

**SANDAG Series 12
2035 2007 RTP
Revenue Constrained
Highway Network
Eastridge East Grading Study
Multi-Family Project Select Zone**

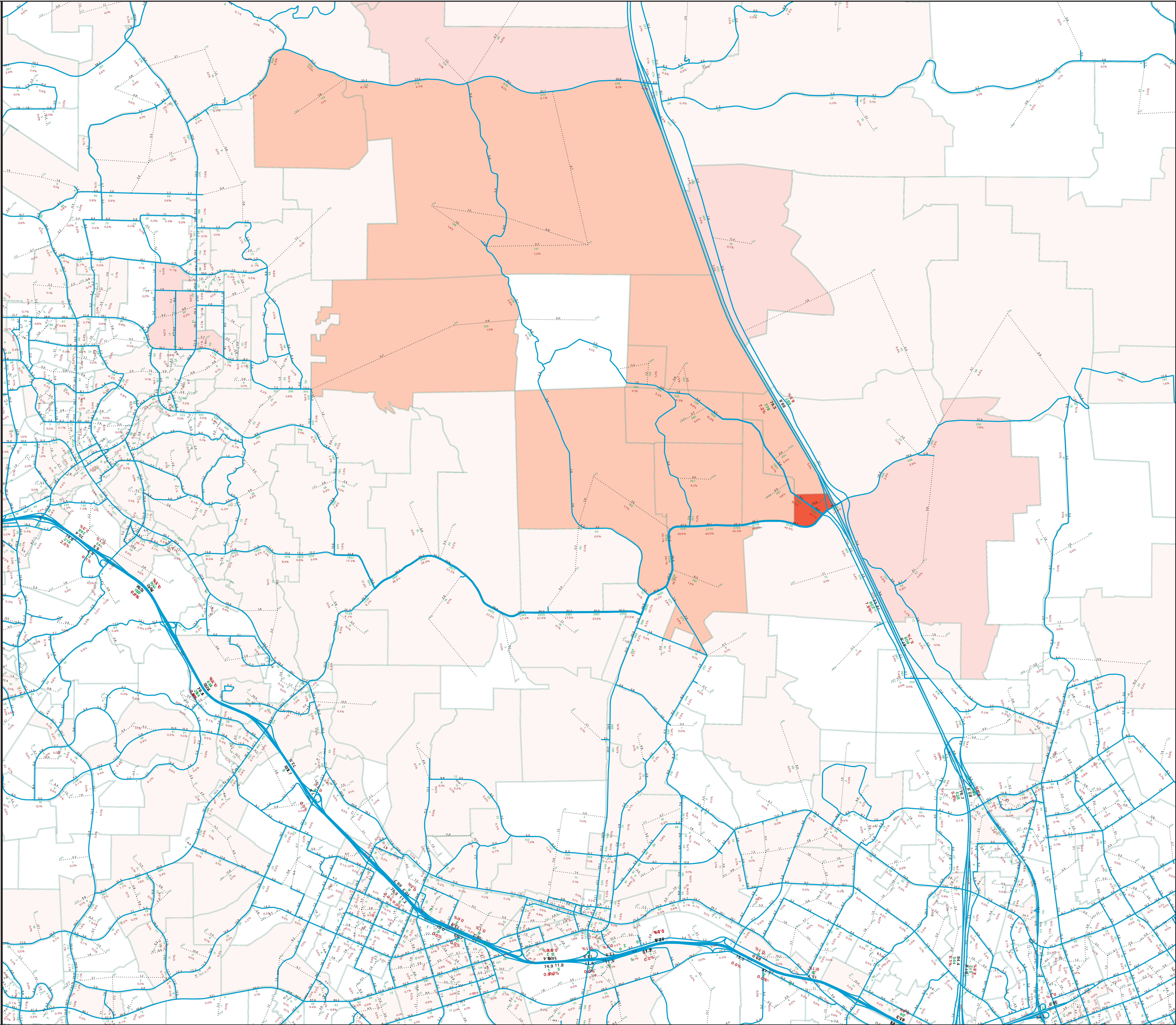
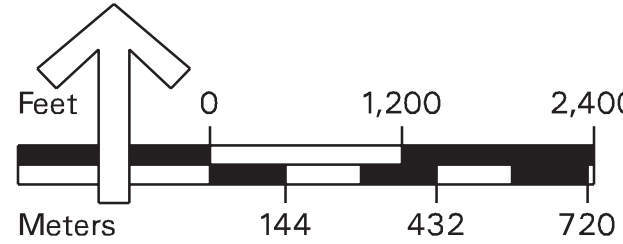
Sierra Project Area

Model Run 10/30/15
SR12 V3 2035 RC RTP11 - Serria run B2
No Las Posas extension

- Forecasted Volumes:
- # Unadjusted Volume (in Thousands)
 - + Select Link Volume
 - + Select Link Percentage
 - + Traffic Analysis Zone

- Link Distributions:
- 100%
 - 50.1% -> 99.9%
 - 25.1% -> 50.0%
 - 10.1% -> 25.0%
 - 5.1% -> 10.0%
 - 0.1% -> 5.0%
 - 0%

- Zonal Distributions:
- 100%
 - 25.1% -> 99.9%
 - 10.1% -> 25.0%
 - 1.1% -> 10.0%
 - 0.6% -> 1.0%
 - 0.1% -> 0.5%
 - Zero Trips (0.0%)



APPENDIX D

YEAR 2020 VOLUMES PLOTS (SCENARIOS A AND B) – CUMULATIVE PROJECTS

SANDAG
Series 12
2020rc11cumu
Option A Cumulative Projects

LLG Follow Up

ADT Volume
with project

Functional Classifications

- Freeway
- Prime
- Major
- Collector
- Light Collector
- Rural Collector
- Local
- Freeway Ramp
- Local Ramp
- Zone Connector

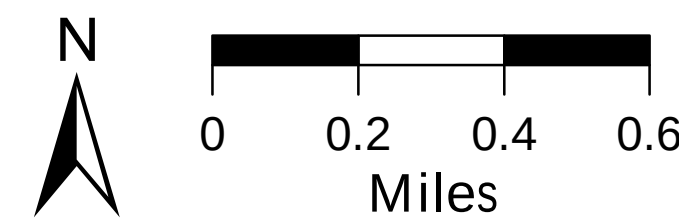
Traffic Analysis Zones

Unadjusted ADT(x1000)

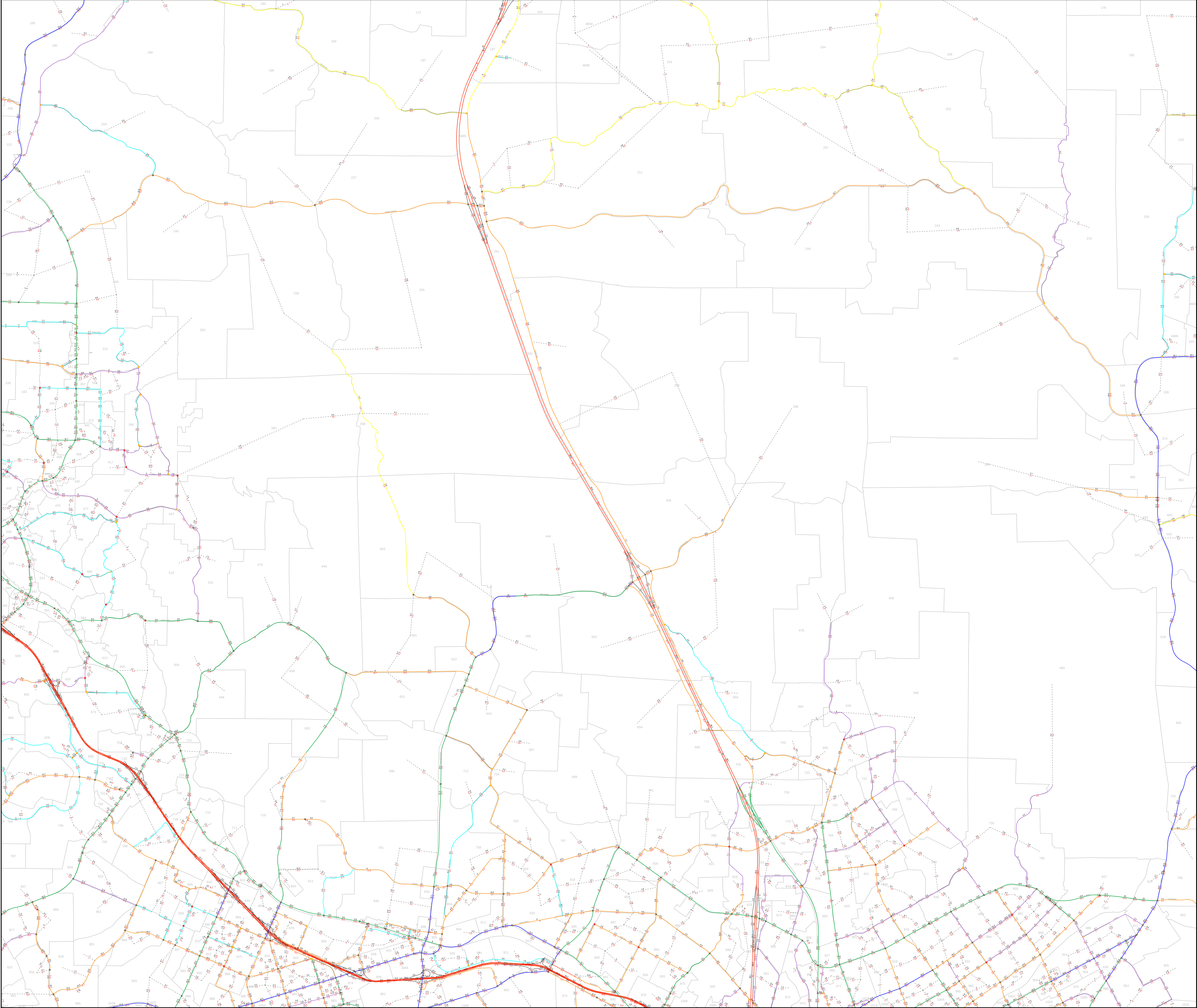
Adjusted ADT(x1000)

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SAN DIEGO ASSOCIATION OF GOVERNMENTS
401 B STREET, SUITE 800
SAN DIEGO, CALIFORNIA 92101 USA
(619) 689-1900
E-mail: sandag@sandag.org
Web site: www.sandag.org



October 7, 2014



SANDAG
SR12
2020rc11

ADT Volume

2020rc11cumu
with 3P Update
without Roads 3B and 3C
without Accretive Proposal

Functional Classifications

- Freeway
- Prime
- Major
- Collector
- Light Collector
- Rural Collector
- Local
- Freeway Ramp
- Local Ramp
- Zone Connector

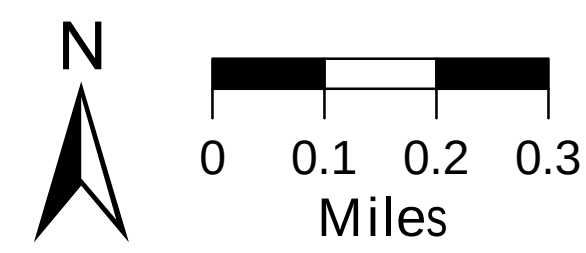
Traffic Analysis Zones

Unadjusted ADT(x1000)

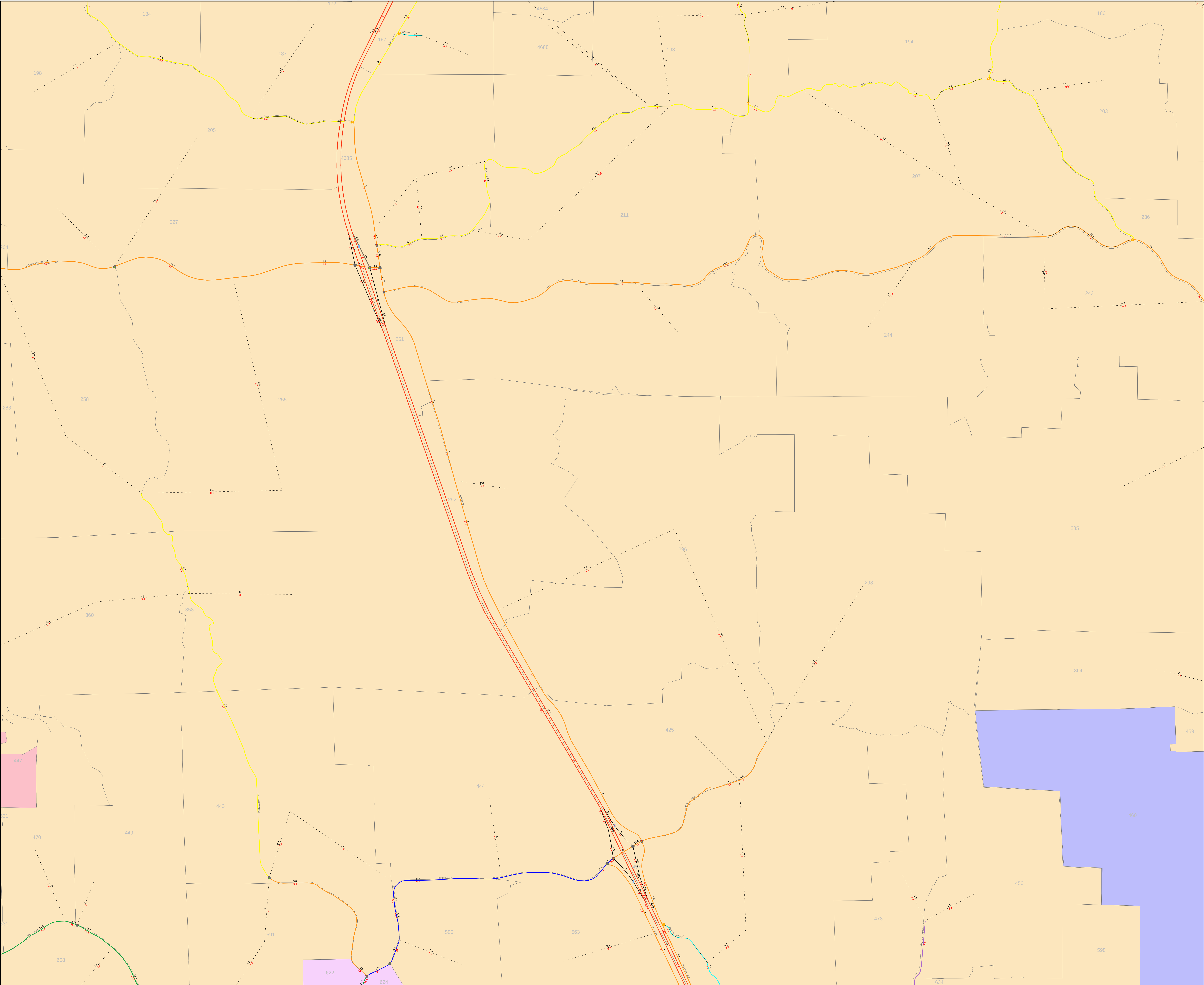
Adjusted ADT(x1000)

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SAN DIEGO ASSOCIATION OF GOVERNMENTS
401 B STREET, SUITE 800
SAN DIEGO, CALIFORNIA 92101 USA
(619) 699-1900
E-mail: sandag@sandag.org
Web site: www.sandag.org



Date: May 29, 2014



APPENDIX E

PEAK HOUR ANALYSIS WORKSHEETS – EXISTING + PROJECT

Exist + Proj AM
1: Champagne Boulevard & Gopher Canyon Road

Sierra Project
03/17/2017

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	148	148	262	89	266	461
Future Volume (vph)	148	148	262	89	266	461
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5	4.5	4.5	4.5	4.5	4.5
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frpb, ped/bikes	1.00	1.00	1.00	1.00	0.99	0.99
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	0.85	1.00	1.00	0.91	0.91
Flt Protected	0.95	1.00	0.95	1.00	1.00	1.00
Satd. Flow (prot)	1770	1583	1770	1863	1689	1689
Flt Permitted	0.95	1.00	0.95	1.00	1.00	1.00
Satd. Flow (perm)	1770	1583	1770	1863	1689	1689
Peak-hour factor, PHF	0.91	0.91	0.91	0.91	0.91	0.91
Adj. Flow (vph)	163	163	288	98	292	507
RTOR Reduction (vph)	0	139	0	0	54	0
Lane Group Flow (vph)	163	24	288	98	745	0
Confl. Bikes (#/hr)						2
Turn Type	Prot	Perm	Prot	NA	NA	
Protected Phases	4		5	2	6	
Permitted Phases		4				
Actuated Green, G (s)	14.3	14.3	20.9	74.7	49.3	
Effective Green, g (s)	14.3	14.3	20.9	74.7	49.3	
Actuated g/C Ratio	0.15	0.15	0.21	0.76	0.50	
Clearance Time (s)	4.5	4.5	4.5	4.5	4.5	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	258	230	377	1420	849	
v/s Ratio Prot	c0.09		c0.16	0.05	c0.44	
v/s Ratio Perm		0.02				
v/c Ratio	0.63	0.10	0.76	0.07	0.88	
Uniform Delay, d1	39.4	36.3	36.2	2.9	21.7	
Progression Factor	1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	5.0	0.2	8.9	0.0	10.1	
Delay (s)	44.3	36.5	45.1	2.9	31.8	
Level of Service	D	D	D	A	C	
Approach Delay (s)	40.4			34.4	31.8	
Approach LOS	D			C	C	

Intersection Summary			
HCM 2000 Control Delay	34.3	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.81		
Actuated Cycle Length (s)	98.0	Sum of lost time (s)	13.5
Intersection Capacity Utilization	76.2%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			

Exist + Proj AM
2: Champagne Boulevard/Gopher Canyon Road & Old Castle Road

Sierra Project
03/17/2017

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	115	252	92	41	164	255
Future Volume (vph)	115	252	92	41	164	255
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5	4.5	4.5		4.5	4.5
Lane Util. Factor	1.00	1.00	1.00		1.00	1.00
Frpb, ped/bikes	1.00	1.00	0.99		1.00	1.00
Flpb, ped/bikes	1.00	1.00	1.00		1.00	1.00
Frt	1.00	0.85	0.96		1.00	1.00
Flt Protected	0.95	1.00	1.00		0.95	1.00
Satd. Flow (prot)	1770	1583	1774		1770	1863
Flt Permitted	0.95	1.00	1.00		0.95	1.00
Satd. Flow (perm)	1770	1583	1774		1770	1863
Peak-hour factor, PHF	0.87	0.87	0.87	0.87	0.87	0.87
Adj. Flow (vph)	132	290	106	47	189	293
RTOR Reduction (vph)	0	222	18	0	0	0
Lane Group Flow (vph)	132	68	135	0	189	293
Confl. Bikes (#/hr)				1		
Turn Type	Prot	Perm	NA		Prot	NA
Protected Phases	8		2		1	6
Permitted Phases		8				
Actuated Green, G (s)	10.0	10.0	10.8		8.3	23.6
Effective Green, g (s)	10.0	10.0	10.8		8.3	23.6
Actuated g/C Ratio	0.23	0.23	0.25		0.19	0.55
Clearance Time (s)	4.5	4.5	4.5		4.5	4.5
Vehicle Extension (s)	3.0	3.0	3.0		3.0	3.0
Lane Grp Cap (vph)	415	371	449		344	1032
v/s Ratio Prot	c0.07		0.08		c0.11	c0.16
v/s Ratio Perm		0.04				
v/c Ratio	0.32	0.18	0.30		0.55	0.28
Uniform Delay, d1	13.5	13.0	12.8		15.5	5.0
Progression Factor	1.00	1.00	1.00		1.00	1.00
Incremental Delay, d2	0.4	0.2	0.4		1.8	0.2
Delay (s)	13.9	13.3	13.2		17.3	5.2
Level of Service	B	B	B		B	A
Approach Delay (s)	13.5		13.2			9.9
Approach LOS	B		B			A

Intersection Summary			
HCM 2000 Control Delay	11.8	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.40		
Actuated Cycle Length (s)	42.6	Sum of lost time (s)	13.5
Intersection Capacity Utilization	34.0%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

Exist + Proj AM
3: Champagne Boulevard & Lawrence Welk Dr

Sierra Project
03/17/2017

																	
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR					
Lane Configurations																	
Traffic Volume (veh/h)	1	0	17	15	0	21	18	148	63	53	279	4					
Future Volume (Veh/h)	1	0	17	15	0	21	18	148	63	53	279	4					
Sign Control		Stop			Stop			Free			Free						
Grade		0%			0%			0%			0%						
Peak Hour Factor	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84					
Hourly flow rate (vph)	1	0	20	18	0	25	21	176	75	63	332	5					
Pedestrians		1			2						1						
Lane Width (ft)		12.0			12.0						12.0						
Walking Speed (ft/s)		4.0			4.0						4.0						
Percent Blockage		0			0						0						
Right turn flare (veh)					7												
Median type								None			None						
Median storage (veh)																	
Upstream signal (ft)											874						
pX, platoon unblocked																	
vC, conflicting volume	680	756	336	698	684	179	338				253						
vC1, stage 1 conf vol																	
vC2, stage 2 conf vol																	
vCu, unblocked vol	680	756	336	698	684	179	338				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	97	94	100	97	98				95						
cM capacity (veh/h)	335	315	706	327	346	862	1220				1310						
Direction, Lane #	EB 1	WB 1	NB 1	NB 2	NB 3	SB 1	SB 2										
Volume Total	21	43	21	176	75	63	337										
Volume Left	1	18	21	0	0	63	0										
Volume Right	20	25	0	0	75	0	5										
cSH	671	781	1220	1700	1700	1310	1700										
Volume to Capacity	0.03	0.06	0.02	0.10	0.04	0.05	0.20										
Queue Length 95th (ft)	2	4	1	0	0	4	0										
Control Delay (s)	10.5	12.4	8.0	0.0	0.0	7.9	0.0										
Lane LOS	B	B	A			A											
Approach Delay (s)	10.5	12.4	0.6				1.2										
Approach LOS	B	B															
Intersection Summary																	
Average Delay	1.9																
Intersection Capacity Utilization	35.3%			ICU Level of Service			A										
Analysis Period (min)	15																

Exist + Proj AM
4: North Centre City Pkwy/Champagne Boulevard & Deer Springs Rd

Sierra Project
03/17/2017

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↖	↖↗		↖	↖↗			↗↖			↗↖	
Traffic Volume (vph)	143	165	66	172	346	10	84	53	49	4	163	243
Future Volume (vph)	143	165	66	172	346	10	84	53	49	4	163	243
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5	4.5		4.5	4.5			4.5			4.5	
Lane Util. Factor	1.00	0.95		1.00	0.95			1.00			1.00	
Frpb, ped/bikes	1.00	0.99		1.00	1.00			1.00			0.99	
Flpb, ped/bikes	1.00	1.00		1.00	1.00			1.00			1.00	
Frt	1.00	0.96		1.00	1.00			0.96			0.92	
Flt Protected	0.95	1.00		0.95	1.00			0.98			1.00	
Satd. Flow (prot)	1770	3361		1770	3522			1750			1699	
Flt Permitted	0.95	1.00		0.95	1.00			0.60			1.00	
Satd. Flow (perm)	1770	3361		1770	3522			1069			1696	
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)	155	179	72	187	376	11	91	58	53	4	177	264
RTOR Reduction (vph)	0	42	0	0	2	0	0	15	0	0	64	0
Lane Group Flow (vph)	155	209	0	187	385	0	0	187	0	0	382	0
Confl. Peds. (#/hr)	1											
Confl. Bikes (#/hr)	4			1			6			1		
Turn Type	Prot	NA		Prot	NA		Perm	NA		Perm	NA	
Protected Phases	7	4		3	8			2			6	
Permitted Phases							2			6		
Actuated Green, G (s)	8.6	12.6		12.0	16.0			18.9			18.9	
Effective Green, g (s)	8.6	12.6		12.0	16.0			18.9			18.9	
Actuated g/C Ratio	0.15	0.22		0.21	0.28			0.33			0.33	
Clearance Time (s)	4.5	4.5		4.5	4.5			4.5			4.5	
Vehicle Extension (s)	3.0	3.0		3.0	3.0			3.0			3.0	
Lane Grp Cap (vph)	267	742		372	988			354			562	
v/s Ratio Prot	0.09	0.06		c0.11	c0.11							
v/s Ratio Perm							0.17			c0.22		
v/c Ratio	0.58	0.28		0.50	0.39			0.53			0.68	
Uniform Delay, d1	22.5	18.4		19.9	16.6			15.4			16.4	
Progression Factor	1.00	1.00		1.00	1.00			1.00			1.00	
Incremental Delay, d2	3.2	0.2		1.1	0.3			1.4			3.3	
Delay (s)	25.7	18.6		20.9	16.8			16.9			19.7	
Level of Service	C	B		C	B			B			B	
Approach Delay (s)	21.3			18.2			16.9			19.7		
Approach LOS	C			B			B			B		
Intersection Summary												
HCM 2000 Control Delay	19.2			HCM 2000 Level of Service			B					
HCM 2000 Volume to Capacity ratio	0.56											
Actuated Cycle Length (s)	57.0			Sum of lost time (s)			13.5					
Intersection Capacity Utilization	67.0%			ICU Level of Service			C					
Analysis Period (min)	15											
c Critical Lane Group												

Exist + Proj AM
5: I-15 NB Ramps & Deer Springs Rd

Sierra Project
03/17/2017

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↱			↰	↱		↰	↱			
Traffic Volume (vph)	317	259	0	0	580	48	278	4	152	0	0	0
Future Volume (vph)	317	259	0	0	580	48	278	4	152	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.2	5.3			5.3	5.3			4.6			
Lane Util. Factor	1.00	1.00			1.00	1.00			1.00			
Flt	1.00	1.00			1.00	0.85			1.00	0.85		
Flt Protected	0.95	1.00			1.00	1.00			0.95	1.00		
Satd. Flow (prot)	1770	1863			1863	1583			1775	1583		
Flt Permitted	0.95	1.00			1.00	1.00			0.95	1.00		
Satd. Flow (perm)	1770	1863			1863	1583			1775	1583		
Peak-hour factor, PHF	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89
Adj. Flow (vph)	356	291	0	0	652	54	312	4	171	0	0	0
RTOR Reduction (vph)	0	0	0	0	0	29	0	0	144	0	0	0
Lane Group Flow (vph)	356	291	0	0	652	25	0	316	27	0	0	0
Turn Type	Prot	NA			NA	Perm	Split	NA	Perm			
Protected Phases	5	2			6		8	8				
Permitted Phases						6			8			
Actuated Green, G (s)	23.3	74.1			46.6	46.6		16.0	16.0			
Effective Green, g (s)	23.3	74.1			46.6	46.6		16.0	16.0			
Actuated g/C Ratio	0.23	0.74			0.47	0.47		0.16	0.16			
Clearance Time (s)	4.2	5.3			5.3	5.3		4.6	4.6			
Vehicle Extension (s)	6.0	2.0			2.0	2.0		2.0	2.0			
Lane Grp Cap (vph)	412	1380			868	737		284	253			
v/s Ratio Prot	c0.20	0.16			c0.35			c0.18				
v/s Ratio Perm						0.02			0.02			
v/c Ratio	0.86	0.21			0.75	0.03		1.11	0.11			
Uniform Delay, d1	36.8	4.0			21.9	14.5		42.0	35.9			
Progression Factor	1.06	2.14			1.00	1.00		1.00	1.00			
Incremental Delay, d2	14.3	0.2			5.9	0.1		87.1	0.1			
Delay (s)	53.4	8.8			27.9	14.6		129.1	36.0			
Level of Service	D	A			C	B		F	D			
Approach Delay (s)		33.3				26.9		96.4			0.0	
Approach LOS		C				C		F			A	

Intersection Summary

HCM 2000 Control Delay	47.5	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.85		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	14.1
Intersection Capacity Utilization	75.5%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

Exist + Proj AM
6: I-15 SB Ramps & Deer Springs Rd

Sierra Project
03/17/2017

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↰	↱	↰	↱			↰	↱		↰	↱
Traffic Volume (vph)	0	556	625	271	622	0	0	0	0	23	25	818
Future Volume (vph)	0	556	625	271	622	0	0	0	0	23	25	818
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		5.3	5.3	4.2	5.3						4.6	4.6
Lane Util. Factor		1.00	1.00	1.00	1.00						1.00	0.88
Flt		1.00	0.85	1.00	1.00						1.00	0.85
Flt Protected		1.00	1.00	0.95	1.00						0.98	1.00
Satd. Flow (prot)		1863	1583	1770	1863						1819	2787
Flt Permitted		1.00	1.00	0.95	1.00						0.98	1.00
Satd. Flow (perm)		1863	1583	1770	1863						1819	2787
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	604	679	295	676	0	0	0	0	25	27	889
RTOR Reduction (vph)	0	0	330	0	0	0	0	0	0	0	0	398
Lane Group Flow (vph)	0	604	349	295	676	0	0	0	0	0	52	491
Turn Type		NA	Perm	Prot	NA					Split	NA	Perm
Protected Phases		2		1	6					4	4	
Permitted Phases			2									4
Actuated Green, G (s)		44.0	44.0	21.0	69.2					20.9	20.9	
Effective Green, g (s)		44.0	44.0	21.0	69.2					20.9	20.9	
Actuated g/C Ratio		0.44	0.44	0.21	0.69					0.21	0.21	
Clearance Time (s)		5.3	5.3	4.2	5.3					4.6	4.6	
Vehicle Extension (s)		2.0	2.0	2.0	2.0					2.0	2.0	
Lane Grp Cap (vph)		819	696	371	1289					380	582	
v/s Ratio Prot		c0.32		c0.17	0.36					0.03		
v/s Ratio Perm			0.22								c0.18	
v/c Ratio		0.74	0.50	0.80	0.52					0.14	0.84	
Uniform Delay, d1		23.2	20.1	37.5	7.4					32.2	38.0	
Progression Factor		1.00	1.00	1.04	1.09					1.00	1.00	
Incremental Delay, d2		5.9	2.6	5.3	0.7					0.1	10.4	
Delay (s)		29.1	22.7	44.4	8.9					32.3	48.4	
Level of Service		C	C	D	A					C	D	
Approach Delay (s)		25.7			19.7			0.0			47.5	
Approach LOS		C			B			A			D	

Intersection Summary

HCM 2000 Control Delay	30.3	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.78		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	14.1
Intersection Capacity Utilization	75.5%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

Exist + Proj AM
7: Mesa Rock Road & Deer Springs Rd

Sierra Project
03/17/2017

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↰↱		↰	↰↱			↱		↰	↰↱	↰
Traffic Volume (vph)	148	502	13	11	1055	374	12	15	13	666	33	177
Future Volume (vph)	148	502	13	11	1055	374	12	15	13	666	33	177
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5	4.5		4.5	4.5			4.5			4.5	4.5
Lane Util. Factor	1.00	0.95		1.00	0.95			1.00			1.00	1.00
Frpb, ped/bikes	1.00	1.00		1.00	0.99			1.00			1.00	1.00
Flpb, ped/bikes	1.00	1.00		1.00	1.00			1.00			1.00	1.00
Frt	1.00	1.00		1.00	0.96			0.96			1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00			0.99			0.95	1.00
Satd. Flow (prot)	1770	3524		1770	3381			1757			1778	1583
Flt Permitted	0.95	1.00		0.95	1.00			0.99			0.95	1.00
Satd. Flow (perm)	1770	3524		1770	3381			1757			1778	1583
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	164	558	14	12	1172	416	13	17	14	740	37	197
RTOR Reduction (vph)	0	1	0	0	31	0	0	13	0	0	0	91
Lane Group Flow (vph)	164	571	0	12	1557	0	0	31	0	0	777	106
Confl. Bikes (#/hr)		9			2							
Turn Type	Prot	NA		Prot	NA		Split	NA		Split	NA	Perm
Protected Phases	7	4		3	8		2	2		6	6	
Permitted Phases												6
Actuated Green, G (s)	4.3	48.3		0.7	44.7			6.0			19.3	19.3
Effective Green, g (s)	4.3	48.3		0.7	44.7			6.0			19.3	19.3
Actuated g/C Ratio	0.05	0.52		0.01	0.48			0.07			0.21	0.21
Clearance Time (s)	4.5	4.5		4.5	4.5			4.5			4.5	4.5
Vehicle Extension (s)	3.0	3.0		3.0	3.0			3.0			3.0	3.0
Lane Grp Cap (vph)	82	1844		13	1637			114			371	331
v/s Ratio Prot	c0.09	c0.16		0.01	c0.46			c0.02			c0.44	
v/s Ratio Perm												0.07
v/c Ratio	2.00	0.31		0.92	0.95			0.27			2.09	0.32
Uniform Delay, d1	44.0	12.5		45.8	22.8			41.1			36.5	30.9
Progression Factor	1.00	1.00		1.00	1.00			1.00			1.00	1.00
Incremental Delay, d2	490.3	0.1		207.3	12.5			1.3			501.6	2.5
Delay (s)	534.3	12.6		253.1	35.3			42.4			538.1	33.5
Level of Service	F	B		F	D			D			F	C
Approach Delay (s)		128.9			36.9			42.4			436.0	
Approach LOS		F			D			D			F	

Intersection Summary

HCM 2000 Control Delay	173.1	HCM 2000 Level of Service	F
HCM 2000 Volume to Capacity ratio	1.21		
Actuated Cycle Length (s)	92.3	Sum of lost time (s)	18.0
Intersection Capacity Utilization	105.9%	ICU Level of Service	G
Analysis Period (min)	15		
c Critical Lane Group			

Exist + Proj AM
9: Deer Springs Rd & Sarver Lane

Sierra Project
03/17/2017

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations	↰	↰	↰		↰	↰
Traffic Volume (veh/h)	76	484	1081	23	99	256
Future Volume (Veh/h)	76	484	1081	23	99	256
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.96	0.96	0.96	0.96	0.96	0.96
Hourly flow rate (vph)	79	504	1126	24	103	267
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	1150				1800	1138
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1150				1800	1138
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	87				0	0
cM capacity (veh/h)	608				76	245
Direction, Lane #	EB 1	EB 2	WB 1	SB 1		
Volume Total	79	504	1150	370		
Volume Left	79	0	0	103		
Volume Right	0	0	24	267		
cSH	608	1700	1700	152		
Volume to Capacity	0.13	0.30	0.68	2.44		
Queue Length 95th (ft)	11	0	0	792		
Control Delay (s)	11.8	0.0	0.0	713.8		
Lane LOS	B			F		
Approach Delay (s)	1.6		0.0	713.8		
Approach LOS				F		

Intersection Summary

Average Delay	126.0		
Intersection Capacity Utilization	91.1%	ICU Level of Service	F
Analysis Period (min)	15		

Exist + Proj AM
10: Deer Springs Rd & Sycamore Road

Sierra Project
03/17/2017

	WBL	WBR	NBT	NBR	SBL	SBT
Movement						
Lane Configurations	↰	↱	↰		↱	↰
Traffic Volume (veh/h)	1	5	561	3	14	1407
Future Volume (Veh/h)	1	5	561	3	14	1407
Sign Control	Stop		Free		Free	
Grade	0%		0%		0%	
Peak Hour Factor	0.89	0.89	0.89	0.89	0.89	0.89
Hourly flow rate (vph)	1	6	630	3	16	1581
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)		4				
Median type			None		None	
Median storage (veh)						
Upstream signal (ft)			680			
pX, platoon unblocked	0.90	0.90			0.90	
vC, conflicting volume	2244	632			633	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	2325	537			539	
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	99			98	
cM capacity (veh/h)	36	491			929	
Direction, Lane #	WB 1	NB 1	SB 1			
Volume Total	7	633	1597			
Volume Left	1	0	16			
Volume Right	6	3	0			
cSH	254	1700	929			
Volume to Capacity	0.03	0.37	0.02			
Queue Length 95th (ft)	2	0	1			
Control Delay (s)	25.9	0.0	2.3			
Lane LOS	D		A			
Approach Delay (s)	25.9	0.0	2.3			
Approach LOS	D					
Intersection Summary						
Average Delay			1.7			
Intersection Capacity Utilization			95.2%	ICU Level of Service	F	
Analysis Period (min)			15			

Exist + Proj AM
11: Twin Oaks Valley Road & Camino Mayor

Sierra Project
03/17/2017

	WBL	WBR	NBT	NBR	SBL	SBT
Movement						
Lane Configurations	↰	↱	↰		↱	↰
Traffic Volume (veh/h)	21	1	15	10	1	15
Future Volume (Veh/h)	21	1	15	10	1	15
Sign Control	Stop		Free		Free	
Grade	0%		0%		0%	
Peak Hour Factor	0.83	0.83	0.83	0.83	0.83	0.83
Hourly flow rate (vph)	25	1	18	12	1	18
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	44	24			30	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	44	24			30	
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	100			100	
cM capacity (veh/h)	966	1052			1583	
Direction, Lane #	WB 1	NB 1	SB 1			
Volume Total	26	30	19			
Volume Left	25	0	1			
Volume Right	1	12	0			
cSH	969	1700	1583			
Volume to Capacity	0.03	0.02	0.00			
Queue Length 95th (ft)	2	0	0			
Control Delay (s)	8.8	0.0	0.4			
Lane LOS	A		A			
Approach Delay (s)	8.8	0.0	0.4			
Approach LOS	A					
Intersection Summary						
Average Delay			3.2			
Intersection Capacity Utilization			13.3%	ICU Level of Service	A	
Analysis Period (min)			15			

Exist + Proj AM
12: Twin Oaks Valley Rd #1/Deer Springs Rd & Twin Oaks Valley Rd

Sierra Project
03/17/2017

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	44	97	88	538	1406	35
Future Volume (vph)	44	97	88	538	1406	35
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.9	4.9	4.0	5.3	5.3	5.3
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Flt Protected	0.95	1.00	0.95	1.00	1.00	1.00
Satd. Flow (prot)	1770	1583	1770	1863	1863	1583
Flt Permitted	0.95	1.00	0.95	1.00	1.00	1.00
Satd. Flow (perm)	1770	1583	1770	1863	1863	1583
Peak-hour factor, PHF	0.91	0.91	0.91	0.91	0.91	0.91
Growth Factor (vph)	100%	100%	100%	130%	130%	100%
Adj. Flow (vph)	48	107	97	769	2009	38
RTOR Reduction (vph)	0	81	0	0	0	3
Lane Group Flow (vph)	48	26	97	769	2009	35
Turn Type	Prot	Perm	Prot	NA	NA	Perm
Protected Phases	4		5	2	6	
Permitted Phases		4				6
Actuated Green, G (s)	13.0	13.0	7.0	118.1	107.1	107.1
Effective Green, g (s)	13.0	13.0	7.0	118.1	107.1	107.1
Actuated g/C Ratio	0.09	0.09	0.05	0.84	0.76	0.76
Clearance Time (s)	4.9	4.9	4.0	5.3	5.3	5.3
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	162	145	87	1557	1412	1199
v/s Ratio Prot	c0.03		c0.05	0.41	c1.08	
v/s Ratio Perm		0.02				0.02
v/c Ratio	0.30	0.18	1.11	0.49	1.42	0.03
Uniform Delay, d1	59.9	59.2	67.2	3.2	17.1	4.2
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	1.0	0.6	131.0	0.2	194.5	0.0
Delay (s)	60.9	59.8	198.1	3.5	211.6	4.2
Level of Service	E	E	F	A	F	A
Approach Delay (s)	60.2			25.3	207.7	
Approach LOS	E			C	F	
Intersection Summary						
HCM 2000 Control Delay		148.8		HCM 2000 Level of Service	F	
HCM 2000 Volume to Capacity ratio		1.29				
Actuated Cycle Length (s)		141.3		Sum of lost time (s)	14.2	
Intersection Capacity Utilization		110.7%		ICU Level of Service	H	
Analysis Period (min)		15				
c Critical Lane Group						

Exist + Proj AM
13: Twin Oaks Valley Rd #1 & Buena Creek Rd

Sierra Project
03/17/2017

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	311	0	172	0	0	0	113	314	0	0	1005	496
Future Volume (vph)	311	0	172	0	0	0	113	314	0	0	1005	496
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0	4.0				5.0	5.5			5.5	5.5
Lane Util. Factor		1.00	1.00				1.00	1.00			1.00	1.00
Flt Protected		0.95	1.00				0.95	1.00			1.00	1.00
Satd. Flow (prot)		1770	1546				1770	1863			1863	1547
Flt Permitted		0.76	1.00				0.95	1.00			1.00	1.00
Satd. Flow (perm)		1410	1546				1770	1863			1863	1547
Peak-hour factor, PHF	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Adj. Flow (vph)	324	0	179	0	0	0	118	327	0	0	1047	517
RTOR Reduction (vph)	0	0	121	0	0	0	0	0	0	0	0	83
Lane Group Flow (vph)	0	324	58	0	0	0	118	327	0	0	1047	434
Confl. Peds. (#/hr)			2									1
Confl. Bikes (#/hr)												3
Turn Type		Perm	NA	Perm			Prot	NA		Prot	NA	Perm
Protected Phases		4			8		5	2		1	6	
Permitted Phases		4		8								6
Actuated Green, G (s)		23.5	23.5				5.0	53.6			43.6	43.6
Effective Green, g (s)		23.5	23.5				5.0	53.6			43.6	43.6
Actuated g/C Ratio		0.27	0.27				0.06	0.62			0.50	0.50
Clearance Time (s)		4.0	4.0				5.0	5.5			5.5	5.5
Vehicle Extension (s)		3.0	3.0				3.0	3.0			3.0	3.0
Lane Grp Cap (vph)		382	419				102	1153			937	778
v/s Ratio Prot							c0.07	0.18			c0.56	
v/s Ratio Perm		c0.23	0.04									0.28
v/c Ratio		0.85	0.14				1.16	0.28			1.12	0.56
Uniform Delay, d1		29.9	23.9				40.8	7.6			21.5	14.8
Progression Factor		1.00	1.00				1.00	1.00			1.00	1.00
Incremental Delay, d2		15.9	0.2				137.4	0.1			67.2	0.9
Delay (s)		45.8	24.0				178.2	7.8			88.7	15.7
Level of Service		D	C				F	A			F	B
Approach Delay (s)		38.0			0.0			53.0				64.6
Approach LOS		D			A			D				E
Intersection Summary												
HCM 2000 Control Delay			57.2				HCM 2000 Level of Service	E				
HCM 2000 Volume to Capacity ratio			1.03									
Actuated Cycle Length (s)			86.6				Sum of lost time (s)	14.5				
Intersection Capacity Utilization			88.5%				ICU Level of Service	E				
Analysis Period (min)			15									
c Critical Lane Group												

Exist + Proj AM
14: Twin Oaks Valley Rd #1 & Cassou Rd

Sierra Project
03/17/2017

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↔			↔		↖	↗	↖	↗	↖	↗
Traffic Volume (vph)	14	7	39	197	12	34	25	402	195	67	994	12
Future Volume (vph)	14	7	39	197	12	34	25	402	195	67	994	12
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		5.0			5.0		5.0	5.0	5.0	5.0	5.0	
Lane Util. Factor		1.00			1.00		1.00	1.00	1.00	1.00	1.00	
Frpb, ped/bikes		0.99			1.00		1.00	1.00	0.98	1.00	1.00	
Flpb, ped/bikes		1.00			1.00		1.00	1.00	1.00	1.00	1.00	
Frt		0.91			0.98		1.00	1.00	0.85	1.00	1.00	
Flt Protected		0.99			0.96		0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)		1656			1757		1770	1863	1547	1770	1859	
Flt Permitted		0.99			0.96		0.95	1.00	1.00	0.95	1.00	
Satd. Flow (perm)		1656			1757		1770	1863	1547	1770	1859	
Peak-hour factor, PHF	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Adj. Flow (vph)	15	7	41	205	12	35	26	419	203	70	1035	12
RTOR Reduction (vph)	0	38	0	0	4	0	0	0	94	0	0	0
Lane Group Flow (vph)	0	26	0	0	249	0	26	419	109	70	1048	0
Confl. Peds. (#/hr)			6						1			
Turn Type	Split	NA		Split	NA		Prot	NA	Perm	Prot	NA	
Protected Phases	4	4		8	8		5	2		1	6	
Permitted Phases									2			
Actuated Green, G (s)		11.2			21.4		2.7	70.5	70.5	8.1	75.9	
Effective Green, g (s)		11.2			21.4		2.7	70.5	70.5	8.1	75.9	
Actuated g/C Ratio		0.09			0.16		0.02	0.54	0.54	0.06	0.58	
Clearance Time (s)		5.0			5.0		5.0	5.0	5.0	5.0	5.0	
Vehicle Extension (s)		3.0			3.0		3.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)		141			286		36	1001	831	109	1075	
v/s Ratio Prot		c0.02			c0.14		0.01	0.22		c0.04	c0.56	
v/s Ratio Perm								0.07				
v/c Ratio		0.18			0.87		0.72	0.42	0.13	0.64	0.97	
Uniform Delay, d1		55.7			53.5		63.9	18.1	15.1	60.1	26.7	
Progression Factor		1.00			1.00		1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2		0.6			23.4		52.1	0.3	0.1	12.2	21.3	
Delay (s)		56.4			76.9		116.0	18.4	15.2	72.4	48.0	
Level of Service		E			E		F	B	B	E	D	
Approach Delay (s)		56.4			76.9		21.3				49.6	
Approach LOS		E			E		C				D	

Intersection Summary

HCM 2000 Control Delay	44.3	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.88		
Actuated Cycle Length (s)	131.2	Sum of lost time (s)	20.0
Intersection Capacity Utilization	84.3%	ICU Level of Service	E
Analysis Period (min)	15		
c Critical Lane Group			

Exist + Proj AM
15: Twin Oaks Valley Rd #1 & La Cienega

Sierra Project
03/17/2017

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations	↖	↗	↕	↖	↗	↕
Traffic Volume (vph)	170	207	564	57	62	1098
Future Volume (vph)	170	207	564	57	62	1098
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)		6.0	6.0	6.5	6.0	6.5
Lane Util. Factor	1.00	1.00	0.95		1.00	0.95
Frpb, ped/bikes	1.00	0.99	1.00		1.00	1.00
Flpb, ped/bikes	1.00	1.00	1.00		1.00	1.00
Frt	1.00	0.85	0.99		1.00	1.00
Flt Protected	0.95	1.00	1.00		0.95	1.00
Satd. Flow (prot)	1770	1563	3476		1770	3539
Flt Permitted	0.95	1.00	1.00		0.95	1.00
Satd. Flow (perm)	1770	1563	3476		1770	3539
Peak-hour factor, PHF	0.91	0.91	0.91	0.91	0.91	0.91
Adj. Flow (vph)	187	227	620	63	68	1207
RTOR Reduction (vph)	0	0	8	0	0	0
Lane Group Flow (vph)	187	227	675	0	68	1207
Confl. Peds. (#/hr)		1		13		
Confl. Bikes (#/hr)				1		
Turn Type	Prot	Perm	NA		Prot	NA
Protected Phases	8		2		1	6
Permitted Phases		8				
Actuated Green, G (s)	14.7	14.7	22.5		4.9	33.4
Effective Green, g (s)	14.7	14.7	22.5		4.9	33.4
Actuated g/C Ratio	0.24	0.24	0.37		0.08	0.55
Clearance Time (s)	6.0	6.0	6.5		6.0	6.5
Vehicle Extension (s)	3.0	3.0	3.0		3.0	3.0
Lane Grp Cap (vph)	429	379	1290		143	1950
v/s Ratio Prot	0.11		0.19		0.04	c0.34
v/s Ratio Perm		c0.15				
v/c Ratio	0.44	0.60	0.52		0.48	0.62
Uniform Delay, d1	19.4	20.3	14.9		26.6	9.3
Progression Factor	1.00	1.00	1.00		1.00	1.00
Incremental Delay, d2	0.7	2.5	0.4		2.5	0.6
Delay (s)	20.1	22.9	15.3		29.1	9.9
Level of Service	C	C	B		C	A
Approach Delay (s)	21.6		15.3			10.9
Approach LOS	C		B			B

Intersection Summary

HCM 2000 Control Delay	14.0	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.70		
Actuated Cycle Length (s)	60.6	Sum of lost time (s)	18.5
Intersection Capacity Utilization	50.5%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

Exist + Proj AM
16: Twin Oaks Valley Rd #1 & Del Roy Dr

Sierra Project
03/17/2017

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↱		↰	↱		↰	↱		↰	↱	
Traffic Volume (vph)	13	0	41	3	0	1	23	607	20	8	1314	13
Future Volume (vph)	13	0	41	3	0	1	23	607	20	8	1314	13
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5	5.0		4.5	5.0		5.0	5.0		5.0	5.0	
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	0.95		1.00	0.95	
Frpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Flpb, ped/bikes	1.00	1.00		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		1.00	1.00	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770	1583		1770	1583		1770	3520		1770	3534	
Flt Permitted	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (perm)	1770	1583		1770	1583		1770	3520		1770	3534	
Peak-hour factor, PHF	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89
Adj. Flow (vph)	15	0	46	3	0	1	26	682	22	9	1476	15
RTOR Reduction (vph)	0	42	0	0	1	0	0	1	0	0	0	0
Lane Group Flow (vph)	15	4	0	3	0	0	26	703	0	9	1491	0
Confl. Peds. (#/hr)	2											
Turn Type	Prot	NA		Prot	NA		Prot	NA		Prot	NA	
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases												
Actuated Green, G (s)	0.5	5.6		0.5	5.6		1.3	45.4		0.5	44.6	
Effective Green, g (s)	0.5	5.6		0.5	5.6		1.3	45.4		0.5	44.6	
Actuated g/C Ratio	0.01	0.08		0.01	0.08		0.02	0.63		0.01	0.62	
Clearance Time (s)	4.5	5.0		4.5	5.0		5.0	5.0		5.0	5.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	12	123		12	123		32	2235		12	2204	
v/s Ratio Prot	c0.01	c0.00		0.00	0.00		c0.01	0.20		0.01	c0.42	
v/s Ratio Perm												
v/c Ratio	1.25	0.03		0.25	0.00		0.81	0.31		0.75	0.68	
Uniform Delay, d1	35.5	30.4		35.3	30.4		35.0	6.0		35.4	8.8	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	352.1	0.1		10.7	0.0		84.7	0.1		128.3	0.8	
Delay (s)	387.6	30.5		46.0	30.4		119.7	6.0		163.7	9.6	
Level of Service	F	C		D	C		F	A		F	A	
Approach Delay (s)	118.3			42.1			10.1			10.5		
Approach LOS	F			D			B			B		

Intersection Summary

HCM 2000 Control Delay	13.3	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.61		
Actuated Cycle Length (s)	71.5	Sum of lost time (s)	19.5
Intersection Capacity Utilization	52.5%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

Exist + Proj AM
17: Twin Oaks Valley Rd #1 & Windy Wy

Sierra Project
03/17/2017

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	10	1	43	0	0	0	49	632	2	0	1313	61
Future Volume (vph)	10	1	43	0	0	0	49	632	2	0	1313	61
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0					6.0	6.0			4.0	
Lane Util. Factor	1.00	1.00					1.00	0.95			0.95	
Frpb, ped/bikes	1.00	0.98					1.00	1.00			1.00	
Flpb, ped/bikes	1.00	1.00					1.00	1.00			1.00	
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	1564					1770	3537			3511	
Flt Permitted	0.95	1.00					0.95	1.00			1.00	
Satd. Flow (perm)	1770	1564					1770	3537			3511	
Peak-hour factor, PHF	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89
Adj. Flow (vph)	11	1	48	0	0	0	55	710	2	0	1475	69
RTOR Reduction (vph)	0	44	0	0	0	0	0	0	0	0	3	0
Lane Group Flow (vph)	11	5	0	0	0	0	55	712	0	0	1541	0
Confl. Peds. (#/hr)	5						5					
Confl. Bikes (#/hr)	4											
Turn Type	Split	NA					Prot	NA				
Protected Phases	4	4					5	2				
Permitted Phases												
Actuated Green, G (s)	5.3	5.3					3.5	50.3				
Effective Green, g (s)	5.3	5.3					3.5	50.3				
Actuated g/C Ratio	0.08	0.08					0.05	0.77				
Clearance Time (s)	4.0	4.0					6.0	6.0				
Vehicle Extension (s)	3.0	3.0					3.0	3.0				
Lane Grp Cap (vph)	143	126					94	2712	2290			
v/s Ratio Prot	c0.01	0.00					c0.03	0.20	c0.44			
v/s Ratio Perm												
v/c Ratio	0.08	0.04					0.59	0.26	0.67			
Uniform Delay, d1	27.9	27.8					30.3	2.2	7.1			
Progression Factor	1.00	1.00					1.00	1.00	1.00			
Incremental Delay, d2	0.2	0.1					9.0	0.1	0.8			
Delay (s)	28.1	27.9					39.3	2.3	7.9			
Level of Service	C	C					D	A	A			
Approach Delay (s)	28.0		0.0		0.0		4.9		7.9		7.9	
Approach LOS	C		A		A		A		A		A	

Intersection Summary

HCM 2000 Control Delay	7.4	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.61		
Actuated Cycle Length (s)	65.6	Sum of lost time (s)	14.0
Intersection Capacity Utilization	54.8%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

Exist + Proj AM
18: Twin Oaks Valley Rd #1 & Borden Rd

Sierra Project
03/17/2017

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	59	39	210	182	84	27	79	368	34	13	877	132
Future Volume (vph)	59	39	210	182	84	27	79	368	34	13	877	132
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.2	5.3		4.2	5.3		4.2	4.9	4.9	4.2	4.9	4.9
Lane Util. Factor	1.00	0.95		1.00	0.95		1.00	0.95	1.00	1.00	0.95	1.00
Frpb, ped/bikes	1.00	0.98		1.00	1.00		1.00	1.00	0.98	1.00	1.00	0.98
Flpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	0.87		1.00	0.96		1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1770	3040		1770	3399		1770	3539	1558	1770	3539	1553
Flt Permitted	0.95	1.00		0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	1770	3040		1770	3399		1770	3539	1558	1770	3539	1553
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)	62	41	221	192	88	28	83	387	36	14	923	139
RTOR Reduction (vph)	0	193	0	0	19	0	0	0	19	0	0	71
Lane Group Flow (vph)	62	69	0	192	97	0	83	387	17	14	923	68
Confl. Peds. (#/hr)			6			2			3			6
Confl. Bikes (#/hr)			1			1			3			3
Turn Type	Prot	NA		Prot	NA		Prot	NA	Perm	Prot	NA	Perm
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases									2			6
Actuated Green, G (s)	8.1	12.8		18.3	23.0		11.3	48.3	48.3	2.3	39.3	39.3
Effective Green, g (s)	8.1	12.8		18.3	23.0		11.3	48.3	48.3	2.3	39.3	39.3
Actuated g/C Ratio	0.08	0.13		0.18	0.23		0.11	0.48	0.48	0.02	0.39	0.39
Clearance Time (s)	4.2	5.3		4.2	5.3		4.2	4.9	4.9	4.2	4.9	4.9
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)	142	387		322	779		199	1704	750	40	1386	608
v/s Ratio Prot	0.04	c0.02		c0.11	0.03		c0.05	0.11		0.01	c0.26	
v/s Ratio Perm									0.01			0.04
v/c Ratio	0.44	0.18		0.60	0.12		0.42	0.23	0.02	0.35	0.67	0.11
Uniform Delay, d1	43.9	39.1		37.6	30.7		41.4	15.1	13.6	48.3	25.1	19.4
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	2.1	0.2		3.0	0.1		1.4	0.1	0.0	5.2	1.2	0.1
Delay (s)	46.1	39.3		40.6	30.7		42.8	15.2	13.6	53.5	26.3	19.5
Level of Service	D	D		D	C		D	B	B	D	C	B
Approach Delay (s)		40.6			36.9			19.6			25.8	
Approach LOS		D			D			B			C	
Intersection Summary												
HCM 2000 Control Delay			28.1			HCM 2000 Level of Service			C			
HCM 2000 Volume to Capacity ratio			0.54									
Actuated Cycle Length (s)			100.3			Sum of lost time (s)			18.6			
Intersection Capacity Utilization			66.1%			ICU Level of Service			C			
Analysis Period (min)			15									
c Critical Lane Group												

Exist + Proj AM
19: Twin Oaks Valley Rd #1 & Richmar Ave

Sierra Project
03/17/2017

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	173	9	98	17	7	1	47	682	18	21	1425	245
Future Volume (vph)	173	9	98	17	7	1	47	682	18	21	1425	245
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.9	4.9		4.0	4.0		4.0	5.7		4.0	5.7	
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	0.95		1.00	0.95	
Frpb, ped/bikes	1.00	0.99		1.00	1.00		1.00	1.00		1.00	1.00	
Flpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Frt	1.00	0.86		1.00	0.98		1.00	1.00		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	1587		1770	1823		1770	3523		1770	3447	
Flt Permitted	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (perm)	1770	1587		1770	1823		1770	3523		1770	3447	
Peak-hour factor, PHF	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99
Adj. Flow (vph)	175	9	99	17	7	1	47	689	18	21	1439	247
RTOR Reduction (vph)	0	85	0	0	1	0	0	1	0	0	8	0
Lane Group Flow (vph)	175	23	0	17	7	0	47	706	0	21	1678	0
Confl. Peds. (#/hr)						8				4		2
Confl. Bikes (#/hr)	1							1				3
Turn Type	Split	NA		Split	NA		Prot	NA		Prot	NA	
Protected Phases	4	4		8	8		5	2		1	6	
Permitted Phases												
Actuated Green, G (s)	15.8	15.8		7.0	7.0		5.2	71.4		2.1	68.3	
Effective Green, g (s)	15.8	15.8		7.0	7.0		5.2	71.4		2.1	68.3	
Actuated g/C Ratio	0.14	0.14		0.06	0.06		0.05	0.62		0.02	0.59	
Clearance Time (s)	4.9	4.9		4.0	4.0		4.0	5.7		4.0	5.7	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	243	218		107	111		80	2189		32	2049	
v/s Ratio Prot	c0.10	0.01		c0.01	0.00		c0.03	c0.20		0.01	c0.49	
v/s Ratio Perm												
v/c Ratio	0.72	0.10		0.16	0.06		0.59	0.32		0.66	0.82	
Uniform Delay, d1	47.4	43.4		51.2	50.9		53.8	10.3		56.0	18.4	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	10.0	0.2		0.7	0.2		10.6	0.1		39.4	2.7	
Delay (s)	57.5	43.6		51.9	51.1		64.4	10.4		95.4	21.1	
Level of Service	E	D		D	D		E	B		F	C	
Approach Delay (s)	52.2				51.6		13.7				22.0	
Approach LOS	D				D		B				C	
Intersection Summary												
HCM 2000 Control Delay	23.1			HCM 2000 Level of Service					C			
HCM 2000 Volume to Capacity ratio	0.73											
Actuated Cycle Length (s)	114.9			Sum of lost time (s)					18.6			
Intersection Capacity Utilization	72.3%			ICU Level of Service					C			
Analysis Period (min)	15											
c Critical Lane Group												

Exist + Proj AM
20: Twin Oaks Valley Rd/Twin Oaks Valley Rd #1 & San Marcos Blvd

Sierra Project
03/17/2017

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↱	↲	↰	↱		↰	↱	↲	↰	↱	↲
Traffic Volume (vph)	164	269	225	364	444	37	236	546	407	113	1125	302
Future Volume (vph)	164	269	225	364	444	37	236	546	407	113	1125	302
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.2	5.3	5.3	4.2	5.0		4.2	5.3	4.2	4.2	5.3	
Lane Util. Factor	0.97	0.95	1.00	0.97	0.95		0.97	0.95	1.00	0.97	0.95	
Frpb, ped/bikes	1.00	1.00	0.97	1.00	1.00		1.00	1.00	0.99	1.00	1.00	
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00	1.00	1.00	
Frt	1.00	1.00	0.85	1.00	0.99		1.00	1.00	0.85	1.00	0.97	
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)	3433	3539	1537	3433	3493		3433	3539	1566	3433	3417	
Flt Permitted	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00	0.95	1.00	
Satd. Flow (perm)	3433	3539	1537	3433	3493		3433	3539	1566	3433	3417	
Peak-hour factor, PHF	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98
Adj. Flow (vph)	167	274	230	371	453	38	241	557	415	115	1148	308
RTOR Reduction (vph)	0	0	118	0	6	0	0	0	76	0	19	0
Lane Group Flow (vph)	167	274	112	371	485	0	241	557	339	115	1437	0
Confl. Peds. (#/hr)			5			4			1			1
Confl. Bikes (#/hr)			8			3			3			3
Turn Type	Prot	NA	Perm	Prot	NA		Prot	NA	pm+ov	Prot	NA	
Protected Phases	7	4		3	8		5	2	3	1	6	
Permitted Phases			4						2			
Actuated Green, G (s)	9.4	16.2	16.2	14.6	21.7		9.8	51.1	65.7	7.2	48.5	
Effective Green, g (s)	9.4	16.2	16.2	14.6	21.7		9.8	51.1	65.7	7.2	48.5	
Actuated g/C Ratio	0.09	0.15	0.15	0.14	0.20		0.09	0.47	0.61	0.07	0.45	
Clearance Time (s)	4.2	5.3	5.3	4.2	5.0		4.2	5.3	4.2	4.2	5.3	
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)	298	530	230	463	701		311	1672	951	228	1533	
v/s Ratio Prot	0.05	0.08		c0.11	c0.14		c0.07	0.16	c0.05	0.03	c0.42	
v/s Ratio Perm			0.07						0.17			
v/c Ratio	0.56	0.52	0.49	0.80	0.69		0.77	0.33	0.36	0.50	0.94	
Uniform Delay, d1	47.4	42.3	42.1	45.3	40.1		48.1	17.8	10.6	48.7	28.4	
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	2.4	0.9	1.6	9.6	3.0		11.4	0.1	0.2	1.8	11.2	
Delay (s)	49.8	43.2	43.8	55.0	43.1		59.5	18.0	10.8	50.5	39.6	
Level of Service	D	D	D	D	D		E	B	B	D	D	
Approach Delay (s)		45.0			48.2			23.8			40.4	
Approach LOS		D			D			C			D	
Intersection Summary												
HCM 2000 Control Delay			38.0		HCM 2000 Level of Service					D		
HCM 2000 Volume to Capacity ratio			0.87									
Actuated Cycle Length (s)			108.1		Sum of lost time (s)					19.0		
Intersection Capacity Utilization			83.6%		ICU Level of Service					E		
Analysis Period (min)			15									
c Critical Lane Group												

Exist + Proj AM
21: Twin Oaks Valley Rd & SR 78 WB Ramps

Sierra Project
03/17/2017

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations				↰		↱		↱	↲		↱	↲
Traffic Volume (vph)	0	0	0	406	0	244	0	945	454	0	1306	408
Future Volume (vph)	0	0	0	406	0	244	0	945	454	0	1306	408
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)				4.6		4.6		5.3	4.6		5.3	5.3
Lane Util. Factor				0.97		0.88		0.91	1.00		0.91	1.00
Frpb, ped/bikes				1.00		1.00		1.00	0.97		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	0.85		1.00	0.85
Flt Protected				0.95		1.00		1.00	1.00		1.00	1.00
Satd. Flow (prot)				3433		2787		5085	1532		5085	1544
Flt Permitted				0.95		1.00		1.00	1.00		1.00	1.00
Satd. Flow (perm)				3433		2787		5085	1532		5085	1544
Peak-hour factor, PHF	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98
Adj. Flow (vph)	0	0	0	414	0	249	0	964	463	0	1333	416
RTOR Reduction (vph)	0	0	0	0	0	190	0	0	0	0	0	102
Lane Group Flow (vph)	0	0	0	414	0	59	0	964	463	0	1333	314
Confl. Peds. (#/hr)								8				5
Confl. Bikes (#/hr)								1				3
Turn Type				Prot		Perm		NA	pm+ov		NA	Perm
Protected Phases				8				2	8		6	
Permitted Phases						8		2			6	
Actuated Green, G (s)				19.6		19.6		90.5	110.1		90.5	90.5
Effective Green, g (s)				19.6		19.6		90.5	110.1		90.5	90.5
Actuated g/C Ratio				0.16		0.16		0.75	0.92		0.75	0.75
Clearance Time (s)				4.6		4.6		5.3	4.6		5.3	5.3
Vehicle Extension (s)				2.0		2.0		2.0	2.0		2.0	2.0
Lane Grp Cap (vph)				560		455		3834	1464		3834	1164
v/s Ratio Prot				c0.12				0.19	0.05		c0.26	
v/s Ratio Perm						0.02			0.25			0.20
v/c Ratio				0.74		0.13		0.25	0.32		0.35	0.27
Uniform Delay, d1				47.8		42.9		4.5	0.6		4.9	4.6
Progression Factor				1.00		1.00		1.02	6.20		1.00	1.00
Incremental Delay, d2				4.4		0.0		0.1	0.0		0.3	0.6
Delay (s)				52.2		43.0		4.7	3.6		5.2	5.1
Level of Service				D		D		A	A		A	A
Approach Delay (s)		0.0			48.7			4.3			5.2	
Approach LOS		A			D			A			A	
Intersection Summary												
HCM 2000 Control Delay				12.4		HCM 2000 Level of Service					B	
HCM 2000 Volume to Capacity ratio				0.42								
Actuated Cycle Length (s)				120.0		Sum of lost time (s)					9.9	
Intersection Capacity Utilization				50.2%		ICU Level of Service					A	
Analysis Period (min)				15								
c Critical Lane Group												

Exist + Proj AM
22: Twin Oaks Valley Rd & SR 78 EB Ramps

Sierra Project
03/17/2017

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↱	↲					↰↱↲	↲	↰↱↲	↰↱↲	
Traffic Volume (vph)	532	7	536	0	0	0	0	867	464	312	1400	0
Future Volume (vph)	532	7	536	0	0	0	0	867	464	312	1400	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.6	4.6	4.6					5.3	5.3	4.2	5.3	
Lane Util. Factor	0.95	0.91	0.95					0.91	1.00	0.97	0.91	
Frpb, ped/bikes	1.00	0.99	0.99					1.00	0.98	1.00	1.00	
Flpb, ped/bikes	1.00	1.00	1.00					1.00	1.00	1.00	1.00	
Frt	1.00	0.92	0.85					1.00	0.85	1.00	1.00	
Flt Protected	0.95	0.98	1.00					1.00	1.00	0.95	1.00	
Satd. Flow (prot)	1681	1514	1485					5085	1553	3433	5085	
Flt Permitted	0.95	0.98	1.00					1.00	1.00	0.95	1.00	
Satd. Flow (perm)	1681	1514	1485					5085	1553	3433	5085	
Peak-hour factor, PHF	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Adj. Flow (vph)	548	7	553	0	0	0	0	894	478	322	1443	0
RTOR Reduction (vph)	0	19	41	0	0	0	0	0	268	0	0	0
Lane Group Flow (vph)	384	351	313	0	0	0	0	894	210	322	1443	0
Confl. Peds. (#/hr)			1						4			
Confl. Bikes (#/hr)												1
Turn Type	Split	NA	Perm					NA	Perm	Prot	NA	
Protected Phases	4	4						2		1	6	
Permitted Phases			4					2				
Actuated Green, G (s)	37.0	37.0	37.0					52.8	52.8	16.1	73.1	
Effective Green, g (s)	37.0	37.0	37.0					52.8	52.8	16.1	73.1	
Actuated g/C Ratio	0.31	0.31	0.31					0.44	0.44	0.13	0.61	
Clearance Time (s)	4.6	4.6	4.6					5.3	5.3	4.2	5.3	
Vehicle Extension (s)	3.0	3.0	3.0					3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	518	466	457					2237	683	460	3097	
v/s Ratio Prot	0.23	c0.23						0.18		c0.09	c0.28	
v/s Ratio Perm			0.21					0.14				
v/c Ratio	0.74	0.75	0.69					0.40	0.31	0.70	0.47	
Uniform Delay, d1	37.2	37.4	36.4					22.8	21.8	49.6	12.8	
Progression Factor	1.00	1.00	1.00					1.00	1.00	1.10	0.80	
Incremental Delay, d2	5.7	6.8	4.2					0.5	1.2	4.4	0.5	
Delay (s)	42.9	44.2	40.6					23.4	22.9	59.0	10.7	
Level of Service	D	D	D					C	C	E	B	
Approach Delay (s)		42.6			0.0			23.2			19.5	
Approach LOS		D			A			C			B	
Intersection Summary												
HCM 2000 Control Delay		26.7		HCM 2000 Level of Service					C			
HCM 2000 Volume to Capacity ratio		0.61										
Actuated Cycle Length (s)		120.0		Sum of lost time (s)					14.1			
Intersection Capacity Utilization		70.6%		ICU Level of Service					C			
Analysis Period (min)		15										
c Critical Lane Group												

Exist + Proj AM
23: Robelini Dr & S. Santa Fe Ave

Sierra Project
03/17/2017

						
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (vph)	333	440	608	229	126	193
Future Volume (vph)	333	440	608	229	126	193
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.3	4.6	4.4	5.3	4.6	4.4
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frpb, ped/bikes	1.00	0.99	1.00	1.00	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	1.00	1.00	0.85
Flt Protected	1.00	1.00	0.95	1.00	0.95	1.00
Satd. Flow (prot)	1863	1570	1770	1863	1770	1583
Flt Permitted	1.00	1.00	0.95	1.00	0.95	1.00
Satd. Flow (perm)	1863	1570	1770	1863	1770	1583
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	362	478	661	249	137	210
RTOR Reduction (vph)	0	14	0	0	0	39
Lane Group Flow (vph)	362	464	661	249	137	171
Confl. Bikes (#/hr)	6					
Turn Type	NA	pm+ov	Prot	NA	Prot	pm+ov
Protected Phases	2	8	1	6	8	1
Permitted Phases	8					
Actuated Green, G (s)	25.7	74.1	31.6	38.9	48.4	80.0
Effective Green, g (s)	25.7	74.1	31.6	38.9	48.4	80.0
Actuated g/C Ratio	0.21	0.62	0.26	0.32	0.40	0.67
Clearance Time (s)	5.3	4.6	4.4	5.3	4.6	4.4
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	398	969	466	603	713	1055
v/s Ratio Prot	c0.19	c0.19	c0.37	0.13	0.08	0.04
v/s Ratio Perm	0.10		0.07			
v/c Ratio	0.91	0.48	1.42	0.41	0.19	0.16
Uniform Delay, d1	46.0	12.5	44.2	31.6	23.2	7.5
Progression Factor	1.00	1.00	1.09	1.09	1.00	1.00
Incremental Delay, d2	24.0	0.4	189.5	0.0	0.1	0.1
Delay (s)	70.0	12.8	237.8	34.6	23.3	7.5
Level of Service	E	B	F	C	C	A
Approach Delay (s)	37.5			182.2	13.8	
Approach LOS	D			F	B	
Intersection Summary						
HCM 2000 Control Delay	96.4		HCM 2000 Level of Service		F	
HCM 2000 Volume to Capacity ratio	0.86					
Actuated Cycle Length (s)	120.0		Sum of lost time (s)		14.3	
Intersection Capacity Utilization	70.1%		ICU Level of Service		C	
Analysis Period (min)	15					
c Critical Lane Group						

Exist + Proj AM
24: Sycamore Avenue/Robelini Dr & SR 78 WB Ramps

Sierra Project
03/17/2017

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	0	0	1104	2	89	368	448	0	0	838	379
Future Volume (vph)	0	0	0	1104	2	89	368	448	0	0	838	379
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)				4.6	4.6	4.6	4.2	5.0			5.0	5.0
Lane Util. Factor				0.95	0.95	0.88	0.97	0.91			0.91	1.00
Frpb, ped/bikes				1.00	1.00	0.99	1.00	1.00			1.00	0.97
Flpb, ped/bikes				1.00	1.00	1.00	1.00	1.00			1.00	1.00
Frt				1.00	1.00	0.85	1.00	1.00			1.00	0.85
Flt Protected				0.95	0.95	1.00	0.95	1.00			1.00	1.00
Satd. Flow (prot)				1681	1686	2751	3433	5085			5085	1532
Flt Permitted				0.95	0.95	1.00	0.95	1.00			1.00	1.00
Satd. Flow (perm)				1681	1686	2751	3433	5085			5085	1532
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	0	0	0	1227	2	99	409	498	0	0	931	421
RTOR Reduction (vph)	0	0	0	0	0	57	0	0	0	0	0	294
Lane Group Flow (vph)	0	0	0	613	616	42	409	498	0	0	931	127
Confl. Peds. (#/hr)			1			1			1			12
Turn Type				Split	NA	Perm	Prot	NA			NA	Perm
Protected Phases				8	8		5	2			6	
Permitted Phases						8						6
Actuated Green, G (s)				46.3	46.3	46.3	16.7	54.1			33.2	33.2
Effective Green, g (s)				46.3	46.3	46.3	16.7	54.1			33.2	33.2
Actuated g/C Ratio				0.42	0.42	0.42	0.15	0.49			0.30	0.30
Clearance Time (s)				4.6	4.6	4.6	4.2	5.0			5.0	5.0
Vehicle Extension (s)				3.0	3.0	3.0	3.0	3.0			3.0	3.0
Lane Grp Cap (vph)				707	709	1157	521	2500			1534	462
v/s Ratio Prot				0.36	c0.37		c0.12	0.10			c0.18	
v/s Ratio Perm						0.02						0.08
v/c Ratio				0.87	0.87	0.04	0.79	0.20			0.61	0.28
Uniform Delay, d1				29.0	29.1	18.7	44.9	15.7			32.8	29.2
Progression Factor				1.00	1.00	1.00	1.58	0.94			1.00	1.00
Incremental Delay, d2				10.9	11.0	0.0	7.5	0.2			1.8	1.5
Delay (s)				39.9	40.1	18.7	78.3	15.0			34.6	30.7
Level of Service				D	D	B	E	B			C	C
Approach Delay (s)	0.0				38.4			43.5			33.4	
Approach LOS	A				D			D			C	
Intersection Summary												
HCM 2000 Control Delay				37.8			HCM 2000 Level of Service				D	
HCM 2000 Volume to Capacity ratio				0.76								
Actuated Cycle Length (s)				110.0			Sum of lost time (s)				13.8	
Intersection Capacity Utilization				77.9%			ICU Level of Service				D	
Analysis Period (min)				15								
c Critical Lane Group												

Exist + Proj AM
25: Sycamore Avenue & SR 78 EB Ramps

Sierra Project
03/17/2017

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	229	1	881	0	0	0	0	587	636	208	1734	0
Future Volume (vph)	229	1	881	0	0	0	0	587	636	208	1734	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)				4.6	4.6	4.6		5.0	5.0	4.2	5.0	
Lane Util. Factor				0.95	0.91	0.95		0.91	1.00	0.97	0.91	
Frpb, ped/bikes				1.00	1.00	1.00		1.00	0.98	1.00	1.00	
Flpb, ped/bikes				1.00	1.00	1.00		1.00	1.00	1.00	1.00	
Frt				1.00	0.86	0.85		1.00	0.85	1.00	1.00	
Flt Protected				0.95	1.00	1.00		1.00	1.00	0.95	1.00	
Satd. Flow (prot)				1681	1450	1504		5085	1554	3433	5085	
Flt Permitted				0.95	1.00	1.00		1.00	1.00	0.95	1.00	
Satd. Flow (perm)				1681	1450	1504		5085	1554	3433	5085	
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)	241	1	927	0	0	0	0	618	669	219	1825	0
RTOR Reduction (vph)	0	4	38	0	0	0	0	0	404	0	0	0
Lane Group Flow (vph)	217	475	435	0	0	0	0	618	265	219	1825	0
Confl. Peds. (#/hr)									4			
Confl. Bikes (#/hr)									1			
Turn Type				Split	NA	Perm		NA	Perm	Prot	NA	
Protected Phases				4	4			2		1	6	
Permitted Phases						4			2			
Actuated Green, G (s)				42.0	42.0	42.0		43.5	43.5	10.7	58.4	
Effective Green, g (s)				42.0	42.0	42.0		43.5	43.5	10.7	58.4	
Actuated g/C Ratio				0.38	0.38	0.38		0.40	0.40	0.10	0.53	
Clearance Time (s)				4.6	4.6	4.6		5.0	5.0	4.2	5.0	
Vehicle Extension (s)				3.0	3.0	3.0		3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)				641	553	574		2010	614	333	2699	
v/s Ratio Prot				0.13	c0.33			0.12		0.06	c0.36	
v/s Ratio Perm						0.29			0.17			
v/c Ratio				0.34	0.86	0.76		0.31	0.43	0.66	0.68	
Uniform Delay, d1				24.1	31.3	29.6		22.9	24.2	47.9	18.9	
Progression Factor				1.00	1.00	1.00		1.00	1.00	1.52	1.28	
Incremental Delay, d2				0.3	12.6	5.7		0.4	2.2	3.6	0.9	
Delay (s)				24.5	43.9	35.3		23.3	26.4	76.5	25.1	
Level of Service				C	D	D		C	C	E	C	
Approach Delay (s)				36.8		0.0		24.9			30.6	
Approach LOS				D		A		C			C	
Intersection Summary												
HCM 2000 Control Delay				30.6			HCM 2000 Level of Service				C	
HCM 2000 Volume to Capacity ratio				0.79								
Actuated Cycle Length (s)				110.0			Sum of lost time (s)				13.8	
Intersection Capacity Utilization				77.9%			ICU Level of Service				D	
Analysis Period (min)				15								
c Critical Lane Group												

Exist + Proj AM
26: S. Santa Fe Ave & Buena Creek Rd

Sierra Project
03/17/2017

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations	↰	↱	↰	↱	↰	↱
Traffic Volume (vph)	161	383	269	83	170	548
Future Volume (vph)	161	383	269	83	170	548
Ideal Flow (vphpl)	1520	1900	1900	1520	1520	1520
Total Lost time (s)	4.4	5.3	5.3	5.3	4.0	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	
Frpb, ped/bikes	1.00	1.00	1.00	0.94	0.98	
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	
Frt	1.00	1.00	1.00	0.85	0.90	
Flt Protected	0.95	1.00	1.00	1.00	0.99	
Satd. Flow (prot)	1416	1863	1863	1195	1288	
Flt Permitted	0.95	1.00	1.00	1.00	0.99	
Satd. Flow (perm)	1416	1863	1863	1195	1288	
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	169	403	283	87	179	577
RTOR Reduction (vph)	0	0	0	34	0	0
Lane Group Flow (vph)	169	403	283	53	756	0
Confl. Peds. (#/hr)				12		4
Confl. Bikes (#/hr)				3		
Turn Type	Prot	NA	NA	Perm	Prot	
Protected Phases	5	2	6		4	
Permitted Phases				6		
Actuated Green, G (s)	18.4	25.7	38.9	38.9	49.0	
Effective Green, g (s)	18.4	25.7	38.9	38.9	49.0	
Actuated g/C Ratio	0.15	0.21	0.32	0.32	0.41	
Clearance Time (s)	4.4	5.3	5.3	5.3	4.0	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	217	398	603	387	525	
v/s Ratio Prot	c0.12	c0.22	c0.15		c0.59	
v/s Ratio Perm				0.04		
v/c Ratio	0.78	1.01	0.47	0.14	1.44	
Uniform Delay, d1	48.8	47.1	32.3	28.7	35.5	
Progression Factor	1.31	0.66	1.00	1.00	1.00	
Incremental Delay, d2	12.6	42.6	0.6	0.2	208.6	
Delay (s)	76.4	73.7	32.9	28.8	244.1	
Level of Service	E	E	C	C	F	
Approach Delay (s)		74.5	31.9		244.1	
Approach LOS		E	C		F	
Intersection Summary						
HCM 2000 Control Delay			140.8		HCM 2000 Level of Service	F
HCM 2000 Volume to Capacity ratio			1.09			
Actuated Cycle Length (s)			120.0		Sum of lost time (s)	14.3
Intersection Capacity Utilization			92.1%		ICU Level of Service	F
Analysis Period (min)			15			
c Critical Lane Group						

Exist + Proj AM
27: Buena Creek Rd & Monte Vista Dr

Sierra Project
03/17/2017

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↱	↱		↰	↱
Sign Control		Stop	Stop		Stop	
Traffic Volume (vph)	88	181	474	234	334	148
Future Volume (vph)	88	181	474	234	334	148
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95
Hourly flow rate (vph)	93	191	499	246	352	156
Direction, Lane #	EB 1	WB 1	SB 1			
Volume Total (vph)	284	745	508			
Volume Left (vph)	93	0	352			
Volume Right (vph)	0	246	156			
Hadj (s)	0.10	-0.16	-0.01			
Departure Headway (s)	6.9	6.2	6.4			
Degree Utilization, x	0.54	1.28	0.91			
Capacity (veh/h)	497	578	548			
Control Delay (s)	17.8	157.8	43.6			
Approach Delay (s)	17.8	157.8	43.6			
Approach LOS	C	F	E			
Intersection Summary						
Delay			94.2			
Level of Service			F			
Intersection Capacity Utilization		91.2%		ICU Level of Service		F
Analysis Period (min)		15				

Exist + Proj AM
28: San Marcos Blvd & Knoll Rd/SR 78 WB Ramps

Sierra Project
03/17/2017

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰		↱	↰	↱		↰	↱	↱		↱	↱
Traffic Volume (vph)	121	0	391	946	374	14	333	387	65	0	879	127
Future Volume (vph)	121	0	391	946	374	14	333	387	65	0	879	127
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.6		5.2	5.6	5.6		5.2	6.3	6.3		6.3	6.3
Lane Util. Factor	1.00		0.88	0.97	0.95		0.97	0.95	1.00		0.91	1.00
Frpb, ped/bikes	1.00		1.00	1.00	1.00		1.00	1.00	1.00		1.00	0.98
Flpb, ped/bikes	1.00		1.00	1.00	1.00		1.00	1.00	1.00		1.00	1.00
Frt	1.00		0.85	1.00	0.99		1.00	1.00	0.85		1.00	0.85
Flt Protected	0.95		1.00	0.95	1.00		0.95	1.00	1.00		1.00	1.00
Satd. Flow (prot)	1770		2787	3433	3519		3433	3539	1583		5085	1546
Flt Permitted	0.95		1.00	0.95	1.00		0.95	1.00	1.00		1.00	1.00
Satd. Flow (perm)	1770		2787	3433	3519		3433	3539	1583		5085	1546
Peak-hour factor, PHF	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Adj. Flow (vph)	125	0	403	975	386	14	343	399	67	0	906	131
RTOR Reduction (vph)	0	0	61	0	2	0	0	0	30	0	0	78
Lane Group Flow (vph)	125	0	342	975	398	0	343	399	37	0	906	53
Confl. Peds. (#/hr)						1						8
Confl. Bikes (#/hr)												2
Turn Type	Prot		pm+ov	Prot	NA		Prot	NA	Perm		NA	Perm
Protected Phases	7		5	3	8		5	2			6	
Permitted Phases			7						2			6
Actuated Green, G (s)	13.4		30.1	42.5	23.5		16.7	65.6	65.6		43.7	43.7
Effective Green, g (s)	13.4		30.1	42.5	23.5		16.7	65.6	65.6		43.7	43.7
Actuated g/C Ratio	0.11		0.25	0.35	0.20		0.14	0.55	0.55		0.36	0.36
Clearance Time (s)	5.6		5.2	5.6	5.6		5.2	6.3	6.3		6.3	6.3
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)	197		699	1215	689		477	1934	865		1851	563
v/s Ratio Prot	0.07		0.07	c0.28	0.11		c0.10	0.11			c0.18	
v/s Ratio Perm			0.05						0.02			0.03
v/c Ratio	0.63		0.49	0.80	0.58		0.72	0.21	0.04		0.49	0.09
Uniform Delay, d1	51.0		38.4	35.0	43.7		49.4	13.9	12.6		29.5	25.1
Progression Factor	1.00		1.00	1.00	1.00		1.03	0.80	0.44		1.00	1.00
Incremental Delay, d2	6.5		0.5	3.9	1.2		5.1	0.2	0.1		0.9	0.3
Delay (s)	57.5		38.9	38.9	44.9		55.9	11.4	5.7		30.4	25.5
Level of Service	E		D	D	D		E	B	A		C	C
Approach Delay (s)		43.3			40.6			29.8			29.8	
Approach LOS		D			D			C			C	
Intersection Summary												
HCM 2000 Control Delay			35.7		HCM 2000 Level of Service				D			
HCM 2000 Volume to Capacity ratio			0.69									
Actuated Cycle Length (s)			120.0		Sum of lost time (s)				22.7			
Intersection Capacity Utilization			78.2%		ICU Level of Service				D			
Analysis Period (min)			15									
c Critical Lane Group												

Exist + Proj AM
29: San Marcos Blvd & SR 78 EB Ramps

Sierra Project
03/17/2017

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰		↱					↱	↱	↱	↱	↱
Traffic Volume (vph)	168	0	123	0	0	0	0	627	727	172	1932	0
Future Volume (vph)	168	0	123	0	0	0	0	627	727	172	1932	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.6		5.6					6.3	6.3	5.2	6.3	
Lane Util. Factor	0.97		1.00					0.91	0.88	0.97	0.91	
Frpb, ped/bikes	1.00		1.00					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)	3433		1583					5085	2726	3433	5085	
Flt Permitted	0.95		1.00					1.00	1.00	0.95	1.00	
Satd. Flow (perm)	3433		1583					5085	2726	3433	5085	
Peak-hour factor, PHF	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Adj. Flow (vph)	175	0	128	0	0	0	0	653	757	179	2012	0
RTOR Reduction (vph)	0	0	70	0	0	0	0	0	254	0	0	0
Lane Group Flow (vph)	175	0	58	0	0	0	0	653	503	179	2013	0
Confl. Peds. (#/hr)												6
Confl. Bikes (#/hr)												4
Turn Type	Prot		Perm					NA	Perm	Prot	NA	
Protected Phases	4							2		1	6	
Permitted Phases			4					2				
Actuated Green, G (s)	11.6		11.6					79.7	79.7	11.6	96.5	
Effective Green, g (s)	11.6		11.6					79.7	79.7	11.6	96.5	
Actuated g/C Ratio	0.10		0.10					0.66	0.66	0.10	0.80	
Clearance Time (s)	5.6		5.6					6.3	6.3	5.2	6.3	
Vehicle Extension (s)	3.0		3.0					3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	331		153					3377	1810	331	4089	
v/s Ratio Prot	c0.05							0.13		0.05	c0.40	
v/s Ratio Perm			0.04						0.18			
v/c Ratio	0.53		0.38					0.19	0.28	0.54	0.49	
Uniform Delay, d1	51.6		50.8					7.8	8.3	51.7	3.8	
Progression Factor	1.00		1.00					1.00	1.00	1.13	0.47	
Incremental Delay, d2	1.5		1.6					0.1	0.4	1.6	0.4	
Delay (s)	53.1		52.4					7.9	8.7	60.2	2.2	
Level of Service	D		D					A	A	E	A	
Approach Delay (s)		52.8			0.0			8.3			6.9	
Approach LOS		D			A			A			A	
Intersection Summary												
HCM 2000 Control Delay			11.0							B		
HCM 2000 Volume to Capacity ratio			0.52									
Actuated Cycle Length (s)			120.0							17.1		
Intersection Capacity Utilization			54.9%							A		
Analysis Period (min)			15									
c Critical Lane Group												

Exist + Proj AM
30: San Marcos Blvd & E. Mission Road

Sierra Project
03/17/2017

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↩	↗	↘	↩	↗	↘	↩	↗	↘	↩	↗	↘
Traffic Volume (vph)	25	358	20	593	722	79	8	34	271	96	323	49
Future Volume (vph)	25	358	20	593	722	79	8	34	271	96	323	49
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	5.3	5.3	4.0	5.3	5.3	4.0	5.3	5.3	4.0	5.3	5.3
Lane Util. Factor	1.00	0.95	1.00	0.97	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00
Frpb, ped/bikes	1.00	1.00	0.99	1.00	1.00	0.97	1.00	1.00	1.00	1.00	1.00	1.00
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.98	1.00
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1770	3539	1561	3433	3539	1531	1770	3539	1583	1770	3469	3469
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	1770	3539	1561	3433	3539	1531	1770	3539	1583	1770	3469	3469
Peak-hour factor, PHF	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86
Adj. Flow (vph)	29	416	23	690	840	92	9	40	315	112	376	57
RTOR Reduction (vph)	0	0	18	0	0	47	0	0	266	0	7	0
Lane Group Flow (vph)	29	416	5	690	840	45	9	40	49	112	426	0
Confl. Peds. (#/hr)			2			12						
Turn Type	Prot	NA	Perm	Prot	NA	Perm	Prot	NA	Prot	Prot	NA	
Protected Phases	7	4		3	8		5	2	2	1	6	
Permitted Phases			4			8						
Actuated Green, G (s)	4.3	20.1	20.1	25.5	41.3	41.3	0.7	14.0	14.0	12.5	25.8	
Effective Green, g (s)	4.3	20.1	20.1	25.5	41.3	41.3	0.7	14.0	14.0	12.5	25.8	
Actuated g/C Ratio	0.05	0.22	0.22	0.28	0.46	0.46	0.01	0.15	0.15	0.14	0.28	
Clearance Time (s)	4.0	5.3	5.3	4.0	5.3	5.3	4.0	5.3	5.3	4.0	5.3	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	83	784	345	965	1611	697	13	546	244	243	986	
v/s Ratio Prot	0.02	0.12		c0.20	c0.24		0.01	0.01	0.03	c0.06	c0.12	
v/s Ratio Perm			0.00			0.03						
v/c Ratio	0.35	0.53	0.01	0.72	0.52	0.06	0.69	0.07	0.20	0.46	0.43	
Uniform Delay, d1	41.8	31.1	27.6	29.3	17.6	13.9	44.9	32.8	33.5	36.0	26.5	
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	2.5	0.7	0.0	2.5	0.3	0.0	96.3	0.1	0.4	1.4	0.3	
Delay (s)	44.4	31.8	27.6	31.9	17.9	13.9	141.2	32.9	33.9	37.4	26.8	
Level of Service	D	C	C	C	B	B	F	C	C	D	C	
Approach Delay (s)		32.4			23.6			36.4			29.0	
Approach LOS		C			C			D			C	

Intersection Summary

HCM 2000 Control Delay	27.5	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.59		
Actuated Cycle Length (s)	90.7	Sum of lost time (s)	18.6
Intersection Capacity Utilization	51.7%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

Exist + Proj AM
31: North Centre City Pkwy & Mesa Rock Rd

Sierra Project
03/17/2017

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations	↩	↘	↩	↗	↗	↘
Traffic Volume (veh/h)	0	54	26	102	340	0
Future Volume (Veh/h)	0	54	26	102	340	0
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.88	0.88	0.88	0.88	0.88	0.88
Hourly flow rate (vph)	0	61	30	116	386	0
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage (veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	562	386	386			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	562	386	386			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	100	91	97			
cM capacity (veh/h)	476	662	1172			
Direction, Lane #	EB 1	NB 1	NB 2	SB 1		
Volume Total	61	30	116	386		
Volume Left	0	30	0	0		
Volume Right	61	0	0	0		
cSH	662	1172	1700	1700		
Volume to Capacity	0.09	0.03	0.07	0.23		
Queue Length 95th (ft)	8	2	0	0		
Control Delay (s)	11.0	8.2	0.0	0.0		
Lane LOS	B	A				
Approach Delay (s)	11.0	1.7		0.0		
Approach LOS	B					

Intersection Summary

Average Delay	1.5		
Intersection Capacity Utilization	31.6%	ICU Level of Service	A
Analysis Period (min)	15		

Exist + Proj AM
32: North Centre City Pkwy & Country Club Ln

Sierra Project
03/17/2017

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	66	331	105	270	374	79	36	250	50	134	420	70
Future Volume (vph)	66	331	105	270	374	79	36	250	50	134	420	70
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00
Flrb, ped/bikes	1.00	1.00	0.98	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1770	3539	1556	1770	3539	1583	1770	3539	1583	1770	3539	1583
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	1770	3539	1556	1770	3539	1583	1770	3539	1583	1770	3539	1583
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)	72	360	114	293	407	86	39	272	54	146	457	76
RTOR Reduction (vph)	0	0	91	0	0	55	0	0	44	0	0	56
Lane Group Flow (vph)	72	360	23	293	407	31	39	272	10	146	457	20
Confl. Peds. (#/hr)	4											
Turn Type	Prot	NA	Perm	Prot	NA	Perm	Prot	NA	Perm	Prot	NA	Perm
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases			4			8			2			6
Actuated Green, G (s)	6.0	14.4	14.4	17.1	25.5	25.5	3.2	12.7	12.7	8.9	18.4	18.4
Effective Green, g (s)	6.0	14.4	14.4	17.1	25.5	25.5	3.2	12.7	12.7	8.9	18.4	18.4
Actuated g/C Ratio	0.08	0.20	0.20	0.24	0.36	0.36	0.05	0.18	0.18	0.13	0.26	0.26
Clearance Time (s)	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	149	716	315	425	1269	567	79	632	282	221	915	409
v/s Ratio Prot	0.04	c0.10		c0.17	0.11		0.02	0.08		c0.08	c0.13	
v/s Ratio Perm			0.01			0.02			0.01			0.01
v/c Ratio	0.48	0.50	0.07	0.69	0.32	0.05	0.49	0.43	0.03	0.66	0.50	0.05
Uniform Delay, d1	31.1	25.2	22.9	24.6	16.5	14.9	33.2	26.0	24.1	29.7	22.4	19.8
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	2.5	0.6	0.1	4.6	0.1	0.0	4.8	0.5	0.0	7.2	0.4	0.0
Delay (s)	33.5	25.7	23.0	29.2	16.7	15.0	37.9	26.5	24.2	36.9	22.9	19.8
Level of Service	C	C	C	C	B	B	D	C	C	D	C	B
Approach Delay (s)	26.2			21.2			27.3			25.5		
Approach LOS	C			C			C			C		
Intersection Summary												
HCM 2000 Control Delay	24.5			HCM 2000 Level of Service			C					
HCM 2000 Volume to Capacity ratio	0.61											
Actuated Cycle Length (s)	71.1			Sum of lost time (s)			18.0					
Intersection Capacity Utilization	54.6%			ICU Level of Service			A					
Analysis Period (min)	15											
c Critical Lane Group												

Exist + Proj AM
33: Twin Oaks Valley Rd & Discovery Street/Barham Dr

Sierra Project
03/17/2017

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰↱	↰↰↰	↱	↰	↰	↱	↰	↰↰↰		↰↰	↰↰↰	↱
Traffic Volume (vph)	253	68	5	298	314	205	18	880	134	460	1131	455
Future Volume (vph)	253	68	5	298	314	205	18	880	134	460	1131	455
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	5.3	5.3	5.0	5.3	5.3	5.0	6.0		5.0	6.0	6.0
Lane Util. Factor	0.97	0.91	1.00	1.00	1.00	1.00	1.00	0.91		0.97	0.91	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.98		1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	3433	5085	1583	1770	1863	1583	1770	4984		3433	5085	1583
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00
Satd. Flow (perm)	3433	5085	1583	1770	1863	1583	1770	4984		3433	5085	1583
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)	275	74	5	324	341	223	20	957	146	500	1229	495
RTOR Reduction (vph)	0	0	4	0	0	166	0	16	0	0	0	283
Lane Group Flow (vph)	275	74	1	324	341	57	20	1087	0	500	1229	212
Turn Type	Prot	NA	Perm	Prot	NA	Perm	Prot	NA		Prot	NA	Perm
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases			4			8						6
Actuated Green, G (s)	12.4	15.1	15.1	25.7	28.4	28.4	1.8	31.3		18.2	47.7	47.7
Effective Green, g (s)	12.4	15.1	15.1	25.7	28.4	28.4	1.8	31.3		18.2	47.7	47.7
Actuated g/C Ratio	0.11	0.14	0.14	0.23	0.25	0.25	0.02	0.28		0.16	0.43	0.43
Clearance Time (s)	5.0	5.3	5.3	5.0	5.3	5.3	5.0	6.0		5.0	6.0	6.0
Vehicle Extension (s)	2.0	4.5	4.5	2.0	4.5	4.5	2.0	3.0		2.0	4.0	4.0
Lane Grp Cap (vph)	381	688	214	407	474	402	28	1397		559	2173	676
v/s Ratio Prot	0.08	0.01		c0.18	c0.18		0.01	c0.22		c0.15	0.24	
v/s Ratio Perm			0.00			0.04						0.13
v/c Ratio	0.72	0.11	0.00	0.80	0.72	0.14	0.71	0.78		0.89	0.57	0.31
Uniform Delay, d1	47.9	42.3	41.7	40.5	38.0	32.2	54.6	37.0		45.8	24.1	21.1
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	5.6	0.1	0.0	9.7	5.9	0.3	52.5	4.3		16.3	1.1	1.2
Delay (s)	53.6	42.5	41.7	50.2	43.9	32.4	107.1	41.3		62.1	25.2	22.3
Level of Service	D	D	D	D	D	C	F	D		E	C	C
Approach Delay (s)	51.1			43.3			42.5			32.8		
Approach LOS	D			D			D			C		
Intersection Summary												
HCM 2000 Control Delay	38.6			HCM 2000 Level of Service					D			
HCM 2000 Volume to Capacity ratio	0.82											
Actuated Cycle Length (s)	111.6			Sum of lost time (s)					21.3			
Intersection Capacity Utilization	74.6%			ICU Level of Service					D			
Analysis Period (min)	15											
c Critical Lane Group												

Exist + Proj PM
1: Champagne Boulevard & Gopher Canyon Road

Sierra Project
03/17/2017

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	437	262	233	321	212	339
Future Volume (vph)	437	262	233	321	212	339
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5	4.5	4.5	4.5	4.5	4.5
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frpb, ped/bikes	1.00	1.00	1.00	1.00	0.99	
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	
Frt	1.00	0.85	1.00	1.00	0.92	
Flt Protected	0.95	1.00	0.95	1.00	1.00	
Satd. Flow (prot)	1770	1583	1770	1863	1689	
Flt Permitted	0.95	1.00	0.95	1.00	1.00	
Satd. Flow (perm)	1770	1583	1770	1863	1689	
Peak-hour factor, PHF	0.94	0.94	0.94	0.94	0.94	0.94
Adj. Flow (vph)	465	279	248	341	226	361
RTOR Reduction (vph)	0	192	0	0	50	0
Lane Group Flow (vph)	465	87	248	341	537	0
Confl. Bikes (#/hr)					10	
Turn Type	Prot	Perm	Prot	NA	NA	
Protected Phases	4		5	2	6	
Permitted Phases		4				
Actuated Green, G (s)	31.6	31.6	18.8	61.1	37.8	
Effective Green, g (s)	31.6	31.6	18.8	61.1	37.8	
Actuated g/C Ratio	0.31	0.31	0.18	0.60	0.37	
Clearance Time (s)	4.5	4.5	4.5	4.5	4.5	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	549	491	327	1119	627	
v/s Ratio Prot	c0.26		c0.14	0.18	c0.32	
v/s Ratio Perm		0.05				
v/c Ratio	0.85	0.18	0.76	0.30	0.86	
Uniform Delay, d1	32.8	25.6	39.3	9.9	29.5	
Progression Factor	1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	11.6	0.2	9.7	0.2	11.1	
Delay (s)	44.4	25.7	49.0	10.1	40.6	
Level of Service	D	C	D	B	D	
Approach Delay (s)	37.4			26.5	40.6	
Approach LOS	D			C	D	

Intersection Summary					
HCM 2000 Control Delay		35.0	HCM 2000 Level of Service		D
HCM 2000 Volume to Capacity ratio		0.83			
Actuated Cycle Length (s)		101.7	Sum of lost time (s)		13.5
Intersection Capacity Utilization		80.3%	ICU Level of Service		D
Analysis Period (min)		15			
c Critical Lane Group					

Exist + Proj PM
2: Champagne Boulevard & Old Castle Road

Sierra Project
03/17/2017

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	63	200	359	108	334	152
Future Volume (vph)	63	200	359	108	334	152
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5	4.5	4.5		4.5	4.5
Lane Util. Factor	1.00	1.00	1.00		1.00	1.00
Frpb, ped/bikes	1.00	0.97	1.00		1.00	1.00
Flpb, ped/bikes	1.00	1.00	1.00		1.00	1.00
Frt	1.00	0.85	0.97		1.00	1.00
Flt Protected	0.95	1.00	1.00		0.95	1.00
Satd. Flow (prot)	1770	1543	1796		1770	1863
Flt Permitted	0.95	1.00	1.00		0.95	1.00
Satd. Flow (perm)	1770	1543	1796		1770	1863
Peak-hour factor, PHF	0.84	0.84	0.84	0.84	0.84	0.84
Adj. Flow (vph)	75	238	427	129	398	181
RTOR Reduction (vph)	0	206	12	0	0	0
Lane Group Flow (vph)	75	32	544	0	398	181
Confl. Bikes (#/hr)		2		1		
Turn Type	Prot	Perm	NA		Prot	NA
Protected Phases	8		2		1	6
Permitted Phases		8				
Actuated Green, G (s)	9.6	9.6	26.9		21.0	52.4
Effective Green, g (s)	9.6	9.6	26.9		21.0	52.4
Actuated g/C Ratio	0.14	0.14	0.38		0.30	0.74
Clearance Time (s)	4.5	4.5	4.5		4.5	4.5
Vehicle Extension (s)	3.0	3.0	3.0		3.0	3.0
Lane Grp Cap (vph)	239	208	680		523	1374
v/s Ratio Prot	c0.04		c0.30		c0.22	0.10
v/s Ratio Perm		0.02				
v/c Ratio	0.31	0.15	0.80		0.76	0.13
Uniform Delay, d1	27.7	27.1	19.7		22.7	2.7
Progression Factor	1.00	1.00	1.00		1.00	1.00
Incremental Delay, d2	0.8	0.3	6.7		6.5	0.0
Delay (s)	28.5	27.5	26.4		29.2	2.7
Level of Service	C	C	C		C	A
Approach Delay (s)	27.7		26.4			20.9
Approach LOS	C		C			C

Intersection Summary					
HCM 2000 Control Delay		24.5	HCM 2000 Level of Service		C
HCM 2000 Volume to Capacity ratio		0.70			
Actuated Cycle Length (s)		71.0	Sum of lost time (s)		13.5
Intersection Capacity Utilization		58.7%	ICU Level of Service		B
Analysis Period (min)		15			
c Critical Lane Group					

Exist + Proj PM
3: Champagne Boulevard & Lawrence Welk Dr

Sierra Project
03/17/2017

																														
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR																		
Lane Configurations																														
Traffic Volume (veh/h)	2	0	19	75	0	45	15	400	61	37	201	1																		
Future Volume (Veh/h)	2	0	19	75	0	45	15	400	61	37	201	1																		
Sign Control	Stop				Stop				Free																					
Grade	0%				0%				0%																					
Peak Hour Factor	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84																		
Hourly flow rate (vph)	2	0	23	89	0	54	18	476	73	44	239	1																		
Pedestrians	1																													
Lane Width (ft)	12.0																													
Walking Speed (ft/s)	4.0																													
Percent Blockage	0																													
Right turn flare (veh)	7																													
Median type	None																													
Median storage (veh)	None																													
Upstream signal (ft)	874																													
pX, platoon unblocked																														
vC, conflicting volume	840	914	240	863	841	477	240	550																						
vC1, stage 1 conf vol																														
vC2, stage 2 conf vol																														
vCu, unblocked vol	840	914	240	863	841	477	240	550																						
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	100	97	65	100	91	99	96																						
cM capacity (veh/h)	248	258	799	255	284	588	1327	1019																						
Direction, Lane #	EB 1	WB 1	NB 1	NB 2	NB 3	SB 1	SB 2																							
Volume Total	25	143	18	476	73	44	240																							
Volume Left	2	89	18	0	0	44	0																							
Volume Right	23	54	0	0	73	0	1																							
cSH	678	410	1327	1700	1700	1019	1700																							
Volume to Capacity	0.04	0.35	0.01	0.28	0.04	0.04	0.14																							
Queue Length 95th (ft)	3	38	1	0	0	3	0																							
Control Delay (s)	10.5	20.9	7.8	0.0	0.0	8.7	0.0																							
Lane LOS	B	C	A					A																						
Approach Delay (s)	10.5	20.9	0.2					1.3																						
Approach LOS	B	C																												
Intersection Summary																														
Average Delay	3.7																													
Intersection Capacity Utilization	45.2%			ICU Level of Service			A																							
Analysis Period (min)	15																													

Exist + Proj PM
4: North Centre City Pkwy/Champagne Boulevard & Deer Springs Rd

Sierra Project
03/17/2017

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	369	364	100	61	232	13	91	179	100	26	114	216
Future Volume (vph)	369	364	100	61	232	13	91	179	100	26	114	216
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5	4.5		4.5	4.5			4.5			4.5	
Lane Util. Factor	1.00	0.95		1.00	0.95			1.00			1.00	
Frpb, ped/bikes	1.00	1.00		1.00	1.00			1.00			0.99	
Flpb, ped/bikes	1.00	1.00		1.00	1.00			1.00			1.00	
Frt	1.00	0.97		1.00	0.99			0.96			0.92	
Flt Protected	0.95	1.00		0.95	1.00			0.99			1.00	
Satd. Flow (prot)	1770	3425		1770	3501			1767			1689	
Flt Permitted	0.95	1.00		0.95	1.00			0.77			0.96	
Satd. Flow (perm)	1770	3425		1770	3501			1369			1626	
Peak-hour factor, PHF	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Adj. Flow (vph)	384	379	104	64	242	14	95	186	104	27	119	225
RTOR Reduction (vph)	0	26	0	0	4	0	0	14	0	0	57	0
Lane Group Flow (vph)	384	457	0	64	252	0	0	371	0	0	314	0
Confl. Bikes (#/hr)	12						2					
Turn Type	Prot	NA		Prot	NA		Perm	NA		Perm	NA	
Protected Phases	5	2		1	6			8			4	
Permitted Phases							8					
Actuated Green, G (s)	21.7	28.5		6.3	13.1			26.2			26.2	
Effective Green, g (s)	21.7	28.5		6.3	13.1			26.2			26.2	
Actuated g/C Ratio	0.29	0.38		0.08	0.18			0.35			0.35	
Clearance Time (s)	4.5	4.5		4.5	4.5			4.5			4.5	
Vehicle Extension (s)	3.0	3.0		3.0	3.0			3.0			3.0	
Lane Grp Cap (vph)	515	1310		149	615			481			571	
v/s Ratio Prot	c0.22	c0.13		0.04	0.07							
v/s Ratio Perm							c0.27					
v/c Ratio	0.75	0.35		0.43	0.41			0.77			0.55	
Uniform Delay, d1	23.9	16.4		32.4	27.3			21.5			19.4	
Progression Factor	1.00	1.00		1.00	1.00			1.00			1.00	
Incremental Delay, d2	5.8	0.2		2.0	0.4			7.5			1.1	
Delay (s)	29.7	16.6		34.4	27.7			29.0			20.5	
Level of Service	C	B		C	C			C			C	
Approach Delay (s)	22.4				29.0				29.0		20.5	
Approach LOS	C				C				C		C	
Intersection Summary												
HCM 2000 Control Delay	24.4			HCM 2000 Level of Service					C			
HCM 2000 Volume to Capacity ratio	0.69											
Actuated Cycle Length (s)	74.5			Sum of lost time (s)					13.5			
Intersection Capacity Utilization	83.5%			ICU Level of Service					E			
Analysis Period (min)	15											
c Critical Lane Group												

Exist + Proj PM
5: I-15 NB Ramps & Deer Springs Rd

Sierra Project
03/17/2017

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↱			↰	↱		↰	↱			
Traffic Volume (vph)	803	367	0	0	499	26	773	5	450	0	0	0
Future Volume (vph)	803	367	0	0	499	26	773	5	450	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.2	5.3			5.3	5.3			4.6			
Lane Util. Factor	1.00	1.00			1.00	1.00			1.00			
Frpb, ped/bikes	1.00	1.00			1.00	0.98			1.00	0.99		
Flpb, ped/bikes	1.00	1.00			1.00	1.00			1.00	1.00		
Frt	1.00	1.00			1.00	0.85			1.00	0.85		
Flt Protected	0.95	1.00			1.00	1.00			0.95	1.00		
Satd. Flow (prot)	1770	1863			1863	1545			1775	1563		
Flt Permitted	0.95	1.00			1.00	1.00			0.95	1.00		
Satd. Flow (perm)	1770	1863			1863	1545			1775	1563		
Peak-hour factor, PHF	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Adj. Flow (vph)	836	382	0	0	520	27	805	5	469	0	0	0
RTOR Reduction (vph)	0	0	0	0	0	20	0	0	229	0	0	0
Lane Group Flow (vph)	836	382	0	0	520	7	0	810	240	0	0	0
Confl. Peds. (#/hr)					1							
Confl. Bikes (#/hr)			4		1				1			
Turn Type	Prot	NA			NA	Perm	Split	NA	Perm			
Protected Phases	5	2			6		8	8				
Permitted Phases						6			8			
Actuated Green, G (s)	27.8	56.7			24.7	24.7		33.4	33.4			
Effective Green, g (s)	27.8	56.7			24.7	24.7		33.4	33.4			
Actuated g/C Ratio	0.28	0.57			0.25	0.25		0.33	0.33			
Clearance Time (s)	4.2	5.3			5.3	5.3		4.6	4.6			
Vehicle Extension (s)	3.0	3.0			3.0	3.0		3.0	3.0			
Lane Grp Cap (vph)	492	1056			460	381		592	522			
v/s Ratio Prot	c0.47	0.21			c0.28			c0.46				
v/s Ratio Perm						0.00			0.15			
v/c Ratio	1.70	0.36			1.13	0.02		1.37	0.46			
Uniform Delay, d1	36.1	11.8			37.6	28.5		33.3	26.2			
Progression Factor	0.94	1.97			1.00	1.00		1.00	1.00			
Incremental Delay, d2	315.4	0.1			82.8	0.1		176.3	0.6			
Delay (s)	349.3	23.3			120.4	28.6		209.6	26.8			
Level of Service	F	C			F	C		F	C			
Approach Delay (s)		247.0				115.9		142.6		0.0		
Approach LOS		F				F		F		A		

Intersection Summary			
HCM 2000 Control Delay	179.6	HCM 2000 Level of Service	F
HCM 2000 Volume to Capacity ratio	1.41		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	14.1
Intersection Capacity Utilization	143.4%	ICU Level of Service	H
Analysis Period (min)	15		

c Critical Lane Group

Exist + Proj PM
6: I-15 SB Ramps & Deer Springs Rd

Sierra Project
03/17/2017

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↰	↱	↰	↱			↰	↱		↰	↱
Traffic Volume (vph)	0	1167	412	174	1061	0	0	0	0	39	2	460
Future Volume (vph)	0	1167	412	174	1061	0	0	0	0	39	2	460
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		5.3	5.3	4.2	5.3						4.6	4.6
Lane Util. Factor		1.00	1.00	1.00	1.00						1.00	0.88
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	1863						1778	2787
Flt Permitted		1.00	1.00	0.95	1.00						0.95	1.00
Satd. Flow (perm)		1863	1583	1770	1863						1778	2787
Peak-hour factor, PHF	0.80	0.80	0.80	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	1459	515	189	1153	0	0	0	0	42	2	500
RTOR Reduction (vph)	0	0	140	0	0	0	0	0	0	0	0	181
Lane Group Flow (vph)	0	1459	375	189	1153	0	0	0	0	0	44	319
Turn Type	NA	Perm	Prot	NA						Split	NA	Perm
Protected Phases		2		1	6					4	4	
Permitted Phases			2									4
Actuated Green, G (s)		57.7	57.7	12.0	73.9						16.2	16.2
Effective Green, g (s)		57.7	57.7	12.0	73.9						16.2	16.2
Actuated g/C Ratio		0.58	0.58	0.12	0.74						0.16	0.16
Clearance Time (s)		5.3	5.3	4.2	5.3						4.6	4.6
Vehicle Extension (s)		3.0	3.0	3.0	3.0						3.0	3.0
Lane Grp Cap (vph)		1074	913	212	1376						288	451
v/s Ratio Prot		c0.78		0.11	c0.62						0.02	
v/s Ratio Perm			0.24									c0.11
v/c Ratio		1.36	0.41	0.89	0.84						0.15	0.71
Uniform Delay, d1		21.1	11.7	43.4	8.9						36.0	39.7
Progression Factor		1.00	1.00	0.87	1.37						1.00	1.00
Incremental Delay, d2		167.4	1.4	4.7	0.6						0.2	5.0
Delay (s)		188.6	13.1	42.3	12.9						36.3	44.7
Level of Service		F	B	D	B						D	D
Approach Delay (s)		142.8			17.0			0.0			44.0	
Approach LOS		F			B			A			D	

Intersection Summary			
HCM 2000 Control Delay	85.1	HCM 2000 Level of Service	F
HCM 2000 Volume to Capacity ratio	1.18		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	14.1
Intersection Capacity Utilization	143.4%	ICU Level of Service	H
Analysis Period (min)	15		

c Critical Lane Group

Exist + Proj PM
7: Mesa Rock Road & Deer Springs Rd

Sierra Project
03/17/2017

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↔	↕	↔	↔	↕	↔	↔	↕	↔	↔	↕	↔
Traffic Volume (vph)	235	1031	14	19	648	854	19	34	23	525	20	172
Future Volume (vph)	235	1031	14	19	648	854	19	34	23	525	20	172
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5	4.5		4.5	4.5			4.5			4.5	4.5
Lane Util. Factor	1.00	0.95		1.00	0.95			1.00			1.00	1.00
Frpb, ped/bikes	1.00	1.00		1.00	0.98			0.99			1.00	0.99
Flpb, ped/bikes	1.00	1.00		1.00	1.00			1.00			1.00	1.00
Frt	1.00	1.00		1.00	0.91			0.96			1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00			0.99			0.95	1.00
Satd. Flow (prot)	1770	3531		1770	3183			1754			1777	1563
Flt Permitted	0.95	1.00		0.95	1.00			0.99			0.95	1.00
Satd. Flow (perm)	1770	3531		1770	3183			1754			1777	1563
Peak-hour factor, PHF	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Adj. Flow (vph)	242	1063	14	20	668	880	20	35	24	541	21	177
RTOR Reduction (vph)	0	1	0	0	215	0	0	17	0	0	0	90
Lane Group Flow (vph)	242	1076	0	20	1333	0	0	62	0	0	562	87
Confl. Bikes (#/hr)			16			11			3			1
Turn Type	Prot	NA		Prot	NA		Split	NA		Split	NA	Perm
Protected Phases	7	4		3	8		2	2		6	6	
Permitted Phases												6
Actuated Green, G (s)	6.5	45.1		2.1	40.7			8.3			20.0	20.0
Effective Green, g (s)	6.5	45.1		2.1	40.7			8.3			20.0	20.0
Actuated g/C Ratio	0.07	0.48		0.02	0.44			0.09			0.21	0.21
Clearance Time (s)	4.5	4.5		4.5	4.5			4.5			4.5	4.5
Vehicle Extension (s)	3.0	3.0		3.0	3.0			3.0			3.0	3.0
Lane Grp Cap (vph)	123	1703		39	1385			155			380	334
v/s Ratio Prot	c0.14	c0.30		0.01	c0.42			c0.04			c0.32	
v/s Ratio Perm												0.06
v/c Ratio	1.97	0.63		0.51	0.96			0.40			1.48	0.26
Uniform Delay, d1	43.5	18.0		45.2	25.7			40.2			36.8	30.6
Progression Factor	1.00	1.00		1.00	1.00			1.00			1.00	1.00
Incremental Delay, d2	463.3	0.8		10.9	16.0			1.7			229.3	1.9
Delay (s)	506.8	18.8		56.1	41.6			41.9			266.0	32.5
Level of Service	F	B		E	D			D			F	C
Approach Delay (s)		108.3			41.8			41.9			210.1	
Approach LOS		F			D			D			F	

Intersection Summary

HCM 2000 Control Delay	99.1	HCM 2000 Level of Service	F
HCM 2000 Volume to Capacity ratio	1.08		
Actuated Cycle Length (s)	93.5	Sum of lost time (s)	18.0
Intersection Capacity Utilization	106.5%	ICU Level of Service	G
Analysis Period (min)	15		
c Critical Lane Group			

Exist + Proj PM
9: Deer Springs Rd & Sarver Lane

Sierra Project
03/17/2017

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations	↔	↕	↕	↕	↔	↔
Traffic Volume (veh/h)	305	1300	715	109	45	114
Future Volume (Veh/h)	305	1300	715	109	45	114
Sign Control	Free	Free			Stop	
Grade	0%	0%			0%	
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95
Hourly flow rate (vph)	321	1368	753	115	47	120
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	868				2820	810
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	868				2820	810
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	59				0	68
cM capacity (veh/h)	776				12	380
Direction, Lane #	EB 1	EB 2	WB 1	SB 1		
Volume Total	321	1368	868	167		
Volume Left	321	0	0	47		
Volume Right	0	0	115	120		
cSH	776	1700	1700	38		
Volume to Capacity	0.41	0.80	0.51	4.39		
Queue Length 95th (ft)	51	0	0	Err		
Control Delay (s)	12.9	0.0	0.0	Err		
Lane LOS	B			F		
Approach Delay (s)	2.4		0.0	Err		
Approach LOS				F		

Intersection Summary

Average Delay	614.5		
Intersection Capacity Utilization	84.6%	ICU Level of Service	E
Analysis Period (min)	15		

Exist + Proj PM
10: Deer Springs Rd & Sycamore Road

Sierra Project
03/17/2017

						
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	2	11	1345	3	5	849
Future Volume (Veh/h)	2	11	1345	3	5	849
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94
Hourly flow rate (vph)	2	12	1431	3	5	903
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)		4				
Median type			None		None	
Median storage (veh)						
Upstream signal (ft)			680			
pX, platoon unblocked	0.26	0.26			0.26	
vC, conflicting volume	2346	1432			1434	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	4775	1239			1244	
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	78			97	
cM capacity (veh/h)	0	55			144	
Direction, Lane #	WB 1	NB 1	SB 1			
Volume Total	14	1434	908			
Volume Left	2	0	5			
Volume Right	12	3	0			
cSH	2	1700	144			
Volume to Capacity	8.40	0.84	0.03			
Queue Length 95th (ft)	Err	0	3			
Control Delay (s)	Err	0.0	2.4			
Lane LOS	F		A			
Approach Delay (s)	Err	0.0	2.4			
Approach LOS	F					
Intersection Summary						
Average Delay		60.4				
Intersection Capacity Utilization		81.0%	ICU Level of Service	D		
Analysis Period (min)		15				

Exist + Proj PM
11: Twin Oaks Valley Road & Camino Mayor

Sierra Project
03/17/2017

						
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	16	1	7	24	1	8
Future Volume (Veh/h)	16	1	7	24	1	8
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.75	0.75	0.75	0.75	0.75	0.75
Hourly flow rate (vph)	21	1	9	32	1	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	38	25			41	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	38	25			41	
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	100			100	
cM capacity (veh/h)	974	1051			1568	
Direction, Lane #	WB 1	NB 1	SB 1			
Volume Total	22	41	12			
Volume Left	21	0	1			
Volume Right	1	32	0			
cSH	977	1700	1568			
Volume to Capacity	0.02	0.02	0.00			
Queue Length 95th (ft)	2	0	0			
Control Delay (s)	8.8	0.0	0.6			
Lane LOS	A		A			
Approach Delay (s)	8.8	0.0	0.6			
Approach LOS	A					
Intersection Summary						
Average Delay			2.7			
Intersection Capacity Utilization			13.3%	ICU Level of Service	A	
Analysis Period (min)			15			

Exist + Proj PM
12: Twin Oaks Valley Rd #1/Deer Springs Rd & Twin Oaks Valley Rd

Sierra Project
03/17/2017

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	48	240	105	1333	872	47
Future Volume (vph)	48	240	105	1333	872	47
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.9	4.9	4.0	5.3	5.3	5.3
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frpb, ped/bikes	1.00	1.00	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)	1770	1583	1770	1863	1863	1547
Flt Permitted	0.95	1.00	0.95	1.00	1.00	1.00
Satd. Flow (perm)	1770	1583	1770	1863	1863	1547
Peak-hour factor, PHF	0.88	0.88	0.88	0.88	0.88	0.88
Growth Factor (vph)	100%	100%	100%	130%	130%	100%
Adj. Flow (vph)	55	273	119	1969	1288	53
RTOR Reduction (vph)	0	143	0	0	0	9
Lane Group Flow (vph)	55	130	119	1969	1288	44
Confl. Peds. (#/hr)						1
Confl. Bikes (#/hr)						2
Turn Type	Prot	Perm	Prot	NA	NA	Perm
Protected Phases	4		5	2	6	
Permitted Phases		4				6
Actuated Green, G (s)	12.5	12.5	7.0	68.1	57.1	57.1
Effective Green, g (s)	12.5	12.5	7.0	68.1	57.1	57.1
Actuated g/C Ratio	0.14	0.14	0.08	0.75	0.63	0.63
Clearance Time (s)	4.9	4.9	4.0	5.3	5.3	5.3
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	243	217	136	1397	1171	972
v/s Ratio Prot	0.03		0.07	c1.06	0.69	
v/s Ratio Perm		c0.08				0.03
v/c Ratio	0.23	0.60	0.88	1.41	1.10	0.05
Uniform Delay, d1	34.8	36.8	41.5	11.4	16.8	6.4
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	0.5	4.4	42.0	188.6	58.1	0.0
Delay (s)	35.3	41.2	83.5	199.9	74.9	6.5
Level of Service	D	D	F	F	E	A
Approach Delay (s)	40.2			193.3	72.2	
Approach LOS	D			F	E	
Intersection Summary						
HCM 2000 Control Delay			136.7		HCM 2000 Level of Service	F
HCM 2000 Volume to Capacity ratio			1.35			
Actuated Cycle Length (s)			90.8		Sum of lost time (s)	14.2
Intersection Capacity Utilization			103.0%		ICU Level of Service	G
Analysis Period (min)			15			
c Critical Lane Group						

Exist + Proj PM
13: Twin Oaks Valley Rd #1 & Buena Creek Rd

Sierra Project
03/17/2017

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	565	0	210	0	0	0	167	861	0	0	683	421
Future Volume (vph)	565	0	210	0	0	0	167	861	0	0	683	421
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0	4.0				5.0	5.5			5.5	5.5
Lane Util. Factor		1.00	1.00				1.00	1.00			1.00	1.00
Frpb, ped/bikes		1.00	1.00				1.00	1.00			1.00	0.97
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)		1770	1583				1770	1863			1863	1542
Flt Permitted		0.76	1.00				0.95	1.00			1.00	1.00
Satd. Flow (perm)		1410	1583				1770	1863			1863	1542
Peak-hour factor, PHF	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Adj. Flow (vph)	608	0	226	0	0	0	180	926	0	0	734	453
RTOR Reduction (vph)	0	0	99	0	0	0	0	0	0	0	0	108
Lane Group Flow (vph)	0	608	127	0	0	0	180	926	0	0	734	345
Confl. Peds. (#/hr)	1											
Confl. Bikes (#/hr)	5											
Turn Type	Perm	NA	Perm				Prot	NA		Prot	NA	Perm
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4		4	8								6
Actuated Green, G (s)		28.4	28.4				11.5	51.6			35.1	35.1
Effective Green, g (s)		28.4	28.4				11.5	51.6			35.1	35.1
Actuated g/C Ratio		0.32	0.32				0.13	0.58			0.39	0.39
Clearance Time (s)		4.0	4.0				5.0	5.5			5.5	5.5
Vehicle Extension (s)		3.0	3.0				3.0	3.0			3.0	3.0
Lane Grp Cap (vph)		447	502				227	1074			730	604
v/s Ratio Prot							0.10	c0.50			c0.39	
v/s Ratio Perm		c0.43	0.08									0.22
v/c Ratio		1.36	0.25				0.79	0.86			1.01	0.57
Uniform Delay, d1		30.6	22.7				37.8	16.0			27.2	21.3
Progression Factor		1.00	1.00				1.00	1.00			1.00	1.00
Incremental Delay, d2		176.1	0.3				17.1	7.3			34.7	1.3
Delay (s)		206.6	22.9				54.9	23.2			61.9	22.6
Level of Service		F	C				D	C			E	C
Approach Delay (s)		156.9			0.0			28.4			46.9	
Approach LOS		F			A			C			D	
Intersection Summary												
HCM 2000 Control Delay			69.7				HCM 2000 Level of Service			E		
HCM 2000 Volume to Capacity ratio			1.15									
Actuated Cycle Length (s)			89.5				Sum of lost time (s)			14.5		
Intersection Capacity Utilization			91.6%				ICU Level of Service			F		
Analysis Period (min)			15									
c Critical Lane Group												

Exist + Proj PM
14: Twin Oaks Valley Rd #1 & Cassou Rd

Sierra Project
03/17/2017

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↔			↔		↖	↗	↖	↗	↖	↗
Traffic Volume (vph)	15	0	51	14	0	27	50	1002	19	10	771	21
Future Volume (vph)	15	0	51	14	0	27	50	1002	19	10	771	21
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		5.0			5.0		5.0	5.0	5.0	5.0	5.0	
Lane Util. Factor		1.00			1.00		1.00	1.00	1.00	1.00	1.00	
Frpb, ped/bikes		0.99			1.00		1.00	1.00	1.00	1.00	1.00	
Flpb, ped/bikes		1.00			1.00		1.00	1.00	1.00	1.00	1.00	
Frt		0.90			0.91		1.00	1.00	0.85	1.00	1.00	
Flt Protected		0.99			0.98		0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)		1633			1669		1770	1863	1583	1770	1855	
Flt Permitted		0.99			0.98		0.95	1.00	1.00	0.95	1.00	
Satd. Flow (perm)		1633			1669		1770	1863	1583	1770	1855	
Peak-hour factor, PHF	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Adj. Flow (vph)	16	0	55	15	0	29	54	1077	20	11	829	23
RTOR Reduction (vph)	0	66	0	0	41	0	0	0	7	0	0	0
Lane Group Flow (vph)	0	5	0	0	3	0	54	1077	13	11	852	0
Confl. Peds. (#/hr)			1									
Turn Type	Split	NA		Split	NA		Prot	NA	Perm	Prot	NA	
Protected Phases	4	4		8	8		5	2		1	6	
Permitted Phases								2				
Actuated Green, G (s)		7.0			5.8		3.9	58.2	58.2	0.7	55.0	
Effective Green, g (s)		7.0			5.8		3.9	58.2	58.2	0.7	55.0	
Actuated g/C Ratio		0.08			0.06		0.04	0.63	0.63	0.01	0.60	
Clearance Time (s)		5.0			5.0		5.0	5.0	5.0	5.0	5.0	
Vehicle Extension (s)		3.0			3.0		3.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)		124			105		75	1182	1004	13	1112	
v/s Ratio Prot		c0.00			c0.00		c0.03	c0.58		0.01	0.46	
v/s Ratio Perm								0.01				
v/c Ratio		0.04			0.03		0.72	0.91	0.01	0.85	0.77	
Uniform Delay, d1		39.2			40.3		43.4	14.5	6.2	45.4	13.6	
Progression Factor		1.00			1.00		1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2		0.1			0.1		28.0	10.6	0.0	166.4	3.2	
Delay (s)		39.4			40.4		71.3	25.1	6.2	211.9	16.8	
Level of Service		D			D		E	C	A	F	B	
Approach Delay (s)		39.4			40.4		26.9				19.3	
Approach LOS		D			D		C				B	

Intersection Summary

HCM 2000 Control Delay	24.5	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.78		
Actuated Cycle Length (s)	91.7	Sum of lost time (s)	20.0
Intersection Capacity Utilization	66.3%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

Exist + Proj PM
15: Twin Oaks Valley Rd #1 & La Cienega

Sierra Project
03/17/2017

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations	↖	↗	↕	↖	↗	↕
Traffic Volume (vph)	88	59	1055	105	105	715
Future Volume (vph)	88	59	1055	105	105	715
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)		6.0	6.5		6.0	6.5
Lane Util. Factor	1.00	1.00	0.95		1.00	0.95
Frpb, ped/bikes	1.00	1.00	1.00		1.00	1.00
Flpb, ped/bikes	1.00	1.00	1.00		1.00	1.00
Frt	1.00	0.85	0.99		1.00	1.00
Flt Protected	0.95	1.00	1.00		0.95	1.00
Satd. Flow (prot)	1770	1583	3476		1770	3539
Flt Permitted	0.95	1.00	1.00		0.95	1.00
Satd. Flow (perm)	1770	1583	3476		1770	3539
Peak-hour factor, PHF	0.98	0.98	0.98	0.98	0.98	0.98
Adj. Flow (vph)	90	60	1077	107	107	730
RTOR Reduction (vph)	0	0	6	0	0	0
Lane Group Flow (vph)	90	60	1178	0	107	730
Confl. Peds. (#/hr)				13		
Confl. Bikes (#/hr)				3		
Turn Type	Prot	Perm	NA		Prot	NA
Protected Phases	8		2		1	6
Permitted Phases		8				
Actuated Green, G (s)	8.5	8.5	35.1		7.6	48.7
Effective Green, g (s)	8.5	8.5	35.1		7.6	48.7
Actuated g/C Ratio	0.12	0.12	0.50		0.11	0.70
Clearance Time (s)	6.0	6.0	6.5		6.0	6.5
Vehicle Extension (s)	3.0	3.0	3.0		3.0	3.0
Lane Grp Cap (vph)	215	193	1750		192	2472
v/s Ratio Prot	c0.05		c0.34		c0.06	0.21
v/s Ratio Perm		0.04				
v/c Ratio	0.42	0.31	0.67		0.56	0.30
Uniform Delay, d1	28.3	27.9	13.0		29.5	4.0
Progression Factor	1.00	1.00	1.00		1.00	1.00
Incremental Delay, d2	1.3	0.9	1.0		3.5	0.1
Delay (s)	29.6	28.8	14.0		32.9	4.1
Level of Service	C	C	B		C	A
Approach Delay (s)	29.3		14.0			7.7
Approach LOS	C		B			A

Intersection Summary

HCM 2000 Control Delay	12.7	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.61		
Actuated Cycle Length (s)	69.7	Sum of lost time (s)	18.5
Intersection Capacity Utilization	58.7%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

Exist + Proj PM
16: Twin Oaks Valley Rd #1 & Del Roy Dr

Sierra Project
03/17/2017

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↱		↰	↱		↰	↱		↰	↱	
Traffic Volume (vph)	7	0	29	25	0	10	56	1067	23	0	741	10
Future Volume (vph)	7	0	29	25	0	10	56	1067	23	0	741	10
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	5.0		5.0	5.0		5.0	5.0		5.0	5.0	
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	0.95		1.00	0.95	
Flpb, ped/bikes	1.00	0.99		1.00	1.00		1.00	1.00		1.00	1.00	
Flpb, ped/bikes	1.00	1.00		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		1.00	1.00	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770	1560		1770	1583		1770	3524		1770	3531	
Flt Permitted	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (perm)	1770	1560		1770	1583		1770	3524		1770	3531	
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	8	0	32	28	0	11	62	1186	26	0	823	11
RTOR Reduction (vph)	0	30	0	0	10	0	0	1	0	0	1	0
Lane Group Flow (vph)	8	2	0	28	1	0	62	1211	0	0	833	0
Confl. Peds. (#/hr)								14			1	
Confl. Bikes (#/hr)			1					4			4	
Turn Type	Prot	NA		Prot	NA		Prot	NA		Prot	NA	
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases												
Actuated Green, G (s)	0.4	4.5		1.7	5.8		4.5	39.4		29.9		
Effective Green, g (s)	0.4	4.5		1.7	5.8		4.5	39.4		29.9		
Actuated g/C Ratio	0.01	0.07		0.03	0.10		0.07	0.65		0.49		
Clearance Time (s)	5.0	5.0		5.0	5.0		5.0	5.0		5.0		
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0		
Lane Grp Cap (vph)	11	115		49	151		131	2291		1742		
v/s Ratio Prot	0.00	c0.00		c0.02	0.00		0.04	c0.34		0.24		
v/s Ratio Perm												
v/c Ratio	0.73	0.02		0.57	0.01		0.47	0.53		0.48		
Uniform Delay, d1	30.0	26.0		29.1	24.8		26.9	5.6		10.2		
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00		
Incremental Delay, d2	123.5	0.1		15.1	0.0		2.7	0.2		0.2		
Delay (s)	153.6	26.1		44.2	24.8		29.6	5.9		10.4		
Level of Service	F	C		D	C		C	A		B		
Approach Delay (s)		51.6			38.7			7.0		10.4		
Approach LOS		D			D			A		B		
Intersection Summary												
HCM 2000 Control Delay		9.7			HCM 2000 Level of Service			A				
HCM 2000 Volume to Capacity ratio		0.54										
Actuated Cycle Length (s)		60.6			Sum of lost time (s)			20.0				
Intersection Capacity Utilization		54.1%			ICU Level of Service			A				
Analysis Period (min)		15										
c Critical Lane Group												

Exist + Proj PM
17: Twin Oaks Valley Rd #1 & Windy Wy

Sierra Project
03/17/2017

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰		↱				↰	↱		↰	↱	
Traffic Volume (vph)	17	0	51	0	0	0	43	1052	2	2	777	5
Future Volume (vph)	17	0	51	0	0	0	43	1052	2	2	777	5
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	6.0		4.0	6.0	
Lane Util. Factor	1.00		1.00				1.00	0.95		1.00	0.95	
Flpb, ped/bikes	1.00		0.99				1.00	1.00		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	1.00		1.00	1.00	
Flt Protected	0.95		1.00				0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770		1563				1770	3538		1770	3535	
Flt Permitted	0.95		1.00				0.95	1.00		0.95	1.00	
Satd. Flow (perm)	1770		1563				1770	3538		1770	3535	
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	17	0	51	0	0	0	43	1052	2	2	777	5
RTOR Reduction (vph)	0	0	46	0	0	0	0	0	0	0	0	0
Lane Group Flow (vph)	17	0	5	0	0	0	43	1054	0	2	782	0
Confl. Peds. (#/hr)			1				2			1		4
Confl. Bikes (#/hr)			2				2			2		5
Turn Type	Prot		Perm				Prot	NA		Prot	NA	
Protected Phases	4						5	2		1	6	
Permitted Phases			4									
Actuated Green, G (s)	5.2		5.2				2.4	31.5		0.7	29.8	
Effective Green, g (s)	5.2		5.2				2.4	31.5		0.7	29.8	
Actuated g/C Ratio	0.10		0.10				0.05	0.61		0.01	0.58	
Clearance Time (s)	4.0		4.0				4.0	6.0		4.0	6.0	
Vehicle Extension (s)	3.0		3.0				3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	179		158				82	2168		24	2049	
v/s Ratio Prot	c0.01						c0.02	c0.30		0.00	0.22	
v/s Ratio Perm			0.00									
v/c Ratio	0.09		0.03				0.52	0.49		0.08	0.38	
Uniform Delay, d1	21.0		20.8				23.9	5.5		25.0	5.8	
Progression Factor	1.00		1.00				1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.2		0.1				5.9	0.2		1.5	0.1	
Delay (s)	21.2		20.9				29.9	5.7		26.5	5.9	
Level of Service	C		C				C	A		C	A	
Approach Delay (s)		21.0			0.0			6.6			6.0	
Approach LOS		C			A			A			A	
Intersection Summary												
HCM 2000 Control Delay		6.9						HCM 2000 Level of Service			A	
HCM 2000 Volume to Capacity ratio		0.45										
Actuated Cycle Length (s)		51.4						Sum of lost time (s)			14.0	
Intersection Capacity Utilization		47.4%						ICU Level of Service			A	
Analysis Period (min)		15										
c Critical Lane Group												

Exist + Proj PM
18: Twin Oaks Valley Rd #1 & Borden Rd

Sierra Project
03/17/2017

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↔	↕	↔	↔	↕	↔	↔	↕	↔	↔	↕	↔
Traffic Volume (vph)	190	193	192	112	168	35	194	842	182	63	636	113
Future Volume (vph)	190	193	192	112	168	35	194	842	182	63	636	113
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.2	5.3		4.2	5.3		4.2	4.9	4.9	4.2	4.9	4.9
Lane Util. Factor	1.00	0.95		1.00	0.95		1.00	0.95	1.00	1.00	0.95	1.00
Frpb, ped/bikes	1.00	0.99		1.00	1.00		1.00	1.00	0.99	1.00	1.00	0.98
Flpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	0.93		1.00	0.97		1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1770	3252		1770	3439		1770	3539	1560	1770	3539	1556
Flt Permitted	0.95	1.00		0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	1770	3252		1770	3439		1770	3539	1560	1770	3539	1556
Peak-hour factor, PHF	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Adj. Flow (vph)	198	201	200	117	175	36	202	877	190	66	662	118
RTOR Reduction (vph)	0	103	0	0	10	0	0	0	61	0	0	82
Lane Group Flow (vph)	198	298	0	117	201	0	202	877	129	66	663	36
Confl. Peds. (#/hr)			2									2
Confl. Bikes (#/hr)						3			5			5
Turn Type	Prot	NA		Prot	NA		Prot	NA	Perm	Prot	NA	Perm
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases									2			6
Actuated Green, G (s)	18.8	19.2		13.6	14.0		19.1	40.4	40.4	8.3	29.6	29.6
Effective Green, g (s)	18.8	19.2		13.6	14.0		19.1	40.4	40.4	8.3	29.6	29.6
Actuated g/C Ratio	0.19	0.19		0.14	0.14		0.19	0.40	0.40	0.08	0.30	0.30
Clearance Time (s)	4.2	5.3		4.2	5.3		4.2	4.9	4.9	4.2	4.9	4.9
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)	332	623		240	480		337	1428	629	146	1046	460
v/s Ratio Prot	c0.11	c0.09		0.07	0.06		c0.11	c0.25		0.04	0.19	
v/s Ratio Perm									0.08			0.02
v/c Ratio	0.60	0.48		0.49	0.42		0.60	0.61	0.20	0.45	0.63	0.08
Uniform Delay, d1	37.2	36.0		40.0	39.3		37.0	23.7	19.4	43.7	30.6	25.4
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	2.9	0.6		1.6	0.6		2.9	0.8	0.2	2.2	1.3	0.1
Delay (s)	40.1	36.6		41.6	39.9		39.9	24.5	19.6	46.0	31.8	25.5
Level of Service	D	D		D	D		D	C	B	D	C	C
Approach Delay (s)		37.7			40.5			26.2			32.0	
Approach LOS		D			D			C			C	

Intersection Summary			
HCM 2000 Control Delay	31.6	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.62		
Actuated Cycle Length (s)	100.1	Sum of lost time (s)	18.6
Intersection Capacity Utilization	63.1%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

Exist + Proj PM
19: Twin Oaks Valley Rd #1 & Richmar Ave

Sierra Project
03/17/2017

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↔	↕	↔	↔	↕	↔	↔	↕	↔	↔	↕	↔
Traffic Volume (vph)	210	11	83	12	6	3	121	1392	25	61	1284	174
Future Volume (vph)	210	11	83	12	6	3	121	1392	25	61	1284	174
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.9	4.9		4.0	4.0		4.0	5.7		4.0	5.7	
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	0.95		1.00	0.95	
Frpb, ped/bikes	1.00	1.00		1.00	0.99		1.00	1.00		1.00	1.00	
Flpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Frt	1.00	0.87		1.00	0.95		1.00	1.00		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	1615		1770	1756		1770	3527		1770	3467	
Flt Permitted	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (perm)	1770	1615		1770	1756		1770	3527		1770	3467	
Peak-hour factor, PHF	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Adj. Flow (vph)	219	11	86	12	6	3	126	1450	26	64	1338	181
RTOR Reduction (vph)	0	72	0	0	3	0	0	1	0	0	7	0
Lane Group Flow (vph)	219	25	0	13	6	0	126	1475	0	64	1512	0
Confl. Peds. (#/hr)						9				7		
Confl. Bikes (#/hr)									8			3
Turn Type	Split	NA		Split	NA		Prot	NA		Prot	NA	
Protected Phases	4	4		8	8		5	2		1	6	
Permitted Phases												
Actuated Green, G (s)	18.5	18.5		7.0	7.0		11.8	64.6		6.1	58.9	
Effective Green, g (s)	18.5	18.5		7.0	7.0		11.8	64.6		6.1	58.9	
Actuated g/C Ratio	0.16	0.16		0.06	0.06		0.10	0.56		0.05	0.51	
Clearance Time (s)	4.9	4.9		4.0	4.0		4.0	5.7		4.0	5.7	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	285	260		107	107		181	1984		94	1778	
v/s Ratio Prot	c0.12	0.02		c0.01	0.00		c0.07	0.42		0.04	c0.44	
v/s Ratio Perm												
v/c Ratio	0.77	0.10		0.12	0.06		0.70	0.74		0.68	0.85	
Uniform Delay, d1	46.1	41.0		51.0	50.8		49.8	18.9		53.4	24.1	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	11.8	0.2		0.5	0.2		11.0	1.5		18.4	4.1	
Delay (s)	57.9	41.2		51.5	51.0		60.8	20.4		71.8	28.3	
Level of Service	E	D		D	D		E	C		E	C	
Approach Delay (s)		52.7			51.3			23.6			30.0	
Approach LOS		D			D			C			C	

Intersection Summary			
HCM 2000 Control Delay	29.3	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.76		
Actuated Cycle Length (s)	114.8	Sum of lost time (s)	18.6
Intersection Capacity Utilization	78.2%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			

Exist + Proj PM
20: Twin Oaks Valley Rd/Twin Oaks Valley Rd #1 & San Marcos Blvd

Sierra Project
03/17/2017

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↱	↲	↰	↱	↲	↰	↱	↲	↰	↱	↲
Traffic Volume (vph)	376	637	202	390	417	110	378	1015	259	141	940	243
Future Volume (vph)	376	637	202	390	417	110	378	1015	259	141	940	243
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.2	5.3	5.3	4.2	5.0		4.2	5.3	4.2	5.0	5.3	
Lane Util. Factor	0.97	0.95	1.00	0.97	0.95		0.97	0.95	1.00	0.97	0.95	
Frpb, ped/bikes	1.00	1.00	0.97	1.00	1.00		1.00	1.00	0.98	1.00	1.00	
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00	1.00	1.00	
Frt	1.00	1.00	0.85	1.00	0.97		1.00	1.00	0.85	1.00	0.97	
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)	3433	3539	1536	3433	3413		3433	3539	1559	3433	3419	
Flt Permitted	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00	0.95	1.00	
Satd. Flow (perm)	3433	3539	1536	3433	3413		3433	3539	1559	3433	3419	
Peak-hour factor, PHF	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Adj. Flow (vph)	404	685	217	419	448	118	406	1091	278	152	1011	261
RTOR Reduction (vph)	0	0	141	0	19	0	0	0	0	0	18	0
Lane Group Flow (vph)	404	685	76	419	547	0	406	1091	278	152	1254	0
Confl. Peds. (#/hr)			9			2			4			1
Confl. Bikes (#/hr)			6			7			6			4
Turn Type	Prot	NA	Perm	Prot	NA		Prot	NA	pm+ov	Prot	NA	
Protected Phases	7	4		3	8		5	2	3	1	6	
Permitted Phases			4						2			
Actuated Green, G (s)	17.8	27.7	27.7	15.8	26.0		15.8	53.3	69.1	8.0	46.3	
Effective Green, g (s)	17.8	27.7	27.7	15.8	26.0		15.8	53.3	69.1	8.0	46.3	
Actuated g/C Ratio	0.14	0.22	0.22	0.13	0.21		0.13	0.43	0.55	0.06	0.37	
Clearance Time (s)	4.2	5.3	5.3	4.2	5.0		4.2	5.3	4.2	5.0	5.3	
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)	490	786	341	435	712		435	1513	864	220	1270	
v/s Ratio Prot	0.12	c0.19		c0.12	0.16		c0.12	0.31	0.04	0.04	c0.37	
v/s Ratio Perm			0.05						0.14			
v/c Ratio	0.82	0.87	0.22	0.96	0.77		0.93	0.72	0.32	0.69	0.99	
Uniform Delay, d1	51.9	46.7	39.6	54.1	46.5		53.9	29.5	15.0	57.1	38.9	
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	10.8	10.4	0.3	33.5	5.0		27.1	1.7	0.2	9.0	22.0	
Delay (s)	62.7	57.2	40.0	87.6	51.5		80.9	31.2	15.3	66.1	60.8	
Level of Service	E	E	D	F	D		F	C	B	E	E	
Approach Delay (s)		56.0			66.8			40.1			61.4	
Approach LOS		E			E			D			E	
Intersection Summary												
HCM 2000 Control Delay		54.2		HCM 2000 Level of Service					D			
HCM 2000 Volume to Capacity ratio		0.95										
Actuated Cycle Length (s)		124.6		Sum of lost time (s)					19.8			
Intersection Capacity Utilization		90.6%		ICU Level of Service					E			
Analysis Period (min)		15										
c Critical Lane Group												

Exist + Proj PM
21: Twin Oaks Valley Rd & SR 78 WB Ramps

Sierra Project
03/17/2017

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations				↰		↱		↱	↲		↱	↲
Traffic Volume (vph)	0	0	0	488	0	326	0	1326	544	0	1197	335
Future Volume (vph)	0	0	0	488	0	326	0	1326	544	0	1197	335
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)				4.6		4.6		5.3	4.6		5.3	5.3
Lane Util. Factor				0.97		0.88		0.91	1.00		0.91	1.00
Frpb, ped/bikes				1.00		1.00		1.00	0.95		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	0.85		1.00	0.85
Flt Protected				0.95		1.00		1.00	1.00		1.00	1.00
Satd. Flow (prot)				3433		2787		5085	1501		5085	1548
Flt Permitted				0.95		1.00		1.00	1.00		1.00	1.00
Satd. Flow (perm)				3433		2787		5085	1501		5085	1548
Peak-hour factor, PHF	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Adj. Flow (vph)	0	0	0	508	0	340	0	1381	567	0	1247	349
RTOR Reduction (vph)	0	0	0	0	0	17	0	0	0	0	0	108
Lane Group Flow (vph)	0	0	0	508	0	323	0	1381	567	0	1247	241
Confl. Peds. (#/hr)									12			
Confl. Bikes (#/hr)									4			4
Turn Type				Prot		Prot		NA	pm+ov		NA	Perm
Protected Phases				8		8		2	8		6	
Permitted Phases								2				6
Actuated Green, G (s)				27.1		27.1		83.0	110.1		83.0	83.0
Effective Green, g (s)				27.1		27.1		83.0	110.1		83.0	83.0
Actuated g/C Ratio				0.23		0.23		0.69	0.92		0.69	0.69
Clearance Time (s)				4.6		4.6		5.3	4.6		5.3	5.3
Vehicle Extension (s)				3.0		3.0		3.0	3.0		3.0	3.0
Lane Grp Cap (vph)				775		629		3517	1434		3517	1070
v/s Ratio Prot				c0.15		0.12		0.27	c0.09		0.25	
v/s Ratio Perm									0.29			0.16
v/c Ratio				0.66		0.51		0.39	0.40		0.35	0.23
Uniform Delay, d1				42.2		40.7		7.8	0.6		7.6	6.8
Progression Factor				1.00		1.00		0.61	3.64		1.00	1.00
Incremental Delay, d2				2.0		0.7		0.3	0.1		0.3	0.5
Delay (s)				44.2		41.4		5.0	2.5		7.8	7.2
Level of Service				D		D		A	A		A	A
Approach Delay (s)		0.0			43.1			4.3			7.7	
Approach LOS		A			D			A			A	
Intersection Summary												
HCM 2000 Control Delay				13.0				HCM 2000 Level of Service				B
HCM 2000 Volume to Capacity ratio				0.47								
Actuated Cycle Length (s)				120.0				Sum of lost time (s)				9.9
Intersection Capacity Utilization				52.5%				ICU Level of Service				A
Analysis Period (min)				15								
c Critical Lane Group												

Exist + Proj PM
22: Twin Oaks Valley Rd & SR 78 EB Ramps

Sierra Project
03/17/2017

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↱	↱					↰↰↰	↱	↱↱	↰↰↰	
Traffic Volume (vph)	210	32	274	0	0	0	0	1660	627	322	1363	0
Future Volume (vph)	210	32	274	0	0	0	0	1660	627	322	1363	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.6	4.6	4.6					5.3	5.3	4.2	5.3	
Lane Util. Factor	0.95	0.91	0.95					0.91	1.00	0.97	0.91	
Frpb, ped/bikes	1.00	0.99	0.99					1.00	0.99	1.00	1.00	
Flpb, ped/bikes	1.00	1.00	1.00					1.00	1.00	1.00	1.00	
Frt	1.00	0.91	0.85					1.00	0.85	1.00	1.00	
Flt Protected	0.95	0.99	1.00					1.00	1.00	0.95	1.00	
Satd. Flow (prot)	1681	1506	1482					5085	1561	3433	5085	
Flt Permitted	0.95	0.99	1.00					1.00	1.00	0.95	1.00	
Satd. Flow (perm)	1681	1506	1482					5085	1561	3433	5085	
Peak-hour factor, PHF	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Adj. Flow (vph)	219	33	285	0	0	0	0	1729	653	335	1420	0
RTOR Reduction (vph)	0	39	48	0	0	0	0	0	254	0	0	0
Lane Group Flow (vph)	186	141	123	0	0	0	0	1729	399	335	1420	0
Confl. Peds. (#/hr)			3									
Confl. Bikes (#/hr)								5				2
Turn Type	Split	NA	Perm					NA	Perm	Prot	NA	
Protected Phases	4	4						2		1	6	
Permitted Phases			4					2				
Actuated Green, G (s)	21.5	21.5	21.5					68.0	68.0	16.4	88.6	
Effective Green, g (s)	21.5	21.5	21.5					68.0	68.0	16.4	88.6	
Actuated g/C Ratio	0.18	0.18	0.18					0.57	0.57	0.14	0.74	
Clearance Time (s)	4.6	4.6	4.6					5.3	5.3	4.2	5.3	
Vehicle Extension (s)	3.0	3.0	3.0					3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	301	269	265					2881	884	469	3754	
v/s Ratio Prot	c0.11	0.09						c0.34		c0.10	0.28	
v/s Ratio Perm			0.08					0.26				
v/c Ratio	0.62	0.53	0.46					0.60	0.45	0.71	0.38	
Uniform Delay, d1	45.5	44.6	44.1					17.1	15.1	49.6	5.7	
Progression Factor	1.00	1.00	1.00					1.00	1.00	1.10	0.88	
Incremental Delay, d2	3.7	1.9	1.3					0.9	1.7	4.9	0.3	
Delay (s)	49.2	46.5	45.4					18.0	16.8	59.6	5.3	
Level of Service	D	D	D					B	B	E	A	
Approach Delay (s)		47.1			0.0			17.7			15.7	
Approach LOS		D			A			B			B	
Intersection Summary												
HCM 2000 Control Delay			20.3									
HCM 2000 Volume to Capacity ratio			0.62									
Actuated Cycle Length (s)			120.0						14.1			
Intersection Capacity Utilization			71.3%						C			
Analysis Period (min)			15									
c Critical Lane Group												

Exist + Proj PM
23: Robelini Dr & S. Santa Fe Ave

Sierra Project
03/17/2017

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↰	↱	↰	↱	↰	↱
Traffic Volume (vph)	507	251	251	441	358	577
Future Volume (vph)	507	251	251	441	358	577
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.3	4.6	4.4	5.3	4.6	4.4
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frpb, ped/bikes	1.00	0.99	1.00	1.00	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	1.00	1.00	0.85
Flt Protected	1.00	1.00	0.95	1.00	0.95	1.00
Satd. Flow (prot)	1863	1560	1770	1863	1770	1583
Flt Permitted	1.00	1.00	0.95	1.00	0.95	1.00
Satd. Flow (perm)	1863	1560	1770	1863	1770	1583
Peak-hour factor, PHF	0.96	0.96	0.96	0.96	0.96	0.92
Adj. Flow (vph)	528	261	261	459	373	627
RTOR Reduction (vph)	0	45	0	0	0	129
Lane Group Flow (vph)	528	216	261	459	373	498
Confl. Bikes (#/hr)		6				
Turn Type	NA	pm+ov	Prot	NA	Prot	pm+ov
Protected Phases	2	8	1	6	8	1
Permitted Phases		2				8
Actuated Green, G (s)	38.9	60.9	14.8	24.5	22.0	36.8
Effective Green, g (s)	38.9	60.9	14.8	24.5	22.0	36.8
Actuated g/C Ratio	0.43	0.68	0.16	0.27	0.24	0.41
Clearance Time (s)	5.3	4.6	4.4	5.3	4.6	4.4
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	805	1055	291	507	432	647
v/s Ratio Prot	c0.28	0.05	c0.15	c0.25	c0.21	0.13
v/s Ratio Perm		0.09				0.19
v/c Ratio	0.66	0.20	0.90	0.91	0.86	0.77
Uniform Delay, d1	20.2	5.5	36.9	31.6	32.6	22.9
Progression Factor	1.00	1.00	0.95	0.86	1.00	1.00
Incremental Delay, d2	1.9	0.1	3.7	2.4	16.2	5.5
Delay (s)	22.2	5.6	38.7	29.5	48.7	28.4
Level of Service	C	A	D	C	D	C
Approach Delay (s)	16.7			32.9	36.0	
Approach LOS	B			C	D	
Intersection Summary						
HCM 2000 Control Delay			29.0			
HCM 2000 Volume to Capacity ratio			0.82			
Actuated Cycle Length (s)			90.0			14.3
Intersection Capacity Utilization			72.3%			C
Analysis Period (min)			15			
c Critical Lane Group						

Exist + Proj PM

24: Sycamore Avenue/Robelini Dr & SR 78 WB Ramps

Sierra Project

03/17/2017

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations				↰	↰	↰	↰	↰			↰	↰
Traffic Volume (vph)	0	0	0	618	6	302	753	1061	0	0	539	563
Future Volume (vph)	0	0	0	618	6	302	753	1061	0	0	539	563
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)				4.6	4.6	4.6	4.2	5.0			5.0	5.0
Lane Util. Factor				0.95	0.95	0.88	0.97	0.91			0.91	1.00
Frpb, ped/bikes				1.00	1.00	0.99	1.00	1.00			1.00	0.97
Flpb, ped/bikes				1.00	1.00	1.00	1.00	1.00			1.00	1.00
Frt				1.00	1.00	0.85	1.00	1.00			1.00	0.85
Flt Protected				0.95	0.95	1.00	0.95	1.00			1.00	1.00
Satd. Flow (prot)				1681	1687	2750	3433	5085			5085	1540
Flt Permitted				0.95	0.95	1.00	0.95	1.00			1.00	1.00
Satd. Flow (perm)				1681	1687	2750	3433	5085			5085	1540
Peak-hour factor, PHF	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98
Adj. Flow (vph)	0	0	0	631	6	308	768	1083	0	0	550	574
RTOR Reduction (vph)	0	0	0	0	0	172	0	0	0	0	0	308
Lane Group Flow (vph)	0	0	0	315	322	136	768	1083	0	0	550	266
Confl. Peds. (#/hr)						1						9
Confl. Bikes (#/hr)									1			
Turn Type				Split	NA	Perm	Prot	NA			NA	Perm
Protected Phases				8	8		5	2			6	
Permitted Phases						8						6
Actuated Green, G (s)				25.4	25.4	25.4	29.3	75.0			41.5	41.5
Effective Green, g (s)				25.4	25.4	25.4	29.3	75.0			41.5	41.5
Actuated g/C Ratio				0.23	0.23	0.23	0.27	0.68			0.38	0.38
Clearance Time (s)				4.6	4.6	4.6	4.2	5.0			5.0	5.0
Vehicle Extension (s)				3.0	3.0	3.0	3.0	3.0			3.0	3.0
Lane Grp Cap (vph)				388	389	635	914	3467			1918	581
v/s Ratio Prot				0.19	c0.19		c0.22	0.21			0.11	
v/s Ratio Perm						0.05						c0.17
v/c Ratio				0.81	0.83	0.21	0.84	0.31			0.29	0.46
Uniform Delay, d1				40.0	40.2	34.2	38.1	7.1			23.9	25.8
Progression Factor				1.00	1.00	1.00	1.55	0.68			1.00	1.00
Incremental Delay, d2				12.2	13.5	0.2	6.1	0.2			0.4	2.6
Delay (s)				52.2	53.7	34.4	65.0	5.0			24.3	28.4
Level of Service				D	D	C	E	A			C	C
Approach Delay (s)		0.0			46.9			29.9			26.4	
Approach LOS		A			D			C			C	
Intersection Summary												
HCM 2000 Control Delay			33.0	HCM 2000 Level of Service					C			
HCM 2000 Volume to Capacity ratio			0.67									
Actuated Cycle Length (s)			110.0	Sum of lost time (s)				13.8				
Intersection Capacity Utilization			86.1%	ICU Level of Service					E			
Analysis Period (min)			15									
c Critical Lane Group												

Exist + Proj PM

25: Sycamore Avenue & SR 78 EB Ramps

Sierra Project

03/17/2017

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↰	↰					↰	↰	↰	↰	↰
Traffic Volume (vph)	522	3	407	0	0	0	0	1342	548	148	986	0
Future Volume (vph)	522	3	407	0	0	0	0	1342	548	148	986	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.6	4.6	4.6					5.0	5.0	4.2	5.0	
Lane Util. Factor	0.95	0.91	0.95					0.91	1.00	0.97	0.91	
Frpb, ped/bikes	1.00	1.00	1.00					1.00	0.98	1.00	1.00	
Flpb, ped/bikes	1.00	1.00	1.00					1.00	1.00	1.00	1.00	
Frt	1.00	0.95	0.85					1.00	0.85	1.00	1.00	
Flt Protected	0.95	0.97	1.00					1.00	1.00	0.95	1.00	
Satd. Flow (prot)	1681	1554	1504					5085	1557	3433	5085	
Flt Permitted	0.95	0.97	1.00					1.00	1.00	0.95	1.00	
Satd. Flow (perm)	1681	1554	1504					5085	1557	3433	5085	
Peak-hour factor, PHF	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Adj. Flow (vph)	538	3	420	0	0	0	0	1384	565	153	1016	0
RTOR Reduction (vph)	0	20	83	0	0	0	0	0	175	0	0	0
Lane Group Flow (vph)	334	305	219	0	0	0	0	1384	390	153	1016	0
Confl. Peds. (#/hr)									2			7
Confl. Bikes (#/hr)									3			2
Turn Type				Split	NA	Perm		NA	Perm	Prot	NA	
Protected Phases				4	4			2		1	6	
Permitted Phases						4						
Actuated Green, G (s)	28.9	28.9	28.9					57.6	57.6	9.7	71.5	
Effective Green, g (s)	28.9	28.9	28.9					57.6	57.6	9.7	71.5	
Actuated g/C Ratio	0.26	0.26	0.26					0.52	0.52	0.09	0.65	
Clearance Time (s)	4.6	4.6	4.6					5.0	5.0	4.2	5.0	
Vehicle Extension (s)	3.0	3.0	3.0					3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	441	408	395					2662	815	302	3305	
v/s Ratio Prot	c0.20	0.20						c0.27		c0.04	0.20	
v/s Ratio Perm			0.15						0.25			
v/c Ratio	0.76	0.75	0.55					0.52	0.48	0.51	0.31	
Uniform Delay, d1	37.3	37.2	35.0					17.1	16.7	47.9	8.4	
Progression Factor	1.00	1.00	1.00					1.00	1.00	1.56	2.06	
Incremental Delay, d2	7.3	7.3	1.7					0.7	2.0	1.3	0.2	
Delay (s)	44.6	44.5	36.7					17.9	18.7	75.7	17.5	
Level of Service	D	D	D					B	B	E	B	
Approach Delay (s)		42.1			0.0			18.1			25.2	
Approach LOS		D			A			B			C	
Intersection Summary												
HCM 2000 Control Delay			25.8	HCM 2000 Level of Service					C			
HCM 2000 Volume to Capacity ratio			0.59									
Actuated Cycle Length (s)			110.0	Sum of lost time (s)				13.8				
Intersection Capacity Utilization			86.1%	ICU Level of Service					E			
Analysis Period (min)			15									
c Critical Lane Group												

Exist + Proj PM
26: S. Santa Fe Ave & Buena Creek Rd

Sierra Project
03/17/2017

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations	↰	↱	↰	↱	↰	↱
Traffic Volume (vph)	663	421	467	209	123	225
Future Volume (vph)	663	421	467	209	123	225
Ideal Flow (vphpl)	1520	1900	1900	1520	1520	1520
Total Lost time (s)	4.4	5.3	5.3	5.3	4.0	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	
Frpb, ped/bikes	1.00	1.00	1.00	0.93	0.97	
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	
Frt	1.00	1.00	1.00	0.85	0.91	
Flt Protected	0.95	1.00	1.00	1.00	0.98	
Satd. Flow (prot)	1416	1863	1863	1184	1295	
Flt Permitted	0.95	1.00	1.00	1.00	0.98	
Satd. Flow (perm)	1416	1863	1863	1184	1295	
Peak-hour factor, PHF	0.96	0.96	0.96	0.96	0.96	0.96
Adj. Flow (vph)	691	439	486	218	128	234
RTOR Reduction (vph)	0	0	0	68	0	0
Lane Group Flow (vph)	691	439	486	150	362	0
Confl. Peds. (#/hr)				19	12	
Confl. Bikes (#/hr)				4		
Turn Type	Prot	NA	NA	Perm	Prot	
Protected Phases	5	2	6		4	
Permitted Phases				6		
Actuated Green, G (s)	29.2	38.9	24.5	24.5	22.6	
Effective Green, g (s)	29.2	38.9	24.5	24.5	22.6	
Actuated g/C Ratio	0.32	0.43	0.27	0.27	0.25	
Clearance Time (s)	4.4	5.3	5.3	5.3	4.0	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	459	805	507	322	325	
v/s Ratio Prot	c0.49	0.24	c0.26		c0.28	
v/s Ratio Perm				0.13		
v/c Ratio	1.51	0.55	0.96	0.46	1.11	
Uniform Delay, d1	30.4	19.0	32.3	27.3	33.7	
Progression Factor	1.21	0.81	1.00	1.00	1.00	
Incremental Delay, d2	235.4	0.5	29.4	1.1	84.2	
Delay (s)	272.0	15.8	61.6	28.3	117.9	
Level of Service	F	B	E	C	F	
Approach Delay (s)		172.5	51.3		117.9	
Approach LOS		F	D		F	
Intersection Summary						
HCM 2000 Control Delay			124.6		HCM 2000 Level of Service	F
HCM 2000 Volume to Capacity ratio			1.22			
Actuated Cycle Length (s)			90.0		Sum of lost time (s)	14.3
Intersection Capacity Utilization			108.5%		ICU Level of Service	G
Analysis Period (min)			15			
c Critical Lane Group						

Exist + Proj PM
27: Buena Creek Rd & Monte Vista Rd

Sierra Project
03/17/2017

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↰	↰		↰	↰
Sign Control		Stop	Stop		Stop	
Traffic Volume (vph)	205	492	226	410	363	93
Future Volume (vph)	205	492	226	410	363	93
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	223	535	246	446	395	101
Direction, Lane #	EB 1	WB 1	SB 1			
Volume Total (vph)	758	692	496			
Volume Left (vph)	223	0	395			
Volume Right (vph)	0	446	101			
Hadj (s)	0.09	-0.35	0.07			
Departure Headway (s)	7.0	6.6	7.1			
Degree Utilization, x	1.48	1.27	0.97			
Capacity (veh/h)	515	555	507			
Control Delay (s)	247.3	155.9	59.7			
Approach Delay (s)	247.3	155.9	59.7			
Approach LOS	F	F	F			
Intersection Summary						
Delay			167.0			
Level of Service			F			
Intersection Capacity Utilization			110.1%		ICU Level of Service	H
Analysis Period (min)			15			

Exist + Proj PM
28: San Marcos Blvd & Knoll Rd/SR 76 WB Ramps

Sierra Project
03/17/2017

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰		↱	↰	↱		↰	↱	↱		↱	↱
Traffic Volume (vph)	136	0	309	889	332	34	350	1056	117	0	917	112
Future Volume (vph)	136	0	309	889	332	34	350	1056	117	0	917	112
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.6		5.2	5.6	5.6		5.2	6.3	6.3		6.3	6.3
Lane Util. Factor	1.00	0.88	0.97	0.95	0.95		0.97	0.95	1.00		0.91	1.00
Frpb, ped/bikes	1.00		1.00	1.00	1.00		1.00	1.00	0.98		1.00	0.97
Flpb, ped/bikes	1.00		1.00	1.00	1.00		1.00	1.00	1.00		1.00	1.00
Frt	1.00	0.85	1.00	0.99			1.00	1.00	0.85		1.00	0.85
Flt Protected	0.95		1.00	0.95	1.00		0.95	1.00	1.00		1.00	1.00
Satd. Flow (prot)	1770		2787	3433	3490		3433	3539	1550		5085	1539
Flt Permitted	0.95		1.00	0.95	1.00		0.95	1.00	1.00		1.00	1.00
Satd. Flow (perm)	1770		2787	3433	3490		3433	3539	1550		5085	1539
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
Adj. Flow (vph)	143	0	325	936	349	36	368	1112	123	0	965	118
RTOR Reduction (vph)	0	0	60	0	7	0	0	0	54	0	0	74
Lane Group Flow (vph)	143	0	265	936	378	0	368	1112	69	0	965	44
Confl. Peds. (#/hr)												12
Confl. Bikes (#/hr)												1
Turn Type	Prot		pm+ov	Prot	NA		Prot	NA	Perm		NA	Perm
Protected Phases	7		5	3	8		5	2			6	
Permitted Phases			7					2				6
Actuated Green, G (s)	13.9		31.1	41.1	21.6		17.2	67.0	67.0		44.6	44.6
Effective Green, g (s)	13.9		31.1	41.1	21.6		17.2	67.0	67.0		44.6	44.6
Actuated g/C Ratio	0.12		0.26	0.34	0.18		0.14	0.56	0.56		0.37	0.37
Clearance Time (s)	5.6		5.2	5.6	5.6		5.2	6.3	6.3		6.3	6.3
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)	205		722	1175	628		492	1975	865		1889	571
v/s Ratio Prot	0.08		0.05	c0.27	0.11		c0.11	c0.31			0.19	
v/s Ratio Perm			0.04					0.04			0.03	
v/c Ratio	0.70		0.37	0.80	0.60		0.75	0.56	0.08		0.51	0.08
Uniform Delay, d1	51.0		36.4	35.7	45.2		49.3	17.1	12.2		29.2	24.4
Progression Factor	1.00		1.00	1.00	1.00		1.00	1.00	1.00		1.00	1.00
Incremental Delay, d2	9.9		0.3	3.8	1.6		6.1	1.2	0.2		1.0	0.3
Delay (s)	60.9		36.7	39.5	46.9		55.5	18.2	12.4		30.2	24.6
Level of Service	E		D	D	D		E	B	B		C	C
Approach Delay (s)		44.1			41.7			26.3			29.6	
Approach LOS		D			D			C			C	
Intersection Summary												
HCM 2000 Control Delay			33.5		HCM 2000 Level of Service				C			
HCM 2000 Volume to Capacity ratio			0.74									
Actuated Cycle Length (s)			120.0		Sum of lost time (s)				22.7			
Intersection Capacity Utilization			73.8%		ICU Level of Service				D			
Analysis Period (min)			15									
c Critical Lane Group												

Exist + Proj PM
29: San Marcos Blvd & SR 78 EB Ramps

Sierra Project
03/17/2017

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰		↱					↱	↱	↱	↱	↱
Traffic Volume (vph)	267	0	78	0	0	0	0	1303	1083	131	1901	0
Future Volume (vph)	267	0	78	0	0	0	0	1303	1083	131	1901	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.6		5.6					6.3	6.3	5.2	6.3	
Lane Util. Factor	0.97		1.00					0.91	0.88	0.97	0.91	
Frpb, ped/bikes	1.00		1.00					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)	3433		1583					5085	2721	3433	5085	
Flt Permitted	0.95		1.00					1.00	1.00	0.95	1.00	
Satd. Flow (perm)	3433		1583					5085	2721	3433	5085	
Peak-hour factor, PHF	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Adj. Flow (vph)	278	0	81	0	0	0	0	1357	1128	136	1980	0
RTOR Reduction (vph)	0	0	68	0	0	0	0	0	0	0	0	0
Lane Group Flow (vph)	278	0	13	0	0	0	0	1357	1128	136	1980	0
Confl. Peds. (#/hr)									1			22
Confl. Bikes (#/hr)									5			4
Turn Type	Prot		Perm					NA	Perm	Prot	NA	
Protected Phases	4							2		1	6	
Permitted Phases			4					2				
Actuated Green, G (s)	14.4		14.4					78.4	78.4	10.1	93.7	
Effective Green, g (s)	14.4		14.4					78.4	78.4	10.1	93.7	
Actuated g/C Ratio	0.12		0.12					0.65	0.65	0.08	0.78	
Clearance Time (s)	5.6		5.6					6.3	6.3	5.2	6.3	
Vehicle Extension (s)	3.0		3.0					3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	411		189					3322	1777	288	3970	
v/s Ratio Prot	c0.08							0.27		0.04	c0.39	
v/s Ratio Perm			0.01						c0.41			
v/c Ratio	0.68		0.07					0.41	0.63	0.47	0.50	
Uniform Delay, d1	50.6		46.9					9.8	12.3	52.4	4.7	
Progression Factor	1.00		1.00					1.00	1.00	1.00	1.00	
Incremental Delay, d2	4.4		0.2					0.4	1.7	1.2	0.5	
Delay (s)	54.9		47.0					10.2	14.1	53.6	5.2	
Level of Service	D		D					B	B	D	A	
Approach Delay (s)		53.2			0.0			12.0			8.3	
Approach LOS		D			A			B			A	
Intersection Summary												
HCM 2000 Control Delay			13.4					HCM 2000 Level of Service			B	
HCM 2000 Volume to Capacity ratio			0.64									
Actuated Cycle Length (s)			120.0					Sum of lost time (s)			17.1	
Intersection Capacity Utilization			62.2%					ICU Level of Service			B	
Analysis Period (min)			15									
c Critical Lane Group												

Exist + Proj PM
30: San Marcos Blvd & E. Mission Road

Sierra Project
03/17/2017

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↱	↱	↰	↱	↱	↰	↱	↱	↰	↱	↱
Traffic Volume (vph)	95	794	60	327	632	95	47	244	556	38	176	39
Future Volume (vph)	95	794	60	327	632	95	47	244	556	38	176	39
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	5.3	5.3	4.0	5.3	5.3	4.0	5.3	5.3	4.0	5.3	
Lane Util. Factor	1.00	0.95	1.00	0.97	0.95	1.00	1.00	0.95	1.00	1.00	0.95	
Frpb, ped/bikes	1.00	1.00	0.98	1.00	1.00	0.97	1.00	1.00	1.00	1.00	1.00	
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.97	
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)	1770	3539	1558	3433	3539	1542	1770	3539	1583	1770	3434	
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	
Satd. Flow (perm)	1770	3539	1558	3433	3539	1542	1770	3539	1583	1770	3434	
Peak-hour factor, PHF	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91
Adj. Flow (vph)	104	873	66	359	695	104	52	268	611	42	193	43
RTOR Reduction (vph)	0	0	45	0	0	64	0	0	220	0	18	0
Lane Group Flow (vph)	104	873	21	359	695	40	52	268	391	42	218	0
Confl. Peds. (#/hr)			3			10						1
Turn Type	Prot	NA	Perm	Prot	NA	Perm	Prot	NA	Prot	Prot	NA	
Protected Phases	7	4		3	8		5	2	2	1	6	
Permitted Phases			4			8						
Actuated Green, G (s)	8.7	31.3	31.3	14.8	37.4	37.4	6.2	29.3	29.3	2.7	25.8	
Effective Green, g (s)	8.7	31.3	31.3	14.8	37.4	37.4	6.2	29.3	29.3	2.7	25.8	
Actuated g/C Ratio	0.09	0.32	0.32	0.15	0.39	0.39	0.06	0.30	0.30	0.03	0.27	
Clearance Time (s)	4.0	5.3	5.3	4.0	5.3	5.3	4.0	5.3	5.3	4.0	5.3	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	159	1145	504	525	1368	596	113	1072	479	49	916	
v/s Ratio Prot	0.06	c0.25		c0.10	0.20		0.03	0.08	c0.25	c0.02	0.06	
v/s Ratio Perm			0.01			0.03						
v/c Ratio	0.65	0.76	0.04	0.68	0.51	0.07	0.46	0.25	0.82	0.86	0.24	
Uniform Delay, d1	42.5	29.4	22.4	38.7	22.6	18.7	43.6	25.4	31.2	46.8	27.8	
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	9.3	3.1	0.0	3.7	0.3	0.0	3.0	0.1	10.3	76.5	0.1	
Delay (s)	51.8	32.4	22.5	42.4	22.9	18.7	46.6	25.5	41.5	123.3	27.9	
Level of Service	D	C	C	D	C	B	D	C	D	F	C	
Approach Delay (s)		33.7			28.6			37.2			42.3	
Approach LOS		C			C			D			D	

Intersection Summary

HCM 2000 Control Delay	33.6	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.77		
Actuated Cycle Length (s)	96.7	Sum of lost time (s)	18.6
Intersection Capacity Utilization	71.9%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

Exist + Proj PM
31: North Centre City Pkwy & Mesa Rock Rd

Sierra Project
03/17/2017

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations	↰	↱	↰	↱	↱	↱
Traffic Volume (veh/h)	2	47	62	289	172	1
Future Volume (Veh/h)	2	47	62	289	172	1
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	2	52	69	321	191	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	650	192	192			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	650	192	192			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	100	94	95			
cM capacity (veh/h)	412	850	1381			
Direction, Lane #	EB 1	NB 1	NB 2	SB 1		
Volume Total	54	69	321	192		
Volume Left	2	69	0	0		
Volume Right	52	0	0	1		
cSH	818	1381	1700	1700		
Volume to Capacity	0.07	0.05	0.19	0.11		
Queue Length 95th (ft)	5	4	0	0		
Control Delay (s)	9.7	7.7	0.0	0.0		
Lane LOS	A	A				
Approach Delay (s)	9.7	1.4		0.0		
Approach LOS	A					

Intersection Summary

Average Delay	1.7		
Intersection Capacity Utilization	25.9%	ICU Level of Service	A
Analysis Period (min)	15		

Exist + Proj PM
32: North Centre City Pkwy & Country Club Ln

Sierra Project
03/17/2017

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↩	↗	↘	↩	↗	↘	↩	↗	↘	↩	↗	↘
Traffic Volume (vph)	137	328	93	114	228	79	108	393	126	101	275	58
Future Volume (vph)	137	328	93	114	228	79	108	393	126	101	275	58
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1770	3539	1583	1770	3539	1583	1770	3539	1583	1770	3539	1583
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	1770	3539	1583	1770	3539	1583	1770	3539	1583	1770	3539	1583
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)	144	345	98	120	240	83	114	414	133	106	289	61
RTOR Reduction (vph)	0	0	77	0	0	66	0	0	101	0	0	47
Lane Group Flow (vph)	144	345	21	120	240	17	114	414	32	106	289	14
Turn Type	Prot	NA	Perm	Prot	NA	Perm	Prot	NA	Perm	Prot	NA	Perm
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases			4			8			2			6
Actuated Green, G (s)	8.1	12.5	12.5	7.6	12.0	12.0	7.5	14.3	14.3	7.2	14.0	14.0
Effective Green, g (s)	8.1	12.5	12.5	7.6	12.0	12.0	7.5	14.3	14.3	7.2	14.0	14.0
Actuated g/C Ratio	0.14	0.21	0.21	0.13	0.20	0.20	0.13	0.24	0.24	0.12	0.23	0.23
Clearance Time (s)	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	240	742	332	225	712	318	222	849	379	213	831	371
v/s Ratio Prot	c0.08	c0.10		0.07	0.07		c0.06	c0.12		0.06	0.08	
v/s Ratio Perm			0.01			0.01			0.02			0.01
v/c Ratio	0.60	0.46	0.06	0.53	0.34	0.05	0.51	0.49	0.08	0.50	0.35	0.04
Uniform Delay, d1	24.2	20.6	18.9	24.3	20.4	19.2	24.3	19.5	17.6	24.5	19.0	17.6
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	4.0	0.5	0.1	2.4	0.3	0.1	2.0	0.4	0.1	1.8	0.3	0.0
Delay (s)	28.2	21.1	18.9	26.8	20.7	19.3	26.3	19.9	17.7	26.3	19.2	17.6
Level of Service	C	C	B	C	C	B	C	B	B	C	B	B
Approach Delay (s)		22.5			22.1			20.6			20.7	
Approach LOS		C			C			C			C	

Intersection Summary

HCM 2000 Control Delay	21.4	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.52		
Actuated Cycle Length (s)	59.6	Sum of lost time (s)	18.0
Intersection Capacity Utilization	46.8%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

Exist + Proj PM
33: Twin Oaks Valley Rd & Discovery St/Barham Dr

Sierra Project
03/17/2017

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↩	↗	↘	↩	↗	↘	↩	↗	↘	↩	↗	↘
Traffic Volume (vph)	486	295	11	263	234	296	10	1395	289	440	632	352
Future Volume (vph)	486	295	11	263	234	296	10	1395	289	440	632	352
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	5.3	4.0	5.0	5.3	4.0	5.0	6.0		5.0	6.0	4.0
Lane Util. Factor	0.97	0.91	1.00	1.00	1.00	1.00	1.00	0.91		0.97	0.91	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.97		1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	3433	5085	1583	1770	1863	1583	1770	4954		3433	5085	1583
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00
Satd. Flow (perm)	3433	5085	1583	1770	1863	1583	1770	4954		3433	5085	1583
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)	528	321	12	286	254	322	11	1516	314	478	687	383
RTOR Reduction (vph)	0	0	0	0	0	0	0	20	0	0	0	0
Lane Group Flow (vph)	528	321	12	286	254	322	11	1810	0	478	687	383
Turn Type	Prot	NA	Free	Prot	NA	Free	Prot	NA		Prot	NA	Free
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases			Free			Free						Free
Actuated Green, G (s)	26.3	21.3	146.7	24.8	19.8	146.7	1.5	58.2		21.1	77.8	146.7
Effective Green, g (s)	26.3	21.3	146.7	24.8	19.8	146.7	1.5	58.2		21.1	77.8	146.7
Actuated g/C Ratio	0.18	0.15	1.00	0.17	0.13	1.00	0.01	0.40		0.14	0.53	1.00
Clearance Time (s)	5.0	5.3		5.0	5.3		5.0	6.0		5.0	6.0	
Vehicle Extension (s)	2.0	4.5		2.0	4.5		2.0	3.0		2.0	4.0	
Lane Grp Cap (vph)	615	738	1583	299	251	1583	18	1965		493	2696	1583
v/s Ratio Prot	0.15	0.06		c0.16	c0.14		0.01	c0.37		c0.14	0.14	
v/s Ratio Perm			0.01			0.20						c0.24
v/c Ratio	0.86	0.43	0.01	0.96	1.01	0.20	0.61	0.92		0.97	0.25	0.24
Uniform Delay, d1	58.4	57.2	0.0	60.4	63.4	0.0	72.3	42.1		62.5	18.7	0.0
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	11.0	0.7	0.0	39.8	59.9	0.3	36.2	8.6		32.2	0.2	0.4
Delay (s)	69.4	57.9	0.0	100.2	123.3	0.3	108.5	50.7		94.7	18.9	0.4
Level of Service	E	E	A	F	F	A	F	D		F	B	A
Approach Delay (s)		64.2			69.7			51.0			37.7	
Approach LOS		E			E			D			D	

Intersection Summary

HCM 2000 Control Delay	52.4	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.94		
Actuated Cycle Length (s)	146.7	Sum of lost time (s)	21.3
Intersection Capacity Utilization	89.9%	ICU Level of Service	E
Analysis Period (min)	15		

c Critical Lane Group

APPENDIX F

PEAK HOUR ANALYSIS WORKSHEETS – EXISTING + PROJECT + SCENARIO A CUMULATIVE PROJECTS

HCM Signalized Intersection Capacity Analysis
1: Champagne Boulevard & Gopher Canyon Road

Exist + Proj + Sce A Cumul AM
03/17/2017

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations	↰	↱	↰	↱	↰	↱
Traffic Volume (vph)	150	185	318	111	285	480
Future Volume (vph)	150	185	318	111	285	480
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5	4.5	4.5	4.5	4.5	4.5
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frpb, ped/bikes	1.00	1.00	1.00	1.00	0.99	0.99
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	0.85	1.00	1.00	0.92	0.92
Flt Protected	0.95	1.00	0.95	1.00	1.00	1.00
Satd. Flow (prot)	1770	1583	1770	1863	1691	1691
Flt Permitted	0.95	1.00	0.95	1.00	1.00	1.00
Satd. Flow (perm)	1770	1583	1770	1863	1691	1691
Peak-hour factor, PHF	0.91	0.91	0.91	0.91	0.91	0.91
Adj. Flow (vph)	165	203	349	122	313	527
RTOR Reduction (vph)	0	175	0	0	52	0
Lane Group Flow (vph)	165	28	349	122	788	0
Confl. Bikes (#/hr)						2
Turn Type	Prot	Perm	Prot	NA	NA	
Protected Phases	4		5	2	6	
Permitted Phases		4				
Actuated Green, G (s)	14.7	14.7	24.5	83.5	54.5	
Effective Green, g (s)	14.7	14.7	24.5	83.5	54.5	
Actuated g/C Ratio	0.14	0.14	0.23	0.78	0.51	
Clearance Time (s)	4.5	4.5	4.5	4.5	4.5	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	242	217	404	1451	859	
v/s Ratio Prot	c0.09		c0.20	0.07	c0.47	
v/s Ratio Perm		0.02				
v/c Ratio	0.68	0.13	0.86	0.08	0.92	
Uniform Delay, d1	44.0	40.6	39.7	2.8	24.3	
Progression Factor	1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	7.7	0.3	17.1	0.0	14.3	
Delay (s)	51.7	40.9	56.9	2.8	38.6	
Level of Service	D	D	E	A	D	
Approach Delay (s)	45.7			42.9	38.6	
Approach LOS	D			D	D	

Intersection Summary

HCM 2000 Control Delay	41.4	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.87		
Actuated Cycle Length (s)	107.2	Sum of lost time (s)	13.5
Intersection Capacity Utilization	81.6%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis
2: Champagne Boulevard/Gopher Canyon Road & Old Castle Road

Exist + Proj + Sce A Cumul AM
03/17/2017

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations	↰	↱	↰	↱	↰	↱
Traffic Volume (vph)	171	280	149	104	190	280
Future Volume (vph)	171	280	149	104	190	280
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5	4.5	4.5		4.5	4.5
Lane Util. Factor	1.00	1.00	1.00		1.00	1.00
Frpb, ped/bikes	1.00	1.00	0.99		1.00	1.00
Flpb, ped/bikes	1.00	1.00	1.00		1.00	1.00
Frt	1.00	0.85	0.94		1.00	1.00
Flt Protected	0.95	1.00	1.00		0.95	1.00
Satd. Flow (prot)	1770	1583	1744		1770	1863
Flt Permitted	0.95	1.00	1.00		0.95	1.00
Satd. Flow (perm)	1770	1583	1744		1770	1863
Peak-hour factor, PHF	0.87	0.87	0.87	0.87	0.87	0.87
Adj. Flow (vph)	197	322	171	120	218	322
RTOR Reduction (vph)	0	247	28	0	0	0
Lane Group Flow (vph)	197	75	263	0	218	322
Confl. Bikes (#/hr)				1		
Turn Type	Prot	Perm	NA		Prot	NA
Protected Phases	8		2		1	6
Permitted Phases		8				
Actuated Green, G (s)	12.1	12.1	14.1		12.5	31.1
Effective Green, g (s)	12.1	12.1	14.1		12.5	31.1
Actuated g/C Ratio	0.23	0.23	0.27		0.24	0.60
Clearance Time (s)	4.5	4.5	4.5		4.5	4.5
Vehicle Extension (s)	3.0	3.0	3.0		3.0	3.0
Lane Grp Cap (vph)	410	366	471		423	1109
v/s Ratio Prot	c0.11		c0.15		c0.12	0.17
v/s Ratio Perm		0.05				
v/c Ratio	0.48	0.20	0.56		0.52	0.29
Uniform Delay, d1	17.3	16.2	16.4		17.2	5.2
Progression Factor	1.00	1.00	1.00		1.00	1.00
Incremental Delay, d2	0.9	0.3	1.4		1.1	0.1
Delay (s)	18.2	16.4	17.8		18.3	5.3
Level of Service	B	B	B		B	A
Approach Delay (s)	17.1		17.8			10.5
Approach LOS	B		B			B

Intersection Summary

HCM 2000 Control Delay	14.6	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.52		
Actuated Cycle Length (s)	52.2	Sum of lost time (s)	13.5
Intersection Capacity Utilization	45.4%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

HCM Unsignalized Intersection Capacity Analysis 3: Champagne Boulevard & Lawrence Welk Dr

Exist + Proj + Sce A Cumul AM
03/17/2017

																	
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR					
Lane Configurations																	
Traffic Volume (veh/h)	5	0	18	20	0	30	23	173	70	60	330	5					
Future Volume (Veh/h)	5	0	18	20	0	30	23	173	70	60	330	5					
Sign Control		Stop				Free				Free							
Grade		0%				0%				0%							
Peak Hour Factor	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84					
Hourly flow rate (vph)	6	0	21	24	0	36	27	206	83	71	393	6					
Pedestrians		1				2				1							
Lane Width (ft)		12.0				12.0				12.0							
Walking Speed (ft/s)		4.0				4.0				4.0							
Percent Blockage		0				0				0							
Right turn flare (veh)							7										
Median type									None		None						
Median storage (veh)																	
Upstream signal (ft)		874															
pX, platoon unblocked																	
vC, conflicting volume	800	884	397	818	804	209	400				291						
vC1, stage 1 conf vol																	
vC2, stage 2 conf vol																	
vCu, unblocked vol	800	884	397	818	804	209	400				291						
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	97	91	100	96	98				94						
cM capacity (veh/h)	272	261	652	267	291	829	1158				1269						
Direction, Lane #	EB 1	WB 1	NB 1	NB 2	NB 3	SB 1	SB 2										
Volume Total	27	60	27	206	83	71	399										
Volume Left	6	24	27	0	0	71	0										
Volume Right	21	36	0	0	83	0	6										
cSH	497	668	1158	1700	1700	1269	1700										
Volume to Capacity	0.05	0.09	0.02	0.12	0.05	0.06	0.23										
Queue Length 95th (ft)	4	7	2	0	0	4	0										
Control Delay (s)	12.7	13.6	8.2	0.0	0.0	8.0	0.0										
Lane LOS	B	B	A			A											
Approach Delay (s)	12.7	13.6	0.7				1.2										
Approach LOS	B	B															
Intersection Summary																	
Average Delay	2.2																
Intersection Capacity Utilization	37.0%			ICU Level of Service			A										
Analysis Period (min)	15																

HCM Signalized Intersection Capacity Analysis 4: North Centre City Pkwy/Champagne Boulevard & Deer Springs Rd

Exist + Proj + Sce A Cumul AM
03/17/2017

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	146	172	78	210	381	15	96	60	60	10	190	258
Future Volume (vph)	146	172	78	210	381	15	96	60	60	10	190	258
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5	4.5		4.5	4.5			4.5			4.5	
Lane Util. Factor	1.00	0.95		1.00	0.95			1.00			1.00	
Frpb, ped/bikes	1.00	0.99		1.00	1.00			1.00			0.99	
Flpb, ped/bikes	1.00	1.00		1.00	1.00			1.00			1.00	
Frt	1.00	0.95		1.00	0.99			0.96			0.92	
Flt Protected	0.95	1.00		0.95	1.00			0.98			1.00	
Satd. Flow (prot)	1770	3344		1770	3517			1746			1706	
Flt Permitted	0.95	1.00		0.95	1.00			0.58			0.99	
Satd. Flow (perm)	1770	3344		1770	3517			1026			1695	
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)	159	187	85	228	414	16	104	65	65	11	207	280
RTOR Reduction (vph)	0	53	0	0	3	0	0	16	0	0	52	0
Lane Group Flow (vph)	159	219	0	228	427	0	0	218	0	0	446	0
Confl. Peds. (#/hr)	1											
Confl. Bikes (#/hr)	1											
Turn Type	Prot	NA		Prot	NA		Perm	NA		Perm	NA	
Protected Phases	7	4		3	8			2			6	
Permitted Phases	6											
Actuated Green, G (s)	11.2	11.8		14.1	14.7			22.9			22.9	
Effective Green, g (s)	11.2	11.8		14.1	14.7			22.9			22.9	
Actuated g/C Ratio	0.18	0.19		0.23	0.24			0.37			0.37	
Clearance Time (s)	4.5	4.5		4.5	4.5			4.5			4.5	
Vehicle Extension (s)	3.0	3.0		3.0	3.0			3.0			3.0	
Lane Grp Cap (vph)	318	633		400	829			377			623	
v/s Ratio Prot	0.09	0.07		c0.13	c0.12							
v/s Ratio Perm	c0.26											
v/c Ratio	0.50	0.35		0.57	0.52			0.58			0.72	
Uniform Delay, d1	23.0	21.9		21.4	20.7			15.8			16.9	
Progression Factor	1.00	1.00		1.00	1.00			1.00			1.00	
Incremental Delay, d2	1.2	0.3		1.9	0.5			2.2			3.9	
Delay (s)	24.3	22.2		23.3	21.2			18.0			20.8	
Level of Service	C	C		C	C			B			C	
Approach Delay (s)	23.0			21.9			18.0			20.8		
Approach LOS	C			C			B			C		
Intersection Summary												
HCM 2000 Control Delay	21.4			HCM 2000 Level of Service					C			
HCM 2000 Volume to Capacity ratio	0.64											
Actuated Cycle Length (s)	62.3			Sum of lost time (s)					13.5			
Intersection Capacity Utilization	72.7%			ICU Level of Service					C			
Analysis Period (min)	15											
c Critical Lane Group												

HCM Signalized Intersection Capacity Analysis
5: I-15 NB Ramps & Deer Springs Rd

Exist + Proj + Sce A Cumul AM
03/17/2017

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↑			↑	↱		↰	↱			
Traffic Volume (vph)	355	286	0	0	694	50	301	5	160	0	0	0
Future Volume (vph)	355	286	0	0	694	50	301	5	160	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.2	5.3			5.3	5.3			4.6	4.6		
Lane Util. Factor	1.00	1.00			1.00	1.00			1.00	1.00		
Flt	1.00	1.00			1.00	0.85			1.00	0.85		
Flt Protected	0.95	1.00			1.00	1.00			0.95	1.00		
Satd. Flow (prot)	1770	1863			1863	1583			1776	1583		
Flt Permitted	0.95	1.00			1.00	1.00			0.95	1.00		
Satd. Flow (perm)	1770	1863			1863	1583			1776	1583		
Peak-hour factor, PHF	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89
Adj. Flow (vph)	399	321	0	0	780	56	338	6	180	0	0	0
RTOR Reduction (vph)	0	0	0	0	0	30	0	0	150	0	0	0
Lane Group Flow (vph)	399	321	0	0	780	26	0	344	30	0	0	0
Turn Type	Prot	NA			NA	Perm	Split	NA	Perm			
Protected Phases	5	2			6		8	8				
Permitted Phases						6			8			
Actuated Green, G (s)	23.8	73.7			45.7	45.7		16.4	16.4			
Effective Green, g (s)	23.8	73.7			45.7	45.7		16.4	16.4			
Actuated g/C Ratio	0.24	0.74			0.46	0.46		0.16	0.16			
Clearance Time (s)	4.2	5.3			5.3	5.3		4.6	4.6			
Vehicle Extension (s)	6.0	2.0			2.0	2.0		2.0	2.0			
Lane Grp Cap (vph)	421	1373			851	723		291	259			
v/s Ratio Prot	c0.23	0.17			c0.42			c0.19				
v/s Ratio Perm						0.02			0.02			
v/c Ratio	0.95	0.23			0.92	0.04		1.18	0.11			
Uniform Delay, d1	37.5	4.2			25.4	15.0		41.8	35.6			
Progression Factor	0.96	2.59			1.00	1.00		1.00	1.00			
Incremental Delay, d2	16.3	0.1			16.2	0.1		111.5	0.1			
Delay (s)	52.3	11.0			41.6	15.1		153.3	35.7			
Level of Service	D	B			D	B		F	D			
Approach Delay (s)		33.8				39.8		112.9			0.0	
Approach LOS		C				D		F			A	
Intersection Summary												
HCM 2000 Control Delay		56.2			HCM 2000 Level of Service			E				
HCM 2000 Volume to Capacity ratio		0.98										
Actuated Cycle Length (s)		100.0			Sum of lost time (s)			14.1				
Intersection Capacity Utilization		84.9%			ICU Level of Service			E				
Analysis Period (min)		15										

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
6: Deer Springs Rd & I-15 SB Ramps

Exist + Proj + Sce A Cumul AM
03/17/2017

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↑	↱	↰	↑						↰	↱
Traffic Volume (vph)	0	631	648	320	715	0	0	0	0	30	30	891
Future Volume (vph)	0	631	648	320	715	0	0	0	0	30	30	891
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		5.3	5.3	4.2	5.3						4.6	4.6
Lane Util. Factor		1.00	1.00	1.00	1.00						1.00	0.88
Flt		1.00	0.85	1.00	1.00						1.00	0.85
Flt Protected		1.00	1.00	0.95	1.00						0.98	1.00
Satd. Flow (prot)		1863	1583	1770	1863						1817	2787
Flt Permitted		1.00	1.00	0.95	1.00						0.98	1.00
Satd. Flow (perm)		1863	1583	1770	1863						1817	2787
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	686	704	348	777	0	0	0	0	33	33	968
RTOR Reduction (vph)	0	0	336	0	0	0	0	0	0	0	0	310
Lane Group Flow (vph)	0	686	368	348	777	0	0	0	0	0	66	658
Turn Type		NA	Perm	Prot	NA					Split	NA	Perm
Protected Phases		2		1	6					4	4	
Permitted Phases			2									4
Actuated Green, G (s)		38.2	38.2	23.3	65.7						24.4	24.4
Effective Green, g (s)		38.2	38.2	23.3	65.7						24.4	24.4
Actuated g/C Ratio		0.38	0.38	0.23	0.66						0.24	0.24
Clearance Time (s)		5.3	5.3	4.2	5.3						4.6	4.6
Vehicle Extension (s)		2.0	2.0	2.0	2.0						2.0	2.0
Lane Grp Cap (vph)		711	604	412	1223						443	680
v/s Ratio Prot		c0.37		c0.20	0.42						0.04	
v/s Ratio Perm			0.23									c0.24
v/c Ratio		0.96	0.61	0.84	0.64						0.15	0.97
Uniform Delay, d1		30.2	24.9	36.6	10.1						29.7	37.4
Progression Factor		1.00	1.00	1.15	1.20						1.00	1.00
Incremental Delay, d2		26.2	4.5	3.9	0.6						0.1	26.2
Delay (s)		56.4	29.4	46.1	12.8						29.7	63.6
Level of Service		E	C	D	B						C	E
Approach Delay (s)		42.8			23.1			0.0			61.5	
Approach LOS		D			C			A			E	
Intersection Summary												
HCM 2000 Control Delay		42.0			HCM 2000 Level of Service			D				
HCM 2000 Volume to Capacity ratio		0.93										
Actuated Cycle Length (s)		100.0			Sum of lost time (s)			14.1				
Intersection Capacity Utilization		84.9%			ICU Level of Service			E				
Analysis Period (min)		15										

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
7: Deer Springs Rd & Mesa Rock Road

Exist + Proj + Sce A Cumul AM
03/17/2017

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↰	↰	↰	↰	↰	↰	↰	↰	↰	↰	↰
Traffic Volume (vph)	151	541	20	20	1143	383	20	18	20	668	44	180
Future Volume (vph)	151	541	20	20	1143	383	20	18	20	668	44	180
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5	4.5		4.5	4.5			4.5			4.5	4.5
Lane Util. Factor	1.00	0.95		1.00	0.95			1.00			1.00	1.00
Flpb, ped/bikes	1.00	1.00		1.00	0.99			1.00			1.00	1.00
Flpb, ped/bikes	1.00	1.00		1.00	1.00			1.00			1.00	1.00
Frt	1.00	0.99		1.00	0.96			0.95			1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00			0.98			0.96	1.00
Satd. Flow (prot)	1770	3517		1770	3387			1746			1779	1583
Flt Permitted	0.95	1.00		0.95	1.00			0.98			0.96	1.00
Satd. Flow (perm)	1770	3517		1770	3387			1746			1779	1583
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	168	601	22	22	1270	426	22	20	22	742	49	200
RTOR Reduction (vph)	0	2	0	0	29	0	0	20	0	0	0	91
Lane Group Flow (vph)	168	621	0	22	1667	0	0	44	0	0	791	109
Conf. Bikes (#/hr)			9			2						
Turn Type	Prot	NA		Prot	NA		Split	NA		Split	NA	Perm
Protected Phases	7	4		3	8		2	2		6	6	
Permitted Phases												6
Actuated Green, G (s)	4.3	46.4		1.5	43.6			7.7			19.2	19.2
Effective Green, g (s)	4.3	46.4		1.5	43.6			7.7			19.2	19.2
Actuated g/C Ratio	0.05	0.50		0.02	0.47			0.08			0.21	0.21
Clearance Time (s)	4.5	4.5		4.5	4.5			4.5			4.5	4.5
Vehicle Extension (s)	3.0	3.0		3.0	3.0			3.0			3.0	3.0
Lane Grp Cap (vph)	82	1758		28	1591			144			368	327
v/s Ratio Prot	c0.09	c0.18		0.01	c0.49			c0.03			c0.44	
v/s Ratio Perm												0.07
v/c Ratio	2.05	0.35		0.79	1.05			0.30			2.15	0.33
Uniform Delay, d1	44.2	14.1		45.5	24.6			40.0			36.8	31.3
Progression Factor	1.00	1.00		1.00	1.00			1.00			1.00	1.00
Incremental Delay, d2	511.5	0.1		82.7	36.2			1.2			526.2	2.7
Delay (s)	555.8	14.2		128.2	60.8			41.2			563.0	34.1
Level of Service	F	B		F	E			D			F	C
Approach Delay (s)		129.2			61.7			41.2			456.3	
Approach LOS		F			E			D			F	
Intersection Summary												
HCM 2000 Control Delay		186.0										F
HCM 2000 Volume to Capacity ratio		1.29										
Actuated Cycle Length (s)		92.8			Sum of lost time (s)			18.0				
Intersection Capacity Utilization		109.4%			ICU Level of Service			H				
Analysis Period (min)		15										
c Critical Lane Group												

HCM Unsignalized Intersection Capacity Analysis
9: Deer Springs Rd & Sarver Lane

Exist + Proj + Sce A Cumul AM
03/17/2017

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations	↰	↰	↰	↰	↰	↰
Traffic Volume (veh/h)	77	531	1210	23	101	256
Future Volume (Veh/h)	77	531	1210	23	101	256
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.96	0.96	0.96	0.96	0.96	0.96
Hourly flow rate (vph)	80	553	1260	24	105	267
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	1284				1985	1272
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1284				1985	1272
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	85				0	0
cM capacity (veh/h)	540				57	205
Direction, Lane #	EB 1	EB 2	WB 1	SB 1		
Volume Total	80	553	1284	372		
Volume Left	80	0	0	105		
Volume Right	0	0	24	267		
cSH	540	1700	1700	119		
Volume to Capacity	0.15	0.33	0.76	3.14		
Queue Length 95th (ft)	13	0	0	Err		
Control Delay (s)	12.8	0.0	0.0	Err		
Lane LOS	B			F		
Approach Delay (s)	1.6		0.0	Err		
Approach LOS				F		
Intersection Summary						
Average Delay		1625.4				
Intersection Capacity Utilization		93.1%		ICU Level of Service		F
Analysis Period (min)		15				

HCM Unsignalized Intersection Capacity Analysis
10: Deer Springs Rd & Sycamore Road

Exist + Proj + Sce A Cumul AM
03/17/2017

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations	↰	↱	↰	↱	↰	↱
Traffic Volume (veh/h)	40	20	613	190	80	1556
Future Volume (Veh/h)	40	20	613	190	80	1556
Sign Control	Stop		Free		Free	
Grade	0%		0%		0%	
Peak Hour Factor	0.89	0.89	0.89	0.89	0.89	0.89
Hourly flow rate (vph)	45	22	689	213	90	1748
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)		4				
Median type			None		None	
Median storage (veh)						
Upstream signal (ft)			680			
pX, platoon unblocked	0.83	0.83			0.83	
vC, conflicting volume	2724	796			902	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	2968	655			783	
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	94			87	
cM capacity (veh/h)	11	389			696	
Direction, Lane #	WB 1	NB 1	SB 1			
Volume Total	67	902	1838			
Volume Left	45	0	90			
Volume Right	22	213	0			
cSH	17	1700	696			
Volume to Capacity	3.97	0.53	0.13			
Queue Length 95th (ft)	Err	0	11			
Control Delay (s)	Err	0.0	0.5			
Lane LOS	F		A			
Approach Delay (s)	Err	0.0	0.5			
Approach LOS	F					
Intersection Summary						
Average Delay		239.0				
Intersection Capacity Utilization		143.5%		ICU Level of Service	H	
Analysis Period (min)		15				

HCM Unsignalized Intersection Capacity Analysis
11: Twin Oaks Valley Road & Camino Mayor

Exist + Proj + Sce A Cumul AM
03/17/2017

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations	↰	↱	↰	↱	↰	↱
Traffic Volume (veh/h)	25	5	120	14	5	120
Future Volume (Veh/h)	25	5	120	14	5	120
Sign Control	Stop		Free		Free	
Grade	0%		0%		0%	
Peak Hour Factor	0.83	0.83	0.83	0.83	0.83	0.83
Hourly flow rate (vph)	30	6	145	17	6	145
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	310	154			162	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	310	154			162	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	96	99			100	
cM capacity (veh/h)	679	892			1417	
Direction, Lane #	WB 1	NB 1	SB 1			
Volume Total	36	162	151			
Volume Left	30	0	6			
Volume Right	6	17	0			
cSH	707	1700	1417			
Volume to Capacity	0.05	0.10	0.00			
Queue Length 95th (ft)	4	0	0			
Control Delay (s)	10.4	0.0	0.3			
Lane LOS	B		A			
Approach Delay (s)	10.4	0.0	0.3			
Approach LOS	B					
Intersection Summary						
Average Delay		1.2				
Intersection Capacity Utilization		20.4%		ICU Level of Service	A	
Analysis Period (min)		15				

HCM Signalized Intersection Capacity Analysis
12: Twin Oaks Valley Rd #1/Deer Springs Rd & Twin Oaks Valley Rd
03/17/2017

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations	↰	↱	↰	↱	↰	↱
Traffic Volume (vph)	51	119	112	579	1536	47
Future Volume (vph)	51	119	112	579	1536	47
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.9	4.9	4.0	5.3	5.3	5.3
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Flt Protected	0.95	1.00	0.95	1.00	1.00	1.00
Satd. Flow (prot)	1770	1583	1770	1863	1863	1583
Flt Permitted	0.95	1.00	0.95	1.00	1.00	1.00
Satd. Flow (perm)	1770	1583	1770	1863	1863	1583
Peak-hour factor, PHF	0.91	0.91	0.91	0.91	0.91	0.91
Growth Factor (vph)	100%	100%	100%	130%	130%	100%
Adj. Flow (vph)	56	131	123	827	2194	52
RTOR Reduction (vph)	0	74	0	0	0	3
Lane Group Flow (vph)	56	57	123	827	2194	49
Turn Type	Prot	Perm	Prot	NA	NA	Perm
Protected Phases	4		5	2	6	
Permitted Phases		4				6
Actuated Green, G (s)	13.3	13.3	7.0	118.1	107.1	107.1
Effective Green, g (s)	13.3	13.3	7.0	118.1	107.1	107.1
Actuated g/C Ratio	0.09	0.09	0.05	0.83	0.76	0.76
Clearance Time (s)	4.9	4.9	4.0	5.3	5.3	5.3
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	166	148	87	1553	1409	1197
v/s Ratio Prot	0.03		c0.07	0.44	c1.18	
v/s Ratio Perm		c0.04				0.03
v/c Ratio	0.34	0.38	1.41	0.53	1.56	0.04
Uniform Delay, d1	60.0	60.3	67.3	3.5	17.2	4.3
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	1.2	1.7	240.9	0.4	254.2	0.0
Delay (s)	61.2	61.9	308.2	3.9	271.5	4.3
Level of Service	E	E	F	A	F	A
Approach Delay (s)	61.7			43.3	265.3	
Approach LOS	E			D	F	
Intersection Summary						
HCM 2000 Control Delay			191.7		HCM 2000 Level of Service	F
HCM 2000 Volume to Capacity ratio			1.43			
Actuated Cycle Length (s)			141.6		Sum of lost time (s)	14.2
Intersection Capacity Utilization			121.0%		ICU Level of Service	H
Analysis Period (min)			15			
c Critical Lane Group						

HCM Signalized Intersection Capacity Analysis
13: Twin Oaks Valley Rd #1 & Buena Creek Rd
03/17/2017

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↰	↱		↰	↱	↰	↱		↰	↱	↰
Traffic Volume (vph)	360	0	210	5	5	0	140	331	5	5	1043	562
Future Volume (vph)	360	0	210	5	5	0	140	331	5	5	1043	562
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		5.0	5.5		5.0	5.5	5.5
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	1.00
Flpb, ped/bikes	1.00	0.98		1.00	1.00		1.00	1.00		1.00	1.00	0.98
Flpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	1.00
Flt Protected		0.95	1.00		0.98		0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)		1770	1546		1817		1770	1859		1770	1863	1547
Flt Permitted		0.75	1.00		0.87		0.95	1.00		0.95	1.00	1.00
Satd. Flow (perm)		1399	1546		1629		1770	1859		1770	1863	1547
Peak-hour factor, PHF	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Adj. Flow (vph)	375	0	219	5	5	0	146	345	5	5	1086	585
RTOR Reduction (vph)	0	0	116	0	0	0	0	0	0	0	0	90
Lane Group Flow (vph)	0	375	103	0	10	0	146	350	0	5	1086	495
Confl. Peds. (#/hr)			2									1
Confl. Bikes (#/hr)												3
Turn Type		Perm	NA	Perm	Perm	NA	Prot	NA		Prot	NA	Perm
Protected Phases			4			8	5	2		1		6
Permitted Phases		4		4	8							6
Actuated Green, G (s)		25.3	25.3		25.3		7.0	52.5		1.0	46.5	46.5
Effective Green, g (s)		25.3	25.3		25.3		7.0	52.5		1.0	46.5	46.5
Actuated g/C Ratio		0.27	0.27		0.27		0.08	0.56		0.01	0.50	0.50
Clearance Time (s)		4.0	4.0		4.0		5.0	5.5		5.0	5.5	5.5
Vehicle Extension (s)		3.0	3.0		3.0		3.0	3.0		3.0	3.0	3.0
Lane Grp Cap (vph)		379	419		441		132	1046		18	928	771
v/s Ratio Prot							c0.08	0.19		0.00	c0.58	
v/s Ratio Perm		c0.27	0.07		0.01							0.32
v/c Ratio		0.99	0.25		0.02		1.11	0.33		0.28	1.17	0.64
Uniform Delay, d1		33.9	26.6		24.9		43.1	11.0		45.8	23.4	17.3
Progression Factor		1.00	1.00		1.00		1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2		42.9	0.3		0.0		109.6	0.2		8.3	88.2	1.8
Delay (s)		76.8	26.9		25.0		152.8	11.2		54.0	111.6	19.1
Level of Service		E	C		C		F	B		D	F	B
Approach Delay (s)		58.4			25.0			52.9			79.1	
Approach LOS		E			C			D			E	
Intersection Summary												
HCM 2000 Control Delay			69.8									E
HCM 2000 Volume to Capacity ratio			1.11									
Actuated Cycle Length (s)			93.3							14.5		
Intersection Capacity Utilization			101.3%							G		
Analysis Period (min)			15									
c Critical Lane Group												

HCM Signalized Intersection Capacity Analysis
14: Twin Oaks Valley Rd #1 & Cassou Rd

Exist + Proj + Sce A Cumul AM
03/17/2017

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↔			↔		↖	↗	↖	↗	↖	↗
Traffic Volume (vph)	18	10	45	202	15	39	27	412	200	72	1014	12
Future Volume (vph)	18	10	45	202	15	39	27	412	200	72	1014	12
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		5.0			5.0			5.0		5.0		5.0
Lane Util. Factor		1.00			1.00			1.00		1.00		1.00
Frpb, ped/bikes		0.99			1.00			1.00		0.98		1.00
Flpb, ped/bikes		1.00			1.00			1.00		1.00		1.00
Frt		0.92			0.98			1.00		0.85		1.00
Flt Protected		0.99			0.96			0.95		1.00		0.95
Satd. Flow (prot)		1665			1755			1770		1863		1770
Flt Permitted		0.99			0.96			0.95		1.00		0.95
Satd. Flow (perm)		1665			1755			1770		1863		1770
Peak-hour factor, PHF	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Adj. Flow (vph)	19	10	47	210	16	41	28	429	208	75	1056	12
RTOR Reduction (vph)	0	44	0	0	5	0	0	0	101	0	0	0
Lane Group Flow (vph)	0	32	0	0	262	0	28	429	107	75	1069	0
Confl. Peds. (#/hr)			6						1			
Turn Type	Split	NA		Split	NA		Prot	NA	Perm	Prot	NA	
Protected Phases	4	4		8	8		5	2		1	6	
Permitted Phases									2			
Actuated Green, G (s)		8.6			21.5		2.7	61.2	61.2	8.1	66.6	
Effective Green, g (s)		8.6			21.5		2.7	61.2	61.2	8.1	66.6	
Actuated g/C Ratio		0.07			0.18		0.02	0.51	0.51	0.07	0.56	
Clearance Time (s)		5.0			5.0		5.0	5.0	5.0	5.0	5.0	
Vehicle Extension (s)		3.0			3.0		3.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)		119			316		40	954	792	120	1036	
v/s Ratio Prot		c0.02			c0.15		0.02	0.23		c0.04	c0.57	
v/s Ratio Perm								0.07				
v/c Ratio		0.27			0.83		0.70	0.45	0.13	0.62	1.03	
Uniform Delay, d1		52.4			47.2		57.9	18.4	15.2	54.2	26.4	
Progression Factor		1.00			1.00		1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2		1.2			16.3		42.0	0.3	0.1	9.7	36.3	
Delay (s)		53.7			63.4		99.9	18.8	15.3	63.9	62.7	
Level of Service		D			E		F	B	B	E	E	
Approach Delay (s)		53.7			63.4		21.1				62.8	
Approach LOS		D			E		C				E	

Intersection Summary

HCM 2000 Control Delay	49.7	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.93		
Actuated Cycle Length (s)	119.4	Sum of lost time (s)	20.0
Intersection Capacity Utilization	89.2%	ICU Level of Service	E
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis
15: Twin Oaks Valley Rd #1 & La Cienega

Exist + Proj + Sce A Cumul AM
03/17/2017

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations	↖	↗	↕	↖	↗	↕
Traffic Volume (vph)	190	214	580	66	64	1119
Future Volume (vph)	190	214	580	66	64	1119
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)		6.0	6.5		6.0	6.5
Lane Util. Factor	1.00	1.00	0.95		1.00	0.95
Frpb, ped/bikes	1.00	0.99	1.00		1.00	1.00
Flpb, ped/bikes	1.00	1.00	1.00		1.00	1.00
Frt	1.00	0.85	0.98		1.00	1.00
Flt Protected	0.95	1.00	1.00		0.95	1.00
Satd. Flow (prot)	1770	1563	3469		1770	3539
Flt Permitted	0.95	1.00	1.00		0.95	1.00
Satd. Flow (perm)	1770	1563	3469		1770	3539
Peak-hour factor, PHF	0.91	0.91	0.91	0.91	0.91	0.91
Adj. Flow (vph)	209	235	637	73	70	1230
RTOR Reduction (vph)	0	0	9	0	0	0
Lane Group Flow (vph)	209	235	701	0	70	1230
Confl. Peds. (#/hr)		1		13		
Confl. Bikes (#/hr)				1		
Turn Type	Prot	Perm	NA		Prot	NA
Protected Phases	8		2		1	6
Permitted Phases		8				
Actuated Green, G (s)	15.3	15.3	23.2		4.9	34.1
Effective Green, g (s)	15.3	15.3	23.2		4.9	34.1
Actuated g/C Ratio	0.25	0.25	0.37		0.08	0.55
Clearance Time (s)	6.0	6.0	6.5		6.0	6.5
Vehicle Extension (s)	3.0	3.0	3.0		3.0	3.0
Lane Grp Cap (vph)	437	386	1300		140	1949
v/s Ratio Prot	0.12		0.20		0.04	c0.35
v/s Ratio Perm		c0.15				
v/c Ratio	0.48	0.61	0.54		0.50	0.63
Uniform Delay, d1	19.9	20.6	15.2		27.3	9.6
Progression Factor	1.00	1.00	1.00		1.00	1.00
Incremental Delay, d2	0.8	2.7	0.4		2.8	0.7
Delay (s)	20.7	23.4	15.6		30.1	10.2
Level of Service	C	C	B		C	B
Approach Delay (s)	22.1		15.6			11.3
Approach LOS	C		B			B

Intersection Summary

HCM 2000 Control Delay	14.5	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.71		
Actuated Cycle Length (s)	61.9	Sum of lost time (s)	18.5
Intersection Capacity Utilization	52.1%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis
16: Twin Oaks Valley Rd #1 & Del Roy Dr

Exist + Proj + Sce A Cumul AM
03/17/2017

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	27	0	65	5	0	5	38	634	20	10	1367	17
Future Volume (vph)	27	0	65	5	0	5	38	634	20	10	1367	17
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5	5.0		4.5	5.0		5.0	5.0		5.0	5.0	
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	0.95		1.00	0.95	
Frpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Flpb, ped/bikes	1.00	1.00		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		1.00	1.00	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770	1583		1770	1583		1770	3521		1770	3533	
Flt Permitted	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (perm)	1770	1583		1770	1583		1770	3521		1770	3533	
Peak-hour factor, PHF	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89
Adj. Flow (vph)	30	0	73	6	0	6	43	712	22	11	1536	19
RTOR Reduction (vph)	0	66	0	0	6	0	0	1	0	0	1	0
Lane Group Flow (vph)	30	7	0	6	0	0	43	733	0	11	1554	0
Confl. Peds. (#/hr)	2											
Turn Type	Prot	NA		Prot	NA		Prot	NA		Prot	NA	
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases												
Actuated Green, G (s)	1.8	7.4		0.5	6.1		2.3	49.2		0.5	47.4	
Effective Green, g (s)	1.8	7.4		0.5	6.1		2.3	49.2		0.5	47.4	
Actuated g/C Ratio	0.02	0.10		0.01	0.08		0.03	0.64		0.01	0.61	
Clearance Time (s)	4.5	5.0		4.5	5.0		5.0	5.0		5.0	5.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	41	151		11	125		52	2246		11	2172	
v/s Ratio Prot	c0.02	c0.00		0.00	0.00		c0.02	0.21		0.01	c0.44	
v/s Ratio Perm												
v/c Ratio	0.73	0.05		0.55	0.00		0.83	0.33		1.00	0.72	
Uniform Delay, d1	37.4	31.6		38.2	32.7		37.2	6.4		38.3	10.2	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	49.4	0.1		45.6	0.0		64.4	0.1		271.4	1.1	
Delay (s)	86.8	31.8		83.8	32.7		101.6	6.5		309.7	11.4	
Level of Service	F	C		F	C		F	A		F	B	
Approach Delay (s)	47.8			58.3			11.7			13.5		
Approach LOS	D			E			B			B		
Intersection Summary												
HCM 2000 Control Delay	14.6			HCM 2000 Level of Service			B					
HCM 2000 Volume to Capacity ratio	0.65											
Actuated Cycle Length (s)	77.1			Sum of lost time (s)			19.5					
Intersection Capacity Utilization	54.8%			ICU Level of Service			A					
Analysis Period (min)	15											
c Critical Lane Group												

HCM Signalized Intersection Capacity Analysis
17: Twin Oaks Valley Rd #1 & Windy Wy

Exist + Proj + Sce A Cumul AM
03/17/2017

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	10	5	45	0	0	0	50	701	5	6	1436	65
Future Volume (vph)	10	5	45	0	0	0	50	701	5	6	1436	65
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0					6.0	6.0		4.0	4.0	
Lane Util. Factor	1.00	1.00					1.00	0.95		1.00	0.95	
Frpb, ped/bikes	1.00	0.99					1.00	1.00		1.00	1.00	
Flpb, ped/bikes	1.00	1.00					1.00	1.00		1.00	1.00	
Frt	1.00	0.87					1.00	1.00		1.00	0.99	
Flt Protected	0.95	1.00					0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770	1589					1770	3534		1770	3512	
Flt Permitted	0.95	1.00					0.95	1.00		0.95	1.00	
Satd. Flow (perm)	1770	1589					1770	3534		1770	3512	
Peak-hour factor, PHF	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89
Adj. Flow (vph)	11	6	51	0	0	0	56	788	6	7	1613	73
RTOR Reduction (vph)	0	47	0	0	0	0	0	0	0	0	2	0
Lane Group Flow (vph)	11	10	0	0	0	0	56	794	0	7	1684	0
Confl. Peds. (#/hr)	5						4					
Confl. Bikes (#/hr)	5											
Turn Type	Split	NA					Prot	NA				
Protected Phases	4	4					5	2				
Permitted Phases												
Actuated Green, G (s)	5.6	5.6					3.5	49.9				
Effective Green, g (s)	5.6	5.6					3.5	49.9				
Actuated g/C Ratio	0.08	0.08					0.05	0.71				
Clearance Time (s)	4.0	4.0					6.0	6.0				
Vehicle Extension (s)	3.0	3.0					3.0	3.0				
Lane Grp Cap (vph)	141	126					88	2512				
v/s Ratio Prot	0.01	c0.01					c0.03	c0.22				
v/s Ratio Perm												
v/c Ratio	0.08	0.08					0.64	0.32				
Uniform Delay, d1	29.9	29.9					32.7	3.8				
Progression Factor	1.00	1.00					1.00	1.00				
Incremental Delay, d2	0.2	0.3					14.1	0.1				
Delay (s)	30.1	30.2					46.8	3.9				
Level of Service	C	C					D	A				
Approach Delay (s)	30.2			0.0			6.7			8.5		
Approach LOS	C			A			A			A		
Intersection Summary												
HCM 2000 Control Delay	8.5			HCM 2000 Level of Service					A			
HCM 2000 Volume to Capacity ratio	0.64											
Actuated Cycle Length (s)	70.2			Sum of lost time (s)					14.0			
Intersection Capacity Utilization	55.8%			ICU Level of Service					B			
Analysis Period (min)	15											
c Critical Lane Group												

HCM Signalized Intersection Capacity Analysis
18: Twin Oaks Valley Rd #1 & Borden Rd

Exist + Proj + Sce A Cumul AM
03/17/2017

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↱		↰	↱		↰	↱		↰	↱	
Traffic Volume (vph)	67	50	240	283	112	34	93	447	67	22	1024	140
Future Volume (vph)	67	50	240	283	112	34	93	447	67	22	1024	140
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.2	5.3		4.2	5.3		4.2	4.9	4.9	4.2	4.9	4.9
Lane Util. Factor	1.00	0.95		1.00	0.95		1.00	0.95	1.00	0.95	1.00	1.00
Frpb, ped/bikes	1.00	0.98		1.00	1.00		1.00	1.00	0.98	1.00	1.00	0.98
Flpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	0.88		1.00	0.96		1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1770	3045		1770	3403		1770	3539	1556	1770	3539	1551
Flt Permitted	0.95	1.00		0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	1770	3045		1770	3403		1770	3539	1556	1770	3539	1551
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)	71	53	253	298	118	36	98	471	71	23	1078	147
RTOR Reduction (vph)	0	190	0	0	17	0	0	0	37	0	0	70
Lane Group Flow (vph)	71	116	0	298	137	0	98	471	34	23	1078	77
Confl. Peds. (#/hr)			6		2				3			6
Confl. Bikes (#/hr)			1		1				3			3
Turn Type	Prot	NA		Prot	NA		Prot	NA	Perm	Prot	NA	Perm
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases									2			6
Actuated Green, G (s)	9.1	16.7		28.4	36.0		13.6	60.8	60.8	3.9	51.1	51.1
Effective Green, g (s)	9.1	16.7		28.4	36.0		13.6	60.8	60.8	3.9	51.1	51.1
Actuated g/C Ratio	0.07	0.13		0.22	0.28		0.11	0.47	0.47	0.03	0.40	0.40
Clearance Time (s)	4.2	5.3		4.2	5.3		4.2	4.9	4.9	4.2	4.9	4.9
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)	125	396		391	954		187	1675	736	53	1408	617
v/s Ratio Prot	0.04	c0.04		c0.17	0.04		c0.06	0.13		0.01	c0.30	
v/s Ratio Perm								0.02			0.05	
v/c Ratio	0.57	0.29		0.76	0.14		0.52	0.28	0.05	0.43	0.77	0.13
Uniform Delay, d1	57.7	50.5		46.8	34.6		54.3	20.5	18.2	61.2	33.5	24.5
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	5.8	0.4		8.5	0.1		2.6	0.1	0.0	5.6	2.5	0.1
Delay (s)	63.6	50.9		55.4	34.7		57.0	20.6	18.2	66.8	36.0	24.6
Level of Service	E	D		E	C		E	C	B	E	D	C
Approach Delay (s)		53.3			48.3			25.9			35.2	
Approach LOS		D			D			C			D	
Intersection Summary												
HCM 2000 Control Delay		37.7			HCM 2000 Level of Service			D				
HCM 2000 Volume to Capacity ratio		0.66										
Actuated Cycle Length (s)		128.4			Sum of lost time (s)			18.6				
Intersection Capacity Utilization		76.9%			ICU Level of Service			D				
Analysis Period (min)		15										
c Critical Lane Group												

HCM Signalized Intersection Capacity Analysis
19: Twin Oaks Valley Rd #1 & Richmar Ave

Exist + Proj + Sce A Cumul AM
03/17/2017

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↱		↰	↱		↰	↱		↰	↱	
Traffic Volume (vph)	183	10	142	20	10	5	75	779	20	25	1581	260
Future Volume (vph)	183	10	142	20	10	5	75	779	20	25	1581	260
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.9	4.9		4.0	4.0		4.0	5.7		4.0	5.7	
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	0.95		1.00	0.95	
Frpb, ped/bikes	1.00	0.99		1.00	0.99		1.00	1.00		1.00	1.00	
Flpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Frt	1.00	0.86		1.00	0.95		1.00	1.00		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	1581		1770	1757		1770	3523		1770	3450	
Flt Permitted	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (perm)	1770	1581		1770	1757		1770	3523		1770	3450	
Peak-hour factor, PHF	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99
Adj. Flow (vph)	185	10	143	20	10	5	76	787	20	25	1597	263
RTOR Reduction (vph)	0	124	0	0	5	0	0	1	0	0	7	0
Lane Group Flow (vph)	185	29	0	20	10	0	76	806	0	25	1853	0
Confl. Peds. (#/hr)						8				4		2
Confl. Bikes (#/hr)			1						1			3
Turn Type	Split	NA		Split	NA		Prot	NA		Prot	NA	
Protected Phases	4	4		8	8		5	2		1	6	
Permitted Phases												
Actuated Green, G (s)	16.3	16.3		7.5	7.5		6.9	74.2		3.4	70.7	
Effective Green, g (s)	16.3	16.3		7.5	7.5		6.9	74.2		3.4	70.7	
Actuated g/C Ratio	0.14	0.14		0.06	0.06		0.06	0.62		0.03	0.59	
Clearance Time (s)	4.9	4.9		4.0	4.0		4.0	5.7		4.0	5.7	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	240	214		110	109		101	2178		50	2032	
v/s Ratio Prot	c0.10	0.02		c0.01	0.01		c0.04	c0.23		0.01	c0.54	
v/s Ratio Perm												
v/c Ratio	0.77	0.14		0.18	0.09		0.75	0.37		0.50	0.91	
Uniform Delay, d1	50.0	45.7		53.3	53.0		55.7	11.3		57.5	21.9	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	14.2	0.3		0.8	0.4		26.7	0.1		7.7	6.7	
Delay (s)	64.2	46.0		54.1	53.4		82.4	11.4		65.1	28.6	
Level of Service	E	D		D	D		F	B		E	C	
Approach Delay (s)		55.9			53.8			17.5			29.1	
Approach LOS		E			D			B			C	
Intersection Summary												
HCM 2000 Control Delay		29.0			HCM 2000 Level of Service			C				
HCM 2000 Volume to Capacity ratio		0.81										
Actuated Cycle Length (s)		120.0			Sum of lost time (s)			18.6				
Intersection Capacity Utilization		85.8%			ICU Level of Service			E				
Analysis Period (min)		15										
c Critical Lane Group												

HCM Signalized Intersection Capacity Analysis
20: Twin Oaks Valley Rd/Twin Oaks Valley Rd #1 & San Marcos Blvd

Exist + Proj + Sce A Cumul AM

03/17/2017

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↱	↱	↰	↱	↱	↰	↱	↱	↰	↱	↱
Traffic Volume (vph)	194	328	358	555	540	49	326	659	512	126	1309	361
Future Volume (vph)	194	328	358	555	540	49	326	659	512	126	1309	361
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.2	5.3	5.3	4.2	5.0		4.2	5.3	4.2	4.2	5.3	
Lane Util. Factor	0.97	0.95	1.00	0.97	0.95		0.97	0.95	1.00	0.97	0.95	
Frpb, ped/bikes	1.00	1.00	0.97	1.00	1.00		1.00	1.00	0.99	1.00	1.00	
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00	1.00	1.00	
Frt	1.00	1.00	0.85	1.00	0.99		1.00	1.00	0.85	1.00	0.97	
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)	3433	3539	1541	3433	3489		3433	3539	1566	3433	3415	
Flt Permitted	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00	0.95	1.00	
Satd. Flow (perm)	3433	3539	1541	3433	3489		3433	3539	1566	3433	3415	
Peak-hour factor, PHF	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98
Adj. Flow (vph)	198	335	365	566	551	50	333	672	522	129	1336	368
RTOR Reduction (vph)	0	0	108	0	6	0	0	0	59	0	20	0
Lane Group Flow (vph)	198	335	257	566	595	0	333	672	463	129	1684	0
Confl. Peds. (#/hr)			5			4			1			1
Confl. Bikes (#/hr)			8			3			3			3
Turn Type	Prot	NA	Perm	Prot	NA		Prot	NA	pm+ov	Prot	NA	
Protected Phases	7	4		3	8		5	2	3	1	6	
Permitted Phases			4						2			
Actuated Green, G (s)	9.8	23.0	23.0	14.9	28.4		9.8	51.0	65.9	7.2	48.4	
Effective Green, g (s)	9.8	23.0	23.0	14.9	28.4		9.8	51.0	65.9	7.2	48.4	
Actuated g/C Ratio	0.09	0.20	0.20	0.13	0.25		0.09	0.44	0.57	0.06	0.42	
Clearance Time (s)	4.2	5.3	5.3	4.2	5.0		4.2	5.3	4.2	4.2	5.3	
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)	292	707	307	444	860		292	1568	896	214	1436	
v/s Ratio Prot	0.06	0.09		c0.16	0.17		c0.10	0.19	c0.07	0.04	c0.49	
v/s Ratio Perm			c0.17						0.23			
v/c Ratio	0.68	0.47	0.84	1.27	0.69		1.14	0.43	0.52	0.60	1.17	
Uniform Delay, d1	51.1	40.7	44.2	50.1	39.4		52.6	22.0	14.9	52.6	33.3	
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	6.1	0.5	17.7	140.2	2.4		96.1	0.2	0.5	4.7	85.4	
Delay (s)	57.2	41.2	61.9	190.3	41.8		148.8	22.2	15.4	57.3	118.7	
Level of Service	E	D	E	F	D		F	C	B	E	F	
Approach Delay (s)		53.2			113.8			47.5			114.4	
Approach LOS		D			F			D			F	

Intersection Summary			
HCM 2000 Control Delay	85.3	HCM 2000 Level of Service	F
HCM 2000 Volume to Capacity ratio	1.09		
Actuated Cycle Length (s)	115.1	Sum of lost time (s)	19.0
Intersection Capacity Utilization	100.0%	ICU Level of Service	F
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis
21: Twin Oaks Valley Rd & SR 78 WB Ramps

Exist + Proj + Sce A Cumul AM

03/17/2017

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations				↰		↱		↱			↱	↱
Traffic Volume (vph)	0	0	0	687	0	315	0	1265	591	0	1777	455
Future Volume (vph)	0	0	0	687	0	315	0	1265	591	0	1777	455
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)				4.6		4.6		5.3	4.6		5.3	5.3
Lane Util. Factor				0.97		0.88		0.91	1.00		0.91	1.00
Frpb, ped/bikes				1.00		1.00		1.00	0.97		1.00	0.97
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	0.85
Flt Protected				0.95		1.00		1.00	1.00		1.00	1.00
Satd. Flow (prot)				3433		2787		5085	1539		5085	1543
Flt Permitted				0.95		1.00		1.00	1.00		1.00	1.00
Satd. Flow (perm)				3433		2787		5085	1539		5085	1543
Peak-hour factor, PHF	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98
Adj. Flow (vph)	0	0	0	701	0	321	0	1291	603	0	1813	464
RTOR Reduction (vph)	0	0	0	0	0	64	0	0	0	0	0	154
Lane Group Flow (vph)	0	0	0	701	0	257	0	1291	603	0	1813	310
Confl. Peds. (#/hr)									8			5
Confl. Bikes (#/hr)									1			3
Turn Type				Prot		Perm		NA	pm+ov		NA	Perm
Protected Phases				8				2	8		6	
Permitted Phases						8			2			6
Actuated Green, G (s)				31.1		31.1		79.0	110.1		79.0	79.0
Effective Green, g (s)				31.1		31.1		79.0	110.1		79.0	79.0
Actuated g/C Ratio				0.26		0.26		0.66	0.92		0.66	0.66
Clearance Time (s)				4.6		4.6		5.3	4.6		5.3	5.3
Vehicle Extension (s)				2.0		2.0		2.0	2.0		2.0	2.0
Lane Grp Cap (vph)				889		722		3347	1471		3347	1015
v/s Ratio Prot				c0.20				0.25	0.11		c0.36	
v/s Ratio Perm						0.09			0.29			0.20
v/c Ratio				0.79		0.36		0.39	0.41		0.54	0.30
Uniform Delay, d1				41.4		36.3		9.4	0.7		10.9	8.8
Progression Factor				1.00		1.00		0.66	7.94		1.00	1.00
Incremental Delay, d2				4.3		0.1		0.2	0.0		0.6	0.8
Delay (s)				45.7		36.4		6.4	5.2		11.5	9.5
Level of Service				D		D		A	A		B	A
Approach Delay (s)		0.0			42.8			6.0			11.1	
Approach LOS		A			D			A			B	

Intersection Summary			
HCM 2000 Control Delay	15.5	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.61		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	9.9
Intersection Capacity Utilization	61.7%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis
22: Twin Oaks Valley Rd & SR 78 EB Ramps

Exist + Proj + Sce A Cumul AM
03/17/2017

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↱	↱					↰	↱	↱	↰	↱
Traffic Volume (vph)	598	10	787	0	0	0	0	1277	675	334	2110	0
Future Volume (vph)	598	10	787	0	0	0	0	1277	675	334	2110	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.6	4.6	4.6					5.3	5.3	4.2	5.3	
Lane Util. Factor	0.95	0.91	0.95					0.91	1.00	0.97	0.91	
Frpb, ped/bikes	1.00	0.99	0.99					1.00	0.98	1.00	1.00	
Flpb, ped/bikes	1.00	1.00	1.00					1.00	1.00	1.00	1.00	
Frt	1.00	0.89	0.85					1.00	0.85	1.00	1.00	
Flt Protected	0.95	0.99	1.00					1.00	1.00	0.95	1.00	
Satd. Flow (prot)	1681	1476	1485					5085	1553	3433	5085	
Flt Permitted	0.95	0.99	1.00					1.00	1.00	0.95	1.00	
Satd. Flow (perm)	1681	1476	1485					5085	1553	3433	5085	
Peak-hour factor, PHF	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Adj. Flow (vph)	616	10	811	0	0	0	0	1316	696	344	2175	0
RTOR Reduction (vph)	0	3	37	0	0	0	0	0	433	0	0	0
Lane Group Flow (vph)	499	473	425	0	0	0	0	1316	263	344	2175	0
Confl. Peds. (#/hr)			1						4			
Confl. Bikes (#/hr)												1
Turn Type	Split	NA	Perm					NA	Perm	Prot	NA	
Protected Phases	4	4						2		1	6	
Permitted Phases			4						2			
Actuated Green, G (s)	44.0	44.0	44.0					45.3	45.3	16.6	66.1	
Effective Green, g (s)	44.0	44.0	44.0					45.3	45.3	16.6	66.1	
Actuated g/C Ratio	0.37	0.37	0.37					0.38	0.38	0.14	0.55	
Clearance Time (s)	4.6	4.6	4.6					5.3	5.3	4.2	5.3	
Vehicle Extension (s)	3.0	3.0	3.0					3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	616	541	544					1919	586	474	2800	
v/s Ratio Prot	0.30	c0.32						0.26		0.10	c0.43	
v/s Ratio Perm			0.29						0.17			
v/c Ratio	0.81	0.88	0.78					0.69	0.45	0.73	0.78	
Uniform Delay, d1	34.2	35.4	33.7					31.4	28.0	49.5	21.2	
Progression Factor	1.00	1.00	1.00					1.00	1.00	1.12	1.16	
Incremental Delay, d2	7.9	14.7	7.2					2.0	2.5	4.6	1.9	
Delay (s)	42.2	50.1	40.9					33.4	30.5	60.3	26.4	
Level of Service	D	D	D					C	C	E	C	
Approach Delay (s)		44.4			0.0			32.4			31.1	
Approach LOS		D			A			C			C	
Intersection Summary												
HCM 2000 Control Delay		34.7		HCM 2000 Level of Service					C			
HCM 2000 Volume to Capacity ratio		0.85										
Actuated Cycle Length (s)		120.0		Sum of lost time (s)					14.1			
Intersection Capacity Utilization		88.6%		ICU Level of Service					E			
Analysis Period (min)		15										
c Critical Lane Group												

HCM Signalized Intersection Capacity Analysis
23: Robelini Dr & S. Santa Fe Ave

Exist + Proj + Sce A Cumul AM
03/17/2017

						
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (vph)	344	450	611	238	130	193
Future Volume (vph)	344	450	611	238	130	193
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.3	4.6	4.4	5.3	4.6	4.4
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frpb, ped/bikes	1.00	0.99	1.00	1.00	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	1.00	1.00	0.85
Flt Protected	1.00	1.00	0.95	1.00	0.95	1.00
Satd. Flow (prot)	1863	1570	1770	1863	1770	1583
Flt Permitted	1.00	1.00	0.95	1.00	0.95	1.00
Satd. Flow (perm)	1863	1570	1770	1863	1770	1583
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	374	489	664	259	141	210
RTOR Reduction (vph)	0	14	0	0	0	36
Lane Group Flow (vph)	374	475	664	259	141	174
Confl. Bikes (#/hr)	6					
Turn Type	NA	pm+ov	Prot	NA	Prot	pm+ov
Protected Phases	2	8	1	6	8	1
Permitted Phases	2					
Actuated Green, G (s)	25.7	74.1	31.6	35.4	48.4	80.0
Effective Green, g (s)	25.7	74.1	31.6	35.4	48.4	80.0
Actuated g/C Ratio	0.21	0.62	0.26	0.29	0.40	0.67
Clearance Time (s)	5.3	4.6	4.4	5.3	4.6	4.4
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	398	969	466	549	713	1055
v/s Ratio Prot	c0.20	c0.20	c0.38	0.14	0.08	0.04
v/s Ratio Perm	0.10					
v/c Ratio	0.94	0.49	1.42	0.47	0.20	0.17
Uniform Delay, d1	46.4	12.6	44.2	34.6	23.2	7.5
Progression Factor	1.00	1.00	1.24	1.12	1.00	1.00
Incremental Delay, d2	29.8	0.4	192.4	0.1	0.1	0.1
Delay (s)	76.2	13.0	247.1	38.7	23.3	7.6
Level of Service	E	B	F	D	C	A
Approach Delay (s)	40.4	188.6			13.9	
Approach LOS	D	F			B	
Intersection Summary						
HCM 2000 Control Delay	100.1			HCM 2000 Level of Service		F
HCM 2000 Volume to Capacity ratio	0.88					
Actuated Cycle Length (s)	120.0			Sum of lost time (s)		14.3
Intersection Capacity Utilization	71.1%			ICU Level of Service		C
Analysis Period (min)	15					
c Critical Lane Group						

HCM Signalized Intersection Capacity Analysis
24: Sycamore Avenue/Robelini Dr & SR 78 WB Ramps

Exist + Proj + Sce A Cumul AM
03/17/2017

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	0	0	1190	5	100	380	493	0	0	929	392
Future Volume (vph)	0	0	0	1190	5	100	380	493	0	0	929	392
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)				4.6	4.6	4.6	4.2	5.0			5.0	5.0
Lane Util. Factor				0.95	0.95	0.88	0.97	0.91			0.91	1.00
Frpb, ped/bikes				1.00	1.00	0.99	1.00	1.00			1.00	0.97
Flpb, ped/bikes				1.00	1.00	1.00	1.00	1.00			1.00	1.00
Frt				1.00	1.00	0.85	1.00	1.00			1.00	0.85
Flt Protected				0.95	0.95	1.00	0.95	1.00			1.00	1.00
Satd. Flow (prot)				1681	1686	2751	3433	5085			5085	1532
Flt Permitted				0.95	0.95	1.00	0.95	1.00			1.00	1.00
Satd. Flow (perm)				1681	1686	2751	3433	5085			5085	1532
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	0	0	0	1322	6	111	422	548	0	0	1032	436
RTOR Reduction (vph)	0	0	0	0	0	61	0	0	0	0	0	319
Lane Group Flow (vph)	0	0	0	661	667	50	422	548	0	0	1032	117
Confl. Peds. (#/hr)			1			1			1			12
Turn Type				Split	NA	Perm	Prot	NA		NA	Perm	
Protected Phases				8	8		5	2			6	
Permitted Phases						8						6
Actuated Green, G (s)				49.7	49.7	49.7	16.9	50.7			29.6	29.6
Effective Green, g (s)				49.7	49.7	49.7	16.9	50.7			29.6	29.6
Actuated g/C Ratio				0.45	0.45	0.45	0.15	0.46			0.27	0.27
Clearance Time (s)				4.6	4.6	4.6	4.2	5.0			5.0	5.0
Vehicle Extension (s)				3.0	3.0	3.0	3.0	3.0			3.0	3.0
Lane Grp Cap (vph)				759	761	1242	527	2343			1368	412
v/s Ratio Prot				0.39	c0.40		c0.12	0.11			c0.20	
v/s Ratio Perm						0.02						0.08
v/c Ratio				0.87	0.88	0.04	0.80	0.23			0.75	0.28
Uniform Delay, d1				27.3	27.4	16.8	44.9	17.9			36.9	31.8
Progression Factor				1.00	1.00	1.00	1.60	0.86			1.00	1.00
Incremental Delay, d2				10.7	11.1	0.0	8.0	0.2			3.9	1.7
Delay (s)				37.9	38.4	16.8	80.0	15.6			40.8	33.6
Level of Service				D	D	B	E	B			D	C
Approach Delay (s)	0.0				36.6			43.6			38.6	
Approach LOS	A				D			D			D	
Intersection Summary												
HCM 2000 Control Delay	39.1								D			
HCM 2000 Volume to Capacity ratio	0.82											
Actuated Cycle Length (s)	110.0					Sum of lost time (s)		13.8				
Intersection Capacity Utilization	106.1%					ICU Level of Service		G				
Analysis Period (min)	15											
c Critical Lane Group												

HCM Signalized Intersection Capacity Analysis
25: Sycamore Avenue & SR 78 EB Ramps

Exist + Proj + Sce A Cumul AM
03/17/2017

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	251	5	910	0	0	0	0	702	1090	360	2079	0
Future Volume (vph)	251	5	910	0	0	0	0	702	1090	360	2079	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)				4.6	4.6	4.6					5.0	5.0
Lane Util. Factor				0.95	0.91	0.95					0.91	1.00
Frpb, ped/bikes				1.00	1.00	1.00					1.00	0.98
Flpb, ped/bikes				1.00	1.00	1.00					1.00	1.00
Frt				1.00	0.86	0.85					1.00	0.85
Flt Protected				0.95	1.00	1.00					1.00	0.95
Satd. Flow (prot)				1681	1453	1504					5085	1532
Flt Permitted				0.95	1.00	1.00					1.00	0.95
Satd. Flow (perm)				1681	1453	1504					5085	1532
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)	264	5	958	0	0	0	0	739	1147	379	2188	0
RTOR Reduction (vph)	0	1	37	0	0	0	0	0	563	0	0	0
Lane Group Flow (vph)	238	499	452	0	0	0	0	739	584	379	2188	0
Confl. Peds. (#/hr)									4			
Confl. Bikes (#/hr)									1			
Turn Type				Split	NA	Perm			NA	Perm	Prot	NA
Protected Phases				4	4				2		1	6
Permitted Phases						4				2		
Actuated Green, G (s)	43.3	43.3	43.3					39.0	39.0	13.9	57.1	
Effective Green, g (s)	43.3	43.3	43.3					39.0	39.0	13.9	57.1	
Actuated g/C Ratio	0.39	0.39	0.39					0.35	0.35	0.13	0.52	
Clearance Time (s)	4.6	4.6	4.6					5.0	5.0	4.2	5.0	
Vehicle Extension (s)	3.0	3.0	3.0					3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	661	571	592					1802	550	433	2639	
v/s Ratio Prot	0.14	c0.34						0.15		0.11	c0.43	
v/s Ratio Perm			0.30						c0.38			
v/c Ratio	0.36	0.87	0.76					0.41	1.06	0.88	0.83	
Uniform Delay, d1	23.6	30.8	28.9					26.8	35.5	47.2	22.3	
Progression Factor	1.00	1.00	1.00					1.00	1.00	1.46	1.23	
Incremental Delay, d2	0.3	13.9	5.8					0.7	55.6	15.2	2.3	
Delay (s)	23.9	44.7	34.7					27.5	91.1	84.2	29.7	
Level of Service	C	D	C					C	F	F	C	
Approach Delay (s)		36.7			0.0			66.2			37.7	
Approach LOS		D			A			E			D	
Intersection Summary												
HCM 2000 Control Delay	46.9									D		
HCM 2000 Volume to Capacity ratio	0.96											
Actuated Cycle Length (s)	110.0					Sum of lost time (s)		13.8				
Intersection Capacity Utilization	106.1%					ICU Level of Service		G				
Analysis Period (min)	15											
c Critical Lane Group												

HCM Signalized Intersection Capacity Analysis
26: S. Santa Fe Ave & Buena Creek Rd

Exist + Proj + Sce A Cumul AM
03/17/2017

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations	↔	↑	↑	↑	↔	↔
Traffic Volume (vph)	237	620	430	160	320	809
Future Volume (vph)	237	620	430	160	320	809
Ideal Flow (vphpl)	1520	1900	1900	1520	1520	1520
Total Lost time (s)	4.4	5.3	5.3	5.3	4.0	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	
Frpb, ped/bikes	1.00	1.00	1.00	0.94	0.98	
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	
Frt	1.00	1.00	1.00	0.85	0.90	
Flt Protected	0.95	1.00	1.00	1.00	0.99	
Satd. Flow (prot)	1416	1863	1863	1194	1296	
Flt Permitted	0.95	1.00	1.00	1.00	0.99	
Satd. Flow (perm)	1416	1863	1863	1194	1296	
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	249	653	453	168	337	852
RTOR Reduction (vph)	0	0	0	42	0	0
Lane Group Flow (vph)	249	653	453	126	1189	0
Confl. Peds. (#/hr)				12		4
Confl. Bikes (#/hr)				3		
Turn Type	Prot	NA	NA	Perm	Prot	
Protected Phases	5	2	6		4	
Permitted Phases				6		
Actuated Green, G (s)	21.9	25.7	35.4	35.4	49.0	
Effective Green, g (s)	21.9	25.7	35.4	35.4	49.0	
Actuated g/C Ratio	0.18	0.21	0.29	0.29	0.41	
Clearance Time (s)	4.4	5.3	5.3	5.3	4.0	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	258	398	549	352	529	
v/s Ratio Prot	c0.18	c0.35	c0.24		c0.92	
v/s Ratio Perm				0.11		
v/c Ratio	0.97	1.64	0.83	0.36	2.25	
Uniform Delay, d1	48.7	47.1	39.4	33.3	35.5	
Progression Factor	1.22	0.77	1.00	1.00	1.00	
Incremental Delay, d2	43.8	298.6	9.8	0.6	567.5	
Delay (s)	103.3	335.1	49.2	34.0	603.0	
Level of Service	F	F	D	C	F	
Approach Delay (s)		271.1	45.1		603.0	
Approach LOS		F	D		F	
Intersection Summary						
HCM 2000 Control Delay			364.9		HCM 2000 Level of Service	F
HCM 2000 Volume to Capacity ratio			1.70			
Actuated Cycle Length (s)			120.0		Sum of lost time (s)	14.3
Intersection Capacity Utilization			135.2%		ICU Level of Service	H
Analysis Period (min)			15			
c Critical Lane Group						

HCM Unsignalized Intersection Capacity Analysis
27: Buena Creek Rd & Monte Vista Rd

Exist + Proj + Sce A Cumul AM
03/17/2017

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↑	↑		↔	↔
Sign Control		Stop	Stop		Stop	
Traffic Volume (vph)	110	229	604	272	399	180
Future Volume (vph)	110	229	604	272	399	180
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95
Hourly flow rate (vph)	116	241	636	286	420	189
Direction, Lane #	EB 1	WB 1	SB 1			
Volume Total (vph)	357	922	609			
Volume Left (vph)	116	0	420			
Volume Right (vph)	0	286	189			
Hadj (s)	0.10	-0.15	-0.01			
Departure Headway (s)	7.1	6.5	6.6			
Degree Utilization, x	0.70	1.66	1.12			
Capacity (veh/h)	499	560	548			
Control Delay (s)	25.1	321.6	100.1			
Approach Delay (s)	25.1	321.6	100.1			
Approach LOS	D	F	F			
Intersection Summary						
Delay			194.1			
Level of Service			F			
Intersection Capacity Utilization			109.7%		ICU Level of Service	H
Analysis Period (min)			15			

HCM Signalized Intersection Capacity Analysis
28: San Marcos Blvd & Knoll Rd/SR 78 WB Ramps

Exist + Proj + Sce A Cumul AM
03/17/2017

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	→	↱	↰	↱	→	↰	↱	↱	↰	↱	↱
Traffic Volume (vph)	186	0	554	1129	381	21	362	477	138	4	1084	223
Future Volume (vph)	186	0	554	1129	381	21	362	477	138	4	1084	223
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.6		5.2	5.6	5.6		5.2	6.3	6.3		6.3	6.3
Lane Util. Factor	1.00	0.88	0.97	0.95			0.97	0.95	1.00		0.91	1.00
Frpb, ped/bikes	1.00		1.00	1.00	1.00		1.00	1.00	1.00		1.00	0.98
Flpb, ped/bikes	1.00		1.00	1.00	1.00		1.00	1.00	1.00		1.00	1.00
Frt	1.00	0.85	1.00	0.99			1.00	1.00	0.85		1.00	0.85
Flt Protected	0.95		1.00	0.95	1.00		0.95	1.00	1.00		1.00	1.00
Satd. Flow (prot)	1770		2787	3433	3509		3433	3539	1583		5084	1546
Flt Permitted	0.95		1.00	0.95	1.00		0.95	1.00	1.00		0.94	1.00
Satd. Flow (perm)	1770		2787	3433	3509		3433	3539	1583		4771	1546
Peak-hour factor, PHF	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Adj. Flow (vph)	192	0	571	1164	393	22	373	492	142	4	1118	230
RTOR Reduction (vph)	0	0	59	0	4	0	0	0	72	0	0	85
Lane Group Flow (vph)	192	0	512	1164	411	0	373	492	70	0	1122	145
Confl. Peds. (#/hr)						1						8
Confl. Bikes (#/hr)												2
Turn Type	Prot		pm+ov	Prot	NA		Prot	NA	Perm		NA	Perm
Protected Phases	7		5	3	8		5	2			6	
Permitted Phases			7						2			6
Actuated Green, G (s)	15.0		32.8	48.6	28.0		17.8	59.5	59.5		36.5	36.5
Effective Green, g (s)	15.0		32.8	48.6	28.0		17.8	59.5	59.5		36.5	36.5
Actuated g/C Ratio	0.12		0.27	0.41	0.23		0.15	0.50	0.50		0.30	0.30
Clearance Time (s)	5.6		5.2	5.6	5.6		5.2	6.3	6.3		6.3	6.3
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)	221		761	1390	818		509	1754	784		1451	470
v/s Ratio Prot	0.11		0.10	c0.34	0.12		c0.11	0.14				
v/s Ratio Perm			0.08					0.04			c0.24	0.09
v/c Ratio	0.87		0.67	0.84	0.50		0.73	0.28	0.09		0.77	0.31
Uniform Delay, d1	51.5		38.8	32.1	40.0		48.8	17.7	16.0		38.0	32.1
Progression Factor	1.00		1.00	1.00	1.00		0.96	1.48	4.00		1.00	1.00
Incremental Delay, d2	28.3		2.4	4.6	0.5		5.3	0.4	0.2		4.1	1.7
Delay (s)	79.8		41.2	36.7	40.4		52.2	26.6	64.1		42.1	33.8
Level of Service	E		D	D	D		D	C	E		D	C
Approach Delay (s)		50.9			37.7			41.4			40.6	
Approach LOS		D			D			D			D	
Intersection Summary												
HCM 2000 Control Delay		41.5			HCM 2000 Level of Service			D				
HCM 2000 Volume to Capacity ratio		0.84										
Actuated Cycle Length (s)		120.0			Sum of lost time (s)			22.7				
Intersection Capacity Utilization		89.2%			ICU Level of Service			E				
Analysis Period (min)		15										
c Critical Lane Group												

HCM Signalized Intersection Capacity Analysis
29: San Marcos Blvd & SR 78 EB Ramps

Exist + Proj + Sce A Cumul AM
03/17/2017

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	→	↱	↰	↱	→	↰	↱	↱	↰	↱	↱
Traffic Volume (vph)	171	0	289	0	0	0	0	836	808	183	2467	0
Future Volume (vph)	171	0	289	0	0	0	0	836	808	183	2467	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.6		5.6					6.3	6.3	5.2	6.3	
Lane Util. Factor	0.97		1.00					0.91	0.88	0.97	0.91	
Frpb, ped/bikes	1.00		1.00					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)	3433		1583					5085	2726	3433	5085	
Flt Permitted	0.95		1.00					1.00	1.00	0.95	1.00	
Satd. Flow (perm)	3433		1583					5085	2726	3433	5085	
Peak-hour factor, PHF	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Adj. Flow (vph)	178	0	301	0	0	0	0	871	842	191	2570	0
RTOR Reduction (vph)	0	0	64	0	0	0	0	0	348	0	0	0
Lane Group Flow (vph)	178	0	237	0	0	0	0	871	494	191	2570	0
Confl. Peds. (#/hr)												6
Confl. Bikes (#/hr)										3		4
Turn Type	Prot		Perm					NA	Perm	Prot	NA	
Protected Phases	4							2		1	6	
Permitted Phases			4					2				
Actuated Green, G (s)	20.5		20.5					70.4	70.4	12.0	87.6	
Effective Green, g (s)	20.5		20.5					70.4	70.4	12.0	87.6	
Actuated g/C Ratio	0.17		0.17					0.59	0.59	0.10	0.73	
Clearance Time (s)	5.6		5.6					6.3	6.3	5.2	6.3	
Vehicle Extension (s)	3.0		3.0					3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	586		270					2983	1599	343	3712	
v/s Ratio Prot	0.05							0.17		0.06	c0.51	
v/s Ratio Perm			c0.15						0.18			
v/c Ratio	0.30		0.88					0.29	0.31	0.56	0.69	
Uniform Delay, d1	43.5		48.5					12.4	12.5	51.5	8.8	
Progression Factor	1.00		1.00					1.00	1.00	1.14	0.56	
Incremental Delay, d2	0.3		25.9					0.2	0.5	1.5	0.8	
Delay (s)	43.8		74.4					12.6	13.0	60.3	5.8	
Level of Service	D		E					B	B	E	A	
Approach Delay (s)		63.0			0.0			12.8			9.6	
Approach LOS		E			A			B			A	
Intersection Summary												
HCM 2000 Control Delay		15.9						HCM 2000 Level of Service		B		
HCM 2000 Volume to Capacity ratio		0.76										
Actuated Cycle Length (s)		120.0						Sum of lost time (s)		17.1		
Intersection Capacity Utilization		75.5%						ICU Level of Service		D		
Analysis Period (min)		15										
c Critical Lane Group												

HCM Signalized Intersection Capacity Analysis
30: San Marcos Blvd & E. Mission Road

Exist + Proj + Sce A Cumul AM
03/17/2017

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↱	↱	↰	↱	↱	↰	↱	↱	↰	↱	↱
Traffic Volume (vph)	30	365	21	726	736	80	10	78	331	100	411	51
Future Volume (vph)	30	365	21	726	736	80	10	78	331	100	411	51
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	5.3	5.3	4.0	5.3	5.3	4.0	5.3	5.3	4.0	5.3	5.3
Lane Util. Factor	1.00	0.95	1.00	0.97	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00
Frpb, ped/bikes	1.00	1.00	0.99	1.00	1.00	0.96	1.00	1.00	1.00	1.00	1.00	1.00
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.98	1.00
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1770	3539	1561	3433	3539	1526	1770	3539	1583	1770	3481	1770
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	1770	3539	1561	3433	3539	1526	1770	3539	1583	1770	3481	1770
Peak-hour factor, PHF	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86
Adj. Flow (vph)	35	424	24	844	856	93	12	91	385	116	478	59
RTOR Reduction (vph)	0	0	19	0	0	44	0	0	328	0	6	0
Lane Group Flow (vph)	35	424	5	844	856	49	12	91	57	116	531	0
Conf. Peds. (#/hr)			2			12						
Turn Type	Prot	NA	Perm	Prot	NA	Perm	Prot	NA	Prot	Prot	NA	
Protected Phases	7	4		3	8		5	2	2	1	6	
Permitted Phases			4			8						
Actuated Green, G (s)	4.5	22.0	22.0	32.5	50.0	50.0	1.5	15.1	15.1	13.5	27.1	
Effective Green, g (s)	4.5	22.0	22.0	32.5	50.0	50.0	1.5	15.1	15.1	13.5	27.1	
Actuated g/C Ratio	0.04	0.22	0.22	0.32	0.49	0.49	0.01	0.15	0.15	0.13	0.27	
Clearance Time (s)	4.0	5.3	5.3	4.0	5.3	5.3	4.0	5.3	5.3	4.0	5.3	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	78	765	337	1097	1739	750	26	525	235	234	927	
v/s Ratio Prot	0.02	c0.12		c0.25	0.24		0.01	0.03	0.04	c0.07	c0.15	
v/s Ratio Perm			0.00			0.03						
v/c Ratio	0.45	0.55	0.02	0.77	0.49	0.07	0.46	0.17	0.24	0.50	0.57	
Uniform Delay, d1	47.4	35.5	31.3	31.2	17.3	13.6	49.7	37.8	38.3	40.9	32.3	
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	4.1	0.9	0.0	3.3	0.2	0.0	12.4	0.2	0.5	1.7	0.9	
Delay (s)	51.5	36.4	31.4	34.5	17.6	13.6	62.1	38.0	38.8	42.6	33.2	
Level of Service	D	D	C	C	B	B	E	D	D	D	C	
Approach Delay (s)		37.2			25.3			39.2			34.8	
Approach LOS		D			C			D			C	

Intersection Summary

HCM 2000 Control Delay	30.8	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.65		
Actuated Cycle Length (s)	101.7	Sum of lost time (s)	18.6
Intersection Capacity Utilization	56.6%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

HCM Unsignalized Intersection Capacity Analysis
31: North Centre City Pkwy & Mesa Rock Rd

Exist + Proj + Sce A Cumul AM
03/17/2017

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations	↰	↱	↰	↱	↱	↱
Traffic Volume (veh/h)	0	84	43	126	438	0
Future Volume (Veh/h)	0	84	43	126	438	0
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.88	0.88	0.88	0.88	0.88	0.88
Hourly flow rate (vph)	0	95	49	143	498	0
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			None	None		
Median storage (veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	739	498	498			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	739	498	498			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	100	83	95			
cM capacity (veh/h)	367	572	1066			
Direction, Lane #	EB 1	NB 1	NB 2	SB 1		
Volume Total	95	49	143	498		
Volume Left	0	49	0	0		
Volume Right	95	0	0	0		
cSH	572	1066	1700	1700		
Volume to Capacity	0.17	0.05	0.08	0.29		
Queue Length 95th (ft)	15	4	0	0		
Control Delay (s)	12.5	8.5	0.0	0.0		
Lane LOS	B	A				
Approach Delay (s)	12.5	2.2		0.0		
Approach LOS	B					

Intersection Summary

Average Delay	2.1		
Intersection Capacity Utilization	41.6%	ICU Level of Service	A
Analysis Period (min)	15		

HCM Signalized Intersection Capacity Analysis
32: North Centre City Pkwy & Country Club Ln

Exist + Proj + Sce A Cumul AM
03/17/2017

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	100	350	110	280	400	130	55	399	115	220	667	105
Future Volume (vph)	100	350	110	280	400	130	55	399	115	220	667	105
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00
Frpb, ped/bikes	1.00	1.00	0.98	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1770	3539	1555	1770	3539	1583	1770	3539	1583	1770	3539	1583
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	1770	3539	1555	1770	3539	1583	1770	3539	1583	1770	3539	1583
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)	109	380	120	304	435	141	60	434	125	239	725	114
RTOR Reduction (vph)	0	0	99	0	0	95	0	0	100	0	0	76
Lane Group Flow (vph)	109	380	21	304	435	46	60	434	25	239	725	38
Confl. Peds. (#/hr)	4											
Turn Type	Prot	NA	Perm	Prot	NA	Perm	Prot	NA	Perm	Prot	NA	Perm
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases			4			8			2			6
Actuated Green, G (s)	6.6	14.5	14.5	18.3	26.2	26.2	3.4	16.3	16.3	14.0	26.9	26.9
Effective Green, g (s)	6.6	14.5	14.5	18.3	26.2	26.2	3.4	16.3	16.3	14.0	26.9	26.9
Actuated g/C Ratio	0.08	0.18	0.18	0.23	0.32	0.32	0.04	0.20	0.20	0.17	0.33	0.33
Clearance Time (s)	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	144	632	278	399	1143	511	74	711	318	305	1173	525
v/s Ratio Prot	0.06	c0.11		c0.17	0.12		0.03	0.12		c0.14	c0.20	
v/s Ratio Perm			0.01			0.03			0.02			0.02
v/c Ratio	0.76	0.60	0.08	0.76	0.38	0.09	0.81	0.61	0.08	0.78	0.62	0.07
Uniform Delay, d1	36.5	30.6	27.7	29.4	21.2	19.1	38.5	29.5	26.3	32.1	22.8	18.6
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	20.1	1.6	0.1	8.4	0.2	0.1	46.8	1.6	0.1	12.4	1.0	0.1
Delay (s)	56.5	32.3	27.8	37.7	21.4	19.2	85.3	31.1	26.4	44.5	23.8	18.6
Level of Service	E	C	C	D	C	B	F	C	C	D	C	B
Approach Delay (s)	35.7			26.7			35.4			27.8		
Approach LOS	D			C			D			C		
Intersection Summary												
HCM 2000 Control Delay	30.5			HCM 2000 Level of Service					C			
HCM 2000 Volume to Capacity ratio	0.72											
Actuated Cycle Length (s)	81.1			Sum of lost time (s)					18.0			
Intersection Capacity Utilization	63.9%			ICU Level of Service					B			
Analysis Period (min)	15											
c Critical Lane Group												

HCM Signalized Intersection Capacity Analysis
33: Twin Oaks Valley Rd & Discovery Street/Barham Dr

Exist + Proj + Sce A Cumul AM
03/17/2017

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	270	70	10	320	340	219	20	915	140	486	1179	490
Future Volume (vph)	270	70	10	320	340	219	20	915	140	486	1179	490
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	5.3	5.3	5.0	5.3	5.3	5.0	6.0		5.0	6.0	6.0
Lane Util. Factor	0.97	0.91	1.00	1.00	1.00	1.00	1.00	0.91		0.97	0.91	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.98		1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	3433	5085	1583	1770	1863	1583	1770	4984		3433	5085	1583
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00
Satd. Flow (perm)	3433	5085	1583	1770	1863	1583	1770	4984		3433	5085	1583
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)	293	76	11	348	370	238	22	995	152	528	1282	533
RTOR Reduction (vph)	0	0	9	0	0	175	0	16	0	0	0	278
Lane Group Flow (vph)	293	76	2	348	370	63	22	1131	0	528	1282	255
Turn Type	Prot	NA	Perm	Prot	NA	Perm	Prot	NA		Prot	NA	Perm
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases			4			8						6
Actuated Green, G (s)	12.2	17.3	17.3	25.6	30.7	30.7	1.9	32.1		18.9	49.1	49.1
Effective Green, g (s)	12.2	17.3	17.3	25.6	30.7	30.7	1.9	32.1		18.9	49.1	49.1
Actuated g/C Ratio	0.11	0.15	0.15	0.22	0.27	0.27	0.02	0.28		0.16	0.43	0.43
Clearance Time (s)	5.0	5.3	5.3	5.0	5.3	5.3	5.0	6.0		5.0	6.0	6.0
Vehicle Extension (s)	2.0	4.5	4.5	2.0	4.5	4.5	2.0	3.0		2.0	4.0	4.0
Lane Grp Cap (vph)	363	763	237	393	496	421	29	1388		563	2167	674
v/s Ratio Prot	0.09	0.01		c0.20	c0.20		0.01	c0.23		c0.15	0.25	
v/s Ratio Perm			0.00			0.04						0.16
v/c Ratio	0.81	0.10	0.01	0.89	0.75	0.15	0.76	0.81		0.94	0.59	0.38
Uniform Delay, d1	50.3	42.2	41.6	43.4	38.7	32.3	56.4	38.8		47.6	25.4	22.6
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	11.7	0.1	0.0	20.0	6.8	0.3	65.7	5.4		23.1	1.2	1.6
Delay (s)	62.1	42.3	41.7	63.4	45.5	32.6	122.1	44.1		70.7	26.6	24.2
Level of Service	E	D	D	E	D	C	F	D		E	C	C
Approach Delay (s)	57.5			48.8			45.6			36.0		
Approach LOS	E			D			D			D		
Intersection Summary												
HCM 2000 Control Delay	42.5			HCM 2000 Level of Service			D					
HCM 2000 Volume to Capacity ratio	0.87											
Actuated Cycle Length (s)	115.2			Sum of lost time (s)			21.3					
Intersection Capacity Utilization	78.0%			ICU Level of Service			D					
Analysis Period (min)	15											
c Critical Lane Group												

HCM Signalized Intersection Capacity Analysis
1: Champagne Boulevard & Gopher Canyon Road

Exist + Proj + Sce A Cumu PM
03/17/2017

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	480	352	278	357	254	370
Future Volume (vph)	480	352	278	357	254	370
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5	4.5	4.5	4.5	4.5	4.5
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frpb, ped/bikes	1.00	1.00	1.00	1.00	0.99	0.99
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	0.85	1.00	1.00	0.92	0.92
Flt Protected	0.95	1.00	0.95	1.00	1.00	1.00
Satd. Flow (prot)	1770	1583	1770	1863	1696	1696
Flt Permitted	0.95	1.00	0.95	1.00	1.00	1.00
Satd. Flow (perm)	1770	1583	1770	1863	1696	1696
Peak-hour factor, PHF	0.94	0.94	0.94	0.94	0.94	0.94
Adj. Flow (vph)	511	374	296	380	270	394
RTOR Reduction (vph)	0	241	0	0	44	0
Lane Group Flow (vph)	511	133	296	380	620	0
Confl. Bikes (#/hr)					10	
Turn Type	Prot	Perm	Prot	NA	NA	
Protected Phases	4		5	2	6	
Permitted Phases		4				
Actuated Green, G (s)	35.1	35.1	21.2	70.5	44.8	
Effective Green, g (s)	35.1	35.1	21.2	70.5	44.8	
Actuated g/C Ratio	0.31	0.31	0.18	0.62	0.39	
Clearance Time (s)	4.5	4.5	4.5	4.5	4.5	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	542	484	327	1146	663	
v/s Ratio Prot	c0.29		c0.17	0.20	c0.37	
v/s Ratio Perm		0.08				
v/c Ratio	0.94	0.28	0.91	0.33	0.93	
Uniform Delay, d1	38.8	30.1	45.7	10.7	33.5	
Progression Factor	1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	25.1	0.3	27.0	0.2	20.3	
Delay (s)	63.8	30.4	72.7	10.8	53.8	
Level of Service	E	C	E	B	D	
Approach Delay (s)	49.7			37.9	53.8	
Approach LOS	D			D	D	

Intersection Summary

HCM 2000 Control Delay	47.4	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.93		
Actuated Cycle Length (s)	114.6	Sum of lost time (s)	13.5
Intersection Capacity Utilization	89.3%	ICU Level of Service	E
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis
2: Champagne Boulevard & Old Castle Road

Exist + Proj + Sce A Cumu PM
03/17/2017

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	99	240	395	157	380	226
Future Volume (vph)	99	240	395	157	380	226
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5	4.5	4.5		4.5	4.5
Lane Util. Factor	1.00	1.00	1.00		1.00	1.00
Frpb, ped/bikes	1.00	0.97	0.99		1.00	1.00
Flpb, ped/bikes	1.00	1.00	1.00		1.00	1.00
Frt	1.00	0.85	0.96		1.00	1.00
Flt Protected	0.95	1.00	1.00		0.95	1.00
Satd. Flow (prot)	1770	1543	1781		1770	1863
Flt Permitted	0.95	1.00	1.00		0.95	1.00
Satd. Flow (perm)	1770	1543	1781		1770	1863
Peak-hour factor, PHF	0.84	0.84	0.84	0.84	0.84	0.84
Adj. Flow (vph)	118	286	470	187	452	269
RTOR Reduction (vph)	0	246	15	0	0	0
Lane Group Flow (vph)	118	40	642	0	452	269
Confl. Bikes (#/hr)		2		1		
Turn Type	Prot	Perm	NA		Prot	NA
Protected Phases	8		2		1	6
Permitted Phases		8				
Actuated Green, G (s)	11.2	11.2	32.5		23.8	60.8
Effective Green, g (s)	11.2	11.2	32.5		23.8	60.8
Actuated g/C Ratio	0.14	0.14	0.40		0.29	0.75
Clearance Time (s)	4.5	4.5	4.5		4.5	4.5
Vehicle Extension (s)	3.0	3.0	3.0		3.0	3.0
Lane Grp Cap (vph)	244	213	714		520	1398
v/s Ratio Prot	c0.07		c0.36		c0.26	0.14
v/s Ratio Perm		0.03				
v/c Ratio	0.48	0.19	0.90		0.87	0.19
Uniform Delay, d1	32.2	30.9	22.7		27.1	2.9
Progression Factor	1.00	1.00	1.00		1.00	1.00
Incremental Delay, d2	1.5	0.4	14.1		14.4	0.1
Delay (s)	33.7	31.3	36.8		41.5	3.0
Level of Service	C	C	D		D	A
Approach Delay (s)	32.0		36.8			27.1
Approach LOS	C		D			C

Intersection Summary

HCM 2000 Control Delay	31.8	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.82		
Actuated Cycle Length (s)	81.0	Sum of lost time (s)	13.5
Intersection Capacity Utilization	68.1%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

HCM Unsignalized Intersection Capacity Analysis
3: Champagne Boulevard & Lawrence Welk Dr

Exist + Proj + Sce A Cumu PM
03/17/2017

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	5	5	22	90	0	50	19	478	70	40	234	5
Future Volume (Veh/h)	5	5	22	90	0	50	19	478	70	40	234	5
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84
Hourly flow rate (vph)	6	6	26	107	0	60	23	569	83	48	279	6
Pedestrians	1											
Lane Width (ft)	12.0											
Walking Speed (ft/s)	4.0											
Percent Blockage	0											
Right turn flare (veh)	7											
Median type	None											
Median storage (veh)	None											
Upstream signal (ft)	874											
pX, platoon unblocked												
vC, conflicting volume	993	1077	282	1020	997	570	285			653		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	993	1077	282	1020	997	570	285			653		
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 %	97	97	97	44	100	88	98			95		
cM capacity (veh/h)	188	204	757	192	227	521	1277			933		
Direction, Lane #	EB 1	WB 1	NB 1	NB 2	NB 3	SB 1	SB 2					
Volume Total	38	167	23	569	83	48	285					
Volume Left	6	107	23	0	0	48	0					
Volume Right	26	60	0	0	83	0	6					
cSH	397	300	1277	1700	1700	933	1700					
Volume to Capacity	0.10	0.56	0.02	0.33	0.05	0.05	0.17					
Queue Length 95th (ft)	8	79	1	0	0	4	0					
Control Delay (s)	15.0	33.5	7.9	0.0	0.0	9.1	0.0					
Lane LOS	C	D	A			A						
Approach Delay (s)	15.0	33.5	0.3			1.3						
Approach LOS	C	D										
Intersection Summary												
Average Delay	5.6											
Intersection Capacity Utilization	50.1%											
Analysis Period (min)	15											
ICU Level of Service												
A												

HCM Signalized Intersection Capacity Analysis
4: North Centre City Pkwy/Champagne Boulevard & Deer Springs Rd

Exist + Proj + Sce A Cumu PM
03/17/2017

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↶	↶↷		↶	↶↷			↷↶			↷↶	
Traffic Volume (vph)	387	401	118	70	243	15	105	210	120	30	130	221
Future Volume (vph)	387	401	118	70	243	15	105	210	120	30	130	221
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5	4.5		4.5	4.5			4.5			4.5	
Lane Util. Factor	1.00	0.95		1.00	0.95			1.00			1.00	
Frpb, ped/bikes	1.00	1.00		1.00	1.00			1.00			0.99	
Flpb, ped/bikes	1.00	1.00		1.00	1.00			1.00			1.00	
Frt	1.00	0.97		1.00	0.99			0.96			0.92	
Flt Protected	0.95	1.00		0.95	1.00			0.99			1.00	
Satd. Flow (prot)	1770	3419		1770	3498			1766			1696	
Flt Permitted	0.95	1.00		0.95	1.00			0.76			0.95	
Satd. Flow (perm)	1770	3419		1770	3498			1362			1614	
Peak-hour factor, PHF	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Adj. Flow (vph)	403	418	123	73	253	16	109	219	125	31	135	230
RTOR Reduction (vph)	0	29	0	0	5	0	0	13	0	0	47	0
Lane Group Flow (vph)	403	512	0	73	264	0	0	440	0	0	349	0
Conf. Bikes (#/hr)	12											
Turn Type	Prot	NA		Prot	NA		Perm	NA		Perm	NA	
Protected Phases	5	2		1	6			8			4	
Permitted Phases	8											
Actuated Green, G (s)	23.7	30.6		6.6	13.5			33.9			33.9	
Effective Green, g (s)	23.7	30.6		6.6	13.5			33.9			33.9	
Actuated g/C Ratio	0.28	0.36		0.08	0.16			0.40			0.40	
Clearance Time (s)	4.5	4.5		4.5	4.5			4.5			4.5	
Vehicle Extension (s)	3.0	3.0		3.0	3.0			3.0			3.0	
Lane Grp Cap (vph)	495	1236		138	558			545			646	
v/s Ratio Prot	c0.23	c0.15		0.04	0.08							
v/s Ratio Perm	c0.32											
v/c Ratio	0.81	0.41		0.53	0.47			0.81			0.54	
Uniform Delay, d1	28.4	20.3		37.5	32.3			22.5			19.4	
Progression Factor	1.00	1.00		1.00	1.00			1.00			1.00	
Incremental Delay, d2	9.9	0.2		3.6	0.6			8.5			0.9	
Delay (s)	38.3	20.5		41.1	33.0			31.0			20.3	
Level of Service	D	C		D	C			C			C	
Approach Delay (s)	28.1		34.7		31.0		20.3					
Approach LOS	C		C		C		C					
Intersection Summary												
HCM 2000 Control Delay	28.3		HCM 2000 Level of Service		C							
HCM 2000 Volume to Capacity ratio	0.75											
Actuated Cycle Length (s)	84.6		Sum of lost time (s)		13.5							
Intersection Capacity Utilization	89.9%		ICU Level of Service		E							
Analysis Period (min)	15											
c Critical Lane Group												

HCM Signalized Intersection Capacity Analysis
5: I-15 NB Ramps & Deer Springs Rd

Exist + Proj + Sce A Cumu PM
03/17/2017

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↑			↑	↱		↰	↱			
Traffic Volume (vph)	928	426	0	0	579	30	809	10	490	0	0	0
Future Volume (vph)	928	426	0	0	579	30	809	10	490	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.2	5.3			5.3	5.3			4.6			
Lane Util. Factor	1.00	1.00			1.00	1.00			1.00			
Frpb, ped/bikes	1.00	1.00			1.00	0.98			1.00	0.99		
Flpb, ped/bikes	1.00	1.00			1.00	1.00			1.00	1.00		
Frt	1.00	1.00			1.00	0.85			1.00	0.85		
Flt Protected	0.95	1.00			1.00	1.00			0.95	1.00		
Satd. Flow (prot)	1770	1863			1863	1545			1775	1563		
Flt Permitted	0.95	1.00			1.00	1.00			0.95	1.00		
Satd. Flow (perm)	1770	1863			1863	1545			1775	1563		
Peak-hour factor, PHF	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Adj. Flow (vph)	967	444	0	0	603	31	843	10	510	0	0	0
RTOR Reduction (vph)	0	0	0	0	0	23	0	0	237	0	0	0
Lane Group Flow (vph)	967	444	0	0	603	8	0	853	273	0	0	0
Confl. Peds. (#/hr)					1				1			
Confl. Bikes (#/hr)			4		1				1			
Turn Type	Prot	NA			NA	Perm	Split	NA	Perm			
Protected Phases	5	2			6		8	8				
Permitted Phases						6			8			
Actuated Green, G (s)	27.8	56.7			24.7	24.7		33.4	33.4			
Effective Green, g (s)	27.8	56.7			24.7	24.7		33.4	33.4			
Actuated g/C Ratio	0.28	0.57			0.25	0.25		0.33	0.33			
Clearance Time (s)	4.2	5.3			5.3	5.3		4.6	4.6			
Vehicle Extension (s)	3.0	3.0			3.0	3.0		3.0	3.0			
Lane Grp Cap (vph)	492	1056			460	381		592	522			
v/s Ratio Prot	c0.55	0.24			c0.32			c0.48				
v/s Ratio Perm						0.00			0.17			
v/c Ratio	1.97	0.42			1.31	0.02		1.44	0.52			
Uniform Delay, d1	36.1	12.3			37.6	28.5		33.3	26.9			
Progression Factor	0.93	1.96			1.00	1.00		1.00	1.00			
Incremental Delay, d2	435.1	0.1			154.8	0.1		207.9	0.9			
Delay (s)	468.6	24.2			192.5	28.6		241.2	27.8			
Level of Service	F	C			F	C		F	C			
Approach Delay (s)		328.8				184.4			161.3		0.0	
Approach LOS		F				F			F		A	
Intersection Summary												
HCM 2000 Control Delay		235.0									F	
HCM 2000 Volume to Capacity ratio		1.57										
Actuated Cycle Length (s)		100.0							14.1			
Intersection Capacity Utilization		162.4%									H	
Analysis Period (min)		15										
c Critical Lane Group												

HCM Signalized Intersection Capacity Analysis
6: Deer Springs Rd & I-15 SB Ramps

Exist + Proj + Sce A Cumu PM
03/17/2017

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↑	↱	↰	↑						↰	↱
Traffic Volume (vph)	0	1404	431	210	1148	0	0	0	0	50	5	490
Future Volume (vph)	0	1404	431	210	1148	0	0	0	0	50	5	490
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		5.3	5.3	4.2	5.3						4.6	4.6
Lane Util. Factor		1.00	1.00	1.00	1.00						1.00	0.88
Frt		1.00	0.85	1.00	1.00						1.00	0.85
Flt Protected		1.00	1.00	0.95	1.00						0.96	1.00
Satd. Flow (prot)		1863	1583	1770	1863						1781	2787
Flt Permitted		1.00	1.00	0.95	1.00						0.96	1.00
Satd. Flow (perm)		1863	1583	1770	1863						1781	2787
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	1526	468	228	1248	0	0	0	0	54	5	533
RTOR Reduction (vph)	0	0	122	0	0	0	0	0	0	0	0	176
Lane Group Flow (vph)	0	1526	346	228	1248	0	0	0	0	0	59	357
Turn Type	NA	Perm	Prot	NA						Split	NA	Perm
Protected Phases		2		1	6					4	4	
Permitted Phases			2									4
Actuated Green, G (s)		58.1	58.1	12.6	74.9						15.2	15.2
Effective Green, g (s)		58.1	58.1	12.6	74.9						15.2	15.2
Actuated g/C Ratio		0.58	0.58	0.13	0.75						0.15	0.15
Clearance Time (s)		5.3	5.3	4.2	5.3						4.6	4.6
Vehicle Extension (s)		3.0	3.0	3.0	3.0						3.0	3.0
Lane Grp Cap (vph)		1082	919	223	1395						270	423
v/s Ratio Prot		c0.82		c0.13	0.67						0.03	
v/s Ratio Perm			0.22									c0.13
v/c Ratio		1.41	0.38	1.02	0.89						0.22	0.85
Uniform Delay, d1		20.9	11.2	43.7	9.5						37.2	41.3
Progression Factor		1.00	1.00	0.89	1.33						1.00	1.00
Incremental Delay, d2		190.2	1.2	24.0	1.0						0.4	14.3
Delay (s)		211.2	12.4	62.8	13.6						37.6	55.6
Level of Service		F	B	E	B						D	E
Approach Delay (s)		164.5			21.2			0.0			53.8	
Approach LOS		F			C			A			D	
Intersection Summary												
HCM 2000 Control Delay		96.3									F	
HCM 2000 Volume to Capacity ratio		1.25										
Actuated Cycle Length (s)		100.0								14.1		
Intersection Capacity Utilization		162.4%									H	
Analysis Period (min)		15										

HCM Signalized Intersection Capacity Analysis
7: Deer Springs Rd & Mesa Rock Road

Exist + Proj + Sce A Cumu PM
03/17/2017

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↰	↰	↰	↰	↰	↰	↰	↰	↰	↰	↰
Traffic Volume (vph)	241	1121	30	40	698	860	40	40	40	534	27	181
Future Volume (vph)	241	1121	30	40	698	860	40	40	40	534	27	181
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5	4.5		4.5	4.5			4.5			4.5	4.5
Lane Util. Factor	1.00	0.95		1.00	0.95			1.00			1.00	1.00
Frpb, ped/bikes	1.00	1.00		1.00	0.98			0.99			1.00	0.99
Flpb, ped/bikes	1.00	1.00		1.00	1.00			1.00			1.00	1.00
Frt	1.00	1.00		1.00	0.92			0.95			1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00			0.98			0.95	1.00
Satd. Flow (prot)	1770	3522		1770	3193			1739			1778	1563
Flt Permitted	0.95	1.00		0.95	1.00			0.98			0.95	1.00
Satd. Flow (perm)	1770	3522		1770	3193			1739			1778	1563
Peak-hour factor, PHF	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Adj. Flow (vph)	248	1156	31	41	720	887	41	41	41	551	28	187
RTOR Reduction (vph)	0	2	0	0	208	0	0	19	0	0	0	91
Lane Group Flow (vph)	248	1185	0	41	1399	0	0	104	0	0	579	96
Confl. Bikes (#/hr)			16			11			3			1
Turn Type	Prot	NA		Prot	NA		Split	NA		Split	NA	Perm
Protected Phases	7	4		3	8		2	2		6	6	
Permitted Phases												6
Actuated Green, G (s)	6.5	42.7		3.2	39.4			11.1			19.9	19.9
Effective Green, g (s)	6.5	42.7		3.2	39.4			11.1			19.9	19.9
Actuated g/C Ratio	0.07	0.45		0.03	0.42			0.12			0.21	0.21
Clearance Time (s)	4.5	4.5		4.5	4.5			4.5			4.5	4.5
Vehicle Extension (s)	3.0	3.0		3.0	3.0			3.0			3.0	3.0
Lane Grp Cap (vph)	121	1584		59	1325			203			372	327
v/s Ratio Prot	c0.14	c0.34		0.02	c0.44			c0.06			c0.33	
v/s Ratio Perm												0.06
v/c Ratio	2.05	0.75		0.69	1.06			0.51			1.56	0.29
Uniform Delay, d1	44.2	21.6		45.4	27.8			39.3			37.5	31.6
Progression Factor	1.00	1.00		1.00	1.00			1.00			1.00	1.00
Incremental Delay, d2	499.8	2.0		29.9	41.0			2.2			263.3	2.3
Delay (s)	544.0	23.6		75.3	68.8			41.5			300.8	33.9
Level of Service	F	C		E	E			D			F	C
Approach Delay (s)		113.6			68.9			41.5			235.6	
Approach LOS		F			E			D			F	
Intersection Summary												
HCM 2000 Control Delay		116.3										F
HCM 2000 Volume to Capacity ratio		1.16										
Actuated Cycle Length (s)		94.9			Sum of lost time (s)			18.0				
Intersection Capacity Utilization		109.2%			ICU Level of Service			H				
Analysis Period (min)		15										
c Critical Lane Group												

HCM Unsignalized Intersection Capacity Analysis
9: Deer Springs Rd & Sarver Lane

Exist + Proj + Sce A Cumu PM
03/17/2017

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations	↰	↰	↰	↰	↰	↰
Traffic Volume (veh/h)	307	1451	791	113	46	115
Future Volume (Veh/h)	307	1451	791	113	46	115
Sign Control	Free	Free			Stop	
Grade	0%	0%			0%	
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95
Hourly flow rate (vph)	323	1527	833	119	48	121
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	952				3066	892
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	952				3066	892
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	55				0	64
cM capacity (veh/h)	722				8	341
Direction, Lane #	EB 1	EB 2	WB 1	SB 1		
Volume Total	323	1527	952	169		
Volume Left	323	0	0	48		
Volume Right	0	0	119	121		
cSH	722	1700	1700	25		
Volume to Capacity	0.45	0.90	0.56	6.73		
Queue Length 95th (ft)	58	0	0	Err		
Control Delay (s)	14.0	0.0	0.0	Err		
Lane LOS	B			F		
Approach Delay (s)	2.4		0.0	Err		
Approach LOS				F		
Intersection Summary						
Average Delay		570.3				
Intersection Capacity Utilization		92.7%		ICU Level of Service		F
Analysis Period (min)		15				

HCM Unsignalized Intersection Capacity Analysis
10: Deer Springs Rd & Sycamore Road

Exist + Proj + Sce A Cumu PM
03/17/2017

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations	↰	↱	↰		↰	↱
Traffic Volume (veh/h)	30	20	1473	10	10	931
Future Volume (Veh/h)	30	20	1473	10	10	931
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94
Hourly flow rate (vph)	32	21	1567	11	11	990
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)		4				
Median type			None		None	
Median storage (veh)						
Upstream signal (ft)			680			
pX, platoon unblocked	0.29	0.29			0.29	
vC, conflicting volume	2584	1572			1578	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	5294	1754			1773	
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	31			89	
cM capacity (veh/h)	0	30			100	
Direction, Lane #	WB 1	NB 1	SB 1			
Volume Total	53	1578	1001			
Volume Left	32	0	11			
Volume Right	21	11	0			
cSH	0	1700	100			
Volume to Capacity	298.34	0.93	0.11			
Queue Length 95th (ft)	Err	0	9			
Control Delay (s)	Err	0.0	12.3			
Lane LOS	F		B			
Approach Delay (s)	Err	0.0	12.3			
Approach LOS	F					
Intersection Summary						
Average Delay		206.0				
Intersection Capacity Utilization		88.1%		ICU Level of Service	E	
Analysis Period (min)		15				

HCM Unsignalized Intersection Capacity Analysis
11: Twin Oaks Valley Road & Camino Mayor

Exist + Proj + Sce A Cumu PM
03/17/2017

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations	↰	↱	↰		↰	↱
Traffic Volume (veh/h)	20	5	50	28	5	60
Future Volume (Veh/h)	20	5	50	28	5	60
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.75	0.75	0.75	0.75	0.75	0.75
Hourly flow rate (vph)	27	7	67	37	7	80
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	180	86			104	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	180	86			104	
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	99			100	
cM capacity (veh/h)	806	973			1488	
Direction, Lane #	WB 1	NB 1	SB 1			
Volume Total	34	104	87			
Volume Left	27	0	7			
Volume Right	7	37	0			
cSH	836	1700	1488			
Volume to Capacity	0.04	0.06	0.00			
Queue Length 95th (ft)	3	0	0			
Control Delay (s)	9.5	0.0	0.6			
Lane LOS	A		A			
Approach Delay (s)	9.5	0.0	0.6			
Approach LOS	A					
Intersection Summary						
Average Delay		1.7				
Intersection Capacity Utilization		17.3%		ICU Level of Service	A	
Analysis Period (min)		15				

HCM Signalized Intersection Capacity Analysis
12: Twin Oaks Valley Rd #1/Deer Springs Rd & Twin Oaks Valley Rd
03/17/2017

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations	↰	↱	↰	↱	↱	↱
Traffic Volume (vph)	61	294	131	1439	947	52
Future Volume (vph)	61	294	131	1439	947	52
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.9	4.9	4.0	5.3	5.3	5.3
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frpb, ped/bikes	1.00	1.00	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)	1770	1583	1770	1863	1863	1546
Flt Permitted	0.95	1.00	0.95	1.00	1.00	1.00
Satd. Flow (perm)	1770	1583	1770	1863	1863	1546
Peak-hour factor, PHF	0.88	0.88	0.88	0.88	0.88	0.88
Growth Factor (vph)	100%	100%	100%	130%	130%	100%
Adj. Flow (vph)	69	334	149	2126	1399	59
RTOR Reduction (vph)	0	129	0	0	0	10
Lane Group Flow (vph)	69	205	149	2126	1399	49
Confl. Peds. (#/hr)						1
Confl. Bikes (#/hr)						2
Turn Type	Prot	Perm	Prot	NA	NA	Perm
Protected Phases	4		5	2	6	
Permitted Phases		4				6
Actuated Green, G (s)	16.0	16.0	7.0	68.0	57.0	57.0
Effective Green, g (s)	16.0	16.0	7.0	68.0	57.0	57.0
Actuated g/C Ratio	0.17	0.17	0.07	0.72	0.61	0.61
Clearance Time (s)	4.9	4.9	4.0	5.3	5.3	5.3
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	300	268	131	1344	1127	935
v/s Ratio Prot	0.04		0.08	c1.14	0.75	
v/s Ratio Perm		c0.13				0.03
v/c Ratio	0.23	0.77	1.14	1.58	1.24	0.05
Uniform Delay, d1	33.8	37.3	43.6	13.1	18.6	7.6
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	0.4	12.3	120.3	265.4	116.3	0.0
Delay (s)	34.2	49.6	163.9	278.5	134.9	7.6
Level of Service	C	D	F	F	F	A
Approach Delay (s)	47.0			271.0	129.7	
Approach LOS	D			F	F	
Intersection Summary						
HCM 2000 Control Delay		199.4		HCM 2000 Level of Service	F	
HCM 2000 Volume to Capacity ratio		1.50				
Actuated Cycle Length (s)		94.2		Sum of lost time (s)	14.2	
Intersection Capacity Utilization		110.3%		ICU Level of Service	H	
Analysis Period (min)		15				
c Critical Lane Group						

HCM Signalized Intersection Capacity Analysis
13: Twin Oaks Valley Rd #1 & Buena Creek Rd
03/17/2017

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↰	↱		↰	↱	↰	↱		↰	↱	↱
Traffic Volume (vph)	639	0	250	5	0	0	200	891	0	5	711	490
Future Volume (vph)	639	0	250	5	0	0	200	891	0	5	711	490
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		5.0	5.5		4.5	5.5	5.5
Lane Util. Factor		1.00	1.00		1.00		1.00	1.00		1.00	1.00	1.00
Frpb, ped/bikes		1.00	1.00		1.00		1.00	1.00		1.00	1.00	0.97
Flpb, ped/bikes		1.00	1.00		1.00		1.00	1.00		1.00	1.00	1.00
Frt		1.00	0.85		1.00		1.00	1.00		1.00	1.00	0.85
Flt Protected		0.95	1.00		0.95		0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)		1770	1583		1770		1770	1863		1770	1863	1543
Flt Permitted		0.75	1.00		0.14		0.95	1.00		0.95	1.00	1.00
Satd. Flow (perm)		1405	1583		262		1770	1863		1770	1863	1543
Peak-hour factor, PHF	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Adj. Flow (vph)	687	0	269	5	0	0	215	958	0	5	765	527
RTOR Reduction (vph)	0	0	101	0	0	0	0	0	0	0	0	117
Lane Group Flow (vph)	0	687	168	0	5	0	215	958	0	5	765	410
Confl. Peds. (#/hr)												1
Confl. Bikes (#/hr)												5
Turn Type	Perm	NA	Perm	Perm	NA		Prot	NA		Prot	NA	Perm
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4		4	8								6
Actuated Green, G (s)		28.4	28.4		28.4		12.0	50.4		0.8	38.7	38.7
Effective Green, g (s)		28.4	28.4		28.4		12.0	50.4		0.8	38.7	38.7
Actuated g/C Ratio		0.30	0.30		0.30		0.13	0.54		0.01	0.41	0.41
Clearance Time (s)		4.0	4.0		4.0		5.0	5.5		4.5	5.5	5.5
Vehicle Extension (s)		3.0	3.0		3.0		3.0	3.0		3.0	3.0	3.0
Lane Grp Cap (vph)		426	480		79		226	1003		15	770	637
v/s Ratio Prot							c0.12	c0.51		0.00	0.41	
v/s Ratio Perm		c0.49	0.11		0.02							0.27
v/c Ratio		1.61	0.35		0.06		0.95	0.96		0.33	0.99	0.64
Uniform Delay, d1		32.6	25.4		23.2		40.5	20.5		46.1	27.3	21.9
Progression Factor		1.00	1.00		1.00		1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2		286.4	0.4		0.3		46.1	18.4		12.7	30.6	2.2
Delay (s)		319.0	25.9		23.5		86.6	38.9		58.8	58.0	24.2
Level of Service		F	C		C		F	D		E	E	C
Approach Delay (s)		236.5			23.5			47.7			44.2	
Approach LOS		F			C			D			D	
Intersection Summary												
HCM 2000 Control Delay		99.0		HCM 2000 Level of Service	F							
HCM 2000 Volume to Capacity ratio		1.22										
Actuated Cycle Length (s)		93.6		Sum of lost time (s)	14.5							
Intersection Capacity Utilization		95.1%		ICU Level of Service	F							
Analysis Period (min)		15										
c Critical Lane Group												

HCM Signalized Intersection Capacity Analysis
14: Twin Oaks Valley Rd #1 & Cassou Rd

Exist + Proj + Sce A Cumu PM
03/17/2017

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↔			↔		↖	↗	↖	↗	↖	↗
Traffic Volume (vph)	18	0	56	15	5	32	51	1038	20	13	801	23
Future Volume (vph)	18	0	56	15	5	32	51	1038	20	13	801	23
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		5.0			5.0			5.0		5.0		5.0
Lane Util. Factor		1.00			1.00			1.00		1.00		1.00
Frpb, ped/bikes		0.99			1.00			1.00		1.00		1.00
Flpb, ped/bikes		1.00			1.00			1.00		1.00		1.00
Frt		0.90			0.92			1.00		0.85		1.00
Flt Protected		0.99			0.99			0.95		1.00		0.95
Satd. Flow (prot)		1635			1683			1770		1583		1770
Flt Permitted		0.99			0.99			0.95		1.00		0.95
Satd. Flow (perm)		1635			1683			1770		1583		1770
Peak-hour factor, PHF	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Adj. Flow (vph)	19	0	60	16	5	34	55	1116	22	14	861	25
RTOR Reduction (vph)	0	73	0	0	31	0	0	0	8	0	0	0
Lane Group Flow (vph)	0	6	0	0	24	0	55	1116	14	14	886	0
Confl. Peds. (#/hr)			1									
Turn Type	Split	NA		Split	NA		Prot	NA	Perm	Prot	NA	
Protected Phases	4	4		8	8		5	2		1	6	
Permitted Phases								2				
Actuated Green, G (s)		7.1			7.7		3.9	57.1	57.1	0.7	53.9	
Effective Green, g (s)		7.1			7.7		3.9	57.1	57.1	0.7	53.9	
Actuated g/C Ratio		0.08			0.08		0.04	0.62	0.62	0.01	0.58	
Clearance Time (s)		5.0			5.0		5.0	5.0	5.0	5.0	5.0	
Vehicle Extension (s)		3.0			3.0		3.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)		125			139		74	1148	976	13	1079	
v/s Ratio Prot		c0.00			c0.01		c0.03	c0.60		0.01	0.48	
v/s Ratio Perm								0.01				
v/c Ratio		0.05			0.17		0.74	0.97	0.01	1.08	0.82	
Uniform Delay, d1		39.6			39.5		43.9	17.0	6.9	45.9	15.5	
Progression Factor		1.00			1.00		1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2		0.2			0.6		32.7	20.0	0.0	276.9	5.1	
Delay (s)		39.8			40.1		76.6	37.0	6.9	322.9	20.6	
Level of Service		D			D		E	D	A	F	C	
Approach Delay (s)		39.8			40.1			38.3			25.3	
Approach LOS		D			D			D			C	

Intersection Summary

HCM 2000 Control Delay	33.1	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.82		
Actuated Cycle Length (s)	92.6	Sum of lost time (s)	20.0
Intersection Capacity Utilization	69.1%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis
15: Twin Oaks Valley Rd #1 & La Cienega

Exist + Proj + Sce A Cumu PM
03/17/2017

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations	↖	↗	↕	↖	↗	↕
Traffic Volume (vph)	108	64	1091	127	109	741
Future Volume (vph)	108	64	1091	127	109	741
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)		6.0	6.5		6.0	6.5
Lane Util. Factor	1.00	1.00	0.95		1.00	0.95
Frpb, ped/bikes	1.00	1.00	0.99		1.00	1.00
Flpb, ped/bikes	1.00	1.00	1.00		1.00	1.00
Frt	1.00	0.85	0.98		1.00	1.00
Flt Protected	0.95	1.00	1.00		0.95	1.00
Satd. Flow (prot)	1770	1583	3466		1770	3539
Flt Permitted	0.95	1.00	1.00		0.95	1.00
Satd. Flow (perm)	1770	1583	3466		1770	3539
Peak-hour factor, PHF	0.98	0.98	0.98	0.98	0.98	0.98
Adj. Flow (vph)	110	65	1113	130	111	756
RTOR Reduction (vph)	0	0	8	0	0	0
Lane Group Flow (vph)	110	65	1235	0	111	756
Confl. Peds. (#/hr)				13		
Confl. Bikes (#/hr)				3		
Turn Type	Prot	Perm	NA		Prot	NA
Protected Phases	8		2		1	6
Permitted Phases		8				
Actuated Green, G (s)	9.2	9.2	38.4		7.9	52.3
Effective Green, g (s)	9.2	9.2	38.4		7.9	52.3
Actuated g/C Ratio	0.12	0.12	0.52		0.11	0.71
Clearance Time (s)	6.0	6.0	6.5		6.0	6.5
Vehicle Extension (s)	3.0	3.0	3.0		3.0	3.0
Lane Grp Cap (vph)	220	196	1798		188	2501
v/s Ratio Prot	c0.06		c0.36		c0.06	0.21
v/s Ratio Perm		0.04				
v/c Ratio	0.50	0.33	0.69		0.59	0.30
Uniform Delay, d1	30.3	29.6	13.3		31.5	4.0
Progression Factor	1.00	1.00	1.00		1.00	1.00
Incremental Delay, d2	1.8	1.0	1.1		4.9	0.1
Delay (s)	32.0	30.6	14.4		36.4	4.1
Level of Service	C	C	B		D	A
Approach Delay (s)	31.5		14.4			8.2
Approach LOS	C		B			A

Intersection Summary

HCM 2000 Control Delay	13.4	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.64		
Actuated Cycle Length (s)	74.0	Sum of lost time (s)	18.5
Intersection Capacity Utilization	61.8%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis
16: Twin Oaks Valley Rd #1 & Del Roy Dr

Exist + Proj + Sce A Cumu PM
03/17/2017

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↱		↰	↱		↰	↱		↰	↱	
Traffic Volume (vph)	12	0	57	30	0	10	90	1126	25	15	796	18
Future Volume (vph)	12	0	57	30	0	10	90	1126	25	15	796	18
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	5.0		5.0	5.0		5.0	5.0		5.0	5.0	
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	0.95		1.00	0.95	
Frpb, ped/bikes	1.00	0.99		1.00	1.00		1.00	1.00		1.00	1.00	
Flpb, ped/bikes	1.00	1.00		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		1.00	1.00	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770	1561		1770	1583		1770	3524		1770	3526	
Flt Permitted	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (perm)	1770	1561		1770	1583		1770	3524		1770	3526	
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	13	0	63	33	0	11	100	1251	28	17	884	20
RTOR Reduction (vph)	0	57	0	0	10	0	0	1	0	0	2	0
Lane Group Flow (vph)	13	6	0	33	1	0	100	1278	0	17	902	0
Confl. Peds. (#/hr)								14			1	
Confl. Bikes (#/hr)			1					4			4	
Turn Type	Prot	NA		Prot	NA		Prot	NA		Prot	NA	
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases												
Actuated Green, G (s)	0.5	6.2		1.8	7.5		6.7	38.6		0.4	32.3	
Effective Green, g (s)	0.5	6.2		1.8	7.5		6.7	38.6		0.4	32.3	
Actuated g/C Ratio	0.01	0.09		0.03	0.11		0.10	0.58		0.01	0.48	
Clearance Time (s)	5.0	5.0		5.0	5.0		5.0	5.0		5.0	5.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	13	144		47	177		177	2030		10	1699	
v/s Ratio Prot	0.01	c0.00		c0.02	0.00		c0.06	c0.36		0.01	0.26	
v/s Ratio Perm												
v/c Ratio	1.00	0.04		0.70	0.01		0.56	0.63		1.70	0.53	
Uniform Delay, d1	33.2	27.7		32.3	26.4		28.8	9.4		33.3	12.1	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	249.6	0.1		38.0	0.0		4.1	0.6		560.6	0.3	
Delay (s)	282.9	27.8		70.3	26.5		32.8	10.1		593.9	12.4	
Level of Service	F	C		E	C		C	B		F	B	
Approach Delay (s)		71.4			59.4			11.7			23.1	
Approach LOS		E			E			B			C	

Intersection Summary			
HCM 2000 Control Delay	18.8	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.58		
Actuated Cycle Length (s)	67.0	Sum of lost time (s)	20.0
Intersection Capacity Utilization	56.1%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis
17: Twin Oaks Valley Rd #1 & Windy Wy

Exist + Proj + Sce A Cumu PM
03/17/2017

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰		↱				↰	↱		↰	↱	
Traffic Volume (vph)	20	0	55	0	0	0	45	1177	5	6	887	10
Future Volume (vph)	20	0	55	0	0	0	45	1177	5	6	887	10
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	6.0		4.0	6.0	
Lane Util. Factor	1.00		1.00				1.00	0.95		1.00	0.95	
Frpb, ped/bikes	1.00		0.99				1.00	1.00		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	1.00		1.00	1.00	
Flt Protected	0.95		1.00				0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770		1563				1770	3537		1770	3532	
Flt Permitted	0.95		1.00				0.95	1.00		0.95	1.00	
Satd. Flow (perm)	1770		1563				1770	3537		1770	3532	
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	20	0	55	0	0	0	45	1177	5	6	887	10
RTOR Reduction (vph)	0	0	49	0	0	0	0	0	0	0	1	0
Lane Group Flow (vph)	20	0	6	0	0	0	45	1182	0	6	896	0
Confl. Peds. (#/hr)			1			2			1		4	
Confl. Bikes (#/hr)			2			2			2		5	
Turn Type	Prot		Perm				Prot	NA		Prot	NA	
Protected Phases	4						5	2		1	6	
Permitted Phases			4									
Actuated Green, G (s)	5.3		5.3				2.4	32.4		0.7	30.7	
Effective Green, g (s)	5.3		5.3				2.4	32.4		0.7	30.7	
Actuated g/C Ratio	0.10		0.10				0.05	0.62		0.01	0.59	
Clearance Time (s)	4.0		4.0				4.0	6.0		4.0	6.0	
Vehicle Extension (s)	3.0		3.0				3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	179		158				81	2187		23	2069	
v/s Ratio Prot	c0.01						c0.03	c0.33		0.00	0.25	
v/s Ratio Perm			0.00									
v/c Ratio	0.11		0.04				0.56	0.54		0.26	0.43	
Uniform Delay, d1	21.4		21.2				24.5	5.7		25.6	6.0	
Progression Factor	1.00		1.00				1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.3		0.1				8.0	0.3		6.0	0.1	
Delay (s)	21.7		21.3				32.5	6.0		31.6	6.2	
Level of Service	C		C				C	A		C	A	
Approach Delay (s)		21.4			0.0			7.0			6.3	
Approach LOS		C			A			A			A	

Intersection Summary			
HCM 2000 Control Delay	7.2	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.50		
Actuated Cycle Length (s)	52.4	Sum of lost time (s)	14.0
Intersection Capacity Utilization	49.1%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis
18: Twin Oaks Valley Rd #1 & Borden Rd

Exist + Proj + Sce A Cumu PM
03/17/2017

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↱		↰	↱		↰	↱	↰	↱	↰	↱
Traffic Volume (vph)	203	252	222	194	221	54	241	1007	304	84	778	116
Future Volume (vph)	203	252	222	194	221	54	241	1007	304	84	778	116
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.2	5.3		4.2	5.3		4.2	4.9	4.9	4.2	4.9	4.9
Lane Util. Factor	1.00	0.95		1.00	0.95		1.00	0.95	1.00	1.00	0.95	1.00
Frpb, ped/bikes	1.00	0.99		1.00	1.00		1.00	1.00	0.99	1.00	1.00	0.98
Flpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	0.93		1.00	0.97		1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1770	3269		1770	3425		1770	3539	1560	1770	3539	1555
Flt Permitted	0.95	1.00		0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	1770	3269		1770	3425		1770	3539	1560	1770	3539	1555
Peak-hour factor, PHF	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Adj. Flow (vph)	211	262	231	202	230	56	251	1049	317	88	810	121
RTOR Reduction (vph)	0	92	0	0	12	0	0	0	85	0	0	81
Lane Group Flow (vph)	211	402	0	202	274	0	251	1049	232	88	810	40
Confl. Peds. (#/hr)			2									2
Confl. Bikes (#/hr)						3			5			5
Turn Type	Prot	NA		Prot	NA		Prot	NA	Perm	Prot	NA	Perm
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases									2			6
Actuated Green, G (s)	22.2	23.6		21.2	22.6		25.4	51.7	12.3	38.6		38.6
Effective Green, g (s)	22.2	23.6		21.2	22.6		25.4	51.7	12.3	38.6		38.6
Actuated g/C Ratio	0.17	0.19		0.17	0.18		0.20	0.41	0.10	0.30		0.30
Clearance Time (s)	4.2	5.3		4.2	5.3		4.2	4.9	4.9	4.2		4.9
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)	308	605		294	607		352	1436	633	170	1072	471
v/s Ratio Prot	c0.12	c0.12		0.11	0.08		c0.14	c0.30		0.05	0.23	
v/s Ratio Perm									0.15			0.03
v/c Ratio	0.69	0.66		0.69	0.45		0.71	0.73	0.37	0.52	0.76	0.09
Uniform Delay, d1	49.3	48.2		50.0	46.9		47.6	32.0	26.4	54.7	40.1	31.8
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	6.2	2.8		6.5	0.5		6.7	1.9	0.4	2.6	3.1	0.1
Delay (s)	55.5	51.0		56.5	47.4		54.3	33.9	26.8	57.4	43.2	31.8
Level of Service	E	D		E	D		D	C	C	E	D	C
Approach Delay (s)		52.3			51.2			35.7			43.1	
Approach LOS		D			D			D			D	
Intersection Summary												
HCM 2000 Control Delay		42.7			HCM 2000 Level of Service			D				
HCM 2000 Volume to Capacity ratio		0.73										
Actuated Cycle Length (s)		127.4			Sum of lost time (s)			18.6				
Intersection Capacity Utilization		76.3%			ICU Level of Service			D				
Analysis Period (min)		15										
c Critical Lane Group												

HCM Signalized Intersection Capacity Analysis
19: Twin Oaks Valley Rd #1 & Richmar Ave

Exist + Proj + Sce A Cumu PM
03/17/2017

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↱		↰	↱		↰	↱	↰	↱	↰	↱
Traffic Volume (vph)	217	15	144	15	10	5	193	1605	30	70	1472	184
Future Volume (vph)	217	15	144	15	10	5	193	1605	30	70	1472	184
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.9	4.9		4.0	4.0		4.0	5.7		4.0	5.7	
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	0.95		1.00	0.95	
Frpb, ped/bikes	1.00	1.00		1.00	0.99		1.00	1.00		1.00	1.00	
Flpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Frt	1.00	0.86		1.00	0.95		1.00	1.00		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	1610		1770	1756		1770	3526		1770	3472	
Flt Permitted	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (perm)	1770	1610		1770	1756		1770	3526		1770	3472	
Peak-hour factor, PHF	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Adj. Flow (vph)	226	16	150	16	10	5	201	1672	31	73	1533	192
RTOR Reduction (vph)	0	126	0	0	5	0	0	1	0	0	6	0
Lane Group Flow (vph)	226	40	0	16	10	0	201	1702	0	73	1719	0
Confl. Peds. (#/hr)						9				7		
Confl. Bikes (#/hr)									8			3
Turn Type	Split	NA		Split	NA		Prot	NA		Prot	NA	
Protected Phases	4	4		8	8		5	2		1	6	
Permitted Phases												
Actuated Green, G (s)	18.8	18.8		7.5	7.5		12.1	67.1		7.9	62.9	
Effective Green, g (s)	18.8	18.8		7.5	7.5		12.1	67.1		7.9	62.9	
Actuated g/C Ratio	0.16	0.16		0.06	0.06		0.10	0.56		0.07	0.52	
Clearance Time (s)	4.9	4.9		4.0	4.0		4.0	5.7		4.0	5.7	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	277	252		110	109		178	1973		116	1821	
v/s Ratio Prot	c0.13	0.02		c0.01	0.01		c0.11	0.48		0.04	c0.50	
v/s Ratio Perm												
v/c Ratio	0.82	0.16		0.15	0.09		1.13	0.86		0.63	0.94	
Uniform Delay, d1	48.9	43.7		53.2	53.0		53.9	22.5		54.6	26.8	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	16.7	0.3		0.6	0.4		106.4	4.2		10.2	10.6	
Delay (s)	65.6	44.0		53.8	53.4		160.3	26.6		64.8	37.5	
Level of Service	E	D		D	D		F	C		E	D	
Approach Delay (s)		56.4			53.6			40.8			38.6	
Approach LOS		E			D			D			D	
Intersection Summary												
HCM 2000 Control Delay		41.4			HCM 2000 Level of Service			D				
HCM 2000 Volume to Capacity ratio		0.88										
Actuated Cycle Length (s)		119.9			Sum of lost time (s)			18.6				
Intersection Capacity Utilization		88.1%			ICU Level of Service			E				
Analysis Period (min)		15										
c Critical Lane Group												

HCM Signalized Intersection Capacity Analysis
20: Twin Oaks Valley Rd/Twin Oaks Valley Rd #1 & San Marcos Blvd

Exist + Proj + Sce A Cumu PM

03/17/2017

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↔	↔	↔	↔	↔		↔	↔	↔	↔	↔	↔
Traffic Volume (vph)	442	925	346	572	486	125	579	1261	504	157	1162	298
Future Volume (vph)	442	925	346	572	486	125	579	1261	504	157	1162	298
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.2	5.3	5.3	4.2	5.0		4.2	5.3	4.2	5.0	5.3	
Lane Util. Factor	0.97	0.95	1.00	0.97	0.95		0.97	0.95	1.00	0.97	0.95	
Frpb, ped/bikes	1.00	1.00	0.97	1.00	1.00		1.00	1.00	0.99	1.00	1.00	
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00	1.00	1.00	
Frt	1.00	1.00	0.85	1.00	0.97		1.00	1.00	0.85	1.00	0.97	
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)	3433	3539	1538	3433	3416		3433	3539	1560	3433	3420	
Flt Permitted	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00	0.95	1.00	
Satd. Flow (perm)	3433	3539	1538	3433	3416		3433	3539	1560	3433	3420	
Peak-hour factor, PHF	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Adj. Flow (vph)	475	995	372	615	523	134	623	1356	542	169	1249	320
RTOR Reduction (vph)	0	0	127	0	19	0	0	0	0	0	19	0
Lane Group Flow (vph)	475	995	245	615	638	0	623	1356	542	169	1550	0
Confl. Peds. (#/hr)			9			2			4			1
Confl. Bikes (#/hr)			6			7			6			4
Turn Type	Prot	NA	Perm	Prot	NA		Prot	NA	pm+ov	Prot	NA	
Protected Phases	7	4		3	8		5	2	3	1	6	
Permitted Phases			4						2			
Actuated Green, G (s)	15.4	28.1	28.1	15.5	28.5		15.0	47.2	62.7	9.4	42.4	
Effective Green, g (s)	15.4	28.1	28.1	15.5	28.5		15.0	47.2	62.7	9.4	42.4	
Actuated g/C Ratio	0.13	0.23	0.23	0.13	0.24		0.12	0.39	0.52	0.08	0.35	
Clearance Time (s)	4.2	5.3	5.3	4.2	5.0		4.2	5.3	4.2	5.0	5.3	
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)	440	828	360	443	811		429	1392	815	268	1208	
v/s Ratio Prot	0.14	c0.28		c0.18	0.19		c0.18	0.38	0.09	0.05	c0.45	
v/s Ratio Perm			0.16						0.26			
v/c Ratio	1.08	1.20	0.68	1.39	0.79		1.45	0.97	0.67	0.63	1.28	
Uniform Delay, d1	52.3	46.0	41.9	52.2	42.9		52.5	35.8	21.0	53.6	38.8	
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	65.9	102.3	5.2	188.2	5.1		216.2	18.1	2.1	4.8	133.9	
Delay (s)	118.2	148.2	47.1	240.5	48.0		268.7	53.9	23.0	58.4	172.7	
Level of Service	F	F	D	F	D		F	D	C	E	F	
Approach Delay (s)		120.1			141.0			100.4			161.6	
Approach LOS		F			F			F			F	

Intersection Summary			
HCM 2000 Control Delay	126.7	HCM 2000 Level of Service	F
HCM 2000 Volume to Capacity ratio	1.31		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	19.8
Intersection Capacity Utilization	115.9%	ICU Level of Service	H
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis
21: Twin Oaks Valley Rd & SR 78 WB Ramps

Exist + Proj + Sce A Cumu PM

03/17/2017

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations				↔		↔		↔	↔		↔	↔
Traffic Volume (vph)	0	0	0	806	0	337	0	1980	816	0	1755	367
Future Volume (vph)	0	0	0	806	0	337	0	1980	816	0	1755	367
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)				4.6		4.6		5.3	4.6		5.3	5.3
Lane Util. Factor				0.97		0.88		0.91	1.00		0.91	1.00
Frpb, ped/bikes				1.00		1.00		1.00	0.96		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	0.85		1.00	0.85
Flt Protected				0.95		1.00		1.00	1.00		1.00	1.00
Satd. Flow (prot)				3433		2787		5085	1515		5085	1548
Flt Permitted				0.95		1.00		1.00	1.00		1.00	1.00
Satd. Flow (perm)				3433		2787		5085	1515		5085	1548
Peak-hour factor, PHF	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Adj. Flow (vph)	0	0	0	840	0	351	0	2062	850	0	1828	382
RTOR Reduction (vph)	0	0	0	0	0	14	0	0	0	0	0	138
Lane Group Flow (vph)	0	0	0	840	0	337	0	2063	850	0	1828	244
Confl. Peds. (#/hr)								12				4
Confl. Bikes (#/hr)								4				4
Turn Type				Prot		Prot		NA	pm+ov		NA	Perm
Protected Phases				8		8		2	8		6	
Permitted Phases								2				6
Actuated Green, G (s)				40.9		40.9		69.2	110.1		69.2	69.2
Effective Green, g (s)				40.9		40.9		69.2	110.1		69.2	69.2
Actuated g/C Ratio				0.34		0.34		0.58	0.92		0.58	0.58
Clearance Time (s)				4.6		4.6		5.3	4.6		5.3	5.3
Vehicle Extension (s)				3.0		3.0		3.0	3.0		3.0	3.0
Lane Grp Cap (vph)				1170		949		2932	1448		2932	892
v/s Ratio Prot				c0.24		0.12		c0.41	0.20		0.36	
v/s Ratio Perm									0.36			0.16
v/c Ratio				0.72		0.36		0.70	0.59		0.62	0.27
Uniform Delay, d1				34.5		29.7		18.1	0.9		16.8	12.8
Progression Factor				1.00		1.00		0.19	16.18		1.00	1.00
Incremental Delay, d2				2.1		0.2		0.1	0.1		1.0	0.8
Delay (s)				36.6		29.9		3.6	14.4		17.8	13.5
Level of Service				D		C		A	B		B	B
Approach Delay (s)		0.0			34.7			6.8			17.1	
Approach LOS		A			C			A			B	

Intersection Summary			
HCM 2000 Control Delay	15.6	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.71		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	9.9
Intersection Capacity Utilization	69.0%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis
22: Twin Oaks Valley Rd & SR 78 EB Ramps

Exist + Proj + Sce A Cumu PM
03/17/2017

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↱	↲					↰	↱	↲	↰	↱
Traffic Volume (vph)	246	35	532	0	0	0	0	2541	1029	343	2188	0
Future Volume (vph)	246	35	532	0	0	0	0	2541	1029	343	2188	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.6	4.6	4.6					5.3	5.3	4.2	5.3	
Lane Util. Factor	0.95	0.91	0.95					0.91	1.00	0.97	0.91	
Frpb, ped/bikes	1.00	0.99	0.99					1.00	0.99	1.00	1.00	
Flpb, ped/bikes	1.00	1.00	1.00					1.00	1.00	1.00	1.00	
Frt	1.00	0.88	0.85					1.00	0.85	1.00	1.00	
Flt Protected	0.95	1.00	1.00					1.00	1.00	0.95	1.00	
Satd. Flow (prot)	1681	1468	1482					5085	1561	3433	5085	
Flt Permitted	0.95	1.00	1.00					1.00	1.00	0.95	1.00	
Satd. Flow (perm)	1681	1468	1482					5085	1561	3433	5085	
Peak-hour factor, PHF	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Adj. Flow (vph)	256	36	554	0	0	0	0	2647	1072	357	2279	0
RTOR Reduction (vph)	0	4	44	0	0	0	0	0	324	0	0	0
Lane Group Flow (vph)	230	307	261	0	0	0	0	2647	748	357	2279	0
Confl. Peds. (#/hr)			3									
Confl. Bikes (#/hr)								5				2
Turn Type	Split	NA	Perm					NA	Perm	Prot	NA	
Protected Phases	4	4						2		1	6	
Permitted Phases			4					2				
Actuated Green, G (s)	31.2	31.2	31.2					58.0	58.0	16.7	78.9	
Effective Green, g (s)	31.2	31.2	31.2					58.0	58.0	16.7	78.9	
Actuated g/C Ratio	0.26	0.26	0.26					0.48	0.48	0.14	0.66	
Clearance Time (s)	4.6	4.6	4.6					5.3	5.3	4.2	5.3	
Vehicle Extension (s)	3.0	3.0	3.0					3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	437	381	385					2457	754	477	3343	
v/s Ratio Prot	0.14	c0.21						c0.52		0.10	c0.45	
v/s Ratio Perm			0.18						0.48			
v/c Ratio	0.53	0.80	0.68					1.08	0.99	0.75	0.68	
Uniform Delay, d1	38.1	41.5	39.9					31.0	30.8	49.6	12.8	
Progression Factor	1.00	1.00	1.00					1.00	1.00	1.07	0.66	
Incremental Delay, d2	1.1	11.7	4.7					43.0	30.8	5.1	0.9	
Delay (s)	39.2	53.2	44.6					74.0	61.5	58.2	9.4	
Level of Service	D	D	D					E	E	E	A	
Approach Delay (s)		46.3			0.0			70.4			16.0	
Approach LOS		D			A			E			B	
Intersection Summary												
HCM 2000 Control Delay		47.7		HCM 2000 Level of Service					D			
HCM 2000 Volume to Capacity ratio		0.94										
Actuated Cycle Length (s)		120.0		Sum of lost time (s)					14.1			
Intersection Capacity Utilization		100.2%		ICU Level of Service					G			
Analysis Period (min)		15										
c Critical Lane Group												

HCM Signalized Intersection Capacity Analysis
23: Robelini Dr & S. Santa Fe Ave

Exist + Proj + Sce A Cumu PM
03/17/2017

						
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (vph)	522	260	251	458	370	588
Future Volume (vph)	522	260	251	458	370	588
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.3	4.6	4.4	5.3	4.6	4.4
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frpb, ped/bikes	1.00	0.99	1.00	1.00	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	1.00	1.00	0.85
Flt Protected	1.00	1.00	0.95	1.00	0.95	1.00
Satd. Flow (prot)	1863	1560	1770	1863	1770	1583
Flt Permitted	1.00	1.00	0.95	1.00	0.95	1.00
Satd. Flow (perm)	1863	1560	1770	1863	1770	1583
Peak-hour factor, PHF	0.96	0.96	0.96	0.96	0.96	0.92
Adj. Flow (vph)	544	271	261	477	385	639
RTOR Reduction (vph)	0	45	0	0	0	124
Lane Group Flow (vph)	544	226	261	477	385	515
Confl. Bikes (#/hr)	6					
Turn Type	NA	pm+ov	Prot	NA	Prot	pm+ov
Protected Phases	2	8	1	6	8	1
Permitted Phases	8					
Actuated Green, G (s)	38.9	60.9	14.8	24.5	22.0	36.8
Effective Green, g (s)	38.9	60.9	14.8	24.5	22.0	36.8
Actuated g/C Ratio	0.43	0.68	0.16	0.27	0.24	0.41
Clearance Time (s)	5.3	4.6	4.4	5.3	4.6	4.4
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	805	1055	291	507	432	647
v/s Ratio Prot	c0.29	0.05	c0.15	c0.26	c0.22	0.13
v/s Ratio Perm	0.09		0.19			
v/c Ratio	0.68	0.21	0.90	0.94	0.89	0.80
Uniform Delay, d1	20.5	5.5	36.9	32.0	32.8	23.3
Progression Factor	1.00	1.00	0.94	0.92	1.00	1.00
Incremental Delay, d2	2.3	0.1	3.7	4.0	20.0	6.8
Delay (s)	22.8	5.6	38.5	33.6	52.8	30.1
Level of Service	C	A	D	C	D	C
Approach Delay (s)	17.0			35.3	38.6	
Approach LOS	B			D	D	
Intersection Summary						
HCM 2000 Control Delay			30.9	HCM 2000 Level of Service		C
HCM 2000 Volume to Capacity ratio			0.84			
Actuated Cycle Length (s)			90.0	Sum of lost time (s)		14.3
Intersection Capacity Utilization			73.8%	ICU Level of Service		D
Analysis Period (min)			15			
c Critical Lane Group						

HCM Signalized Intersection Capacity Analysis
24: Sycamore Avenue/Robelini Dr & SR 78 WB Ramps

Exist + Proj + Sce A Cumu PM
03/17/2017

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	0	0	670	10	330	790	1168	0	0	594	587
Future Volume (vph)	0	0	0	670	10	330	790	1168	0	0	594	587
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)				4.6	4.6	4.6	4.2	5.0			5.0	5.0
Lane Util. Factor				0.95	0.95	0.88	0.97	0.91			0.91	1.00
Frpb, ped/bikes				1.00	1.00	0.99	1.00	1.00			1.00	0.97
Flpb, ped/bikes				1.00	1.00	1.00	1.00	1.00			1.00	1.00
Frt				1.00	1.00	0.85	1.00	1.00			1.00	0.85
Flt Protected				0.95	0.95	1.00	0.95	1.00			1.00	1.00
Satd. Flow (prot)				1681	1688	2750	3433	5085			5085	1540
Flt Permitted				0.95	0.95	1.00	0.95	1.00			1.00	1.00
Satd. Flow (perm)				1681	1688	2750	3433	5085			5085	1540
Peak-hour factor, PHF	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98
Adj. Flow (vph)	0	0	0	684	10	337	806	1192	0	0	606	599
RTOR Reduction (vph)	0	0	0	0	0	109	0	0	0	0	0	349
Lane Group Flow (vph)	0	0	0	349	345	228	806	1192	0	0	606	250
Confl. Peds. (#/hr)	1											
Confl. Bikes (#/hr)	1											
Turn Type				Split	NA	Perm	Prot	NA			NA	Perm
Protected Phases				8	8		5	2			6	
Permitted Phases						8						6
Actuated Green, G (s)				28.7	28.7	28.7	30.0	71.7			37.5	37.5
Effective Green, g (s)				28.7	28.7	28.7	30.0	71.7			37.5	37.5
Actuated g/C Ratio				0.26	0.26	0.26	0.27	0.65			0.34	0.34
Clearance Time (s)				4.6	4.6	4.6	4.2	5.0			5.0	5.0
Vehicle Extension (s)				3.0	3.0	3.0	3.0	3.0			3.0	3.0
Lane Grp Cap (vph)				438	440	717	936	3314			1733	525
v/s Ratio Prot				c0.21	0.20		c0.23	0.23			0.12	
v/s Ratio Perm						0.08						c0.16
v/c Ratio				0.80	0.78	0.32	0.86	0.36			0.35	0.48
Uniform Delay, d1				37.9	37.8	32.8	38.0	8.7			27.1	28.5
Progression Factor				1.00	1.00	1.00	1.46	0.99			1.00	1.00
Incremental Delay, d2				9.7	8.9	0.3	6.3	0.2			0.6	3.1
Delay (s)				47.6	46.6	33.0	61.9	8.8			27.7	31.6
Level of Service				D	D	C	E	A			C	C
Approach Delay (s)		0.0			42.5			30.2			29.6	
Approach LOS		A			D			C			C	
Intersection Summary												
HCM 2000 Control Delay			33.1	HCM 2000 Level of Service						C		
HCM 2000 Volume to Capacity ratio			0.69									
Actuated Cycle Length (s)			110.0	Sum of lost time (s)					13.8			
Intersection Capacity Utilization			96.9%	ICU Level of Service						F		
Analysis Period (min)			15									
c Critical Lane Group												

HCM Signalized Intersection Capacity Analysis
25: Sycamore Avenue & SR 78 EB Ramps

Exist + Proj + Sce A Cumu PM
03/17/2017

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations								  		 	  	
Traffic Volume (vph)	557	5	420	0	0	0	0	1611	940	250	1184	0
Future Volume (vph)	557	5	420	0	0	0	0	1611	940	250	1184	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.6	4.6	4.6					5.0	5.0	4.2	5.0	
Lane Util. Factor	0.95	0.91	0.95					0.91	1.00	0.97	0.91	
Frpb, ped/bikes	1.00	1.00	1.00					1.00	0.98	1.00	1.00	
Flpb, ped/bikes	1.00	1.00	1.00					1.00	1.00	1.00	1.00	
Frt	1.00	0.95	0.85					1.00	0.85	1.00	1.00	
Flt Protected	0.95	0.97	1.00					1.00	1.00	0.95	1.00	
Satd. Flow (prot)	1681	1560	1504					5085	1557	3433	5085	
Flt Permitted	0.95	0.97	1.00					1.00	1.00	0.95	1.00	
Satd. Flow (perm)	1681	1560	1504					5085	1557	3433	5085	
Peak-hour factor, PHF	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Adj. Flow (vph)	574	5	433	0	0	0	0	1661	969	258	1221	0
RTOR Reduction (vph)	0	17	51	0	0	0	0	0	262	0	0	0
Lane Group Flow (vph)	350	325	269	0	0	0	0	1661	707	258	1221	0
Confl. Peds. (#/hr)									2			7
Confl. Bikes (#/hr)									3			2
Turn Type	Split	NA	Perm					NA	Perm	Prot	NA	
Protected Phases	4	4						2		1	6	
Permitted Phases			4						2			
Actuated Green, G (s)	29.6	29.6	29.6					55.1	55.1	11.5	70.8	
Effective Green, g (s)	29.6	29.6	29.6					55.1	55.1	11.5	70.8	
Actuated g/C Ratio	0.27	0.27	0.27					0.50	0.50	0.10	0.64	
Clearance Time (s)	4.6	4.6	4.6					5.0	5.0	4.2	5.0	
Vehicle Extension (s)	3.0	3.0	3.0					3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	452	419	404					2547	779	358	3272	
v/s Ratio Prot	0.21	c0.21						0.33		c0.08	0.24	
v/s Ratio Perm			0.18						c0.45			
v/c Ratio	0.77	0.78	0.67					0.65	0.91	0.72	0.37	
Uniform Delay, d1	37.1	37.1	35.8					20.3	25.1	47.7	9.2	
Progression Factor	1.00	1.00	1.00					1.00	1.00	1.45	1.43	
Incremental Delay, d2	8.1	8.7	4.1					1.3	16.3	6.9	0.3	
Delay (s)	45.2	45.9	39.9					21.7	41.4	76.0	13.4	
Level of Service	D	D	D					C	D	E	B	
Approach Delay (s)		43.8			0.0			28.9			24.4	
Approach LOS		D			A			C			C	
Intersection Summary												
HCM 2000 Control Delay			30.5	HCM 2000 Level of Service					C			
HCM 2000 Volume to Capacity ratio			0.84									
Actuated Cycle Length (s)			110.0	Sum of lost time (s)					13.8			
Intersection Capacity Utilization			96.9%	ICU Level of Service					F			
Analysis Period (min)			15									
c Critical Lane Group												

HCM Signalized Intersection Capacity Analysis
26: S. Santa Fe Ave & Buena Creek Rd

Exist + Proj + Sce A Cumu PM
03/17/2017

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations	↰	↑	↰	↑	↰	↰
Traffic Volume (vph)	980	680	750	400	230	329
Future Volume (vph)	980	680	750	400	230	329
Ideal Flow (vphpl)	1520	1900	1900	1520	1520	1520
Total Lost time (s)	4.4	5.3	5.3	5.3	4.0	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	
Frpb, ped/bikes	1.00	1.00	1.00	0.93	0.97	
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	
Frt	1.00	1.00	1.00	0.85	0.92	
Flt Protected	0.95	1.00	1.00	1.00	0.98	
Satd. Flow (prot)	1416	1863	1863	1184	1306	
Flt Permitted	0.95	1.00	1.00	1.00	0.98	
Satd. Flow (perm)	1416	1863	1863	1184	1306	
Peak-hour factor, PHF	0.96	0.96	0.96	0.96	0.96	0.96
Adj. Flow (vph)	1021	708	781	417	240	343
RTOR Reduction (vph)	0	0	0	82	0	0
Lane Group Flow (vph)	1021	708	781	335	583	0
Confl. Peds. (#/hr)				19	12	
Confl. Bikes (#/hr)				4		
Turn Type	Prot	NA	NA	Perm	Prot	
Protected Phases	5	2	6		4	
Permitted Phases				6		
Actuated Green, G (s)	29.2	38.9	24.5	24.5	22.6	
Effective Green, g (s)	29.2	38.9	24.5	24.5	22.6	
Actuated g/C Ratio	0.32	0.43	0.27	0.27	0.25	
Clearance Time (s)	4.4	5.3	5.3	5.3	4.0	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	459	805	507	322	327	
v/s Ratio Prot	c0.72	0.38	c0.42		c0.45	
v/s Ratio Perm				0.28		
v/c Ratio	2.22	0.88	1.54	1.04	1.78	
Uniform Delay, d1	30.4	23.4	32.8	32.8	33.7	
Progression Factor	1.14	0.89	1.00	1.00	1.00	
Incremental Delay, d2	557.2	9.7	252.9	61.5	364.4	
Delay (s)	591.8	30.5	285.7	94.2	398.1	
Level of Service	F	C	F	F	F	
Approach Delay (s)		362.0	219.0		398.1	
Approach LOS		F	F		F	
Intersection Summary						
HCM 2000 Control Delay			319.2		HCM 2000 Level of Service	F
HCM 2000 Volume to Capacity ratio			1.89			
Actuated Cycle Length (s)			90.0		Sum of lost time (s)	14.3
Intersection Capacity Utilization			160.7%		ICU Level of Service	H
Analysis Period (min)			15			
c Critical Lane Group						

HCM Unsignalized Intersection Capacity Analysis
27: Buena Creek Rd & Monte Vista Dr

Exist + Proj + Sce A Cumu PM
03/17/2017

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↑	↑		↰	↰
Sign Control		Stop	Stop		Stop	
Traffic Volume (vph)	250	612	282	485	424	110
Future Volume (vph)	250	612	282	485	424	110
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	272	665	307	527	461	120
Direction, Lane #	EB 1	WB 1	SB 1			
Volume Total (vph)	937	834	581			
Volume Left (vph)	272	0	461			
Volume Right (vph)	0	527	120			
Hadj (s)	0.09	-0.35	0.07			
Departure Headway (s)	7.1	6.6	7.1			
Degree Utilization, x	1.84	1.54	1.14			
Capacity (veh/h)	515	547	515			
Control Delay (s)	403.8	269.6	108.8			
Approach Delay (s)	403.8	269.6	108.8			
Approach LOS	F	F	F			
Intersection Summary						
Delay			283.3			
Level of Service			F			
Intersection Capacity Utilization			130.8%		ICU Level of Service	H
Analysis Period (min)			15			

HCM Signalized Intersection Capacity Analysis
28: San Marcos Blvd & Knoll Rd/SR 76 WB Ramps

Exist + Proj + Sce A Cumu PM
03/17/2017

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	→	↱	↰	↱	→	↰	↱	↱	↰	↱	↱
Traffic Volume (vph)	266	0	538	1022	343	46	415	1282	286	3	1107	220
Future Volume (vph)	266	0	538	1022	343	46	415	1282	286	3	1107	220
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.6		5.2	5.6	5.6		5.2	6.3	6.3		6.3	6.3
Lane Util. Factor	1.00	0.88	0.97	0.95			0.97	0.95	1.00		0.91	1.00
Frpb, ped/bikes	1.00		1.00	1.00	1.00		1.00	1.00	0.98		1.00	0.97
Flpb, ped/bikes	1.00		1.00	1.00	1.00		1.00	1.00	1.00		1.00	1.00
Frt	1.00		0.85	1.00	0.98		1.00	1.00	0.85		1.00	0.85
Flt Protected	0.95		1.00	0.95	1.00		0.95	1.00	1.00		1.00	1.00
Satd. Flow (prot)	1770		2787	3433	3477		3433	3539	1549		5085	1539
Flt Permitted	0.95		1.00	0.95	1.00		0.95	1.00	1.00		0.94	1.00
Satd. Flow (perm)	1770		2787	3433	3477		3433	3539	1549		4759	1539
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)	280	0	566	1076	361	48	437	1349	301	3	1165	232
RTOR Reduction (vph)	0	0	57	0	10	0	0	0	118	0	0	84
Lane Group Flow (vph)	280	0	509	1076	399	0	437	1349	183	0	1168	148
Confl. Peds. (#/hr)												12
Confl. Bikes (#/hr)												1
Turn Type	Prot		pm+ov	Prot	NA		Prot	NA	Perm		NA	Perm
Protected Phases	7		5	3	8		5	2			6	
Permitted Phases			7						2			6
Actuated Green, G (s)	15.4		35.6	45.6	24.6		20.2	62.5	62.5		37.1	37.1
Effective Green, g (s)	15.4		35.6	45.6	24.6		20.2	62.5	62.5		37.1	37.1
Actuated g/C Ratio	0.13		0.30	0.38	0.21		0.17	0.52	0.52		0.31	0.31
Clearance Time (s)	5.6		5.2	5.6	5.6		5.2	6.3	6.3		6.3	6.3
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)	227		826	1304	712		577	1843	806		1471	475
v/s Ratio Prot	c0.16		0.10	c0.31	0.11		0.13	c0.38				
v/s Ratio Perm			0.08					0.12			c0.25	0.10
v/c Ratio	1.23		0.62	0.83	0.56		0.76	0.73	0.23		0.79	0.31
Uniform Delay, d1	52.3		36.3	33.6	42.8		47.6	22.3	15.6		38.0	31.7
Progression Factor	1.00		1.00	1.00	1.00		1.00	1.00	1.00		1.00	1.00
Incremental Delay, d2	137.2		1.4	4.4	1.0		5.6	2.6	0.7		4.5	1.7
Delay (s)	189.5		37.7	38.0	43.9		53.2	24.9	16.3		42.5	33.4
Level of Service	F		D	D	D		D	C	B		D	C
Approach Delay (s)		87.9			39.6			29.6			40.9	
Approach LOS		F			D			C			D	
Intersection Summary												
HCM 2000 Control Delay			43.4		HCM 2000 Level of Service			D				
HCM 2000 Volume to Capacity ratio			0.90									
Actuated Cycle Length (s)			120.0		Sum of lost time (s)			22.7				
Intersection Capacity Utilization			104.3%		ICU Level of Service			G				
Analysis Period (min)			15									
c Critical Lane Group												

HCM Signalized Intersection Capacity Analysis
29: San Marcos Blvd & SR 78 EB Ramps

Exist + Proj + Sce A Cumu PM
03/17/2017

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	→	↱	↰	↱	→	↰	↱	↱	↰	↱	↱
Traffic Volume (vph)	279	5	192	0	0	0	0	1795	1277	142	2348	0
Future Volume (vph)	279	5	192	0	0	0	0	1795	1277	142	2348	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.6	5.6						6.3	6.3	5.2	6.3	
Lane Util. Factor	0.97	1.00						0.91	0.88	0.97	0.91	
Frpb, ped/bikes	1.00	1.00						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)	3433	1590						5085	2720	3433	5085	
Flt Permitted	0.95	1.00						1.00	1.00	0.95	1.00	
Satd. Flow (perm)	3433	1590						5085	2720	3433	5085	
Peak-hour factor, PHF	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Adj. Flow (vph)	291	5	200	0	0	0	0	1870	1330	148	2446	0
RTOR Reduction (vph)	0	9	0	0	0	0	0	0	0	0	0	0
Lane Group Flow (vph)	291	196	0	0	0	0	0	1870	1330	148	2446	0
Confl. Peds. (#/hr)									1			22
Confl. Bikes (#/hr)									5			4
Turn Type	Split	NA						NA	Perm	Prot	NA	
Protected Phases	4	4						2		1	6	
Permitted Phases									2			
Actuated Green, G (s)	17.8	17.8						74.6	74.6	10.5	90.3	
Effective Green, g (s)	17.8	17.8						74.6	74.6	10.5	90.3	
Actuated g/C Ratio	0.15	0.15						0.62	0.62	0.09	0.75	
Clearance Time (s)	5.6	5.6						6.3	6.3	5.2	6.3	
Vehicle Extension (s)	3.0	3.0						3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	509	235						3161	1690	300	3826	
v/s Ratio Prot	0.08	c0.12						0.37		0.04	c0.48	
v/s Ratio Perm									c0.49			
v/c Ratio	0.57	0.83						0.59	0.79	0.49	0.64	
Uniform Delay, d1	47.6	49.7						13.6	16.8	52.2	7.1	
Progression Factor	1.00	1.00						1.00	1.00	1.00	1.00	
Incremental Delay, d2	1.6	21.5						0.8	3.8	1.3	0.8	
Delay (s)	49.1	71.2						14.4	20.6	53.5	7.9	
Level of Service	D	E						B	C	D	A	
Approach Delay (s)		58.2			0.0			17.0			10.5	
Approach LOS		E			A			B			B	
Intersection Summary												
HCM 2000 Control Delay			17.6		HCM 2000 Level of Service			B				
HCM 2000 Volume to Capacity ratio			0.80									
Actuated Cycle Length (s)			120.0		Sum of lost time (s)			17.1				
Intersection Capacity Utilization			73.5%		ICU Level of Service			D				
Analysis Period (min)			15									
c Critical Lane Group												

HCM Signalized Intersection Capacity Analysis
30: San Marcos Blvd & E. Mission Road

Exist + Proj + Sce A Cumu PM
03/17/2017

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↱	↱	↰	↱	↱	↰	↱	↱	↰	↱	↱
Traffic Volume (vph)	101	810	60	435	649	100	50	342	710	40	254	41
Future Volume (vph)	101	810	60	435	649	100	50	342	710	40	254	41
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	5.3	5.3	4.0	5.3	5.3	4.0	5.3	5.3	4.0	5.3	5.3
Lane Util. Factor	1.00	0.95	1.00	0.97	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00
Frpb, ped/bikes	1.00	1.00	0.98	1.00	1.00	0.97	1.00	1.00	1.00	1.00	1.00	1.00
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.98	1.00
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1770	3539	1556	3433	3539	1537	1770	3539	1583	1770	3459	1770
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	1770	3539	1556	3433	3539	1537	1770	3539	1583	1770	3459	1770
Peak-hour factor, PHF	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91
Adj. Flow (vph)	111	890	66	478	713	110	55	376	780	44	279	45
RTOR Reduction (vph)	0	0	47	0	0	74	0	0	193	0	10	0
Lane Group Flow (vph)	111	890	19	478	713	36	55	376	587	44	314	0
Conf. Peds. (#/hr)			3			10						1
Turn Type	Prot	NA	Perm	Prot	NA	Perm	Prot	NA	Prot	Prot	NA	
Protected Phases	7	4		3	8		5	2	2	1	6	
Permitted Phases			4			8						
Actuated Green, G (s)	11.5	33.1	33.1	16.1	37.7	37.7	6.8	44.5	44.5	4.2	41.9	
Effective Green, g (s)	11.5	33.1	33.1	16.1	37.7	37.7	6.8	44.5	44.5	4.2	41.9	
Actuated g/C Ratio	0.10	0.28	0.28	0.14	0.32	0.32	0.06	0.38	0.38	0.04	0.36	
Clearance Time (s)	4.0	5.3	5.3	4.0	5.3	5.3	4.0	5.3	5.3	4.0	5.3	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	174	1005	442	474	1145	497	103	1351	604	63	1244	
v/s Ratio Prot	0.06	c0.25		c0.14	0.20		c0.03	0.11	c0.37	0.02	0.09	
v/s Ratio Perm			0.01			0.02						
v/c Ratio	0.64	0.89	0.04	1.01	0.62	0.07	0.53	0.28	0.97	0.70	0.25	
Uniform Delay, d1	50.5	39.9	30.2	50.2	33.4	27.3	53.3	24.9	35.4	55.5	26.3	
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	7.5	9.5	0.0	43.5	1.1	0.1	5.2	0.1	29.3	28.6	0.1	
Delay (s)	58.0	49.3	30.3	93.7	34.4	27.3	58.5	25.0	64.7	84.2	26.4	
Level of Service	E	D	C	F	C	C	E	C	E	F	C	
Approach Delay (s)		49.1			55.6			52.1			33.3	
Approach LOS		D			E			D			C	
Intersection Summary												
HCM 2000 Control Delay		50.7			HCM 2000 Level of Service			D				
HCM 2000 Volume to Capacity ratio		0.94										
Actuated Cycle Length (s)		116.5			Sum of lost time (s)			18.6				
Intersection Capacity Utilization		81.9%			ICU Level of Service			D				
Analysis Period (min)		15										
c Critical Lane Group												

HCM Unsignalized Intersection Capacity Analysis
31: North Centre City Pkwy & Mesa Rock Rd

Exist + Proj + Sce A Cumu PM
03/17/2017

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations	↰	↱	↰	↱	↱	↱
Traffic Volume (veh/h)	10	77	100	375	218	5
Future Volume (Veh/h)	10	77	100	375	218	5
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	11	86	111	417	242	6
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	884	245	248			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	884	245	248			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	96	89	92			
cM capacity (veh/h)	289	794	1318			
Direction, Lane #	EB 1	NB 1	NB 2	SB 1		
Volume Total	97	111	417	248		
Volume Left	11	111	0	0		
Volume Right	86	0	0	6		
cSH	663	1318	1700	1700		
Volume to Capacity	0.15	0.08	0.25	0.15		
Queue Length 95th (ft)	13	7	0	0		
Control Delay (s)	11.4	8.0	0.0	0.0		
Lane LOS	B	A				
Approach Delay (s)	11.4	1.7		0.0		
Approach LOS	B					
Intersection Summary						
Average Delay		2.3				
Intersection Capacity Utilization		32.6%		ICU Level of Service		A
Analysis Period (min)		15				

HCM Signalized Intersection Capacity Analysis
32: North Centre City Pkwy & Country Club Ln

Exist + Proj + Sce A Cumu PM
03/17/2017

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	209	350	100	120	240	130	115	616	130	170	432	83
Future Volume (vph)	209	350	100	120	240	130	115	616	130	170	432	83
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1770	3539	1583	1770	3539	1583	1770	3539	1583	1770	3539	1583
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	1770	3539	1583	1770	3539	1583	1770	3539	1583	1770	3539	1583
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)	220	368	105	126	253	137	121	648	137	179	455	87
RTOR Reduction (vph)	0	0	81	0	0	113	0	0	93	0	0	60
Lane Group Flow (vph)	220	368	24	126	253	24	121	648	44	179	455	27
Turn Type	Prot	NA	Perm	Prot	NA	Perm	Prot	NA	Perm	Prot	NA	Perm
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases			4			8			2			6
Actuated Green, G (s)	13.2	17.6	17.6	8.8	13.2	13.2	8.7	20.5	20.5	11.9	23.7	23.7
Effective Green, g (s)	13.2	17.6	17.6	8.8	13.2	13.2	8.7	20.5	20.5	11.9	23.7	23.7
Actuated g/C Ratio	0.17	0.23	0.23	0.11	0.17	0.17	0.11	0.27	0.27	0.15	0.31	0.31
Clearance Time (s)	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	304	811	362	202	608	272	200	944	422	274	1092	488
v/s Ratio Prot	c0.12	c0.10		0.07	0.07		0.07	c0.18		c0.10	c0.13	
v/s Ratio Perm			0.02			0.01			0.03			0.02
v/c Ratio	0.72	0.45	0.07	0.62	0.42	0.09	0.60	0.69	0.10	0.65	0.42	0.06
Uniform Delay, d1	30.1	25.5	23.2	32.4	28.4	26.7	32.4	25.3	21.2	30.5	21.1	18.7
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	8.3	0.4	0.1	5.9	0.5	0.1	5.1	2.1	0.1	5.5	0.3	0.0
Delay (s)	38.3	25.9	23.2	38.3	28.8	26.9	37.5	27.4	21.3	36.0	21.3	18.7
Level of Service	D	C	C	D	C	C	D	C	C	D	C	B
Approach Delay (s)	29.4			30.6			27.8			24.7		
Approach LOS	C			C			C			C		
Intersection Summary												
HCM 2000 Control Delay	27.9			HCM 2000 Level of Service					C			
HCM 2000 Volume to Capacity ratio	0.63											
Actuated Cycle Length (s)	76.8			Sum of lost time (s)					18.0			
Intersection Capacity Utilization	59.7%			ICU Level of Service					B			
Analysis Period (min)	15											
c Critical Lane Group												

HCM Signalized Intersection Capacity Analysis
33: Twin Oaks Valley Rd & Discovery St/Barham Dr

Exist + Proj + Sce A Cumu PM
03/17/2017

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	520	320	20	280	250	313	10	1452	310	466	658	380
Future Volume (vph)	520	320	20	280	250	313	10	1452	310	466	658	380
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	5.3	4.0	5.0	5.3	4.0	5.0	6.0	6.0	5.0	6.0	4.0
Lane Util. Factor	0.97	0.91	1.00	1.00	1.00	1.00	1.00	0.86	0.86	0.97	0.91	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	3433	5085	1583	1770	1863	1583	1770	4791	1362	3433	5085	1583
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	3433	5085	1583	1770	1863	1583	1770	4791	1362	3433	5085	1583
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)	565	348	22	304	272	340	11	1578	337	507	715	413
RTOR Reduction (vph)	0	0	0	0	0	0	0	1	145	0	0	0
Lane Group Flow (vph)	565	348	22	304	272	340	11	1611	158	507	715	413
Turn Type	Prot	NA	Free	Prot	NA	Free	Prot	NA	Perm	Prot	NA	Free
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases			Free			Free			2			Free
Actuated Green, G (s)	22.9	24.9	135.0	22.0	24.0	135.0	1.6	47.8	47.8	19.0	65.2	135.0
Effective Green, g (s)	22.9	24.9	135.0	22.0	24.0	135.0	1.6	47.8	47.8	19.0	65.2	135.0
Actuated g/C Ratio	0.17	0.18	1.00	0.16	0.18	1.00	0.01	0.35	0.35	0.14	0.48	1.00
Clearance Time (s)	5.0	5.3		5.0	5.3		5.0	6.0	6.0	5.0	6.0	
Vehicle Extension (s)	2.0	4.5		2.0	4.5		2.0	3.0	3.0	2.0	4.0	
Lane Grp Cap (vph)	582	937	1583	288	331	1583	20	1696	482	483	2455	1583
v/s Ratio Prot	0.16	0.07		c0.17	c0.15		0.01	c0.34		c0.15	0.14	
v/s Ratio Perm			0.01			0.21			0.12			c0.26
v/c Ratio	0.97	0.37	0.01	1.06	0.82	0.21	0.55	0.95	0.33	1.05	0.29	0.26
Uniform Delay, d1	55.7	48.2	0.0	56.5	53.4	0.0	66.3	42.4	31.9	58.0	21.0	0.0
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	29.8	0.4	0.0	68.4	16.3	0.3	17.2	12.8	1.8	54.6	0.3	0.4
Delay (s)	85.5	48.6	0.0	124.9	69.8	0.3	83.6	55.2	33.7	112.6	21.3	0.4
Level of Service	F	D	A	F	E	A	F	E	C	F	C	A
Approach Delay (s)	69.8			62.3			52.0			44.3		
Approach LOS	E			E			D			D		
Intersection Summary												
HCM 2000 Control Delay	54.5			HCM 2000 Level of Service			D					
HCM 2000 Volume to Capacity ratio	0.95											
Actuated Cycle Length (s)	135.0			Sum of lost time (s)			21.3					
Intersection Capacity Utilization	89.4%			ICU Level of Service			E					
Analysis Period (min)	15											
c Critical Lane Group												

APPENDIX G

PEAK HOUR ANALYSIS WORKSHEETS – EXISTING + PROJECT + SCENARIO B CUMULATIVE PROJECTS (WITH MOUNTAIN MEADOW ROAD CONNECTION)

HCM Signalized Intersection Capacity Analysis
1: Champagne Boulevard & Gopher Canyon Road

Exist + Proj + Sce B Cumul AM
03/17/2017

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	150	185	318	111	285	480
Future Volume (vph)	150	185	318	111	285	480
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5	4.5	4.5	4.5	4.5	4.5
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frpb, ped/bikes	1.00	1.00	1.00	1.00	0.99	0.99
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	0.85	1.00	1.00	0.92	0.92
Flt Protected	0.95	1.00	0.95	1.00	1.00	1.00
Satd. Flow (prot)	1770	1583	1770	1863	1691	1691
Flt Permitted	0.95	1.00	0.95	1.00	1.00	1.00
Satd. Flow (perm)	1770	1583	1770	1863	1691	1691
Peak-hour factor, PHF	0.91	0.91	0.91	0.91	0.91	0.91
Adj. Flow (vph)	165	203	349	122	313	527
RTOR Reduction (vph)	0	175	0	0	51	0
Lane Group Flow (vph)	165	28	349	122	789	0
Confl. Bikes (#/hr)						2
Turn Type	Prot	Perm	Prot	NA	NA	
Protected Phases	4		5	2	6	
Permitted Phases		4				
Actuated Green, G (s)	14.7	14.7	24.6	83.7	54.6	
Effective Green, g (s)	14.7	14.7	24.6	83.7	54.6	
Actuated g/C Ratio	0.14	0.14	0.23	0.78	0.51	
Clearance Time (s)	4.5	4.5	4.5	4.5	4.5	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	242	216	405	1451	859	
v/s Ratio Prot	c0.09		c0.20	0.07	c0.47	
v/s Ratio Perm		0.02				
v/c Ratio	0.68	0.13	0.86	0.08	0.92	
Uniform Delay, d1	44.1	40.7	39.8	2.8	24.3	
Progression Factor	1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	7.7	0.3	16.9	0.0	14.5	
Delay (s)	51.8	41.0	56.7	2.8	38.8	
Level of Service	D	D	E	A	D	
Approach Delay (s)	45.8			42.7	38.8	
Approach LOS	D			D	D	

Intersection Summary

HCM 2000 Control Delay	41.5	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.87		
Actuated Cycle Length (s)	107.4	Sum of lost time (s)	13.5
Intersection Capacity Utilization	81.6%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis
2: Champagne Boulevard/Gopher Canyon Road & Old Castle Road

Exist + Proj + Sce B Cumul AM
03/17/2017

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	171	280	149	104	190	280
Future Volume (vph)	171	280	149	104	190	280
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5	4.5	4.5		4.5	4.5
Lane Util. Factor	1.00	1.00	1.00		1.00	1.00
Frpb, ped/bikes	1.00	1.00	0.99		1.00	1.00
Flpb, ped/bikes	1.00	1.00	1.00		1.00	1.00
Frt	1.00	0.85	0.94		1.00	1.00
Flt Protected	0.95	1.00	1.00		0.95	1.00
Satd. Flow (prot)	1770	1583	1744		1770	1863
Flt Permitted	0.95	1.00	1.00		0.95	1.00
Satd. Flow (perm)	1770	1583	1744		1770	1863
Peak-hour factor, PHF	0.87	0.87	0.87	0.87	0.87	0.87
Adj. Flow (vph)	197	322	171	120	218	322
RTOR Reduction (vph)	0	247	28	0	0	0
Lane Group Flow (vph)	197	75	263	0	218	322
Confl. Bikes (#/hr)				1		
Turn Type	Prot	Perm	NA		Prot	NA
Protected Phases	8		2		1	6
Permitted Phases		8				
Actuated Green, G (s)	12.1	12.1	14.1		12.5	31.1
Effective Green, g (s)	12.1	12.1	14.1		12.5	31.1
Actuated g/C Ratio	0.23	0.23	0.27		0.24	0.60
Clearance Time (s)	4.5	4.5	4.5		4.5	4.5
Vehicle Extension (s)	3.0	3.0	3.0		3.0	3.0
Lane Grp Cap (vph)	410	366	471		423	1109
v/s Ratio Prot	c0.11		c0.15		c0.12	0.17
v/s Ratio Perm		0.05				
v/c Ratio	0.48	0.20	0.56		0.52	0.29
Uniform Delay, d1	17.3	16.2	16.4		17.2	5.2
Progression Factor	1.00	1.00	1.00		1.00	1.00
Incremental Delay, d2	0.9	0.3	1.4		1.1	0.1
Delay (s)	18.2	16.4	17.8		18.3	5.3
Level of Service	B	B	B		B	A
Approach Delay (s)	17.1		17.8			10.5
Approach LOS	B		B			B

Intersection Summary

HCM 2000 Control Delay	14.6	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.52		
Actuated Cycle Length (s)	52.2	Sum of lost time (s)	13.5
Intersection Capacity Utilization	45.4%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

HCM Unsignalized Intersection Capacity Analysis
3: Champagne Boulevard & Lawrence Welk Dr

Exist + Proj + Sce B Cumul AM
03/17/2017

																		
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR						
Lane Configurations																		
Traffic Volume (veh/h)	5	0	18	20	0	30	18	173	70	60	340	5						
Future Volume (Veh/h)	5	0	18	20	0	30	18	173	70	60	340	5						
Sign Control		Stop				Free				Free								
Grade		0%				0%				0%								
Peak Hour Factor	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84						
Hourly flow rate (vph)	6	0	21	24	0	36	21	206	83	71	405	6						
Pedestrians		1				2				1								
Lane Width (ft)		12.0				12.0				12.0								
Walking Speed (ft/s)		4.0				4.0				4.0								
Percent Blockage		0				0				0								
Right turn flare (veh)							7											
Median type							None					None						
Median storage (veh)																		
Upstream signal (ft)												874						
pX, platoon unblocked																		
vC, conflicting volume	800	884	409	818	804	209	412						291					
vC1, stage 1 conf vol																		
vC2, stage 2 conf vol																		
vCu, unblocked vol	800	884	409	818	804	209	412						291					
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	97	91	100	96	98						94					
cM capacity (veh/h)	273	263	642	268	293	829	1146						1269					
Direction, Lane #	EB 1	WB 1	NB 1	NB 2	NB 3	SB 1	SB 2											
Volume Total	27	60	21	206	83	71	411											
Volume Left	6	24	21	0	0	71	0											
Volume Right	21	36	0	0	83	0	6											
cSH	493	670	1146	1700	1700	1269	1700											
Volume to Capacity	0.05	0.09	0.02	0.12	0.05	0.06	0.24											
Queue Length 95th (ft)	4	7	1	0	0	4	0											
Control Delay (s)	12.7	13.6	8.2	0.0	0.0	8.0	0.0											
Lane LOS	B	B	A			A												
Approach Delay (s)	12.7	13.6	0.6				1.2											
Approach LOS	B	B																
Intersection Summary																		
Average Delay	2.2																	
Intersection Capacity Utilization	37.5%			ICU Level of Service			A											
Analysis Period (min)	15																	

HCM Signalized Intersection Capacity Analysis
4: North Centre City Pkwy/Champagne Boulevard & Deer Springs Rd

Exist + Proj + Sce B Cumul AM
03/17/2017

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↖	↖↗		↖	↖↗			↗↖			↗↖	
Traffic Volume (vph)	146	182	78	210	381	10	96	60	60	5	190	258
Future Volume (vph)	146	182	78	210	381	10	96	60	60	5	190	258
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5	4.5		4.5	4.5			4.5			4.5	
Lane Util. Factor	1.00	0.95		1.00	0.95			1.00			1.00	
Frpb, ped/bikes	1.00	0.99		1.00	1.00			1.00			0.99	
Flpb, ped/bikes	1.00	1.00		1.00	1.00			1.00			1.00	
Frt	1.00	0.95		1.00	1.00			0.96			0.92	
Flt Protected	0.95	1.00		0.95	1.00			0.98			1.00	
Satd. Flow (prot)	1770	3352		1770	3524			1746			1705	
Flt Permitted	0.95	1.00		0.95	1.00			0.57			1.00	
Satd. Flow (perm)	1770	3352		1770	3524			1018			1701	
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)	159	198	85	228	414	11	104	65	65	5	207	280
RTOR Reduction (vph)	0	48	0	0	2	0	0	16	0	0	55	0
Lane Group Flow (vph)	159	235	0	228	423	0	0	218	0	0	437	0
Confl. Peds. (#/hr)	1											
Confl. Bikes (#/hr)	4			1			6			1		
Turn Type	Prot	NA		Prot	NA		Perm	NA		Perm	NA	
Protected Phases	7	4		3	8			2			6	
Permitted Phases							2			6		
Actuated Green, G (s)	11.2	11.7		14.1	14.6			22.3			22.3	
Effective Green, g (s)	11.2	11.7		14.1	14.6			22.3			22.3	
Actuated g/C Ratio	0.18	0.19		0.23	0.24			0.36			0.36	
Clearance Time (s)	4.5	4.5		4.5	4.5			4.5			4.5	
Vehicle Extension (s)	3.0	3.0		3.0	3.0			3.0			3.0	
Lane Grp Cap (vph)	321	636		405	835			368			615	
v/s Ratio Prot	0.09	0.07		c0.13	c0.12							
v/s Ratio Perm							0.21			c0.26		
v/c Ratio	0.50	0.37		0.56	0.51			0.59			0.71	
Uniform Delay, d1	22.7	21.7		21.0	20.4			16.0			16.9	
Progression Factor	1.00	1.00		1.00	1.00			1.00			1.00	
Incremental Delay, d2	1.2	0.4		1.8	0.5			2.6			3.9	
Delay (s)	23.9	22.1		22.8	20.9			18.5			20.7	
Level of Service	C	C		C	C			B			C	
Approach Delay (s)	22.7			21.5			18.5			20.7		
Approach LOS	C			C			B			C		
Intersection Summary												
HCM 2000 Control Delay	21.2			HCM 2000 Level of Service			C					
HCM 2000 Volume to Capacity ratio	0.64											
Actuated Cycle Length (s)	61.6			Sum of lost time (s)			13.5					
Intersection Capacity Utilization	72.4%			ICU Level of Service			C					
Analysis Period (min)	15											
c Critical Lane Group												

HCM Signalized Intersection Capacity Analysis
5: I-15 NB Ramps & Deer Springs Rd

Exist + Proj + Sce B Cumul AM
03/17/2017

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↑			↑	↰		↰	↑			
Traffic Volume (vph)	365	296	0	0	734	50	301	5	170	0	0	0
Future Volume (vph)	365	296	0	0	734	50	301	5	170	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.2	5.3			5.3	5.3			4.6	4.6		
Lane Util. Factor	1.00	1.00			1.00	1.00			1.00	1.00		
Flt	1.00	1.00			1.00	0.85			1.00	0.85		
Flt Protected	0.95	1.00			1.00	1.00			0.95	1.00		
Satd. Flow (prot)	1770	1863			1863	1583			1776	1583		
Flt Permitted	0.95	1.00			1.00	1.00			0.95	1.00		
Satd. Flow (perm)	1770	1863			1863	1583			1776	1583		
Peak-hour factor, PHF	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89
Adj. Flow (vph)	410	333	0	0	825	56	338	6	191	0	0	0
RTOR Reduction (vph)	0	0	0	0	0	30	0	0	160	0	0	0
Lane Group Flow (vph)	410	333	0	0	825	26	0	344	31	0	0	0
Turn Type	Prot	NA			NA	Perm	Split	NA	Perm			
Protected Phases	5	2			6		8	8				
Permitted Phases						6			8			
Actuated Green, G (s)	23.8	73.7			45.7	45.7		16.4	16.4			
Effective Green, g (s)	23.8	73.7			45.7	45.7		16.4	16.4			
Actuated g/C Ratio	0.24	0.74			0.46	0.46		0.16	0.16			
Clearance Time (s)	4.2	5.3			5.3	5.3		4.6	4.6			
Vehicle Extension (s)	6.0	2.0			2.0	2.0		2.0	2.0			
Lane Grp Cap (vph)	421	1373			851	723		291	259			
v/s Ratio Prot	c0.23	0.18			c0.44			c0.19				
v/s Ratio Perm						0.02			0.02			
v/c Ratio	0.97	0.24			0.97	0.04		1.18	0.12			
Uniform Delay, d1	37.8	4.2			26.5	15.0		41.8	35.7			
Progression Factor	0.95	2.65			1.00	1.00		1.00	1.00			
Incremental Delay, d2	16.6	0.1			24.3	0.1		111.5	0.1			
Delay (s)	52.5	11.3			50.7	15.1		153.3	35.7			
Level of Service	D	B			D	B		F	D			
Approach Delay (s)		34.0				48.5		111.3			0.0	
Approach LOS		C				D		F			A	
Intersection Summary												
HCM 2000 Control Delay		59.1			HCM 2000 Level of Service			E				
HCM 2000 Volume to Capacity ratio		1.01										
Actuated Cycle Length (s)		100.0			Sum of lost time (s)			14.1				
Intersection Capacity Utilization		87.5%			ICU Level of Service			E				
Analysis Period (min)		15										

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
6: Deer Springs Rd & I-15 SB Ramps

Exist + Proj + Sce B Cumul AM
03/17/2017

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↑	↰	↰	↑				↰	↰	↰	↰
Traffic Volume (vph)	0	661	658	330	755	0	0	0	0	30	30	911
Future Volume (vph)	0	661	658	330	755	0	0	0	0	30	30	911
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		5.3	5.3	4.2	5.3					4.6	4.6	
Lane Util. Factor		1.00	1.00	1.00	1.00					1.00	0.88	
Flt		1.00	0.85	1.00	1.00					1.00	0.85	
Flt Protected		1.00	1.00	0.95	1.00					0.98	1.00	
Satd. Flow (prot)		1863	1583	1770	1863					1817	2787	
Flt Permitted		1.00	1.00	0.95	1.00					0.98	1.00	
Satd. Flow (perm)		1863	1583	1770	1863					1817	2787	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	718	715	359	821	0	0	0	0	33	33	990
RTOR Reduction (vph)	0	0	335	0	0	0	0	0	0	0	0	283
Lane Group Flow (vph)	0	718	380	359	821	0	0	0	0	0	66	707
Turn Type		NA	Perm	Prot	NA					Split	NA	Perm
Protected Phases		2		1	6					4	4	
Permitted Phases			2									4
Actuated Green, G (s)		37.7	37.7	23.8	65.7					24.4	24.4	
Effective Green, g (s)		37.7	37.7	23.8	65.7					24.4	24.4	
Actuated g/C Ratio		0.38	0.38	0.24	0.66					0.24	0.24	
Clearance Time (s)		5.3	5.3	4.2	5.3					4.6	4.6	
Vehicle Extension (s)		2.0	2.0	2.0	2.0					2.0	2.0	
Lane Grp Cap (vph)		702	596	421	1223					443	680	
v/s Ratio Prot		c0.39		c0.20	0.44					0.04		
v/s Ratio Perm			0.24								c0.25	
v/c Ratio		1.02	0.64	0.85	0.67					0.15	1.04	
Uniform Delay, d1		31.1	25.6	36.4	10.5					29.7	37.8	
Progression Factor		1.00	1.00	1.17	1.21					1.00	1.00	
Incremental Delay, d2		39.9	5.2	1.6	0.3					0.1	45.4	
Delay (s)		71.0	30.7	44.1	13.0					29.7	83.2	
Level of Service		E	C	D	B					C	F	
Approach Delay (s)		50.9			22.4			0.0			79.8	
Approach LOS		D			C			A			E	
Intersection Summary												
HCM 2000 Control Delay		50.1			HCM 2000 Level of Service			D				
HCM 2000 Volume to Capacity ratio		0.98										
Actuated Cycle Length (s)		100.0			Sum of lost time (s)			14.1				
Intersection Capacity Utilization		87.5%			ICU Level of Service			E				
Analysis Period (min)		15										

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
7: Deer Springs Rd & Mesa Rock Road

Exist + Proj + Sce B Cumul AM
03/17/2017

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↰	↰	↰	↰	↰	↰	↰	↰	↰	↰	↰
Traffic Volume (vph)	151	581	30	20	1253	383	20	18	30	668	44	180
Future Volume (vph)	151	581	30	20	1253	383	20	18	30	668	44	180
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5	4.5		4.5	4.5			4.5			4.5	4.5
Lane Util. Factor	1.00	0.95		1.00	0.95			1.00			1.00	1.00
Flpb, ped/bikes	1.00	1.00		1.00	0.99			1.00			1.00	1.00
Flpb, ped/bikes	1.00	1.00		1.00	1.00			1.00			1.00	1.00
Frt	1.00	0.99		1.00	0.96			0.94			1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00			0.99			0.96	1.00
Satd. Flow (prot)	1770	3509		1770	3398			1727			1779	1583
Flt Permitted	0.95	1.00		0.95	1.00			0.99			0.96	1.00
Satd. Flow (perm)	1770	3509		1770	3398			1727			1779	1583
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	168	646	33	22	1392	426	22	20	33	742	49	200
RTOR Reduction (vph)	0	3	0	0	26	0	0	30	0	0	0	91
Lane Group Flow (vph)	168	676	0	22	1792	0	0	45	0	0	791	109
Confl. Bikes (#/hr)			9			2						
Turn Type	Prot	NA		Prot	NA		Split	NA		Split	NA	Perm
Protected Phases	7	4		3	8		2	2		6	6	
Permitted Phases												6
Actuated Green, G (s)	4.3	46.4		1.5	43.6			7.7			19.2	19.2
Effective Green, g (s)	4.3	46.4		1.5	43.6			7.7			19.2	19.2
Actuated g/C Ratio	0.05	0.50		0.02	0.47			0.08			0.21	0.21
Clearance Time (s)	4.5	4.5		4.5	4.5			4.5			4.5	4.5
Vehicle Extension (s)	3.0	3.0		3.0	3.0			3.0			3.0	3.0
Lane Grp Cap (vph)	82	1754		28	1596			143			368	327
v/s Ratio Prot	c0.09	c0.19		0.01	c0.53			c0.03			c0.44	
v/s Ratio Perm												0.07
v/c Ratio	2.05	0.39		0.79	1.12			0.31			2.15	0.33
Uniform Delay, d1	44.2	14.4		45.5	24.6			40.1			36.8	31.3
Progression Factor	1.00	1.00		1.00	1.00			1.00			1.00	1.00
Incremental Delay, d2	511.5	0.1		82.7	64.2			1.3			526.2	2.7
Delay (s)	555.8	14.5		128.2	88.8			41.3			563.0	34.1
Level of Service	F	B		F	F			D			F	C
Approach Delay (s)		121.9			89.2			41.3			456.3	
Approach LOS		F			F			D			F	
Intersection Summary												
HCM 2000 Control Delay		192.6										
HCM 2000 Volume to Capacity ratio		1.34										
Actuated Cycle Length (s)		92.8						18.0				
Intersection Capacity Utilization		112.5%										
Analysis Period (min)		15										
c Critical Lane Group												

HCM Unsignalized Intersection Capacity Analysis
9: Deer Springs Rd & Sarver Lane

Exist + Proj + Sce B Cumul AM
03/17/2017

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations	↰	↰	↰	↰	↰	↰
Traffic Volume (veh/h)	77	581	1340	23	101	256
Future Volume (Veh/h)	77	581	1340	23	101	256
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.96	0.96	0.96	0.96	0.96	0.96
Hourly flow rate (vph)	80	605	1396	24	105	267
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	1420				2173	1408
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1420				2173	1408
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	83				0	0
cM capacity (veh/h)	479				43	170
Direction, Lane #	EB 1	EB 2	WB 1	SB 1		
Volume Total	80	605	1420	372		
Volume Left	80	0	0	105		
Volume Right	0	0	24	267		
cSH	479	1700	1700	92		
Volume to Capacity	0.17	0.36	0.84	4.03		
Queue Length 95th (ft)	15	0	0	Err		
Control Delay (s)	14.0	0.0	0.0	Err		
Lane LOS	B			F		
Approach Delay (s)	1.6		0.0	Err		
Approach LOS				F		
Intersection Summary						
Average Delay		1502.1				
Intersection Capacity Utilization		99.9%		ICU Level of Service		F
Analysis Period (min)		15				

HCM Unsignalized Intersection Capacity Analysis
10: Deer Springs Rd & Sycamore Road

Exist + Proj + Sce B Cumul AM
03/17/2017

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations	↰	↱	↰	↱	↰	↱
Traffic Volume (veh/h)	40	20	663	190	80	1696
Future Volume (Veh/h)	40	20	663	190	80	1696
Sign Control	Stop		Free		Free	
Grade	0%		0%		0%	
Peak Hour Factor	0.89	0.89	0.89	0.89	0.89	0.89
Hourly flow rate (vph)	45	22	745	213	90	1906
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)		4				
Median type			None		None	
Median storage (veh)						
Upstream signal (ft)			680			
pX, platoon unblocked	0.80	0.80			0.80	
vC, conflicting volume	2938	852			958	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	3290	693			825	
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	94			86	
cM capacity (veh/h)	7	356			647	
Direction, Lane #	WB 1	NB 1	SB 1			
Volume Total	67	958	1996			
Volume Left	45	0	90			
Volume Right	22	213	0			
cSH	10	1700	647			
Volume to Capacity	6.76	0.56	0.14			
Queue Length 95th (ft)	Err	0	12			
Control Delay (s)	Err	0.0	0.5			
Lane LOS	F		A			
Approach Delay (s)	Err	0.0	0.5			
Approach LOS	F					
Intersection Summary						
Average Delay		222.1				
Intersection Capacity Utilization		153.5%		ICU Level of Service	H	
Analysis Period (min)		15				

HCM Unsignalized Intersection Capacity Analysis
11: Twin Oaks Valley Road & Camino Mayor

Exist + Proj + Sce B Cumul AM
03/17/2017

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations	↰	↱	↰	↱	↰	↱
Traffic Volume (veh/h)	25	5	120	14	5	120
Future Volume (Veh/h)	25	5	120	14	5	120
Sign Control	Stop		Free		Free	
Grade	0%		0%		0%	
Peak Hour Factor	0.83	0.83	0.83	0.83	0.83	0.83
Hourly flow rate (vph)	30	6	145	17	6	145
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	310	154			162	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	310	154			162	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	96	99			100	
cM capacity (veh/h)	679	892			1417	
Direction, Lane #	WB 1	NB 1	SB 1			
Volume Total	36	162	151			
Volume Left	30	0	6			
Volume Right	6	17	0			
cSH	707	1700	1417			
Volume to Capacity	0.05	0.10	0.00			
Queue Length 95th (ft)	4	0	0			
Control Delay (s)	10.4	0.0	0.3			
Lane LOS	B		A			
Approach Delay (s)	10.4	0.0	0.3			
Approach LOS	B					
Intersection Summary						
Average Delay		1.2				
Intersection Capacity Utilization		20.4%		ICU Level of Service	A	
Analysis Period (min)		15				

HCM Signalized Intersection Capacity Analysis
12: Twin Oaks Valley Rd & Deer Springs Rd

Exist + Proj + Sce B Cumul AM
03/17/2017

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations	↰	↱	↰	↱	↰	↱
Traffic Volume (vph)	51	119	112	619	1646	47
Future Volume (vph)	51	119	112	619	1646	47
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.9	4.9	4.0	5.3	5.3	5.3
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Flt Protected	1.00	0.85	1.00	1.00	1.00	0.85
Satd. Flow (prot)	1770	1583	1770	1863	1863	1583
Flt Permitted	0.95	1.00	0.95	1.00	1.00	1.00
Satd. Flow (perm)	1770	1583	1770	1863	1863	1583
Peak-hour factor, PHF	0.91	0.91	0.91	0.91	0.91	0.91
Growth Factor (vph)	100%	100%	100%	130%	130%	100%
Adj. Flow (vph)	56	131	123	884	2351	52
RTOR Reduction (vph)	0	71	0	0	0	3
Lane Group Flow (vph)	56	60	123	884	2351	49
Turn Type	Prot	Perm	Prot	NA	NA	Perm
Protected Phases	4		5	2	6	
Permitted Phases		4				6
Actuated Green, G (s)	13.4	13.4	7.0	118.1	107.1	107.1
Effective Green, g (s)	13.4	13.4	7.0	118.1	107.1	107.1
Actuated g/C Ratio	0.09	0.09	0.05	0.83	0.76	0.76
Clearance Time (s)	4.9	4.9	4.0	5.3	5.3	5.3
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	167	149	87	1552	1408	1196
v/s Ratio Prot	0.03		c0.07	0.47	c1.26	
v/s Ratio Perm		c0.04				0.03
v/c Ratio	0.34	0.41	1.41	0.57	1.67	0.04
Uniform Delay, d1	60.0	60.4	67.3	3.7	17.3	4.4
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	1.2	1.8	240.9	0.5	304.5	0.0
Delay (s)	61.2	62.2	308.2	4.2	321.8	4.4
Level of Service	E	E	F	A	F	A
Approach Delay (s)	61.9			41.4	315.0	
Approach LOS	E			D	F	
Intersection Summary						
HCM 2000 Control Delay			225.2		HCM 2000 Level of Service	F
HCM 2000 Volume to Capacity ratio			1.52			
Actuated Cycle Length (s)			141.7		Sum of lost time (s)	14.2
Intersection Capacity Utilization			128.5%		ICU Level of Service	H
Analysis Period (min)			15			
c Critical Lane Group						

HCM Signalized Intersection Capacity Analysis
13: Twin Oaks Valley Rd & Buena Creek Rd

Exist + Proj + Sce B Cumul AM
03/17/2017

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↰	↱		↰	↱	↰	↱		↰	↱	↰
Traffic Volume (vph)	380	0	220	5	5	0	140	341	5	5	1093	592
Future Volume (vph)	380	0	220	5	5	0	140	341	5	5	1093	592
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		5.0	5.5		5.0	5.5	5.5
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	1.00
Flpb, ped/bikes	1.00	0.98		1.00	1.00		1.00	1.00		1.00	1.00	0.98
Flpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	1.00
Flt Protected		1.00	0.85		1.00		1.00	1.00		1.00	1.00	0.85
Satd. Flow (prot)		1770	1546		1817		1770	1859		1770	1863	1547
Flt Permitted		0.75	1.00		0.87		0.95	1.00		0.95	1.00	1.00
Satd. Flow (perm)		1399	1546		1624		1770	1859		1770	1863	1547
Peak-hour factor, PHF	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Adj. Flow (vph)	396	0	229	5	5	0	146	355	5	5	1139	617
RTOR Reduction (vph)	0	0	111	0	0	0	0	0	0	0	0	91
Lane Group Flow (vph)	0	396	118	0	10	0	146	360	0	5	1139	526
Confl. Peds. (#/hr)			2									1
Confl. Bikes (#/hr)												3
Turn Type		Perm	NA	Perm	Perm	NA	Prot	NA		Prot	NA	Perm
Protected Phases			4		8		5	2		1	6	
Permitted Phases		4		4	8							6
Actuated Green, G (s)		26.0	26.0		26.0		7.0	52.5		1.0	46.5	46.5
Effective Green, g (s)		26.0	26.0		26.0		7.0	52.5		1.0	46.5	46.5
Actuated g/C Ratio		0.28	0.28		0.28		0.07	0.56		0.01	0.49	0.49
Clearance Time (s)		4.0	4.0		4.0		5.0	5.5		5.0	5.5	5.5
Vehicle Extension (s)		3.0	3.0		3.0		3.0	3.0		3.0	3.0	3.0
Lane Grp Cap (vph)		386	427		449		131	1038		18	921	765
v/s Ratio Prot							c0.08	0.19		0.00	c0.61	
v/s Ratio Perm		c0.28	0.08		0.01							0.34
v/c Ratio		1.03	0.28		0.02		1.11	0.35		0.28	1.24	0.69
Uniform Delay, d1		34.0	26.6		24.7		43.5	11.4		46.1	23.8	18.2
Progression Factor		1.00	1.00		1.00		1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2		52.6	0.4		0.0		112.7	0.2		8.3	115.9	2.6
Delay (s)		86.6	27.0		24.8		156.2	11.6		54.4	139.6	20.8
Level of Service		F	C		C		F	B		D	F	C
Approach Delay (s)		64.8			24.8			53.3			97.8	
Approach LOS		E			C			D			F	
Intersection Summary												
HCM 2000 Control Delay			82.6								F	
HCM 2000 Volume to Capacity ratio			1.16									
Actuated Cycle Length (s)			94.0							14.5		
Intersection Capacity Utilization			105.1%							G		
Analysis Period (min)			15									
c Critical Lane Group												

HCM Signalized Intersection Capacity Analysis
14: Twin Oaks Valley Rd & Cassou Rd

Exist + Proj + Sce B Cumul AM
03/17/2017

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↔			↔		↖	↗	↖	↗	↖	↗
Traffic Volume (vph)	18	10	45	202	15	39	27	412	200	72	1014	12
Future Volume (vph)	18	10	45	202	15	39	27	412	200	72	1014	12
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		5.0			5.0			5.0		5.0		
Lane Util. Factor		1.00			1.00			1.00		1.00		
Frpb, ped/bikes		0.99			1.00			1.00		0.98		
Flpb, ped/bikes		1.00			1.00			1.00		1.00		
Frt		0.92			0.98			1.00		0.85		
Flt Protected		0.99			0.96			0.95		1.00		
Satd. Flow (prot)		1665			1755			1770		1863		
Flt Permitted		0.99			0.96			0.95		1.00		
Satd. Flow (perm)		1665			1755			1770		1863		
Peak-hour factor, PHF	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Adj. Flow (vph)	19	10	47	210	16	41	28	429	208	75	1056	12
RTOR Reduction (vph)	0	44	0	0	5	0	0	0	103	0	0	0
Lane Group Flow (vph)	0	32	0	0	262	0	28	429	105	75	1069	0
Confl. Peds. (#/hr)			6						1			
Turn Type	Split	NA		Split	NA		Prot	NA	Perm	Prot	NA	
Protected Phases	4	4		8	8		5	2		1	6	
Permitted Phases									2			
Actuated Green, G (s)		8.6			21.0		2.7	59.2	59.2	8.1	64.6	
Effective Green, g (s)		8.6			21.0		2.7	59.2	59.2	8.1	64.6	
Actuated g/C Ratio		0.07			0.18		0.02	0.51	0.51	0.07	0.55	
Clearance Time (s)		5.0			5.0		5.0	5.0	5.0	5.0	5.0	
Vehicle Extension (s)		3.0			3.0		3.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)		122			315		40	943	783	122	1027	
v/s Ratio Prot		c0.02			c0.15		0.02	0.23		c0.04	c0.57	
v/s Ratio Perm								0.07				
v/c Ratio		0.27			0.83		0.70	0.45	0.13	0.61	1.04	
Uniform Delay, d1		51.2			46.2		56.7	18.5	15.3	52.9	26.2	
Progression Factor		1.00			1.00		1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2		1.2			16.8		42.0	0.3	0.1	8.9	39.2	
Delay (s)		52.3			63.1		98.7	18.9	15.4	61.8	65.3	
Level of Service		D			E		F	B	B	E	E	
Approach Delay (s)		52.3			63.1		21.1				65.1	
Approach LOS		D			E			C			E	

Intersection Summary

HCM 2000 Control Delay	50.8	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.93		
Actuated Cycle Length (s)	116.9	Sum of lost time (s)	20.0
Intersection Capacity Utilization	89.2%	ICU Level of Service	E
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis
15: Twin Oaks Valley Rd & La Cienega

Exist + Proj + Sce B Cumul AM
03/17/2017

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations	↖	↗	↕	↖	↗	↕
Traffic Volume (vph)	200	224	619	66	69	1189
Future Volume (vph)	200	224	619	66	69	1189
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)		6.0	6.0	6.5	6.0	6.5
Lane Util. Factor	1.00	1.00	0.95		1.00	0.95
Frpb, ped/bikes	1.00	0.99	1.00		1.00	1.00
Flpb, ped/bikes	1.00	1.00	1.00		1.00	1.00
Frt	1.00	0.85	0.99		1.00	1.00
Flt Protected	0.95	1.00	1.00		0.95	1.00
Satd. Flow (prot)	1770	1563	3472		1770	3539
Flt Permitted	0.95	1.00	1.00		0.95	1.00
Satd. Flow (perm)	1770	1563	3472		1770	3539
Peak-hour factor, PHF	0.91	0.91	0.91	0.91	0.91	0.91
Adj. Flow (vph)	220	246	680	73	76	1307
RTOR Reduction (vph)	0	0	8	0	0	0
Lane Group Flow (vph)	220	246	745	0	76	1307
Confl. Peds. (#/hr)		1		13		
Confl. Bikes (#/hr)				1		
Turn Type	Prot	Perm	NA		Prot	NA
Protected Phases	8		2		1	6
Permitted Phases		8				
Actuated Green, G (s)	16.2	16.2	23.0		6.9	35.9
Effective Green, g (s)	16.2	16.2	23.0		6.9	35.9
Actuated g/C Ratio	0.25	0.25	0.36		0.11	0.56
Clearance Time (s)	6.0	6.0	6.5		6.0	6.5
Vehicle Extension (s)	3.0	3.0	3.0		3.0	3.0
Lane Grp Cap (vph)	443	391	1236		189	1966
v/s Ratio Prot	0.12		0.21		0.04	c0.37
v/s Ratio Perm		c0.16				
v/c Ratio	0.50	0.63	0.60		0.40	0.66
Uniform Delay, d1	20.7	21.5	17.1		26.9	10.1
Progression Factor	1.00	1.00	1.00		1.00	1.00
Incremental Delay, d2	0.9	3.2	0.8		1.4	0.9
Delay (s)	21.6	24.7	17.9		28.3	11.0
Level of Service	C	C	B		C	B
Approach Delay (s)	23.2		17.9			11.9
Approach LOS	C		B			B

Intersection Summary

HCM 2000 Control Delay	15.7	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.74		
Actuated Cycle Length (s)	64.6	Sum of lost time (s)	18.5
Intersection Capacity Utilization	54.6%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis
16: Twin Oaks Valley Rd & Del Roy Dr

Exist + Proj + Sce B Cumul AM
03/17/2017

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↱		↰	↱		↰	↱		↰	↱	
Traffic Volume (vph)	27	0	65	5	0	5	38	673	20	10	1447	17
Future Volume (vph)	27	0	65	5	0	5	38	673	20	10	1447	17
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5	5.0		4.5	5.0		5.0	5.0		5.0	5.0	
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	0.95		1.00	0.95	
Frpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Flpb, ped/bikes	1.00	1.00		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		1.00	1.00	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770	1583		1770	1583		1770	3522		1770	3533	
Flt Permitted	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (perm)	1770	1583		1770	1583		1770	3522		1770	3533	
Peak-hour factor, PHF	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89
Adj. Flow (vph)	30	0	73	6	0	6	43	756	22	11	1626	19
RTOR Reduction (vph)	0	66	0	0	6	0	0	1	0	0	1	0
Lane Group Flow (vph)	30	7	0	6	0	0	43	777	0	11	1644	0
Confl. Peds. (#/hr)	2											
Turn Type	Prot	NA		Prot	NA		Prot	NA		Prot	NA	
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases												
Actuated Green, G (s)	1.8	7.4		0.5	6.1		2.4	49.4		0.5	47.5	
Effective Green, g (s)	1.8	7.4		0.5	6.1		2.4	49.4		0.5	47.5	
Actuated g/C Ratio	0.02	0.10		0.01	0.08		0.03	0.64		0.01	0.61	
Clearance Time (s)	4.5	5.0		4.5	5.0		5.0	5.0		5.0	5.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	41	151		11	124		54	2250		11	2170	
v/s Ratio Prot	c0.02	c0.00		0.00	0.00		c0.02	0.22		0.01	c0.47	
v/s Ratio Perm												
v/c Ratio	0.73	0.05		0.55	0.00		0.80	0.35		1.00	0.76	
Uniform Delay, d1	37.5	31.7		38.3	32.8		37.2	6.5		38.4	10.7	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	49.4	0.1		45.6	0.0		54.4	0.1		271.4	1.6	
Delay (s)	86.9	31.9		83.9	32.8		91.7	6.6		309.8	12.3	
Level of Service	F	C		F	C		F	A		F	B	
Approach Delay (s)	47.9			58.4			11.0			14.3		
Approach LOS	D			E			B			B		

Intersection Summary

HCM 2000 Control Delay	14.8	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.68		
Actuated Cycle Length (s)	77.3	Sum of lost time (s)	19.5
Intersection Capacity Utilization	57.0%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis
17: Twin Oaks Valley Rd & Windy Wy

Exist + Proj + Sce B Cumul AM
03/17/2017

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↱		↰	↱		↰	↱		↰	↱	
Traffic Volume (vph)	10	5	45	0	0	0	50	716	5	5	1467	65
Future Volume (vph)	10	5	45	0	0	0	50	716	5	5	1467	65
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		6.0	6.0		6.0	6.0		4.0	4.0	
Lane Util. Factor	1.00	1.00		1.00	0.95		1.00	0.95		1.00	0.95	
Frpb, ped/bikes	1.00	0.99		1.00	1.00		1.00	1.00		1.00	1.00	
Flpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Frt	1.00	0.87		1.00	1.00		1.00	1.00		1.00	0.99	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770	1589		1770	3534		1770	3534		1770	3513	
Flt Permitted	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (perm)	1770	1589		1770	3534		1770	3513		1770	3513	
Peak-hour factor, PHF	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89
Adj. Flow (vph)	11	6	51	0	0	0	56	804	6	6	1648	73
RTOR Reduction (vph)	0	47	0	0	0	0	0	0	0	0	2	0
Lane Group Flow (vph)	11	10	0	0	0	0	56	810	0	6	1719	0
Confl. Peds. (#/hr)	5											
Confl. Bikes (#/hr)	5											
Turn Type	Split	NA		Prot	NA		Prot	NA		Prot	NA	
Protected Phases	4	4		5	2		1	6				
Permitted Phases												
Actuated Green, G (s)	5.7	5.7		3.6	51.0		0.7	48.1				
Effective Green, g (s)	5.7	5.7		3.6	51.0		0.7	48.1				
Actuated g/C Ratio	0.08	0.08		0.05	0.71		0.01	0.67				
Clearance Time (s)	4.0	4.0		6.0	6.0		4.0	4.0				
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0				
Lane Grp Cap (vph)	141	126		89	2524		17	2366				
v/s Ratio Prot	0.01	c0.01		c0.03	c0.23		0.00	c0.49				
v/s Ratio Perm												
v/c Ratio	0.08	0.08		0.63	0.32		0.35	0.73				
Uniform Delay, d1	30.4	30.4		33.2	3.8		35.1	7.4				
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00				
Incremental Delay, d2	0.2	0.3		13.1	0.1		12.2	1.1				
Delay (s)	30.7	30.7		46.4	3.9		47.3	8.6				
Level of Service	C	C		D	A		D	A				
Approach Delay (s)	30.7			0.0			6.6			8.7		
Approach LOS	C			A			A			A		

Intersection Summary

HCM 2000 Control Delay	8.6	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.65		
Actuated Cycle Length (s)	71.4	Sum of lost time (s)	14.0
Intersection Capacity Utilization	55.8%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis
18: Twin Oaks Valley Rd & Borden Rd

Exist + Proj + Sce B Cumul AM
03/17/2017

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↱		↰	↱		↰	↱		↰	↱	
Traffic Volume (vph)	60	50	240	282	112	34	93	453	63	22	1046	139
Future Volume (vph)	60	50	240	282	112	34	93	453	63	22	1046	139
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.2	5.3		4.2	5.3		4.2	4.9	4.9	4.2	4.9	4.9
Lane Util. Factor	1.00	0.95		1.00	0.95		1.00	0.95	1.00	1.00	0.95	1.00
Frpb, ped/bikes	1.00	0.98		1.00	1.00		1.00	1.00	0.98	1.00	1.00	0.98
Flpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	0.88		1.00	0.96		1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1770	3045		1770	3403		1770	3539	1556	1770	3539	1551
Flt Permitted	0.95	1.00		0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	1770	3045		1770	3403		1770	3539	1556	1770	3539	1551
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	53	253	297	118	36	98	477	66	23	1101	146
RTOR Reduction (vph)	0	189	0	0	17	0	0	0	35	0	0	69
Lane Group Flow (vph)	63	117	0	297	137	0	98	477	31	23	1101	77
Confl. Peds. (#/hr)			6		2				3			6
Confl. Bikes (#/hr)			1		1				3			3
Turn Type	Prot	NA		Prot	NA		Prot	NA	Perm	Prot	NA	Perm
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases									2			6
Actuated Green, G (s)	8.8	16.8		28.5	36.5		13.6	61.7	61.7	3.9	52.0	52.0
Effective Green, g (s)	8.8	16.8		28.5	36.5		13.6	61.7	61.7	3.9	52.0	52.0
Actuated g/C Ratio	0.07	0.13		0.22	0.28		0.11	0.48	0.48	0.03	0.40	0.40
Clearance Time (s)	4.2	5.3		4.2	5.3		4.2	4.9	4.9	4.2	4.9	4.9
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)	120	395		389	959		185	1686	741	53	1421	622
v/s Ratio Prot	0.04	c0.04		c0.17	0.04		c0.06	0.13		0.01	c0.31	
v/s Ratio Perm								0.02			0.05	
v/c Ratio	0.53	0.30		0.76	0.14		0.53	0.28	0.04	0.43	0.77	0.12
Uniform Delay, d1	58.3	51.0		47.3	34.8		54.9	20.5	18.1	61.7	33.7	24.4
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	4.1	0.4		8.6	0.1		2.7	0.1	0.0	5.6	2.7	0.1
Delay (s)	62.4	51.4		56.0	34.9		57.6	20.6	18.1	67.3	36.4	24.5
Level of Service	E	D		E	C		E	C	B	E	D	C
Approach Delay (s)		53.3			48.8			26.0			35.6	
Approach LOS		D			D			C			D	

Intersection Summary			
HCM 2000 Control Delay	37.9	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.67		
Actuated Cycle Length (s)	129.5	Sum of lost time (s)	18.6
Intersection Capacity Utilization	77.5%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis
19: Twin Oaks Valley Rd & Richmar Road

Exist + Proj + Sce B Cumul AM
03/17/2017

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↱		↰	↱		↰	↱		↰	↱	
Traffic Volume (vph)	193	10	142	20	10	5	75	771	20	25	1566	260
Future Volume (vph)	193	10	142	20	10	5	75	771	20	25	1566	260
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.9	4.9		4.0	4.0		4.0	5.7		4.0	5.7	
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	0.95		1.00	0.95	
Frpb, ped/bikes	1.00	0.99		1.00	0.99		1.00	1.00		1.00	1.00	
Flpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Frt	1.00	0.86		1.00	0.95		1.00	1.00		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	1581		1770	1757		1770	3523		1770	3449	
Flt Permitted	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (perm)	1770	1581		1770	1757		1770	3523		1770	3449	
Peak-hour factor, PHF	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99
Adj. Flow (vph)	195	10	143	20	10	5	76	779	20	25	1582	263
RTOR Reduction (vph)	0	123	0	0	5	0	0	1	0	0	8	0
Lane Group Flow (vph)	195	30	0	20	10	0	76	798	0	25	1837	0
Confl. Peds. (#/hr)						8				4		2
Confl. Bikes (#/hr)												3
Turn Type	Split	NA		Split	NA		Prot	NA		Prot	NA	
Protected Phases	4	4		8	8		5	2		1	6	
Permitted Phases												
Actuated Green, G (s)	16.9	16.9		7.5	7.5		6.9	74.1		3.4	70.6	
Effective Green, g (s)	16.9	16.9		7.5	7.5		6.9	74.1		3.4	70.6	
Actuated g/C Ratio	0.14	0.14		0.06	0.06		0.06	0.61		0.03	0.59	
Clearance Time (s)	4.9	4.9		4.0	4.0		4.0	5.7		4.0	5.7	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	248	221		110	109		101	2166		49	2020	
v/s Ratio Prot	c0.11	0.02		c0.01	0.01		c0.04	c0.23		0.01	c0.53	
v/s Ratio Perm												
v/c Ratio	0.79	0.14		0.18	0.09		0.75	0.37		0.51	0.91	
Uniform Delay, d1	50.1	45.4		53.6	53.3		56.0	11.5		57.7	22.1	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	15.1	0.3		0.8	0.4		26.7	0.1		8.7	6.5	
Delay (s)	65.1	45.7		54.4	53.7		82.6	11.7		66.4	28.6	
Level of Service	E	D		D	D		F	B		E	C	
Approach Delay (s)		56.6			54.1			17.8			29.1	
Approach LOS		E			D			B			C	

Intersection Summary			
HCM 2000 Control Delay	29.3	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.81		
Actuated Cycle Length (s)	120.5	Sum of lost time (s)	18.6
Intersection Capacity Utilization	85.4%	ICU Level of Service	E
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis
20: Twin Oaks Valley Rd & San Marcos Blvd

Exist + Proj + Sce B Cumul AM
03/17/2017

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↑	↱	↰	↑	↱	↰	↑	↱	↰	↑	↱
Traffic Volume (vph)	193	348	358	560	580	54	326	662	562	136	1317	358
Future Volume (vph)	193	348	358	560	580	54	326	662	562	136	1317	358
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.2	5.3	5.3	4.2	5.0		4.2	5.3	4.2	5.3		5.3
Lane Util. Factor	0.97	0.95	1.00	0.97	0.95		0.97	0.95	1.00	0.97	0.95	
Frpb, ped/bikes	1.00	1.00	0.97	1.00	1.00		1.00	1.00	0.99	1.00	1.00	
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00	1.00	1.00	
Frt	1.00	1.00	0.85	1.00	0.99		1.00	1.00	0.85	1.00	0.97	
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)	3433	3539	1541	3433	3488		3433	3539	1566	3433	3416	
Flt Permitted	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00	0.95	1.00	
Satd. Flow (perm)	3433	3539	1541	3433	3488		3433	3539	1566	3433	3416	
Peak-hour factor, PHF	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98
Adj. Flow (vph)	197	355	365	571	592	55	333	676	573	139	1344	365
RTOR Reduction (vph)	0	0	108	0	6	0	0	0	51	0	20	0
Lane Group Flow (vph)	197	355	257	571	641	0	333	676	522	139	1689	0
Confl. Peds. (#/hr)			5		4				1			1
Confl. Bikes (#/hr)			8		3				3			3
Turn Type	Prot	NA	Perm	Prot	NA		Prot	NA	pm+ov	Prot	NA	
Protected Phases	7	4		3	8		5	2	3	1	6	
Permitted Phases			4						2			
Actuated Green, G (s)	9.8	23.0	23.0	14.9	28.4		9.8	50.9	65.8	7.3	48.4	
Effective Green, g (s)	9.8	23.0	23.0	14.9	28.4		9.8	50.9	65.8	7.3	48.4	
Actuated g/C Ratio	0.09	0.20	0.20	0.13	0.25		0.09	0.44	0.57	0.06	0.42	
Clearance Time (s)	4.2	5.3	5.3	4.2	5.0		4.2	5.3	4.2	5.3		5.3
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)	292	707	307	444	860		292	1565	895	217	1436	
v/s Ratio Prot	0.06	0.10		c0.17	c0.18		c0.10	0.19	0.08	0.04	c0.49	
v/s Ratio Perm			0.17						0.26			
v/c Ratio	0.67	0.50	0.84	1.29	0.75		1.14	0.43	0.58	0.64	1.18	
Uniform Delay, d1	51.1	41.0	44.2	50.1	40.0		52.6	22.1	15.8	52.6	33.3	
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	6.0	0.6	17.7	144.9	3.5		96.1	0.2	1.0	6.3	87.0	
Delay (s)	57.1	41.5	61.9	195.0	43.6		148.8	22.3	16.8	58.9	120.4	
Level of Service	E	D	E	F	D		F	C	B	E	F	
Approach Delay (s)		53.0			114.6			46.9			115.7	
Approach LOS		D			F			D			F	
Intersection Summary												
HCM 2000 Control Delay		85.6			HCM 2000 Level of Service			F				
HCM 2000 Volume to Capacity ratio		1.10										
Actuated Cycle Length (s)		115.1			Sum of lost time (s)			19.0				
Intersection Capacity Utilization		100.7%			ICU Level of Service			G				
Analysis Period (min)		15										
c Critical Lane Group												

HCM Signalized Intersection Capacity Analysis
21: Twin Oaks Valley Rd & SR 78 WB Ramps

Exist + Proj + Sce B Cumul AM
03/17/2017

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations				↰		↱		↰	↱		↰	↱
Traffic Volume (vph)	0	0	0	687	0	313	0	1260	591	0	1769	451
Future Volume (vph)	0	0	0	687	0	313	0	1260	591	0	1769	451
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)				4.6		4.6		5.3	4.6		5.3	5.3
Lane Util. Factor				0.97		0.88		0.91	1.00		0.91	1.00
Frpb, ped/bikes				1.00		1.00		1.00	0.97		1.00	0.97
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	0.85
Flt Protected				0.95		1.00		1.00	1.00		1.00	1.00
Satd. Flow (prot)				3433		2787		5085	1539		5085	1543
Flt Permitted				0.95		1.00		1.00	1.00		1.00	1.00
Satd. Flow (perm)				3433		2787		5085	1539		5085	1543
Peak-hour factor, PHF	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98
Adj. Flow (vph)	0	0	0	701	0	319	0	1286	603	0	1805	460
RTOR Reduction (vph)	0	0	0	0	0	64	0	0	0	0	0	154
Lane Group Flow (vph)	0	0	0	701	0	255	0	1286	603	0	1805	306
Confl. Peds. (#/hr)								8				5
Confl. Bikes (#/hr)								1				3
Turn Type				Prot		Perm		NA	pm+ov		NA	Perm
Protected Phases				8				2	8		6	
Permitted Phases						8			2			6
Actuated Green, G (s)				31.1		31.1		79.0	110.1		79.0	79.0
Effective Green, g (s)				31.1		31.1		79.0	110.1		79.0	79.0
Actuated g/C Ratio				0.26		0.26		0.66	0.92		0.66	0.66
Clearance Time (s)				4.6		4.6		5.3	4.6		5.3	5.3
Vehicle Extension (s)				2.0		2.0		2.0	2.0		2.0	2.0
Lane Grp Cap (vph)				889		722		3347	1471		3347	1015
v/s Ratio Prot				c0.20				0.25	0.11		c0.35	
v/s Ratio Perm						0.09			0.29			0.20
v/c Ratio				0.79		0.35		0.38	0.41		0.54	0.30
Uniform Delay, d1				41.4		36.2		9.4	0.7		10.9	8.7
Progression Factor				1.00		1.00		0.45	9.95		1.00	1.00
Incremental Delay, d2				4.3		0.1		0.2	0.0		0.6	0.8
Delay (s)				45.7		36.4		4.4	6.6		11.5	9.5
Level of Service				D		D		A	A		B	A
Approach Delay (s)		0.0			42.8			5.1			11.1	
Approach LOS		A			D			A			B	
Intersection Summary												
HCM 2000 Control Delay				15.2				HCM 2000 Level of Service			B	
HCM 2000 Volume to Capacity ratio				0.61								
Actuated Cycle Length (s)				120.0				Sum of lost time (s)			9.9	
Intersection Capacity Utilization				61.5%				ICU Level of Service			B	
Analysis Period (min)				15								
c Critical Lane Group												

HCM Signalized Intersection Capacity Analysis
22: Twin Oaks Valley Rd & SR 78 EB Ramps

Exist + Proj + Sce B Cumul AM
03/17/2017

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↱	↱					↰↱↱	↱	↰↱	↰↱	
Traffic Volume (vph)	596	10	797	0	0	0	0	1284	675	330	2126	0
Future Volume (vph)	596	10	797	0	0	0	0	1284	675	330	2126	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.6	4.6	4.6					5.3	5.3	4.2	5.3	
Lane Util. Factor	0.95	0.91	0.95					0.91	1.00	0.97	0.91	
Frpb, ped/bikes	1.00	0.99	0.99					1.00	0.98	1.00	1.00	
Flpb, ped/bikes	1.00	1.00	1.00					1.00	1.00	1.00	1.00	
Frt	1.00	0.89	0.85					1.00	0.85	1.00	1.00	
Flt Protected	0.95	0.99	1.00					1.00	1.00	0.95	1.00	
Satd. Flow (prot)	1681	1474	1485					5085	1553	3433	5085	
Flt Permitted	0.95	0.99	1.00					1.00	1.00	0.95	1.00	
Satd. Flow (perm)	1681	1474	1485					5085	1553	3433	5085	
Peak-hour factor, PHF	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Adj. Flow (vph)	614	10	822	0	0	0	0	1324	696	340	2192	0
RTOR Reduction (vph)	0	2	37	0	0	0	0	0	433	0	0	0
Lane Group Flow (vph)	503	472	432	0	0	0	0	1324	263	340	2192	0
Confl. Peds. (#/hr)			1						4			
Confl. Bikes (#/hr)												1
Turn Type	Split	NA	Perm					NA	Perm	Prot	NA	
Protected Phases	4	4						2		1	6	
Permitted Phases			4					2				
Actuated Green, G (s)	44.0	44.0	44.0					45.4	45.4	16.5	66.1	
Effective Green, g (s)	44.0	44.0	44.0					45.4	45.4	16.5	66.1	
Actuated g/C Ratio	0.37	0.37	0.37					0.38	0.38	0.14	0.55	
Clearance Time (s)	4.6	4.6	4.6					5.3	5.3	4.2	5.3	
Vehicle Extension (s)	3.0	3.0	3.0					3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	616	540	544					1923	587	472	2800	
v/s Ratio Prot	0.30	c0.32						0.26		0.10	c0.43	
v/s Ratio Perm			0.29					0.17				
v/c Ratio	0.82	0.87	0.79					0.69	0.45	0.72	0.78	
Uniform Delay, d1	34.4	35.4	33.9					31.4	27.9	49.5	21.3	
Progression Factor	1.00	1.00	1.00					1.00	1.00	1.12	1.16	
Incremental Delay, d2	8.2	14.6	7.8					2.0	2.5	4.6	1.9	
Delay (s)	42.6	50.0	41.8					33.4	30.4	60.2	26.5	
Level of Service	D	D	D					C	C	E	C	
Approach Delay (s)		44.7			0.0			32.4			31.0	
Approach LOS		D			A			C			C	
Intersection Summary												
HCM 2000 Control Delay			34.8									
HCM 2000 Volume to Capacity ratio			0.85									
Actuated Cycle Length (s)			120.0						14.1			
Intersection Capacity Utilization			88.5%						E			
Analysis Period (min)			15									
c Critical Lane Group												

HCM Signalized Intersection Capacity Analysis
23: Robelini Dr & S. Santa Fe Ave

Exist + Proj + Sce B Cumul AM
03/17/2017

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↰	↱	↰	↱	↰	↱
Traffic Volume (vph)	344	450	611	238	130	193
Future Volume (vph)	344	450	611	238	130	193
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.3	4.6	4.4	5.3	4.6	4.4
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frpb, ped/bikes	1.00	0.99	1.00	1.00	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	1.00	1.00	0.85
Flt Protected	1.00	1.00	0.95	1.00	0.95	1.00
Satd. Flow (prot)	1863	1570	1770	1863	1770	1583
Flt Permitted	1.00	1.00	0.95	1.00	0.95	1.00
Satd. Flow (perm)	1863	1570	1770	1863	1770	1583
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	374	489	664	259	141	210
RTOR Reduction (vph)	0	14	0	0	0	36
Lane Group Flow (vph)	374	475	664	259	141	174
Confl. Bikes (#/hr)		6				
Turn Type	NA	pm+ov	Prot	NA	Prot	pm+ov
Protected Phases	2	8	1	6	8	1
Permitted Phases		2				8
Actuated Green, G (s)	25.7	74.1	31.6	35.4	48.4	80.0
Effective Green, g (s)	25.7	74.1	31.6	35.4	48.4	80.0
Actuated g/C Ratio	0.21	0.62	0.26	0.29	0.40	0.67
Clearance Time (s)	5.3	4.6	4.4	5.3	4.6	4.4
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	398	969	466	549	713	1055
v/s Ratio Prot	c0.20	c0.20	c0.38	0.14	0.08	0.04
v/s Ratio Perm		0.10				0.07
v/c Ratio	0.94	0.49	1.42	0.47	0.20	0.17
Uniform Delay, d1	46.4	12.6	44.2	34.6	23.2	7.5
Progression Factor	1.00	1.00	1.23	1.12	1.00	1.00
Incremental Delay, d2	29.8	0.4	192.4	0.1	0.1	0.1
Delay (s)	76.2	13.0	246.9	38.9	23.3	7.6
Level of Service	E	B	F	D	C	A
Approach Delay (s)		40.4		188.5		13.9
Approach LOS		D		F		B
Intersection Summary						
HCM 2000 Control Delay			100.0			F
HCM 2000 Volume to Capacity ratio			0.88			
Actuated Cycle Length (s)			120.0			14.3
Intersection Capacity Utilization			71.1%			C
Analysis Period (min)			15			
c Critical Lane Group						

HCM Signalized Intersection Capacity Analysis
24: Sycamore Avenue & SR 78 WB Ramps

Exist + Proj + Sce B Cumul AM
03/17/2017

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations				↰	↰	↰	↰	↰			↰	↰
Traffic Volume (vph)	0	0	0	1190	5	100	400	503	0	0	949	402
Future Volume (vph)	0	0	0	1190	5	100	400	503	0	0	949	402
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)				4.6	4.6	4.6	4.2	5.0			5.0	5.0
Lane Util. Factor				0.95	0.95	0.88	0.97	0.91			0.91	1.00
Frpb, ped/bikes				1.00	1.00	0.99	1.00	1.00			1.00	0.97
Flpb, ped/bikes				1.00	1.00	1.00	1.00	1.00			1.00	1.00
Frt				1.00	1.00	0.85	1.00	1.00			1.00	0.85
Flt Protected				0.95	0.95	1.00	0.95	1.00			1.00	1.00
Satd. Flow (prot)				1681	1686	2751	3433	5085			5085	1532
Flt Permitted				0.95	0.95	1.00	0.95	1.00			1.00	1.00
Satd. Flow (perm)				1681	1686	2751	3433	5085			5085	1532
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	0	0	0	1322	6	111	444	559	0	0	1054	447
RTOR Reduction (vph)	0	0	0	0	0	61	0	0	0	0	0	328
Lane Group Flow (vph)	0	0	0	661	667	50	444	559	0	0	1054	119
Confl. Peds. (#/hr)				1		1		1				12
Turn Type				Split	NA	Perm	Prot	NA			NA	Perm
Protected Phases				8	8		5	2			6	
Permitted Phases						8						6
Actuated Green, G (s)				49.7	49.7	49.7	17.2	50.7			29.3	29.3
Effective Green, g (s)				49.7	49.7	49.7	17.2	50.7			29.3	29.3
Actuated g/C Ratio				0.45	0.45	0.45	0.16	0.46			0.27	0.27
Clearance Time (s)				4.6	4.6	4.6	4.2	5.0			5.0	5.0
Vehicle Extension (s)				3.0	3.0	3.0	3.0	3.0			3.0	3.0
Lane Grp Cap (vph)				759	761	1242	536	2343			1354	408
v/s Ratio Prot				0.39	c0.40		c0.13	0.11			c0.21	
v/s Ratio Perm						0.02						0.08
v/c Ratio				0.87	0.88	0.04	0.83	0.24			0.78	0.29
Uniform Delay, d1				27.3	27.4	16.8	45.0	18.0			37.3	32.1
Progression Factor				1.00	1.00	1.00	1.50	0.87			1.00	1.00
Incremental Delay, d2				10.7	11.1	0.0	9.6	0.2			4.5	1.8
Delay (s)				37.9	38.4	16.8	77.0	15.8			41.8	33.9
Level of Service				D	D	B	E	B			D	C
Approach Delay (s)	0.0				36.6			42.9			39.5	
Approach LOS	A				D			D			D	
Intersection Summary												
HCM 2000 Control Delay	39.3											
HCM 2000 Volume to Capacity ratio	0.84											
Actuated Cycle Length (s)	110.0							13.8				
Intersection Capacity Utilization	107.8%							G				
Analysis Period (min)	15											
c Critical Lane Group												

HCM Signalized Intersection Capacity Analysis
25: Sycamore Avenue & SR 78 EB Ramps

Exist + Proj + Sce B Cumul AM
03/17/2017

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↰	↰					↰	↰	↰	↰	↰
Traffic Volume (vph)	271	5	1020	0	0	0	0	702	1090	360	2079	0
Future Volume (vph)	271	5	1020	0	0	0	0	702	1090	360	2079	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.6	4.6	4.6					5.0	5.0	4.2	5.0	
Lane Util. Factor	0.95	0.91	0.95					0.91	1.00	0.97	0.91	
Frpb, ped/bikes	1.00	1.00	1.00					1.00	0.98	1.00	1.00	
Flpb, ped/bikes	1.00	1.00	1.00					1.00	1.00	1.00	1.00	
Frt	1.00	0.86	0.85					1.00	0.85	1.00	1.00	
Flt Protected	0.95	1.00	1.00					1.00	1.00	0.95	1.00	
Satd. Flow (prot)	1681	1453	1504					5085	1554	3433	5085	
Flt Permitted	0.95	1.00	1.00					1.00	1.00	0.95	1.00	
Satd. Flow (perm)	1681	1453	1504					5085	1554	3433	5085	
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)	285	5	1074	0	0	0	0	739	1147	379	2188	0
RTOR Reduction (vph)	0	1	36	0	0	0	0	0	563	0	0	0
Lane Group Flow (vph)	256	559	512	0	0	0	0	739	584	379	2188	0
Confl. Peds. (#/hr)									4			
Confl. Bikes (#/hr)									1			
Turn Type	Split	NA	Perm					NA	Perm	Prot	NA	
Protected Phases	4	4						2		1	6	
Permitted Phases			4						2			
Actuated Green, G (s)	45.3	45.3	45.3					39.0	39.0	11.9	55.1	
Effective Green, g (s)	45.3	45.3	45.3					39.0	39.0	11.9	55.1	
Actuated g/C Ratio	0.41	0.41	0.41					0.35	0.35	0.11	0.50	
Clearance Time (s)	4.6	4.6	4.6					5.0	5.0	4.2	5.0	
Vehicle Extension (s)	3.0	3.0	3.0					3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	692	598	619					1802	550	371	2547	
v/s Ratio Prot	0.15	c0.38						0.15		c0.11	0.43	
v/s Ratio Perm			0.34						c0.38			
v/c Ratio	0.37	0.93	0.83					0.41	1.06	1.02	0.86	
Uniform Delay, d1	22.4	30.9	28.9					26.8	35.5	49.0	24.0	
Progression Factor	1.00	1.00	1.00					1.00	1.00	1.40	1.09	
Incremental Delay, d2	0.3	21.9	8.9					0.7	55.6	47.7	2.9	
Delay (s)	22.8	52.8	37.8					27.5	91.1	116.5	29.1	
Level of Service	C	D	D					C	F	F	C	
Approach Delay (s)	41.1				0.0			66.2			42.0	
Approach LOS	D				A			E			D	
Intersection Summary												
HCM 2000 Control Delay	49.6											
HCM 2000 Volume to Capacity ratio	1.00											
Actuated Cycle Length (s)	110.0									13.8		
Intersection Capacity Utilization	107.8%									G		
Analysis Period (min)	15											
c Critical Lane Group												

HCM Signalized Intersection Capacity Analysis
26: S. Santa Fe Ave & Buena Creek Rd

Exist + Proj + Sce B Cumul AM
03/17/2017

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations	↰	↑	↰	↰	↰	↰
Traffic Volume (vph)	247	610	430	160	320	819
Future Volume (vph)	247	610	430	160	320	819
Ideal Flow (vphpl)	1520	1900	1900	1520	1520	1520
Total Lost time (s)	4.4	5.3	5.3	5.3	4.0	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	
Frpb, ped/bikes	1.00	1.00	1.00	0.94	0.98	
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	
Frt	1.00	1.00	1.00	0.85	0.90	
Flt Protected	0.95	1.00	1.00	1.00	0.99	
Satd. Flow (prot)	1416	1863	1863	1194	1296	
Flt Permitted	0.95	1.00	1.00	1.00	0.99	
Satd. Flow (perm)	1416	1863	1863	1194	1296	
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	260	642	453	168	337	862
RTOR Reduction (vph)	0	0	0	42	0	0
Lane Group Flow (vph)	260	642	453	126	1199	0
Confl. Peds. (#/hr)				12		4
Confl. Bikes (#/hr)				3		
Turn Type	Prot	NA	NA	Perm	Prot	
Protected Phases	5	2	6		4	
Permitted Phases				6		
Actuated Green, G (s)	21.9	25.7	35.4	35.4	49.0	
Effective Green, g (s)	21.9	25.7	35.4	35.4	49.0	
Actuated g/C Ratio	0.18	0.21	0.29	0.29	0.41	
Clearance Time (s)	4.4	5.3	5.3	5.3	4.0	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	258	398	549	352	529	
v/s Ratio Prot	c0.18	c0.34	c0.24		c0.93	
v/s Ratio Perm				0.11		
v/c Ratio	1.01	1.61	0.83	0.36	2.27	
Uniform Delay, d1	49.0	47.1	39.4	33.3	35.5	
Progression Factor	1.22	0.77	1.00	1.00	1.00	
Incremental Delay, d2	55.7	286.4	9.8	0.6	576.0	
Delay (s)	115.6	322.9	49.2	34.0	611.5	
Level of Service	F	F	D	C	F	
Approach Delay (s)		263.2	45.1		611.5	
Approach LOS		F	D		F	
Intersection Summary						
HCM 2000 Control Delay			366.8		HCM 2000 Level of Service	F
HCM 2000 Volume to Capacity ratio			1.71			
Actuated Cycle Length (s)			120.0		Sum of lost time (s)	14.3
Intersection Capacity Utilization			136.7%		ICU Level of Service	H
Analysis Period (min)			15			
c Critical Lane Group						

HCM Unsignalized Intersection Capacity Analysis
27: Buena Creek Rd & Monte Vista Rd

Exist + Proj + Sce B Cumul AM
03/17/2017

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↑	↑		↰	↰
Sign Control		Stop	Stop		Stop	
Traffic Volume (vph)	110	229	604	272	399	180
Future Volume (vph)	110	229	604	272	399	180
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95
Hourly flow rate (vph)	116	241	636	286	420	189
Direction, Lane #	EB 1	WB 1	SB 1			
Volume Total (vph)	357	922	609			
Volume Left (vph)	116	0	420			
Volume Right (vph)	0	286	189			
Hadj (s)	0.10	-0.15	-0.01			
Departure Headway (s)	7.1	6.5	6.6			
Degree Utilization, x	0.70	1.66	1.12			
Capacity (veh/h)	499	560	548			
Control Delay (s)	25.1	321.6	100.1			
Approach Delay (s)	25.1	321.6	100.1			
Approach LOS	D	F	F			
Intersection Summary						
Delay			194.1			
Level of Service			F			
Intersection Capacity Utilization			109.7%		ICU Level of Service	H
Analysis Period (min)			15			

HCM Signalized Intersection Capacity Analysis
28: San Marcos Blvd & Knoll Rd/SR 78 WB Ramps

Exist + Proj + Sce B Cumul AM
03/17/2017

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	→	↱	↰	↱	→	↰	↱	↱	↰	↱	↱
Traffic Volume (vph)	186	0	564	1139	391	21	372	477	138	4	1093	223
Future Volume (vph)	186	0	564	1139	391	21	372	477	138	4	1093	223
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.6		5.2	5.6	5.6		5.2	6.3	6.3		6.3	6.3
Lane Util. Factor	1.00	0.88	0.97	0.95			0.97	0.95	1.00		0.91	1.00
Frpb, ped/bikes	1.00		1.00	1.00	1.00		1.00	1.00	1.00		1.00	0.98
Flpb, ped/bikes	1.00		1.00	1.00	1.00		1.00	1.00	1.00		1.00	1.00
Frt	1.00	0.85	1.00	0.99			1.00	1.00	0.85		1.00	0.85
Flt Protected	0.95		1.00	0.95	1.00		0.95	1.00	1.00		1.00	1.00
Satd. Flow (prot)	1770		2787	3433	3509		3433	3539	1583		5084	1546
Flt Permitted	0.95		1.00	0.95	1.00		0.95	1.00	1.00		0.94	1.00
Satd. Flow (perm)	1770		2787	3433	3509		3433	3539	1583		4771	1546
Peak-hour factor, PHF	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Adj. Flow (vph)	192	0	581	1174	403	22	384	492	142	4	1127	230
RTOR Reduction (vph)	0	0	59	0	4	0	0	0	72	0	0	85
Lane Group Flow (vph)	192	0	522	1174	421	0	384	492	70	0	1131	145
Confl. Peds. (#/hr)						1						8
Confl. Bikes (#/hr)												2
Turn Type	Prot		pm+ov	Prot	NA		Prot	NA	Perm		NA	Perm
Protected Phases	7		5	3	8		5	2			6	
Permitted Phases			7						2			6
Actuated Green, G (s)	15.0		33.0	48.9	28.3		18.0	59.2	59.2		36.0	36.0
Effective Green, g (s)	15.0		33.0	48.9	28.3		18.0	59.2	59.2		36.0	36.0
Actuated g/C Ratio	0.12		0.28	0.41	0.24		0.15	0.49	0.49		0.30	0.30
Clearance Time (s)	5.6		5.2	5.6	5.6		5.2	6.3	6.3		6.3	6.3
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)	221		766	1398	827		514	1745	780		1431	463
v/s Ratio Prot	0.11		0.10	c0.34	0.12		c0.11	0.14				
v/s Ratio Perm			0.09					0.04			c0.24	0.09
v/c Ratio	0.87		0.68	0.84	0.51		0.75	0.28	0.09		0.79	0.31
Uniform Delay, d1	51.5		38.8	32.0	39.8		48.8	17.9	16.1		38.5	32.4
Progression Factor	1.00		1.00	1.00	1.00		0.94	1.45	3.65		1.00	1.00
Incremental Delay, d2	28.3		2.5	4.6	0.5		5.7	0.4	0.2		4.5	1.8
Delay (s)	79.8		41.3	36.6	40.3		51.4	26.3	59.0		43.1	34.2
Level of Service	E		D	D	D		D	C	E		D	C
Approach Delay (s)		50.9			37.6			40.3			41.6	
Approach LOS		D			D			D			D	
Intersection Summary												
HCM 2000 Control Delay			41.5		HCM 2000 Level of Service				D			
HCM 2000 Volume to Capacity ratio			0.85									
Actuated Cycle Length (s)			120.0		Sum of lost time (s)				22.7			
Intersection Capacity Utilization			89.8%		ICU Level of Service				E			
Analysis Period (min)			15									
c Critical Lane Group												

HCM Signalized Intersection Capacity Analysis
29: San Marcos Blvd & SR 78 EB Ramps

Exist + Proj + Sce B Cumul AM
03/17/2017

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	→	↱	↰	↱	→	↰	↱	↱	↰	↱	↱
Traffic Volume (vph)	221	0	319	0	0	0	0	836	828	183	2466	0
Future Volume (vph)	221	0	319	0	0	0	0	836	828	183	2466	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.6		5.6					6.3	6.3	5.2	6.3	
Lane Util. Factor	0.97		1.00					0.91	0.88	0.97	0.91	
Frpb, ped/bikes	1.00		1.00					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)	3433		1583					5085	2726	3433	5085	
Flt Permitted	0.95		1.00					1.00	1.00	0.95	1.00	
Satd. Flow (perm)	3433		1583					5085	2726	3433	5085	
Peak-hour factor, PHF	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Adj. Flow (vph)	230	0	332	0	0	0	0	871	862	191	2569	0
RTOR Reduction (vph)	0	0	63	0	0	0	0	0	366	0	0	0
Lane Group Flow (vph)	230	0	269	0	0	0	0	871	497	191	2569	0
Confl. Peds. (#/hr)												6
Confl. Bikes (#/hr)										3		4
Turn Type	Prot		Perm					NA	Perm	Prot	NA	
Protected Phases	4							2		1	6	
Permitted Phases			4					2				
Actuated Green, G (s)	21.8		21.8					69.1	69.1	12.0	86.3	
Effective Green, g (s)	21.8		21.8					69.1	69.1	12.0	86.3	
Actuated g/C Ratio	0.18		0.18					0.58	0.58	0.10	0.72	
Clearance Time (s)	5.6		5.6					6.3	6.3	5.2	6.3	
Vehicle Extension (s)	3.0		3.0					3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	623		287					2928	1569	343	3656	
v/s Ratio Prot	0.07							0.17		0.06	c0.51	
v/s Ratio Perm			c0.17						0.18			
v/c Ratio	0.37		0.94					0.30	0.32	0.56	0.70	
Uniform Delay, d1	43.1		48.4					13.0	13.2	51.5	9.6	
Progression Factor	1.00		1.00					1.00	1.00	1.14	0.56	
Incremental Delay, d2	0.4		36.4					0.3	0.5	1.4	0.8	
Delay (s)	43.4		84.8					13.3	13.7	60.2	6.2	
Level of Service	D		F					B	B	E	A	
Approach Delay (s)		67.9			0.0			13.5			10.0	
Approach LOS		E			A			B			A	
Intersection Summary												
HCM 2000 Control Delay			17.6					HCM 2000 Level of Service			B	
HCM 2000 Volume to Capacity ratio			0.79									
Actuated Cycle Length (s)			120.0					Sum of lost time (s)			17.1	
Intersection Capacity Utilization			77.3%					ICU Level of Service			D	
Analysis Period (min)			15									
c Critical Lane Group												

HCM Signalized Intersection Capacity Analysis
30: San Marcos Blvd & E. Mission Road

Exist + Proj + Sce B Cumul AM
03/17/2017

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↱	↱	↰	↱	↱	↰	↱	↱	↰	↱	↱
Traffic Volume (vph)	30	440	21	756	736	80	10	78	351	100	421	51
Future Volume (vph)	30	440	21	756	736	80	10	78	351	100	421	51
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	5.3	5.3	4.0	5.3	5.3	4.0	5.3	5.3	4.0	5.3	5.3
Lane Util. Factor	1.00	0.95	1.00	0.97	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00
Flpb, ped/bikes	1.00	1.00	0.99	1.00	1.00	0.96	1.00	1.00	1.00	1.00	1.00	1.00
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.98	1.00
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1770	3539	1560	3433	3539	1523	1770	3539	1583	1770	3482	1770
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	1770	3539	1560	3433	3539	1523	1770	3539	1583	1770	3482	1770
Peak-hour factor, PHF	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86
Adj. Flow (vph)	35	512	24	879	856	93	12	91	408	116	490	59
RTOR Reduction (vph)	0	0	18	0	0	42	0	0	347	0	6	0
Lane Group Flow (vph)	35	512	6	879	856	51	12	91	61	116	543	0
Conf. Peds. (#/hr)			2			12						
Turn Type	Prot	NA	Perm	Prot	NA	Perm	Prot	NA	Prot	Prot	NA	NA
Protected Phases	7	4		3	8		5	2	2	1	6	
Permitted Phases			4			8						
Actuated Green, G (s)	4.5	25.9	25.9	35.9	57.3	57.3	1.5	16.7	16.7	14.0	29.2	
Effective Green, g (s)	4.5	25.9	25.9	35.9	57.3	57.3	1.5	16.7	16.7	14.0	29.2	
Actuated g/C Ratio	0.04	0.23	0.23	0.32	0.52	0.52	0.01	0.15	0.15	0.13	0.26	
Clearance Time (s)	4.0	5.3	5.3	4.0	5.3	5.3	4.0	5.3	5.3	4.0	5.3	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	71	825	363	1109	1825	785	23	531	237	223	915	
v/s Ratio Prot	0.02	c0.14		c0.26	0.24		0.01	0.03	0.04	c0.07	c0.16	
v/s Ratio Perm			0.00			0.03						
v/c Ratio	0.49	0.62	0.02	0.79	0.47	0.06	0.52	0.17	0.26	0.52	0.59	
Uniform Delay, d1	52.2	38.2	32.8	34.2	17.2	13.5	54.4	41.2	41.7	45.4	35.8	
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	5.3	1.5	0.0	4.0	0.2	0.0	19.7	0.2	0.6	2.2	1.0	
Delay (s)	57.5	39.7	32.8	38.2	17.4	13.5	74.2	41.3	42.3	47.6	36.8	
Level of Service	E	D	C	D	B	B	E	D	D	D	D	
Approach Delay (s)		40.5			27.2			42.9			38.7	
Approach LOS		D			C			D			D	

Intersection Summary

HCM 2000 Control Delay	33.7	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.69		
Actuated Cycle Length (s)	111.1	Sum of lost time (s)	18.6
Intersection Capacity Utilization	59.7%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

HCM Unsignalized Intersection Capacity Analysis
31: North Centre City Pkwy & Mesa Rock Rd

Exist + Proj + Sce B Cumul AM
03/17/2017

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations	↰	↱	↰	↱	↱	↱
Traffic Volume (veh/h)	0	84	43	126	438	0
Future Volume (Veh/h)	0	84	43	126	438	0
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.88	0.88	0.88	0.88	0.88	0.88
Hourly flow rate (vph)	0	95	49	143	498	0
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			None	None		
Median storage (veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	739	498	498			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	739	498	498			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	100	83	95			
cM capacity (veh/h)	367	572	1066			
Direction, Lane #	EB 1	NB 1	NB 2	SB 1		
Volume Total	95	49	143	498		
Volume Left	0	49	0	0		
Volume Right	95	0	0	0		
cSH	572	1066	1700	1700		
Volume to Capacity	0.17	0.05	0.08	0.29		
Queue Length 95th (ft)	15	4	0	0		
Control Delay (s)	12.5	8.5	0.0	0.0		
Lane LOS	B	A				
Approach Delay (s)	12.5	2.2		0.0		
Approach LOS	B					

Intersection Summary

Average Delay	2.1		
Intersection Capacity Utilization	41.6%	ICU Level of Service	A
Analysis Period (min)	15		

HCM Signalized Intersection Capacity Analysis
32: North Centre City Pkwy & Country Club Ln

Exist + Proj + Sce B Cumul AM
03/17/2017

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		 			 			 			 	
Traffic Volume (vph)	100	360	110	280	400	130	40	399	115	220	667	105
Future Volume (vph)	100	360	110	280	400	130	40	399	115	220	667	105
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00
Frpb, ped/bikes	1.00	1.00	0.98	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1770	3539	1555	1770	3539	1583	1770	3539	1583	1770	3539	1583
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	1770	3539	1555	1770	3539	1583	1770	3539	1583	1770	3539	1583
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)	109	391	120	304	435	141	43	434	125	239	725	114
RTOR Reduction (vph)	0	0	98	0	0	95	0	0	100	0	0	76
Lane Group Flow (vph)	109	391	22	304	435	46	43	434	25	239	725	38
Confl. Peds. (#/hr)	4											
Turn Type	Prot	NA	Perm	Prot	NA	Perm	Prot	NA	Perm	Prot	NA	Perm
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases			4			8			2			6
Actuated Green, G (s)	6.6	14.7	14.7	18.3	26.4	26.4	3.4	16.4	16.4	14.0	27.0	27.0
Effective Green, g (s)	6.6	14.7	14.7	18.3	26.4	26.4	3.4	16.4	16.4	14.0	27.0	27.0
Actuated g/C Ratio	0.08	0.18	0.18	0.22	0.32	0.32	0.04	0.20	0.20	0.17	0.33	0.33
Clearance Time (s)	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	143	639	280	397	1147	513	73	713	318	304	1173	525
v/s Ratio Prot	0.06	c0.11		c0.17	0.12		0.02	0.12		c0.14	c0.20	
v/s Ratio Perm			0.01			0.03			0.02			0.02
v/c Ratio	0.76	0.61	0.08	0.77	0.38	0.09	0.59	0.61	0.08	0.79	0.62	0.07
Uniform Delay, d1	36.6	30.7	27.7	29.5	21.2	19.1	38.3	29.6	26.4	32.3	22.9	18.6
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	21.0	1.7	0.1	8.6	0.2	0.1	11.6	1.5	0.1	12.6	1.0	0.1
Delay (s)	57.7	32.5	27.8	38.1	21.4	19.2	49.9	31.1	26.5	44.8	23.8	18.7
Level of Service	E	C	C	D	C	B	D	C	C	D	C	B
Approach Delay (s)	36.0			26.8			31.5			27.9		
Approach LOS	D			C			C			C		
Intersection Summary												
HCM 2000 Control Delay	29.9			HCM 2000 Level of Service			C					
HCM 2000 Volume to Capacity ratio	0.72											
Actuated Cycle Length (s)	81.4			Sum of lost time (s)			18.0					
Intersection Capacity Utilization	64.1%			ICU Level of Service			C					
Analysis Period (min)	15											
c Critical Lane Group												

HCM Signalized Intersection Capacity Analysis
33: Twin Oaks Valley Rd & Discovery Street/Barham Dr

Exist + Proj + Sce B Cumul AM
03/17/2017

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰↱	↰↱↱	↰	↰	↰	↰	↰	↰↱↱		↰↱	↰↱↱	↰
Traffic Volume (vph)	270	70	10	320	340	219	20	915	140	486	1179	490
Future Volume (vph)	270	70	10	320	340	219	20	915	140	486	1179	490
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	5.3	5.3	5.0	5.3	5.3	5.0	6.0		5.0	6.0	6.0
Lane Util. Factor	0.97	0.91	1.00	1.00	1.00	1.00	1.00	0.91		0.97	0.91	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.98		1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	3433	5085	1583	1770	1863	1583	1770	4984		3433	5085	1583
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00
Satd. Flow (perm)	3433	5085	1583	1770	1863	1583	1770	4984		3433	5085	1583
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)	293	76	11	348	370	238	22	995	152	528	1282	533
RTOR Reduction (vph)	0	0	9	0	0	175	0	16	0	0	0	278
Lane Group Flow (vph)	293	76	2	348	370	63	22	1131	0	528	1282	255
Turn Type	Prot	NA	Perm	Prot	NA	Perm	Prot	NA		Prot	NA	Perm
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases			4			8						6
Actuated Green, G (s)	12.2	17.4	17.4	25.6	30.8	30.8	1.9	33.1		18.1	49.3	49.3
Effective Green, g (s)	12.2	17.4	17.4	25.6	30.8	30.8	1.9	33.1		18.1	49.3	49.3
Actuated g/C Ratio	0.11	0.15	0.15	0.22	0.27	0.27	0.02	0.29		0.16	0.43	0.43
Clearance Time (s)	5.0	5.3	5.3	5.0	5.3	5.3	5.0	6.0		5.0	6.0	6.0
Vehicle Extension (s)	2.0	4.5	4.5	2.0	4.5	4.5	2.0	3.0		2.0	4.0	4.0
Lane Grp Cap (vph)	362	766	238	392	496	422	29	1428		537	2170	675
v/s Ratio Prot	0.09	0.01		c0.20	c0.20		0.01	c0.23		c0.15	0.25	
v/s Ratio Perm			0.00			0.04						0.16
v/c Ratio	0.81	0.10	0.01	0.89	0.75	0.15	0.76	0.79		0.98	0.59	0.38
Uniform Delay, d1	50.5	42.3	41.7	43.6	38.8	32.4	56.6	38.0		48.5	25.4	22.6
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	11.9	0.1	0.0	20.3	6.8	0.3	65.7	4.6		34.2	1.2	1.6
Delay (s)	62.4	42.4	41.7	63.9	45.6	32.6	122.2	42.6		82.8	26.6	24.2
Level of Service	E	D	D	E	D	C	F	D		F	C	C
Approach Delay (s)	57.8			49.0			44.1			38.7		
Approach LOS	E			D			D			D		
Intersection Summary												
HCM 2000 Control Delay	43.5			HCM 2000 Level of Service					D			
HCM 2000 Volume to Capacity ratio	0.87											
Actuated Cycle Length (s)	115.5			Sum of lost time (s)					21.3			
Intersection Capacity Utilization	78.0%			ICU Level of Service					D			
Analysis Period (min)	15											
c Critical Lane Group												

HCM Signalized Intersection Capacity Analysis
1: Champagne Boulevard & Gopher Canyon Road

Exist + Proj + Sce B Cumu PM
03/17/2017

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations	↰	↱	↰	↱	↱	
Traffic Volume (vph)	480	352	278	357	254	350
Future Volume (vph)	480	352	278	357	254	350
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5	4.5	4.5	4.5	4.5	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	
Frpb, ped/bikes	1.00	1.00	1.00	1.00	0.99	
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	
Frt	1.00	0.85	1.00	1.00	0.92	
Flt Protected	0.95	1.00	0.95	1.00	1.00	
Satd. Flow (prot)	1770	1583	1770	1863	1699	
Flt Permitted	0.95	1.00	0.95	1.00	1.00	
Satd. Flow (perm)	1770	1583	1770	1863	1699	
Peak-hour factor, PHF	0.94	0.94	0.94	0.94	0.94	0.94
Adj. Flow (vph)	511	374	296	380	270	372
RTOR Reduction (vph)	0	242	0	0	42	0
Lane Group Flow (vph)	511	132	296	380	600	0
Confl. Bikes (#/hr)					10	
Turn Type	Prot	Perm	Prot	NA	NA	
Protected Phases	4		5	2	6	
Permitted Phases		4				
Actuated Green, G (s)	35.3	35.3	21.4	68.9	43.0	
Effective Green, g (s)	35.3	35.3	21.4	68.9	43.0	
Actuated g/C Ratio	0.31	0.31	0.19	0.61	0.38	
Clearance Time (s)	4.5	4.5	4.5	4.5	4.5	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	551	493	334	1133	645	
v/s Ratio Prot	c0.29		c0.17	0.20	c0.35	
v/s Ratio Perm		0.08				
v/c Ratio	0.93	0.27	0.89	0.34	0.93	
Uniform Delay, d1	37.7	29.3	44.7	10.9	33.7	
Progression Factor	1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	21.8	0.3	23.3	0.2	20.2	
Delay (s)	59.5	29.5	68.0	11.1	53.9	
Level of Service	E	C	E	B	D	
Approach Delay (s)	46.9			36.0	53.9	
Approach LOS	D			D	D	

Intersection Summary					
HCM 2000 Control Delay	45.6	HCM 2000 Level of Service	D		
HCM 2000 Volume to Capacity ratio	0.92				
Actuated Cycle Length (s)	113.2	Sum of lost time (s)	13.5		
Intersection Capacity Utilization	88.1%	ICU Level of Service	E		
Analysis Period (min)	15				
c Critical Lane Group					

HCM Signalized Intersection Capacity Analysis
2: Champagne Boulevard & Old Castle Road

Exist + Proj + Sce B Cumu PM
03/17/2017

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations	↰	↱	↱		↰	↱
Traffic Volume (vph)	99	240	395	157	380	226
Future Volume (vph)	99	240	395	157	380	226
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5	4.5	4.5		4.5	4.5
Lane Util. Factor	1.00	1.00	1.00		1.00	1.00
Frpb, ped/bikes	1.00	0.97	0.99		1.00	1.00
Flpb, ped/bikes	1.00	1.00	1.00		1.00	1.00
Frt	1.00	0.85	0.96		1.00	1.00
Flt Protected	0.95	1.00	1.00		0.95	1.00
Satd. Flow (prot)	1770	1543	1781		1770	1863
Flt Permitted	0.95	1.00	1.00		0.95	1.00
Satd. Flow (perm)	1770	1543	1781		1770	1863
Peak-hour factor, PHF	0.84	0.84	0.84	0.84	0.84	0.84
Adj. Flow (vph)	118	286	470	187	452	269
RTOR Reduction (vph)	0	246	15	0	0	0
Lane Group Flow (vph)	118	40	642	0	452	269
Confl. Bikes (#/hr)		2		1		
Turn Type	Prot	Perm	NA		Prot	NA
Protected Phases	8		2		1	6
Permitted Phases		8				
Actuated Green, G (s)	11.2	11.2	32.5		23.8	60.8
Effective Green, g (s)	11.2	11.2	32.5		23.8	60.8
Actuated g/C Ratio	0.14	0.14	0.40		0.29	0.75
Clearance Time (s)	4.5	4.5	4.5		4.5	4.5
Vehicle Extension (s)	3.0	3.0	3.0		3.0	3.0
Lane Grp Cap (vph)	244	213	714		520	1398
v/s Ratio Prot	c0.07		c0.36		c0.26	0.14
v/s Ratio Perm		0.03				
v/c Ratio	0.48	0.19	0.90		0.87	0.19
Uniform Delay, d1	32.2	30.9	22.7		27.1	2.9
Progression Factor	1.00	1.00	1.00		1.00	1.00
Incremental Delay, d2	1.5	0.4	14.1		14.4	0.1
Delay (s)	33.7	31.3	36.8		41.5	3.0
Level of Service	C	C	D		D	A
Approach Delay (s)	32.0		36.8			27.1
Approach LOS	C		D			C

Intersection Summary					
HCM 2000 Control Delay	31.8	HCM 2000 Level of Service	C		
HCM 2000 Volume to Capacity ratio	0.82				
Actuated Cycle Length (s)	81.0	Sum of lost time (s)	13.5		
Intersection Capacity Utilization	68.1%	ICU Level of Service	C		
Analysis Period (min)	15				
c Critical Lane Group					

HCM Unsignalized Intersection Capacity Analysis 3: Champagne Boulevard & Lawrence Welk Dr

Exist + Proj + Sce B Cumu PM
03/17/2017

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	5	5	22	90	0	50	19	488	70	40	234	5
Future Volume (Veh/h)	5	5	22	90	0	50	19	488	70	40	234	5
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84
Hourly flow rate (vph)	6	6	26	107	0	60	23	581	83	48	279	6
Pedestrians					1							
Lane Width (ft)					12.0							
Walking Speed (ft/s)					4.0							
Percent Blockage					0							
Right turn flare (veh)						7						
Median type								None			None	
Median storage (veh)												
Upstream signal (ft)											874	
pX, platoon unblocked												
vC, conflicting volume	1005	1089	282	1032	1009	582	285			665		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	1005	1089	282	1032	1009	582	285			665		
tC, single (s)	7.1	6.5	6.2	*7.0	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 %	97	97	97	45	100	88	98			95		
cM capacity (veh/h)	184	200	757	195	223	512	1277			923		
Direction, Lane #	EB 1	WB 1	NB 1	NB 2	NB 3	SB 1	SB 2					
Volume Total	38	167	23	581	83	48	285					
Volume Left	6	107	23	0	0	48	0					
Volume Right	26	60	0	0	83	0	6					
cSH	392	304	1277	1700	1700	923	1700					
Volume to Capacity	0.10	0.55	0.02	0.34	0.05	0.05	0.17					
Queue Length 95th (ft)	8	77	1	0	0	4	0					
Control Delay (s)	15.2	32.8	7.9	0.0	0.0	9.1	0.0					
Lane LOS	C	D	A			A						
Approach Delay (s)	15.2	32.8	0.3			1.3						
Approach LOS	C	D										
Intersection Summary												
Average Delay			5.4									
Intersection Capacity Utilization			50.7%	ICU Level of Service				A				
Analysis Period (min)			15									
* User Entered Value												

HCM Signalized Intersection Capacity Analysis 4: North Centre City Pkwy/Champagne Boulevard & Deer Springs Rd

Exist + Proj + Sce B Cumu PM
03/17/2017

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	387	401	118	70	253	15	105	210	120	30	130	221
Future Volume (vph)	387	401	118	70	253	15	105	210	120	30	130	221
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5	4.5		4.5	4.5			4.5			4.5	
Lane Util. Factor	1.00	0.95		1.00	0.95			1.00			1.00	
Frpb, ped/bikes	1.00	1.00		1.00	1.00			1.00			0.99	
Flpb, ped/bikes	1.00	1.00		1.00	1.00			1.00			1.00	
Frt	1.00	0.97		1.00	0.99			0.96			0.92	
Flt Protected	0.95	1.00		0.95	1.00			0.99			1.00	
Satd. Flow (prot)	1770	3419		1770	3499			1766			1696	
Flt Permitted	0.95	1.00		0.95	1.00			0.76			0.95	
Satd. Flow (perm)	1770	3419		1770	3499			1359			1615	
Peak-hour factor, PHF	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Adj. Flow (vph)	403	418	123	73	264	16	109	219	125	31	135	230
RTOR Reduction (vph)	0	29	0	0	4	0	0	13	0	0	47	0
Lane Group Flow (vph)	403	512	0	73	276	0	0	440	0	0	349	0
Conf. Bikes (#/hr)				12			2			4		
Turn Type	Prot	NA		Prot	NA		Perm	NA		Perm	NA	
Protected Phases	5	2		1	6			8			4	
Permitted Phases							8			4		
Actuated Green, G (s)	23.8	30.9		6.6	13.7			33.9			33.9	
Effective Green, g (s)	23.8	30.9		6.6	13.7			33.9			33.9	
Actuated g/C Ratio	0.28	0.36		0.08	0.16			0.40			0.40	
Clearance Time (s)	4.5	4.5		4.5	4.5			4.5			4.5	
Vehicle Extension (s)	3.0	3.0		3.0	3.0			3.0			3.0	
Lane Grp Cap (vph)	496	1244		137	564			542			644	
v/s Ratio Prot	c0.23	0.15		0.04	c0.08							
v/s Ratio Perm							c0.32			0.22		
v/c Ratio	0.81	0.41		0.53	0.49			0.81			0.54	
Uniform Delay, d1	28.5	20.2		37.7	32.4			22.7			19.5	
Progression Factor	1.00	1.00		1.00	1.00			1.00			1.00	
Incremental Delay, d2	9.8	0.2		3.9	0.7			9.0			0.9	
Delay (s)	38.3	20.4		41.6	33.1			31.7			20.5	
Level of Service	D	C		D	C			C			C	
Approach Delay (s)	28.0			34.8			31.7			20.5		
Approach LOS	C			C			C			C		
Intersection Summary												
HCM 2000 Control Delay				28.5			HCM 2000 Level of Service			C		
HCM 2000 Volume to Capacity ratio				0.75								
Actuated Cycle Length (s)				84.9			Sum of lost time (s)			13.5		
Intersection Capacity Utilization				90.1%			ICU Level of Service			E		
Analysis Period (min)				15								
c Critical Lane Group												

HCM Signalized Intersection Capacity Analysis
5: I-15 NB Ramps & Deer Springs Rd

Exist + Proj + Sce B Cumu PM
03/17/2017

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↑			↑	↱		↰	↱			
Traffic Volume (vph)	958	446	0	0	599	30	819	10	500	0	0	0
Future Volume (vph)	958	446	0	0	599	30	819	10	500	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.2	5.3			5.3	5.3			4.6			
Lane Util. Factor	1.00	1.00			1.00	1.00			1.00			
Frpb, ped/bikes	1.00	1.00			1.00	0.98			1.00	0.99		
Flpb, ped/bikes	1.00	1.00			1.00	1.00			1.00	1.00		
Frt	1.00	1.00			1.00	0.85			1.00	0.85		
Flt Protected	0.95	1.00			1.00	1.00			0.95	1.00		
Satd. Flow (prot)	1770	1863			1863	1545			1775	1563		
Flt Permitted	0.95	1.00			1.00	1.00			0.95	1.00		
Satd. Flow (perm)	1770	1863			1863	1545			1775	1563		
Peak-hour factor, PHF	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Adj. Flow (vph)	998	465	0	0	624	31	853	10	521	0	0	0
RTOR Reduction (vph)	0	0	0	0	0	23	0	0	239	0	0	0
Lane Group Flow (vph)	998	465	0	0	624	8	0	863	282	0	0	0
Confl. Peds. (#/hr)					1				1			
Confl. Bikes (#/hr)			4		1				1			
Turn Type	Prot	NA			NA	Perm	Split	NA	Perm			
Protected Phases	5	2			6		8	8				
Permitted Phases						6			8			
Actuated Green, G (s)	27.8	56.7			24.7	24.7		33.4	33.4			
Effective Green, g (s)	27.8	56.7			24.7	24.7		33.4	33.4			
Actuated g/C Ratio	0.28	0.57			0.25	0.25		0.33	0.33			
Clearance Time (s)	4.2	5.3			5.3	5.3		4.6	4.6			
Vehicle Extension (s)	3.0	3.0			3.0	3.0		3.0	3.0			
Lane Grp Cap (vph)	492	1056			460	381		592	522			
v/s Ratio Prot	c0.56	0.25			c0.33			c0.49				
v/s Ratio Perm						0.00			0.18			
v/c Ratio	2.03	0.44			1.36	0.02		1.46	0.54			
Uniform Delay, d1	36.1	12.5			37.6	28.5		33.3	27.1			
Progression Factor	0.93	1.97			1.00	1.00		1.00	1.00			
Incremental Delay, d2	463.5	0.1			174.2	0.1		215.3	1.1			
Delay (s)	497.0	24.7			211.8	28.6		248.6	28.2			
Level of Service	F	C			F	C		F	C			
Approach Delay (s)		346.9			203.1			165.6		0.0		
Approach LOS		F			F			F		A		
Intersection Summary												
HCM 2000 Control Delay		248.4										
HCM 2000 Volume to Capacity ratio		1.61										
Actuated Cycle Length (s)		100.0							14.1			
Intersection Capacity Utilization		169.8%										
Analysis Period (min)		15										
c Critical Lane Group												

HCM Signalized Intersection Capacity Analysis
6: Deer Springs Rd & I-15 SB Ramps

Exist + Proj + Sce B Cumu PM
03/17/2017

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↑	↱	↰	↑						↰	↱
Traffic Volume (vph)	0	1514	441	220	1188	0	0	0	0	50	5	500
Future Volume (vph)	0	1514	441	220	1188	0	0	0	0	50	5	500
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		5.3	5.3	4.2	5.3						4.6	4.6
Lane Util. Factor		1.00	1.00	1.00	1.00						1.00	0.88
Frt		1.00	0.85	1.00	1.00						1.00	0.85
Flt Protected		1.00	1.00	0.95	1.00						0.96	1.00
Satd. Flow (prot)		1863	1583	1770	1863						1781	2787
Flt Permitted		1.00	1.00	0.95	1.00						0.96	1.00
Satd. Flow (perm)		1863	1583	1770	1863						1781	2787
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	1646	479	239	1291	0	0	0	0	54	5	543
RTOR Reduction (vph)	0	0	115	0	0	0	0	0	0	0	0	161
Lane Group Flow (vph)	0	1646	364	239	1291	0	0	0	0	0	59	382
Turn Type	NA	Perm	Prot	NA						Split	NA	Perm
Protected Phases		2		1	6					4		4
Permitted Phases			2									4
Actuated Green, G (s)		58.1	58.1	12.3	74.6						15.5	15.5
Effective Green, g (s)		58.1	58.1	12.3	74.6						15.5	15.5
Actuated g/C Ratio		0.58	0.58	0.12	0.75						0.16	0.16
Clearance Time (s)		5.3	5.3	4.2	5.3						4.6	4.6
Vehicle Extension (s)		3.0	3.0	3.0	3.0						3.0	3.0
Lane Grp Cap (vph)		1082	919	217	1389						276	431
v/s Ratio Prot		c0.88		c0.14	0.69						0.03	
v/s Ratio Perm			0.23									c0.14
v/c Ratio		1.52	0.40	1.10	0.93						0.21	0.89
Uniform Delay, d1		20.9	11.4	43.9	10.5						36.9	41.4
Progression Factor		1.00	1.00	0.89	1.30						1.00	1.00
Incremental Delay, d2		239.3	1.3	52.6	1.5						0.4	19.0
Delay (s)		260.3	12.7	91.8	15.2						37.3	60.4
Level of Service		F	B	F	B						D	E
Approach Delay (s)		204.5			27.1			0.0			58.2	
Approach LOS		F			C			A			E	
Intersection Summary												
HCM 2000 Control Delay		120.0										
HCM 2000 Volume to Capacity ratio		1.35										
Actuated Cycle Length (s)		100.0								14.1		
Intersection Capacity Utilization		169.8%										
Analysis Period (min)		15										

HCM Signalized Intersection Capacity Analysis
7: Deer Springs Rd & Mesa Rock Road

Exist + Proj + Sce B Cumu PM
03/17/2017

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↰	↰	↰	↰	↰	↰	↰	↰	↰	↰	↰
Traffic Volume (vph)	241	1221	30	40	748	860	40	40	50	534	27	176
Future Volume (vph)	241	1221	30	40	748	860	40	40	50	534	27	176
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5	4.5		4.5	4.5			4.5			4.5	4.5
Lane Util. Factor	1.00	0.95		1.00	0.95			1.00			1.00	1.00
Frpb, ped/bikes	1.00	1.00		1.00	0.98			0.99			1.00	0.99
Flpb, ped/bikes	1.00	1.00		1.00	1.00			1.00			1.00	1.00
Frt	1.00	1.00		1.00	0.92			0.95			1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00			0.98			0.95	1.00
Satd. Flow (prot)	1770	3524		1770	3203			1727			1778	1563
Flt Permitted	0.95	1.00		0.95	1.00			0.98			0.95	1.00
Satd. Flow (perm)	1770	3524		1770	3203			1727			1778	1563
Peak-hour factor, PHF	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Adj. Flow (vph)	248	1259	31	41	771	887	41	41	52	551	28	181
RTOR Reduction (vph)	0	2	0	0	195	0	0	25	0	0	0	91
Lane Group Flow (vph)	248	1288	0	41	1463	0	0	109	0	0	579	90
Confl. Bikes (#/hr)			16			11			3			1
Turn Type	Prot	NA		Prot	NA		Split	NA		Split	NA	Perm
Protected Phases	7	4		3	8		2	2		6	6	
Permitted Phases												6
Actuated Green, G (s)	6.5	42.7		3.2	39.4			11.4			19.9	19.9
Effective Green, g (s)	6.5	42.7		3.2	39.4			11.4			19.9	19.9
Actuated g/C Ratio	0.07	0.45		0.03	0.41			0.12			0.21	0.21
Clearance Time (s)	4.5	4.5		4.5	4.5			4.5			4.5	4.5
Vehicle Extension (s)	3.0	3.0		3.0	3.0			3.0			3.0	3.0
Lane Grp Cap (vph)	120	1580		59	1325			206			371	326
v/s Ratio Prot	c0.14	c0.37		0.02	c0.46			c0.06			c0.33	
v/s Ratio Perm												0.06
v/c Ratio	2.07	0.82		0.69	1.10			0.53			1.56	0.28
Uniform Delay, d1	44.4	22.8		45.5	27.9			39.4			37.7	31.6
Progression Factor	1.00	1.00		1.00	1.00			1.00			1.00	1.00
Incremental Delay, d2	507.5	3.4		29.9	58.5			2.6			265.1	2.1
Delay (s)	551.8	26.2		75.4	86.4			42.0			302.8	33.7
Level of Service	F	C		E	F			D			F	C
Approach Delay (s)		110.9			86.2			42.0			238.7	
Approach LOS		F			F			D			F	
Intersection Summary												
HCM 2000 Control Delay		122.0										F
HCM 2000 Volume to Capacity ratio		1.19										
Actuated Cycle Length (s)		95.2			Sum of lost time (s)			18.0				
Intersection Capacity Utilization		110.6%			ICU Level of Service			H				
Analysis Period (min)		15										
c Critical Lane Group												

HCM Unsignalized Intersection Capacity Analysis
9: Deer Springs Rd & Sarver Lane

Exist + Proj + Sce B Cumu PM
03/17/2017

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations	↰	↰	↰	↰	↰	↰
Traffic Volume (veh/h)	307	1611	871	113	46	115
Future Volume (Veh/h)	307	1611	871	113	46	115
Sign Control	Free	Free			Stop	
Grade	0%	0%			0%	
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95
Hourly flow rate (vph)	323	1696	917	119	48	121
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	1036				3318	976
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1036				3318	976
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	52				0	60
cM capacity (veh/h)	671				5	304
Direction, Lane #	EB 1	EB 2	WB 1	SB 1		
Volume Total	323	1696	1036	169		
Volume Left	323	0	0	48		
Volume Right	0	0	119	121		
cSH	671	1700	1700	16		
Volume to Capacity	0.48	1.00	0.61	10.36		
Queue Length 95th (ft)	66	0	0	Err		
Control Delay (s)	15.2	0.0	0.0	Err		
Lane LOS	C			F		
Approach Delay (s)	2.4		0.0	Err		
Approach LOS				F		
Intersection Summary						
Average Delay		525.7				
Intersection Capacity Utilization		101.1%		ICU Level of Service		G
Analysis Period (min)		15				

HCM Unsignalized Intersection Capacity Analysis
10: Deer Springs Rd & Sycamore Road

Exist + Proj + Sce B Cumu PM
03/17/2017

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations	↰	↱	↰		↰	↱
Traffic Volume (veh/h)	30	20	1583	10	10	1021
Future Volume (Veh/h)	30	20	1583	10	10	1021
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94
Hourly flow rate (vph)	32	21	1684	11	11	1086
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)		4				
Median type			None		None	
Median storage (veh)						
Upstream signal (ft)			680			
pX, platoon unblocked	0.29	0.29			0.29	
vC, conflicting volume	2798	1690			1695	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	5912	2144			2163	
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			85	
cM capacity (veh/h)	0	18			73	
Direction, Lane #	WB 1	NB 1	SB 1			
Volume Total	53	1695	1097			
Volume Left	32	0	11			
Volume Right	21	11	0			
cSH	0	1700	73			
Volume to Capacity	821.45	1.00	0.15			
Queue Length 95th (ft)	Err	0	13			
Control Delay (s)	Err	0.0	26.8			
Lane LOS	F		D			
Approach Delay (s)	Err	0.0	26.8			
Approach LOS	F					
Intersection Summary						
Average Delay		196.6				
Intersection Capacity Utilization		93.9%		ICU Level of Service	F	
Analysis Period (min)		15				

HCM Unsignalized Intersection Capacity Analysis
11: Twin Oaks Valley Road & Camino Mayor

Exist + Proj + Sce B Cumu PM
03/17/2017

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations	↰	↱	↰		↰	↱
Traffic Volume (veh/h)	20	5	50	28	5	60
Future Volume (Veh/h)	20	5	50	28	5	60
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.75	0.75	0.75	0.75	0.75	0.75
Hourly flow rate (vph)	27	7	67	37	7	80
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	180	86			104	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	180	86			104	
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	99			100	
cM capacity (veh/h)	806	973			1488	
Direction, Lane #	WB 1	NB 1	SB 1			
Volume Total	34	104	87			
Volume Left	27	0	7			
Volume Right	7	37	0			
cSH	836	1700	1488			
Volume to Capacity	0.04	0.06	0.00			
Queue Length 95th (ft)	3	0	0			
Control Delay (s)	9.5	0.0	0.6			
Lane LOS	A		A			
Approach Delay (s)	9.5	0.0	0.6			
Approach LOS	A					
Intersection Summary						
Average Delay		1.7				
Intersection Capacity Utilization		17.3%		ICU Level of Service	A	
Analysis Period (min)		15				

HCM Signalized Intersection Capacity Analysis
12: Twin Oaks Valley Rd & Deer Springs Rd

Exist + Proj + Sce B Cumu PM
03/17/2017

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations	↰	↱	↰	↱	↰	↱
Traffic Volume (vph)	61	304	131	1529	1017	52
Future Volume (vph)	61	304	131	1529	1017	52
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.9	4.9	4.0	5.3	5.3	5.3
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frpb, ped/bikes	1.00	1.00	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)	1770	1583	1770	1863	1863	1546
Flt Permitted	0.95	1.00	0.95	1.00	1.00	1.00
Satd. Flow (perm)	1770	1583	1770	1863	1863	1546
Peak-hour factor, PHF	0.88	0.88	0.88	0.88	0.88	0.88
Growth Factor (vph)	100%	100%	100%	130%	130%	100%
Adj. Flow (vph)	69	345	149	2259	1502	59
RTOR Reduction (vph)	0	121	0	0	0	9
Lane Group Flow (vph)	69	224	149	2259	1502	50
Confl. Peds. (#/hr)						1
Confl. Bikes (#/hr)						2
Turn Type	Prot	Perm	Prot	NA	NA	Perm
Protected Phases	4		5	2	6	
Permitted Phases		4				6
Actuated Green, G (s)	17.1	17.1	7.0	68.0	57.0	57.0
Effective Green, g (s)	17.1	17.1	7.0	68.0	57.0	57.0
Actuated g/C Ratio	0.18	0.18	0.07	0.71	0.60	0.60
Clearance Time (s)	4.9	4.9	4.0	5.3	5.3	5.3
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	317	284	130	1329	1114	924
v/s Ratio Prot	0.04		0.08	c1.21	0.81	
v/s Ratio Perm		c0.14				0.03
v/c Ratio	0.22	0.79	1.15	1.70	1.35	0.05
Uniform Delay, d1	33.4	37.4	44.1	13.6	19.1	8.0
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	0.3	13.9	123.6	318.2	162.8	0.0
Delay (s)	33.7	51.2	167.7	331.8	181.9	8.0
Level of Service	C	D	F	F	F	A
Approach Delay (s)	48.3			321.7	175.3	
Approach LOS	D			F	F	
Intersection Summary						
HCM 2000 Control Delay		243.7		HCM 2000 Level of Service	F	
HCM 2000 Volume to Capacity ratio		1.59				
Actuated Cycle Length (s)		95.3		Sum of lost time (s)	14.2	
Intersection Capacity Utilization		116.5%		ICU Level of Service	H	
Analysis Period (min)		15				
c Critical Lane Group						

HCM Signalized Intersection Capacity Analysis
13: Twin Oaks Valley Rd & Buena Creek Rd

Exist + Proj + Sce B Cumu PM
03/17/2017

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	669	0	260	5	0	0	210	931	0	5	741	510
Future Volume (vph)	669	0	260	5	0	0	210	931	0	5	741	510
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		5.0	5.5		4.5	5.5	5.5
Lane Util. Factor		1.00	1.00		1.00		1.00	1.00		1.00	1.00	1.00
Frpb, ped/bikes		1.00	1.00		1.00		1.00	1.00		1.00	1.00	0.97
Flpb, ped/bikes		1.00	1.00		1.00		1.00	1.00		1.00	1.00	1.00
Frt		1.00	0.85		1.00		1.00	1.00		1.00	1.00	0.85
Flt Protected		0.95	1.00		0.95		0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)		1770	1583		1770		1770	1863		1770	1863	1543
Flt Permitted		0.75	1.00		0.14		0.95	1.00		0.95	1.00	1.00
Satd. Flow (perm)		1405	1583		262		1770	1863		1770	1863	1543
Peak-hour factor, PHF	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Adj. Flow (vph)	719	0	280	5	0	0	226	1001	0	5	797	548
RTOR Reduction (vph)	0	0	174	0	0	0	0	0	0	0	0	116
Lane Group Flow (vph)	0	719	106	0	5	0	226	1001	0	5	797	432
Confl. Peds. (#/hr)	1											
Confl. Bikes (#/hr)	5											
Turn Type	Perm	NA	Perm	Perm	NA		Prot	NA		Prot	NA	Perm
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4		4	8								6
Actuated Green, G (s)		28.4	28.4		28.4		12.0	50.4		0.8	38.7	38.7
Effective Green, g (s)		28.4	28.4		28.4		12.0	50.4		0.8	38.7	38.7
Actuated g/C Ratio		0.30	0.30		0.30		0.13	0.54		0.01	0.41	0.41
Clearance Time (s)		4.0	4.0		4.0		5.0	5.5		4.5	5.5	5.5
Vehicle Extension (s)		3.0	3.0		3.0		3.0	3.0		3.0	3.0	3.0
Lane Grp Cap (vph)		426	480		79		226	1003		15	770	637
v/s Ratio Prot							c0.13	c0.54		0.00	0.43	
v/s Ratio Perm		c0.51	0.07		0.02							0.28
v/c Ratio		1.69	0.22		0.06		1.00	1.00		0.33	1.04	0.68
Uniform Delay, d1		32.6	24.3		23.2		40.8	21.5		46.1	27.4	22.4
Progression Factor		1.00	1.00		1.00		1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2		319.5	0.2		0.3		59.9	27.7		12.7	41.8	2.9
Delay (s)		352.1	24.6		23.5		100.7	49.3		58.8	69.3	25.2
Level of Service		F	C		C		F	D		E	E	C
Approach Delay (s)		260.3			23.5			58.7			51.4	
Approach LOS		F			C			E			D	
Intersection Summary												
HCM 2000 Control Delay		112.1		HCM 2000 Level of Service					F			
HCM 2000 Volume to Capacity ratio		1.28										
Actuated Cycle Length (s)		93.6		Sum of lost time (s)					14.5			
Intersection Capacity Utilization		98.7%		ICU Level of Service					F			
Analysis Period (min)		15										
c Critical Lane Group												

HCM Signalized Intersection Capacity Analysis
14: Twin Oaks Valley Rd & Cassou Rd

Exist + Proj + Sce B Cumu PM
03/17/2017

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↔			↔		↔	↔	↔	↔	↔	↔
Traffic Volume (vph)	18	0	55	20	5	32	50	1048	20	13	811	23
Future Volume (vph)	18	0	55	20	5	32	50	1048	20	13	811	23
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		5.0			5.0		5.0	5.0	5.0	5.0		5.0
Lane Util. Factor		1.00			1.00		1.00	1.00	1.00	1.00		1.00
Frpb, ped/bikes		0.99			1.00		1.00	1.00	1.00	1.00		1.00
Flpb, ped/bikes		1.00			1.00		1.00	1.00	1.00	1.00		1.00
Frt		0.90			0.92		1.00	1.00	0.85	1.00		1.00
Flt Protected		0.99			0.98		0.95	1.00	1.00	0.95		1.00
Satd. Flow (prot)		1636			1692		1770	1863	1583	1770		1855
Flt Permitted		0.99			0.98		0.95	1.00	1.00	0.95		1.00
Satd. Flow (perm)		1636			1692		1770	1863	1583	1770		1855
Peak-hour factor, PHF	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Adj. Flow (vph)	19	0	59	22	5	34	54	1127	22	14	872	25
RTOR Reduction (vph)	0	72	0	0	31	0	0	0	8	0	0	0
Lane Group Flow (vph)	0	6	0	0	30	0	54	1127	14	14	897	0
Confl. Peds. (#/hr)			1									
Turn Type	Split	NA		Split	NA		Prot	NA	Perm	Prot	NA	
Protected Phases	4	4		8	8		5	2		1	6	
Permitted Phases								2				
Actuated Green, G (s)		7.1			7.8		3.9	57.1	57.1	0.7	53.9	
Effective Green, g (s)		7.1			7.8		3.9	57.1	57.1	0.7	53.9	
Actuated g/C Ratio		0.08			0.08		0.04	0.62	0.62	0.01	0.58	
Clearance Time (s)		5.0			5.0		5.0	5.0	5.0	5.0	5.0	
Vehicle Extension (s)		3.0			3.0		3.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)		125			142		74	1147	975	13	1078	
v/s Ratio Prot		c0.00			c0.02		c0.03	c0.61		0.01	0.48	
v/s Ratio Perm								0.01				
v/c Ratio		0.05			0.21		0.73	0.98	0.01	1.08	0.83	
Uniform Delay, d1		39.7			39.6		43.9	17.3	6.9	46.0	15.7	
Progression Factor		1.00			1.00		1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2		0.2			0.7		29.9	22.3	0.0	276.9	5.6	
Delay (s)		39.8			40.3		73.8	39.6	6.9	322.9	21.3	
Level of Service		D			D		E	D	A	F	C	
Approach Delay (s)		39.8			40.3			40.5			26.0	
Approach LOS		D			D			D			C	

Intersection Summary

HCM 2000 Control Delay	34.6	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.83		
Actuated Cycle Length (s)	92.7	Sum of lost time (s)	20.0
Intersection Capacity Utilization	69.3%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis
15: Twin Oaks Valley Rd & La Cienega

Exist + Proj + Sce B Cumu PM
03/17/2017

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations	↔	↔	↔	↔	↔	↔
Traffic Volume (vph)	113	64	1150	125	109	790
Future Volume (vph)	113	64	1150	125	109	790
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)		6.0	6.5		6.0	6.5
Lane Util. Factor	1.00	1.00	0.95		1.00	0.95
Frpb, ped/bikes	1.00	1.00	0.99		1.00	1.00
Flpb, ped/bikes	1.00	1.00	1.00		1.00	1.00
Frt	1.00	0.85	0.99		1.00	1.00
Flt Protected	0.95	1.00	1.00		0.95	1.00
Satd. Flow (prot)	1770	1583	3469		1770	3539
Flt Permitted	0.95	1.00	1.00		0.95	1.00
Satd. Flow (perm)	1770	1583	3469		1770	3539
Peak-hour factor, PHF	0.98	0.98	0.98	0.98	0.98	0.98
Adj. Flow (vph)	115	65	1173	128	111	806
RTOR Reduction (vph)	0	0	7	0	0	0
Lane Group Flow (vph)	115	65	1294	0	111	806
Confl. Peds. (#/hr)				13		
Confl. Bikes (#/hr)				3		
Turn Type	Prot	Perm	NA		Prot	NA
Protected Phases	8		2		1	6
Permitted Phases		8				
Actuated Green, G (s)	11.8	11.8	39.3		8.4	53.7
Effective Green, g (s)	11.8	11.8	39.3		8.4	53.7
Actuated g/C Ratio	0.15	0.15	0.50		0.11	0.69
Clearance Time (s)	6.0	6.0	6.5		6.0	6.5
Vehicle Extension (s)	3.0	3.0	3.0		3.0	3.0
Lane Grp Cap (vph)	267	239	1747		190	2436
v/s Ratio Prot	c0.06		c0.37		c0.06	0.23
v/s Ratio Perm		0.04				
v/c Ratio	0.43	0.27	0.74		0.58	0.33
Uniform Delay, d1	30.1	29.3	15.3		33.1	4.9
Progression Factor	1.00	1.00	1.00		1.00	1.00
Incremental Delay, d2	1.1	0.6	1.7		4.5	0.1
Delay (s)	31.2	29.9	17.0		37.7	5.0
Level of Service	C	C	B		D	A
Approach Delay (s)	30.7		17.0			8.9
Approach LOS	C		B			A

Intersection Summary

HCM 2000 Control Delay	15.0	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.66		
Actuated Cycle Length (s)	78.0	Sum of lost time (s)	18.5
Intersection Capacity Utilization	63.6%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis
16: Twin Oaks Valley Rd & Del Roy Dr

Exist + Proj + Sce B Cumu PM
03/17/2017

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↱		↰	↱		↰	↱		↰	↱	
Traffic Volume (vph)	12	0	57	30	0	10	90	1183	25	15	830	18
Future Volume (vph)	12	0	57	30	0	10	90	1183	25	15	830	18
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	5.0		5.0	5.0		5.0	5.0		5.0	5.0	
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	0.95		1.00	0.95	
Frpb, ped/bikes	1.00	0.99		1.00	1.00		1.00	1.00		1.00	1.00	
Flpb, ped/bikes	1.00	1.00		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		1.00	1.00	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770	1560		1770	1583		1770	3524		1770	3526	
Flt Permitted	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (perm)	1770	1560		1770	1583		1770	3524		1770	3526	
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	13	0	63	33	0	11	100	1314	28	17	922	20
RTOR Reduction (vph)	0	57	0	0	10	0	0	1	0	0	2	0
Lane Group Flow (vph)	13	6	0	33	1	0	100	1341	0	17	940	0
Confl. Peds. (#/hr)								14			1	
Confl. Bikes (#/hr)			1					4			4	
Turn Type	Prot	NA		Prot	NA		Prot	NA		Prot	NA	
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases												
Actuated Green, G (s)	0.5	6.2		1.8	7.5		6.8	39.7		0.4	33.3	
Effective Green, g (s)	0.5	6.2		1.8	7.5		6.8	39.7		0.4	33.3	
Actuated g/C Ratio	0.01	0.09		0.03	0.11		0.10	0.58		0.01	0.49	
Clearance Time (s)	5.0	5.0		5.0	5.0		5.0	5.0		5.0	5.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	12	142		46	174		176	2054		10	1724	
v/s Ratio Prot	0.01	c0.00		c0.02	0.00		c0.06	c0.38		0.01	0.27	
v/s Ratio Perm												
v/c Ratio	1.08	0.04		0.72	0.01		0.57	0.65		1.70	0.55	
Uniform Delay, d1	33.8	28.2		32.9	27.0		29.2	9.6		33.8	12.1	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	289.8	0.1		41.5	0.0		4.2	0.8		560.6	0.4	
Delay (s)	323.6	28.4		74.4	27.0		33.4	10.3		594.5	12.5	
Level of Service	F	C		E	C		C	B		F	B	
Approach Delay (s)		78.9			62.5			11.9			22.8	
Approach LOS		E			E			B			C	

Intersection Summary			
HCM 2000 Control Delay	19.0	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.60		
Actuated Cycle Length (s)	68.1	Sum of lost time (s)	20.0
Intersection Capacity Utilization	57.7%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis
17: Twin Oaks Valley Rd & Windy Wy

Exist + Proj + Sce B Cumu PM
03/17/2017

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰		↱				↰	↱		↰	↱	
Traffic Volume (vph)	20	0	55	0	0	0	45	1193	5	5	897	10
Future Volume (vph)	20	0	55	0	0	0	45	1193	5	5	897	10
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	6.0		4.0	6.0	
Lane Util. Factor	1.00		1.00				1.00	0.95		1.00	0.95	
Frpb, ped/bikes	1.00		0.99				1.00	1.00		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	1.00		1.00	1.00	
Flt Protected	0.95		1.00				0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770		1563				1770	3537		1770	3532	
Flt Permitted	0.95		1.00				0.95	1.00		0.95	1.00	
Satd. Flow (perm)	1770		1563				1770	3537		1770	3532	
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	20	0	55	0	0	0	45	1193	5	5	897	10
RTOR Reduction (vph)	0	0	50	0	0	0	0	0	0	0	1	0
Lane Group Flow (vph)	20	0	6	0	0	0	45	1198	0	5	906	0
Confl. Peds. (#/hr)			1				2			1		4
Confl. Bikes (#/hr)			2				2			2		5
Turn Type	Prot		Perm				Prot	NA		Prot	NA	
Protected Phases	4						5	2		1	6	
Permitted Phases			4									
Actuated Green, G (s)	5.3		5.3				2.4	33.0		0.7	31.3	
Effective Green, g (s)	5.3		5.3				2.4	33.0		0.7	31.3	
Actuated g/C Ratio	0.10		0.10				0.05	0.62		0.01	0.59	
Clearance Time (s)	4.0		4.0				4.0	6.0		4.0	6.0	
Vehicle Extension (s)	3.0		3.0				3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	177		156				80	2202		23	2085	
v/s Ratio Prot	c0.01						c0.03	c0.34		0.00	0.26	
v/s Ratio Perm			0.00									
v/c Ratio	0.11		0.04				0.56	0.54		0.22	0.43	
Uniform Delay, d1	21.7		21.5				24.8	5.7		25.9	6.0	
Progression Factor	1.00		1.00				1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.3		0.1				8.8	0.3		4.7	0.1	
Delay (s)	22.0		21.6				33.5	6.0		30.6	6.1	
Level of Service	C		C				C	A		C	A	
Approach Delay (s)		21.7			0.0			7.0			6.3	
Approach LOS		C			A			A			A	

Intersection Summary			
HCM 2000 Control Delay	7.2	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.51		
Actuated Cycle Length (s)	53.0	Sum of lost time (s)	14.0
Intersection Capacity Utilization	49.1%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis
18: Twin Oaks Valley Rd & Borden Rd

Exist + Proj + Sce B Cumu PM
03/17/2017

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↱		↰	↱		↰	↱		↰	↱	
Traffic Volume (vph)	196	252	237	187	221	54	241	1024	293	94	788	116
Future Volume (vph)	196	252	237	187	221	54	241	1024	293	94	788	116
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.2	5.3		4.2	5.3		4.2	4.9	4.9	4.2	4.9	4.9
Lane Util. Factor	1.00	0.95		1.00	0.95		1.00	0.95	1.00	1.00	0.95	1.00
Frpb, ped/bikes	1.00	0.99		1.00	1.00		1.00	1.00	0.99	1.00	1.00	0.98
Flpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	0.93		1.00	0.97		1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1770	3259		1770	3425		1770	3539	1560	1770	3539	1555
Flt Permitted	0.95	1.00		0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	1770	3259		1770	3425		1770	3539	1560	1770	3539	1555
Peak-hour factor, PHF	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Adj. Flow (vph)	204	262	247	195	230	56	251	1067	305	98	821	121
RTOR Reduction (vph)	0	98	0	0	12	0	0	0	81	0	0	80
Lane Group Flow (vph)	204	412	0	195	274	0	251	1067	224	98	821	41
Confl. Peds. (#/hr)			2									2
Confl. Bikes (#/hr)						3			5			5
Turn Type	Prot	NA		Prot	NA		Prot	NA	Perm	Prot	NA	Perm
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases								2				6
Actuated Green, G (s)	21.7	23.8		20.5	22.6		25.4	51.6	12.9	39.1	39.1	
Effective Green, g (s)	21.7	23.8		20.5	22.6		25.4	51.6	12.9	39.1	39.1	
Actuated g/C Ratio	0.17	0.19		0.16	0.18		0.20	0.41	0.10	0.31	0.31	
Clearance Time (s)	4.2	5.3		4.2	5.3		4.2	4.9	4.9	4.2	4.9	
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)	301	608		284	607		352	1433	631	179	1086	477
v/s Ratio Prot	c0.12	c0.13		0.11	0.08		c0.14	c0.30		0.06	0.23	
v/s Ratio Perm								0.14			0.03	
v/c Ratio	0.68	0.68		0.69	0.45		0.71	0.74	0.36	0.55	0.76	0.09
Uniform Delay, d1	49.6	48.2		50.4	46.9		47.6	32.3	26.3	54.5	39.8	31.4
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	5.9	3.0		6.7	0.5		6.7	2.1	0.3	3.4	3.0	0.1
Delay (s)	55.5	51.2		57.2	47.4		54.3	34.4	26.7	57.9	42.9	31.5
Level of Service	E	D		E	D		D	C	C	E	D	C
Approach Delay (s)		52.4			51.4			36.0			43.0	
Approach LOS		D			D			D			D	
Intersection Summary												
HCM 2000 Control Delay		42.9			HCM 2000 Level of Service			D				
HCM 2000 Volume to Capacity ratio		0.73										
Actuated Cycle Length (s)		127.4			Sum of lost time (s)			18.6				
Intersection Capacity Utilization		76.7%			ICU Level of Service			D				
Analysis Period (min)		15										
c Critical Lane Group												

HCM Signalized Intersection Capacity Analysis
19: Twin Oaks Valley Rd & Richmar Road

Exist + Proj + Sce B Cumu PM
03/17/2017

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↱		↰	↱		↰	↱		↰	↱	
Traffic Volume (vph)	217	15	144	15	10	5	193	1582	30	70	1449	194
Future Volume (vph)	217	15	144	15	10	5	193	1582	30	70	1449	194
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.9	4.9		4.0	4.0		4.0	5.7		4.0	5.7	
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	0.95		1.00	0.95	
Frpb, ped/bikes	1.00	1.00		1.00	0.99		1.00	1.00		1.00	1.00	
Flpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Frt	1.00	0.86		1.00	0.95		1.00	1.00		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	1610		1770	1756		1770	3526		1770	3467	
Flt Permitted	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (perm)	1770	1610		1770	1756		1770	3526		1770	3467	
Peak-hour factor, PHF	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Adj. Flow (vph)	226	16	150	16	10	5	201	1648	31	73	1509	202
RTOR Reduction (vph)	0	126	0	0	5	0	0	1	0	0	6	0
Lane Group Flow (vph)	226	40	0	16	10	0	201	1678	0	73	1705	0
Confl. Peds. (#/hr)					9			7				3
Confl. Bikes (#/hr)								8				
Turn Type	Split	NA		Split	NA		Prot	NA		Prot	NA	
Protected Phases	4	4		8	8		5	2		1	6	
Permitted Phases												
Actuated Green, G (s)	18.8	18.8		7.5	7.5		12.1	67.1		7.9	62.9	
Effective Green, g (s)	18.8	18.8		7.5	7.5		12.1	67.1		7.9	62.9	
Actuated g/C Ratio	0.16	0.16		0.06	0.06		0.10	0.56		0.07	0.52	
Clearance Time (s)	4.9	4.9		4.0	4.0		4.0	5.7		4.0	5.7	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	277	252		110	109		178	1973		116	1818	
v/s Ratio Prot	c0.13	0.02		c0.01	0.01		c0.11	0.48		0.04	c0.49	
v/s Ratio Perm												
v/c Ratio	0.82	0.16		0.15	0.09		1.13	0.85		0.63	0.94	
Uniform Delay, d1	48.9	43.7		53.2	53.0		53.9	22.2		54.6	26.7	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	16.7	0.3		0.6	0.4		106.4	3.7		10.2	9.8	
Delay (s)	65.6	44.0		53.8	53.4		160.3	25.9		64.8	36.5	
Level of Service	E	D		D	D		F	C		E	D	
Approach Delay (s)		56.4			53.6			40.3			37.6	
Approach LOS		E			D			D			D	
Intersection Summary												
HCM 2000 Control Delay		40.8			HCM 2000 Level of Service			D				
HCM 2000 Volume to Capacity ratio		0.88										
Actuated Cycle Length (s)		119.9			Sum of lost time (s)			18.6				
Intersection Capacity Utilization		87.8%			ICU Level of Service			E				
Analysis Period (min)		15										
c Critical Lane Group												

HCM Signalized Intersection Capacity Analysis
20: Twin Oaks Valley Rd & San Marcos Blvd

Exist + Proj + Sce B Cumu PM
03/17/2017

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↱	↲	↰	↱		↰	↱	↲	↰	↱	↲
Traffic Volume (vph)	444	815	346	617	551	135	579	1266	494	167	1172	285
Future Volume (vph)	444	815	346	617	551	135	579	1266	494	167	1172	285
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.2	5.3	5.3	4.2	5.0		4.2	5.3	4.2	5.0	5.3	
Lane Util. Factor	0.97	0.95	1.00	0.97	0.95		0.97	0.95	1.00	0.97	0.95	
Frpb, ped/bikes	1.00	1.00	0.97	1.00	1.00		1.00	1.00	0.99	1.00	1.00	
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00	1.00	1.00	
Frt	1.00	1.00	0.85	1.00	0.97		1.00	1.00	0.85	1.00	0.97	
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)	3433	3539	1538	3433	3421		3433	3539	1560	3433	3425	
Flt Permitted	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00	0.95	1.00	
Satd. Flow (perm)	3433	3539	1538	3433	3421		3433	3539	1560	3433	3425	
Peak-hour factor, PHF	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Adj. Flow (vph)	477	876	372	663	592	145	623	1361	531	180	1260	306
RTOR Reduction (vph)	0	0	127	0	18	0	0	0	0	0	17	0
Lane Group Flow (vph)	477	876	245	663	719	0	623	1361	531	180	1549	0
Confl. Peds. (#/hr)			9			2			4			1
Confl. Bikes (#/hr)			6			7			6			4
Turn Type	Prot	NA	Perm	Prot	NA		Prot	NA	pm+ov	Prot	NA	
Protected Phases	7	4		3	8		5	2	3	1	6	
Permitted Phases			4						2			
Actuated Green, G (s)	15.4	28.1	28.1	15.5	28.5		15.0	47.2	62.7	9.4	42.4	
Effective Green, g (s)	15.4	28.1	28.1	15.5	28.5		15.0	47.2	62.7	9.4	42.4	
Actuated g/C Ratio	0.13	0.23	0.23	0.13	0.24		0.12	0.39	0.52	0.08	0.35	
Clearance Time (s)	4.2	5.3	5.3	4.2	5.0		4.2	5.3	4.2	5.0	5.3	
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)	440	828	360	443	812		429	1392	815	268	1210	
v/s Ratio Prot	0.14	c0.25		c0.19	0.21		c0.18	0.38	0.08	0.05	c0.45	
v/s Ratio Perm			0.16						0.26			
v/c Ratio	1.08	1.06	0.68	1.50	0.89		1.45	0.98	0.65	0.67	1.28	
Uniform Delay, d1	52.3	46.0	41.9	52.2	44.2		52.5	35.9	20.7	53.8	38.8	
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	67.4	47.8	5.2	235.1	11.4		216.2	18.8	1.9	6.5	132.4	
Delay (s)	119.7	93.7	47.1	287.4	55.6		268.7	54.7	22.6	60.3	171.2	
Level of Service	F	F	D	F	E		F	D	C	E	F	
Approach Delay (s)		90.8			165.3			100.9			159.7	
Approach LOS		F			F			F			F	
Intersection Summary												
HCM 2000 Control Delay		124.7			HCM 2000 Level of Service			F				
HCM 2000 Volume to Capacity ratio		1.29										
Actuated Cycle Length (s)		120.0			Sum of lost time (s)			19.8				
Intersection Capacity Utilization		114.2%			ICU Level of Service			H				
Analysis Period (min)		15										
c Critical Lane Group												

HCM Signalized Intersection Capacity Analysis
21: Twin Oaks Valley Rd & SR 78 WB Ramps

Exist + Proj + Sce B Cumu PM
03/17/2017

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations				↰		↱		↱	↲		↱	↲
Traffic Volume (vph)	0	0	0	806	0	333	0	1969	816	0	1748	364
Future Volume (vph)	0	0	0	806	0	333	0	1969	816	0	1748	364
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)				4.6		4.6		5.3	4.6		5.3	5.3
Lane Util. Factor				0.97		0.88		0.91	1.00		0.91	1.00
Frpb, ped/bikes				1.00		1.00		1.00	0.96		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	0.85		1.00	0.85
Flt Protected				0.95		1.00		1.00	1.00		1.00	1.00
Satd. Flow (prot)				3433		2787		5085	1515		5085	1548
Flt Permitted				0.95		1.00		1.00	1.00		1.00	1.00
Satd. Flow (perm)				3433		2787		5085	1515		5085	1548
Peak-hour factor, PHF	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Adj. Flow (vph)	0	0	0	840	0	347	0	2051	850	0	1821	379
RTOR Reduction (vph)	0	0	0	0	0	14	0	0	0	0	0	137
Lane Group Flow (vph)	0	0	0	840	0	333	0	2051	850	0	1821	242
Confl. Peds. (#/hr)								12				4
Confl. Bikes (#/hr)								4				4
Turn Type				Prot		Prot		NA	pm+ov		NA	Perm
Protected Phases				8		8		2	8		6	
Permitted Phases								2				6
Actuated Green, G (s)				40.9		40.9		69.2	110.1		69.2	69.2
Effective Green, g (s)				40.9		40.9		69.2	110.1		69.2	69.2
Actuated g/C Ratio				0.34		0.34		0.58	0.92		0.58	0.58
Clearance Time (s)				4.6		4.6		5.3	4.6		5.3	5.3
Vehicle Extension (s)				3.0		3.0		3.0	3.0		3.0	3.0
Lane Grp Cap (vph)				1170		949		2932	1448		2932	892
v/s Ratio Prot				c0.24		0.12		c0.40	0.20		0.36	
v/s Ratio Perm									0.36			0.16
v/c Ratio				0.72		0.35		0.70	0.59		0.62	0.27
Uniform Delay, d1				34.5		29.6		18.0	0.9		16.8	12.7
Progression Factor				1.00		1.00		0.38	16.75		1.00	1.00
Incremental Delay, d2				2.1		0.2		0.1	0.1		1.0	0.7
Delay (s)				36.6		29.8		7.0	14.9		17.8	13.5
Level of Service				D		C		A	B		B	B
Approach Delay (s)		0.0			34.7			9.3			17.0	
Approach LOS		A			C			A			B	
Intersection Summary												
HCM 2000 Control Delay				16.8				HCM 2000 Level of Service			B	
HCM 2000 Volume to Capacity ratio				0.71								
Actuated Cycle Length (s)				120.0				Sum of lost time (s)			9.9	
Intersection Capacity Utilization				68.8%				ICU Level of Service			C	
Analysis Period (min)				15								
c Critical Lane Group												

HCM Signalized Intersection Capacity Analysis
22: Twin Oaks Valley Rd & SR 78 EB Ramps

Exist + Proj + Sce B Cumu PM
03/17/2017

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↱	↱					↰↱↱	↰	↱↱	↰↱↱	
Traffic Volume (vph)	241	35	532	0	0	0	0	2565	1029	340	2204	0
Future Volume (vph)	241	35	532	0	0	0	0	2565	1029	340	2204	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.6	4.6	4.6					5.3	5.3	4.2	5.3	
Lane Util. Factor	0.95	0.91	0.95					0.91	1.00	0.97	0.91	
Frpb, ped/bikes	1.00	0.99	0.99					1.00	0.99	1.00	1.00	
Flpb, ped/bikes	1.00	1.00	1.00					1.00	1.00	1.00	1.00	
Frt	1.00	0.88	0.85					1.00	0.85	1.00	1.00	
Flt Protected	0.95	1.00	1.00					1.00	1.00	0.95	1.00	
Satd. Flow (prot)	1681	1467	1482					5085	1561	3433	5085	
Flt Permitted	0.95	1.00	1.00					1.00	1.00	0.95	1.00	
Satd. Flow (perm)	1681	1467	1482					5085	1561	3433	5085	
Peak-hour factor, PHF	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Adj. Flow (vph)	251	36	554	0	0	0	0	2672	1072	354	2296	0
RTOR Reduction (vph)	0	4	44	0	0	0	0	0	321	0	0	0
Lane Group Flow (vph)	226	306	261	0	0	0	0	2672	751	354	2296	0
Confl. Peds. (#/hr)			3									
Confl. Bikes (#/hr)								5				2
Turn Type	Split	NA	Perm					NA	Perm	Prot	NA	
Protected Phases	4	4						2		1	6	
Permitted Phases			4					2				
Actuated Green, G (s)	31.2	31.2	31.2					58.1	58.1	16.6	78.9	
Effective Green, g (s)	31.2	31.2	31.2					58.1	58.1	16.6	78.9	
Actuated g/C Ratio	0.26	0.26	0.26					0.48	0.48	0.14	0.66	
Clearance Time (s)	4.6	4.6	4.6					5.3	5.3	4.2	5.3	
Vehicle Extension (s)	3.0	3.0	3.0					3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	437	381	385					2461	755	474	3343	
v/s Ratio Prot	0.13	c0.21						c0.53		0.10	c0.45	
v/s Ratio Perm			0.18						0.48			
v/c Ratio	0.52	0.80	0.68					1.09	0.99	0.75	0.69	
Uniform Delay, d1	38.0	41.5	39.9					30.9	30.8	49.7	12.8	
Progression Factor	1.00	1.00	1.00					1.00	1.00	1.07	0.66	
Incremental Delay, d2	1.0	11.5	4.7					46.3	31.5	5.1	0.9	
Delay (s)	39.0	53.0	44.6					77.3	62.3	58.3	9.4	
Level of Service	D	D	D					E	E	E	A	
Approach Delay (s)		46.2			0.0			73.0			15.9	
Approach LOS		D			A			E			B	
Intersection Summary												
HCM 2000 Control Delay		49.0		HCM 2000 Level of Service				D				
HCM 2000 Volume to Capacity ratio		0.95										
Actuated Cycle Length (s)		120.0		Sum of lost time (s)				14.1				
Intersection Capacity Utilization		100.0%		ICU Level of Service				F				
Analysis Period (min)		15										
c Critical Lane Group												

HCM Signalized Intersection Capacity Analysis
23: Robelini Dr & S. Santa Fe Ave

Exist + Proj + Sce B Cumu PM
03/17/2017

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↰	↱	↰	↱	↰	↱
Traffic Volume (vph)	522	260	251	458	370	588
Future Volume (vph)	522	260	251	458	370	588
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.3	4.6	4.4	5.3	4.6	4.4
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frpb, ped/bikes	1.00	0.99	1.00	1.00	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	1.00	1.00	0.85
Flt Protected	1.00	1.00	0.95	1.00	0.95	1.00
Satd. Flow (prot)	1863	1560	1770	1863	1770	1583
Flt Permitted	1.00	1.00	0.95	1.00	0.95	1.00
Satd. Flow (perm)	1863	1560	1770	1863	1770	1583
Peak-hour factor, PHF	0.96	0.96	0.96	0.96	0.96	0.92
Adj. Flow (vph)	544	271	261	477	385	639
RTOR Reduction (vph)	0	45	0	0	0	124
Lane Group Flow (vph)	544	226	261	477	385	515
Confl. Bikes (#/hr)		6				
Turn Type	NA	pm+ov	Prot	NA	Prot	pm+ov
Protected Phases	2	8	1	6	8	1
Permitted Phases		2				8
Actuated Green, G (s)	38.9	60.9	14.8	24.5	22.0	36.8
Effective Green, g (s)	38.9	60.9	14.8	24.5	22.0	36.8
Actuated g/C Ratio	0.43	0.68	0.16	0.27	0.24	0.41
Clearance Time (s)	5.3	4.6	4.4	5.3	4.6	4.4
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	805	1055	291	507	432	647
v/s Ratio Prot	c0.29	0.05	c0.15	c0.26	c0.22	0.13
v/s Ratio Perm		0.09				0.19
v/c Ratio	0.68	0.21	0.90	0.94	0.89	0.80
Uniform Delay, d1	20.5	5.5	36.9	32.0	32.8	23.3
Progression Factor	1.00	1.00	0.94	0.92	1.00	1.00
Incremental Delay, d2	2.3	0.1	3.7	4.0	20.0	6.8
Delay (s)	22.8	5.6	38.5	33.6	52.8	30.1
Level of Service	C	A	D	C	D	C
Approach Delay (s)	17.0			35.3	38.6	
Approach LOS	B			D	D	
Intersection Summary						
HCM 2000 Control Delay		30.9		HCM 2000 Level of Service		C
HCM 2000 Volume to Capacity ratio		0.84				
Actuated Cycle Length (s)		90.0		Sum of lost time (s)		14.3
Intersection Capacity Utilization		73.8%		ICU Level of Service		D
Analysis Period (min)		15				
c Critical Lane Group						

HCM Signalized Intersection Capacity Analysis
24: Sycamore Avenue & SR 78 WB Ramps

Exist + Proj + Sce B Cumu PM
03/17/2017

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	0	0	670	10	330	810	1188	0	0	614	607
Future Volume (vph)	0	0	0	670	10	330	810	1188	0	0	614	607
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)				4.6	4.6	4.6	4.2	5.0			5.0	5.0
Lane Util. Factor				0.95	0.95	0.88	0.97	0.91			0.91	1.00
Frpb, ped/bikes				1.00	1.00	0.99	1.00	1.00			1.00	0.97
Flpb, ped/bikes				1.00	1.00	1.00	1.00	1.00			1.00	1.00
Frt				1.00	1.00	0.85	1.00	1.00			1.00	0.85
Flt Protected				0.95	0.95	1.00	0.95	1.00			1.00	1.00
Satd. Flow (prot)				1681	1688	2750	3433	5085			5085	1540
Flt Permitted				0.95	0.95	1.00	0.95	1.00			1.00	1.00
Satd. Flow (perm)				1681	1688	2750	3433	5085			5085	1540
Peak-hour factor, PHF	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98
Adj. Flow (vph)	0	0	0	684	10	337	827	1212	0	0	627	619
RTOR Reduction (vph)	0	0	0	0	0	104	0	0	0	0	0	350
Lane Group Flow (vph)	0	0	0	349	345	233	827	1212	0	0	627	269
Confl. Peds. (#/hr)						1						9
Confl. Bikes (#/hr)									1			
Turn Type				Split	NA	Perm	Prot	NA			NA	Perm
Protected Phases				8	8		5	2			6	
Permitted Phases						8						6
Actuated Green, G (s)				28.7	28.7	28.7	30.4	71.7			37.1	37.1
Effective Green, g (s)				28.7	28.7	28.7	30.4	71.7			37.1	37.1
Actuated g/C Ratio				0.26	0.26	0.26	0.28	0.65			0.34	0.34
Clearance Time (s)				4.6	4.6	4.6	4.2	5.0			5.0	5.0
Vehicle Extension (s)				3.0	3.0	3.0	3.0	3.0			3.0	3.0
Lane Grp Cap (vph)				438	440	717	948	3314			1715	519
v/s Ratio Prot				c0.21	0.20		c0.24	0.24			0.12	
v/s Ratio Perm						0.08						c0.17
v/c Ratio				0.80	0.78	0.32	0.87	0.37			0.37	0.52
Uniform Delay, d1				37.9	37.8	32.8	38.0	8.8			27.6	29.3
Progression Factor				1.00	1.00	1.00	1.44	0.95			1.00	1.00
Incremental Delay, d2				9.7	8.9	0.3	6.8	0.2			0.6	3.7
Delay (s)				47.6	46.6	33.1	61.3	8.5			28.2	32.9
Level of Service				D	D	C	E	A			C	C
Approach Delay (s)		0.0			42.5			29.9			30.5	
Approach LOS		A			D			C			C	
Intersection Summary												
HCM 2000 Control Delay			33.1	HCM 2000 Level of Service					C			
HCM 2000 Volume to Capacity ratio			0.71									
Actuated Cycle Length (s)			110.0	Sum of lost time (s)					13.8			
Intersection Capacity Utilization			98.8%	ICU Level of Service					F			
Analysis Period (min)			15									
c Critical Lane Group												

HCM Signalized Intersection Capacity Analysis
25: Sycamore Avenue & SR 78 EB Ramps

Exist + Proj + Sce B Cumu PM
03/17/2017

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	607	5	470	0	0	0	0	1611	940	250	1184	0
Future Volume (vph)	607	5	470	0	0	0	0	1611	940	250	1184	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.6	4.6	4.6					5.0	5.0	4.2	5.0	
Lane Util. Factor	0.95	0.91	0.95					0.91	1.00	0.97	0.91	
Frpb, ped/bikes	1.00	1.00	1.00					1.00	0.98	1.00	1.00	
Flpb, ped/bikes	1.00	1.00	1.00					1.00	1.00	1.00	1.00	
Frt	1.00	0.95	0.85					1.00	0.85	1.00	1.00	
Flt Protected	0.95	0.97	1.00					1.00	1.00	0.95	1.00	
Satd. Flow (prot)	1681	1555	1504					5085	1557	3433	5085	
Flt Permitted	0.95	0.97	1.00					1.00	1.00	0.95	1.00	
Satd. Flow (perm)	1681	1555	1504					5085	1557	3433	5085	
Peak-hour factor, PHF	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Adj. Flow (vph)	626	5	485	0	0	0	0	1661	969	258	1221	0
RTOR Reduction (vph)	0	19	50	0	0	0	0	0	268	0	0	0
Lane Group Flow (vph)	388	360	299	0	0	0	0	1661	701	258	1221	0
Confl. Peds. (#/hr)									2			7
Confl. Bikes (#/hr)									3			2
Turn Type	Split	NA	Perm					NA	Perm	Prot	NA	
Protected Phases	4	4						2		1	6	
Permitted Phases			4						2			
Actuated Green, G (s)	31.3	31.3	31.3					53.9	53.9	11.0	69.1	
Effective Green, g (s)	31.3	31.3	31.3					53.9	53.9	11.0	69.1	
Actuated g/C Ratio	0.28	0.28	0.28					0.49	0.49	0.10	0.63	
Clearance Time (s)	4.6	4.6	4.6					5.0	5.0	4.2	5.0	
Vehicle Extension (s)	3.0	3.0	3.0					3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	478	442	427					2491	762	343	3194	
v/s Ratio Prot	0.23	c0.23						0.33		c0.08	0.24	
v/s Ratio Perm			0.20						c0.45			
v/c Ratio	0.81	0.81	0.70					0.67	0.92	0.75	0.38	
Uniform Delay, d1	36.6	36.6	35.2					21.2	26.1	48.2	10.0	
Progression Factor	1.00	1.00	1.00					1.00	1.00	1.47	1.41	
Incremental Delay, d2	10.1	11.0	5.1					1.4	18.1	8.8	0.3	
Delay (s)	46.7	47.6	40.3					22.7	44.2	79.8	14.4	
Level of Service	D	D	D					C	D	E	B	
Approach Delay (s)		45.0			0.0			30.6			25.8	
Approach LOS		D			A			C			C	
Intersection Summary												
HCM 2000 Control Delay			32.3	HCM 2000 Level of Service					C			
HCM 2000 Volume to Capacity ratio			0.87									
Actuated Cycle Length (s)			110.0	Sum of lost time (s)					13.8			
Intersection Capacity Utilization			98.8%	ICU Level of Service					F			
Analysis Period (min)			15									
c Critical Lane Group												

HCM Signalized Intersection Capacity Analysis
26: S. Santa Fe Ave & Buena Creek Rd

Exist + Proj + Sce B Cumu PM
03/17/2017

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations	↰	↑	↰	↰	↰	↰
Traffic Volume (vph)	990	680	750	400	230	329
Future Volume (vph)	990	680	750	400	230	329
Ideal Flow (vphpl)	1520	1900	1900	1520	1520	1520
Total Lost time (s)	4.4	5.3	5.3	5.3	4.0	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	
Frpb, ped/bikes	1.00	1.00	1.00	0.93	0.97	
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	
Frt	1.00	1.00	1.00	0.85	0.92	
Flt Protected	0.95	1.00	1.00	1.00	0.98	
Satd. Flow (prot)	1416	1863	1863	1184	1306	
Flt Permitted	0.95	1.00	1.00	1.00	0.98	
Satd. Flow (perm)	1416	1863	1863	1184	1306	
Peak-hour factor, PHF	0.96	0.96	0.96	0.96	0.96	0.96
Adj. Flow (vph)	1031	708	781	417	240	343
RTOR Reduction (vph)	0	0	0	82	0	0
Lane Group Flow (vph)	1031	708	781	335	583	0
Confl. Peds. (#/hr)				19	12	
Confl. Bikes (#/hr)				4		
Turn Type	Prot	NA	NA	Perm	Prot	
Protected Phases	5	2	6		4	
Permitted Phases				6		
Actuated Green, G (s)	29.2	38.9	24.5	24.5	22.6	
Effective Green, g (s)	29.2	38.9	24.5	24.5	22.6	
Actuated g/C Ratio	0.32	0.43	0.27	0.27	0.25	
Clearance Time (s)	4.4	5.3	5.3	5.3	4.0	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	459	805	507	322	327	
v/s Ratio Prot	c0.73	0.38	c0.42		c0.45	
v/s Ratio Perm				0.28		
v/c Ratio	2.25	0.88	1.54	1.04	1.78	
Uniform Delay, d1	30.4	23.4	32.8	32.8	33.7	
Progression Factor	1.14	0.89	1.00	1.00	1.00	
Incremental Delay, d2	567.0	9.7	252.9	61.5	364.4	
Delay (s)	601.5	30.5	285.7	94.2	398.1	
Level of Service	F	C	F	F	F	
Approach Delay (s)		369.1	219.0		398.1	
Approach LOS		F	F		F	
Intersection Summary						
HCM 2000 Control Delay			322.8		HCM 2000 Level of Service	F
HCM 2000 Volume to Capacity ratio			1.89			
Actuated Cycle Length (s)			90.0		Sum of lost time (s)	14.3
Intersection Capacity Utilization			161.4%		ICU Level of Service	H
Analysis Period (min)			15			
c Critical Lane Group						

HCM Unsignalized Intersection Capacity Analysis
27: Buena Creek Rd & Monte Vista Rd

Exist + Proj + Sce B Cumu PM
03/17/2017

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↑	↑		↰	↰
Sign Control		Stop	Stop		Stop	
Traffic Volume (vph)	250	612	282	485	424	110
Future Volume (vph)	250	612	282	485	424	110
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	272	665	307	527	461	120
Direction, Lane #	EB 1	WB 1	SB 1			
Volume Total (vph)	937	834	581			
Volume Left (vph)	272	0	461			
Volume Right (vph)	0	527	120			
Hadj (s)	0.09	-0.35	0.07			
Departure Headway (s)	7.1	6.6	7.1			
Degree Utilization, x	1.84	1.54	1.14			
Capacity (veh/h)	515	547	515			
Control Delay (s)	403.8	269.6	108.8			
Approach Delay (s)	403.8	269.6	108.8			
Approach LOS	F	F	F			
Intersection Summary						
Delay			283.3			
Level of Service			F			
Intersection Capacity Utilization			130.8%		ICU Level of Service	H
Analysis Period (min)			15			

HCM Signalized Intersection Capacity Analysis
28: San Marcos Blvd & Knoll Rd/SR 76 WB Ramps

Exist + Proj + Sce B Cumu PM
03/17/2017

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	→	↱	↰	↱	→	↰	↱	↱	↰	↱	↱
Traffic Volume (vph)	266	0	548	1032	343	46	425	1297	286	3	1105	220
Future Volume (vph)	266	0	548	1032	343	46	425	1297	286	3	1105	220
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.6		5.2	5.6	5.6		5.2	6.3	6.3		6.3	6.3
Lane Util. Factor	1.00	0.88	0.97	0.95	0.95		0.97	0.95	1.00	0.91	1.00	1.00
Frpb, ped/bikes	1.00	1.00	1.00	1.00	1.00		1.00	1.00	0.98	1.00	0.97	1.00
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	0.85	1.00	0.98	1.00		1.00	1.00	0.85	1.00	0.85	1.00
Flt Protected	0.95	1.00	0.95	1.00	1.00		0.95	1.00	1.00	1.00	1.00	1.00
Satd. Flow (prot)	1770	2787	3433	3477	3433		3433	3539	1549	5085	1539	1539
Flt Permitted	0.95	1.00	0.95	1.00	1.00		0.95	1.00	1.00	0.94	1.00	1.00
Satd. Flow (perm)	1770	2787	3433	3477	3433		3433	3539	1549	4759	1539	1539
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
Adj. Flow (vph)	280	0	577	1086	361	48	447	1365	301	3	1163	232
RTOR Reduction (vph)	0	0	57	0	9	0	0	0	118	0	0	85
Lane Group Flow (vph)	280	0	520	1086	400	0	447	1365	183	0	1166	147
Confl. Peds. (#/hr)												12
Confl. Bikes (#/hr)												1
Turn Type	Prot	pm+ov		Prot	NA		Prot	NA	Perm	NA	Perm	
Protected Phases	7	5	3	8			5	2			6	
Permitted Phases		7						2			6	
Actuated Green, G (s)	15.4	35.9	46.1	25.1			20.5	62.0	62.0	36.3	36.3	
Effective Green, g (s)	15.4	35.9	46.1	25.1			20.5	62.0	62.0	36.3	36.3	
Actuated g/C Ratio	0.13	0.30	0.38	0.21			0.17	0.52	0.52	0.30	0.30	
Clearance Time (s)	5.6	5.2	5.6	5.6			5.2	6.3	6.3	6.3	6.3	
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)	227	833	1318	727			586	1828	800	1439	465	
v/s Ratio Prot	c0.16	0.11	c0.32	0.11			0.13	c0.39				
v/s Ratio Perm		0.08						0.12		c0.25	0.10	
v/c Ratio	1.23	0.62	0.82	0.55			0.76	0.75	0.23	0.81	0.32	
Uniform Delay, d1	52.3	36.2	33.3	42.4			47.4	22.8	15.9	38.7	32.3	
Progression Factor	1.00	1.00	1.00	1.00			1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	137.2	1.5	4.3	0.9			5.8	2.8	0.7	5.0	1.8	
Delay (s)	189.5	37.7	37.6	43.3			53.3	25.7	16.6	43.7	34.1	
Level of Service	F	D	D	D			D	C	B	D	C	
Approach Delay (s)		87.3		39.2			30.2			42.1		
Approach LOS		F		D			C			D		
Intersection Summary												
HCM 2000 Control Delay		43.7		HCM 2000 Level of Service			D					
HCM 2000 Volume to Capacity ratio		0.91										
Actuated Cycle Length (s)		120.0		Sum of lost time (s)			22.7					
Intersection Capacity Utilization		104.7%		ICU Level of Service			G					
Analysis Period (min)		15										
c Critical Lane Group												

HCM Signalized Intersection Capacity Analysis
29: San Marcos Blvd & SR 78 EB Ramps

Exist + Proj + Sce B Cumu PM
03/17/2017

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	→	↱	↰	↱	→	↰	↱	↱	↰	↱	↱
Traffic Volume (vph)	349	5	212	0	0	0	0	1790	1297	142	2336	0
Future Volume (vph)	349	5	212	0	0	0	0	1790	1297	142	2336	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.6	5.6						6.3	6.3	5.2	6.3	
Lane Util. Factor	0.97	1.00						0.91	0.88	0.97	0.91	
Frpb, ped/bikes	1.00	1.00						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)	3433	1590						5085	2720	3433	5085	
Flt Permitted	0.95	1.00						5085	2720	1.00	0.95	1.00
Satd. Flow (perm)	3433	1590						5085	2720	3433	5085	
Peak-hour factor, PHF	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Adj. Flow (vph)	364	5	221	0	0	0	0	1865	1351	148	2433	0
RTOR Reduction (vph)	0	8	0	0	0	0	0	0	0	0	0	0
Lane Group Flow (vph)	364	218	0	0	0	0	0	1865	1351	148	2433	0
Confl. Peds. (#/hr)									1			22
Confl. Bikes (#/hr)									5			4
Turn Type	Split	NA						NA	Perm	Prot	NA	
Protected Phases	4	4						2		1	6	
Permitted Phases								2				
Actuated Green, G (s)	19.5	19.5						72.9	72.9	10.5	88.6	
Effective Green, g (s)	19.5	19.5						72.9	72.9	10.5	88.6	
Actuated g/C Ratio	0.16	0.16						0.61	0.61	0.09	0.74	
Clearance Time (s)	5.6	5.6						6.3	6.3	5.2	6.3	
Vehicle Extension (s)	3.0	3.0						3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	557	258						3089	1652	300	3754	
v/s Ratio Prot	0.11	c0.14						0.37		0.04	c0.48	
v/s Ratio Perm									c0.50			
v/c Ratio	0.65	0.84						0.60	0.82	0.49	0.65	
Uniform Delay, d1	47.1	48.8						14.6	18.4	52.2	7.9	
Progression Factor	1.00	1.00						1.00	1.00	1.00	1.00	
Incremental Delay, d2	2.8	21.4						0.9	4.6	1.3	0.9	
Delay (s)	49.8	70.2						15.5	23.0	53.5	8.8	
Level of Service	D	E						B	C	D	A	
Approach Delay (s)		57.6			0.0			18.6			11.3	
Approach LOS		E			A			B			B	
Intersection Summary												
HCM 2000 Control Delay		19.3		HCM 2000 Level of Service			B					
HCM 2000 Volume to Capacity ratio		0.82										
Actuated Cycle Length (s)		120.0		Sum of lost time (s)			17.1					
Intersection Capacity Utilization		75.4%		ICU Level of Service			D					
Analysis Period (min)		15										
c Critical Lane Group												

HCM Signalized Intersection Capacity Analysis
30: San Marcos Blvd & E. Mission Road

Exist + Proj + Sce B Cumu PM
03/17/2017

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↱	↱	↰	↱	↱	↰	↱	↱	↰	↱	↱
Traffic Volume (vph)	206	810	70	445	649	100	50	352	740	40	279	126
Future Volume (vph)	206	810	70	445	649	100	50	352	740	40	279	126
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	5.3	5.3	4.0	5.3	5.3	4.0	5.3	5.3	4.0	5.3	5.3
Lane Util. Factor	1.00	0.95	1.00	0.97	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00
Flpb, ped/bikes	1.00	1.00	0.98	1.00	1.00	0.97	1.00	1.00	1.00	1.00	1.00	1.00
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.95	1.00
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1770	3539	1556	3433	3539	1538	1770	3539	1583	1770	3360	3360
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	1770	3539	1556	3433	3539	1538	1770	3539	1583	1770	3360	3360
Peak-hour factor, PHF	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91
Adj. Flow (vph)	226	890	77	489	713	110	55	387	813	44	307	138
RTOR Reduction (vph)	0	0	55	0	0	76	0	0	253	0	41	0
Lane Group Flow (vph)	226	890	22	489	713	34	55	387	560	44	404	0
Conf. Peds. (#/hr)			3			10						1
Turn Type	Prot	NA	Perm	Prot	NA	Perm	Prot	NA	Prot	Prot	NA	
Protected Phases	7	4		3	8		5	2	2	1	6	
Permitted Phases			4			8						
Actuated Green, G (s)	17.5	32.7	32.7	19.8	35.0	35.0	6.7	39.2	39.2	4.1	36.6	
Effective Green, g (s)	17.5	32.7	32.7	19.8	35.0	35.0	6.7	39.2	39.2	4.1	36.6	
Actuated g/C Ratio	0.15	0.29	0.29	0.17	0.31	0.31	0.06	0.34	0.34	0.04	0.32	
Clearance Time (s)	4.0	5.3	5.3	4.0	5.3	5.3	4.0	5.3	5.3	4.0	5.3	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	270	1011	444	594	1082	470	103	1212	542	63	1074	
v/s Ratio Prot	0.13	c0.25		c0.14	0.20		c0.03	0.11	c0.35	0.02	0.12	
v/s Ratio Perm			0.01			0.02						
v/c Ratio	0.84	0.88	0.05	0.82	0.66	0.07	0.53	0.32	1.03	0.70	0.38	
Uniform Delay, d1	47.1	39.0	29.6	45.6	34.5	28.2	52.3	27.8	37.6	54.5	30.1	
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	19.7	9.1	0.0	9.0	1.5	0.1	5.2	0.2	47.4	28.6	0.2	
Delay (s)	66.7	48.0	29.6	54.6	36.0	28.2	57.6	27.9	85.0	83.2	30.3	
Level of Service	E	D	C	D	D	C	E	C	F	F	C	
Approach Delay (s)		50.4			42.3			66.2			35.0	
Approach LOS		D			D			E			D	

Intersection Summary

HCM 2000 Control Delay	50.8	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.92		
Actuated Cycle Length (s)	114.4	Sum of lost time (s)	18.6
Intersection Capacity Utilization	83.7%	ICU Level of Service	E
Analysis Period (min)	15		
c Critical Lane Group			

HCM Unsignalized Intersection Capacity Analysis
31: North Centre City Pkwy & Mesa Rock Rd

Exist + Proj + Sce B Cumu PM
03/17/2017

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations	↰	↱	↰	↱	↱	↱
Traffic Volume (veh/h)	5	77	100	375	218	5
Future Volume (Veh/h)	5	77	100	375	218	5
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	6	86	111	417	242	6
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	884	245	248			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	884	245	248			
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	89	92			
cM capacity (veh/h)	289	794	1318			
Direction, Lane #	EB 1	NB 1	NB 2	SB 1		
Volume Total	92	111	417	248		
Volume Left	6	111	0	0		
Volume Right	86	0	0	6		
cSH	713	1318	1700	1700		
Volume to Capacity	0.13	0.08	0.25	0.15		
Queue Length 95th (ft)	11	7	0	0		
Control Delay (s)	10.8	8.0	0.0	0.0		
Lane LOS	B	A				
Approach Delay (s)	10.8	1.7		0.0		
Approach LOS	B					

Intersection Summary

Average Delay	2.2		
Intersection Capacity Utilization	32.4%	ICU Level of Service	A
Analysis Period (min)	15		

HCM Signalized Intersection Capacity Analysis
32: North Centre City Pkwy & Country Club Ln

Exist + Proj + Sce B Cumu PM
03/17/2017

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		 			 			 			 	
Traffic Volume (vph)	209	350	100	120	250	130	110	616	130	170	432	83
Future Volume (vph)	209	350	100	120	250	130	110	616	130	170	432	83
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1770	3539	1583	1770	3539	1583	1770	3539	1583	1770	3539	1583
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	1770	3539	1583	1770	3539	1583	1770	3539	1583	1770	3539	1583
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)	220	368	105	126	263	137	116	648	137	179	455	87
RTOR Reduction (vph)	0	0	81	0	0	113	0	0	93	0	0	60
Lane Group Flow (vph)	220	368	24	126	263	24	116	648	44	179	455	27
Turn Type	Prot	NA	Perm	Prot	NA	Perm	Prot	NA	Perm	Prot	NA	Perm
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases			4			8			2			6
Actuated Green, G (s)	13.2	17.7	17.7	8.8	13.3	13.3	8.6	20.5	20.5	11.9	23.8	23.8
Effective Green, g (s)	13.2	17.7	17.7	8.8	13.3	13.3	8.6	20.5	20.5	11.9	23.8	23.8
Actuated g/C Ratio	0.17	0.23	0.23	0.11	0.17	0.17	0.11	0.27	0.27	0.15	0.31	0.31
Clearance Time (s)	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	303	814	364	202	612	273	197	943	421	273	1095	489
v/s Ratio Prot	c0.12	c0.10		0.07	0.07		0.07	c0.18		c0.10	c0.13	
v/s Ratio Perm			0.02			0.01			0.03			0.02
v/c Ratio	0.73	0.45	0.07	0.62	0.43	0.09	0.59	0.69	0.10	0.66	0.42	0.06
Uniform Delay, d1	30.1	25.4	23.1	32.5	28.4	26.7	32.5	25.3	21.3	30.6	21.0	18.7
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	8.4	0.4	0.1	5.9	0.5	0.1	4.4	2.1	0.1	5.6	0.3	0.0
Delay (s)	38.5	25.8	23.2	38.4	28.9	26.8	36.9	27.4	21.4	36.1	21.3	18.7
Level of Service	D	C	C	D	C	C	D	C	C	D	C	B
Approach Delay (s)	29.5			30.6			27.7			24.7		
Approach LOS	C			C			C			C		
Intersection Summary												
HCM 2000 Control Delay	27.9			HCM 2000 Level of Service			C					
HCM 2000 Volume to Capacity ratio	0.63											
Actuated Cycle Length (s)	76.9			Sum of lost time (s)			18.0					
Intersection Capacity Utilization	59.9%			ICU Level of Service			B					
Analysis Period (min)	15											
c Critical Lane Group												

HCM Signalized Intersection Capacity Analysis
33: Twin Oaks Valley Rd & Discovery St/Barham Dr

Exist + Proj + Sce B Cumu PM
03/17/2017

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	520	320	10	280	250	313	10	1452	310	466	658	380
Future Volume (vph)	520	320	10	280	250	313	10	1452	310	466	658	380
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	5.3	4.0	5.0	5.3	4.0	5.0	6.0	6.0	5.0	6.0	4.0
Lane Util. Factor	0.97	0.91	1.00	1.00	1.00	1.00	1.00	0.86	0.86	0.97	0.91	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	3433	5085	1583	1770	1863	1583	1770	4791	1362	3433	5085	1583
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	3433	5085	1583	1770	1863	1583	1770	4791	1362	3433	5085	1583
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)	565	348	11	304	272	340	11	1578	337	507	715	413
RTOR Reduction (vph)	0	0	0	0	0	0	0	1	145	0	0	0
Lane Group Flow (vph)	565	348	11	304	272	340	11	1611	158	507	715	413
Turn Type	Prot	NA	Free	Prot	NA	Free	Prot	NA	Perm	Prot	NA	Free
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases			Free			Free			2			Free
Actuated Green, G (s)	22.9	24.9	135.0	22.0	24.0	135.0	1.6	47.8	47.8	19.0	65.2	135.0
Effective Green, g (s)	22.9	24.9	135.0	22.0	24.0	135.0	1.6	47.8	47.8	19.0	65.2	135.0
Actuated g/C Ratio	0.17	0.18	1.00	0.16	0.18	1.00	0.01	0.35	0.35	0.14	0.48	1.00
Clearance Time (s)	5.0	5.3		5.0	5.3		5.0	6.0	6.0	5.0	6.0	
Vehicle Extension (s)	2.0	4.5		2.0	4.5		2.0	3.0	3.0	2.0	4.0	
Lane Grp Cap (vph)	582	937	1583	288	331	1583	20	1696	482	483	2455	1583
v/s Ratio Prot	0.16	0.07		c0.17	c0.15		0.01	c0.34		c0.15	0.14	
v/s Ratio Perm			0.01			0.21			0.12			c0.26
v/c Ratio	0.97	0.37	0.01	1.06	0.82	0.21	0.55	0.95	0.33	1.05	0.29	0.26
Uniform Delay, d1	55.7	48.2	0.0	56.5	53.4	0.0	66.3	42.4	31.9	58.0	21.0	0.0
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	29.8	0.4	0.0	68.4	16.3	0.3	17.2	12.8	1.8	54.6	0.3	0.4
Delay (s)	85.5	48.6	0.0	124.9	69.8	0.3	83.6	55.2	33.7	112.6	21.3	0.4
Level of Service	F	D	A	F	E	A	F	E	C	F	C	A
Approach Delay (s)	70.6			62.3			52.0			44.3		
Approach LOS	E			E			D			D		
Intersection Summary												
HCM 2000 Control Delay	54.6			HCM 2000 Level of Service			D					
HCM 2000 Volume to Capacity ratio	0.95											
Actuated Cycle Length (s)	135.0			Sum of lost time (s)			21.3					
Intersection Capacity Utilization	89.4%			ICU Level of Service			E					
Analysis Period (min)	15											
c Critical Lane Group												

APPENDIX H

PEAK HOUR ANALYSIS WORKSHEETS – SAN MARCOS HORIZON YEAR 2035

APPENDIX H-1

PEAK HOUR ANALYSIS WORKSHEETS – SAN MARCOS HORIZON YEAR 2035 WITHOUT PROJECT

Year 2035 AM
12: Twin Oaks Valley Rd & Deer Springs Rd

Sierra Project
03/17/2017

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	49	131	128	651	1714	53
Future Volume (vph)	49	131	128	651	1714	53
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.9	4.9	4.0	5.3	5.3	5.3
Lane Util. Factor	1.00	1.00	1.00	0.95	0.95	1.00
Flt Protected	1.00	0.85	1.00	1.00	1.00	0.85
Satd. Flow (prot)	1770	1583	1770	3539	3539	1583
Flt Permitted	0.95	1.00	0.95	1.00	1.00	1.00
Satd. Flow (perm)	1770	1583	1770	3539	3539	1583
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	53	142	139	708	1863	58
RTOR Reduction (vph)	0	127	0	0	0	9
Lane Group Flow (vph)	53	15	139	708	1863	49
Turn Type	Prot	Perm	Prot	NA	NA	Perm
Protected Phases	4		5	2	6	
Permitted Phases		4				6
Actuated Green, G (s)	12.4	12.4	14.6	95.1	76.5	76.5
Effective Green, g (s)	12.4	12.4	14.6	95.1	76.5	76.5
Actuated g/C Ratio	0.11	0.11	0.12	0.81	0.65	0.65
Clearance Time (s)	4.9	4.9	4.0	5.3	5.3	5.3
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	186	166	219	2859	2300	1028
v/s Ratio Prot	c0.03		c0.08	0.20	c0.53	
v/s Ratio Perm		0.01				0.03
v/c Ratio	0.28	0.09	0.63	0.25	0.81	0.05
Uniform Delay, d1	48.6	47.6	49.0	2.7	15.2	7.4
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	0.8	0.2	5.9	0.0	2.3	0.0
Delay (s)	49.4	47.8	54.9	2.8	17.5	7.5
Level of Service	D	D	D	A	B	A
Approach Delay (s)	48.2			11.3	17.2	
Approach LOS	D			B	B	
Intersection Summary						
HCM 2000 Control Delay			17.6	HCM 2000 Level of Service		B
HCM 2000 Volume to Capacity ratio			0.72			
Actuated Cycle Length (s)			117.7	Sum of lost time (s)		14.2
Intersection Capacity Utilization			69.6%	ICU Level of Service		C
Analysis Period (min)			15			
c Critical Lane Group						

Year 2035 AM
13: Twin Oaks Valley Rd & Buena Creek Rd

Sierra Project
03/17/2017

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	460	0	270	10	10	0	180	329	10	10	1087	698
Future Volume (vph)	460	0	270	10	10	0	180	329	10	10	1087	698
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		5.0	5.5		5.0	5.5	5.5
Lane Util. Factor	0.97		1.00		1.00		1.00	0.95		1.00	0.95	1.00
Flt Protected	1.00		0.99		1.00		1.00	1.00		1.00	1.00	0.99
Flt Permitted	1.00		1.00		1.00		1.00	1.00		1.00	1.00	1.00
Satd. Flow (prot)	1770		1560		1817		1770	3524		1770	3539	1561
Flt Permitted	0.74		1.00		0.98		0.95	1.00		0.95	1.00	1.00
Satd. Flow (perm)	2690		1560		1817		1770	3524		1770	3539	1561
Peak-hour factor, PHF	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Adj. Flow (vph)	479	0	281	10	10	0	188	343	10	10	1132	727
RTOR Reduction (vph)	0	0	149	0	0	0	0	2	0	0	0	201
Lane Group Flow (vph)	479	0	132	0	20	0	188	351	0	10	1132	526
Confl. Peds. (#/hr)			2									1
Confl. Bikes (#/hr)												3
Turn Type	Perm		Perm	Perm	NA		Prot	NA		Prot	NA	Perm
Protected Phases					8		5	2		1	6	
Permitted Phases	4		4	8								6
Actuated Green, G (s)	19.8		19.8		19.8		11.5	48.8		0.9	38.2	38.2
Effective Green, g (s)	19.8		19.8		19.8		11.5	48.8		0.9	38.2	38.2
Actuated g/C Ratio	0.24		0.24		0.24		0.14	0.58		0.01	0.45	0.45
Clearance Time (s)	4.0		4.0		4.0		5.0	5.5		5.0	5.5	5.5
Vehicle Extension (s)	3.0		3.0		3.0		3.0	3.0		3.0	3.0	3.0
Lane Grp Cap (vph)	634		367		428		242	2047		18	1609	709
v/s Ratio Prot							c0.11	0.10		0.01	0.32	
v/s Ratio Perm	c0.18		0.08		0.01							c0.34
v/c Ratio	0.76		0.36		0.05		0.78	0.17		0.56	0.70	0.74
Uniform Delay, d1	29.8		26.8		24.8		35.0	8.2		41.4	18.4	18.8
Progression Factor	1.00		1.00		1.00		1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	5.1		0.6		0.0		14.4	0.0		32.3	1.4	4.2
Delay (s)	35.0		27.4		24.9		49.5	8.2		73.6	19.8	23.1
Level of Service	C		C		C		D	A		E	B	C
Approach Delay (s)		32.2			24.9			22.6			21.3	
Approach LOS		C			C			C			C	
Intersection Summary												
HCM 2000 Control Delay			24.2	HCM 2000 Level of Service						C		
HCM 2000 Volume to Capacity ratio			0.75									
Actuated Cycle Length (s)			84.0	Sum of lost time (s)						14.5		
Intersection Capacity Utilization			71.9%	ICU Level of Service						C		
Analysis Period (min)			15									
c Critical Lane Group												

Year 2035 AM
14: Twin Oaks Valley Rd & Cassou Rd

Sierra Project
03/17/2017

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↔			↔		↔	↔		↔	↔	
Traffic Volume (vph)	17	10	50	240	20	46	30	364	230	62	872	8
Future Volume (vph)	17	10	50	240	20	46	30	364	230	62	872	8
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		5.0			5.0		5.0	5.0		5.0	5.0	
Lane Util. Factor		1.00			1.00		1.00	0.95		1.00	0.95	
Frpb, ped/bikes		0.99			1.00		1.00	0.99		1.00	1.00	
Flpb, ped/bikes		1.00			1.00		1.00	1.00		1.00	1.00	
Frt		0.91			0.98		1.00	0.94		1.00	1.00	
Flt Protected		0.99			0.96		0.95	1.00		0.95	1.00	
Satd. Flow (prot)		1661			1756		1770	3305		1770	3535	
Flt Permitted		0.99			0.96		0.95	1.00		0.95	1.00	
Satd. Flow (perm)		1661			1756		1770	3305		1770	3535	
Peak-hour factor, PHF	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Adj. Flow (vph)	18	10	52	250	21	48	31	379	240	65	908	8
RTOR Reduction (vph)	0	47	0	0	4	0	0	74	0	0	1	0
Lane Group Flow (vph)	0	33	0	0	315	0	31	545	0	65	915	0
Confl. Peds. (#/hr)			6						1			
Turn Type	Split	NA		Split	NA		Prot	NA		Prot	NA	
Protected Phases	4	4		8	8		5	2		1	6	
Permitted Phases												
Actuated Green, G (s)		7.5			22.5		2.9	28.1		6.6	31.8	
Effective Green, g (s)		7.5			22.5		2.9	28.1		6.6	31.8	
Actuated g/C Ratio		0.09			0.27		0.03	0.33		0.08	0.38	
Clearance Time (s)		5.0			5.0		5.0	5.0		5.0	5.0	
Vehicle Extension (s)		3.0			3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)		147			466		60	1096		137	1327	
v/s Ratio Prot		c0.02			c0.18		0.02	0.17		c0.04	c0.26	
v/s Ratio Perm												
v/c Ratio		0.22			0.68		0.52	0.50		0.47	0.69	
Uniform Delay, d1		35.9			27.8		40.2	22.7		37.4	22.3	
Progression Factor		1.00			1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2		0.8			3.8		7.3	0.4		2.6	1.5	
Delay (s)		36.7			31.7		47.5	23.0		40.0	23.8	
Level of Service		D			C		D	C		D	C	
Approach Delay (s)		36.7			31.7			24.2			24.9	
Approach LOS		D			C			C			C	

Intersection Summary

HCM 2000 Control Delay	26.2	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.64		
Actuated Cycle Length (s)	84.7	Sum of lost time (s)	20.0
Intersection Capacity Utilization	64.8%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

Year 2035 AM
15: Twin Oaks Valley Rd & La Cienega

Sierra Project
03/17/2017

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations	↔	↔	↔	↔	↔	↔
Traffic Volume (vph)	220	226	578	70	71	1041
Future Volume (vph)	220	226	578	70	71	1041
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.0	6.0	6.5		6.0	6.5
Lane Util. Factor	1.00	1.00	0.95		1.00	0.95
Frpb, ped/bikes	1.00	0.99	1.00		1.00	1.00
Flpb, ped/bikes	1.00	1.00	1.00		1.00	1.00
Frt	1.00	0.85	0.98		1.00	1.00
Flt Protected	0.95	1.00	1.00		0.95	1.00
Satd. Flow (prot)	1770	1563	3465		1770	3539
Flt Permitted	0.95	1.00	1.00		0.95	1.00
Satd. Flow (perm)	1770	1563	3465		1770	3539
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	239	246	628	76	77	1132
RTOR Reduction (vph)	0	0	10	0	0	0
Lane Group Flow (vph)	239	246	694	0	77	1132
Confl. Peds. (#/hr)		1		13		
Confl. Bikes (#/hr)				1		
Turn Type	Prot	Perm	NA		Prot	NA
Protected Phases	8		2		1	6
Permitted Phases		8				
Actuated Green, G (s)	15.8	15.8	20.9		6.7	33.6
Effective Green, g (s)	15.8	15.8	20.9		6.7	33.6
Actuated g/C Ratio	0.26	0.26	0.34		0.11	0.54
Clearance Time (s)	6.0	6.0	6.5		6.0	6.5
Vehicle Extension (s)	3.0	3.0	3.0		3.0	3.0
Lane Grp Cap (vph)	451	398	1169		191	1921
v/s Ratio Prot	0.14		0.20		0.04	c0.32
v/s Ratio Perm		c0.16				
v/c Ratio	0.53	0.62	0.59		0.40	0.59
Uniform Delay, d1	19.9	20.4	17.0		25.7	9.5
Progression Factor	1.00	1.00	1.00		1.00	1.00
Incremental Delay, d2	1.1	2.9	0.8		1.4	0.5
Delay (s)	21.0	23.2	17.8		27.1	10.0
Level of Service	C	C	B		C	A
Approach Delay (s)	22.1		17.8			11.1
Approach LOS	C		B			B

Intersection Summary

HCM 2000 Control Delay	15.3	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.68		
Actuated Cycle Length (s)	61.9	Sum of lost time (s)	18.5
Intersection Capacity Utilization	51.6%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

Year 2035 AM
16: Twin Oaks Valley Rd & Del Roy Dr

Sierra Project
03/17/2017

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↱		↰	↱		↰	↱		↰	↱	
Traffic Volume (vph)	28	0	70	10	0	10	40	630	20	10	1293	18
Future Volume (vph)	28	0	70	10	0	10	40	630	20	10	1293	18
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5	5.0		4.5	5.0		5.0	5.0		5.0	5.0	
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	0.95		1.00	0.95	
Frpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Flpb, ped/bikes	1.00	1.00		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		1.00	1.00	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770	1583		1770	1583		1770	3520		1770	3532	
Flt Permitted	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (perm)	1770	1583		1770	1583		1770	3520		1770	3532	
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)	30	0	76	11	0	11	43	685	22	11	1405	20
RTOR Reduction (vph)	0	67	0	0	10	0	0	2	0	0	1	0
Lane Group Flow (vph)	30	9	0	11	1	0	43	705	0	11	1424	0
Confl. Peds. (#/hr)	2											
Turn Type	Prot	NA		Prot	NA		Prot	NA		Prot	NA	
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases												
Actuated Green, G (s)	1.1	8.3		0.5	7.7		2.0	42.5		0.5	41.0	
Effective Green, g (s)	1.1	8.3		0.5	7.7		2.0	42.5		0.5	41.0	
Actuated g/C Ratio	0.02	0.12		0.01	0.11		0.03	0.60		0.01	0.58	
Clearance Time (s)	4.5	5.0		4.5	5.0		5.0	5.0		5.0	5.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	27	184		12	170		49	2098		12	2031	
v/s Ratio Prot	c0.02	c0.01		0.01	0.00		c0.02	0.20		0.01	c0.40	
v/s Ratio Perm												
v/c Ratio	1.11	0.05		0.92	0.01		0.88	0.34		0.92	0.70	
Uniform Delay, d1	35.1	28.0		35.4	28.4		34.5	7.3		35.4	10.8	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	209.3	0.1		212.2	0.0		83.1	0.1		212.2	1.1	
Delay (s)	244.4	28.1		247.5	28.4		117.6	7.4		247.5	11.9	
Level of Service	F	C		F	C		F	A		F	B	
Approach Delay (s)	89.3			138.0			13.7			13.7		
Approach LOS	F			F			B			B		

Intersection Summary

HCM 2000 Control Delay	18.3	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.62		
Actuated Cycle Length (s)	71.3	Sum of lost time (s)	19.5
Intersection Capacity Utilization	52.9%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

Year 2035 AM
17: Twin Oaks Valley Rd & Windy Wy

Sierra Project
03/17/2017

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	10	10	50	0	0	0	50	690	10	10	1343	70
Future Volume (vph)	10	10	50	0	0	0	50	690	10	10	1343	70
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0					6.0	6.0		4.0	4.0	
Lane Util. Factor	1.00	1.00					1.00	0.95		1.00	0.95	
Frpb, ped/bikes	1.00	0.99					1.00	1.00		1.00	1.00	
Flpb, ped/bikes	1.00	1.00					1.00	1.00		1.00	1.00	
Frt	1.00	0.88					1.00	1.00		1.00	0.99	
Flt Protected	0.95	1.00					0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770	1608					1770	3530		1770	3508	
Flt Permitted	0.95	1.00					0.95	1.00		0.95	1.00	
Satd. Flow (perm)	1770	1608					1770	3530		1770	3508	
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	54	0	0	0	54	750	11	11	1460	76
RTOR Reduction (vph)	0	49	0	0	0	0	0	1	0	0	3	0
Lane Group Flow (vph)	11	16	0	0	0	0	54	760	0	11	1533	0
Confl. Peds. (#/hr)			5			4			5			4
Confl. Bikes (#/hr)									5			
Turn Type	Split	NA					Prot	NA				
Protected Phases	4	4					5	2				
Permitted Phases												
Actuated Green, G (s)	6.9	6.9					3.7	46.3				
Effective Green, g (s)	6.9	6.9					3.7	46.3				
Actuated g/C Ratio	0.10	0.10					0.05	0.68				
Clearance Time (s)	4.0	4.0					6.0	6.0				
Vehicle Extension (s)	3.0	3.0					3.0	3.0				
Lane Grp Cap (vph)	179	163					96	2407				
v/s Ratio Prot	0.01	c0.01					c0.03	c0.22				
v/s Ratio Perm												
v/c Ratio	0.06	0.10					0.56	0.32				
Uniform Delay, d1	27.6	27.7					31.3	4.4				
Progression Factor	1.00	1.00					1.00	1.00				
Incremental Delay, d2	0.1	0.3					7.3	0.1				
Delay (s)	27.7	28.0					38.7	4.5				
Level of Service	C	C					D	A				
Approach Delay (s)	27.9		0.0		6.7		9.3					
Approach LOS	C		A		A		A					

Intersection Summary

HCM 2000 Control Delay	9.0	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.60		
Actuated Cycle Length (s)	67.9	Sum of lost time (s)	14.0
Intersection Capacity Utilization	56.3%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

Year 2035 AM
18: Twin Oaks Valley Rd & Borden Rd

Sierra Project
03/17/2017

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↱		↰	↱		↰	↱	↰	↱	↰	↱
Traffic Volume (vph)	60	50	270	270	110	27	100	573	60	18	1134	121
Future Volume (vph)	60	50	270	270	110	27	100	573	60	18	1134	121
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.2	5.3		4.2	5.3		4.2	4.9	4.9	4.2	4.9	4.9
Lane Util. Factor	1.00	0.95		1.00	0.95		1.00	0.95	1.00	0.95	1.00	1.00
Frpb, ped/bikes	1.00	0.98		1.00	1.00		1.00	1.00	0.98	1.00	1.00	0.98
Flpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	0.87		1.00	0.97		1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1770	3035		1770	3426		1770	3539	1556	1770	3539	1550
Flt Permitted	0.95	1.00		0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	1770	3035		1770	3426		1770	3539	1556	1770	3539	1550
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	53	284	284	116	28	105	603	63	19	1194	127
RTOR Reduction (vph)	0	169	0	0	12	0	0	0	32	0	0	67
Lane Group Flow (vph)	63	168	0	284	132	0	105	603	31	19	1194	60
Confl. Peds. (#/hr)			6		2			3			6	
Confl. Bikes (#/hr)			1		1			3			3	
Turn Type	Prot	NA		Prot	NA		Prot	NA	Perm	Prot	NA	Perm
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases								2				6
Actuated Green, G (s)	8.3	17.9		28.5	38.1		13.8	68.0	68.0	3.2	57.4	57.4
Effective Green, g (s)	8.3	17.9		28.5	38.1		13.8	68.0	68.0	3.2	57.4	57.4
Actuated g/C Ratio	0.06	0.13		0.21	0.28		0.10	0.50	0.50	0.02	0.42	0.42
Clearance Time (s)	4.2	5.3		4.2	5.3		4.2	4.9	4.9	4.2	4.9	4.9
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)	107	398		370	958		179	1766	776	41	1491	653
v/s Ratio Prot	0.04	c0.06		c0.16	0.04		c0.06	0.17		0.01	c0.34	
v/s Ratio Perm								0.02				0.04
v/c Ratio	0.59	0.42		0.77	0.14		0.59	0.34	0.04	0.46	0.80	0.09
Uniform Delay, d1	62.3	54.4		50.7	36.7		58.5	20.6	17.4	65.7	34.4	23.7
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	8.0	0.7		9.2	0.1		4.8	0.1	0.0	8.1	3.2	0.1
Delay (s)	70.3	55.1		59.9	36.8		63.3	20.7	17.4	73.7	37.6	23.8
Level of Service	E	E		E	D		E	C	B	E	D	C
Approach Delay (s)		57.5			52.2			26.2			36.8	
Approach LOS		E			D			C			D	

Intersection Summary			
HCM 2000 Control Delay	39.1	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.71		
Actuated Cycle Length (s)	136.2	Sum of lost time (s)	18.6
Intersection Capacity Utilization	80.5%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			

Year 2035 AM
19: Twin Oaks Valley Rd & Richmar Road

Sierra Project
03/17/2017

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↱		↰	↱		↰	↱	↰	↱	↰	↱
Traffic Volume (vph)	210	30	150	70	30	20	80	763	50	50	1484	280
Future Volume (vph)	210	30	150	70	30	20	80	763	50	50	1484	280
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.9	4.9		4.0	4.0		4.0	5.7		4.0	5.7	
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	0.95		1.00	0.95	
Frpb, ped/bikes	1.00	0.99		1.00	0.99		1.00	1.00		1.00	1.00	
Flpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Frt	1.00	0.87		1.00	0.94		1.00	0.99		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	1611		1770	1735		1770	3498		1770	3438	
Flt Permitted	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (perm)	1770	1611		1770	1735		1770	3498		1770	3438	
Peak-hour factor, PHF	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99
Adj. Flow (vph)	212	30	152	71	30	20	81	771	51	51	1499	283
RTOR Reduction (vph)	0	116	0	0	18	0	0	3	0	0	9	0
Lane Group Flow (vph)	212	66	0	71	32	0	81	819	0	51	1773	0
Confl. Peds. (#/hr)						8			4			2
Confl. Bikes (#/hr)			1						1			3
Turn Type	Prot	NA		Prot	NA		Prot	NA		Prot	NA	
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases												
Actuated Green, G (s)	18.8	22.5		9.3	13.0		8.1	78.1		7.9	77.9	
Effective Green, g (s)	18.8	22.5		9.3	13.0		8.1	78.1		7.9	77.9	
Actuated g/C Ratio	0.14	0.16		0.07	0.10		0.06	0.57		0.06	0.57	
Clearance Time (s)	4.9	4.9		4.0	4.0		4.0	5.7		4.0	5.7	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	243	265		120	165		105	2002		102	1963	
v/s Ratio Prot	c0.12	c0.04		0.04	0.02		c0.05	0.23		0.03	c0.52	
v/s Ratio Perm												
v/c Ratio	0.87	0.25		0.59	0.19		0.77	0.41		0.50	0.90	
Uniform Delay, d1	57.6	49.6		61.7	56.9		63.2	16.3		62.3	25.9	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	27.2	0.5		7.6	0.6		28.8	0.1		3.8	6.3	
Delay (s)	84.8	50.1		69.3	57.4		92.1	16.4		66.2	32.2	
Level of Service	F	D		E	E		F	B		E	C	
Approach Delay (s)		68.8			64.4			23.2			33.1	
Approach LOS		E			E			C			C	

Intersection Summary			
HCM 2000 Control Delay	35.9	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.82		
Actuated Cycle Length (s)	136.4	Sum of lost time (s)	18.6
Intersection Capacity Utilization	90.2%	ICU Level of Service	E
Analysis Period (min)	15		
c Critical Lane Group			

Year 2035 AM
20: Twin Oaks Valley Rd & San Marcos Blvd

Sierra Project
03/17/2017

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↱	↱	↰	↱		↰	↱	↱	↰	↱	↱
Traffic Volume (vph)	236	430	480	530	720	45	430	652	530	112	1267	415
Future Volume (vph)	236	430	480	530	720	45	430	652	530	112	1267	415
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.2	5.3	5.3	4.2	5.0		4.2	5.3	4.2	4.2	5.3	5.3
Lane Util. Factor	0.97	0.95	0.88	0.94	0.95		0.97	0.95	1.00	0.97	0.95	1.00
Frpb, ped/bikes	1.00	1.00	0.97	1.00	1.00		1.00	1.00	0.99	1.00	1.00	0.99
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	1.00	0.85	1.00	0.99		1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	3433	3539	2712	4990	3504		3433	3539	1565	3433	3539	1562
Flt Permitted	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	3433	3539	2712	4990	3504		3433	3539	1565	3433	3539	1562
Peak-hour factor, PHF	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98
Adj. Flow (vph)	241	439	490	541	735	46	439	665	541	114	1293	423
RTOR Reduction (vph)	0	0	270	0	4	0	0	0	37	0	0	145
Lane Group Flow (vph)	241	439	220	541	777	0	439	665	504	114	1293	278
Confl. Peds. (#/hr)			5			4			1			1
Confl. Bikes (#/hr)			8			3			3			3
Turn Type	Prot	NA	Perm	Prot	NA		Prot	NA	pm+ov	Prot	NA	Perm
Protected Phases	7	4		3	8		5	2	3	1	6	
Permitted Phases			4						2			6
Actuated Green, G (s)	10.1	26.3	26.3	14.4	30.9		16.2	55.5	69.9	8.1	47.4	47.4
Effective Green, g (s)	10.1	26.3	26.3	14.4	30.9		16.2	55.5	69.9	8.1	47.4	47.4
Actuated g/C Ratio	0.08	0.21	0.21	0.12	0.25		0.13	0.45	0.57	0.07	0.38	0.38
Clearance Time (s)	4.2	5.3	5.3	4.2	5.0		4.2	5.3	4.2	4.2	5.3	5.3
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	281	754	578	582	878		451	1592	887	225	1360	600
v/s Ratio Prot	0.07	0.12		c0.11	c0.22		c0.13	0.19	0.07	0.03	c0.37	
v/s Ratio Perm			0.08						0.26			0.18
v/c Ratio	0.86	0.58	0.38	0.93	0.89		0.97	0.42	0.57	0.51	0.95	0.46
Uniform Delay, d1	55.9	43.6	41.5	53.9	44.5		53.3	23.0	17.1	55.7	36.8	28.4
Progression Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	21.9	1.2	0.4	21.3	10.6		35.2	0.2	0.8	1.8	14.3	0.6
Delay (s)	77.8	44.7	41.9	75.2	55.1		88.6	23.1	17.9	57.5	51.1	29.0
Level of Service	E	D	D	E	E		F	C	B	E	D	C
Approach Delay (s)		50.4			63.3			38.9			46.4	
Approach LOS		D			E			D			D	

Intersection Summary			
HCM 2000 Control Delay	48.9	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.96		
Actuated Cycle Length (s)	123.3	Sum of lost time (s)	19.0
Intersection Capacity Utilization	91.2%	ICU Level of Service	F
Analysis Period (min)	15		
c Critical Lane Group			

Year 2035 AM
21: Twin Oaks Valley Rd & SR 78 WB Ramps

Sierra Project
03/17/2017

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations				↰		↱		↱	↱		↱	↱
Traffic Volume (vph)	0	0	0	700	0	310	0	1262	600	0	1745	652
Future Volume (vph)	0	0	0	700	0	310	0	1262	600	0	1745	652
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)				4.6		4.6		5.3	4.6		5.3	5.3
Lane Util. Factor				0.97		0.88		0.91	1.00		0.91	1.00
Frpb, ped/bikes				1.00		1.00		1.00	0.97		1.00	0.97
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	0.85
Flt Protected				0.95		1.00		1.00	1.00		1.00	1.00
Satd. Flow (prot)				3433		2787		5085	1539		5085	1543
Flt Permitted				0.95		1.00		1.00	1.00		1.00	1.00
Satd. Flow (perm)				3433		2787		5085	1539		5085	1543
Peak-hour factor, PHF	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98
Adj. Flow (vph)	0	0	0	714	0	316	0	1288	612	0	1781	665
RTOR Reduction (vph)	0	0	0	0	0	67	0	0	0	0	0	229
Lane Group Flow (vph)	0	0	0	714	0	249	0	1288	612	0	1781	436
Confl. Peds. (#/hr)									8			5
Confl. Bikes (#/hr)									1			3
Turn Type				Prot		Perm		NA	pm+ov		NA	Perm
Protected Phases				8				2	8		6	
Permitted Phases						8			2			6
Actuated Green, G (s)				31.5		31.5		78.6	110.1		78.6	78.6
Effective Green, g (s)				31.5		31.5		78.6	110.1		78.6	78.6
Actuated g/C Ratio				0.26		0.26		0.65	0.92		0.65	0.65
Clearance Time (s)				4.6		4.6		5.3	4.6		5.3	5.3
Vehicle Extension (s)				2.0		2.0		2.0	2.0		2.0	2.0
Lane Grp Cap (vph)				901		731		3330	1471		3330	1010
v/s Ratio Prot				c0.21				0.25	0.11		c0.35	
v/s Ratio Perm						0.09			0.29			0.28
v/c Ratio				0.79		0.34		0.39	0.42		0.53	0.43
Uniform Delay, d1				41.2		35.8		9.6	0.7		11.0	10.0
Progression Factor				1.00		1.00		0.45	9.15		1.00	1.00
Incremental Delay, d2				4.5		0.1		0.2	0.0		0.6	1.3
Delay (s)				45.7		35.9		4.5	6.1		11.6	11.3
Level of Service				D		D		A	A		B	B
Approach Delay (s)		0.0			42.7			5.0			11.5	
Approach LOS		A			D			A			B	

Intersection Summary			
HCM 2000 Control Delay	15.2	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.61		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	9.9
Intersection Capacity Utilization	61.4%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

Year 2035 AM
22: Twin Oaks Valley Rd & SR 78 EB Ramps

Sierra Project
03/17/2017

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↱	↲					↰↱↲	↰	↱↲	↰↱↲	
Traffic Volume (vph)	666	10	850	0	0	0	0	1246	760	370	2025	0
Future Volume (vph)	666	10	850	0	0	0	0	1246	760	370	2025	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.6	4.6	4.6					5.3	5.3	4.2	5.3	
Lane Util. Factor	0.95	0.91	0.95					0.91	1.00	0.97	0.91	
Frpb, ped/bikes	1.00	0.99	0.99					1.00	0.98	1.00	1.00	
Flpb, ped/bikes	1.00	1.00	1.00					1.00	1.00	1.00	1.00	
Frt	1.00	0.89	0.85					1.00	0.85	1.00	1.00	
Flt Protected	0.95	0.99	1.00					1.00	1.00	0.95	1.00	
Satd. Flow (prot)	1681	1482	1485					5085	1553	3433	5085	
Flt Permitted	0.95	0.99	1.00					1.00	1.00	0.95	1.00	
Satd. Flow (perm)	1681	1482	1485					5085	1553	3433	5085	
Peak-hour factor, PHF	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Adj. Flow (vph)	687	10	876	0	0	0	0	1285	784	381	2088	0
RTOR Reduction (vph)	0	2	36	0	0	0	0	0	510	0	0	0
Lane Group Flow (vph)	543	520	472	0	0	0	0	1285	274	381	2088	0
Confl. Peds. (#/hr)			1						4			
Confl. Bikes (#/hr)												1
Turn Type	Split	NA	Perm					NA	Perm	Prot	NA	
Protected Phases	4	4						2		1	6	
Permitted Phases			4						2			
Actuated Green, G (s)	47.7	47.7	47.7					41.9	41.9	16.3	62.4	
Effective Green, g (s)	47.7	47.7	47.7					41.9	41.9	16.3	62.4	
Actuated g/C Ratio	0.40	0.40	0.40					0.35	0.35	0.14	0.52	
Clearance Time (s)	4.6	4.6	4.6					5.3	5.3	4.2	5.3	
Vehicle Extension (s)	3.0	3.0	3.0					3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	668	589	590					1775	542	466	2644	
v/s Ratio Prot	0.32	c0.35						0.25		0.11	c0.41	
v/s Ratio Perm			0.32						0.18			0.11
v/c Ratio	0.81	0.88	0.80					0.72	0.51	0.82	0.79	
Uniform Delay, d1	32.2	33.6	32.0					34.0	30.9	50.4	23.5	
Progression Factor	1.00	1.00	1.00					1.00	1.00	1.14	1.19	
Incremental Delay, d2	7.5	14.6	7.7					2.6	3.3	9.1	2.1	
Delay (s)	39.7	48.2	39.6					36.6	34.2	66.5	30.0	
Level of Service	D	D	D					D	C	E	C	
Approach Delay (s)		42.5			0.0			35.7			35.6	
Approach LOS		D			A			D			D	
Intersection Summary												
HCM 2000 Control Delay			37.4									
HCM 2000 Volume to Capacity ratio			0.86									
Actuated Cycle Length (s)			120.0						14.1			
Intersection Capacity Utilization			97.3%									
Analysis Period (min)			15									
c Critical Lane Group												

Year 2035 AM
28: San Marcos Blvd & Knoll Rd/SR 78 WB Ramps

Sierra Project
03/17/2017

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰		↱↲	↰↱	↱		↰↱	↱↲	↰	↱↲	↰↱↲	↱
Traffic Volume (vph)	210	0	620	1200	430	20	410	491	150	0	1104	250
Future Volume (vph)	210	0	620	1200	430	20	410	491	150	0	1104	250
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.6		5.2	5.6	5.6		5.2	6.3	6.3		6.3	6.3
Lane Util. Factor	1.00		0.88	0.97	0.95		0.97	0.95	1.00		0.91	1.00
Frpb, ped/bikes	1.00		1.00	1.00	1.00		1.00	1.00	1.00		1.00	0.98
Flpb, ped/bikes	1.00		1.00	1.00	1.00		1.00	1.00	1.00		1.00	1.00
Frt	1.00		0.85	1.00	0.99		1.00	1.00	0.85		1.00	0.85
Flt Protected	0.95		1.00	0.95	1.00		0.95	1.00	1.00		1.00	1.00
Satd. Flow (prot)	1770		2787	3433	3513		3433	3539	1583		5085	1546
Flt Permitted	0.95		1.00	0.95	1.00		0.95	1.00	1.00		1.00	1.00
Satd. Flow (perm)	1770		2787	3433	3513		3433	3539	1583		5085	1546
Peak-hour factor, PHF	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Adj. Flow (vph)	216	0	639	1237	443	21	423	506	155	0	1138	258
RTOR Reduction (vph)	0	0	57	0	3	0	0	0	81	0	0	90
Lane Group Flow (vph)	216	0	582	1237	461	0	423	506	74	0	1138	168
Confl. Peds. (#/hr)							1					8
Confl. Bikes (#/hr)												2
Turn Type	Prot		pm+ov	Prot	NA		Prot	NA	Perm		NA	Perm
Protected Phases	7		5	3	8		5	2			6	
Permitted Phases			7					2				6
Actuated Green, G (s)	16.2		34.9	51.0	29.2		18.7	57.1	57.1		33.2	33.2
Effective Green, g (s)	16.2		34.9	51.0	29.2		18.7	57.1	57.1		33.2	33.2
Actuated g/C Ratio	0.13		0.29	0.42	0.24		0.16	0.48	0.48		0.28	0.28
Clearance Time (s)	5.6		5.2	5.6	5.6		5.2	6.3	6.3		6.3	6.3
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)	238		810	1459	854		534	1683	753		1406	427
v/s Ratio Prot	0.12		0.11	c0.36	0.13		c0.12	0.14			c0.22	
v/s Ratio Perm			0.10						0.05			0.11
v/c Ratio	0.91		0.72	0.85	0.54		0.79	0.30	0.10		0.81	0.39
Uniform Delay, d1	51.2		38.1	31.0	39.5		48.8	19.2	17.3		40.5	35.2
Progression Factor	1.00		1.00	1.00	1.00		1.01	1.34	3.69		1.00	1.00
Incremental Delay, d2	34.2		3.1	4.8	0.7		7.8	0.5	0.3		5.1	2.7
Delay (s)	85.4		41.2	35.8	40.2		56.9	26.3	64.0		45.6	38.0
Level of Service	F		D	D	D		E	C	E		D	D
Approach Delay (s)		52.4			37.0			43.6			44.2	
Approach LOS		D			D			D			D	
Intersection Summary												
HCM 2000 Control Delay			43.0									
HCM 2000 Volume to Capacity ratio			0.87									
Actuated Cycle Length (s)			120.0						22.7			
Intersection Capacity Utilization			93.5%									
Analysis Period (min)			15									
c Critical Lane Group												

Year 2035 AM
29: San Marcos Blvd & SR 78 EB Ramps

Sierra Project
03/17/2017

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↱	↲	↰	↱	↲	↰	↱	↲	↰	↱	↲
Traffic Volume (vph)	171	0	260	0	0	0	0	820	850	190	2420	0
Future Volume (vph)	171	0	260	0	0	0	0	820	850	190	2420	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.6		5.6					6.3	6.3	5.2	6.3	
Lane Util. Factor	0.97		1.00					0.91	0.88	0.97	0.91	
Frpb, ped/bikes	1.00		1.00					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)	3433		1583					5085	2726	3433	5085	
Flt Permitted	0.95		1.00					1.00	1.00	0.95	1.00	
Satd. Flow (perm)	3433		1583					5085	2726	3433	5085	
Peak-hour factor, PHF	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Adj. Flow (vph)	178	0	271	0	0	0	0	854	885	198	2521	0
RTOR Reduction (vph)	0	0	64	0	0	0	0	0	369	0	0	0
Lane Group Flow (vph)	178	0	207	0	0	0	0	854	516	198	2521	0
Confl. Peds. (#/hr)												6
Confl. Bikes (#/hr)												4
Turn Type	Prot		Perm					NA	Perm	Prot	NA	
Protected Phases	4							2		1	6	
Permitted Phases			4						2			
Actuated Green, G (s)	20.7		20.7					70.0	70.0	12.2	87.4	
Effective Green, g (s)	20.7		20.7					70.0	70.0	12.2	87.4	
Actuated g/C Ratio	0.17		0.17					0.58	0.58	0.10	0.73	
Clearance Time (s)	5.6		5.6					6.3	6.3	5.2	6.3	
Vehicle Extension (s)	3.0		3.0					3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	592		273					2966	1590	349	3703	
v/s Ratio Prot	0.05							0.17		0.06	c0.50	
v/s Ratio Perm			c0.13						0.19			
v/c Ratio	0.30		0.76					0.29	0.32	0.57	0.68	
Uniform Delay, d1	43.3		47.3					12.5	12.9	51.4	8.8	
Progression Factor	1.00		1.00					1.00	1.00	1.10	0.70	
Incremental Delay, d2	0.3		11.5					0.2	0.5	1.8	0.9	
Delay (s)	43.6		58.7					12.8	13.4	58.4	7.0	
Level of Service	D		E					B	B	E	A	
Approach Delay (s)		52.8			0.0			13.1			10.7	
Approach LOS		D			A			B			B	
Intersection Summary												
HCM 2000 Control Delay			15.4									
HCM 2000 Volume to Capacity ratio			0.73									
Actuated Cycle Length (s)			120.0							17.1		
Intersection Capacity Utilization			72.8%							C		
Analysis Period (min)			15									
c Critical Lane Group												

Year 2035 AM
30: San Marcos Blvd & E. Mission Road

Sierra Project
03/17/2017

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↱	↲	↰	↱	↲	↰	↱	↲	↰	↱	↲
Traffic Volume (vph)	20	300	20	735	510	70	10	70	322	90	390	40
Future Volume (vph)	20	300	20	735	510	70	10	70	322	90	390	40
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	5.3	5.3	4.0	5.3	5.3	4.0	5.3	5.3	4.0	5.3	
Lane Util. Factor	1.00	0.95	1.00	0.97	0.95	1.00	1.00	0.95	1.00	1.00	0.95	
Frpb, ped/bikes	1.00	1.00	0.99	1.00	1.00	0.97	1.00	1.00	1.00	1.00	1.00	
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.99	
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)	1770	3539	1561	3433	3539	1530	1770	3539	1583	1770	3490	
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	
Satd. Flow (perm)	1770	3539	1561	3433	3539	1530	1770	3539	1583	1770	3490	
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)	22	326	22	799	554	76	11	76	350	98	424	43
RTOR Reduction (vph)	0	0	17	0	0	39	0	0	296	0	4	0
Lane Group Flow (vph)	22	326	5	799	554	37	11	76	54	98	463	0
Confl. Peds. (#/hr)			2			12						
Turn Type	Prot	NA	Perm	Prot	NA	Perm	Prot	NA	Prot	Prot	NA	
Protected Phases	7	4		3	8		5	2	2	1	6	
Permitted Phases			4			8						
Actuated Green, G (s)	2.5	18.8	18.8	28.6	44.9	44.9	0.8	14.2	14.2	11.7	25.1	
Effective Green, g (s)	2.5	18.8	18.8	28.6	44.9	44.9	0.8	14.2	14.2	11.7	25.1	
Actuated g/C Ratio	0.03	0.20	0.20	0.31	0.49	0.49	0.01	0.15	0.15	0.13	0.27	
Clearance Time (s)	4.0	5.3	5.3	4.0	5.3	5.3	4.0	5.3	5.3	4.0	5.3	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	48	723	319	1068	1729	747	15	546	244	225	953	
v/s Ratio Prot	0.01	c0.09		c0.23	0.16		0.01	0.02	0.03	c0.06	c0.13	
v/s Ratio Perm			0.00			0.02						
v/c Ratio	0.46	0.45	0.01	0.75	0.32	0.05	0.73	0.14	0.22	0.44	0.49	
Uniform Delay, d1	44.0	32.0	29.2	28.4	14.2	12.3	45.4	33.6	34.0	37.0	28.0	
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	6.8	0.4	0.0	2.9	0.1	0.0	103.2	0.1	0.5	1.4	0.4	
Delay (s)	50.8	32.5	29.2	31.3	14.4	12.3	148.7	33.7	34.5	38.4	28.4	
Level of Service	D	C	C	C	B	B	F	C	C	D	C	
Approach Delay (s)		33.4			23.7			37.2			30.1	
Approach LOS		C			C			D			C	
Intersection Summary												
HCM 2000 Control Delay			28.4									
HCM 2000 Volume to Capacity ratio			0.59									
Actuated Cycle Length (s)			91.9							18.6		
Intersection Capacity Utilization			54.3%							A		
Analysis Period (min)			15									
c Critical Lane Group												

Year 2035 AM
33: Twin Oaks Valley Rd & Discovery Street/Barham Dr

Sierra Project
03/17/2017

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↰	↰	↰	↰	↰	↰	↰	↰	↰	↰	↰
Traffic Volume (vph)	380	100	10	380	490	261	30	935	170	554	1191	690
Future Volume (vph)	380	100	10	380	490	261	30	935	170	554	1191	690
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	5.3	5.3	5.0	5.3	5.3	5.0	6.0		5.0	6.0	6.0
Lane Util. Factor	0.97	0.91	1.00	1.00	1.00	1.00	1.00	0.91		0.97	0.91	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.98		1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	3433	5085	1583	1770	1863	1583	1770	4968		3433	5085	1583
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00
Satd. Flow (perm)	3433	5085	1583	1770	1863	1583	1770	4968		3433	5085	1583
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)	413	109	11	413	533	284	33	1016	185	602	1295	750
RTOR Reduction (vph)	0	0	9	0	0	142	0	17	0	0	0	244
Lane Group Flow (vph)	413	109	2	413	533	142	33	1184	0	602	1295	506
Turn Type	Prot	NA	Perm	Prot	NA	Perm	Prot	NA		Prot	NA	Perm
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases			4			8						6
Actuated Green, G (s)	19.0	28.8	28.8	35.0	44.8	44.8	4.0	39.2		26.0	61.2	61.2
Effective Green, g (s)	19.0	28.8	28.8	35.0	44.8	44.8	4.0	39.2		26.0	61.2	61.2
Actuated g/C Ratio	0.13	0.19	0.19	0.23	0.30	0.30	0.03	0.26		0.17	0.41	0.41
Clearance Time (s)	5.0	5.3	5.3	5.0	5.3	5.3	5.0	6.0		5.0	6.0	6.0
Vehicle Extension (s)	2.0	4.5	4.5	2.0	4.5	4.5	2.0	3.0		2.0	4.0	4.0
Lane Grp Cap (vph)	433	974	303	412	555	471	47	1295		593	2070	644
v/s Ratio Prot	0.12	0.02		c0.23	c0.29		0.02	c0.24		c0.18	0.25	
v/s Ratio Perm			0.00			0.09						0.32
v/c Ratio	0.95	0.11	0.01	1.00	0.96	0.30	0.70	0.91		1.02	0.63	0.79
Uniform Delay, d1	65.2	50.2	49.2	57.7	51.9	40.7	72.6	53.9		62.2	35.4	38.8
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	31.2	0.1	0.0	44.9	28.7	0.6	32.1	10.1		40.8	0.7	6.6
Delay (s)	96.4	50.3	49.2	102.6	80.6	41.3	104.6	64.0		103.0	36.1	45.4
Level of Service	F	D	D	F	F	D	F	E		F	D	D
Approach Delay (s)		86.0			78.9			65.1			54.0	
Approach LOS		F			E			E			D	

Intersection Summary

HCM 2000 Control Delay	64.9	HCM 2000 Level of Service	E
HCM 2000 Volume to Capacity ratio	0.99		
Actuated Cycle Length (s)	150.3	Sum of lost time (s)	21.3
Intersection Capacity Utilization	92.0%	ICU Level of Service	F
Analysis Period (min)	15		

c Critical Lane Group

Year 2035 AM
112: San Marcos Blvd

Sierra Project
03/17/2017

Intersection Sign configuration not allowed in HCM analysis.

Year 2035 PM
12: Twin Oaks Valley Rd & Deer Springs Rd

Sierra Project
03/17/2017

						
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	59	356	149	1571	1123	48
Future Volume (vph)	59	356	149	1571	1123	48
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.9	4.9	4.0	5.3	5.3	5.3
Lane Util. Factor	1.00	1.00	1.00	0.95	0.95	1.00
Frpb, ped/bikes	1.00	1.00	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)	1770	1583	1770	3539	3539	1547
Flt Permitted	0.95	1.00	0.95	1.00	1.00	1.00
Satd. Flow (perm)	1770	1583	1770	3539	3539	1547
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	64	387	162	1708	1221	52
RTOR Reduction (vph)	0	254	0	0	0	20
Lane Group Flow (vph)	64	133	162	1708	1221	32
Confl. Peds. (#/hr)						1
Confl. Bikes (#/hr)						2
Turn Type	Prot	Perm	Prot	NA	NA	Perm
Protected Phases	4		5	2	6	
Permitted Phases		4				6
Actuated Green, G (s)	11.6	11.6	12.3	51.4	35.1	35.1
Effective Green, g (s)	11.6	11.6	12.3	51.4	35.1	35.1
Actuated g/C Ratio	0.16	0.16	0.17	0.70	0.48	0.48
Clearance Time (s)	4.9	4.9	4.0	5.3	5.3	5.3
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	280	250	297	2485	1696	741
v/s Ratio Prot	0.04		0.09	c0.48	0.34	
v/s Ratio Perm		c0.08				0.02
v/c Ratio	0.23	0.53	0.55	0.69	0.72	0.04
Uniform Delay, d1	26.9	28.3	27.9	6.3	15.1	10.1
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	0.4	2.2	2.0	0.8	1.5	0.0
Delay (s)	27.3	30.5	29.9	7.1	16.6	10.2
Level of Service	C	C	C	A	B	B
Approach Delay (s)	30.0			9.1	16.4	
Approach LOS	C			A	B	
Intersection Summary						
HCM 2000 Control Delay			14.3	HCM 2000 Level of Service		B
HCM 2000 Volume to Capacity ratio			0.70			
Actuated Cycle Length (s)			73.2	Sum of lost time (s)		14.2
Intersection Capacity Utilization			61.6%	ICU Level of Service		B
Analysis Period (min)			15			
c Critical Lane Group						

Year 2035 PM
13: Twin Oaks Valley Rd & Buena Creek Rd

Sierra Project
03/17/2017

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	761	0	310	10	0	0	280	849	0	10	759	620
Future Volume (vph)	761	0	310	10	0	0	280	849	0	10	759	620
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		5.0	5.5		4.5	5.5	5.5
Lane Util. Factor	0.97		1.00		1.00		1.00	0.95		1.00	0.95	1.00
Frpb, ped/bikes	1.00		1.00		1.00		1.00	1.00		1.00	1.00	0.98
Flpb, ped/bikes	1.00		1.00		1.00		1.00	1.00		1.00	1.00	1.00
Frt	1.00		0.85		1.00		1.00	1.00		1.00	1.00	0.85
Flt Protected	0.95		1.00		0.95		0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	3433		1583		1770		1770	3539		1770	3539	1558
Flt Permitted	0.75		1.00		0.95		0.95	1.00		0.95	1.00	1.00
Satd. Flow (perm)	2712		1583		1770		1770	3539		1770	3539	1558
Peak-hour factor, PHF	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Adj. Flow (vph)	818	0	333	11	0	0	301	913	0	11	816	667
RTOR Reduction (vph)	0	0	226	0	0	0	0	0	0	0	0	270
Lane Group Flow (vph)	818	0	107	0	11	0	301	913	0	11	816	397
Confl. Peds. (#/hr)	1											
Confl. Bikes (#/hr)	5											
Turn Type	Perm		Perm	Perm	NA		Prot	NA		Prot	NA	Perm
Protected Phases					8		5	2		1	6	
Permitted Phases	4		4	8								6
Actuated Green, G (s)	28.2		28.2		28.2		16.1	47.0		0.8	31.2	31.2
Effective Green, g (s)	28.2		28.2		28.2		16.1	47.0		0.8	31.2	31.2
Actuated g/C Ratio	0.31		0.31		0.31		0.18	0.52		0.01	0.35	0.35
Clearance Time (s)	4.0		4.0		4.0		5.0	5.5		4.5	5.5	5.5
Vehicle Extension (s)	3.0		3.0		3.0		3.0	3.0		3.0	3.0	3.0
Lane Grp Cap (vph)	849		496		554		316	1848		15	1226	540
v/s Ratio Prot							c0.17	0.26		0.01	0.23	
v/s Ratio Perm	c0.30		0.07		0.01							c0.25
v/c Ratio	0.96		0.22		0.02		0.95	0.49		0.73	0.67	0.73
Uniform Delay, d1	30.4		22.8		21.4		36.6	13.8		44.5	25.0	25.8
Progression Factor	1.00		1.00		1.00		1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	22.2		0.2		0.0		37.9	0.2		103.2	1.4	5.1
Delay (s)	52.6		23.0		21.4		74.5	14.1		147.7	26.3	30.9
Level of Service	D		C		C		E	B		F	C	C
Approach Delay (s)		44.1			21.4			29.0			29.3	
Approach LOS		D			C			C			C	
Intersection Summary												
HCM 2000 Control Delay			33.6	HCM 2000 Level of Service					C			
HCM 2000 Volume to Capacity ratio			0.87									
Actuated Cycle Length (s)			90.0	Sum of lost time (s)					14.5			
Intersection Capacity Utilization			71.9%	ICU Level of Service					C			
Analysis Period (min)			15									
c Critical Lane Group												

Year 2035 PM
14: Twin Oaks Valley Rd & Cassou Rd

Sierra Project
03/17/2017

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↔			↔		↖	↗		↖	↗	
Traffic Volume (vph)	17	0	60	20	10	18	50	862	20	12	749	17
Future Volume (vph)	17	0	60	20	10	18	50	862	20	12	749	17
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		5.0			5.0		5.0	5.0		5.0	5.0	
Lane Util. Factor		1.00			1.00		1.00	0.95		1.00	0.95	
Frpb, ped/bikes		0.99			1.00		1.00	1.00		1.00	1.00	
Flpb, ped/bikes		1.00			1.00		1.00	1.00		1.00	1.00	
Frt		0.89			0.95		1.00	1.00		1.00	1.00	
Flt Protected		0.99			0.98		0.95	1.00		0.95	1.00	
Satd. Flow (prot)		1631			1734		1770	3527		1770	3528	
Flt Permitted		0.99			0.98		0.95	1.00		0.95	1.00	
Satd. Flow (perm)		1631			1734		1770	3527		1770	3528	
Peak-hour factor, PHF	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Adj. Flow (vph)	18	0	65	22	11	19	54	927	22	13	805	18
RTOR Reduction (vph)	0	75	0	0	17	0	0	1	0	0	1	0
Lane Group Flow (vph)	0	8	0	0	35	0	54	948	0	13	822	0
Confl. Peds. (#/hr)			1									
Turn Type	Split	NA		Split	NA		Prot	NA		Prot	NA	
Protected Phases	4	4		8	8		5	2		1	6	
Permitted Phases												
Actuated Green, G (s)		6.5			5.6		4.2	37.3		0.5	33.6	
Effective Green, g (s)		6.5			5.6		4.2	37.3		0.5	33.6	
Actuated g/C Ratio		0.09			0.08		0.06	0.53		0.01	0.48	
Clearance Time (s)		5.0			5.0		5.0	5.0		5.0	5.0	
Vehicle Extension (s)		3.0			3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)		151			138		106	1882		12	1695	
v/s Ratio Prot		c0.00			c0.02		c0.03	c0.27		0.01	0.23	
v/s Ratio Perm												
v/c Ratio		0.05			0.25		0.51	0.50		1.08	0.48	
Uniform Delay, d1		28.9			30.2		31.9	10.4		34.7	12.3	
Progression Factor		1.00			1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2		0.1			1.0		3.8	0.2		289.8	0.2	
Delay (s)		29.0			31.1		35.7	10.6		324.5	12.5	
Level of Service		C			C		D	B		F	B	
Approach Delay (s)		29.0			31.1		12.0			17.4		
Approach LOS		C			C		B			B		

Intersection Summary

HCM 2000 Control Delay	15.5	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.44		
Actuated Cycle Length (s)	69.9	Sum of lost time (s)	20.0
Intersection Capacity Utilization	46.8%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

Year 2035 PM
15: Twin Oaks Valley Rd & La Cienega

Sierra Project
03/17/2017

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations	↖	↗	↕		↖	↗
Traffic Volume (vph)	120	56	966	140	106	723
Future Volume (vph)	120	56	966	140	106	723
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)		6.0	6.5		6.0	6.5
Lane Util. Factor	1.00	1.00	0.95		1.00	0.95
Frpb, ped/bikes	1.00	1.00	0.99		1.00	1.00
Flpb, ped/bikes	1.00	1.00	1.00		1.00	1.00
Frt	1.00	0.85	0.98		1.00	1.00
Flt Protected	0.95	1.00	1.00		0.95	1.00
Satd. Flow (prot)	1770	1583	3450		1770	3539
Flt Permitted	0.95	1.00	1.00		0.95	1.00
Satd. Flow (perm)	1770	1583	3450		1770	3539
Peak-hour factor, PHF	0.98	0.98	0.98	0.98	0.98	0.98
Adj. Flow (vph)	122	57	986	143	108	738
RTOR Reduction (vph)	0	0	11	0	0	0
Lane Group Flow (vph)	122	57	1118	0	108	738
Confl. Peds. (#/hr)				13		
Confl. Bikes (#/hr)				3		
Turn Type	Prot	Perm	NA		Prot	NA
Protected Phases	8		2		1	6
Permitted Phases		8				
Actuated Green, G (s)	9.3	9.3	35.9		7.6	49.5
Effective Green, g (s)	9.3	9.3	35.9		7.6	49.5
Actuated g/C Ratio	0.13	0.13	0.50		0.11	0.69
Clearance Time (s)	6.0	6.0	6.5		6.0	6.5
Vehicle Extension (s)	3.0	3.0	3.0		3.0	3.0
Lane Grp Cap (vph)	230	206	1737		188	2456
v/s Ratio Prot	c0.07		c0.32		c0.06	0.21
v/s Ratio Perm		0.04				
v/c Ratio	0.53	0.28	0.64		0.57	0.30
Uniform Delay, d1	29.0	28.0	13.0		30.3	4.2
Progression Factor	1.00	1.00	1.00		1.00	1.00
Incremental Delay, d2	2.3	0.7	0.8		4.2	0.1
Delay (s)	31.3	28.7	13.8		34.5	4.3
Level of Service	C	C	B		C	A
Approach Delay (s)	30.5		13.8			8.1
Approach LOS	C		B			A

Intersection Summary

HCM 2000 Control Delay	13.0	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.61		
Actuated Cycle Length (s)	71.3	Sum of lost time (s)	18.5
Intersection Capacity Utilization	59.3%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

Year 2035 PM
16: Twin Oaks Valley Rd & Del Roy Dr

Sierra Project
03/17/2017

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↱		↰	↱		↰	↱		↰	↱	
Traffic Volume (vph)	8	0	60	30	0	10	90	988	30	20	756	17
Future Volume (vph)	8	0	60	30	0	10	90	988	30	20	756	17
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	5.0		5.0	5.0		5.0	5.0		5.0	5.0	
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	0.95		1.00	0.95	
Frpb, ped/bikes	1.00	0.99		1.00	1.00		1.00	1.00		1.00	1.00	
Flpb, ped/bikes	1.00	1.00		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		1.00	1.00	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770	1561		1770	1583		1770	3518		1770	3526	
Flt Permitted	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (perm)	1770	1561		1770	1583		1770	3518		1770	3526	
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)	9	0	65	33	0	11	98	1074	33	22	822	18
RTOR Reduction (vph)	0	59	0	0	10	0	0	2	0	0	2	0
Lane Group Flow (vph)	9	6	0	33	1	0	98	1105	0	22	838	0
Confl. Peds. (#/hr)									14			1
Confl. Bikes (#/hr)			1						4			4
Turn Type	Prot	NA		Prot	NA		Prot	NA		Prot	NA	
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases												
Actuated Green, G (s)	0.4	6.0		1.2	6.8		6.9	35.3		1.2	29.6	
Effective Green, g (s)	0.4	6.0		1.2	6.8		6.9	35.3		1.2	29.6	
Actuated g/C Ratio	0.01	0.09		0.02	0.11		0.11	0.55		0.02	0.46	
Clearance Time (s)	5.0	5.0		5.0	5.0		5.0	5.0		5.0	5.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	11	147		33	168		191	1949		33	1638	
v/s Ratio Prot	0.01	c0.00		c0.02	0.00		c0.06	c0.31		0.01	0.24	
v/s Ratio Perm												
v/c Ratio	0.82	0.04		1.00	0.01		0.51	0.57		0.67	0.51	
Uniform Delay, d1	31.6	26.2		31.2	25.4		26.8	9.2		31.1	12.0	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	167.9	0.1		156.7	0.0		2.3	0.4		40.8	0.3	
Delay (s)	199.5	26.4		187.9	25.4		29.1	9.6		71.9	12.2	
Level of Service	F	C		F	C		C	A		E	B	
Approach Delay (s)		47.4			147.3			11.2			13.8	
Approach LOS		D			F			B			B	

Intersection Summary			
HCM 2000 Control Delay	16.2	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.53		
Actuated Cycle Length (s)	63.7	Sum of lost time (s)	20.0
Intersection Capacity Utilization	52.5%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

Year 2035 PM
17: Twin Oaks Valley Rd & Windy Wy

Sierra Project
03/17/2017

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↱		↰	↱		↰	↱		↰	↱	
Traffic Volume (vph)	20	0	60	0	0	0	50	1028	10	10	846	10
Future Volume (vph)	20	0	60	0	0	0	50	1028	10	10	846	10
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	6.0		4.0	6.0		4.0	6.0	
Lane Util. Factor	1.00	1.00		1.00	0.95		1.00	0.95		1.00	0.95	
Frpb, ped/bikes	1.00	0.99		1.00	1.00		1.00	1.00		1.00	1.00	
Flpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Frt	1.00	0.85		1.00	1.00		1.00	1.00		1.00	1.00	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770	1563		1770	3533		1770	3533		1770	3532	
Flt Permitted	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (perm)	1770	1563		1770	3533		1770	3533		1770	3532	
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	20	0	60	0	0	0	50	1028	10	10	846	10
RTOR Reduction (vph)	0	54	0	0	0	0	0	1	0	0	1	0
Lane Group Flow (vph)	20	6	0	0	0	0	50	1037	0	10	855	0
Confl. Peds. (#/hr)			1			2			1			4
Confl. Bikes (#/hr)						2			2			5
Turn Type	Split	NA					Prot	NA		Prot	NA	
Protected Phases	4	4					5	2		1	6	
Permitted Phases												
Actuated Green, G (s)	5.3	5.3					2.2	30.9		0.6	29.3	
Effective Green, g (s)	5.3	5.3					2.2	30.9		0.6	29.3	
Actuated g/C Ratio	0.10	0.10					0.04	0.61		0.01	0.58	
Clearance Time (s)	4.0	4.0					4.0	6.0		4.0	6.0	
Vehicle Extension (s)	3.0	3.0					3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	184	163					76	2149		20	2037	
v/s Ratio Prot	c0.01	0.00					c0.03	c0.29		0.01	0.24	
v/s Ratio Perm												
v/c Ratio	0.11	0.04					0.66	0.48		0.50	0.42	
Uniform Delay, d1	20.6	20.5					23.9	5.5		25.0	6.0	
Progression Factor	1.00	1.00					1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.3	0.1					18.7	0.2		18.3	0.1	
Delay (s)	20.9	20.6					42.6	5.7		43.3	6.1	
Level of Service	C	C					D	A		D	A	
Approach Delay (s)		20.6			0.0			7.4			6.6	
Approach LOS		C			A			A			A	

Intersection Summary			
HCM 2000 Control Delay	7.6	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.46		
Actuated Cycle Length (s)	50.8	Sum of lost time (s)	14.0
Intersection Capacity Utilization	48.1%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

Year 2035 PM
18: Twin Oaks Valley Rd & Borden Rd

Sierra Project
03/17/2017

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↱		↰	↱		↰	↱	↱	↰	↱	↱
Traffic Volume (vph)	184	250	260	180	220	47	270	987	280	87	825	114
Future Volume (vph)	184	250	260	180	220	47	270	987	280	87	825	114
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.2	5.3		4.2	5.3		4.2	4.9	4.9	4.2	4.9	4.9
Lane Util. Factor	1.00	0.95		1.00	0.95		1.00	0.95	1.00	1.00	0.95	1.00
Frpb, ped/bikes	1.00	0.99		1.00	1.00		1.00	1.00	0.99	1.00	1.00	0.98
Flpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	0.92		1.00	0.97		1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1770	3245		1770	3436		1770	3539	1560	1770	3539	1556
Flt Permitted	0.95	1.00		0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	1770	3245		1770	3436		1770	3539	1560	1770	3539	1556
Peak-hour factor, PHF	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Adj. Flow (vph)	192	260	271	188	229	49	281	1028	292	91	859	119
RTOR Reduction (vph)	0	192	0	0	18	0	0	0	115	0	0	82
Lane Group Flow (vph)	192	339	0	188	260	0	281	1028	177	91	859	37
Confl. Peds. (#/hr)			2									2
Confl. Bikes (#/hr)						3			5			5
Turn Type	Prot	NA		Prot	NA		Prot	NA	Perm	Prot	NA	Perm
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases									2			6
Actuated Green, G (s)	12.0	16.1		12.0	16.1		17.1	39.4	39.4	6.7	29.0	29.0
Effective Green, g (s)	12.0	16.1		12.0	16.1		17.1	39.4	39.4	6.7	29.0	29.0
Actuated g/C Ratio	0.13	0.17		0.13	0.17		0.18	0.42	0.42	0.07	0.31	0.31
Clearance Time (s)	4.2	5.3		4.2	5.3		4.2	4.9	4.9	4.2	4.9	4.9
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)	228	562		228	596		326	1502	662	127	1105	486
v/s Ratio Prot	c0.11	c0.10		0.11	0.08		c0.16	0.29		0.05	c0.24	
v/s Ratio Perm									0.11			0.02
v/c Ratio	0.84	0.60		0.82	0.44		0.86	0.68	0.27	0.72	0.78	0.08
Uniform Delay, d1	39.5	35.4		39.4	34.3		36.7	21.7	17.3	42.1	29.0	22.5
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	23.5	1.8		20.9	0.5		20.2	1.3	0.2	17.5	3.5	0.1
Delay (s)	63.0	37.2		60.3	34.8		56.9	23.0	17.5	59.6	32.5	22.5
Level of Service	E	D		E	C		E	C	B	E	C	C
Approach Delay (s)		44.1			45.1			27.9			33.7	
Approach LOS		D			D			C			C	
Intersection Summary												
HCM 2000 Control Delay		34.6			HCM 2000 Level of Service			C				
HCM 2000 Volume to Capacity ratio		0.77										
Actuated Cycle Length (s)		92.8			Sum of lost time (s)			18.6				
Intersection Capacity Utilization		79.5%			ICU Level of Service			D				
Analysis Period (min)		15										
c Critical Lane Group												

Year 2035 PM
19: Twin Oaks Valley Rd & Richmar Road

Sierra Project
03/17/2017

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↱		↰	↱		↰	↱	↱	↰	↱	↱
Traffic Volume (vph)	230	40	160	50	30	20	210	1477	70	100	1445	210
Future Volume (vph)	230	40	160	50	30	20	210	1477	70	100	1445	210
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.9	4.9		4.0	4.0		4.0	5.7		4.0	5.7	
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	0.95		1.00	0.95	
Frpb, ped/bikes	1.00	1.00		1.00	0.99		1.00	1.00		1.00	1.00	
Flpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Frt	1.00	0.88		1.00	0.94		1.00	0.99		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	1639		1770	1732		1770	3506		1770	3462	
Flt Permitted	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (perm)	1770	1639		1770	1732		1770	3506		1770	3462	
Peak-hour factor, PHF	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Adj. Flow (vph)	240	42	167	52	31	21	219	1539	73	104	1505	219
RTOR Reduction (vph)	0	90	0	0	18	0	0	2	0	0	7	0
Lane Group Flow (vph)	240	119	0	52	34	0	219	1610	0	104	1717	0
Confl. Peds. (#/hr)						9			7			
Confl. Bikes (#/hr)								8				3
Turn Type	Prot	NA		Prot	NA		Prot	NA		Prot	NA	
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases												
Actuated Green, G (s)	19.3	24.3		8.1	13.1		17.2	74.9		10.2	67.9	
Effective Green, g (s)	19.3	24.3		8.1	13.1		17.2	74.9		10.2	67.9	
Actuated g/C Ratio	0.14	0.18		0.06	0.10		0.13	0.55		0.07	0.50	
Clearance Time (s)	4.9	4.9		4.0	4.0		4.0	5.7		4.0	5.7	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	250	292		105	166		223	1929		132	1727	
v/s Ratio Prot	c0.14	c0.07		0.03	0.02		c0.12	0.46		0.06	c0.50	
v/s Ratio Perm												
v/c Ratio	0.96	0.41		0.50	0.20		0.98	0.83		0.79	0.99	
Uniform Delay, d1	58.0	49.5		62.0	56.7		59.3	25.5		61.9	33.9	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	45.2	0.9		3.6	0.6		54.9	3.3		26.0	20.2	
Delay (s)	103.3	50.5		65.7	57.3		114.2	28.7		87.8	54.1	
Level of Service	F	D		E	E		F	C		F	D	
Approach Delay (s)		78.7			61.5			39.0			56.0	
Approach LOS		E			E			D			E	
Intersection Summary												
HCM 2000 Control Delay		51.1			HCM 2000 Level of Service			D				
HCM 2000 Volume to Capacity ratio		0.93										
Actuated Cycle Length (s)		136.1			Sum of lost time (s)			18.6				
Intersection Capacity Utilization		95.6%			ICU Level of Service			F				
Analysis Period (min)		15										
c Critical Lane Group												

Year 2035 PM
20: Twin Oaks Valley Rd & San Marcos Blvd

Sierra Project
03/17/2017

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↱	↱	↰	↱		↰	↱	↱	↰	↱	↱
Traffic Volume (vph)	516	1020	460	580	690	108	770	1203	460	152	1158	345
Future Volume (vph)	516	1020	460	580	690	108	770	1203	460	152	1158	345
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.2	5.3	5.3	4.2	5.0		4.2	5.3	4.2	5.0	5.3	5.3
Lane Util. Factor	0.97	0.95	0.88	0.94	0.95		0.97	0.95	1.00	0.97	0.95	1.00
Frpb, ped/bikes	1.00	1.00	0.97	1.00	1.00		1.00	1.00	0.98	1.00	1.00	0.98
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	1.00	0.85	1.00	0.98		1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	3433	3539	2701	4990	3457		3433	3539	1557	3433	3539	1557
Flt Permitted	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	3433	3539	2701	4990	3457		3433	3539	1557	3433	3539	1557
Peak-hour factor, PHF	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Adj. Flow (vph)	555	1097	495	624	742	116	828	1294	495	163	1245	371
RTOR Reduction (vph)	0	0	235	0	8	0	0	0	25	0	0	155
Lane Group Flow (vph)	555	1097	260	624	850	0	828	1294	470	163	1245	216
Confl. Peds. (#/hr)			9			2			4			1
Confl. Bikes (#/hr)			6			7			6			4
Turn Type	Prot	NA	Perm	Prot	NA		Prot	NA	pm+ov	Prot	NA	Perm
Protected Phases	7	4		3	8		5	2	3	1	6	
Permitted Phases			4						2			6
Actuated Green, G (s)	18.8	37.7	37.7	14.8	34.0		26.8	64.7	79.5	8.0	46.7	46.7
Effective Green, g (s)	18.8	37.7	37.7	14.8	34.0		26.8	64.7	79.5	8.0	46.7	46.7
Actuated g/C Ratio	0.13	0.26	0.26	0.10	0.23		0.18	0.45	0.55	0.06	0.32	0.32
Clearance Time (s)	4.2	5.3	5.3	4.2	5.0		4.2	5.3	4.2	5.0	5.3	5.3
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	445	920	702	509	810		634	1579	853	189	1139	501
v/s Ratio Prot	c0.16	c0.31		0.13	0.25		c0.24	0.37	0.06	0.05	c0.35	
v/s Ratio Perm			0.10						0.25			0.14
v/c Ratio	1.25	1.19	0.37	1.23	1.05		1.31	0.82	0.55	0.86	1.09	0.43
Uniform Delay, d1	63.1	53.6	43.9	65.1	55.5		59.1	35.1	21.2	68.0	49.1	38.7
Progression Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	128.9	97.4	0.3	118.2	45.2		148.9	3.5	0.8	30.9	55.8	0.6
Delay (s)	192.0	151.0	44.3	183.3	100.7		208.0	38.5	22.0	98.9	105.0	39.3
Level of Service	F	F	D	F	F		F	D	C	F	F	D
Approach Delay (s)		137.0			135.5			89.0			90.7	
Approach LOS		F			F			F			F	

Intersection Summary			
HCM 2000 Control Delay	110.8	HCM 2000 Level of Service	F
HCM 2000 Volume to Capacity ratio	1.21		
Actuated Cycle Length (s)	145.0	Sum of lost time (s)	19.8
Intersection Capacity Utilization	109.0%	ICU Level of Service	H
Analysis Period (min)	15		
c Critical Lane Group			

Year 2035 PM
21: Twin Oaks Valley Rd & SR 78 WB Ramps

Sierra Project
03/17/2017

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations				↰		↱		↱	↱		↱	↱
Traffic Volume (vph)	0	0	0	820	0	330	0	1913	830	0	1756	532
Future Volume (vph)	0	0	0	820	0	330	0	1913	830	0	1756	532
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)				4.6		4.6		5.3	4.6		5.3	5.3
Lane Util. Factor				0.97		0.88		0.91	1.00		0.91	1.00
Frpb, ped/bikes				1.00		1.00		1.00	0.96		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	0.85		1.00	0.85
Flt Protected				0.95		1.00		1.00	1.00		1.00	1.00
Satd. Flow (prot)				3433		2787		5085	1515		5085	1548
Flt Permitted				0.95		1.00		1.00	1.00		1.00	1.00
Satd. Flow (perm)				3433		2787		5085	1515		5085	1548
Peak-hour factor, PHF	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Adj. Flow (vph)	0	0	0	854	0	344	0	1993	865	0	1829	554
RTOR Reduction (vph)	0	0	0	0	0	14	0	0	0	0	0	234
Lane Group Flow (vph)	0	0	0	854	0	330	0	1993	865	0	1829	320
Confl. Peds. (#/hr)									12			
Confl. Bikes (#/hr)									4			4
Turn Type				Prot		Prot		NA	pm+ov		NA	Perm
Protected Phases				8		8		2	8		6	
Permitted Phases								2				6
Actuated Green, G (s)				40.8		40.8		69.3	110.1		69.3	69.3
Effective Green, g (s)				40.8		40.8		69.3	110.1		69.3	69.3
Actuated g/C Ratio				0.34		0.34		0.58	0.92		0.58	0.58
Clearance Time (s)				4.6		4.6		5.3	4.6		5.3	5.3
Vehicle Extension (s)				3.0		3.0		3.0	3.0		3.0	3.0
Lane Grp Cap (vph)				1167		947		2936	1448		2936	893
v/s Ratio Prot				c0.25		0.12		c0.39	0.20		0.36	
v/s Ratio Perm									0.37			0.21
v/c Ratio				0.73		0.35		0.68	0.60		0.62	0.36
Uniform Delay, d1				34.8		29.7		17.6	0.9		16.7	13.5
Progression Factor				1.00		1.00		1.00	1.00		1.00	1.00
Incremental Delay, d2				2.4		0.2		1.3	0.7		1.0	1.1
Delay (s)				37.2		29.9		18.9	1.6		17.7	14.6
Level of Service				D		C		B	A		B	B
Approach Delay (s)		0.0			35.1			13.7			17.0	
Approach LOS		A			D			B			B	

Intersection Summary			
HCM 2000 Control Delay	18.9	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.70		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	9.9
Intersection Capacity Utilization	68.1%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

Year 2035 PM
22: Twin Oaks Valley Rd & SR 78 EB Ramps

Sierra Project
03/17/2017

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	248	40	590	0	0	0	0	2455	1150	390	2136	0
Future Volume (vph)	248	40	590	0	0	0	0	2455	1150	390	2136	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.6	4.6	4.6					5.3	5.3	4.2	5.3	
Lane Util. Factor	0.95	0.91	0.95					0.91	1.00	0.97	0.91	
Frpb, ped/bikes	1.00	0.99	0.98					1.00	0.99	1.00	1.00	
Flpb, ped/bikes	1.00	1.00	1.00					1.00	1.00	1.00	1.00	
Frt	1.00	0.88	0.85					1.00	0.85	1.00	1.00	
Flt Protected	0.95	1.00	1.00					1.00	1.00	0.95	1.00	
Satd. Flow (prot)	1681	1467	1481					5085	1561	3433	5085	
Flt Permitted	0.95	1.00	1.00					1.00	1.00	0.95	1.00	
Satd. Flow (perm)	1681	1467	1481					5085	1561	3433	5085	
Peak-hour factor, PHF	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Adj. Flow (vph)	258	42	615	0	0	0	0	2557	1198	406	2225	0
RTOR Reduction (vph)	0	10	36	0	0	0	0	0	266	0	0	0
Lane Group Flow (vph)	232	335	302	0	0	0	0	2557	932	406	2225	0
Confl. Peds. (#/hr)			3									
Confl. Bikes (#/hr)								5				2
Turn Type	Split	NA	Perm					NA	Perm	Prot	NA	
Protected Phases	4	4						2		1	6	
Permitted Phases			4					2				
Actuated Green, G (s)	36.1	36.1	36.1					81.7	81.7	18.1	104.0	
Effective Green, g (s)	36.1	36.1	36.1					81.7	81.7	18.1	104.0	
Actuated g/C Ratio	0.24	0.24	0.24					0.54	0.54	0.12	0.69	
Clearance Time (s)	4.6	4.6	4.6					5.3	5.3	4.2	5.3	
Vehicle Extension (s)	3.0	3.0	3.0					3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	404	353	356					2769	850	414	3525	
v/s Ratio Prot	0.14	c0.23						0.50		c0.12	0.44	
v/s Ratio Perm			0.20					c0.60				0.11
v/c Ratio	0.57	0.95	0.85					0.92	1.10	0.98	0.63	
Uniform Delay, d1	50.2	56.1	54.4					31.3	34.1	65.8	12.5	
Progression Factor	1.00	1.00	1.00					1.00	1.00	1.00	1.00	
Incremental Delay, d2	2.0	34.4	16.9					6.6	60.7	39.0	0.9	
Delay (s)	52.2	90.5	71.3					37.9	94.8	104.7	13.4	
Level of Service	D	F	E					D	F	F	B	
Approach Delay (s)		73.7			0.0			56.0			27.5	
Approach LOS		E			A			E			C	

Intersection Summary			
HCM 2000 Control Delay	48.0	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	1.04		
Actuated Cycle Length (s)	150.0	Sum of lost time (s)	14.1
Intersection Capacity Utilization	109.7%	ICU Level of Service	H
Analysis Period (min)	15		
c Critical Lane Group			

Year 2035 PM
28: San Marcos Blvd & Knoll Rd/SR 78 WB Ramps

Sierra Project
03/17/2017

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	300	0	600	1090	380	50	470	1307	300	0	1134	250
Future Volume (vph)	300	0	600	1090	380	50	470	1307	300	0	1134	250
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.6		5.2	5.6	5.6		5.2	6.3	6.3		6.3	6.3
Lane Util. Factor	1.00		0.88	0.97	0.95		0.97	0.95	1.00		0.91	1.00
Frpb, ped/bikes	1.00		1.00	1.00	1.00		1.00	1.00	0.98		1.00	0.97
Flpb, ped/bikes	1.00		1.00	1.00	1.00		1.00	1.00	1.00		1.00	1.00
Frt	1.00		0.85	1.00	0.98		1.00	1.00	0.85		1.00	0.85
Flt Protected	0.95		1.00	0.95	1.00		0.95	1.00	1.00		1.00	1.00
Satd. Flow (prot)	1770		2787	3433	3477		3433	3539	1549		5085	1539
Flt Permitted	0.95		1.00	0.95	1.00		0.95	1.00	1.00		1.00	1.00
Satd. Flow (perm)	1770		2787	3433	3477		3433	3539	1549		5085	1539
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)	316	0	632	1147	400	53	495	1376	316	0	1194	263
RTOR Reduction (vph)	0	0	52	0	10	0	0	0	123	0	0	92
Lane Group Flow (vph)	316	0	580	1147	443	0	495	1376	193	0	1194	171
Confl. Peds. (#/hr)												12
Confl. Bikes (#/hr)									2			1
Turn Type	Prot		pm+ov	Prot	NA		Prot	NA	Perm		NA	Perm
Protected Phases	7		5	3	8		5	2			6	
Permitted Phases			7					2				6
Actuated Green, G (s)	18.4		43.4	48.4	24.4		25.0	59.7	59.7		29.5	29.5
Effective Green, g (s)	18.4		43.4	48.4	24.4		25.0	59.7	59.7		29.5	29.5
Actuated g/C Ratio	0.15		0.36	0.40	0.20		0.21	0.50	0.50		0.25	0.25
Clearance Time (s)	5.6		5.2	5.6	5.6		5.2	6.3	6.3		6.3	6.3
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)	271		1007	1384	706		715	1760	770		1250	378
v/s Ratio Prot	c0.18		0.12	c0.33	0.13		0.14	c0.39			c0.23	
v/s Ratio Perm			0.09						0.12			0.11
v/c Ratio	1.17		0.58	0.83	0.63		0.69	0.78	0.25		0.96	0.45
Uniform Delay, d1	50.8		30.9	32.1	43.7		43.9	24.8	17.3		44.6	38.4
Progression Factor	1.00		1.00	1.00	1.00		1.00	1.00	1.00		1.00	1.00
Incremental Delay, d2	107.2		0.8	4.2	1.8		2.9	3.5	0.8		16.8	3.9
Delay (s)	158.0		31.7	36.3	45.4		46.8	28.3	18.1		61.4	42.3
Level of Service	F		C	D	D		D	C	B		E	D
Approach Delay (s)		73.8			38.9			31.0			57.9	
Approach LOS		E			D			C			E	

Intersection Summary			
HCM 2000 Control Delay	45.9	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.96		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	22.7
Intersection Capacity Utilization	89.7%	ICU Level of Service	E
Analysis Period (min)	15		
c Critical Lane Group			

Year 2035 PM
29: San Marcos Blvd & SR 78 EB Ramps

Sierra Project
03/17/2017

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰↱		↱					↰↱↱	↱↱	↰↱	↰↱↱	
Traffic Volume (vph)	247	0	170	0	0	0	0	1760	1330	150	2290	0
Future Volume (vph)	247	0	170	0	0	0	0	1760	1330	150	2290	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.6		5.6					6.3	6.3	5.2	6.3	
Lane Util. Factor	0.97		1.00					0.91	0.88	0.97	0.91	
Frpb, ped/bikes	1.00		1.00					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)	3433		1583					5085	2721	3433	5085	
Flt Permitted	0.95		1.00					1.00	1.00	0.95	1.00	
Satd. Flow (perm)	3433		1583					5085	2721	3433	5085	
Peak-hour factor, PHF	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Adj. Flow (vph)	257	0	177	0	0	0	0	1833	1385	156	2385	0
RTOR Reduction (vph)	0	0	68	0	0	0	0	0	446	0	0	0
Lane Group Flow (vph)	257	0	109	0	0	0	0	1833	939	156	2385	0
Confl. Peds. (#/hr)								1			22	
Confl. Bikes (#/hr)								5			4	
Turn Type	Prot		Perm					NA	Perm	Prot	NA	
Protected Phases	4							2		1	6	
Permitted Phases			4					2				
Actuated Green, G (s)	14.8		14.8					77.3	77.3	10.8	93.3	
Effective Green, g (s)	14.8		14.8					77.3	77.3	10.8	93.3	
Actuated g/C Ratio	0.12		0.12					0.64	0.64	0.09	0.78	
Clearance Time (s)	5.6		5.6					6.3	6.3	5.2	6.3	
Vehicle Extension (s)	3.0		3.0					3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	423		195					3275	1752	308	3953	
v/s Ratio Prot	c0.07							0.36		0.05	c0.47	
v/s Ratio Perm			0.07						0.35			
v/c Ratio	0.61		0.56					0.56	0.54	0.51	0.60	
Uniform Delay, d1	49.8		49.5					11.9	11.6	52.1	5.6	
Progression Factor	1.00		1.00					1.00	1.00	1.00	1.00	
Incremental Delay, d2	2.5		3.7					0.7	1.2	1.3	0.7	
Delay (s)	52.3		53.2					12.6	12.8	53.4	6.3	
Level of Service	D		D					B	B	D	A	
Approach Delay (s)		52.7			0.0			12.7			9.2	
Approach LOS		D			A			B			A	
Intersection Summary												
HCM 2000 Control Delay		14.0		HCM 2000 Level of Service					B			
HCM 2000 Volume to Capacity ratio		0.63										
Actuated Cycle Length (s)		120.0		Sum of lost time (s)					17.1			
Intersection Capacity Utilization		72.2%		ICU Level of Service					C			
Analysis Period (min)		15										
c Critical Lane Group												

Year 2035 PM
30: San Marcos Blvd & E. Mission Road

Sierra Project
03/17/2017

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰↱	↰↱	↱	↰↱	↰↱	↱	↰↱	↰↱	↱	↰↱	↰↱	↱
Traffic Volume (vph)	160	560	60	418	450	90	40	330	712	30	260	100
Future Volume (vph)	160	560	60	418	450	90	40	330	712	30	260	100
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	5.3	5.3	4.0	5.3	5.3	4.0	5.3	5.3	4.0	5.3	
Lane Util. Factor	1.00	0.95	1.00	0.97	0.95	1.00	1.00	0.95	1.00	1.00	0.95	
Frpb, ped/bikes	1.00	1.00	0.98	1.00	1.00	0.97	1.00	1.00	1.00	1.00	1.00	
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.96	
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)	1770	3539	1558	3433	3539	1542	1770	3539	1583	1770	3379	
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	
Satd. Flow (perm)	1770	3539	1558	3433	3539	1542	1770	3539	1583	1770	3379	
Peak-hour factor, PHF	0.92	0.92	1.00	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	174	609	60	454	489	98	43	359	774	33	283	109
RTOR Reduction (vph)	0	0	46	0	0	73	0	0	281	0	37	0
Lane Group Flow (vph)	174	609	14	454	489	25	43	359	493	33	355	0
Confl. Peds. (#/hr)			3			10						1
Turn Type	Prot	NA	Perm	Prot	NA	Perm	Prot	NA	Prot	Prot	NA	
Protected Phases	7	4		3	8		5	2	2	1	6	
Permitted Phases			4			8						
Actuated Green, G (s)	14.4	21.7	21.7	17.5	24.8	24.8	3.6	35.5	35.5	2.3	34.2	
Effective Green, g (s)	14.4	21.7	21.7	17.5	24.8	24.8	3.6	35.5	35.5	2.3	34.2	
Actuated g/C Ratio	0.15	0.23	0.23	0.18	0.26	0.26	0.04	0.37	0.37	0.02	0.36	
Clearance Time (s)	4.0	5.3	5.3	4.0	5.3	5.3	4.0	5.3	5.3	4.0	5.3	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	266	803	353	628	918	400	66	1314	587	42	1208	
v/s Ratio Prot	0.10	c0.17		c0.13	c0.14		c0.02	0.10	c0.31	0.02	0.11	
v/s Ratio Perm			0.01			0.02						
v/c Ratio	0.65	0.76	0.04	0.72	0.53	0.06	0.65	0.27	0.84	0.79	0.29	
Uniform Delay, d1	38.3	34.5	28.8	36.8	30.4	26.7	45.4	21.0	27.5	46.4	22.0	
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	5.7	4.1	0.0	4.1	0.6	0.1	20.7	0.1	10.2	62.3	0.1	
Delay (s)	43.9	38.6	28.9	40.9	31.0	26.7	66.1	21.1	37.7	108.7	22.2	
Level of Service	D	D	C	D	C	C	E	C	D	F	C	
Approach Delay (s)		39.0			34.9			33.7			28.9	
Approach LOS		D			C			C			C	
Intersection Summary												
HCM 2000 Control Delay		34.8		HCM 2000 Level of Service					C			
HCM 2000 Volume to Capacity ratio		0.78										
Actuated Cycle Length (s)		95.6		Sum of lost time (s)					18.6			
Intersection Capacity Utilization		75.2%		ICU Level of Service					D			
Analysis Period (min)		15										
c Critical Lane Group												

Year 2035 PM
33: Twin Oaks Valley Rd & Discovery Street/Barham Dr

Sierra Project
03/17/2017

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	740	460	10	330	360	337	10	1468	370	554	662	540
Future Volume (vph)	740	460	10	330	360	337	10	1468	370	554	662	540
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	5.3	4.0	5.0	5.3	4.0	5.0	6.0		5.0	6.0	4.0
Lane Util. Factor	0.97	0.91	1.00	1.00	1.00	1.00	1.00	0.91		0.97	0.91	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.97		1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	3433	5085	1583	1770	1863	1583	1770	4932		3433	5085	1583
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00
Satd. Flow (perm)	3433	5085	1583	1770	1863	1583	1770	4932		3433	5085	1583
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)	804	500	11	359	391	366	11	1596	402	602	720	587
RTOR Reduction (vph)	0	0	0	0	0	0	0	30	0	0	0	0
Lane Group Flow (vph)	804	500	11	359	391	366	11	1968	0	602	720	587
Turn Type	Prot	NA	Free	Prot	NA	Free	Prot	NA		Prot	NA	Free
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases			Free			Free						Free
Actuated Green, G (s)	26.0	30.7	148.0	23.0	27.7	148.0	1.6	53.0		20.0	71.4	148.0
Effective Green, g (s)	26.0	30.7	148.0	23.0	27.7	148.0	1.6	53.0		20.0	71.4	148.0
Actuated g/C Ratio	0.18	0.21	1.00	0.16	0.19	1.00	0.01	0.36		0.14	0.48	1.00
Clearance Time (s)	5.0	5.3		5.0	5.3		5.0	6.0		5.0	6.0	
Vehicle Extension (s)	2.0	4.5		2.0	4.5		2.0	3.0		2.0	4.0	
Lane Grp Cap (vph)	603	1054	1583	275	348	1583	19	1766		463	2453	1583
v/s Ratio Prot	c0.23	0.10		0.20	c0.21		0.01	c0.40		c0.18	0.14	
v/s Ratio Perm			0.01			0.23						c0.37
v/c Ratio	1.33	0.47	0.01	1.31	1.12	0.23	0.58	1.11		1.30	0.29	0.37
Uniform Delay, d1	61.0	51.6	0.0	62.5	60.1	0.0	72.9	47.5		64.0	23.1	0.0
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	161.1	0.6	0.0	161.3	86.0	0.3	23.8	60.1		150.2	0.3	0.7
Delay (s)	222.1	52.1	0.0	223.8	146.2	0.3	96.7	107.6		214.2	23.4	0.7
Level of Service	F	D	A	F	F	A	F	F		F	C	A
Approach Delay (s)		155.6			123.3			107.5			76.6	
Approach LOS		F			F			F			E	
Intersection Summary												
HCM 2000 Control Delay		111.0			HCM 2000 Level of Service			F				
HCM 2000 Volume to Capacity ratio		1.19										
Actuated Cycle Length (s)		148.0			Sum of lost time (s)			21.3				
Intersection Capacity Utilization		110.2%			ICU Level of Service			H				
Analysis Period (min)		15										
c Critical Lane Group												

Year 2035 PM
112: San Marcos Blvd

Sierra Project
03/17/2017

Intersection Sign configuration not allowed in HCM analysis.

APPENDIX H-2

PEAK HOUR ANALYSIS WORKSHEETS – SAN MARCOS HORIZON YEAR 2035 WITH PROJECT

Year 2035 + Proj AM
12: Twin Oaks Valley Rd & Deer Springs Rd

Sierra Project
03/17/2017

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	60	140	130	830	2100	60
Future Volume (vph)	60	140	130	830	2100	60
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.9	4.9	4.0	5.3	5.3	5.3
Lane Util. Factor	1.00	1.00	1.00	0.95	0.95	1.00
Flt Protected	0.95	1.00	0.95	1.00	1.00	1.00
Satd. Flow (prot)	1770	1583	1770	3539	3539	1583
Flt Permitted	0.95	1.00	0.95	1.00	1.00	1.00
Satd. Flow (perm)	1770	1583	1770	3539	3539	1583
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	65	152	141	902	2283	65
RTOR Reduction (vph)	0	137	0	0	0	8
Lane Group Flow (vph)	65	15	141	902	2283	57
Turn Type	Prot	Perm	Prot	NA	NA	Perm
Protected Phases	4		5	2	6	
Permitted Phases		4				6
Actuated Green, G (s)	13.5	13.5	15.1	115.3	96.2	96.2
Effective Green, g (s)	13.5	13.5	15.1	115.3	96.2	96.2
Actuated g/C Ratio	0.10	0.10	0.11	0.83	0.69	0.69
Clearance Time (s)	4.9	4.9	4.0	5.3	5.3	5.3
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	171	153	192	2935	2449	1095
v/s Ratio Prot	c0.04		c0.08	0.25	c0.65	
v/s Ratio Perm		0.01				0.04
v/c Ratio	0.38	0.10	0.73	0.31	0.93	0.05
Uniform Delay, d1	58.8	57.2	60.0	2.7	18.6	6.8
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	1.4	0.3	13.5	0.1	7.3	0.0
Delay (s)	60.2	57.5	73.6	2.8	25.8	6.9
Level of Service	E	E	E	A	C	A
Approach Delay (s)	58.3			12.3	25.3	
Approach LOS	E			B	C	

Intersection Summary			
HCM 2000 Control Delay	23.5	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.85		
Actuated Cycle Length (s)	139.0	Sum of lost time (s)	14.2
Intersection Capacity Utilization	80.4%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

Year 2035 + Proj AM
13: Twin Oaks Valley Rd & Buena Creek Rd

Sierra Project
03/17/2017

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	560	0	270	10	10	0	180	410	10	10	1300	880
Future Volume (vph)	560	0	270	10	10	0	180	410	10	10	1300	880
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		5.0	5.5		5.0	5.5	5.5
Lane Util. Factor	0.97		1.00		1.00		1.00	0.95		1.00	0.95	1.00
Flpb, ped/bikes	1.00		0.99		1.00		1.00	1.00		1.00	1.00	0.99
Flpb, ped/bikes	1.00		1.00		1.00		1.00	1.00		1.00	1.00	1.00
Frt	1.00		0.85		1.00		1.00	1.00		1.00	1.00	0.85
Flt Protected	0.95		1.00		0.98		0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	3433		1561		1817		1770	3527		1770	3539	1561
Flt Permitted	0.74		1.00		0.98		0.95	1.00		0.95	1.00	1.00
Satd. Flow (perm)	2690		1561		1817		1770	3527		1770	3539	1561
Peak-hour factor, PHF	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Adj. Flow (vph)	583	0	281	10	10	0	188	427	10	10	1354	917
RTOR Reduction (vph)	0	0	136	0	0	0	0	2	0	0	0	209
Lane Group Flow (vph)	583	0	145	0	20	0	188	435	0	10	1354	708
Confl. Peds. (#/hr)			2									1
Confl. Bikes (#/hr)												3
Turn Type	Perm		Perm	Perm	NA		Prot	NA		Prot	NA	Perm
Protected Phases					8		5	2		1	6	
Permitted Phases	4		4	8								6
Actuated Green, G (s)	22.9		22.9		22.9		11.5	52.2		1.0	41.7	41.7
Effective Green, g (s)	22.9		22.9		22.9		11.5	52.2		1.0	41.7	41.7
Actuated g/C Ratio	0.25		0.25		0.25		0.13	0.58		0.01	0.46	0.46
Clearance Time (s)	4.0		4.0		4.0		5.0	5.5		5.0	5.5	5.5
Vehicle Extension (s)	3.0		3.0		3.0		3.0	3.0		3.0	3.0	3.0
Lane Grp Cap (vph)	679		394		459		224	2032		19	1628	718
v/s Ratio Prot							c0.11	0.12		0.01	0.38	
v/s Ratio Perm	c0.22		0.09		0.01							c0.45
v/c Ratio	0.86		0.37		0.04		0.84	0.21		0.53	0.83	0.99
Uniform Delay, d1	32.3		27.9		25.6		38.6	9.3		44.6	21.4	24.2
Progression Factor	1.00		1.00		1.00		1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	10.5		0.6		0.0		23.1	0.1		23.9	3.8	29.7
Delay (s)	42.8		28.5		25.6		61.8	9.3		68.4	25.2	53.9
Level of Service	D		C		C		E	A		E	C	D
Approach Delay (s)		38.1			25.6			25.1			36.9	
Approach LOS		D			C			C			D	

Intersection Summary			
HCM 2000 Control Delay	35.2	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.92		
Actuated Cycle Length (s)	90.6	Sum of lost time (s)	14.5
Intersection Capacity Utilization	82.5%	ICU Level of Service	E
Analysis Period (min)	15		

c Critical Lane Group

Year 2035 + Proj AM
14: Twin Oaks Valley Rd & Cassou Rd

Sierra Project
03/17/2017

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↔			↔		↔	↔		↔	↔	
Traffic Volume (vph)	20	10	50	240	20	50	30	430	230	80	1060	10
Future Volume (vph)	20	10	50	240	20	50	30	430	230	80	1060	10
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		5.0			5.0		5.0	5.0		5.0	5.0	
Lane Util. Factor		1.00			1.00		1.00	0.95		1.00	0.95	
Frpb, ped/bikes		0.99			1.00		1.00	0.99		1.00	1.00	
Flpb, ped/bikes		1.00			1.00		1.00	1.00		1.00	1.00	
Frt		0.92			0.98		1.00	0.95		1.00	1.00	
Flt Protected		0.99			0.96		0.95	1.00		0.95	1.00	
Satd. Flow (prot)		1664			1754		1770	3328		1770	3534	
Flt Permitted		0.99			0.96		0.95	1.00		0.95	1.00	
Satd. Flow (perm)		1664			1754		1770	3328		1770	3534	
Peak-hour factor, PHF	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Adj. Flow (vph)	21	10	52	250	21	52	31	448	240	83	1104	10
RTOR Reduction (vph)	0	48	0	0	5	0	0	49	0	0	1	0
Lane Group Flow (vph)	0	35	0	0	318	0	31	639	0	83	1113	0
Confl. Peds. (#/hr)			6						1			
Turn Type	Split	NA		Split	NA		Prot	NA		Prot	NA	
Protected Phases	4	4		8	8		5	2		1	6	
Permitted Phases												
Actuated Green, G (s)		7.9			24.1		2.9	35.0		7.1	39.2	
Effective Green, g (s)		7.9			24.1		2.9	35.0		7.1	39.2	
Actuated g/C Ratio		0.08			0.26		0.03	0.37		0.08	0.42	
Clearance Time (s)		5.0			5.0		5.0	5.0		5.0	5.0	
Vehicle Extension (s)		3.0			3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)		139			449		54	1237		133	1472	
v/s Ratio Prot		c0.02			c0.18		0.02	0.19		c0.05	c0.32	
v/s Ratio Perm												
v/c Ratio		0.25			0.71		0.57	0.52		0.62	0.76	
Uniform Delay, d1		40.3			31.8		45.0	23.0		42.2	23.4	
Progression Factor		1.00			1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2		1.0			5.0		13.9	0.4		8.8	2.3	
Delay (s)		41.3			36.9		58.9	23.3		51.0	25.7	
Level of Service		D			D		E	C		D	C	
Approach Delay (s)		41.3			36.9		24.9			27.4		
Approach LOS		D			D		C			C		

Intersection Summary

HCM 2000 Control Delay	28.4	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.70		
Actuated Cycle Length (s)	94.1	Sum of lost time (s)	20.0
Intersection Capacity Utilization	70.3%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

Year 2035 + Proj AM
15: Twin Oaks Valley Rd & La Cienega

Sierra Project
03/17/2017

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations	↔	↔	↔	↔	↔	↔
Traffic Volume (vph)	220	240	630	70	80	1220
Future Volume (vph)	220	240	630	70	80	1220
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.0	6.0	6.5		6.0	6.5
Lane Util. Factor	1.00	1.00	0.95		1.00	0.95
Frpb, ped/bikes	1.00	0.99	1.00		1.00	1.00
Flpb, ped/bikes	1.00	1.00	1.00		1.00	1.00
Frt	1.00	0.85	0.99		1.00	1.00
Flt Protected	0.95	1.00	1.00		0.95	1.00
Satd. Flow (prot)	1770	1563	3470		1770	3539
Flt Permitted	0.95	1.00	1.00		0.95	1.00
Satd. Flow (perm)	1770	1563	3470		1770	3539
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	239	261	685	76	87	1326
RTOR Reduction (vph)	0	0	8	0	0	0
Lane Group Flow (vph)	239	261	753	0	87	1326
Confl. Peds. (#/hr)		1		13		
Confl. Bikes (#/hr)				1		
Turn Type	Prot	Perm	NA		Prot	NA
Protected Phases	8		2		1	6
Permitted Phases		8				
Actuated Green, G (s)	17.3	17.3	23.7		7.1	36.8
Effective Green, g (s)	17.3	17.3	23.7		7.1	36.8
Actuated g/C Ratio	0.26	0.26	0.36		0.11	0.55
Clearance Time (s)	6.0	6.0	6.5		6.0	6.5
Vehicle Extension (s)	3.0	3.0	3.0		3.0	3.0
Lane Grp Cap (vph)	459	406	1234		188	1955
v/s Ratio Prot	0.14		0.22		0.05	c0.37
v/s Ratio Perm		c0.17				
v/c Ratio	0.52	0.64	0.61		0.46	0.68
Uniform Delay, d1	21.1	21.9	17.6		28.0	10.7
Progression Factor	1.00	1.00	1.00		1.00	1.00
Incremental Delay, d2	1.1	3.5	0.9		1.8	0.9
Delay (s)	22.2	25.4	18.5		29.8	11.6
Level of Service	C	C	B		C	B
Approach Delay (s)	23.8		18.5			12.7
Approach LOS	C		B			B

Intersection Summary

HCM 2000 Control Delay	16.5	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.75		
Actuated Cycle Length (s)	66.6	Sum of lost time (s)	18.5
Intersection Capacity Utilization	56.5%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

Year 2035 + Proj AM
16: Twin Oaks Valley Rd & Del Roy Dr

Sierra Project
03/17/2017

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↱		↰	↱		↰	↱		↰	↱	
Traffic Volume (vph)	30	0	70	10	0	10	40	680	20	10	1470	20
Future Volume (vph)	30	0	70	10	0	10	40	680	20	10	1470	20
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5	5.0		4.5	5.0		5.0	5.0		5.0	5.0	
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	0.95		1.00	0.95	
Frpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Flpb, ped/bikes	1.00	1.00		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		1.00	1.00	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770	1583		1770	1583		1770	3521		1770	3532	
Flt Permitted	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (perm)	1770	1583		1770	1583		1770	3521		1770	3532	
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)	33	0	76	11	0	11	43	739	22	11	1598	22
RTOR Reduction (vph)	0	67	0	0	10	0	0	1	0	0	1	0
Lane Group Flow (vph)	33	9	0	11	1	0	43	760	0	11	1619	0
Confl. Peds. (#/hr)	2											
Turn Type	Prot	NA		Prot	NA		Prot	NA		Prot	NA	
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases												
Actuated Green, G (s)	1.2	8.9		0.5	8.2		2.2	49.5		0.6	47.9	
Effective Green, g (s)	1.2	8.9		0.5	8.2		2.2	49.5		0.6	47.9	
Actuated g/C Ratio	0.02	0.11		0.01	0.10		0.03	0.63		0.01	0.61	
Clearance Time (s)	4.5	5.0		4.5	5.0		5.0	5.0		5.0	5.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	26	178		11	164		49	2206		13	2141	
v/s Ratio Prot	c0.02	c0.01		0.01	0.00		c0.02	0.22		0.01	c0.46	
v/s Ratio Perm												
v/c Ratio	1.27	0.05		1.00	0.01		0.88	0.34		0.85	0.76	
Uniform Delay, d1	38.9	31.3		39.2	31.7		38.3	7.0		39.2	11.3	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	268.4	0.1		271.4	0.0		83.1	0.1		166.4	1.6	
Delay (s)	307.3	31.4		310.6	31.8		121.4	7.1		205.6	12.9	
Level of Service	F	C		F	C		F	A		F	B	
Approach Delay (s)	114.9			171.2			13.2			14.2		
Approach LOS	F			F			B			B		

Intersection Summary

HCM 2000 Control Delay	19.5	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.67		
Actuated Cycle Length (s)	79.0	Sum of lost time (s)	19.5
Intersection Capacity Utilization	57.9%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

Year 2035 + Proj AM
17: Twin Oaks Valley Rd & Windy Wy

Sierra Project
03/17/2017

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	10	10	50	0	0	0	50	740	10	10	1520	70
Future Volume (vph)	10	10	50	0	0	0	50	740	10	10	1520	70
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0					6.0	6.0		4.0	4.0	
Lane Util. Factor	1.00	1.00					1.00	0.95		1.00	0.95	
Frpb, ped/bikes	1.00	0.99					1.00	1.00		1.00	1.00	
Flpb, ped/bikes	1.00	1.00					1.00	1.00		1.00	1.00	
Frt	1.00	0.88					1.00	1.00		1.00	0.99	
Flt Protected	0.95	1.00					0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770	1608					1770	3530		1770	3512	
Flt Permitted	0.95	1.00					0.95	1.00		0.95	1.00	
Satd. Flow (perm)	1770	1608					1770	3530		1770	3512	
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	54	0	0	0	54	804	11	11	1652	76
RTOR Reduction (vph)	0	49	0	0	0	0	0	1	0	0	3	0
Lane Group Flow (vph)	11	16	0	0	0	0	54	814	0	11	1725	0
Confl. Peds. (#/hr)	5						5					
Confl. Bikes (#/hr)	4											
Turn Type	Split	NA					Prot	NA				
Protected Phases	4	4					5	2				
Permitted Phases												
Actuated Green, G (s)	7.1	7.1					3.6	52.5				
Effective Green, g (s)	7.1	7.1					3.6	52.5				
Adj. Flow (vph)	0.10	0.10					0.05	0.71				
Clearance Time (s)	4.0	4.0					6.0	6.0				
Vehicle Extension (s)	3.0	3.0					3.0	3.0				
Lane Grp Cap (vph)	169	153					85	2494				
v/s Ratio Prot	0.01	c0.01					c0.03	c0.23				
v/s Ratio Perm												
v/c Ratio	0.07	0.11					0.64	0.33				
Uniform Delay, d1	30.6	30.7					34.7	4.2				
Progression Factor	1.00	1.00					1.00	1.00				
Incremental Delay, d2	0.2	0.3					14.5	0.1				
Delay (s)	30.7	31.0					49.2	4.2				
Level of Service	C	C					D	A				
Approach Delay (s)	31.0		0.0				7.0		10.0			
Approach LOS	C		A				A		A			

Intersection Summary

HCM 2000 Control Delay	9.6	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.65		
Actuated Cycle Length (s)	74.3	Sum of lost time (s)	14.0
Intersection Capacity Utilization	57.3%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

Year 2035 + Proj AM
18: Twin Oaks Valley Rd & Borden Rd

Sierra Project
03/17/2017

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↱		↰	↱		↰	↱	↰	↱	↰	↱
Traffic Volume (vph)	70	50	270	270	110	30	100	610	60	20	1280	150
Future Volume (vph)	70	50	270	270	110	30	100	610	60	20	1280	150
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.2	5.3		4.2	5.3		4.2	4.9	4.9	4.2	4.9	4.9
Lane Util. Factor	1.00	0.95		1.00	0.95		1.00	0.95	1.00	0.95	1.00	1.00
Frpb, ped/bikes	1.00	0.98		1.00	1.00		1.00	1.00	0.98	1.00	1.00	0.98
Flpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	0.87		1.00	0.97		1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1770	3033		1770	3413		1770	3539	1556	1770	3539	1550
Flt Permitted	0.95	1.00		0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	1770	3033		1770	3413		1770	3539	1556	1770	3539	1550
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)	74	53	284	284	116	32	105	642	63	21	1347	158
RTOR Reduction (vph)	0	167	0	0	15	0	0	0	30	0	0	64
Lane Group Flow (vph)	74	170	0	284	133	0	105	642	33	21	1347	94
Confl. Peds. (#/hr)			6		2			3			6	
Confl. Bikes (#/hr)			1		1			3			3	
Turn Type	Prot	NA		Prot	NA		Prot	NA	Perm	Prot	NA	Perm
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases								2				6
Actuated Green, G (s)	10.9	16.9		29.5	35.5		14.0	75.7	75.7	3.2	64.9	64.9
Effective Green, g (s)	10.9	16.9		29.5	35.5		14.0	75.7	75.7	3.2	64.9	64.9
Actuated g/C Ratio	0.08	0.12		0.21	0.25		0.10	0.53	0.53	0.02	0.45	0.45
Clearance Time (s)	4.2	5.3		4.2	5.3		4.2	4.9	4.9	4.2	4.9	4.9
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)	134	356		362	841		172	1861	818	39	1596	699
v/s Ratio Prot	0.04	c0.06		c0.16	0.04		c0.06	0.18		0.01	c0.38	
v/s Ratio Perm								0.02			0.06	
v/c Ratio	0.55	0.48		0.78	0.16		0.61	0.34	0.04	0.54	0.84	0.13
Uniform Delay, d1	64.1	59.4		54.2	42.5		62.3	19.7	16.5	69.6	35.0	23.1
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	4.9	1.0		10.6	0.1		6.3	0.1	0.0	13.5	4.3	0.1
Delay (s)	69.0	60.4		64.8	42.6		68.6	19.9	16.5	83.2	39.3	23.2
Level of Service	E	E		E	D		E	B	B	F	D	C
Approach Delay (s)		61.9			57.2			25.9			38.2	
Approach LOS		E			E			C			D	

Intersection Summary			
HCM 2000 Control Delay	40.7	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.75		
Actuated Cycle Length (s)	143.9	Sum of lost time (s)	18.6
Intersection Capacity Utilization	84.5%	ICU Level of Service	E
Analysis Period (min)	15		
c Critical Lane Group			

Year 2035 + Proj AM
19: Twin Oaks Valley Rd & Richmar Road

Sierra Project
03/17/2017

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↱		↰	↱		↰	↱	↰	↱	↰	↱
Traffic Volume (vph)	210	30	150	70	30	20	80	800	70	50	1630	280
Future Volume (vph)	210	30	150	70	30	20	80	800	70	50	1630	280
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.9	4.9		4.0	4.0		4.0	5.7		4.0	5.7	
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	0.95		1.00	0.95	
Frpb, ped/bikes	1.00	0.99		1.00	0.99		1.00	1.00		1.00	1.00	
Flpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Frt	1.00	0.87		1.00	0.94		1.00	0.99		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	1611		1770	1735		1770	3485		1770	3446	
Flt Permitted	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (perm)	1770	1611		1770	1735		1770	3485		1770	3446	
Peak-hour factor, PHF	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99
Adj. Flow (vph)	212	30	152	71	30	20	81	808	71	51	1646	283
RTOR Reduction (vph)	0	116	0	0	18	0	0	4	0	0	8	0
Lane Group Flow (vph)	212	66	0	71	32	0	81	875	0	51	1921	0
Confl. Peds. (#/hr)					8			4			2	
Confl. Bikes (#/hr)			1					1			3	
Turn Type	Prot	NA		Prot	NA		Prot	NA		Prot	NA	
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases												
Actuated Green, G (s)	18.3	22.0		9.3	13.0		7.7	79.8		7.1	79.2	
Effective Green, g (s)	18.3	22.0		9.3	13.0		7.7	79.8		7.1	79.2	
Actuated g/C Ratio	0.13	0.16		0.07	0.10		0.06	0.58		0.05	0.58	
Clearance Time (s)	4.9	4.9		4.0	4.0		4.0	5.7		4.0	5.7	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	236	259		120	164		99	2032		91	1995	
v/s Ratio Prot	c0.12	c0.04		0.04	0.02		c0.05	0.25		0.03	c0.56	
v/s Ratio Perm												
v/c Ratio	0.90	0.26		0.59	0.19		0.82	0.43		0.56	0.96	
Uniform Delay, d1	58.3	50.2		61.9	57.1		63.9	15.9		63.3	27.4	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	32.5	0.5		7.6	0.6		38.7	0.1		7.7	12.5	
Delay (s)	90.8	50.8		69.5	57.7		102.5	16.0		71.0	39.9	
Level of Service	F	D		E	E		F	B		E	D	
Approach Delay (s)		72.3			64.6			23.3			40.7	
Approach LOS		E			E			C			D	

Intersection Summary			
HCM 2000 Control Delay	40.3	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.87		
Actuated Cycle Length (s)	136.8	Sum of lost time (s)	18.6
Intersection Capacity Utilization	94.2%	ICU Level of Service	F
Analysis Period (min)	15		
c Critical Lane Group			

Year 2035 + Proj AM
20: Twin Oaks Valley Rd & San Marcos Blvd

Sierra Project
03/17/2017

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↱	↱	↰	↱		↰	↱	↱	↰	↱	↱
Traffic Volume (vph)	250	430	480	530	720	50	430	670	530	130	1340	470
Future Volume (vph)	250	430	480	530	720	50	430	670	530	130	1340	470
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.2	5.3	5.3	4.2	5.0		4.2	5.3	4.2	5.3	5.3	5.3
Lane Util. Factor	0.97	0.95	0.88	0.94	0.95		0.97	0.95	1.00	0.97	0.95	1.00
Frpb, ped/bikes	1.00	1.00	0.97	1.00	1.00		1.00	1.00	0.99	1.00	1.00	0.99
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	1.00	0.85	1.00	0.99		1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	3433	3539	2712	4990	3500		3433	3539	1565	3433	3539	1562
Flt Permitted	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	3433	3539	2712	4990	3500		3433	3539	1565	3433	3539	1562
Peak-hour factor, PHF	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98
Adj. Flow (vph)	255	439	490	541	735	51	439	684	541	133	1367	480
RTOR Reduction (vph)	0	0	267	0	4	0	0	0	33	0	0	145
Lane Group Flow (vph)	255	439	223	541	782	0	439	684	508	133	1367	335
Confl. Peds. (#/hr)			5			4			1			1
Confl. Bikes (#/hr)			8			3			3			3
Turn Type	Prot	NA	Perm	Prot	NA		Prot	NA	pm+ov	Prot	NA	Perm
Protected Phases	7	4		3	8		5	2	3	1	6	
Permitted Phases			4						2			6
Actuated Green, G (s)	10.1	26.4	26.4	14.4	31.0		16.2	55.4	69.8	8.3	47.5	47.5
Effective Green, g (s)	10.1	26.4	26.4	14.4	31.0		16.2	55.4	69.8	8.3	47.5	47.5
Actuated g/C Ratio	0.08	0.21	0.21	0.12	0.25		0.13	0.45	0.57	0.07	0.38	0.38
Clearance Time (s)	4.2	5.3	5.3	4.2	5.0		4.2	5.3	4.2	4.2	5.3	5.3
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	280	756	579	581	878		450	1587	884	230	1361	600
v/s Ratio Prot	0.07	0.12		c0.11	c0.22		c0.13	0.19	0.07	0.04	c0.39	
v/s Ratio Perm			0.08						0.26			0.21
v/c Ratio	0.91	0.58	0.38	0.93	0.89		0.98	0.43	0.57	0.58	1.00	0.56
Uniform Delay, d1	56.3	43.6	41.6	54.1	44.6		53.5	23.3	17.3	55.9	38.0	29.8
Progression Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	31.5	1.1	0.4	21.8	11.2		35.8	0.2	0.9	3.5	25.5	1.1
Delay (s)	87.7	44.7	42.0	75.9	55.9		89.2	23.5	18.2	59.4	63.5	30.9
Level of Service	F	D	D	E	E		F	C	B	E	E	C
Approach Delay (s)		52.9			64.0			39.1			55.3	
Approach LOS		D			E			D			E	
Intersection Summary												
HCM 2000 Control Delay			52.3		HCM 2000 Level of Service				D			
HCM 2000 Volume to Capacity ratio			0.98									
Actuated Cycle Length (s)			123.5		Sum of lost time (s)				19.0			
Intersection Capacity Utilization			93.8%		ICU Level of Service				F			
Analysis Period (min)			15									
c Critical Lane Group												

Year 2035 + Proj AM
21: Twin Oaks Valley Rd & SR 78 WB Ramps

Sierra Project
03/17/2017

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations				↰		↱		↱	↱		↱	↱
Traffic Volume (vph)	0	0	0	700	0	310	0	1280	600	0	1800	670
Future Volume (vph)	0	0	0	700	0	310	0	1280	600	0	1800	670
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)				4.6		4.6		5.3	4.6		5.3	5.3
Lane Util. Factor				0.97		0.88		0.91	1.00		0.91	1.00
Frpb, ped/bikes				1.00		1.00		1.00	0.97		1.00	0.97
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	0.85
Flt Protected				0.95		1.00		1.00	1.00		1.00	1.00
Satd. Flow (prot)				3433		2787		5085	1539		5085	1543
Flt Permitted				0.95		1.00		1.00	1.00		1.00	1.00
Satd. Flow (perm)				3433		2787		5085	1539		5085	1543
Peak-hour factor, PHF	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98
Adj. Flow (vph)	0	0	0	714	0	316	0	1306	612	0	1837	684
RTOR Reduction (vph)	0	0	0	0	0	64	0	0	0	0	0	236
Lane Group Flow (vph)	0	0	0	714	0	252	0	1306	612	0	1837	448
Confl. Peds. (#/hr)								8				5
Confl. Bikes (#/hr)								1				3
Turn Type				Prot		Perm		NA	pm+ov		NA	Perm
Protected Phases				8				2	8		6	
Permitted Phases						8		2				6
Actuated Green, G (s)				31.5		31.5		78.6	110.1		78.6	78.6
Effective Green, g (s)				31.5		31.5		78.6	110.1		78.6	78.6
Actuated g/C Ratio				0.26		0.26		0.65	0.92		0.65	0.65
Clearance Time (s)				4.6		4.6		5.3	4.6		5.3	5.3
Vehicle Extension (s)				2.0		2.0		2.0	2.0		2.0	2.0
Lane Grp Cap (vph)				901		731		3330	1471		3330	1010
v/s Ratio Prot				c0.21				0.26	0.11		c0.36	
v/s Ratio Perm						0.09			0.29			0.29
v/c Ratio				0.79		0.34		0.39	0.42		0.55	0.44
Uniform Delay, d1				41.2		35.9		9.6	0.7		11.2	10.1
Progression Factor				1.00		1.00		0.45	8.97		1.00	1.00
Incremental Delay, d2				4.5		0.1		0.2	0.0		0.7	1.4
Delay (s)				45.7		36.0		4.5	6.0		11.8	11.5
Level of Service				D		D		A	A		B	B
Approach Delay (s)		0.0			42.7			5.0			11.7	
Approach LOS		A			D			A			B	
Intersection Summary												
HCM 2000 Control Delay				15.2		HCM 2000 Level of Service			B			
HCM 2000 Volume to Capacity ratio				0.62								
Actuated Cycle Length (s)				120.0		Sum of lost time (s)			9.9			
Intersection Capacity Utilization				62.5%		ICU Level of Service			B			
Analysis Period (min)				15								
c Critical Lane Group												

Year 2035 + Proj AM
22: Twin Oaks Valley Rd & SR 78 EB Ramps

Sierra Project
03/17/2017

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↱	↲					↰	↱	↲	↰	↱
Traffic Volume (vph)	670	10	850	0	0	0	0	1260	760	370	2080	0
Future Volume (vph)	670	10	850	0	0	0	0	1260	760	370	2080	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.6	4.6	4.6					5.3	5.3	4.2	5.3	
Lane Util. Factor	0.95	0.91	0.95					0.91	1.00	0.97	0.91	
Frpb, ped/bikes	1.00	0.99	0.99					1.00	0.98	1.00	1.00	
Flpb, ped/bikes	1.00	1.00	1.00					1.00	1.00	1.00	1.00	
Frt	1.00	0.89	0.85					1.00	0.85	1.00	1.00	
Flt Protected	0.95	0.99	1.00					1.00	1.00	0.95	1.00	
Satd. Flow (prot)	1681	1482	1485					5085	1553	3433	5085	
Flt Permitted	0.95	0.99	1.00					1.00	1.00	0.95	1.00	
Satd. Flow (perm)	1681	1482	1485					5085	1553	3433	5085	
Peak-hour factor, PHF	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Adj. Flow (vph)	691	10	876	0	0	0	0	1299	784	381	2144	0
RTOR Reduction (vph)	0	2	36	0	0	0	0	0	510	0	0	0
Lane Group Flow (vph)	546	521	472	0	0	0	0	1299	274	381	2144	0
Confl. Peds. (#/hr)			1						4			
Confl. Bikes (#/hr)												1
Turn Type	Split	NA	Perm					NA	Perm	Prot	NA	
Protected Phases	4	4						2		1	6	
Permitted Phases			4						2			
Actuated Green, G (s)	47.7	47.7	47.7					41.9	41.9	16.3	62.4	
Effective Green, g (s)	47.7	47.7	47.7					41.9	41.9	16.3	62.4	
Actuated g/C Ratio	0.40	0.40	0.40					0.35	0.35	0.14	0.52	
Clearance Time (s)	4.6	4.6	4.6					5.3	5.3	4.2	5.3	
Vehicle Extension (s)	3.0	3.0	3.0					3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	668	589	590					1775	542	466	2644	
v/s Ratio Prot	0.32	c0.35						0.26		0.11	c0.42	
v/s Ratio Perm			0.32						0.18			0.11
v/c Ratio	0.82	0.88	0.80					0.73	0.51	0.82	0.81	0.40
Uniform Delay, d1	32.3	33.6	32.0					34.1	30.9	50.4	23.9	35.3
Progression Factor	1.00	1.00	1.00					1.00	1.00	1.13	1.20	1.00
Incremental Delay, d2	7.7	14.8	7.7					2.7	3.3	9.0	2.4	2.8
Delay (s)	39.9	48.4	39.6					36.8	34.2	65.9	31.1	38.0
Level of Service	D	D	D					D	C	E	C	D
Approach Delay (s)		42.6			0.0			35.8			36.4	
Approach LOS		D			A			D			D	
Intersection Summary												
HCM 2000 Control Delay			37.8									
HCM 2000 Volume to Capacity ratio			0.88									
Actuated Cycle Length (s)			120.0						14.1			
Intersection Capacity Utilization			97.4%						F			
Analysis Period (min)			15									
c Critical Lane Group												

Year 2035 + Proj AM
28: San Marcos Blvd & Knoll Rd/SR 78 WB Ramps

Sierra Project
03/17/2017

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰		↱	↰	↱	↲		↰	↱	↲	↰	↱
Traffic Volume (vph)	210	0	620	1200	430	20	410	500	150	0	1140	250
Future Volume (vph)	210	0	620	1200	430	20	410	500	150	0	1140	250
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.6		5.2	5.6	5.6		5.2	6.3	6.3		6.3	6.3
Lane Util. Factor	1.00		0.88	0.97	0.95		0.97	0.95	1.00		0.91	1.00
Frpb, ped/bikes	1.00		1.00	1.00	1.00		1.00	1.00	1.00		1.00	0.98
Flpb, ped/bikes	1.00		1.00	1.00	1.00		1.00	1.00	1.00		1.00	1.00
Frt	1.00		0.85	1.00	0.99		1.00	1.00	0.85		1.00	0.85
Flt Protected	0.95		1.00	0.95	1.00		0.95	1.00	1.00		1.00	1.00
Satd. Flow (prot)	1770		2787	3433	3513		3433	3539	1583		5085	1546
Flt Permitted	0.95		1.00	0.95	1.00		0.95	1.00	1.00		1.00	1.00
Satd. Flow (perm)	1770		2787	3433	3513		3433	3539	1583		5085	1546
Peak-hour factor, PHF	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Adj. Flow (vph)	216	0	639	1237	443	21	423	515	155	0	1175	258
RTOR Reduction (vph)	0	0	57	0	3	0	0	0	81	0	0	88
Lane Group Flow (vph)	216	0	582	1237	461	0	423	515	74	0	1175	170
Confl. Peds. (#/hr)							1					8
Confl. Bikes (#/hr)												2
Turn Type	Prot	pm+ov	Prot	NA			Prot	NA	Perm		NA	Perm
Protected Phases	7		5	3	8		5	2			6	
Permitted Phases			7					2				6
Actuated Green, G (s)	16.2		34.9	51.0	29.2		18.7	57.1	57.1		33.2	33.2
Effective Green, g (s)	16.2		34.9	51.0	29.2		18.7	57.1	57.1		33.2	33.2
Actuated g/C Ratio	0.13		0.29	0.42	0.24		0.16	0.48	0.48		0.28	0.28
Clearance Time (s)	5.6		5.2	5.6	5.6		5.2	6.3	6.3		6.3	6.3
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)	238		810	1459	854		534	1683	753		1406	427
v/s Ratio Prot	0.12		0.11	c0.36	0.13		c0.12	0.15			c0.23	
v/s Ratio Perm			0.10						0.05			0.11
v/c Ratio	0.91		0.72	0.85	0.54		0.79	0.31	0.10		0.84	0.40
Uniform Delay, d1	51.2		38.1	31.0	39.5		48.8	19.3	17.3		40.8	35.3
Progression Factor	1.00		1.00	1.00	1.00		1.00	1.33	3.60		1.00	1.00
Incremental Delay, d2	34.2		3.1	4.8	0.7		7.8	0.5	0.3		6.0	2.8
Delay (s)	85.4		41.2	35.8	40.2		56.5	26.0	62.5		46.9	38.0
Level of Service	F		D	D	D		E	C	E		D	D
Approach Delay (s)		52.4			37.0			43.0			45.3	
Approach LOS		D			D			D			D	
Intersection Summary												
HCM 2000 Control Delay			43.2									
HCM 2000 Volume to Capacity ratio			0.88									
Actuated Cycle Length (s)			120.0						22.7			
Intersection Capacity Utilization			93.5%						F			
Analysis Period (min)			15									
c Critical Lane Group												

Year 2035 + Proj AM
29: San Marcos Blvd & SR 78 EB Ramps

Sierra Project
03/17/2017

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↱	↲	↰	↱	↲	↰	↱	↲	↰	↱	↲
Traffic Volume (vph)	180	0	260	0	0	0	0	820	850	190	2420	0
Future Volume (vph)	180	0	260	0	0	0	0	820	850	190	2420	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.6		5.6					6.3	6.3	5.2	6.3	
Lane Util. Factor	0.97		1.00					0.91	0.88	0.97	0.91	
Frpb, ped/bikes	1.00		1.00					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)	3433		1583					5085	2726	3433	5085	
Flt Permitted	0.95		1.00					1.00	1.00	0.95	1.00	
Satd. Flow (perm)	3433		1583					5085	2726	3433	5085	
Peak-hour factor, PHF	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Adj. Flow (vph)	188	0	271	0	0	0	0	854	885	198	2521	0
RTOR Reduction (vph)	0	0	64	0	0	0	0	0	369	0	0	0
Lane Group Flow (vph)	188	0	207	0	0	0	0	854	516	198	2521	0
Confl. Peds. (#/hr)												6
Confl. Bikes (#/hr)												4
Turn Type	Prot		Perm					NA	Perm	Prot	NA	
Protected Phases	4							2		1	6	
Permitted Phases			4						2			
Actuated Green, G (s)	20.7		20.7					70.0	70.0	12.2	87.4	
Effective Green, g (s)	20.7		20.7					70.0	70.0	12.2	87.4	
Actuated g/C Ratio	0.17		0.17					0.58	0.58	0.10	0.73	
Clearance Time (s)	5.6		5.6					6.3	6.3	5.2	6.3	
Vehicle Extension (s)	3.0		3.0					3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	592		273					2966	1590	349	3703	
v/s Ratio Prot	0.05							0.17		0.06	c0.50	
v/s Ratio Perm			c0.13						0.19			
v/c Ratio	0.32		0.76					0.29	0.32	0.57	0.68	
Uniform Delay, d1	43.5		47.3					12.5	12.9	51.4	8.8	
Progression Factor	1.00		1.00					1.00	1.00	1.11	0.69	
Incremental Delay, d2	0.3		11.5					0.2	0.5	1.7	0.8	
Delay (s)	43.8		58.7					12.8	13.4	58.5	6.9	
Level of Service	D		E					B	B	E	A	
Approach Delay (s)		52.6			0.0			13.1			10.7	
Approach LOS		D			A			B			B	

Intersection Summary			
HCM 2000 Control Delay	15.4	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.73		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	17.1
Intersection Capacity Utilization	72.8%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

Year 2035 + Proj AM
30: San Marcos Blvd & E. Mission Road

Sierra Project
03/17/2017

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↱	↲	↰	↱	↲	↰	↱	↲	↰	↱	↲
Traffic Volume (vph)	20	300	20	740	510	70	10	70	340	90	390	40
Future Volume (vph)	20	300	20	740	510	70	10	70	340	90	390	40
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	5.3	5.3	4.0	5.3	5.3	4.0	5.3	5.3	4.0	5.3	
Lane Util. Factor	1.00	0.95	1.00	0.97	0.95	1.00	1.00	0.95	1.00	1.00	0.95	
Frpb, ped/bikes	1.00	1.00	0.99	1.00	1.00	0.97	1.00	1.00	1.00	1.00	1.00	
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.99	
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)	1770	3539	1561	3433	3539	1530	1770	3539	1583	1770	3490	
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	
Satd. Flow (perm)	1770	3539	1561	3433	3539	1530	1770	3539	1583	1770	3490	
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)	22	326	22	804	554	76	11	76	370	98	424	43
RTOR Reduction (vph)	0	0	18	0	0	39	0	0	313	0	4	0
Lane Group Flow (vph)	22	326	4	804	554	37	11	76	57	98	463	0
Confl. Peds. (#/hr)			2			12						
Turn Type	Prot	NA	Perm	Prot	NA	Perm	Prot	NA	Prot	Prot	NA	
Protected Phases	7	4		3	8		5	2	2	1	6	
Permitted Phases			4			8						
Actuated Green, G (s)	2.5	18.8	18.8	28.8	45.1	45.1	0.8	14.3	14.3	11.7	25.2	
Effective Green, g (s)	2.5	18.8	18.8	28.8	45.1	45.1	0.8	14.3	14.3	11.7	25.2	
Actuated g/C Ratio	0.03	0.20	0.20	0.31	0.49	0.49	0.01	0.16	0.16	0.13	0.27	
Clearance Time (s)	4.0	5.3	5.3	4.0	5.3	5.3	4.0	5.3	5.3	4.0	5.3	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	47	721	318	1072	1731	748	15	548	245	224	953	
v/s Ratio Prot	0.01	c0.09		c0.23	0.16		0.01	0.02	0.04	c0.06	c0.13	
v/s Ratio Perm			0.00			0.02						
v/c Ratio	0.47	0.45	0.01	0.75	0.32	0.05	0.73	0.14	0.23	0.44	0.49	
Uniform Delay, d1	44.2	32.2	29.3	28.5	14.3	12.3	45.6	33.6	34.1	37.2	28.1	
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	7.2	0.5	0.0	3.0	0.1	0.0	103.2	0.1	0.5	1.4	0.4	
Delay (s)	51.4	32.6	29.3	31.5	14.4	12.4	148.8	33.7	34.6	38.6	28.5	
Level of Service	D	C	C	C	B	B	F	C	C	D	C	
Approach Delay (s)		33.6			23.8			37.2			30.2	
Approach LOS		C			C			D			C	

Intersection Summary			
HCM 2000 Control Delay	28.6	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.59		
Actuated Cycle Length (s)	92.2	Sum of lost time (s)	18.6
Intersection Capacity Utilization	54.4%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

Year 2035 + Proj AM

33: Twin Oaks Valley Rd & Discovery Street/Barham Dr

Sierra Project

03/17/2017

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	380	100	10	380	490	270	30	940	170	590	1210	690
Future Volume (vph)	380	100	10	380	490	270	30	940	170	590	1210	690
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	5.3	5.3	5.0	5.3	5.3	5.0	6.0		5.0	6.0	6.0
Lane Util. Factor	0.97	0.91	1.00	1.00	1.00	1.00	1.00	0.91		0.97	0.91	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.98		1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	3433	5085	1583	1770	1863	1583	1770	4968		3433	5085	1583
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00
Satd. Flow (perm)	3433	5085	1583	1770	1863	1583	1770	4968		3433	5085	1583
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)	413	109	11	413	533	293	33	1022	185	641	1315	750
RTOR Reduction (vph)	0	0	9	0	0	146	0	17	0	0	0	244
Lane Group Flow (vph)	413	109	2	413	533	147	33	1190	0	641	1315	506
Turn Type	Prot	NA	Perm	Prot	NA	Perm	Prot	NA		Prot	NA	Perm
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases			4			8						6
Actuated Green, G (s)	19.0	28.1	28.1	35.8	44.9	44.9	4.0	38.4		27.0	61.4	61.4
Effective Green, g (s)	19.0	28.1	28.1	35.8	44.9	44.9	4.0	38.4		27.0	61.4	61.4
Actuated g/C Ratio	0.13	0.19	0.19	0.24	0.30	0.30	0.03	0.25		0.18	0.41	0.41
Clearance Time (s)	5.0	5.3	5.3	5.0	5.3	5.3	5.0	6.0		5.0	6.0	6.0
Vehicle Extension (s)	2.0	4.5	4.5	2.0	4.5	4.5	2.0	3.0		2.0	4.0	4.0
Lane Grp Cap (vph)	433	948	295	420	555	471	47	1266		615	2073	645
v/s Ratio Prot	0.12	0.02		c0.23	c0.29		0.02	c0.24		c0.19	0.26	
v/s Ratio Perm			0.00			0.09						0.32
v/c Ratio	0.95	0.11	0.01	0.98	0.96	0.31	0.70	0.94		1.04	0.63	0.78
Uniform Delay, d1	65.4	50.9	49.9	57.1	52.0	40.9	72.7	55.0		61.8	35.6	38.8
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	31.2	0.1	0.0	39.2	28.7	0.7	32.1	13.2		47.8	0.7	6.6
Delay (s)	96.6	51.0	49.9	96.3	80.7	41.6	104.8	68.2		109.6	36.4	45.4
Level of Service	F	D	D	F	F	D	F	E		F	D	D
Approach Delay (s)		86.3			76.6			69.2			56.2	
Approach LOS		F			E			E			E	
Intersection Summary												
HCM 2000 Control Delay			66.3		HCM 2000 Level of Service					E		
HCM 2000 Volume to Capacity ratio			1.00									
Actuated Cycle Length (s)			150.6		Sum of lost time (s)					21.3		
Intersection Capacity Utilization			93.2%		ICU Level of Service					F		
Analysis Period (min)			15									
c Critical Lane Group												

Year 2035 + Proj PM
12: Twin Oaks Valley Rd & Deer Springs Rd

Sierra Project
03/17/2017

						
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	70	360	160	2050	1370	60
Future Volume (vph)	70	360	160	2050	1370	60
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.9	4.9	4.0	5.3	5.3	5.3
Lane Util. Factor	1.00	1.00	1.00	0.95	0.95	1.00
Frpb, ped/bikes	1.00	1.00	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)	1770	1583	1770	3539	3539	1546
Flt Permitted	0.95	1.00	0.95	1.00	1.00	1.00
Satd. Flow (perm)	1770	1583	1770	3539	3539	1546
Peak-hour factor, PHF	0.88	0.88	0.88	0.88	0.88	0.88
Adj. Flow (vph)	80	409	182	2330	1557	68
RTOR Reduction (vph)	0	243	0	0	0	18
Lane Group Flow (vph)	80	166	182	2330	1557	50
Confl. Peds. (#/hr)						1
Confl. Bikes (#/hr)						2
Turn Type	Prot	Perm	Prot	NA	NA	Perm
Protected Phases	4		5	2	6	
Permitted Phases		4				6
Actuated Green, G (s)	13.7	13.7	13.3	65.4	48.1	48.1
Effective Green, g (s)	13.7	13.7	13.3	65.4	48.1	48.1
Actuated g/C Ratio	0.15	0.15	0.15	0.73	0.54	0.54
Clearance Time (s)	4.9	4.9	4.0	5.3	5.3	5.3
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	271	242	263	2591	1906	832
v/s Ratio Prot	0.05		0.10	c0.66	0.44	
v/s Ratio Perm		c0.10				0.03
v/c Ratio	0.30	0.69	0.69	0.90	0.82	0.06
Uniform Delay, d1	33.5	35.8	36.1	9.4	17.0	9.8
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	0.6	7.8	7.6	4.6	2.8	0.0
Delay (s)	34.1	43.6	43.7	14.0	19.8	9.9
Level of Service	C	D	D	B	B	A
Approach Delay (s)	42.0			16.2	19.4	
Approach LOS	D			B	B	
Intersection Summary						
HCM 2000 Control Delay			20.0	HCM 2000 Level of Service		C
HCM 2000 Volume to Capacity ratio			0.91			
Actuated Cycle Length (s)			89.3	Sum of lost time (s)		14.2
Intersection Capacity Utilization			69.0%	ICU Level of Service		C
Analysis Period (min)			15			
c Critical Lane Group						

Year 2035 + Proj PM
13: Twin Oaks Valley Rd & Buena Creek Rd

Sierra Project
03/17/2017

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	990	0	310	10	0	0	280	1110	0	10	880	750
Future Volume (vph)	990	0	310	10	0	0	280	1110	0	10	880	750
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		5.0	5.5		4.5	5.5	5.5
Lane Util. Factor	0.97		1.00		1.00		1.00	0.95		1.00	0.95	1.00
Frpb, ped/bikes	1.00		1.00		1.00		1.00	1.00		1.00	1.00	0.98
Flpb, ped/bikes	1.00		1.00		1.00		1.00	1.00		1.00	1.00	1.00
Frt	1.00		0.85		1.00		1.00	1.00		1.00	1.00	0.85
Flt Protected	0.95		1.00		0.95		0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	3433		1583		1770		1770	3539		1770	3539	1558
Flt Permitted	0.75		1.00		0.95		0.95	1.00		0.95	1.00	1.00
Satd. Flow (perm)	2712		1583		1770		1770	3539		1770	3539	1558
Peak-hour factor, PHF	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Adj. Flow (vph)	1065	0	333	11	0	0	301	1194	0	11	946	806
RTOR Reduction (vph)	0	0	175	0	0	0	0	0	0	0	0	307
Lane Group Flow (vph)	1065	0	158	0	11	0	301	1194	0	11	946	499
Confl. Peds. (#/hr)												1
Confl. Bikes (#/hr)												5
Turn Type	Perm		Perm	Perm	NA		Prot	NA		Prot	NA	Perm
Protected Phases					8		5	2		1	6	
Permitted Phases	4		4	8								6
Actuated Green, G (s)	29.6		29.6		29.6		12.0	39.2		0.8	27.5	27.5
Effective Green, g (s)	29.6		29.6		29.6		12.0	39.2		0.8	27.5	27.5
Actuated g/C Ratio	0.35		0.35		0.35		0.14	0.47		0.01	0.33	0.33
Clearance Time (s)	4.0		4.0		4.0		5.0	5.5		4.5	5.5	5.5
Vehicle Extension (s)	3.0		3.0		3.0		3.0	3.0		3.0	3.0	3.0
Lane Grp Cap (vph)	960		560		626		254	1659		16	1164	512
v/s Ratio Prot							c0.17	0.34		0.01	0.27	
v/s Ratio Perm	c0.39		0.10		0.01							c0.32
v/c Ratio	1.11		0.28		0.02		1.19	0.72		0.69	0.81	0.98
Uniform Delay, d1	27.0		19.4		17.5		35.8	17.8		41.3	25.7	27.7
Progression Factor	1.00		1.00		1.00		1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	63.9		0.3		0.0		115.9	1.5		80.1	4.4	33.2
Delay (s)	90.9		19.7		17.6		151.7	19.3		121.4	30.1	60.9
Level of Service	F		B		B		F	B		F	C	E
Approach Delay (s)		73.9			17.6			46.0			44.8	
Approach LOS		E			B			D			D	
Intersection Summary												
HCM 2000 Control Delay			53.8		HCM 2000 Level of Service					D		
HCM 2000 Volume to Capacity ratio			1.07									
Actuated Cycle Length (s)			83.6		Sum of lost time (s)					14.5		
Intersection Capacity Utilization			80.2%		ICU Level of Service					D		
Analysis Period (min)			15									
c Critical Lane Group												

Year 2035 + Proj PM
14: Twin Oaks Valley Rd & Cassou Rd

Sierra Project
03/17/2017

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	20	0	60	20	10	40	50	1090	20	20	850	20
Future Volume (vph)	20	0	60	20	10	40	50	1090	20	20	850	20
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		5.0			5.0		5.0	5.0		5.0	5.0	
Lane Util. Factor		1.00			1.00		1.00	0.95		1.00	0.95	
Frpb, ped/bikes		0.99			1.00		1.00	1.00		1.00	1.00	
Flpb, ped/bikes		1.00			1.00		1.00	1.00		1.00	1.00	
Frt		0.90			0.92		1.00	1.00		1.00	1.00	
Flt Protected		0.99			0.99		0.95	1.00		0.95	1.00	
Satd. Flow (prot)		1638			1696		1770	3529		1770	3527	
Flt Permitted		0.99			0.99		0.95	1.00		0.95	1.00	
Satd. Flow (perm)		1638			1696		1770	3529		1770	3527	
Peak-hour factor, PHF	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Adj. Flow (vph)	22	0	65	22	11	43	54	1172	22	22	914	22
RTOR Reduction (vph)	0	79	0	0	39	0	0	1	0	0	1	0
Lane Group Flow (vph)	0	8	0	0	37	0	54	1193	0	22	935	0
Confl. Peds. (#/hr)			1									
Turn Type	Split	NA		Split	NA		Prot	NA		Prot	NA	
Protected Phases	4	4		8	8		5	2		1	6	
Permitted Phases												
Actuated Green, G (s)		6.6			7.4		4.3	37.7		1.5	34.9	
Effective Green, g (s)		6.6			7.4		4.3	37.7		1.5	34.9	
Actuated g/C Ratio		0.09			0.10		0.06	0.52		0.02	0.48	
Clearance Time (s)		5.0			5.0		5.0	5.0		5.0	5.0	
Vehicle Extension (s)		3.0			3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)		147			171		103	1817		36	1681	
v/s Ratio Prot		c0.00			c0.02		c0.03	c0.34		0.01	0.27	
v/s Ratio Perm												
v/c Ratio		0.05			0.22		0.52	0.66		0.61	0.56	
Uniform Delay, d1		30.4			30.2		33.5	13.0		35.6	13.6	
Progression Factor		1.00			1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2		0.2			0.6		4.7	0.9		27.0	0.4	
Delay (s)		30.6			30.9		38.2	13.9		62.5	14.0	
Level of Service		C			C		D	B		E	B	
Approach Delay (s)		30.6			30.9			14.9			15.2	
Approach LOS		C			C			B			B	

Intersection Summary

HCM 2000 Control Delay	16.1	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.54		
Actuated Cycle Length (s)	73.2	Sum of lost time (s)	20.0
Intersection Capacity Utilization	54.1%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

Year 2035 + Proj PM
15: Twin Oaks Valley Rd & La Cienega

Sierra Project
03/17/2017

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	120	70	1180	140	120	810
Future Volume (vph)	120	70	1180	140	120	810
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)		6.0	6.5		6.0	6.5
Lane Util. Factor		1.00	0.95		1.00	0.95
Frpb, ped/bikes		1.00	1.00		1.00	1.00
Flpb, ped/bikes		1.00	1.00		1.00	1.00
Frt		1.00	0.85		1.00	1.00
Flt Protected		0.95	1.00		0.95	1.00
Satd. Flow (prot)		1770	1583		1770	3539
Flt Permitted		0.95	1.00		0.95	1.00
Satd. Flow (perm)		1770	1583		1770	3539
Peak-hour factor, PHF	0.98	0.98	0.98	0.98	0.98	0.98
Adj. Flow (vph)	122	71	1204	143	122	827
RTOR Reduction (vph)	0	0	9	0	0	0
Lane Group Flow (vph)	122	71	1338	0	122	827
Confl. Peds. (#/hr)				13		
Confl. Bikes (#/hr)				3		
Turn Type	Prot	Perm	NA		Prot	NA
Protected Phases	8		2		1	6
Permitted Phases		8				
Actuated Green, G (s)	12.1	12.1	40.7		10.2	56.9
Effective Green, g (s)	12.1	12.1	40.7		10.2	56.9
Actuated g/C Ratio	0.15	0.15	0.50		0.13	0.70
Clearance Time (s)	6.0	6.0	6.5		6.0	6.5
Vehicle Extension (s)	3.0	3.0	3.0		3.0	3.0
Lane Grp Cap (vph)	262	235	1729		221	2470
v/s Ratio Prot	c0.07		c0.39		c0.07	0.23
v/s Ratio Perm		0.04				
v/c Ratio	0.47	0.30	0.77		0.55	0.33
Uniform Delay, d1	31.7	30.9	16.6		33.5	4.8
Progression Factor	1.00	1.00	1.00		1.00	1.00
Incremental Delay, d2	1.3	0.7	2.2		3.0	0.1
Delay (s)	33.1	31.7	18.9		36.5	4.9
Level of Service	C	C	B		D	A
Approach Delay (s)	32.5		18.9			9.0
Approach LOS	C		B			A

Intersection Summary

HCM 2000 Control Delay	16.2	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.68		
Actuated Cycle Length (s)	81.5	Sum of lost time (s)	18.5
Intersection Capacity Utilization	65.9%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

Year 2035 + Proj PM
16: Twin Oaks Valley Rd & Del Roy Dr

Sierra Project
03/17/2017

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↱		↰	↱		↰	↱		↰	↱	
Traffic Volume (vph)	10	0	60	30	0	10	90	1200	30	20	840	20
Future Volume (vph)	10	0	60	30	0	10	90	1200	30	20	840	20
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	5.0		5.0	5.0		5.0	5.0		5.0	5.0	
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	0.95		1.00	0.95	
Frpb, ped/bikes	1.00	0.99		1.00	1.00		1.00	1.00		1.00	1.00	
Flpb, ped/bikes	1.00	1.00		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		1.00	1.00	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770	1560		1770	1583		1770	3522		1770	3525	
Flt Permitted	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (perm)	1770	1560		1770	1583		1770	3522		1770	3525	
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	11	0	67	33	0	11	100	1333	33	22	933	22
RTOR Reduction (vph)	0	61	0	0	10	0	0	1	0	0	2	0
Lane Group Flow (vph)	11	6	0	33	1	0	100	1365	0	22	953	0
Confl. Peds. (#/hr)								14			1	
Confl. Bikes (#/hr)			1					4			4	
Turn Type	Prot	NA		Prot	NA		Prot	NA		Prot	NA	
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases												
Actuated Green, G (s)	0.5	6.2		1.2	6.9		7.1	39.2		1.2	33.3	
Effective Green, g (s)	0.5	6.2		1.2	6.9		7.1	39.2		1.2	33.3	
Actuated g/C Ratio	0.01	0.09		0.02	0.10		0.10	0.58		0.02	0.49	
Clearance Time (s)	5.0	5.0		5.0	5.0		5.0	5.0		5.0	5.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	13	142		31	161		185	2036		31	1731	
v/s Ratio Prot	0.01	c0.00		c0.02	0.00		c0.06	c0.39		0.01	0.27	
v/s Ratio Perm												
v/c Ratio	0.85	0.04		1.06	0.01		0.54	0.67		0.71	0.55	
Uniform Delay, d1	33.6	28.1		33.3	27.4		28.8	9.8		33.1	12.0	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	166.4	0.1		181.9	0.0		3.2	0.9		54.2	0.4	
Delay (s)	200.1	28.2		215.2	27.4		32.0	10.7		87.3	12.4	
Level of Service	F	C		F	C		C	B		F	B	
Approach Delay (s)		52.5			168.3			12.2			14.1	
Approach LOS		D			F			B			B	

Intersection Summary			
HCM 2000 Control Delay	16.8	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.62		
Actuated Cycle Length (s)	67.8	Sum of lost time (s)	20.0
Intersection Capacity Utilization	58.3%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

Year 2035 + Proj PM
17: Twin Oaks Valley Rd & Windy Wy

Sierra Project
03/17/2017

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↱		↰	↱		↰	↱		↰	↱	
Traffic Volume (vph)	20	0	60	0	0	0	50	1240	10	10	930	10
Future Volume (vph)	20	0	60	0	0	0	50	1240	10	10	930	10
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	6.0		4.0	6.0		4.0	6.0	
Lane Util. Factor	1.00	1.00		1.00	0.95		1.00	0.95		1.00	0.95	
Frpb, ped/bikes	1.00	0.99		1.00	1.00		1.00	1.00		1.00	1.00	
Flpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Frt	1.00	0.85		1.00	1.00		1.00	1.00		1.00	1.00	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770	1563		1770	3534		1770	3534		1770	3533	
Flt Permitted	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (perm)	1770	1563		1770	3534		1770	3534		1770	3533	
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	20	0	60	0	0	0	50	1240	10	10	930	10
RTOR Reduction (vph)	0	54	0	0	0	0	0	0	0	0	1	0
Lane Group Flow (vph)	20	6	0	0	0	0	50	1250	0	10	939	0
Confl. Peds. (#/hr)			1			2			1		4	
Confl. Bikes (#/hr)						2			2		5	
Turn Type	Split	NA					Prot	NA		Prot	NA	
Protected Phases	4	4					5	2		1	6	
Permitted Phases												
Actuated Green, G (s)	5.4	5.4					2.2	32.8		0.6	31.2	
Effective Green, g (s)	5.4	5.4					2.2	32.8		0.6	31.2	
Actuated g/C Ratio	0.10	0.10					0.04	0.62		0.01	0.59	
Clearance Time (s)	4.0	4.0					4.0	6.0		4.0	6.0	
Vehicle Extension (s)	3.0	3.0					3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	181	159					73	2195		20	2087	
v/s Ratio Prot	c0.01	0.00					c0.03	c0.35		0.01	0.27	
v/s Ratio Perm												
v/c Ratio	0.11	0.04					0.68	0.57		0.50	0.45	
Uniform Delay, d1	21.5	21.4					25.0	5.9		26.0	6.0	
Progression Factor	1.00	1.00					1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.3	0.1					23.4	0.3		18.3	0.2	
Delay (s)	21.8	21.5					48.3	6.2		44.3	6.2	
Level of Service	C	C					D	A		D	A	
Approach Delay (s)		21.5			0.0			7.8			6.6	
Approach LOS		C			A			A			A	

Intersection Summary			
HCM 2000 Control Delay	7.8	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.53		
Actuated Cycle Length (s)	52.8	Sum of lost time (s)	14.0
Intersection Capacity Utilization	53.9%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

Year 2035 + Proj PM
18: Twin Oaks Valley Rd & Borden Rd

Sierra Project
03/17/2017

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↱		↰	↱		↰	↱	↱	↰	↱	↱
Traffic Volume (vph)	220	250	260	180	220	50	270	1160	280	90	890	130
Future Volume (vph)	220	250	260	180	220	50	270	1160	280	90	890	130
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.2	5.3		4.2	5.3		4.2	4.9	4.9	4.2	4.9	4.9
Lane Util. Factor	1.00	0.95		1.00	0.95		1.00	0.95	1.00	1.00	0.95	1.00
Frpb, ped/bikes	1.00	0.99		1.00	1.00		1.00	1.00	0.99	1.00	1.00	0.98
Flpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	0.92		1.00	0.97		1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1770	3245		1770	3431		1770	3539	1560	1770	3539	1556
Flt Permitted	0.95	1.00		0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	1770	3245		1770	3431		1770	3539	1560	1770	3539	1556
Peak-hour factor, PHF	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Adj. Flow (vph)	229	260	271	188	229	52	281	1208	292	94	927	135
RTOR Reduction (vph)	0	192	0	0	20	0	0	0	99	0	0	91
Lane Group Flow (vph)	229	339	0	188	261	0	281	1208	193	94	927	44
Confl. Peds. (#/hr)			2									2
Confl. Bikes (#/hr)						3			5			5
Turn Type	Prot	NA		Prot	NA		Prot	NA	Perm	Prot	NA	Perm
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases									2			6
Actuated Green, G (s)	11.9	16.3		11.9	16.3		17.0	39.2	39.2	8.4	30.6	30.6
Effective Green, g (s)	11.9	16.3		11.9	16.3		17.0	39.2	39.2	8.4	30.6	30.6
Actuated g/C Ratio	0.13	0.17		0.13	0.17		0.18	0.42	0.42	0.09	0.32	0.32
Clearance Time (s)	4.2	5.3		4.2	5.3		4.2	4.9	4.9	4.2	4.9	4.9
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)	223	560		223	592		318	1469	647	157	1147	504
v/s Ratio Prot	c0.13	c0.10		0.11	0.08		c0.16	c0.34		0.05	0.26	
v/s Ratio Perm									0.12			0.03
v/c Ratio	1.03	0.61		0.84	0.44		0.88	0.82	0.30	0.60	0.81	0.09
Uniform Delay, d1	41.2	36.1		40.3	35.0		37.7	24.5	18.4	41.4	29.2	22.2
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	67.4	1.9		24.1	0.5		23.9	3.9	0.3	6.0	4.3	0.1
Delay (s)	108.7	37.9		64.4	35.5		61.6	28.4	18.7	47.4	33.5	22.3
Level of Service	F	D		E	D		E	C	B	D	C	C
Approach Delay (s)		59.3			47.1			32.0			33.3	
Approach LOS		E			D			C			C	
Intersection Summary												
HCM 2000 Control Delay		39.0			HCM 2000 Level of Service			D				
HCM 2000 Volume to Capacity ratio		0.85										
Actuated Cycle Length (s)		94.4			Sum of lost time (s)			18.6				
Intersection Capacity Utilization		81.2%			ICU Level of Service			D				
Analysis Period (min)		15										
c Critical Lane Group												

Year 2035 + Proj PM
19: Twin Oaks Valley Rd & Richmar Road

Sierra Project
03/17/2017

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↱		↰	↱		↰	↱	↱	↰	↱	↱
Traffic Volume (vph)	230	40	160	50	30	20	210	1650	70	100	1510	210
Future Volume (vph)	230	40	160	50	30	20	210	1650	70	100	1510	210
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.9	4.9		4.0	4.0		4.0	5.7		4.0	5.7	
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	0.95		1.00	0.95	
Frpb, ped/bikes	1.00	1.00		1.00	0.99		1.00	1.00		1.00	1.00	
Flpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Frt	1.00	0.88		1.00	0.94		1.00	0.99		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	1639		1770	1732		1770	3509		1770	3465	
Flt Permitted	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (perm)	1770	1639		1770	1732		1770	3509		1770	3465	
Peak-hour factor, PHF	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Adj. Flow (vph)	240	42	167	52	31	21	219	1719	73	104	1573	219
RTOR Reduction (vph)	0	84	0	0	16	0	0	2	0	0	6	0
Lane Group Flow (vph)	240	125	0	52	36	0	219	1790	0	104	1786	0
Confl. Peds. (#/hr)						9			7			
Confl. Bikes (#/hr)									8			3
Turn Type	Prot	NA		Prot	NA		Prot	NA		Prot	NA	
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases												
Actuated Green, G (s)	20.3	25.3		8.3	13.3		18.1	82.9		11.1	75.9	
Effective Green, g (s)	20.3	25.3		8.3	13.3		18.1	82.9		11.1	75.9	
Actuated g/C Ratio	0.14	0.17		0.06	0.09		0.12	0.57		0.08	0.52	
Clearance Time (s)	4.9	4.9		4.0	4.0		4.0	5.7		4.0	5.7	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	245	283		100	157		219	1989		134	1798	
v/s Ratio Prot	c0.14	c0.08		0.03	0.02		c0.12	0.51		0.06	c0.52	
v/s Ratio Perm												
v/c Ratio	0.98	0.44		0.52	0.23		1.00	0.90		0.78	0.99	
Uniform Delay, d1	62.7	54.1		67.0	61.7		64.0	28.0		66.3	34.9	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	51.1	1.1		4.8	0.7		60.8	6.0		24.0	19.5	
Delay (s)	113.9	55.2		71.8	62.4		124.9	34.0		90.3	54.4	
Level of Service	F	E		E	E		F	C		F	D	
Approach Delay (s)		86.6			67.1			43.9			56.4	
Approach LOS		F			E			D			E	
Intersection Summary												
HCM 2000 Control Delay		54.0			HCM 2000 Level of Service			D				
HCM 2000 Volume to Capacity ratio		0.94										
Actuated Cycle Length (s)		146.2			Sum of lost time (s)			18.6				
Intersection Capacity Utilization		97.4%			ICU Level of Service			F				
Analysis Period (min)		15										
c Critical Lane Group												

Year 2035 + Proj PM
20: Twin Oaks Valley Rd & San Marcos Blvd

Sierra Project
03/17/2017

	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔
Traffic Volume (vph)	580	1020	460	580	690	130	770	1290	460	160	1190	370
Future Volume (vph)	580	1020	460	580	690	130	770	1290	460	160	1190	370
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.2	5.3	5.3	4.2	5.0		4.2	5.3	4.2	5.0	5.3	5.3
Lane Util. Factor	0.97	0.95	0.88	0.94	0.95		0.97	0.95	1.00	0.97	0.95	1.00
Frpb, ped/bikes	1.00	1.00	0.97	1.00	1.00		1.00	1.00	0.98	1.00	1.00	0.98
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	1.00	0.85	1.00	0.98		1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	3433	3539	2701	4990	3443		3433	3539	1558	3433	3539	1557
Flt Permitted	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	3433	3539	2701	4990	3443		3433	3539	1558	3433	3539	1557
Peak-hour factor, PHF	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Adj. Flow (vph)	624	1097	495	624	742	140	828	1387	495	172	1280	398
RTOR Reduction (vph)	0	0	235	0	11	0	0	0	40	0	0	161
Lane Group Flow (vph)	624	1097	260	624	871	0	828	1387	455	172	1280	237
Confl. Peds. (#/hr)			9			2			4			1
Confl. Bikes (#/hr)			6			7			6			4
Turn Type	Prot	NA	Perm	Prot	NA		Prot	NA	pm+ov	Prot	NA	Perm
Protected Phases	7	4		3	8		5	2	3	1	6	
Permitted Phases			4						2			6
Actuated Green, G (s)	22.8	38.7	38.7	16.8	33.0		26.8	61.3	78.1	8.4	43.7	43.7
Effective Green, g (s)	22.8	38.7	38.7	16.8	33.0		26.8	61.3	78.1	8.4	43.7	43.7
Actuated g/C Ratio	0.16	0.27	0.27	0.12	0.23		0.18	0.42	0.54	0.06	0.30	0.30
Clearance Time (s)	4.2	5.3	5.3	4.2	5.0		4.2	5.3	4.2	5.0	5.3	5.3
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	539	944	720	578	783		634	1496	839	198	1066	469
v/s Ratio Prot	c0.18	c0.31		0.13	0.25		c0.24	0.39	0.06	0.05	c0.36	
v/s Ratio Perm			0.10						0.23			0.15
v/c Ratio	1.16	1.16	0.36	1.08	1.11		1.31	0.93	0.54	0.87	1.20	0.50
Uniform Delay, d1	61.1	53.1	43.1	64.1	56.0		59.1	39.7	21.8	67.8	50.6	41.7
Progression Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	90.2	84.7	0.3	60.7	67.7		148.9	10.2	0.7	30.7	99.5	0.9
Delay (s)	151.3	137.9	43.4	124.8	123.7		208.0	49.9	22.5	98.5	150.2	42.6
Level of Service	F	F	D	F	F		F	D	C	F	F	D
Approach Delay (s)		120.6			124.2			93.2			122.2	
Approach LOS		F			F			F			F	

Intersection Summary			
HCM 2000 Control Delay	112.6	HCM 2000 Level of Service	F
HCM 2000 Volume to Capacity ratio	1.24		
Actuated Cycle Length (s)	145.0	Sum of lost time (s)	19.8
Intersection Capacity Utilization	110.3%	ICU Level of Service	H
Analysis Period (min)	15		
c Critical Lane Group			

Year 2035 + Proj PM
21: Twin Oaks Valley Rd & SR 78 WB Ramps

Sierra Project
03/17/2017

	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations				↔		↔		↔			↔	↔
Traffic Volume (vph)	0	0	0	820	0	330	0	2000	830	0	1780	540
Future Volume (vph)	0	0	0	820	0	330	0	2000	830	0	1780	540
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)				4.6		4.6		5.3	4.6		5.3	5.3
Lane Util. Factor				0.97		0.88		0.91	1.00		0.91	1.00
Frpb, ped/bikes				1.00		1.00		1.00	0.96		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	0.85		1.00	0.85
Flt Protected				0.95		1.00		1.00	1.00		1.00	1.00
Satd. Flow (prot)				3433		2787		5085	1515		5085	1548
Flt Permitted				0.95		1.00		1.00	1.00		1.00	1.00
Satd. Flow (perm)				3433		2787		5085	1515		5085	1548
Peak-hour factor, PHF	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Adj. Flow (vph)	0	0	0	854	0	344	0	2083	865	0	1854	562
RTOR Reduction (vph)	0	0	0	0	0	14	0	0	0	0	0	238
Lane Group Flow (vph)	0	0	0	854	0	330	0	2083	865	0	1854	325
Confl. Peds. (#/hr)									12			
Confl. Bikes (#/hr)									4			4
Turn Type				Prot		Prot		NA	pm+ov		NA	Perm
Protected Phases				8		8		2	8		6	
Permitted Phases								2				6
Actuated Green, G (s)				40.8		40.8		69.3	110.1		69.3	69.3
Effective Green, g (s)				40.8		40.8		69.3	110.1		69.3	69.3
Actuated g/C Ratio				0.34		0.34		0.58	0.92		0.58	0.58
Clearance Time (s)				4.6		4.6		5.3	4.6		5.3	5.3
Vehicle Extension (s)				3.0		3.0		3.0	3.0		3.0	3.0
Lane Grp Cap (vph)				1167		947		2936	1448		2936	893
v/s Ratio Prot				c0.25		0.12		c0.41	0.20		0.36	
v/s Ratio Perm									0.37			0.21
v/c Ratio				0.73		0.35		0.71	0.60		0.63	0.36
Uniform Delay, d1				34.8		29.7		18.1	0.9		16.9	13.6
Progression Factor				1.00		1.00		1.00	1.00		1.00	1.00
Incremental Delay, d2				2.4		0.2		1.5	0.7		1.0	1.1
Delay (s)				37.2		29.9		19.6	1.6		17.9	14.7
Level of Service				D		C		B	A		B	B
Approach Delay (s)		0.0			35.1			14.3			17.2	
Approach LOS		A			D			B			B	

Intersection Summary			
HCM 2000 Control Delay	19.2	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.72		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	9.9
Intersection Capacity Utilization	69.8%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

Year 2035 + Proj PM
22: Twin Oaks Valley Rd & SR 78 EB Ramps

Sierra Project
03/17/2017

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↱	↲					↰↱↲	↰	↱↲	↰↱↲	
Traffic Volume (vph)	270	40	590	0	0	0	0	2520	1150	390	2160	0
Future Volume (vph)	270	40	590	0	0	0	0	2520	1150	390	2160	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.6	4.6	4.6					5.3	5.3	4.2	5.3	
Lane Util. Factor	0.95	0.91	0.95					0.91	1.00	0.97	0.91	
Frpb, ped/bikes	1.00	0.99	0.98					1.00	0.99	1.00	1.00	
Flpb, ped/bikes	1.00	1.00	1.00					1.00	1.00	1.00	1.00	
Frt	1.00	0.88	0.85					1.00	0.85	1.00	1.00	
Flt Protected	0.95	1.00	1.00					1.00	1.00	0.95	1.00	
Satd. Flow (prot)	1681	1468	1481					5085	1561	3433	5085	
Flt Permitted	0.95	1.00	1.00					1.00	1.00	0.95	1.00	
Satd. Flow (perm)	1681	1468	1481					5085	1561	3433	5085	
Peak-hour factor, PHF	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Adj. Flow (vph)	281	42	615	0	0	0	0	2625	1198	406	2250	0
RTOR Reduction (vph)	0	9	36	0	0	0	0	0	266	0	0	0
Lane Group Flow (vph)	253	338	302	0	0	0	0	2625	932	406	2250	0
Confl. Peds. (#/hr)			3									
Confl. Bikes (#/hr)								5				2
Turn Type	Split	NA	Perm					NA	Perm	Prot	NA	
Protected Phases	4	4						2		1	6	
Permitted Phases			4					2				
Actuated Green, G (s)	36.3	36.3	36.3					81.7	81.7	17.9	103.8	
Effective Green, g (s)	36.3	36.3	36.3					81.7	81.7	17.9	103.8	
Actuated g/C Ratio	0.24	0.24	0.24					0.54	0.54	0.12	0.69	
Clearance Time (s)	4.6	4.6	4.6					5.3	5.3	4.2	5.3	
Vehicle Extension (s)	3.0	3.0	3.0					3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	406	355	358					2769	850	409	3518	
v/s Ratio Prot	0.15	c0.23						0.52		c0.12	0.44	
v/s Ratio Perm			0.20					c0.60				
v/c Ratio	0.62	0.95	0.84					0.95	1.10	0.99	0.64	
Uniform Delay, d1	50.7	56.0	54.2					32.2	34.1	66.0	12.8	
Progression Factor	1.00	1.00	1.00					1.00	1.00	1.00	1.00	
Incremental Delay, d2	3.0	35.2	16.5					8.7	60.7	42.4	0.9	
Delay (s)	53.7	91.1	70.6					40.8	94.8	108.3	13.7	
Level of Service	D	F	E					D	F	F	B	
Approach Delay (s)		73.7			0.0			57.7			28.1	
Approach LOS		E			A			E			C	
Intersection Summary												
HCM 2000 Control Delay			49.1									
HCM 2000 Volume to Capacity ratio			1.04									
Actuated Cycle Length (s)			150.0						14.1			
Intersection Capacity Utilization			110.3%									
Analysis Period (min)			15									
c Critical Lane Group												

Year 2035 + Proj PM
28: San Marcos Blvd & Knoll Rd/SR 78 WB Ramps

Sierra Project
03/17/2017

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰		↱	↰	↱	↲		↰	↱	↰	↱	↲
Traffic Volume (vph)	300	0	600	1090	380	50	470	1350	300	0	1150	250
Future Volume (vph)	300	0	600	1090	380	50	470	1350	300	0	1150	250
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.6		5.2	5.6	5.6		5.2	6.3	6.3		6.3	6.3
Lane Util. Factor	1.00		0.88	0.97	0.95		0.97	0.95	1.00		0.91	1.00
Frpb, ped/bikes	1.00		1.00	1.00	1.00		1.00	1.00	0.98		1.00	0.97
Flpb, ped/bikes	1.00		1.00	1.00	1.00		1.00	1.00	1.00		1.00	1.00
Frt	1.00		0.85	1.00	0.98		1.00	1.00	0.85		1.00	0.85
Flt Protected	0.95		1.00	0.95	1.00		0.95	1.00	1.00		1.00	1.00
Satd. Flow (prot)	1770		2787	3433	3477		3433	3539	1549		5085	1539
Flt Permitted	0.95		1.00	0.95	1.00		0.95	1.00	1.00		1.00	1.00
Satd. Flow (perm)	1770		2787	3433	3477		3433	3539	1549		5085	1539
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)	316	0	632	1147	400	53	495	1421	316	0	1211	263
RTOR Reduction (vph)	0	0	52	0	10	0	0	0	119	0	0	92
Lane Group Flow (vph)	316	0	580	1147	443	0	495	1421	197	0	1211	171
Confl. Peds. (#/hr)												12
Confl. Bikes (#/hr)												1
Turn Type	Prot		pm+ov	Prot	NA		Prot	NA	Perm		NA	Perm
Protected Phases	7		5	3	8		5	2			6	
Permitted Phases			7					2				6
Actuated Green, G (s)	18.4		43.4	48.4	24.4		25.0	59.7	59.7		29.5	29.5
Effective Green, g (s)	18.4		43.4	48.4	24.4		25.0	59.7	59.7		29.5	29.5
Actuated g/C Ratio	0.15		0.36	0.40	0.20		0.21	0.50	0.50		0.25	0.25
Clearance Time (s)	5.6		5.2	5.6	5.6		5.2	6.3	6.3		6.3	6.3
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)	271		1007	1384	706		715	1760	770		1250	378
v/s Ratio Prot	c0.18		0.12	c0.33	0.13		0.14	c0.40			c0.24	
v/s Ratio Perm			0.09						0.13			0.11
v/c Ratio	1.17		0.58	0.83	0.63		0.69	0.81	0.26		0.97	0.45
Uniform Delay, d1	50.8		30.9	32.1	43.7		43.9	25.3	17.4		44.8	38.4
Progression Factor	1.00		1.00	1.00	1.00		1.00	1.00	1.00		1.00	1.00
Incremental Delay, d2	107.2		0.8	4.2	1.8		2.9	4.1	0.8		19.0	3.9
Delay (s)	158.0		31.7	36.3	45.4		46.8	29.4	18.2		63.8	42.3
Level of Service	F		C	D	D		D	C	B		E	D
Approach Delay (s)		73.8			38.9			31.7			60.0	
Approach LOS		E			D			C			E	
Intersection Summary												
HCM 2000 Control Delay			46.6									
HCM 2000 Volume to Capacity ratio			0.97									
Actuated Cycle Length (s)			120.0						22.7			
Intersection Capacity Utilization			89.7%						E			
Analysis Period (min)			15									
c Critical Lane Group												

Year 2035 + Proj PM
29: San Marcos Blvd & SR 78 EB Ramps

Sierra Project
03/17/2017

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↱	↲	↰	↱	↲	↰	↱	↲	↰	↱	↲
Traffic Volume (vph)	290	0	170	0	0	0	0	1760	1330	150	2290	0
Future Volume (vph)	290	0	170	0	0	0	0	1760	1330	150	2290	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.6		5.6					6.3	6.3	5.2	6.3	
Lane Util. Factor	0.97		1.00					0.91	0.88	0.97	0.91	
Frpb, ped/bikes	1.00		1.00					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)	3433		1583					5085	2721	3433	5085	
Flt Permitted	0.95		1.00					1.00	1.00	0.95	1.00	
Satd. Flow (perm)	3433		1583					5085	2721	3433	5085	
Peak-hour factor, PHF	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Adj. Flow (vph)	302	0	177	0	0	0	0	1833	1385	156	2385	0
RTOR Reduction (vph)	0	0	67	0	0	0	0	0	457	0	0	0
Lane Group Flow (vph)	302	0	110	0	0	0	0	1833	928	156	2385	0
Confl. Peds. (#/hr)								1			22	
Confl. Bikes (#/hr)								5			4	
Turn Type	Prot		Perm					NA	Perm	Prot	NA	
Protected Phases	4							2		1	6	
Permitted Phases			4					2				
Actuated Green, G (s)	15.9		15.9					76.2	76.2	10.8	92.2	
Effective Green, g (s)	15.9		15.9					76.2	76.2	10.8	92.2	
Actuated g/C Ratio	0.13		0.13					0.64	0.64	0.09	0.77	
Clearance Time (s)	5.6		5.6					6.3	6.3	5.2	6.3	
Vehicle Extension (s)	3.0		3.0					3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	454		209					3228	1727	308	3906	
v/s Ratio Prot	c0.09							0.36		0.05	c0.47	
v/s Ratio Perm			0.07						0.34			
v/c Ratio	0.67		0.53					0.57	0.54	0.51	0.61	
Uniform Delay, d1	49.5		48.5					12.5	12.1	52.1	6.1	
Progression Factor	1.00		1.00					1.00	1.00	1.00	1.00	
Incremental Delay, d2	3.7		2.4					0.7	1.2	1.3	0.7	
Delay (s)	53.2		50.9					13.2	13.3	53.4	6.8	
Level of Service	D		D					B	B	D	A	
Approach Delay (s)		52.4			0.0			13.3			9.6	
Approach LOS		D			A			B			A	
Intersection Summary												
HCM 2000 Control Delay		14.8			HCM 2000 Level of Service			B				
HCM 2000 Volume to Capacity ratio		0.65										
Actuated Cycle Length (s)		120.0			Sum of lost time (s)			17.1				
Intersection Capacity Utilization		73.4%			ICU Level of Service			D				
Analysis Period (min)		15										
c Critical Lane Group												

Year 2035 + Proj PM
30: San Marcos Blvd & E. Mission Road

Sierra Project
03/17/2017

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↱	↲	↰	↱	↲	↰	↱	↲	↰	↱	↲
Traffic Volume (vph)	160	560	60	440	450	90	40	330	720	30	260	100
Future Volume (vph)	160	560	60	440	450	90	40	330	720	30	260	100
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	5.3	5.3	4.0	5.3	5.3	4.0	5.3	5.3	4.0	5.3	
Lane Util. Factor	1.00	0.95	1.00	0.97	0.95	1.00	1.00	0.95	1.00	1.00	0.95	
Frpb, ped/bikes	1.00	1.00	0.98	1.00	1.00	0.97	1.00	1.00	1.00	1.00	1.00	
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.96	
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)	1770	3539	1557	3433	3539	1541	1770	3539	1583	1770	3379	
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	
Satd. Flow (perm)	1770	3539	1557	3433	3539	1541	1770	3539	1583	1770	3379	
Peak-hour factor, PHF	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91
Adj. Flow (vph)	176	615	66	484	495	99	44	363	791	33	286	110
RTOR Reduction (vph)	0	0	51	0	0	73	0	0	277	0	36	0
Lane Group Flow (vph)	176	615	15	484	495	26	44	363	514	33	360	0
Confl. Peds. (#/hr)			3			10						1
Turn Type	Prot	NA	Perm	Prot	NA	Perm	Prot	NA	Prot	Prot	NA	
Protected Phases	7	4		3	8		5	2	2	1	6	
Permitted Phases			4			8						
Actuated Green, G (s)	14.6	22.0	22.0	18.2	25.6	25.6	3.6	37.2	37.2	2.3	35.9	
Effective Green, g (s)	14.6	22.0	22.0	18.2	25.6	25.6	3.6	37.2	37.2	2.3	35.9	
Actuated g/C Ratio	0.15	0.22	0.22	0.19	0.26	0.26	0.04	0.38	0.38	0.02	0.37	
Clearance Time (s)	4.0	5.3	5.3	4.0	5.3	5.3	4.0	5.3	5.3	4.0	5.3	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	262	792	348	635	921	401	64	1339	599	41	1234	
v/s Ratio Prot	0.10	c0.17		c0.14	c0.14		c0.02	0.10	c0.32	0.02	0.11	
v/s Ratio Perm			0.01			0.02						
v/c Ratio	0.67	0.78	0.04	0.76	0.54	0.06	0.69	0.27	0.86	0.80	0.29	
Uniform Delay, d1	39.6	35.8	29.9	38.0	31.3	27.3	46.8	21.2	28.1	47.8	22.2	
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	6.6	4.8	0.1	5.4	0.6	0.1	26.5	0.1	11.6	69.0	0.1	
Delay (s)	46.2	40.6	29.9	43.4	31.9	27.4	73.2	21.3	39.8	116.7	22.3	
Level of Service	D	D	C	D	C	C	E	C	D	F	C	
Approach Delay (s)		41.0			36.6			35.4			29.6	
Approach LOS		D			D			D			C	
Intersection Summary												
HCM 2000 Control Delay		36.4			HCM 2000 Level of Service			D				
HCM 2000 Volume to Capacity ratio		0.81										
Actuated Cycle Length (s)		98.3			Sum of lost time (s)			18.6				
Intersection Capacity Utilization		75.7%			ICU Level of Service			D				
Analysis Period (min)		15										
c Critical Lane Group												

Year 2035 + Proj PM
33: Twin Oaks Valley Rd & Discovery Street/Barham Dr

Sierra Project
03/17/2017

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	740	460	10	330	360	380	10	1490	370	570	670	540
Future Volume (vph)	740	460	10	330	360	380	10	1490	370	570	670	540
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	5.3	4.0	5.0	5.3	4.0	5.0	6.0	5.0	6.0	4.0	5.0
Lane Util. Factor	0.97	0.91	1.00	1.00	1.00	1.00	1.00	0.91	0.97	0.91	1.00	0.97
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.97	1.00	1.00	0.85	1.00
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	0.95	1.00	1.00	0.95
Satd. Flow (prot)	3433	5085	1583	1770	1863	1583	1770	4934	3433	5085	1583	1770
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	0.95	1.00	1.00	0.95
Satd. Flow (perm)	3433	5085	1583	1770	1863	1583	1770	4934	3433	5085	1583	1770
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)	804	500	11	359	391	413	11	1620	402	620	728	587
RTOR Reduction (vph)	0	0	0	0	0	0	0	29	0	0	0	0
Lane Group Flow (vph)	804	500	11	359	391	413	11	1993	0	620	728	587
Turn Type	Prot	NA	Free	Prot	NA	Free	Prot	NA	Prot	NA	Free	Prot
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases			Free			Free						Free
Actuated Green, G (s)	27.0	30.7	148.0	24.0	27.7	148.0	1.6	52.0		20.0	70.4	148.0
Effective Green, g (s)	27.0	30.7	148.0	24.0	27.7	148.0	1.6	52.0		20.0	70.4	148.0
Actuated g/C Ratio	0.18	0.21	1.00	0.16	0.19	1.00	0.01	0.35		0.14	0.48	1.00
Clearance Time (s)	5.0	5.3		5.0	5.3		5.0	6.0		5.0	6.0	
Vehicle Extension (s)	2.0	4.5		2.0	4.5		2.0	3.0		2.0	4.0	
Lane Grp Cap (vph)	626	1054	1583	287	348	1583	19	1733		463	2418	1583
v/s Ratio Prot	c0.23	0.10		0.20	c0.21		0.01	c0.40		c0.18	0.14	
v/s Ratio Perm			0.01			0.26						c0.37
v/c Ratio	1.28	0.47	0.01	1.25	1.12	0.26	0.58	1.15		1.34	0.30	0.37
Uniform Delay, d1	60.5	51.6	0.0	62.0	60.1	0.0	72.9	48.0		64.0	23.7	0.0
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	139.8	0.6	0.0	138.4	86.0	0.4	23.8	74.8		166.6	0.1	0.7
Delay (s)	200.3	52.1	0.0	200.4	146.2	0.4	96.7	122.8		230.6	23.8	0.7
Level of Service	F	D	A	F	F	A	F	F		F	C	A
Approach Delay (s)		142.3			111.1			122.7			83.1	
Approach LOS		F			F			F			F	
Intersection Summary												
HCM 2000 Control Delay		112.7			HCM 2000 Level of Service			F				
HCM 2000 Volume to Capacity ratio		1.21										
Actuated Cycle Length (s)		148.0			Sum of lost time (s)			21.3				
Intersection Capacity Utilization		111.1%			ICU Level of Service			H				
Analysis Period (min)		15										
c Critical Lane Group												

Year 2035 + Proj PM
112: San Marcos Blvd

Sierra Project
03/17/2017

Intersection Sign configuration not allowed in HCM analysis.

APPENDIX I

PEAK HOUR ANALYSIS WORKSHEETS – SAN MARCOS ALTERNATE HORIZON YEAR 2035

APPENDIX I-1

PEAK HOUR ANALYSIS WORKSHEETS – SAN MARCOS ALTERNATE HORIZON YEAR 2035 WITHOUT PROJECT

Alt Year 2035 AM
12: Twin Oaks Valley Rd & Deer Springs Rd

Sierra Project
03/17/2017

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	59	141	138	481	1354	53
Future Volume (vph)	59	141	138	481	1354	53
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.9	4.9	4.0	5.3	5.3	5.3
Lane Util. Factor	1.00	1.00	1.00	0.95	0.95	1.00
Flt Protected	1.00	0.85	1.00	1.00	1.00	0.85
Satd. Flow (prot)	1770	1583	1770	3539	3539	1583
Flt Permitted	0.95	1.00	0.95	1.00	1.00	1.00
Satd. Flow (perm)	1770	1583	1770	3539	3539	1583
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	64	153	150	523	1472	58
RTOR Reduction (vph)	0	135	0	0	0	13
Lane Group Flow (vph)	64	18	150	523	1472	45
Turn Type	Prot	Perm	Prot	NA	NA	Perm
Protected Phases	4		5	2	6	
Permitted Phases		4				6
Actuated Green, G (s)	10.6	10.6	14.6	71.6	53.0	53.0
Effective Green, g (s)	10.6	10.6	14.6	71.6	53.0	53.0
Actuated g/C Ratio	0.11	0.11	0.16	0.77	0.57	0.57
Clearance Time (s)	4.9	4.9	4.0	5.3	5.3	5.3
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	203	181	279	2742	2029	907
v/s Ratio Prot	c0.04		c0.08	0.15	c0.42	
v/s Ratio Perm		0.01				0.03
v/c Ratio	0.32	0.10	0.54	0.19	0.73	0.05
Uniform Delay, d1	37.6	36.6	35.8	2.7	14.4	8.6
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	0.9	0.2	2.0	0.0	1.3	0.0
Delay (s)	38.5	36.9	37.8	2.8	15.7	8.7
Level of Service	D	D	D	A	B	A
Approach Delay (s)	37.3			10.6	15.4	
Approach LOS	D			B	B	
Intersection Summary						
HCM 2000 Control Delay			16.1		HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio			0.63			
Actuated Cycle Length (s)			92.4		Sum of lost time (s)	14.2
Intersection Capacity Utilization			60.2%		ICU Level of Service	B
Analysis Period (min)			15			
c Critical Lane Group						

Alt Year 2035 AM
13: Twin Oaks Valley Rd & Buena Creek Rd

Sierra Project
03/17/2017

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	280	0	240	10	0	0	150	329	10	10	1087	418
Future Volume (vph)	280	0	240	10	0	0	150	329	10	10	1087	418
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		5.0	5.5		5.0	5.5	5.5
Lane Util. Factor	0.97		1.00		1.00		1.00	0.95		1.00	0.95	1.00
Flt Protected	1.00		0.98		1.00		1.00	1.00		1.00	1.00	0.99
Flt Permitted	1.00		1.00		1.00		1.00	1.00		1.00	1.00	1.00
Satd. Flow (prot)	3433		1559		1770		1770	3524		1770	3539	1561
Flt Permitted	0.75		1.00		0.95		0.95	1.00		0.95	1.00	1.00
Satd. Flow (perm)	2714		1559		1770		1770	3524		1770	3539	1561
Peak-hour factor, PHF	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Adj. Flow (vph)	292	0	250	10	0	0	156	343	10	10	1132	435
RTOR Reduction (vph)	0	0	174	0	0	0	0	2	0	0	0	115
Lane Group Flow (vph)	292	0	76	0	10	0	156	351	0	10	1132	320
Confl. Peds. (#/hr)			2									1
Confl. Bikes (#/hr)												3
Turn Type	Perm		Perm	Perm	NA		Prot	NA		Prot	NA	Perm
Protected Phases					8		5	2		1	6	
Permitted Phases	4		4	8								6
Actuated Green, G (s)	14.5		14.5		14.5		11.0	45.5		0.8	35.3	35.3
Effective Green, g (s)	14.5		14.5		14.5		11.0	45.5		0.8	35.3	35.3
Actuated g/C Ratio	0.19		0.19		0.19		0.15	0.60		0.01	0.47	0.47
Clearance Time (s)	4.0		4.0		4.0		5.0	5.5		5.0	5.5	5.5
Vehicle Extension (s)	3.0		3.0		3.0		3.0	3.0		3.0	3.0	3.0
Lane Grp Cap (vph)	522		300		340		258	2129		18	1659	731
v/s Ratio Prot							c0.09	0.10		0.01	c0.32	
v/s Ratio Perm	c0.11		0.05		0.01							0.21
v/c Ratio	0.56		0.25		0.03		0.60	0.17		0.56	0.68	0.44
Uniform Delay, d1	27.5		25.8		24.7		30.1	6.5		37.1	15.6	13.4
Progression Factor	1.00		1.00		1.00		1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	1.3		0.4		0.0		4.0	0.0		32.3	1.2	0.4
Delay (s)	28.8		26.2		24.7		34.1	6.6		69.4	16.8	13.8
Level of Service	C		C		C		C	A		E	B	B
Approach Delay (s)		27.6			24.7			15.0			16.3	
Approach LOS		C			C			B			B	
Intersection Summary												
HCM 2000 Control Delay			18.4									B
HCM 2000 Volume to Capacity ratio			0.64									
Actuated Cycle Length (s)			75.3								14.5	
Intersection Capacity Utilization			62.2%									B
Analysis Period (min)			15									
c Critical Lane Group												

Alt Year 2035 AM
14: Twin Oaks Valley Rd & Cassou Rd

Sierra Project
03/17/2017

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↔			↔		↔	↔		↔	↔	
Traffic Volume (vph)	17	10	50	240	20	46	30	454	240	72	1082	8
Future Volume (vph)	17	10	50	240	20	46	30	454	240	72	1082	8
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		5.0			5.0		5.0	5.0		5.0	5.0	
Lane Util. Factor		1.00			1.00		1.00	0.95		1.00	0.95	
Frpb, ped/bikes		0.99			1.00		1.00	0.99		1.00	1.00	
Flpb, ped/bikes		1.00			1.00		1.00	1.00		1.00	1.00	
Frt		0.91			0.98		1.00	0.95		1.00	1.00	
Flt Protected		0.99			0.96		0.95	1.00		0.95	1.00	
Satd. Flow (prot)		1660			1756		1770	3330		1770	3535	
Flt Permitted		0.99			0.96		0.95	1.00		0.95	1.00	
Satd. Flow (perm)		1660			1756		1770	3330		1770	3535	
Peak-hour factor, PHF	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Adj. Flow (vph)	18	10	52	250	21	48	31	473	250	75	1127	8
RTOR Reduction (vph)	0	48	0	0	4	0	0	49	0	0	1	0
Lane Group Flow (vph)	0	32	0	0	315	0	31	674	0	75	1134	0
Confl. Peds. (#/hr)			6						1			
Turn Type	Split	NA		Split	NA		Prot	NA		Prot	NA	
Protected Phases	4	4		8	8		5	2		1	6	
Permitted Phases												
Actuated Green, G (s)		7.7			23.6		2.4	33.7		7.5	38.8	
Effective Green, g (s)		7.7			23.6		2.4	33.7		7.5	38.8	
Actuated g/C Ratio		0.08			0.26		0.03	0.36		0.08	0.42	
Clearance Time (s)		5.0			5.0		5.0	5.0		5.0	5.0	
Vehicle Extension (s)		3.0			3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)		138			448		45	1213		143	1482	
v/s Ratio Prot		c0.02			c0.18		0.02	0.20		c0.04	c0.32	
v/s Ratio Perm												
v/c Ratio		0.23			0.70		0.69	0.56		0.52	0.77	
Uniform Delay, d1		39.6			31.3		44.7	23.4		40.8	23.0	
Progression Factor		1.00			1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2		0.9			4.9		35.8	0.6		3.4	2.4	
Delay (s)		40.5			36.2		80.5	24.0		44.2	25.4	
Level of Service		D			D		F	C		D	C	
Approach Delay (s)		40.5			36.2			26.3			26.5	
Approach LOS		D			D			C			C	

Intersection Summary			
HCM 2000 Control Delay	28.2	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.70		
Actuated Cycle Length (s)	92.5	Sum of lost time (s)	20.0
Intersection Capacity Utilization	70.6%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

Alt Year 2035 AM
15: Twin Oaks Valley Rd & La Cienega

Sierra Project
03/17/2017

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations	↔	↔	↔	↔	↔	↔
Traffic Volume (vph)	220	236	728	70	71	1311
Future Volume (vph)	220	236	728	70	71	1311
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.0	6.0	6.5		6.0	6.5
Lane Util. Factor	1.00	1.00	0.95		1.00	0.95
Frpb, ped/bikes	1.00	0.99	1.00		1.00	1.00
Flpb, ped/bikes	1.00	1.00	1.00		1.00	1.00
Frt	1.00	0.85	0.99		1.00	1.00
Flt Protected	0.95	1.00	1.00		0.95	1.00
Satd. Flow (prot)	1770	1563	3478		1770	3539
Flt Permitted	0.95	1.00	1.00		0.95	1.00
Satd. Flow (perm)	1770	1563	3478		1770	3539
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	239	257	791	76	77	1425
RTOR Reduction (vph)	0	0	8	0	0	0
Lane Group Flow (vph)	239	257	859	0	77	1425
Confl. Peds. (#/hr)		1		13		
Confl. Bikes (#/hr)				1		
Turn Type	Prot	Perm	NA		Prot	NA
Protected Phases	8		2		1	6
Permitted Phases		8				
Actuated Green, G (s)	17.5	17.5	27.6		6.6	40.2
Effective Green, g (s)	17.5	17.5	27.6		6.6	40.2
Actuated g/C Ratio	0.25	0.25	0.39		0.09	0.57
Clearance Time (s)	6.0	6.0	6.5		6.0	6.5
Vehicle Extension (s)	3.0	3.0	3.0		3.0	3.0
Lane Grp Cap (vph)	441	389	1367		166	2026
v/s Ratio Prot	0.14		0.25		0.04	c0.40
v/s Ratio Perm		c0.16				
v/c Ratio	0.54	0.66	0.63		0.46	0.70
Uniform Delay, d1	22.9	23.7	17.2		30.1	10.7
Progression Factor	1.00	1.00	1.00		1.00	1.00
Incremental Delay, d2	1.4	4.2	0.9		2.0	1.1
Delay (s)	24.2	27.9	18.1		32.2	11.9
Level of Service	C	C	B		C	B
Approach Delay (s)	26.1		18.1			12.9
Approach LOS	C		B			B

Intersection Summary			
HCM 2000 Control Delay	16.8	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.77		
Actuated Cycle Length (s)	70.2	Sum of lost time (s)	18.5
Intersection Capacity Utilization	59.0%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

Alt Year 2035 AM
16: Twin Oaks Valley Rd & Del Roy Dr

Sierra Project
03/17/2017

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↱		↰	↱		↰	↱		↰	↱	
Traffic Volume (vph)	28	0	70	10	0	10	40	790	20	10	1643	18
Future Volume (vph)	28	0	70	10	0	10	40	790	20	10	1643	18
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5	5.0		4.5	5.0		5.0	5.0		5.0	5.0	
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	0.95		1.00	0.95	
Frpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Flpb, ped/bikes	1.00	1.00		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		1.00	1.00	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770	1583		1770	1583		1770	3524		1770	3533	
Flt Permitted	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (perm)	1770	1583		1770	1583		1770	3524		1770	3533	
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)	30	0	76	11	0	11	43	859	22	11	1786	20
RTOR Reduction (vph)	0	67	0	0	10	0	0	1	0	0	1	0
Lane Group Flow (vph)	30	9	0	11	1	0	43	880	0	11	1805	0
Confl. Peds. (#/hr)	2											
Turn Type	Prot	NA		Prot	NA		Prot	NA		Prot	NA	
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases												
Actuated Green, G (s)	1.2	8.9		0.5	8.2		2.0	49.6		0.5	48.1	
Effective Green, g (s)	1.2	8.9		0.5	8.2		2.0	49.6		0.5	48.1	
Actuated g/C Ratio	0.02	0.11		0.01	0.10		0.03	0.63		0.01	0.61	
Clearance Time (s)	4.5	5.0		4.5	5.0		5.0	5.0		5.0	5.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	26	178		11	164		44	2212		11	2151	
v/s Ratio Prot	c0.02	c0.01		0.01	0.00		c0.02	0.25		0.01	c0.51	
v/s Ratio Perm												
v/c Ratio	1.15	0.05		1.00	0.01		0.98	0.40		1.00	0.84	
Uniform Delay, d1	38.9	31.3		39.2	31.7		38.5	7.3		39.2	12.4	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	227.3	0.1		271.4	0.0		125.9	0.1		271.4	3.1	
Delay (s)	266.2	31.4		310.6	31.8		164.3	7.4		310.6	15.4	
Level of Service	F	C		F	C		F	A		F	B	
Approach Delay (s)	97.9		171.2		14.7		17.2					
Approach LOS	F		F		B		B					

Intersection Summary

HCM 2000 Control Delay	20.6	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.74		
Actuated Cycle Length (s)	79.0	Sum of lost time (s)	19.5
Intersection Capacity Utilization	62.5%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

Alt Year 2035 AM
17: Twin Oaks Valley Rd & Windy Wy

Sierra Project
03/17/2017

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	10	10	50	0	0	0	50	810	10	10	1643	70
Future Volume (vph)	10	10	50	0	0	0	50	810	10	10	1643	70
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0					6.0	6.0		4.0	4.0	
Lane Util. Factor	1.00	1.00					1.00	0.95		1.00	0.95	
Frpb, ped/bikes	1.00	0.99					1.00	1.00		1.00	1.00	
Flpb, ped/bikes	1.00	1.00					1.00	1.00		1.00	1.00	
Frt	1.00	0.88					1.00	1.00		1.00	0.99	
Flt Protected	0.95	1.00					0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770	1607					1770	3531		1770	3514	
Flt Permitted	0.95	1.00					0.95	1.00		0.95	1.00	
Satd. Flow (perm)	1770	1607					1770	3531		1770	3514	
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	54	0	0	0	54	880	11	11	1786	76
RTOR Reduction (vph)	0	49	0	0	0	0	0	1	0	0	2	0
Lane Group Flow (vph)	11	16	0	0	0	0	54	890	0	11	1860	0
Confl. Peds. (#/hr)	5			4				5				
Confl. Bikes (#/hr)	5											
Turn Type	Split	NA					Prot	NA				
Protected Phases	4	4					5	2				
Permitted Phases												
Actuated Green, G (s)	7.6	7.6					3.1	57.4				
Effective Green, g (s)	7.6	7.6					3.1	57.4				
Actuated g/C Ratio	0.10	0.10					0.04	0.72				
Clearance Time (s)	4.0	4.0					6.0	6.0				
Vehicle Extension (s)	3.0	3.0					3.0	3.0				
Lane Grp Cap (vph)	168	153					68	2539				
v/s Ratio Prot	0.01	c0.01					c0.03	c0.25				
v/s Ratio Perm												
v/c Ratio	0.07	0.11					0.79	0.35				
Uniform Delay, d1	32.9	33.0					38.0	4.2				
Progression Factor	1.00	1.00					1.00	1.00				
Incremental Delay, d2	0.2	0.3					45.6	0.1				
Delay (s)	33.0	33.3					83.6	4.3				
Level of Service	C	C					F	A				
Approach Delay (s)	33.3		0.0				8.8		10.2			
Approach LOS	C		A				A		B			

Intersection Summary

HCM 2000 Control Delay	10.3	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.69		
Actuated Cycle Length (s)	79.8	Sum of lost time (s)	14.0
Intersection Capacity Utilization	60.7%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

Alt Year 2035 AM
18: Twin Oaks Valley Rd & Borden Rd

Sierra Project
03/17/2017

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↱		↰	↱		↰	↱		↰	↱	
Traffic Volume (vph)	60	50	280	300	120	37	110	623	70	18	1324	131
Future Volume (vph)	60	50	280	300	120	37	110	623	70	18	1324	131
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.2	5.3		4.2	5.3		4.2	4.9	4.9	4.2	4.9	4.9
Lane Util. Factor	1.00	0.95		1.00	0.95		1.00	0.95	1.00	1.00	0.95	1.00
Frpb, ped/bikes	1.00	0.98		1.00	1.00		1.00	1.00	0.98	1.00	1.00	0.98
Flpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	0.87		1.00	0.96		1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1770	3029		1770	3401		1770	3539	1555	1770	3539	1549
Flt Permitted	0.95	1.00		0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	1770	3029		1770	3401		1770	3539	1555	1770	3539	1549
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	53	295	316	126	39	116	656	74	19	1394	138
RTOR Reduction (vph)	0	132	0	0	17	0	0	0	35	0	0	64
Lane Group Flow (vph)	63	216	0	316	148	0	116	656	39	19	1394	74
Confl. Peds. (#/hr)			6		2				3			6
Confl. Bikes (#/hr)			1		1				3			3
Turn Type	Prot	NA		Prot	NA		Prot	NA	Perm	Prot	NA	Perm
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases									2			6
Actuated Green, G (s)	8.6	20.0		32.4	43.8		14.3	81.3	81.3	3.3	70.3	70.3
Effective Green, g (s)	8.6	20.0		32.4	43.8		14.3	81.3	81.3	3.3	70.3	70.3
Actuated g/C Ratio	0.06	0.13		0.21	0.28		0.09	0.52	0.52	0.02	0.45	0.45
Clearance Time (s)	4.2	5.3		4.2	5.3		4.2	4.9	4.9	4.2	4.9	4.9
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)	97	389		368	957		162	1849	812	37	1598	699
v/s Ratio Prot	0.04	c0.07		c0.18	0.04		c0.07	0.19		0.01	c0.39	
v/s Ratio Perm								0.02			0.05	
v/c Ratio	0.65	0.91dr		0.86	0.16		0.72	0.35	0.05	0.51	0.87	0.11
Uniform Delay, d1	72.0	63.6		59.4	42.0		68.7	21.8	18.2	75.4	38.6	24.6
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	14.0	1.7		17.7	0.1		14.0	0.1	0.0	11.5	5.6	0.1
Delay (s)	86.0	65.3		77.1	42.1		82.7	21.9	18.2	86.9	44.1	24.6
Level of Service	F	E		E	D		F	C	B	F	D	C
Approach Delay (s)		68.5			65.1			29.9			42.9	
Approach LOS		E			E			C			D	
Intersection Summary												
HCM 2000 Control Delay		46.0			HCM 2000 Level of Service			D				
HCM 2000 Volume to Capacity ratio		0.81										
Actuated Cycle Length (s)		155.6			Sum of lost time (s)			18.6				
Intersection Capacity Utilization		88.2%			ICU Level of Service			E				
Analysis Period (min)		15										
dr Defacto Right Lane. Recode with 1 though lane as a right lane.												
c Critical Lane Group												

Alt Year 2035 AM
19: Twin Oaks Valley Rd & Richmar Ave

Sierra Project
03/17/2017

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↱		↰	↱		↰	↱		↰	↱	
Traffic Volume (vph)	240	10	170	20	10	10	90	813	20	30	1584	320
Future Volume (vph)	240	10	170	20	10	10	90	813	20	30	1584	320
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.9	4.9		4.0	4.0		4.0	5.7		4.0	5.7	
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	0.95		1.00	0.95	
Frpb, ped/bikes	1.00	0.99		1.00	0.99		1.00	1.00		1.00	0.99	
Flpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Frt	1.00	0.86		1.00	0.93		1.00	1.00		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	1578		1770	1704		1770	3524		1770	3433	
Flt Permitted	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (perm)	1770	1578		1770	1704		1770	3524		1770	3433	
Peak-hour factor, PHF	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99
Adj. Flow (vph)	242	10	172	20	10	10	91	821	20	30	1600	323
RTOR Reduction (vph)	0	148	0	0	9	0	0	1	0	0	10	0
Lane Group Flow (vph)	242	34	0	20	11	0	91	840	0	30	1913	0
Confl. Peds. (#/hr)						8				4		2
Confl. Bikes (#/hr)			1						1			3
Turn Type	Split	NA		Split	NA		Prot	NA		Prot	NA	
Protected Phases	4	4		8	8		5	2		1	6	
Permitted Phases												
Actuated Green, G (s)	17.3	17.3		7.6	7.6		7.1	75.0		3.8	71.7	
Effective Green, g (s)	17.3	17.3		7.6	7.6		7.1	75.0		3.8	71.7	
Actuated g/C Ratio	0.14	0.14		0.06	0.06		0.06	0.61		0.03	0.59	
Clearance Time (s)	4.9	4.9		4.0	4.0		4.0	5.7		4.0	5.7	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	250	223		109	105		102	2161		54	2012	
v/s Ratio Prot	c0.14	0.02		c0.01	0.01		c0.05	c0.24		0.02	c0.56	
v/s Ratio Perm												
v/c Ratio	0.97	0.15		0.18	0.10		0.89	0.39		0.56	0.95	
Uniform Delay, d1	52.2	46.1		54.4	54.1		57.2	12.0		58.4	23.7	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	47.5	0.3		0.8	0.4		55.9	0.1		11.8	10.7	
Delay (s)	99.7	46.4		55.2	54.6		113.1	12.1		70.2	34.4	
Level of Service	F	D		E	D		F	B		E	C	
Approach Delay (s)		76.8			54.9			22.0			34.9	
Approach LOS		E			D			C			C	
Intersection Summary												
HCM 2000 Control Delay		36.9			HCM 2000 Level of Service			D				
HCM 2000 Volume to Capacity ratio		0.88										
Actuated Cycle Length (s)		122.3			Sum of lost time (s)			18.6				
Intersection Capacity Utilization		91.1%			ICU Level of Service			F				
Analysis Period (min)		15										
c Critical Lane Group												

Alt Year 2035 AM
20: Twin Oaks Valley Rd & San Marcos Blvd

Sierra Project
03/17/2017

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↱	↱	↰	↱		↰	↱	↱	↰	↱	↱
Traffic Volume (vph)	226	420	450	560	700	45	410	652	560	122	1267	385
Future Volume (vph)	226	420	450	560	700	45	410	652	560	122	1267	385
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.2	5.3	5.3	4.2	5.0		4.2	5.3	4.2	5.3	5.3	5.3
Lane Util. Factor	0.97	0.95	0.88	0.94	0.95		0.97	0.95	1.00	0.97	0.95	1.00
Frpb, ped/bikes	1.00	1.00	0.97	1.00	1.00		1.00	1.00	0.99	1.00	1.00	0.99
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	1.00	0.85	1.00	0.99		1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	3433	3539	2712	4990	3503		3433	3539	1565	3433	3539	1562
Flt Permitted	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	3433	3539	2712	4990	3503		3433	3539	1565	3433	3539	1562
Peak-hour factor, PHF	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98
Adj. Flow (vph)	231	429	459	571	714	46	418	665	571	124	1293	393
RTOR Reduction (vph)	0	0	252	0	4	0	0	0	38	0	0	160
Lane Group Flow (vph)	231	429	207	571	756	0	418	665	533	124	1293	233
Confl. Peds. (#/hr)			5			4			1			1
Confl. Bikes (#/hr)			8			3			3			3
Turn Type	Prot	NA	Perm	Prot	NA		Prot	NA	pm+ov	Prot	NA	Perm
Protected Phases	7	4		3	8		5	2	3	1	6	
Permitted Phases			4						2			6
Actuated Green, G (s)	11.1	25.9	25.9	15.0	30.1		15.4	54.3	69.3	8.5	47.4	47.4
Effective Green, g (s)	11.1	25.9	25.9	15.0	30.1		15.4	54.3	69.3	8.5	47.4	47.4
Actuated g/C Ratio	0.09	0.21	0.21	0.12	0.25		0.13	0.44	0.56	0.07	0.39	0.39
Clearance Time (s)	4.2	5.3	5.3	4.2	5.0		4.2	5.3	4.2	5.3	5.3	5.3
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	310	747	572	610	859		430	1566	883	237	1367	603
v/s Ratio Prot	0.07	0.12		c0.11	c0.22		c0.12	0.19	0.07	0.04	c0.37	
v/s Ratio Perm			0.08						0.27			0.15
v/c Ratio	0.75	0.57	0.36	0.94	0.88		0.97	0.42	0.60	0.52	0.95	0.39
Uniform Delay, d1	54.4	43.5	41.3	53.4	44.6		53.4	23.5	17.6	55.1	36.4	27.2
Progression Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	9.4	1.1	0.4	21.8	10.4		35.9	0.2	1.2	2.1	13.4	0.4
Delay (s)	63.8	44.5	41.7	75.2	55.0		89.4	23.7	18.8	57.2	49.8	27.6
Level of Service	E	D	D	E	E		F	C	B	E	D	C
Approach Delay (s)		47.4			63.7			38.6			45.5	
Approach LOS		D			E			D			D	

Intersection Summary			
HCM 2000 Control Delay	48.0	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.95		
Actuated Cycle Length (s)	122.7	Sum of lost time (s)	19.0
Intersection Capacity Utilization	89.9%	ICU Level of Service	E
Analysis Period (min)	15		
c Critical Lane Group			

Alt Year 2035 AM
21: Twin Oaks Valley Rd & SR 78 WB Ramps

Sierra Project
03/17/2017

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations				↰		↱		↱		↰	↱	↱
Traffic Volume (vph)	0	0	0	720	0	320	0	1302	620	0	1765	662
Future Volume (vph)	0	0	0	720	0	320	0	1302	620	0	1765	662
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)				4.6		4.6		5.3	4.6		5.3	5.3
Lane Util. Factor				0.97		0.88		0.91	1.00		0.91	1.00
Frpb, ped/bikes				1.00		1.00		1.00	0.97		1.00	0.97
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	0.85
Flt Protected				0.95		1.00		1.00	1.00		1.00	1.00
Satd. Flow (prot)				3433		2787		5085	1539		5085	1543
Flt Permitted				0.95		1.00		1.00	1.00		1.00	1.00
Satd. Flow (perm)				3433		2787		5085	1539		5085	1543
Peak-hour factor, PHF	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98
Adj. Flow (vph)	0	0	0	735	0	327	0	1329	633	0	1801	676
RTOR Reduction (vph)	0	0	0	0	0	57	0	0	0	0	0	237
Lane Group Flow (vph)	0	0	0	735	0	270	0	1329	633	0	1801	439
Confl. Peds. (#/hr)								8			5	
Confl. Bikes (#/hr)								1			3	
Turn Type				Prot		Perm		NA	pm+ov		NA	Perm
Protected Phases				8				2	8		6	
Permitted Phases						8		2			6	
Actuated Green, G (s)				32.2		32.2		77.9	110.1		77.9	77.9
Effective Green, g (s)				32.2		32.2		77.9	110.1		77.9	77.9
Actuated g/C Ratio				0.27		0.27		0.65	0.92		0.65	0.65
Clearance Time (s)				4.6		4.6		5.3	4.6		5.3	5.3
Vehicle Extension (s)				2.0		2.0		2.0	2.0		2.0	2.0
Lane Grp Cap (vph)				921		747		3301	1471		3301	1001
v/s Ratio Prot				c0.21				0.26	0.12		c0.35	
v/s Ratio Perm						0.10			0.30			0.28
v/c Ratio				0.80		0.36		0.40	0.43		0.55	0.44
Uniform Delay, d1				40.9		35.6		10.0	0.7		11.4	10.3
Progression Factor				1.00		1.00		0.45	9.83		1.00	1.00
Incremental Delay, d2				4.6		0.1		0.2	0.0		0.7	1.4
Delay (s)				45.4		35.7		4.7	6.7		12.1	11.7
Level of Service				D		D		A	A		B	B
Approach Delay (s)		0.0			42.4			5.3			12.0	
Approach LOS		A			D			A			B	

Intersection Summary			
HCM 2000 Control Delay	15.5	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.62		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	9.9
Intersection Capacity Utilization	62.4%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

Alt Year 2035 AM
22: Twin Oaks Valley Rd & SR 78 EB Ramps

Sierra Project
03/17/2017

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↱	↲					↰	↱	↲	↰	↱
Traffic Volume (vph)	676	10	900	0	0	0	0	1256	740	370	2115	0
Future Volume (vph)	676	10	900	0	0	0	0	1256	740	370	2115	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.6	4.6	4.6					5.3	5.3	4.2	5.3	
Lane Util. Factor	0.95	0.91	0.95					0.91	1.00	0.97	0.91	
Frpb, ped/bikes	1.00	0.99	0.99					1.00	0.98	1.00	1.00	
Flpb, ped/bikes	1.00	1.00	1.00					1.00	1.00	1.00	1.00	
Frt	1.00	0.89	0.85					1.00	0.85	1.00	1.00	
Flt Protected	0.95	0.99	1.00					1.00	1.00	0.95	1.00	
Satd. Flow (prot)	1681	1475	1485					5085	1553	3433	5085	
Flt Permitted	0.95	0.99	1.00					1.00	1.00	0.95	1.00	
Satd. Flow (perm)	1681	1475	1485					5085	1553	3433	5085	
Peak-hour factor, PHF	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Adj. Flow (vph)	697	10	928	0	0	0	0	1295	763	381	2180	0
RTOR Reduction (vph)	0	1	35	0	0	0	0	0	509	0	0	0
Lane Group Flow (vph)	565	540	494	0	0	0	0	1295	254	381	2180	0
Confl. Peds. (#/hr)			1						4			
Confl. Bikes (#/hr)												1
Turn Type	Split	NA	Perm					NA	Perm	Prot	NA	
Protected Phases	4	4						2		1	6	
Permitted Phases			4						2			
Actuated Green, G (s)	49.6	49.6	49.6					40.0	40.0	16.3	60.5	
Effective Green, g (s)	49.6	49.6	49.6					40.0	40.0	16.3	60.5	
Actuated g/C Ratio	0.41	0.41	0.41					0.33	0.33	0.14	0.50	
Clearance Time (s)	4.6	4.6	4.6					5.3	5.3	4.2	5.3	
Vehicle Extension (s)	3.0	3.0	3.0					3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	694	609	613					1695	517	466	2563	
v/s Ratio Prot	0.34	c0.37						0.25		0.11	c0.43	
v/s Ratio Perm			0.33						0.16			0.10
v/c Ratio	0.81	0.89	0.81					0.76	0.49	0.82	0.85	
Uniform Delay, d1	31.1	32.6	31.0					35.8	31.9	50.4	25.8	
Progression Factor	1.00	1.00	1.00					1.00	1.00	1.14	1.20	
Incremental Delay, d2	7.3	14.5	7.7					3.3	3.3	9.1	3.2	
Delay (s)	38.4	47.1	38.6					39.1	35.2	66.8	34.3	
Level of Service	D	D	D					D	D	E	C	
Approach Delay (s)		41.4			0.0			37.7			39.1	
Approach LOS		D			A			D			D	
Intersection Summary												
HCM 2000 Control Delay			39.2									
HCM 2000 Volume to Capacity ratio			0.90									
Actuated Cycle Length (s)			120.0						14.1			
Intersection Capacity Utilization			96.8%						F			
Analysis Period (min)			15									
c Critical Lane Group												

Alt Year 2035 AM
28: San Marcos Blvd & Knoll Rd/SR 78 WB Ramps

Sierra Project
03/17/2017

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰		↱	↰	↱	↲		↰	↱	↲	↰	↱
Traffic Volume (vph)	200	0	580	1130	410	20	380	461	140	0	1044	240
Future Volume (vph)	200	0	580	1130	410	20	380	461	140	0	1044	240
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.6		5.2	5.6	5.6		5.2	6.3	6.3		6.3	6.3
Lane Util. Factor	1.00		0.88	0.97	0.95		0.97	0.95	1.00		0.91	1.00
Frpb, ped/bikes	1.00		1.00	1.00	1.00		1.00	1.00	1.00		1.00	0.98
Flpb, ped/bikes	1.00		1.00	1.00	1.00		1.00	1.00	1.00		1.00	1.00
Frt	1.00		0.85	1.00	0.99		1.00	1.00	0.85		1.00	0.85
Flt Protected	0.95		1.00	0.95	1.00		0.95	1.00	1.00		1.00	1.00
Satd. Flow (prot)	1770		2787	3433	3512		3433	3539	1583		5085	1546
Flt Permitted	0.95		1.00	0.95	1.00		0.95	1.00	1.00		1.00	1.00
Satd. Flow (perm)	1770		2787	3433	3512		3433	3539	1583		5085	1546
Peak-hour factor, PHF	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Adj. Flow (vph)	206	0	598	1165	423	21	392	475	144	0	1076	247
RTOR Reduction (vph)	0	0	58	0	3	0	0	0	73	0	0	88
Lane Group Flow (vph)	206	0	540	1165	441	0	392	475	71	0	1076	159
Confl. Peds. (#/hr)							1					8
Confl. Bikes (#/hr)												2
Turn Type	Prot	pm+ov	Prot	NA			Prot	NA	Perm		NA	Perm
Protected Phases	7		5	3	8		5	2			6	
Permitted Phases			7					2				6
Actuated Green, G (s)	15.9		34.1	48.8	27.3		18.2	59.3	59.3		35.9	35.9
Effective Green, g (s)	15.9		34.1	48.8	27.3		18.2	59.3	59.3		35.9	35.9
Actuated g/C Ratio	0.13		0.28	0.41	0.23		0.15	0.49	0.49		0.30	0.30
Clearance Time (s)	5.6		5.2	5.6	5.6		5.2	6.3	6.3		6.3	6.3
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		791	1396	798		520	1748	782		1521	462
v/s Ratio Prot	0.12		0.10	c0.34	0.13		c0.11	0.13			c0.21	
v/s Ratio Perm			0.09						0.04			0.10
v/c Ratio	0.88		0.68	0.83	0.55		0.75	0.27	0.09		0.71	0.34
Uniform Delay, d1	51.1		38.1	32.0	41.0		48.8	17.7	16.1		37.4	32.8
Progression Factor	1.00		1.00	1.00	1.00		0.93	1.62	4.85		1.00	1.00
Incremental Delay, d2	29.5		2.4	4.5	0.8		6.0	0.4	0.2		2.8	2.0
Delay (s)	80.6		40.6	36.4	41.8		51.1	29.2	78.3		40.2	34.9
Level of Service	F		D	D	D		D	C	E		D	C
Approach Delay (s)		50.9			37.9			44.7			39.2	
Approach LOS		D			D			D			D	
Intersection Summary												
HCM 2000 Control Delay			41.9									
HCM 2000 Volume to Capacity ratio			0.82									
Actuated Cycle Length (s)			120.0						22.7			
Intersection Capacity Utilization			90.1%						E			
Analysis Period (min)			15									
c Critical Lane Group												

Alt Year 2035 AM
29: San Marcos Blvd & SR 78 EB Ramps

Sierra Project
03/17/2017

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↰	↰	↰	↰	↰	↰	↰	↰	↰	↰	↰
Traffic Volume (vph)	171	0	260	0	0	0	0	830	840	190	2450	0
Future Volume (vph)	171	0	260	0	0	0	0	830	840	190	2450	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.6		5.6					6.3	6.3	5.2	6.3	
Lane Util. Factor	0.97		1.00					0.91	0.88	0.97	0.91	
Frpb, ped/bikes	1.00		1.00					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)	3433		1583					5085	2726	3433	5085	
Flt Permitted	0.95		1.00					1.00	1.00	0.95	1.00	
Satd. Flow (perm)	3433		1583					5085	2726	3433	5085	
Peak-hour factor, PHF	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Adj. Flow (vph)	178	0	271	0	0	0	0	865	875	198	2552	0
RTOR Reduction (vph)	0	0	64	0	0	0	0	0	359	0	0	0
Lane Group Flow (vph)	178	0	207	0	0	0	0	865	516	198	2552	0
Confl. Peds. (#/hr)												6
Confl. Bikes (#/hr)												4
Turn Type	Prot		Perm					NA	Perm	Prot	NA	
Protected Phases	4							2		1	6	
Permitted Phases			4					2				
Actuated Green, G (s)	20.6		20.6					70.7	70.7	11.6	87.5	
Effective Green, g (s)	20.6		20.6					70.7	70.7	11.6	87.5	
Actuated g/C Ratio	0.17		0.17					0.59	0.59	0.10	0.73	
Clearance Time (s)	5.6		5.6					6.3	6.3	5.2	6.3	
Vehicle Extension (s)	3.0		3.0					3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	589		271					2995	1606	331	3707	
v/s Ratio Prot	0.05							0.17		0.06	c0.50	
v/s Ratio Perm			c0.13						0.19			
v/c Ratio	0.30		0.76					0.29	0.32	0.60	0.69	
Uniform Delay, d1	43.4		47.4					12.2	12.5	52.0	8.8	
Progression Factor	1.00		1.00					1.00	1.00	1.15	0.52	
Incremental Delay, d2	0.3		12.1					0.2	0.5	2.5	0.9	
Delay (s)	43.7		59.5					12.4	13.0	62.1	5.6	
Level of Service	D		E					B	B	E	A	
Approach Delay (s)		53.2			0.0			12.7			9.6	
Approach LOS		D			A			B			A	

Intersection Summary			
HCM 2000 Control Delay	14.7	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.74		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	17.1
Intersection Capacity Utilization	73.4%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			

Alt Year 2035 AM
30: San Marcos Blvd & E. Mission Road

Sierra Project
03/17/2017

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↰	↰	↰	↰	↰	↰	↰	↰	↰	↰	↰
Traffic Volume (vph)	30	320	20	735	540	80	10	80	322	100	450	50
Future Volume (vph)	30	320	20	735	540	80	10	80	322	100	450	50
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	5.3	5.3	4.0	5.3	5.3	4.0	5.3	5.3	4.0	5.3	
Lane Util. Factor	1.00	0.95	1.00	0.97	0.95	1.00	1.00	0.95	1.00	1.00	0.95	
Frpb, ped/bikes	1.00	1.00	0.99	1.00	1.00	0.97	1.00	1.00	1.00	1.00	1.00	
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.99	
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)	1770	3539	1561	3433	3539	1530	1770	3539	1583	1770	3486	
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	
Satd. Flow (perm)	1770	3539	1561	3433	3539	1530	1770	3539	1583	1770	3486	
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)	33	348	22	799	587	87	11	87	350	109	489	54
RTOR Reduction (vph)	0	0	18	0	0	47	0	0	296	0	5	0
Lane Group Flow (vph)	33	348	4	799	587	40	11	87	54	109	538	0
Confl. Peds. (#/hr)			2			12						
Turn Type	Prot	NA	Perm	Prot	NA	Perm	Prot	NA	Prot	Prot	NA	
Protected Phases	7	4		3	8		5	2	2	1	6	
Permitted Phases			4			8						
Actuated Green, G (s)	4.7	18.6	18.6	29.2	43.1	43.1	0.9	14.4	14.4	12.5	26.0	
Effective Green, g (s)	4.7	18.6	18.6	29.2	43.1	43.1	0.9	14.4	14.4	12.5	26.0	
Actuated g/C Ratio	0.05	0.20	0.20	0.31	0.46	0.46	0.01	0.15	0.15	0.13	0.28	
Clearance Time (s)	4.0	5.3	5.3	4.0	5.3	5.3	4.0	5.3	5.3	4.0	5.3	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	89	705	311	1074	1634	706	17	546	244	237	971	
v/s Ratio Prot	0.02	c0.10		c0.23	0.17		0.01	0.02	0.03	c0.06	c0.15	
v/s Ratio Perm			0.00			0.03						
v/c Ratio	0.37	0.49	0.01	0.74	0.36	0.06	0.65	0.16	0.22	0.46	0.55	
Uniform Delay, d1	42.9	33.2	30.0	28.7	16.2	13.9	46.0	34.2	34.5	37.3	28.7	
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	2.6	0.5	0.0	2.8	0.1	0.0	62.0	0.1	0.5	1.4	0.7	
Delay (s)	45.5	33.7	30.0	31.5	16.3	13.9	108.0	34.3	35.0	38.7	29.4	
Level of Service	D	C	C	C	B	B	F	C	D	D	C	
Approach Delay (s)		34.5			24.4			36.7			30.9	
Approach LOS		C			C			D			C	

Intersection Summary			
HCM 2000 Control Delay	29.1	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.62		
Actuated Cycle Length (s)	93.3	Sum of lost time (s)	18.6
Intersection Capacity Utilization	56.8%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

Alt Year 2035 AM

Sierra Project

33: Twin Oaks Valley Rd & Discovery Street/Barham Dr

03/17/2017

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	390	100	10	390	500	261	30	945	170	564	1201	700
Future Volume (vph)	390	100	10	390	500	261	30	945	170	564	1201	700
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	5.3	5.3	5.0	5.3	5.3	5.0	6.0		5.0	6.0	6.0
Lane Util. Factor	0.97	0.91	1.00	1.00	1.00	1.00	1.00	0.91		0.97	0.91	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.98		1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	3433	5085	1583	1770	1863	1583	1770	4969		3433	5085	1583
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00
Satd. Flow (perm)	3433	5085	1583	1770	1863	1583	1770	4969		3433	5085	1583
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)	424	109	11	424	543	284	33	1027	185	613	1305	761
RTOR Reduction (vph)	0	0	9	0	0	139	0	17	0	0	0	244
Lane Group Flow (vph)	424	109	2	424	543	145	33	1195	0	613	1305	517
Turn Type	Prot	NA	Perm	Prot	NA	Perm	Prot	NA		Prot	NA	Perm
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases			4			8						6
Actuated Green, G (s)	19.0	28.0	28.0	36.7	45.7	45.7	4.0	37.6		27.0	60.6	60.6
Effective Green, g (s)	19.0	28.0	28.0	36.7	45.7	45.7	4.0	37.6		27.0	60.6	60.6
Actuated g/C Ratio	0.13	0.19	0.19	0.24	0.30	0.30	0.03	0.25		0.18	0.40	0.40
Clearance Time (s)	5.0	5.3	5.3	5.0	5.3	5.3	5.0	6.0		5.0	6.0	6.0
Vehicle Extension (s)	2.0	4.5	4.5	2.0	4.5	4.5	2.0	3.0		2.0	4.0	4.0
Lane Grp Cap (vph)	433	945	294	431	565	480	47	1240		615	2046	636
v/s Ratio Prot	0.12	0.02		c0.24	c0.29		0.02	c0.24		c0.18	0.26	
v/s Ratio Perm			0.00			0.09						0.33
v/c Ratio	0.98	0.12	0.01	0.98	0.96	0.30	0.70	0.96		1.00	0.64	0.81
Uniform Delay, d1	65.6	51.0	50.0	56.7	51.6	40.2	72.7	55.8		61.8	36.2	40.0
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	37.2	0.1	0.0	38.7	28.5	0.6	32.1	17.4		35.2	0.7	8.2
Delay (s)	102.8	51.1	50.0	95.4	80.1	40.8	104.8	73.2		96.9	36.9	48.2
Level of Service	F	D	D	F	F	D	F	E		F	D	D
Approach Delay (s)		91.4			76.4			74.1			53.9	
Approach LOS		F			E			E			D	
Intersection Summary												
HCM 2000 Control Delay			66.7		HCM 2000 Level of Service						E	
HCM 2000 Volume to Capacity ratio			0.99									
Actuated Cycle Length (s)			150.6		Sum of lost time (s)						21.3	
Intersection Capacity Utilization			93.3%		ICU Level of Service						F	
Analysis Period (min)			15									
c Critical Lane Group												

Alt Year 2035 PM
12: Twin Oaks Valley Rd & Deer Springs Rd

Sierra Project
03/17/2017

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	69	386	159	1141	833	58
Future Volume (vph)	69	386	159	1141	833	58
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.9	4.9	4.0	5.3	5.3	5.3
Lane Util. Factor	1.00	1.00	1.00	0.95	0.95	1.00
Frpb, ped/bikes	1.00	1.00	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)	1770	1583	1770	3539	3539	1547
Flt Permitted	0.95	1.00	0.95	1.00	1.00	1.00
Satd. Flow (perm)	1770	1583	1770	3539	3539	1547
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	75	420	173	1240	905	63
RTOR Reduction (vph)	0	323	0	0	0	33
Lane Group Flow (vph)	75	98	173	1240	905	30
Confl. Peds. (#/hr)						1
Confl. Bikes (#/hr)						2
Turn Type	Prot	Perm	Prot	NA	NA	Perm
Protected Phases	4		5	2	6	
Permitted Phases		4				6
Actuated Green, G (s)	10.3	10.3	12.2	41.3	25.1	25.1
Effective Green, g (s)	10.3	10.3	12.2	41.3	25.1	25.1
Actuated g/C Ratio	0.17	0.17	0.20	0.67	0.41	0.41
Clearance Time (s)	4.9	4.9	4.0	5.3	5.3	5.3
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	295	263	349	2365	1437	628
v/s Ratio Prot	0.04		0.10	c0.35	c0.26	
v/s Ratio Perm		c0.06				0.02
v/c Ratio	0.25	0.37	0.50	0.52	0.63	0.05
Uniform Delay, d1	22.4	22.9	22.1	5.2	14.6	11.1
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	0.5	0.9	1.1	0.2	0.9	0.0
Delay (s)	22.9	23.8	23.2	5.4	15.5	11.1
Level of Service	C	C	C	A	B	B
Approach Delay (s)	23.6			7.6	15.2	
Approach LOS	C			A	B	

Intersection Summary			
HCM 2000 Control Delay	12.9	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.56		
Actuated Cycle Length (s)	61.8	Sum of lost time (s)	14.2
Intersection Capacity Utilization	55.4%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

Alt Year 2035 PM
13: Twin Oaks Valley Rd & Buena Creek Rd

Sierra Project
03/17/2017

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	451	0	280	10	0	0	230	849	0	10	759	380
Future Volume (vph)	451	0	280	10	0	0	230	849	0	10	759	380
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		5.0	5.5		4.5	5.5	5.5
Lane Util. Factor	0.97		1.00		1.00		1.00	0.95		1.00	0.95	1.00
Frpb, ped/bikes	1.00		1.00		1.00		1.00	1.00		1.00	1.00	0.98
Flpb, ped/bikes	1.00		1.00		1.00		1.00	1.00		1.00	1.00	1.00
Frt	1.00		0.85		1.00		1.00	1.00		1.00	1.00	0.85
Flt Protected	0.95		1.00		0.95		0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	3433		1583		1770		1770	3539		1770	3539	1558
Flt Permitted	0.75		1.00		0.95		0.95	1.00		0.95	1.00	1.00
Satd. Flow (perm)	2712		1583		1770		1770	3539		1770	3539	1558
Peak-hour factor, PHF	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Adj. Flow (vph)	485	0	301	11	0	0	247	913	0	11	816	409
RTOR Reduction (vph)	0	0	227	0	0	0	0	0	0	0	0	158
Lane Group Flow (vph)	485	0	74	0	11	0	247	913	0	11	816	251
Confl. Peds. (#/hr)												1
Confl. Bikes (#/hr)												5
Turn Type		Perm		Perm		Perm		NA		Prot		NA
Protected Phases								8		5		2
Permitted Phases		4		4		8						6
Actuated Green, G (s)		19.1		19.1		19.1		15.3		43.6		0.7
Effective Green, g (s)		19.1		19.1		19.1		15.3		43.6		0.7
Actuated g/C Ratio		0.25		0.25		0.25		0.20		0.56		0.01
Clearance Time (s)		4.0		4.0		4.0		5.0		5.5		4.5
Vehicle Extension (s)		3.0		3.0		3.0		3.0		3.0		3.0
Lane Grp Cap (vph)		669		390		436		349		1993		16
v/s Ratio Prot								c0.14		0.26		0.01
v/s Ratio Perm		c0.18		0.05		0.01						0.16
v/c Ratio		0.72		0.19		0.03		0.71		0.46		0.69
Uniform Delay, d1		26.7		23.0		22.1		29.0		9.9		38.2
Progression Factor		1.00		1.00		1.00		1.00		1.00		1.00
Incremental Delay, d2		3.9		0.2		0.0		6.4		0.2		80.1
Delay (s)		30.6		23.3		22.1		35.4		10.1		118.3
Level of Service		C		C		C		D		B		F
Approach Delay (s)		27.8				22.1		15.5				21.2
Approach LOS		C				C		B				C

Intersection Summary			
HCM 2000 Control Delay	20.8	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.68		
Actuated Cycle Length (s)	77.4	Sum of lost time (s)	14.5
Intersection Capacity Utilization	58.7%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

Alt Year 2035 PM
14: Twin Oaks Valley Rd & Cassou Rd

Sierra Project
03/17/2017

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↔			↔		↖	↗		↖	↗	
Traffic Volume (vph)	17	0	60	20	10	18	50	1092	20	12	919	17
Future Volume (vph)	17	0	60	20	10	18	50	1092	20	12	919	17
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		5.0			5.0		5.0	5.0		5.0	5.0	
Lane Util. Factor		1.00			1.00		1.00	0.95		1.00	0.95	
Frpb, ped/bikes		0.99			1.00		1.00	1.00		1.00	1.00	
Flpb, ped/bikes		1.00			1.00		1.00	1.00		1.00	1.00	
Frt		0.89			0.95		1.00	1.00		1.00	1.00	
Flt Protected		0.99			0.98		0.95	1.00		0.95	1.00	
Satd. Flow (prot)		1631			1734		1770	3529		1770	3530	
Flt Permitted		0.99			0.98		0.95	1.00		0.95	1.00	
Satd. Flow (perm)		1631			1734		1770	3529		1770	3530	
Peak-hour factor, PHF	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Adj. Flow (vph)	18	0	65	22	11	19	54	1174	22	13	988	18
RTOR Reduction (vph)	0	76	0	0	17	0	0	1	0	0	1	0
Lane Group Flow (vph)	0	7	0	0	35	0	54	1195	0	13	1005	0
Confl. Peds. (#/hr)			1									
Turn Type	Split	NA		Split	NA		Prot	NA		Prot	NA	
Protected Phases	4	4		8	8		5	2		1	6	
Permitted Phases												
Actuated Green, G (s)		6.5			5.8		4.8	40.5		0.6	36.3	
Effective Green, g (s)		6.5			5.8		4.8	40.5		0.6	36.3	
Actuated g/C Ratio		0.09			0.08		0.07	0.55		0.01	0.49	
Clearance Time (s)		5.0			5.0		5.0	5.0		5.0	5.0	
Vehicle Extension (s)		3.0			3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)		144			137		115	1947		14	1745	
v/s Ratio Prot		c0.00			c0.02		c0.03	c0.34		0.01	0.28	
v/s Ratio Perm												
v/c Ratio		0.05			0.25		0.47	0.61		0.93	0.58	
Uniform Delay, d1		30.6			31.8		33.1	11.1		36.4	13.1	
Progression Factor		1.00			1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2		0.1			1.0		3.0	0.6		201.0	0.5	
Delay (s)		30.8			32.7		36.1	11.7		237.3	13.6	
Level of Service		C			C		D	B		F	B	
Approach Delay (s)		30.8			32.7			12.8			16.4	
Approach LOS		C			C			B			B	

Intersection Summary

HCM 2000 Control Delay	15.4	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.53		
Actuated Cycle Length (s)	73.4	Sum of lost time (s)	20.0
Intersection Capacity Utilization	53.2%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

Alt Year 2035 PM
15: Twin Oaks Valley Rd & La Cienega

Sierra Project
03/17/2017

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations	↖	↗	↕		↖	↕
Traffic Volume (vph)	130	56	1226	140	106	903
Future Volume (vph)	130	56	1226	140	106	903
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)		6.0	6.5		6.0	6.5
Lane Util. Factor	1.00	1.00	0.95		1.00	0.95
Frpb, ped/bikes	1.00	1.00	0.99		1.00	1.00
Flpb, ped/bikes	1.00	1.00	1.00		1.00	1.00
Frt	1.00	0.85	0.98		1.00	1.00
Flt Protected	0.95	1.00	1.00		0.95	1.00
Satd. Flow (prot)	1770	1583	3466		1770	3539
Flt Permitted	0.95	1.00	1.00		0.95	1.00
Satd. Flow (perm)	1770	1583	3466		1770	3539
Peak-hour factor, PHF	0.98	0.98	0.98	0.98	0.98	0.98
Adj. Flow (vph)	133	57	1251	143	108	921
RTOR Reduction (vph)	0	0	8	0	0	0
Lane Group Flow (vph)	133	57	1386	0	108	921
Confl. Peds. (#/hr)				13		
Confl. Bikes (#/hr)				3		
Turn Type	Prot	Perm	NA		Prot	NA
Protected Phases	8		2		1	6
Permitted Phases		8				
Actuated Green, G (s)	12.5	12.5	42.8		7.4	56.2
Effective Green, g (s)	12.5	12.5	42.8		7.4	56.2
Actuated g/C Ratio	0.15	0.15	0.53		0.09	0.69
Clearance Time (s)	6.0	6.0	6.5		6.0	6.5
Vehicle Extension (s)	3.0	3.0	3.0		3.0	3.0
Lane Grp Cap (vph)	272	243	1826		161	2449
v/s Ratio Prot	c0.08		c0.40		c0.06	0.26
v/s Ratio Perm		0.04				
v/c Ratio	0.49	0.23	0.76		0.67	0.38
Uniform Delay, d1	31.4	30.2	15.1		35.7	5.2
Progression Factor	1.00	1.00	1.00		1.00	1.00
Incremental Delay, d2	1.4	0.5	1.9		10.5	0.1
Delay (s)	32.8	30.6	17.0		46.2	5.3
Level of Service	C	C	B		D	A
Approach Delay (s)	32.2		17.0			9.6
Approach LOS	C		B			A

Intersection Summary

HCM 2000 Control Delay	15.2	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.69		
Actuated Cycle Length (s)	81.2	Sum of lost time (s)	18.5
Intersection Capacity Utilization	67.0%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

Alt Year 2035 PM
16: Twin Oaks Valley Rd & Del Roy Dr

Sierra Project
03/17/2017

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↱		↰	↱		↰	↱		↰	↱	
Traffic Volume (vph)	8	0	60	30	0	10	90	1268	30	20	956	17
Future Volume (vph)	8	0	60	30	0	10	90	1268	30	20	956	17
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	5.0		5.0	5.0		5.0	5.0		5.0	5.0	
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	0.95		1.00	0.95	
Frpb, ped/bikes	1.00	0.99		1.00	1.00		1.00	1.00		1.00	1.00	
Flpb, ped/bikes	1.00	1.00		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		1.00	1.00	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770	1560		1770	1583		1770	3523		1770	3529	
Flt Permitted	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (perm)	1770	1560		1770	1583		1770	3523		1770	3529	
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)	9	0	65	33	0	11	98	1378	33	22	1039	18
RTOR Reduction (vph)	0	59	0	0	10	0	0	1	0	0	1	0
Lane Group Flow (vph)	9	6	0	33	1	0	98	1410	0	22	1056	0
Confl. Peds. (#/hr)								14				1
Confl. Bikes (#/hr)			1					4				4
Turn Type	Prot	NA		Prot	NA		Prot	NA		Prot	NA	
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases												
Actuated Green, G (s)	0.5	6.3		1.1	6.9		6.3	40.4		1.1	35.2	
Effective Green, g (s)	0.5	6.3		1.1	6.9		6.3	40.4		1.1	35.2	
Actuated g/C Ratio	0.01	0.09		0.02	0.10		0.09	0.59		0.02	0.51	
Clearance Time (s)	5.0	5.0		5.0	5.0		5.0	5.0		5.0	5.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	12	142		28	158		161	2065		28	1802	
v/s Ratio Prot	0.01	c0.00		c0.02	0.00		c0.06	c0.40		0.01	0.30	
v/s Ratio Perm												
v/c Ratio	0.75	0.04		1.18	0.01		0.61	0.68		0.79	0.59	
Uniform Delay, d1	34.1	28.5		33.9	27.9		30.1	9.8		33.8	11.8	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	128.3	0.1		229.1	0.0		6.4	0.9		82.7	0.5	
Delay (s)	162.4	28.7		263.0	27.9		36.5	10.8		116.5	12.3	
Level of Service	F	C		F	C		D	B		F	B	
Approach Delay (s)		44.9			204.3			12.4			14.4	
Approach LOS		D			F			B			B	

Intersection Summary			
HCM 2000 Control Delay	17.2	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.64		
Actuated Cycle Length (s)	68.9	Sum of lost time (s)	20.0
Intersection Capacity Utilization	60.2%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

Alt Year 2035 PM
17: Twin Oaks Valley Rd & Windy Wy

Sierra Project
03/17/2017

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↱		↰	↱		↰	↱		↰	↱	
Traffic Volume (vph)	20	0	60	0	0	0	50	1308	10	10	1056	10
Future Volume (vph)	20	0	60	0	0	0	50	1308	10	10	1056	10
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	6.0		4.0	6.0		4.0	6.0	
Lane Util. Factor	1.00	1.00		1.00	0.95		1.00	0.95		1.00	0.95	
Frpb, ped/bikes	1.00	0.99		1.00	1.00		1.00	1.00		1.00	1.00	
Flpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Frt	1.00	0.85		1.00	1.00		1.00	1.00		1.00	1.00	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770	1563		1770	3535		1770	3535		1770	3533	
Flt Permitted	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (perm)	1770	1563		1770	3535		1770	3535		1770	3533	
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	20	0	60	0	0	0	50	1308	10	10	1056	10
RTOR Reduction (vph)	0	54	0	0	0	0	0	0	0	0	0	0
Lane Group Flow (vph)	20	6	0	0	0	0	50	1318	0	10	1066	0
Confl. Peds. (#/hr)			1			2			1			4
Confl. Bikes (#/hr)						2			2			5
Turn Type	Split	NA					Prot	NA		Prot	NA	
Protected Phases	4	4					5	2		1	6	
Permitted Phases												
Actuated Green, G (s)	5.4	5.4					2.1	34.1		0.6	32.6	
Effective Green, g (s)	5.4	5.4					2.1	34.1		0.6	32.6	
Actuated g/C Ratio	0.10	0.10					0.04	0.63		0.01	0.60	
Clearance Time (s)	4.0	4.0					4.0	6.0		4.0	6.0	
Vehicle Extension (s)	3.0	3.0					3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	176	156					68	2228		19	2128	
v/s Ratio Prot	c0.01	0.00					c0.03	c0.37		0.01	0.30	
v/s Ratio Perm												
v/c Ratio	0.11	0.04					0.74	0.59		0.53	0.50	
Uniform Delay, d1	22.2	22.0					25.7	5.9		26.6	6.1	
Progression Factor	1.00	1.00					1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.3	0.1					33.4	0.4		23.9	0.2	
Delay (s)	22.5	22.1					59.1	6.3		50.5	6.3	
Level of Service	C	C					E	A		D	A	
Approach Delay (s)		22.2			0.0			8.2			6.7	
Approach LOS		C			A			A			A	

Intersection Summary			
HCM 2000 Control Delay	8.0	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.56		
Actuated Cycle Length (s)	54.1	Sum of lost time (s)	14.0
Intersection Capacity Utilization	54.2%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

Alt Year 2035 PM
18: Twin Oaks Valley Rd & Borden Rd

Sierra Project
03/17/2017

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↰↱		↰	↰↱		↰	↰↱	↰	↰	↰↱	↰
Traffic Volume (vph)	194	260	280	200	230	57	280	1197	310	97	995	124
Future Volume (vph)	194	260	280	200	230	57	280	1197	310	97	995	124
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.2	5.3		4.2	5.3		4.2	4.9	4.9	4.2	4.9	4.9
Lane Util. Factor	1.00	0.95		1.00	0.95		1.00	0.95	1.00	1.00	0.95	1.00
Frpb, ped/bikes	1.00	0.99		1.00	1.00		1.00	1.00	0.99	1.00	1.00	0.98
Flpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	0.92		1.00	0.97		1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1770	3240		1770	3424		1770	3539	1560	1770	3539	1556
Flt Permitted	0.95	1.00		0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	1770	3240		1770	3424		1770	3539	1560	1770	3539	1556
Peak-hour factor, PHF	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Adj. Flow (vph)	202	271	292	208	240	59	292	1247	323	101	1036	129
RTOR Reduction (vph)	0	197	0	0	22	0	0	0	105	0	0	86
Lane Group Flow (vph)	202	366	0	208	277	0	292	1247	218	101	1036	43
Confl. Peds. (#/hr)			2									2
Confl. Bikes (#/hr)						3			5			5
Turn Type	Prot	NA		Prot	NA		Prot	NA	Perm	Prot	NA	Perm
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases									2			6
Actuated Green, G (s)	11.9	17.5		11.9	17.5		16.9	42.4	42.4	7.3	32.8	32.8
Effective Green, g (s)	11.9	17.5		11.9	17.5		16.9	42.4	42.4	7.3	32.8	32.8
Actuated g/C Ratio	0.12	0.18		0.12	0.18		0.17	0.43	0.43	0.07	0.34	0.34
Clearance Time (s)	4.2	5.3		4.2	5.3		4.2	4.9	4.9	4.2	4.9	4.9
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)	215	580		215	613		306	1535	677	132	1188	522
v/s Ratio Prot	0.11	c0.11		c0.12	0.08		c0.17	c0.35		0.06	0.29	
v/s Ratio Perm									0.14			0.03
v/c Ratio	0.94	0.63		0.97	0.45		0.95	0.81	0.32	0.77	0.87	0.08
Uniform Delay, d1	42.5	37.1		42.7	35.8		40.0	24.2	18.2	44.4	30.5	22.2
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	44.1	2.2		51.5	0.5		39.0	3.4	0.3	22.8	7.3	0.1
Delay (s)	86.6	39.4		94.2	36.3		79.0	27.6	18.5	67.2	37.7	22.2
Level of Service	F	D		F	D		E	C	B	E	D	C
Approach Delay (s)		51.8			60.1			34.1			38.5	
Approach LOS		D			E			C			D	

Intersection Summary			
HCM 2000 Control Delay	41.4	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.85		
Actuated Cycle Length (s)	97.7	Sum of lost time (s)	18.6
Intersection Capacity Utilization	86.4%	ICU Level of Service	E
Analysis Period (min)	15		
c Critical Lane Group			

Alt Year 2035 PM
19: Twin Oaks Valley Rd & Richmar Ave

Sierra Project
03/17/2017

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↰		↰	↰		↰	↰↱		↰	↰↱	↰
Traffic Volume (vph)	270	20	180	20	10	10	220	1567	30	80	1520	240
Future Volume (vph)	270	20	180	20	10	10	220	1567	30	80	1520	240
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.9	4.9		4.0	4.0		4.0	5.7		4.0	5.7	
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	0.95		1.00	0.95	
Frpb, ped/bikes	1.00	1.00		1.00	0.99		1.00	1.00		1.00	1.00	
Flpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Frt	1.00	0.87		1.00	0.93		1.00	1.00		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	1611		1770	1703		1770	3526		1770	3456	
Flt Permitted	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (perm)	1770	1611		1770	1703		1770	3526		1770	3456	
Peak-hour factor, PHF	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Adj. Flow (vph)	281	21	188	21	10	10	229	1632	31	83	1583	250
RTOR Reduction (vph)	0	157	0	0	9	0	0	1	0	0	8	0
Lane Group Flow (vph)	281	52	0	21	11	0	229	1662	0	83	1825	0
Confl. Peds. (#/hr)					9					7		
Confl. Bikes (#/hr)									8			3
Turn Type	Prot	NA		Prot	NA		Prot	NA		Prot	NA	
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases												
Actuated Green, G (s)	20.3	20.1		7.6	7.4		15.1	66.4		7.6	58.9	
Effective Green, g (s)	20.3	20.1		7.6	7.4		15.1	66.4		7.6	58.9	
Actuated g/C Ratio	0.17	0.17		0.06	0.06		0.13	0.55		0.06	0.49	
Clearance Time (s)	4.9	4.9		4.0	4.0		4.0	5.7		4.0	5.7	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	298	269		111	104		222	1946		111	1692	
v/s Ratio Prot	c0.16	c0.03		0.01	0.01		c0.13	0.47		0.05	c0.53	
v/s Ratio Perm												
v/c Ratio	0.94	0.19		0.19	0.10		1.03	0.85		0.75	1.08	
Uniform Delay, d1	49.4	43.1		53.4	53.3		52.6	22.8		55.4	30.7	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	37.0	0.4		0.8	0.4		68.9	3.9		23.7	46.6	
Delay (s)	86.4	43.5		54.3	53.7		121.5	26.7		79.1	77.3	
Level of Service	F	D		D	D		F	C		E	E	
Approach Delay (s)		68.1			54.0			38.2			77.3	
Approach LOS		E			D			D			E	

Intersection Summary			
HCM 2000 Control Delay	59.0	HCM 2000 Level of Service	E
HCM 2000 Volume to Capacity ratio	0.98		
Actuated Cycle Length (s)	120.3	Sum of lost time (s)	18.6
Intersection Capacity Utilization	95.6%	ICU Level of Service	F
Analysis Period (min)	15		
c Critical Lane Group			

Alt Year 2035 PM
20: Twin Oaks Valley Rd & San Marcos Blvd

Sierra Project
03/17/2017

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↱	↱	↰	↱	↱	↰	↱	↱	↰	↱	↱
Traffic Volume (vph)	476	990	430	620	670	118	720	1203	500	162	1158	325
Future Volume (vph)	476	990	430	620	670	118	720	1203	500	162	1158	325
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.2	5.3	5.3	4.2	5.0		4.2	5.3	4.2	5.0	5.3	5.3
Lane Util. Factor	0.97	0.95	0.88	0.94	0.95		0.97	0.95	1.00	0.97	0.95	1.00
Frpb, ped/bikes	1.00	1.00	0.97	1.00	1.00		1.00	1.00	0.98	1.00	1.00	0.98
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	1.00	0.85	1.00	0.98		1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	3433	3539	2701	4990	3448		3433	3539	1557	3433	3539	1557
Flt Permitted	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	3433	3539	2701	4990	3448		3433	3539	1557	3433	3539	1557
Peak-hour factor, PHF	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Adj. Flow (vph)	512	1065	462	667	720	127	774	1294	538	174	1245	349
RTOR Reduction (vph)	0	0	225	0	10	0	0	0	39	0	0	146
Lane Group Flow (vph)	512	1065	237	667	837	0	774	1294	499	174	1245	203
Confl. Peds. (#/hr)			9			2			4			1
Confl. Bikes (#/hr)			6			7			6			4
Turn Type	Prot	NA	Perm	Prot	NA		Prot	NA	pm+ov	Prot	NA	Perm
Protected Phases	7	4		3	8		5	2	3	1	6	
Permitted Phases			4						2			6
Actuated Green, G (s)	20.8	37.7	37.7	14.8	32.0		26.8	64.7	79.5	8.0	46.7	46.7
Effective Green, g (s)	20.8	37.7	37.7	14.8	32.0		26.8	64.7	79.5	8.0	46.7	46.7
Actuated g/C Ratio	0.14	0.26	0.26	0.10	0.22		0.18	0.45	0.55	0.06	0.32	0.32
Clearance Time (s)	4.2	5.3	5.3	4.2	5.0		4.2	5.3	4.2	5.0	5.3	5.3
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	492	920	702	509	760		634	1579	853	189	1139	501
v/s Ratio Prot	c0.15	c0.30		c0.13	0.24		c0.23	0.37	0.06	0.05	c0.35	
v/s Ratio Perm			0.09						0.26			0.13
v/c Ratio	1.04	1.16	0.34	1.31	1.10		1.22	0.82	0.58	0.92	1.09	0.41
Uniform Delay, d1	62.1	53.6	43.5	65.1	56.5		59.1	35.1	21.8	68.2	49.1	38.3
Progression Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	51.5	83.2	0.3	153.3	63.9		113.2	3.5	1.0	43.5	55.8	0.5
Delay (s)	113.6	136.8	43.8	218.4	120.4		172.3	38.5	22.8	111.6	105.0	38.9
Level of Service	F	F	D	F	F		F	D	C	F	F	D
Approach Delay (s)		109.9			163.6			75.0			92.6	
Approach LOS		F			F			E			F	

Intersection Summary			
HCM 2000 Control Delay	104.8	HCM 2000 Level of Service	F
HCM 2000 Volume to Capacity ratio	1.18		
Actuated Cycle Length (s)	145.0	Sum of lost time (s)	19.8
Intersection Capacity Utilization	107.5%	ICU Level of Service	G
Analysis Period (min)	15		
c Critical Lane Group			

Alt Year 2035 PM
21: Twin Oaks Valley Rd & SR 78 WB Ramps

Sierra Project
03/17/2017

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations				↰		↱		↱	↱		↱	↱
Traffic Volume (vph)	0	0	0	840	0	350	0	1943	850	0	1776	532
Future Volume (vph)	0	0	0	840	0	350	0	1943	850	0	1776	532
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)				4.6		4.6		5.3	4.6		5.3	5.3
Lane Util. Factor				0.97		0.88		0.91	1.00		0.91	1.00
Frpb, ped/bikes				1.00		1.00		1.00	0.96		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	0.85		1.00	0.85
Flt Protected				0.95		1.00		1.00	1.00		1.00	1.00
Satd. Flow (prot)				3433		2787		5085	1516		5085	1548
Flt Permitted				0.95		1.00		1.00	1.00		1.00	1.00
Satd. Flow (perm)				3433		2787		5085	1516		5085	1548
Peak-hour factor, PHF	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Adj. Flow (vph)	0	0	0	875	0	365	0	2024	885	0	1850	554
RTOR Reduction (vph)	0	0	0	0	0	14	0	0	0	0	0	237
Lane Group Flow (vph)	0	0	0	875	0	351	0	2024	885	0	1850	317
Confl. Peds. (#/hr)									12			
Confl. Bikes (#/hr)									4			4
Turn Type				Prot		Prot		NA	pm+ov		NA	Perm
Protected Phases				8		8		2	8		6	
Permitted Phases								2				6
Actuated Green, G (s)				41.4		41.4		68.7	110.1		68.7	68.7
Effective Green, g (s)				41.4		41.4		68.7	110.1		68.7	68.7
Actuated g/C Ratio				0.34		0.34		0.57	0.92		0.57	0.57
Clearance Time (s)				4.6		4.6		5.3	4.6		5.3	5.3
Vehicle Extension (s)				3.0		3.0		3.0	3.0		3.0	3.0
Lane Grp Cap (vph)				1184		961		2911	1449		2911	886
v/s Ratio Prot				c0.25		0.13		c0.40	0.21		0.36	
v/s Ratio Perm									0.37			0.20
v/c Ratio				0.74		0.37		0.70	0.61		0.64	0.36
Uniform Delay, d1				34.6		29.5		18.2	0.9		17.2	13.8
Progression Factor				1.00		1.00		1.00	1.00		1.00	1.00
Incremental Delay, d2				2.5		0.2		1.4	0.8		1.1	1.1
Delay (s)				37.0		29.7		19.6	1.7		18.3	14.9
Level of Service				D		C		B	A		B	B
Approach Delay (s)		0.0			34.9			14.2			17.5	
Approach LOS		A			C			B			B	

Intersection Summary			
HCM 2000 Control Delay	19.3	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.71		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	9.9
Intersection Capacity Utilization	69.3%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

Alt Year 2035 PM
22: Twin Oaks Valley Rd & SR 78 EB Ramps

Sierra Project
03/17/2017

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↱	↲					↰↱↲	↰	↱↲	↰↱↲	
Traffic Volume (vph)	248	40	600	0	0	0	0	2515	1120	380	2196	0
Future Volume (vph)	248	40	600	0	0	0	0	2515	1120	380	2196	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.6	4.6	4.6					5.3	5.3	4.2	5.3	
Lane Util. Factor	0.95	0.91	0.95					0.91	1.00	0.97	0.91	
Frpb, ped/bikes	1.00	0.99	0.98					1.00	0.99	1.00	1.00	
Flpb, ped/bikes	1.00	1.00	1.00					1.00	1.00	1.00	1.00	
Frt	1.00	0.88	0.85					1.00	0.85	1.00	1.00	
Flt Protected	0.95	1.00	1.00					1.00	1.00	0.95	1.00	
Satd. Flow (prot)	1681	1466	1481					5085	1561	3433	5085	
Flt Permitted	0.95	1.00	1.00					1.00	1.00	0.95	1.00	
Satd. Flow (perm)	1681	1466	1481					5085	1561	3433	5085	
Peak-hour factor, PHF	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Adj. Flow (vph)	258	42	625	0	0	0	0	2620	1167	396	2288	0
RTOR Reduction (vph)	0	8	36	0	0	0	0	0	267	0	0	0
Lane Group Flow (vph)	232	341	308	0	0	0	0	2620	900	396	2288	0
Confl. Peds. (#/hr)			3									
Confl. Bikes (#/hr)								5				2
Turn Type	Split	NA	Perm					NA	Perm	Prot	NA	
Protected Phases	4	4						2		1	6	
Permitted Phases			4					2				
Actuated Green, G (s)	36.4	36.4	36.4					82.1	82.1	17.4	103.7	
Effective Green, g (s)	36.4	36.4	36.4					82.1	82.1	17.4	103.7	
Actuated g/C Ratio	0.24	0.24	0.24					0.55	0.55	0.12	0.69	
Clearance Time (s)	4.6	4.6	4.6					5.3	5.3	4.2	5.3	
Vehicle Extension (s)	3.0	3.0	3.0					3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	407	355	359					2783	854	398	3515	
v/s Ratio Prot	0.14	c0.23						0.52		c0.12	0.45	
v/s Ratio Perm			0.21					c0.58				
v/c Ratio	0.57	0.96	0.86					0.94	1.05	0.99	0.65	
Uniform Delay, d1	49.9	56.1	54.3					31.7	34.0	66.3	13.0	
Progression Factor	1.00	1.00	1.00					1.00	1.00	1.00	1.00	
Incremental Delay, d2	1.9	36.7	18.1					8.0	46.1	43.5	0.9	
Delay (s)	51.8	92.8	72.4					39.7	80.1	109.8	13.9	
Level of Service	D	F	E					D	F	F	B	
Approach Delay (s)		74.9			0.0			52.1			28.1	
Approach LOS		E			A			D			C	
Intersection Summary												
HCM 2000 Control Delay			46.3									
HCM 2000 Volume to Capacity ratio			1.02									
Actuated Cycle Length (s)			150.0						14.1			
Intersection Capacity Utilization			107.7%						G			
Analysis Period (min)			15									
c Critical Lane Group												

Alt Year 2035 PM
28: San Marcos Blvd & Knoll Rd/SR 78 WB Ramps

Sierra Project
03/17/2017

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰		↱	↰	↱	↲		↰	↱	↲	↰↱↲	↰
Traffic Volume (vph)	280	0	560	1020	360	50	440	1307	280	0	1074	230
Future Volume (vph)	280	0	560	1020	360	50	440	1307	280	0	1074	230
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.6		5.2	5.6	5.6		5.2	6.3	6.3		6.3	6.3
Lane Util. Factor	1.00		0.88	0.97	0.95		0.97	0.95	1.00		0.91	1.00
Frpb, ped/bikes	1.00		1.00	1.00	1.00		1.00	1.00	0.98		1.00	0.97
Flpb, ped/bikes	1.00		1.00	1.00	1.00		1.00	1.00	1.00		1.00	1.00
Frt	1.00		0.85	1.00	0.98		1.00	1.00	0.85		1.00	0.85
Flt Protected	0.95		1.00	0.95	1.00		0.95	1.00	1.00		1.00	1.00
Satd. Flow (prot)	1770		2787	3433	3474		3433	3539	1549		5085	1539
Flt Permitted	0.95		1.00	0.95	1.00		0.95	1.00	1.00		1.00	1.00
Satd. Flow (perm)	1770		2787	3433	3474		3433	3539	1549		5085	1539
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)	295	0	589	1074	379	53	463	1376	295	0	1131	242
RTOR Reduction (vph)	0	0	52	0	11	0	0	0	111	0	0	89
Lane Group Flow (vph)	295	0	537	1074	421	0	463	1376	184	0	1131	153
Confl. Peds. (#/hr)												12
Confl. Bikes (#/hr)									2			1
Turn Type	Prot		pm+ov	Prot	NA		Prot	NA	Perm		NA	Perm
Protected Phases	7		5	3	8		5	2			6	
Permitted Phases			7					2				6
Actuated Green, G (s)	18.4		42.5	46.3	22.3		24.1	61.8	61.8		32.5	32.5
Effective Green, g (s)	18.4		42.5	46.3	22.3		24.1	61.8	61.8		32.5	32.5
Actuated g/C Ratio	0.15		0.35	0.39	0.19		0.20	0.51	0.51		0.27	0.27
Clearance Time (s)	5.6		5.2	5.6	5.6		5.2	6.3	6.3		6.3	6.3
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)	271		987	1324	645		689	1822	797		1377	416
v/s Ratio Prot	c0.17		0.11	c0.31	0.12		0.13	c0.39			c0.22	
v/s Ratio Perm			0.08						0.12			0.10
v/c Ratio	1.09		0.54	0.81	0.65		0.67	0.76	0.23		0.82	0.37
Uniform Delay, d1	50.8		31.0	32.9	45.3		44.3	23.1	16.0		41.0	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	80.3		0.6	3.9	2.4		2.6	3.0	0.7		5.6	2.5
Delay (s)	131.1		31.6	36.8	47.7		46.9	26.1	16.7		46.6	37.9
Level of Service	F		C	D	D		D	C	B		D	D
Approach Delay (s)		64.8			39.9			29.3			45.1	
Approach LOS		E			D			C			D	
Intersection Summary												
HCM 2000 Control Delay			41.0									
HCM 2000 Volume to Capacity ratio			0.89									
Actuated Cycle Length (s)			120.0						22.7			
Intersection Capacity Utilization			86.3%						E			
Analysis Period (min)			15									
c Critical Lane Group												

Alt Year 2035 PM
29: San Marcos Blvd & SR 78 EB Ramps

Sierra Project
03/17/2017

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↰	↰	↰	↰	↰	↰	↰	↰	↰	↰	↰
Traffic Volume (vph)	247	0	180	0	0	0	0	1780	1320	150	2320	0
Future Volume (vph)	247	0	180	0	0	0	0	1780	1320	150	2320	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.6		5.6					6.3	6.3	5.2	6.3	
Lane Util. Factor	0.97		1.00					0.91	0.88	0.97	0.91	
Frpb, ped/bikes	1.00		1.00					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)	3433		1583					5085	2721	3433	5085	
Flt Permitted	0.95		1.00					1.00	1.00	0.95	1.00	
Satd. Flow (perm)	3433		1583					5085	2721	3433	5085	
Peak-hour factor, PHF	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Adj. Flow (vph)	257	0	188	0	0	0	0	1854	1375	156	2417	0
RTOR Reduction (vph)	0	0	67	0	0	0	0	0	478	0	0	0
Lane Group Flow (vph)	257	0	121	0	0	0	0	1854	897	156	2417	0
Confl. Peds. (#/hr)								1			22	
Confl. Bikes (#/hr)								5			4	
Turn Type	Prot		Perm					NA	Perm	Prot	NA	
Protected Phases	4							2		1	6	
Permitted Phases			4					2				
Actuated Green, G (s)	15.2		15.2					77.2	77.2	10.5	92.9	
Effective Green, g (s)	15.2		15.2					77.2	77.2	10.5	92.9	
Actuated g/C Ratio	0.13		0.13					0.64	0.64	0.09	0.77	
Clearance Time (s)	5.6		5.6					6.3	6.3	5.2	6.3	
Vehicle Extension (s)	3.0		3.0					3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	434		200					3271	1750	300	3936	
v/s Ratio Prot	0.07							0.36		0.05	c0.48	
v/s Ratio Perm			c0.08					0.33				
v/c Ratio	0.59		0.60					0.57	0.51	0.52	0.61	
Uniform Delay, d1	49.5		49.6					12.0	11.4	52.3	5.8	
Progression Factor	1.00		1.00					1.00	1.00	1.00	1.00	
Incremental Delay, d2	2.2		5.1					0.7	1.1	1.6	0.7	
Delay (s)	51.6		54.6					12.7	12.5	54.0	6.6	
Level of Service	D		D					B	B	D	A	
Approach Delay (s)		52.9			0.0			12.6			9.4	
Approach LOS		D			A			B			A	

Intersection Summary			
HCM 2000 Control Delay	14.2	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.64		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	17.1
Intersection Capacity Utilization	71.9%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

Alt Year 2035 PM
30: San Marcos Blvd & E. Mission Road

Sierra Project
03/17/2017

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↰	↰	↰	↰	↰	↰	↰	↰	↰	↰	↰
Traffic Volume (vph)	190	590	60	418	470	100	40	380	722	40	300	120
Future Volume (vph)	190	590	60	418	470	100	40	380	722	40	300	120
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	5.3	5.3	4.0	5.3	5.3	4.0	5.3	5.3	4.0	5.3	
Lane Util. Factor	1.00	0.95	1.00	0.97	0.95	1.00	1.00	0.95	1.00	1.00	0.95	
Frpb, ped/bikes	1.00	1.00	0.98	1.00	1.00	0.97	1.00	1.00	1.00	1.00	1.00	
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.96	
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)	1770	3539	1557	3433	3539	1541	1770	3539	1583	1770	3375	
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	
Satd. Flow (perm)	1770	3539	1557	3433	3539	1541	1770	3539	1583	1770	3375	
Peak-hour factor, PHF	0.92	0.92	1.00	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	207	641	60	454	511	109	43	413	785	43	326	130
RTOR Reduction (vph)	0	0	46	0	0	83	0	0	281	0	37	0
Lane Group Flow (vph)	207	641	14	454	511	26	43	413	504	43	419	0
Confl. Peds. (#/hr)			3			10						1
Turn Type	Prot	NA	Perm	Prot	NA	Perm	Prot	NA	Prot	Prot	NA	
Protected Phases	7	4		3	8		5	2	2	1	6	
Permitted Phases			4			8						
Actuated Green, G (s)	16.3	22.9	22.9	17.7	24.3	24.3	3.7	38.0	38.0	3.8	38.1	
Effective Green, g (s)	16.3	22.9	22.9	17.7	24.3	24.3	3.7	38.0	38.0	3.8	38.1	
Actuated g/C Ratio	0.16	0.23	0.23	0.18	0.24	0.24	0.04	0.38	0.38	0.04	0.38	
Clearance Time (s)	4.0	5.3	5.3	4.0	5.3	5.3	4.0	5.3	5.3	4.0	5.3	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	285	802	353	601	851	370	64	1331	595	66	1273	
v/s Ratio Prot	0.12	c0.18		c0.13	0.14		c0.02	0.12	c0.32	0.02	0.12	
v/s Ratio Perm			0.01			0.02						
v/c Ratio	0.73	0.80	0.04	0.76	0.60	0.07	0.67	0.31	0.85	0.65	0.33	
Uniform Delay, d1	40.2	36.9	30.5	39.6	34.0	29.6	48.1	22.2	28.8	47.9	22.4	
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	8.9	5.6	0.0	5.4	1.2	0.1	24.3	0.1	10.8	20.7	0.2	
Delay (s)	49.1	42.5	30.5	45.0	35.2	29.7	72.4	22.4	39.7	68.7	22.5	
Level of Service	D	D	C	D	D	C	E	C	D	E	C	
Approach Delay (s)		43.2			38.8			35.0			26.5	
Approach LOS		D			D			D			C	

Intersection Summary				
HCM 2000 Control Delay	37.0	HCM 2000 Level of Service	D	
HCM 2000 Volume to Capacity ratio	0.80			
Actuated Cycle Length (s)	101.0	Sum of lost time (s)	18.6	
Intersection Capacity Utilization	76.5%	ICU Level of Service	D	
Analysis Period (min)	15			
c Critical Lane Group				

Alt Year 2035 PM

Sierra Project

33: Twin Oaks Valley Rd & Discovery Street/Barham Dr

03/17/2017

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	740	470	10	340	370	347	10	1478	370	564	672	540
Future Volume (vph)	740	470	10	340	370	347	10	1478	370	564	672	540
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	5.3	4.0	5.0	5.3	4.0	5.0	6.0		5.0	6.0	4.0
Lane Util. Factor	0.97	0.91	1.00	1.00	1.00	1.00	1.00	0.91		0.97	0.91	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.97		1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	3433	5085	1583	1770	1863	1583	1770	4933		3433	5085	1583
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00
Satd. Flow (perm)	3433	5085	1583	1770	1863	1583	1770	4933		3433	5085	1583
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)	804	511	11	370	402	377	11	1607	402	613	730	587
RTOR Reduction (vph)	0	0	0	0	0	0	0	29	0	0	0	0
Lane Group Flow (vph)	804	511	11	370	402	377	11	1980	0	613	730	587
Turn Type	Prot	NA	Free	Prot	NA	Free	Prot	NA		Prot	NA	Free
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases			Free			Free						Free
Actuated Green, G (s)	25.0	29.7	148.0	23.0	27.7	148.0	1.6	54.0		20.0	72.4	148.0
Effective Green, g (s)	25.0	29.7	148.0	23.0	27.7	148.0	1.6	54.0		20.0	72.4	148.0
Actuated g/C Ratio	0.17	0.20	1.00	0.16	0.19	1.00	0.01	0.36		0.14	0.49	1.00
Clearance Time (s)	5.0	5.3		5.0	5.3		5.0	6.0		5.0	6.0	
Vehicle Extension (s)	2.0	4.5		2.0	4.5		2.0	3.0		2.0	4.0	
Lane Grp Cap (vph)	579	1020	1583	275	348	1583	19	1799		463	2487	1583
v/s Ratio Prot	c0.23	0.10		0.21	c0.22		0.01	c0.40		c0.18	0.14	
v/s Ratio Perm			0.01			0.24						c0.37
v/c Ratio	1.39	0.50	0.01	1.35	1.16	0.24	0.58	1.10		1.32	0.29	0.37
Uniform Delay, d1	61.5	52.6	0.0	62.5	60.1	0.0	72.9	47.0		64.0	22.5	0.0
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	185.4	0.7	0.0	177.7	97.4	0.4	23.8	54.3		160.2	0.3	0.7
Delay (s)	246.9	53.2	0.0	240.2	157.6	0.4	96.7	101.3		224.2	22.8	0.7
Level of Service	F	D	A	F	F	A	F	F		F	C	A
Approach Delay (s)		170.2			132.6			101.3			80.1	
Approach LOS		F			F			F			F	
Intersection Summary												
HCM 2000 Control Delay		114.7			HCM 2000 Level of Service			F				
HCM 2000 Volume to Capacity ratio		1.21										
Actuated Cycle Length (s)		148.0			Sum of lost time (s)			21.3				
Intersection Capacity Utilization		111.2%			ICU Level of Service			H				
Analysis Period (min)		15										

c Critical Lane Group

APPENDIX I-2

PEAK HOUR ANALYSIS WORKSHEETS – SAN MARCOS ALTERNATE HORIZON YEAR 2035 WITH PROJECT

Year 2035 ALT + Proj AM
12: Twin Oaks Valley Rd & Deer Springs Rd

Sierra Project
03/17/2017

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	70	150	140	660	1740	60
Future Volume (vph)	70	150	140	660	1740	60
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.9	4.9	4.0	5.3	5.3	5.3
Lane Util. Factor	1.00	1.00	1.00	0.95	0.95	1.00
Flt Protected	1.00	0.85	1.00	1.00	1.00	0.85
Satd. Flow (prot)	1770	1583	1770	3539	3539	1583
Flt Permitted	0.95	1.00	0.95	1.00	1.00	1.00
Satd. Flow (perm)	1770	1583	1770	3539	3539	1583
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	76	163	152	717	1891	65
RTOR Reduction (vph)	0	145	0	0	0	10
Lane Group Flow (vph)	76	18	152	717	1891	55
Turn Type	Prot	Perm	Prot	NA	NA	Perm
Protected Phases	4		5	2	6	
Permitted Phases		4				6
Actuated Green, G (s)	13.5	13.5	16.2	97.3	77.1	77.1
Effective Green, g (s)	13.5	13.5	16.2	97.3	77.1	77.1
Actuated g/C Ratio	0.11	0.11	0.13	0.80	0.64	0.64
Clearance Time (s)	4.9	4.9	4.0	5.3	5.3	5.3
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	197	176	236	2845	2255	1008
v/s Ratio Prot	c0.04		c0.09	0.20	c0.53	
v/s Ratio Perm		0.01				0.03
v/c Ratio	0.39	0.10	0.64	0.25	0.84	0.05
Uniform Delay, d1	49.9	48.3	49.7	2.9	17.1	8.3
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	1.3	0.3	5.9	0.0	2.9	0.0
Delay (s)	51.2	48.6	55.6	3.0	20.0	8.3
Level of Service	D	D	E	A	C	A
Approach Delay (s)	49.4			12.2	19.6	
Approach LOS	D			B	B	
Intersection Summary						
HCM 2000 Control Delay			19.8		HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio			0.75			
Actuated Cycle Length (s)			121.0		Sum of lost time (s)	14.2
Intersection Capacity Utilization			71.6%		ICU Level of Service	C
Analysis Period (min)			15			

c Critical Lane Group

Year 2035 ALT + Proj AM
13: Twin Oaks Valley Rd & Buena Creek Rd

Sierra Project
03/17/2017

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	380	0	240	10	0	0	150	410	10	10	1300	600
Future Volume (vph)	380	0	240	10	0	0	150	410	10	10	1300	600
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		5.0	5.5		5.0	5.5	5.5
Lane Util. Factor	0.97		1.00		1.00		1.00	0.95		1.00	0.95	1.00
Flt Protected	1.00		0.99		1.00		1.00	1.00		1.00	1.00	0.99
Flt Permitted	1.00		1.00		1.00		1.00	1.00		1.00	1.00	1.00
Satd. Flow (prot)	3433		1560		1770		1770	3527		1770	3539	1561
Satd. Flow (perm)	2714		1560		1770		1770	3527		1770	3539	1561
Peak-hour factor, PHF	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Adj. Flow (vph)	396	0	250	10	0	0	156	427	10	10	1354	625
RTOR Reduction (vph)	0	0	162	0	0	0	0	2	0	0	0	135
Lane Group Flow (vph)	396	0	88	0	10	0	156	435	0	10	1354	490
Confl. Peds. (#/hr)			2									1
Confl. Bikes (#/hr)												3
Turn Type	Perm		Perm	Perm	NA		Prot	NA		Prot	NA	Perm
Protected Phases					8		5	2		1	6	
Permitted Phases	4		4	8								6
Actuated Green, G (s)	17.4		17.4		17.4		11.1	50.1		0.9	39.9	39.9
Effective Green, g (s)	17.4		17.4		17.4		11.1	50.1		0.9	39.9	39.9
Actuated g/C Ratio	0.21		0.21		0.21		0.13	0.60		0.01	0.48	0.48
Clearance Time (s)	4.0		4.0		4.0		5.0	5.5		5.0	5.5	5.5
Vehicle Extension (s)	3.0		3.0		3.0		3.0	3.0		3.0	3.0	3.0
Lane Grp Cap (vph)	569		327		371		236	2131		19	1703	751
v/s Ratio Prot							c0.09	0.12		0.01	c0.38	
v/s Ratio Perm	c0.15		0.06		0.01							0.31
v/c Ratio	0.70		0.27		0.03		0.66	0.20		0.53	0.80	0.65
Uniform Delay, d1	30.3		27.4		26.0		34.1	7.4		40.8	18.1	16.3
Progression Factor	1.00		1.00		1.00		1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	3.7		0.4		0.0		6.8	0.0		23.9	2.7	2.0
Delay (s)	34.0		27.9		26.1		40.9	7.5		64.6	20.7	18.3
Level of Service	C		C		C		D	A		E	C	B
Approach Delay (s)		31.6			26.1			16.2			20.2	
Approach LOS		C			C			B			C	
Intersection Summary												
HCM 2000 Control Delay			21.8									C
HCM 2000 Volume to Capacity ratio			0.75									
Actuated Cycle Length (s)			82.9								14.5	
Intersection Capacity Utilization			68.1%									C
Analysis Period (min)			15									

c Critical Lane Group

Year 2035 ALT + Proj AM
14: Twin Oaks Valley Rd & Cassou Rd

Sierra Project
03/17/2017

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↔			↔		↔	↔		↔	↔	
Traffic Volume (vph)	20	10	50	240	20	50	30	520	240	90	1270	10
Future Volume (vph)	20	10	50	240	20	50	30	520	240	90	1270	10
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		5.0			5.0		5.0	5.0		5.0	5.0	
Lane Util. Factor		1.00			1.00		1.00	0.95		1.00	0.95	
Frpb, ped/bikes		0.99			1.00		1.00	0.99		1.00	1.00	
Flpb, ped/bikes		1.00			1.00		1.00	1.00		1.00	1.00	
Frt		0.92			0.98		1.00	0.95		1.00	1.00	
Flt Protected		0.99			0.96		0.95	1.00		0.95	1.00	
Satd. Flow (prot)		1664			1754		1770	3348		1770	3535	
Flt Permitted		0.99			0.96		0.95	1.00		0.95	1.00	
Satd. Flow (perm)		1664			1754		1770	3348		1770	3535	
Peak-hour factor, PHF	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Adj. Flow (vph)	21	10	52	250	21	52	31	542	250	94	1323	10
RTOR Reduction (vph)	0	48	0	0	5	0	0	37	0	0	1	0
Lane Group Flow (vph)	0	35	0	0	318	0	31	755	0	94	1332	0
Confl. Peds. (#/hr)			6						1			
Turn Type	Split	NA		Split	NA		Prot	NA		Prot	NA	
Protected Phases	4	4		8	8		5	2		1	6	
Permitted Phases												
Actuated Green, G (s)		8.2			24.6		2.5	39.9		10.6	48.0	
Effective Green, g (s)		8.2			24.6		2.5	39.9		10.6	48.0	
Actuated g/C Ratio		0.08			0.24		0.02	0.39		0.10	0.46	
Clearance Time (s)		5.0			5.0		5.0	5.0		5.0	5.0	
Vehicle Extension (s)		3.0			3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)		132			417		42	1293		181	1642	
v/s Ratio Prot		c0.02			c0.18		0.02	0.23		c0.05	c0.38	
v/s Ratio Perm												
v/c Ratio		0.27			0.76		0.74	0.58		0.52	0.81	
Uniform Delay, d1		44.7			36.6		50.1	25.1		43.9	23.8	
Progression Factor		1.00			1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2		1.1			8.0		49.5	0.7		2.5	3.2	
Delay (s)		45.8			44.6		99.6	25.8		46.4	26.9	
Level of Service		D			D		F	C		D	C	
Approach Delay (s)		45.8			44.6			28.6			28.2	
Approach LOS		D			D			C			C	

Intersection Summary

HCM 2000 Control Delay	30.9	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.75		
Actuated Cycle Length (s)	103.3	Sum of lost time (s)	20.0
Intersection Capacity Utilization	76.2%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			

Year 2035 ALT + Proj AM
15: Twin Oaks Valley Rd & La Cienega

Sierra Project
03/17/2017

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations	↔	↔	↔	↔	↔	↔
Traffic Volume (vph)	220	250	780	70	80	1490
Future Volume (vph)	220	250	780	70	80	1490
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.0	6.0	6.5		6.0	6.5
Lane Util. Factor	1.00	1.00	0.95		1.00	0.95
Frpb, ped/bikes	1.00	0.99	1.00		1.00	1.00
Flpb, ped/bikes	1.00	1.00	1.00		1.00	1.00
Frt	1.00	0.85	0.99		1.00	1.00
Flt Protected	0.95	1.00	1.00		0.95	1.00
Satd. Flow (prot)	1770	1563	3481		1770	3539
Flt Permitted	0.95	1.00	1.00		0.95	1.00
Satd. Flow (perm)	1770	1563	3481		1770	3539
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	239	272	848	76	87	1620
RTOR Reduction (vph)	0	0	7	0	0	0
Lane Group Flow (vph)	239	272	917	0	87	1620
Confl. Peds. (#/hr)		1		13		
Confl. Bikes (#/hr)				1		
Turn Type	Prot	Perm	NA		Prot	NA
Protected Phases	8		2		1	6
Permitted Phases		8				
Actuated Green, G (s)	19.4	19.4	32.5		7.0	45.5
Effective Green, g (s)	19.4	19.4	32.5		7.0	45.5
Actuated g/C Ratio	0.25	0.25	0.42		0.09	0.59
Clearance Time (s)	6.0	6.0	6.5		6.0	6.5
Vehicle Extension (s)	3.0	3.0	3.0		3.0	3.0
Lane Grp Cap (vph)	443	391	1461		160	2080
v/s Ratio Prot	0.14		0.26		0.05	c0.46
v/s Ratio Perm		c0.17				
v/c Ratio	0.54	0.70	0.63		0.54	0.78
Uniform Delay, d1	25.1	26.3	17.7		33.7	12.1
Progression Factor	1.00	1.00	1.00		1.00	1.00
Incremental Delay, d2	1.3	5.3	0.9		3.7	1.9
Delay (s)	26.4	31.6	18.5		37.4	14.0
Level of Service	C	C	B		D	B
Approach Delay (s)	29.2		18.5			15.2
Approach LOS	C		B			B

Intersection Summary

HCM 2000 Control Delay	18.5	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.83		
Actuated Cycle Length (s)	77.4	Sum of lost time (s)	18.5
Intersection Capacity Utilization	64.0%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

Year 2035 ALT + Proj AM
16: Twin Oaks Valley Rd & Del Roy Dr

Sierra Project
03/17/2017

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↱		↰	↱		↰	↱		↰	↱	
Traffic Volume (vph)	30	0	70	10	0	10	40	840	20	10	1820	20
Future Volume (vph)	30	0	70	10	0	10	40	840	20	10	1820	20
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5	5.0		4.5	5.0		5.0	5.0		5.0	5.0	
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	0.95		1.00	0.95	
Frpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Flpb, ped/bikes	1.00	1.00		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		1.00	1.00	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770	1583		1770	1583		1770	3525		1770	3533	
Flt Permitted	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (perm)	1770	1583		1770	1583		1770	3525		1770	3533	
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)	33	0	76	11	0	11	43	913	22	11	1978	22
RTOR Reduction (vph)	0	67	0	0	10	0	0	1	0	0	0	0
Lane Group Flow (vph)	33	9	0	11	1	0	43	934	0	11	2000	0
Confl. Peds. (#/hr)	2											
Turn Type	Prot	NA		Prot	NA		Prot	NA		Prot	NA	
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases												
Actuated Green, G (s)	1.2	8.9		0.5	8.2		2.0	49.6		0.5	48.1	
Effective Green, g (s)	1.2	8.9		0.5	8.2		2.0	49.6		0.5	48.1	
Actuated g/C Ratio	0.02	0.11		0.01	0.10		0.03	0.63		0.01	0.61	
Clearance Time (s)	4.5	5.0		4.5	5.0		5.0	5.0		5.0	5.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	26	178		11	164		44	2213		11	2151	
v/s Ratio Prot	c0.02	c0.01		0.01	0.00		c0.02	0.26		0.01	c0.57	
v/s Ratio Perm												
v/c Ratio	1.27	0.05		1.00	0.01		0.98	0.42		1.00	0.93	
Uniform Delay, d1	38.9	31.3		39.2	31.7		38.5	7.4		39.2	13.9	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	268.4	0.1		271.4	0.0		125.9	0.1		271.4	7.7	
Delay (s)	307.3	31.4		310.6	31.8		164.3	7.6		310.6	21.7	
Level of Service	F	C		F	C		F	A		F	C	
Approach Delay (s)	114.9			171.2			14.5			23.2		
Approach LOS	F			F			B			C		

Intersection Summary

HCM 2000 Control Delay	24.7	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.82		
Actuated Cycle Length (s)	79.0	Sum of lost time (s)	19.5
Intersection Capacity Utilization	67.6%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

Year 2035 ALT + Proj AM
17: Twin Oaks Valley Rd & Windy Wy

Sierra Project
03/17/2017

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	10	10	50	0	0	0	50	860	10	10	1820	70
Future Volume (vph)	10	10	50	0	0	0	50	860	10	10	1820	70
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0					6.0	6.0		4.0	4.0	
Lane Util. Factor	1.00	1.00					1.00	0.95		1.00	0.95	
Frpb, ped/bikes	1.00	0.99					1.00	1.00		1.00	1.00	
Flpb, ped/bikes	1.00	1.00					1.00	1.00		1.00	1.00	
Frt	1.00	0.88					1.00	1.00		1.00	0.99	
Flt Protected	0.95	1.00					0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770	1607					1770	3532		1770	3516	
Flt Permitted	0.95	1.00					0.95	1.00		0.95	1.00	
Satd. Flow (perm)	1770	1607					1770	3532		1770	3516	
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	54	0	0	0	54	935	11	11	1978	76
RTOR Reduction (vph)	0	49	0	0	0	0	0	1	0	0	2	0
Lane Group Flow (vph)	11	16	0	0	0	0	54	945	0	11	2052	0
Confl. Peds. (#/hr)	5						5					
Confl. Bikes (#/hr)	4											
Turn Type	Split	NA					Prot	NA				
Protected Phases	4	4					5	2				
Permitted Phases												
Actuated Green, G (s)	8.0	8.0					3.0	61.7				
Effective Green, g (s)	8.0	8.0					3.0	61.7				
Actuated g/C Ratio	0.09	0.09					0.04	0.73				
Clearance Time (s)	4.0	4.0					6.0	6.0				
Vehicle Extension (s)	3.0	3.0					3.0	3.0				
Lane Grp Cap (vph)	167	152					62	2578				
v/s Ratio Prot	0.01	c0.01					c0.03	c0.27				
v/s Ratio Perm												
v/c Ratio	0.07	0.11					0.87	0.37				
Uniform Delay, d1	34.8	35.0					40.6	4.2				
Progression Factor	1.00	1.00					1.00	1.00				
Incremental Delay, d2	0.2	0.3					70.2	0.1				
Delay (s)	35.0	35.3					110.8	4.3				
Level of Service	D	D					F	A				
Approach Delay (s)	35.2		0.0				10.0		11.9			
Approach LOS	D		A				B		B			

Intersection Summary

HCM 2000 Control Delay	11.9	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.75		
Actuated Cycle Length (s)	84.5	Sum of lost time (s)	14.0
Intersection Capacity Utilization	65.6%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

Year 2035 ALT + Proj AM
18: Twin Oaks Valley Rd & Borden Rd

Sierra Project
03/17/2017

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↱		↰	↱		↰	↱		↰	↱	
Traffic Volume (vph)	70	50	280	300	120	40	110	660	70	20	1470	160
Future Volume (vph)	70	50	280	300	120	40	110	660	70	20	1470	160
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.2	5.3		4.2	5.3		4.2	4.9	4.9	4.2	4.9	4.9
Lane Util. Factor	1.00	0.95		1.00	0.95		1.00	0.95	1.00	0.95	1.00	1.00
Frpb, ped/bikes	1.00	0.98		1.00	1.00		1.00	1.00	0.98	1.00	1.00	0.98
Flpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	0.87		1.00	0.96		1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1770	3027		1770	3393		1770	3539	1555	1770	3539	1548
Flt Permitted	0.95	1.00		0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	1770	3027		1770	3393		1770	3539	1555	1770	3539	1548
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)	74	53	295	316	126	42	116	695	74	21	1547	168
RTOR Reduction (vph)	0	131	0	0	20	0	0	0	33	0	0	60
Lane Group Flow (vph)	74	217	0	316	148	0	116	695	41	21	1547	108
Confl. Peds. (#/hr)			6		2				3			6
Confl. Bikes (#/hr)			1		1				3			3
Turn Type	Prot	NA		Prot	NA		Prot	NA	Perm	Prot	NA	Perm
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases									2			6
Actuated Green, G (s)	11.1	19.2		32.9	41.0		14.3	90.8	90.8	3.5	80.0	80.0
Effective Green, g (s)	11.1	19.2		32.9	41.0		14.3	90.8	90.8	3.5	80.0	80.0
Actuated g/C Ratio	0.07	0.12		0.20	0.25		0.09	0.55	0.55	0.02	0.48	0.48
Clearance Time (s)	4.2	5.3		4.2	5.3		4.2	4.9	4.9	4.2	4.9	4.9
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)	119	352		352	843		153	1947	855	37	1715	750
v/s Ratio Prot	0.04	c0.07		c0.18	0.04		c0.07	0.20		0.01	c0.44	
v/s Ratio Perm									0.03			0.07
v/c Ratio	0.62	0.94dr		0.90	0.18		0.76	0.36	0.05	0.57	0.90	0.14
Uniform Delay, d1	74.9	69.4		64.4	48.7		73.7	20.8	17.1	80.0	38.9	23.5
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	9.7	3.2		24.2	0.1		19.1	0.1	0.0	18.4	7.0	0.1
Delay (s)	84.6	72.6		88.6	48.8		92.8	20.9	17.2	98.4	45.9	23.6
Level of Service	F	E		F	D		F	C	B	F	D	C
Approach Delay (s)		74.7			74.8			30.0			44.4	
Approach LOS		E			E			C			D	
Intersection Summary												
HCM 2000 Control Delay		48.6			HCM 2000 Level of Service			D				
HCM 2000 Volume to Capacity ratio		0.85										
Actuated Cycle Length (s)		165.0			Sum of lost time (s)			18.6				
Intersection Capacity Utilization		92.2%			ICU Level of Service			F				
Analysis Period (min)		15										
dr Defacto Right Lane. Recode with 1 though lane as a right lane.												
c Critical Lane Group												

Year 2035 ALT + Proj AM
19: Twin Oaks Valley Rd & Richmar Ave

Sierra Project
03/17/2017

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↱		↰	↱		↰	↱		↰	↱	
Traffic Volume (vph)	240	10	170	20	10	10	90	850	20	30	1730	320
Future Volume (vph)	240	10	170	20	10	10	90	850	20	30	1730	320
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.9	4.9		4.0	4.0		4.0	5.7		4.0	5.7	
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	0.95		1.00	0.95	
Frpb, ped/bikes	1.00	0.99		1.00	0.99		1.00	1.00		1.00	1.00	
Flpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Frt	1.00	0.86		1.00	0.93		1.00	1.00		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	1578		1770	1704		1770	3524		1770	3440	
Flt Permitted	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (perm)	1770	1578		1770	1704		1770	3524		1770	3440	
Peak-hour factor, PHF	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99
Adj. Flow (vph)	242	10	172	20	10	10	91	859	20	30	1747	323
RTOR Reduction (vph)	0	148	0	0	9	0	0	1	0	0	9	0
Lane Group Flow (vph)	242	34	0	20	11	0	91	878	0	30	2061	0
Confl. Peds. (#/hr)					8				4			2
Confl. Bikes (#/hr)			1						1			3
Turn Type	Split	NA		Split	NA		Prot	NA		Prot	NA	
Protected Phases	4	4		8	8		5	2		1	6	
Permitted Phases												
Actuated Green, G (s)	17.3	17.3		7.6	7.6		7.1	75.0		3.8	71.7	
Effective Green, g (s)	17.3	17.3		7.6	7.6		7.1	75.0		3.8	71.7	
Actuated g/C Ratio	0.14	0.14		0.06	0.06		0.06	0.61		0.03	0.59	
Clearance Time (s)	4.9	4.9		4.0	4.0		4.0	5.7		4.0	5.7	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	250	223		109	105		102	2161		54	2016	
v/s Ratio Prot	c0.14	0.02		c0.01	0.01		c0.05	c0.25		0.02	c0.60	
v/s Ratio Perm												
v/c Ratio	0.97	0.15		0.18	0.10		0.89	0.41		0.56	1.02	
Uniform Delay, d1	52.2	46.1		54.4	54.1		57.2	12.2		58.4	25.3	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	47.5	0.3		0.8	0.4		55.9	0.1		11.8	25.9	
Delay (s)	99.7	46.4		55.2	54.6		113.1	12.3		70.2	51.2	
Level of Service	F	D		E	D		F	B		E	D	
Approach Delay (s)		76.8			54.9			21.8			51.5	
Approach LOS		E			D			C			D	
Intersection Summary												
HCM 2000 Control Delay		46.4			HCM 2000 Level of Service			D				
HCM 2000 Volume to Capacity ratio		0.93										
Actuated Cycle Length (s)		122.3			Sum of lost time (s)			18.6				
Intersection Capacity Utilization		95.2%			ICU Level of Service			F				
Analysis Period (min)		15										
c Critical Lane Group												

Year 2035 ALT + Proj AM
20: Twin Oaks Valley Rd & San Marcos Blvd

Sierra Project
03/17/2017

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↱	↱	↰	↱		↰	↱	↱	↰	↱	↱
Traffic Volume (vph)	240	420	450	560	700	50	410	670	560	140	1340	440
Future Volume (vph)	240	420	450	560	700	50	410	670	560	140	1340	440
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.2	5.3	5.3	4.2	5.0		4.2	5.3	4.2	5.3	5.3	5.3
Lane Util. Factor	0.97	0.95	0.88	0.94	0.95		0.97	0.95	1.00	0.97	0.95	1.00
Frpb, ped/bikes	1.00	1.00	0.97	1.00	1.00		1.00	1.00	0.99	1.00	1.00	0.99
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	1.00	0.85	1.00	0.99		1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	3433	3539	2712	4990	3499		3433	3539	1565	3433	3539	1562
Flt Permitted	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	3433	3539	2712	4990	3499		3433	3539	1565	3433	3539	1562
Peak-hour factor, PHF	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98
Adj. Flow (vph)	245	429	459	571	714	51	418	684	571	143	1367	449
RTOR Reduction (vph)	0	0	249	0	5	0	0	0	34	0	0	160
Lane Group Flow (vph)	245	429	210	571	760	0	418	684	537	143	1367	289
Confl. Peds. (#/hr)			5			4			1			1
Confl. Bikes (#/hr)			8			3			3			3
Turn Type	Prot	NA	Perm	Prot	NA		Prot	NA	pm+ov	Prot	NA	Perm
Protected Phases	7	4		3	8		5	2	3	1	6	
Permitted Phases			4						2			6
Actuated Green, G (s)	11.2	26.1	26.1	15.0	30.2		15.4	54.4	69.4	8.6	47.6	47.6
Effective Green, g (s)	11.2	26.1	26.1	15.0	30.2		15.4	54.4	69.4	8.6	47.6	47.6
Actuated g/C Ratio	0.09	0.21	0.21	0.12	0.25		0.13	0.44	0.56	0.07	0.39	0.39
Clearance Time (s)	4.2	5.3	5.3	4.2	5.0		4.2	5.3	4.2	4.2	5.3	5.3
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	312	750	575	608	858		429	1563	882	239	1368	603
v/s Ratio Prot	0.07	0.12		c0.11	c0.22		c0.12	0.19	0.07	0.04	c0.39	
v/s Ratio Perm			0.08						0.27			0.18
v/c Ratio	0.79	0.57	0.37	0.94	0.89		0.97	0.44	0.61	0.60	1.00	0.48
Uniform Delay, d1	54.8	43.5	41.4	53.6	44.8		53.7	23.8	17.8	55.6	37.7	28.4
Progression Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	12.2	1.1	0.4	22.3	10.9		36.5	0.2	1.2	4.0	24.0	0.6
Delay (s)	67.0	44.6	41.8	75.9	55.7		90.1	24.0	19.0	59.6	61.7	29.0
Level of Service	E	D	D	E	E		F	C	B	E	E	C
Approach Delay (s)		48.3			64.3			38.8			54.1	
Approach LOS		D			E			D			D	
Intersection Summary												
HCM 2000 Control Delay			51.1		HCM 2000 Level of Service					D		
HCM 2000 Volume to Capacity ratio			0.97									
Actuated Cycle Length (s)			123.1		Sum of lost time (s)					19.0		
Intersection Capacity Utilization			92.4%		ICU Level of Service					F		
Analysis Period (min)			15									
c Critical Lane Group												

Year 2035 ALT + Proj AM
21: Twin Oaks Valley Rd & SR 78 WB Ramps

Sierra Project
03/17/2017

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations				↰		↱		↱	↱		↱	↱
Traffic Volume (vph)	0	0	0	720	0	320	0	1320	620	0	1820	680
Future Volume (vph)	0	0	0	720	0	320	0	1320	620	0	1820	680
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)				4.6		4.6		5.3	4.6		5.3	5.3
Lane Util. Factor				0.97		0.88		0.91	1.00		0.91	1.00
Frpb, ped/bikes				1.00		1.00		1.00	0.97		1.00	0.97
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	0.85
Flt Protected				0.95		1.00		1.00	1.00		1.00	1.00
Satd. Flow (prot)				3433		2787		5085	1539		5085	1543
Flt Permitted				0.95		1.00		1.00	1.00		1.00	1.00
Satd. Flow (perm)				3433		2787		5085	1539		5085	1543
Peak-hour factor, PHF	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98
Adj. Flow (vph)	0	0	0	735	0	327	0	1347	633	0	1857	694
RTOR Reduction (vph)	0	0	0	0	0	54	0	0	0	0	0	243
Lane Group Flow (vph)	0	0	0	735	0	273	0	1347	633	0	1857	451
Confl. Peds. (#/hr)									8			5
Confl. Bikes (#/hr)									1			3
Turn Type				Prot		Perm		NA	pm+ov		NA	Perm
Protected Phases				8				2	8		6	
Permitted Phases						8			2			6
Actuated Green, G (s)				32.2		32.2		77.9	110.1		77.9	77.9
Effective Green, g (s)				32.2		32.2		77.9	110.1		77.9	77.9
Actuated g/C Ratio				0.27		0.27		0.65	0.92		0.65	0.65
Clearance Time (s)				4.6		4.6		5.3	4.6		5.3	5.3
Vehicle Extension (s)				2.0		2.0		2.0	2.0		2.0	2.0
Lane Grp Cap (vph)				921		747		3301	1471		3301	1001
v/s Ratio Prot				c0.21				0.26	0.12		c0.37	
v/s Ratio Perm						0.10			0.30			0.29
v/c Ratio				0.80		0.37		0.41	0.43		0.56	0.45
Uniform Delay, d1				40.9		35.6		10.0	0.7		11.6	10.4
Progression Factor				1.00		1.00		0.45	9.63		1.00	1.00
Incremental Delay, d2				4.6		0.1		0.2	0.0		0.7	1.5
Delay (s)				45.4		35.7		4.7	6.5		12.3	11.9
Level of Service				D		D		A	A		B	B
Approach Delay (s)		0.0			42.4			5.3			12.2	
Approach LOS		A			D			A			B	
Intersection Summary												
HCM 2000 Control Delay				15.5		HCM 2000 Level of Service					B	
HCM 2000 Volume to Capacity ratio				0.63								
Actuated Cycle Length (s)				120.0		Sum of lost time (s)					9.9	
Intersection Capacity Utilization				63.5%		ICU Level of Service					B	
Analysis Period (min)				15								
c Critical Lane Group												

Year 2035 ALT + Proj AM
22: Twin Oaks Valley Rd & SR 78 EB Ramps

Sierra Project
03/17/2017

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	680	10	900	0	0	0	0	1270	740	370	2170	0
Future Volume (vph)	680	10	900	0	0	0	0	1270	740	370	2170	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.6	4.6	4.6					5.3	5.3	4.2	5.3	
Lane Util. Factor	0.95	0.91	0.95					0.91	1.00	0.97	0.91	
Frpb, ped/bikes	1.00	0.99	0.99					1.00	0.98	1.00	1.00	
Flpb, ped/bikes	1.00	1.00	1.00					1.00	1.00	1.00	1.00	
Frt	1.00	0.89	0.85					1.00	0.85	1.00	1.00	
Flt Protected	0.95	0.99	1.00					1.00	1.00	0.95	1.00	
Satd. Flow (prot)	1681	1475	1485					5085	1553	3433	5085	
Flt Permitted	0.95	0.99	1.00					1.00	1.00	0.95	1.00	
Satd. Flow (perm)	1681	1475	1485					5085	1553	3433	5085	
Peak-hour factor, PHF	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Adj. Flow (vph)	701	10	928	0	0	0	0	1309	763	381	2237	0
RTOR Reduction (vph)	0	1	35	0	0	0	0	0	509	0	0	0
Lane Group Flow (vph)	568	541	494	0	0	0	0	1309	254	381	2237	0
Confl. Peds. (#/hr)			1						4			
Confl. Bikes (#/hr)												1
Turn Type	Split	NA	Perm					NA	Perm	Prot	NA	
Protected Phases	4	4						2		1	6	
Permitted Phases			4						2			
Actuated Green, G (s)	49.6	49.6	49.6					40.0	40.0	16.3	60.5	
Effective Green, g (s)	49.6	49.6	49.6					40.0	40.0	16.3	60.5	
Actuated g/C Ratio	0.41	0.41	0.41					0.33	0.33	0.14	0.50	
Clearance Time (s)	4.6	4.6	4.6					5.3	5.3	4.2	5.3	
Vehicle Extension (s)	3.0	3.0	3.0					3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	694	609	613					1695	517	466	2563	
v/s Ratio Prot	0.34	c0.37						0.26		0.11	c0.44	
v/s Ratio Perm			0.33						0.16			
v/c Ratio	0.82	0.89	0.81					0.77	0.49	0.82	0.87	
Uniform Delay, d1	31.2	32.6	31.0					35.9	31.9	50.4	26.3	
Progression Factor	1.00	1.00	1.00					1.00	1.00	1.13	1.21	
Incremental Delay, d2	7.5	14.7	7.7					3.5	3.3	9.0	3.7	
Delay (s)	38.7	47.3	38.6					39.4	35.2	66.2	35.7	
Level of Service	D	D	D					D	D	E	D	
Approach Delay (s)		41.5			0.0			37.9			40.2	
Approach LOS		D			A			D			D	
Intersection Summary												
HCM 2000 Control Delay			39.8							D		
HCM 2000 Volume to Capacity ratio			0.91									
Actuated Cycle Length (s)			120.0							14.1		
Intersection Capacity Utilization			96.9%							F		
Analysis Period (min)			15									
c Critical Lane Group												

Year 2035 ALT + Proj AM
28: San Marcos Blvd & Knoll Rd/SR 78 WB Ramps

Sierra Project
03/17/2017

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰		↱↲	↰↱	↱		↰↱↲	↰↱↲	↰		↱↲↱	↱
Traffic Volume (vph)	200	0	580	1130	410	20	380	470	140	0	1080	240
Future Volume (vph)	200	0	580	1130	410	20	380	470	140	0	1080	240
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.6		5.2	5.6	5.6		5.2	6.3	6.3		6.3	6.3
Lane Util. Factor	1.00		0.88	0.97	0.95		0.97	0.95	1.00		0.91	1.00
Frpb, ped/bikes	1.00		1.00	1.00	1.00		1.00	1.00	1.00		1.00	0.98
Flpb, ped/bikes	1.00		1.00	1.00	1.00		1.00	1.00	1.00		1.00	1.00
Frt	1.00		0.85	1.00	0.99		1.00	1.00	0.85		1.00	0.85
Flt Protected	0.95		1.00	0.95	1.00		0.95	1.00	1.00		1.00	1.00
Satd. Flow (prot)	1770		2787	3433	3512		3433	3539	1583		5085	1546
Flt Permitted	0.95		1.00	0.95	1.00		0.95	1.00	1.00		1.00	1.00
Satd. Flow (perm)	1770		2787	3433	3512		3433	3539	1583		5085	1546
Peak-hour factor, PHF	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Adj. Flow (vph)	206	0	598	1165	423	21	392	485	144	0	1113	247
RTOR Reduction (vph)	0	0	58	0	3	0	0	0	73	0	0	86
Lane Group Flow (vph)	206	0	540	1165	441	0	392	485	71	0	1113	161
Confl. Peds. (#/hr)							1					8
Confl. Bikes (#/hr)												2
Turn Type	Prot		pm+ov	Prot	NA		Prot	NA	Perm		NA	Perm
Protected Phases	7		5	3	8		5	2			6	
Permitted Phases			7						2			6
Actuated Green, G (s)	15.9		34.1	48.8	27.3		18.2	59.3	59.3		35.9	35.9
Effective Green, g (s)	15.9		34.1	48.8	27.3		18.2	59.3	59.3		35.9	35.9
Actuated g/C Ratio	0.13		0.28	0.41	0.23		0.15	0.49	0.49		0.30	0.30
Clearance Time (s)	5.6		5.2	5.6	5.6		5.2	6.3	6.3		6.3	6.3
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		791	1396	798		520	1748	782		1521	462
v/s Ratio Prot	0.12		0.10	c0.34	0.13		c0.11	0.14			c0.22	
v/s Ratio Perm			0.09						0.04			0.10
v/c Ratio	0.88		0.68	0.83	0.55		0.75	0.28	0.09		0.73	0.35
Uniform Delay, d1	51.1		38.1	32.0	41.0		48.8	17.8	16.1		37.7	32.9
Progression Factor	1.00		1.00	1.00	1.00		0.94	1.60	4.74		1.00	1.00
Incremental Delay, d2	29.5		2.4	4.5	0.8		6.0	0.4	0.2		3.1	2.1
Delay (s)	80.6		40.6	36.4	41.8		51.6	28.9	76.4		40.9	35.0
Level of Service	F		D	D	D		D	C	E		D	C
Approach Delay (s)		50.9			37.9			44.3			39.8	
Approach LOS		D			D			D			D	
Intersection Summary												
HCM 2000 Control Delay			42.0		HCM 2000 Level of Service				D			
HCM 2000 Volume to Capacity ratio			0.83									
Actuated Cycle Length (s)			120.0		Sum of lost time (s)				22.7			
Intersection Capacity Utilization			90.1%		ICU Level of Service				E			
Analysis Period (min)			15									
c Critical Lane Group												

Year 2035 ALT + Proj AM
29: San Marcos Blvd & SR 78 EB Ramps

Sierra Project
03/17/2017

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↰	↰	↰	↰	↰	↰	↰	↰	↰	↰	↰
Traffic Volume (vph)	180	0	260	0	0	0	0	830	840	190	2450	0
Future Volume (vph)	180	0	260	0	0	0	0	830	840	190	2450	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.6		5.6					6.3	6.3	5.2	6.3	
Lane Util. Factor	0.97		1.00					0.91	0.88	0.97	0.91	
Frpb, ped/bikes	1.00		1.00					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)	3433		1583					5085	2726	3433	5085	
Flt Permitted	0.95		1.00					1.00	1.00	0.95	1.00	
Satd. Flow (perm)	3433		1583					5085	2726	3433	5085	
Peak-hour factor, PHF	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Adj. Flow (vph)	188	0	271	0	0	0	0	865	875	198	2552	0
RTOR Reduction (vph)	0	0	64	0	0	0	0	0	359	0	0	0
Lane Group Flow (vph)	188	0	207	0	0	0	0	865	516	198	2552	0
Confl. Peds. (#/hr)												6
Confl. Bikes (#/hr)												4
Turn Type	Prot		Perm					NA	Perm	Prot	NA	
Protected Phases	4							2		1	6	
Permitted Phases			4					2				
Actuated Green, G (s)	20.6		20.6					70.7	70.7	11.6	87.5	
Effective Green, g (s)	20.6		20.6					70.7	70.7	11.6	87.5	
Actuated g/C Ratio	0.17		0.17					0.59	0.59	0.10	0.73	
Clearance Time (s)	5.6		5.6					6.3	6.3	5.2	6.3	
Vehicle Extension (s)	3.0		3.0					3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	589		271					2995	1606	331	3707	
v/s Ratio Prot	0.05							0.17		0.06	c0.50	
v/s Ratio Perm			c0.13						0.19			
v/c Ratio	0.32		0.76					0.29	0.32	0.60	0.69	
Uniform Delay, d1	43.6		47.4					12.2	12.5	52.0	8.8	
Progression Factor	1.00		1.00					1.00	1.00	1.15	0.52	
Incremental Delay, d2	0.3		12.1					0.2	0.5	2.5	0.9	
Delay (s)	43.9		59.5					12.4	13.0	62.4	5.5	
Level of Service	D		E					B	B	E	A	
Approach Delay (s)		53.1			0.0			12.7			9.6	
Approach LOS		D			A			B			A	
Intersection Summary												
HCM 2000 Control Delay			14.7									
HCM 2000 Volume to Capacity ratio			0.74									
Actuated Cycle Length (s)			120.0						17.1			
Intersection Capacity Utilization			73.4%						D			
Analysis Period (min)			15									
c Critical Lane Group												

Year 2035 ALT + Proj AM
30: San Marcos Blvd & E. Mission Road

Sierra Project
03/17/2017

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↰	↰	↰	↰	↰	↰	↰	↰	↰	↰	↰
Traffic Volume (vph)	30	320	20	740	540	80	10	80	340	100	450	50
Future Volume (vph)	30	320	20	740	540	80	10	80	340	100	450	50
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	5.3	5.3	4.0	5.3	5.3	4.0	5.3	5.3	4.0	5.3	
Lane Util. Factor	1.00	0.95	1.00	0.97	0.95	1.00	1.00	0.95	1.00	1.00	0.95	
Frpb, ped/bikes	1.00	1.00	0.99	1.00	1.00	0.97	1.00	1.00	1.00	1.00	1.00	
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.99	
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)	1770	3539	1561	3433	3539	1529	1770	3539	1583	1770	3486	
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	
Satd. Flow (perm)	1770	3539	1561	3433	3539	1529	1770	3539	1583	1770	3486	
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)	33	348	22	804	587	87	11	87	370	109	489	54
RTOR Reduction (vph)	0	0	18	0	0	47	0	0	313	0	5	0
Lane Group Flow (vph)	33	348	4	804	587	40	11	87	57	109	538	0
Confl. Peds. (#/hr)			2			12						
Turn Type	Prot	NA	Perm	Prot	NA	Perm	Prot	NA	Prot	Prot	NA	
Protected Phases	7	4		3	8		5	2	2	1	6	
Permitted Phases			4			8						
Actuated Green, G (s)	4.7	18.7	18.7	29.4	43.4	43.4	0.9	14.4	14.4	12.5	26.0	
Effective Green, g (s)	4.7	18.7	18.7	29.4	43.4	43.4	0.9	14.4	14.4	12.5	26.0	
Actuated g/C Ratio	0.05	0.20	0.20	0.31	0.46	0.46	0.01	0.15	0.15	0.13	0.28	
Clearance Time (s)	4.0	5.3	5.3	4.0	5.3	5.3	4.0	5.3	5.3	4.0	5.3	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	88	707	311	1078	1640	708	17	544	243	236	968	
v/s Ratio Prot	0.02	c0.10		c0.23	0.17		0.01	0.02	0.04	c0.06	c0.15	
v/s Ratio Perm			0.00			0.03						
v/c Ratio	0.38	0.49	0.01	0.75	0.36	0.06	0.65	0.16	0.23	0.46	0.56	
Uniform Delay, d1	43.0	33.2	30.1	28.8	16.1	13.8	46.2	34.4	34.8	37.4	28.9	
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	2.7	0.5	0.0	2.8	0.1	0.0	62.0	0.1	0.5	1.4	0.7	
Delay (s)	45.7	33.8	30.1	31.6	16.3	13.9	108.2	34.5	35.3	38.9	29.6	
Level of Service	D	C	C	C	B	B	F	C	D	D	C	
Approach Delay (s)		34.6			24.5			36.8			31.1	
Approach LOS		C			C			D			C	
Intersection Summary												
HCM 2000 Control Delay			29.2									
HCM 2000 Volume to Capacity ratio			0.62									
Actuated Cycle Length (s)			93.6						18.6			
Intersection Capacity Utilization			56.9%						B			
Analysis Period (min)			15									
c Critical Lane Group												

Year 2035 ALT + Proj AM

33: Twin Oaks Valley Rd & Discovery Street/Barham Dr

Sierra Project

03/17/2017

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	390	100	10	390	500	270	30	950	170	600	1220	700
Future Volume (vph)	390	100	10	390	500	270	30	950	170	600	1220	700
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	5.3	5.3	5.0	5.3	5.3	5.0	6.0		5.0	6.0	6.0
Lane Util. Factor	0.97	0.91	1.00	1.00	1.00	1.00	1.00	0.91		0.97	0.91	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.98		1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	3433	5085	1583	1770	1863	1583	1770	4969		3433	5085	1583
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00
Satd. Flow (perm)	3433	5085	1583	1770	1863	1583	1770	4969		3433	5085	1583
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)	424	109	11	424	543	293	33	1033	185	652	1326	761
RTOR Reduction (vph)	0	0	9	0	0	143	0	17	0	0	0	242
Lane Group Flow (vph)	424	109	2	424	543	150	33	1201	0	652	1326	519
Turn Type	Prot	NA	Perm	Prot	NA	Perm	Prot	NA		Prot	NA	Perm
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases			4			8						6
Actuated Green, G (s)	19.0	27.5	27.5	36.8	45.3	45.3	4.0	37.6		28.0	61.6	61.6
Effective Green, g (s)	19.0	27.5	27.5	36.8	45.3	45.3	4.0	37.6		28.0	61.6	61.6
Actuated g/C Ratio	0.13	0.18	0.18	0.24	0.30	0.30	0.03	0.25		0.19	0.41	0.41
Clearance Time (s)	5.0	5.3	5.3	5.0	5.3	5.3	5.0	6.0		5.0	6.0	6.0
Vehicle Extension (s)	2.0	4.5	4.5	2.0	4.5	4.5	2.0	3.0		2.0	4.0	4.0
Lane Grp Cap (vph)	431	924	287	430	558	474	46	1235		635	2071	644
v/s Ratio Prot	0.12	0.02		c0.24	c0.29		0.02	c0.24		c0.19	0.26	
v/s Ratio Perm			0.00			0.09						0.33
v/c Ratio	0.98	0.12	0.01	0.99	0.97	0.32	0.72	0.97		1.03	0.64	0.81
Uniform Delay, d1	65.9	51.7	50.7	56.9	52.3	41.0	73.0	56.3		61.6	35.9	39.5
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	38.7	0.1	0.0	39.3	31.3	0.7	35.7	19.2		42.7	0.8	7.7
Delay (s)	104.7	51.8	50.7	96.2	83.7	41.6	108.7	75.5		104.3	36.7	47.2
Level of Service	F	D	D	F	F	D	F	E		F	D	D
Approach Delay (s)		93.0			78.1			76.3			55.7	
Approach LOS		F			E			E			E	
Intersection Summary												
HCM 2000 Control Delay			68.5		HCM 2000 Level of Service					E		
HCM 2000 Volume to Capacity ratio			1.01									
Actuated Cycle Length (s)			151.2		Sum of lost time (s)					21.3		
Intersection Capacity Utilization			94.5%		ICU Level of Service					F		
Analysis Period (min)			15									

c Critical Lane Group

Year 2035 ALT + Proj PM
12: Twin Oaks Valley Rd & Deer Springs Rd

Sierra Project
03/17/2017

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	80	390	170	1620	1080	70
Future Volume (vph)	80	390	170	1620	1080	70
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.9	4.9	4.0	5.3	5.3	5.3
Lane Util. Factor	1.00	1.00	1.00	0.95	0.95	1.00
Frpb, ped/bikes	1.00	1.00	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)	1770	1583	1770	3539	3539	1547
Flt Permitted	0.95	1.00	0.95	1.00	1.00	1.00
Satd. Flow (perm)	1770	1583	1770	3539	3539	1547
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	87	424	185	1761	1174	76
RTOR Reduction (vph)	0	309	0	0	0	28
Lane Group Flow (vph)	87	115	185	1761	1174	48
Confl. Peds. (#/hr)						1
Confl. Bikes (#/hr)						2
Turn Type	Prot	Perm	Prot	NA	NA	Perm
Protected Phases	4		5	2	6	
Permitted Phases		4				6
Actuated Green, G (s)	11.2	11.2	13.2	50.0	32.8	32.8
Effective Green, g (s)	11.2	11.2	13.2	50.0	32.8	32.8
Actuated g/C Ratio	0.16	0.16	0.18	0.70	0.46	0.46
Clearance Time (s)	4.9	4.9	4.0	5.3	5.3	5.3
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	277	248	327	2478	1625	710
v/s Ratio Prot	0.05		0.10	c0.50	0.33	
v/s Ratio Perm		c0.07				0.03
v/c Ratio	0.31	0.47	0.57	0.71	0.72	0.07
Uniform Delay, d1	26.7	27.4	26.5	6.4	15.6	10.8
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	0.7	1.4	2.2	1.0	1.6	0.0
Delay (s)	27.3	28.8	28.7	7.4	17.2	10.8
Level of Service	C	C	C	A	B	B
Approach Delay (s)	28.5			9.4	16.8	
Approach LOS	C			A	B	

Intersection Summary			
HCM 2000 Control Delay	14.5	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.71		
Actuated Cycle Length (s)	71.4	Sum of lost time (s)	14.2
Intersection Capacity Utilization	62.5%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

Year 2035 ALT + Proj PM
13: Twin Oaks Valley Rd & Buena Creek Rd

Sierra Project
03/17/2017

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	680	0	280	10	0	0	230	1110	0	10	880	510
Future Volume (vph)	680	0	280	10	0	0	230	1110	0	10	880	510
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		5.0	5.5		4.5	5.5	5.5
Lane Util. Factor	0.97		1.00		1.00		1.00	0.95		1.00	0.95	1.00
Frpb, ped/bikes	1.00		1.00		1.00		1.00	1.00		1.00	1.00	0.98
Flpb, ped/bikes	1.00		1.00		1.00		1.00	1.00		1.00	1.00	1.00
Frt	1.00		0.85		1.00		1.00	1.00		1.00	1.00	0.85
Flt Protected	0.95		1.00		0.95		0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	3433		1583		1770		1770	3539		1770	3539	1558
Flt Permitted	0.75		1.00		0.95		0.95	1.00		0.95	1.00	1.00
Satd. Flow (perm)	2712		1583		1770		1770	3539		1770	3539	1558
Peak-hour factor, PHF	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Adj. Flow (vph)	731	0	301	11	0	0	247	1194	0	11	946	548
RTOR Reduction (vph)	0	0	215	0	0	0	0	0	0	0	0	184
Lane Group Flow (vph)	731	0	86	0	11	0	247	1194	0	11	946	364
Confl. Peds. (#/hr)												1
Confl. Bikes (#/hr)												5
Turn Type		Perm		Perm		Perm		NA		Prot		NA
Protected Phases								8		5		2
Permitted Phases		4		4		8						6
Actuated Green, G (s)		25.0		25.0		25.0		16.1		47.3		0.7
Effective Green, g (s)		25.0		25.0		25.0		16.1		47.3		0.7
Actuated g/C Ratio		0.29		0.29		0.29		0.19		0.54		0.01
Clearance Time (s)		4.0		4.0		4.0		5.0		5.5		4.5
Vehicle Extension (s)		3.0		3.0		3.0		3.0		3.0		3.0
Lane Grp Cap (vph)		779		454		508		327		1924		14
v/s Ratio Prot								c0.14		0.34		0.01
v/s Ratio Perm		c0.27		0.05		0.01						0.23
v/c Ratio		0.94		0.19		0.02		0.76		0.62		0.79
Uniform Delay, d1		30.2		23.4		22.2		33.6		13.7		43.1
Progression Factor		1.00		1.00		1.00		1.00		1.00		1.00
Incremental Delay, d2		18.7		0.2		0.0		9.5		0.6		130.6
Delay (s)		48.9		23.6		22.2		43.1		14.3		173.6
Level of Service		D		C		C		D		B		F
Approach Delay (s)		41.5				22.2				19.2		27.4
Approach LOS		D				C				B		C

Intersection Summary			
HCM 2000 Control Delay	28.1	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.81		
Actuated Cycle Length (s)	87.0	Sum of lost time (s)	14.5
Intersection Capacity Utilization	68.6%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

Year 2035 ALT + Proj PM
14: Twin Oaks Valley Rd & Cassou Rd

Sierra Project
03/17/2017

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↔			↔		↖	↗		↖	↗	
Traffic Volume (vph)	20	0	60	20	10	40	50	1320	20	20	1020	20
Future Volume (vph)	20	0	60	20	10	40	50	1320	20	20	1020	20
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		5.0			5.0		5.0	5.0		5.0	5.0	
Lane Util. Factor		1.00			1.00		1.00	0.95		1.00	0.95	
Frpb, ped/bikes		0.99			1.00		1.00	1.00		1.00	1.00	
Flpb, ped/bikes		1.00			1.00		1.00	1.00		1.00	1.00	
Frt		0.90			0.92		1.00	1.00		1.00	1.00	
Flt Protected		0.99			0.99		0.95	1.00		0.95	1.00	
Satd. Flow (prot)		1638			1696		1770	3531		1770	3529	
Flt Permitted		0.99			0.99		0.95	1.00		0.95	1.00	
Satd. Flow (perm)		1638			1696		1770	3531		1770	3529	
Peak-hour factor, PHF	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Adj. Flow (vph)	22	0	65	22	11	43	54	1419	22	22	1097	22
RTOR Reduction (vph)	0	80	0	0	39	0	0	0	0	0	1	0
Lane Group Flow (vph)	0	7	0	0	37	0	54	1441	0	22	1118	0
Confl. Peds. (#/hr)			1									
Turn Type	Split	NA		Split	NA		Prot	NA		Prot	NA	
Protected Phases	4	4		8	8		5	2		1	6	
Permitted Phases												
Actuated Green, G (s)		7.1			8.0		4.8	50.9		1.7	47.8	
Effective Green, g (s)		7.1			8.0		4.8	50.9		1.7	47.8	
Actuated g/C Ratio		0.08			0.09		0.05	0.58		0.02	0.55	
Clearance Time (s)		5.0			5.0		5.0	5.0		5.0	5.0	
Vehicle Extension (s)		3.0			3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)		132			154		96	2049		34	1923	
v/s Ratio Prot		c0.00			c0.02		c0.03	c0.41		0.01	0.32	
v/s Ratio Perm												
v/c Ratio		0.05			0.24		0.56	0.70		0.65	0.58	
Uniform Delay, d1		37.2			37.0		40.4	13.0		42.7	13.3	
Progression Factor		1.00			1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2		0.2			0.8		7.3	1.1		35.3	0.5	
Delay (s)		37.4			37.8		47.8	14.2		78.0	13.7	
Level of Service		D			D		D	B		E	B	
Approach Delay (s)		37.4			37.8		15.4			15.0		
Approach LOS		D			D		B			B		

Intersection Summary

HCM 2000 Control Delay	16.5	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.60		
Actuated Cycle Length (s)	87.7	Sum of lost time (s)	20.0
Intersection Capacity Utilization	56.6%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

Year 2035 ALT + Proj PM
15: Twin Oaks Valley Rd & La Cienega

Sierra Project
03/17/2017

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations	↖	↗	↕		↖	↗
Traffic Volume (vph)	130	70	1440	140	120	990
Future Volume (vph)	130	70	1440	140	120	990
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)		6.0	6.5		6.0	6.5
Lane Util. Factor	1.00	1.00	0.95		1.00	0.95
Frpb, ped/bikes	1.00	1.00	1.00		1.00	1.00
Flpb, ped/bikes	1.00	1.00	1.00		1.00	1.00
Frt	1.00	0.85	0.99		1.00	1.00
Flt Protected	0.95	1.00	1.00		0.95	1.00
Satd. Flow (prot)	1770	1583	3475		1770	3539
Flt Permitted	0.95	1.00	1.00		0.95	1.00
Satd. Flow (perm)	1770	1583	3475		1770	3539
Peak-hour factor, PHF	0.98	0.98	0.98	0.98	0.98	0.98
Adj. Flow (vph)	133	71	1469	143	122	1010
RTOR Reduction (vph)	0	0	6	0	0	0
Lane Group Flow (vph)	133	71	1606	0	122	1010
Confl. Peds. (#/hr)				13		
Confl. Bikes (#/hr)				3		
Turn Type	Prot	Perm	NA		Prot	NA
Protected Phases	8		2		1	6
Permitted Phases		8				
Actuated Green, G (s)	12.8	12.8	48.1		9.5	63.6
Effective Green, g (s)	12.8	12.8	48.1		9.5	63.6
Actuated g/C Ratio	0.14	0.14	0.54		0.11	0.72
Clearance Time (s)	6.0	6.0	6.5		6.0	6.5
Vehicle Extension (s)	3.0	3.0	3.0		3.0	3.0
Lane Grp Cap (vph)	254	227	1880		189	2531
v/s Ratio Prot	c0.08		c0.46		c0.07	0.29
v/s Ratio Perm		0.04				
v/c Ratio	0.52	0.31	0.85		0.65	0.40
Uniform Delay, d1	35.2	34.1	17.4		38.1	5.0
Progression Factor	1.00	1.00	1.00		1.00	1.00
Incremental Delay, d2	1.9	0.8	4.0		7.4	0.1
Delay (s)	37.2	34.9	21.4		45.4	5.1
Level of Service	D	C	C		D	A
Approach Delay (s)	36.4		21.4		9.5	
Approach LOS	D		C		A	

Intersection Summary

HCM 2000 Control Delay	17.9	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.77		
Actuated Cycle Length (s)	88.9	Sum of lost time (s)	18.5
Intersection Capacity Utilization	73.6%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			

Year 2035 ALT + Proj PM
16: Twin Oaks Valley Rd & Del Roy Dr

Sierra Project
03/17/2017

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↱		↰	↱		↰	↱		↰	↱	
Traffic Volume (vph)	10	0	60	30	0	10	90	1480	30	20	1040	20
Future Volume (vph)	10	0	60	30	0	10	90	1480	30	20	1040	20
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	5.0		5.0	5.0		5.0	5.0		5.0	5.0	
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	0.95		1.00	0.95	
Frpb, ped/bikes	1.00	0.99		1.00	1.00		1.00	1.00		1.00	1.00	
Flpb, ped/bikes	1.00	1.00		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		1.00	1.00	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770	1560		1770	1583		1770	3525		1770	3527	
Flt Permitted	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (perm)	1770	1560		1770	1583		1770	3525		1770	3527	
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	0	65	33	0	11	98	1609	33	22	1130	22
RTOR Reduction (vph)	0	59	0	0	10	0	0	1	0	0	1	0
Lane Group Flow (vph)	11	6	0	33	1	0	98	1641	0	22	1151	0
Confl. Peds. (#/hr)									14			1
Confl. Bikes (#/hr)			1						4			4
Turn Type	Prot	NA		Prot	NA		Prot	NA		Prot	NA	
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases												
Actuated Green, G (s)	0.5	6.8		1.2	7.5		6.6	45.4		1.2	40.0	
Effective Green, g (s)	0.5	6.8		1.2	7.5		6.6	45.4		1.2	40.0	
Actuated g/C Ratio	0.01	0.09		0.02	0.10		0.09	0.61		0.02	0.54	
Clearance Time (s)	5.0	5.0		5.0	5.0		5.0	5.0		5.0	5.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	11	142		28	159		156	2145		28	1891	
v/s Ratio Prot	0.01	c0.00		c0.02	0.00		c0.06	c0.47		0.01	0.33	
v/s Ratio Perm												
v/c Ratio	1.00	0.04		1.18	0.01		0.63	0.76		0.79	0.61	
Uniform Delay, d1	37.0	30.9		36.7	30.2		32.8	10.7		36.6	11.9	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	271.4	0.1		229.1	0.0		7.7	1.7		82.7	0.6	
Delay (s)	308.4	31.0		265.8	30.2		40.5	12.4		119.3	12.5	
Level of Service	F	C		F	C		D	B		F	B	
Approach Delay (s)		71.2			206.9			14.0			14.5	
Approach LOS		E			F			B			B	
Intersection Summary												
HCM 2000 Control Delay		18.4			HCM 2000 Level of Service			B				
HCM 2000 Volume to Capacity ratio		0.71										
Actuated Cycle Length (s)		74.6			Sum of lost time (s)			20.0				
Intersection Capacity Utilization		66.1%			ICU Level of Service			C				
Analysis Period (min)		15										
c Critical Lane Group												

Year 2035 ALT + Proj PM
17: Twin Oaks Valley Rd & Windy Wy

Sierra Project
03/17/2017

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↱		↰	↱		↰	↱		↰	↱	
Traffic Volume (vph)	20	0	60	0	0	0	50	1520	10	10	1140	10
Future Volume (vph)	20	0	60	0	0	0	50	1520	10	10	1140	10
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	6.0		4.0	6.0		4.0	6.0	
Lane Util. Factor	1.00	1.00		1.00	0.95		1.00	0.95		1.00	0.95	
Frpb, ped/bikes	1.00	0.99		1.00	1.00		1.00	1.00		1.00	1.00	
Flpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Frt	1.00	0.85		1.00	1.00		1.00	1.00		1.00	1.00	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770	1563		1770	3535		1770	3535		1770	3534	
Flt Permitted	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (perm)	1770	1563		1770	3535		1770	3535		1770	3534	
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	20	0	60	0	0	0	50	1520	10	10	1140	10
RTOR Reduction (vph)	0	54	0	0	0	0	0	0	0	0	0	0
Lane Group Flow (vph)	20	6	0	0	0	0	50	1530	0	10	1150	0
Confl. Peds. (#/hr)			1			2			1			4
Confl. Bikes (#/hr)						2			2			5
Turn Type	Split	NA					Prot	NA		Prot	NA	
Protected Phases	4	4					5	2		1	6	
Permitted Phases												
Actuated Green, G (s)	5.6	5.6					3.6	37.4		0.6	34.4	
Effective Green, g (s)	5.6	5.6					3.6	37.4		0.6	34.4	
Actuated g/C Ratio	0.10	0.10					0.06	0.65		0.01	0.60	
Clearance Time (s)	4.0	4.0					4.0	6.0		4.0	6.0	
Vehicle Extension (s)	3.0	3.0					3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	172	151					110	2295		18	2110	
v/s Ratio Prot	c0.01	0.00					c0.03	c0.43		0.01	0.33	
v/s Ratio Perm												
v/c Ratio	0.12	0.04					0.45	0.67		0.56	0.54	
Uniform Delay, d1	23.7	23.6					26.1	6.2		28.4	6.9	
Progression Factor	1.00	1.00					1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.3	0.1					3.0	0.7		32.3	0.3	
Delay (s)	24.0	23.7					29.0	7.0		60.7	7.2	
Level of Service	C	C					C	A		E	A	
Approach Delay (s)		23.8			0.0			7.7			7.7	
Approach LOS		C			A			A			A	
Intersection Summary												
HCM 2000 Control Delay		8.1						HCM 2000 Level of Service			A	
HCM 2000 Volume to Capacity ratio		0.61										
Actuated Cycle Length (s)		57.6						Sum of lost time (s)			14.0	
Intersection Capacity Utilization		55.0%						ICU Level of Service			A	
Analysis Period (min)		15										
c Critical Lane Group												

Year 2035 ALT + Proj PM
18: Twin Oaks Valley Rd & Borden Rd

Sierra Project
03/17/2017

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↰	↰	↰	↰	↰	↰	↰	↰	↰	↰	↰
Traffic Volume (vph)	230	260	280	200	230	60	280	1370	310	100	1060	140
Future Volume (vph)	230	260	280	200	230	60	280	1370	310	100	1060	140
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.2	5.3		4.2	5.3		4.2	4.9	4.9	4.2	4.9	4.9
Lane Util. Factor	1.00	0.95		1.00	0.95		1.00	0.95	1.00	1.00	0.95	1.00
Frpb, ped/bikes	1.00	0.99		1.00	1.00		1.00	1.00	0.99	1.00	1.00	0.98
Flpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	0.92		1.00	0.97		1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1770	3240		1770	3418		1770	3539	1560	1770	3539	1556
Flt Permitted	0.95	1.00		0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	1770	3240		1770	3418		1770	3539	1560	1770	3539	1556
Peak-hour factor, PHF	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Adj. Flow (vph)	240	271	292	208	240	62	292	1427	323	104	1104	146
RTOR Reduction (vph)	0	197	0	0	24	0	0	0	91	0	0	96
Lane Group Flow (vph)	240	366	0	208	279	0	292	1427	232	104	1104	50
Confl. Peds. (#/hr)			2									2
Confl. Bikes (#/hr)						3			5			5
Turn Type	Prot	NA		Prot	NA		Prot	NA	Perm	Prot	NA	Perm
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases									2			6
Actuated Green, G (s)	11.8	17.6		11.8	17.6		16.9	43.5	43.5	7.3	33.9	33.9
Effective Green, g (s)	11.8	17.6		11.8	17.6		16.9	43.5	43.5	7.3	33.9	33.9
Actuated g/C Ratio	0.12	0.18		0.12	0.18		0.17	0.44	0.44	0.07	0.34	0.34
Clearance Time (s)	4.2	5.3		4.2	5.3		4.2	4.9	4.9	4.2	4.9	4.9
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)	211	577		211	608		302	1558	686	130	1214	533
v/s Ratio Prot	c0.14	c0.11		0.12	0.08		c0.17	c0.40		0.06	0.31	
v/s Ratio Perm									0.15			0.03
v/c Ratio	1.14	0.63		0.99	0.46		0.97	0.92	0.34	0.80	0.91	0.09
Uniform Delay, d1	43.5	37.6		43.4	36.3		40.7	25.9	18.2	45.0	31.0	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	103.9	2.3		57.4	0.6		42.4	8.7	0.3	28.6	10.0	0.1
Delay (s)	147.4	39.9		100.8	36.9		83.0	34.7	18.5	73.6	41.0	22.1
Level of Service	F	D		F	D		F	C	B	E	D	C
Approach Delay (s)		72.0			62.9			39.0			41.5	
Approach LOS		E			E			D			D	

Intersection Summary			
HCM 2000 Control Delay	48.0	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.92		
Actuated Cycle Length (s)	98.8	Sum of lost time (s)	18.6
Intersection Capacity Utilization	88.2%	ICU Level of Service	E
Analysis Period (min)	15		
c Critical Lane Group			

Year 2035 ALT + Proj PM
19: Twin Oaks Valley Rd & Richmar Ave

Sierra Project
03/17/2017

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↰	↰	↰	↰	↰	↰	↰	↰	↰	↰	↰
Traffic Volume (vph)	270	20	180	20	10	10	220	1740	30	80	1585	240
Future Volume (vph)	270	20	180	20	10	10	220	1740	30	80	1585	240
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.9	4.9		4.0	4.0		4.0	5.7		4.0	5.7	
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	0.95		1.00	0.95	
Frpb, ped/bikes	1.00	1.00		1.00	0.99		1.00	1.00		1.00	1.00	
Flpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Frt	1.00	0.87		1.00	0.93		1.00	1.00		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	1611		1770	1703		1770	3527		1770	3459	
Flt Permitted	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (perm)	1770	1611		1770	1703		1770	3527		1770	3459	
Peak-hour factor, PHF	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Adj. Flow (vph)	281	21	188	21	10	10	229	1812	31	83	1651	250
RTOR Reduction (vph)	0	156	0	0	9	0	0	1	0	0	8	0
Lane Group Flow (vph)	281	53	0	21	11	0	229	1843	0	83	1893	0
Confl. Peds. (#/hr)					9			7				
Confl. Bikes (#/hr)								8				3
Turn Type	Split	NA		Split	NA		Prot	NA		Prot	NA	
Protected Phases	4	4		8	8		5	2		1	6	
Permitted Phases												
Actuated Green, G (s)	20.3	20.3		7.6	7.6		14.1	67.9		6.1	59.9	
Effective Green, g (s)	20.3	20.3		7.6	7.6		14.1	67.9		6.1	59.9	
Actuated g/C Ratio	0.17	0.17		0.06	0.06		0.12	0.56		0.05	0.50	
Clearance Time (s)	4.9	4.9		4.0	4.0		4.0	5.7		4.0	5.7	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	298	271		111	107		207	1987		89	1719	
v/s Ratio Prot	c0.16	0.03		c0.01	0.01		c0.13	0.52		0.05	c0.55	
v/s Ratio Perm												
v/c Ratio	0.94	0.19		0.19	0.10		1.11	0.93		0.93	1.10	
Uniform Delay, d1	49.5	43.1		53.5	53.2		53.2	24.1		57.0	30.3	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	37.0	0.4		0.8	0.4		93.9	8.1		73.0	55.1	
Delay (s)	86.5	43.4		54.4	53.6		147.1	32.2		130.0	85.4	
Level of Service	F	D		D	D		F	C		F	F	
Approach Delay (s)		68.1			54.0			44.9			87.3	
Approach LOS		E			D			D			F	

Intersection Summary			
HCM 2000 Control Delay	65.8	HCM 2000 Level of Service	E
HCM 2000 Volume to Capacity ratio	1.00		
Actuated Cycle Length (s)	120.5	Sum of lost time (s)	18.6
Intersection Capacity Utilization	97.4%	ICU Level of Service	F
Analysis Period (min)	15		
c Critical Lane Group			

Year 2035 ALT + Proj PM
20: Twin Oaks Valley Rd & San Marcos Blvd

Sierra Project
03/17/2017

	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔
Traffic Volume (vph)	540	990	430	620	670	140	720	1290	500	170	1190	350
Future Volume (vph)	540	990	430	620	670	140	720	1290	500	170	1190	350
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.2	5.3	5.3	4.2	5.0		4.2	5.3	4.2	5.0	5.3	5.3
Lane Util. Factor	0.97	0.95	0.88	0.94	0.95		0.97	0.95	1.00	0.97	0.95	1.00
Frpb, ped/bikes	1.00	1.00	0.97	1.00	1.00		1.00	1.00	0.98	1.00	1.00	0.98
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	1.00	0.85	1.00	0.97		1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	3433	3539	2701	4990	3434		3433	3539	1558	3433	3539	1557
Flt Permitted	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	3433	3539	2701	4990	3434		3433	3539	1558	3433	3539	1557
Peak-hour factor, PHF	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Adj. Flow (vph)	581	1065	462	667	720	151	774	1387	538	183	1280	376
RTOR Reduction (vph)	0	0	225	0	12	0	0	0	25	0	0	152
Lane Group Flow (vph)	581	1065	237	667	859	0	774	1387	513	183	1280	224
Confl. Peds. (#/hr)			9			2			4			1
Confl. Bikes (#/hr)			6			7			6			4
Turn Type	Prot	NA	Perm	Prot	NA		Prot	NA	pm+ov	Prot	NA	Perm
Protected Phases	7	4		3	8		5	2	3	1	6	
Permitted Phases			4						2			6
Actuated Green, G (s)	20.8	38.7	38.7	17.8	36.0		25.8	60.3	78.1	8.4	43.7	43.7
Effective Green, g (s)	20.8	38.7	38.7	17.8	36.0		25.8	60.3	78.1	8.4	43.7	43.7
Actuated g/C Ratio	0.14	0.27	0.27	0.12	0.25		0.18	0.42	0.54	0.06	0.30	0.30
Clearance Time (s)	4.2	5.3	5.3	4.2	5.0		4.2	5.3	4.2	5.0	5.3	5.3
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	492	944	720	612	852		610	1471	839	198	1066	469
v/s Ratio Prot	c0.17	c0.30		0.13	0.25		c0.23	0.39	0.07	0.05	c0.36	
v/s Ratio Perm			0.09						0.25			0.14
v/c Ratio	1.18	1.13	0.33	1.09	1.01		1.27	0.94	0.61	0.92	1.20	0.48
Uniform Delay, d1	62.1	53.1	42.7	63.6	54.5		59.6	40.7	23.0	68.0	50.6	41.3
Progression Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	100.7	71.3	0.3	63.2	32.9		133.6	12.3	1.3	42.9	99.5	0.8
Delay (s)	162.8	124.4	43.0	126.8	87.4		193.2	53.0	24.3	110.8	150.2	42.1
Level of Service	F	F	D	F	F		F	D	C	F	F	D
Approach Delay (s)		117.1			104.5			87.5			124.1	
Approach LOS		F			F			F			F	
Intersection Summary												
HCM 2000 Control Delay		106.6			HCM 2000 Level of Service			F				
HCM 2000 Volume to Capacity ratio		1.21										
Actuated Cycle Length (s)		145.0			Sum of lost time (s)			19.8				
Intersection Capacity Utilization		108.4%			ICU Level of Service			G				
Analysis Period (min)		15										
c Critical Lane Group												

Year 2035 ALT + Proj PM
21: Twin Oaks Valley Rd & SR 78 WB Ramps

Sierra Project
03/17/2017

	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations				↔		↔		↔	↔		↔	↔
Traffic Volume (vph)	0	0	0	840	0	350	0	2030	850	0	1800	540
Future Volume (vph)	0	0	0	840	0	350	0	2030	850	0	1800	540
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)				4.6		4.6		5.3	4.6		5.3	5.3
Lane Util. Factor				0.97		0.88		0.91	1.00		0.91	1.00
Frpb, ped/bikes				1.00		1.00		1.00	0.96		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	0.85		1.00	0.85
Flt Protected				0.95		1.00		1.00	1.00		1.00	1.00
Satd. Flow (prot)				3433		2787		5085	1516		5085	1548
Flt Permitted				0.95		1.00		1.00	1.00		1.00	1.00
Satd. Flow (perm)				3433		2787		5085	1516		5085	1548
Peak-hour factor, PHF	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Adj. Flow (vph)	0	0	0	875	0	365	0	2115	885	0	1875	562
RTOR Reduction (vph)	0	0	0	0	0	14	0	0	0	0	0	241
Lane Group Flow (vph)	0	0	0	875	0	351	0	2115	885	0	1875	322
Confl. Peds. (#/hr)									12			
Confl. Bikes (#/hr)									4			4
Turn Type				Prot		Prot		NA	pm+ov		NA	Perm
Protected Phases				8		8		2	8		6	
Permitted Phases								2				6
Actuated Green, G (s)				41.4		41.4		68.7	110.1		68.7	68.7
Effective Green, g (s)				41.4		41.4		68.7	110.1		68.7	68.7
Actuated g/C Ratio				0.34		0.34		0.57	0.92		0.57	0.57
Clearance Time (s)				4.6		4.6		5.3	4.6		5.3	5.3
Vehicle Extension (s)				3.0		3.0		3.0	3.0		3.0	3.0
Lane Grp Cap (vph)				1184		961		2911	1449		2911	886
v/s Ratio Prot				c0.25		0.13		c0.42	0.21		0.37	
v/s Ratio Perm									0.37			0.21
v/c Ratio				0.74		0.37		0.73	0.61		0.64	0.36
Uniform Delay, d1				34.6		29.5		18.8	0.9		17.4	13.8
Progression Factor				1.00		1.00		1.00	1.00		1.00	1.00
Incremental Delay, d2				2.5		0.2		1.6	0.8		1.1	1.2
Delay (s)				37.0		29.7		20.4	1.7		18.5	15.0
Level of Service				D		C		C	A		B	B
Approach Delay (s)		0.0			34.9			14.9			17.7	
Approach LOS		A			C			B			B	
Intersection Summary												
HCM 2000 Control Delay				19.6				HCM 2000 Level of Service			B	
HCM 2000 Volume to Capacity ratio				0.73								
Actuated Cycle Length (s)				120.0				Sum of lost time (s)			9.9	
Intersection Capacity Utilization				70.9%				ICU Level of Service			C	
Analysis Period (min)				15								
c Critical Lane Group												

Year 2035 ALT + Proj PM
22: Twin Oaks Valley Rd & SR 78 EB Ramps

Sierra Project
03/17/2017

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↱	↲					↰↱↲	↰	↱	↲	
Traffic Volume (vph)	270	40	600	0	0	0	0	2580	1120	380	2220	0
Future Volume (vph)	270	40	600	0	0	0	0	2580	1120	380	2220	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.6	4.6	4.6					5.3	5.3	4.2	5.3	
Lane Util. Factor	0.95	0.91	0.95					0.91	1.00	0.97	0.91	
Frpb, ped/bikes	1.00	0.99	0.98					1.00	0.99	1.00	1.00	
Flpb, ped/bikes	1.00	1.00	1.00					1.00	1.00	1.00	1.00	
Frt	1.00	0.88	0.85					1.00	0.85	1.00	1.00	
Flt Protected	0.95	1.00	1.00					1.00	1.00	0.95	1.00	
Satd. Flow (prot)	1681	1467	1481					5085	1561	3433	5085	
Flt Permitted	0.95	1.00	1.00					1.00	1.00	0.95	1.00	
Satd. Flow (perm)	1681	1467	1481					5085	1561	3433	5085	
Peak-hour factor, PHF	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Adj. Flow (vph)	281	42	625	0	0	0	0	2688	1167	396	2312	0
RTOR Reduction (vph)	0	8	36	0	0	0	0	0	266	0	0	0
Lane Group Flow (vph)	253	343	308	0	0	0	0	2688	901	396	2313	0
Confl. Peds. (#/hr)			3									
Confl. Bikes (#/hr)								5				2
Turn Type	Split	NA	Perm					NA	Perm	Prot	NA	
Protected Phases	4	4						2		1	6	
Permitted Phases			4					2				
Actuated Green, G (s)	36.5	36.5	36.5					82.1	82.1	17.3	103.6	
Effective Green, g (s)	36.5	36.5	36.5					82.1	82.1	17.3	103.6	
Actuated g/C Ratio	0.24	0.24	0.24					0.55	0.55	0.12	0.69	
Clearance Time (s)	4.6	4.6	4.6					5.3	5.3	4.2	5.3	
Vehicle Extension (s)	3.0	3.0	3.0					3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	409	356	360					2783	854	395	3512	
v/s Ratio Prot	0.15	c0.23						0.53		c0.12	0.45	
v/s Ratio Perm			0.21					c0.58				
v/c Ratio	0.62	0.96	0.86					0.97	1.05	1.00	0.66	
Uniform Delay, d1	50.5	56.1	54.3					32.6	34.0	66.3	13.2	
Progression Factor	1.00	1.00	1.00					1.00	1.00	1.00	1.00	
Incremental Delay, d2	2.8	37.6	17.8					10.8	46.3	45.9	1.0	
Delay (s)	53.3	93.7	72.1					43.4	80.2	112.3	14.1	
Level of Service	D	F	E					D	F	F	B	
Approach Delay (s)		75.1			0.0			54.5			28.5	
Approach LOS		E			A			D			C	

Intersection Summary												
HCM 2000 Control Delay		47.7		HCM 2000 Level of Service		D						
HCM 2000 Volume to Capacity ratio		1.02										
Actuated Cycle Length (s)		150.0		Sum of lost time (s)		14.1						
Intersection Capacity Utilization		108.2%		ICU Level of Service		G						
Analysis Period (min)		15										
c Critical Lane Group												

Year 2035 ALT + Proj PM
28: San Marcos Blvd & Knoll Rd/SR 78 WB Ramps

Sierra Project
03/17/2017

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰		↱	↰	↱			↰↱↲	↰	↱	↲	↱
Traffic Volume (vph)	280	0	560	1020	360	50	440	1350	280	0	1090	230
Future Volume (vph)	280	0	560	1020	360	50	440	1350	280	0	1090	230
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.6		5.2	5.6	5.6		5.2	6.3	6.3		6.3	6.3
Lane Util. Factor	1.00		0.88	0.97	0.95		0.97	0.95	1.00		0.91	1.00
Frpb, ped/bikes	1.00		1.00	1.00	1.00		1.00	1.00	0.98		1.00	0.97
Flpb, ped/bikes	1.00		1.00	1.00	1.00		1.00	1.00	1.00		1.00	1.00
Frt	1.00		0.85	1.00	0.98		1.00	1.00	0.85		1.00	0.85
Flt Protected	0.95		1.00	0.95	1.00		0.95	1.00	1.00		1.00	1.00
Satd. Flow (prot)	1770		2787	3433	3474		3433	3539	1549		5085	1539
Flt Permitted	0.95		1.00	0.95	1.00		0.95	1.00	1.00		1.00	1.00
Satd. Flow (perm)	1770		2787	3433	3474		3433	3539	1549		5085	1539
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)	295	0	589	1074	379	53	463	1421	295	0	1147	242
RTOR Reduction (vph)	0	0	52	0	11	0	0	0	107	0	0	89
Lane Group Flow (vph)	295	0	537	1074	421	0	463	1421	188	0	1147	153
Confl. Peds. (#/hr)												12
Confl. Bikes (#/hr)									2			1
Turn Type	Prot		pm+ov	Prot	NA		Prot	NA	Perm		NA	Perm
Protected Phases	7		5	3	8		5	2			6	
Permitted Phases			7					2				6
Actuated Green, G (s)	18.4		42.5	46.3	22.3		24.1	61.8	61.8		32.5	32.5
Effective Green, g (s)	18.4		42.5	46.3	22.3		24.1	61.8	61.8		32.5	32.5
Actuated g/C Ratio	0.15		0.35	0.39	0.19		0.20	0.51	0.51		0.27	0.27
Clearance Time (s)	5.6		5.2	5.6	5.6		5.2	6.3	6.3		6.3	6.3
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)	271		987	1324	645		689	1822	797		1377	416
v/s Ratio Prot	c0.17		0.11	c0.31	0.12		0.13	c0.40			0.23	
v/s Ratio Perm			0.08						0.12			0.10
v/c Ratio	1.09		0.54	0.81	0.65		0.67	0.78	0.24		0.83	0.37
Uniform Delay, d1	50.8		31.0	32.9	45.3		44.3	23.6	16.1		41.2	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	80.3		0.6	3.9	2.4		2.6	3.4	0.7		6.0	2.5
Delay (s)	131.1		31.6	36.8	47.7		46.9	27.0	16.8		47.2	37.9
Level of Service	F		C	D	D		D	C	B		D	D
Approach Delay (s)		64.8			39.9			29.8			45.6	
Approach LOS		E			D			C			D	

Intersection Summary												
HCM 2000 Control Delay		41.3		HCM 2000 Level of Service		D						
HCM 2000 Volume to Capacity ratio		0.91										
Actuated Cycle Length (s)		120.0		Sum of lost time (s)		22.7						
Intersection Capacity Utilization		86.3%		ICU Level of Service		E						
Analysis Period (min)		15										
c Critical Lane Group												

Year 2035 ALT + Proj PM
29: San Marcos Blvd & SR 78 EB Ramps

Sierra Project
03/17/2017

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	→	↱	↰	→	↱	↰	→	↱	↰	→	↱
Traffic Volume (vph)	290	0	180	0	0	0	0	1780	1320	150	2320	0
Future Volume (vph)	290	0	180	0	0	0	0	1780	1320	150	2320	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.6		5.6					6.3	6.3	5.2	6.3	
Lane Util. Factor	0.97		1.00					0.91	0.88	0.97	0.91	
Frpb, ped/bikes	1.00		1.00					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)	3433		1583					5085	2721	3433	5085	
Flt Permitted	0.95		1.00					1.00	1.00	0.95	1.00	
Satd. Flow (perm)	3433		1583					5085	2721	3433	5085	
Peak-hour factor, PHF	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Adj. Flow (vph)	302	0	188	0	0	0	0	1854	1375	156	2417	0
RTOR Reduction (vph)	0	0	67	0	0	0	0	0	488	0	0	0
Lane Group Flow (vph)	302	0	121	0	0	0	0	1854	887	156	2417	0
Confl. Peds. (#/hr)								1			22	
Confl. Bikes (#/hr)								5			4	
Turn Type	Prot		Perm					NA	Perm	Prot	NA	
Protected Phases	4							2		1	6	
Permitted Phases			4					2				
Actuated Green, G (s)	16.1		16.1					76.3	76.3	10.5	92.0	
Effective Green, g (s)	16.1		16.1					76.3	76.3	10.5	92.0	
Actuated g/C Ratio	0.13		0.13					0.64	0.64	0.09	0.77	
Clearance Time (s)	5.6		5.6					6.3	6.3	5.2	6.3	
Vehicle Extension (s)	3.0		3.0					3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	460		212					3233	1730	300	3898	
v/s Ratio Prot	c0.09							0.36		0.05	c0.48	
v/s Ratio Perm			0.08						0.33			
v/c Ratio	0.66		0.57					0.57	0.51	0.52	0.62	
Uniform Delay, d1	49.3		48.7					12.5	11.8	52.3	6.2	
Progression Factor	1.00		1.00					1.00	1.00	1.00	1.00	
Incremental Delay, d2	3.4		3.7					0.7	1.1	1.6	0.8	
Delay (s)	52.7		52.4					13.3	12.9	54.0	7.0	
Level of Service	D		D					B	B	D	A	
Approach Delay (s)		52.6			0.0			13.1			9.8	
Approach LOS		D			A			B			A	
Intersection Summary												
HCM 2000 Control Delay			14.8									
HCM 2000 Volume to Capacity ratio			0.66									
Actuated Cycle Length (s)			120.0						17.1			
Intersection Capacity Utilization			73.1%						D			
Analysis Period (min)			15									
c Critical Lane Group												

Year 2035 ALT + Proj PM
30: San Marcos Blvd & E. Mission Road

Sierra Project
03/17/2017

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↱	↱	↰	↱	↱	↰	↱	↱	↰	↱	↱
Traffic Volume (vph)	190	590	60	440	470	100	40	380	730	40	300	120
Future Volume (vph)	190	590	60	440	470	100	40	380	730	40	300	120
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	5.3	5.3	4.0	5.3	5.3	4.0	5.3	5.3	4.0	5.3	
Lane Util. Factor	1.00	0.95	1.00	0.97	0.95	1.00	1.00	0.95	1.00	1.00	0.95	
Frpb, ped/bikes	1.00	1.00	0.98	1.00	1.00	0.97	1.00	1.00	1.00	1.00	1.00	
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.96	
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)	1770	3539	1557	3433	3539	1540	1770	3539	1583	1770	3375	
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	
Satd. Flow (perm)	1770	3539	1557	3433	3539	1540	1770	3539	1583	1770	3375	
Peak-hour factor, PHF	0.92	0.92	1.00	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	207	641	60	478	511	109	43	413	793	43	326	130
RTOR Reduction (vph)	0	0	47	0	0	83	0	0	279	0	37	0
Lane Group Flow (vph)	207	641	13	478	511	26	43	413	514	43	419	0
Confl. Peds. (#/hr)			3			10						1
Turn Type	Prot	NA	Perm	Prot	NA	Perm	Prot	NA	Prot	Prot	NA	
Protected Phases	7	4		3	8		5	2	2	1	6	
Permitted Phases			4			8						
Actuated Green, G (s)	16.3	23.0	23.0	18.1	24.8	24.8	3.7	38.9	38.9	3.8	39.0	
Effective Green, g (s)	16.3	23.0	23.0	18.1	24.8	24.8	3.7	38.9	38.9	3.8	39.0	
Actuated g/C Ratio	0.16	0.22	0.22	0.18	0.24	0.24	0.04	0.38	0.38	0.04	0.38	
Clearance Time (s)	4.0	5.3	5.3	4.0	5.3	5.3	4.0	5.3	5.3	4.0	5.3	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	281	794	349	606	857	372	63	1344	601	65	1285	
v/s Ratio Prot	0.12	c0.18		c0.14	0.14		c0.02	0.12	c0.32	0.02	0.12	
v/s Ratio Perm			0.01			0.02						
v/c Ratio	0.74	0.81	0.04	0.79	0.60	0.07	0.68	0.31	0.86	0.66	0.33	
Uniform Delay, d1	41.0	37.6	31.1	40.3	34.4	29.9	48.8	22.3	29.2	48.7	22.4	
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	9.6	6.0	0.0	6.8	1.1	0.1	26.3	0.1	11.4	22.5	0.1	
Delay (s)	50.6	43.6	31.1	47.1	35.5	30.0	75.1	22.4	40.6	71.1	22.6	
Level of Service	D	D	C	D	D	C	E	C	D	E	C	
Approach Delay (s)		44.4			40.0			35.8			26.7	
Approach LOS		D			D			D			C	
Intersection Summary												
HCM 2000 Control Delay			37.9									
HCM 2000 Volume to Capacity ratio			0.82									
Actuated Cycle Length (s)			102.4						18.6			
Intersection Capacity Utilization			77.0%						D			
Analysis Period (min)			15									
c Critical Lane Group												

Year 2035 ALT + Proj PM

33: Twin Oaks Valley Rd & Discovery Street/Barham Dr

Sierra Project

03/17/2017

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	740	470	10	340	370	390	10	1500	370	580	680	540
Future Volume (vph)	740	470	10	340	370	390	10	1500	370	580	680	540
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	5.3	4.0	5.0	5.3	4.0	5.0	6.0		5.0	6.0	4.0
Lane Util. Factor	0.97	0.91	1.00	1.00	1.00	1.00	1.00	0.91		0.97	0.91	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.97		1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	3433	5085	1583	1770	1863	1583	1770	4934		3433	5085	1583
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00
Satd. Flow (perm)	3433	5085	1583	1770	1863	1583	1770	4934		3433	5085	1583
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)	804	511	11	370	402	424	11	1630	402	630	739	587
RTOR Reduction (vph)	0	0	0	0	0	0	0	29	0	0	0	0
Lane Group Flow (vph)	804	511	11	370	402	424	11	2003	0	630	739	587
Turn Type	Prot	NA	Free	Prot	NA	Free	Prot	NA		Prot	NA	Free
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases			Free			Free						Free
Actuated Green, G (s)	26.0	30.7	148.0	22.0	26.7	148.0	1.6	53.0		21.0	72.4	148.0
Effective Green, g (s)	26.0	30.7	148.0	22.0	26.7	148.0	1.6	53.0		21.0	72.4	148.0
Actuated g/C Ratio	0.18	0.21	1.00	0.15	0.18	1.00	0.01	0.36		0.14	0.49	1.00
Clearance Time (s)	5.0	5.3		5.0	5.3		5.0	6.0		5.0	6.0	
Vehicle Extension (s)	2.0	4.5		2.0	4.5		2.0	3.0		2.0	4.0	
Lane Grp Cap (vph)	603	1054	1583	263	336	1583	19	1766		487	2487	1583
v/s Ratio Prot	c0.23	0.10		0.21	c0.22		0.01	c0.41		c0.18	0.15	
v/s Ratio Perm			0.01			0.27						c0.37
v/c Ratio	1.33	0.48	0.01	1.41	1.20	0.27	0.58	1.13		1.29	0.30	0.37
Uniform Delay, d1	61.0	51.7	0.0	63.0	60.6	0.0	72.9	47.5		63.5	22.6	0.0
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	161.1	0.6	0.0	204.3	113.7	0.4	23.8	68.1		146.8	0.3	0.7
Delay (s)	222.1	52.3	0.0	267.3	174.4	0.4	96.7	115.6		210.3	22.9	0.7
Level of Service	F	D	A	F	F	A	F	F		F	C	A
Approach Delay (s)		154.8			141.5			115.5			76.6	
Approach LOS		F			F			F			E	
Intersection Summary												
HCM 2000 Control Delay		116.6			HCM 2000 Level of Service			F				
HCM 2000 Volume to Capacity ratio		1.21										
Actuated Cycle Length (s)		148.0			Sum of lost time (s)			21.3				
Intersection Capacity Utilization		112.1%			ICU Level of Service			H				
Analysis Period (min)		15										

c Critical Lane Group

APPENDIX J

INTERNAL PROJECT INTERSECTION ANALYSIS WORKSHEETS

Project AM
1: Mesa Rock Road & Street K-10

Sierra Internal Intersections
4/19/2016

						
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	0	19	8	16	31	0
Future Volume (Veh/h)	0	19	8	16	31	0
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	21	9	17	34	0
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage (veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	69	34	34			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	69	34	34			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	100	98	99			
cM capacity (veh/h)	930	1039	1578			
Direction, Lane #	EB 1	NB 1	SB 1			
Volume Total	21	26	34			
Volume Left	0	9	0			
Volume Right	21	0	0			
cSH	1039	1578	1700			
Volume to Capacity	0.02	0.01	0.02			
Queue Length 95th (ft)	2	0	0			
Control Delay (s)	8.5	2.6	0.0			
Lane LOS	A	A				
Approach Delay (s)	8.5	2.6	0.0			
Approach LOS	A					
Intersection Summary						
Average Delay		3.0				
Intersection Capacity Utilization		17.9%		ICU Level of Service	A	
Analysis Period (min)		15				

Project AM
2: Mesa Rock Road & Street S-1

Sierra Internal Intersections
4/19/2016

						
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	59	0	24	32	0	50
Future Volume (Veh/h)	59	0	24	32	0	50
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	64	0	26	35	0	54
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	98	44			61	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	98	44			61	
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	100			100	
cM capacity (veh/h)	902	1027			1542	
Direction, Lane #	WB 1	NB 1	SB 1			
Volume Total	64	61	54			
Volume Left	64	0	0			
Volume Right	0	35	0			
cSH	902	1700	1542			
Volume to Capacity	0.07	0.04	0.00			
Queue Length 95th (ft)	6	0	0			
Control Delay (s)	9.3	0.0	0.0			
Lane LOS	A					
Approach Delay (s)	9.3	0.0	0.0			
Approach LOS	A					
Intersection Summary						
Average Delay		3.3				
Intersection Capacity Utilization		13.3%		ICU Level of Service	A	
Analysis Period (min)		15				

Project AM
3: Street K-9 & Mesa Rock Road

Sierra Internal Intersections
4/19/2016

						
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	0	74	40	56	109	0
Future Volume (Veh/h)	0	74	40	56	109	0
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	80	43	61	118	0
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage (veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	265	118	118			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	265	118	118			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	100	91	97			
cM capacity (veh/h)	703	934	1470			
Direction, Lane #	EB 1	NB 1	SB 1			
Volume Total	80	104	118			
Volume Left	0	43	0			
Volume Right	80	0	0			
cSH	934	1470	1700			
Volume to Capacity	0.09	0.03	0.07			
Queue Length 95th (ft)	7	2	0			
Control Delay (s)	9.2	3.2	0.0			
Lane LOS	A	A				
Approach Delay (s)	9.2	3.2	0.0			
Approach LOS	A					
Intersection Summary						
Average Delay		3.6				
Intersection Capacity Utilization		23.1%		ICU Level of Service	A	
Analysis Period (min)		15				

Project AM
4: Mesa Rock Road & Street K-1

Sierra Internal Intersections
4/19/2016

						
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	0	62	26	96	183	0
Future Volume (Veh/h)	0	62	26	96	183	0
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	67	28	104	199	0
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage (veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	359	199	199			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	359	199	199			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	100	92	98			
cM capacity (veh/h)	627	842	1373			
Direction, Lane #	EB 1	NB 1	SB 1			
Volume Total	67	132	199			
Volume Left	0	28	0			
Volume Right	67	0	0			
cSH	842	1373	1700			
Volume to Capacity	0.08	0.02	0.12			
Queue Length 95th (ft)	6	2	0			
Control Delay (s)	9.6	1.8	0.0			
Lane LOS	A	A				
Approach Delay (s)	9.6	1.8	0.0			
Approach LOS	A					
Intersection Summary						
Average Delay		2.2				
Intersection Capacity Utilization		30.0%		ICU Level of Service	A	
Analysis Period (min)		15				

Project AM
5: Mesa Rock Road & Street M-2

Sierra Internal Intersections
4/19/2016

						
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	48	0	122	13	0	245
Future Volume (Veh/h)	48	0	122	13	0	245
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	52	0	133	14	0	266
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	406	140			147	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	406	140			147	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	91	100			100	
cM capacity (veh/h)	601	908			1435	
Direction, Lane #	WB 1	NB 1	SB 1			
Volume Total	52	147	266			
Volume Left	52	0	0			
Volume Right	0	14	0			
cSH	601	1700	1435			
Volume to Capacity	0.09	0.09	0.00			
Queue Length 95th (ft)	7	0	0			
Control Delay (s)	11.6	0.0	0.0			
Lane LOS	B					
Approach Delay (s)	11.6	0.0	0.0			
Approach LOS	B					
Intersection Summary						
Average Delay		1.3				
Intersection Capacity Utilization		22.9%		ICU Level of Service	A	
Analysis Period (min)		15				

Project AM
6: Mesa Rock Road & Sarver Lane

Sierra Internal Intersections
4/19/2016

						
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Sign Control	Stop			Stop	Stop	
Traffic Volume (vph)	6	174	67	122	241	15
Future Volume (vph)	6	174	67	122	241	15
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	7	189	73	133	262	16
Direction, Lane #	EB 1	NB 1	SB 1			
Volume Total (vph)	196	206	278			
Volume Left (vph)	7	73	0			
Volume Right (vph)	189	0	16			
Hadj (s)	-0.54	0.10	0.00			
Departure Headway (s)	4.5	4.8	4.6			
Degree Utilization, x	0.25	0.28	0.36			
Capacity (veh/h)	731	712	741			
Control Delay (s)	9.0	9.6	10.2			
Approach Delay (s)	9.0	9.6	10.2			
Approach LOS	A	A	B			
Intersection Summary						
Delay		9.7				
Level of Service		A				
Intersection Capacity Utilization		44.8%		ICU Level of Service	A	
Analysis Period (min)		15				

Project AM
7: Sarver Lane & Street V-3

Sierra Internal Intersections
4/19/2016

						
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	24	29	9	147	296	8
Future Volume (Veh/h)	24	29	9	147	296	8
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	26	32	10	160	322	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	506	326	331			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	506	326	331			
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	99			
cM capacity (veh/h)	521	715	1228			
Direction, Lane #	EB 1	NB 1	NB 2	SB 1		
Volume Total	58	10	160	331		
Volume Left	26	10	0	0		
Volume Right	32	0	0	9		
cSH	613	1228	1700	1700		
Volume to Capacity	0.09	0.01	0.09	0.19		
Queue Length 95th (ft)	8	1	0	0		
Control Delay (s)	11.5	8.0	0.0	0.0		
Lane LOS	B	A				
Approach Delay (s)	11.5	0.5		0.0		
Approach LOS	B					
Intersection Summary						
Average Delay			1.3			
Intersection Capacity Utilization			26.1%	ICU Level of Service	A	
Analysis Period (min)			15			

Project AM
8: Sarver Lane & Street V-5

Sierra Internal Intersections
4/19/2016

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	62	0	29	29	0	24	10	70	10	0	283	34
Future Volume (Veh/h)	62	0	29	29	0	24	10	70	10	0	283	34
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	67	0	32	32	0	26	11	76	11	0	308	37
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	450	436	326	444	448	82	345			87		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	450	436	326	444	448	82	345			87		
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 %	87	100	96	94	100	97	99			100		
cM capacity (veh/h)	502	509	715	498	501	978	1214			1509		
Direction, Lane #	EB 1	WB 1	NB 1	NB 2	SB 1	SB 2						
Volume Total	99	58	11	87	0	345						
Volume Left	67	32	11	0	0	0						
Volume Right	32	26	0	11	0	37						
cSH	555	638	1214	1700	1700	1700						
Volume to Capacity	0.18	0.09	0.01	0.05	0.00	0.20						
Queue Length 95th (ft)	16	7	1	0	0	0						
Control Delay (s)	12.9	11.2	8.0	0.0	0.0	0.0						
Lane LOS	B	B	A									
Approach Delay (s)	12.9	11.2	0.9		0.0							
Approach LOS	B	B										
Intersection Summary												
Average Delay				3.4								
Intersection Capacity Utilization			30.6%		ICU Level of Service	A						
Analysis Period (min)			15									

Project AM
9: Street V-1 & Sarver Lane

Sierra Internal Intersections
4/19/2016

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	24	0	29	29	0	23	9	43	10	0	326	8
Future Volume (Veh/h)	24	0	29	29	0	23	9	43	10	0	326	8
Sign Control	Stop			Stop			Free			Free		
Grade	0%			0%			0%			0%		
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	26	0	32	32	0	25	10	47	11	0	354	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	450	436	358	458	436	52	363	58				
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	450	436	358	458	436	52	363	58				
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 %	95	100	95	93	100	98	99	100				
cM capacity (veh/h)	503	509	686	486	510	1015	1196	1546				
Direction, Lane #	EB 1	WB 1	NB 1	NB 2	SB 1	SB 2						
Volume Total	58	57	10	58	0	363						
Volume Left	26	32	10	0	0	0						
Volume Right	32	25	0	11	0	9						
cSH	590	630	1196	1700	1700	1700						
Volume to Capacity	0.10	0.09	0.01	0.03	0.00	0.21						
Queue Length 95th (ft)	8	7	1	0	0	0						
Control Delay (s)	11.8	11.3	8.0	0.0	0.0	0.0						
Lane LOS	B	B	A									
Approach Delay (s)	11.8	11.3	1.2	0.0								
Approach LOS	B	B										
Intersection Summary												
Average Delay				2.6								
Intersection Capacity Utilization				28.5%	ICU Level of Service			A				
Analysis Period (min)				15								

Project AM
10: Mesa Rock Road & Street H-2

Sierra Internal Intersections
4/19/2016

						
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	30	25	173	15	12	361
Future Volume (Veh/h)	30	25	173	15	12	361
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	33	27	188	16	13	392
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	614	196	204			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	614	196	204			
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	97	99			
cM capacity (veh/h)	451	845	1368			
Direction, Lane #	WB 1	NB 1	SB 1	SB 2		
Volume Total	60	204	13	392		
Volume Left	33	0	13	0		
Volume Right	27	16	0	0		
cSH	571	1700	1368	1700		
Volume to Capacity	0.11	0.12	0.01	0.23		
Queue Length 95th (ft)	9	0	1	0		
Control Delay (s)	12.0	0.0	7.7	0.0		
Lane LOS	B		A			
Approach Delay (s)	12.0	0.0	0.2			
Approach LOS	B					
Intersection Summary						
Average Delay				1.2		
Intersection Capacity Utilization				29.0%	ICU Level of Service	
Analysis Period (min)				15	A	

Project AM
11: Mesa Rock Road & Street H-1

Sierra Internal Intersections
4/19/2016

						
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	86	16	172	39	5	386
Future Volume (Veh/h)	86	16	172	39	5	386
Sign Control	Stop		Free		Free	
Grade	0%		0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	93	17	187	42	5	420
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	638	208			229	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	638	208			229	
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	98			100	
cM capacity (veh/h)	439	832			1339	
Direction, Lane #	WB 1	NB 1	SB 1	SB 2		
Volume Total	110	229	5	420		
Volume Left	93	0	5	0		
Volume Right	17	42	0	0		
cSH	474	1700	1339	1700		
Volume to Capacity	0.23	0.13	0.00	0.25		
Queue Length 95th (ft)	22	0	0	0		
Control Delay (s)	14.9	0.0	7.7	0.0		
Lane LOS	B		A			
Approach Delay (s)	14.9	0.0	0.1			
Approach LOS	B					
Intersection Summary						
Average Delay		2.2				
Intersection Capacity Utilization		32.7%		ICU Level of Service	A	
Analysis Period (min)		15				

Project AM
12: Mesa Rock Road & Street T-1 N

Sierra Internal Intersections
4/19/2016

						
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	0	71	18	211	472	0
Future Volume (Veh/h)	0	71	18	211	472	0
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	77	20	229	513	0
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage (veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	782	513	513			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	782	513	513			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	100	86	98			
cM capacity (veh/h)	356	561	1052			
Direction, Lane #	EB 1	NB 1	NB 2	SB 1		
Volume Total	77	20	229	513		
Volume Left	0	20	0	0		
Volume Right	77	0	0	0		
cSH	561	1052	1700	1700		
Volume to Capacity	0.14	0.02	0.13	0.30		
Queue Length 95th (ft)	12	1	0	0		
Control Delay (s)	12.4	8.5	0.0	0.0		
Lane LOS	B	A				
Approach Delay (s)	12.4	0.7		0.0		
Approach LOS	B					
Intersection Summary						
Average Delay		1.3				
Intersection Capacity Utilization		35.9%		ICU Level of Service	A	
Analysis Period (min)		15				

Project AM
13: Mesa Rock Road & Street T-1 S

Sierra Internal Intersections
4/19/2016

						
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	0	204	68	229	543	0
Future Volume (Veh/h)	0	204	68	229	543	0
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	222	74	249	590	0
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage (veh)						
Upstream signal (ft)				1062		
pX, platoon unblocked						
vC, conflicting volume	987	590	590			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	987	590	590			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	100	56	92			
cM capacity (veh/h)	254	508	985			
Direction, Lane #	EB 1	NB 1	NB 2	SB 1		
Volume Total	222	74	249	590		
Volume Left	0	74	0	0		
Volume Right	222	0	0	0		
cSH	508	985	1700	1700		
Volume to Capacity	0.44	0.08	0.15	0.35		
Queue Length 95th (ft)	55	6	0	0		
Control Delay (s)	17.5	8.9	0.0	0.0		
Lane LOS	C	A				
Approach Delay (s)	17.5	2.1		0.0		
Approach LOS	C					
Intersection Summary						
Average Delay		4.0				
Intersection Capacity Utilization		55.0%		ICU Level of Service	A	
Analysis Period (min)		15				

Project AM
14: Mesa Rock Road & Street TC-3

Sierra Internal Intersections
4/19/2016

						
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	49	86	270	52	128	709
Future Volume (Veh/h)	49	86	270	52	128	709
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	53	93	293	57	139	771
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			None		None	
Median storage (veh)						
Upstream signal (ft)			520			
pX, platoon unblocked	0.95	0.95			0.95	
vC, conflicting volume	985	322			350	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	960	265			294	
tC, single (s)	6.8	6.9			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	75	87			88	
cM capacity (veh/h)	215	700			1206	
Direction, Lane #	WB 1	WB 2	NB 1	SB 1	SB 2	SB 3
Volume Total	53	93	350	139	386	386
Volume Left	53	0	0	139	0	0
Volume Right	0	93	57	0	0	0
cSH	215	700	1700	1206	1700	1700
Volume to Capacity	0.25	0.13	0.21	0.12	0.23	0.23
Queue Length 95th (ft)	23	11	0	10	0	0
Control Delay (s)	27.2	10.9	0.0	8.4	0.0	0.0
Lane LOS	D	B		A		
Approach Delay (s)	16.8		0.0	1.3		
Approach LOS	C					
Intersection Summary						
Average Delay			2.6			
Intersection Capacity Utilization			37.8%		ICU Level of Service	A
Analysis Period (min)			15			

Project AM
15: Mesa Rock Road & Street TC-2

Sierra Internal Intersections
4/19/2016

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations	W<W<W		N<N<N		S<S<S	
Traffic Volume (vph)	132	20	275	70	30	731
Future Volume (vph)	132	20	275	70	30	731
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5		4.5		4.5	
Lane Util. Factor	0.97		0.95		1.00	0.95
Frt	0.98		0.97		1.00	1.00
Flt Protected	0.96		1.00		0.95	1.00
Satd. Flow (prot)	3394		3432		1770	3539
Flt Permitted	0.96		1.00		0.95	1.00
Satd. Flow (perm)	3394		3432		1770	3539
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	143	22	299	76	33	795
RTOR Reduction (vph)	17	0	14	0	0	0
Lane Group Flow (vph)	148	0	361	0	33	795
Turn Type	Prot		NA		Prot	NA
Protected Phases	8		2		1	6
Permitted Phases						
Actuated Green, G (s)	8.7		55.7		3.4	63.6
Effective Green, g (s)	8.7		55.7		3.4	63.6
Actuated g/C Ratio	0.11		0.69		0.04	0.78
Clearance Time (s)	4.5		4.5		4.5	4.5
Vehicle Extension (s)	3.0		3.0		3.0	3.0
Lane Grp Cap (vph)	363		2351		74	2768
v/s Ratio Prot	c0.04		0.11		0.02	c0.22
v/s Ratio Perm						
v/c Ratio	0.41		0.15		0.45	0.29
Uniform Delay, d1	33.9		4.5		38.0	2.5
Progression Factor	1.00		1.00		1.00	1.00
Incremental Delay, d2	0.7		0.1		4.2	0.3
Delay (s)	34.6		4.6		42.3	2.7
Level of Service	C		A		D	A
Approach Delay (s)	34.6		4.6		4.3	
Approach LOS	C		A		A	
Intersection Summary						
HCM 2000 Control Delay			8.1		HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio			0.32			
Actuated Cycle Length (s)			81.3		Sum of lost time (s)	13.5
Intersection Capacity Utilization			32.1%		ICU Level of Service	A
Analysis Period (min)			15			
c Critical Lane Group						

Project AM
16: Mesa Rock Road & Street TC-1

Sierra Internal Intersections
4/19/2016

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations	W<W<W		N<N<N		S<S<S	
Traffic Volume (vph)	177	51	342	110	84	762
Future Volume (vph)	177	51	342	110	84	762
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5		4.5		4.5	
Lane Util. Factor	0.97		0.95		1.00	0.95
Frt	0.97		0.96		1.00	1.00
Flt Protected	0.96		1.00		0.95	1.00
Satd. Flow (prot)	3362		3410		1770	3539
Flt Permitted	0.96		1.00		0.95	1.00
Satd. Flow (perm)	3362		3410		1770	3539
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	192	55	372	120	91	828
RTOR Reduction (vph)	37	0	23	0	0	0
Lane Group Flow (vph)	210	0	469	0	91	828
Turn Type	Prot		NA		Prot	NA
Protected Phases	8		2		1	6
Permitted Phases						
Actuated Green, G (s)	10.0		46.2		8.1	58.8
Effective Green, g (s)	10.0		46.2		8.1	58.8
Actuated g/C Ratio	0.13		0.59		0.10	0.76
Clearance Time (s)	4.5		4.5		4.5	4.5
Vehicle Extension (s)	3.0		3.0		3.0	3.0
Lane Grp Cap (vph)	432		2024		184	2674
v/s Ratio Prot	c0.06		0.14		c0.05	c0.23
v/s Ratio Perm						
v/c Ratio	0.49		0.23		0.49	0.31
Uniform Delay, d1	31.5		7.4		32.9	3.0
Progression Factor	1.00		1.00		1.00	1.00
Incremental Delay, d2	0.9		0.3		2.1	0.3
Delay (s)	32.4		7.7		35.0	3.3
Level of Service	C		A		D	A
Approach Delay (s)	32.4		7.7		6.5	
Approach LOS	C		A		A	
Intersection Summary						
HCM 2000 Control Delay			10.7		HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio			0.37			
Actuated Cycle Length (s)			77.8		Sum of lost time (s)	13.5
Intersection Capacity Utilization			35.5%		ICU Level of Service	A
Analysis Period (min)			15			
c Critical Lane Group						

Project AM
17: Mesa Rock Road & Mesa Rock Way

Sierra Internal Intersections
4/19/2016

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations		↗	↕	↗		↕
Traffic Volume (veh/h)	0	35	375	175	0	764
Future Volume (Veh/h)	0	35	375	175	0	764
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	38	408	190	0	830
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			None		None	
Median storage (veh)						
Upstream signal (ft)						530
pX, platoon unblocked	0.97					
vC, conflicting volume	823	204			598	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	757	204			598	
tC, single (s)	6.8	6.9			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	100	95			100	
cM capacity (veh/h)	334	803			975	
Direction, Lane #	WB 1	NB 1	NB 2	NB 3	SB 1	SB 2
Volume Total	38	204	204	190	415	415
Volume Left	0	0	0	0	0	0
Volume Right	38	0	0	190	0	0
cSH	803	1700	1700	1700	1700	1700
Volume to Capacity	0.05	0.12	0.12	0.11	0.24	0.24
Queue Length 95th (ft)	4	0	0	0	0	0
Control Delay (s)	9.7	0.0	0.0	0.0	0.0	0.0
Lane LOS	A					
Approach Delay (s)	9.7	0.0			0.0	
Approach LOS	A					
Intersection Summary						
Average Delay			0.3			
Intersection Capacity Utilization			24.5%		ICU Level of Service	A
Analysis Period (min)			15			

Project PM
1: Mesa Rock Road & Street K-10

Sierra Internal Intersections
4/19/2016

						
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	0	11	23	37	16	0
Future Volume (Veh/h)	0	11	23	37	16	0
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	12	25	40	17	0
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage (veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	107	17	17			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	107	17	17			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	100	99	98			
cM capacity (veh/h)	877	1062	1600			
Direction, Lane #	EB 1	NB 1	SB 1			
Volume Total	12	65	17			
Volume Left	0	25	0			
Volume Right	12	0	0			
cSH	1062	1600	1700			
Volume to Capacity	0.01	0.02	0.01			
Queue Length 95th (ft)	1	1	0			
Control Delay (s)	8.4	2.9	0.0			
Lane LOS	A	A				
Approach Delay (s)	8.4	2.9	0.0			
Approach LOS	A					
Intersection Summary						
Average Delay		3.1				
Intersection Capacity Utilization		19.9%		ICU Level of Service	A	
Analysis Period (min)		15				

Project PM
2: Mesa Rock Road & Street S-1

Sierra Internal Intersections
4/19/2016

						
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	40	0	60	71	0	27
Future Volume (Veh/h)	40	0	60	71	0	27
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	43	0	65	77	0	29
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	132	104			142	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	132	104			142	
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	100			100	
cM capacity (veh/h)	861	951			1441	
Direction, Lane #	WB 1	NB 1	SB 1			
Volume Total	43	142	29			
Volume Left	43	0	0			
Volume Right	0	77	0			
cSH	861	1700	1441			
Volume to Capacity	0.05	0.08	0.00			
Queue Length 95th (ft)	4	0	0			
Control Delay (s)	9.4	0.0	0.0			
Lane LOS	A					
Approach Delay (s)	9.4	0.0	0.0			
Approach LOS	A					
Intersection Summary						
Average Delay		1.9				
Intersection Capacity Utilization		17.5%		ICU Level of Service	A	
Analysis Period (min)		15				

Project PM
3: Street K-9 & Mesa Rock Road

Sierra Internal Intersections
4/19/2016

						
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	0	61	94	131	67	0
Future Volume (Veh/h)	0	61	94	131	67	0
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	66	102	142	73	0
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage (veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	419	73	73			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	419	73	73			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	100	93	93			
cM capacity (veh/h)	551	989	1527			
Direction, Lane #	EB 1	NB 1	SB 1			
Volume Total	66	244	73			
Volume Left	0	102	0			
Volume Right	66	0	0			
cSH	989	1527	1700			
Volume to Capacity	0.07	0.07	0.04			
Queue Length 95th (ft)	5	5	0			
Control Delay (s)	8.9	3.5	0.0			
Lane LOS	A	A				
Approach Delay (s)	8.9	3.5	0.0			
Approach LOS	A					
Intersection Summary						
Average Delay		3.7				
Intersection Capacity Utilization		29.2%		ICU Level of Service	A	
Analysis Period (min)		15				

Project PM
4: Mesa Rock Road & Street K-1

Sierra Internal Intersections
4/19/2016

						
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	0	33	77	225	128	0
Future Volume (Veh/h)	0	33	77	225	128	0
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	36	84	245	139	0
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage (veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	552	139	139			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	552	139	139			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	100	96	94			
cM capacity (veh/h)	466	909	1445			
Direction, Lane #	EB 1	NB 1	SB 1			
Volume Total	36	329	139			
Volume Left	0	84	0			
Volume Right	36	0	0			
cSH	909	1445	1700			
Volume to Capacity	0.04	0.06	0.08			
Queue Length 95th (ft)	3	5	0			
Control Delay (s)	9.1	2.3	0.0			
Lane LOS	A	A				
Approach Delay (s)	9.1	2.3	0.0			
Approach LOS	A					
Intersection Summary						
Average Delay		2.2				
Intersection Capacity Utilization		36.2%		ICU Level of Service	A	
Analysis Period (min)		15				

Project PM
5: Mesa Rock Road & Street M-2

Sierra Internal Intersections
4/19/2016

						
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	33	0	302	32	0	161
Future Volume (Veh/h)	33	0	302	32	0	161
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	36	0	328	35	0	175
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	520	346			363	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	520	346			363	
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	100			100	
cM capacity (veh/h)	516	697			1196	
Direction, Lane #	WB 1	NB 1	SB 1			
Volume Total	36	363	175			
Volume Left	36	0	0			
Volume Right	0	35	0			
cSH	516	1700	1196			
Volume to Capacity	0.07	0.21	0.00			
Queue Length 95th (ft)	6	0	0			
Control Delay (s)	12.5	0.0	0.0			
Lane LOS	B					
Approach Delay (s)	12.5	0.0	0.0			
Approach LOS	B					
Intersection Summary						
Average Delay		0.8				
Intersection Capacity Utilization		27.8%		ICU Level of Service	A	
Analysis Period (min)		15				

Project PM
6: Mesa Rock Road & Sarver Lane

Sierra Internal Intersections
4/19/2016

						
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Sign Control	Stop			Stop	Stop	
Traffic Volume (vph)	18	155	70	326	167	8
Future Volume (vph)	18	155	70	326	167	8
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	20	168	76	354	182	9
Direction, Lane #	EB 1	NB 1	SB 1			
Volume Total (vph)	188	430	191			
Volume Left (vph)	20	76	0			
Volume Right (vph)	168	0	9			
Hadj (s)	-0.48	0.07	0.01			
Departure Headway (s)	4.9	4.7	4.9			
Degree Utilization, x	0.26	0.56	0.26			
Capacity (veh/h)	664	743	690			
Control Delay (s)	9.6	13.6	9.7			
Approach Delay (s)	9.6	13.6	9.7			
Approach LOS	A	B	A			
Intersection Summary						
Delay		11.7				
Level of Service		B				
Intersection Capacity Utilization		50.9%		ICU Level of Service	A	
Analysis Period (min)		15				

Project PM
7: Sarver Lane & Street V-3

Sierra Internal Intersections
4/19/2016

						
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	12	14	34	139	265	28
Future Volume (Veh/h)	12	14	34	139	265	28
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	13	15	37	151	288	30
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	528	303	318			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	528	303	318			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	97	98	97			
cM capacity (veh/h)	496	737	1242			
Direction, Lane #	EB 1	NB 1	NB 2	SB 1		
Volume Total	28	37	151	318		
Volume Left	13	37	0	0		
Volume Right	15	0	0	30		
cSH	601	1242	1700	1700		
Volume to Capacity	0.05	0.03	0.09	0.19		
Queue Length 95th (ft)	4	2	0	0		
Control Delay (s)	11.3	8.0	0.0	0.0		
Lane LOS	B	A				
Approach Delay (s)	11.3	1.6		0.0		
Approach LOS	B					
Intersection Summary						
Average Delay		1.1				
Intersection Capacity Utilization		32.3%		ICU Level of Service	A	
Analysis Period (min)		15				

Project PM
8: Sarver Lane & Street V-5

Sierra Internal Intersections
4/19/2016

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	58	0	15	15	0	12	34	103	34	0	175	76
Future Volume (Veh/h)	58	0	15	15	0	12	34	103	34	0	175	76
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	63	0	16	16	0	13	37	112	37	0	190	83
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	430	454	232	410	478	130	273			149		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	430	454	232	410	478	130	273			149		
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 %	88	100	98	97	100	99	97			100		
cM capacity (veh/h)	516	487	808	529	473	919	1290			1432		
Direction, Lane #	EB 1	WB 1	NB 1	NB 2	SB 1	SB 2						
Volume Total	79	29	37	149	0	273						
Volume Left	63	16	37	0	0	0						
Volume Right	16	13	0	37	0	83						
cSH	557	653	1290	1700	1700	1700						
Volume to Capacity	0.14	0.04	0.03	0.09	0.00	0.16						
Queue Length 95th (ft)	12	3	2	0	0	0						
Control Delay (s)	12.5	10.8	7.9	0.0	0.0	0.0						
Lane LOS	B	B	A									
Approach Delay (s)	12.5	10.8	1.6		0.0							
Approach LOS	B	B										
Intersection Summary												
Average Delay			2.8									
Intersection Capacity Utilization			33.1%		ICU Level of Service	A						
Analysis Period (min)			15									

Project PM
9: Street V-1 & Sarver Lane

Sierra Internal Intersections
4/19/2016

													
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	
Lane Configurations													
Traffic Volume (veh/h)	12	0	14	14	0	11	33	147	9	0	150	28	
Future Volume (Veh/h)	12	0	14	14	0	11	33	147	9	0	150	28	
Sign Control	Stop			Stop			Free			Free			
Grade	0%			0%			0%			0%			
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	
Hourly flow rate (vph)	13	0	15	15	0	12	36	160	10	0	163	30	
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	422	420	178	415	430	165	193						170
vC1, stage 1 conf vol													
vC2, stage 2 conf vol													
vCu, unblocked vol	422	420	178	415	430	165	193						170
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	98	97	100	99	97						100
cM capacity (veh/h)	524	511	865	528	504	879	1380						1407
Direction, Lane #	EB 1	WB 1	NB 1	NB 2	SB 1	SB 2							
Volume Total	28	27	36	170	0	193							
Volume Left	13	15	36	0	0	0							
Volume Right	15	12	0	10	0	30							
cSH	664	642	1380	1700	1700	1700							
Volume to Capacity	0.04	0.04	0.03	0.10	0.00	0.11							
Queue Length 95th (ft)	3	3	2	0	0	0							
Control Delay (s)	10.7	10.9	7.7	0.0	0.0	0.0							
Lane LOS	B	B	A										
Approach Delay (s)	10.7	10.9	1.3	0.0									
Approach LOS	B	B											
Intersection Summary													
Average Delay				1.9									
Intersection Capacity Utilization				26.3%	ICU Level of Service			A					
Analysis Period (min)				15									

Project PM
10: Mesa Rock Road & Street H-2

Sierra Internal Intersections
4/19/2016

						
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	15	15	409	48	30	277
Future Volume (Veh/h)	15	15	409	48	30	277
Sign Control	Stop		Free		Free	
Grade	0%		0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	16	16	445	52	33	301
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	838	471			497	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	838	471			497	
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	97			97	
cM capacity (veh/h)	326	593			1067	
Direction, Lane #	WB 1	NB 1	SB 1	SB 2		
Volume Total	32	497	33	301		
Volume Left	16	0	33	0		
Volume Right	16	52	0	0		
cSH	421	1700	1067	1700		
Volume to Capacity	0.08	0.29	0.03	0.18		
Queue Length 95th (ft)	6	0	2	0		
Control Delay (s)	14.3	0.0	8.5	0.0		
Lane LOS	B	A				
Approach Delay (s)	14.3	0.0	0.8			
Approach LOS	B					
Intersection Summary						
Average Delay			0.9			
Intersection Capacity Utilization			34.9%	ICU Level of Service	A	
Analysis Period (min)			15			

Project PM
11: Mesa Rock Road & Street H-1

Sierra Internal Intersections
4/19/2016

						
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	60	7	450	96	20	272
Future Volume (Veh/h)	60	7	450	96	20	272
Sign Control	Stop		Free		Free	
Grade	0%		0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	65	8	489	104	22	296
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	881	541			593	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	881	541			593	
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	99			98	
cM capacity (veh/h)	310	541			983	
Direction, Lane #	WB 1	NB 1	SB 1	SB 2		
Volume Total	73	593	22	296		
Volume Left	65	0	22	0		
Volume Right	8	104	0	0		
cSH	325	1700	983	1700		
Volume to Capacity	0.22	0.35	0.02	0.17		
Queue Length 95th (ft)	21	0	2	0		
Control Delay (s)	19.2	0.0	8.7	0.0		
Lane LOS	C		A			
Approach Delay (s)	19.2	0.0	0.6			
Approach LOS	C					
Intersection Summary						
Average Delay		1.6				
Intersection Capacity Utilization		39.9%		ICU Level of Service	A	
Analysis Period (min)		15				

Project PM
12: Mesa Rock Road & Street T-1 N

Sierra Internal Intersections
4/19/2016

						
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	0	33	78	546	304	0
Future Volume (Veh/h)	0	33	78	546	304	0
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	36	85	593	330	0
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage (veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	1093	330	330			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1093	330	330			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	100	95	93			
cM capacity (veh/h)	221	712	1229			
Direction, Lane #	EB 1	NB 1	NB 2	SB 1		
Volume Total	36	85	593	330		
Volume Left	0	85	0	0		
Volume Right	36	0	0	0		
cSH	712	1229	1700	1700		
Volume to Capacity	0.05	0.07	0.35	0.19		
Queue Length 95th (ft)	4	6	0	0		
Control Delay (s)	10.3	8.1	0.0	0.0		
Lane LOS	B	A				
Approach Delay (s)	10.3	1.0		0.0		
Approach LOS	B					
Intersection Summary						
Average Delay		1.0				
Intersection Capacity Utilization		38.7%		ICU Level of Service	A	
Analysis Period (min)		15				

Project PM
13: Mesa Rock Road & Street T-1 S

Sierra Internal Intersections
4/19/2016

						
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	0	125	229	624	337	0
Future Volume (Veh/h)	0	125	229	624	337	0
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	136	249	678	366	0
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage (veh)						
Upstream signal (ft)				1062		
pX, platoon unblocked	0.81					
vC, conflicting volume	1542	366	366			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1552	366	366			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	100	80	79			
cM capacity (veh/h)	80	679	1193			
Direction, Lane #	EB 1	NB 1	NB 2	SB 1		
Volume Total	136	249	678	366		
Volume Left	0	249	0	0		
Volume Right	136	0	0	0		
cSH	679	1193	1700	1700		
Volume to Capacity	0.20	0.21	0.40	0.22		
Queue Length 95th (ft)	19	20	0	0		
Control Delay (s)	11.6	8.8	0.0	0.0		
Lane LOS	B	A				
Approach Delay (s)	11.6	2.4		0.0		
Approach LOS	B					
Intersection Summary						
Average Delay		2.6				
Intersection Capacity Utilization		48.2%		ICU Level of Service	A	
Analysis Period (min)		15				

Project PM
14: Mesa Rock Road & Street TC-3

Sierra Internal Intersections
4/19/2016

						
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	21	36	805	46	24	415
Future Volume (Veh/h)	21	36	805	46	24	415
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	23	39	875	50	26	451
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			None		None	
Median storage (veh)						
Upstream signal (ft)			520			
pX, platoon unblocked	0.73	0.73			0.73	
vC, conflicting volume	1178	900			925	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1061	683			717	
tC, single (s)	6.8	6.9			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	85	86			96	
cM capacity (veh/h)	154	288			646	
Direction, Lane #	WB 1	WB 2	NB 1	SB 1	SB 2	SB 3
Volume Total	23	39	925	26	226	226
Volume Left	23	0	0	26	0	0
Volume Right	0	39	50	0	0	0
cSH	154	288	1700	646	1700	1700
Volume to Capacity	0.15	0.14	0.54	0.04	0.13	0.13
Queue Length 95th (ft)	13	12	0	3	0	0
Control Delay (s)	32.4	19.5	0.0	10.8	0.0	0.0
Lane LOS	D	C		B		
Approach Delay (s)	24.3		0.0	0.6		
Approach LOS	C					
Intersection Summary						
Average Delay			1.2			
Intersection Capacity Utilization			55.2%		ICU Level of Service	B
Analysis Period (min)			15			

Project PM
15: Mesa Rock Road & Street TC-2

Sierra Internal Intersections
4/19/2016

	WBL	WBR	NBT	NBR	SBL	SBT
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations	WBL	WBR	NBT	NBR	SBL	SBT
Traffic Volume (vph)	269	44	826	176	47	454
Future Volume (vph)	269	44	826	176	47	454
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5		4.5		4.5	4.5
Lane Util. Factor	0.97		0.95		1.00	0.95
Frt	0.98		0.97		1.00	1.00
Flt Protected	0.96		1.00		0.95	1.00
Satd. Flow (prot)	3392		3446		1770	3539
Flt Permitted	0.96		1.00		0.95	1.00
Satd. Flow (perm)	3392		3446		1770	3539
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	292	48	898	191	51	493
RTOR Reduction (vph)	17	0	16	0	0	0
Lane Group Flow (vph)	323	0	1073	0	51	493
Turn Type	Prot		NA		Prot	NA
Protected Phases	8		2		1	6
Permitted Phases						
Actuated Green, G (s)	13.0		53.3		4.8	62.6
Effective Green, g (s)	13.0		53.3		4.8	62.6
Actuated g/C Ratio	0.15		0.63		0.06	0.74
Clearance Time (s)	4.5		4.5		4.5	4.5
Vehicle Extension (s)	3.0		3.0		3.0	3.0
Lane Grp Cap (vph)	521		2171		100	2618
v/s Ratio Prot	c0.10		c0.31		c0.03	0.14
v/s Ratio Perm						
v/c Ratio	0.62		0.49		0.51	0.19
Uniform Delay, d1	33.5		8.4		38.8	3.3
Progression Factor	1.00		1.00		1.00	1.00
Incremental Delay, d2	2.3		0.8		4.3	0.2
Delay (s)	35.8		9.2		43.1	3.5
Level of Service	D		A		D	A
Approach Delay (s)	35.8		9.2		7.2	
Approach LOS	D		A		A	

Intersection Summary					
HCM 2000 Control Delay	13.2	HCM 2000 Level of Service	B		
HCM 2000 Volume to Capacity ratio	0.52				
Actuated Cycle Length (s)	84.6	Sum of lost time (s)	13.5		
Intersection Capacity Utilization	52.9%	ICU Level of Service	A		
Analysis Period (min)	15				
c Critical Lane Group					

Project PM
16: Mesa Rock Road & Street TC-1

Sierra Internal Intersections
4/19/2016

	WBL	WBR	NBT	NBR	SBL	SBT
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations	WBL	WBR	NBT	NBR	SBL	SBT
Traffic Volume (vph)	406	84	915	216	93	498
Future Volume (vph)	406	84	915	216	93	498
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5		4.5		4.5	4.5
Lane Util. Factor	0.97		0.95		1.00	0.95
Frt	0.97		0.97		1.00	1.00
Flt Protected	0.96		1.00		0.95	1.00
Satd. Flow (prot)	3381		3438		1770	3539
Flt Permitted	0.96		1.00		0.95	1.00
Satd. Flow (perm)	3381		3438		1770	3539
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	441	91	995	235	101	541
RTOR Reduction (vph)	21	0	20	0	0	0
Lane Group Flow (vph)	511	0	1210	0	101	541
Turn Type	Prot		NA		Prot	NA
Protected Phases	8		2		1	6
Permitted Phases						
Actuated Green, G (s)	17.6		47.9		8.4	60.8
Effective Green, g (s)	17.6		47.9		8.4	60.8
Actuated g/C Ratio	0.20		0.55		0.10	0.70
Clearance Time (s)	4.5		4.5		4.5	4.5
Vehicle Extension (s)	3.0		3.0		3.0	3.0
Lane Grp Cap (vph)	680		1884		170	2461
v/s Ratio Prot	c0.15		c0.35		c0.06	0.15
v/s Ratio Perm						
v/c Ratio	0.75		0.64		0.59	0.22
Uniform Delay, d1	32.8		13.8		37.9	4.8
Progression Factor	1.00		1.00		1.00	1.00
Incremental Delay, d2	4.7		1.7		5.5	0.2
Delay (s)	37.5		15.5		43.3	5.0
Level of Service	D		B		D	A
Approach Delay (s)	37.5		15.5		11.0	
Approach LOS	D		B		B	

Intersection Summary					
HCM 2000 Control Delay	19.2	HCM 2000 Level of Service	B		
HCM 2000 Volume to Capacity ratio	0.66				
Actuated Cycle Length (s)	87.4	Sum of lost time (s)	13.5		
Intersection Capacity Utilization	62.8%	ICU Level of Service	B		
Analysis Period (min)	15				
c Critical Lane Group					

Project PM
17: Mesa Rock Road & Mesa Rock Way

Sierra Internal Intersections
4/19/2016

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations		↗	↕	↗		↕
Traffic Volume (veh/h)	0	64	944	228	0	529
Future Volume (Veh/h)	0	64	944	228	0	529
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	70	1026	248	0	575
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			None		None	
Median storage (veh)						
Upstream signal (ft)						530
pX, platoon unblocked						
vC, conflicting volume	1314	513			1274	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1314	513			1274	
tC, single (s)	6.8	6.9			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	100	86			100	
cM capacity (veh/h)	150	506			541	
Direction, Lane #	WB 1	NB 1	NB 2	NB 3	SB 1	SB 2
Volume Total	70	513	513	248	288	288
Volume Left	0	0	0	0	0	0
Volume Right	70	0	0	248	0	0
cSH	506	1700	1700	1700	1700	1700
Volume to Capacity	0.14	0.30	0.30	0.15	0.17	0.17
Queue Length 95th (ft)	12	0	0	0	0	0
Control Delay (s)	13.2	0.0	0.0	0.0	0.0	0.0
Lane LOS	B					
Approach Delay (s)	13.2	0.0			0.0	
Approach LOS	B					
Intersection Summary						
Average Delay			0.5			
Intersection Capacity Utilization			36.7%		ICU Level of Service	A
Analysis Period (min)			15			

APPENDIX K

CONSTRUCTION SCHEDULE

Newland Sierra Project

Phase 1

Workdays per week

6

	Weeks	Start Date	End Date
Phase 1 - Total Construction Duration/Schedule	359.7	1/10/2018	12/2/2024

Note: Assumes 2 one-way trips per each worker, haul truck, and vendor truck

Phase	Weeks Per Activity	Start Date	End Date	# of Workers per day	Total Haul Trucks	Vendor Trucks per day	Equipment Type	No. of Equip Units
Site Preparation*	5.0	1/10/2018	2/14/2018	24	360	8	Crawler Tractors	4
							Loaders	2
							Grinder	1
Grading	148.1	1/29/2018	12/1/2020	150	290,071	36	Crawler Tractors	11
Phase 1 Grading Acres = 565							Excavators	5
Phase 1 Soil Hauling = 2,320,570 cubic yards of on-site soil movement							Graders	4
Average on-site haul distance = 0.4 mile (one-way)							Tractors/Loaders/Backhoes	2
Haul truck capacity = 16 cubic yards							Drill Rigs	15
							Water Trucks	14
							Off Hwy. Trucks	2
							Scrapers	5
Building Construction	246.0	3/16/2020	12/2/2024	800	0	40	Cranes	8
							Forklifts	8
							Generator Sets	8
							Tractors/Loaders/Backhoes	4
Trenching (for utilities)	131.1	10/28/2018	5/3/2021	78	0	32	Excavators	2
							Tractors/Loaders/Backhoes	8
							Water Truck	8
Architectural Coating (painting and finishing)	228.9	7/14/2020	12/2/2024	160	0	8	Air Compressors	20
Paving	140.0	7/17/2019	3/23/2022	36	0	20	Pavers	1
							Paving Eqpmnt. (Oiler, Sweeper)	2
							Loader	2
							Water Trucks	4
							Rollers	3
							Scrapers	2
Brush Management/Landscaping	108.9	5/1/2019	6/1/2021	192	0	28	Loader	8
							Dumpruck	4
							Water Truck	8
							Trencher	4
Reservoirs (2 Steel Tanks)	26.9	12/27/2018	7/3/2019	44	0	4	Excavators	1
							Tractors/Loaders/Backhoes	4
							Generator Sets	3
							Aerial Lifts	4

Source: Fuscoe, August 2016

* Site prep hauling activity would include distribution of mulched vegetation, grubbed material, and biological fencing supplies to staging locations within the work area.

Newland Sierra Project

Phase 2

Workdays per week

6

	Weeks	Start Date	End Date
Phase 2 - Total Construction Duration/Schedule	362.1	12/21/2020	11/30/2027

Note: Assumes 2 one-way trips per each worker, haul truck, and vendor truck

Phase	Weeks Per Activity	Start Date	End Date	# of Workers per day	Total Haul Trucks	Vendor Trucks per day	Equipment Type	No. of Equip Units
Site Preparation*	4.0	12/21/2020	1/18/2021	36	288	8	Crawler Tractors	3
							Loaders	2
							Grinder	1
Grading Phase 1 Grading Acres = 11.2 Phase 2 Soil Hauling = 103,140 cubic yards of on-site soil movement Average on-site haul distance = 0.8 mile (one-way) Haul truck capacity = 16 cubic yards	95.6	1/18/2021	11/18/2022	96	12,893	28	Crawler Tractors	7
							Excavators	2
							Graders	2
							Tractors/Loaders/Backhoes	2
							Drill Rigs	6
							Water Trucks	10
							Off Hwy. Trucks	2
							Scrapers	5
Building Construction	147.1	2/3/2025	11/30/2027	400	0	32	Cranes	4
							Forklifts	8
							Generator Sets	20
							Tractors/Loaders/Backhoes	4
Trenching (for utilities)	116.0	1/3/2022	3/25/2024	44	0	24	Excavators	4
							Tractors/Loaders/Backhoes	4
							Water Truck	8
Architectural Coating (painting and finishing)	121.6	8/1/2025	11/30/2027	80	0	8	Air Compressors	10
Paving	143.4	8/1/2022	5/1/2025	24	0	16	Pavers	1
							Paving Eqpmnt. (Oiler, Sweeper)	2
							Loader	2
							Water Trucks	4
							Rollers	3
							Scrapers	2
Brush Management/Landscaping	82.3	11/1/2021	5/31/2023	96	0	16	Loader	4
							Dumpruck	2
							Water Truck	4
							Trencher	2

Source: Fuscoe, August 2016

* Site prep hauling activity would include distribution of mulched vegetation, grubbed material, and biological fencing supplies to staging locations within the work area.

APPENDIX L

INTERSECTION AND ARTERIAL MITIGATION ANALYSIS WORKSHEETS – EXISTING + PROJECT AND EXISTING + PROJECT + CUMULATIVE PROJECTS

APPENDIX L-1

INTERSECTION ANALYSIS WORKSHEETS – EXISTING + PROJECT

Mitigated Existing + Proj AM
9: Deer Springs Rd & Sarver Lane

Sierra Project
03/21/2017

						
Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	76	484	1081	23	99	256
Future Volume (vph)	76	484	1081	23	99	256
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	0.97	0.95	0.95	1.00	1.00	1.00
Frt	1.00	1.00	1.00	0.85	1.00	0.85
Flt Protected	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (prot)	3433	3539	3539	1583	1770	1583
Flt Permitted	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (perm)	3433	3539	3539	1583	1770	1583
Peak-hour factor, PHF	0.96	0.96	0.96	0.96	0.96	0.96
Adj. Flow (vph)	79	504	1126	24	103	267
RTOR Reduction (vph)	0	0	0	10	0	121
Lane Group Flow (vph)	79	504	1126	14	103	146
Turn Type	Prot	NA	NA	Perm	Prot	Perm
Protected Phases	7	4	8		6	
Permitted Phases				8		6
Actuated Green, G (s)	6.1	49.0	38.9	38.9	38.0	38.0
Effective Green, g (s)	6.1	49.0	38.9	38.9	38.0	38.0
Actuated g/C Ratio	0.06	0.52	0.41	0.41	0.40	0.40
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)	220	1825	1449	648	708	633
v/s Ratio Prot	c0.02	0.14	c0.32		0.06	
v/s Ratio Perm				0.01		c0.09
v/c Ratio	0.36	0.28	0.78	0.02	0.15	0.23
Uniform Delay, d1	42.6	13.0	24.3	16.7	18.2	18.8
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	1.0	0.1	2.7	0.0	0.4	0.8
Delay (s)	43.6	13.1	27.0	16.7	18.6	19.7
Level of Service	D	B	C	B	B	B
Approach Delay (s)		17.2	26.8		19.4	
Approach LOS		B	C		B	
Intersection Summary						
HCM 2000 Control Delay			22.8		HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio			0.50			
Actuated Cycle Length (s)			95.0		Sum of lost time (s)	12.0
Intersection Capacity Utilization			52.4%		ICU Level of Service	A
Analysis Period (min)			15			
c Critical Lane Group						

Mitigated Existing + Proj AM
12: Twin Oaks Valley Rd #1/Deer Springs Rd & Twin Oaks Valley Rd

Sierra Project
03/21/2017

						
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	44	97	88	538	1406	35
Future Volume (vph)	44	97	88	538	1406	35
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.9	4.9	4.0	5.3	5.3	5.3
Lane Util. Factor	1.00	1.00	1.00	0.95	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	1770	3539	3539	1583
Flt Permitted	0.95	1.00	0.95	1.00	1.00	1.00
Satd. Flow (perm)	1770	1583	1770	3539	3539	1583
Peak-hour factor, PHF	0.91	0.91	0.91	0.91	0.91	0.91
Growth Factor (vph)	100%	100%	100%	130%	130%	100%
Adj. Flow (vph)	48	107	97	769	2009	38
RTOR Reduction (vph)	0	97	0	0	0	6
Lane Group Flow (vph)	48	10	97	769	2009	32
Turn Type	Prot	Perm	Prot	NA	NA	Perm
Protected Phases	4		5	2	6	
Permitted Phases		4				6
Actuated Green, G (s)	10.1	10.1	8.1	84.3	72.2	72.2
Effective Green, g (s)	10.1	10.1	8.1	84.3	72.2	72.2
Actuated g/C Ratio	0.10	0.10	0.08	0.81	0.69	0.69
Clearance Time (s)	4.9	4.9	4.0	5.3	5.3	5.3
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	170	152	137	2852	2442	1092
v/s Ratio Prot	c0.03		c0.05	0.22	c0.57	
v/s Ratio Perm		0.01				0.02
v/c Ratio	0.28	0.07	0.71	0.27	0.82	0.03
Uniform Delay, d1	43.9	43.0	47.1	2.5	11.6	5.1
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	0.9	0.2	15.4	0.1	2.4	0.0
Delay (s)	44.8	43.2	62.5	2.6	14.0	5.1
Level of Service	D	D	E	A	B	A
Approach Delay (s)	43.7			9.3	13.8	
Approach LOS	D			A	B	
Intersection Summary						
HCM 2000 Control Delay			14.0		HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio			0.75			
Actuated Cycle Length (s)			104.6		Sum of lost time (s)	14.2
Intersection Capacity Utilization			70.6%		ICU Level of Service	C
Analysis Period (min)			15			
c Critical Lane Group						

Mitigated Existing + Proj AM
13: Twin Oaks Valley Rd #1 & Buena Creek Rd

Sierra Project
03/21/2017

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	 				 		 	 			 	
Traffic Volume (vph)	311	0	172	0	0	0	113	314	0	0	1005	496
Future Volume (vph)	311	0	172	0	0	0	113	314	0	0	1005	496
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0		4.0				5.0	5.5			5.5	5.5
Lane Util. Factor	0.97		1.00				1.00	0.95			0.95	1.00
Frpb, 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)	3433		1562				1770	3539			3539	1546
Flt Permitted	0.76		1.00				0.95	1.00			1.00	1.00
Satd. Flow (perm)	2736		1562				1770	3539			3539	1546
Peak-hour factor, PHF	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Adj. Flow (vph)	324	0	179	0	0	0	118	327	0	0	1047	517
RTOR Reduction (vph)	0	0	136	0	0	0	0	0	0	0	0	192
Lane Group Flow (vph)	324	0	43	0	0	0	118	327	0	0	1047	325
Confl. Peds. (#/hr)			2									1
Confl. Bikes (#/hr)												3
Turn Type	Perm		Perm				Prot	NA		Prot	NA	Perm
Protected Phases					8		5	2		1	6	
Permitted Phases	4		4	8								6
Actuated Green, G (s)	13.4		13.4				5.1	33.2			23.1	23.1
Effective Green, g (s)	13.4		13.4				5.1	33.2			23.1	23.1
Actuated g/C Ratio	0.24		0.24				0.09	0.59			0.41	0.41
Clearance Time (s)	4.0		4.0				5.0	5.5			5.5	5.5
Vehicle Extension (s)	3.0		3.0				3.0	3.0			3.0	3.0
Lane Grp Cap (vph)	653		373				160	2094			1457	636
v/s Ratio Prot							c0.07	0.09			c0.30	
v/s Ratio Perm	c0.12		0.03									0.21
v/c Ratio	0.50		0.11				0.74	0.16			0.72	0.51
Uniform Delay, d1	18.4		16.7				24.8	5.1			13.8	12.3
Progression Factor	1.00		1.00				1.00	1.00			1.00	1.00
Incremental Delay, d2	0.6		0.1				16.2	0.0			1.7	0.7
Delay (s)	19.0		16.8				41.0	5.2			15.5	13.0
Level of Service	B		B				D	A			B	B
Approach Delay (s)		18.3			0.0			14.7			14.7	
Approach LOS		B			A			B			B	
Intersection Summary												
HCM 2000 Control Delay			15.4		HCM 2000 Level of Service					B		
HCM 2000 Volume to Capacity ratio			0.65									
Actuated Cycle Length (s)			56.1		Sum of lost time (s)					14.5		
Intersection Capacity Utilization			55.3%		ICU Level of Service					B		
Analysis Period (min)			15									
c Critical Lane Group												

c Critical Lane Group

Mitigated Existing + Proj AM
26: S. Santa Fe Ave & Buena Creek Rd

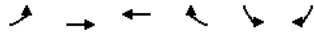
Sierra Project
03/21/2017

						
Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	161	383	269	83	170	548
Future Volume (vph)	161	383	269	83	170	548
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.4	5.3	5.3	5.3	4.0	4.0
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frpb, ped/bikes	1.00	1.00	1.00	0.94	1.00	0.97
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	1.00	1.00	0.85	1.00	0.85
Flt Protected	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (prot)	1770	1863	1863	1495	1770	1533
Flt Permitted	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (perm)	1770	1863	1863	1495	1770	1533
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	169	403	283	87	179	577
RTOR Reduction (vph)	0	0	0	32	0	0
Lane Group Flow (vph)	169	403	283	55	179	577
Confl. Peds. (#/hr)				12		4
Confl. Bikes (#/hr)				3		
Turn Type	Prot	NA	NA	Perm	Prot	Perm
Protected Phases	5	2	6		4	
Permitted Phases				6		4
Actuated Green, G (s)	16.3	25.7	41.1	41.1	46.2	46.2
Effective Green, g (s)	16.3	25.7	41.1	41.1	46.2	46.2
Actuated g/C Ratio	0.14	0.22	0.35	0.35	0.39	0.39
Clearance Time (s)	4.4	5.3	5.3	5.3	4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	245	408	652	523	697	603
v/s Ratio Prot	c0.10	c0.22	c0.15		0.10	
v/s Ratio Perm				0.04		c0.38
v/c Ratio	0.69	0.99	0.43	0.10	0.26	0.96
Uniform Delay, d1	48.1	45.6	29.2	25.7	24.0	34.6
Progression Factor	1.28	0.66	1.00	1.00	1.00	1.00
Incremental Delay, d2	6.2	35.7	0.5	0.1	0.2	26.0
Delay (s)	67.5	66.1	29.7	25.8	24.2	60.6
Level of Service	E	E	C	C	C	E
Approach Delay (s)		66.5	28.7		52.0	
Approach LOS		E	C		D	
Intersection Summary						
HCM 2000 Control Delay			51.8		HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio			0.84			
Actuated Cycle Length (s)			117.3		Sum of lost time (s)	14.3
Intersection Capacity Utilization			57.4%		ICU Level of Service	B
Analysis Period (min)			15			
c Critical Lane Group						

c Critical Lane Group

Mitigated Existing + Proj AM
27: Buena Creek Rd & Monte Vista Dr

Sierra Project
03/21/2017



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	88	181	474	234	334	148
Future Volume (vph)	88	181	474	234	334	148
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	
Flpb, ped/bikes	1.00	1.00	1.00	1.00	0.99	
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	
Frt	1.00	1.00	1.00	0.85	0.96	
Flt Protected	0.95	1.00	1.00	1.00	0.97	
Satd. Flow (prot)	1770	1863	1863	1583	1713	
Flt Permitted	0.37	1.00	1.00	1.00	0.97	
Satd. Flow (perm)	693	1863	1863	1583	1713	
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	93	191	499	246	352	156
RTOR Reduction (vph)	0	0	0	0	21	0
Lane Group Flow (vph)	93	191	499	246	487	0
Confl. Peds. (#/hr)						2
Turn Type	Perm	NA	NA	pm+ov	Prot	
Protected Phases		4	8	6	6	
Permitted Phases	4			8		
Actuated Green, G (s)	40.5	40.5	40.5	66.8	26.3	
Effective Green, g (s)	40.5	40.5	40.5	66.8	26.3	
Actuated g/C Ratio	0.54	0.54	0.54	0.89	0.35	
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	1008	1008	1583	602	
v/s Ratio Prot		0.10	c0.27	0.05	c0.28	
v/s Ratio Perm	0.13			0.10		
v/c Ratio	0.25	0.19	0.50	0.16	0.81	
Uniform Delay, d1	9.1	8.8	10.7	0.5	22.0	
Progression Factor	1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	1.6	0.4	1.7	0.0	7.9	
Delay (s)	10.7	9.2	12.5	0.5	29.8	
Level of Service	B	A	B	A	C	
Approach Delay (s)		9.7	8.5		29.8	
Approach LOS		A	A		C	
Intersection Summary						
HCM 2000 Control Delay			15.8	HCM 2000 Level of Service		B
HCM 2000 Volume to Capacity ratio			0.62			
Actuated Cycle Length (s)			74.8	Sum of lost time (s)		8.0
Intersection Capacity Utilization			67.4%	ICU Level of Service		C
Analysis Period (min)			15			
c Critical Lane Group						

Miti Existing +Proj PM
9: Deer Springs Rd & Sarver Lane

Sierra Project
03/21/2017

						
Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	305	1300	715	109	45	114
Future Volume (vph)	305	1300	715	109	45	114
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5	4.5	4.5	4.5	4.5	4.5
Lane Util. Factor	0.97	0.95	0.95	1.00	1.00	1.00
Frt	1.00	1.00	1.00	0.85	1.00	0.85
Flt Protected	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (prot)	3433	3539	3539	1583	1770	1583
Flt Permitted	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (perm)	3433	3539	3539	1583	1770	1583
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	321	1368	753	115	47	120
RTOR Reduction (vph)	0	0	0	75	0	80
Lane Group Flow (vph)	321	1368	753	40	47	40
Turn Type	Prot	NA	NA	Perm	Prot	Perm
Protected Phases	7	4	8		6	
Permitted Phases				8		6
Actuated Green, G (s)	12.6	40.8	23.7	23.7	24.8	24.8
Effective Green, g (s)	12.6	40.8	23.7	23.7	24.8	24.8
Actuated g/C Ratio	0.17	0.55	0.32	0.32	0.33	0.33
Clearance Time (s)	4.5	4.5	4.5	4.5	4.5	4.5
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	579	1935	1124	502	588	526
v/s Ratio Prot	0.09	c0.39	0.21		c0.03	
v/s Ratio Perm				0.03		0.03
v/c Ratio	0.55	0.71	0.67	0.08	0.08	0.08
Uniform Delay, d1	28.4	12.5	22.1	17.8	17.1	17.1
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	1.2	1.2	1.5	0.1	0.3	0.3
Delay (s)	29.6	13.7	23.6	17.9	17.3	17.3
Level of Service	C	B	C	B	B	B
Approach Delay (s)		16.7	22.8		17.3	
Approach LOS		B	C		B	
Intersection Summary						
HCM 2000 Control Delay			18.7		HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio			0.50			
Actuated Cycle Length (s)			74.6		Sum of lost time (s)	13.5
Intersection Capacity Utilization			46.8%		ICU Level of Service	A
Analysis Period (min)			15			
c Critical Lane Group						

Miti Existing +Proj PM
12: Twin Oaks Valley Rd #1/Deer Springs Rd & Twin Oaks Valley Rd

Sierra Project
03/21/2017

						
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	48	240	105	1333	872	47
Future Volume (vph)	48	240	105	1333	872	47
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.9	4.9	4.0	5.3	5.3	5.3
Lane Util. Factor	1.00	1.00	1.00	0.95	0.95	1.00
Frb, ped/bikes	1.00	1.00	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)	1770	1583	1770	3539	3539	1547
Flt Permitted	0.95	1.00	0.95	1.00	1.00	1.00
Satd. Flow (perm)	1770	1583	1770	3539	3539	1547
Peak-hour factor, PHF	0.88	0.88	0.88	0.88	0.88	0.88
Growth Factor (vph)	100%	100%	100%	130%	130%	100%
Adj. Flow (vph)	55	273	119	1969	1288	53
RTOR Reduction (vph)	0	217	0	0	0	17
Lane Group Flow (vph)	55	56	119	1969	1288	36
Confl. Peds. (#/hr)						1
Confl. Bikes (#/hr)						2
Turn Type	Prot	Perm	Prot	NA	NA	Perm
Protected Phases	4		5	2	6	
Permitted Phases		4				6
Actuated Green, G (s)	9.9	9.9	9.2	54.9	41.7	41.7
Effective Green, g (s)	9.9	9.9	9.2	54.9	41.7	41.7
Actuated g/C Ratio	0.13	0.13	0.12	0.73	0.56	0.56
Clearance Time (s)	4.9	4.9	4.0	5.3	5.3	5.3
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	233	208	217	2590	1967	860
v/s Ratio Prot	0.03		0.07	c0.56	0.36	
v/s Ratio Perm		c0.04				0.02
v/c Ratio	0.24	0.27	0.55	0.76	0.65	0.04
Uniform Delay, d1	29.2	29.3	30.9	6.1	11.6	7.6
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	0.5	0.7	2.8	1.4	0.8	0.0
Delay (s)	29.7	30.0	33.8	7.4	12.4	7.6
Level of Service	C	C	C	A	B	A
Approach Delay (s)	29.9			8.9	12.2	
Approach LOS	C			A	B	
Intersection Summary						
HCM 2000 Control Delay			11.9		HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio			0.73			
Actuated Cycle Length (s)			75.0		Sum of lost time (s)	14.2
Intersection Capacity Utilization			59.7%		ICU Level of Service	B
Analysis Period (min)			15			
c Critical Lane Group						

Miti Existing +Proj PM
13: Twin Oaks Valley Rd #1 & Buena Creek Rd

Sierra Project
03/21/2017

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↔	↗	↘		↖	↗	↔	↖	↗	↘	↗	↘
Traffic Volume (vph)	565	0	210	0	0	0	167	861	0	0	683	421
Future Volume (vph)	565	0	210	0	0	0	167	861	0	0	683	421
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0		4.0				5.0	5.5			5.5	5.5
Lane Util. Factor	0.97		1.00				1.00	0.95			0.95	1.00
Frpb, ped/bikes	1.00		1.00				1.00	1.00			1.00	0.97
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)	3433		1583				1770	3539			3539	1539
Flt Permitted	0.76		1.00				0.95	1.00			1.00	1.00
Satd. Flow (perm)	2736		1583				1770	3539			3539	1539
Peak-hour factor, PHF	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Adj. Flow (vph)	608	0	226	0	0	0	180	926	0	0	734	453
RTOR Reduction (vph)	0	0	152	0	0	0	0	0	0	0	0	276
Lane Group Flow (vph)	608	0	74	0	0	0	180	926	0	0	734	177
Confl. Peds. (#/hr)												1
Confl. Bikes (#/hr)												5
Turn Type	Perm		Perm				Prot	NA		Prot	NA	Perm
Protected Phases					8		5	2		1	6	
Permitted Phases	4		4		8							6
Actuated Green, G (s)	18.2		18.2				7.1	28.6			16.5	16.5
Effective Green, g (s)	18.2		18.2				7.1	28.6			16.5	16.5
Actuated g/C Ratio	0.32		0.32				0.13	0.51			0.29	0.29
Clearance Time (s)	4.0		4.0				5.0	5.5			5.5	5.5
Vehicle Extension (s)	3.0		3.0				3.0	3.0			3.0	3.0
Lane Grp Cap (vph)	884		511				223	1797			1037	451
v/s Ratio Prot							c0.10	0.26			c0.21	
v/s Ratio Perm	c0.22		0.05									0.11
v/c Ratio	0.69		0.14				0.81	0.52			0.71	0.39
Uniform Delay, d1	16.6		13.5				23.9	9.2			17.7	15.9
Progression Factor	1.00		1.00				1.00	1.00			1.00	1.00
Incremental Delay, d2	2.2		0.1				18.9	0.3			2.2	0.6
Delay (s)	18.8		13.7				42.8	9.5			20.0	16.5
Level of Service	B		B				D	A			B	B
Approach Delay (s)		17.4			0.0			14.9			18.6	
Approach LOS		B			A			B			B	
Intersection Summary												
HCM 2000 Control Delay			17.0									B
HCM 2000 Volume to Capacity ratio			0.72									
Actuated Cycle Length (s)			56.3					Sum of lost time (s)			14.5	
Intersection Capacity Utilization			56.3%					ICU Level of Service			B	
Analysis Period (min)			15									

c Critical Lane Group

Miti Existing +Proj PM
26: S. Santa Fe Ave & Buena Creek Rd

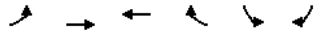
Sierra Project
03/21/2017

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations	↔	↗	↗	↖	↘	↘
Traffic Volume (vph)	663	421	467	209	123	225
Future Volume (vph)	663	421	467	209	123	225
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.4	5.3	5.3	5.3	4.0	7.0
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frpb, ped/bikes	1.00	1.00	1.00	0.93	1.00	0.95
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	1.00	1.00	0.85	1.00	0.85
Flt Protected	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (prot)	1770	1863	1863	1473	1770	1503
Flt Permitted	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (perm)	1770	1863	1863	1473	1770	1503
Peak-hour factor, PHF	0.96	0.96	0.96	0.96	0.96	0.96
Adj. Flow (vph)	691	439	486	218	128	234
RTOR Reduction (vph)	0	0	0	61	0	0
Lane Group Flow (vph)	691	439	486	157	128	234
Confl. Peds. (#/hr)				19		12
Confl. Bikes (#/hr)				4		
Turn Type	Prot	NA	NA	Perm	Prot	Perm
Protected Phases	5	2	6		4	
Permitted Phases				6		4
Actuated Green, G (s)	37.6	45.1	26.1	26.1	22.6	22.6
Effective Green, g (s)	37.6	45.1	26.1	26.1	22.6	19.6
Actuated g/C Ratio	0.38	0.45	0.26	0.26	0.23	0.20
Clearance Time (s)	4.4	5.3	5.3	5.3	4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	665	840	486	384	400	294
v/s Ratio Prot	c0.39	0.24	c0.26		0.07	
v/s Ratio Perm				0.11		c0.16
v/c Ratio	1.04	0.52	1.00	0.41	0.32	0.80
Uniform Delay, d1	31.2	19.7	37.0	30.6	32.3	38.3
Progression Factor	1.10	0.83	1.00	1.00	1.00	1.00
Incremental Delay, d2	40.3	0.4	40.8	0.7	0.5	13.8
Delay (s)	74.5	16.8	77.8	31.3	32.8	52.1
Level of Service	E	B	E	C	C	D
Approach Delay (s)		52.0	63.4		45.3	
Approach LOS		D	E		D	
Intersection Summary						
HCM 2000 Control Delay			54.6			HCM 2000 Level of Service D
HCM 2000 Volume to Capacity ratio			0.94			
Actuated Cycle Length (s)			100.0			Sum of lost time (s) 14.3
Intersection Capacity Utilization			82.5%			ICU Level of Service E
Analysis Period (min)			15			

c Critical Lane Group

Miti Existing +Proj PM
27: Buena Creek Rd & Monte Vista Dr

Sierra Project
03/21/2017



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations	↰	↱	↱	↱	↰	↱
Traffic Volume (vph)	205	492	226	410	363	93
Future Volume (vph)	205	492	226	410	363	93
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5	4.5	4.5	4.5	4.5	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	
Frt	1.00	1.00	1.00	0.85	0.97	
Flt Protected	0.95	1.00	1.00	1.00	0.96	
Satd. Flow (prot)	1770	1863	1863	1583	1734	
Flt Permitted	0.95	1.00	1.00	1.00	0.96	
Satd. Flow (perm)	1770	1863	1863	1583	1734	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	223	535	246	446	395	101
RTOR Reduction (vph)	0	0	0	308	12	0
Lane Group Flow (vph)	223	535	246	138	484	0
Confl. Bikes (#/hr)						3
Turn Type	Prot	NA	NA	Perm	Prot	
Protected Phases	7	4	8		6	
Permitted Phases				8		
Actuated Green, G (s)	14.1	42.9	24.3	24.3	26.5	
Effective Green, g (s)	14.1	42.9	24.3	24.3	26.5	
Actuated g/C Ratio	0.18	0.55	0.31	0.31	0.34	
Clearance Time (s)	4.5	4.5	4.5	4.5	4.5	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	318	1019	577	490	586	
v/s Ratio Prot	c0.13	c0.29	0.13		c0.28	
v/s Ratio Perm				0.09		
v/c Ratio	0.70	0.53	0.43	0.28	0.83	
Uniform Delay, d1	30.2	11.3	21.5	20.5	23.8	
Progression Factor	1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	6.8	1.9	2.3	1.4	9.3	
Delay (s)	37.0	13.2	23.8	21.9	33.1	
Level of Service	D	B	C	C	C	
Approach Delay (s)		20.2	22.6		33.1	
Approach LOS		C	C		C	
Intersection Summary						
HCM 2000 Control Delay			24.3		HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio			0.71			
Actuated Cycle Length (s)			78.4		Sum of lost time (s)	13.5
Intersection Capacity Utilization			60.3%		ICU Level of Service	B
Analysis Period (min)			15			
c Critical Lane Group						

APPENDIX L-2

INTERSECTION ANALYSIS WORKSHEETS – EXISTING + PROJECT + CUMULATIVE PROJECTS

Mitigated Existing + Proj + Cuml AM
9: Deer Springs Rd & Sarver Lane

Sierra Project
03/21/2017

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	77	531	1210	23	101	256
Future Volume (vph)	77	531	1210	23	101	256
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	0.97	0.95	0.95	1.00	1.00	1.00
Frt	1.00	1.00	1.00	0.85	1.00	0.85
Flt Protected	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (prot)	3433	3539	3539	1583	1770	1583
Flt Permitted	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (perm)	3433	3539	3539	1583	1770	1583
Peak-hour factor, PHF	0.96	0.96	0.96	0.96	0.96	0.96
Adj. Flow (vph)	80	553	1260	24	105	267
RTOR Reduction (vph)	0	0	0	9	0	120
Lane Group Flow (vph)	80	553	1260	15	105	147
Turn Type	Prot	NA	NA	Perm	Prot	Perm
Protected Phases	7	4	8		6	
Permitted Phases				8		6
Actuated Green, G (s)	6.2	54.5	44.3	44.3	35.1	35.1
Effective Green, g (s)	6.2	54.5	44.3	44.3	35.1	35.1
Actuated g/C Ratio	0.06	0.56	0.45	0.45	0.36	0.36
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)	218	1976	1606	718	636	569
v/s Ratio Prot	c0.02	0.16	c0.36		0.06	
v/s Ratio Perm				0.01		c0.09
v/c Ratio	0.37	0.28	0.78	0.02	0.17	0.26
Uniform Delay, d1	43.8	11.3	22.6	14.7	21.3	22.1
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	1.0	0.1	2.6	0.0	0.6	1.1
Delay (s)	44.9	11.4	25.2	14.7	21.8	23.2
Level of Service	D	B	C	B	C	C
Approach Delay (s)		15.6	25.0		22.8	
Approach LOS		B	C		C	
Intersection Summary						
HCM 2000 Control Delay			22.0		HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio			0.54			
Actuated Cycle Length (s)			97.6		Sum of lost time (s)	12.0
Intersection Capacity Utilization			56.0%		ICU Level of Service	B
Analysis Period (min)			15			
c Critical Lane Group						

Mitigated Existing + Proj + Cuml AM
10: Deer Springs Rd & Sycamore Road

Sierra Project
03/21/2017

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	40	20	613	190	80	1556
Future Volume (vph)	40	20	613	190	80	1556
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	0.95		1.00	0.95
Frt	1.00	0.85	0.96		1.00	1.00
Flt Protected	0.95	1.00	1.00		0.95	1.00
Satd. Flow (prot)	1770	1583	3414		1770	3539
Flt Permitted	0.95	1.00	1.00		0.95	1.00
Satd. Flow (perm)	1770	1583	3414		1770	3539
Peak-hour factor, PHF	0.89	0.89	0.89	0.89	0.89	0.89
Adj. Flow (vph)	45	22	689	213	90	1748
RTOR Reduction (vph)	0	21	16	0	0	0
Lane Group Flow (vph)	45	1	886	0	90	1748
Turn Type	Prot	Perm	NA		Prot	NA
Protected Phases	8		2		1	6
Permitted Phases		8				
Actuated Green, G (s)	7.2	7.2	86.3		9.7	100.0
Effective Green, g (s)	7.2	7.2	86.3		9.7	100.0
Actuated g/C Ratio	0.06	0.06	0.75		0.08	0.87
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)	110	98	2557		149	3072
v/s Ratio Prot	c0.03		0.26		0.05	c0.49
v/s Ratio Perm		0.00				
v/c Ratio	0.41	0.01	0.35		0.60	0.57
Uniform Delay, d1	52.0	50.7	4.9		50.9	2.0
Progression Factor	1.00	1.00	1.00		1.00	1.00
Incremental Delay, d2	2.5	0.1	0.4		6.7	0.8
Delay (s)	54.4	50.7	5.3		57.6	2.8
Level of Service	D	D	A		E	A
Approach Delay (s)	53.2		5.3			5.4
Approach LOS	D		A			A
Intersection Summary						
HCM 2000 Control Delay			6.5		HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio			0.58			
Actuated Cycle Length (s)			115.2		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						

Mitigated Existing + Proj + Cuml AM
12: Twin Oaks Valley Rd #1/Deer Springs Rd & Twin Oaks Valley Rd

Sierra Project
03/21/2017

	EBL	EBR	NBL	NBT	SBT	SBR
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations	↔	↔	↔	↕	↕	↔
Traffic Volume (vph)	51	119	112	579	1536	47
Future Volume (vph)	51	119	112	579	1536	47
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.9	4.9	4.0	5.3	5.3	5.3
Lane Util. Factor	1.00	1.00	1.00	0.95	0.95	1.00
Flt	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	1770	3539	3539	1583
Flt Permitted	0.95	1.00	0.95	1.00	1.00	1.00
Satd. Flow (perm)	1770	1583	1770	3539	3539	1583
Peak-hour factor, PHF	0.91	0.91	0.91	0.91	0.91	0.91
Growth Factor (vph)	100%	100%	100%	130%	130%	100%
Adj. Flow (vph)	56	131	123	827	2194	52
RTOR Reduction (vph)	0	113	0	0	0	8
Lane Group Flow (vph)	56	18	123	827	2194	44
Turn Type	Prot	Perm	Prot	NA	NA	Perm
Protected Phases	4		5	2	6	
Permitted Phases		4				6
Actuated Green, G (s)	10.6	10.6	9.0	89.8	76.8	76.8
Effective Green, g (s)	10.6	10.6	9.0	89.8	76.8	76.8
Actuated g/C Ratio	0.10	0.10	0.08	0.81	0.69	0.69
Clearance Time (s)	4.9	4.9	4.0	5.3	5.3	5.3
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	169	151	144	2873	2457	1099
v/s Ratio Prot	c0.03		c0.07	0.23	c0.62	
v/s Ratio Perm		0.01				0.03
v/c Ratio	0.33	0.12	0.85	0.29	0.89	0.04
Uniform Delay, d1	46.7	45.7	50.2	2.6	13.6	5.3
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	1.2	0.4	35.9	0.1	4.6	0.0
Delay (s)	47.8	46.1	86.1	2.6	18.2	5.3
Level of Service	D	D	F	A	B	A
Approach Delay (s)	46.6			13.4	17.9	
Approach LOS	D			B	B	

Intersection Summary			
HCM 2000 Control Delay	18.2	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.83		
Actuated Cycle Length (s)	110.6	Sum of lost time (s)	14.2
Intersection Capacity Utilization	76.6%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			

Mitigated Existing + Proj + Cuml AM
13: Twin Oaks Valley Rd #1 & Buena Creek Rd

Sierra Project
03/21/2017

	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↔	↔	↔	↔	↔	↔	↔	↕	↕	↔	↕	↔
Traffic Volume (vph)	360	0	210	5	5	0	140	331	5	5	1043	562
Future Volume (vph)	360	0	210	5	5	0	140	331	5	5	1043	562
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		5.0	5.5		5.0	5.5	5.5
Lane Util. Factor	0.97		1.00		1.00		1.00	0.95		1.00	0.95	1.00
Fltpb, ped/bikes	1.00		0.99		1.00		1.00	1.00		1.00	1.00	0.99
Fltpb, ped/bikes	1.00		1.00		1.00		1.00	1.00		1.00	1.00	1.00
Flt	1.00		0.85		1.00		1.00	1.00		1.00	1.00	0.85
Flt Protected	0.95		1.00		0.98		0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	3433		1562		1817		1770	3532		1770	3539	1561
Flt Permitted	0.75		1.00		0.98		0.95	1.00		0.95	1.00	1.00
Satd. Flow (perm)	2714		1562		1817		1770	3532		1770	3539	1561
Peak-hour factor, PHF	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Adj. Flow (vph)	375	0	219	5	5	0	146	345	5	5	1086	585
RTOR Reduction (vph)	0	0	142	0	0	0	0	1	0	0	0	187
Lane Group Flow (vph)	375	0	77	0	10	0	146	349	0	5	1086	398
Confl. Peds. (#/hr)			2									1
Confl. Bikes (#/hr)												3
Turn Type	Perm		Perm	Perm	NA		Prot	NA		Prot	NA	Perm
Protected Phases					8		5	2		1	6	
Permitted Phases	4		4	8								6
Actuated Green, G (s)	15.1		15.1		15.1		7.1	36.4		0.8	30.1	30.1
Effective Green, g (s)	15.1		15.1		15.1		7.1	36.4		0.8	30.1	30.1
Actuated g/C Ratio	0.23		0.23		0.23		0.11	0.54		0.01	0.45	0.45
Clearance Time (s)	4.0		4.0		4.0		5.0	5.5		5.0	5.5	5.5
Vehicle Extension (s)	3.0		3.0		3.0		3.0	3.0		3.0	3.0	3.0
Lane Grp Cap (vph)	613		353		410		188	1924		21	1594	703
v/s Ratio Prot							c0.08	0.10		0.00	c0.31	
v/s Ratio Perm	c0.14		0.05		0.01							0.25
v/c Ratio	0.61		0.22		0.02		0.78	0.18		0.24	0.68	0.57
Uniform Delay, d1	23.2		21.0		20.1		29.1	7.7		32.7	14.5	13.5
Progression Factor	1.00		1.00		1.00		1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	1.8		0.3		0.0		18.0	0.0		5.8	1.2	1.0
Delay (s)	25.0		21.3		20.1		47.1	7.7		38.5	15.8	14.6
Level of Service	C		C		C		D	A		D	B	B
Approach Delay (s)		23.7			20.1			19.3			15.4	
Approach LOS		C			C			B			B	

Intersection Summary			
HCM 2000 Control Delay	17.9	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.67		
Actuated Cycle Length (s)	66.8	Sum of lost time (s)	14.5
Intersection Capacity Utilization	65.6%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

Mitigated Existing + Proj + Cuml AM
20: Twin Oaks Valley Rd/Twin Oaks Valley Rd #1 & San Marcos Blvd

Sierra Project
03/21/2017

	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔
Traffic Volume (vph)	194	328	358	555	540	49	326	659	512	126	1309	361
Future Volume (vph)	194	328	358	555	540	49	326	659	512	126	1309	361
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.2	5.3	5.3	4.2	5.0		4.2	5.3	4.2	4.2	5.3	5.3
Lane Util. Factor	0.97	0.95	0.88	0.94	0.95		0.97	0.95	1.00	0.97	0.95	1.00
Frpb, ped/bikes	1.00	1.00	0.97	1.00	1.00		1.00	1.00	0.99	1.00	1.00	0.99
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	1.00	0.85	1.00	0.99		1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	3433	3539	2706	4990	3489		3433	3539	1566	3433	3539	1562
Flt Permitted	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	3433	3539	2706	4990	3489		3433	3539	1566	3433	3539	1562
Peak-hour factor, PHF	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98
Adj. Flow (vph)	198	335	365	566	551	50	333	672	522	129	1336	368
RTOR Reduction (vph)	0	0	211	0	5	0	0	0	46	0	0	124
Lane Group Flow (vph)	198	335	154	566	596	0	333	672	476	129	1336	244
Confl. Peds. (#/hr)			5			4			1			1
Confl. Bikes (#/hr)			8			3			3			
Turn Type	Prot	NA	Perm	Prot	NA		Prot	NA	pm+ov	Prot	NA	Perm
Protected Phases	7	4		3	8		5	2	3	1	6	
Permitted Phases			4						2			6
Actuated Green, G (s)	11.7	21.3	21.3	16.9	26.8		14.1	58.1	75.0	9.1	53.1	53.1
Effective Green, g (s)	11.7	21.3	21.3	16.9	26.8		14.1	58.1	75.0	9.1	53.1	53.1
Actuated g/C Ratio	0.09	0.17	0.17	0.14	0.22		0.11	0.47	0.60	0.07	0.43	0.43
Clearance Time (s)	4.2	5.3	5.3	4.2	5.0		4.2	5.3	4.2	4.2	5.3	5.3
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	322	605	463	677	751		389	1652	944	251	1510	666
v/s Ratio Prot	0.06	0.09		c0.11	c0.17		c0.10	0.19	0.07	0.04	c0.38	
v/s Ratio Perm			0.06						0.24			0.16
v/c Ratio	0.61	0.55	0.33	0.84	0.79		0.86	0.41	0.50	0.51	0.88	0.37
Uniform Delay, d1	54.2	47.2	45.3	52.4	46.2		54.2	21.8	14.1	55.5	32.8	24.2
Progression Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	3.5	1.1	0.4	8.8	5.8		16.6	0.2	0.4	1.8	6.6	0.3
Delay (s)	57.6	48.3	45.7	61.2	51.9		70.8	22.0	14.5	57.3	39.4	24.6
Level of Service	E	D	D	E	D		E	C	B	E	D	C
Approach Delay (s)		49.3			56.4			30.1			37.7	
Approach LOS		D			E			C			D	

Intersection Summary			
HCM 2000 Control Delay	41.5	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.88		
Actuated Cycle Length (s)	124.4	Sum of lost time (s)	19.0
Intersection Capacity Utilization	84.0%	ICU Level of Service	E
Analysis Period (min)	15		

c Critical Lane Group

Mitigated Existing + Proj + Cuml AM
26: S. Santa Fe Ave & Buena Creek Rd

Sierra Project
03/21/2017

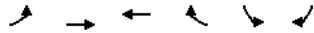
	EBL	EBT	WBT	WBR	SBL	SBR
Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations	↔	↔	↔	↔	↔	↔
Traffic Volume (vph)	237	620	430	160	320	809
Future Volume (vph)	237	620	430	160	320	809
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.4	5.3	5.3	5.3	4.0	4.0
Lane Util. Factor	0.97	0.95	0.95	1.00	1.00	1.00
Frpb, ped/bikes	1.00	1.00	1.00	0.97	1.00	0.98
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	1.00	1.00	0.85	1.00	0.85
Flt Protected	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (prot)	3433	3539	3539	1530	1770	1553
Flt Permitted	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (perm)	3433	3539	3539	1530	1770	1553
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	249	653	453	168	337	852
RTOR Reduction (vph)	0	0	0	79	0	0
Lane Group Flow (vph)	249	653	453	89	337	852
Confl. Peds. (#/hr)				12		4
Confl. Bikes (#/hr)				3		
Turn Type	Prot	NA	NA	Perm	Prot	Perm
Protected Phases	5	2	6		4	
Permitted Phases				6		4
Actuated Green, G (s)	13.0	25.0	43.6	43.6	49.0	49.0
Effective Green, g (s)	13.0	25.0	43.6	43.6	49.0	49.0
Actuated g/C Ratio	0.11	0.21	0.37	0.37	0.41	0.41
Clearance Time (s)	4.4	5.3	5.3	5.3	4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	374	741	1293	559	726	637
v/s Ratio Prot	c0.07	c0.18	c0.13		0.19	
v/s Ratio Perm				0.06		c0.55
v/c Ratio	0.67	0.88	0.35	0.16	0.46	1.34
Uniform Delay, d1	51.1	45.7	27.5	25.5	25.6	35.1
Progression Factor	1.17	0.66	1.00	1.00	1.00	1.00
Incremental Delay, d2	4.4	11.7	0.2	0.1	0.5	162.4
Delay (s)	64.2	41.9	27.7	25.6	26.1	197.5
Level of Service	E	D	C	C	C	F
Approach Delay (s)		48.1	27.1		148.9	
Approach LOS		D	C		F	

Intersection Summary			
HCM 2000 Control Delay	87.5	HCM 2000 Level of Service	F
HCM 2000 Volume to Capacity ratio	0.97		
Actuated Cycle Length (s)	119.3	Sum of lost time (s)	14.3
Intersection Capacity Utilization	72.0%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

Mitigated Existing + Proj + Cuml AM
27: Buena Creek Rd & Monte Vista Dr

Sierra Project
03/21/2017



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations	↰	↱	↱	↰	↰	↰
Traffic Volume (vph)	110	229	604	272	399	180
Future Volume (vph)	110	229	604	272	399	180
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	
Flpb, ped/bikes	1.00	1.00	1.00	1.00	0.99	
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	
Frt	1.00	1.00	1.00	0.85	0.96	
Flt Protected	0.95	1.00	1.00	1.00	0.97	
Satd. Flow (prot)	1770	1863	1863	1583	1712	
Flt Permitted	0.24	1.00	1.00	1.00	0.97	
Satd. Flow (perm)	451	1863	1863	1583	1712	
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	116	241	636	286	420	189
RTOR Reduction (vph)	0	0	0	0	19	0
Lane Group Flow (vph)	116	241	636	286	590	0
Confl. Peds. (#/hr)						2
Turn Type	Perm	NA	NA	pm+ov	Prot	
Protected Phases		4	8	6	6	
Permitted Phases	4			8		
Actuated Green, G (s)	42.3	42.3	42.3	74.8	32.5	
Effective Green, g (s)	42.3	42.3	42.3	74.8	32.5	
Actuated g/C Ratio	0.51	0.51	0.51	0.90	0.39	
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)	230	951	951	1583	671	
v/s Ratio Prot		0.13	c0.34	0.07	c0.34	
v/s Ratio Perm	0.26			0.11		
v/c Ratio	0.50	0.25	0.67	0.18	0.88	
Uniform Delay, d1	13.3	11.4	15.0	0.5	23.3	
Progression Factor	1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	7.7	0.6	3.7	0.1	12.5	
Delay (s)	21.0	12.0	18.8	0.5	35.8	
Level of Service	C	B	B	A	D	
Approach Delay (s)		15.0	13.1		35.8	
Approach LOS		B	B		D	
Intersection Summary						
HCM 2000 Control Delay			20.8		HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio			0.76			
Actuated Cycle Length (s)			82.8		Sum of lost time (s)	8.0
Intersection Capacity Utilization			81.1%		ICU Level of Service	D
Analysis Period (min)			15			
c Critical Lane Group						

Miti Existing + Proj + Cuml PM
9: Deer Springs Rd & Sarver Lane

Sierra Project
03/21/2017

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	307	1451	791	113	46	115
Future Volume (vph)	307	1451	791	113	46	115
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5	4.5	4.5	4.5	4.5	4.5
Lane Util. Factor	0.97	0.95	0.95	1.00	1.00	1.00
Frt	1.00	1.00	1.00	0.85	1.00	0.85
Flt Protected	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (prot)	3433	3539	3539	1583	1770	1583
Flt Permitted	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (perm)	3433	3539	3539	1583	1770	1583
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	323	1527	833	119	48	121
RTOR Reduction (vph)	0	0	0	72	0	84
Lane Group Flow (vph)	323	1527	833	47	48	37
Turn Type	Prot	NA	NA	Perm	Prot	Perm
Protected Phases	7	4	8		6	
Permitted Phases				8		6
Actuated Green, G (s)	12.7	43.5	26.3	26.3	22.8	22.8
Effective Green, g (s)	12.7	43.5	26.3	26.3	22.8	22.8
Actuated g/C Ratio	0.17	0.58	0.35	0.35	0.30	0.30
Clearance Time (s)	4.5	4.5	4.5	4.5	4.5	4.5
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	579	2044	1236	552	535	479
v/s Ratio Prot	0.09	c0.43	0.24		c0.03	
v/s Ratio Perm				0.03		0.02
v/c Ratio	0.56	0.75	0.67	0.09	0.09	0.08
Uniform Delay, d1	28.7	11.8	20.9	16.4	18.8	18.7
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	1.2	1.5	1.5	0.1	0.3	0.3
Delay (s)	29.9	13.3	22.3	16.5	19.1	19.0
Level of Service	C	B	C	B	B	B
Approach Delay (s)		16.2	21.6		19.1	
Approach LOS		B	C		B	
Intersection Summary						
HCM 2000 Control Delay		18.1		HCM 2000 Level of Service		B
HCM 2000 Volume to Capacity ratio		0.56				
Actuated Cycle Length (s)		75.3		Sum of lost time (s)		13.5
Intersection Capacity Utilization		50.9%		ICU Level of Service		A
Analysis Period (min)		15				
c Critical Lane Group						

Miti Existing + Proj + Cuml PM
10: Deer Springs Rd & Sycamore Road

Sierra Project
03/21/2017

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	30	20	1473	10	10	931
Future Volume (vph)	30	20	1473	10	10	931
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5	4.5	4.5		4.5	4.5
Lane Util. Factor	1.00	1.00	0.95		1.00	0.95
Frb, ped/bikes	1.00	1.00	1.00		1.00	1.00
Flpb, ped/bikes	1.00	1.00	1.00		1.00	1.00
Frt	1.00	0.85	1.00		1.00	1.00
Flt Protected	0.95	1.00	1.00		0.95	1.00
Satd. Flow (prot)	1770	1583	3535		1770	3539
Flt Permitted	0.95	1.00	1.00		0.95	1.00
Satd. Flow (perm)	1770	1583	3535		1770	3539
Peak-hour factor, PHF	0.94	0.94	0.94	0.94	0.94	0.94
Adj. Flow (vph)	32	21	1567	11	11	990
RTOR Reduction (vph)	0	20	0	0	0	0
Lane Group Flow (vph)	32	1	1578	0	11	990
Confl. Bikes (#/hr)				2		
Turn Type	Prot	Perm	NA		Prot	NA
Protected Phases	8		2		1	6
Permitted Phases		8				
Actuated Green, G (s)	6.1	6.1	74.9		0.9	80.3
Effective Green, g (s)	6.1	6.1	74.9		0.9	80.3
Actuated g/C Ratio	0.06	0.06	0.79		0.01	0.84
Clearance Time (s)	4.5	4.5	4.5		4.5	4.5
Vehicle Extension (s)	3.0	3.0	3.0		3.0	3.0
Lane Grp Cap (vph)	113	101	2775		16	2978
v/s Ratio Prot	c0.02		c0.45		0.01	c0.28
v/s Ratio Perm		0.00				
v/c Ratio	0.28	0.01	0.57		0.69	0.33
Uniform Delay, d1	42.6	41.8	4.0		47.1	1.7
Progression Factor	1.00	1.00	1.00		1.00	1.00
Incremental Delay, d2	1.4	0.1	0.9		80.1	0.3
Delay (s)	43.9	41.9	4.8		127.2	2.0
Level of Service	D	D	A		F	A
Approach Delay (s)	43.1		4.8			3.3
Approach LOS	D		A			A
Intersection Summary						
HCM 2000 Control Delay			5.0		HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio			0.55			
Actuated Cycle Length (s)			95.4		Sum of lost time (s)	13.5
Intersection Capacity Utilization			51.9%		ICU Level of Service	A
Analysis Period (min)			15			
c Critical Lane Group						

Miti Existing + Proj + Cuml PM

12: Twin Oaks Valley Rd #1/Deer Springs Rd & Twin Oaks Valley Rd

Sierra Project

03/21/2017

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations	↔	↔	↔	↕↕	↕↕	↔
Traffic Volume (vph)	61	294	131	1439	947	52
Future Volume (vph)	61	294	131	1439	947	52
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.9	4.9	4.0	5.3	5.3	5.3
Lane Util. Factor	1.00	1.00	1.00	0.95	0.95	1.00
Frpb, ped/bikes	1.00	1.00	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)	1770	1583	1770	3539	3539	1547
Flt Permitted	0.95	1.00	0.95	1.00	1.00	1.00
Satd. Flow (perm)	1770	1583	1770	3539	3539	1547
Peak-hour factor, PHF	0.88	0.88	0.88	0.88	0.88	0.88
Growth Factor (vph)	100%	100%	100%	130%	130%	100%
Adj. Flow (vph)	69	334	149	2126	1399	59
RTOR Reduction (vph)	0	256	0	0	0	16
Lane Group Flow (vph)	69	78	149	2126	1399	43
Confl. Peds. (#/hr)						1
Confl. Bikes (#/hr)						2
Turn Type	Prot	Perm	Prot	NA	NA	Perm
Protected Phases	4		5	2	6	
Permitted Phases		4				6
Actuated Green, G (s)	10.9	10.9	13.6	62.2	44.6	44.6
Effective Green, g (s)	10.9	10.9	13.6	62.2	44.6	44.6
Actuated g/C Ratio	0.13	0.13	0.16	0.75	0.54	0.54
Clearance Time (s)	4.9	4.9	4.0	5.3	5.3	5.3
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	231	207	288	2642	1894	828
v/s Ratio Prot	0.04		0.08	0.60	0.40	
v/s Ratio Perm		0.05				0.03
v/c Ratio	0.30	0.37	0.52	0.80	0.74	0.05
Uniform Delay, d1	32.7	33.1	31.9	6.7	14.9	9.2
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	0.7	1.1	1.6	1.9	1.5	0.0
Delay (s)	33.5	34.2	33.4	8.6	16.4	9.3
Level of Service	C	C	C	A	B	A
Approach Delay (s)	34.1			10.2	16.1	
Approach LOS	C			B	B	

Intersection Summary

HCM 2000 Control Delay	14.6	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.78		
Actuated Cycle Length (s)	83.3	Sum of lost time (s)	14.2
Intersection Capacity Utilization	63.6%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis

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Synchro 8 Report

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Miti Existing + Proj + Cuml PM

13: Twin Oaks Valley Rd #1 & Buena Creek Rd

Sierra Project

03/21/2017

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↔↔		↔		↕↕		↔	↕↕		↔	↕↕	↔
Traffic Volume (vph)	639	0	250	5	0	0	200	891	0	5	711	490
Future Volume (vph)	639	0	250	5	0	0	200	891	0	5	711	490
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		5.0	5.5		4.5	5.5	5.5
Lane Util. Factor	0.97		1.00		1.00		1.00	0.95		1.00	0.95	1.00
Frpb, ped/bikes	1.00		1.00		1.00		1.00	1.00		1.00	1.00	0.98
Flpb, ped/bikes	1.00		1.00		1.00		1.00	1.00		1.00	1.00	1.00
Frt	1.00		0.85		1.00		1.00	1.00		1.00	1.00	0.85
Flt Protected	0.95		1.00		0.95		0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	3433		1583		1770		1770	3539		1770	3539	1558
Flt Permitted	0.75		1.00		0.95		0.95	1.00		0.95	1.00	1.00
Satd. Flow (perm)	2726		1583		1770		1770	3539		1770	3539	1558
Peak-hour factor, PHF	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Adj. Flow (vph)	687	0	269	5	0	0	215	958	0	5	765	527
RTOR Reduction (vph)	0	0	190	0	0	0	0	0	0	0	0	227
Lane Group Flow (vph)	687	0	79	0	5	0	215	958	0	5	765	300
Confl. Peds. (#/hr)												1
Confl. Bikes (#/hr)												5
Turn Type	Perm		Perm		Perm		NA	Prot	NA		Prot	NA
Protected Phases							8	5	2		1	6
Permitted Phases	4		4		8							6
Actuated Green, G (s)	24.1		24.1		24.1		13.8	42.9		0.7	29.3	29.3
Effective Green, g (s)	24.1		24.1		24.1		13.8	42.9		0.7	29.3	29.3
Actuated g/C Ratio	0.29		0.29		0.29		0.17	0.53		0.01	0.36	0.36
Clearance Time (s)	4.0		4.0		4.0		5.0	5.5		4.5	5.5	5.5
Vehicle Extension (s)	3.0		3.0		3.0		3.0	3.0		3.0	3.0	3.0
Lane Grp Cap (vph)	804		466		522		298	1858		15	1269	558
v/s Ratio Prot							0.12	0.27		0.00	0.22	
v/s Ratio Perm	0.25		0.05		0.00							0.19
v/c Ratio	0.85		0.17		0.01		0.72	0.52		0.33	0.60	0.54
Uniform Delay, d1	27.1		21.4		20.4		32.1	12.6		40.3	21.4	20.8
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		0.0		8.3	0.2		12.7	0.8	1.0
Delay (s)	36.0		21.6		20.4		40.5	12.9		52.9	22.3	21.8
Level of Service	D		C		C		D	B		D	C	C
Approach Delay (s)		31.9			20.4			17.9			22.2	
Approach LOS		C			C			B			C	

Intersection Summary

HCM 2000 Control Delay	23.4	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.72		
Actuated Cycle Length (s)	81.7	Sum of lost time (s)	14.5
Intersection Capacity Utilization	61.0%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis

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Miti Existing + Proj + Cuml PM

20: Twin Oaks Valley Rd/Twin Oaks Valley Rd #1 & San Marcos Blvd

Sierra Project

03/21/2017

	↖	→	↘	↙	←	↖	↙	↗	↘	↖	↙	↗
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↖↖	↖↖	↖↖	↖↖	↖↖		↖↖	↖↖	↖↖	↖↖	↖↖	↖↖
Traffic Volume (vph)	442	925	346	572	486	125	579	1261	504	157	1162	298
Future Volume (vph)	442	925	346	572	486	125	579	1261	504	157	1162	298
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.2	5.3	4.2	4.2	5.0		4.2	5.3	4.2	4.2	5.3	5.3
Lane Util. Factor	0.97	0.95	0.88	0.94	0.95		0.97	0.95	1.00	0.97	0.95	1.00
Frpb, ped/bikes	1.00	1.00	0.98	1.00	1.00		1.00	1.00	0.98	1.00	1.00	0.98
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	1.00	0.85	1.00	0.97		1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	3433	3539	2738	4990	3415		3433	3539	1558	3433	3539	1557
Flt Permitted	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	3433	3539	2738	4990	3415		3433	3539	1558	3433	3539	1557
Peak-hour factor, PHF	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Adj. Flow (vph)	475	995	372	615	523	134	623	1356	542	169	1249	320
RTOR Reduction (vph)	0	0	30	0	16	0	0	0	37	0	0	113
Lane Group Flow (vph)	475	995	342	615	641	0	623	1356	505	169	1249	207
Confl. Peds. (#/hr)			9			2			4			1
Confl. Bikes (#/hr)			6			7			6			4
Turn Type	Prot	NA	pm+ov	Prot	NA		Prot	NA	pm+ov	Prot	NA	Perm
Protected Phases	7	4	5	3	8		5	2	3	1	6	
Permitted Phases			4						2			6
Actuated Green, G (s)	20.6	34.7	56.5	15.8	30.2		21.8	62.6	78.4	7.9	48.7	48.7
Effective Green, g (s)	20.6	34.7	56.5	15.8	30.2		21.8	62.6	78.4	7.9	48.7	48.7
Actuated g/C Ratio	0.15	0.25	0.40	0.11	0.22		0.16	0.45	0.56	0.06	0.35	0.35
Clearance Time (s)	4.2	5.3	4.2	4.2	5.0		4.2	5.3	4.2	4.2	5.3	5.3
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	505	877	1104	563	736		534	1582	872	193	1231	541
v/s Ratio Prot	c0.14	c0.28	0.05	c0.12	0.19		c0.18	0.38	0.07	0.05	c0.35	
v/s Ratio Perm			0.08						0.26			0.13
v/c Ratio	0.94	1.13	0.31	1.09	0.87		1.17	0.86	0.58	0.88	1.01	0.38
Uniform Delay, d1	59.1	52.6	28.5	62.1	53.0		59.1	34.7	20.1	65.6	45.6	34.3
Progression Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	25.9	74.6	0.2	65.5	10.9		93.9	4.8	0.9	32.8	29.3	0.5
Delay (s)	85.0	127.2	28.6	127.6	64.0		153.0	39.5	21.0	98.4	75.0	34.8
Level of Service	F	F	C	F	E		F	D	C	F	E	C
Approach Delay (s)		96.4			94.7			63.6			69.9	
Approach LOS		F			F			E			E	

Intersection Summary

HCM 2000 Control Delay	78.6	HCM 2000 Level of Service	E
HCM 2000 Volume to Capacity ratio	1.09		
Actuated Cycle Length (s)	140.0	Sum of lost time (s)	19.0
Intersection Capacity Utilization	100.9%	ICU Level of Service	G
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis

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Synchro 8 Report

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Miti Existing + Proj + Cuml PM

26: S. Santa Fe Ave & Buena Creek Rd

Sierra Project

03/21/2017

	↖	→	←	↖	↙	↗
Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations	↖↖	↖↖	↖↖	↖↖	↖↖	↖↖
Traffic Volume (vph)	980	680	750	400	230	329
Future Volume (vph)	980	680	750	400	230	329
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.4	5.3	5.3	5.3	4.0	7.0
Lane Util. Factor	0.97	0.95	0.95	1.00	1.00	1.00
Frpb, ped/bikes	1.00	1.00	1.00	0.96	1.00	0.97
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	1.00	1.00	0.85	1.00	0.85
Flt Protected	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (prot)	3433	3539	3539	1522	1770	1538
Flt Permitted	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (perm)	3433	3539	3539	1522	1770	1538
Peak-hour factor, PHF	0.96	0.96	0.96	0.96	0.96	0.96
Adj. Flow (vph)	1021	708	781	417	240	343
RTOR Reduction (vph)	0	0	0	153	0	0
Lane Group Flow (vph)	1021	708	781	264	240	343
Confl. Peds. (#/hr)				19		12
Confl. Bikes (#/hr)				4		
Turn Type	Prot	NA	NA	Perm	Prot	Perm
Protected Phases	5	2	6		4	
Permitted Phases				6		4
Actuated Green, G (s)	28.0	33.2	22.6	22.6	23.6	23.6
Effective Green, g (s)	28.0	33.2	22.6	22.6	23.6	20.6
Actuated g/C Ratio	0.32	0.38	0.26	0.26	0.27	0.23
Clearance Time (s)	4.4	5.3	5.3	5.3	4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	1093	1336	909	391	475	360
v/s Ratio Prot	c0.30	0.20	c0.22		0.14	
v/s Ratio Perm				0.17		c0.22
v/c Ratio	0.93	0.53	0.86	0.68	0.51	0.95
Uniform Delay, d1	29.1	21.3	31.1	29.3	27.2	33.2
Progression Factor	1.18	0.86	1.00	1.00	1.00	1.00
Incremental Delay, d2	13.4	0.4	8.1	4.6	0.8	35.0
Delay (s)	47.7	18.6	39.3	33.9	28.1	68.2
Level of Service	D	B	D	C	C	E
Approach Delay (s)		35.8	37.4		51.7	
Approach LOS		D	D		D	

Intersection Summary

HCM 2000 Control Delay	39.0	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.89		
Actuated Cycle Length (s)	87.9	Sum of lost time (s)	14.3
Intersection Capacity Utilization	73.9%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis

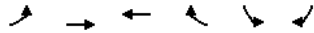
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Synchro 8 Report

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Miti Existing + Proj + Cuml PM
27: Buena Creek Rd & Monte Vista Dr

Sierra Project
03/21/2017



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	250	612	282	485	424	110
Future Volume (vph)	250	612	282	485	424	110
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5	4.5	4.5	4.5	4.5	4.5
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Flpb, ped/bikes	1.00	1.00	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	1.00	1.00	0.85	1.00	0.85
Flt Protected	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (prot)	1770	1863	1863	1583	1770	1546
Flt Permitted	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (perm)	1770	1863	1863	1583	1770	1546
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	272	665	307	527	461	120
RTOR Reduction (vph)	0	0	0	310	0	82
Lane Group Flow (vph)	272	665	307	217	461	38
Confl. Bikes (#/hr)						3
Turn Type	Prot	NA	NA	Perm	Prot	Perm
Protected Phases	7	4	8		6	
Permitted Phases				8		6
Actuated Green, G (s)	16.2	45.8	25.1	25.1	25.4	25.4
Effective Green, g (s)	16.2	45.8	25.1	25.1	25.4	25.4
Actuated g/C Ratio	0.20	0.57	0.31	0.31	0.32	0.32
Clearance Time (s)	4.5	4.5	4.5	4.5	4.5	4.5
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	357	1063	583	495	560	489
v/s Ratio Prot	c0.15	c0.36	0.16		c0.26	
v/s Ratio Perm				0.14		0.02
v/c Ratio	0.76	0.63	0.53	0.44	0.82	0.08
Uniform Delay, d1	30.2	11.5	22.7	21.9	25.3	19.2
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	9.3	2.8	3.4	2.8	9.5	0.1
Delay (s)	39.4	14.3	26.0	24.8	34.8	19.3
Level of Service	D	B	C	C	C	B
Approach Delay (s)		21.6	25.2		31.6	
Approach LOS		C	C		C	
Intersection Summary						
HCM 2000 Control Delay			25.4		HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio			0.76			
Actuated Cycle Length (s)			80.2		Sum of lost time (s)	13.5
Intersection Capacity Utilization			63.4%		ICU Level of Service	B
Analysis Period (min)			15			
c Critical Lane Group						

Mitigated Existing + Proj + Sce B Cuml AM
9: Deer Springs Rd & Sarver Lane

Sierra Project
03/21/2017

						
Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	106	571	1339	34	114	290
Future Volume (vph)	106	571	1339	34	114	290
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	0.97	0.95	0.95	1.00	1.00	1.00
Frt	1.00	1.00	1.00	0.85	1.00	0.85
Flt Protected	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (prot)	3433	3539	3539	1583	1770	1583
Flt Permitted	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (perm)	3433	3539	3539	1583	1770	1583
Peak-hour factor, PHF	0.96	0.96	0.96	0.96	0.96	0.96
Adj. Flow (vph)	110	595	1395	35	119	302
RTOR Reduction (vph)	0	0	0	11	0	101
Lane Group Flow (vph)	110	595	1395	24	119	201
Turn Type	Prot	NA	NA	Perm	Prot	Perm
Protected Phases	7	4	8		6	
Permitted Phases				8		6
Actuated Green, G (s)	7.6	63.7	52.1	52.1	34.4	34.4
Effective Green, g (s)	7.6	63.7	52.1	52.1	34.4	34.4
Actuated g/C Ratio	0.07	0.60	0.49	0.49	0.32	0.32
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)	245	2124	1737	777	573	513
v/s Ratio Prot	c0.03	0.17	c0.39		0.07	
v/s Ratio Perm				0.02		c0.13
v/c Ratio	0.45	0.28	0.80	0.03	0.21	0.39
Uniform Delay, d1	47.2	10.2	22.7	14.0	26.0	27.7
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	1.3	0.1	2.8	0.0	0.8	2.2
Delay (s)	48.6	10.3	25.5	14.0	26.8	30.0
Level of Service	D	B	C	B	C	C
Approach Delay (s)		16.2	25.2		29.1	
Approach LOS		B	C		C	
Intersection Summary						
HCM 2000 Control Delay			23.4		HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio			0.62			
Actuated Cycle Length (s)			106.1		Sum of lost time (s)	12.0
Intersection Capacity Utilization			61.6%		ICU Level of Service	B
Analysis Period (min)			15			
c Critical Lane Group						

Mitigated Existing + Proj + Sce B Cuml AM
10: Deer Springs Rd & Sycamore Road

Sierra Project
03/21/2017

						
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	40	20	682	190	80	1729
Future Volume (vph)	40	20	682	190	80	1729
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	0.95		1.00	0.95
Frt	1.00	0.85	0.97		1.00	1.00
Flt Protected	0.95	1.00	1.00		0.95	1.00
Satd. Flow (prot)	1770	1583	3424		1770	3539
Flt Permitted	0.95	1.00	1.00		0.95	1.00
Satd. Flow (perm)	1770	1583	3424		1770	3539
Peak-hour factor, PHF	0.89	0.89	0.89	0.89	0.89	0.89
Adj. Flow (vph)	45	22	766	213	90	1943
RTOR Reduction (vph)	0	21	19	0	0	0
Lane Group Flow (vph)	45	1	960	0	90	1943
Turn Type	Prot	Perm	NA		Prot	NA
Protected Phases	8		2		1	6
Permitted Phases		8				
Actuated Green, G (s)	5.2	5.2	61.3		7.6	72.9
Effective Green, g (s)	5.2	5.2	61.3		7.6	72.9
Actuated g/C Ratio	0.06	0.06	0.71		0.09	0.85
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)	106	95	2437		156	2996
v/s Ratio Prot	c0.03		0.28		0.05	c0.55
v/s Ratio Perm		0.00				
v/c Ratio	0.42	0.01	0.39		0.58	0.65
Uniform Delay, d1	39.0	38.0	5.0		37.7	2.2
Progression Factor	1.00	1.00	1.00		1.00	1.00
Incremental Delay, d2	2.7	0.1	0.5		5.1	1.1
Delay (s)	41.7	38.1	5.4		42.8	3.3
Level of Service	D	D	A		D	A
Approach Delay (s)	40.5		5.4			5.1
Approach LOS	D		A			A
Intersection Summary						
HCM 2000 Control Delay			6.0		HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio			0.67			
Actuated Cycle Length (s)			86.1		Sum of lost time (s)	12.0
Intersection Capacity Utilization			57.8%		ICU Level of Service	B
Analysis Period (min)			15			
c Critical Lane Group						

Mitigated Existing + Proj + Sce B Cuml AM
12: Twin Oaks Valley Rd & Deer Springs Rd

Sierra Project
03/21/2017

						
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	51	120	113	641	1681	48
Future Volume (vph)	51	120	113	641	1681	48
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.9	4.9	4.0	5.3	5.3	5.3
Lane Util. Factor	1.00	1.00	1.00	0.95	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	1770	3539	3539	1583
Flt Permitted	0.95	1.00	0.95	1.00	1.00	1.00
Satd. Flow (perm)	1770	1583	1770	3539	3539	1583
Peak-hour factor, PHF	0.91	0.91	0.91	0.91	0.91	0.91
Growth Factor (vph)	100%	100%	100%	130%	130%	100%
Adj. Flow (vph)	56	132	124	916	2401	53
RTOR Reduction (vph)	0	99	0	0	0	7
Lane Group Flow (vph)	56	33	124	916	2401	46
Turn Type	Prot	Perm	Prot	NA	NA	Perm
Protected Phases	4		5	2	6	
Permitted Phases		4				6
Actuated Green, G (s)	10.6	10.6	8.0	89.9	77.9	77.9
Effective Green, g (s)	10.6	10.6	8.0	89.9	77.9	77.9
Actuated g/C Ratio	0.10	0.10	0.07	0.81	0.70	0.70
Clearance Time (s)	4.9	4.9	4.0	5.3	5.3	5.3
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	169	151	127	2874	2490	1113
v/s Ratio Prot	c0.03		c0.07	0.26	c0.68	
v/s Ratio Perm		0.02				0.03
v/c Ratio	0.33	0.22	0.98	0.32	0.96	0.04
Uniform Delay, d1	46.7	46.2	51.3	2.6	15.1	5.0
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	1.2	0.7	71.9	0.1	10.9	0.0
Delay (s)	47.9	47.0	123.1	2.7	26.0	5.0
Level of Service	D	D	F	A	C	A
Approach Delay (s)	47.3			17.1	25.5	
Approach LOS	D			B	C	

Intersection Summary			
HCM 2000 Control Delay	24.3	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.89		
Actuated Cycle Length (s)	110.7	Sum of lost time (s)	14.2
Intersection Capacity Utilization	81.8%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			

Mitigated Existing + Proj + Sce B Cuml AM
13: Twin Oaks Valley Rd & Buena Creek Rd

Sierra Project
03/21/2017

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	386	0	220	5	5	0	140	359	5	5	1117	605
Future Volume (vph)	386	0	220	5	5	0	140	359	5	5	1117	605
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		5.0	5.5		5.0	5.5	5.5
Lane Util. Factor	0.95	0.95	1.00		1.00		1.00	0.95		1.00	0.95	1.00
Frbp, ped/bikes	1.00	1.00	0.97		1.00		1.00	1.00		1.00	1.00	0.99
Flpb, ped/bikes	1.00	1.00	1.00		1.00		1.00	1.00		1.00	1.00	1.00
Frt	1.00	1.00	0.85		1.00		1.00	1.00		1.00	1.00	0.85
Flt Protected	0.95	0.95	1.00		0.98		0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	1681	1681	1543		1817		1770	3532		1770	3539	1561
Flt Permitted	0.95	0.95	1.00		0.74		0.95	1.00		0.95	1.00	1.00
Satd. Flow (perm)	1681	1681	1543		1370		1770	3532		1770	3539	1561
Peak-hour factor, PHF	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Adj. Flow (vph)	402	0	229	5	5	0	146	374	5	5	1164	630
RTOR Reduction (vph)	0	0	190	0	0	0	0	0	0	0	0	119
Lane Group Flow (vph)	201	201	39	0	10	0	146	379	0	5	1164	511
Confl. Peds. (#/hr)				2								1
Confl. Bikes (#/hr)												3
Turn Type	Split	NA	Perm	Perm	NA		Prot	NA		Prot	NA	Perm
Protected Phases	4	4			8		5	2		1	6	
Permitted Phases			4	8								6
Actuated Green, G (s)	16.2	16.2	16.2		5.0		11.4	54.2		0.7	43.5	43.5
Effective Green, g (s)	16.2	16.2	16.2		5.0		11.4	54.2		0.7	43.5	43.5
Actuated g/C Ratio	0.17	0.17	0.17		0.05		0.12	0.57		0.01	0.46	0.46
Clearance Time (s)	4.0	4.0	4.0		4.0		5.0	5.5		5.0	5.5	5.5
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)	287	287	264		72		213	2023		13	1627	717
v/s Ratio Prot	c0.12	0.12					c0.08	0.11		0.00	c0.33	
v/s Ratio Perm			0.03		c0.01							0.33
v/c Ratio	0.70	0.70	0.15		0.14		0.69	0.19		0.38	0.72	0.71
Uniform Delay, d1	36.9	36.9	33.3		42.7		39.9	9.7		46.7	20.6	20.5
Progression Factor	1.00	1.00	1.00		1.00		1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	7.5	7.5	0.3		0.9		8.8	0.0		17.9	1.5	3.4
Delay (s)	44.4	44.4	33.6		43.6		48.7	9.7		64.6	22.1	23.9
Level of Service	D	D	C		D		D	A		E	C	C
Approach Delay (s)		40.5			43.6			20.5			22.8	
Approach LOS		D			D			C			C	

Intersection Summary			
HCM 2000 Control Delay	26.3	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.67		
Actuated Cycle Length (s)	94.6	Sum of lost time (s)	18.5
Intersection Capacity Utilization	68.1%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

Mitigated Existing + Proj + Sce B Cuml AM
20: Twin Oaks Valley Rd & San Marcos Blvd

Sierra Project
03/21/2017

	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔
Traffic Volume (vph)	199	348	358	560	580	56	326	671	562	139	1327	365
Future Volume (vph)	199	348	358	560	580	56	326	671	562	139	1327	365
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.2	5.3	5.3	4.2	5.0		4.2	5.3	4.2	4.2	5.3	5.3
Lane Util. Factor	0.97	0.95	1.00	0.97	0.95		0.97	0.95	1.00	0.97	0.95	1.00
Frpb, ped/bikes	1.00	1.00	0.97	1.00	1.00		1.00	1.00	0.99	1.00	1.00	0.99
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	1.00	0.85	1.00	0.99		1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	3433	3539	1540	3433	3487		3433	3539	1567	3433	3539	1562
Flt Permitted	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	3433	3539	1540	3433	3487		3433	3539	1567	3433	3539	1562
Peak-hour factor, PHF	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98
Adj. Flow (vph)	203	355	365	571	592	57	333	685	573	142	1354	372
RTOR Reduction (vph)	0	0	132	0	6	0	0	0	57	0	0	167
Lane Group Flow (vph)	203	355	233	571	643	0	333	685	516	142	1354	205
Confl. Peds. (#/hr)			5			4			1			1
Confl. Bikes (#/hr)			8			3			3			
Turn Type	Prot	NA	Perm	Prot	NA		Prot	NA	pm+ov	Prot	NA	Perm
Protected Phases	7	4		3	8		5	2	3	1	6	
Permitted Phases			4						2			6
Actuated Green, G (s)	11.1	21.5	21.5	19.1	29.8		11.4	45.2	64.3	9.0	42.8	42.8
Effective Green, g (s)	11.1	21.5	21.5	19.1	29.8		11.4	45.2	64.3	9.0	42.8	42.8
Actuated g/C Ratio	0.10	0.19	0.19	0.17	0.26		0.10	0.40	0.57	0.08	0.38	0.38
Clearance Time (s)	4.2	5.3	5.3	4.2	5.0		4.2	5.3	4.2	4.2	5.3	5.3
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	334	668	290	576	913		343	1405	885	271	1331	587
v/s Ratio Prot	0.06	0.10		c0.17	0.18		c0.10	0.19	0.10	0.04	c0.38	
v/s Ratio Perm			c0.15						0.23			0.13
v/c Ratio	0.61	0.53	0.80	0.99	0.70		0.97	0.49	0.58	0.52	1.02	0.35
Uniform Delay, d1	49.3	41.6	44.1	47.3	38.0		51.0	25.6	16.1	50.3	35.5	25.5
Progression Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	3.1	0.8	14.7	35.1	2.5		40.6	0.3	1.0	1.8	29.1	0.4
Delay (s)	52.4	42.4	58.9	82.4	40.5		91.7	25.9	17.0	52.2	64.6	25.9
Level of Service	D	D	E	F	D		F	C	B	D	E	C
Approach Delay (s)		51.1			60.1			36.5			55.9	
Approach LOS		D			E			D			E	

Intersection Summary			
HCM 2000 Control Delay	50.5	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.95		
Actuated Cycle Length (s)	113.8	Sum of lost time (s)	19.0
Intersection Capacity Utilization	89.5%	ICU Level of Service	E
Analysis Period (min)	15		

c Critical Lane Group

Mitigated Existing + Proj + Sce B Cuml AM
26: S. Santa Fe Ave & Buena Creek Rd

Sierra Project
03/21/2017

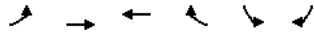
	EBL	EBT	WBT	WBR	SBL	SBR
Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations	↔	↔	↔	↔	↔	↔
Traffic Volume (vph)	261	610	430	160	320	835
Future Volume (vph)	261	610	430	160	320	835
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.4	5.3	5.3	5.3	4.0	4.0
Lane Util. Factor	0.97	0.95	0.95	1.00	1.00	1.00
Frpb, ped/bikes	1.00	1.00	1.00	0.97	1.00	0.98
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	1.00	1.00	0.85	1.00	0.85
Flt Protected	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (prot)	3433	3539	3539	1530	1770	1553
Flt Permitted	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (perm)	3433	3539	3539	1530	1770	1553
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	275	642	453	168	337	879
RTOR Reduction (vph)	0	0	0	79	0	0
Lane Group Flow (vph)	275	642	453	89	337	879
Confl. Peds. (#/hr)				12		4
Confl. Bikes (#/hr)				3		
Turn Type	Prot	NA	NA	Perm	Prot	Perm
Protected Phases	5	2	6		4	
Permitted Phases				6		4
Actuated Green, G (s)	14.0	24.4	42.0	42.0	50.0	50.0
Effective Green, g (s)	14.0	24.4	42.0	42.0	50.0	50.0
Actuated g/C Ratio	0.12	0.20	0.35	0.35	0.42	0.42
Clearance Time (s)	4.4	5.3	5.3	5.3	4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	401	721	1241	536	739	648
v/s Ratio Prot	c0.08	c0.18	c0.13		0.19	
v/s Ratio Perm				0.06		c0.57
v/c Ratio	0.69	0.89	0.37	0.17	0.46	1.36
Uniform Delay, d1	50.7	46.3	28.9	26.8	25.1	34.9
Progression Factor	1.17	0.67	1.00	1.00	1.00	1.00
Incremental Delay, d2	4.7	13.0	0.2	0.1	0.4	170.4
Delay (s)	64.1	43.8	29.1	26.9	25.5	205.2
Level of Service	E	D	C	C	C	F
Approach Delay (s)		49.9	28.5		155.4	
Approach LOS		D	C		F	

Intersection Summary			
HCM 2000 Control Delay	91.7	HCM 2000 Level of Service	F
HCM 2000 Volume to Capacity ratio	0.99		
Actuated Cycle Length (s)	119.7	Sum of lost time (s)	14.3
Intersection Capacity Utilization	73.6%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

Mitigated Existing + Proj + Sce B Cuml AM
27: Buena Creek Rd & Monte Vista Rd

Sierra Project
03/21/2017



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations	↰	↱	↰	↱	↰	↱
Traffic Volume (vph)	110	239	618	274	398	180
Future Volume (vph)	110	239	618	274	398	180
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	0.95	0.95	1.00	1.00	1.00
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	0.99
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	1.00	1.00	0.85	1.00	0.85
Flt Protected	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (prot)	1770	3539	3539	1583	1770	1560
Flt Permitted	0.25	1.00	1.00	1.00	0.95	1.00
Satd. Flow (perm)	469	3539	3539	1583	1770	1560
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	116	252	651	288	419	189
RTOR Reduction (vph)	0	0	0	0	0	71
Lane Group Flow (vph)	116	252	651	288	419	118
Confl. Peds. (#/hr)						2
Turn Type	Perm	NA	NA	pm+ov	Prot	Perm
Protected Phases		4	8	6	6	
Permitted Phases	4			8		6
Actuated Green, G (s)	19.5	19.5	19.5	59.8	40.3	40.3
Effective Green, g (s)	19.5	19.5	19.5	59.8	40.3	40.3
Actuated g/C Ratio	0.29	0.29	0.29	0.88	0.59	0.59
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)	134	1017	1017	1583	1052	927
v/s Ratio Prot		0.07	0.18	0.11	c0.24	
v/s Ratio Perm	c0.25			0.07		0.08
v/c Ratio	0.87	0.25	0.64	0.18	0.40	0.13
Uniform Delay, d1	22.9	18.5	21.1	0.6	7.3	6.0
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	40.3	0.1	1.4	0.1	1.1	0.3
Delay (s)	63.2	18.7	22.5	0.6	8.4	6.3
Level of Service	E	B	C	A	A	A
Approach Delay (s)		32.7	15.8		7.8	
Approach LOS		C	B		A	
Intersection Summary						
HCM 2000 Control Delay			16.5		HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio			0.55			
Actuated Cycle Length (s)			67.8		Sum of lost time (s)	8.0
Intersection Capacity Utilization			55.2%		ICU Level of Service	B
Analysis Period (min)			15			
c Critical Lane Group						

Miti Existing + Proj + Sce B Cuml PM
9: Deer Springs Rd & Sarver Lane

Sierra Project
03/21/2017

						
Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	336	1631	885	124	53	135
Future Volume (vph)	336	1631	885	124	53	135
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5	4.5	4.5	4.5	4.5	4.5
Lane Util. Factor	0.97	0.95	0.95	1.00	1.00	1.00
Frt	1.00	1.00	1.00	0.85	1.00	0.85
Flt Protected	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (prot)	3433	3539	3539	1583	1770	1583
Flt Permitted	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (perm)	3433	3539	3539	1583	1770	1583
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	354	1717	932	131	56	142
RTOR Reduction (vph)	0	0	0	70	0	103
Lane Group Flow (vph)	354	1717	932	61	56	39
Turn Type	Prot	NA	NA	Perm	Prot	Perm
Protected Phases	7	4	8		6	
Permitted Phases				8		6
Actuated Green, G (s)	13.7	48.5	30.3	30.3	21.9	21.9
Effective Green, g (s)	13.7	48.5	30.3	30.3	21.9	21.9
Actuated g/C Ratio	0.17	0.61	0.38	0.38	0.28	0.28
Clearance Time (s)	4.5	4.5	4.5	4.5	4.5	4.5
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	592	2161	1350	604	488	436
v/s Ratio Prot	0.10	c0.49	0.26		c0.03	
v/s Ratio Perm				0.04		0.02
v/c Ratio	0.60	0.79	0.69	0.10	0.11	0.09
Uniform Delay, d1	30.3	11.7	20.6	15.8	21.5	21.3
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	1.6	2.1	1.5	0.1	0.5	0.4
Delay (s)	31.9	13.8	22.2	15.9	22.0	21.8
Level of Service	C	B	C	B	C	C
Approach Delay (s)		16.9	21.4		21.8	
Approach LOS		B	C		C	
Intersection Summary						
HCM 2000 Control Delay			18.6		HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio			0.62			
Actuated Cycle Length (s)			79.4		Sum of lost time (s)	13.5
Intersection Capacity Utilization			55.9%		ICU Level of Service	B
Analysis Period (min)			15			
c Critical Lane Group						

Miti Existing + Proj + Sce B Cuml PM
10: Deer Springs Rd & Sycamore Road

Sierra Project
03/21/2017

						
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	30	20	1633	10	10	1055
Future Volume (vph)	30	20	1633	10	10	1055
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5	4.5	4.5		4.5	4.5
Lane Util. Factor	1.00	1.00	0.95		1.00	0.95
Frb, ped/bikes	1.00	1.00	1.00		1.00	1.00
Flpb, ped/bikes	1.00	1.00	1.00		1.00	1.00
Frt	1.00	0.85	1.00		1.00	1.00
Flt Protected	0.95	1.00	1.00		0.95	1.00
Satd. Flow (prot)	1770	1583	3535		1770	3539
Flt Permitted	0.95	1.00	1.00		0.12	1.00
Satd. Flow (perm)	1770	1583	3535		215	3539
Peak-hour factor, PHF	0.94	0.94	0.94	0.94	0.94	0.94
Adj. Flow (vph)	32	21	1737	11	11	1122
RTOR Reduction (vph)	0	20	0	0	0	0
Lane Group Flow (vph)	32	1	1748	0	11	1122
Confl. Bikes (#/hr)				2		
Turn Type	Prot	Perm	NA		Perm	NA
Protected Phases	8		2			6
Permitted Phases		8			6	
Actuated Green, G (s)	5.9	5.9	78.6		78.6	78.6
Effective Green, g (s)	5.9	5.9	78.6		78.6	78.6
Actuated g/C Ratio	0.06	0.06	0.84		0.84	0.84
Clearance Time (s)	4.5	4.5	4.5		4.5	4.5
Vehicle Extension (s)	3.0	3.0	3.0		3.0	3.0
Lane Grp Cap (vph)	111	99	2971		180	2975
v/s Ratio Prot	c0.02		c0.49			0.32
v/s Ratio Perm		0.00			0.05	
v/c Ratio	0.29	0.01	0.59		0.06	0.38
Uniform Delay, d1	41.8	41.1	2.3		1.3	1.7
Progression Factor	1.00	1.00	1.00		1.00	1.00
Incremental Delay, d2	1.4	0.1	0.9		0.6	0.4
Delay (s)	43.2	41.1	3.2		1.9	2.1
Level of Service	D	D	A		A	A
Approach Delay (s)	42.4		3.2			2.1
Approach LOS	D		A			A
Intersection Summary						
HCM 2000 Control Delay			3.5		HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio			0.57			
Actuated Cycle Length (s)			93.5		Sum of lost time (s)	9.0
Intersection Capacity Utilization			56.3%		ICU Level of Service	B
Analysis Period (min)			15			
c Critical Lane Group						

Miti Existing + Proj + Sce B Cuml PM
12: Twin Oaks Valley Rd & Deer Springs Rd

Sierra Project
03/21/2017

						
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	65	305	132	1578	1049	55
Future Volume (vph)	65	305	132	1578	1049	55
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.9	4.9	4.0	5.3	5.3	5.3
Lane Util. Factor	1.00	1.00	1.00	0.95	0.95	1.00
Frpb, ped/bikes	1.00	1.00	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)	1770	1583	1770	3539	3539	1546
Flt Permitted	0.95	1.00	0.95	1.00	1.00	1.00
Satd. Flow (perm)	1770	1583	1770	3539	3539	1546
Peak-hour factor, PHF	0.88	0.88	0.88	0.88	0.88	0.88
Growth Factor (vph)	100%	100%	100%	130%	130%	100%
Adj. Flow (vph)	74	347	150	2331	1550	62
RTOR Reduction (vph)	0	176	0	0	0	16
Lane Group Flow (vph)	74	171	150	2331	1550	47
Confl. Peds. (#/hr)						1
Confl. Bikes (#/hr)						2
Turn Type	Prot	Perm	Prot	NA	NA	Perm
Protected Phases	4		5	2	6	
Permitted Phases		4				6
Actuated Green, G (s)	15.4	15.4	12.9	75.7	58.8	58.8
Effective Green, g (s)	15.4	15.4	12.9	75.7	58.8	58.8
Actuated g/C Ratio	0.15	0.15	0.13	0.75	0.58	0.58
Clearance Time (s)	4.9	4.9	4.0	5.3	5.3	5.3
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	269	240	225	2644	2054	897
v/s Ratio Prot	0.04		0.08	c0.66	0.44	
v/s Ratio Perm		c0.11				0.03
v/c Ratio	0.28	0.71	0.67	0.88	0.75	0.05
Uniform Delay, d1	38.0	40.9	42.1	9.5	15.9	9.2
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	0.6	9.7	7.3	3.8	1.6	0.0
Delay (s)	38.6	50.5	49.4	13.3	17.5	9.2
Level of Service	D	D	D	B	B	A
Approach Delay (s)	48.4			15.5	17.2	
Approach LOS	D			B	B	
Intersection Summary						
HCM 2000 Control Delay			19.2		HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio			0.89			
Actuated Cycle Length (s)			101.3		Sum of lost time (s)	14.2
Intersection Capacity Utilization			68.8%		ICU Level of Service	C
Analysis Period (min)			15			
c Critical Lane Group						

Miti Existing + Proj + Sce B Cuml PM
13: Twin Oaks Valley Rd & Buena Creek Rd

Sierra Project
03/21/2017

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	693	0	260	5	0	0	210	957	0	5	758	525
Future Volume (vph)	693	0	260	5	0	0	210	957	0	5	758	525
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		5.0	5.5		4.5	5.5	5.5
Lane Util. Factor	0.95	0.95	1.00		1.00		1.00	0.95		1.00	0.95	1.00
Frpb, ped/bikes	1.00	1.00	1.00		1.00		1.00	1.00		1.00	1.00	0.98
Flpb, ped/bikes	1.00	1.00	1.00		1.00		1.00	1.00		1.00	1.00	1.00
Frt	1.00	1.00	0.85		1.00		1.00	1.00		1.00	1.00	0.85
Flt Protected	0.95	0.95	1.00		0.95		0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	1681	1681	1583		1770		1770	3539		1770	3539	1558
Flt Permitted	0.95	0.95	1.00		0.73		0.95	1.00		0.95	1.00	1.00
Satd. Flow (perm)	1681	1681	1583		1355		1770	3539		1770	3539	1558
Peak-hour factor, PHF	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Adj. Flow (vph)	745	0	280	5	0	0	226	1029	0	5	815	565
RTOR Reduction (vph)	0	0	195	0	0	0	0	0	0	0	0	155
Lane Group Flow (vph)	372	373	85	0	5	0	226	1029	0	5	815	410
Confl. Peds. (#/hr)												1
Confl. Bikes (#/hr)												5
Turn Type	Split	NA	Perm	Perm	NA		Prot	NA		Prot	NA	Perm
Protected Phases	4	4			8		5	2		1	6	
Permitted Phases			4	8								6
Actuated Green, G (s)	27.5	27.5	27.5		5.5		15.3	50.1		0.6	34.9	34.9
Effective Green, g (s)	27.5	27.5	27.5		5.5		15.3	50.1		0.6	34.9	34.9
Actuated g/C Ratio	0.27	0.27	0.27		0.05		0.15	0.49		0.01	0.34	0.34
Clearance Time (s)	4.0	4.0	4.0		4.0		5.0	5.5		4.5	5.5	5.5
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)	454	454	428		73		266	1743		10	1214	534
v/s Ratio Prot	0.22	c0.22					c0.13	0.29		0.00	0.23	
v/s Ratio Perm			0.05		c0.00							c0.26
v/c Ratio	0.82	0.82	0.20		0.07		0.85	0.59		0.50	0.67	0.77
Uniform Delay, d1	34.8	34.8	28.6		45.7		42.1	18.5		50.4	28.5	29.8
Progression Factor	1.00	1.00	1.00		1.00		1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	11.0	11.4	0.2		0.4		21.6	0.5		34.4	1.5	6.5
Delay (s)	45.8	46.2	28.8		46.1		63.6	19.0		84.8	30.0	36.3
Level of Service	D	D	C		D		E	B		F	C	D
Approach Delay (s)		41.3			46.1			27.0			32.8	
Approach LOS		D			D			C			C	
Intersection Summary												
HCM 2000 Control Delay			33.2		HCM 2000 Level of Service					C		
HCM 2000 Volume to Capacity ratio			0.75									
Actuated Cycle Length (s)			101.7		Sum of lost time (s)			18.5				
Intersection Capacity Utilization			62.7%		ICU Level of Service			B				
Analysis Period (min)			15									
c Critical Lane Group												

Miti Existing + Proj + Sce B Cuml PM
20: Twin Oaks Valley Rd & San Marcos Blvd

Sierra Project
03/21/2017

	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔
Traffic Volume (vph)	451	815	346	617	551	137	579	1274	494	169	1178	289
Future Volume (vph)	451	815	346	617	551	137	579	1274	494	169	1178	289
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.2	5.3	5.3	4.2	5.0		4.2	5.3	4.2	5.0	5.3	5.3
Lane Util. Factor	0.97	0.95	1.00	0.97	0.95		0.97	0.95	1.00	0.97	0.95	1.00
Frpb, ped/bikes	1.00	1.00	0.97	1.00	1.00		1.00	1.00	0.99	1.00	1.00	0.98
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	1.00	0.85	1.00	0.97		1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	3433	3539	1538	3433	3419		3433	3539	1561	3433	3539	1558
Flt Permitted	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	3433	3539	1538	3433	3419		3433	3539	1561	3433	3539	1558
Peak-hour factor, PHF	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Adj. Flow (vph)	485	876	372	663	592	147	623	1370	531	182	1267	311
RTOR Reduction (vph)	0	0	149	0	18	0	0	0	30	0	0	154
Lane Group Flow (vph)	485	876	223	663	721	0	623	1370	501	182	1267	157
Confl. Peds. (#/hr)			9			2			4			1
Confl. Bikes (#/hr)			6			7			6			4
Turn Type	Prot	NA	Perm	Prot	NA		Prot	NA	pm+ov	Prot	NA	Perm
Protected Phases	7	4		3	8		5	2	3	1	6	
Permitted Phases			4						2			6
Actuated Green, G (s)	17.1	28.0	28.0	17.8	29.0		16.8	47.4	65.2	7.0	38.4	38.4
Effective Green, g (s)	17.1	28.0	28.0	17.8	29.0		16.8	47.4	65.2	7.0	38.4	38.4
Actuated g/C Ratio	0.14	0.23	0.23	0.15	0.24		0.14	0.39	0.54	0.06	0.32	0.32
Clearance Time (s)	4.2	5.3	5.3	4.2	5.0		4.2	5.3	4.2	5.0	5.3	5.3
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	489	825	358	509	826		480	1397	848	200	1132	498
v/s Ratio Prot	0.14	c0.25		c0.19	0.21		c0.18	0.39	0.09	0.05	c0.36	
v/s Ratio Perm			0.15						0.23			0.10
v/c Ratio	0.99	1.06	0.62	1.30	0.87		1.30	0.98	0.59	0.91	1.12	0.32
Uniform Delay, d1	51.4	46.0	41.3	51.1	43.7		51.6	35.8	18.4	56.2	40.8	30.9
Progression Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	38.4	49.1	3.4	150.0	10.1		148.8	19.5	1.1	39.5	65.8	0.4
Delay (s)	89.8	95.1	44.6	201.1	53.8		200.4	55.4	19.5	95.6	106.6	31.2
Level of Service	F	F	D	F	D		F	E	B	F	F	C
Approach Delay (s)		82.8			123.4			83.6			92.2	
Approach LOS		F			F			F			F	

Intersection Summary			
HCM 2000 Control Delay	93.0	HCM 2000 Level of Service	F
HCM 2000 Volume to Capacity ratio	1.17		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	19.8
Intersection Capacity Utilization	105.3%	ICU Level of Service	G
Analysis Period (min)	15		

c Critical Lane Group

Miti Existing + Proj + Sce B Cuml PM
26: S. Santa Fe Ave & Buena Creek Rd

Sierra Project
03/21/2017

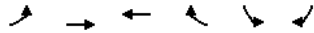
	EBL	EBT	WBT	WBR	SBL	SBR
Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations	↔	↔	↔	↔	↔	↔
Traffic Volume (vph)	1003	680	750	400	230	338
Future Volume (vph)	1003	680	750	400	230	338
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.4	5.3	5.3	5.3	4.0	7.0
Lane Util. Factor	0.97	0.95	0.95	1.00	1.00	1.00
Frpb, ped/bikes	1.00	1.00	1.00	0.96	1.00	0.97
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	1.00	1.00	0.85	1.00	0.85
Flt Protected	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (prot)	3433	3539	3539	1522	1770	1538
Flt Permitted	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (perm)	3433	3539	3539	1522	1770	1538
Peak-hour factor, PHF	0.96	0.96	0.96	0.96	0.96	0.96
Adj. Flow (vph)	1045	708	781	417	240	352
RTOR Reduction (vph)	0	0	0	153	0	0
Lane Group Flow (vph)	1045	708	781	264	240	352
Confl. Peds. (#/hr)				19		12
Confl. Bikes (#/hr)				4		
Turn Type	Prot	NA	NA	Perm	Prot	Perm
Protected Phases	5	2	6		4	
Permitted Phases				6		4
Actuated Green, G (s)	28.5	33.0	22.7	22.7	24.0	24.0
Effective Green, g (s)	28.5	33.0	22.7	22.7	24.0	21.0
Actuated g/C Ratio	0.32	0.37	0.26	0.26	0.27	0.24
Clearance Time (s)	4.4	5.3	5.3	5.3	4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	1100	1313	903	388	477	363
v/s Ratio Prot	c0.30	0.20	c0.22		0.14	
v/s Ratio Perm				0.17		c0.23
v/c Ratio	0.95	0.54	0.86	0.68	0.50	0.97
Uniform Delay, d1	29.5	22.0	31.6	29.8	27.4	33.6
Progression Factor	1.15	0.85	1.00	1.00	1.00	1.00
Incremental Delay, d2	15.6	0.4	8.7	4.7	0.8	38.7
Delay (s)	49.4	19.0	40.3	34.5	28.3	72.3
Level of Service	D	B	D	C	C	E
Approach Delay (s)		37.1	38.3		54.5	
Approach LOS		D	D		D	

Intersection Summary			
HCM 2000 Control Delay	40.4	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.90		
Actuated Cycle Length (s)	88.9	Sum of lost time (s)	14.3
Intersection Capacity Utilization	74.5%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

Miti Existing + Proj + Sce B Cuml PM
27: Buena Creek Rd & Monte Vista Rd

Sierra Project
03/21/2017



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	250	628	293	489	431	110
Future Volume (vph)	250	628	293	489	431	110
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5	4.5	4.5	4.5	4.5	4.5
Lane Util. Factor	1.00	0.95	0.95	1.00	1.00	1.00
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	0.99
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	1.00	1.00	0.85	1.00	0.85
Flt Protected	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (prot)	1770	3539	3539	1583	1770	1562
Flt Permitted	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (perm)	1770	3539	3539	1583	1770	1562
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	272	683	318	532	468	120
RTOR Reduction (vph)	0	0	0	432	0	67
Lane Group Flow (vph)	272	683	318	100	468	53
Confl. Bikes (#/hr)						3
Turn Type	Prot	NA	NA	Perm	Prot	Perm
Protected Phases	7	4	8		6	
Permitted Phases				8		6
Actuated Green, G (s)	16.4	36.2	15.3	15.3	35.8	35.8
Effective Green, g (s)	16.4	36.2	15.3	15.3	35.8	35.8
Actuated g/C Ratio	0.20	0.45	0.19	0.19	0.44	0.44
Clearance Time (s)	4.5	4.5	4.5	4.5	4.5	4.5
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	358	1581	668	299	782	690
v/s Ratio Prot	c0.15	c0.19	0.09		c0.26	
v/s Ratio Perm				0.06		0.03
v/c Ratio	0.76	0.43	0.48	0.34	0.60	0.08
Uniform Delay, d1	30.4	15.4	29.3	28.5	17.1	13.1
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	9.0	0.2	0.5	0.7	3.4	0.2
Delay (s)	39.4	15.5	29.8	29.1	20.5	13.3
Level of Service	D	B	C	C	C	B
Approach Delay (s)		22.3	29.4		19.0	
Approach LOS		C	C		B	
Intersection Summary						
HCM 2000 Control Delay			24.0		HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio			0.62			
Actuated Cycle Length (s)			81.0		Sum of lost time (s)	13.5
Intersection Capacity Utilization			57.1%		ICU Level of Service	B
Analysis Period (min)			15			
c Critical Lane Group						

APPENDIX L-3

ARTERIAL ANALYSIS WORKSHEETS – EXISTING + PROJECT

Arterial Level of Service: EB S. Santa Fe Ave

Cross Street	Arterial Class	Flow Speed	Running Time	Signal Delay	Travel Time (s)	Dist (mi)	Arterial Speed	Arterial LOS
Robelini Dr	II	40	21.8	72.3	94.1	0.19	7.2	F
Buena Creek Rd	II	40	9.4	74.4	83.8	0.08	3.5	F
Total	II		31.2	146.7	177.9	0.27	5.5	F

Arterial Level of Service: WB S. Santa Fe Ave

Cross Street	Arterial Class	Flow Speed	Running Time	Signal Delay	Travel Time (s)	Dist (mi)	Arterial Speed	Arterial LOS
Buena Creek Rd	II	40	21.8	35.0	56.8	0.19	12.0	F
Robelini Dr	II	40	9.4	33.4	42.8	0.08	6.9	F
Total	II		31.2	68.4	99.6	0.27	9.8	F

Arterial Level of Service: NB Twin Oaks Valley Rd #1

Cross Street	Arterial Class	Flow Speed	Running Time	Signal Delay	Travel Time (s)	Dist (mi)	Arterial Speed	Arterial LOS
Richmar Ave	I	45	22.7	12.8	35.5	0.22	22.1	D
Borden Rd	I	45	42.2	17.7	59.9	0.46	27.9	C
Windy Wy	I	45	13.0	3.6	16.6	0.13	27.1	C
Del Roy Dr	I	50	80.0	6.8	86.8	1.11	46.1	A
La Cienega	I	50	29.9	17.3	47.2	0.33	25.0	D
Cassou Rd	I	45	39.2	21.1	60.3	0.42	24.9	D
Buena Creek Rd	I	45	12.8	6.8	19.6	0.12	22.6	D
Twin Oaks Valley Rd	I	45	19.1	3.8	22.9	0.18	28.9	C
Total	I		258.9	89.9	348.8	2.97	30.6	C

Arterial Level of Service: SB Twin Oaks Valley Rd #1

Cross Street	Arterial Class	Flow Speed	Running Time	Signal Delay	Travel Time (s)	Dist (mi)	Arterial Speed	Arterial LOS
Buena Creek Rd	I	45	19.1	32.6	51.7	0.18	12.8	F
Cassou Rd	I	45	12.8	31.3	44.1	0.12	10.0	F
La Cienega	I	45	39.2	10.9	50.1	0.42	29.9	C
Del Roy Dr	I	50	29.9	10.6	40.5	0.33	29.2	C
Windy Wy	I	50	80.0	10.3	90.3	1.11	44.3	A
Borden Rd	I	45	13.0	28.9	41.9	0.13	10.8	F
Richmar Ave	I	45	42.2	24.6	66.8	0.46	25.0	D
San Marcos Blvd	I	45	22.7	35.4	58.1	0.22	13.5	F
Total	I		258.9	184.6	443.5	2.97	24.1	D

Arterial Level of Service: EB S. Santa Fe Ave

Cross Street	Arterial Class	Flow Speed	Running Time	Signal Delay	Travel Time (s)	Dist (mi)	Arterial Speed	Arterial LOS
Robelini Dr	II	40	21.8	23.6	45.4	0.19	15.0	E
Buena Creek Rd	II	40	9.4	16.5	25.9	0.08	11.3	F
Total	II		31.2	40.1	71.3	0.27	13.7	E

Arterial Level of Service: WB S. Santa Fe Ave

Cross Street	Arterial Class	Flow Speed	Running Time	Signal Delay	Travel Time (s)	Dist (mi)	Arterial Speed	Arterial LOS
Buena Creek Rd	II	40	21.8	64.5	86.3	0.19	7.9	F
Robelini Dr	II	40	9.4	34.9	44.3	0.08	6.6	F
Total	II		31.2	99.4	130.6	0.27	7.5	F

Arterial Level of Service: NB Twin Oaks Valley Rd #1

Cross Street	Arterial Class	Flow Speed	Running Time	Signal Delay	Travel Time (s)	Dist (mi)	Arterial Speed	Arterial LOS
Richmar Ave	I	45	22.7	21.5	44.2	0.22	17.7	E
Borden Rd	I	45	42.2	25.3	67.5	0.46	24.7	D
Windy Wy	I	45	13.0	7.1	20.1	0.13	22.4	D
Del Roy Dr	I	50	80.0	7.0	87.0	1.11	45.9	A
La Cienega	I	50	29.9	16.4	46.3	0.33	25.5	D
Cassou Rd	I	45	39.2	16.4	55.6	0.42	27.0	D
Buena Creek Rd	I	45	12.8	14.4	27.2	0.12	16.3	E
Twin Oaks Valley Rd	I	45	19.1	18.8	37.9	0.18	17.5	E
Total	I		258.9	126.9	385.8	2.97	27.7	C

Arterial Level of Service: SB Twin Oaks Valley Rd #1

Cross Street	Arterial Class	Flow Speed	Running Time	Signal Delay	Travel Time (s)	Dist (mi)	Arterial Speed	Arterial LOS
Buena Creek Rd	I	45	19.1	38.3	57.4	0.18	11.5	F
Cassou Rd	I	45	12.8	19.5	32.3	0.12	13.7	F
La Cienega	I	45	39.2	5.4	44.6	0.42	33.6	C
Del Roy Dr	I	50	29.9	13.0	42.9	0.33	27.5	C
Windy Wy	I	50	80.0	9.0	89.0	1.11	44.9	A
Borden Rd	I	45	13.0	35.2	48.2	0.13	9.4	F
Richmar Ave	I	45	42.2	30.5	72.7	0.46	23.0	D
San Marcos Blvd	I	45	22.7	57.7	80.4	0.22	9.8	F
Total	I		258.9	208.6	467.5	2.97	22.9	D

Arterial Level of Service: Buena Creek Road - S. Santa Fe Ave to Monte Vista Dr

Scenario	Peak Hour	Direction	Class	Flow Speed	Running Time	Signal Delay	Travel Time	Distance	Speed	LOS
Existing	AM	EB	2	40	108	14.8	122.8	1.20	35.2	A
		WB	2	40	108	150.3	258.3	1.20	16.7	E
	PM	EB	2	40	108	100.3	208.3	1.20	20.7	D
		WB	2	40	108	74.9	182.9	1.20	23.6	C

Arterial Level of Service: Buena Creek Road - Monte Vista Dr to Twin Oaks Valley Rd

Scenario	Peak Hour	Direction	Flow Speed	Running Time	Signal Delay	Travel Time	Distance	Speed	LOS
Existing	AM	EB	40	243	41.1	284.1	2.70	34.2	B
		WB	40	243	44.0	287	2.70	33.9	B
	PM	EB	40	243	47.8	290.8	2.70	33.4	B
		WB	40	243	63.2	306.2	2.70	31.7	B

Arterial Level of Service - Monte Vista Drive: Foothill Dr to Buena Creek Rd

Scenario	Class	Peak Hour	Direction	Flow Speed	Running Time	Signal Delay	Travel Time	Distance	Speed	LOS
Existing	2	AM	NB	45	44.8	12.7	57.5	0.56	35.1	A
	2		SB	45	44.8	31.8	76.6	0.56	26.3	C
	2	PM	NB	45	44.8	13.9	58.7	0.56	34.3	B
	2		SB	45	44.8	38.7	83.5	0.56	24.1	C

Arterial Level of Service: EB S. Santa Fe Ave

Cross Street	Arterial Class	Flow Speed	Running Time	Signal Delay	Travel Time (s)	Dist (mi)	Arterial Speed	Arterial LOS
Robelini Dr	II	40	21.8	73.9	95.7	0.19	7.1	F
Buena Creek Rd	II	40	9.4	75.8	85.2	0.08	3.4	F
Total	II		31.2	149.7	180.9	0.27	5.4	F

Arterial Level of Service: WB S. Santa Fe Ave

Cross Street	Arterial Class	Flow Speed	Running Time	Signal Delay	Travel Time (s)	Dist (mi)	Arterial Speed	Arterial LOS
Buena Creek Rd	II	40	21.8	36.4	58.2	0.19	11.7	F
Robelini Dr	II	40	9.4	36.4	45.8	0.08	6.4	F
Total	II		31.2	72.8	104.0	0.27	9.4	F

Arterial Level of Service: NB Twin Oaks Valley Rd #1

Cross Street	Arterial Class	Flow Speed	Running Time	Signal Delay	Travel Time (s)	Dist (mi)	Arterial Speed	Arterial LOS
Richmar Ave	I	45	22.7	12.3	35.0	0.22	22.4	D
Borden Rd	I	45	42.2	16.7	58.9	0.46	28.4	C
Windy Wy	I	45	13.0	3.5	16.5	0.13	27.3	C
Del Roy Dr	I	50	80.0	6.7	86.7	1.11	46.1	A
La Cienega	I	50	29.9	17.9	47.8	0.33	24.7	D
Cassou Rd	I	45	39.2	23.7	62.9	0.42	23.8	D
Buena Creek Rd	I	45	12.8	9.1	21.9	0.12	20.2	E
Twin Oaks Valley Rd	I	45	19.1	5.2	24.3	0.18	27.2	C
Total	I		258.9	95.1	354.0	2.97	30.2	C

Arterial Level of Service: SB Twin Oaks Valley Rd #1

Cross Street	Arterial Class	Flow Speed	Running Time	Signal Delay	Travel Time (s)	Dist (mi)	Arterial Speed	Arterial LOS
Buena Creek Rd	I	45	19.1	91.1	110.2	0.18	6.0	F
Cassou Rd	I	45	12.8	46.2	59.0	0.12	7.5	F
La Cienega	I	45	39.2	12.3	51.5	0.42	29.1	C
Del Roy Dr	I	50	29.9	11.4	41.3	0.33	28.6	C
Windy Wy	I	50	80.0	11.1	91.1	1.11	43.9	A
Borden Rd	I	45	13.0	30.7	43.7	0.13	10.3	F
Richmar Ave	I	45	42.2	24.5	66.7	0.46	25.0	D
San Marcos Blvd	I	45	22.7	41.4	64.1	0.22	12.2	F
Total	I		258.9	268.7	527.6	2.97	20.3	E

Arterial Level of Service: EB S. Santa Fe Ave

Cross Street	Arterial Class	Flow Speed	Running Time	Signal Delay	Travel Time (s)	Dist (mi)	Arterial Speed	Arterial LOS
Robelini Dr	II	40	21.8	25.1	46.9	0.19	14.5	E
Buena Creek Rd	II	40	9.4	17.7	27.1	0.08	10.8	F
Total	II		31.2	42.8	74.0	0.27	13.2	E

Arterial Level of Service: WB S. Santa Fe Ave

Cross Street	Arterial Class	Flow Speed	Running Time	Signal Delay	Travel Time (s)	Dist (mi)	Arterial Speed	Arterial LOS
Buena Creek Rd	II	40	21.8	65.0	86.8	0.19	7.9	F
Robelini Dr	II	40	9.4	31.9	41.3	0.08	7.1	F
Total	II		31.2	96.9	128.1	0.27	7.6	F

Arterial Level of Service: NB Twin Oaks Valley Rd #1

Cross Street	Arterial Class	Flow Speed	Running Time	Signal Delay	Travel Time (s)	Dist (mi)	Arterial Speed	Arterial LOS
Richmar Ave	I	45	22.7	23.3	46.0	0.22	17.0	E
Borden Rd	I	45	42.2	28.6	70.8	0.46	23.6	D
Windy Wy	I	45	13.0	7.1	20.1	0.13	22.4	D
Del Roy Dr	I	50	80.0	7.7	87.7	1.11	45.6	A
La Cienega	I	50	29.9	17.3	47.2	0.33	25.0	D
Cassou Rd	I	45	39.2	22.9	62.1	0.42	24.2	D
Buena Creek Rd	I	45	12.8	26.4	39.2	0.12	11.3	F
Twin Oaks Valley Rd	I	45	19.1	206.7	225.8	0.18	2.9	F
Total	I		258.9	340.0	598.9	2.97	17.8	E

Arterial Level of Service: SB Twin Oaks Valley Rd #1

Cross Street	Arterial Class	Flow Speed	Running Time	Signal Delay	Travel Time (s)	Dist (mi)	Arterial Speed	Arterial LOS
Buena Creek Rd	I	45	19.1	63.8	82.9	0.18	8.0	F
Cassou Rd	I	45	12.8	23.5	36.3	0.12	12.2	F
La Cienega	I	45	39.2	5.2	44.4	0.42	33.8	C
Del Roy Dr	I	50	29.9	13.3	43.2	0.33	27.3	C
Windy Wy	I	50	80.0	8.6	88.6	1.11	45.1	A
Borden Rd	I	45	13.0	37.3	50.3	0.13	9.0	F
Richmar Ave	I	45	42.2	30.5	72.7	0.46	23.0	D
San Marcos Blvd	I	45	22.7	60.6	83.3	0.22	9.4	F
Total	I		258.9	242.8	501.7	2.97	21.3	D

Arterial Level of Service: Buena Creek Road - S. Santa Fe Ave to Monte Vista Dr

Scenario	Peak Hour	Direction	Class	Flow Speed	Running Time	Signal Delay	Travel Time	Distance	Speed	LOS
Existing + Project	AM	EB	2	40	108	17.8	125.8	1.20	34.3	B
		WB	2	40	108	248.7	356.7	1.20	12.1	F
	PM	EB	2	40	108	247.3	355.3	1.20	12.2	F
		WB	2	40	108	118.2	226.2	1.20	19.1	D

Arterial Level of Service: Buena Creek Road - Monte Vista Dr to Twin Oaks Valley Rd

Scenario	Peak Hour	Direction	Flow Speed	Running Time	Signal Delay	Travel Time	Distance	Speed	LOS
Existing + Project	AM	EB	40	243	51.1	294.1	2.70	33.0	B
		WB	40	243	157.8	400.8	2.70	24.3	C
	PM	EB	40	243	205.0	448	2.70	21.7	D
		WB	40	243	155.9	398.9	2.70	24.4	C

Arterial Level of Service - Monte Vista Drive: Foothill Dr to Buena Creek Rd

Scenario	Class	Peak Hour	Direction	Flow Speed	Running Time	Signal Delay	Travel Time	Distance	Speed	LOS
Existing + Project	2	AM	NB	45	44.8	12.7	57.5	0.56	35.1	A
	2		SB	45	44.8	43.6	88.4	0.56	22.8	C
	2	PM	NB	45	44.8	13.9	58.7	0.56	34.3	B
	2		SB	45	44.8	59.7	104.5	0.56	19.3	D

Arterial Level of Service: EB S. Santa Fe Ave

Cross Street	Arterial Class	Flow Speed	Running Time	Signal Delay	Travel Time (s)	Dist (mi)	Arterial Speed	Arterial LOS
Robelini Dr	II	40	21.8	69.4	91.2	0.19	7.5	F
Buena Creek Rd	II	40	9.4	69.5	78.9	0.08	3.7	F
Total	II		31.2	138.9	170.1	0.27	5.7	F

Arterial Level of Service: WB S. Santa Fe Ave

Cross Street	Arterial Class	Flow Speed	Running Time	Signal Delay	Travel Time (s)	Dist (mi)	Arterial Speed	Arterial LOS
Buena Creek Rd	II	40	21.8	33.8	55.6	0.19	12.3	F
Robelini Dr	II	40	9.4	36.4	45.8	0.08	6.4	F
Total	II		31.2	70.2	101.4	0.27	9.6	F

Arterial Level of Service: NB Twin Oaks Valley Rd #1

Cross Street	Arterial Class	Flow Speed	Running Time	Signal Delay	Travel Time (s)	Dist (mi)	Arterial Speed	Arterial LOS
Richmar Road	I	45	22.7	12.3	35.0	0.22	22.4	D
Borden Rd	I	45	42.2	16.7	58.9	0.46	28.4	C
Windy Wy	I	45	13.0	3.6	16.6	0.13	27.1	C
Del Roy Dr	I	50	80.0	6.7	86.7	1.11	46.1	A
La Cienega	I	50	29.9	17.9	47.8	0.33	24.7	D
Cassou Rd	I	45	39.2	24.4	63.6	0.42	23.6	D
Buena Creek Rd	I	45	12.8	6.5	19.3	0.12	23.0	D
Twin Oaks Valley Rd	I	45	19.1	3.2	22.3	0.18	29.7	C
Total	I		258.9	91.3	350.2	2.97	30.5	C

Arterial Level of Service: SB Twin Oaks Valley Rd #1

Cross Street	Arterial Class	Flow Speed	Running Time	Signal Delay	Travel Time (s)	Dist (mi)	Arterial Speed	Arterial LOS
Buena Creek Rd	I	45	19.1	18.9	38.0	0.18	17.4	E
Cassou Rd	I	45	12.8	20.7	33.5	0.12	13.2	F
La Cienega	I	45	39.2	12.3	51.5	0.42	29.1	C
Del Roy Dr	I	50	29.9	11.3	41.2	0.33	28.7	C
Windy Wy	I	50	80.0	10.0	90.0	1.11	44.4	A
Borden Rd	I	45	13.0	30.7	43.7	0.13	10.3	F
Richmar Road	I	45	42.2	24.5	66.7	0.46	25.0	D
San Marcos Blvd	I	45	22.7	32.3	55.0	0.22	14.3	F
Total	I		258.9	160.7	419.6	2.97	25.5	D

Arterial Level of Service: EB S. Santa Fe Ave

Cross Street	Arterial Class	Flow Speed	Running Time	Signal Delay	Travel Time (s)	Dist (mi)	Arterial Speed	Arterial LOS
Robelini Dr	II	40	21.8	22.2	44.0	0.19	15.5	E
Buena Creek Rd	II	40	9.4	16.5	25.9	0.08	11.3	F
Total	II		31.2	38.7	69.9	0.27	13.9	E

Arterial Level of Service: WB S. Santa Fe Ave

Cross Street	Arterial Class	Flow Speed	Running Time	Signal Delay	Travel Time (s)	Dist (mi)	Arterial Speed	Arterial LOS
Buena Creek Rd	II	40	21.8	79.2	101.0	0.19	6.8	F
Robelini Dr	II	40	9.4	48.4	57.8	0.08	5.1	F
Total	II		31.2	127.6	158.8	0.27	6.1	F

Arterial Level of Service: NB Twin Oaks Valley Rd #1

Cross Street	Arterial Class	Flow Speed	Running Time	Signal Delay	Travel Time (s)	Dist (mi)	Arterial Speed	Arterial LOS
Richmar Road	I	45	22.7	23.3	46.0	0.22	17.0	E
Borden Rd	I	45	42.2	28.6	70.8	0.46	23.6	D
Windy Wy	I	45	13.0	8.8	21.8	0.13	20.7	E
Del Roy Dr	I	50	80.0	7.0	87.0	1.11	45.9	A
La Cienega	I	50	29.9	17.3	47.2	0.33	25.0	D
Cassou Rd	I	45	39.2	23.0	62.2	0.42	24.1	D
Buena Creek Rd	I	45	12.8	11.5	24.3	0.12	18.2	E
Twin Oaks Valley Rd	I	45	19.1	9.4	28.5	0.18	23.2	D
Total	I		258.9	128.9	387.8	2.97	27.6	C

Arterial Level of Service: SB Twin Oaks Valley Rd #1

Cross Street	Arterial Class	Flow Speed	Running Time	Signal Delay	Travel Time (s)	Dist (mi)	Arterial Speed	Arterial LOS
Buena Creek Rd	I	45	19.1	23.6	42.7	0.18	15.5	F
Cassou Rd	I	45	12.8	15.8	28.6	0.12	15.5	F
La Cienega	I	45	39.2	5.2	44.4	0.42	33.8	C
Del Roy Dr	I	50	29.9	12.5	42.4	0.33	27.9	C
Windy Wy	I	50	80.0	9.6	89.6	1.11	44.6	A
Borden Rd	I	45	13.0	37.3	50.3	0.13	9.0	F
Richmar Road	I	45	42.2	30.5	72.7	0.46	23.0	D
San Marcos Blvd	I	45	22.7	45.0	67.7	0.22	11.6	F
Total	I		258.9	179.5	438.4	2.97	24.4	D

Arterial Level of Service: Buena Creek Road - S. Santa Fe Ave to Monte Vista Dr

Scenario	Peak Hour	Direction	Class	Flow Speed	Running Time	Signal Delay	Travel Time	Distance	Speed	LOS
Existing + Project Mitigated	AM	EB	2	40	108	11.4	119.4	1.20	36.2	A
		WB	2	40	108	24.9	132.9	1.20	32.5	B
	PM	EB	2	40	108	15.4	123.4	1.20	35.0	A
		WB	2	40	108	50.7	158.7	1.20	27.2	C

Arterial Level of Service: Buena Creek Road - Monte Vista Dr to Twin Oaks Valley Rd

Scenario	Peak Hour	Direction	Flow Speed	Running Time	Signal Delay	Travel Time	Distance	Speed	LOS
Existing + Project <i>Mitigated</i>	AM	EB	40	243	21.2	264.2	2.70	36.8	A
		WB	40	243	14.9	257.9	2.70	37.7	A
	PM	EB	40	243	21.1	264.1	2.70	36.8	A
		WB	40	243	27.7	270.7	2.70	35.9	A

Arterial Level of Service - Monte Vista Drive: Foothill Dr to Buena Creek Rd

Scenario	Class	Peak Hour	Direction	Flow Speed	Running Time	Signal Delay	Travel Time	Distance	Speed	LOS
Existing + Project (Mitigated)	2	AM	NB	45	44.8	12.7	57.5	0.56	35.1	A
	2		SB	45	44.8	31.4	76.2	0.56	26.5	C
	2	PM	NB	45	44.8	13.9	58.7	0.56	34.3	B
	2		SB	45	44.8	35.5	80.3	0.56	25.1	C

APPENDIX L-4

ARTERIAL ANALYSIS WORKSHEETS – EXISTING + PROJECT + CUMULATIVE PROJECTS

Arterial Level of Service: EB S. Santa Fe Ave

Cross Street	Arterial Class	Flow Speed	Running Time	Signal Delay	Travel Time (s)	Dist (mi)	Arterial Speed	Arterial LOS
Robelini Dr	II	40	21.8	79.2	101.0	0.19	6.8	F
Buena Creek Rd	II	40	9.4	326.4	335.8	0.08	0.9	F
Total	II		31.2	405.6	436.8	0.27	2.2	F

Arterial Level of Service: WB S. Santa Fe Ave

Cross Street	Arterial Class	Flow Speed	Running Time	Signal Delay	Travel Time (s)	Dist (mi)	Arterial Speed	Arterial LOS
Buena Creek Rd	II	40	21.8	53.4	75.2	0.19	9.1	F
Robelini Dr	II	40	9.4	39.6	49.0	0.08	6.0	F
Total	II		31.2	93.0	124.2	0.27	7.9	F

Arterial Level of Service: NB Twin Oaks Valley Rd #1

Cross Street	Arterial Class	Flow Speed	Running Time	Signal Delay	Travel Time (s)	Dist (mi)	Arterial Speed	Arterial LOS
Richmar Ave	I	45	22.7	13.8	36.5	0.22	21.5	D
Borden Rd	I	45	42.2	23.0	65.2	0.46	25.6	D
Windy Wy	I	45	13.0	4.9	17.9	0.13	25.2	D
Del Roy Dr	I	50	80.0	7.0	87.0	1.11	45.9	A
La Cienega	I	50	29.9	18.2	48.1	0.33	24.6	D
Total	I		187.8	66.9	254.7	2.25	31.7	C

Arterial Level of Service: SB Twin Oaks Valley Rd #1

Cross Street	Arterial Class	Flow Speed	Running Time	Signal Delay	Travel Time (s)	Dist (mi)	Arterial Speed	Arterial LOS
La Cienega	I	45	39.2	12.6	51.8	0.42	29.0	C
Del Roy Dr	I	50	29.9	13.7	43.6	0.33	27.1	C
Windy Wy	I	50	80.0	12.0	92.0	1.11	43.5	A
Borden Rd	I	45	13.0	41.2	54.2	0.13	8.3	F
Richmar Ave	I	45	42.2	31.0	73.2	0.46	22.8	D
San Marcos Blvd	I	45	22.7	115.6	138.3	0.22	5.7	F
Total	I		227.0	226.1	453.1	2.66	21.2	D

Arterial Level of Service: EB S. Santa Fe Ave

Cross Street	Arterial Class	Flow Speed	Running Time	Signal Delay	Travel Time (s)	Dist (mi)	Arterial Speed	Arterial LOS
Robelini Dr	II	40	21.8	25.8	47.6	0.19	14.3	E
Buena Creek Rd	II	40	9.4	34.1	43.5	0.08	6.7	F
Total	II		31.2	59.9	91.1	0.27	10.7	F

Arterial Level of Service: WB S. Santa Fe Ave

Cross Street	Arterial Class	Flow Speed	Running Time	Signal Delay	Travel Time (s)	Dist (mi)	Arterial Speed	Arterial LOS
Buena Creek Rd	II	40	21.8	280.4	302.2	0.19	2.3	F
Robelini Dr	II	40	9.4	36.0	45.4	0.08	6.5	F
Total	II		31.2	316.4	347.6	0.27	2.8	F

Arterial Level of Service: NB Twin Oaks Valley Rd #1

Cross Street	Arterial Class	Flow Speed	Running Time	Signal Delay	Travel Time (s)	Dist (mi)	Arterial Speed	Arterial LOS
Richmar Ave	I	45	22.7	28.5	51.2	0.22	15.3	F
Borden Rd	I	45	42.2	37.0	79.2	0.46	21.1	D
Windy Wy	I	45	13.0	7.5	20.5	0.13	22.0	D
Del Roy Dr	I	50	80.0	11.2	91.2	1.11	43.8	A
La Cienega	I	50	29.9	17.9	47.8	0.33	24.7	D
Total	I		187.8	102.1	289.9	2.25	27.9	C

Arterial Level of Service: SB Twin Oaks Valley Rd #1

Cross Street	Arterial Class	Flow Speed	Running Time	Signal Delay	Travel Time (s)	Dist (mi)	Arterial Speed	Arterial LOS
La Cienega	I	45	39.2	5.3	44.5	0.42	33.7	C
Del Roy Dr	I	50	29.9	15.8	45.7	0.33	25.8	D
Windy Wy	I	50	80.0	8.8	88.8	1.11	45.0	A
Borden Rd	I	45	13.0	48.0	61.0	0.13	7.4	F
Richmar Ave	I	45	42.2	37.4	79.6	0.46	21.0	E
San Marcos Blvd	I	45	22.7	165.6	188.3	0.22	4.2	F
Total	I		227.0	280.9	507.9	2.66	18.9	E

Arterial Level of Service: Buena Creek Road - Monte Vista Dr to Twin Oaks Valley Rd

Scenario	Peak Hour	Direction	Flow Speed	Running Time	Signal Delay	Travel Time	Distance	Speed	LOS
Existing + Project + Cumulative	AM	EB	40	243	66.7	309.7	2.70	31.4	B
		WB	40	243	321.6	564.6	2.70	17.2	D
	PM	EB	40	243	208.9	451.9	2.70	21.5	D
		WB	40	243	269.6	512.6	2.70	19.0	D

Arterial Level of Service - Monte Vista Drive: Foothill Dr to Buena Creek Rd

Scenario	Class	Peak Hour	Direction	Flow Speed	Running Time	Signal Delay	Travel Time	Distance	Speed	LOS
Existing + Project + Cumulative	2	AM	NB	45	44.8	12.7	57.5	0.56	35.1	A
	2		SB	45	44.8	100.1	144.9	0.56	13.9	E
	2	PM	NB	45	44.8	13.9	58.7	0.56	34.3	B
	2		SB	45	44.8	108.8	153.6	0.56	13.1	E

Arterial Level of Service: Buena Creek Road - S. Santa Fe Ave to Monte Vista Dr

Scenario	Peak Hour	Direction	Class	Flow Speed	Running Time	Signal Delay	Travel Time	Distance	Speed	LOS
Existing + Project + Cumulative	AM	EB	2	40	108	25.1	133.1	1.20	32.5	B
		WB	2	40	108	600.9	708.9	1.20	6.1	F
	PM	EB	2	40	108	403.8	511.8	1.20	8.4	F
		WB	2	40	108	387.4	495.4	1.20	8.7	F

Arterial Level of Service: EB S. Santa Fe Ave

Cross Street	Arterial Class	Flow Speed	Running Time	Signal Delay	Travel Time (s)	Dist (mi)	Arterial Speed	Arterial LOS
Robelini Dr	II	40	21.8	44.4	66.2	0.19	10.3	F
Buena Creek Rd	II	40	9.4	44.9	54.3	0.08	5.4	F
Total	II		31.2	89.3	120.5	0.27	8.1	F

Arterial Level of Service: WB S. Santa Fe Ave

Cross Street	Arterial Class	Flow Speed	Running Time	Signal Delay	Travel Time (s)	Dist (mi)	Arterial Speed	Arterial LOS
Buena Creek Rd	II	40	21.8	28.8	50.6	0.19	13.5	E
Robelini Dr	II	40	9.4	29.4	38.8	0.08	7.6	F
Total	II		31.2	58.2	89.4	0.27	10.9	F

Arterial Level of Service: NB Twin Oaks Valley Rd #1

Cross Street	Arterial Class	Flow Speed	Running Time	Signal Delay	Travel Time (s)	Dist (mi)	Arterial Speed	Arterial LOS
Richmar Ave	I	45	23.6	13.0	36.6	0.23	22.4	D
Borden Rd	I	45	42.2	16.3	58.5	0.46	28.6	C
Windy Wy	I	45	13.0	4.9	17.9	0.13	25.2	D
Del Roy Dr	I	50	80.0	7.0	87.0	1.11	45.9	A
La Cienega	I	50	29.9	18.2	48.1	0.33	24.6	D
Cassou Rd	I	45	39.2	23.9	63.1	0.42	23.8	D
Buena Creek Rd	I	45	12.8	8.4	21.2	0.12	20.9	E
Twin Oaks Valley Rd	I	45	19.1	3.3	22.4	0.18	29.5	C
Total	I		259.8	95.0	354.8	2.98	30.2	C

Arterial Level of Service: SB Twin Oaks Valley Rd #1

Cross Street	Arterial Class	Flow Speed	Running Time	Signal Delay	Travel Time (s)	Dist (mi)	Arterial Speed	Arterial LOS
Buena Creek Rd	I	45	19.1	20.8	39.9	0.18	16.6	E
Cassou Rd	I	45	12.8	23.2	36.0	0.12	12.3	F
La Cienega	I	45	39.2	12.6	51.8	0.42	29.0	C
Del Roy Dr	I	50	29.9	13.6	43.5	0.33	27.1	C
Windy Wy	I	50	80.0	11.8	91.8	1.11	43.5	A
Borden Rd	I	45	13.0	28.5	41.5	0.13	10.9	F
Richmar Ave	I	45	42.2	29.0	71.2	0.46	23.5	D
San Marcos Blvd	I	45	23.6	41.9	65.5	0.23	12.5	F
Total	I		259.8	181.4	441.2	2.98	24.3	D

Arterial Level of Service: EB S. Santa Fe Ave

Cross Street	Arterial Class	Flow Speed	Running Time	Signal Delay	Travel Time (s)	Dist (mi)	Arterial Speed	Arterial LOS
Robelini Dr	II	40	21.8	22.4	44.2	0.19	15.4	E
Buena Creek Rd	II	40	9.4	20.9	30.3	0.08	9.7	F
Total	II		31.2	43.3	74.5	0.27	13.1	E

Arterial Level of Service: WB S. Santa Fe Ave

Cross Street	Arterial Class	Flow Speed	Running Time	Signal Delay	Travel Time (s)	Dist (mi)	Arterial Speed	Arterial LOS
Buena Creek Rd	II	40	21.8	42.8	64.6	0.19	10.6	F
Robelini Dr	II	40	9.4	26.4	35.8	0.08	8.2	F
Total	II		31.2	69.2	100.4	0.27	9.7	F

Arterial Level of Service: NB Twin Oaks Valley Rd #1

Cross Street	Arterial Class	Flow Speed	Running Time	Signal Delay	Travel Time (s)	Dist (mi)	Arterial Speed	Arterial LOS
Richmar Ave	I	45	22.7	24.2	46.9	0.22	16.7	E
Borden Rd	I	45	42.2	37.1	79.3	0.46	21.1	D
Windy Wy	I	45	13.0	7.3	20.3	0.13	22.2	D
Del Roy Dr	I	50	80.0	10.4	90.4	1.11	44.2	A
La Cienega	I	50	29.9	17.9	47.8	0.33	24.7	D
Cassou Rd	I	45	39.2	14.8	54.0	0.42	27.8	C
Buena Creek Rd	I	45	12.8	12.8	25.6	0.12	17.3	E
Twin Oaks Valley Rd	I	45	19.1	10.7	29.8	0.18	22.2	D
Total	I		258.9	135.2	394.1	2.97	27.1	C

Arterial Level of Service: SB Twin Oaks Valley Rd #1

Cross Street	Arterial Class	Flow Speed	Running Time	Signal Delay	Travel Time (s)	Dist (mi)	Arterial Speed	Arterial LOS
Buena Creek Rd	I	45	19.1	26.5	45.6	0.18	14.5	F
Cassou Rd	I	45	12.8	18.9	31.7	0.12	14.0	F
La Cienega	I	45	39.2	5.3	44.5	0.42	33.7	C
Del Roy Dr	I	50	29.9	14.9	44.8	0.33	26.4	D
Windy Wy	I	50	80.0	8.5	88.5	1.11	45.2	A
Borden Rd	I	45	13.0	47.9	60.9	0.13	7.4	F
Richmar Ave	I	45	42.2	35.6	77.8	0.46	21.5	D
San Marcos Blvd	I	45	22.7	74.3	97.0	0.22	8.1	F
Total	I		258.9	231.9	490.8	2.97	21.8	D

Arterial Level of Service: Buena Creek Road - S. Santa Fe Ave to Monte Vista Dr

Scenario	Peak Hour	Direction	Class	Flow Speed	Running Time	Signal Delay	Travel Time	Distance	Speed	LOS
Existing + Project + Cumulative <i>Mitigated</i>	AM	EB	2	40	108	13.8	121.8	1.20	35.5	A
		WB	2	40	108	28.4	136.4	1.20	31.7	B
	PM	EB	2	40	108	16.4	124.4	1.20	34.7	B
		WB	2	40	108	31.6	139.6	1.20	30.9	B

Arterial Level of Service: Buena Creek Road - Monte Vista Dr to Twin Oaks Valley Rd

Scenario	Peak Hour	Direction	Flow Speed	Running Time	Signal Delay	Travel Time	Distance	Speed	LOS
Existing + Project + Cumulative <i>Mitigated</i>	AM	EB	40	243	24.6	267.6	2.70	36.3	A
		WB	40	243	21.1	264.1	2.70	36.8	A
	PM	EB	40	243	35.5	278.5	2.70	34.9	B
		WB	40	243	29.8	272.8	2.70	35.6	A

Arterial Level of Service - Monte Vista Drive: Foothill Dr to Buena Creek Rd

Scenario	Class	Peak Hour	Direction	Flow Speed	Running Time	Signal Delay	Travel Time	Distance	Speed	LOS
Existing + Project + Cumulative (Mitigated)	2	AM	NB	45	44.8	12.7	57.5	0.56	35.1	A
	2		SB	45	44.8	37.5	82.3	0.56	24.5	C
	2	PM	NB	45	44.8	13.9	58.7	0.56	34.3	B
	2		SB	45	44.8	38.0	82.8	0.56	24.3	C