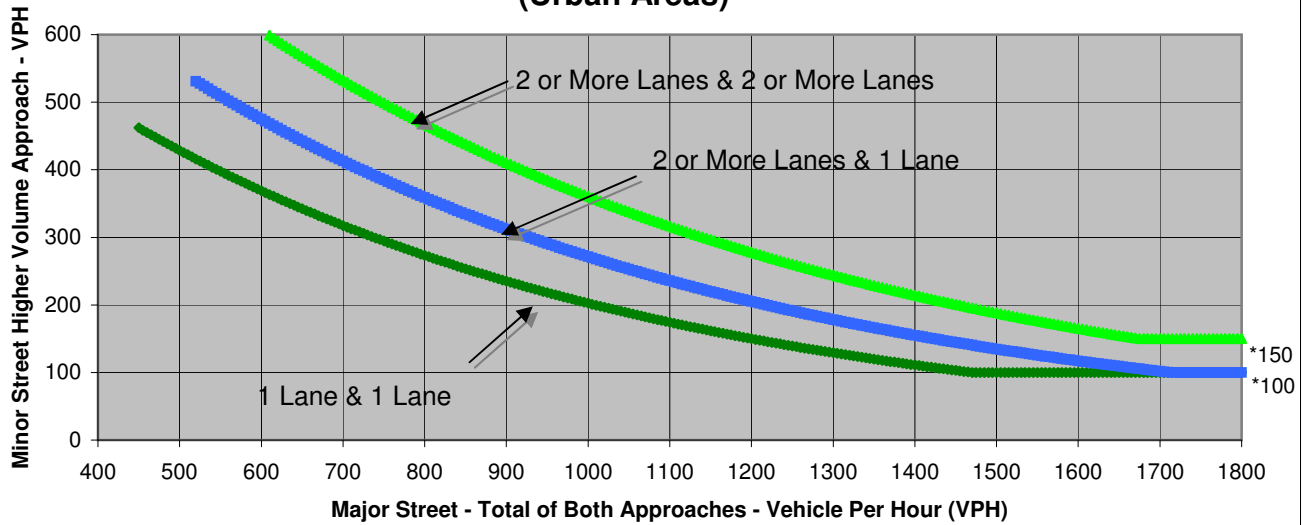
 Project **Austin Road Business Park**
 Scenario **Existing Plus Project Conditions**
 Peak Hour **AM**
Turn Movement Volumes

	NB	SB	EB	WB
Left	0	690	0	0
Through	0	0	400	620
Right	0	480	0	0
Total	0	1,170	400	620

Major Street Direction

x	North/South
	East/West

**Figure 4C-3
Warrant 3, Peak Hour
(Urban Areas)**



* Note: 150 VPH APPLIES AS THE LOWER THRESHOLD VOLUME FOR A MINOR STREET APPROACH WITH TWO OR MORE LANES AND 100 VPH APPLIES AS THE LOWER THRESHOLD VOLUME FOR A MINOR STREET APPROACHING WITH ONE LANE.

Source: *California Manual on Uniform Traffic Control Devices*, Caltrans, 2006

	Major Street	Minor Street	Warrant Met
	SR-99 SB Off-Ramp	Moffat Blvd.	
Number of Approach Lanes	1	1	<u>YES</u>
Traffic Volume (VPH) *	1,170	620	

* Note: Traffic Volume for Major Street is Total Volume of Both Approaches.
 Traffic Volume for Minor Street is the Volume of High Volume Approach.

Major Street **Austin Rd.**
 Minor Street **Graves Rd.**

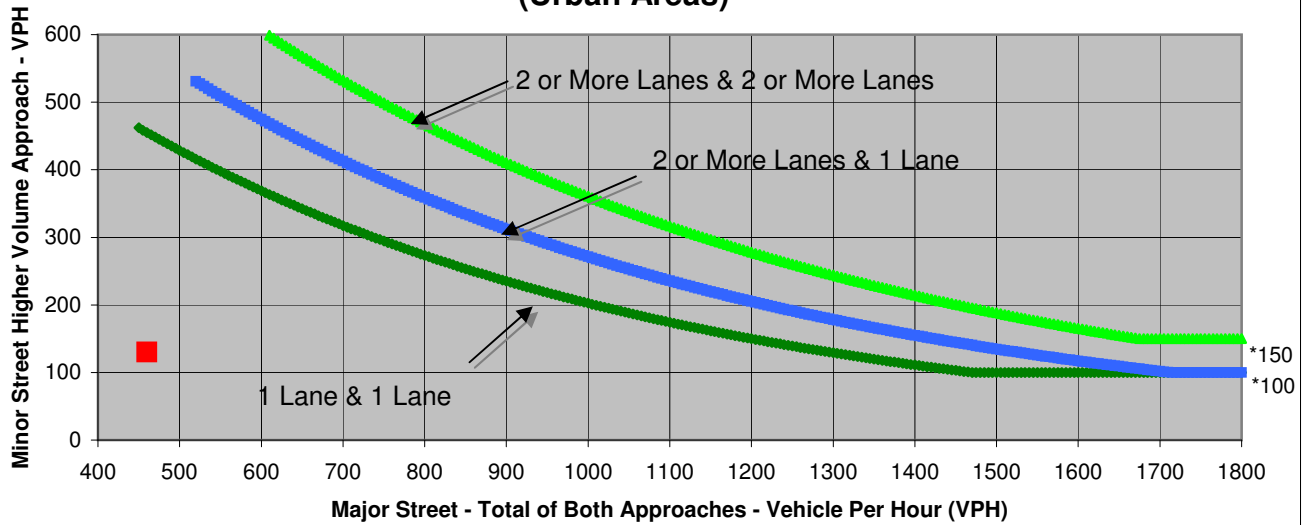
 Project **Austin Road Business Park**
 Scenario **Existing Plus Project Conditions**
 Peak Hour **AM**
Turn Movement Volumes

	NB	SB	EB	WB
Left	0	20	0	110
Through	180	250	0	0
Right	10	0	0	20
Total	190	270	0	130

Major Street Direction

x	North/South
	East/West

**Figure 4C-3
Warrant 3, Peak Hour
(Urban Areas)**



* Note: 150 VPH APPLIES AS THE LOWER THRESHOLD VOLUME FOR A MINOR STREET APPROACH WITH TWO OR MORE LANES AND 100 VPH APPLIES AS THE LOWER THRESHOLD VOLUME FOR A MINOR STREET APPROACHING WITH ONE LANE.

Source: *California Manual on Uniform Traffic Control Devices*, Caltrans, 2006

	Major Street Austin Rd.	Minor Street Graves Rd.	Warrant Met
Number of Approach Lanes	1	1	NO
Traffic Volume (VPH) *	460	130	

* Note: Traffic Volume for Major Street is Total Volume of Both Approaches.
 Traffic Volume for Minor Street is the Volume of High Volume Approach.

Major Street **Austin Rd.**
 Minor Street **SR-99 NB Ramps**

Project **Austin Road Business Park**
 Scenario **Existing Plus Project Conditions**
 Peak Hour **AM**

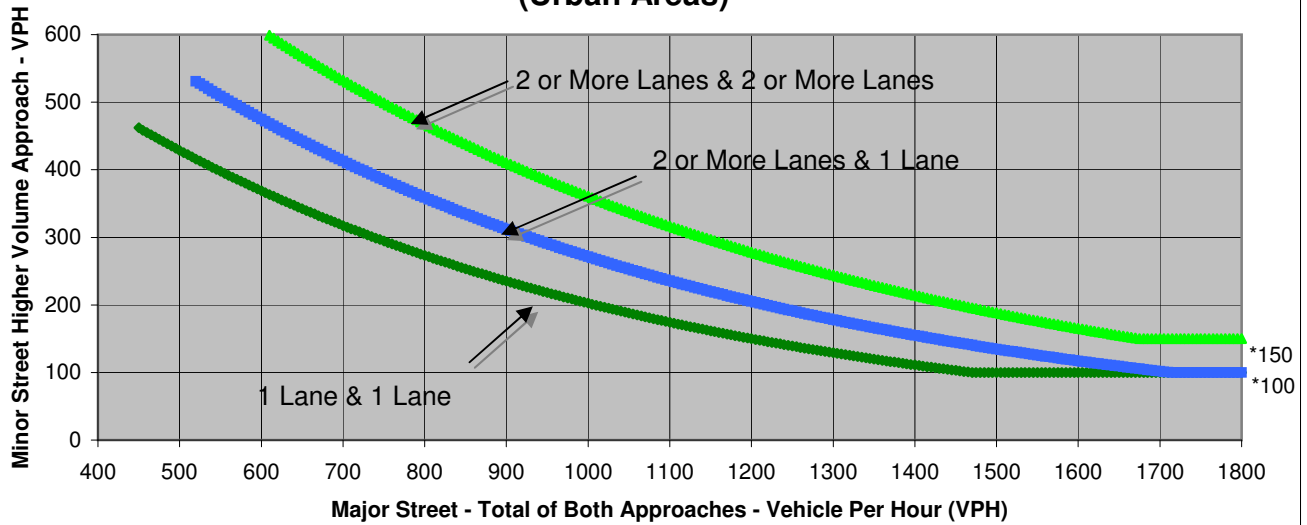
Turn Movement Volumes

	NB	SB	EB	WB
Left	670	0	0	1,060
Through	140	280	0	0
Right	0	80	0	50
Total	810	360	0	1,110

Major Street Direction

x	North/South
	East/West

**Figure 4C-3
 Warrant 3, Peak Hour
 (Urban Areas)**



* Note: 150 VPH APPLIES AS THE LOWER THRESHOLD VOLUME FOR A MINOR STREET APPROACH WITH TWO OR MORE LANES AND 100 VPH APPLIES AS THE LOWER THRESHOLD VOLUME FOR A MINOR STREET APPROACHING WITH ONE LANE.

Source: *California Manual on Uniform Traffic Control Devices*, Caltrans, 2006

	Major Street Austin Rd.	Minor Street SR-99 NB Ramps	Warrant Met
Number of Approach Lanes	1	1	YES
Traffic Volume (VPH) *	1,170	1,110	

* Note: Traffic Volume for Major Street is Total Volume of Both Approches.
 Traffic Volume for Minor Street is the Volume of High Volume Approach.

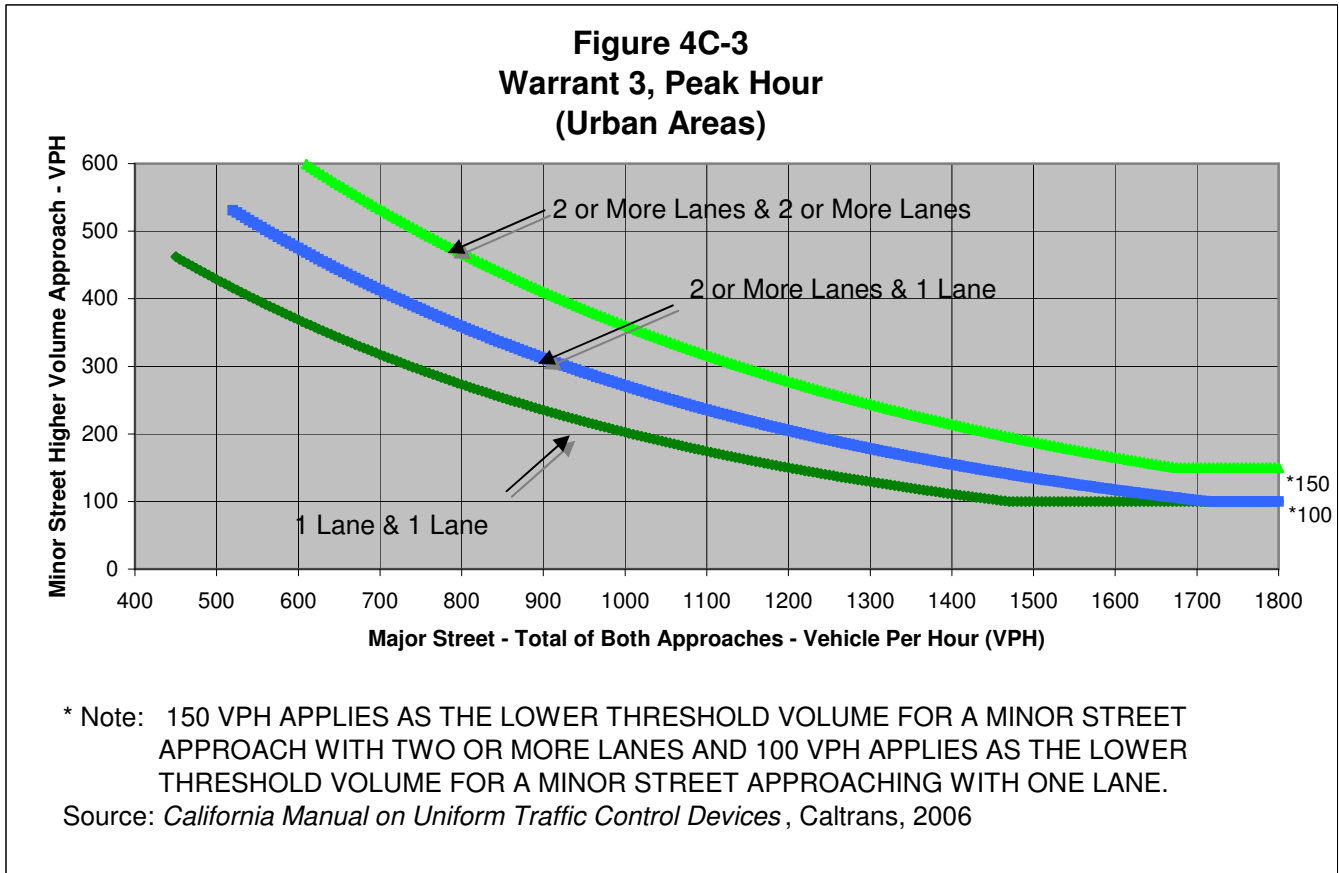
Major Street **Austin Rd.**
 Minor Street **Moffat Blvd / SR-99 SB On-Ramp**

 Project **Austin Road Business Park**
 Scenario **Existing Plus Project Conditions**
 Peak Hour **AM**
Turn Movement Volumes

	NB	SB	EB	WB
Left	310	50	110	10
Through	690	990	160	10
Right	480	300	820	10
Total	1,480	1,340	1,090	30

Major Street Direction

x	North/South
	East/West



	Major Street	Minor Street	Warrant Met
	Austin Rd.	Moffat Blvd / SR-99 SB On-Ramp	
Number of Approach Lanes	1	1	YES
Traffic Volume (VPH) *	2,820	1,090	

* Note: Traffic Volume for Major Street is Total Volume of Both Approaches.
 Traffic Volume for Minor Street is the Volume of High Volume Approach.

Major Street **Jack Tone Rd.**
 Minor Street **Graves Rd.**

Project **Austin Road Business Park**
 Scenario **Existing Plus Project Conditions**
 Peak Hour **AM**

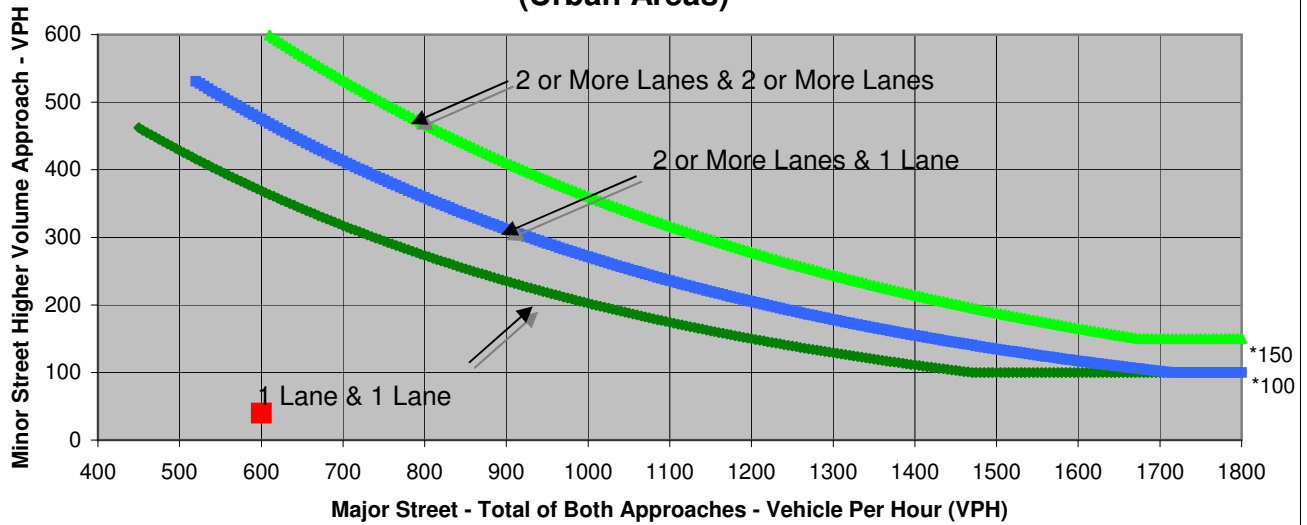
Turn Movement Volumes

	NB	SB	EB	WB
Left	20	0	20	0
Through	200	270	0	0
Right	0	110	20	0
Total	220	380	40	0

Major Street Direction

x	North/South
	East/West

**Figure 4C-3
 Warrant 3, Peak Hour
 (Urban Areas)**



* Note: 150 VPH APPLIES AS THE LOWER THRESHOLD VOLUME FOR A MINOR STREET APPROACH WITH TWO OR MORE LANES AND 100 VPH APPLIES AS THE LOWER THRESHOLD VOLUME FOR A MINOR STREET APPROACHING WITH ONE LANE.

Source: *California Manual on Uniform Traffic Control Devices*, Caltrans, 2006

	Major Street	Minor Street	<u>Warrant Met</u>
	Jack Tone Rd.	Graves Rd.	
Number of Approach Lanes	1	1	<u>NO</u>
Traffic Volume (VPH) *	600	40	

* Note: Traffic Volume for Major Street is Total Volume of Both Approaches.
 Traffic Volume for Minor Street is the Volume of High Volume Approach.

Major Street **Main St.**
 Minor Street **Sedan Ave.**

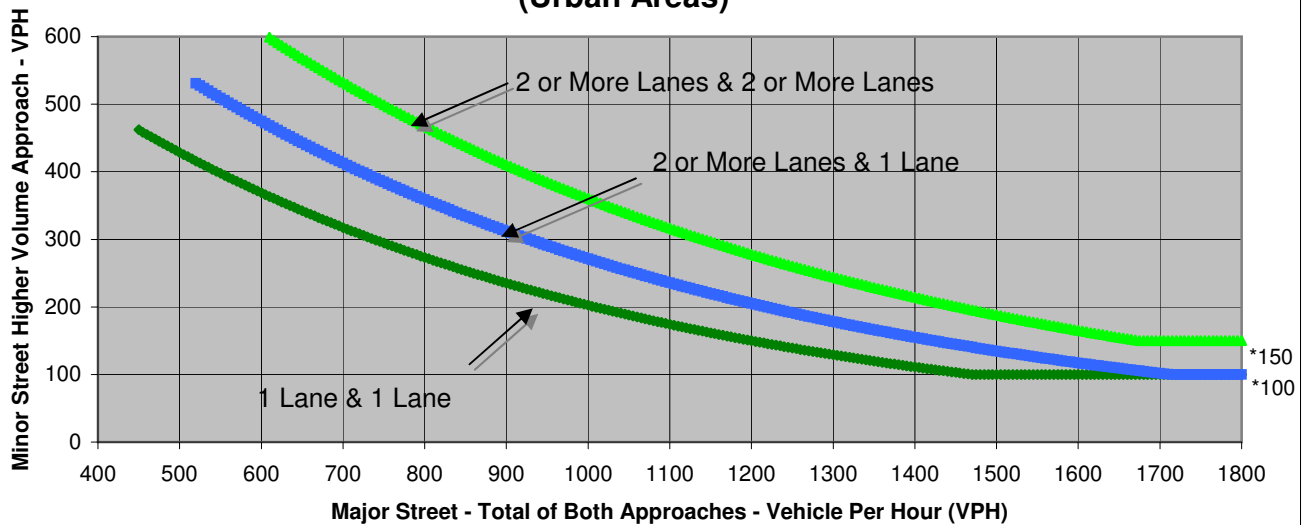
 Project **Austin Road Business Park**
 Scenario **Existing Plus Project Conditions**
 Peak Hour **AM**
Turn Movement Volumes

	NB	SB	EB	WB
Left	10	10	10	10
Through	90	70	10	10
Right	10	10	10	10
Total	110	90	30	30

Major Street Direction

x	North/South
	East/West

**Figure 4C-3
Warrant 3, Peak Hour
(Urban Areas)**



* Note: 150 VPH APPLIES AS THE LOWER THRESHOLD VOLUME FOR A MINOR STREET APPROACH WITH TWO OR MORE LANES AND 100 VPH APPLIES AS THE LOWER THRESHOLD VOLUME FOR A MINOR STREET APPROACHING WITH ONE LANE.

Source: *California Manual on Uniform Traffic Control Devices*, Caltrans, 2006

	Major Street Main St.	Minor Street Sedan Ave.	Warrant Met
Number of Approach Lanes	1	1	<u>NO</u>
Traffic Volume (VPH) *	200	30	

* Note: Traffic Volume for Major Street is Total Volume of Both Approaches.
 Traffic Volume for Minor Street is the Volume of High Volume Approach.

Major Street **Jack Tone Rd.**
 Minor Street **W. River Rd.**

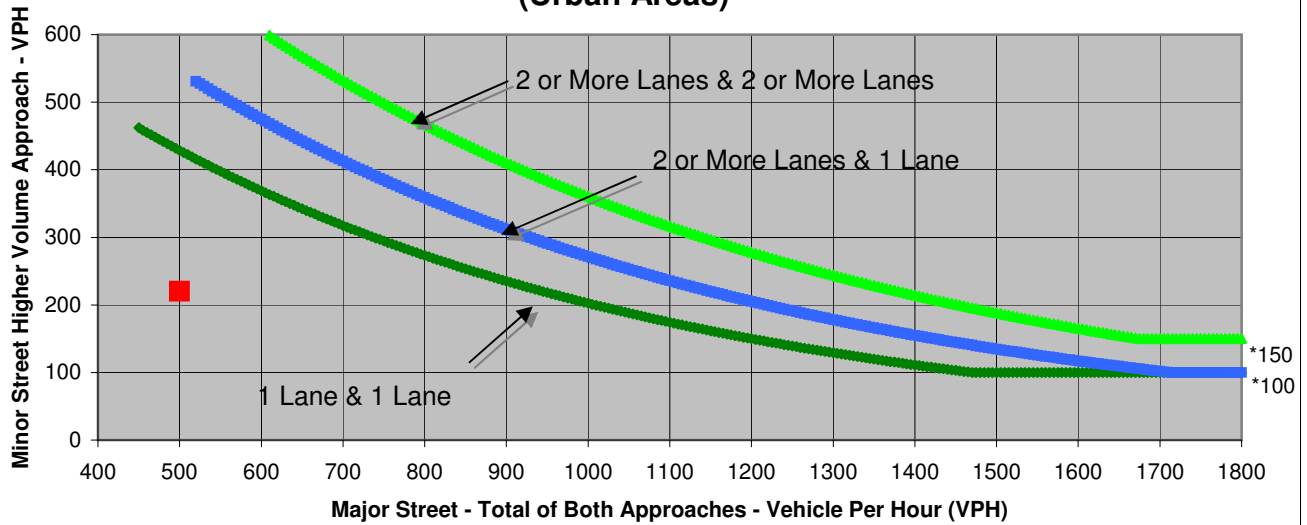
 Project **Austin Road Business Park**
 Scenario **Existing Plus Project Conditions**
 Peak Hour **AM**
Turn Movement Volumes

	NB	SB	EB	WB
Left	0	30	0	180
Through	150	260	0	0
Right	60	0	0	40
Total	210	290	0	220

Major Street Direction

x	North/South
	East/West

**Figure 4C-3
Warrant 3, Peak Hour
(Urban Areas)**



* Note: 150 VPH APPLIES AS THE LOWER THRESHOLD VOLUME FOR A MINOR STREET APPROACH WITH TWO OR MORE LANES AND 100 VPH APPLIES AS THE LOWER THRESHOLD VOLUME FOR A MINOR STREET APPROACHING WITH ONE LANE.

Source: *California Manual on Uniform Traffic Control Devices*, Caltrans, 2006

	Major Street	Minor Street	Warrant Met
	Jack Tone Rd.	W. River Rd.	
Number of Approach Lanes	1	1	<u>NO</u>
Traffic Volume (VPH) *	500	220	

* Note: Traffic Volume for Major Street is Total Volume of Both Approaches.
 Traffic Volume for Minor Street is the Volume of High Volume Approach.

Major Street **Colony Rd.**
 Minor Street **SR-99 NB Ramps / Hoff Rd.**

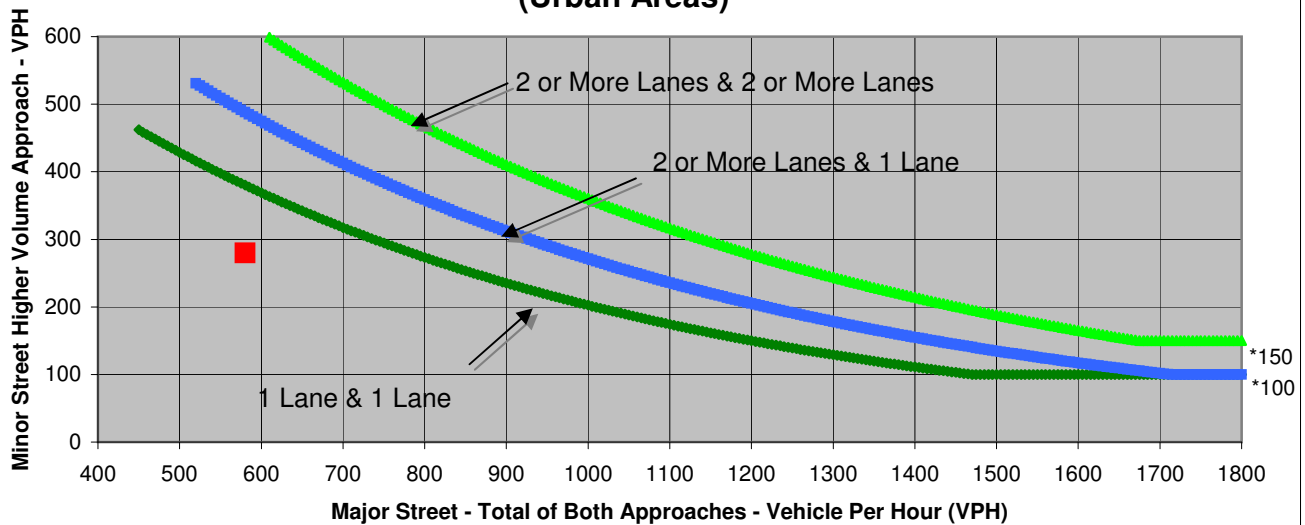
 Project **Austin Road Business Park**
 Scenario **Existing Plus Project Conditions**
 Peak Hour **AM**
Turn Movement Volumes

	NB	SB	EB	WB
Left	160	10	10	90
Through	100	10	120	140
Right	20	10	200	20
Total	280	30	330	250

Major Street Direction

	North/South
x	East/West

**Figure 4C-3
Warrant 3, Peak Hour
(Urban Areas)**



* Note: 150 VPH APPLIES AS THE LOWER THRESHOLD VOLUME FOR A MINOR STREET APPROACH WITH TWO OR MORE LANES AND 100 VPH APPLIES AS THE LOWER THRESHOLD VOLUME FOR A MINOR STREET APPROACHING WITH ONE LANE.

Source: *California Manual on Uniform Traffic Control Devices*, Caltrans, 2006

	Major Street	Minor Street	Warrant Met
	Colony Rd.	SR-99 NB Ramps / Hoff Rd.	
Number of Approach Lanes	2	2	<u>NO</u>
Traffic Volume (VPH) *	580	280	

* Note: Traffic Volume for Major Street is Total Volume of Both Approaches.
 Traffic Volume for Minor Street is the Volume of High Volume Approach.

Major Street **Austin Rd.**
 Minor Street **Ripon Rd.**

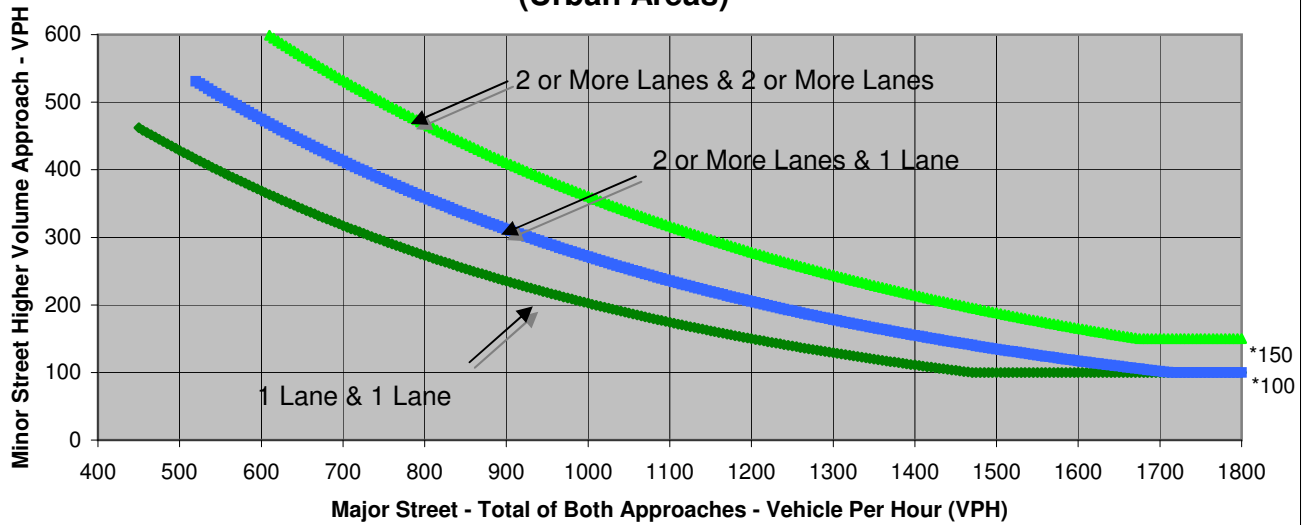
 Project **Austin Road Business Park**
 Scenario **Existing Plus Project Conditions**
 Peak Hour **AM**
Turn Movement Volumes

	NB	SB	EB	WB
Left	10	40	10	20
Through	30	20	120	130
Right	30	20	10	800
Total	70	80	140	950

Major Street Direction

x	North/South
	East/West

**Figure 4C-3
Warrant 3, Peak Hour
(Urban Areas)**



* Note: 150 VPH APPLIES AS THE LOWER THRESHOLD VOLUME FOR A MINOR STREET APPROACH WITH TWO OR MORE LANES AND 100 VPH APPLIES AS THE LOWER THRESHOLD VOLUME FOR A MINOR STREET APPROACHING WITH ONE LANE.

Source: *California Manual on Uniform Traffic Control Devices*, Caltrans, 2006

	Major Street	Minor Street	Warrant Met
	Austin Rd.	Ripon Rd.	
Number of Approach Lanes	1	1	YES
Traffic Volume (VPH) *	150	950	

* Note: Traffic Volume for Major Street is Total Volume of Both Approaches.
 Traffic Volume for Minor Street is the Volume of High Volume Approach.

Major Street **Main St.**
 Minor Street **Woodward Ave.**

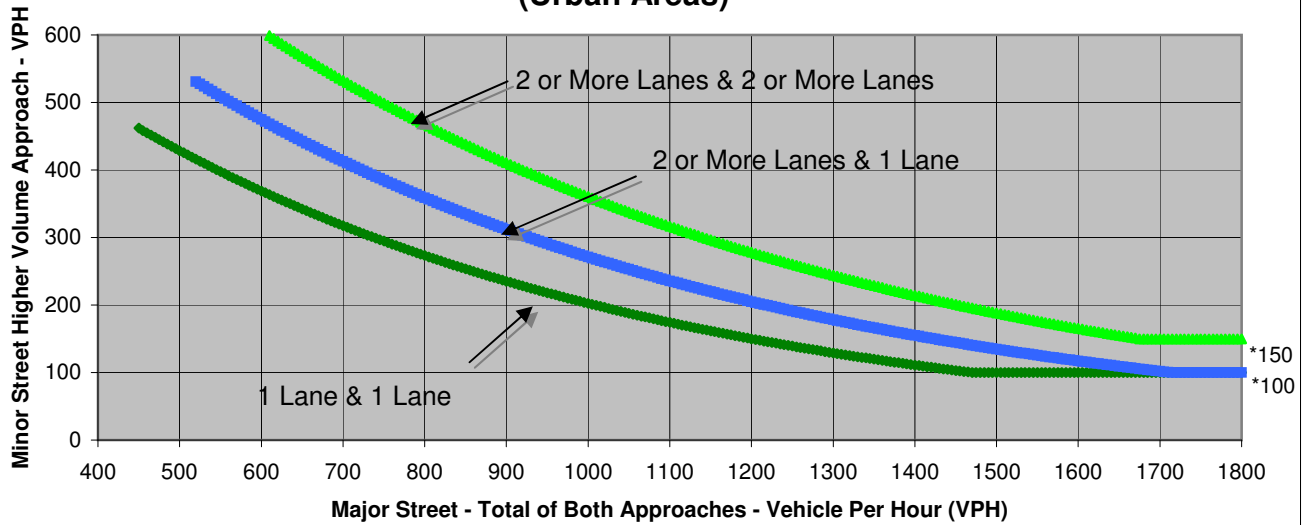
 Project **Austin Road Business Park**
 Scenario **Existing Plus Project Conditions**
 Peak Hour **PM**
Turn Movement Volumes

	NB	SB	EB	WB
Left	60	420	30	30
Through	330	230	220	410
Right	20	40	80	390
Total	410	690	330	830

Major Street Direction

x	North/South
	East/West

**Figure 4C-3
Warrant 3, Peak Hour
(Urban Areas)**



* Note: 150 VPH APPLIES AS THE LOWER THRESHOLD VOLUME FOR A MINOR STREET APPROACH WITH TWO OR MORE LANES AND 100 VPH APPLIES AS THE LOWER THRESHOLD VOLUME FOR A MINOR STREET APPROACHING WITH ONE LANE.

Source: *California Manual on Uniform Traffic Control Devices*, Caltrans, 2006

	Major Street Main St.	Minor Street Woodward Ave.	Warrant Met
Number of Approach Lanes	1	1	<u>YES</u>
Traffic Volume (VPH) *	1,100	830	

* Note: Traffic Volume for Major Street is Total Volume of Both Approaches.
 Traffic Volume for Minor Street is the Volume of High Volume Approach.

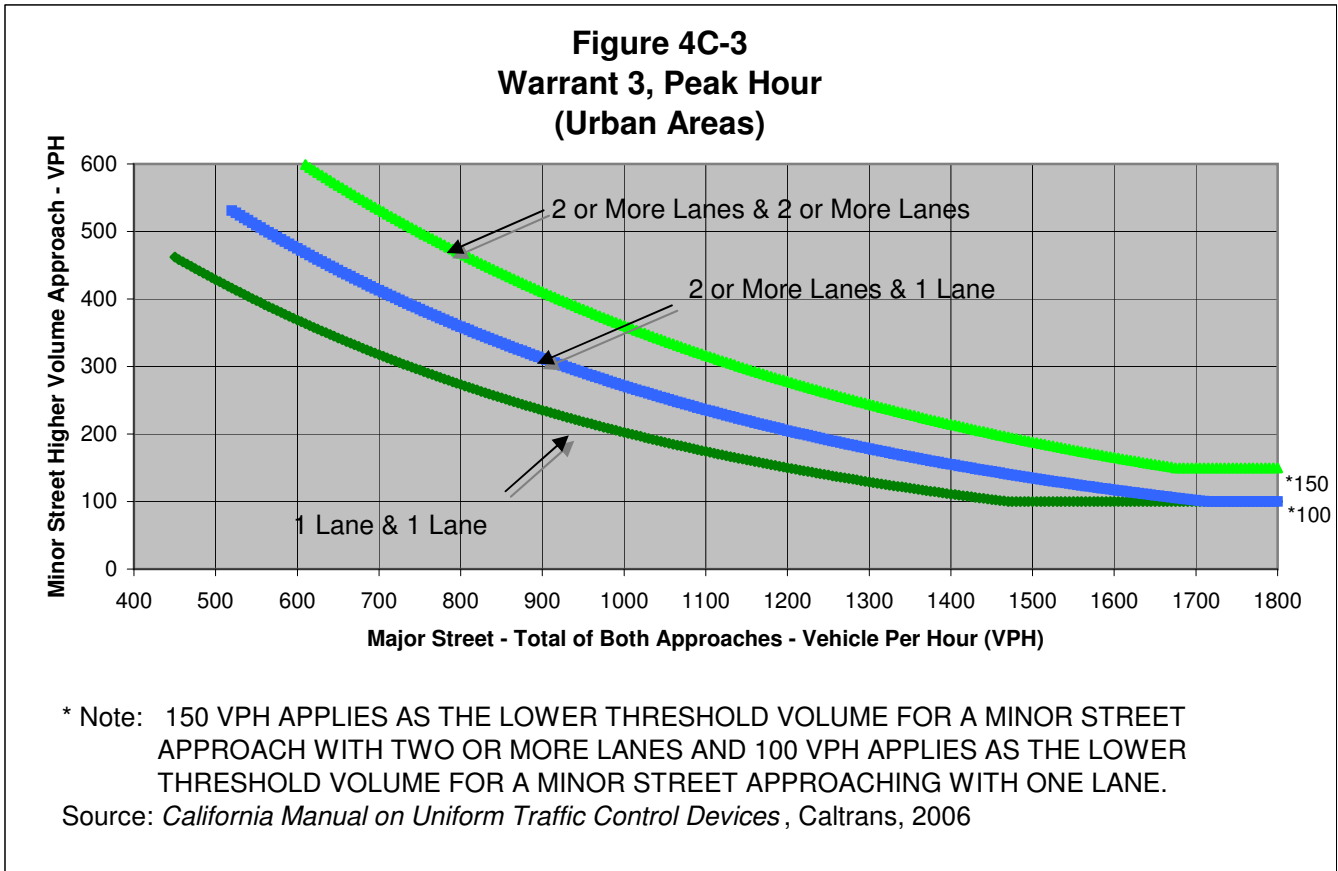
Major Street **Industrial Park Dr.**
 Minor Street **Van Ryn Ave.**

 Project **Austin Road Business Park**
 Scenario **Existing Plus Project Conditions**
 Peak Hour **PM**
Turn Movement Volumes

	NB	SB	EB	WB
Left	150	0	0	240
Through	0	0	290	200
Right	490	0	160	0
Total	640	0	450	440

Major Street Direction

	North/South
x	East/West



	Major Street Industrial Park Dr.	Minor Street Van Ryn Ave.	<u>Warrant Met</u>
Number of Approach Lanes	1	1	<u>YES</u>
Traffic Volume (VPH) *	890	640	

* Note: Traffic Volume for Major Street is Total Volume of Both Approches.
 Traffic Volume for Minor Street is the Volume of High Volume Approach.

Major Street **Woodward Ave.**
 Minor Street **Van Ryn Ave.**

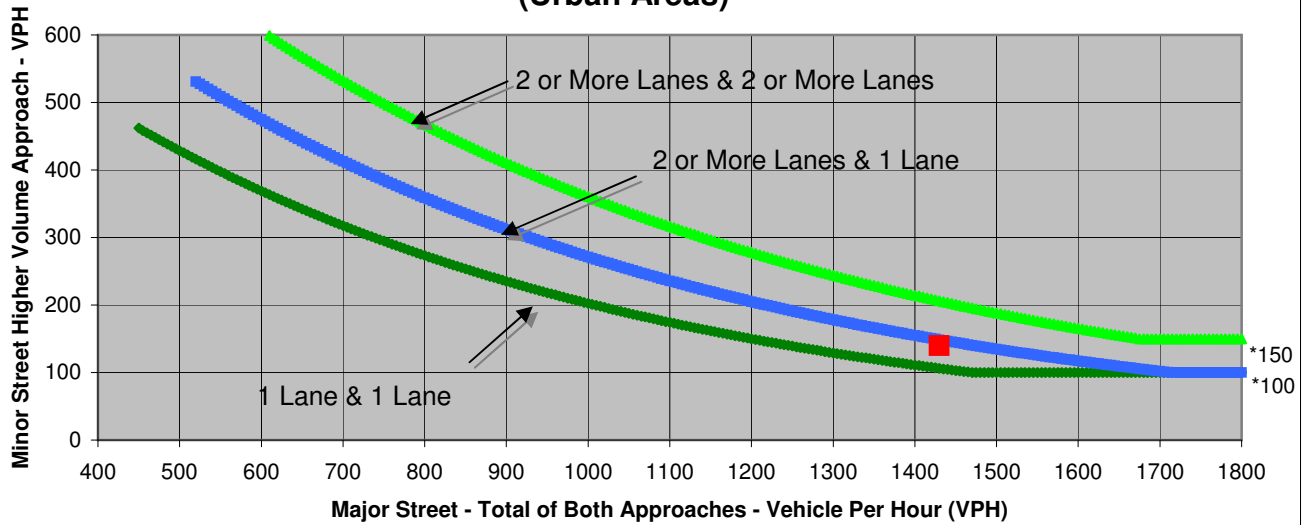
 Project **Austin Road Business Park**
 Scenario **Existing Plus Project Conditions**
 Peak Hour **PM**
Turn Movement Volumes

	NB	SB	EB	WB
Left	0	30	110	0
Through	0	0	520	780
Right	0	110	0	20
Total	0	140	630	800

Major Street Direction

	North/South
x	East/West

**Figure 4C-3
Warrant 3, Peak Hour
(Urban Areas)**



* Note: 150 VPH APPLIES AS THE LOWER THRESHOLD VOLUME FOR A MINOR STREET APPROACH WITH TWO OR MORE LANES AND 100 VPH APPLIES AS THE LOWER THRESHOLD VOLUME FOR A MINOR STREET APPROACHING WITH ONE LANE.

Source: *California Manual on Uniform Traffic Control Devices*, Caltrans, 2006

	Major Street Woodward Ave.	Minor Street Van Ryn Ave.	Warrant Met
Number of Approach Lanes	1	1	YES
Traffic Volume (VPH) *	1,430	140	

* Note: Traffic Volume for Major Street is Total Volume of Both Approaches.
 Traffic Volume for Minor Street is the Volume of High Volume Approach.

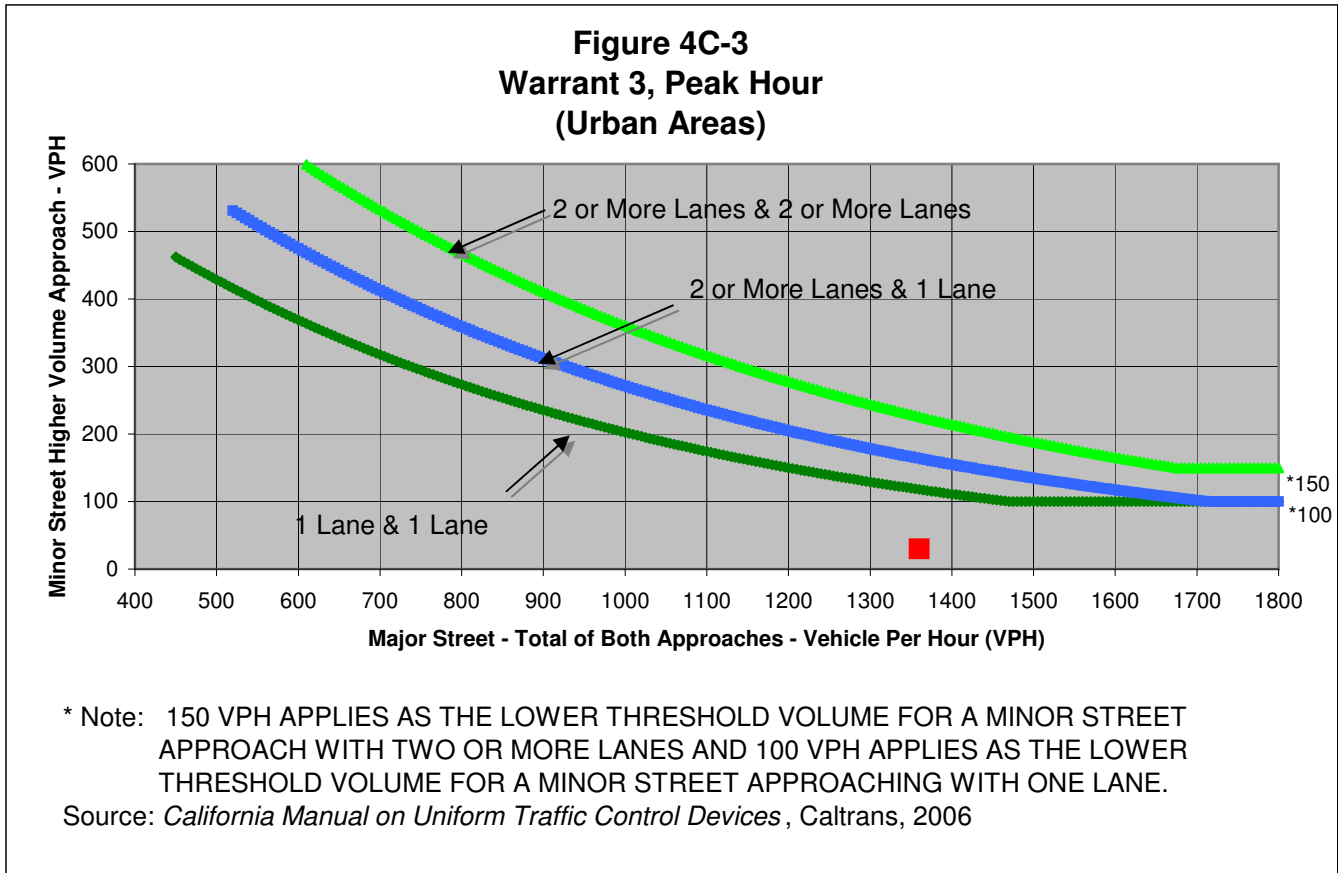
Major Street **Woodward Ave.**
 Minor Street **Pillsbury Rd.**

 Project **Austin Road Business Park**
 Scenario **Existing Plus Project Conditions**
 Peak Hour **PM**
Turn Movement Volumes

	NB	SB	EB	WB
Left	10	0	0	20
Through	0	0	530	790
Right	20	0	20	0
Total	30	0	550	810

Major Street Direction

	North/South
x	East/West



	Major Street Woodward Ave.	Minor Street Pillsbury Rd.	<u>Warrant Met</u>
Number of Approach Lanes	1	1	<u>NO</u>
Traffic Volume (VPH) *	1,360	30	

* Note: Traffic Volume for Major Street is Total Volume of Both Approaches.
 Traffic Volume for Minor Street is the Volume of High Volume Approach.

Major Street **Atherton Dr.**
 Minor Street **Woodward Ave.**

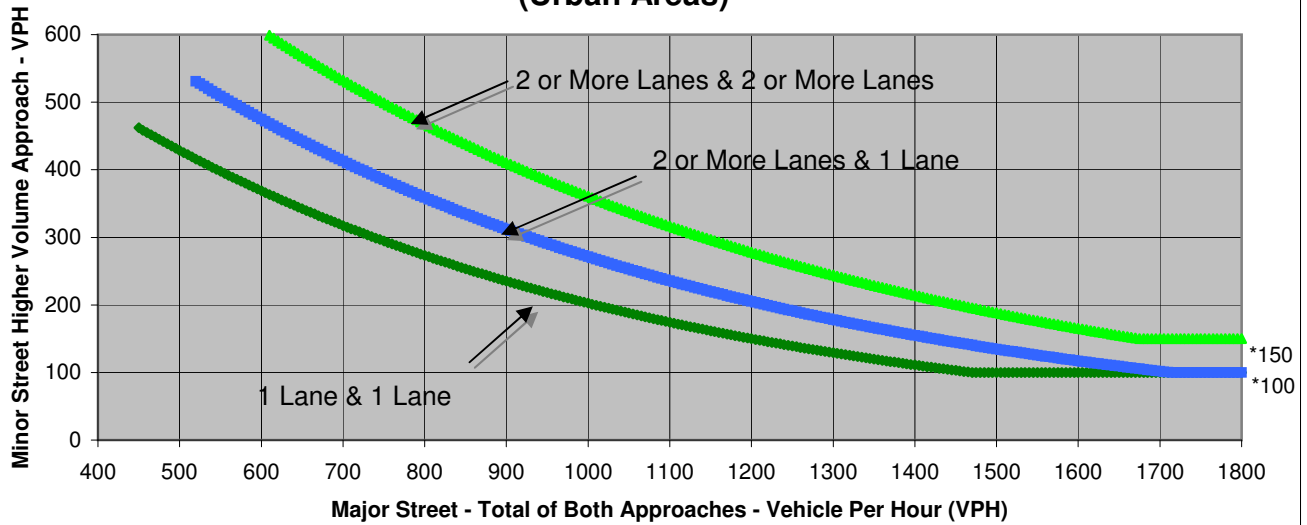
 Project **Austin Road Business Park**
 Scenario **Existing Plus Project Conditions**
 Peak Hour **PM**
Turn Movement Volumes

	NB	SB	EB	WB
Left	550	20	10	550
Through	440	220	200	250
Right	660	10	340	40
Total	1,650	250	550	840

Major Street Direction

x	North/South
	East/West

**Figure 4C-3
Warrant 3, Peak Hour
(Urban Areas)**



* Note: 150 VPH APPLIES AS THE LOWER THRESHOLD VOLUME FOR A MINOR STREET APPROACH WITH TWO OR MORE LANES AND 100 VPH APPLIES AS THE LOWER THRESHOLD VOLUME FOR A MINOR STREET APPROACHING WITH ONE LANE.

Source: *California Manual on Uniform Traffic Control Devices*, Caltrans, 2006

	Major Street Atherton Dr.	Minor Street Woodward Ave.	Warrant Met
Number of Approach Lanes	2	1	<u>YES</u>
Traffic Volume (VPH) *	1,900	840	

* Note: Traffic Volume for Major Street is Total Volume of Both Approaches.
 Traffic Volume for Minor Street is the Volume of High Volume Approach.

Major Street **Moffat Blvd.**
 Minor Street **Woodward Ave.**

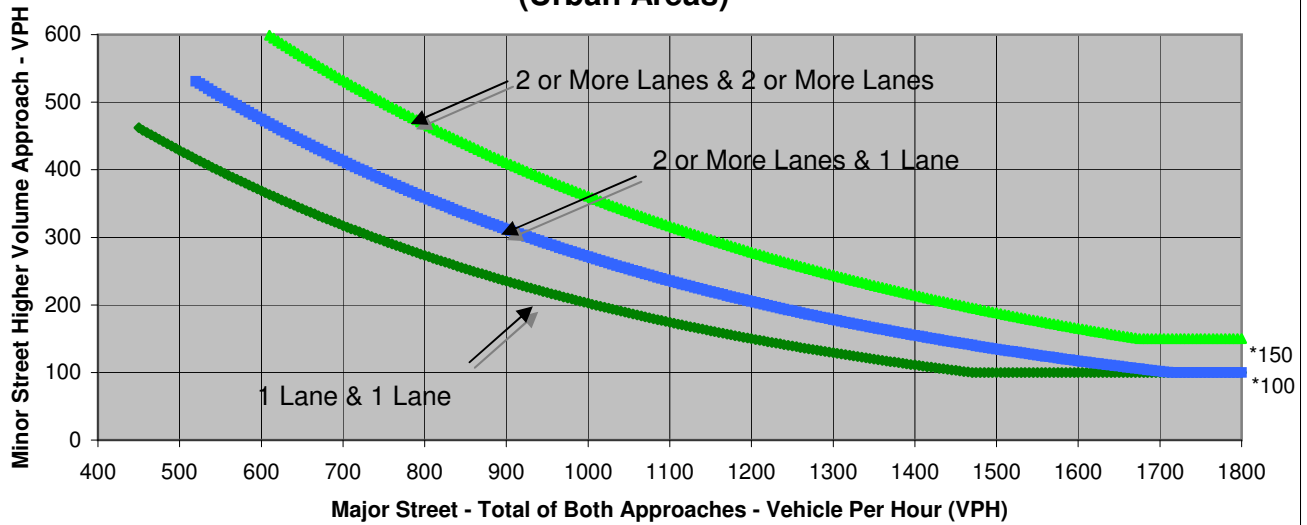
 Project **Austin Road Business Park**
 Scenario **Existing Plus Project Conditions**
 Peak Hour **PM**
Turn Movement Volumes

	NB	SB	EB	WB
Left	610	0	140	0
Through	230	360	0	0
Right	0	230	740	0
Total	840	590	880	0

Major Street Direction

x	North/South
	East/West

**Figure 4C-3
Warrant 3, Peak Hour
(Urban Areas)**



* Note: 150 VPH APPLIES AS THE LOWER THRESHOLD VOLUME FOR A MINOR STREET APPROACH WITH TWO OR MORE LANES AND 100 VPH APPLIES AS THE LOWER THRESHOLD VOLUME FOR A MINOR STREET APPROACHING WITH ONE LANE.

Source: *California Manual on Uniform Traffic Control Devices*, Caltrans, 2006

	Major Street Moffat Blvd.	Minor Street Woodward Ave.	Warrant Met
Number of Approach Lanes	1	1	<u>YES</u>
Traffic Volume (VPH) *	1,430	880	

* Note: Traffic Volume for Major Street is Total Volume of Both Approaches.
 Traffic Volume for Minor Street is the Volume of High Volume Approach.

Major Street **SR-99 SB Off-Ramp**
 Minor Street **Moffat Blvd.**

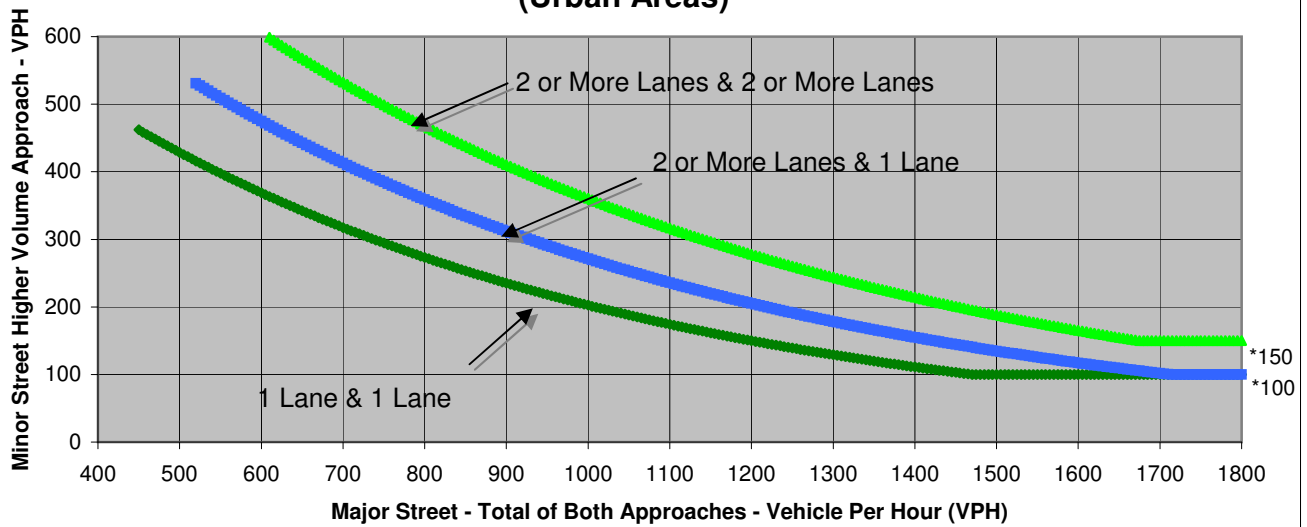
 Project **Austin Road Business Park**
 Scenario **Existing Plus Project Conditions**
 Peak Hour **PM**
Turn Movement Volumes

	NB	SB	EB	WB
Left	0	690	0	0
Through	0	0	1,100	510
Right	0	330	0	0
Total	0	1,020	1,100	510

Major Street Direction

x	North/South
	East/West

**Figure 4C-3
Warrant 3, Peak Hour
(Urban Areas)**



* Note: 150 VPH APPLIES AS THE LOWER THRESHOLD VOLUME FOR A MINOR STREET APPROACH WITH TWO OR MORE LANES AND 100 VPH APPLIES AS THE LOWER THRESHOLD VOLUME FOR A MINOR STREET APPROACHING WITH ONE LANE.

Source: *California Manual on Uniform Traffic Control Devices*, Caltrans, 2006

	Major Street	Minor Street	Warrant Met
	SR-99 SB Off-Ramp	Moffat Blvd.	
Number of Approach Lanes	1	1	YES
Traffic Volume (VPH) *	1,020	1,100	

* Note: Traffic Volume for Major Street is Total Volume of Both Approaches.
 Traffic Volume for Minor Street is the Volume of High Volume Approach.

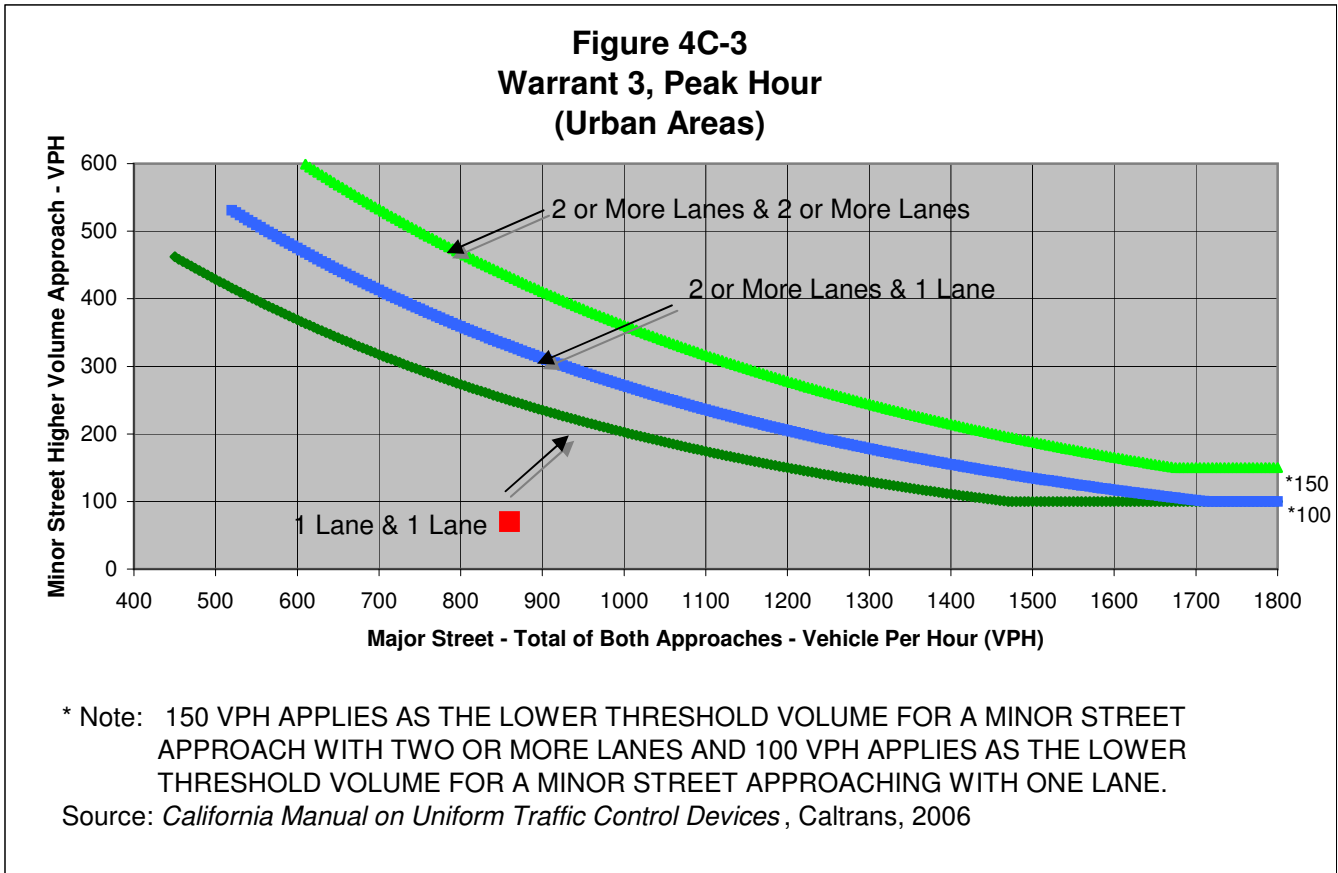
Major Street **Austin Rd.**
 Minor Street **Graves Rd.**

 Project **Austin Road Business Park**
 Scenario **Existing Plus Project Conditions**
 Peak Hour **PM**
Turn Movement Volumes

	NB	SB	EB	WB
Left	0	80	0	40
Through	340	320	0	0
Right	120	0	0	30
Total	460	400	0	70

Major Street Direction

x	North/South
	East/West



	Major Street Austin Rd.	Minor Street Graves Rd.	<u>Warrant Met</u>
Number of Approach Lanes	1	1	<u>NO</u>
Traffic Volume (VPH) *	860	70	

* Note: Traffic Volume for Major Street is Total Volume of Both Approaches.
 Traffic Volume for Minor Street is the Volume of High Volume Approach.

Major Street **Austin Rd.**
 Minor Street **SR-99 NB Ramps**

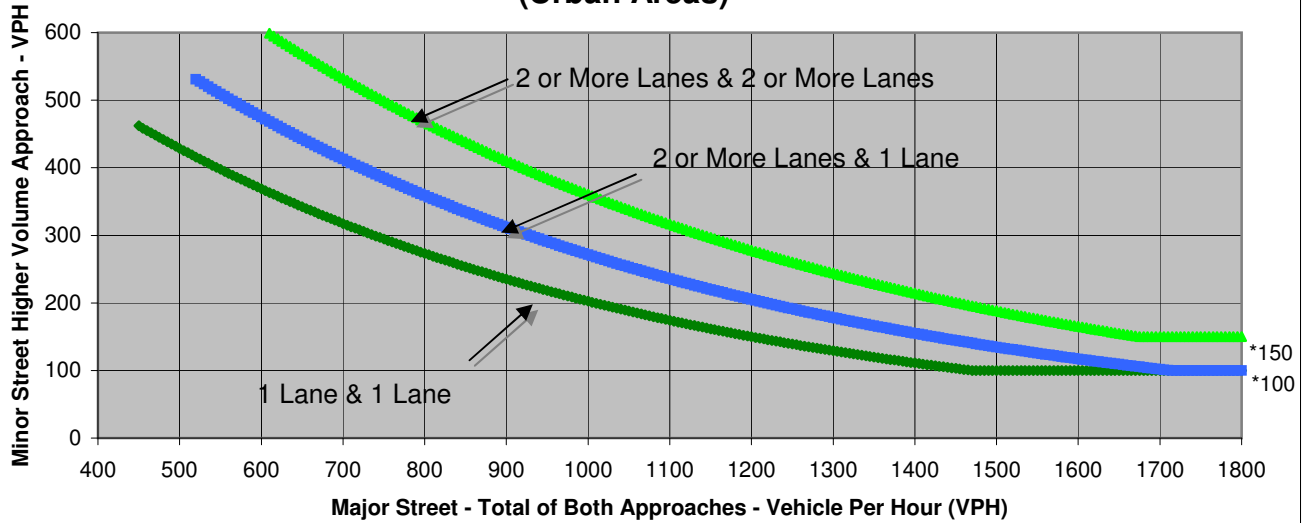
 Project **Austin Road Business Park**
 Scenario **Existing Plus Project Conditions**
 Peak Hour **PM**
Turn Movement Volumes

	NB	SB	EB	WB
Left	900	0	0	1,150
Through	400	320	0	0
Right	0	40	0	60
Total	1,300	360	0	1,210

Major Street Direction

x	North/South
	East/West

**Figure 4C-3
Warrant 3, Peak Hour
(Urban Areas)**



* Note: 150 VPH APPLIES AS THE LOWER THRESHOLD VOLUME FOR A MINOR STREET APPROACH WITH TWO OR MORE LANES AND 100 VPH APPLIES AS THE LOWER THRESHOLD VOLUME FOR A MINOR STREET APPROACHING WITH ONE LANE.

Source: *California Manual on Uniform Traffic Control Devices*, Caltrans, 2006

	Major Street Austin Rd.	Minor Street SR-99 NB Ramps	Warrant Met
Number of Approach Lanes	1	1	YES
Traffic Volume (VPH) *	1,660	1,210	

* Note: Traffic Volume for Major Street is Total Volume of Both Approaches.
 Traffic Volume for Minor Street is the Volume of High Volume Approach.

Major Street **Austin Rd.**
 Minor Street **Moffat Blvd / SR-99 SB On-Ramp**

Project **Austin Road Business Park**
 Scenario **Existing Plus Project Conditions**
 Peak Hour **PM**

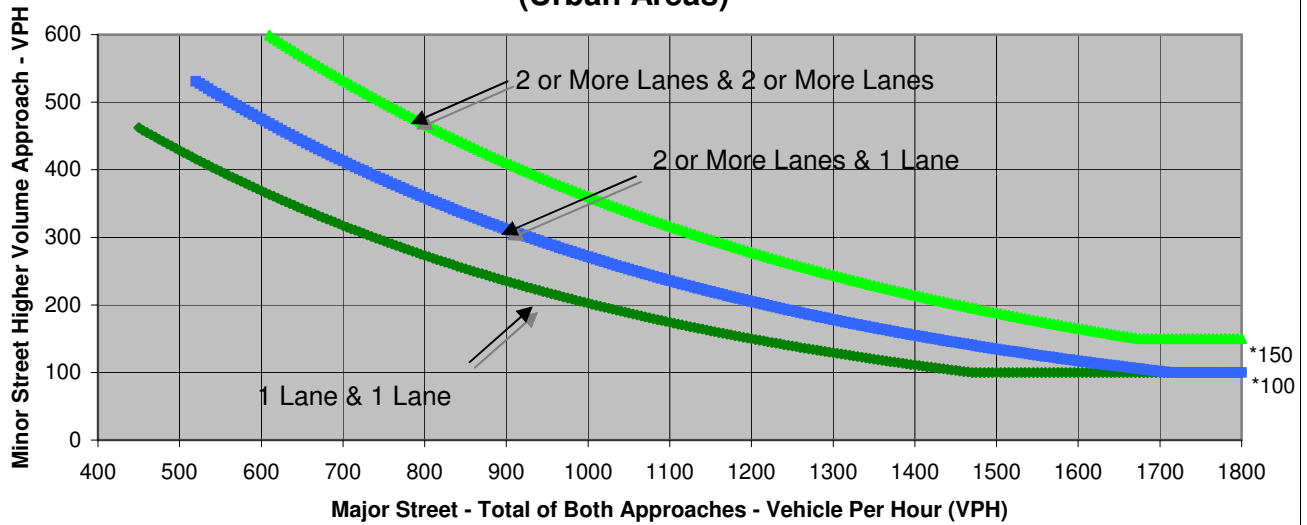
Turn Movement Volumes

	NB	SB	EB	WB
Left	200	70	140	10
Through	1,150	1,100	620	10
Right	1,460	300	1,030	10
Total	2,810	1,470	1,790	30

Major Street Direction

x	North/South
	East/West

**Figure 4C-3
 Warrant 3, Peak Hour
 (Urban Areas)**



* Note: 150 VPH APPLIES AS THE LOWER THRESHOLD VOLUME FOR A MINOR STREET APPROACH WITH TWO OR MORE LANES AND 100 VPH APPLIES AS THE LOWER THRESHOLD VOLUME FOR A MINOR STREET APPROACHING WITH ONE LANE.

Source: *California Manual on Uniform Traffic Control Devices*, Caltrans, 2006

	Major Street	Minor Street	Warrant Met
	Austin Rd.	Moffat Blvd / SR-99 SB On-Ramp	
Number of Approach Lanes	1	1	YES
Traffic Volume (VPH) *	4,280	1,790	

* Note: Traffic Volume for Major Street is Total Volume of Both Approaches.
 Traffic Volume for Minor Street is the Volume of High Volume Approach.

Major Street **Jack Tone Rd.**
 Minor Street **Graves Rd.**

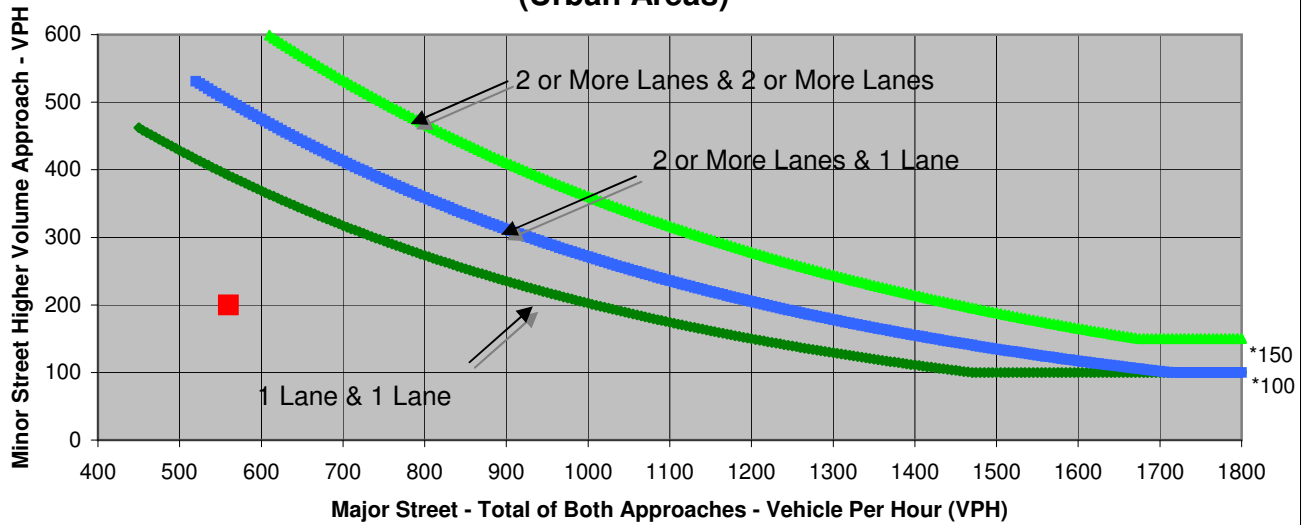
 Project **Austin Road Business Park**
 Scenario **Existing Plus Project Conditions**
 Peak Hour **PM**
Turn Movement Volumes

	NB	SB	EB	WB
Left	30	0	170	0
Through	170	310	0	0
Right	0	50	30	0
Total	200	360	200	0

Major Street Direction

x	North/South
	East/West

**Figure 4C-3
Warrant 3, Peak Hour
(Urban Areas)**



* Note: 150 VPH APPLIES AS THE LOWER THRESHOLD VOLUME FOR A MINOR STREET APPROACH WITH TWO OR MORE LANES AND 100 VPH APPLIES AS THE LOWER THRESHOLD VOLUME FOR A MINOR STREET APPROACHING WITH ONE LANE.

Source: *California Manual on Uniform Traffic Control Devices*, Caltrans, 2006

	Major Street	Minor Street	Warrant Met
	Jack Tone Rd.	Graves Rd.	
Number of Approach Lanes	1	1	<u>NO</u>
Traffic Volume (VPH) *	560	200	

* Note: Traffic Volume for Major Street is Total Volume of Both Approaches.
 Traffic Volume for Minor Street is the Volume of High Volume Approach.

Major Street **Main St.**
 Minor Street **Sedan Ave.**

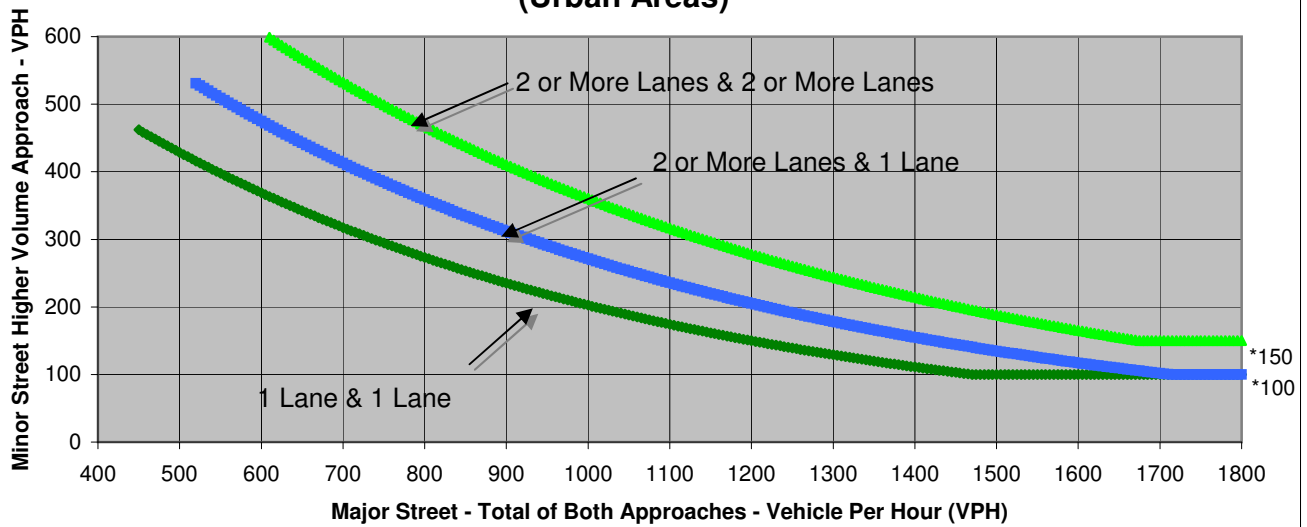
 Project **Austin Road Business Park**
 Scenario **Existing Plus Project Conditions**
 Peak Hour **PM**
Turn Movement Volumes

	NB	SB	EB	WB
Left	10	110	10	10
Through	100	130	10	90
Right	10	10	10	310
Total	120	250	30	410

Major Street Direction

x	North/South
	East/West

**Figure 4C-3
Warrant 3, Peak Hour
(Urban Areas)**



* Note: 150 VPH APPLIES AS THE LOWER THRESHOLD VOLUME FOR A MINOR STREET APPROACH WITH TWO OR MORE LANES AND 100 VPH APPLIES AS THE LOWER THRESHOLD VOLUME FOR A MINOR STREET APPROACHING WITH ONE LANE.

Source: *California Manual on Uniform Traffic Control Devices*, Caltrans, 2006

	Major Street Main St.	Minor Street Sedan Ave.	Warrant Met
Number of Approach Lanes	1	1	NO
Traffic Volume (VPH) *	370	410	

* Note: Traffic Volume for Major Street is Total Volume of Both Approaches.
 Traffic Volume for Minor Street is the Volume of High Volume Approach.

Major Street **Jack Tone Rd.**
 Minor Street **W. River Rd.**

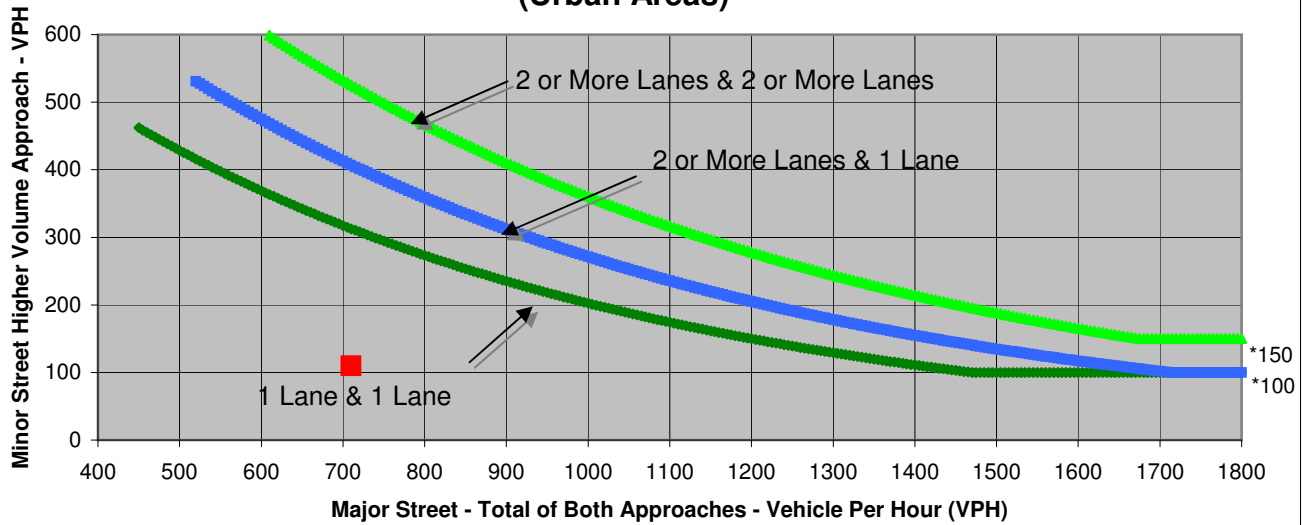
 Project **Austin Road Business Park**
 Scenario **Existing Plus Project Conditions**
 Peak Hour **PM**
Turn Movement Volumes

	NB	SB	EB	WB
Left	0	110	0	80
Through	200	280	0	0
Right	120	0	0	30
Total	320	390	0	110

Major Street Direction

x	North/South
	East/West

**Figure 4C-3
Warrant 3, Peak Hour
(Urban Areas)**



* Note: 150 VPH APPLIES AS THE LOWER THRESHOLD VOLUME FOR A MINOR STREET APPROACH WITH TWO OR MORE LANES AND 100 VPH APPLIES AS THE LOWER THRESHOLD VOLUME FOR A MINOR STREET APPROACHING WITH ONE LANE.

Source: *California Manual on Uniform Traffic Control Devices*, Caltrans, 2006

	Major Street	Minor Street	Warrant Met
	Jack Tone Rd.	W. River Rd.	
Number of Approach Lanes	1	1	<u>NO</u>
Traffic Volume (VPH) *	710	110	

* Note: Traffic Volume for Major Street is Total Volume of Both Approaches.
 Traffic Volume for Minor Street is the Volume of High Volume Approach.

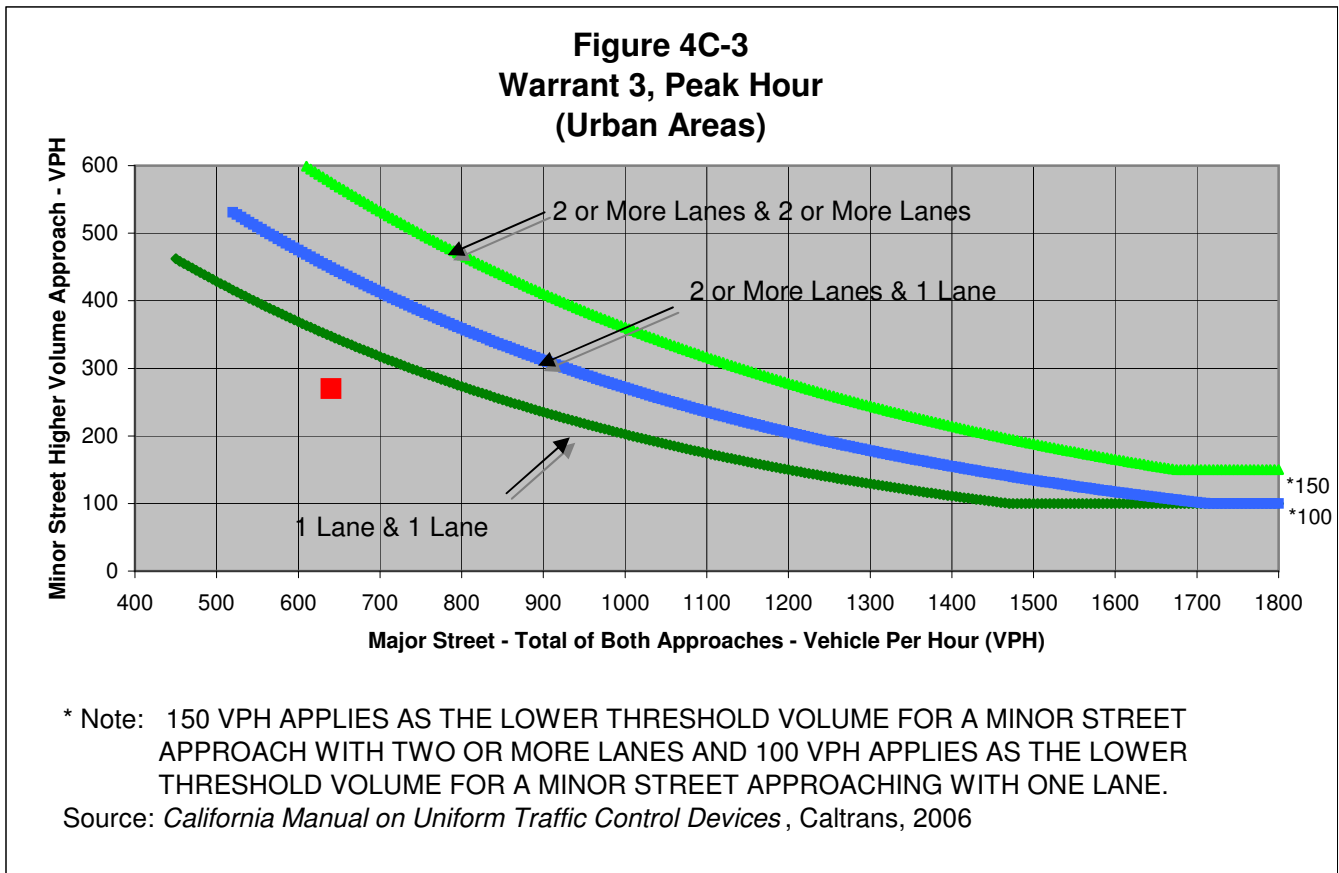
Major Street **Colony Rd.**
 Minor Street **SR-99 NB Ramps / Hoff Rd.**

 Project **Austin Road Business Park**
 Scenario **Existing Plus Project Conditions**
 Peak Hour **PM**
Turn Movement Volumes

	NB	SB	EB	WB
Left	170	30	10	50
Through	60	10	250	160
Right	40	20	150	20
Total	270	60	410	230

Major Street Direction

	North/South
x	East/West



	Major Street	Minor Street	Warrant Met
	Colony Rd.	SR-99 NB Ramps / Hoff Rd.	
Number of Approach Lanes	2	1	<u>NO</u>
Traffic Volume (VPH) *	640	270	

* Note: Traffic Volume for Major Street is Total Volume of Both Approaches.
Traffic Volume for Minor Street is the Volume of High Volume Approach.

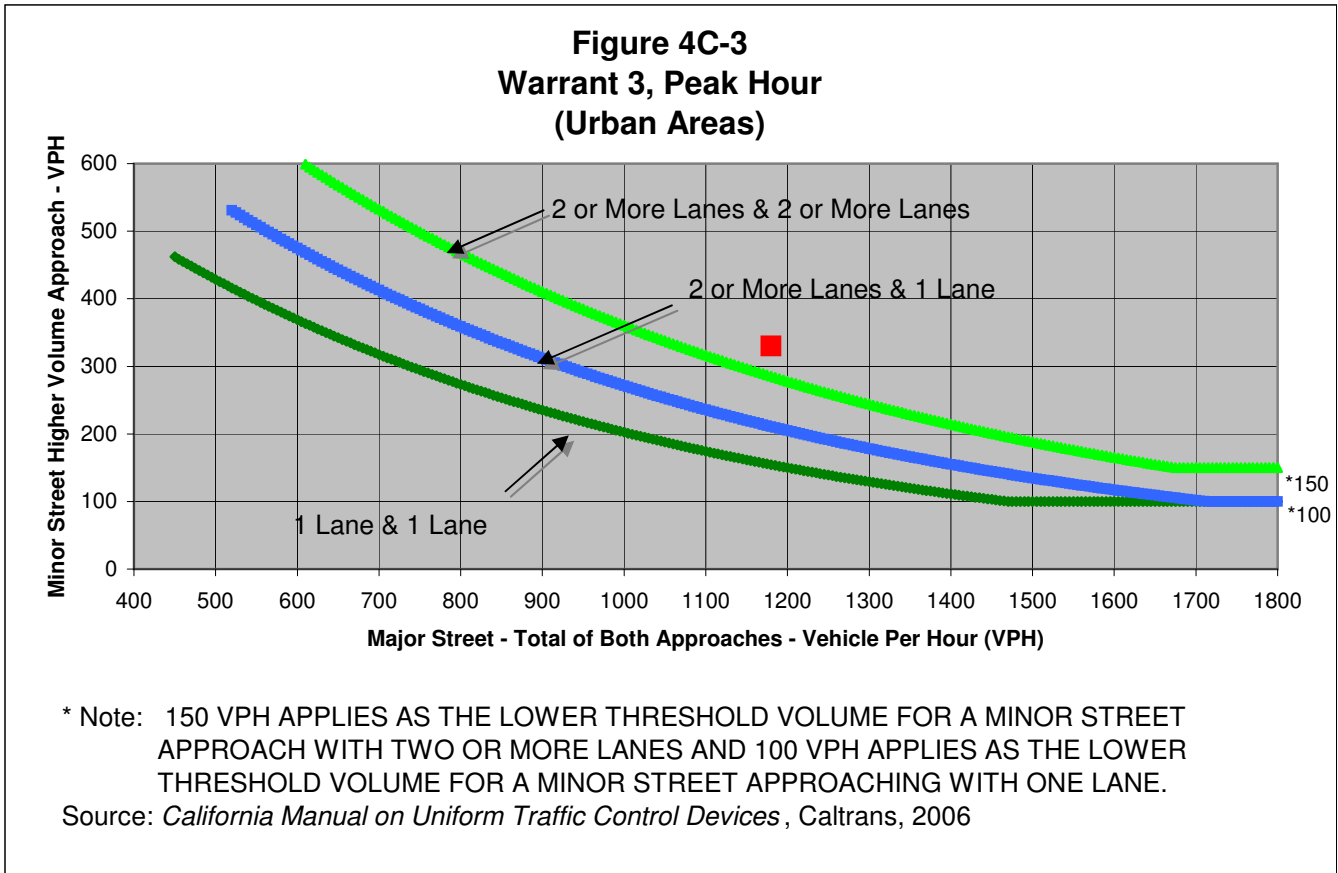
Major Street **Austin Rd.**
 Minor Street **Ripon Rd.**

 Project **Austin Road Business Park**
 Scenario **Existing Plus Project Conditions**
 Peak Hour **PM**
Turn Movement Volumes

	NB	SB	EB	WB
Left	10	1,020	30	20
Through	50	30	180	80
Right	30	40	10	230
Total	90	1,090	220	330

Major Street Direction

x	North/South
	East/West



	Major Street Austin Rd.	Minor Street Ripon Rd.	<u>Warrant Met</u>
Number of Approach Lanes	1	1	<u>YES</u>
Traffic Volume (VPH) *	1,180	330	

* Note: Traffic Volume for Major Street is Total Volume of Both Approaches.
 Traffic Volume for Minor Street is the Volume of High Volume Approach.

Technical Appendix F

Existing Plus Project with Mitigation Intersection LOS Reports

HCM Signalized Intersection Capacity Analysis
5: Industrial Park Dr & VanRyn (Spreckles)

11/23/2009

	→	↘	↙	←	↖	↗
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	4.0
Lane Util. Factor	1.00	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)	1810	1538	1719	3438	1719	1538
Flt Permitted	1.00	1.00	0.95	1.00	0.95	1.00
Satd. Flow (perm)	1810	1538	1719	3438	1719	1538
Volume (vph)	140	30	140	120	50	90
Peak-hour factor, PHF	0.75	0.75	0.92	0.92	0.85	0.85
Adj. Flow (vph)	187	40	152	130	59	106
RTOR Reduction (vph)	0	20	0	0	0	92
Lane Group Flow (vph)	187	20	152	130	59	14
Heavy Vehicles (%)	5%	5%	5%	5%	5%	5%
Turn Type		Perm	Prot			Perm
Protected Phases	4		3		2	
Permitted Phases		4		8		2
Actuated Green, G (s)	35.0	35.0	13.6	52.6	9.4	9.4
Effective Green, g (s)	35.0	35.0	13.6	52.6	9.4	9.4
Actuated g/C Ratio	0.50	0.50	0.19	0.75	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)	905	769	334	2583	231	207
v/s Ratio Prot	c0.10		c0.09		c0.03	
v/s Ratio Perm		0.01		0.04		0.01
v/c Ratio	0.21	0.03	0.46	0.05	0.26	0.07
Uniform Delay, d1	9.8	8.9	24.9	2.2	27.2	26.5
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	0.5	0.1	1.0	0.0	0.6	0.1
Delay (s)	10.3	8.9	25.9	2.3	27.7	26.6
Level of Service	B	A	C	A	C	C
Approach Delay (s)	10.0			15.0	27.0	
Approach LOS	B			B	C	
Intersection Summary						
HCM Average Control Delay			16.3		HCM Level of Service	B
HCM Volume to Capacity ratio			0.27			
Actuated Cycle Length (s)			70.0		Sum of lost time (s)	12.0
Intersection Capacity Utilization			28.5%		ICU Level of Service	A
Analysis Period (min)			15			
c Critical Lane Group						

HCM Signalized Intersection Capacity Analysis
 25: Ripon Rd & Austin Rd.

11/23/2009



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			1.00	1.00		1.00		0.95	0.95	
Frt		0.99			1.00	0.85		0.94		1.00	0.93	
Flt Protected		1.00			0.99	1.00		0.99		0.95	1.00	
Satd. Flow (prot)		1839			1850	1583		1742		1681	1637	
Flt Permitted		0.98			0.95	1.00		0.99		0.95	1.00	
Satd. Flow (perm)		1802			1766	1583		1742		1681	1637	
Volume (vph)	10	120	10	20	130	800	10	30	30	40	20	20
Peak-hour factor, PHF	0.75	0.75	0.75	0.92	0.92	0.92	0.70	0.70	0.70	0.85	0.85	0.85
Adj. Flow (vph)	13	160	13	22	141	870	14	43	43	47	24	24
RTOR Reduction (vph)	0	3	0	0	0	606	0	34	0	0	19	0
Lane Group Flow (vph)	0	183	0	0	163	264	0	66	0	47	29	0
Turn Type	Perm		Perm		Perm		Split		Split			
Protected Phases	4		8		8		2 2		6		6	
Permitted Phases	4		8		8							
Actuated Green, G (s)	12.6				12.6 12.6		8.5		8.4		8.4	
Effective Green, g (s)	12.6				12.6 12.6		8.5		8.4		8.4	
Actuated g/C Ratio	0.30				0.30 0.30		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)	547				536 481		357		340		331	
v/s Ratio Prot							c0.04		c0.03		0.02	
v/s Ratio Perm	0.10				0.09 c0.17							
v/c Ratio	0.33				0.30 0.55		0.18		0.14		0.09	
Uniform Delay, d1	11.2				11.1 12.1		13.6		13.6		13.4	
Progression Factor	1.00				1.00 1.00		1.00		1.00		1.00	
Incremental Delay, d2	0.4				0.3 1.3		0.3		0.2		0.1	
Delay (s)	11.6				11.4 13.4		13.9		13.8		13.6	
Level of Service	B				B B		B		B		B	
Approach Delay (s)	11.6				13.1		13.9				13.7	
Approach LOS	B				B		B				B	

Intersection Summary

HCM Average Control Delay	13.0	HCM Level of Service	B
HCM Volume to Capacity ratio	0.33		
Actuated Cycle Length (s)	41.5	Sum of lost time (s)	12.0
Intersection Capacity Utilization	71.0%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis
5: Industrial Park Dr & VanRyn (Spreckles)

11/23/2009

	→	↘	↙	←	↖	↗
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	4.0
Lane Util. Factor	1.00	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)	1863	1583	1770	3539	1770	1583
Flt Permitted	1.00	1.00	0.95	1.00	0.95	1.00
Satd. Flow (perm)	1863	1583	1770	3539	1770	1583
Volume (vph)	290	160	240	200	150	490
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.92	0.92
Adj. Flow (vph)	305	168	253	211	163	533
RTOR Reduction (vph)	0	65	0	0	0	438
Lane Group Flow (vph)	305	103	253	211	163	95
Turn Type		Perm	Prot			Perm
Protected Phases	4		3		2	
Permitted Phases		4		8		2
Actuated Green, G (s)	31.0	31.0	14.5	49.5	12.5	12.5
Effective Green, g (s)	31.0	31.0	14.5	49.5	12.5	12.5
Actuated g/C Ratio	0.44	0.44	0.21	0.71	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)	825	701	367	2503	316	283
v/s Ratio Prot	c0.16		c0.14		c0.09	
v/s Ratio Perm		0.06		0.06		0.06
v/c Ratio	0.37	0.15	0.69	0.08	0.52	0.34
Uniform Delay, d1	13.0	11.6	25.7	3.2	26.0	25.1
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	1.3	0.4	5.3	0.1	1.4	0.7
Delay (s)	14.3	12.1	31.0	3.3	27.4	25.8
Level of Service	B	B	C	A	C	C
Approach Delay (s)	13.5			18.4	26.2	
Approach LOS	B			B	C	
Intersection Summary						
HCM Average Control Delay			20.3		HCM Level of Service	C
HCM Volume to Capacity ratio			0.48			
Actuated Cycle Length (s)			70.0		Sum of lost time (s)	12.0
Intersection Capacity Utilization			52.3%		ICU Level of Service	A
Analysis Period (min)			15			
c Critical Lane Group						

HCM Signalized Intersection Capacity Analysis
25: Ripon Rd & Austin Rd.

11/23/2009



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			1.00	1.00		1.00		0.95	0.95	
Frt		0.99			1.00	0.85		0.95		1.00	0.99	
Flt Protected		0.99			0.99	1.00		0.99		0.95	0.96	
Satd. Flow (prot)		1839			1844	1583		1769		1681	1677	
Flt Permitted		0.95			0.89	1.00		0.99		0.95	0.96	
Satd. Flow (perm)		1751			1666	1583		1769		1681	1677	
Volume (vph)	30	180	10	20	80	230	10	50	30	1020	30	40
Peak-hour factor, PHF	0.70	0.70	0.70	0.92	0.92	0.92	0.65	0.65	0.65	0.92	0.92	0.92
Adj. Flow (vph)	43	257	14	22	87	250	15	77	46	1109	33	43
RTOR Reduction (vph)	0	2	0	0	0	191	0	25	0	0	3	0
Lane Group Flow (vph)	0	312	0	0	109	59	0	113	0	602	580	0
Turn Type	Perm			Perm		Perm	Split			Split		
Protected Phases		4			8		2	2		6	6	
Permitted Phases	4			8		8						
Actuated Green, G (s)		15.6			15.6	15.6		10.3		28.1	28.1	
Effective Green, g (s)		15.6			15.6	15.6		10.3		28.1	28.1	
Actuated g/C Ratio		0.24			0.24	0.24		0.16		0.43	0.43	
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)		414			394	374		276		716	714	
v/s Ratio Prot								c0.06		c0.36	0.35	
v/s Ratio Perm		c0.18			0.07	0.04						
v/c Ratio		0.75			0.28	0.16		0.41		0.84	0.81	
Uniform Delay, d1		23.4			20.6	20.0		25.1		16.9	16.6	
Progression Factor		1.00			1.00	1.00		1.00		1.00	1.00	
Incremental Delay, d2		7.6			0.4	0.2		1.0		8.8	7.0	
Delay (s)		31.0			21.0	20.2		26.1		25.7	23.6	
Level of Service		C			C	C		C		C	C	
Approach Delay (s)		31.0			20.4			26.1			24.7	
Approach LOS		C			C			C			C	

Intersection Summary

HCM Average Control Delay	25.0	HCM Level of Service	C
HCM Volume to Capacity ratio	0.73		
Actuated Cycle Length (s)	66.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	62.0%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

SIMTRAFFIC LEVEL OF SERVICE REPORT Including Upstream Delays

Project: ARBPRC **HCM:** 2000
Scenario: E+P Full Buildout Mitigation **PHF:** 0.95
TOD: AM Peak Hr. **Analysis Period:** 15 Minutes **# of Runs:** 10

Intersection: 2: SR 120 EB Ramps & Main Street **Type:** Signalized

Approach	Movement	Demand Volume	Volume Served			Delay/Veh (sec)		
			Avg	%	Std Dev	Avg	LOS	Std Dev
NB	T	129	126	98	8	22.0	C	--
	R	18	17	89	4	4.7	A	--
	Subtotal	147	143	97	--	20.0	C	--
SB	L	53	54	102	5	33.3	C	--
	T	37	38	103	5	8.6	A	--
	Subtotal	89	92	103	--	23.0	C	--
EB	L	66	59	89	5	31.8	C	--
	R	34	32	94	6	8.2	A	--
	Subtotal	100	92	92	--	23.5	C	--
Total		337	326	97	--	21.8	C	--

Intersection: 3: Atherton Drive & Main Street **Type:** Un-Signalized

Approach	Movement	Demand Volume	Volume Served			Delay/Veh (sec)		
			Avg	%	Std Dev	Avg	LOS	Std Dev
NB	L	5	5	80	1	11.0	B	--
	T	137	132	96	8	13.6	B	--
	Subtotal	142	137	96	--	13.5	B	--
SB	T	61	61	100	6	8.8	A	--
	R	11	11	100	4	4.2	A	--
	Subtotal	71	72	101	--	8.1	A	--
EB	L	11	10	91	3	7.1	A	--
	R	5	4	80	2	2.9	A	--
	Subtotal	16	14	88	--	5.9	A	--
Total		229	222	97	--	11.3	B	--

HCM Signalized Intersection Capacity Analysis
4: Woodward Avenue & Main Street

11/23/2009

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	0.95		1.00	1.00	0.85	1.00	0.99		1.00	0.95	
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770	1779		1770	1863	1583	1770	1841		1770	1777	
Flt Permitted	0.95	1.00		0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (perm)	1770	1779		1770	1863	1583	1770	1841		1770	1777	
Volume (vph)	20	70	30	10	100	280	60	240	20	120	90	40
Peak-hour factor, PHF	0.70	0.70	0.70	0.95	0.95	0.95	0.80	0.80	0.80	0.95	0.95	0.95
Adj. Flow (vph)	29	100	43	11	105	295	75	300	25	126	95	42
RTOR Reduction (vph)	0	22	0	0	0	246	0	4	0	0	19	0
Lane Group Flow (vph)	29	121	0	11	105	49	75	321	0	126	118	0
Turn Type	Prot			Prot		Perm	Prot			Prot		
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases						8						
Actuated Green, G (s)	1.9	9.6		0.9	8.6	8.6	4.1	19.9		5.1	20.9	
Effective Green, g (s)	1.9	9.6		0.9	8.6	8.6	4.1	19.9		5.1	20.9	
Actuated g/C Ratio	0.04	0.19		0.02	0.17	0.17	0.08	0.39		0.10	0.41	
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)	65	332		31	311	264	141	711		175	721	
v/s Ratio Prot	c0.02	c0.07		0.01	0.06		0.04	c0.17		c0.07	0.07	
v/s Ratio Perm						0.03						
v/c Ratio	0.45	0.36		0.35	0.34	0.19	0.53	0.45		0.72	0.16	
Uniform Delay, d1	24.3	18.3		25.0	18.9	18.4	22.8	11.7		22.5	9.7	
Progression Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Incremental Delay, d2	4.8	0.7		6.9	0.6	0.3	3.8	0.5		13.3	0.1	
Delay (s)	29.1	19.0		31.9	19.6	18.8	26.6	12.2		35.8	9.8	
Level of Service	C	B		C	B	B	C	B		D	A	
Approach Delay (s)		20.7			19.3			14.9			22.3	
Approach LOS		C			B			B			C	
Intersection Summary												
HCM Average Control Delay			18.7				HCM Level of Service				B	
HCM Volume to Capacity ratio			0.43									
Actuated Cycle Length (s)			51.5				Sum of lost time (s)			12.0		
Intersection Capacity Utilization			44.5%				ICU Level of Service			A		
Analysis Period (min)			15									
c	Critical Lane Group											

HCM Unsignalized Intersection Capacity Analysis
 5: Industrial Park Dr & VanRyn (Spreckles)

11/23/2009

	→	↘	↙	←	↖	↗	
Movement	EBT	EBR	WBL	WBT	NBL	NBR	
Lane Configurations	↑	↗	↙	↑↑	↖	↗	
Sign Control	Free			Free	Stop		
Grade	0%			0%	0%		
Volume (veh/h)	140	10	100	120	50	90	
Peak Hour Factor	0.75	0.75	0.92	0.92	0.85	0.85	
Hourly flow rate (vph)	187	13	109	130	59	106	
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			200		469	187	
vC1, stage 1 conf vol							
vC2, stage 2 conf vol							
vCu, unblocked vol			200		469	187	
tC, single (s)			4.2		6.9	7.0	
tC, 2 stage (s)							
tF (s)			2.2		3.5	3.3	
p0 queue free %			92		88	87	
cM capacity (veh/h)			1348		474	814	
Direction, Lane #	EB 1	EB 2	WB 1	WB 2	WB 3	NB 1	NB 2
Volume Total	187	13	109	65	65	59	106
Volume Left	0	0	109	0	0	59	0
Volume Right	0	13	0	0	0	0	106
cSH	1700	1700	1348	1700	1700	474	814
Volume to Capacity	0.11	0.01	0.08	0.04	0.04	0.12	0.13
Queue Length 95th (ft)	0	0	7	0	0	11	11
Control Delay (s)	0.0	0.0	7.9	0.0	0.0	13.7	10.1
Lane LOS			A			B	B
Approach Delay (s)	0.0		3.6			11.4	
Approach LOS						B	
Intersection Summary							
Average Delay			4.5				
Intersection Capacity Utilization			26.2%		ICU Level of Service		A
Analysis Period (min)			15				

HCM Signalized Intersection Capacity Analysis

8: Woodward Avenue & Atherton Drive

11/23/2009



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	0.95		1.00	0.95		1.00	0.95	
Frt	1.00	1.00	0.85	1.00	0.97		1.00	0.91		1.00	0.99	
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770	1863	1583	1770	3432		1770	3210		1770	3498	
Flt Permitted	0.95	1.00	1.00	0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (perm)	1770	1863	1583	1770	3432		1770	3210		1770	3498	
Volume (vph)	10	260	40	10	120	30	230	30	50	30	120	10
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)	11	283	43	11	130	33	250	33	54	33	130	11
RTOR Reduction (vph)	0	0	34	0	26	0	0	37	0	0	7	0
Lane Group Flow (vph)	11	283	9	11	137	0	250	50	0	33	134	0
Turn Type	Prot		Perm	Prot			Prot			Prot		
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases			4									
Actuated Green, G (s)	0.7	9.9	9.9	0.7	9.9		9.2	15.6		7.7	14.1	
Effective Green, g (s)	0.7	9.9	9.9	0.7	9.9		9.2	15.6		7.7	14.1	
Actuated g/C Ratio	0.01	0.20	0.20	0.01	0.20		0.18	0.31		0.15	0.28	
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)	25	370	314	25	681		326	1004		273	988	
v/s Ratio Prot	c0.01	c0.15		0.01	0.04		c0.14	0.02		0.02	c0.04	
v/s Ratio Perm			0.01									
v/c Ratio	0.44	0.76	0.03	0.44	0.20		0.77	0.05		0.12	0.14	
Uniform Delay, d1	24.4	18.9	16.1	24.4	16.7		19.3	12.0		18.2	13.4	
Progression Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	11.9	9.1	0.0	11.9	0.1		10.3	0.0		0.2	0.1	
Delay (s)	36.3	28.0	16.2	36.3	16.8		29.6	12.0		18.4	13.4	
Level of Service	D	C	B	D	B		C	B		B	B	
Approach Delay (s)		26.8			18.1			25.1			14.4	
Approach LOS		C			B			C			B	

Intersection Summary

HCM Average Control Delay	22.6	HCM Level of Service	C
HCM Volume to Capacity ratio	0.50		
Actuated Cycle Length (s)	49.9	Sum of lost time (s)	16.0
Intersection Capacity Utilization	40.1%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis
 9: Woodward Avenue & Moffat Blvd

11/23/2009



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0			4.0	4.0	
Lane Util. Factor	1.00			1.00	1.00	
Frt	1.00			1.00	0.98	
Flt Protected	0.95			1.00	1.00	
Satd. Flow (prot)	1768			1863	1830	
Flt Permitted	0.95			1.00	1.00	
Satd. Flow (perm)	1768			1863	1830	
Volume (vph)	270	10	0	130	200	30
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	293	11	0	141	217	33
RTOR Reduction (vph)	2	0	0	0	16	0
Lane Group Flow (vph)	302	0	0	141	234	0
Turn Type						
Protected Phases	4			2	6	
Permitted Phases						
Actuated Green, G (s)	32.3			9.7	9.7	
Effective Green, g (s)	32.3			9.7	9.7	
Actuated g/C Ratio	0.65			0.19	0.19	
Clearance Time (s)	4.0			4.0	4.0	
Vehicle Extension (s)	3.0			3.0	3.0	
Lane Grp Cap (vph)	1142			361	355	
v/s Ratio Prot	c0.17			0.08	c0.13	
v/s Ratio Perm						
v/c Ratio	0.26			0.39	0.66	
Uniform Delay, d1	3.8			17.6	18.6	
Progression Factor	1.00			1.00	1.00	
Incremental Delay, d2	0.6			0.7	4.4	
Delay (s)	4.3			18.3	23.0	
Level of Service	A			B	C	
Approach Delay (s)	4.3			18.3	23.0	
Approach LOS	A			B	C	
Intersection Summary						
HCM Average Control Delay			13.9		HCM Level of Service	B
HCM Volume to Capacity ratio			0.36			
Actuated Cycle Length (s)			50.0		Sum of lost time (s)	8.0
Intersection Capacity Utilization			34.6%		ICU Level of Service	A
Analysis Period (min)			15			
c Critical Lane Group						

HCM Unsignalized Intersection Capacity Analysis
 11: Graves Road & Austin Road

11/23/2009




















Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Sign Control	Stop		Free		Free	
Grade	0%		0%		0%	
Volume (veh/h)	110	20	240	10	20	230
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	120	22	261	11	22	250
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	560	266			272	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	560	266			272	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	75	97			98	
cM capacity (veh/h)	481	772			1292	

Direction, Lane #	WB 1	NB 1	SB 1
Volume Total	141	272	272
Volume Left	120	0	22
Volume Right	22	11	0
cSH	511	1700	1292
Volume to Capacity	0.28	0.16	0.02
Queue Length 95th (ft)	28	0	1
Control Delay (s)	14.7	0.0	0.8
Lane LOS	B		A
Approach Delay (s)	14.7	0.0	0.8
Approach LOS	B		

Intersection Summary			
Average Delay		3.3	
Intersection Capacity Utilization	42.6%	ICU Level of Service	A
Analysis Period (min)		15	

HCM Unsignalized Intersection Capacity Analysis
 13: Moffat Blvd & Austin Road






















11/24/2009

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control	Stop			Stop			Free			Free		
Grade	0%			0%			0%			0%		
Volume (veh/h)	0	0	210	0	0	10	0	240	10	0	200	130
Peak Hour Factor	0.95	0.95	0.95	0.50	0.50	0.50	0.95	0.95	0.95	0.95	0.95	0.95
Hourly flow rate (vph)	0	0	221	0	0	20	0	253	11	0	211	137
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type	None			None								
Median storage veh												
Upstream signal (ft)							430					
pX, platoon unblocked												
vC, conflicting volume	552	532	279	753	600	253	347				253	
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	552	532	279	753	600	253	347				253	
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1				4.1	
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2				2.2	
p0 queue free %	100	100	71	100	100	97	100				100	
cM capacity (veh/h)	429	449	753	228	411	779	1195				1295	
Direction, Lane #	EB 1	WB 1	NB 1	NB 2	SB 1							
Volume Total	221	20	253	11	347							
Volume Left	0	0	0	0	0							
Volume Right	221	20	0	11	137							
cSH	753	779	1700	1700	1700							
Volume to Capacity	0.29	0.03	0.15	0.01	0.20							
Queue Length 95th (ft)	31	2	0	0	0							
Control Delay (s)	11.8	9.7	0.0	0.0	0.0							
Lane LOS	B	A										
Approach Delay (s)	11.8	9.7	0.0	0.0								
Approach LOS	B	A										
Intersection Summary												
Average Delay			3.3									
Intersection Capacity Utilization			38.1%			ICU Level of Service			A			
Analysis Period (min)			15									

HCM Signalized Intersection Capacity Analysis

14: Yosemite Ave & Austin Road

11/23/2009

												
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	0.95		1.00	1.00		1.00	1.00	
Frt	1.00	1.00	0.85	1.00	0.99		1.00	0.93		1.00	0.96	
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770	1863	1583	1770	3503		1770	1739		1770	1793	
Flt Permitted	0.95	1.00	1.00	0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (perm)	1770	1863	1583	1770	3503		1770	1739		1770	1793	
Volume (vph)	40	250	110	40	410	30	240	50	40	30	120	40
Peak-hour factor, PHF	0.90	0.90	0.90	0.95	0.95	0.95	0.85	0.85	0.85	0.95	0.95	0.95
Adj. Flow (vph)	44	278	122	42	432	32	282	59	47	32	126	42
RTOR Reduction (vph)	0	0	93	0	9	0	0	30	0	0	20	0
Lane Group Flow (vph)	44	278	29	42	455	0	282	76	0	32	148	0
Turn Type	Prot		Perm	Prot			Prot			Prot		
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases			4									
Actuated Green, G (s)	1.8	11.3	11.3	1.8	11.3		6.5	17.0		1.8	12.3	
Effective Green, g (s)	1.8	11.3	11.3	1.8	11.3		6.5	17.0		1.8	12.3	
Actuated g/C Ratio	0.04	0.24	0.24	0.04	0.24		0.14	0.35		0.04	0.26	
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)	67	439	373	67	826		240	617		67	460	
v/s Ratio Prot	c0.02	c0.15		0.02	0.13		c0.16	0.04		0.02	c0.08	
v/s Ratio Perm			0.02									
v/c Ratio	0.66	0.63	0.08	0.63	0.55		1.18	0.12		0.48	0.32	
Uniform Delay, d1	22.7	16.4	14.2	22.7	16.1		20.7	10.4		22.6	14.4	
Progression Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	20.8	3.0	0.1	16.9	0.8		113.6	0.1		5.3	0.4	
Delay (s)	43.6	19.4	14.3	39.6	16.9		134.3	10.5		27.9	14.8	
Level of Service	D	B	B	D	B		F	B		C	B	
Approach Delay (s)		20.4			18.8			100.5			16.9	
Approach LOS		C			B			F			B	
Intersection Summary												
HCM Average Control Delay			39.6			HCM Level of Service				D		
HCM Volume to Capacity ratio			0.62									
Actuated Cycle Length (s)			47.9			Sum of lost time (s)			16.0			
Intersection Capacity Utilization			51.9%			ICU Level of Service				A		
Analysis Period (min)			15									
c Critical Lane Group												

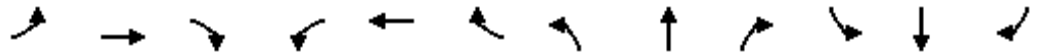
HCM Signalized Intersection Capacity Analysis
 18: McKinley Ave & Austin Road

11/23/2009

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	
Lane Util. Factor	1.00	0.95		0.97	0.95	1.00	1.00	0.95	1.00	0.97	0.95	
Frt	1.00	0.93		1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.99	
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)	1770	3274		3433	3539	1583	1770	3539	1583	3433	3506	
Flt Permitted	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	
Satd. Flow (perm)	1770	3274		3433	3539	1583	1770	3539	1583	3433	3506	
Volume (vph)	10	10	10	80	20	190	10	230	270	280	150	10
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)	11	11	11	87	22	207	11	250	293	304	163	11
RTOR Reduction (vph)	0	10	0	0	0	181	0	0	194	0	5	0
Lane Group Flow (vph)	11	12	0	87	22	26	11	250	99	304	169	0
Turn Type	Prot			Prot		Perm	Prot		Perm	Prot		
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases						8			2			
Actuated Green, G (s)	0.9	4.1		2.3	5.5	5.5	0.8	14.6	14.6	6.3	20.1	
Effective Green, g (s)	0.9	4.1		2.3	5.5	5.5	0.8	14.6	14.6	6.3	20.1	
Actuated g/C Ratio	0.02	0.09		0.05	0.13	0.13	0.02	0.34	0.34	0.15	0.46	
Clearance Time (s)	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	
Lane Grp Cap (vph)	37	310		182	450	201	33	1193	534	499	1627	
v/s Ratio Prot	0.01	0.00		c0.03	0.01		0.01	c0.07		c0.09	0.05	
v/s Ratio Perm						c0.02			0.06			
v/c Ratio	0.30	0.04		0.48	0.05	0.13	0.33	0.21	0.19	0.61	0.10	
Uniform Delay, d1	20.9	17.8		19.9	16.6	16.8	21.0	10.2	10.1	17.3	6.5	
Progression Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	4.5	0.1		2.0	0.0	0.3	5.9	0.1	0.2	2.1	0.0	
Delay (s)	25.4	17.9		21.9	16.6	17.1	26.9	10.3	10.3	19.5	6.6	
Level of Service	C	B		C	B	B	C	B	B	B	A	
Approach Delay (s)		20.4			18.4			10.6			14.8	
Approach LOS		C			B			B			B	
Intersection Summary												
HCM Average Control Delay			14.1				HCM Level of Service				B	
HCM Volume to Capacity ratio			0.28									
Actuated Cycle Length (s)			43.3				Sum of lost time (s)				12.0	
Intersection Capacity Utilization			38.0%				ICU Level of Service				A	
Analysis Period (min)			15									
c	Critical Lane Group											

HCM Unsignalized Intersection Capacity Analysis
 25: Ripon Rd & Austin Road

11/23/2009



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Sign Control		Stop			Stop			Stop			Stop	
Volume (vph)	20	120	10	20	120	120	10	30	30	30	20	20
Peak Hour Factor	0.75	0.75	0.75	0.92	0.92	0.92	0.70	0.70	0.70	0.85	0.85	0.85
Hourly flow rate (vph)	27	160	13	22	130	130	14	43	43	35	24	24
Direction, Lane #	EB 1	WB 1	NB 1	SB 1								
Volume Total (vph)	200	283	100	82								
Volume Left (vph)	27	22	14	35								
Volume Right (vph)	13	130	43	24								
Hadj (s)	0.02	-0.23	-0.19	-0.05								
Departure Headway (s)	4.7	4.4	4.9	5.1								
Degree Utilization, x	0.26	0.35	0.14	0.12								
Capacity (veh/h)	716	779	655	629								
Control Delay (s)	9.4	9.7	8.7	8.8								
Approach Delay (s)	9.4	9.7	8.7	8.8								
Approach LOS	A	A	A	A								
Intersection Summary												
Delay			9.3									
HCM Level of Service			A									
Intersection Capacity Utilization			33.3%	ICU Level of Service	A							
Analysis Period (min)			15									

HCM Signalized Intersection Capacity Analysis
 27: Woodward Avenue & Woodward Avenue Extension

11/23/2009



Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations	↶		↶↷		↶	↶↷
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0		4.0		4.0	4.0
Lane Util. Factor	1.00		0.95		1.00	0.95
Frt	0.91		0.91		1.00	1.00
Flt Protected	0.98		1.00		0.95	1.00
Satd. Flow (prot)	1667		3227		1770	3539
Flt Permitted	0.98		1.00		0.95	1.00
Satd. Flow (perm)	1667		3227		1770	3539
Volume (vph)	10	20	140	200	80	260
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	11	22	152	217	87	283
RTOR Reduction (vph)	10	0	175	0	0	0
Lane Group Flow (vph)	23	0	194	0	87	283
Turn Type					Prot	
Protected Phases	8		2		1	6
Permitted Phases						
Actuated Green, G (s)	29.6		10.8		3.6	18.4
Effective Green, g (s)	29.6		10.8		3.6	18.4
Actuated g/C Ratio	0.53		0.19		0.06	0.33
Clearance Time (s)	4.0		4.0		4.0	4.0
Vehicle Extension (s)	3.0		3.0		3.0	3.0
Lane Grp Cap (vph)	881		622		114	1163
v/s Ratio Prot	c0.01		c0.06		c0.05	0.08
v/s Ratio Perm						
v/c Ratio	0.03		0.31		0.76	0.24
Uniform Delay, d1	6.3		19.4		25.8	13.7
Progression Factor	1.00		1.00		1.00	1.00
Incremental Delay, d2	0.1		0.3		25.6	0.1
Delay (s)	6.4		19.7		51.4	13.8
Level of Service	A		B		D	B
Approach Delay (s)	6.4		19.7			22.7
Approach LOS	A		B			C

Intersection Summary

HCM Average Control Delay	20.5	HCM Level of Service	C
HCM Volume to Capacity ratio	0.16		
Actuated Cycle Length (s)	56.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	28.1%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis
 28: Woodward Avenue Extension & Austin Road

11/23/2009



Movement	EBL	EBR	NBL	NBT	SBT	SBR
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	0.97	1.00	0.95	
Frt	1.00	0.85	1.00	1.00	0.99	
Flt Protected	0.95	1.00	0.95	1.00	1.00	
Satd. Flow (prot)	1770	1583	3433	1863	3489	
Flt Permitted	0.95	1.00	0.95	1.00	1.00	
Satd. Flow (perm)	1770	1583	3433	1863	3489	
Volume (vph)	10	260	300	240	380	40
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	11	283	326	261	413	43
RTOR Reduction (vph)	0	237	0	0	10	0
Lane Group Flow (vph)	11	46	326	261	446	0
Turn Type		Perm	Prot			
Protected Phases	4		5	2	6	
Permitted Phases		4				
Actuated Green, G (s)	6.6	6.6	7.3	26.0	14.7	
Effective Green, g (s)	6.6	6.6	7.3	26.0	14.7	
Actuated g/C Ratio	0.16	0.16	0.18	0.64	0.36	
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)	288	257	617	1193	1263	
v/s Ratio Prot	0.01		c0.09	0.14	c0.13	
v/s Ratio Perm		c0.03				
v/c Ratio	0.04	0.18	0.53	0.22	0.35	
Uniform Delay, d1	14.3	14.7	15.1	3.1	9.5	
Progression Factor	1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	0.1	0.3	0.8	0.1	0.2	
Delay (s)	14.4	15.0	15.9	3.1	9.6	
Level of Service	B	B	B	A	A	
Approach Delay (s)	15.0			10.2	9.6	
Approach LOS	B			B	A	

Intersection Summary

HCM Average Control Delay	11.1	HCM Level of Service	B
HCM Volume to Capacity ratio	0.36		
Actuated Cycle Length (s)	40.6	Sum of lost time (s)	12.0
Intersection Capacity Utilization	34.5%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

SIMTRAFFIC LEVEL OF SERVICE REPORT Including Upstream Delays

Project: ARBPRC **HCM:** 2000
Scenario: E+P Full Buildout Mitigation **PHF:** 0.95
TOD: PM Peak Hr. **Analysis Period:** 15 Minutes **# of Runs:** 10

Intersection: 2: SR 120 EB Ramps & Main Street **Type:** Signalized

Approach	Movement	Demand Volume	Volume Served			Delay/Veh (sec)		
			Avg	%	Std Dev	Avg	LOS	Std Dev
NB	T	161	158	98	10	52.1	D	--
	R	13	14	108	4	11.7	B	--
	Subtotal	174	172	99	--	48.8	D	--
SB	L	103	98	95	6	89.7	F	--
	T	76	69	91	8	36.8	D	--
	Subtotal	179	166	93	--	67.9	E	--
EB	L	113	108	96	6	77.6	E	--
	R	100	95	95	11	17.4	B	--
	Subtotal	213	203	95	--	49.4	D	--
Total		566	541	96	--	54.9	D	--






















Intersection: 3: Atherton Drive & Main Street **Type:** Un-Signalized

Approach	Movement	Demand Volume	Volume Served			Delay/Veh (sec)		
			Avg	%	Std Dev	Avg	LOS	Std Dev
NB	L	13	12	92	3	37.5	E	--
	T	147	143	97	6	35.1	E	--
	Subtotal	161	155	96	--	35.2	E	--
SB	T	147	137	93	10	16.7	C	--
	R	29	28	97	3	7.0	A	--
	Subtotal	176	165	94	--	15.1	C	--
EB	L	26	27	104	6	10.4	B	--
	R	11	9	82	1	5.6	A	--
	Subtotal	37	36	97	--	9.2	A	--
Total		374	355	95	--	23.3	C	--

HCM Signalized Intersection Capacity Analysis

4: Woodward Avenue & Main Street

11/23/2009

												
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	0.96		1.00	1.00	0.85	1.00	0.98		1.00	0.98	
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770	1795		1770	1863	1583	1770	1833		1770	1822	
Flt Permitted	0.95	1.00		0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (perm)	1770	1795		1770	1863	1583	1770	1833		1770	1822	
Volume (vph)	30	250	80	30	140	410	30	170	20	330	230	40
Peak-hour factor, PHF	0.95	0.95	0.95	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	32	263	84	33	152	446	33	185	22	359	250	43
RTOR Reduction (vph)	0	15	0	0	0	343	0	6	0	0	8	0
Lane Group Flow (vph)	32	332	0	33	152	103	33	201	0	359	285	0
Turn Type	Prot			Prot		Perm	Prot			Prot		
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases						8						
Actuated Green, G (s)	1.9	14.4		1.9	14.4	14.4	1.9	14.5		15.6	28.2	
Effective Green, g (s)	1.9	14.4		1.9	14.4	14.4	1.9	14.5		15.6	28.2	
Actuated g/C Ratio	0.03	0.23		0.03	0.23	0.23	0.03	0.23		0.25	0.45	
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)	54	414		54	430	365	54	426		443	823	
v/s Ratio Prot	0.02	c0.19		c0.02	0.08		0.02	c0.11		c0.20	0.16	
v/s Ratio Perm						0.07						
v/c Ratio	0.59	0.80		0.61	0.35	0.28	0.61	0.47		0.81	0.35	
Uniform Delay, d1	29.9	22.7		29.9	20.1	19.7	29.9	20.6		22.0	11.1	
Progression Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Incremental Delay, d2	16.2	10.7		18.7	0.5	0.4	18.7	0.8		10.7	0.3	
Delay (s)	46.1	33.4		48.6	20.6	20.2	48.6	21.5		32.7	11.4	
Level of Service	D	C		D	C	C	D	C		C	B	
Approach Delay (s)		34.5			21.8			25.2			23.1	
Approach LOS		C			C			C			C	
Intersection Summary												
HCM Average Control Delay			25.2				HCM Level of Service				C	
HCM Volume to Capacity ratio			0.69									
Actuated Cycle Length (s)			62.4				Sum of lost time (s)			16.0		
Intersection Capacity Utilization			63.1%				ICU Level of Service			B		
Analysis Period (min)			15									
c	Critical Lane Group											

HCM Unsignalized Intersection Capacity Analysis
 5: Industrial Park Dr & VanRyn (Spreckles)

11/23/2009

	→	↘	↙	←	↖	↗			
Movement	EBT	EBR	WBL	WBT	NBL	NBR			
Lane Configurations	↑	↗	↖	↑↑	↖	↗			
Sign Control	Free			Free	Stop				
Grade	0%			0%	0%				
Volume (veh/h)	290	100	250	200	50	150			
Peak Hour Factor	0.95	0.95	0.95	0.95	0.92	0.92			
Hourly flow rate (vph)	305	105	263	211	54	163			
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			411			937	305		
vC1, stage 1 conf vol									
vC2, stage 2 conf vol									
vCu, unblocked vol			411			937	305		
tC, single (s)			4.1			6.8	6.9		
tC, 2 stage (s)									
tF (s)			2.2			3.5	3.3		
p0 queue free %			77			73	76		
cM capacity (veh/h)			1145			203	691		
Direction, Lane #	EB 1	EB 2	WB 1	WB 2	WB 3	NB 1	NB 2		
Volume Total	305	105	263	105	105	54	163		
Volume Left	0	0	263	0	0	54	0		
Volume Right	0	105	0	0	0	0	163		
cSH	1700	1700	1145	1700	1700	203	691		
Volume to Capacity	0.18	0.06	0.23	0.06	0.06	0.27	0.24		
Queue Length 95th (ft)	0	0	22	0	0	26	23		
Control Delay (s)	0.0	0.0	9.1	0.0	0.0	29.1	11.8		
Lane LOS			A			D	B		
Approach Delay (s)	0.0	5.0				16.1			
Approach LOS						C			
Intersection Summary									
Average Delay			5.4						
Intersection Capacity Utilization			42.4%	ICU Level of Service		A			
Analysis Period (min)			15						

HCM Signalized Intersection Capacity Analysis

8: Woodward Avenue & Atherton Drive

11/23/2009



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	0.95		1.00	0.95		1.00	0.95	
Frt	1.00	1.00	0.85	1.00	0.99		1.00	0.95		1.00	0.99	
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770	1863	1583	1770	3514		1770	3360		1770	3512	
Flt Permitted	0.95	1.00	1.00	0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (perm)	1770	1863	1583	1770	3514		1770	3360		1770	3512	
Volume (vph)	10	240	270	10	410	20	180	60	30	50	190	10
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)	11	261	293	11	446	22	196	65	33	54	207	11
RTOR Reduction (vph)	0	0	221	0	5	0	0	24	0	0	5	0
Lane Group Flow (vph)	11	261	72	11	463	0	196	74	0	54	214	0
Turn Type	Prot		Perm	Prot			Prot			Prot		
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases			4									
Actuated Green, G (s)	0.7	12.4	12.4	0.7	12.4		8.7	13.7		7.6	12.6	
Effective Green, g (s)	0.7	12.4	12.4	0.7	12.4		8.7	13.7		7.6	12.6	
Actuated g/C Ratio	0.01	0.25	0.25	0.01	0.25		0.17	0.27		0.15	0.25	
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)	25	458	389	25	865		306	913		267	878	
v/s Ratio Prot	c0.01	c0.14		0.01	0.13		c0.11	0.02		0.03	c0.06	
v/s Ratio Perm			0.05									
v/c Ratio	0.44	0.57	0.19	0.44	0.54		0.64	0.08		0.20	0.24	
Uniform Delay, d1	24.7	16.7	15.0	24.7	16.5		19.4	13.7		18.7	15.1	
Progression Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	11.9	1.6	0.2	11.9	0.6		4.5	0.0		0.4	0.1	
Delay (s)	36.5	18.3	15.2	36.5	17.1		23.9	13.7		19.1	15.2	
Level of Service	D	B	B	D	B		C	B		B	B	
Approach Delay (s)		17.1			17.6			20.5			16.0	
Approach LOS		B			B			C			B	

Intersection Summary

HCM Average Control Delay	17.7	HCM Level of Service	B
HCM Volume to Capacity ratio	0.47		
Actuated Cycle Length (s)	50.4	Sum of lost time (s)	16.0
Intersection Capacity Utilization	38.2%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis
 9: Woodward Avenue & Moffat Blvd

11/23/2009



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0			4.0	4.0	
Lane Util. Factor	1.00			1.00	1.00	
Frt	1.00			1.00	0.92	
Flt Protected	0.95			1.00	1.00	
Satd. Flow (prot)	1770			1863	1705	
Flt Permitted	0.95			1.00	1.00	
Satd. Flow (perm)	1770			1863	1705	
Volume (vph)	390	10	0	20	190	320
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	424	11	0	22	207	348
RTOR Reduction (vph)	1	0	0	0	126	0
Lane Group Flow (vph)	434	0	0	22	429	0
Turn Type						
Protected Phases	4			2	6	
Permitted Phases						
Actuated Green, G (s)	33.3			18.7	18.7	
Effective Green, g (s)	33.3			18.7	18.7	
Actuated g/C Ratio	0.55			0.31	0.31	
Clearance Time (s)	4.0			4.0	4.0	
Vehicle Extension (s)	3.0			3.0	3.0	
Lane Grp Cap (vph)	982			581	531	
v/s Ratio Prot	c0.24			0.01	c0.25	
v/s Ratio Perm						
v/c Ratio	0.44			0.04	0.81	
Uniform Delay, d1	7.9			14.4	19.0	
Progression Factor	0.44			1.00	1.00	
Incremental Delay, d2	1.0			0.0	8.8	
Delay (s)	4.5			14.4	27.8	
Level of Service	A			B	C	
Approach Delay (s)	4.5			14.4	27.8	
Approach LOS	A			B	C	
Intersection Summary						
HCM Average Control Delay			17.5		HCM Level of Service	B
HCM Volume to Capacity ratio			0.57			
Actuated Cycle Length (s)			60.0		Sum of lost time (s)	8.0
Intersection Capacity Utilization			58.5%		ICU Level of Service	B
Analysis Period (min)			15			
c Critical Lane Group						

HCM Unsignalized Intersection Capacity Analysis
 11: Graves Road & Austin Road


















11/23/2009



Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations	↔		↔		↔	
Sign Control	Stop		Free		Free	
Grade	0%		0%		0%	
Volume (veh/h)	70	30	390	140	80	360
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	76	33	424	152	87	391
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	1065	500			576	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1065	500			576	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	66	94			91	
cM capacity (veh/h)	225	571			997	
Direction, Lane #	WB 1	NB 1	SB 1			
Volume Total	109	576	478			
Volume Left	76	0	87			
Volume Right	33	152	0			
cSH	275	1700	997			
Volume to Capacity	0.40	0.34	0.09			
Queue Length 95th (ft)	45	0	7			
Control Delay (s)	26.4	0.0	2.5			
Lane LOS	D		A			
Approach Delay (s)	26.4	0.0	2.5			
Approach LOS	D					
Intersection Summary						
Average Delay			3.5			
Intersection Capacity Utilization			68.1%		ICU Level of Service	C
Analysis Period (min)			15			

HCM Unsignalized Intersection Capacity Analysis
 13: Moffat Blvd & Austin Road

11/24/2009

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control	Stop			Stop			Free			Free		
Grade	0%			0%			0%			0%		
Volume (veh/h)	0	0	200	0	0	10	0	520	10	0	450	20
Peak Hour Factor	0.92	0.92	0.92	0.50	0.50	0.50	0.95	0.95	0.95	0.95	0.95	0.95
Hourly flow rate (vph)	0	0	217	0	0	20	0	547	11	0	474	21
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type	None			None								
Median storage veh												
Upstream signal (ft)								430				
pX, platoon unblocked	0.95	0.95		0.95	0.95	0.95					0.95	
vC, conflicting volume	1052	1032	484	1249	1042	547	495				547	
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	1054	1033	484	1262	1044	523	495				523	
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1				4.1	
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2				2.2	
p0 queue free %	100	100	63	100	100	96	100				100	
cM capacity (veh/h)	186	221	583	87	217	526	1069				991	
Direction, Lane #	EB 1	WB 1	NB 1	NB 2	SB 1							
Volume Total	217	20	547	11	495							
Volume Left	0	0	0	0	0							
Volume Right	217	20	0	11	21							
cSH	583	526	1700	1700	1700							
Volume to Capacity	0.37	0.04	0.32	0.01	0.29							
Queue Length 95th (ft)	43	3	0	0	0							
Control Delay (s)	14.8	12.1	0.0	0.0	0.0							
Lane LOS	B	B										
Approach Delay (s)	14.8	12.1	0.0	0.0								
Approach LOS	B	B										
Intersection Summary												
Average Delay			2.7									
Intersection Capacity Utilization			43.9%		ICU Level of Service		A					
Analysis Period (min)			15									

HCM Signalized Intersection Capacity Analysis

14: Yosemite Ave & Austin Road

11/23/2009

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	0.95		1.00	1.00		1.00	1.00	
Frt	1.00	1.00	0.85	1.00	0.99		1.00	0.97		1.00	0.96	
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770	1863	1583	1770	3496		1770	1807		1770	1788	
Flt Permitted	0.95	1.00	1.00	0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (perm)	1770	1863	1583	1770	3496		1770	1807		1770	1788	
Volume (vph)	60	510	250	50	340	30	200	160	40	30	110	40
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.80	0.80	0.80
Adj. Flow (vph)	65	554	272	54	370	33	217	174	43	38	138	50
RTOR Reduction (vph)	0	0	190	0	10	0	0	14	0	0	23	0
Lane Group Flow (vph)	65	554	82	54	393	0	217	203	0	38	165	0
Turn Type	Prot		Perm	Prot			Prot			Prot		
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases			4									
Actuated Green, G (s)	3.2	16.5	16.5	3.2	16.5		6.2	17.0		2.1	12.9	
Effective Green, g (s)	3.2	16.5	16.5	3.2	16.5		6.2	17.0		2.1	12.9	
Actuated g/C Ratio	0.06	0.30	0.30	0.06	0.30		0.11	0.31		0.04	0.24	
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)	103	561	477	103	1053		200	561		68	421	
v/s Ratio Prot	c0.04	c0.30		0.03	0.11		c0.12	c0.11		0.02	0.09	
v/s Ratio Perm			0.05									
v/c Ratio	0.63	0.99	0.17	0.52	0.37		1.08	0.36		0.56	0.39	
Uniform Delay, d1	25.2	19.0	14.1	25.1	15.1		24.3	14.7		25.9	17.6	
Progression Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	11.9	34.4	0.2	4.7	0.2		88.1	0.4		9.6	0.6	
Delay (s)	37.2	53.5	14.3	29.8	15.3		112.4	15.1		35.5	18.3	
Level of Service	D	D	B	C	B		F	B		D	B	
Approach Delay (s)		40.3			17.0			63.8			21.2	
Approach LOS		D			B			E			C	
Intersection Summary												
HCM Average Control Delay			37.9				HCM Level of Service				D	
HCM Volume to Capacity ratio			0.72									
Actuated Cycle Length (s)			54.8				Sum of lost time (s)			12.0		
Intersection Capacity Utilization			62.8%				ICU Level of Service			B		
Analysis Period (min)			15									
c Critical Lane Group												

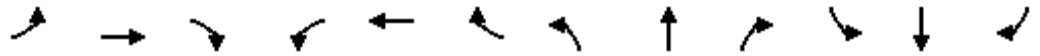
HCM Signalized Intersection Capacity Analysis
 18: McKinley Ave & Austin Road

11/23/2009

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		
Lane Util. Factor	1.00	0.95		0.97	0.95	1.00	1.00	0.95	1.00	0.97	0.95		
Frt	1.00	0.95		1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.99		
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		
Satd. Flow (prot)	1770	3362		3433	3539	1583	1770	3539	1583	3433	3503		
Flt Permitted	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		
Satd. Flow (perm)	1770	3362		3433	3539	1583	1770	3539	1583	3433	3503		
Volume (vph)	30	20	10	410	130	400	20	290	180	190	410	30	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.95	0.95	0.95	
Adj. Flow (vph)	33	22	11	446	141	435	22	315	196	200	432	32	
RTOR Reduction (vph)	0	10	0	0	0	333	0	0	142	0	6	0	
Lane Group Flow (vph)	33	23	0	446	141	102	22	315	54	200	458	0	
Turn Type	Prot			Prot		Perm	Prot		Perm	Prot			
Protected Phases	7	4		3	8		5	2		1	6		
Permitted Phases						8			2				
Actuated Green, G (s)	2.2	2.2		10.9	10.9	10.9	0.8	12.8	12.8	4.6	16.6		
Effective Green, g (s)	2.2	2.2		10.9	10.9	10.9	0.8	12.8	12.8	4.6	16.6		
Actuated g/C Ratio	0.05	0.05		0.23	0.23	0.23	0.02	0.28	0.28	0.10	0.36		
Clearance Time (s)	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		
Lane Grp Cap (vph)	84	159		805	830	371	30	974	436	340	1251		
v/s Ratio Prot	0.02	0.01		c0.13	0.04		0.01	0.09		c0.06	c0.13		
v/s Ratio Perm						c0.06			0.03				
v/c Ratio	0.39	0.14		0.55	0.17	0.27	0.73	0.32	0.12	0.59	0.37		
Uniform Delay, d1	21.5	21.2		15.7	14.2	14.6	22.7	13.4	12.6	20.0	11.1		
Progression Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		
Incremental Delay, d2	3.0	0.4		0.8	0.1	0.4	63.0	0.2	0.1	2.6	0.2		
Delay (s)	24.5	21.7		16.5	14.3	15.0	85.7	13.6	12.8	22.6	11.2		
Level of Service	C	C		B	B	B	F	B	B	C	B		
Approach Delay (s)		23.1			15.5			16.3			14.7		
Approach LOS		C			B			B			B		
Intersection Summary													
HCM Average Control Delay			15.7									HCM Level of Service	B
HCM Volume to Capacity ratio			0.43										
Actuated Cycle Length (s)			46.5									Sum of lost time (s)	12.0
Intersection Capacity Utilization			46.1%									ICU Level of Service	A
Analysis Period (min)			15										
c	Critical Lane Group												

HCM Unsignalized Intersection Capacity Analysis
 25: Ripon Rd & Austin Road

11/23/2009



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Sign Control		Stop			Stop			Stop			Stop	
Volume (vph)	30	180	10	20	80	70	10	40	30	260	30	50
Peak Hour Factor	0.70	0.70	0.70	0.92	0.92	0.92	0.65	0.65	0.65	0.92	0.92	0.92
Hourly flow rate (vph)	43	257	14	22	87	76	15	62	46	283	33	54

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total (vph)	314	185	123	370
Volume Left (vph)	43	22	15	283
Volume Right (vph)	14	76	46	54
Hadj (s)	0.03	-0.19	-0.17	0.10
Departure Headway (s)	5.7	5.8	5.9	5.7
Degree Utilization, x	0.50	0.30	0.20	0.58
Capacity (veh/h)	585	555	520	597
Control Delay (s)	14.4	11.2	10.4	16.4
Approach Delay (s)	14.4	11.2	10.4	16.4
Approach LOS	B	B	B	C

Intersection Summary			
Delay		14.0	
HCM Level of Service		B	
Intersection Capacity Utilization	48.7%		ICU Level of Service A
Analysis Period (min)		15	

HCM Signalized Intersection Capacity Analysis
 27: Woodward Avenue & Woodward Avenue Extension

11/23/2009



Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations	↔		↕↔		↔	↕↕
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0		4.0		4.0	4.0
Lane Util. Factor	1.00		0.95		1.00	0.95
Frt	0.97		0.93		1.00	1.00
Flt Protected	0.96		1.00		0.95	1.00
Satd. Flow (prot)	1745		3285		1770	3539
Flt Permitted	0.96		1.00		0.95	1.00
Satd. Flow (perm)	1745		3285		1770	3539
Volume (vph)	260	60	380	350	50	270
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	283	65	413	380	54	293
RTOR Reduction (vph)	11	0	288	0	0	0
Lane Group Flow (vph)	337	0	505	0	54	293
Turn Type					Prot	
Protected Phases	8		2		1	6
Permitted Phases						
Actuated Green, G (s)	29.9		14.5		3.6	22.1
Effective Green, g (s)	29.9		14.5		3.6	22.1
Actuated g/C Ratio	0.50		0.24		0.06	0.37
Clearance Time (s)	4.0		4.0		4.0	4.0
Vehicle Extension (s)	3.0		3.0		3.0	3.0
Lane Grp Cap (vph)	870		794		106	1304
v/s Ratio Prot	c0.19		c0.15		c0.03	0.08
v/s Ratio Perm						
v/c Ratio	0.39		0.64		0.51	0.22
Uniform Delay, d1	9.4		20.4		27.3	13.1
Progression Factor	0.37		1.00		1.00	1.00
Incremental Delay, d2	0.7		1.7		3.8	0.1
Delay (s)	4.1		22.1		31.2	13.1
Level of Service	A		C		C	B
Approach Delay (s)	4.1		22.1			15.9
Approach LOS	A		C			B
Intersection Summary						
HCM Average Control Delay			16.4		HCM Level of Service	B
HCM Volume to Capacity ratio			0.47			
Actuated Cycle Length (s)			60.0		Sum of lost time (s)	12.0
Intersection Capacity Utilization			53.1%		ICU Level of Service	A
Analysis Period (min)			15			
c Critical Lane Group						

HCM Signalized Intersection Capacity Analysis
 28: Woodward Avenue Extension & Austin Road

11/23/2009



Movement	EBL	EBR	NBL	NBT	SBT	SBR
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	0.97	1.00	0.95	
Frt	1.00	0.85	1.00	1.00	0.99	
Flt Protected	0.95	1.00	0.95	1.00	1.00	
Satd. Flow (prot)	1770	1583	3433	1863	3499	
Flt Permitted	0.95	1.00	0.95	1.00	1.00	
Satd. Flow (perm)	1770	1583	3433	1863	3499	
Volume (vph)	200	330	680	330	610	50
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	217	359	739	359	663	54
RTOR Reduction (vph)	0	283	0	0	8	0
Lane Group Flow (vph)	217	76	739	359	709	0
Turn Type		Perm	Prot			
Protected Phases	4		5	2	6	
Permitted Phases		4				
Actuated Green, G (s)	13.1	13.1	18.5	40.8	18.3	
Effective Green, g (s)	13.1	13.1	18.5	40.8	18.3	
Actuated g/C Ratio	0.21	0.21	0.30	0.66	0.30	
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)	375	335	1026	1228	1034	
v/s Ratio Prot	c0.12		c0.22	0.19	c0.20	
v/s Ratio Perm		0.05				
v/c Ratio	0.58	0.23	0.72	0.29	0.69	
Uniform Delay, d1	21.9	20.2	19.4	4.5	19.3	
Progression Factor	1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	2.2	0.3	2.5	0.1	1.9	
Delay (s)	24.1	20.6	21.9	4.6	21.2	
Level of Service	C	C	C	A	C	
Approach Delay (s)	21.9			16.2	21.2	
Approach LOS	C			B	C	

Intersection Summary

HCM Average Control Delay	19.1	HCM Level of Service	B
HCM Volume to Capacity ratio	0.67		
Actuated Cycle Length (s)	61.9	Sum of lost time (s)	12.0
Intersection Capacity Utilization	58.9%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

SIMTRAFFIC LEVEL OF SERVICE REPORT Including Upstream Delays

Project: ARBPRC **HCM:** 2000
Scenario: E+P Partial Buildout Mitigation **PHF:** 0.95
TOD: AM Peak Hr. **Analysis Period:** 15 Minutes **# of Runs:** 10

Intersection: 2: SR 120 EB Ramps & Main Street **Type:** Signalized

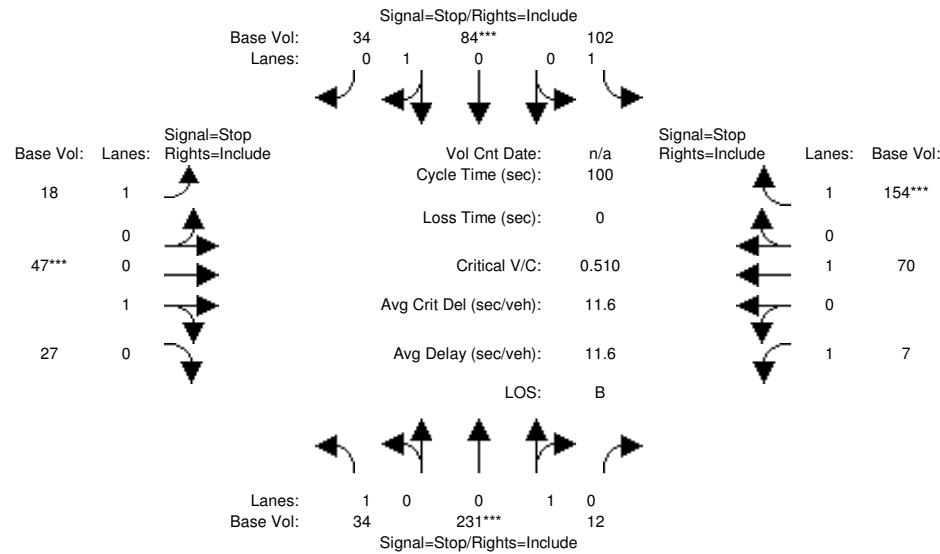
Approach	Movement	Demand Volume	Volume Served			Delay/Veh (sec)		
			Avg	%	Std Dev	Avg	LOS	Std Dev
NB	T	97	90	93	12	17.3	B	--
	R	10	10	100	3	10.9	B	--
	Subtotal	106	100	94	--	16.7	B	--
SB	L	37	36	97	5	50.7	D	--
	T	35	37	106	7	8.0	A	--
	Subtotal	72	73	101	--	29.0	C	--
EB	L	63	63	100	7	46.6	D	--
	R	26	28	108	6	11.8	B	--
	Subtotal	89	91	102	--	36.0	D	--
Total		267	264	99	--	26.8	C	--

Intersection: 3: Atherton Dr. & Main Street **Type:** Un-Signalized

Approach	Movement	Demand Volume	Volume Served			Delay/Veh (sec)		
			Avg	%	Std Dev	Avg	LOS	Std Dev
NB	L	3	3	100	2	9.0	A	--
	T	103	94	91	10	9.3	A	--
	Subtotal	106	97	92	--	9.3	A	--
SB	T	55	62	113	10	8.2	A	--
	R	6	6	100	2	4.2	A	--
	Subtotal	60	68	113	--	7.9	A	--
EB	L	4	3	75	1	7.7	A	--
	R	3	5	167	2	2.5	A	--
	Subtotal	7	8	114	--	4.4	A	--
Total		173	172	99	--	8.5	A	--

Level Of Service Computation Report
 2000 HCM 4-Way Stop (Base Volume Alternative)
 Default Scenario

Intersection #5: Woodward Ave / Main St E+P Partial Buildout Mit AM



Approach:	North Bound			South Bound			East Bound			West Bound		
Movement:	L	T	R	L	T	R	L	T	R	L	T	R
Min. Green:	0	0	0	0	0	0	0	0	0	0	0	0

Volume Module:	North Bound			South Bound			East Bound			West Bound		
Base Vol:	34	231	12	102	84	34	18	47	27	7	70	154
Growth Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Initial Bse:	34	231	12	102	84	34	18	47	27	7	70	154
User Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PHF Adj:	0.80	0.80	0.80	0.95	0.95	0.95	0.70	0.70	0.70	0.95	0.95	0.95
PHF Volume:	43	289	15	107	88	36	26	67	39	7	74	162
Reduct Vol:	0	0	0	0	0	0	0	0	0	0	0	0
Reduced Vol:	43	289	15	107	88	36	26	67	39	7	74	162
PCE Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
MLF Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Final Volume:	43	289	15	107	88	36	26	67	39	7	74	162

Saturation Flow Module:	North Bound			South Bound			East Bound			West Bound		
Adjustment:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Lanes:	1.00	0.95	0.05	1.00	0.71	0.29	1.00	0.64	0.36	1.00	1.00	1.00
Final Sat.:	541	566	29	526	417	169	482	342	197	479	515	574

Capacity Analysis Module:	North Bound			South Bound			East Bound			West Bound		
Vol/Sat:	0.08	0.51	0.51	0.20	0.21	0.21	0.05	0.20	0.20	0.02	0.14	0.28
Crit Moves:	****	****	****	****	****	****	****	****	****	****	****	****
Delay/Veh:	9.6	14.1	14.1	10.8	10.0	10.0	10.0	10.2	10.2	9.9	10.3	10.7
Delay Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
AdjDel/Veh:	9.6	14.1	14.1	10.8	10.0	10.0	10.0	10.2	10.2	9.9	10.3	10.7
LOS by Move:	A	B	B	B	A	A	A	B	B	A	B	B
ApproachDel:	13.6			10.4			10.2			10.5		
Delay Adj:	1.00			1.00			1.00			1.00		
ApprAdjDel:	13.6			10.4			10.2			10.5		
LOS by Appr:	B			B			B			B		
AllWayAvgQ:	0.1	0.9	0.9	0.2	0.2	0.2	0.0	0.2	0.2	0.0	0.1	0.3

Note: Queue reported is the number of cars per lane.
 Peak Hour Volume Signal Warrant Report [Urban]

 Intersection #5 Woodward Ave / Main St E+P Partial Buildout Mit AM

 Base Volume Alternative: Peak Hour Warrant NOT Met

Approach:	North Bound			South Bound			East Bound			West Bound		
Movement:	L	T	R	L	T	R	L	T	R	L	T	R
Control:	Stop Sign			Stop Sign			Stop Sign			Stop Sign		
Lanes:	1	0	0	1	0	0	1	0	0	1	0	0
Initial Vol:	34	231	12	102	84	34	18	47	27	7	70	154
Major Street Volume:	497			231								
Minor Approach Volume:				497								
Minor Approach Volume Threshold:				675								

SIGNAL WARRANT DISCLAIMER
 This peak hour signal warrant analysis should be considered solely as an "indicator" of the likelihood of an unsignalized intersection warranting a traffic signal in the future. Intersections that exceed this warrant are probably more likely to meet one or more of the other volume based signal warrant (such as the 4-hour or 8-hour warrants).

The peak hour warrant analysis in this report is not intended to replace a rigorous and complete traffic signal warrant analysis by the responsible jurisdiction. Consideration of the other signal warrants, which is beyond the scope of this software, may yield different results.

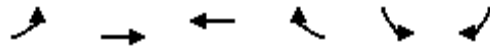
HCM Unsignalized Intersection Capacity Analysis
 5: Industrial Park Dr. & Van Ryn Rd.

11/17/2009

	→	↘	↙	←	↖	↗				
Movement	EBT	EBR	WBL	WBT	NBL	NBR				
Lane Configurations	↑	↗	↙	↑↑	↖	↗				
Sign Control	Free			Free	Stop					
Grade	0%			0%	0%					
Volume (veh/h)	134	7	50	118	28	83				
Peak Hour Factor	0.75	0.75	0.92	0.92	0.85	0.85				
Hourly flow rate (vph)	179	9	54	128	33	98				
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			188			351	179			
vC1, stage 1 conf vol										
vC2, stage 2 conf vol										
vCu, unblocked vol			188			351	179			
tC, single (s)			4.2			6.9	7.0			
tC, 2 stage (s)										
tF (s)			2.2			3.5	3.3			
p0 queue free %			96			94	88			
cM capacity (veh/h)			1362			587	824			
Direction, Lane #	EB 1	EB 2	WB 1	WB 2	WB 3	NB 1	NB 2			
Volume Total	179	9	54	64	64	33	98			
Volume Left	0	0	54	0	0	33	0			
Volume Right	0	9	0	0	0	0	98			
cSH	1700	1700	1362	1700	1700	587	824			
Volume to Capacity	0.11	0.01	0.04	0.04	0.04	0.06	0.12			
Queue Length 95th (ft)	0	0	3	0	0	4	10			
Control Delay (s)	0.0	0.0	7.8	0.0	0.0	11.5	10.0			
Lane LOS			A			B	A			
Approach Delay (s)	0.0	2.3				10.3				
Approach LOS							B			
Intersection Summary										
Average Delay			3.5							
Intersection Capacity Utilization			23.7%		ICU Level of Service		A			
Analysis Period (min)			15							

HCM Unsignalized Intersection Capacity Analysis
 8: Woodward Avenue & Athernton Dr.

11/17/2009



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations	↖	↑	↗		↖	↗
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Volume (veh/h)	2	180	107	11	23	1
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	2	196	116	12	25	1
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				TWLTL		
Median storage veh				1		
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	128				322	122
vC1, stage 1 conf vol					122	
vC2, stage 2 conf vol					200	
vCu, unblocked vol	128				322	122
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)					5.4	
tF (s)	2.2				3.5	3.3
p0 queue free %	100				96	100
cM capacity (veh/h)	1458				699	929

Direction, Lane #	EB 1	EB 2	WB 1	SB 1	SB 2
Volume Total	2	196	128	25	1
Volume Left	2	0	0	25	0
Volume Right	0	0	12	0	1
cSH	1458	1700	1700	699	929
Volume to Capacity	0.00	0.12	0.08	0.04	0.00
Queue Length 95th (ft)	0	0	0	3	0
Control Delay (s)	7.5	0.0	0.0	10.3	8.9
Lane LOS	A			B	A
Approach Delay (s)	0.1		0.0	10.3	
Approach LOS				B	

Intersection Summary					
Average Delay			0.8		
Intersection Capacity Utilization		19.5%		ICU Level of Service	A
Analysis Period (min)		15			

HCM Unsignalized Intersection Capacity Analysis
 9: Woodward Avenue & Moffat Blvd.

11/17/2009



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations	↰	↱	↰	↱	↱	↱
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Volume (veh/h)	4	199	116	312	141	2
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95
Hourly flow rate (vph)	4	209	122	328	148	2
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)		4				
Median type	None					
Median storage (veh)						
Upstream signal (ft)				1180		
pX, platoon unblocked	0.89					
vC, conflicting volume	721	148	151			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	685	148	151			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	99	77	91			
cM capacity (veh/h)	335	898	1431			

Direction, Lane #	EB 1	NB 1	NB 2	SB 1	SB 2
Volume Total	214	122	328	148	2
Volume Left	4	122	0	0	0
Volume Right	209	0	0	0	2
cSH	916	1431	1700	1700	1700
Volume to Capacity	0.23	0.09	0.19	0.09	0.00
Queue Length 95th (ft)	23	7	0	0	0
Control Delay (s)	10.3	7.8	0.0	0.0	0.0
Lane LOS	B	A			
Approach Delay (s)	10.3	2.1		0.0	
Approach LOS	B				

Intersection Summary					
Average Delay			3.9		
Intersection Capacity Utilization		27.2%		ICU Level of Service	A
Analysis Period (min)		15			

SIMTRAFFIC LEVEL OF SERVICE REPORT Including Upstream Delays

Project: ARBPRC **HCM:** 2000
Scenario: E+P Partial Buildout Mitigation **PHF:** 0.95
TOD: AM Peak Hr. **Analysis Period:** 15 Minutes **# of Runs:** 10

Intersection: 10: SR 99 SB & Moffat Blvd. **Type:** Signalized

Approach	Movement	Demand Volume	Volume Served			Delay/Veh (sec)		
			Avg	%	Std Dev	Avg	LOS	Std Dev
NB	T	101	97	95	8	21.3	C	--
	Subtotal	101	97	95	--	21.3	C	--
SB	T	89	84	94	8	25.2	C	--
	Subtotal	89	84	94	--	25.2	C	--
WB	L	87	89	102	11	19.0	B	--
	R	11	11	100	2	13.9	B	--
	Subtotal	98	99	101	--	18.5	B	--
Total		289	280	97	--	21.4	C	--

Intersection: 12: SR 99 NB & Austin Road **Type:** Signalized

Approach	Movement	Demand Volume	Volume Served			Delay/Veh (sec)		
			Avg	%	Std Dev	Avg	LOS	Std Dev
NB	L	41	40	98	7	21.6	C	--
	T	23	25	109	4	23.5	C	--
	Subtotal	64	65	102	--	22.3	C	--
SB	T	45	43	96	6	31.7	C	--
	R	7	8	114	4	8.0	A	--
	Subtotal	52	51	96	--	28.0	C	--
WB	L	104	99	95	7	33.9	C	--
	T	1	1	100	1	43.4	D	--
	R	14	14	100	2	25.6	C	--
	Subtotal	119	115	97	--	33.0	C	--
Total		235	230	98	--	28.9	C	--

SIMTRAFFIC LEVEL OF SERVICE REPORT Including Upstream Delays

Project: ARBPRC **HCM:** 2000
Scenario: E+P Partial Buildout Mitigation **PHF:** 0.95
TOD: AM Peak Hr. **Analysis Period:** 15 Minutes **# of Runs:** 10

Intersection: 13: Moffat Blvd. & Austin Road **Type:** Signalized

Approach	Movement	Demand Volume	Volume Served			Delay/Veh (sec)		
			Avg	%	Std Dev	Avg	LOS	Std Dev
NB	L	20	20	100	4	28.1	C	--
	T	41	41	100	7	29.6	C	--
	R	14	12	86	3	18.0	B	--
	Subtotal	74	74	100	--	27.2	C	--
SB	L	12	11	92	2	37.9	D	--
	T	56	54	96	6	28.1	C	--
	R	81	75	91	7	11.3	B	--
	Subtotal	149	139	93	--	19.9	B	--
EB	L	23	23	100	4	31.6	C	--
	T	48	44	92	7	32.3	C	--
	R	105	107	102	14	4.4	A	--
	Subtotal	177	174	98	--	15.0	B	--
WB	T	0	0	--	0	0.0	--	--
	R	1	1	100	1	1.6	A	--
	Subtotal	1	1	100	--	1.6	A	--
Total		401	388	97	--	19.0	B	--

HCM Unsignalized Intersection Capacity Analysis
 25: Ripon Road & Austin Road

11/17/2009



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Sign Control		Stop			Stop			Stop			Stop	
Volume (vph)	4	118	2	12	113	127	3	19	22	36	13	12
Peak Hour Factor	0.75	0.75	0.75	0.92	0.92	0.92	0.70	0.70	0.70	0.85	0.85	0.85
Hourly flow rate (vph)	5	157	3	13	123	138	4	27	31	42	15	14

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total (vph)	165	274	63	72
Volume Left (vph)	5	13	4	42
Volume Right (vph)	3	138	31	14
Hadj (s)	0.03	-0.26	-0.25	0.03
Departure Headway (s)	4.6	4.2	4.7	5.0
Degree Utilization, x	0.21	0.32	0.08	0.10
Capacity (veh/h)	756	825	687	651
Control Delay (s)	8.8	9.1	8.2	8.6
Approach Delay (s)	8.8	9.1	8.2	8.6
Approach LOS	A	A	A	A

Intersection Summary			
Delay		8.8	
HCM Level of Service		A	
Intersection Capacity Utilization	35.9%	ICU Level of Service	A
Analysis Period (min)		15	

SIMTRAFFIC LEVEL OF SERVICE REPORT Including Upstream Delays

Project: ARBPRC **HCM:** 2000
Scenario: E+P Partial Buildout Mitigation **PHF:** 0.95
TOD: PM Peak Hr **Analysis Period:** 15 Minutes **# of Runs:** 10

Intersection: 2: SR 120 EB Ramps & Main Street **Type:** Signalized

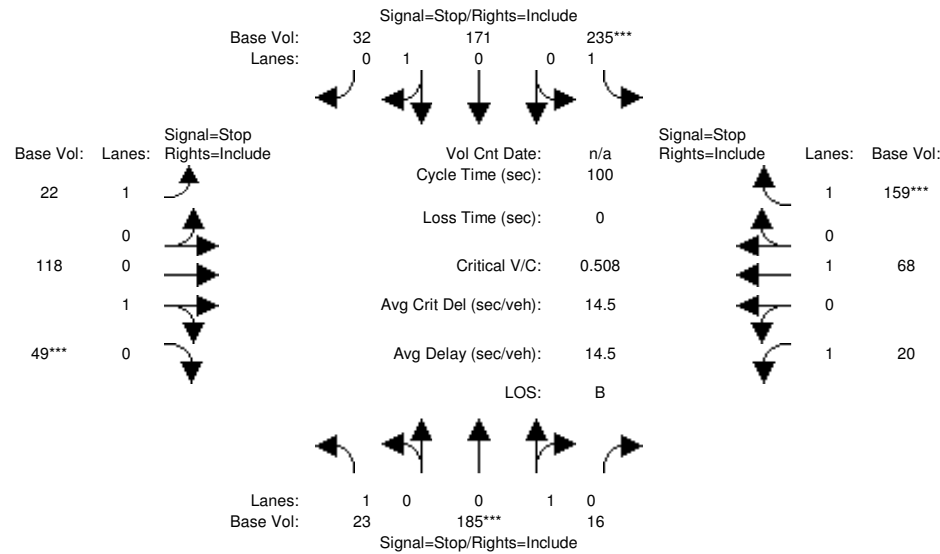
Approach	Movement	Demand Volume	Volume Served			Delay/Veh (sec)		
			Avg	%	Std Dev	Avg	LOS	Std Dev
NB	T	109	111	101	7	31.6	C	--
	R	7	7	100	3	18.6	B	--
	Subtotal	116	118	102	--	30.8	C	--
SB	L	60	59	98	10	53.7	D	--
	T	76	81	107	7	15.5	B	--
	Subtotal	136	140	103	--	31.6	C	--
EB	L	111	106	95	11	55.3	E	--
	R	53	52	98	5	24.3	C	--
	Subtotal	164	159	97	--	45.1	D	--
Total		415	416	100	--	36.5	D	--

Intersection: 3: Atherton Dr. & Main Street **Type:** Un-Signalized

Approach	Movement	Demand Volume	Volume Served			Delay/Veh (sec)		
			Avg	%	Std Dev	Avg	LOS	Std Dev
NB	L	4	5	125	1	9.0	A	--
	T	92	95	103	9	10.3	B	--
	Subtotal	96	100	104	--	10.3	B	--
SB	T	106	112	106	8	13.4	B	--
	R	22	22	100	5	6.6	A	--
	Subtotal	129	134	104	--	12.3	B	--
EB	L	24	25	104	4	8.3	A	--
	R	9	10	111	4	4.6	A	--
	Subtotal	33	35	106	--	7.2	A	--
Total		258	269	104	--	10.9	B	--

Level Of Service Computation Report
 2000 HCM 4-Way Stop (Base Volume Alternative)
 Default Scenario

Intersection #6: Woodward Ave / Main St E+P Partial Buildout Mit PM



Approach:	North Bound			South Bound			East Bound			West Bound		
Movement:	L	T	R	L	T	R	L	T	R	L	T	R
Min. Green:	0	0	0	0	0	0	0	0	0	0	0	0

Volume Module:	North Bound			South Bound			East Bound			West Bound		
Base Vol:	23	185	16	235	171	32	22	118	49	20	68	159
Growth Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Initial Bse:	23	185	16	235	171	32	22	118	49	20	68	159
User Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PHF Adj:	0.80	0.80	0.80	0.95	0.95	0.95	0.70	0.70	0.70	0.95	0.95	0.95
PHF Volume:	29	231	20	247	180	34	31	169	70	21	72	167
Reduct Vol:	0	0	0	0	0	0	0	0	0	0	0	0
Reduced Vol:	29	231	20	247	180	34	31	169	70	21	72	167
PCE Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
MLF Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Final Volume:	29	231	20	247	180	34	31	169	70	21	72	167

Saturation Flow Module:	North Bound			South Bound			East Bound			West Bound		
Adjustment:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Lanes:	1.00	0.92	0.08	1.00	0.84	0.16	1.00	0.71	0.29	1.00	1.00	1.00
Final Sat.:	459	460	40	487	445	83	447	350	145	416	443	486

Capacity Analysis Module:	North Bound			South Bound			East Bound			West Bound		
Vol/Sat:	0.06	0.50	0.50	0.51	0.40	0.40	0.07	0.48	0.48	0.05	0.16	0.34
Crit Moves:	****	****	****	****	****	****	****	****	****	****	****	****
Delay/Veh:	10.6	15.8	15.8	16.7	13.4	13.4	10.9	15.3	15.3	11.2	11.7	12.9
Delay Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
AdjDel/Veh:	10.6	15.8	15.8	16.7	13.4	13.4	10.9	15.3	15.3	11.2	11.7	12.9
LOS by Move:	B	C	C	C	B	B	B	C	C	B	B	B
ApproachDel:	15.3			15.1			14.8			12.4		
Delay Adj:	1.00			1.00			1.00			1.00		
ApprAdjDel:	15.3			15.1			14.8			12.4		
LOS by Appr:	C			C			B			B		
AllWayAvgQ:	0.1	0.9	0.9	0.9	0.6	0.6	0.1	0.8	0.8	0.0	0.2	0.4

Note: Queue reported is the number of cars per lane.

Peak Hour Volume Signal Warrant Report [Urban]

 Intersection #6 Woodward Ave / Main St E+P Partial Buildout Mit PM

 Base Volume Alternative: Peak Hour Warrant NOT Met

Approach:	North Bound			South Bound			East Bound			West Bound		
Movement:	L	T	R	L	T	R	L	T	R	L	T	R
Control:	Stop Sign			Stop Sign			Stop Sign			Stop Sign		
Lanes:	1	0	0	1	0	0	1	0	0	1	0	0
Initial Vol:	23	185	16	235	171	32	22	118	49	20	68	159

Major Street Volume: 662
 Minor Approach Volume: 247
 Minor Approach Volume Threshold: 551

SIGNAL WARRANT DISCLAIMER
 This peak hour signal warrant analysis should be considered solely as an "indicator" of the likelihood of an unsignalized intersection warranting a traffic signal in the future. Intersections that exceed this warrant are probably more likely to meet one or more of the other volume based signal warrant (such as the 4-hour or 8-hour warrants).

The peak hour warrant analysis in this report is not intended to replace a rigorous and complete traffic signal warrant analysis by the responsible jurisdiction. Consideration of the other signal warrants, which is beyond the scope of this software, may yield different results.

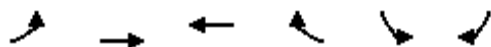
HCM Unsignalized Intersection Capacity Analysis
5: Industrial Park Dr. & Van Ryn Rd.

11/17/2009

	→	↘	↙	←	↖	↗	
Movement	EBT	EBR	WBL	WBT	NBL	NBR	
Lane Configurations	↑	↗	↙	↑↑	↖	↗	
Sign Control	Free			Free	Stop		
Grade	0%			0%	0%		
Volume (veh/h)	281	29	128	191	29	113	
Peak Hour Factor	0.75	0.75	0.92	0.92	0.85	0.85	
Hourly flow rate (vph)	375	39	139	208	34	133	
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			413		757	375	
vC1, stage 1 conf vol							
vC2, stage 2 conf vol							
vCu, unblocked vol			413		757	375	
tC, single (s)			4.1		6.8	6.9	
tC, 2 stage (s)							
tF (s)			2.2		3.5	3.3	
p0 queue free %			88		89	79	
cM capacity (veh/h)			1142		302	623	
Direction, Lane #	EB 1	EB 2	WB 1	WB 2	WB 3	NB 1	NB 2
Volume Total	375	39	139	104	104	34	133
Volume Left	0	0	139	0	0	34	0
Volume Right	0	39	0	0	0	0	133
cSH	1700	1700	1142	1700	1700	302	623
Volume to Capacity	0.22	0.02	0.12	0.06	0.06	0.11	0.21
Queue Length 95th (ft)	0	0	10	0	0	9	20
Control Delay (s)	0.0	0.0	8.6	0.0	0.0	18.4	12.3
Lane LOS			A			C	B
Approach Delay (s)	0.0		3.4			13.6	
Approach LOS						B	
Intersection Summary							
Average Delay			3.7				
Intersection Capacity Utilization			35.2%		ICU Level of Service		A
Analysis Period (min)			15				

HCM Unsignalized Intersection Capacity Analysis
 8: Woodward Avenue & Athernton Dr.

11/17/2009



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations	↗	↑	↖		↘	↗
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Volume (veh/h)	3	158	188	19	15	1
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	3	172	204	21	16	1
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				TWLTL		
Median storage veh				1		
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	225				393	215
vC1, stage 1 conf vol					215	
vC2, stage 2 conf vol					178	
vCu, unblocked vol	225				393	215
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)					5.4	
tF (s)	2.2				3.5	3.3
p0 queue free %	100				98	100
cM capacity (veh/h)	1344				659	825

Direction, Lane #	EB 1	EB 2	WB 1	SB 1	SB 2
Volume Total	3	172	225	16	1
Volume Left	3	0	0	16	0
Volume Right	0	0	21	0	1
cSH	1344	1700	1700	659	825
Volume to Capacity	0.00	0.10	0.13	0.02	0.00
Queue Length 95th (ft)	0	0	0	2	0
Control Delay (s)	7.7	0.0	0.0	10.6	9.4
Lane LOS	A			B	A
Approach Delay (s)	0.1		0.0	10.5	
Approach LOS				B	

Intersection Summary			
Average Delay		0.5	
Intersection Capacity Utilization	21.0%		ICU Level of Service A
Analysis Period (min)		15	

HCM Unsignalized Intersection Capacity Analysis
 9: Woodward Avenue & Moffat Blvd.

11/17/2009



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations	↶	↷	↶	↶	↶	↷
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Volume (veh/h)	13	160	173	223	334	34
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95
Hourly flow rate (vph)	14	168	182	235	352	36
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)		4				
Median type	None					
Median storage (veh)						
Upstream signal (ft)	1180					
pX, platoon unblocked	0.93					
vC, conflicting volume	951	352	387			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	947	352	387			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	94	76	84			
cM capacity (veh/h)	227	692	1171			
Direction, Lane #	EB 1	NB 1	NB 2	SB 1	SB 2	
Volume Total	182	182	235	352	36	
Volume Left	14	182	0	0	0	
Volume Right	168	0	0	0	36	
cSH	748	1171	1700	1700	1700	
Volume to Capacity	0.24	0.16	0.14	0.21	0.02	
Queue Length 95th (ft)	24	14	0	0	0	
Control Delay (s)	12.6	8.6	0.0	0.0	0.0	
Lane LOS	B	A				
Approach Delay (s)	12.6	3.8		0.0		
Approach LOS	B					
Intersection Summary						
Average Delay			3.9			
Intersection Capacity Utilization			40.5%		ICU Level of Service	A
Analysis Period (min)			15			

SIMTRAFFIC LEVEL OF SERVICE REPORT Including Upstream Delays

Project: ARBPRC **HCM:** 2000
Scenario: E+P Partial Buildout Mitigation **PHF:** 0.95
TOD: PM Peak Hr **Analysis Period:** 15 Minutes **# of Runs:** 10

Intersection: 10: SR 99 SB & Moffat Blvd. **Type:** Signalized

Approach	Movement	Demand Volume	Volume Served			Delay/Veh (sec)		
			Avg	%	Std Dev	Avg	LOS	Std Dev
NB	T	93	99	105	9	32.1	C	--
	Subtotal	93	99	105	--	32.1	C	--
SB	T	131	132	101	14	53.7	D	--
	Subtotal	131	132	101	--	53.7	D	--
WB	L	48	49	100	6	20.3	C	--
	R	11	10	91	4	8.7	A	--
	Subtotal	60	59	98	--	18.3	B	--
Total		283	289	102	--	39.2	D	--

Intersection: 12: SR 99 NB & Austin Road **Type:** Signalized

Approach	Movement	Demand Volume	Volume Served			Delay/Veh (sec)		
			Avg	%	Std Dev	Avg	LOS	Std Dev
NB	L	116	111	96	13	28.7	C	--
	T	37	36	97	6	29.3	C	--
	Subtotal	153	146	95	--	28.8	C	--
SB	T	37	39	105	7	45.9	D	--
	R	10	11	110	3	12.4	B	--
	Subtotal	47	50	106	--	38.8	D	--
WB	L	70	71	101	6	40.9	D	--
	T	1	2	200	1	41.4	D	--
	R	14	15	107	3	28.2	C	--
	Subtotal	85	88	104	--	38.7	D	--
Total		286	284	99	--	33.6	C	--

SIMTRAFFIC LEVEL OF SERVICE REPORT Including Upstream Delays

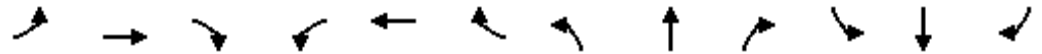
Project: ARBPRC **HCM:** 2000
Scenario: E+P Partial Buildout Mitigation **PHF:** 0.95
TOD: PM Peak Hr **Analysis Period:** 15 Minutes **# of Runs:** 10

Intersection: 13: Moffat Blvd. & Austin Road **Type:** Signalized

Approach	Movement	Demand Volume	Volume Served			Delay/Veh (sec)		
			Avg	%	Std Dev	Avg	LOS	Std Dev
NB	L	32	29	91	6	64.9	E	--
	T	117	109	93	11	64.2	E	--
	R	46	46	100	7	55.9	E	--
	Subtotal	194	184	95	--	62.2	E	--
SB	L	17	17	100	4	35.4	D	--
	T	29	32	110	3	44.4	D	--
	R	61	64	105	5	14.2	B	--
	Subtotal	108	113	105	--	26.0	C	--
EB	L	36	35	97	7	32.1	C	--
	T	82	82	100	12	46.9	D	--
	R	62	64	103	8	1.9	A	--
	Subtotal	179	181	101	--	28.2	C	--
WB	L	0	2	--	0	60.8	E	--
	R	1	2	200	1	7.7	A	--
	Subtotal	1	4	400	--	38.0	D	--
Total		482	482	100	--	40.7	D	--

HCM Unsignalized Intersection Capacity Analysis
 25: Ripon Road & Austin Road

11/17/2009



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Sign Control		Stop			Stop			Stop			Stop	
Volume (vph)	18	173	2	12	73	81	5	25	26	120	14	14
Peak Hour Factor	0.75	0.75	0.75	0.92	0.92	0.92	0.70	0.70	0.70	0.85	0.85	0.85
Hourly flow rate (vph)	24	231	3	13	79	88	7	36	37	141	16	16

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total (vph)	257	180	80	174
Volume Left (vph)	24	13	7	141
Volume Right (vph)	3	88	37	16
Hadj (s)	0.05	-0.24	-0.23	0.14
Departure Headway (s)	4.9	4.7	5.0	5.2
Degree Utilization, x	0.35	0.23	0.11	0.25
Capacity (veh/h)	698	714	640	631
Control Delay (s)	10.4	9.1	8.6	10.0
Approach Delay (s)	10.4	9.1	8.6	10.0
Approach LOS	B	A	A	A

Intersection Summary			
Delay		9.8	
HCM Level of Service		A	
Intersection Capacity Utilization	35.9%	ICU Level of Service	A
Analysis Period (min)		15	

SIMTRAFFIC LEVEL OF SERVICE REPORT Including Upstream Delays

Project: ARBPRC **HCM:** 2000
Scenario: CNP **PHF:** 0.99
TOD: AM Peak Hr **Analysis Period:** 15 Minutes **# of Runs:** 10

Intersection: 1: SR 120 WB Ramp & Main Street **Type:** Signalized

Approach	Movement	Demand Volume	Volume Served			Delay/Veh (sec)		
			Avg	%	Std Dev	Avg	LOS	Std Dev
NB	L	154	122	79	12	85.3	F	--
	T	202	164	81	14	58.9	E	--
	Subtotal	356	286	80	--	70.2	E	--
SB	T	98	103	105	13	33.7	C	--
	R	126	126	100	14	17.0	B	--
	Subtotal	225	229	102	--	24.6	C	--
WB	L	48	49	102	8	44.7	D	--
	R	73	75	103	8	14.3	B	--
	Subtotal	121	124	102	--	26.4	C	--
Total		702	639	91	--	45.4	D	--

Intersection: 2: SR 120 EB Ramps & Main Street **Type:** Signalized

Approach	Movement	Demand Volume	Volume Served			Delay/Veh (sec)		
			Avg	%	Std Dev	Avg	LOS	Std Dev
NB	T	260	224	86	10	44.5	D	--
	R	86	78	91	12	8.2	A	--
	Subtotal	346	302	87	--	35.2	D	--
SB	L	38	34	89	4	105.1	F	--
	T	109	116	106	16	15.8	B	--
	Subtotal	146	150	103	--	35.8	D	--
EB	L	96	77	79	8	181.8	F	--
	R	146	121	83	18	127.3	F	--
	Subtotal	242	198	82	--	148.4	F	--
Total		735	650	88	--	69.8	E	--

SIMTRAFFIC LEVEL OF SERVICE REPORT Including Upstream Delays

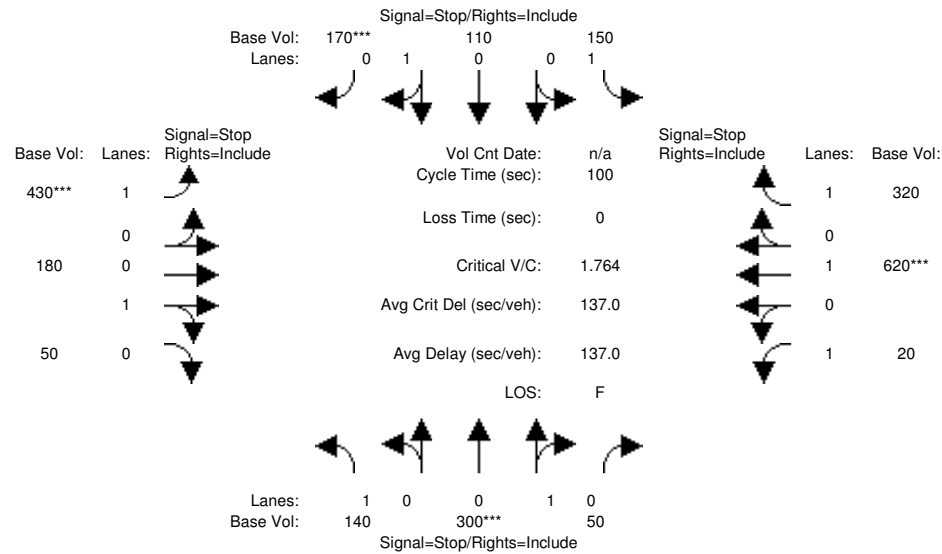
Project: ARBPRC **HCM:** 2000
Scenario: CNP **PHF:** 0.99
TOD: AM Peak Hr **Analysis Period:** 15 Minutes **# of Runs:** 10

Intersection: 3: Atherton Drive & Main Street **Type:** Signalized

Approach	Movement	Demand Volume	Volume Served			Delay/Veh (sec)		
			Avg	%	Std Dev	Avg	LOS	Std Dev
NB	L	25	19	72	7	150.0	F	--
	T	174	138	79	26	171.7	F	--
	R	66	56	85	12	106.4	F	--
	Subtotal	265	212	80	--	152.7	F	--
SB	L	154	142	92	26	38.6	D	--
	T	66	67	102	7	9.2	A	--
	R	35	30	86	6	4.2	A	--
	Subtotal	255	240	94	--	26.0	C	--
EB	L	25	18	72	5	218.2	F	--
	T	23	22	96	3	53.5	D	--
	R	10	9	90	3	11.8	B	--
	Subtotal	58	48	83	--	107.3	F	--
WB	L	33	30	91	6	106.0	F	--
	T	58	59	102	6	57.6	E	--
	R	146	139	95	20	99.3	F	--
	Subtotal	237	229	97	--	89.4	F	--
Total		816	729	89	--	88.2	F	--

Level Of Service Computation Report
 2000 HCM 4-Way Stop (Base Volume Alternative)
 Default Scenario

Intersection #7: Woodward Ave / Main Street CNP AM



Approach:	North Bound			South Bound			East Bound			West Bound		
Movement:	L	T	R	L	T	R	L	T	R	L	T	R
Min. Green:	0	0	0	0	0	0	0	0	0	0	0	0
Volume Module:												
Base Vol:	140	300	50	150	110	170	430	180	50	20	620	320
Growth Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Initial Bse:	140	300	50	150	110	170	430	180	50	20	620	320
User Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PHF Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PHF Volume:	140	300	50	150	110	170	430	180	50	20	620	320
Reduct Vol:	0	0	0	0	0	0	0	0	0	0	0	0
Reduced Vol:	140	300	50	150	110	170	430	180	50	20	620	320
PCE Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
MLF Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Final Volume:	140	300	50	150	110	170	430	180	50	20	620	320

Saturation Flow Module:	North Bound			South Bound			East Bound			West Bound		
Adjustment:	L	T	R	L	T	R	L	T	R	L	T	R
Adjustment:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Lanes:	1.00	0.86	0.14	1.00	0.39	0.61	1.00	0.78	0.22	1.00	1.00	1.00
Final Sat.:	354	326	54	347	151	234	367	304	84	325	352	376

Capacity Analysis Module:	North Bound			South Bound			East Bound			West Bound		
Vol/Sat:	L	T	R	L	T	R	L	T	R	L	T	R
Vol/Sat:	0.40	0.92	0.92	0.43	0.73	0.73	1.17	0.59	0.59	0.06	1.76	0.85
Crit Moves:	****			****			****			****		
Delay/Veh:	19.0	58.5	58.5	20.2	32.6	32.6	132.3	23.9	23.9	14.1	379	47.4
Delay Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
AdjDel/Veh:	19.0	58.5	58.5	20.2	32.6	32.6	132.3	23.9	23.9	14.1	379	47.4
LOS by Move:	C	F	F	C	D	D	F	C	C	B	F	E
ApproachDel:	47.2			28.3			94.5			260.8		
Delay Adj:	1.00			1.00			1.00			1.00		
ApprAdjDel:	47.2			28.3			94.5			260.8		
LOS by Appr:	E			D			F			F		
AllWayAvgQ:	0.6	4.9	4.9	0.7	2.2	2.2	12.2	1.3	1.3	0.1	35.7	3.7

Note: Queue reported is the number of cars per lane.

Peak Hour Volume Signal Warrant Report [Urban]

 Intersection #7 Woodward Ave / Main Street CNP AM

 Base Volume Alternative: Peak Hour Warrant Met

Approach:	North Bound			South Bound			East Bound			West Bound				
Movement:	L	T	R	L	T	R	L	T	R	L	T	R		
Control:	Stop Sign			Stop Sign			Stop Sign			Stop Sign				
Lanes:	1	0	1	0	1	0	0	1	0	1	0	1	0	1
Initial Vol:	140	300	50	150	110	170	430	180	50	20	620	320		
Major Street Volume:	1620													
Minor Approach Volume:	490													
Minor Approach Volume Threshold:	167													

SIGNAL WARRANT DISCLAIMER
 This peak hour signal warrant analysis should be considered solely as an "indicator" of the likelihood of an unsignalized intersection warranting a traffic signal in the future. Intersections that exceed this warrant are probably more likely to meet one or more of the other volume based signal warrant (such as the 4-hour or 8-hour warrants).

The peak hour warrant analysis in this report is not intended to replace a rigorous and complete traffic signal warrant analysis by the responsible jurisdiction. Consideration of the other signal warrants, which is beyond the scope of this software, may yield different results.

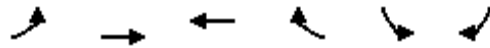
HCM Unsignalized Intersection Capacity Analysis
 5: Industrial Park Dr & VanRyn (Spreckles)

11/17/2009

	→	↘	↙	←	↖	↗	
Movement	EBT	EBR	WBL	WBT	NBL	NBR	
Lane Configurations	↑	↗	↙	↑↑	↖	↗	
Sign Control	Free			Free	Stop		
Grade	0%			0%	0%		
Volume (veh/h)	140	10	200	120	60	580	
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	
Hourly flow rate (vph)	147	11	211	126	63	611	
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			158		632	147	
vC1, stage 1 conf vol							
vC2, stage 2 conf vol							
vCu, unblocked vol			158		632	147	
tC, single (s)			4.1		6.8	6.9	
tC, 2 stage (s)							
tF (s)			2.2		3.5	3.3	
p0 queue free %			85		82	30	
cM capacity (veh/h)			1419		352	873	
Direction, Lane #	EB 1	EB 2	WB 1	WB 2	WB 3	NB 1	NB 2
Volume Total	147	11	211	63	63	63	611
Volume Left	0	0	211	0	0	63	0
Volume Right	0	11	0	0	0	0	611
cSH	1700	1700	1419	1700	1700	352	873
Volume to Capacity	0.09	0.01	0.15	0.04	0.04	0.18	0.70
Queue Length 95th (ft)	0	0	13	0	0	16	148
Control Delay (s)	0.0	0.0	8.0	0.0	0.0	17.5	18.1
Lane LOS			A			C	C
Approach Delay (s)	0.0		5.0			18.1	
Approach LOS						C	
Intersection Summary							
Average Delay			11.9				
Intersection Capacity Utilization			49.9%		ICU Level of Service		A
Analysis Period (min)			15				

HCM Unsignalized Intersection Capacity Analysis
 6: Woodward Avenue & VanRyn (Spreckles)

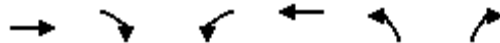
11/17/2009



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations	↶	↷	↷↶		↶	↷
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Volume (veh/h)	160	410	510	40	30	90
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95
Hourly flow rate (vph)	168	432	537	42	32	95
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				TWLTL		
Median storage (veh)				0		
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	579				1326	289
vC1, stage 1 conf vol					558	
vC2, stage 2 conf vol					768	
vCu, unblocked vol	579				1326	289
tC, single (s)	4.1				6.8	6.9
tC, 2 stage (s)					5.8	
tF (s)	2.2				3.5	3.3
p0 queue free %	83				83	87
cM capacity (veh/h)	991				182	707
Direction, Lane #	EB 1	EB 2	WB 1	WB 2	SB 1	SB 2
Volume Total	168	432	358	221	32	95
Volume Left	168	0	0	0	32	0
Volume Right	0	0	0	42	0	95
cSH	991	1700	1700	1700	182	707
Volume to Capacity	0.17	0.25	0.21	0.13	0.17	0.13
Queue Length 95th (ft)	15	0	0	0	15	12
Control Delay (s)	9.4	0.0	0.0	0.0	28.9	10.9
Lane LOS	A				D	B
Approach Delay (s)	2.6		0.0		15.4	
Approach LOS					C	
Intersection Summary						
Average Delay			2.7			
Intersection Capacity Utilization			37.6%		ICU Level of Service	A
Analysis Period (min)			15			

HCM Unsignalized Intersection Capacity Analysis
7: Woodward Avenue & Pillsbury Road

11/17/2009



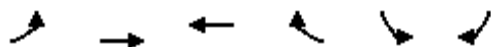
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↷		↶	↷↶	↶↷	
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Volume (veh/h)	400	40	30	450	100	70
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95
Hourly flow rate (vph)	421	42	32	474	105	74
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				TWLTL		
Median storage veh					1	
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume			463		742	442
vC1, stage 1 conf vol					442	
vC2, stage 2 conf vol					300	
vCu, unblocked vol			463		742	442
tC, single (s)			4.1		6.8	6.9
tC, 2 stage (s)					5.8	
tF (s)			2.2		3.5	3.3
p0 queue free %			97		77	87
cM capacity (veh/h)			1094		454	563

Direction, Lane #	EB 1	WB 1	WB 2	WB 3	NB 1
Volume Total	463	32	237	237	179
Volume Left	0	32	0	0	105
Volume Right	42	0	0	0	74
cSH	1700	1094	1700	1700	493
Volume to Capacity	0.27	0.03	0.14	0.14	0.36
Queue Length 95th (ft)	0	2	0	0	41
Control Delay (s)	0.0	8.4	0.0	0.0	16.4
Lane LOS		A			C
Approach Delay (s)	0.0	0.5			16.4
Approach LOS					C

Intersection Summary					
Average Delay			2.8		
Intersection Capacity Utilization		41.4%		ICU Level of Service	A
Analysis Period (min)		15			

HCM Unsignalized Intersection Capacity Analysis
 8: Woodward Avenue & Atherton Dr.

11/17/2009



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations	↶	↷	↷		↶	↷
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Volume (veh/h)	10	550	380	100	60	10
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95
Hourly flow rate (vph)	11	579	400	105	63	11
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				TWLTL		
Median storage veh				1		
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	505				1053	453
vC1, stage 1 conf vol					453	
vC2, stage 2 conf vol					600	
vCu, unblocked vol	505				1053	453
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)					5.4	
tF (s)	2.2				3.5	3.3
p0 queue free %	99				83	98
cM capacity (veh/h)	1059				380	607

Direction, Lane #	EB 1	EB 2	WB 1	SB 1	SB 2
Volume Total	11	579	505	63	11
Volume Left	11	0	0	63	0
Volume Right	0	0	105	0	11
cSH	1059	1700	1700	380	607
Volume to Capacity	0.01	0.34	0.30	0.17	0.02
Queue Length 95th (ft)	1	0	0	15	1
Control Delay (s)	8.4	0.0	0.0	16.3	11.0
Lane LOS	A			C	B
Approach Delay (s)	0.2		0.0	15.6	
Approach LOS				C	

Intersection Summary					
Average Delay			1.1		
Intersection Capacity Utilization		38.9%		ICU Level of Service	A
Analysis Period (min)		15			

HCM Unsignalized Intersection Capacity Analysis
 9: Woodward Avenue & Moffat Blvd.

11/17/2009



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Volume (veh/h)	80	530	460	290	160	20
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95
Hourly flow rate (vph)	84	558	484	305	168	21
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	1453	179	189			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1453	179	189			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	10	35	65			
cM capacity (veh/h)	93	864	1384			

Direction, Lane #	EB 1	NB 1	NB 2	SB 1
Volume Total	642	484	305	189
Volume Left	84	484	0	0
Volume Right	558	0	0	21
cSH	415	1384	1700	1700
Volume to Capacity	1.55	0.35	0.18	0.11
Queue Length 95th (ft)	881	40	0	0
Control Delay (s)	282.4	9.0	0.0	0.0
Lane LOS	F	A		
Approach Delay (s)	282.4	5.5		0.0
Approach LOS	F			

Intersection Summary			
Average Delay		114.6	
Intersection Capacity Utilization	82.3%		ICU Level of Service E
Analysis Period (min)		15	

SIMTRAFFIC LEVEL OF SERVICE REPORT Including Upstream Delays

Project: ARBPRC **HCM:** 2000
Scenario: CNP **PHF:** 0.99
TOD: AM Peak Hr **Analysis Period:** 15 Minutes **# of Runs:** 10

Intersection: 10: Moffat Blvd. & SR 99 SB **Type:** Un-Signalized

Approach	Movement	Demand Volume	Volume Served			Delay/Veh (sec)		
			Avg	%	Std Dev	Avg	LOS	Std Dev
SB	L	15	3	20	4	651.0	F	--
	R	13	3	23	3	543.4	F	--
	Subtotal	28	7	25	--	597.2	F	--
EB	T	174	141	81	9	185.1	F	--
	Subtotal	174	141	81	--	185.1	F	--
WB	T	177	172	97	6	1.1	A	--
	Subtotal	177	172	97	--	1.1	A	--
Total		379	320	84	--	95.2	F	--

HCM Unsignalized Intersection Capacity Analysis

11: Graves Road & Austin Rd.

11/17/2009



Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations	↔		↔		↔	
Sign Control	Stop		Free		Free	
Grade	0%		0%		0%	
Volume (veh/h)	80	20	160	10	20	200
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95
Hourly flow rate (vph)	84	21	168	11	21	211
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	426	174			179	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	426	174			179	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	85	98			98	
cM capacity (veh/h)	576	870			1397	

Direction, Lane #	WB 1	NB 1	SB 1
Volume Total	105	179	232
Volume Left	84	0	21
Volume Right	21	11	0
cSH	618	1700	1397
Volume to Capacity	0.17	0.11	0.02
Queue Length 95th (ft)	15	0	1
Control Delay (s)	12.0	0.0	0.8
Lane LOS	B		A
Approach Delay (s)	12.0	0.0	0.8
Approach LOS	B		

Intersection Summary			
Average Delay			2.8
Intersection Capacity Utilization	36.3%	ICU Level of Service	A
Analysis Period (min)			15

SIMTRAFFIC LEVEL OF SERVICE REPORT Including Upstream Delays

Project: ARBPRC **HCM:** 2000
Scenario: CNP **PHF:** 0.99
TOD: AM Peak Hr **Analysis Period:** 15 Minutes **# of Runs:** 10

Intersection: 12: SR 99 NB & Austin Rd. **Type:** Un-Signalized

Approach	Movement	Demand Volume	Volume Served			Delay/Veh (sec)		
			Avg	%	Std Dev	Avg	LOS	Std Dev
NB	L	96	79	82	5	12.9	B	--
	T	30	25	83	5	14.7	B	--
	Subtotal	126	104	83	--	13.3	B	--
SB	T	45	44	98	6	17.4	C	--
	R	25	26	104	5	14.3	B	--
	Subtotal	71	69	97	--	16.3	C	--
WB	L	114	108	95	12	39.0	E	--
	R	13	13	100	3	27.5	D	--
	Subtotal	126	121	96	--	37.7	E	--
Total	323	294	91	--	24.1	C	--	























Intersection: 13: Moffat Blvd. & Austin Rd. **Type:** Un-Signalized

Approach	Movement	Demand Volume	Volume Served			Delay/Veh (sec)		
			Avg	%	Std Dev	Avg	LOS	Std Dev
NB	L	40	42	105	8	22.7	C	--
	T	25	26	104	6	25.9	D	--
	R	18	19	106	6	12.2	B	--
	Subtotal	83	86	104	--	21.4	C	--
SB	L	13	10	77	3	75.9	F	--
	T	13	11	85	3	81.7	F	--
	R	134	126	94	7	73.0	F	--
	Subtotal	159	146	92	--	73.8	F	--
EB	L	98	75	77	8	38.5	E	--
	T	78	61	78	6	40.4	E	--
	R	13	10	77	2	34.2	D	--
	Subtotal	189	145	77	--	39.0	E	--
WB	L	3	4	133	1	6.5	A	--
	T	3	3	100	1	11.9	B	--
	R	3	3	100	1	4.4	A	--
	Subtotal	8	10	125	--	7.7	A	--
Total	439	387	88	--	47.4	E	--	

HCM Signalized Intersection Capacity Analysis























14: Yosemite Avenue & Austin Rd.

11/17/2009

												
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	1.00	0.95		1.00	0.95		1.00	1.00		1.00	1.00	
Frt	1.00	0.97		1.00	1.00		1.00	0.93		1.00	0.95	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770	3426		1770	3525		1770	1739		1770	1770	
Flt Permitted	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (perm)	1770	3426		1770	3525		1770	1739		1770	1770	
Volume (vph)	110	370	100	40	1070	30	90	50	40	60	80	40
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	116	389	105	42	1126	32	95	53	42	63	84	42
RTOR Reduction (vph)	0	23	0	0	2	0	0	22	0	0	13	0
Lane Group Flow (vph)	116	471	0	42	1156	0	95	73	0	63	113	0
Turn Type	Prot			Prot			Prot			Prot		
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases												
Actuated Green, G (s)	9.2	41.1		4.5	36.4		8.3	23.7		6.8	22.2	
Effective Green, g (s)	9.2	41.1		4.5	36.4		8.3	23.7		6.8	22.2	
Actuated g/C Ratio	0.10	0.45		0.05	0.40		0.09	0.26		0.07	0.24	
Clearance Time (s)	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	
Lane Grp Cap (vph)	177	1529		86	1393		160	447		131	427	
v/s Ratio Prot	c0.07	0.14		0.02	c0.33		c0.05	0.04		0.04	c0.06	
v/s Ratio Perm												
v/c Ratio	0.66	0.31		0.49	0.83		0.59	0.16		0.48	0.26	
Uniform Delay, d1	39.9	16.4		42.7	25.1		40.3	26.5		41.0	28.3	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	8.4	0.1		4.3	4.3		5.8	0.8		2.8	1.5	
Delay (s)	48.4	16.5		47.0	29.3		46.1	27.3		43.7	29.8	
Level of Service	D	B		D	C		D	C		D	C	
Approach Delay (s)		22.5			29.9			36.7			34.5	
Approach LOS		C			C			D			C	
Intersection Summary												
HCM Average Control Delay			28.9			HCM Level of Service					C	
HCM Volume to Capacity ratio			0.62									
Actuated Cycle Length (s)			92.1			Sum of lost time (s)			16.0			
Intersection Capacity Utilization			58.3%			ICU Level of Service					B	
Analysis Period (min)			15									
c Critical Lane Group												

HCM Signalized Intersection Capacity Analysis
 15: Yosemite Avenue & Jack Tone Rd

11/17/2009

												
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	1.00	0.95		1.00	0.95		1.00	1.00		1.00	1.00	
Frt	1.00	0.98		1.00	0.99		1.00	0.95		1.00	0.97	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770	3453		1770	3510		1770	1769		1770	1799	
Flt Permitted	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (perm)	1770	3453		1770	3510		1770	1769		1770	1799	
Volume (vph)	30	310	60	60	1030	60	60	100	50	30	170	50
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	32	326	63	63	1084	63	63	105	53	32	179	53
RTOR Reduction (vph)	0	21	0	0	5	0	0	23	0	0	14	0
Lane Group Flow (vph)	32	368	0	63	1142	0	63	135	0	32	218	0
Turn Type	Prot		Prot			Prot			Prot			
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases												
Actuated Green, G (s)	1.7	21.5		2.8	22.6		2.8	13.7		1.7	12.6	
Effective Green, g (s)	1.7	21.5		2.8	22.6		2.8	13.7		1.7	12.6	
Actuated g/C Ratio	0.03	0.39		0.05	0.41		0.05	0.25		0.03	0.23	
Clearance Time (s)	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	
Lane Grp Cap (vph)	54	1333		89	1424		89	435		54	407	
v/s Ratio Prot	0.02	0.11		c0.04	c0.33		c0.04	0.08		0.02	c0.12	
v/s Ratio Perm												
v/c Ratio	0.59	0.28		0.71	0.80		0.71	0.31		0.59	0.54	
Uniform Delay, d1	26.7	11.7		26.0	14.6		26.0	17.1		26.7	19.0	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	16.2	0.1		22.6	3.3		22.6	0.4		16.2	1.4	
Delay (s)	42.9	11.9		48.6	17.9		48.6	17.5		42.9	20.3	
Level of Service	D	B		D	B		D	B		D	C	
Approach Delay (s)		14.2			19.5			26.4			23.1	
Approach LOS		B			B			C			C	
Intersection Summary												
HCM Average Control Delay			19.6	HCM Level of Service				B				
HCM Volume to Capacity ratio			0.66									
Actuated Cycle Length (s)			55.7	Sum of lost time (s)				12.0				
Intersection Capacity Utilization			62.4%	ICU Level of Service				B				
Analysis Period (min)			15									
c Critical Lane Group												

HCM Unsignalized Intersection Capacity Analysis
 16: Graves Road & Jack Tone Rd

11/17/2009



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations	↙			↑	↓	↘
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Volume (veh/h)	10	20	70	170	260	20
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95
Hourly flow rate (vph)	11	21	74	179	274	21
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	611	284	295			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	611	284	295			
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	97	94			
cM capacity (veh/h)	431	755	1267			

Direction, Lane #	EB 1	NB 1	SB 1
Volume Total	32	253	295
Volume Left	11	74	0
Volume Right	21	0	21
cSH	603	1267	1700
Volume to Capacity	0.05	0.06	0.17
Queue Length 95th (ft)	4	5	0
Control Delay (s)	11.3	2.7	0.0
Lane LOS	B	A	
Approach Delay (s)	11.3	2.7	0.0
Approach LOS	B		

Intersection Summary			
Average Delay		1.8	
Intersection Capacity Utilization	41.0%	ICU Level of Service	A
Analysis Period (min)		15	

HCM Unsignalized Intersection Capacity Analysis
 17: Sedan Ave & Main Street

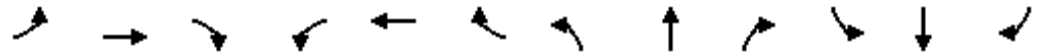
11/17/2009



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Volume (veh/h)	10	10	10	10	10	10	10	200	10	10	110	10
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Hourly flow rate (vph)	11	11	11	11	11	11	11	211	11	11	116	11
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	395	384	121	395	384	216	126			221		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	395	384	121	395	384	216	126			221		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	98	98	99	98	98	99	99			99		
cM capacity (veh/h)	543	541	930	544	541	824	1460			1348		
Direction, Lane #	EB 1	WB 1	NB 1	SB 1								
Volume Total	32	32	232	137								
Volume Left	11	11	11	11								
Volume Right	11	11	11	11								
cSH	630	612	1460	1348								
Volume to Capacity	0.05	0.05	0.01	0.01								
Queue Length 95th (ft)	4	4	1	1								
Control Delay (s)	11.0	11.2	0.4	0.7								
Lane LOS	B	B	A	A								
Approach Delay (s)	11.0	11.2	0.4	0.7								
Approach LOS	B	B										
Intersection Summary												
Average Delay			2.0									
Intersection Capacity Utilization			23.7%		ICU Level of Service					A		
Analysis Period (min)			15									

HCM Unsignalized Intersection Capacity Analysis
 18: Sedan Ave & Austin Rd.

11/17/2009



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Volume (veh/h)	10	10	10	10	10	10	60	210	10	10	60	10
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Hourly flow rate (vph)	11	11	11	11	11	11	63	221	11	11	63	11
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type	None			None								
Median storage veh												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	458	447	68	458	447	226	74			232		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	458	447	68	458	447	226	74			232		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	98	98	99	98	98	99	96			99		
cM capacity (veh/h)	480	481	995	481	481	813	1526			1336		
Direction, Lane #	EB 1	WB 1	NB 1	SB 1								
Volume Total	32	32	295	84								
Volume Left	11	11	63	11								
Volume Right	11	11	11	11								
cSH	581	557	1526	1336								
Volume to Capacity	0.05	0.06	0.04	0.01								
Queue Length 95th (ft)	4	4	3	1								
Control Delay (s)	11.6	11.9	1.9	1.0								
Lane LOS	B	B	A	A								
Approach Delay (s)	11.6	11.9	1.9	1.0								
Approach LOS	B	B										
Intersection Summary												
Average Delay			3.1									
Intersection Capacity Utilization			31.6%	ICU Level of Service			A					
Analysis Period (min)			15									

HCM Unsignalized Intersection Capacity Analysis
 19: W. River Rd & Jack Tone Rd

11/17/2009



Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations	↶	↷	↶		↶	↷
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Volume (veh/h)	120	100	170	60	30	250
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95
Hourly flow rate (vph)	126	105	179	63	32	263
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	537	211			242	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	537	211			242	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	74	87			98	
cM capacity (veh/h)	493	830			1324	
Direction, Lane #	WB 1	WB 2	NB 1	SB 1	SB 2	
Volume Total	126	105	242	32	263	
Volume Left	126	0	0	32	0	
Volume Right	0	105	63	0	0	
cSH	493	830	1700	1324	1700	
Volume to Capacity	0.26	0.13	0.14	0.02	0.15	
Queue Length 95th (ft)	25	11	0	2	0	
Control Delay (s)	14.8	10.0	0.0	7.8	0.0	
Lane LOS	B	A		A		
Approach Delay (s)	12.6		0.0	0.8		
Approach LOS	B					
Intersection Summary						
Average Delay			4.1			
Intersection Capacity Utilization			32.6%		ICU Level of Service	A
Analysis Period (min)			15			

SIMTRAFFIC LEVEL OF SERVICE REPORT Including Upstream Delays

Project: ARBPRC **HCM:** 2000
Scenario: CNP **PHF:** 0.99
TOD: AM Peak Hr **Analysis Period:** 15 Minutes **# of Runs:** 10

Intersection: 20: Santos Ave & Jack Tone Rd **Type:** Signalized

Approach	Movement	Demand Volume	Volume Served			Delay/Veh (sec)		
			Avg	%	Std Dev	Avg	LOS	Std Dev
NB	L	20	22	110	5	14.4	B	--
	T	35	38	109	6	17.1	B	--
	R	15	16	107	3	3.9	A	--
	Subtotal	71	76	107	--	13.4	B	--
SB	L	5	4	80	1	26.7	C	--
	T	78	72	92	9	26.6	C	--
	R	10	11	110	3	17.2	B	--
	Subtotal	93	87	94	--	25.4	C	--
EB	L	5	5	100	2	24.0	C	--
	T	5	5	100	2	21.2	C	--
	R	25	24	96	4	3.8	A	--
	Subtotal	35	34	97	--	9.5	A	--
WB	L	40	39	98	6	26.7	C	--
	T	15	15	100	4	20.8	C	--
	R	18	17	94	5	3.5	A	--
	Subtotal	73	71	97	--	20.0	B	--
Total		273	268	98	--	18.6	B	--

Intersection: 22: Colony Rd / SR 99 On-Ramps & Jack Tone Rd **Type:** Signalized

Approach	Movement	Demand Volume	Volume Served			Delay/Veh (sec)		
			Avg	%	Std Dev	Avg	LOS	Std Dev
NB	T	53	53	100	6	8.5	A	--
	R	119	117	98	11	6.7	A	--
	Subtotal	172	170	99	--	7.3	A	--
SB	L	5	4	80	1	30.2	C	--
	T	33	33	100	7	4.7	A	--
	R	76	70	92	8	6.3	A	--
	R2	30	28	93	3	1.6	A	--
	Subtotal	144	136	94	--	5.6	A	--
WB	L	43	46	107	6	29.9	C	--
	R	18	21	117	4	3.3	A	--
	L2	25	27	108	6	25.3	C	--
	Subtotal	86	95	110	--	22.6	C	--
Total		402	400	100	--	10.3	B	--

SIMTRAFFIC LEVEL OF SERVICE REPORT Including Upstream Delays

Project: ARBPRC **HCM:** 2000
Scenario: CNP **PHF:** 0.99
TOD: AM Peak Hr **Analysis Period:** 15 Minutes **# of Runs:** 10

Intersection: 23: Colony Rd / SR 99 On-Ramps & Hoff Rd/SR 99 **Type:** Un-Signalized

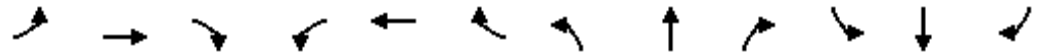
Approach	Movement	Demand Volume	Volume Served			Delay/Veh (sec)		
			Avg	%	Std Dev	Avg	LOS	Std Dev
NB	L	40	43	108	7	11.8	B	--
	T	25	25	100	7	9.4	A	--
	R	8	9	113	2	5.8	A	--
	Subtotal	73	77	105	--	10.4	B	--
SB	L	5	5	100	2	9.4	A	--
	T	5	5	100	2	7.4	A	--
	R	3	4	133	2	3.0	A	--
	Subtotal	13	14	108	--	6.8	A	--
EB	L	3	2	67	2	5.9	A	--
	T	38	37	97	6	8.7	A	--
	R	83	83	99	9	4.2	A	--
	Subtotal	124	122	98	--	5.6	A	--
WB	L	30	31	103	5	11.5	B	--
	T	43	47	109	7	8.3	A	--
	R	5	6	120	2	3.9	A	--
	Subtotal	78	84	108	--	9.2	A	--
Total	288	297	103	--	7.9	A	--	

Intersection: 24: SR 99 SB & Jack Tone Rd **Type:** Signalized

Approach	Movement	Demand Volume	Volume Served			Delay/Veh (sec)		
			Avg	%	Std Dev	Avg	LOS	Std Dev
NB	T	114	113	99	11	5.1	A	--
	R	38	35	92	6	3.2	A	--
	Subtotal	152	149	98	--	4.6	A	--
SB	T	58	59	102	11	4.3	A	--
	Subtotal	58	59	102	--	4.3	A	--
EB	L	58	56	97	4	22.0	C	--
	R	56	54	96	9	8.5	A	--
	Subtotal	114	110	96	--	15.3	B	--
Total	323	318	98	--	8.3	A	--	

HCM Unsignalized Intersection Capacity Analysis
 25: Ripon Rd & Austin Rd.

11/17/2009



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Sign Control		Stop			Stop			Stop			Stop	
Volume (vph)	20	120	10	20	210	230	10	20	30	30	20	20
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Hourly flow rate (vph)	21	126	11	21	221	242	11	21	32	32	21	21

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total (vph)	158	484	63	74
Volume Left (vph)	21	21	11	32
Volume Right (vph)	11	242	32	21
Hadj (s)	0.02	-0.26	-0.23	-0.05
Departure Headway (s)	4.8	4.2	5.2	5.4
Degree Utilization, x	0.21	0.57	0.09	0.11
Capacity (veh/h)	700	828	596	588
Control Delay (s)	9.1	12.6	8.7	9.0
Approach Delay (s)	9.1	12.6	8.7	9.0
Approach LOS	A	B	A	A

Intersection Summary			
Delay		11.2	
HCM Level of Service		B	
Intersection Capacity Utilization	43.8%	ICU Level of Service	A
Analysis Period (min)		15	

HCM Signalized Intersection Capacity Analysis

26: Ripon Rd & Jack Tone Rd

11/17/2009

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	0.95		1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Frt	1.00	0.98		1.00	1.00	0.85	1.00	0.97		1.00	0.92	
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770	3486		1770	1863	1583	1770	1803		1770	1717	
Flt Permitted	0.95	1.00		0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (perm)	1770	3486		1770	1863	1583	1770	1803		1770	1717	
Volume (vph)	140	180	20	70	240	110	100	260	70	110	110	120
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	147	189	21	74	253	116	105	274	74	116	116	126
RTOR Reduction (vph)	0	9	0	0	0	94	0	8	0	0	30	0
Lane Group Flow (vph)	147	201	0	74	253	22	105	340	0	116	212	0
Turn Type	Prot			Prot		Perm	Prot			Prot		
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases						8						
Actuated Green, G (s)	10.3	19.9		7.2	16.8	16.8	8.6	38.1		9.1	38.6	
Effective Green, g (s)	10.3	19.9		7.2	16.8	16.8	8.6	38.1		9.1	38.6	
Actuated g/C Ratio	0.11	0.22		0.08	0.19	0.19	0.10	0.42		0.10	0.43	
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)	202	768		141	347	295	169	761		178	734	
v/s Ratio Prot	c0.08	c0.06		0.04	c0.14		0.06	c0.19		c0.07	0.12	
v/s Ratio Perm						0.01						
v/c Ratio	0.73	0.26		0.52	0.73	0.07	0.62	0.45		0.65	0.29	
Uniform Delay, d1	38.6	29.1		39.9	34.6	30.3	39.3	18.6		39.1	16.9	
Progression Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Incremental Delay, d2	12.3	0.2		3.5	7.5	0.1	6.9	1.9		8.3	1.0	
Delay (s)	50.9	29.3		43.4	42.1	30.4	46.2	20.5		47.3	17.9	
Level of Service	D	C		D	D	C	D	C		D	B	
Approach Delay (s)		38.2			39.3			26.5			27.4	
Approach LOS		D			D			C			C	
Intersection Summary												
HCM Average Control Delay			32.8				HCM Level of Service				C	
HCM Volume to Capacity ratio			0.59									
Actuated Cycle Length (s)			90.3				Sum of lost time (s)			20.0		
Intersection Capacity Utilization			57.8%				ICU Level of Service			B		
Analysis Period (min)			15									
c	Critical Lane Group											

SIMTRAFFIC LEVEL OF SERVICE REPORT Including Upstream Delays

Project: ARBPRC **HCM:** 2000
Scenario: CNP **PHF:** 0.99
TOD: PM Peak Hr **Analysis Period:** 15 Minutes **# of Runs:** 10

Intersection: 1: SR 120 WB Ramp & Main Street **Type:** Signalized

Approach	Movement	Demand Volume	Volume Served			Delay/Veh (sec)		
			Avg	%	Std Dev	Avg	LOS	Std Dev
NB	L	126	79	63	4	177.5	F	--
	T	278	141	51	20	101.9	F	--
	Subtotal	404	220	54	--	129.0	F	--
SB	T	230	175	76	10	323.6	F	--
	R	164	127	77	17	235.4	F	--
	Subtotal	394	301	76	--	286.5	F	--
WB	L	73	74	101	6	69.7	E	--
	R	63	62	98	7	33.6	C	--
	Subtotal	136	136	100	--	53.3	D	--
Total		934	657	70	--	185.6	F	--

Intersection: 2: SR 120 EB Ramps & Main Street **Type:** Signalized

Approach	Movement	Demand Volume	Volume Served			Delay/Veh (sec)		
			Avg	%	Std Dev	Avg	LOS	Std Dev
NB	T	237	161	68	11	83.8	F	--
	R	56	40	71	8	13.8	B	--
	Subtotal	293	200	68	--	70.0	E	--
SB	L	66	48	73	4	152.6	F	--
	T	237	200	84	20	59.4	E	--
	Subtotal	303	248	82	--	77.3	E	--
EB	L	167	75	45	13	324.8	F	--
	R	184	81	44	16	269.7	F	--
	Subtotal	351	156	44	--	296.1	F	--
Total		947	605	64	--	131.5	F	--

SIMTRAFFIC LEVEL OF SERVICE REPORT Including Upstream Delays

Project: ARBPRC **HCM:** 2000
Scenario: CNP **PHF:** 0.99
TOD: PM Peak Hr **Analysis Period:** 15 Minutes **# of Runs:** 10

Intersection: 3: Atherton Drive & Main Street **Type:** Signalized

Approach	Movement	Demand Volume	Volume Served			Delay/Veh (sec)		
			Avg	%	Std Dev	Avg	LOS	Std Dev
NB	L	18	9	50	6	429.5	F	--
	T	116	58	50	27	516.4	F	--
	R	56	35	63	9	347.5	F	--
	Subtotal	189	102	54	--	450.6	F	--
SB	L	205	136	66	19	36.5	D	--
	T	177	123	69	14	21.3	C	--
	R	40	29	73	5	6.0	A	--
	Subtotal	422	287	68	--	27.0	C	--
EB	L	25	4	16	3	912.9	F	--
	T	68	64	94	7	72.2	E	--
	R	48	44	92	9	49.1	D	--
	Subtotal	141	112	79	--	92.3	F	--
WB	L	73	65	88	17	188.3	F	--
	T	38	39	103	7	92.3	F	--
	R	152	136	89	22	118.6	F	--
	Subtotal	263	240	91	--	133.1	F	--
Total	1015	741	73	--	129.4	F	--	

Level Of Service Computation Report
2000 HCM 4-Way Stop (Base Volume Alternative)
Default Scenario

Intersection #8: Woodward Ave / Main Street CNP PM

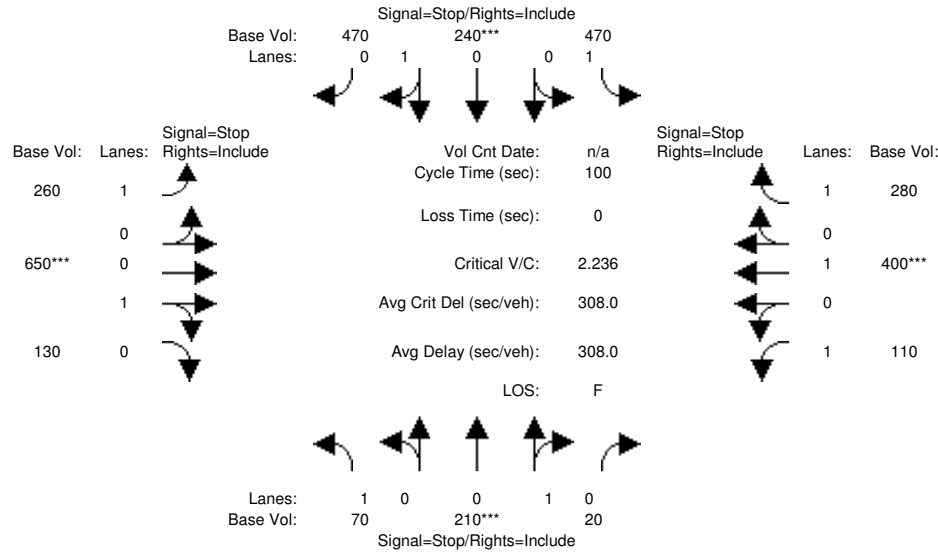


Table with 4 columns: Approach, North Bound, South Bound, East Bound, West Bound. Rows include Movement, Min. Green, and Volume Module data.

Table with 12 columns for lane movements (L, T, R) and 4 columns for approaches (North, South, East, West). Rows include Base Vol, Growth Adj, Initial Bse, User Adj, PHF Adj, PHF Volume, Reduct Vol, Reduced Vol, PCE Adj, MLF Adj, and Final Volume.

Table with 12 columns for lane movements and 4 columns for approaches. Rows include Saturation Flow Module Adjustment, Lanes, and Final Sat.

Table with 12 columns for lane movements and 4 columns for approaches. Rows include Capacity Analysis Module Vol/Sat, Crit Moves, Delay/Veh, Delay Adj, AdjDel/Veh, LOS by Move, ApproachDel, Delay Adj, ApprAdjDel, LOS by Appr, and AllWayAvgQ.

Note: Queue reported is the number of cars per lane.
Peak Hour Volume Signal Warrant Report [Urban]

Intersection #8 Woodward Ave / Main Street CNP PM

Base Volume Alternative: Peak Hour Warrant Met

Table with 4 columns for approaches (North, South, East, West) and 3 rows for Control, Lanes, and Initial Vol.

SIGNAL WARRANT DISCLAIMER
This peak hour signal warrant analysis should be considered solely as an "indicator" of the likelihood of an unsignalized intersection warranting a traffic signal in the future.

The peak hour warrant analysis in this report is not intended to replace a rigorous and complete traffic signal warrant analysis by the responsible jurisdiction.

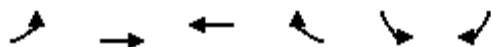
HCM Unsignalized Intersection Capacity Analysis
 5: Industrial Park Dr & VanRyn (Spreckles)

11/17/2009

	→	↘	↙	←	↖	↗	
Movement	EBT	EBR	WBL	WBT	NBL	NBR	
Lane Configurations	↑	↗	↙	↑↑	↖	↗	
Sign Control	Free			Free	Stop		
Grade	0%			0%	0%		
Volume (veh/h)	290	100	600	220	40	480	
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	
Hourly flow rate (vph)	305	105	632	232	42	505	
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			411		1684	305	
vC1, stage 1 conf vol							
vC2, stage 2 conf vol							
vCu, unblocked vol			411		1684	305	
tC, single (s)			4.1		6.8	6.9	
tC, 2 stage (s)							
tF (s)			2.2		3.5	3.3	
p0 queue free %			45		0	27	
cM capacity (veh/h)			1145		38	691	
Direction, Lane #	EB 1	EB 2	WB 1	WB 2	WB 3	NB 1	NB 2
Volume Total	305	105	632	116	116	42	505
Volume Left	0	0	632	0	0	42	0
Volume Right	0	105	0	0	0	0	505
cSH	1700	1700	1145	1700	1700	38	691
Volume to Capacity	0.18	0.06	0.55	0.07	0.07	1.10	0.73
Queue Length 95th (ft)	0	0	88	0	0	106	160
Control Delay (s)	0.0	0.0	11.9	0.0	0.0	340.9	23.0
Lane LOS			B			F	C
Approach Delay (s)	0.0		8.7			47.5	
Approach LOS						E	
Intersection Summary							
Average Delay			18.4				
Intersection Capacity Utilization			61.8%		ICU Level of Service		B
Analysis Period (min)			15				

HCM Unsignalized Intersection Capacity Analysis
 6: Woodward Avenue & VanRyn (Spreckles)

11/17/2009



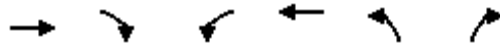
Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations	↶	↷	↷↶		↶	↷
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Volume (veh/h)	150	470	570	30	60	300
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95
Hourly flow rate (vph)	158	495	600	32	63	316
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type					TWLTL	
Median storage veh					1	
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	632				1426	316
vC1, stage 1 conf vol					616	
vC2, stage 2 conf vol					811	
vCu, unblocked vol	632				1426	316
tC, single (s)	4.1				6.8	6.9
tC, 2 stage (s)					5.8	
tF (s)	2.2				3.5	3.3
p0 queue free %	83				72	54
cM capacity (veh/h)	947				227	680

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	SB 1	SB 2
Volume Total	158	495	400	232	63	316
Volume Left	158	0	0	0	63	0
Volume Right	0	0	0	32	0	316
cSH	947	1700	1700	1700	227	680
Volume to Capacity	0.17	0.29	0.24	0.14	0.28	0.46
Queue Length 95th (ft)	15	0	0	0	27	62
Control Delay (s)	9.6	0.0	0.0	0.0	26.8	14.8
Lane LOS	A				D	B
Approach Delay (s)	2.3		0.0		16.8	
Approach LOS					C	

Intersection Summary						
Average Delay			4.7			
Intersection Capacity Utilization		42.0%		ICU Level of Service		A
Analysis Period (min)			15			

HCM Unsignalized Intersection Capacity Analysis
7: Woodward Avenue & Pillsbury Road

11/17/2009



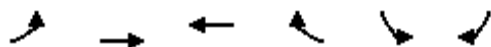
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↻		↻	↻↻	↻↻	
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Volume (veh/h)	390	140	60	540	60	30
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95
Hourly flow rate (vph)	411	147	63	568	63	32
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				TWLTL		
Median storage veh					1	
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume			558		895	484
vC1, stage 1 conf vol					484	
vC2, stage 2 conf vol					411	
vCu, unblocked vol			558		895	484
tC, single (s)			4.1		6.8	6.9
tC, 2 stage (s)					5.8	
tF (s)			2.2		3.5	3.3
p0 queue free %			94		84	94
cM capacity (veh/h)			1009		390	529

Direction, Lane #	EB 1	WB 1	WB 2	WB 3	NB 1
Volume Total	558	63	284	284	95
Volume Left	0	63	0	0	63
Volume Right	147	0	0	0	32
cSH	1700	1009	1700	1700	427
Volume to Capacity	0.33	0.06	0.17	0.17	0.22
Queue Length 95th (ft)	0	5	0	0	21
Control Delay (s)	0.0	8.8	0.0	0.0	15.8
Lane LOS		A			C
Approach Delay (s)	0.0	0.9			15.8
Approach LOS					C

Intersection Summary					
Average Delay			1.6		
Intersection Capacity Utilization		47.5%		ICU Level of Service	A
Analysis Period (min)			15		

HCM Unsignalized Intersection Capacity Analysis
 8: Woodward Avenue & Atherton Drive

11/17/2009



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations	↶	↷	↷		↶	↷
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Volume (veh/h)	10	360	690	140	180	10
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95
Hourly flow rate (vph)	11	379	726	147	189	11
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				TWLTL		
Median storage veh				1		
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	874			1200	800	
vC1, stage 1 conf vol				800		
vC2, stage 2 conf vol				400		
vCu, unblocked vol	874			1200	800	
tC, single (s)	4.1			6.4	6.2	
tC, 2 stage (s)				5.4		
tF (s)	2.2			3.5	3.3	
p0 queue free %	99			42	97	
cM capacity (veh/h)	772			329	385	

Direction, Lane #	EB 1	EB 2	WB 1	SB 1	SB 2
Volume Total	11	379	874	189	11
Volume Left	11	0	0	189	0
Volume Right	0	0	147	0	11
cSH	772	1700	1700	329	385
Volume to Capacity	0.01	0.22	0.51	0.58	0.03
Queue Length 95th (ft)	1	0	0	85	2
Control Delay (s)	9.7	0.0	0.0	29.8	14.6
Lane LOS	A			D	B
Approach Delay (s)	0.3		0.0	29.0	
Approach LOS				D	

Intersection Summary					
Average Delay			4.0		
Intersection Capacity Utilization		61.5%		ICU Level of Service	B
Analysis Period (min)		15			

HCM Unsignalized Intersection Capacity Analysis
 9: Woodward Avenue & Moffat Blvd.

11/17/2009



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Volume (veh/h)	40	500	690	280	310	140
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95
Hourly flow rate (vph)	42	526	726	295	326	147
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	2147	400	474			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	2147	400	474			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	0	19	33			
cM capacity (veh/h)	18	650	1088			

Direction, Lane #	EB 1	NB 1	NB 2	SB 1
Volume Total	568	726	295	474
Volume Left	42	726	0	0
Volume Right	526	0	0	147
cSH	178	1088	1700	1700
Volume to Capacity	3.19	0.67	0.17	0.28
Queue Length 95th (ft)	Err	135	0	0
Control Delay (s)	Err	14.7	0.0	0.0
Lane LOS	F	B		
Approach Delay (s)	Err	10.4		0.0
Approach LOS	F			

Intersection Summary			
Average Delay		2760.0	
Intersection Capacity Utilization		106.2%	ICU Level of Service G
Analysis Period (min)		15	

SIMTRAFFIC LEVEL OF SERVICE REPORT Including Upstream Delays

Project: ARBPRC **HCM:** 2000
Scenario: CNP **PHF:** 0.99
TOD: PM Peak Hr **Analysis Period:** 15 Minutes **# of Runs:** 10

Intersection: 10: Moffat Blvd. & SR 99 SB **Type:** Un-Signalized

Approach	Movement	Demand Volume	Volume Served			Delay/Veh (sec)		
			Avg	%	Std Dev	Avg	LOS	Std Dev
SB	L	48	6	13	3	2119.5	F	--
	R	73	8	11	4	2058.4	F	--
	Subtotal	121	15	12	--	2084.3	F	--
EB	T	205	151	74	6	191.9	F	--
	Subtotal	205	151	74	--	191.9	F	--
WB	T	172	146	85	9	1.0	A	--
	Subtotal	172	146	85	--	1.0	A	--
Total		497	311	63	--	191.3	F	--

HCM Unsignalized Intersection Capacity Analysis
 11: Graves Rd. & Austin Rd.

11/17/2009



Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations	↔		↔		↔	
Sign Control	Stop		Free		Free	
Grade	0%		0%		0%	
Volume (veh/h)	20	30	190	90	50	280
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95
Hourly flow rate (vph)	21	32	200	95	53	295
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	647	247			295	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	647	247			295	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	95	96			96	
cM capacity (veh/h)	417	791			1267	

Direction, Lane #	WB 1	NB 1	SB 1
Volume Total	53	295	347
Volume Left	21	0	53
Volume Right	32	95	0
cSH	582	1700	1267
Volume to Capacity	0.09	0.17	0.04
Queue Length 95th (ft)	7	0	3
Control Delay (s)	11.8	0.0	1.5
Lane LOS	B		A
Approach Delay (s)	11.8	0.0	1.5
Approach LOS	B		

Intersection Summary			
Average Delay		1.7	
Intersection Capacity Utilization	46.3%	ICU Level of Service	A
Analysis Period (min)	15		

SIMTRAFFIC LEVEL OF SERVICE REPORT Including Upstream Delays

Project: ARBPRC **HCM:** 2000
Scenario: CNP **PHF:** 0.99
TOD: PM Peak Hr **Analysis Period:** 15 Minutes **# of Runs:** 10

Intersection: 12: SR 99 NB & Austin Rd. **Type:** Un-Signalized

Approach	Movement	Demand Volume	Volume Served			Delay/Veh (sec)		
			Avg	%	Std Dev	Avg	LOS	Std Dev
NB	L	35	27	77	5	10.7	B	--
	T	51	36	71	5	11.4	B	--
	Subtotal	86	64	74	--	11.1	B	--
SB	T	61	58	95	8	27.6	D	--
	R	15	15	100	4	24.1	C	--
	Subtotal	76	73	96	--	26.9	D	--
WB	L	139	120	86	10	122.1	F	--
	R	20	17	85	4	111.1	F	--
	Subtotal	159	137	86	--	120.8	F	--
Total	321	274	85	--	70.1	F	--	























Intersection: 13: Moffat Blvd. & Austin Rd. **Type:** Un-Signalized

Approach	Movement	Demand Volume	Volume Served			Delay/Veh (sec)		
			Avg	%	Std Dev	Avg	LOS	Std Dev
NB	L	18	16	89	6	15.5	C	--
	T	20	21	105	3	17.0	C	--
	R	25	28	112	6	6.9	A	--
	Subtotal	63	64	102	--	12.3	B	--
SB	L	18	15	83	3	108.8	F	--
	T	30	27	90	6	105.4	F	--
	R	152	126	83	7	99.7	F	--
	Subtotal	199	168	84	--	101.4	F	--
EB	L	63	40	63	6	34.5	D	--
	T	146	92	63	7	38.0	E	--
	R	43	26	60	5	33.2	D	--
	Subtotal	253	158	62	--	36.3	E	--
WB	L	3	3	100	1	8.4	A	--
	T	3	3	100	2	11.9	B	--
	R	3	2	67	1	4.7	A	--
	Subtotal	8	8	100	--	8.8	A	--
Total	523	398	76	--	59.4	F	--	

HCM Signalized Intersection Capacity Analysis























14: Yosemite Avenue & Austin Rd.

11/17/2009

												
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	1.00	0.95		1.00	0.95		1.00	1.00		1.00	1.00	
Frt	1.00	0.98		1.00	0.99		1.00	0.95		1.00	0.94	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770	3481		1770	3495		1770	1770		1770	1759	
Flt Permitted	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (perm)	1770	3481		1770	3495		1770	1770		1770	1759	
Volume (vph)	60	1370	170	70	560	50	90	80	40	30	170	100
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	63	1442	179	74	589	53	95	84	42	32	179	105
RTOR Reduction (vph)	0	10	0	0	7	0	0	13	0	0	17	0
Lane Group Flow (vph)	63	1611	0	74	635	0	95	113	0	32	267	0
Turn Type	Prot			Prot			Prot			Prot		
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases												
Actuated Green, G (s)	6.3	52.0		4.5	50.2		6.3	22.8		3.2	19.7	
Effective Green, g (s)	6.3	52.0		4.5	50.2		6.3	22.8		3.2	19.7	
Actuated g/C Ratio	0.06	0.53		0.05	0.51		0.06	0.23		0.03	0.20	
Clearance Time (s)	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	
Lane Grp Cap (vph)	113	1838		81	1781		113	410		58	352	
v/s Ratio Prot	0.04	c0.46		c0.04	0.18		c0.05	c0.06		0.02	c0.15	
v/s Ratio Perm												
v/c Ratio	0.56	0.88		0.91	0.36		0.84	0.28		0.55	0.76	
Uniform Delay, d1	44.7	20.4		46.8	14.5		45.6	31.1		46.9	37.2	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	5.8	5.0		71.1	0.1		40.1	1.7		10.9	14.2	
Delay (s)	50.6	25.5		117.9	14.6		85.7	32.7		57.8	51.4	
Level of Service	D	C		F	B		F	C		E	D	
Approach Delay (s)		26.4			25.3			55.5			52.1	
Approach LOS		C			C			E			D	
Intersection Summary												
HCM Average Control Delay			31.1			HCM Level of Service					C	
HCM Volume to Capacity ratio			0.83									
Actuated Cycle Length (s)			98.5			Sum of lost time (s)			16.0			
Intersection Capacity Utilization			80.5%			ICU Level of Service					D	
Analysis Period (min)			15									
c Critical Lane Group												

HCM Signalized Intersection Capacity Analysis
 15: Yosemite Avenue & Jack Tone Rd

11/17/2009

												
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	1.00	0.95		1.00	0.95		1.00	1.00		1.00	1.00	
Frt	1.00	0.99		1.00	0.99		1.00	0.97		1.00	0.98	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770	3515		1770	3509		1770	1814		1770	1820	
Flt Permitted	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (perm)	1770	3515		1770	3509		1770	1814		1770	1820	
Volume (vph)	100	1240	60	40	500	30	50	190	40	100	220	40
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	105	1305	63	42	526	32	53	200	42	105	232	42
RTOR Reduction (vph)	0	5	0	0	6	0	0	10	0	0	8	0
Lane Group Flow (vph)	105	1363	0	42	552	0	53	232	0	105	266	0
Turn Type	Prot			Prot			Prot			Prot		
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases												
Actuated Green, G (s)	6.6	28.7		3.0	25.1		3.0	14.0		4.3	15.3	
Effective Green, g (s)	6.6	28.7		3.0	25.1		3.0	14.0		4.3	15.3	
Actuated g/C Ratio	0.10	0.43		0.05	0.38		0.05	0.21		0.07	0.23	
Clearance Time (s)	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	
Lane Grp Cap (vph)	177	1528		80	1334		80	385		115	422	
v/s Ratio Prot	c0.06	c0.39		0.02	0.16		0.03	0.13		c0.06	c0.15	
v/s Ratio Perm												
v/c Ratio	0.59	0.89		0.53	0.41		0.66	0.60		0.91	0.63	
Uniform Delay, d1	28.4	17.2		30.8	15.0		31.0	23.5		30.7	22.8	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	5.2	7.0		6.1	0.2		18.7	2.6		57.2	2.9	
Delay (s)	33.7	24.2		36.9	15.3		49.7	26.1		87.8	25.7	
Level of Service	C	C		D	B		D	C		F	C	
Approach Delay (s)		24.9			16.8			30.4			42.9	
Approach LOS		C			B			C			D	
Intersection Summary												
HCM Average Control Delay			26.2			HCM Level of Service					C	
HCM Volume to Capacity ratio			0.77									
Actuated Cycle Length (s)			66.0			Sum of lost time (s)		12.0				
Intersection Capacity Utilization			70.8%			ICU Level of Service					C	
Analysis Period (min)			15									
c Critical Lane Group												

HCM Unsignalized Intersection Capacity Analysis
 16: Graves Rd. & Jack Tone Rd

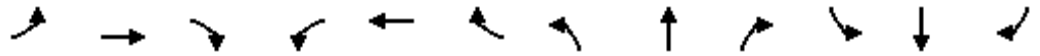
11/17/2009



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations	↙			↑	↓	↘
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Volume (veh/h)	40	180	30	240	300	10
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95
Hourly flow rate (vph)	42	189	32	253	316	11
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	637	321	326			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	637	321	326			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	90	74	97			
cM capacity (veh/h)	430	720	1233			
Direction, Lane #	EB 1	NB 1	SB 1			
Volume Total	232	284	326			
Volume Left	42	32	0			
Volume Right	189	0	11			
cSH	641	1233	1700			
Volume to Capacity	0.36	0.03	0.19			
Queue Length 95th (ft)	41	2	0			
Control Delay (s)	13.8	1.1	0.0			
Lane LOS	B	A				
Approach Delay (s)	13.8	1.1	0.0			
Approach LOS	B					
Intersection Summary						
Average Delay			4.2			
Intersection Capacity Utilization			54.0%	ICU Level of Service	A	
Analysis Period (min)			15			

HCM Unsignalized Intersection Capacity Analysis
 17: Sedan Ave & Main Street

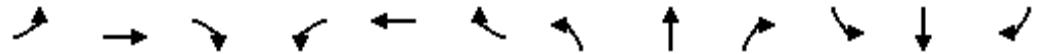
11/17/2009



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Volume (veh/h)	10	10	10	10	10	10	10	170	10	10	260	10
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Hourly flow rate (vph)	11	11	11	11	11	11	11	179	11	11	274	11
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type	None			None								
Median storage veh												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	521	511	279	521	511	184	284			189		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	521	511	279	521	511	184	284			189		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	98	98	99	98	98	99	99			99		
cM capacity (veh/h)	447	459	760	446	459	858	1278			1384		
Direction, Lane #	EB 1	WB 1	NB 1	SB 1								
Volume Total	32	32	200	295								
Volume Left	11	11	11	11								
Volume Right	11	11	11	11								
cSH	523	537	1278	1384								
Volume to Capacity	0.06	0.06	0.01	0.01								
Queue Length 95th (ft)	5	5	1	1								
Control Delay (s)	12.3	12.1	0.5	0.3								
Lane LOS	B	B	A	A								
Approach Delay (s)	12.3	12.1	0.5	0.3								
Approach LOS	B	B										
Intersection Summary												
Average Delay			1.7									
Intersection Capacity Utilization			27.5%	ICU Level of Service			A					
Analysis Period (min)			15									

HCM Unsignalized Intersection Capacity Analysis
 18: Sedan Ave & Austin Rd.

11/17/2009



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Volume (veh/h)	30	10	50	10	10	10	10	120	10	10	230	20
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Hourly flow rate (vph)	32	11	53	11	11	11	11	126	11	11	242	21
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	442	432	253	484	437	132	263			137		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	442	432	253	484	437	132	263			137		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	94	98	93	98	98	99	99			99		
cM capacity (veh/h)	505	509	786	447	505	918	1301			1447		
Direction, Lane #	EB 1	WB 1	NB 1	SB 1								
Volume Total	95	32	147	274								
Volume Left	32	11	11	11								
Volume Right	53	11	11	21								
cSH	631	566	1301	1447								
Volume to Capacity	0.15	0.06	0.01	0.01								
Queue Length 95th (ft)	13	4	1	1								
Control Delay (s)	11.7	11.7	0.6	0.4								
Lane LOS	B	B	A	A								
Approach Delay (s)	11.7	11.7	0.6	0.4								
Approach LOS	B	B										
Intersection Summary												
Average Delay			3.0									
Intersection Capacity Utilization			29.6%		ICU Level of Service					A		
Analysis Period (min)			15									

HCM Unsignalized Intersection Capacity Analysis
 19: W. River Rd & Jack Tone Rd

11/17/2009



Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations	↶	↷	↷		↶	↷
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Volume (veh/h)	90	30	230	120	120	390
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95
Hourly flow rate (vph)	95	32	242	126	126	411
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	968	305			368	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	968	305			368	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	62	96			89	
cM capacity (veh/h)	252	735			1190	

Direction, Lane #	WB 1	WB 2	NB 1	SB 1	SB 2
Volume Total	95	32	368	126	411
Volume Left	95	0	0	126	0
Volume Right	0	32	126	0	0
cSH	252	735	1700	1190	1700
Volume to Capacity	0.38	0.04	0.22	0.11	0.24
Queue Length 95th (ft)	42	3	0	9	0
Control Delay (s)	27.7	10.1	0.0	8.4	0.0
Lane LOS	D	B		A	
Approach Delay (s)	23.3		0.0	2.0	
Approach LOS	C				

Intersection Summary					
Average Delay			3.9		
Intersection Capacity Utilization			41.1%	ICU Level of Service	A
Analysis Period (min)			15		

SIMTRAFFIC LEVEL OF SERVICE REPORT Including Upstream Delays

Project: ARBPRC **HCM:** 2000
Scenario: CNP **PHF:** 0.99
TOD: PM Peak Hr **Analysis Period:** 15 Minutes **# of Runs:** 10

Intersection: 20: Santos Ave & Jack Tone Rd **Type:** Signalized

Approach	Movement	Demand Volume	Volume Served			Delay/Veh (sec)		
			Avg	%	Std Dev	Avg	LOS	Std Dev
NB	L	25	25	100	4	19.1	B	--
	T	61	61	100	5	20.9	C	--
	R	35	36	103	6	5.1	A	--
	Subtotal	121	122	101	--	15.9	B	--
SB	L	15	14	93	5	37.9	D	--
	T	98	96	98	5	36.7	D	--
	R	8	9	100	3	29.3	C	--
	Subtotal	121	119	98	--	36.3	D	--
EB	L	10	9	90	3	28.4	C	--
	T	5	5	100	2	26.4	C	--
	R	25	27	108	4	3.9	A	--
	Subtotal	40	41	103	--	12.2	B	--
WB	L	25	21	84	4	25.8	C	--
	T	15	15	100	4	23.1	C	--
	R	18	16	89	3	3.4	A	--
	Subtotal	58	52	90	--	18.1	B	--
Total	341	333	98	--	23.1	C	--	

Intersection: 22: Colony Rd / SR 99 On-Ramps & Jack Tone Rd **Type:** Signalized

Approach	Movement	Demand Volume	Volume Served			Delay/Veh (sec)		
			Avg	%	Std Dev	Avg	LOS	Std Dev
NB	T	71	68	96	8	11.7	B	--
	R	131	133	102	12	11.7	B	--
	Subtotal	202	201	100	--	11.7	B	--
SB	L	15	15	100	4	32.0	C	--
	T	35	36	103	8	4.6	A	--
	R	71	65	92	8	6.3	A	--
	R2	28	30	107	5	1.5	A	--
	Subtotal	149	145	97	--	7.5	A	--
WB	L	38	33	87	7	30.6	C	--
	R	51	52	102	6	3.8	A	--
	L2	33	30	91	4	25.3	C	--
	Subtotal	121	116	96	--	17.2	B	--
Total	472	462	98	--	11.7	B	--	

SIMTRAFFIC LEVEL OF SERVICE REPORT Including Upstream Delays

Project: ARBPRC **HCM:** 2000
Scenario: CNP **PHF:** 0.99
TOD: PM Peak Hr **Analysis Period:** 15 Minutes **# of Runs:** 10

Intersection: 23: Colony Rd / SR 99 On-Ramps & Hoff Rd/SR 99 **Type:** Un-Signalized

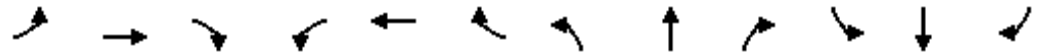
Approach	Movement	Demand Volume	Volume Served			Delay/Veh (sec)		
			Avg	%	Std Dev	Avg	LOS	Std Dev
NB	L	68	65	96	8	13.8	B	--
	T	15	17	113	3	10.4	B	--
	R	13	13	100	4	6.0	A	--
	Subtotal	96	95	99	--	12.1	B	--
SB	L	10	13	130	4	10.3	B	--
	T	8	8	100	2	8.2	A	--
	R	5	5	100	2	3.6	A	--
	Subtotal	23	26	113	--	8.4	A	--
EB	L	3	4	133	2	5.7	A	--
	T	83	85	102	7	9.4	A	--
	R	61	60	98	8	4.0	A	--
	Subtotal	146	149	102	--	7.2	A	--
WB	L	20	21	105	4	11.5	B	--
	T	48	47	98	9	8.4	A	--
	R	10	8	80	3	3.9	A	--
	Subtotal	78	76	97	--	8.8	A	--
Total	343	345	101	--	9.0	A	--	

Intersection: 24: SR 99 SB & Jack Tone Rd **Type:** Signalized

Approach	Movement	Demand Volume	Volume Served			Delay/Veh (sec)		
			Avg	%	Std Dev	Avg	LOS	Std Dev
NB	T	126	126	100	12	9.6	A	--
	R	30	31	103	5	5.3	A	--
	Subtotal	157	157	100	--	8.7	A	--
SB	T	68	67	99	8	6.8	A	--
	Subtotal	68	67	99	--	6.8	A	--
EB	L	76	75	99	10	21.3	C	--
	R	96	98	102	11	12.4	B	--
	Subtotal	172	173	101	--	16.2	B	--
Total	396	397	100	--	11.7	B	--	

HCM Unsignalized Intersection Capacity Analysis
 25: Ripon Rd & Austin Rd.

11/17/2009



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Sign Control		Stop			Stop			Stop			Stop	
Volume (vph)	20	380	10	20	80	70	10	30	40	240	20	20
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Hourly flow rate (vph)	21	400	11	21	84	74	11	32	42	253	21	21























Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total (vph)	432	179	84	295
Volume Left (vph)	21	21	11	253
Volume Right (vph)	11	74	42	21
Hadj (s)	0.03	-0.19	-0.24	0.16
Departure Headway (s)	5.4	5.6	6.0	5.9
Degree Utilization, x	0.65	0.28	0.14	0.48
Capacity (veh/h)	638	579	502	565
Control Delay (s)	17.8	10.8	10.0	14.4
Approach Delay (s)	17.8	10.8	10.0	14.4
Approach LOS	C	B	A	B

Intersection Summary			
Delay		14.8	
HCM Level of Service		B	
Intersection Capacity Utilization	53.3%	ICU Level of Service	A
Analysis Period (min)		15	

HCM Signalized Intersection Capacity Analysis

26: Ripon Rd & Jack Tone Rd

11/17/2009

												
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	0.95		1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Frt	1.00	0.98		1.00	1.00	0.85	1.00	0.96		1.00	0.93	
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770	3485		1770	1863	1583	1770	1780		1770	1737	
Flt Permitted	0.95	1.00		0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (perm)	1770	3485		1770	1863	1583	1770	1780		1770	1737	
Volume (vph)	130	350	40	60	210	140	20	190	80	150	160	130
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	137	368	42	63	221	147	21	200	84	158	168	137
RTOR Reduction (vph)	0	9	0	0	0	121	0	11	0	0	21	0
Lane Group Flow (vph)	137	401	0	63	221	26	21	273	0	158	284	0
Turn Type	Prot			Prot		Perm	Prot			Prot		
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases							8					
Actuated Green, G (s)	10.0	18.6		6.9	15.5	15.5	2.7	36.4		10.8	44.5	
Effective Green, g (s)	10.0	18.6		6.9	15.5	15.5	2.7	36.4		10.8	44.5	
Actuated g/C Ratio	0.11	0.21		0.08	0.17	0.17	0.03	0.41		0.12	0.50	
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)	200	731		138	326	277	54	730		216	871	
v/s Ratio Prot	c0.08	c0.12		0.04	c0.12		0.01	c0.15		c0.09	0.16	
v/s Ratio Perm							0.02					
v/c Ratio	0.69	0.55		0.46	0.68	0.09	0.39	0.37		0.73	0.33	
Uniform Delay, d1	37.8	31.3		39.1	34.3	30.7	42.2	18.2		37.6	13.2	
Progression Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Incremental Delay, d2	9.3	0.8		2.4	5.5	0.1	4.6	1.5		12.0	1.0	
Delay (s)	47.2	32.2		41.5	39.8	30.8	46.8	19.7		49.6	14.2	
Level of Service	D			D		C	D		B	D		B
Approach Delay (s)	35.9			37.0			21.5			26.2		
Approach LOS	D			D			C			C		
Intersection Summary												
HCM Average Control Delay	31.1		HCM Level of Service				C					
HCM Volume to Capacity ratio	0.56											
Actuated Cycle Length (s)	88.7		Sum of lost time (s)				20.0					
Intersection Capacity Utilization	54.8%		ICU Level of Service				A					
Analysis Period (min)	15											
c Critical Lane Group												

SIMTRAFFIC LEVEL OF SERVICE REPORT Including Upstream Delays

Project: ARBPRC **HCM:** 2000
Scenario: CNP - Phase 1 Improvements **PHF:** 0.99
TOD: AM Peak Hr. **Analysis Period:** 15 Minutes **# of Runs:** 10

Intersection: 10: SR 99 SB & Moffat Blvd. **Type:** Signalized

Approach	Movement	Demand Volume	Volume Served			Delay/Veh (sec)		
			Avg	%	Std Dev	Avg	LOS	Std Dev
NB	T	177	177	100	8	15.7	B	--
	Subtotal	177	177	100	--	15.7	B	--
SB	T	174	180	103	11	40.4	D	--
	Subtotal	174	180	103	--	40.4	D	--
WB	L	15	14	93	4	59.6	E	--
	R	13	14	108	5	8.0	A	--
	Subtotal	28	28	100	--	33.0	C	--
Total		379	385	102	--	28.5	C	--

Intersection: 12: SR 99 NB & Austin Road **Type:** Signalized

Approach	Movement	Demand Volume	Volume Served			Delay/Veh (sec)		
			Avg	%	Std Dev	Avg	LOS	Std Dev
NB	L	96	95	99	10	36.2	D	--
	T	30	31	100	6	33.6	C	--
	Subtotal	126	126	100	--	35.5	D	--
SB	T	45	48	107	6	38.0	D	--
	R	25	22	88	6	10.7	B	--
	Subtotal	71	69	97	--	29.5	C	--
WB	L	114	112	98	7	42.0	D	--
	R	13	11	77	3	33.3	C	--
	Subtotal	126	122	97	--	41.2	D	--
Total		323	317	98	--	36.4	D	--

SIMTRAFFIC LEVEL OF SERVICE REPORT Including Upstream Delays

Project: ARBPRC **HCM:** 2000
Scenario: CNP - Phase 1 Improvements **PHF:** 0.99
TOD: AM Peak Hr. **Analysis Period:** 15 Minutes **# of Runs:** 10

Intersection: 13: Moffat Blvd. & Austin Road **Type:** Signalized

Approach	Movement	Demand Volume	Volume Served			Delay/Veh (sec)		
			Avg	%	Std Dev	Avg	LOS	Std Dev
NB	L	40	39	98	5	39.7	D	--
	T	25	24	96	3	41.4	D	--
	R	18	17	94	3	28.4	C	--
	Subtotal	83	80	96	--	37.8	D	--
SB	L	13	12	92	5	31.4	C	--
	T	13	14	108	4	43.5	D	--
	R	134	134	100	7	18.3	B	--
	Subtotal	159	159	100	--	21.5	C	--
EB	L	98	97	99	13	42.4	D	--
	T	78	81	104	9	41.5	D	--
	R	13	15	115	4	1.2	A	--
	Subtotal	189	192	102	--	38.8	D	--
WB	L	3	3	100	2	50.2	D	--
	T	3	2	67	1	51.0	D	--
	R	3	2	67	1	13.2	B	--
	Subtotal	8	7	88	--	39.4	D	--
Total		439	439	100	--	32.4	C	--

SIMTRAFFIC LEVEL OF SERVICE REPORT Including Upstream Delays

Project: ARBPRC **HCM:** 2000
Scenario: CNP - Phase 1 Improvements **PHF:** 0.99
TOD: PM Peak Hou **Analysis Period:** 15 Minutes **# of Runs:** 10

Intersection: 10: SR 99 SB & Moffat Blvd. **Type:** Signalized

Approach	Movement	Demand Volume	Volume Served			Delay/Veh (sec)		
			Avg	%	Std Dev	Avg	LOS	Std Dev
NB	T	172	168	98	10	20.1	C	--
	Subtotal	172	168	98	--	20.1	C	--
SB	T	205	174	85	22	354.9	F	--
	Subtotal	205	174	85	--	354.9	F	--
WB	L	48	49	102	4	34.4	C	--
	R	73	74	101	6	18.5	B	--
	Subtotal	121	123	102	--	24.9	C	--
Total		497	465	94	--	146.7	F	--

Intersection: 12: SR 99 NB & Austin Road **Type:** Signalized

Approach	Movement	Demand Volume	Volume Served			Delay/Veh (sec)		
			Avg	%	Std Dev	Avg	LOS	Std Dev
NB	L	35	33	94	4	34.0	C	--
	T	51	44	86	8	34.7	C	--
	Subtotal	86	77	90	--	34.4	C	--
SB	T	61	58	95	10	81.0	F	--
	R	15	14	93	4	49.0	D	--
	Subtotal	76	72	95	--	74.9	E	--
WB	L	139	142	102	9	50.1	D	--
	R	20	21	105	5	40.7	D	--
	Subtotal	159	162	102	--	48.9	D	--
Total		321	311	97	--	51.3	D	--

SIMTRAFFIC LEVEL OF SERVICE REPORT Including Upstream Delays

Project: ARBPRC **HCM:** 2000
Scenario: CNP - Phase 1 Improvements **PHF:** 0.99
TOD: PM Peak Hou **Analysis Period:** 15 Minutes **# of Runs:** 10

Intersection: 13: Moffat Blvd. & Austin Road **Type:** Signalized

Approach	Movement	Demand Volume	Volume Served			Delay/Veh (sec)		
			Avg	%	Std Dev	Avg	LOS	Std Dev
NB	L	18	18	100	6	46.8	D	--
	T	20	20	100	5	47.8	D	--
	R	25	22	88	5	27.5	C	--
	Subtotal	63	60	95	--	40.0	D	--
SB	L	18	18	100	5	39.5	D	--
	T	30	30	100	6	52.2	D	--
	R	152	149	98	10	32.4	C	--
	Subtotal	199	197	99	--	36.0	D	--
EB	L	63	54	86	9	28.0	C	--
	T	146	128	88	14	38.2	D	--
	R	43	48	112	6	4.8	A	--
	Subtotal	253	230	91	--	28.9	C	--
WB	L	3	3	100	2	64.4	E	--
	T	3	3	100	1	62.7	E	--
	R	3	3	100	2	9.6	A	--
	Subtotal	8	8	100	--	44.9	D	--
Total	523	495	95	--	33.3	C	--	

Technical Appendix H
Cumulative Plus Project Conditions
Intersection LOS Reports

SIMTRAFFIC LEVEL OF SERVICE REPORT Including Upstream Delays

Project: ARBPRC **HCM:** 2000
Scenario: C+P **PHF:** 0.99
TOD: AM Peak Hr **Analysis Period:** 15 Minutes **# of Runs:** 10

Intersection: 1: SR 120 WB Ramp & Main Street **Type:** Signalized

Approach	Movement	Demand Volume	Volume Served			Delay/Veh (sec)		
			Avg	%	Std Dev	Avg	LOS	Std Dev
NB	L	182	138	76	7	95.6	F	--
	T	199	139	70	12	69.4	E	--
	Subtotal	381	277	73	--	82.5	F	--
SB	T	98	100	102	13	25.8	C	--
	R	126	125	99	10	20.7	C	--
	Subtotal	225	224	100	--	23.0	C	--
WB	L	48	45	92	7	45.9	D	--
	R	81	82	101	9	13.3	B	--
	Subtotal	129	127	98	--	24.8	C	--
Total		735	628	85	--	49.5	D	--

Intersection: 2: SR 120 EB Ramps & Main Street **Type:** Signalized

Approach	Movement	Demand Volume	Volume Served			Delay/Veh (sec)		
			Avg	%	Std Dev	Avg	LOS	Std Dev
NB	T	273	215	79	14	49.6	D	--
	R	109	88	81	11	9.0	A	--
	Subtotal	381	303	80	--	37.9	D	--
SB	L	38	35	92	2	140.4	F	--
	T	109	104	95	8	17.2	B	--
	Subtotal	146	139	95	--	48.4	D	--
EB	L	109	73	67	13	223.2	F	--
	R	189	139	74	20	167.7	F	--
	Subtotal	298	212	71	--	186.9	F	--
Total		826	654	79	--	88.5	F	--

SIMTRAFFIC LEVEL OF SERVICE REPORT Including Upstream Delays

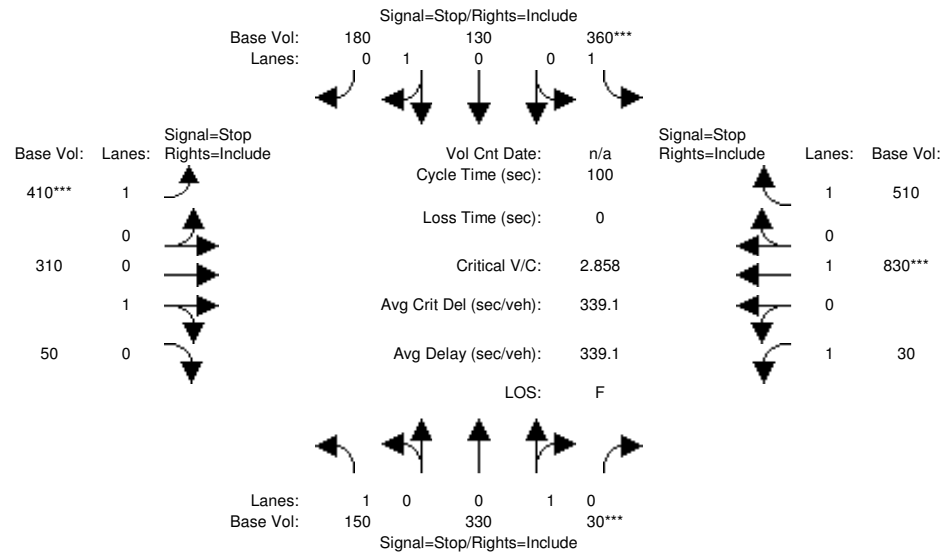
Project: ARBPRC **HCM:** 2000
Scenario: C+P **PHF:** 0.99
TOD: AM Peak Hr **Analysis Period:** 15 Minutes **# of Runs:** 10

Intersection: 3: Atherton Drive & Main Street **Type:** Signalized

Approach	Movement	Demand Volume	Volume Served			Delay/Veh (sec)		
			Avg	%	Std Dev	Avg	LOS	Std Dev
NB	L	33	25	76	6	224.1	F	--
	T	220	178	81	18	226.8	F	--
	R	63	51	79	9	160.0	F	--
	Subtotal	316	253	80	--	213.2	F	--
SB	L	144	120	83	11	41.8	D	--
	T	119	100	84	5	10.8	B	--
	R	35	29	80	7	5.0	A	--
	Subtotal	298	248	83	--	25.1	C	--
EB	L	18	13	72	5	374.8	F	--
	T	20	20	100	5	51.3	D	--
	R	13	13	100	4	11.5	B	--
	Subtotal	51	46	90	--	130.9	F	--
WB	L	38	37	97	4	145.7	F	--
	T	43	42	98	11	81.5	F	--
	R	144	108	75	20	193.5	F	--
	Subtotal	225	187	83	--	158.9	F	--
Total		889	734	83	--	130.6	F	--

Level Of Service Computation Report
 2000 HCM 4-Way Stop (Base Volume Alternative)
 Default Scenario

Intersection #9: Woodward Ave / Main Street C+P AM



Approach:	North Bound			South Bound			East Bound			West Bound		
Movement:	L	T	R	L	T	R	L	T	R	L	T	R
Min. Green:	0	0	0	0	0	0	0	0	0	0	0	0

Volume Module:

Base Vol:	150	330	30	360	130	180	410	310	50	30	830	510
Growth Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Initial Bse:	150	330	30	360	130	180	410	310	50	30	830	510
User Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PHF Adj:	0.92	0.92	0.92	0.95	0.95	0.95	0.92	0.92	0.92	0.95	0.95	0.95
PHF Volume:	163	359	33	379	137	189	446	337	54	32	874	537
Reduct Vol:	0	0	0	0	0	0	0	0	0	0	0	0
Reduced Vol:	163	359	33	379	137	189	446	337	54	32	874	537
PCE Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
MLF Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Final Volume:	163	359	33	379	137	189	446	337	54	32	874	537

Saturation Flow Module:

Adjustment:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Lanes:	1.00	0.92	0.08	1.00	0.42	0.58	1.00	0.86	0.14	1.00	1.00	1.00
Final Sat.:	313	303	28	330	151	209	332	303	49	291	306	325

Capacity Analysis Module:

Vol/Sat:	0.52	1.18	1.18	1.15	0.91	0.91	1.34	1.11	1.11	0.11	2.86	1.65
Crit Moves:	****	****	****	****	****	****	****	****	****	****	****	****
Delay/Veh:	25.8	141	140.9	129.2	59.0	59.0	201.7	114	114.2	16.5	868	332.9
Delay Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
AdjDel/Veh:	25.8	141	140.9	129.2	59.0	59.0	201.7	114	114.2	16.5	868	332.9
LOS by Move:	D	F	F	F	F	F	F	F	F	C	F	F
ApproachDel:	107.0			96.7			160.8			650.3		
Delay Adj:	1.00			1.00			1.00			1.00		
ApprAdjDel:	107.0			96.7			160.8			650.3		
LOS by Appr:	F			F			F			F		
AllWayAvgQ:	1.0	11.7	11.7	10.6	4.6	4.6	17.4	9.9	9.9	0.1	72.5	28.8

Note: Queue reported is the number of cars per lane.
 Peak Hour Volume Signal Warrant Report [Urban]

 Intersection #9 Woodward Ave / Main Street C+P AM

 Base Volume Alternative: Peak Hour Warrant Met

Approach:	North Bound			South Bound			East Bound			West Bound		
Movement:	L	T	R	L	T	R	L	T	R	L	T	R
Control:	Stop Sign			Stop Sign			Stop Sign			Stop Sign		
Lanes:	1	0	0	1	0	0	1	0	0	1	0	1
Initial Vol:	150	330	30	360	130	180	410	310	50	30	830	510
Major Street Volume:	2140											
Minor Approach Volume:	670											
Minor Approach Volume Threshold:	47 [less than minimum of 150]											

SIGNAL WARRANT DISCLAIMER
 This peak hour signal warrant analysis should be considered solely as an "indicator" of the likelihood of an unsignalized intersection warranting a traffic signal in the future. Intersections that exceed this warrant are probably more likely to meet one or more of the other volume based signal warrant (such as the 4-hour or 8-hour warrants).

The peak hour warrant analysis in this report is not intended to replace a rigorous and complete traffic signal warrant analysis by the responsible jurisdiction. Consideration of the other signal warrants, which is beyond the scope of this software, may yield different results.

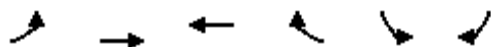
HCM Unsignalized Intersection Capacity Analysis
 5: Industrial Park Dr & VanRyn (Spreckles)

11/17/2009

	→	↘	↙	←	↖	↗	
Movement	EBT	EBR	WBL	WBT	NBL	NBR	
Lane Configurations	↑	↗	↙	↑↑	↖	↗	
Sign Control	Free			Free	Stop		
Grade	0%			0%	0%		
Volume (veh/h)	140	10	240	120	60	630	
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	
Hourly flow rate (vph)	147	11	253	126	63	663	
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			158		716	147	
vC1, stage 1 conf vol							
vC2, stage 2 conf vol							
vCu, unblocked vol			158		716	147	
tC, single (s)			4.2		6.9	7.0	
tC, 2 stage (s)							
tF (s)			2.2		3.5	3.3	
p0 queue free %			82		78	23	
cM capacity (veh/h)			1398		294	863	
Direction, Lane #	EB 1	EB 2	WB 1	WB 2	WB 3	NB 1	NB 2
Volume Total	147	11	253	63	63	63	663
Volume Left	0	0	253	0	0	63	0
Volume Right	0	11	0	0	0	0	663
cSH	1700	1700	1398	1700	1700	294	863
Volume to Capacity	0.09	0.01	0.18	0.04	0.04	0.22	0.77
Queue Length 95th (ft)	0	0	16	0	0	20	190
Control Delay (s)	0.0	0.0	8.1	0.0	0.0	20.6	21.5
Lane LOS			A			C	C
Approach Delay (s)	0.0		5.4			21.4	
Approach LOS						C	
Intersection Summary							
Average Delay			14.0				
Intersection Capacity Utilization			53.0%		ICU Level of Service		A
Analysis Period (min)			15				

HCM Unsignalized Intersection Capacity Analysis
6: Woodward Avenue & VanRyn (Spreckles)

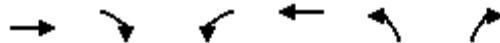
11/17/2009



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations	↶	↷	↷↶		↶	↷
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Volume (veh/h)	150	840	840	40	30	90
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95
Hourly flow rate (vph)	158	884	884	42	32	95
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				TWLTL		
Median storage (veh)				0		
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	926				2105	463
vC1, stage 1 conf vol					905	
vC2, stage 2 conf vol					1200	
vCu, unblocked vol	926				2105	463
tC, single (s)	4.1				6.8	6.9
tC, 2 stage (s)					5.8	
tF (s)	2.2				3.5	3.3
p0 queue free %	78				67	83
cM capacity (veh/h)	734				96	546
Direction, Lane #	EB 1	EB 2	WB 1	WB 2	SB 1	SB 2
Volume Total	158	884	589	337	32	95
Volume Left	158	0	0	0	32	0
Volume Right	0	0	0	42	0	95
cSH	734	1700	1700	1700	96	546
Volume to Capacity	0.22	0.52	0.35	0.20	0.33	0.17
Queue Length 95th (ft)	20	0	0	0	32	16
Control Delay (s)	11.2	0.0	0.0	0.0	59.8	13.0
Lane LOS	B				F	B
Approach Delay (s)	1.7		0.0		24.7	
Approach LOS					C	
Intersection Summary						
Average Delay			2.3			
Intersection Capacity Utilization			54.2%		ICU Level of Service	A
Analysis Period (min)			15			

HCM Unsignalized Intersection Capacity Analysis
7: Woodward Avenue & Pillsbury Road

11/17/2009

























Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↻		↻	↻↻	↻↻	
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Volume (veh/h)	830	40	20	780	100	70
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95
Hourly flow rate (vph)	874	42	21	821	105	74
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				TWLTL		
Median storage veh					1	
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume			916		1347	895
vC1, stage 1 conf vol					895	
vC2, stage 2 conf vol					453	
vCu, unblocked vol			916		1347	895
tC, single (s)			4.1		6.8	6.9
tC, 2 stage (s)					5.8	
tF (s)			2.2		3.5	3.3
p0 queue free %			97		60	74
cM capacity (veh/h)			740		262	284

Direction, Lane #	EB 1	WB 1	WB 2	WB 3	NB 1
Volume Total	916	21	411	411	179
Volume Left	0	21	0	0	105
Volume Right	42	0	0	0	74
cSH	1700	740	1700	1700	270
Volume to Capacity	0.54	0.03	0.24	0.24	0.66
Queue Length 95th (ft)	0	2	0	0	107
Control Delay (s)	0.0	10.0	0.0	0.0	41.0
Lane LOS		B			E
Approach Delay (s)	0.0	0.3			41.0
Approach LOS					E

Intersection Summary					
Average Delay			3.9		
Intersection Capacity Utilization		62.6%		ICU Level of Service	B
Analysis Period (min)			15		

HCM Unsignalized Intersection Capacity Analysis
8: Woodward Avenue & Atherton Dr.

11/17/2009

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control	Free		Free		Stop			Stop		Stop		
Grade	0%		0%		0%			0%		0%		
Volume (veh/h)	10	460	560	300	430	100	350	80	150	60	120	10
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Hourly flow rate (vph)	11	484	589	316	453	105	368	84	158	63	126	11
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type							None			TWLTL		
Median storage veh										1		
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	558			1074			1958	1989	779	1842	2232	505
vC1, stage 1 conf vol											1137	1137
vC2, stage 2 conf vol											705	1095
vCu, unblocked vol	558			1074			1958	1989	779	1842	2232	505
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)											6.1	5.5
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	99			51			0	0	60	0	0	98
cM capacity (veh/h)	1013			649			0	31	396	0	22	567
Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	NB 2	NB 3	SB 1	SB 2	SB 3		
Volume Total	11	1074	316	558	368	56	186	63	84	53		
Volume Left	11	0	316	0	368	0	0	63	0	0		
Volume Right	0	589	0	105	0	0	158	0	0	11		
cSH	1013	1700	649	1700	0	31	142	0	22	27		
Volume to Capacity	0.01	0.63	0.49	0.33	Err	1.82	1.31	Err	3.88	1.96		
Queue Length 95th (ft)	1	0	67	0	Err	161	288	Err	Err	158		
Control Delay (s)	8.6	0.0	15.7	0.0	Err	664.5	239.7	Err	Err	759.1		
Lane LOS	A		C		F	F	F	F	F	F		
Approach Delay (s)	0.1	5.7		Err		Err			Err			
Approach LOS		F		F		F			F			
Intersection Summary												
Average Delay			Err									
Intersection Capacity Utilization			111.5%		ICU Level of Service				H			
Analysis Period (min)			15									

HCM Unsignalized Intersection Capacity Analysis
 9: Woodward Avenue & Moffat Blvd.

11/17/2009



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Volume (veh/h)	210	460	690	290	160	140
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95
Hourly flow rate (vph)	221	484	726	305	168	147
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	2000	242	316			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	2000	242	316			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	0	39	42			
cM capacity (veh/h)	27	797	1244			

Direction, Lane #	EB 1	NB 1	NB 2	SB 1
Volume Total	705	726	305	316
Volume Left	221	726	0	0
Volume Right	484	0	0	147
cSH	81	1244	1700	1700
Volume to Capacity	8.67	0.58	0.18	0.19
Queue Length 95th (ft)	Err	99	0	0
Control Delay (s)	Err	11.9	0.0	0.0
Lane LOS	F	B		
Approach Delay (s)	Err	8.4		0.0
Approach LOS	F			

Intersection Summary			
Average Delay		3439.8	
Intersection Capacity Utilization		105.1%	ICU Level of Service G
Analysis Period (min)		15	

SIMTRAFFIC LEVEL OF SERVICE REPORT Including Upstream Delays

Project: ARBPRC **HCM:** 2000
Scenario: C+P **PHF:** 0.99
TOD: AM Peak Hr **Analysis Period:** 15 Minutes **# of Runs:** 10

Intersection: 10: Moffat Blvd. & SR 99 SB **Type:** Un-Signalized

Approach	Movement	Demand Volume	Volume Served			Delay/Veh (sec)		
			Avg	%	Std Dev	Avg	LOS	Std Dev
SB	L	215	15	7	11	3846.0	F	--
	R	58	5	9	4	3156.7	F	--
	Subtotal	273	21	7	--	3667.8	F	--
EB	T	157	101	64	15	313.1	F	--
	Subtotal	157	101	64	--	313.1	F	--
WB	T	189	89	47	8	1.1	A	--
	Subtotal	189	89	47	--	1.1	A	--
Total		619	210	34	--	508.4	F	--

HCM Unsignalized Intersection Capacity Analysis
 11: Graves Road & Austin Rd.

11/17/2009



Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations	↔		↔		↔	
Sign Control	Stop		Free		Free	
Grade	0%		0%		0%	
Volume (veh/h)	80	20	230	20	20	230
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95
Hourly flow rate (vph)	84	21	242	21	21	242
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	537	253			263	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	537	253			263	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	83	97			98	
cM capacity (veh/h)	497	786			1301	

Direction, Lane #	WB 1	NB 1	SB 1
Volume Total	105	263	263
Volume Left	84	0	21
Volume Right	21	21	0
cSH	536	1700	1301
Volume to Capacity	0.20	0.15	0.02
Queue Length 95th (ft)	18	0	1
Control Delay (s)	13.3	0.0	0.8
Lane LOS	B		A
Approach Delay (s)	13.3	0.0	0.8
Approach LOS	B		

Intersection Summary			
Average Delay			2.5
Intersection Capacity Utilization	41.0%	ICU Level of Service	A
Analysis Period (min)			15

SIMTRAFFIC LEVEL OF SERVICE REPORT Including Upstream Delays

Project: ARBPRC **HCM:** 2000
Scenario: C+P **PHF:** 0.99
TOD: AM Peak Hr **Analysis Period:** 15 Minutes **# of Runs:** 10

Intersection: 12: SR 99 NB & Austin Rd. **Type:** Un-Signalized

Approach	Movement	Demand Volume	Volume Served			Delay/Veh (sec)		
			Avg	%	Std Dev	Avg	LOS	Std Dev
NB	L	202	82	41	8	15.1	C	--
	T	40	18	45	3	16.8	C	--
	Subtotal	242	100	41	--	15.4	C	--
SB	T	56	48	86	7	122.8	F	--
	R	23	18	78	5	108.5	F	--
	Subtotal	78	66	85	--	119.0	F	--
WB	L	192	68	35	8	689.2	F	--
	R	23	9	39	3	654.6	F	--
	Subtotal	215	77	36	--	685.0	F	--
Total		535	244	46	--	255.8	F	--

Intersection: 13: Moffat Blvd. & Austin Rd. **Type:** Un-Signalized

Approach	Movement	Demand Volume	Volume Served			Delay/Veh (sec)		
			Avg	%	Std Dev	Avg	LOS	Std Dev
NB	L	106	48	45	5	149.2	F	--
	T	182	80	44	6	145.9	F	--
	R	96	45	47	7	135.0	F	--
	Subtotal	384	174	45	--	144.0	F	--
SB	L	13	10	77	4	197.3	F	--
	T	154	68	44	6	208.2	F	--
	R	81	38	47	6	204.7	F	--
	Subtotal	247	116	47	--	206.1	F	--
EB	L	58	16	28	6	50.4	F	--
	T	61	18	30	1	52.8	F	--
	R	253	82	32	8	47.8	E	--
	Subtotal	371	117	32	--	48.9	E	--
WB	L	3	3	100	1	7.6	A	--
	T	3	3	100	2	13.2	B	--
	R	3	3	67	2	3.6	A	--
	Subtotal	8	8	100	--	8.1	A	--
Total		1010	414	41	--	131.9	F	--

HCM Signalized Intersection Capacity Analysis

14: Yosemite Avenue & Austin Rd.

11/17/2009

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	1.00	0.95		1.00	0.95		1.00	1.00		1.00	1.00	
Frt	1.00	0.97		1.00	0.99		1.00	0.95		1.00	0.95	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770	3433		1770	3520		1770	1770		1770	1777	
Flt Permitted	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (perm)	1770	3433		1770	3520		1770	1770		1770	1777	
Volume (vph)	90	400	100	110	1070	40	90	120	60	80	90	40
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	95	421	105	116	1126	42	95	126	63	84	95	42
RTOR Reduction (vph)	0	19	0	0	2	0	0	14	0	0	12	0
Lane Group Flow (vph)	95	507	0	116	1166	0	95	175	0	84	125	0
Turn Type	Prot			Prot			Prot			Prot		
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases												
Actuated Green, G (s)	8.3	35.8		9.3	36.8		8.3	25.7		7.8	25.2	
Effective Green, g (s)	8.3	35.8		9.3	36.8		8.3	25.7		7.8	25.2	
Actuated g/C Ratio	0.09	0.38		0.10	0.39		0.09	0.27		0.08	0.27	
Clearance Time (s)	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	
Lane Grp Cap (vph)	155	1299		174	1369		155	481		146	473	
v/s Ratio Prot	0.05	0.15		c0.07	c0.33		c0.05	c0.10		0.05	0.07	
v/s Ratio Perm												
v/c Ratio	0.61	0.39		0.67	0.85		0.61	0.36		0.58	0.26	
Uniform Delay, d1	41.6	21.4		41.2	26.4		41.6	27.8		41.8	27.4	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	7.0	0.2		9.3	5.3		7.0	2.1		5.4	1.4	
Delay (s)	48.6	21.6		50.4	31.7		48.6	30.0		47.2	28.8	
Level of Service	D	C		D	C		D	C		D	C	
Approach Delay (s)		25.8			33.4			36.2			35.8	
Approach LOS		C			C			D			D	
Intersection Summary												
HCM Average Control Delay			32.0			HCM Level of Service				C		
HCM Volume to Capacity ratio			0.60									
Actuated Cycle Length (s)			94.6			Sum of lost time (s)			8.0			
Intersection Capacity Utilization			63.6%			ICU Level of Service				B		
Analysis Period (min)			15									
c Critical Lane Group												

HCM Signalized Intersection Capacity Analysis
 15: Yosemite Avenue & Jack Tone Rd

11/17/2009

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	1.00	0.95		1.00	0.95		1.00	1.00		1.00	1.00	
Frt	1.00	0.97		1.00	0.99		1.00	0.95		1.00	0.96	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770	3430		1770	3519		1770	1769		1770	1784	
Flt Permitted	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (perm)	1770	3430		1770	3519		1770	1769		1770	1784	
Volume (vph)	30	350	90	80	1030	40	50	100	50	30	180	70
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	32	368	95	84	1084	42	53	105	53	32	189	74
RTOR Reduction (vph)	0	30	0	0	4	0	0	24	0	0	19	0
Lane Group Flow (vph)	32	433	0	84	1122	0	53	134	0	32	244	0
Turn Type	Prot			Prot			Prot			Prot		
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases												
Actuated Green, G (s)	1.7	20.0		4.0	22.3		2.8	14.4		1.7	13.3	
Effective Green, g (s)	1.7	20.0		4.0	22.3		2.8	14.4		1.7	13.3	
Actuated g/C Ratio	0.03	0.36		0.07	0.40		0.05	0.26		0.03	0.24	
Clearance Time (s)	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	
Lane Grp Cap (vph)	54	1223		126	1399		88	454		54	423	
v/s Ratio Prot	0.02	0.13		c0.05	c0.32		c0.03	0.08		0.02	c0.14	
v/s Ratio Perm												
v/c Ratio	0.59	0.35		0.67	0.80		0.60	0.30		0.59	0.58	
Uniform Delay, d1	26.9	13.3		25.4	14.9		26.1	16.8		26.9	18.9	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	16.2	0.2		12.5	3.4		11.1	0.4		16.2	1.9	
Delay (s)	43.1	13.5		37.9	18.4		37.2	17.1		43.1	20.8	
Level of Service	D	B		D	B		D	B		D	C	
Approach Delay (s)		15.4			19.7			22.2			23.2	
Approach LOS		B			B			C			C	
Intersection Summary												
HCM Average Control Delay			19.5			HCM Level of Service				B		
HCM Volume to Capacity ratio			0.67									
Actuated Cycle Length (s)			56.1			Sum of lost time (s)			12.0			
Intersection Capacity Utilization			63.5%			ICU Level of Service				B		
Analysis Period (min)			15									
c Critical Lane Group												

HCM Unsignalized Intersection Capacity Analysis
 16: Graves Road & Jack Tone Rd

11/17/2009



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations	↔			↑	↓	↔
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Volume (veh/h)	10	20	140	170	300	60
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95
Hourly flow rate (vph)	11	21	147	179	316	63
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	821	347	379			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	821	347	379			
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	97	88			
cM capacity (veh/h)	301	696	1180			
Direction, Lane #	EB 1	NB 1	SB 1			
Volume Total	32	326	379			
Volume Left	11	147	0			
Volume Right	21	0	63			
cSH	484	1180	1700			
Volume to Capacity	0.07	0.12	0.22			
Queue Length 95th (ft)	5	11	0			
Control Delay (s)	13.0	4.5	0.0			
Lane LOS	B	A				
Approach Delay (s)	13.0	4.5	0.0			
Approach LOS	B					
Intersection Summary						
Average Delay			2.5			
Intersection Capacity Utilization			49.5%	ICU Level of Service	A	
Analysis Period (min)			15			

HCM Unsignalized Intersection Capacity Analysis
 17: Sedan Ave & Main Street

11/17/2009
































Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Volume (veh/h)	10	10	10	10	10	10	10	170	20	40	120	10
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Hourly flow rate (vph)	11	11	11	11	11	11	11	179	21	42	126	11
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	442	437	132	442	432	189	137			200		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	442	437	132	442	432	189	137			200		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	98	98	99	98	98	99	99			97		
cM capacity (veh/h)	496	494	918	497	497	852	1447			1372		
Direction, Lane #	EB 1	WB 1	NB 1	SB 1								
Volume Total	32	32	211	179								
Volume Left	11	11	11	42								
Volume Right	11	11	21	11								
cSH	585	577	1447	1372								
Volume to Capacity	0.05	0.05	0.01	0.03								
Queue Length 95th (ft)	4	4	1	2								
Control Delay (s)	11.5	11.6	0.4	2.0								
Lane LOS	B	B	A	A								
Approach Delay (s)	11.5	11.6	0.4	2.0								
Approach LOS	B	B										
Intersection Summary												
Average Delay			2.6									
Intersection Capacity Utilization			32.8%		ICU Level of Service					A		
Analysis Period (min)			15									

HCM Signalized Intersection Capacity Analysis












18: Sedan Ave & Austin Rd.

11/17/2009

												
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	
Lane Util. Factor	1.00	0.95		0.97	0.95	1.00	1.00	0.95	1.00	0.97	0.95	
Frt	1.00	0.97		1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.99	
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)	1770	3449		3433	3539	1583	1770	3539	1583	3433	3510	
Flt Permitted	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	
Satd. Flow (perm)	1770	3449		3433	3539	1583	1770	3539	1583	3433	3510	
Volume (vph)	50	440	90	60	70	140	10	360	590	540	180	10
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	53	463	95	63	74	147	11	379	621	568	189	11
RTOR Reduction (vph)	0	21	0	0	0	116	0	0	160	0	4	0
Lane Group Flow (vph)	53	537	0	63	74	31	11	379	461	568	196	0
Turn Type	Prot			Prot		Perm	Prot		Perm	Prot		
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases						8			2			
Actuated Green, G (s)	5.1	18.1		4.5	17.5	17.5	1.1	28.5	28.5	15.4	42.8	
Effective Green, g (s)	5.1	18.1		4.5	17.5	17.5	1.1	28.5	28.5	15.4	42.8	
Actuated g/C Ratio	0.06	0.22		0.05	0.21	0.21	0.01	0.35	0.35	0.19	0.52	
Clearance Time (s)	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	
Lane Grp Cap (vph)	109	757		187	751	336	24	1223	547	641	1821	
v/s Ratio Prot	c0.03	c0.16		0.02	0.02		0.01	0.11		c0.17	0.06	
v/s Ratio Perm						0.02			c0.29			
v/c Ratio	0.49	0.71		0.34	0.10	0.09	0.46	0.31	0.84	0.89	0.11	
Uniform Delay, d1	37.4	29.8		37.6	26.2	26.1	40.4	19.8	24.9	32.7	10.1	
Progression Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	3.4	3.1		1.1	0.1	0.1	13.2	0.1	11.3	13.9	0.0	
Delay (s)	40.8	32.8		38.6	26.2	26.2	53.6	19.9	36.2	46.6	10.1	
Level of Service	D	C		D	C	C	D	B	D	D	B	
Approach Delay (s)		33.5			29.0			30.3			37.1	
Approach LOS		C			C			C			D	
Intersection Summary												
HCM Average Control Delay			32.8				HCM Level of Service			C		
HCM Volume to Capacity ratio			0.75									
Actuated Cycle Length (s)			82.5				Sum of lost time (s)			12.0		
Intersection Capacity Utilization			77.0%				ICU Level of Service			D		
Analysis Period (min)			15									
c	Critical Lane Group											

HCM Unsignalized Intersection Capacity Analysis
 19: W. River Rd & Jack Tone Rd

11/17/2009

						
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Sign Control	Stop		Free		Free	
Grade	0%		0%		0%	
Volume (veh/h)	160	100	190	60	30	300
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95
Hourly flow rate (vph)	168	105	200	63	32	316
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	611	232			263	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	611	232			263	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	62	87			98	
cM capacity (veh/h)	446	808			1301	
Direction, Lane #	WB 1	WB 2	NB 1	SB 1	SB 2	
Volume Total	168	105	263	32	316	
Volume Left	168	0	0	32	0	
Volume Right	0	105	63	0	0	
cSH	446	808	1700	1301	1700	
Volume to Capacity	0.38	0.13	0.15	0.02	0.19	
Queue Length 95th (ft)	43	11	0	2	0	
Control Delay (s)	17.9	10.1	0.0	7.8	0.0	
Lane LOS	C	B		A		
Approach Delay (s)	14.9		0.0	0.7		
Approach LOS	B					
Intersection Summary						
Average Delay			4.9			
Intersection Capacity Utilization			35.8%	ICU Level of Service	A	
Analysis Period (min)			15			

SIMTRAFFIC LEVEL OF SERVICE REPORT Including Upstream Delays

Project: ARBPRC **HCM:** 2000
Scenario: C+P **PHF:** 0.99
TOD: AM Peak Hr **Analysis Period:** 15 Minutes **# of Runs:** 10

Intersection: 20: Santos Ave & Jack Tone Rd **Type:** Signalized

Approach	Movement	Demand Volume	Volume Served			Delay/Veh (sec)		
			Avg	%	Std Dev	Avg	LOS	Std Dev
NB	L	20	18	90	5	16.6	B	--
	T	43	41	95	7	18.1	B	--
	R	13	14	108	4	4.2	A	--
	Subtotal	76	73	96	--	15.1	B	--
SB	L	8	8	100	3	27.4	C	--
	T	98	100	102	10	31.3	C	--
	R	10	9	90	3	19.8	B	--
	Subtotal	116	117	101	--	30.1	C	--
EB	L	5	4	80	2	28.0	C	--
	T	5	4	80	1	22.7	C	--
	R	25	26	104	5	3.6	A	--
	Subtotal	35	34	97	--	8.7	A	--
WB	L	40	38	95	7	26.2	C	--
	T	15	17	113	6	21.8	C	--
	R	15	16	107	4	3.7	A	--
	Subtotal	71	71	100	--	20.0	B	--
Total	298	296	99	--	21.5	C	--	

Intersection: 22: Colony Rd / SR 99 On-Ramps & Jack Tone Rd **Type:** Signalized

Approach	Movement	Demand Volume	Volume Served			Delay/Veh (sec)		
			Avg	%	Std Dev	Avg	LOS	Std Dev
NB	T	45	43	96	8	7.9	A	--
	R	121	121	100	9	6.4	A	--
	Subtotal	167	164	98	--	6.8	A	--
SB	L	5	3	60	2	38.9	D	--
	T	40	42	105	5	5.6	A	--
	R	71	67	94	9	6.2	A	--
	R2	48	50	104	6	1.9	A	--
	Subtotal	164	162	99	--	5.3	A	--
WB	L	40	41	100	8	29.6	C	--
	R	30	29	97	4	3.3	A	--
	L2	25	25	100	8	23.8	C	--
	Subtotal	96	95	99	--	20.0	B	--
Total	427	421	99	--	9.2	A	--	

SIMTRAFFIC LEVEL OF SERVICE REPORT Including Upstream Delays

Project: ARBPRC **HCM:** 2000
Scenario: C+P **PHF:** 0.99
TOD: AM Peak Hr **Analysis Period:** 15 Minutes **# of Runs:** 10

Intersection: 23: Colony Rd / SR 99 On-Ramps & Hoff Rd/SR 99 **Type:** Un-Signalized

Approach	Movement	Demand Volume	Volume Served			Delay/Veh (sec)		
			Avg	%	Std Dev	Avg	LOS	Std Dev
NB	L	51	49	96	8	12.4	B	--
	T	25	24	96	6	10.3	B	--
	R	8	8	100	3	6.4	A	--
	Subtotal	83	82	99	--	11.2	B	--
SB	L	5	5	100	2	9.8	A	--
	T	5	5	100	2	8.0	A	--
	R	3	3	100	2	3.7	A	--
	Subtotal	13	13	100	--	7.7	A	--
EB	L	3	3	100	1	5.1	A	--
	T	40	41	100	7	8.9	A	--
	R	83	81	98	8	4.2	A	--
	Subtotal	126	124	98	--	5.8	A	--
WB	L	30	29	97	7	10.5	B	--
	T	43	44	102	6	8.5	A	--
	R	5	6	120	2	3.6	A	--
	Subtotal	78	80	103	--	8.9	A	--
Total	301	298	99	--	8.2	A	--	

Intersection: 24: SR 99 SB & Jack Tone Rd **Type:** Signalized

Approach	Movement	Demand Volume	Volume Served			Delay/Veh (sec)		
			Avg	%	Std Dev	Avg	LOS	Std Dev
NB	T	106	105	99	12	5.6	A	--
	R	45	47	104	9	3.1	A	--
	Subtotal	152	152	100	--	4.8	A	--
SB	T	66	68	103	9	5.1	A	--
	Subtotal	66	68	103	--	5.1	A	--
EB	L	61	60	98	8	21.0	C	--
	R	61	59	97	8	9.3	A	--
	Subtotal	121	119	98	--	15.2	B	--
Total	338	338	100	--	8.5	A	--	

HCM Unsignalized Intersection Capacity Analysis
 25: Ripon Rd & Austin Rd.

11/17/2009



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Sign Control		Stop			Stop			Stop			Stop	
Volume (vph)	10	120	10	20	130	800	10	30	30	40	20	20
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Hourly flow rate (vph)	11	126	11	21	137	842	11	32	32	42	21	21























Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total (vph)	147	1000	74	84
Volume Left (vph)	11	21	11	42
Volume Right (vph)	11	842	32	21
Hadj (s)	0.01	-0.47	-0.19	-0.02
Departure Headway (s)	5.3	4.1	6.1	6.2
Degree Utilization, x	0.22	1.15	0.12	0.15
Capacity (veh/h)	659	863	571	555
Control Delay (s)	9.8	98.8	9.9	10.3
Approach Delay (s)	9.8	98.8	9.9	10.3
Approach LOS	A	F	A	B

Intersection Summary			
Delay		78.0	
HCM Level of Service		F	
Intersection Capacity Utilization	79.8%		ICU Level of Service D
Analysis Period (min)		15	

HCM Signalized Intersection Capacity Analysis

26: Ripon Rd & Jack Tone Rd

11/17/2009

													
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	0.95		1.00	1.00	1.00	1.00	1.00		1.00	1.00		
Frt	1.00	0.98		1.00	1.00	0.85	1.00	0.97		1.00	0.91		
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00		0.95	1.00		
Satd. Flow (prot)	1770	3486		1770	1863	1583	1770	1805		1770	1695		
Flt Permitted	0.95	1.00		0.95	1.00	1.00	0.95	1.00		0.95	1.00		
Satd. Flow (perm)	1770	3486		1770	1863	1583	1770	1805		1770	1695		
Volume (vph)	160	180	20	70	680	110	140	270	70	110	120	180	
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	
Adj. Flow (vph)	168	189	21	74	716	116	147	284	74	116	126	189	
RTOR Reduction (vph)	0	9	0	0	0	69	0	10	0	0	60	0	
Lane Group Flow (vph)	168	201	0	74	716	47	147	348	0	116	255	0	
Turn Type	Prot			Prot		Perm	Prot			Prot			
Protected Phases	7	4		3	8		5	2		1	6		
Permitted Phases							8						
Actuated Green, G (s)	9.9	39.6		6.8	36.5	36.5	8.0	20.0		7.0	19.0		
Effective Green, g (s)	9.9	39.6		6.8	36.5	36.5	8.0	20.0		7.0	19.0		
Actuated g/C Ratio	0.11	0.44		0.08	0.41	0.41	0.09	0.22		0.08	0.21		
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)	196	1544		135	761	646	158	404		139	360		
v/s Ratio Prot	c0.09	c0.06		0.04	c0.38		c0.08	c0.19		0.07	0.15		
v/s Ratio Perm							0.03						
v/c Ratio	0.86	0.13		0.55	0.94	0.07	0.93	0.86		0.83	0.71		
Uniform Delay, d1	39.1	14.7		39.8	25.4	16.1	40.4	33.4		40.6	32.6		
Progression Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00		1.00	1.00		
Incremental Delay, d2	28.9	0.0		4.5	19.6	0.0	51.3	20.7		33.0	11.2		
Delay (s)	67.9	14.8		44.3	45.0	16.2	91.7	54.1		73.6	43.8		
Level of Service	E	B		D	D	B	F	D		E	D		
Approach Delay (s)	38.4			41.3			65.1			51.8			
Approach LOS	D			D			E			D			
Intersection Summary													
HCM Average Control Delay	48.2			HCM Level of Service		D							
HCM Volume to Capacity ratio	0.90												
Actuated Cycle Length (s)	89.4			Sum of lost time (s)		16.0							
Intersection Capacity Utilization	83.1%			ICU Level of Service		E							
Analysis Period (min)	15												
c Critical Lane Group													

SIMTRAFFIC LEVEL OF SERVICE REPORT Including Upstream Delays

Project: ARBPRC **HCM:** 2000
Scenario: C+P **PHF:** 0.99
TOD: PM Peak Hr **Analysis Period:** 15 Minutes **# of Runs:** 10

Intersection: 1: SR 120 WB Ramp & Main Street **Type:** Signalized

Approach	Movement	Demand Volume	Volume Served			Delay/Veh (sec)		
			Avg	%	Std Dev	Avg	LOS	Std Dev
NB	L	159	87	55	5	182.7	F	--
	T	265	99	37	17	99.2	F	--
	Subtotal	424	186	44	--	138.2	F	--
SB	T	220	97	44	31	838.2	F	--
	R	174	84	48	22	606.6	F	--
	Subtotal	394	181	46	--	730.9	F	--
WB	L	81	48	59	19	247.1	F	--
	R	63	41	65	19	133.6	F	--
	Subtotal	144	89	62	--	195.0	F	--
Total		962	456	47	--	384.7	F	--

Intersection: 2: SR 120 EB Ramps & Main Street **Type:** Signalized

Approach	Movement	Demand Volume	Volume Served			Delay/Veh (sec)		
			Avg	%	Std Dev	Avg	LOS	Std Dev
NB	T	255	152	60	14	94.3	F	--
	R	93	59	63	11	9.0	A	--
	Subtotal	348	210	60	--	70.5	E	--
SB	L	73	32	44	10	299.6	F	--
	T	227	100	44	22	268.8	F	--
	Subtotal	301	132	44	--	276.3	F	--
EB	L	169	46	27	17	458.6	F	--
	R	253	63	25	27	517.2	F	--
	Subtotal	422	109	26	--	492.4	F	--
Total		1071	452	42	--	232.8	F	--

SIMTRAFFIC LEVEL OF SERVICE REPORT Including Upstream Delays

Project: ARBPRC **HCM:** 2000
Scenario: C+P **PHF:** 0.99
TOD: PM Peak Hr **Analysis Period:** 15 Minutes **# of Runs:** 10

Intersection: 3: Atherton Drive & Main Street **Type:** Signalized

Approach	Movement	Demand Volume	Volume Served			Delay/Veh (sec)		
			Avg	%	Std Dev	Avg	LOS	Std Dev
NB	L	23	18	78	6	202.7	F	--
	T	169	139	82	30	220.1	F	--
	R	61	45	72	12	146.7	F	--
	Subtotal	253	201	79	--	202.3	F	--
SB	L	194	66	34	13	419.8	F	--
	T	247	86	35	18	15.0	B	--
	R	38	14	37	6	3.6	A	--
	Subtotal	480	166	35	--	175.1	F	--
EB	L	28	22	79	7	194.9	F	--
	T	78	76	97	7	38.4	D	--
	R	48	45	94	9	21.5	C	--
	Subtotal	154	142	92	--	57.0	E	--
WB	L	73	43	59	7	780.6	F	--
	T	38	22	58	8	615.6	F	--
	R	152	53	35	22	1184.3	F	--
	Subtotal	263	119	45	--	930.9	F	--
Total	1149	627	55	--	300.4	F	--	

Level Of Service Computation Report
2000 HCM 4-Way Stop (Base Volume Alternative)
Default Scenario

Intersection #63: Woodward Ave / Main Street C+P PM

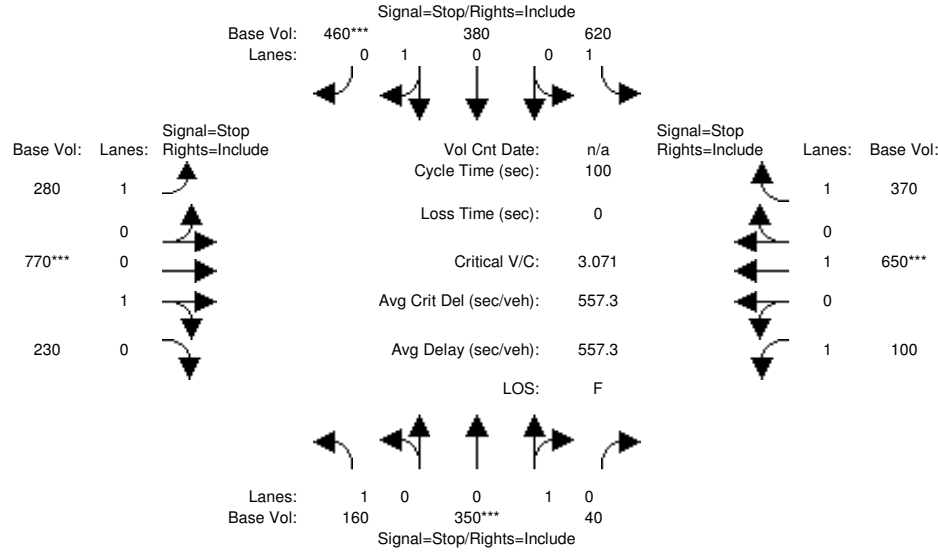


Table with 4 columns: Approach, North Bound, South Bound, East Bound, West Bound. Rows include Movement, Min. Green, and Volume Module data.

Table with 12 columns representing lane movements (L, T, R) for North, South, East, and West bounds. Rows include Base Vol, Growth Adj, Initial Bse, User Adj, PHF Adj, PHF Volume, Reduct Vol, Reduced Vol, PCE Adj, MLF Adj, and Final Volume.

Table with 12 columns for lane movements. Rows include Saturation Flow Module: Adjustment, Lanes, and Final Sat.

Table with 12 columns for lane movements. Rows include Capacity Analysis Module: Vol/Sat, Crit Moves, Delay/Veh, Delay Adj, AdjDel/Veh, LOS by Move, ApproachDel, Delay Adj, ApprAdjDel, LOS by Appr, and AllWayAvgQ.

Note: Queue reported is the number of cars per lane.
Peak Hour Volume Signal Warrant Report [Urban]

Intersection #63 Woodward Ave / Main Street C+P PM

Base Volume Alternative: Peak Hour Warrant Met

Table with 4 columns: Approach, North Bound, South Bound, East Bound, West Bound. Rows include Movement, Control, Lanes, Initial Vol, Major Street Volume, Minor Approach Volume, and Minor Approach Volume Threshold.

SIGNAL WARRANT DISCLAIMER
This peak hour signal warrant analysis should be considered solely as an "indicator" of the likelihood of an unsignalized intersection warranting a traffic signal in the future.

The peak hour warrant analysis in this report is not intended to replace a rigorous and complete traffic signal warrant analysis by the responsible jurisdiction.

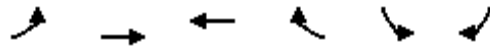
HCM Unsignalized Intersection Capacity Analysis
 5: Industrial Park Dr & VanRyn (Spreckles)

11/17/2009

	→	↘	↙	←	↖	↗	
Movement	EBT	EBR	WBL	WBT	NBL	NBR	
Lane Configurations	↑	↗	↙	↑↑	↖	↗	
Sign Control	Free			Free	Stop		
Grade	0%			0%	0%		
Volume (veh/h)	290	110	630	230	80	520	
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	
Hourly flow rate (vph)	305	116	663	242	84	547	
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			421		1753	305	
vC1, stage 1 conf vol							
vC2, stage 2 conf vol							
vCu, unblocked vol			421		1753	305	
tC, single (s)			4.1		6.8	6.9	
tC, 2 stage (s)							
tF (s)			2.2		3.5	3.3	
p0 queue free %			42		0	21	
cM capacity (veh/h)			1135		32	691	
Direction, Lane #	EB 1	EB 2	WB 1	WB 2	WB 3	NB 1	NB 2
Volume Total	305	116	663	121	121	84	547
Volume Left	0	0	663	0	0	84	0
Volume Right	0	116	0	0	0	0	547
cSH	1700	1700	1135	1700	1700	32	691
Volume to Capacity	0.18	0.07	0.58	0.07	0.07	2.65	0.79
Queue Length 95th (ft)	0	0	99	0	0	245	198
Control Delay (s)	0.0	0.0	12.5	0.0	0.0	1011.3	27.1
Lane LOS			B			F	D
Approach Delay (s)	0.0		9.2			158.3	
Approach LOS						F	
Intersection Summary							
Average Delay			55.3				
Intersection Capacity Utilization			64.6%		ICU Level of Service		C
Analysis Period (min)			15				

HCM Unsignalized Intersection Capacity Analysis
 6: Woodward Avenue & VanRyn (Spreckles)

11/17/2009



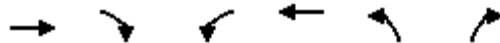
Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations	↶	↷	↷↶		↶	↷
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Volume (veh/h)	140	830	1100	30	60	300
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95
Hourly flow rate (vph)	147	874	1158	32	63	316
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type					TWLTL	
Median storage veh					1	
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	1189				2342	595
vC1, stage 1 conf vol					1174	
vC2, stage 2 conf vol					1168	
vCu, unblocked vol	1189				2342	595
tC, single (s)	4.1				6.8	6.9
tC, 2 stage (s)					5.8	
tF (s)	2.2				3.5	3.3
p0 queue free %	75				43	29
cM capacity (veh/h)	583				110	448

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	SB 1	SB 2
Volume Total	147	874	772	418	63	316
Volume Left	147	0	0	0	63	0
Volume Right	0	0	0	32	0	316
cSH	583	1700	1700	1700	110	448
Volume to Capacity	0.25	0.51	0.45	0.25	0.57	0.71
Queue Length 95th (ft)	25	0	0	0	68	135
Control Delay (s)	13.3	0.0	0.0	0.0	74.1	30.1
Lane LOS	B				F	D
Approach Delay (s)	1.9		0.0		37.4	
Approach LOS					E	

Intersection Summary						
Average Delay			6.2			
Intersection Capacity Utilization			56.6%		ICU Level of Service	B
Analysis Period (min)			15			

HCM Unsignalized Intersection Capacity Analysis
7: Woodward Avenue & Pillsbury Road

11/17/2009



Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↷		↶	↷↶	↶↷	
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Volume (veh/h)	760	130	60	1070	60	30
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95
Hourly flow rate (vph)	800	137	63	1126	63	32
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				TWLTL		
Median storage veh					1	
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume			937		1558	868
vC1, stage 1 conf vol					868	
vC2, stage 2 conf vol					689	
vCu, unblocked vol			937		1558	868
tC, single (s)			4.1		6.8	6.9
tC, 2 stage (s)					5.8	
tF (s)			2.2		3.5	3.3
p0 queue free %			91		72	89
cM capacity (veh/h)			727		223	295

Direction, Lane #	EB 1	WB 1	WB 2	WB 3	NB 1
Volume Total	937	63	563	563	95
Volume Left	0	63	0	0	63
Volume Right	137	0	0	0	32
cSH	1700	727	1700	1700	242
Volume to Capacity	0.55	0.09	0.33	0.33	0.39
Queue Length 95th (ft)	0	7	0	0	44
Control Delay (s)	0.0	10.4	0.0	0.0	29.1
Lane LOS		B			D
Approach Delay (s)	0.0	0.6			29.1
Approach LOS					D

Intersection Summary					
Average Delay			1.5		
Intersection Capacity Utilization		61.7%		ICU Level of Service	B
Analysis Period (min)		15			

HCM Unsignalized Intersection Capacity Analysis
 8: Woodward Avenue & Atherton Drive

11/17/2009



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↶	↷		↶	↷		↶	↶↷		↶	↶↷	
Sign Control	Free		Free		Free		Stop		Stop		Stop	
Grade	0%		0%		0%		0%		0%		0%	
Volume (veh/h)	10	370	410	330	620	70	640	350	340	140	220	10
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Hourly flow rate (vph)	11	389	432	347	653	74	674	368	358	147	232	11
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type							None			TWLTL		
Median storage veh										1		
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	726			821			2100	2047	605	2337	2226	689
vC1, stage 1 conf vol											1384	1384
vC2, stage 2 conf vol											953	842
vCu, unblocked vol	726			821			2100	2047	605	2337	2226	689
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)											6.1	5.5
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	99			57			0	0	28	0	0	98
cM capacity (veh/h)	877			808			0	31	497	0	25	445

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	NB 2	NB 3	SB 1	SB 2	SB 3
Volume Total	11	821	347	726	674	246	481	147	154	88
Volume Left	11	0	347	0	674	0	0	147	0	0
Volume Right	0	432	0	74	0	0	358	0	0	11
cSH	877	1700	808	1700	0	31	104	0	25	29
Volume to Capacity	0.01	0.48	0.43	0.43	Err	7.80	4.62	Err	6.06	3.06
Queue Length 95th (ft)	1	0	54	0	Err	Err	Err	Err	Err	Err
Control Delay (s)	9.2	0.0	12.8	0.0	Err	Err	Err	Err	Err	Err
Lane LOS	A		B		F	F	F	F	F	F
Approach Delay (s)	0.1	4.1		Err		Err		Err		
Approach LOS		F		F		F		F		

Intersection Summary

Average Delay	Err	
Intersection Capacity Utilization	118.0%	ICU Level of Service H
Analysis Period (min)	15	

HCM Unsignalized Intersection Capacity Analysis
 9: Woodward Avenue & Moffat Blvd.

11/17/2009



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Volume (veh/h)	280	570	730	290	310	290
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95
Hourly flow rate (vph)	295	600	768	305	326	305
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	2321	479	632			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	2321	479	632			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	0	0	19			
cM capacity (veh/h)	8	587	951			

Direction, Lane #	EB 1	NB 1	NB 2	SB 1
Volume Total	895	768	305	632
Volume Left	295	768	0	0
Volume Right	600	0	0	305
cSH	23	951	1700	1700
Volume to Capacity	38.23	0.81	0.18	0.37
Queue Length 95th (ft)	Err	226	0	0
Control Delay (s)	Err	22.5	0.0	0.0
Lane LOS	F	C		
Approach Delay (s)	Err	16.1		0.0
Approach LOS	F			

Intersection Summary			
Average Delay		3447.6	
Intersection Capacity Utilization	135.1%		ICU Level of Service H
Analysis Period (min)		15	

SIMTRAFFIC LEVEL OF SERVICE REPORT Including Upstream Delays

Project: ARBPRC **HCM:** 2000
Scenario: C+P **PHF:** 0.99
TOD: PM Peak Hr **Analysis Period:** 15 Minutes **# of Runs:** 10

Intersection: 10: Moffat Blvd. & SR 99 SB **Type:** Un-Signalized

Approach	Movement	Demand Volume	Volume Served			Delay/Veh (sec)		
			Avg	%	Std Dev	Avg	LOS	Std Dev
SB	L	192	7	4	8	7810.8	F	--
	R	96	4	4	5	7169.7	F	--
	Subtotal	288	11	4	--	7601.1	F	--
EB	T	222	115	51	9	313.1	F	--
	Subtotal	222	115	51	--	313.1	F	--
WB	T	162	63	39	5	0.7	A	--
	Subtotal	162	63	39	--	0.7	A	--
Total		672	188	28	--	623.9	F	--

HCM Unsignalized Intersection Capacity Analysis
 11: Graves Rd. & Austin Rd.

11/17/2009



Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Volume (veh/h)	60	40	220	90	100	350
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95
Hourly flow rate (vph)	63	42	232	95	105	368
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	858	279			326	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	858	279			326	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	79	94			91	
cM capacity (veh/h)	299	760			1233	

Direction, Lane #	WB 1	NB 1	SB 1
Volume Total	105	326	474
Volume Left	63	0	105
Volume Right	42	95	0
cSH	395	1700	1233
Volume to Capacity	0.27	0.19	0.09
Queue Length 95th (ft)	26	0	7
Control Delay (s)	17.4	0.0	2.5
Lane LOS	C		A
Approach Delay (s)	17.4	0.0	2.5
Approach LOS	C		

Intersection Summary			
Average Delay		3.3	
Intersection Capacity Utilization	56.8%	ICU Level of Service	B
Analysis Period (min)		15	

SIMTRAFFIC LEVEL OF SERVICE REPORT Including Upstream Delays

Project: ARBPRC **HCM:** 2000
Scenario: C+P **PHF:** 0.99
TOD: PM Peak Hr **Analysis Period:** 15 Minutes **# of Runs:** 10

Intersection: 12: SR 99 NB & Austin Rd. **Type:** Un-Signalized

Approach	Movement	Demand Volume	Volume Served			Delay/Veh (sec)		
			Avg	%	Std Dev	Avg	LOS	Std Dev
NB	L	283	107	38	5	103.9	F	--
	T	61	23	38	4	103.9	F	--
	Subtotal	343	130	38	--	103.9	F	--
SB	T	88	64	73	4	264.7	F	--
	R	15	13	87	2	243.2	F	--
	Subtotal	104	76	73	--	261.1	F	--
WB	L	263	74	28	5	1193.9	F	--
	T	1	1	0	1	1598.6	F	--
	R	18	6	33	2	1059.9	F	--
	Subtotal	282	81	28	--	1186.7	F	--
Total	729	287	39	--	449.8	F	--	























Intersection: 13: Moffat Blvd. & Austin Rd. **Type:** Un-Signalized

Approach	Movement	Demand Volume	Volume Served			Delay/Veh (sec)		
			Avg	%	Std Dev	Avg	LOS	Std Dev
NB	L	35	13	37	3	129.8	F	--
	T	308	122	40	6	123.6	F	--
	R	242	92	38	9	112.3	F	--
	Subtotal	586	227	39	--	119.4	F	--
SB	L	18	12	67	3	163.1	F	--
	T	210	75	36	6	172.4	F	--
	R	124	48	39	3	164.3	F	--
	Subtotal	351	134	38	--	168.7	F	--
EB	L	33	11	33	5	57.9	F	--
	T	86	23	27	4	57.0	F	--
	R	295	87	29	6	49.4	E	--
	Subtotal	414	121	29	--	51.6	F	--
WB	L	3	3	100	1	11.5	B	--
	T	3	2	67	1	10.5	B	--
	R	3	4	133	2	4.8	A	--
	Subtotal	8	9	113	--	8.5	A	--
Total	1359	491	36	--	114.2	F	--	

HCM Signalized Intersection Capacity Analysis























14: Yosemite Avenue & Austin Rd.

11/17/2009

												
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	1.00	0.95		1.00	0.95		1.00	1.00		1.00	1.00	
Frt	1.00	0.98		1.00	0.99		1.00	0.96		1.00	0.95	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770	3481		1770	3495		1770	1783		1770	1777	
Flt Permitted	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (perm)	1770	3481		1770	3495		1770	1783		1770	1777	
Volume (vph)	60	1370	170	130	560	50	100	100	40	50	180	80
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	63	1442	179	137	589	53	105	105	42	53	189	84
RTOR Reduction (vph)	0	9	0	0	6	0	0	11	0	0	13	0
Lane Group Flow (vph)	63	1612	0	137	636	0	105	136	0	53	260	0
Turn Type	Prot		Prot		Prot		Prot		Prot			
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases												
Actuated Green, G (s)	6.6	56.3		8.1	57.8		6.1	20.6		4.6	19.1	
Effective Green, g (s)	6.6	56.3		8.1	57.8		6.1	20.6		4.6	19.1	
Actuated g/C Ratio	0.06	0.53		0.08	0.55		0.06	0.20		0.04	0.18	
Clearance Time (s)	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	
Lane Grp Cap (vph)	111	1856		136	1913		102	348		77	321	
v/s Ratio Prot	0.04	c0.46		c0.08	0.18		c0.06	0.08		0.03	c0.15	
v/s Ratio Perm												
v/c Ratio	0.57	0.87		1.01	0.33		1.03	0.39		0.69	0.81	
Uniform Delay, d1	48.1	21.4		48.8	13.2		49.8	37.0		49.8	41.5	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	6.5	4.6		79.1	0.1		97.3	3.3		22.6	19.4	
Delay (s)	54.6	26.0		127.9	13.3		147.0	40.3		72.4	60.9	
Level of Service	D	C		F	B		F	D		E	E	
Approach Delay (s)		27.1			33.5			84.8			62.8	
Approach LOS		C			C			F			E	
Intersection Summary												
HCM Average Control Delay			37.3	HCM Level of Service				D				
HCM Volume to Capacity ratio			0.88									
Actuated Cycle Length (s)			105.6	Sum of lost time (s)				16.0				
Intersection Capacity Utilization			83.7%	ICU Level of Service				E				
Analysis Period (min)			15									
c Critical Lane Group												

HCM Signalized Intersection Capacity Analysis
 15: Yosemite Avenue & Jack Tone Rd

11/17/2009

												
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	1.00	0.95		1.00	0.95		1.00	1.00		1.00	1.00	
Frt	1.00	0.99		1.00	0.99		1.00	0.95		1.00	0.97	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770	3503		1770	3510		1770	1779		1770	1813	
Flt Permitted	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (perm)	1770	3503		1770	3510		1770	1779		1770	1813	
Volume (vph)	80	1240	90	80	520	30	40	210	90	50	230	50
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	84	1305	95	84	547	32	42	221	95	53	242	53
RTOR Reduction (vph)	0	7	0	0	5	0	0	21	0	0	10	0
Lane Group Flow (vph)	84	1393	0	84	574	0	42	295	0	53	285	0
Turn Type	Prot			Prot			Prot			Prot		
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases												
Actuated Green, G (s)	6.1	29.4		4.3	27.6		3.1	13.9		3.1	13.9	
Effective Green, g (s)	6.1	29.4		4.3	27.6		3.1	13.9		3.1	13.9	
Actuated g/C Ratio	0.09	0.44		0.06	0.41		0.05	0.21		0.05	0.21	
Clearance Time (s)	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	
Lane Grp Cap (vph)	162	1544		114	1452		82	371		82	378	
v/s Ratio Prot	0.05	c0.40		c0.05	0.16		0.02	c0.17		c0.03	0.16	
v/s Ratio Perm												
v/c Ratio	0.52	0.90		0.74	0.40		0.51	0.80		0.65	0.75	
Uniform Delay, d1	28.9	17.3		30.6	13.7		31.1	25.1		31.3	24.8	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	2.8	7.7		21.7	0.2		5.3	11.2		16.2	8.3	
Delay (s)	31.7	25.0		52.4	13.9		36.4	36.3		47.4	33.0	
Level of Service	C	C		D	B		D	D		D	C	
Approach Delay (s)		25.4			18.8			36.3			35.2	
Approach LOS		C			B			D			D	
Intersection Summary												
HCM Average Control Delay			26.4			HCM Level of Service					C	
HCM Volume to Capacity ratio			0.78									
Actuated Cycle Length (s)			66.7			Sum of lost time (s)			12.0			
Intersection Capacity Utilization			74.8%			ICU Level of Service					D	
Analysis Period (min)			15									
c Critical Lane Group												

HCM Unsignalized Intersection Capacity Analysis
 16: Graves Rd. & Jack Tone Rd

11/17/2009



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations	T			T	T	
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Volume (veh/h)	110	140	40	230	340	60
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95
Hourly flow rate (vph)	116	147	42	242	358	63
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	716	389	421			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	716	389	421			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	70	78	96			
cM capacity (veh/h)	382	659	1138			
Direction, Lane #	EB 1	NB 1	SB 1			
Volume Total	263	284	421			
Volume Left	116	42	0			
Volume Right	147	0	63			
cSH	500	1138	1700			
Volume to Capacity	0.53	0.04	0.25			
Queue Length 95th (ft)	76	3	0			
Control Delay (s)	19.9	1.5	0.0			
Lane LOS	C	A				
Approach Delay (s)	19.9	1.5	0.0			
Approach LOS	C					
Intersection Summary						
Average Delay			5.9			
Intersection Capacity Utilization			60.5%	ICU Level of Service	B	
Analysis Period (min)			15			

HCM Unsignalized Intersection Capacity Analysis
 17: Sedan Ave & Main Street

11/17/2009


























Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Volume (veh/h)	10	10	10	30	60	300	20	170	10	90	220	10
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Hourly flow rate (vph)	11	11	11	32	63	316	21	179	11	95	232	11
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	1000	658	237	668	658	184	242			189		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	1000	658	237	668	658	184	242			189		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	91	97	99	91	82	63	98			93		
cM capacity (veh/h)	113	352	802	336	352	858	1324			1384		
Direction, Lane #	EB 1	WB 1	NB 1	SB 1								
Volume Total	32	411	211	337								
Volume Left	11	32	21	95								
Volume Right	11	316	11	11								
cSH	233	640	1324	1384								
Volume to Capacity	0.14	0.64	0.02	0.07								
Queue Length 95th (ft)	12	116	1	6								
Control Delay (s)	22.9	20.1	0.9	2.6								
Lane LOS	C	C	A	A								
Approach Delay (s)	22.9	20.1	0.9	2.6								
Approach LOS	C	C										
Intersection Summary												
Average Delay			10.2									
Intersection Capacity Utilization			62.0%		ICU Level of Service					B		
Analysis Period (min)			15									

HCM Signalized Intersection Capacity Analysis

18: Sedan Ave & Austin Rd.

11/17/2009

												
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	
Lane Util. Factor	1.00	0.95		0.97	0.95	1.00	1.00	0.95	1.00	0.97	0.95	
Frt	1.00	0.97		1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.96	
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)	1770	3421		3433	3539	1583	1770	3539	1583	3433	3381	
Flt Permitted	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	
Satd. Flow (perm)	1770	3421		3433	3539	1583	1770	3539	1583	3433	3381	
Volume (vph)	30	140	40	650	630	450	110	240	170	240	260	110
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	32	147	42	684	663	474	116	253	179	253	274	116
RTOR Reduction (vph)	0	33	0	0	0	295	0	0	149	0	56	0
Lane Group Flow (vph)	32	156	0	684	663	179	116	253	30	253	334	0
Turn Type	Prot			Prot		Perm	Prot		Perm	Prot		
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases						8			2			
Actuated Green, G (s)	2.6	8.3		16.9	22.6	22.6	7.5	10.1	10.1	8.6	11.2	
Effective Green, g (s)	2.6	8.3		16.9	22.6	22.6	7.5	10.1	10.1	8.6	11.2	
Actuated g/C Ratio	0.04	0.14		0.28	0.38	0.38	0.13	0.17	0.17	0.14	0.19	
Clearance Time (s)	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	
Lane Grp Cap (vph)	77	474		969	1335	597	222	597	267	493	632	
v/s Ratio Prot	0.02	0.05		c0.20	c0.19		0.07	0.07		c0.07	c0.10	
v/s Ratio Perm						0.11			0.02			
v/c Ratio	0.42	0.33		0.71	0.50	0.30	0.52	0.42	0.11	0.51	0.53	
Uniform Delay, d1	27.9	23.3		19.3	14.3	13.1	24.5	22.3	21.1	23.7	22.0	
Progression Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	3.6	0.4		2.4	0.3	0.3	2.2	0.5	0.2	0.9	0.8	
Delay (s)	31.5	23.7		21.6	14.6	13.4	26.7	22.8	21.3	24.6	22.8	
Level of Service	C	C		C	B	B	C	C	C	C	C	
Approach Delay (s)		24.8			16.9			23.1			23.5	
Approach LOS		C			B			C			C	
Intersection Summary												
HCM Average Control Delay			19.8				HCM Level of Service				B	
HCM Volume to Capacity ratio			0.53									
Actuated Cycle Length (s)			59.9				Sum of lost time (s)				8.0	
Intersection Capacity Utilization			53.8%				ICU Level of Service				A	
Analysis Period (min)			15									
c	Critical Lane Group											

HCM Unsignalized Intersection Capacity Analysis
 19: W. River Rd & Jack Tone Rd

11/17/2009



Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations	↰	↱	↻		↰	↱
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Volume (veh/h)	90	30	240	120	160	360
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95
Hourly flow rate (vph)	95	32	253	126	168	379
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	1032	316			379	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1032	316			379	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	57	96			86	
cM capacity (veh/h)	221	725			1180	
Direction, Lane #	WB 1	WB 2	NB 1	SB 1	SB 2	
Volume Total	95	32	379	168	379	
Volume Left	95	0	0	168	0	
Volume Right	0	32	126	0	0	
cSH	221	725	1700	1180	1700	
Volume to Capacity	0.43	0.04	0.22	0.14	0.22	
Queue Length 95th (ft)	50	3	0	12	0	
Control Delay (s)	32.9	10.2	0.0	8.6	0.0	
Lane LOS	D	B		A		
Approach Delay (s)	27.2		0.0	2.6		
Approach LOS	D					
Intersection Summary						
Average Delay			4.6			
Intersection Capacity Utilization			43.8%		ICU Level of Service	A
Analysis Period (min)			15			

SIMTRAFFIC LEVEL OF SERVICE REPORT Including Upstream Delays

Project: ARBPRC **HCM:** 2000
Scenario: C+P **PHF:** 0.99
TOD: PM Peak Hr **Analysis Period:** 15 Minutes **# of Runs:** 10

Intersection: 20: Santos Ave & Jack Tone Rd **Type:** Signalized

Approach	Movement	Demand Volume	Volume Served			Delay/Veh (sec)		
			Avg	%	Std Dev	Avg	LOS	Std Dev
NB	L	25	25	100	7	18.8	B	--
	T	63	67	106	7	24.4	C	--
	R	43	42	98	5	5.2	A	--
	Subtotal	131	134	102	--	17.3	B	--
SB	L	8	8	100	4	31.6	C	--
	T	98	95	97	10	32.8	C	--
	R	8	8	100	3	21.2	C	--
	Subtotal	114	111	96	--	31.9	C	--
EB	L	10	10	100	3	23.6	C	--
	T	5	5	80	2	22.9	C	--
	R	25	24	96	4	3.9	A	--
	Subtotal	40	39	98	--	11.3	B	--
WB	L	28	27	96	4	28.7	C	--
	T	15	16	107	4	25.6	C	--
	R	18	18	100	5	4.4	A	--
	Subtotal	61	62	102	--	20.7	C	--
Total	346	346	100	--	21.9	C	--	

Intersection: 22: Colony Rd / SR 99 On-Ramps & Jack Tone Rd **Type:** Signalized

Approach	Movement	Demand Volume	Volume Served			Delay/Veh (sec)		
			Avg	%	Std Dev	Avg	LOS	Std Dev
NB	T	83	83	100	6	11.9	B	--
	R	126	135	107	12	11.4	B	--
	Subtotal	210	218	104	--	11.6	B	--
SB	L	18	16	89	5	32.0	C	--
	T	30	31	103	6	5.3	A	--
	R	68	67	99	8	6.0	A	--
	R2	35	32	91	6	1.7	A	--
	Subtotal	152	146	96	--	7.8	A	--
WB	L	38	36	95	7	29.1	C	--
	R	48	50	104	9	3.7	A	--
	L2	35	37	106	5	25.4	C	--
	Subtotal	121	123	102	--	17.6	B	--
Total	482	487	101	--	12.0	B	--	

SIMTRAFFIC LEVEL OF SERVICE REPORT Including Upstream Delays

Project: ARBPRC **HCM:** 2000
Scenario: C+P **PHF:** 0.99
TOD: PM Peak Hr **Analysis Period:** 15 Minutes **# of Runs:** 10

Intersection: 23: Colony Rd / SR 99 On-Ramps & Hoff Rd/SR 99 **Type:** Un-Signalized

Approach	Movement	Demand Volume	Volume Served			Delay/Veh (sec)		
			Avg	%	Std Dev	Avg	LOS	Std Dev
NB	L	68	68	100	8	14.0	B	--
	T	15	15	100	3	10.2	B	--
	R	13	13	100	4	6.6	A	--
	Subtotal	96	96	100	--	12.4	B	--
SB	L	10	9	90	3	10.0	A	--
	T	8	7	88	3	8.2	A	--
	R	5	4	80	2	3.5	A	--
	Subtotal	23	20	87	--	8.1	A	--
EB	L	3	3	100	1	6.6	A	--
	T	88	92	105	10	9.7	A	--
	R	53	59	111	9	4.1	A	--
	Subtotal	144	154	107	--	7.5	A	--
WB	L	23	21	91	5	11.5	B	--
	T	48	50	104	6	8.8	A	--
	R	10	10	100	3	4.4	A	--
	Subtotal	81	80	99	--	8.9	A	--
Total	343	350	102	--	9.2	A	--	

Intersection: 24: SR 99 SB & Jack Tone Rd **Type:** Signalized

Approach	Movement	Demand Volume	Volume Served			Delay/Veh (sec)		
			Avg	%	Std Dev	Avg	LOS	Std Dev
NB	T	124	127	102	13	12.4	B	--
	R	66	65	98	6	7.0	A	--
	Subtotal	189	192	102	--	10.6	B	--
SB	T	66	67	102	5	8.7	A	--
	Subtotal	66	67	102	--	8.7	A	--
EB	L	86	91	106	9	21.8	C	--
	R	121	122	101	8	14.7	B	--
	Subtotal	207	213	103	--	17.7	B	--
Total	462	472	102	--	13.5	B	--	

HCM Unsignalized Intersection Capacity Analysis
 25: Ripon Rd & Austin Rd.

11/17/2009



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Sign Control		Stop			Stop			Stop			Stop	
Volume (vph)	30	200	10	20	80	230	10	40	30	1020	30	20
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Hourly flow rate (vph)	32	211	11	21	84	242	11	42	32	1074	32	21

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total (vph)	253	347	84	1126
Volume Left (vph)	32	21	11	1074
Volume Right (vph)	11	242	32	21
Hadj (s)	0.03	-0.37	-0.17	0.21
Departure Headway (s)	6.9	6.3	7.1	6.3
Degree Utilization, x	0.48	0.61	0.17	1.97
Capacity (veh/h)	498	558	445	579
Control Delay (s)	16.1	18.5	11.5	458.2
Approach Delay (s)	16.1	18.5	11.5	458.2
Approach LOS	C	C	B	F

Intersection Summary			
Delay		291.4	
HCM Level of Service		F	
Intersection Capacity Utilization	94.9%		ICU Level of Service F
Analysis Period (min)		15	

HCM Signalized Intersection Capacity Analysis

26: Ripon Rd & Jack Tone Rd

11/17/2009



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	0.95		1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Frt	1.00	0.99		1.00	1.00	0.85	1.00	0.97		1.00	0.93	
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770	3512		1770	1863	1583	1770	1799		1770	1739	
Flt Permitted	0.95	1.00		0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (perm)	1770	3512		1770	1863	1583	1770	1799		1770	1739	
Volume (vph)	340	750	40	60	290	140	50	170	50	150	240	190
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	358	789	42	63	305	147	53	179	53	158	253	200
RTOR Reduction (vph)	0	3	0	0	0	117	0	9	0	0	24	0
Lane Group Flow (vph)	358	828	0	63	305	30	53	223	0	158	429	0
Turn Type	Prot			Prot		Perm	Prot			Prot		
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases						8						
Actuated Green, G (s)	22.6	36.1		7.6	21.1	21.1	7.1	29.5		13.8	36.2	
Effective Green, g (s)	22.6	36.1		7.6	21.1	21.1	7.1	29.5		13.8	36.2	
Actuated g/C Ratio	0.22	0.35		0.07	0.20	0.20	0.07	0.29		0.13	0.35	
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)	388	1231		131	382	324	122	515		237	611	
v/s Ratio Prot	c0.20	0.24		0.04	c0.16		0.03	0.12		c0.09	c0.25	
v/s Ratio Perm						0.02						
v/c Ratio	0.92	0.67		0.48	0.80	0.09	0.43	0.43		0.67	0.70	
Uniform Delay, d1	39.3	28.4		45.8	38.9	33.2	46.0	29.9		42.4	28.8	
Progression Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Incremental Delay, d2	27.1	1.5		2.8	11.1	0.1	2.5	2.6		6.9	6.6	
Delay (s)	66.5	29.9		48.6	50.0	33.3	48.5	32.6		49.3	35.4	
Level of Service	E	C		D	D	C	D	C		D	D	
Approach Delay (s)		40.9			45.1			35.5			39.0	
Approach LOS		D			D			D			D	

Intersection Summary

HCM Average Control Delay	40.7	HCM Level of Service	D
HCM Volume to Capacity ratio	0.76		
Actuated Cycle Length (s)	103.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	75.0%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			

Technical Appendix I
Cumulative Plus Project Conditions
Signal Warrant Analysis

Major Street **Main St.**
 Minor Street **Woodward Ave.**

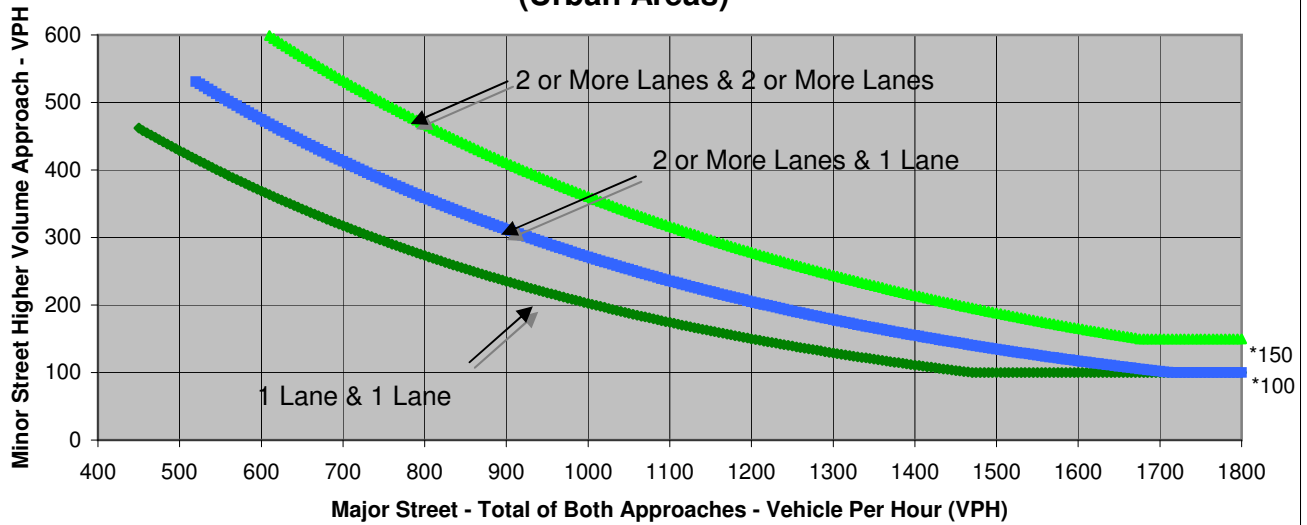
 Project **Austin Road Business Park**
 Scenario **Cumulative Plus Project Conditions**
 Peak Hour **AM**
Turn Movement Volumes

	NB	SB	EB	WB
Left	150	360	410	30
Through	330	130	310	830
Right	30	180	50	510
Total	510	670	770	1,370

Major Street Direction

x	North/South
	East/West

**Figure 4C-3
Warrant 3, Peak Hour
(Urban Areas)**



* Note: 150 VPH APPLIES AS THE LOWER THRESHOLD VOLUME FOR A MINOR STREET APPROACH WITH TWO OR MORE LANES AND 100 VPH APPLIES AS THE LOWER THRESHOLD VOLUME FOR A MINOR STREET APPROACHING WITH ONE LANE.

Source: *California Manual on Uniform Traffic Control Devices*, Caltrans, 2006

	Major Street Main St.	Minor Street Woodward Ave.	Warrant Met
Number of Approach Lanes	1	1	<u>YES</u>
Traffic Volume (VPH) *	1,180	1,370	

* Note: Traffic Volume for Major Street is Total Volume of Both Approaches.
 Traffic Volume for Minor Street is the Volume of High Volume Approach.

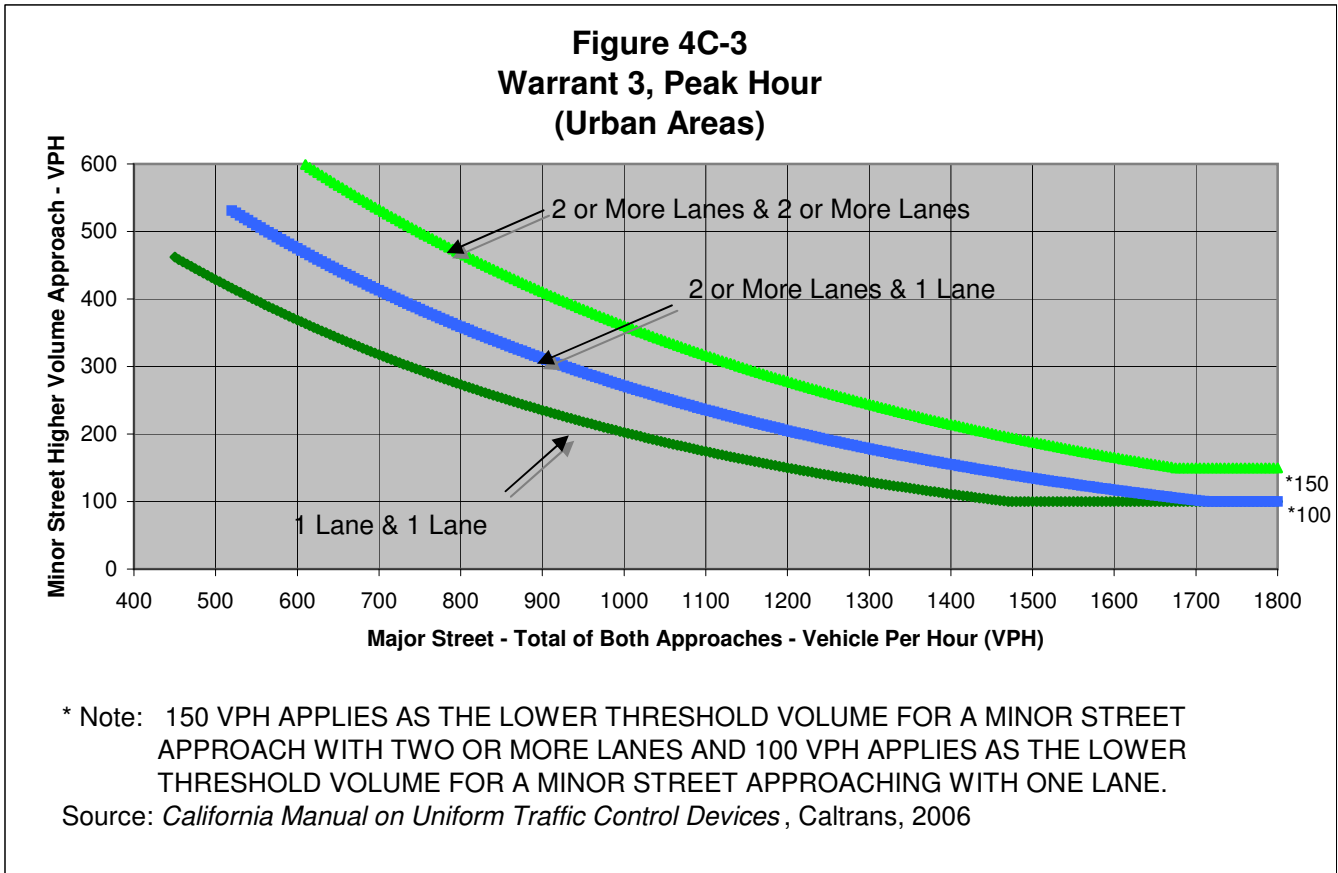
Major Street **Industrial Park Dr.**
 Minor Street **Van Ryn Ave.**

 Project **Austin Road Business Park**
 Scenario **Cumulative Plus Project Conditions**
 Peak Hour **AM**
Turn Movement Volumes

	NB	SB	EB	WB
Left	60	0	0	240
Through	0	0	140	120
Right	630	0	10	0
Total	690	0	150	360

Major Street Direction

	North/South
x	East/West



	Major Street Industrial Park Dr.	Minor Street Van Ryn Ave.	<u>Warrant Met</u>
Number of Approach Lanes	1	1	<u>YES</u>
Traffic Volume (VPH) *	510	690	

* Note: Traffic Volume for Major Street is Total Volume of Both Approaches.
 Traffic Volume for Minor Street is the Volume of High Volume Approach.

Major Street **Woodward Ave.**
 Minor Street **Van Ryn Ave.**

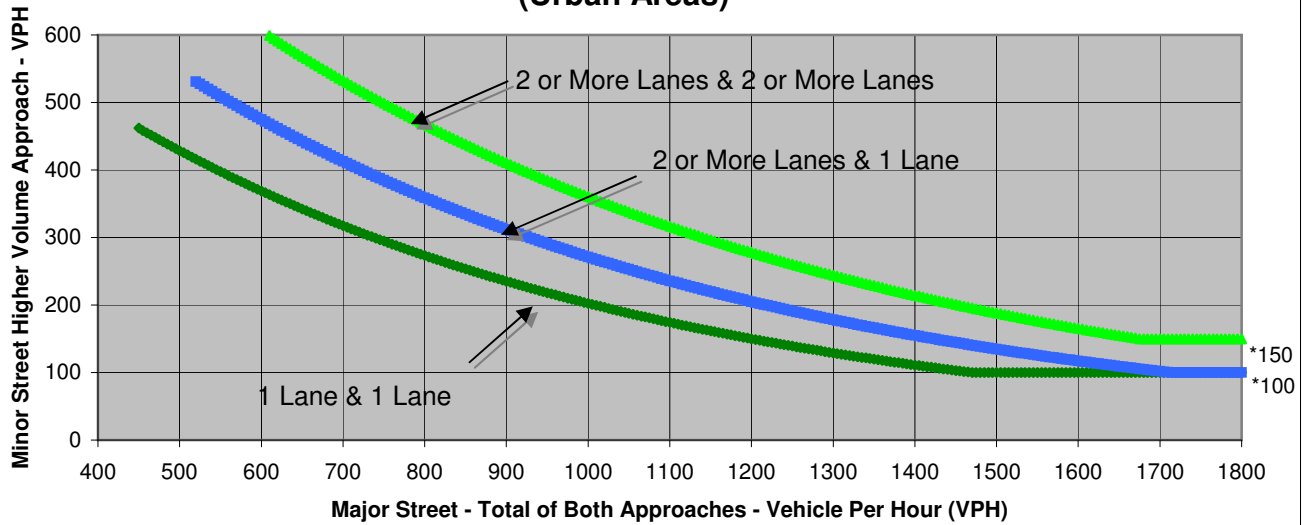
 Project **Austin Road Business Park**
 Scenario **Cumulative Plus Project Conditions**
 Peak Hour **AM**
Turn Movement Volumes

	NB	SB	EB	WB
Left	0	30	150	0
Through	0	0	840	840
Right	0	90	0	40
Total	0	120	990	880

Major Street Direction

	North/South
x	East/West

**Figure 4C-3
Warrant 3, Peak Hour
(Urban Areas)**



* Note: 150 VPH APPLIES AS THE LOWER THRESHOLD VOLUME FOR A MINOR STREET APPROACH WITH TWO OR MORE LANES AND 100 VPH APPLIES AS THE LOWER THRESHOLD VOLUME FOR A MINOR STREET APPROACHING WITH ONE LANE.

Source: *California Manual on Uniform Traffic Control Devices*, Caltrans, 2006

	Major Street Woodward Ave.	Minor Street Van Ryn Ave.	Warrant Met
Number of Approach Lanes	2	1	YES
Traffic Volume (VPH) *	1,870	120	

* Note: Traffic Volume for Major Street is Total Volume of Both Approaches.
 Traffic Volume for Minor Street is the Volume of High Volume Approach.

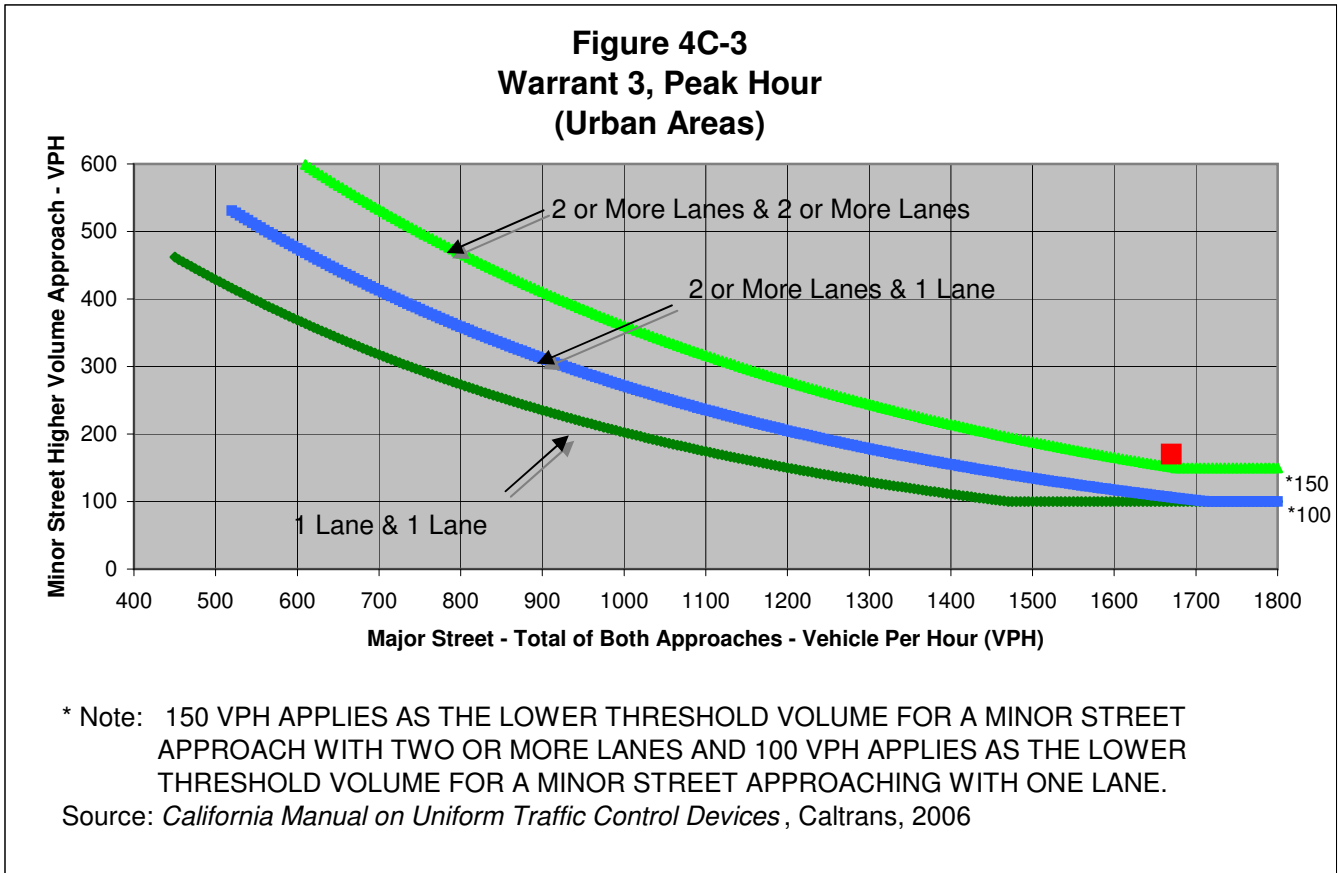
Major Street **Woodward Ave.**
 Minor Street **Pillsbury Rd.**

 Project **Austin Road Business Park**
 Scenario **Cumulative Plus Project Conditions**
 Peak Hour **AM**
Turn Movement Volumes

	NB	SB	EB	WB
Left	100	0	0	0
Through	0	0	830	780
Right	70	0	40	20
Total	170	0	870	800

Major Street Direction

	North/South
x	East/West



	Major Street Woodward Ave.	Minor Street Pillsbury Rd.	<u>Warrant Met</u>
Number of Approach Lanes	1	1	<u>YES</u>
Traffic Volume (VPH) *	1,670	170	

* Note: Traffic Volume for Major Street is Total Volume of Both Approaches.
 Traffic Volume for Minor Street is the Volume of High Volume Approach.

Major Street **Atherton Dr.**
 Minor Street **Woodward Ave.**

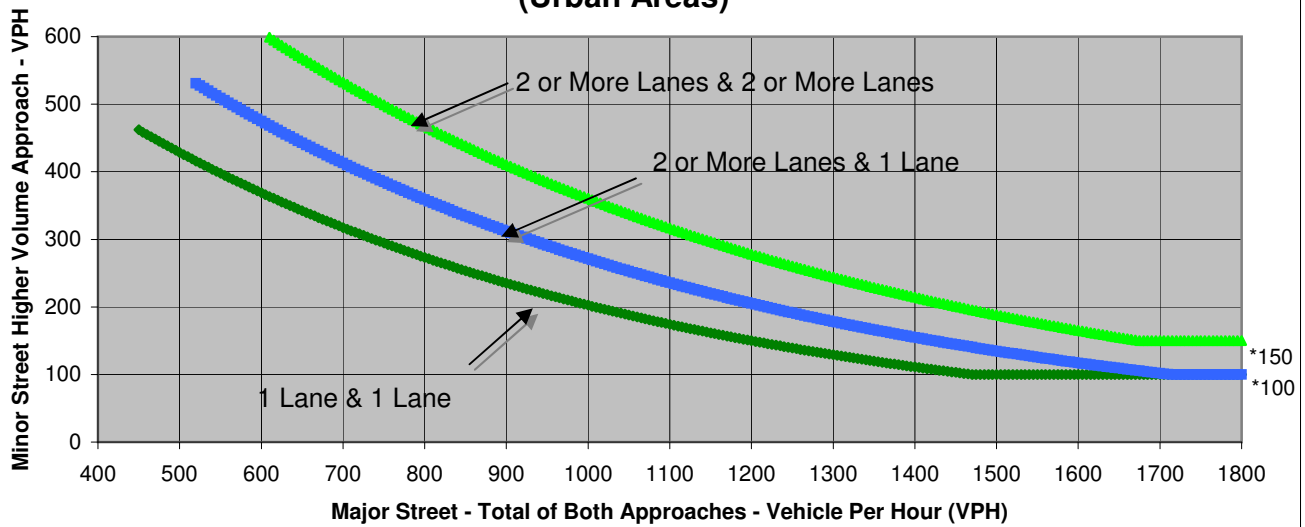
 Project **Austin Road Business Park**
 Scenario **Cumulative Plus Project Conditions**
 Peak Hour **AM**
Turn Movement Volumes

	NB	SB	EB	WB
Left	350	60	10	300
Through	80	120	460	430
Right	150	10	560	100
Total	580	190	1,030	830

Major Street Direction

x	North/South
	East/West

**Figure 4C-3
Warrant 3, Peak Hour
(Urban Areas)**



* Note: 150 VPH APPLIES AS THE LOWER THRESHOLD VOLUME FOR A MINOR STREET APPROACH WITH TWO OR MORE LANES AND 100 VPH APPLIES AS THE LOWER THRESHOLD VOLUME FOR A MINOR STREET APPROACHING WITH ONE LANE.

Source: *California Manual on Uniform Traffic Control Devices*, Caltrans, 2006

	Major Street Atherton Dr.	Minor Street Woodward Ave.	Warrant Met
Number of Approach Lanes	2	1	<u>YES</u>
Traffic Volume (VPH) *	770	1,030	

* Note: Traffic Volume for Major Street is Total Volume of Both Approaches.
 Traffic Volume for Minor Street is the Volume of High Volume Approach.

Major Street **Moffat Blvd.**
 Minor Street **Woodward Ave.**

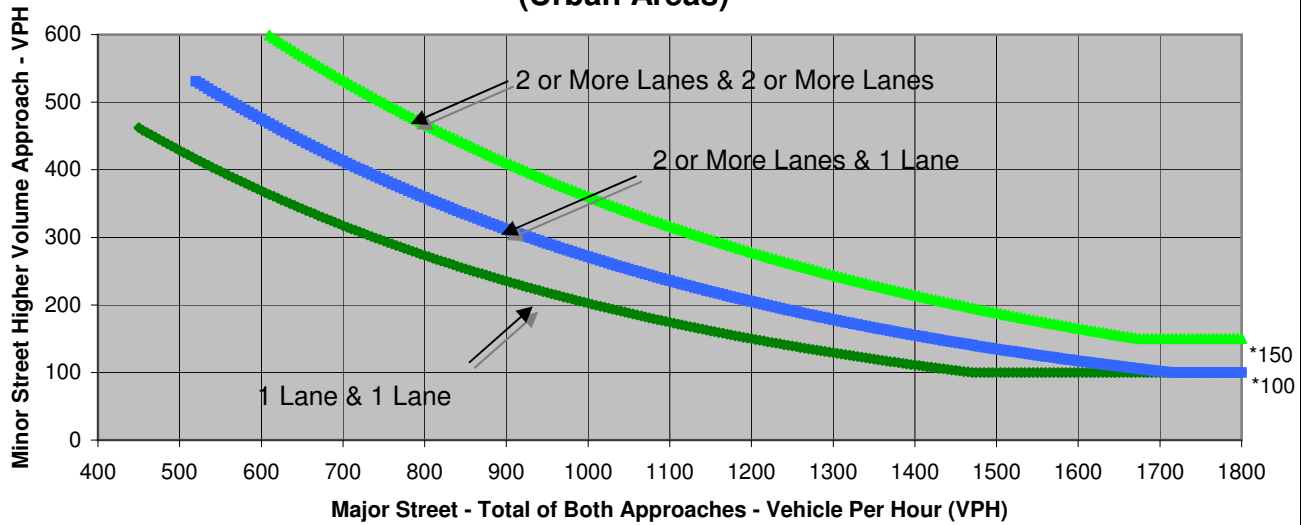
 Project **Austin Road Business Park**
 Scenario **Cumulative Plus Project Conditions**
 Peak Hour **AM**
Turn Movement Volumes

	NB	SB	EB	WB
Left	690	0	210	0
Through	290	160	0	0
Right	0	140	460	0
Total	980	300	670	0

Major Street Direction

x	North/South
	East/West

**Figure 4C-3
Warrant 3, Peak Hour
(Urban Areas)**



* Note: 150 VPH APPLIES AS THE LOWER THRESHOLD VOLUME FOR A MINOR STREET APPROACH WITH TWO OR MORE LANES AND 100 VPH APPLIES AS THE LOWER THRESHOLD VOLUME FOR A MINOR STREET APPROACHING WITH ONE LANE.

Source: *California Manual on Uniform Traffic Control Devices*, Caltrans, 2006

	Major Street Moffat Blvd.	Minor Street Woodward Ave.	Warrant Met
Number of Approach Lanes	1	1	<u>YES</u>
Traffic Volume (VPH) *	1,280	670	

* Note: Traffic Volume for Major Street is Total Volume of Both Approaches.
 Traffic Volume for Minor Street is the Volume of High Volume Approach.

Major Street **SR-99 SB Off-Ramp**
 Minor Street **Moffat Blvd.**

Project **Austin Road Business Park**
 Scenario **Cumulative Plus Project Conditions**
 Peak Hour **AM**

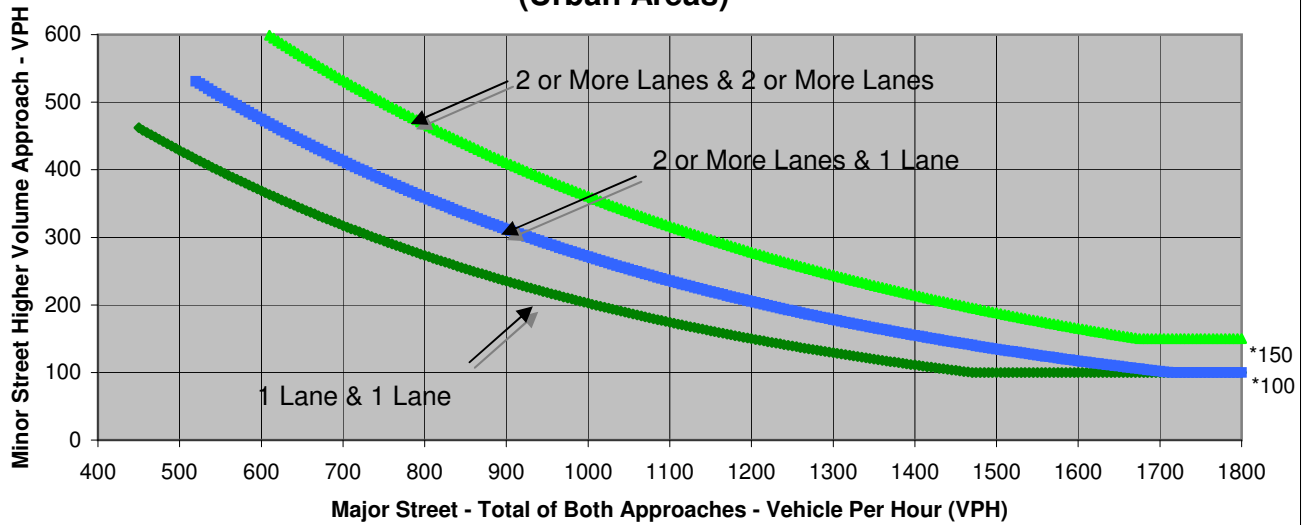
Turn Movement Volumes

	NB	SB	EB	WB
Left	0	850	0	0
Through	0	0	620	750
Right	0	230	0	0
Total	0	1,080	620	750

Major Street Direction

x	North/South
	East/West

**Figure 4C-3
 Warrant 3, Peak Hour
 (Urban Areas)**



* Note: 150 VPH APPLIES AS THE LOWER THRESHOLD VOLUME FOR A MINOR STREET APPROACH WITH TWO OR MORE LANES AND 100 VPH APPLIES AS THE LOWER THRESHOLD VOLUME FOR A MINOR STREET APPROACHING WITH ONE LANE.

Source: *California Manual on Uniform Traffic Control Devices*, Caltrans, 2006

	Major Street	Minor Street	<u>Warrant Met</u>
	SR-99 SB Off-Ramp	Moffat Blvd.	
Number of Approach Lanes	1	1	<u>YES</u>
Traffic Volume (VPH) *	1,080	750	

* Note: Traffic Volume for Major Street is Total Volume of Both Approaches.
 Traffic Volume for Minor Street is the Volume of High Volume Approach.

Major Street **Austin Rd.**
 Minor Street **SR-99 NB Ramps**

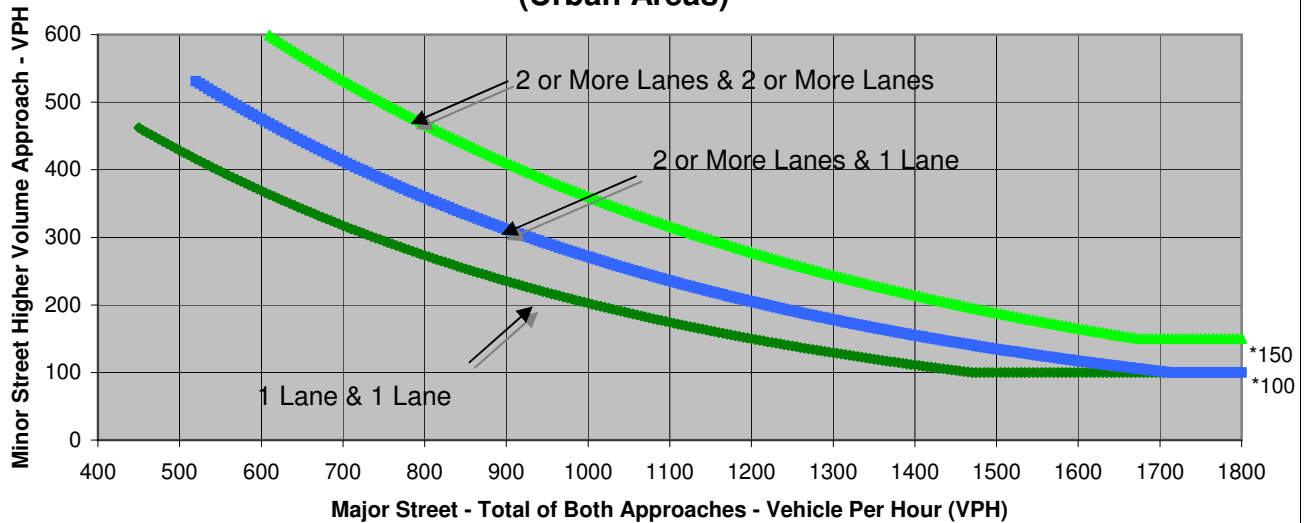
 Project **Austin Road Business Park**
 Scenario **Cumulative Plus Project Conditions**
 Peak Hour **AM**
Turn Movement Volumes

	NB	SB	EB	WB
Left	800	0	0	760
Through	160	220	0	0
Right	0	90	0	90
Total	960	310	0	850

Major Street Direction

x	North/South
	East/West

**Figure 4C-3
Warrant 3, Peak Hour
(Urban Areas)**



* Note: 150 VPH APPLIES AS THE LOWER THRESHOLD VOLUME FOR A MINOR STREET APPROACH WITH TWO OR MORE LANES AND 100 VPH APPLIES AS THE LOWER THRESHOLD VOLUME FOR A MINOR STREET APPROACHING WITH ONE LANE.

Source: *California Manual on Uniform Traffic Control Devices*, Caltrans, 2006

	Major Street Austin Rd.	Minor Street SR-99 NB Ramps	Warrant Met
Number of Approach Lanes	1	1	<u>YES</u>
Traffic Volume (VPH) *	1,270	850	

* Note: Traffic Volume for Major Street is Total Volume of Both Approaches.
 Traffic Volume for Minor Street is the Volume of High Volume Approach.

Major Street **Austin Rd.**
 Minor Street **Moffat Blvd / SR-99 SB On-Ramp**

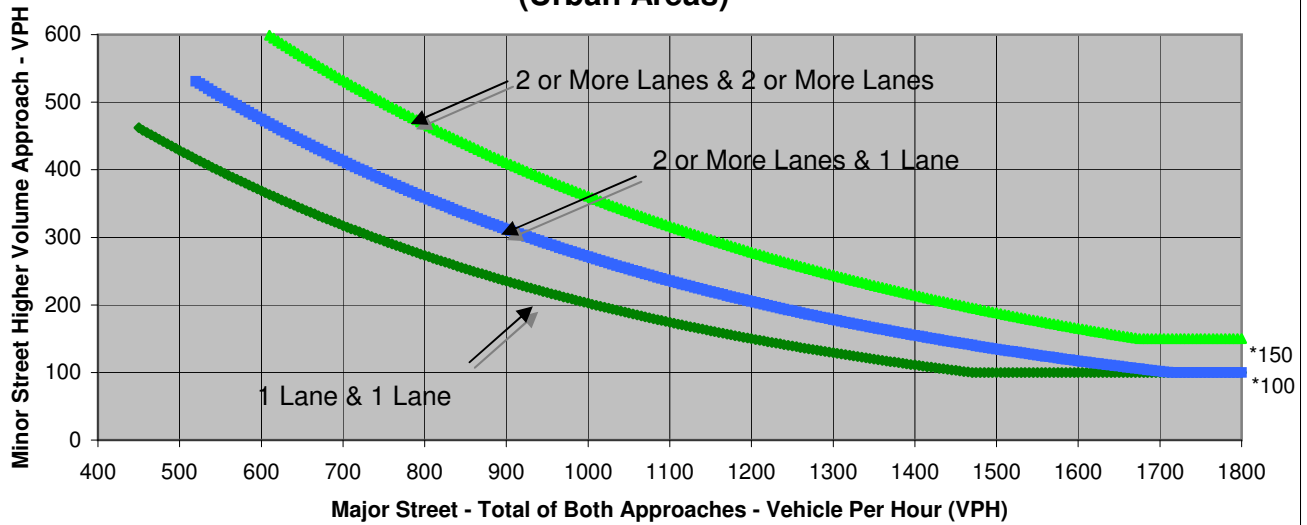
 Project **Austin Road Business Park**
 Scenario **Cumulative Plus Project Conditions**
 Peak Hour **AM**
Turn Movement Volumes

	NB	SB	EB	WB
Left	420	50	230	10
Through	720	610	240	10
Right	380	320	1,000	10
Total	1,520	980	1,470	30

Major Street Direction

x	North/South
	East/West

**Figure 4C-3
Warrant 3, Peak Hour
(Urban Areas)**



* Note: 150 VPH APPLIES AS THE LOWER THRESHOLD VOLUME FOR A MINOR STREET APPROACH WITH TWO OR MORE LANES AND 100 VPH APPLIES AS THE LOWER THRESHOLD VOLUME FOR A MINOR STREET APPROACHING WITH ONE LANE.

Source: *California Manual on Uniform Traffic Control Devices*, Caltrans, 2006

	Major Street	Minor Street	Warrant Met
	Austin Rd.	Moffat Blvd / SR-99 SB On-Ramp	
Number of Approach Lanes	1	1	<u>YES</u>
Traffic Volume (VPH) *	2,500	1,470	

* Note: Traffic Volume for Major Street is Total Volume of Both Approaches.
 Traffic Volume for Minor Street is the Volume of High Volume Approach.

Major Street **Austin Rd.**
 Minor Street **Ripon Rd.**

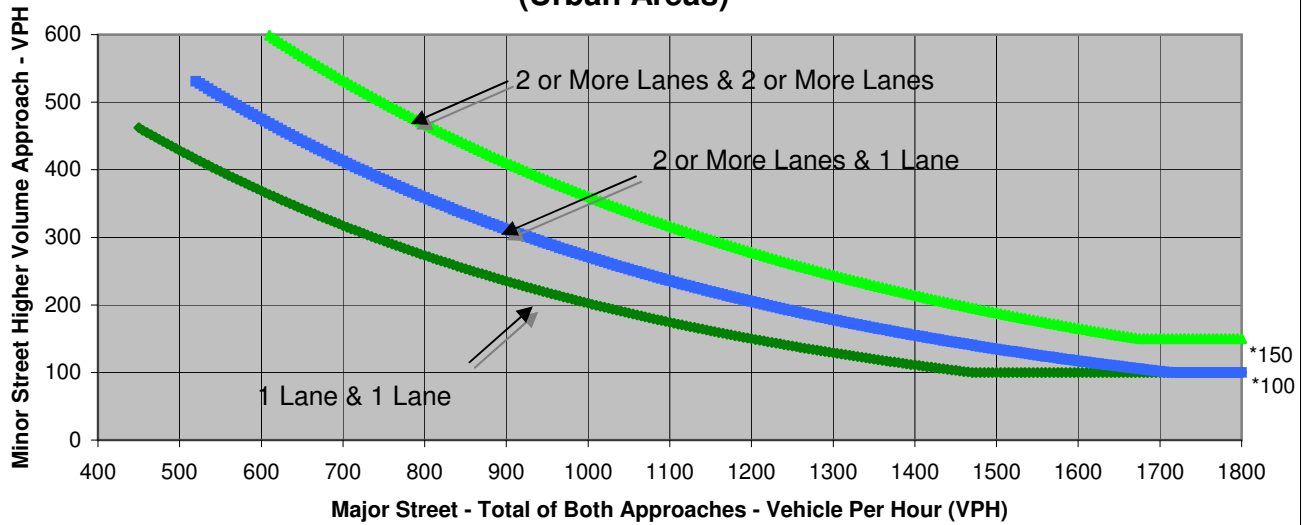
 Project **Austin Road Business Park**
 Scenario **Cumulative Plus Project Conditions**
 Peak Hour **AM**
Turn Movement Volumes

	NB	SB	EB	WB
Left	10	40	10	20
Through	30	20	120	130
Right	30	20	10	800
Total	70	80	140	950

Major Street Direction

x	North/South
	East/West

**Figure 4C-3
Warrant 3, Peak Hour
(Urban Areas)**



* Note: 150 VPH APPLIES AS THE LOWER THRESHOLD VOLUME FOR A MINOR STREET APPROACH WITH TWO OR MORE LANES AND 100 VPH APPLIES AS THE LOWER THRESHOLD VOLUME FOR A MINOR STREET APPROACHING WITH ONE LANE.

Source: *California Manual on Uniform Traffic Control Devices*, Caltrans, 2006

	Major Street Austin Rd.	Minor Street Ripon Rd.	Warrant Met
Number of Approach Lanes	1	1	<u>YES</u>
Traffic Volume (VPH) *	150	950	

* Note: Traffic Volume for Major Street is Total Volume of Both Approaches.
 Traffic Volume for Minor Street is the Volume of High Volume Approach.



Sheet No **1** of **10**

Major Street **Main St.**
 Minor Street **Woodward Ave.**

Project **Austin Road Business Park**
 Scenario **Cumulative Plus Project Conditions**
 Peak Hour **PM**

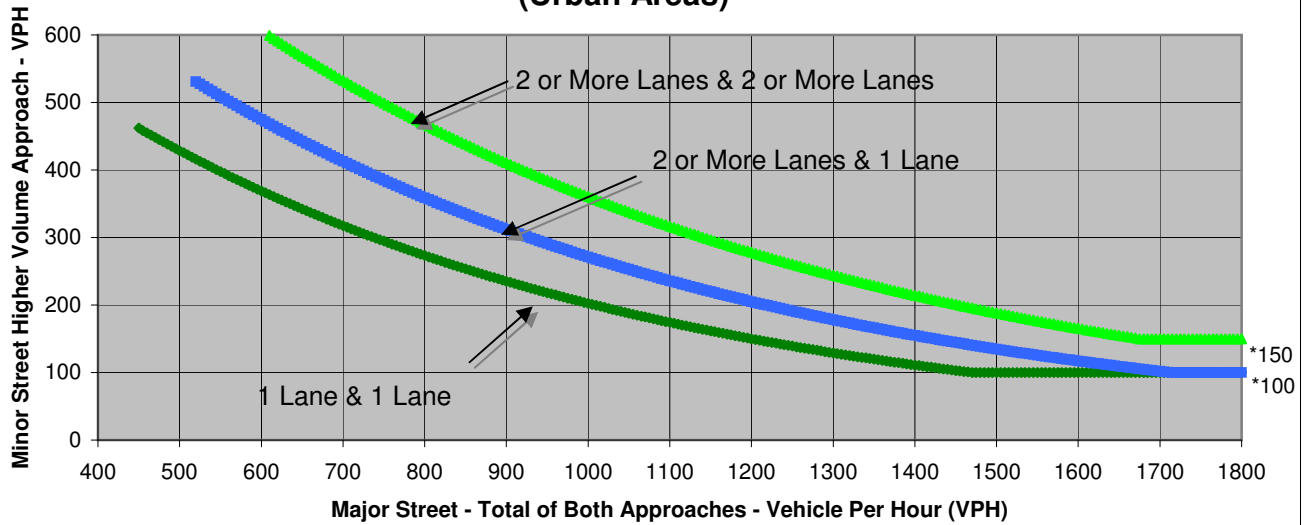
Turn Movement Volumes

	NB	SB	EB	WB
Left	160	620	280	100
Through	350	380	770	650
Right	40	460	230	370
Total	550	1,460	1,280	1,120

Major Street Direction

x	North/South
	East/West

**Figure 4C-3
 Warrant 3, Peak Hour
 (Urban Areas)**



* Note: 150 VPH APPLIES AS THE LOWER THRESHOLD VOLUME FOR A MINOR STREET APPROACH WITH TWO OR MORE LANES AND 100 VPH APPLIES AS THE LOWER THRESHOLD VOLUME FOR A MINOR STREET APPROACHING WITH ONE LANE.

Source: *California Manual on Uniform Traffic Control Devices*, Caltrans, 2006

	Major Street Main St.	Minor Street Woodward Ave.	Warrant Met
Number of Approach Lanes	1	1	<u>YES</u>
Traffic Volume (VPH) *	2,010	1,280	

* Note: Traffic Volume for Major Street is Total Volume of Both Approaches.
 Traffic Volume for Minor Street is the Volume of High Volume Approach.

Major Street **Industrial Park Dr.**
 Minor Street **Van Ryn Ave.**

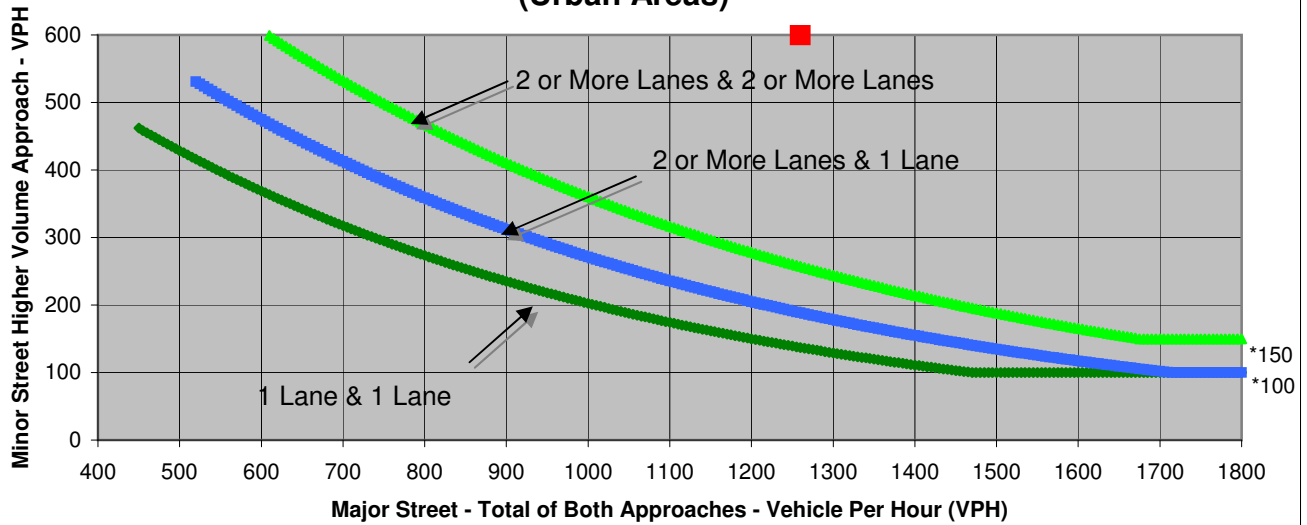
 Project **Austin Road Business Park**
 Scenario **Cumulative Plus Project Conditions**
 Peak Hour **PM**
Turn Movement Volumes

	NB	SB	EB	WB
Left	80	0	0	630
Through	0	0	290	230
Right	520	0	110	0
Total	600	0	400	860

Major Street Direction

	North/South
x	East/West

**Figure 4C-3
Warrant 3, Peak Hour
(Urban Areas)**



* Note: 150 VPH APPLIES AS THE LOWER THRESHOLD VOLUME FOR A MINOR STREET APPROACH WITH TWO OR MORE LANES AND 100 VPH APPLIES AS THE LOWER THRESHOLD VOLUME FOR A MINOR STREET APPROACHING WITH ONE LANE.

Source: *California Manual on Uniform Traffic Control Devices*, Caltrans, 2006

	Major Street Industrial Park Dr.	Minor Street Van Ryn Ave.	Warrant Met
Number of Approach Lanes	1	1	<u>YES</u>
Traffic Volume (VPH) *	1,260	600	

* Note: Traffic Volume for Major Street is Total Volume of Both Approaches.
 Traffic Volume for Minor Street is the Volume of High Volume Approach.

Major Street **Woodward Ave.**
 Minor Street **Van Ryn Ave.**

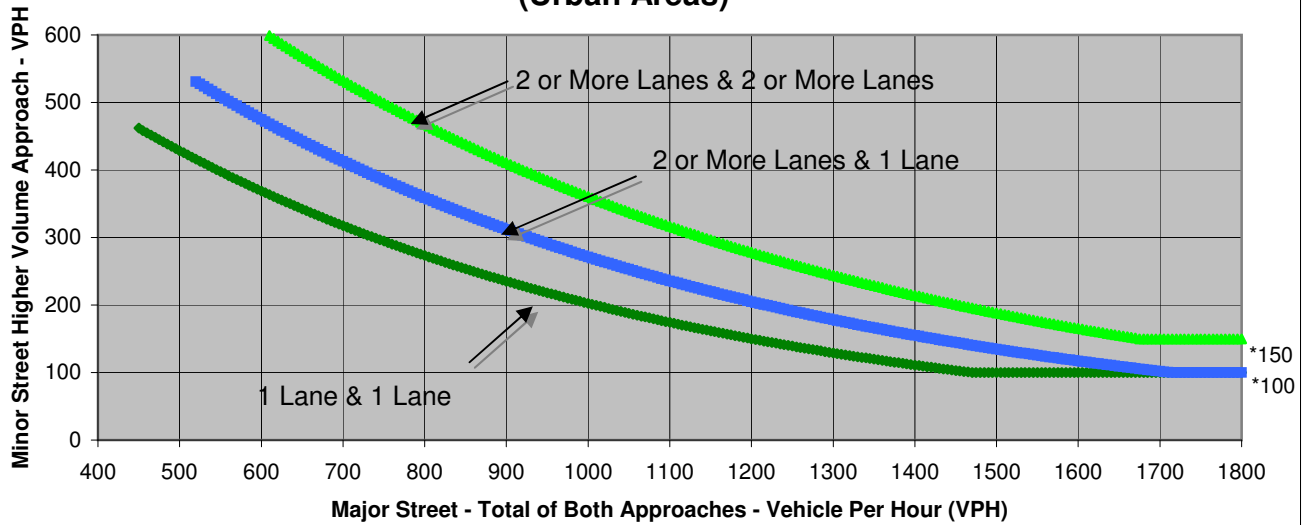
 Project **Austin Road Business Park**
 Scenario **Cumulative Plus Project Conditions**
 Peak Hour **PM**
Turn Movement Volumes

	NB	SB	EB	WB
Left	0	60	140	0
Through	0	0	830	1,100
Right	0	300	0	30
Total	0	360	970	1,130

Major Street Direction

	North/South
x	East/West

**Figure 4C-3
Warrant 3, Peak Hour
(Urban Areas)**



* Note: 150 VPH APPLIES AS THE LOWER THRESHOLD VOLUME FOR A MINOR STREET APPROACH WITH TWO OR MORE LANES AND 100 VPH APPLIES AS THE LOWER THRESHOLD VOLUME FOR A MINOR STREET APPROACHING WITH ONE LANE.

Source: *California Manual on Uniform Traffic Control Devices*, Caltrans, 2006

	Major Street Woodward Ave.	Minor Street Van Ryn Ave.	Warrant Met
Number of Approach Lanes	1	1	<u>YES</u>
Traffic Volume (VPH) *	2,100	360	

* Note: Traffic Volume for Major Street is Total Volume of Both Approaches.
 Traffic Volume for Minor Street is the Volume of High Volume Approach.

Major Street **Woodward Ave.**
 Minor Street **Pillsbury Rd.**

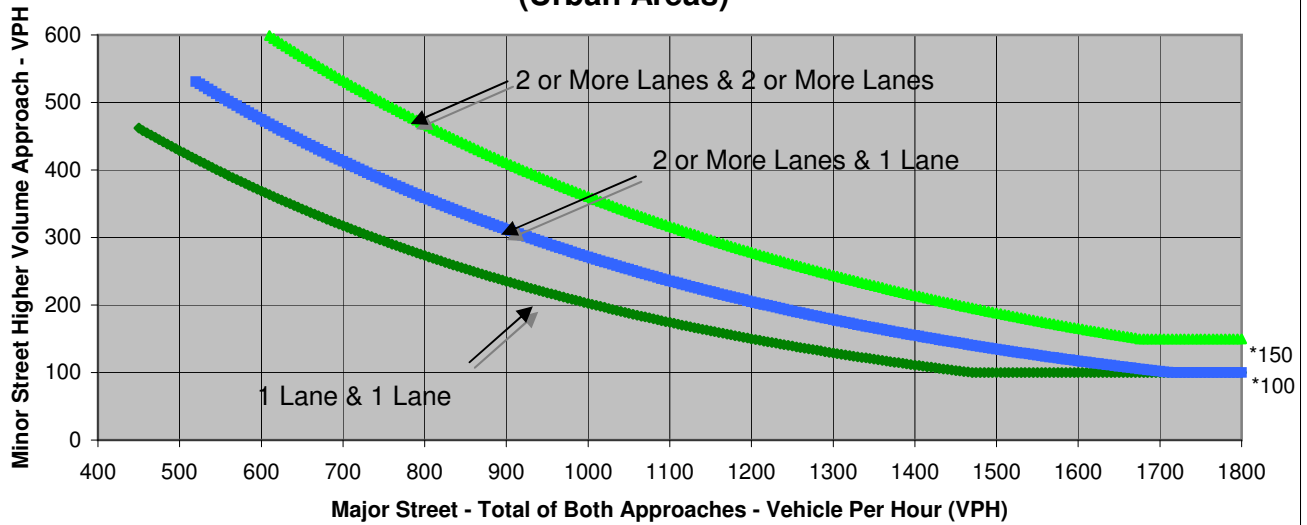
 Project **Austin Road Business Park**
 Scenario **Cumulative Plus Project Conditions**
 Peak Hour **PM**
Turn Movement Volumes

	NB	SB	EB	WB
Left	60	0	0	60
Through	0	0	760	1,070
Right	30	0	130	0
Total	90	0	890	1,130

Major Street Direction

	North/South
x	East/West

**Figure 4C-3
Warrant 3, Peak Hour
(Urban Areas)**



* Note: 150 VPH APPLIES AS THE LOWER THRESHOLD VOLUME FOR A MINOR STREET APPROACH WITH TWO OR MORE LANES AND 100 VPH APPLIES AS THE LOWER THRESHOLD VOLUME FOR A MINOR STREET APPROACHING WITH ONE LANE.

Source: *California Manual on Uniform Traffic Control Devices*, Caltrans, 2006

	Major Street Woodward Ave.	Minor Street Pillsbury Rd.	Warrant Met
Number of Approach Lanes	1	1	<u>NO</u>
Traffic Volume (VPH) *	2,020	90	

* Note: Traffic Volume for Major Street is Total Volume of Both Approaches.
 Traffic Volume for Minor Street is the Volume of High Volume Approach.

Major Street **Atherton Dr.**
 Minor Street **Woodward Ave.**

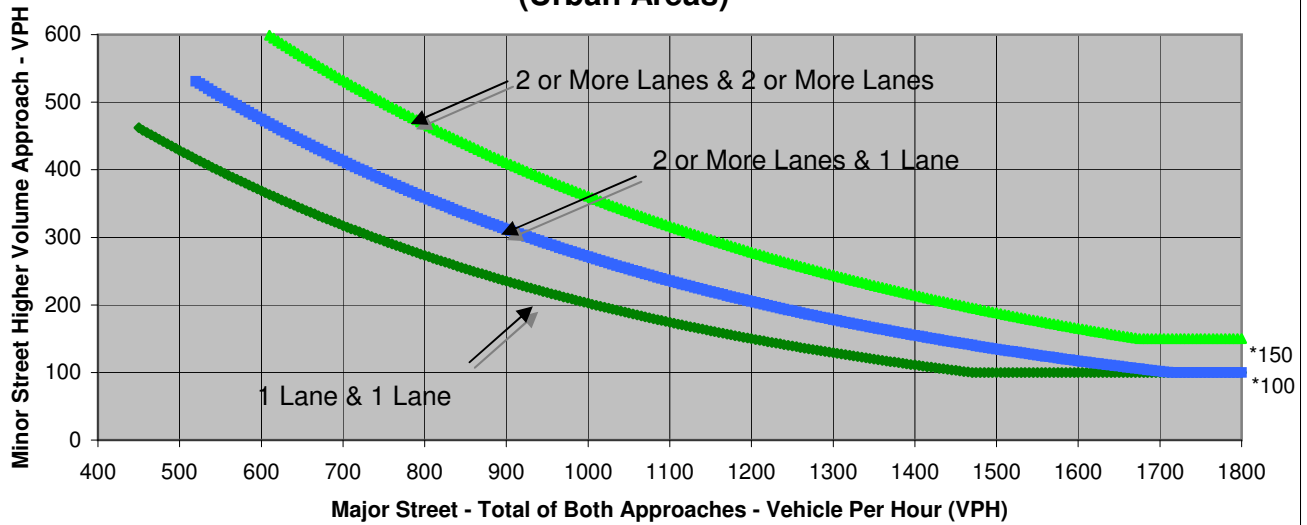
 Project **Austin Road Business Park**
 Scenario **Cumulative Plus Project Conditions**
 Peak Hour **PM**
Turn Movement Volumes

	NB	SB	EB	WB
Left	640	140	10	330
Through	350	220	370	620
Right	340	10	410	70
Total	1,330	370	790	1,020

Major Street Direction

x	North/South
	East/West

**Figure 4C-3
Warrant 3, Peak Hour
(Urban Areas)**



* Note: 150 VPH APPLIES AS THE LOWER THRESHOLD VOLUME FOR A MINOR STREET APPROACH WITH TWO OR MORE LANES AND 100 VPH APPLIES AS THE LOWER THRESHOLD VOLUME FOR A MINOR STREET APPROACHING WITH ONE LANE.

Source: *California Manual on Uniform Traffic Control Devices*, Caltrans, 2006

	Major Street Atherton Dr.	Minor Street Woodward Ave.	Warrant Met
Number of Approach Lanes	2	1	<u>YES</u>
Traffic Volume (VPH) *	1,700	1,020	

* Note: Traffic Volume for Major Street is Total Volume of Both Approaches.
 Traffic Volume for Minor Street is the Volume of High Volume Approach.

Major Street **Moffat Blvd.**
Minor Street **Woodward Ave.**

Project **Austin Road Business Park**
Scenario **Cumulative Plus Project Conditions**
Peak Hour **PM**

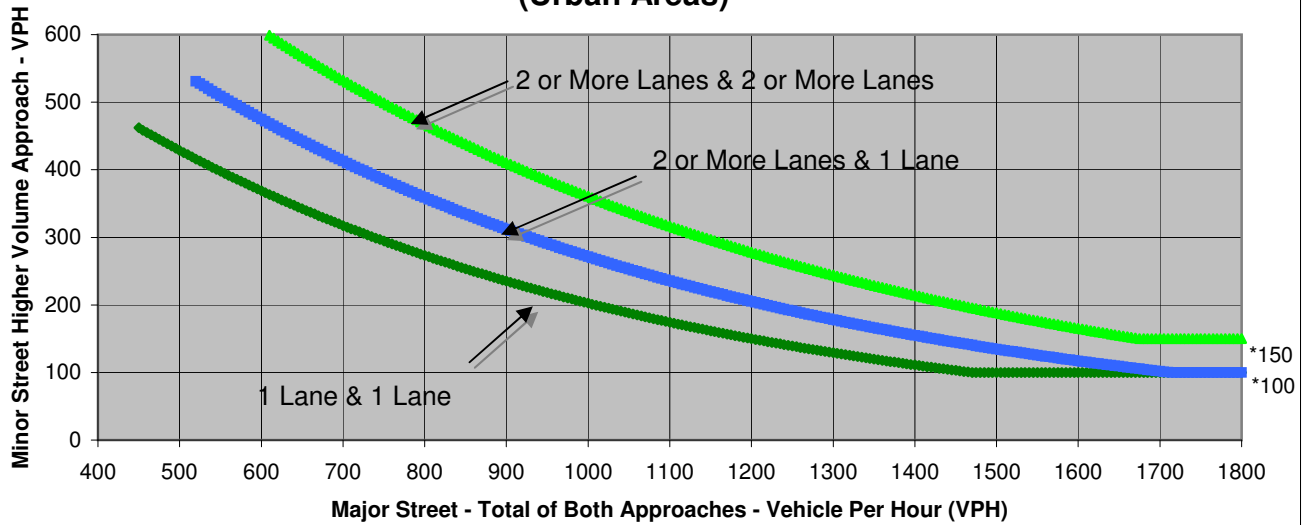
Turn Movement Volumes

	NB	SB	EB	WB
Left	730	0	280	0
Through	290	310	0	0
Right	0	290	570	0
Total	1,020	600	850	0

Major Street Direction

x	North/South
	East/West

**Figure 4C-3
Warrant 3, Peak Hour
(Urban Areas)**



* Note: 150 VPH APPLIES AS THE LOWER THRESHOLD VOLUME FOR A MINOR STREET APPROACH WITH TWO OR MORE LANES AND 100 VPH APPLIES AS THE LOWER THRESHOLD VOLUME FOR A MINOR STREET APPROACHING WITH ONE LANE.

Source: *California Manual on Uniform Traffic Control Devices*, Caltrans, 2006

	Major Street Moffat Blvd.	Minor Street Woodward Ave.	Warrant Met
Number of Approach Lanes	1	1	<u>YES</u>
Traffic Volume (VPH) *	1,620	850	

* Note: Traffic Volume for Major Street is Total Volume of Both Approaches.
Traffic Volume for Minor Street is the Volume of High Volume Approach.

Major Street **SR-99 SB Off-Ramp**
 Minor Street **Moffat Blvd.**

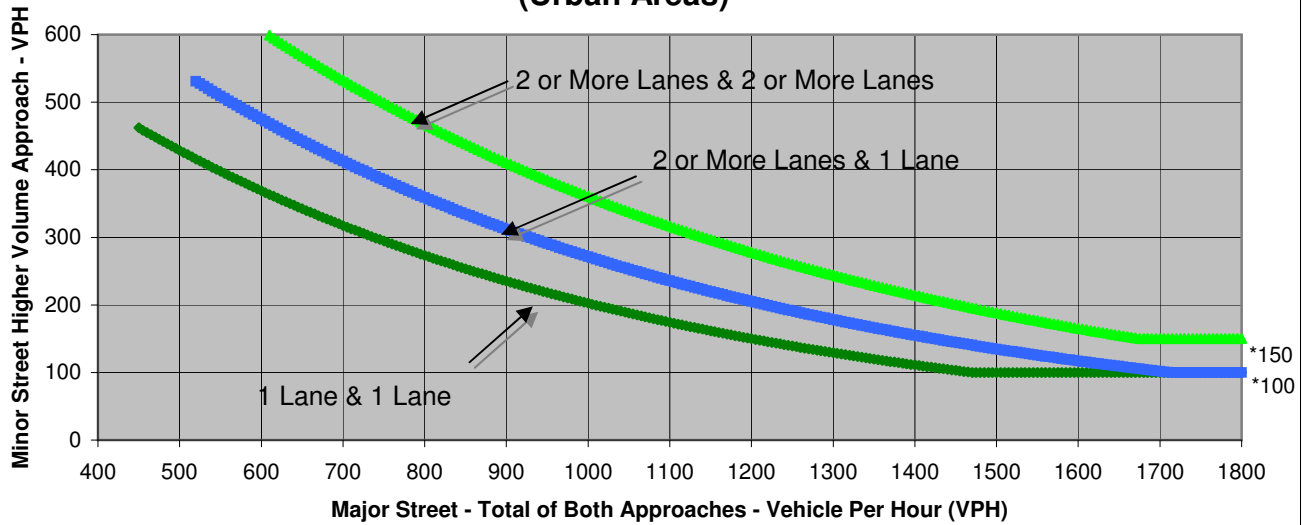
 Project **Austin Road Business Park**
 Scenario **Cumulative Plus Project Conditions**
 Peak Hour **PM**
Turn Movement Volumes

	NB	SB	EB	WB
Left	0	760	0	0
Through	0	0	880	640
Right	0	380	0	0
Total	0	1,140	880	640

Major Street Direction

x	North/South
	East/West

**Figure 4C-3
Warrant 3, Peak Hour
(Urban Areas)**



* Note: 150 VPH APPLIES AS THE LOWER THRESHOLD VOLUME FOR A MINOR STREET APPROACH WITH TWO OR MORE LANES AND 100 VPH APPLIES AS THE LOWER THRESHOLD VOLUME FOR A MINOR STREET APPROACHING WITH ONE LANE.

Source: *California Manual on Uniform Traffic Control Devices*, Caltrans, 2006

	Major Street	Minor Street	Warrant Met
	SR-99 SB Off-Ramp	Moffat Blvd.	
Number of Approach Lanes	1	1	<u>YES</u>
Traffic Volume (VPH) *	1,140	880	

* Note: Traffic Volume for Major Street is Total Volume of Both Approaches.
 Traffic Volume for Minor Street is the Volume of High Volume Approach.

Major Street **Austin Rd.**
 Minor Street **SR-99 NB Ramps**

Project **Austin Road Business Park**
 Scenario **Cumulative Plus Project Conditions**
 Peak Hour **PM**

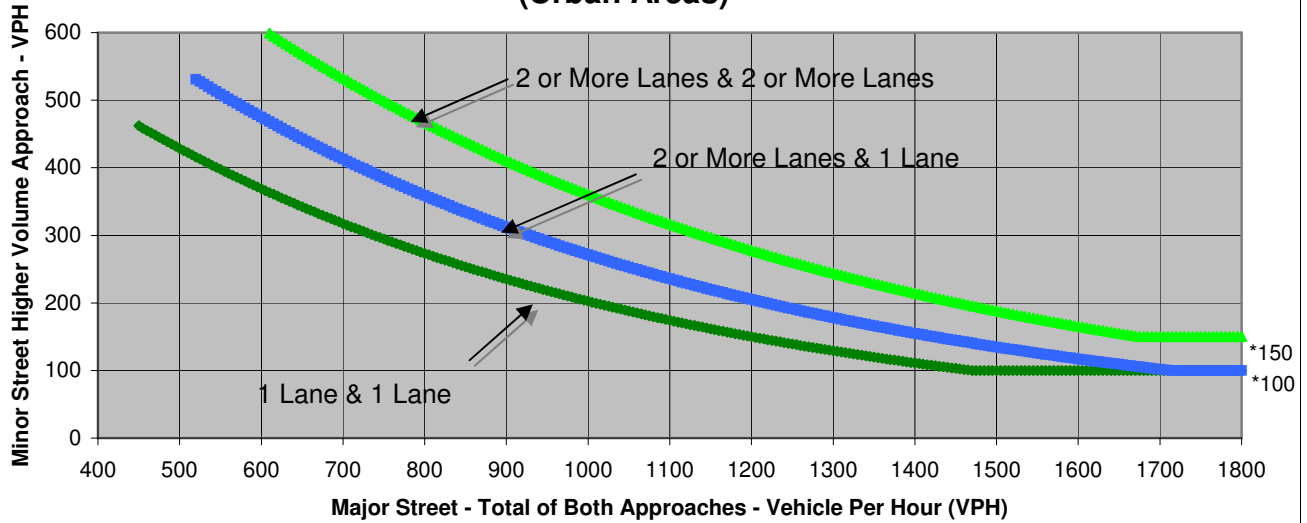
Turn Movement Volumes

	NB	SB	EB	WB
Left	1,120	0	0	1,040
Through	240	350	0	0
Right	0	60	0	70
Total	1,360	410	0	1,110

Major Street Direction

x	North/South
	East/West

**Figure 4C-3
 Warrant 3, Peak Hour
 (Urban Areas)**



* Note: 150 VPH APPLIES AS THE LOWER THRESHOLD VOLUME FOR A MINOR STREET APPROACH WITH TWO OR MORE LANES AND 100 VPH APPLIES AS THE LOWER THRESHOLD VOLUME FOR A MINOR STREET APPROACHING WITH ONE LANE.

Source: *California Manual on Uniform Traffic Control Devices*, Caltrans, 2006

	Major Street Austin Rd.	Minor Street SR-99 NB Ramps	Warrant Met
Number of Approach Lanes	1	1	YES
Traffic Volume (VPH) *	1,770	1,110	

* Note: Traffic Volume for Major Street is Total Volume of Both Approches.
 Traffic Volume for Minor Street is the Volume of High Volume Approach.

Major Street **Austin Rd.**
 Minor Street **Moffat Blvd / SR-99 SB On-Ramp**

Project **Austin Road Business Park**
 Scenario **Cumulative Plus Project Conditions**
 Peak Hour **PM**

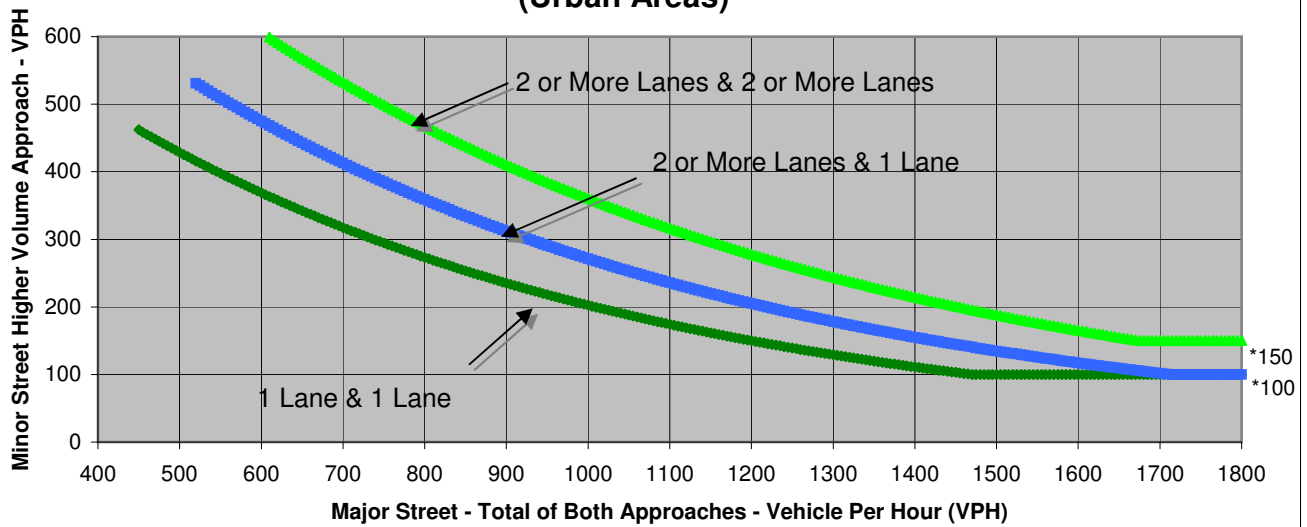
Turn Movement Volumes

	NB	SB	EB	WB
Left	140	70	130	10
Through	1,220	830	340	10
Right	960	490	1,170	10
Total	2,320	1,390	1,640	30

Major Street Direction

x	North/South
	East/West

**Figure 4C-3
 Warrant 3, Peak Hour
 (Urban Areas)**



* Note: 150 VPH APPLIES AS THE LOWER THRESHOLD VOLUME FOR A MINOR STREET APPROACH WITH TWO OR MORE LANES AND 100 VPH APPLIES AS THE LOWER THRESHOLD VOLUME FOR A MINOR STREET APPROACHING WITH ONE LANE.

Source: *California Manual on Uniform Traffic Control Devices*, Caltrans, 2006

	Major Street	Minor Street	Warrant Met
	Austin Rd.	Moffat Blvd / SR-99 SB On-Ramp	
Number of Approach Lanes	1	1	YES
Traffic Volume (VPH) *	3,710	1,640	

* Note: Traffic Volume for Major Street is Total Volume of Both Approches.
 Traffic Volume for Minor Street is the Volume of High Volume Approach.

Major Street **Austin Rd.**
 Minor Street **Ripon Rd.**

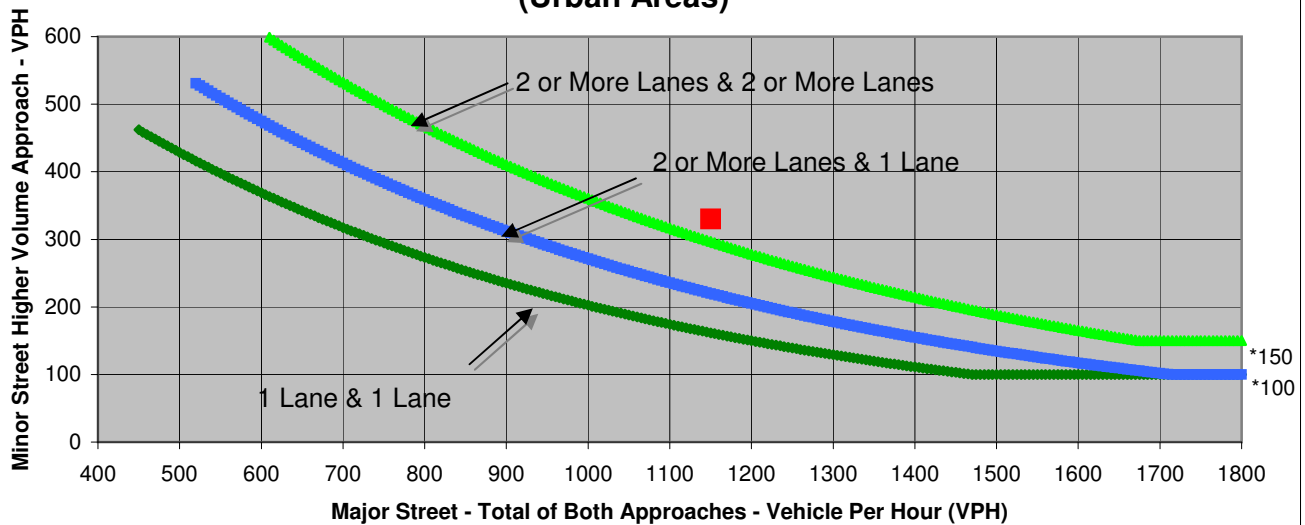
 Project **Austin Road Business Park**
 Scenario **Cumulative Plus Project Conditions**
 Peak Hour **PM**
Turn Movement Volumes

	NB	SB	EB	WB
Left	10	1,020	30	20
Through	40	30	200	80
Right	30	20	10	230
Total	80	1,070	240	330

Major Street Direction

x	North/South
	East/West

**Figure 4C-3
Warrant 3, Peak Hour
(Urban Areas)**



* Note: 150 VPH APPLIES AS THE LOWER THRESHOLD VOLUME FOR A MINOR STREET APPROACH WITH TWO OR MORE LANES AND 100 VPH APPLIES AS THE LOWER THRESHOLD VOLUME FOR A MINOR STREET APPROACHING WITH ONE LANE.

Source: *California Manual on Uniform Traffic Control Devices*, Caltrans, 2006

	Major Street Austin Rd.	Minor Street Ripon Rd.	Warrant Met
Number of Approach Lanes	1	1	<u>YES</u>
Traffic Volume (VPH) *	1,150	330	

* Note: Traffic Volume for Major Street is Total Volume of Both Approaches.
 Traffic Volume for Minor Street is the Volume of High Volume Approach.

Technical Appendix J

Cumulative Plus Project with Mitigation Intersection LOS Reports

SIMTRAFFIC LEVEL OF SERVICE REPORT Including Upstream Delays

Project: ARBPRC **HCM:** 2000
Scenario: Cumulative Plus Project - Mitigation **PHF:** 0.99
TOD: AM Peak Hr. **Analysis Period:** 15 Minutes **# of Runs:** 10

Intersection: 1: SR 120 WB Ramp & Main Street **Type:** Signalized

Approach	Movement	Demand Volume	Volume Served			Delay/Veh (sec)		
			Avg	%	Std Dev	Avg	LOS	Std Dev
NB	T	197	203	103	13	10.0	B	--
	R	194	192	99	11	15.6	B	--
	Subtotal	391	395	101	--	12.7	B	--
SB	T	88	101	115	8	3.2	A	--
	R	124	123	99	9	3.1	A	--
	Subtotal	212	224	106	--	3.1	A	--
WB	L	40	41	103	7	51.8	D	--
	R	78	77	99	8	8.4	A	--
	Subtotal	119	118	99	--	23.6	C	--
Total		722	738	102	--	11.6	B	--

Intersection: 2: SR 120 EB Ramps & Main Street **Type:** Signalized

Approach	Movement	Demand Volume	Volume Served			Delay/Veh (sec)		
			Avg	%	Std Dev	Avg	LOS	Std Dev
NB	T	283	285	101	15	15.8	B	--
	R	144	137	95	9	5.5	A	--
	Subtotal	427	422	99	--	12.5	B	--
SB	T	88	98	111	8	9.2	A	--
	R	40	44	110	5	2.9	A	--
	Subtotal	129	142	110	--	7.3	A	--
EB	L	109	113	104	10	47.9	D	--
	R	154	149	96	9	12.3	B	--
	Subtotal	263	261	99	--	27.7	C	--
Total		818	826	101	--	16.4	B	--

SIMTRAFFIC LEVEL OF SERVICE REPORT Including Upstream Delays

Project: ARBPRC **HCM:** 2000
Scenario: Cumulative Plus Project - Mitigation **PHF:** 0.99
TOD: AM Peak Hr. **Analysis Period:** 15 Minutes **# of Runs:** 10























Intersection: 3: Atherton Drive & Main Street **Type:** Signalized

Approach	Movement	Demand Volume	Volume Served			Delay/Veh (sec)		
			Avg	%	Std Dev	Avg	LOS	Std Dev
NB	L	23	24	104	9	65.7	E	--
	T	245	228	93	9	43.4	D	--
	R	58	54	93	7	54.8	D	--
	Subtotal	326	306	94	--	47.1	D	--
SB	L	134	141	105	10	64.0	E	--
	T	83	87	105	6	10.0	B	--
	R	25	27	108	4	5.0	A	--
	Subtotal	242	255	105	--	39.4	D	--
EB	L	18	17	94	2	62.2	E	--
	T	25	26	104	5	48.5	D	--
	R	13	14	108	3	18.4	B	--
	Subtotal	56	57	102	--	45.4	D	--
WB	L	35	38	109	5	112.2	F	--
	T	76	84	111	4	54.8	D	--
	R	164	165	101	8	46.5	D	--
	Subtotal	275	287	104	--	57.7	E	--
Total	899	904	101	--	48.2	D	--	

HCM Signalized Intersection Capacity Analysis

4: Woodward Ave. & Main Street

11/23/2009

													
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	0.95		1.00	0.95	1.00	1.00	0.95		0.97	0.95		
Frt	1.00	0.97		1.00	1.00	0.85	1.00	0.99		1.00	0.90		
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00		0.95	1.00		
Satd. Flow (prot)	1770	3447		1770	3539	1583	1770	3490		3433	3198		
Flt Permitted	0.95	1.00		0.95	1.00	1.00	0.95	1.00		0.95	1.00		
Satd. Flow (perm)	1770	3447		1770	3539	1583	1770	3490		3433	3198		
Volume (vph)	400	240	50	10	830	500	180	390	40	240	100	180	
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	
Adj. Flow (vph)	421	253	53	11	874	526	189	411	42	253	105	189	
RTOR Reduction (vph)	0	11	0	0	0	182	0	8	0	0	160	0	
Lane Group Flow (vph)	421	295	0	11	874	344	189	445	0	253	134	0	
Turn Type	Prot			Prot		Perm	Prot			Prot			
Protected Phases	5	2		1	6		3	8		7	4		
Permitted Phases						6							
Actuated Green, G (s)	24.1	48.3		4.7	28.9	28.9	11.0	17.3		8.0	14.3		
Effective Green, g (s)	24.1	48.3		4.7	28.9	28.9	11.0	17.3		8.0	14.3		
Actuated g/C Ratio	0.26	0.51		0.05	0.31	0.31	0.12	0.18		0.08	0.15		
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)	452	1766		88	1085	485	206	640		291	485		
v/s Ratio Prot	c0.24	0.09		0.01	c0.25		c0.11	c0.13		0.07	0.04		
v/s Ratio Perm						0.22							
v/c Ratio	0.93	0.17		0.12	0.81	0.71	0.92	0.70		0.87	0.28		
Uniform Delay, d1	34.3	12.3		42.8	30.1	29.0	41.2	36.0		42.6	35.4		
Progression Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00		1.00	1.00		
Incremental Delay, d2	26.0	0.0		0.6	4.4	4.7	40.0	3.3		23.0	0.3		
Delay (s)	60.3	12.3		43.5	34.6	33.7	81.2	39.3		65.6	35.7		
Level of Service	E	B		D	C	C	F	D		E	D		
Approach Delay (s)		40.1			34.3			51.7			49.5		
Approach LOS		D			C			D			D		
Intersection Summary													
HCM Average Control Delay			41.4									HCM Level of Service	D
HCM Volume to Capacity ratio			0.85										
Actuated Cycle Length (s)			94.3									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													

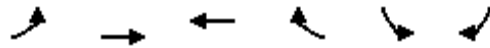
HCM Signalized Intersection Capacity Analysis
5: Industrial Park Dr & VanRyn (Spreckles)

11/23/2009

	→	↘	↙	←	↖	↗
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	4.0
Lane Util. Factor	1.00	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)	1810	1538	1719	3438	1719	1538
Flt Permitted	1.00	1.00	0.95	1.00	0.95	1.00
Satd. Flow (perm)	1810	1538	1719	3438	1719	1538
Volume (vph)	140	10	240	120	80	630
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	147	11	253	126	84	663
RTOR Reduction (vph)	0	9	0	0	0	477
Lane Group Flow (vph)	147	2	253	126	84	186
Heavy Vehicles (%)	5%	5%	5%	5%	5%	5%
Turn Type		Perm	Prot			Perm
Protected Phases	2		1	6	8	
Permitted Phases		2				8
Actuated Green, G (s)	8.0	8.0	9.9	21.9	11.7	11.7
Effective Green, g (s)	8.0	8.0	9.9	21.9	11.7	11.7
Actuated g/C Ratio	0.19	0.19	0.24	0.53	0.28	0.28
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)	348	296	409	1810	483	433
v/s Ratio Prot	c0.08		c0.15	0.04	0.05	
v/s Ratio Perm		0.00				c0.12
v/c Ratio	0.42	0.01	0.62	0.07	0.17	0.43
Uniform Delay, d1	14.8	13.6	14.2	4.8	11.3	12.2
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	0.8	0.0	2.8	0.0	0.2	0.7
Delay (s)	15.6	13.6	16.9	4.9	11.5	12.9
Level of Service	B	B	B	A	B	B
Approach Delay (s)	15.5			12.9	12.8	
Approach LOS	B			B	B	
Intersection Summary						
HCM Average Control Delay			13.1		HCM Level of Service	B
HCM Volume to Capacity ratio			0.49			
Actuated Cycle Length (s)			41.6		Sum of lost time (s)	12.0
Intersection Capacity Utilization			53.0%		ICU Level of Service	A
Analysis Period (min)			15			
c Critical Lane Group						

HCM Signalized Intersection Capacity Analysis
6: Woodward Ave. & VanRyn (Spreckles)

11/23/2009



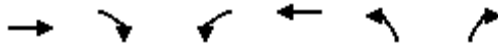
Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations	↖	↕	↕↗		↖	↗
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0		4.0	4.0
Lane Util. Factor	1.00	0.95	0.95		1.00	1.00
Frt	1.00	1.00	0.99		1.00	0.85
Flt Protected	0.95	1.00	1.00		0.95	1.00
Satd. Flow (prot)	1770	3539	3502		1770	1583
Flt Permitted	0.95	1.00	1.00		0.95	1.00
Satd. Flow (perm)	1770	3539	3502		1770	1583
Volume (vph)	80	500	800	60	30	70
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	84	526	842	63	32	74
RTOR Reduction (vph)	0	0	7	0	0	58
Lane Group Flow (vph)	84	526	898	0	32	16
Turn Type	Prot			Perm		
Protected Phases	7	4	8		6	
Permitted Phases						6
Actuated Green, G (s)	4.0	24.7	16.7		8.9	8.9
Effective Green, g (s)	4.0	24.7	16.7		8.9	8.9
Actuated g/C Ratio	0.10	0.59	0.40		0.21	0.21
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)	170	2101	1406		379	339
v/s Ratio Prot	c0.05	0.15	c0.26		c0.02	
v/s Ratio Perm						0.01
v/c Ratio	0.49	0.25	0.64		0.08	0.05
Uniform Delay, d1	17.8	4.0	10.0		13.1	13.0
Progression Factor	1.00	1.00	1.00		1.00	1.00
Incremental Delay, d2	2.3	0.1	1.0		0.1	0.1
Delay (s)	20.1	4.1	11.0		13.2	13.0
Level of Service	C	A	B		B	B
Approach Delay (s)		6.3	11.0		13.1	
Approach LOS		A	B		B	

Intersection Summary

HCM Average Control Delay	9.4	HCM Level of Service	A
HCM Volume to Capacity ratio	0.45		
Actuated Cycle Length (s)	41.6	Sum of lost time (s)	12.0
Intersection Capacity Utilization	41.8%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis
7: Woodward Ave. & Pillsbury Road



























11/23/2009



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	
Lane Util. Factor	0.95		1.00	0.95	1.00	
Frt	0.99		1.00	1.00	0.94	
Flt Protected	1.00		0.95	1.00	0.97	
Satd. Flow (prot)	3499		1770	3539	1709	
Flt Permitted	1.00		0.95	1.00	0.97	
Satd. Flow (perm)	3499		1770	3539	1709	
Volume (vph)	490	40	20	760	100	70
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	516	42	21	800	105	74
RTOR Reduction (vph)	8	0	0	0	41	0
Lane Group Flow (vph)	550	0	21	800	138	0
Turn Type			Prot			
Protected Phases	4		3	8	2	
Permitted Phases						
Actuated Green, G (s)	13.2		0.8	18.0	9.4	
Effective Green, g (s)	13.2		0.8	18.0	9.4	
Actuated g/C Ratio	0.37		0.02	0.51	0.27	
Clearance Time (s)	4.0		4.0	4.0	4.0	
Vehicle Extension (s)	3.0		3.0	3.0	3.0	
Lane Grp Cap (vph)	1305		40	1799	454	
v/s Ratio Prot	0.16		0.01	c0.23	c0.08	
v/s Ratio Perm						
v/c Ratio	0.42		0.53	0.44	0.30	
Uniform Delay, d1	8.3		17.1	5.5	10.4	
Progression Factor	1.00		1.00	1.00	1.00	
Incremental Delay, d2	0.2		11.9	0.2	0.4	
Delay (s)	8.5		29.0	5.7	10.8	
Level of Service	A		C	A	B	
Approach Delay (s)	8.5			6.3	10.8	
Approach LOS	A			A	B	
Intersection Summary						
HCM Average Control Delay			7.6		HCM Level of Service	A
HCM Volume to Capacity ratio			0.40			
Actuated Cycle Length (s)			35.4		Sum of lost time (s)	8.0
Intersection Capacity Utilization			37.5%		ICU Level of Service	A
Analysis Period (min)			15			
c Critical Lane Group						

HCM Signalized Intersection Capacity Analysis
8: Woodward Ave. & Atherton Drive

11/23/2009

												
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	0.95	1.00	1.00	0.95		1.00	0.95		1.00	0.95	
Frt	1.00	1.00	0.85	1.00	0.97		1.00	0.95		1.00	0.99	
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770	3539	1583	1770	3439		1770	3347		1770	3497	
Flt Permitted	0.95	1.00	1.00	0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (perm)	1770	3539	1583	1770	3439		1770	3347		1770	3497	
Volume (vph)	10	530	50	70	430	100	340	160	90	80	120	10
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	11	558	53	74	453	105	358	168	95	84	126	11
RTOR Reduction (vph)	0	0	39	0	18	0	0	67	0	0	8	0
Lane Group Flow (vph)	11	558	14	74	540	0	358	196	0	84	129	0
Turn Type	Prot		Perm	Prot			Prot			Prot		
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases			4									
Actuated Green, G (s)	0.7	16.4	16.4	3.4	19.1		17.1	18.3		9.1	10.3	
Effective Green, g (s)	0.7	16.4	16.4	3.4	19.1		17.1	18.3		9.1	10.3	
Actuated g/C Ratio	0.01	0.26	0.26	0.05	0.30		0.27	0.29		0.14	0.16	
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)	20	918	411	95	1039		479	969		255	570	
v/s Ratio Prot	0.01	c0.16		c0.04	c0.16		c0.20	c0.06		0.05	0.04	
v/s Ratio Perm			0.01									
v/c Ratio	0.55	0.61	0.03	0.78	0.52		0.75	0.20		0.33	0.23	
Uniform Delay, d1	31.1	20.6	17.5	29.5	18.3		21.1	16.9		24.3	23.0	
Progression Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	28.9	1.1	0.0	32.2	0.4		6.3	0.1		0.8	0.2	
Delay (s)	60.0	21.7	17.5	61.7	18.7		27.4	17.0		25.1	23.2	
Level of Service	E	C	B	E	B		C	B		C	C	
Approach Delay (s)		22.0			23.7			23.0			23.9	
Approach LOS		C			C			C			C	
Intersection Summary												
HCM Average Control Delay			23.0			HCM Level of Service				C		
HCM Volume to Capacity ratio			0.58									
Actuated Cycle Length (s)			63.2			Sum of lost time (s)			16.0			
Intersection Capacity Utilization			54.3%			ICU Level of Service				A		
Analysis Period (min)			15									
c Critical Lane Group												

HCM Signalized Intersection Capacity Analysis
 9: Old Woodward Ave. & Moffat Blvd.

11/23/2009



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0			4.0	4.0	
Lane Util. Factor	1.00			1.00	1.00	
Frt	1.00			1.00	0.98	
Flt Protected	0.95			1.00	1.00	
Satd. Flow (prot)	1771			1863	1824	
Flt Permitted	0.95			1.00	1.00	
Satd. Flow (perm)	1771			1863	1824	
Volume (vph)	460	10	0	90	220	40
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	484	11	0	95	232	42
RTOR Reduction (vph)	1	0	0	0	15	0
Lane Group Flow (vph)	494	0	0	95	259	0
Turn Type						
Protected Phases	4			2	6	
Permitted Phases						
Actuated Green, G (s)	30.2			11.8	11.8	
Effective Green, g (s)	30.2			11.8	11.8	
Actuated g/C Ratio	0.60			0.24	0.24	
Clearance Time (s)	4.0			4.0	4.0	
Vehicle Extension (s)	3.0			3.0	3.0	
Lane Grp Cap (vph)	1070			440	430	
v/s Ratio Prot	c0.28			0.05	c0.14	
v/s Ratio Perm						
v/c Ratio	0.46			0.22	0.60	
Uniform Delay, d1	5.4			15.4	17.0	
Progression Factor	1.00			1.00	1.00	
Incremental Delay, d2	1.4			0.2	2.4	
Delay (s)	6.9			15.6	19.4	
Level of Service	A			B	B	
Approach Delay (s)	6.9			15.6	19.4	
Approach LOS	A			B	B	
Intersection Summary						
HCM Average Control Delay			11.8		HCM Level of Service	B
HCM Volume to Capacity ratio			0.50			
Actuated Cycle Length (s)			50.0		Sum of lost time (s)	8.0
Intersection Capacity Utilization			46.8%		ICU Level of Service	A
Analysis Period (min)			15			
c Critical Lane Group						

HCM Unsignalized Intersection Capacity Analysis
 11: Graves Rd. & Austin Rd.

11/23/2009




















Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations	↔		↔		↔	
Sign Control	Stop		Free		Free	
Grade	0%		0%		0%	
Volume (veh/h)	80	30	420	30	20	450
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95
Hourly flow rate (vph)	84	32	442	32	21	474
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	974	458			474	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	974	458			474	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	69	95			98	
cM capacity (veh/h)	274	603			1088	

Direction, Lane #	WB 1	NB 1	SB 1
Volume Total	116	474	495
Volume Left	84	0	21
Volume Right	32	32	0
cSH	322	1700	1088
Volume to Capacity	0.36	0.28	0.02
Queue Length 95th (ft)	40	0	1
Control Delay (s)	22.3	0.0	0.6
Lane LOS	C		A
Approach Delay (s)	22.3	0.0	0.6
Approach LOS	C		

Intersection Summary			
Average Delay			2.6
Intersection Capacity Utilization	52.9%	ICU Level of Service	A
Analysis Period (min)			15

HCM Unsignalized Intersection Capacity Analysis
 13: Moffat Blvd. & Austin Rd.
























11/23/2009

													
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	
Lane Configurations													
Sign Control	Stop			Stop				Free			Free		
Grade	0%			0%				0%			0%		
Volume (veh/h)	0	0	230	0	0	10	0	440	10	0	430	90	
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	
Hourly flow rate (vph)	0	0	242	0	0	11	0	463	11	0	453	95	
Pedestrians													
Lane Width (ft)													
Walking Speed (ft/s)													
Percent Blockage													
Right turn flare (veh)													
Median type	None			None									
Median storage veh													
Upstream signal (ft)									430				
pX, platoon unblocked	0.95	0.95		0.95	0.95	0.95					0.95		
vC, conflicting volume	932	916	453	1163	1016	468	547				463		
vC1, stage 1 conf vol													
vC2, stage 2 conf vol													
vCu, unblocked vol	928	912	453	1171	1017	443	547				438		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1				4.1		
tC, 2 stage (s)													
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2				2.2		
p0 queue free %	100	100	60	100	100	98	100				100		
cM capacity (veh/h)	230	261	601	97	227	587	1007				1071		
Direction, Lane #	EB 1	WB 1	NB 1	SB 1	SB 2								
Volume Total	242	11	474	453	95								
Volume Left	0	0	0	0	0								
Volume Right	242	11	11	0	95								
cSH	601	587	1700	1700	1700								
Volume to Capacity	0.40	0.02	0.28	0.27	0.06								
Queue Length 95th (ft)	49	1	0	0	0								
Control Delay (s)	15.0	11.2	0.0	0.0	0.0								
Lane LOS	B	B											
Approach Delay (s)	15.0	11.2	0.0	0.0									
Approach LOS	B	B											
Intersection Summary													
Average Delay			2.9										
Intersection Capacity Utilization			43.5%	ICU Level of Service	A								
Analysis Period (min)			15										

HCM Signalized Intersection Capacity Analysis























14: Yosemite Avenue & Austin Rd.

11/23/2009

												
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	0.95	1.00	1.00	0.95		1.00	1.00		1.00	1.00	
Frt	1.00	1.00	0.85	1.00	0.99		1.00	0.96		1.00	0.97	
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770	3539	1583	1770	3502		1770	1780		1770	1804	
Flt Permitted	0.95	1.00	1.00	0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (perm)	1770	3539	1583	1770	3502		1770	1780		1770	1804	
Volume (vph)	110	280	200	110	1070	80	300	120	50	70	150	40
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	116	295	211	116	1126	84	316	126	53	74	158	42
RTOR Reduction (vph)	0	0	146	0	5	0	0	15	0	0	10	0
Lane Group Flow (vph)	116	295	65	116	1205	0	316	164	0	74	190	0
Turn Type	Prot		Perm	Prot			Prot			Prot		
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases			4									
Actuated Green, G (s)	7.0	31.1	31.1	10.9	35.0		18.0	35.8		7.0	24.8	
Effective Green, g (s)	7.0	31.1	31.1	10.9	35.0		18.0	35.8		7.0	24.8	
Actuated g/C Ratio	0.07	0.31	0.31	0.11	0.35		0.18	0.36		0.07	0.25	
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)	123	1092	488	191	1216		316	632		123	444	
v/s Ratio Prot	c0.07	0.08		0.07	c0.34		c0.18	0.09		0.04	c0.11	
v/s Ratio Perm			0.04									
v/c Ratio	0.94	0.27	0.13	0.61	0.99		1.00	0.26		0.60	0.43	
Uniform Delay, d1	46.7	26.3	25.1	42.9	32.7		41.4	23.1		45.5	32.0	
Progression Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	63.2	0.1	0.1	5.4	23.5		50.6	1.0		8.0	3.0	
Delay (s)	109.9	26.4	25.3	48.3	56.2		92.0	24.1		53.6	35.0	
Level of Service	F	C	C	D	E		F	C		D	D	
Approach Delay (s)		41.6			55.5			67.5			40.0	
Approach LOS		D			E			E			D	
Intersection Summary												
HCM Average Control Delay			53.0			HCM Level of Service		D				
HCM Volume to Capacity ratio			0.82									
Actuated Cycle Length (s)			100.8	Sum of lost time (s)		16.0						
Intersection Capacity Utilization			78.5%	ICU Level of Service		D						
Analysis Period (min)			15									
c Critical Lane Group												

HCM Signalized Intersection Capacity Analysis
 15: Yosemite Avenue & Jack Tone Rd

11/23/2009

												
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	1.00	0.95		1.00	0.95		1.00	1.00		1.00	1.00	
Frt	1.00	0.95		1.00	0.99		1.00	0.95		1.00	0.97	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770	3380		1770	3505		1770	1775		1770	1814	
Flt Permitted	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (perm)	1770	3380		1770	3505		1770	1775		1770	1814	
Volume (vph)	30	210	90	90	1030	70	70	110	50	30	240	50
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	32	221	95	95	1084	74	74	116	53	32	253	53
RTOR Reduction (vph)	0	62	0	0	7	0	0	22	0	0	11	0
Lane Group Flow (vph)	32	254	0	95	1151	0	74	147	0	32	295	0
Turn Type	Prot			Prot			Prot			Prot		
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases												
Actuated Green, G (s)	1.8	19.7		4.2	22.1		2.8	14.7		1.8	13.7	
Effective Green, g (s)	1.8	19.7		4.2	22.1		2.8	14.7		1.8	13.7	
Actuated g/C Ratio	0.03	0.35		0.07	0.39		0.05	0.26		0.03	0.24	
Clearance Time (s)	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	
Lane Grp Cap (vph)	56	1181		132	1373		88	463		56	441	
v/s Ratio Prot	0.02	0.08		c0.05	c0.33		c0.04	0.08		0.02	c0.16	
v/s Ratio Perm												
v/c Ratio	0.57	0.22		0.72	0.84		0.84	0.32		0.57	0.67	
Uniform Delay, d1	26.9	12.9		25.5	15.5		26.6	16.8		26.9	19.3	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	13.3	0.1		17.1	4.7		48.1	0.4		13.3	3.8	
Delay (s)	40.2	13.0		42.6	20.2		74.7	17.2		40.2	23.1	
Level of Service	D	B		D	C		E	B		D	C	
Approach Delay (s)		15.5			21.9			34.7			24.8	
Approach LOS		B			C			C			C	
Intersection Summary												
HCM Average Control Delay			22.7			HCM Level of Service					C	
HCM Volume to Capacity ratio			0.73									
Actuated Cycle Length (s)			56.4			Sum of lost time (s)		12.0				
Intersection Capacity Utilization			66.9%			ICU Level of Service		C				
Analysis Period (min)			15									
c Critical Lane Group												

HCM Unsignalized Intersection Capacity Analysis
 16: Graves Rd. & Jack Tone Rd

11/23/2009



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Volume (veh/h)	30	20	90	200	330	90
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95
Hourly flow rate (vph)	32	21	95	211	347	95
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	795	395	442			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	795	395	442			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	90	97	92			
cM capacity (veh/h)	326	654	1118			

Direction, Lane #	EB 1	EB 2	NB 1	SB 1
Volume Total	32	21	305	442
Volume Left	32	0	95	0
Volume Right	0	21	0	95
cSH	326	654	1118	1700
Volume to Capacity	0.10	0.03	0.08	0.26
Queue Length 95th (ft)	8	2	7	0
Control Delay (s)	17.2	10.7	3.2	0.0
Lane LOS	C	B	A	
Approach Delay (s)	14.6		3.2	0.0
Approach LOS	B			

Intersection Summary			
Average Delay		2.2	
Intersection Capacity Utilization	51.7%	ICU Level of Service	A
Analysis Period (min)	15		

HCM Unsignalized Intersection Capacity Analysis
 25: Ripon Rd & Austin Rd.

11/23/2009



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Sign Control		Stop			Stop			Stop			Stop	
Volume (vph)	30	120	10	20	180	270	10	30	30	30	20	20
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Hourly flow rate (vph)	32	126	11	21	189	284	11	32	32	32	21	21

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total (vph)	168	495	74	74
Volume Left (vph)	32	21	11	32
Volume Right (vph)	11	284	32	21
Hadj (s)	0.03	-0.30	-0.19	-0.05
Departure Headway (s)	4.9	4.2	5.3	5.5
Degree Utilization, x	0.23	0.58	0.11	0.11
Capacity (veh/h)	689	826	586	577
Control Delay (s)	9.3	12.9	9.0	9.1
Approach Delay (s)	9.3	12.9	9.0	9.1
Approach LOS	A	B	A	A

Intersection Summary			
Delay		11.4	
HCM Level of Service		B	
Intersection Capacity Utilization	44.6%	ICU Level of Service	A
Analysis Period (min)		15	

HCM Signalized Intersection Capacity Analysis
 27: Old Woodward Ave. & Woodward Ave.

11/23/2009

	↙	↖	↑	↗	↘	↓
Movement	WBL	WBR	NBT	NBR	SBL	SBT
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	4.0
Lane Util. Factor	1.00	1.00	0.95	1.00	1.00	0.95
Frt	1.00	0.85	1.00	0.85	1.00	1.00
Flt Protected	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (prot)	1770	1583	3539	1583	1770	3539
Flt Permitted	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (perm)	1770	1583	3539	1583	1770	3539
Volume (vph)	10	30	570	310	160	540
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	11	32	600	326	168	568
RTOR Reduction (vph)	0	19	0	243	0	0
Lane Group Flow (vph)	11	13	600	83	168	568
Turn Type		Perm		Perm	Prot	
Protected Phases	8		2		1	6
Permitted Phases		8		2		
Actuated Green, G (s)	23.8	23.8	15.2	15.2	9.0	28.2
Effective Green, g (s)	23.8	23.8	15.2	15.2	9.0	28.2
Actuated g/C Ratio	0.40	0.40	0.25	0.25	0.15	0.47
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)	702	628	897	401	266	1663
v/s Ratio Prot	0.01		c0.17		c0.09	0.16
v/s Ratio Perm		c0.01		0.05		
v/c Ratio	0.02	0.02	0.67	0.21	0.63	0.34
Uniform Delay, d1	11.0	11.0	20.1	17.6	23.9	10.0
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	0.0	0.1	1.9	0.3	4.8	0.1
Delay (s)	11.0	11.1	22.0	17.9	28.8	10.2
Level of Service	B	B	C	B	C	B
Approach Delay (s)	11.1		20.6			14.4
Approach LOS	B		C			B
Intersection Summary						
HCM Average Control Delay			17.7		HCM Level of Service	B
HCM Volume to Capacity ratio			0.34			
Actuated Cycle Length (s)			60.0		Sum of lost time (s)	12.0
Intersection Capacity Utilization			38.0%		ICU Level of Service	A
Analysis Period (min)			15			
c Critical Lane Group						

HCM Signalized Intersection Capacity Analysis
28: Woodward Ave. & Austin Rd.

11/23/2009



Movement	EBL	EBR	NBL	NBT	SBT	SBR
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	4.0
Lane Util. Factor	1.00	1.00	0.97	1.00	0.95	1.00
Frt	1.00	0.85	1.00	1.00	1.00	0.85
Flt Protected	0.95	1.00	0.95	1.00	1.00	1.00
Satd. Flow (prot)	1770	1583	3433	1863	3539	1583
Flt Permitted	0.95	1.00	0.95	1.00	1.00	1.00
Satd. Flow (perm)	1770	1583	3433	1863	3539	1583
Volume (vph)	130	420	680	320	470	200
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	137	442	716	337	495	211
RTOR Reduction (vph)	0	367	0	0	0	130
Lane Group Flow (vph)	137	75	716	337	495	81
Turn Type		Perm	Prot			Perm
Protected Phases	4		5	2	6	
Permitted Phases		4				6
Actuated Green, G (s)	11.8	11.8	18.9	49.3	26.4	26.4
Effective Green, g (s)	11.8	11.8	18.9	49.3	26.4	26.4
Actuated g/C Ratio	0.17	0.17	0.27	0.71	0.38	0.38
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)	302	270	939	1329	1352	605
v/s Ratio Prot	c0.08		c0.21	0.18	c0.14	
v/s Ratio Perm		0.05				0.05
v/c Ratio	0.45	0.28	0.76	0.25	0.37	0.13
Uniform Delay, d1	25.8	24.9	23.0	3.5	15.3	13.9
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	1.1	0.6	3.7	0.5	0.8	0.5
Delay (s)	26.8	25.5	26.8	3.9	16.1	14.4
Level of Service	C	C	C	A	B	B
Approach Delay (s)	25.8			19.4	15.6	
Approach LOS	C			B	B	

Intersection Summary

HCM Average Control Delay	19.9	HCM Level of Service	B
HCM Volume to Capacity ratio	0.52		
Actuated Cycle Length (s)	69.1	Sum of lost time (s)	12.0
Intersection Capacity Utilization	49.6%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

SIMTRAFFIC LEVEL OF SERVICE REPORT Including Upstream Delays

Project: ARBPRC **HCM:** 2000
Scenario: Cumulative Plus Project - Mitigation **PHF:** 0.99
TOD: PM Peak Hr. **Analysis Period:** 15 Minutes **# of Runs:** 10

Intersection: 1: SR 120 WB Ramp & Main Street **Type:** Signalized

Approach	Movement	Demand Volume	Volume Served			Delay/Veh (sec)		
			Avg	%	Std Dev	Avg	LOS	Std Dev
NB	T	273	265	97	12	23.4	C	--
	R	139	137	99	10	18.2	B	--
	Subtotal	412	402	98	--	21.7	C	--
SB	T	215	210	98	9	12.6	B	--
	R	169	174	103	7	6.0	A	--
	Subtotal	384	384	100	--	9.6	A	--
WB	L	111	119	107	9	49.2	D	--
	R	66	63	94	5	10.8	B	--
	Subtotal	177	181	102	--	35.9	D	--
Total		972	967	99	--	19.6	B	--

Intersection: 2: SR 120 EB Ramps & Main Street **Type:** Signalized

Approach	Movement	Demand Volume	Volume Served			Delay/Veh (sec)		
			Avg	%	Std Dev	Avg	LOS	Std Dev
NB	T	232	216	93	13	27.2	C	--
	R	86	86	100	9	4.3	A	--
	Subtotal	318	302	95	--	20.6	C	--
SB	T	253	242	96	17	28.9	C	--
	R	73	76	104	9	12.2	B	--
	Subtotal	326	318	98	--	24.9	C	--
EB	L	179	191	107	15	28.8	C	--
	R	263	269	102	15	23.0	C	--
	Subtotal	442	460	104	--	25.4	C	--
Total		1086	1080	99	--	23.9	C	--

SIMTRAFFIC LEVEL OF SERVICE REPORT Including Upstream Delays

Project: ARBPRC **HCM:** 2000
Scenario: Cumulative Plus Project - Mitigation **PHF:** 0.99
TOD: PM Peak Hr. **Analysis Period:** 15 Minutes **# of Runs:** 10























Intersection: 3: Atherton Drive & Main Street **Type:** Signalized

Approach	Movement	Demand Volume	Volume Served			Delay/Veh (sec)		
			Avg	%	Std Dev	Avg	LOS	Std Dev
NB	L	25	28	112	6	60.9	E	--
	T	134	119	89	8	78.1	E	--
	R	53	45	85	5	108.9	F	--
	Subtotal	212	193	91	--	82.9	F	--
SB	L	210	213	101	9	61.1	E	--
	T	270	274	101	13	26.0	C	--
	R	35	37	103	5	21.9	C	--
	Subtotal	515	524	102	--	40.0	D	--
EB	L	25	22	88	2	83.7	F	--
	T	73	78	107	9	43.4	D	--
	R	48	49	102	4	25.4	C	--
	Subtotal	146	150	103	--	43.4	D	--
WB	L	66	59	88	4	153.0	F	--
	T	33	29	88	7	45.7	D	--
	R	159	163	103	16	32.5	C	--
	Subtotal	258	250	97	--	62.2	E	--
Total	1131	1116	99	--	52.8	D	--	

HCM Signalized Intersection Capacity Analysis

4: Woodward Ave. & Main Street

11/23/2009

												
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	0.95		1.00	0.95	1.00	1.00	0.95		0.97	0.95	
Frt	1.00	0.97		1.00	1.00	0.85	1.00	0.98		1.00	0.92	
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770	3440		1770	3539	1583	1770	3462		3433	3247	
Flt Permitted	0.95	1.00		0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (perm)	1770	3440		1770	3539	1583	1770	3462		3433	3247	
Volume (vph)	250	960	220	70	630	410	80	180	30	650	390	480
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	263	1011	232	74	663	432	84	189	32	684	411	505
RTOR Reduction (vph)	0	14	0	0	0	309	0	12	0	0	184	0
Lane Group Flow (vph)	263	1229	0	74	663	123	84	209	0	684	732	0
Turn Type	Prot			Prot		Perm	Prot			Prot		
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases							6					
Actuated Green, G (s)	19.0	37.6		9.9	28.5	28.5	6.1	17.7		18.7	30.3	
Effective Green, g (s)	19.0	37.6		9.9	28.5	28.5	6.1	17.7		18.7	30.3	
Actuated g/C Ratio	0.19	0.38		0.10	0.29	0.29	0.06	0.18		0.19	0.30	
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)	337	1295		175	1010	452	108	613		643	985	
v/s Ratio Prot	c0.15	c0.36		0.04	0.19		c0.05	0.06		c0.20	c0.23	
v/s Ratio Perm							0.08					
v/c Ratio	0.78	0.95		0.42	0.66	0.27	0.78	0.34		1.06	0.74	
Uniform Delay, d1	38.5	30.2		42.3	31.4	27.7	46.2	36.0		40.6	31.3	
Progression Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Incremental Delay, d2	11.1	14.3		1.6	1.6	0.3	28.9	0.3		53.7	3.1	
Delay (s)	49.6	44.6		44.0	32.9	28.0	75.1	36.3		94.3	34.4	
Level of Service	D	D		D	C	C	E	D		F	C	
Approach Delay (s)	45.4			31.8			47.0			60.0		
Approach LOS	D			C			D			E		
Intersection Summary												
HCM Average Control Delay	47.1			HCM Level of Service		D						
HCM Volume to Capacity ratio	0.91											
Actuated Cycle Length (s)	99.9			Sum of lost time (s)		16.0						
Intersection Capacity Utilization	81.4%			ICU Level of Service		D						
Analysis Period (min)	15											
c Critical Lane Group												

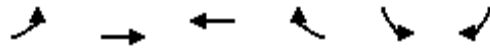
HCM Signalized Intersection Capacity Analysis
5: Industrial Park Dr & VanRyn (Spreckles)

11/23/2009

	→	↘	↙	←	↖	↗
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	4.0
Lane Util. Factor	1.00	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)	1863	1583	1770	3539	1770	1583
Flt Permitted	1.00	1.00	0.95	1.00	0.95	1.00
Satd. Flow (perm)	1863	1583	1770	3539	1770	1583
Volume (vph)	290	140	660	230	50	460
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	305	147	695	242	53	484
RTOR Reduction (vph)	0	50	0	0	0	413
Lane Group Flow (vph)	305	97	695	242	53	71
Turn Type		Perm	Prot			Perm
Protected Phases	2		1	6	8	
Permitted Phases		2				8
Actuated Green, G (s)	16.5	16.5	34.0	54.5	10.7	10.7
Effective Green, g (s)	16.5	16.5	34.0	54.5	10.7	10.7
Actuated g/C Ratio	0.23	0.23	0.46	0.74	0.15	0.15
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)	420	357	822	2635	259	231
v/s Ratio Prot	c0.16		c0.39	0.07	0.03	
v/s Ratio Perm		0.06				c0.04
v/c Ratio	0.73	0.27	0.85	0.09	0.20	0.31
Uniform Delay, d1	26.3	23.4	17.3	2.6	27.5	27.9
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	6.1	0.4	8.0	0.0	0.4	0.8
Delay (s)	32.4	23.8	25.3	2.6	27.9	28.7
Level of Service	C	C	C	A	C	C
Approach Delay (s)	29.6			19.4	28.6	
Approach LOS	C			B	C	
Intersection Summary						
HCM Average Control Delay			24.4		HCM Level of Service	C
HCM Volume to Capacity ratio			0.72			
Actuated Cycle Length (s)			73.2		Sum of lost time (s)	12.0
Intersection Capacity Utilization			65.2%		ICU Level of Service	C
Analysis Period (min)			15			
c Critical Lane Group						

HCM Signalized Intersection Capacity Analysis
6: Woodward Ave. & VanRyn (Spreckles)

11/23/2009



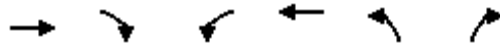
Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0		4.0	4.0
Lane Util. Factor	1.00	0.95	0.95		1.00	1.00
Frt	1.00	1.00	1.00		1.00	0.85
Flt Protected	0.95	1.00	1.00		0.95	1.00
Satd. Flow (prot)	1770	3539	3522		1770	1583
Flt Permitted	0.95	1.00	1.00		0.95	1.00
Satd. Flow (perm)	1770	3539	3522		1770	1583
Volume (vph)	140	1010	910	30	70	300
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	147	1063	958	32	74	316
RTOR Reduction (vph)	0	0	3	0	0	252
Lane Group Flow (vph)	147	1063	987	0	74	64
Turn Type	Prot			Perm		
Protected Phases	7	4	8		6	
Permitted Phases						6
Actuated Green, G (s)	6.6	29.7	19.1		9.6	9.6
Effective Green, g (s)	6.6	29.7	19.1		9.6	9.6
Actuated g/C Ratio	0.14	0.63	0.40		0.20	0.20
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)	247	2222	1422		359	321
v/s Ratio Prot	c0.08	0.30	c0.28		c0.04	
v/s Ratio Perm						0.04
v/c Ratio	0.60	0.48	0.69		0.21	0.20
Uniform Delay, d1	19.1	4.7	11.7		15.7	15.7
Progression Factor	1.00	1.00	1.00		1.00	1.00
Incremental Delay, d2	3.8	0.2	1.5		0.3	0.3
Delay (s)	22.9	4.8	13.2		16.0	16.0
Level of Service	C	A	B		B	B
Approach Delay (s)		7.0	13.2		16.0	
Approach LOS		A	B		B	

Intersection Summary

HCM Average Control Delay	10.7	HCM Level of Service	B
HCM Volume to Capacity ratio	0.54		
Actuated Cycle Length (s)	47.3	Sum of lost time (s)	12.0
Intersection Capacity Utilization	51.4%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis
7: Woodward Ave. & Pillsbury Road



























11/23/2009



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	
Lane Util. Factor	0.95		1.00	0.95	1.00	
Frt	0.98		1.00	1.00	0.95	
Flt Protected	1.00		0.95	1.00	0.97	
Satd. Flow (prot)	3475		1770	3539	1721	
Flt Permitted	1.00		0.95	1.00	0.97	
Satd. Flow (perm)	3475		1770	3539	1721	
Volume (vph)	950	130	60	880	60	30
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	1000	137	63	926	63	32
RTOR Reduction (vph)	15	0	0	0	25	0
Lane Group Flow (vph)	1122	0	63	926	70	0
Turn Type			Prot			
Protected Phases	4		3	8	2	
Permitted Phases						
Actuated Green, G (s)	20.5		2.9	27.4	9.4	
Effective Green, g (s)	20.5		2.9	27.4	9.4	
Actuated g/C Ratio	0.46		0.06	0.61	0.21	
Clearance Time (s)	4.0		4.0	4.0	4.0	
Vehicle Extension (s)	3.0		3.0	3.0	3.0	
Lane Grp Cap (vph)	1590		115	2164	361	
v/s Ratio Prot	c0.32		0.04	c0.26	c0.04	
v/s Ratio Perm						
v/c Ratio	0.71		0.55	0.43	0.19	
Uniform Delay, d1	9.7		20.3	4.6	14.6	
Progression Factor	1.00		1.00	1.00	1.00	
Incremental Delay, d2	1.5		5.3	0.1	0.3	
Delay (s)	11.2		25.6	4.7	14.8	
Level of Service	B		C	A	B	
Approach Delay (s)	11.2			6.0	14.8	
Approach LOS	B			A	B	
Intersection Summary						
HCM Average Control Delay			9.1		HCM Level of Service	A
HCM Volume to Capacity ratio			0.55			
Actuated Cycle Length (s)			44.8		Sum of lost time (s)	12.0
Intersection Capacity Utilization			48.9%		ICU Level of Service	A
Analysis Period (min)			15			
c Critical Lane Group						

HCM Signalized Intersection Capacity Analysis
8: Woodward Ave. & Atherton Drive

11/23/2009

												
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	0.95	1.00	1.00	0.95		1.00	0.95		1.00	0.95	
Frt	1.00	1.00	0.85	1.00	0.98		1.00	0.95		1.00	0.99	
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770	3539	1583	1770	3473		1770	3362		1770	3516	
Flt Permitted	0.95	1.00	1.00	0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (perm)	1770	3539	1583	1770	3473		1770	3362		1770	3516	
Volume (vph)	10	570	400	160	700	100	360	160	80	200	230	10
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	11	600	421	168	737	105	379	168	84	211	242	11
RTOR Reduction (vph)	0	0	309	0	9	0	0	64	0	0	3	0
Lane Group Flow (vph)	11	600	112	168	833	0	379	188	0	211	250	0
Turn Type	Prot		Perm	Prot			Prot			Prot		
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases			4									
Actuated Green, G (s)	1.0	21.9	21.9	10.6	31.5		20.9	19.5		14.0	12.6	
Effective Green, g (s)	1.0	21.9	21.9	10.6	31.5		20.9	19.5		14.0	12.6	
Actuated g/C Ratio	0.01	0.27	0.27	0.13	0.38		0.25	0.24		0.17	0.15	
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)	22	945	423	229	1334		451	800		302	540	
v/s Ratio Prot	0.01	0.17		c0.09	c0.24		c0.21	0.06		0.12	c0.07	
v/s Ratio Perm			0.07									
v/c Ratio	0.50	0.63	0.27	0.73	0.62		0.84	0.23		0.70	0.46	
Uniform Delay, d1	40.3	26.5	23.7	34.3	20.5		29.0	25.2		32.0	31.6	
Progression Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	16.8	1.4	0.3	11.5	0.9		13.2	0.2		6.9	0.6	
Delay (s)	57.0	27.9	24.0	45.8	21.4		42.2	25.4		38.9	32.2	
Level of Service	E	C	C	D	C		D	C		D	C	
Approach Delay (s)		26.7			25.4			35.5			35.3	
Approach LOS		C			C			D			D	
Intersection Summary												
HCM Average Control Delay			29.3			HCM Level of Service				C		
HCM Volume to Capacity ratio			0.66									
Actuated Cycle Length (s)			82.0			Sum of lost time (s)		12.0				
Intersection Capacity Utilization			65.8%			ICU Level of Service				C		
Analysis Period (min)			15									
c Critical Lane Group												

HCM Signalized Intersection Capacity Analysis
 9: Old Woodward Ave. & Moffat Blvd.

11/23/2009



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0			4.0	4.0	
Lane Util. Factor	1.00			1.00	1.00	
Frt	1.00			1.00	0.91	
Flt Protected	0.95			1.00	1.00	
Satd. Flow (prot)	1770			1863	1703	
Flt Permitted	0.95			1.00	1.00	
Satd. Flow (perm)	1770			1863	1703	
Volume (vph)	360	10	0	50	260	450
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	379	11	0	53	274	474
RTOR Reduction (vph)	2	0	0	0	131	0
Lane Group Flow (vph)	388	0	0	53	617	0
Turn Type						
Protected Phases	4			2	6	
Permitted Phases						
Actuated Green, G (s)	27.3			24.7	24.7	
Effective Green, g (s)	27.3			24.7	24.7	
Actuated g/C Ratio	0.46			0.41	0.41	
Clearance Time (s)	4.0			4.0	4.0	
Vehicle Extension (s)	3.0			3.0	3.0	
Lane Grp Cap (vph)	805			767	701	
v/s Ratio Prot	c0.22			0.03	c0.36	
v/s Ratio Perm						
v/c Ratio	0.48			0.07	0.88	
Uniform Delay, d1	11.4			10.7	16.3	
Progression Factor	1.31			1.00	1.00	
Incremental Delay, d2	1.9			0.0	12.4	
Delay (s)	16.9			10.7	28.7	
Level of Service	B			B	C	
Approach Delay (s)	16.9			10.7	28.7	
Approach LOS	B			B	C	
Intersection Summary						
HCM Average Control Delay			24.1		HCM Level of Service	C
HCM Volume to Capacity ratio			0.67			
Actuated Cycle Length (s)			60.0		Sum of lost time (s)	8.0
Intersection Capacity Utilization			68.5%		ICU Level of Service	C
Analysis Period (min)			15			
c Critical Lane Group						

HCM Unsignalized Intersection Capacity Analysis
 11: Graves Rd. & Austin Rd.

11/23/2009




















Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations	↔		↔		↔	
Sign Control	Stop		Free		Free	
Grade	0%		0%		0%	
Volume (veh/h)	40	40	470	260	100	520
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95
Hourly flow rate (vph)	42	42	495	274	105	547
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	1389	632			768	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1389	632			768	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	69	91			88	
cM capacity (veh/h)	137	481			846	

Direction, Lane #	WB 1	NB 1	SB 1
Volume Total	84	768	653
Volume Left	42	0	105
Volume Right	42	274	0
cSH	214	1700	846
Volume to Capacity	0.39	0.45	0.12
Queue Length 95th (ft)	44	0	11
Control Delay (s)	32.4	0.0	3.1
Lane LOS	D		A
Approach Delay (s)	32.4	0.0	3.1
Approach LOS	D		

Intersection Summary			
Average Delay		3.2	
Intersection Capacity Utilization	88.2%	ICU Level of Service	E
Analysis Period (min)		15	

HCM Unsignalized Intersection Capacity Analysis
 13: Moffat Blvd. & Austin Rd.
























11/23/2009

													
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	
Lane Configurations													
Sign Control	Stop			Stop				Free			Free		
Grade	0%			0%				0%			0%		
Volume (veh/h)	0	0	270	0	0	10	0	720	10	0	500	50	
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	
Hourly flow rate (vph)	0	0	284	0	0	11	0	758	11	0	526	53	
Pedestrians													
Lane Width (ft)													
Walking Speed (ft/s)													
Percent Blockage													
Right turn flare (veh)													
Median type	None			None									
Median storage veh													
Upstream signal (ft)									429				
pX, platoon unblocked	0.91	0.91		0.91	0.91	0.91					0.91		
vC, conflicting volume	1300	1284	526	1574	1342	763	579				758		
vC1, stage 1 conf vol													
vC2, stage 2 conf vol													
vCu, unblocked vol	1328	1311	526	1628	1374	741	579				735		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1				4.1		
tC, 2 stage (s)													
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2				2.2		
p0 queue free %	100	100	48	100	100	97	100				100		
cM capacity (veh/h)	117	145	552	36	133	380	995				795		
Direction, Lane #	EB 1	WB 1	NB 1	SB 1	SB 2								
Volume Total	284	11	768	526	53								
Volume Left	0	0	0	0	0								
Volume Right	284	11	11	0	53								
cSH	552	380	1700	1700	1700								
Volume to Capacity	0.52	0.03	0.45	0.31	0.03								
Queue Length 95th (ft)	73	2	0	0	0								
Control Delay (s)	18.3	14.7	0.0	0.0	0.0								
Lane LOS	C	B											
Approach Delay (s)	18.3	14.7	0.0	0.0									
Approach LOS	C	B											
Intersection Summary													
Average Delay			3.3										
Intersection Capacity Utilization			49.7%	ICU Level of Service	A								
Analysis Period (min)			15										

HCM Signalized Intersection Capacity Analysis























14: Yosemite Avenue & Austin Rd.

11/23/2009

												
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	0.95	1.00	1.00	0.95		1.00	1.00		1.00	1.00	
Frt	1.00	1.00	0.85	1.00	0.99		1.00	0.97		1.00	0.96	
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770	3539	1583	1770	3486		1770	1810		1770	1795	
Flt Permitted	0.95	1.00	1.00	0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (perm)	1770	3539	1583	1770	3486		1770	1810		1770	1795	
Volume (vph)	50	1360	250	80	540	60	240	170	40	50	250	80
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	53	1432	263	84	568	63	253	179	42	53	263	84
RTOR Reduction (vph)	0	0	155	0	8	0	0	8	0	0	12	0
Lane Group Flow (vph)	53	1432	108	84	623	0	253	213	0	53	335	0
Turn Type	Prot		Perm	Prot			Prot			Prot		
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases			4									
Actuated Green, G (s)	5.6	41.8	41.8	6.0	42.2		15.0	32.2		5.6	22.8	
Effective Green, g (s)	5.6	41.8	41.8	6.0	42.2		15.0	32.2		5.6	22.8	
Actuated g/C Ratio	0.06	0.41	0.41	0.06	0.42		0.15	0.32		0.06	0.22	
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)	98	1456	651	105	1448		261	574		98	403	
v/s Ratio Prot	0.03	c0.40		c0.05	0.18		c0.14	0.12		0.03	c0.19	
v/s Ratio Perm			0.07									
v/c Ratio	0.54	0.98	0.17	0.80	0.43		0.97	0.37		0.54	0.83	
Uniform Delay, d1	46.7	29.6	18.9	47.2	21.1		43.1	26.9		46.7	37.6	
Progression Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	6.0	19.6	0.1	33.9	0.2		46.6	1.8		6.0	17.9	
Delay (s)	52.7	49.2	19.0	81.1	21.3		89.7	28.7		52.7	55.5	
Level of Service	D	D	B	F	C		F	C		D	E	
Approach Delay (s)		44.7			28.4			61.2			55.1	
Approach LOS		D			C			E			E	
Intersection Summary												
HCM Average Control Delay			44.8			HCM Level of Service			D			
HCM Volume to Capacity ratio			0.93									
Actuated Cycle Length (s)			101.6			Sum of lost time (s)			16.0			
Intersection Capacity Utilization			86.7%			ICU Level of Service			E			
Analysis Period (min)			15									
c Critical Lane Group												

HCM Signalized Intersection Capacity Analysis
 15: Yosemite Avenue & Jack Tone Rd

11/23/2009

												
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	1.00	0.95		1.00	0.95		1.00	1.00		1.00	1.00	
Frt	1.00	0.99		1.00	0.99		1.00	0.95		1.00	0.97	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770	3499		1770	3509		1770	1778		1770	1807	
Flt Permitted	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (perm)	1770	3499		1770	3509		1770	1778		1770	1807	
Volume (vph)	90	1230	100	60	500	30	50	230	100	80	200	50
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	95	1295	105	63	526	32	53	242	105	84	211	53
RTOR Reduction (vph)	0	7	0	0	5	0	0	18	0	0	10	0
Lane Group Flow (vph)	95	1393	0	63	553	0	53	329	0	84	254	0
Turn Type	Prot			Prot			Prot			Prot		
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases												
Actuated Green, G (s)	6.7	35.4		4.2	32.9		3.1	18.8		4.9	20.6	
Effective Green, g (s)	6.7	35.4		4.2	32.9		3.1	18.8		4.9	20.6	
Actuated g/C Ratio	0.08	0.45		0.05	0.41		0.04	0.24		0.06	0.26	
Clearance Time (s)	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	
Lane Grp Cap (vph)	150	1562		94	1456		69	422		109	469	
v/s Ratio Prot	c0.05	c0.40		0.04	0.16		0.03	c0.19		c0.05	0.14	
v/s Ratio Perm												
v/c Ratio	0.63	0.89		0.67	0.38		0.77	0.78		0.77	0.54	
Uniform Delay, d1	35.1	20.2		36.9	16.1		37.7	28.3		36.6	25.3	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	8.4	6.9		17.2	0.2		39.2	9.1		27.9	1.3	
Delay (s)	43.6	27.1		54.0	16.3		76.9	37.4		64.5	26.6	
Level of Service	D	C		D	B		E	D		E	C	
Approach Delay (s)		28.1			20.1			42.6			35.7	
Approach LOS		C			C			D			D	
Intersection Summary												
HCM Average Control Delay			29.3			HCM Level of Service					C	
HCM Volume to Capacity ratio			0.79									
Actuated Cycle Length (s)			79.3			Sum of lost time (s)		12.0				
Intersection Capacity Utilization			76.5%			ICU Level of Service					D	
Analysis Period (min)			15									
c Critical Lane Group												

HCM Unsignalized Intersection Capacity Analysis
 16: Graves Rd. & Jack Tone Rd

11/23/2009



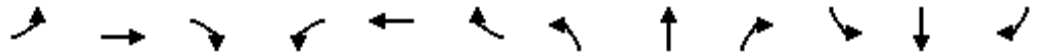
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Volume (veh/h)	160	320	30	230	310	50
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95
Hourly flow rate (vph)	168	337	32	242	326	53
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None					
Median storage (veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	658	353	379			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	658	353	379			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	60	51	97			
cM capacity (veh/h)	418	691	1180			

Direction, Lane #	EB 1	EB 2	NB 1	SB 1
Volume Total	168	337	274	379
Volume Left	168	0	32	0
Volume Right	0	337	0	53
cSH	418	691	1180	1700
Volume to Capacity	0.40	0.49	0.03	0.22
Queue Length 95th (ft)	48	67	2	0
Control Delay (s)	19.3	15.1	1.2	0.0
Lane LOS	C	C	A	
Approach Delay (s)	16.5		1.2	0.0
Approach LOS	C			

Intersection Summary			
Average Delay		7.5	
Intersection Capacity Utilization	52.0%	ICU Level of Service	A
Analysis Period (min)		15	

HCM Unsignalized Intersection Capacity Analysis
 25: Ripon Rd & Austin Rd.

11/23/2009



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Sign Control		Stop			Stop			Stop			Stop	
Volume (vph)	30	360	10	20	80	70	10	50	40	320	40	50
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Hourly flow rate (vph)	32	379	11	21	84	74	11	53	42	337	42	53

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total (vph)	421	179	105	432
Volume Left (vph)	32	21	11	337
Volume Right (vph)	11	74	42	53
Hadj (s)	0.03	-0.19	-0.19	0.12
Departure Headway (s)	6.1	6.4	6.6	6.1
Degree Utilization, x	0.71	0.32	0.19	0.74
Capacity (veh/h)	421	495	433	432
Control Delay (s)	22.5	12.3	11.2	24.3
Approach Delay (s)	22.5	12.3	11.2	24.3
Approach LOS	C	B	B	C

Intersection Summary			
Delay		20.5	
HCM Level of Service		C	
Intersection Capacity Utilization	61.6%	ICU Level of Service	B
Analysis Period (min)		15	

HCM Signalized Intersection Capacity Analysis
 27: Old Woodward Ave. & Woodward Ave.

11/23/2009

	↙	↖	↑	↗	↘	↓
Movement	WBL	WBR	NBT	NBR	SBL	SBT
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	4.0
Lane Util. Factor	1.00	1.00	0.95	1.00	1.00	0.95
Frt	1.00	0.85	1.00	0.85	1.00	1.00
Flt Protected	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (prot)	1770	1583	3539	1583	1770	3539
Flt Permitted	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (perm)	1770	1583	3539	1583	1770	3539
Volume (vph)	150	300	660	250	120	730
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	158	316	695	263	126	768
RTOR Reduction (vph)	0	194	0	188	0	0
Lane Group Flow (vph)	158	122	695	75	126	768
Turn Type		Perm		Perm	Prot	
Protected Phases	8		2		1	6
Permitted Phases		8		2		
Actuated Green, G (s)	23.1	23.1	17.0	17.0	7.9	28.9
Effective Green, g (s)	23.1	23.1	17.0	17.0	7.9	28.9
Actuated g/C Ratio	0.39	0.39	0.28	0.28	0.13	0.48
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)	681	609	1003	449	233	1705
v/s Ratio Prot	c0.09		c0.20		c0.07	0.22
v/s Ratio Perm		0.08		0.05		
v/c Ratio	0.23	0.20	0.69	0.17	0.54	0.45
Uniform Delay, d1	12.5	12.3	19.2	16.2	24.4	10.3
Progression Factor	1.20	3.31	1.00	1.00	1.00	1.00
Incremental Delay, d2	0.3	0.3	2.1	0.2	2.6	0.2
Delay (s)	15.3	40.9	21.3	16.3	26.9	10.5
Level of Service	B	D	C	B	C	B
Approach Delay (s)	32.4		19.9			12.8
Approach LOS	C		B			B
Intersection Summary						
HCM Average Control Delay			19.7		HCM Level of Service	B
HCM Volume to Capacity ratio			0.45			
Actuated Cycle Length (s)			60.0		Sum of lost time (s)	12.0
Intersection Capacity Utilization			43.5%		ICU Level of Service	A
Analysis Period (min)			15			
c Critical Lane Group						

HCM Signalized Intersection Capacity Analysis
 28: Woodward Ave. & Austin Rd.

11/23/2009



Movement	EBL	EBR	NBL	NBT	SBT	SBR
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	4.0
Lane Util. Factor	1.00	1.00	0.97	1.00	0.95	1.00
Frt	1.00	0.85	1.00	1.00	1.00	0.85
Flt Protected	0.95	1.00	0.95	1.00	1.00	1.00
Satd. Flow (prot)	1770	1583	3433	1863	3539	1583
Flt Permitted	0.95	1.00	0.95	1.00	1.00	1.00
Satd. Flow (perm)	1770	1583	3433	1863	3539	1583
Volume (vph)	390	490	750	340	620	160
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	411	516	789	358	653	168
RTOR Reduction (vph)	0	374	0	0	0	118
Lane Group Flow (vph)	411	142	789	358	653	50
Turn Type		Perm	Prot			Perm
Protected Phases	4		5	2	6	
Permitted Phases		4				6
Actuated Green, G (s)	21.4	21.4	21.2	48.1	22.9	22.9
Effective Green, g (s)	21.4	21.4	21.2	48.1	22.9	22.9
Actuated g/C Ratio	0.28	0.28	0.27	0.62	0.30	0.30
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)	489	437	939	1156	1046	468
v/s Ratio Prot	c0.23		c0.23	0.19	c0.18	
v/s Ratio Perm		0.09				0.03
v/c Ratio	0.84	0.33	0.84	0.31	0.62	0.11
Uniform Delay, d1	26.4	22.3	26.6	6.9	23.6	19.9
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	12.3	0.4	6.8	0.7	2.8	0.5
Delay (s)	38.8	22.8	33.4	7.6	26.4	20.3
Level of Service	D	C	C	A	C	C
Approach Delay (s)	29.8			25.3	25.2	
Approach LOS	C			C	C	

Intersection Summary

HCM Average Control Delay	26.7	HCM Level of Service	C
HCM Volume to Capacity ratio	0.76		
Actuated Cycle Length (s)	77.5	Sum of lost time (s)	12.0
Intersection Capacity Utilization	70.1%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			