

HCM 7th TWSC
12: I-15 SB Ramps & Glen Helen Pkwy

Glen Helen RP Feasibility Analysis
Exist_Weekend_WP_AM

Intersection

Int Delay, s/veh 7.7

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↑↑		↑	↑↑					↑	↑	
Traffic Vol, veh/h	0	18	0	130	13	0	0	0	0	52	21	10
Future Vol, veh/h	0	18	0	130	13	0	0	0	0	52	21	10
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	220	-	-	-	-	-	825	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	79	79	79	79	79	79	79	79	79	79	79	79
Heavy Vehicles, %	0	0	0	0	0	0	0	0	0	0	0	0
Mvmt Flow	0	23	0	165	16	0	0	0	0	66	27	13

Major/Minor	Major1			Major2			Minor2		
Conflicting Flow All	-	0	0	23	0	0	357	368	8
Stage 1	-	-	-	-	-	-	346	346	-
Stage 2	-	-	-	-	-	-	11	23	-
Critical Hdwy	-	-	-	4.1	-	-	6.8	6.5	6.9
Critical Hdwy Stg 1	-	-	-	-	-	-	5.8	5.5	-
Critical Hdwy Stg 2	-	-	-	-	-	-	5.8	5.5	-
Follow-up Hdwy	-	-	-	2.2	-	-	3.5	4	3.3
Pot Cap-1 Maneuver	0	-	-	1606	-	0	620	564	1078
Stage 1	0	-	-	-	-	0	694	639	-
Stage 2	0	-	-	-	-	0	1015	880	-
Platoon blocked, %	-	-	-	-	-	-	-	-	-
Mov Cap-1 Maneuver	-	-	-	1606	-	-	557	0	1078
Mov Cap-2 Maneuver	-	-	-	-	-	-	557	0	-
Stage 1	-	-	-	-	-	-	694	0	-
Stage 2	-	-	-	-	-	-	911	0	-

Approach	EB	WB	SB
HCM Control Delay, s/v	0	6.82	10.89
HCM LOS			B

Minor Lane/Major Mvmt	EBT	EBR	WBL	WBT	SBLn1	SBLn2
Capacity (veh/h)	-	-	1606	-	557	1078
HCM Lane V/C Ratio	-	-	0.102	-	0.118	0.036
HCM Control Delay (s/veh)	-	-	7.5	-	12.3	8.5
HCM Lane LOS	-	-	A	-	B	A
HCM 95th %tile Q(veh)	-	-	0.3	-	0.4	0.1

HCM 7th AWSC
1: Glen Helen Pkwy & I-215 NB Ramps

Glen Helen RP Feasibility Analysis
Exist_Weekend_WP_PM

Intersection	
Intersection Delay, s/veh	8.2
Intersection LOS	A

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations					↱	↱	↱	↱			↱	↱
Traffic Vol, veh/h	0	0	0	23	5	62	77	105	0	0	58	78
Future Vol, veh/h	0	0	0	23	5	62	77	105	0	0	58	78
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Heavy Vehicles, %	0	0	0	0	0	0	0	0	0	0	0	0
Mvmt Flow	0	0	0	24	5	66	82	112	0	0	62	83
Number of Lanes	0	0	0	0	1	1	1	1	0	0	1	1

Approach	WB	NB	SB
Opposing Approach		SB	NB
Opposing Lanes	0	2	2
Conflicting Approach Left	NB		WB
Conflicting Lanes Left	2	0	2
Conflicting Approach Right	SB	WB	
Conflicting Lanes Right	2	2	0
HCM Control Delay, s/veh	8	8.6	7.7
HCM LOS	A	A	A

Lane	NBLn1	NBLn2	WBLn1	WBLn2	SBLn1	SBLn2
Vol Left, %	100%	0%	82%	0%	0%	0%
Vol Thru, %	0%	100%	18%	0%	100%	0%
Vol Right, %	0%	0%	0%	100%	0%	100%
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop
Traffic Vol by Lane	77	105	28	62	58	78
LT Vol	77	0	23	0	0	0
Through Vol	0	105	5	0	58	0
RT Vol	0	0	0	62	0	78
Lane Flow Rate	82	112	30	66	62	83
Geometry Grp	5	5	5	5	5	5
Degree of Util (X)	0.122	0.151	0.047	0.084	0.084	0.097
Departure Headway (Hd)	5.355	4.854	5.699	4.585	4.914	4.211
Convergence, Y/N	Yes	Yes	Yes	Yes	Yes	Yes
Cap	672	741	630	783	731	853
Service Time	3.071	2.569	3.419	2.304	2.631	1.928
HCM Lane V/C Ratio	0.122	0.151	0.048	0.084	0.085	0.097
HCM Control Delay, s/veh	8.8	8.4	8.7	7.7	8.1	7.4
HCM Lane LOS	A	A	A	A	A	A
HCM 95th-tile Q	0.4	0.5	0.1	0.3	0.3	0.3

HCM 7th AWSC
2: Glen Helen Pkwy & I-215 SB Ramps

Glen Helen RP Feasibility Analysis
Exist_Weekend_WP_PM

Intersection

Intersection Delay, s/veh 8.9
Intersection LOS A

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↖	↗					↖		↗	↖	
Traffic Vol, veh/h	77	6	126	0	0	0	0	105	71	29	52	0
Future Vol, veh/h	77	6	126	0	0	0	0	105	71	29	52	0
Peak Hour Factor	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Heavy Vehicles, %	0	0	0	0	0	0	0	0	0	0	0	0
Mvmt Flow	80	6	131	0	0	0	0	109	74	30	54	0
Number of Lanes	0	1	1	0	0	0	0	1	0	1	1	0

Approach	EB	NB	SB
Opposing Approach		SB	NB
Opposing Lanes	0	2	1
Conflicting Approach Left SB		EB	
Conflicting Lanes Left	2	2	0
Conflicting Approach Right NB			EB
Conflicting Lanes Right	1	0	2
HCM Control Delay, s/veh	8.5	9.5	8.5
HCM LOS	A	A	A

Lane	NBLn1	EBLn1	EBLn2	SBLn1	SBLn2
Vol Left, %	0%	93%	0%	100%	0%
Vol Thru, %	60%	7%	0%	0%	100%
Vol Right, %	40%	0%	100%	0%	0%
Sign Control	Stop	Stop	Stop	Stop	Stop
Traffic Vol by Lane	176	83	126	29	52
LT Vol	0	77	0	29	0
Through Vol	105	6	0	0	52
RT Vol	71	0	126	0	0
Lane Flow Rate	183	86	131	30	54
Geometry Grp	4b	5	5	5	5
Degree of Util (X)	0.249	0.135	0.163	0.048	0.078
Departure Headway (Hd)	4.89	5.64	4.471	5.711	5.208
Convergence, Y/N	Yes	Yes	Yes	Yes	Yes
Cap	735	636	802	627	688
Service Time	2.917	3.367	2.198	3.443	2.94
HCM Lane V/C Ratio	0.249	0.135	0.163	0.048	0.078
HCM Control Delay, s/veh	9.5	9.2	8.1	8.7	8.4
HCM Lane LOS	A	A	A	A	A
HCM 95th-tile Q	1	0.5	0.6	0.2	0.3

HCM 7th AWSC
3: Glen Helen Pkwy & Cajon Blvd

Glen Helen RP Feasibility Analysis
Exist_Weekend_WP_PM

Intersection

Intersection Delay, s/veh 9.7

Intersection LOS A

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	39	29	19	54	35	92	21	45	80	118	30	30
Future Vol, veh/h	39	29	19	54	35	92	21	45	80	118	30	30
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Heavy Vehicles, %	0	0	0	0	0	0	0	0	0	0	0	0
Mvmt Flow	42	31	20	58	38	99	23	48	86	127	32	32
Number of Lanes	1	2	0	1	2	0	0	1	0	1	1	0

Approach	EB	WB	NB	SB
Opposing Approach	WB	EB	SB	NB
Opposing Lanes	3	3	2	1
Conflicting Approach Left	SB	NB	EB	WB
Conflicting Lanes Left	2	1	3	3
Conflicting Approach Right	NB	SB	WB	EB
Conflicting Lanes Right	1	2	3	3
HCM Control Delay, s/veh	9.3	9.2	10	10
HCM LOS	A	A	A	A

Lane	NBLn1	EBLn1	EBLn2	EBLn3	WBLn1	WBLn2	WBLn3	SBLn1	SBLn2
Vol Left, %	14%	100%	0%	0%	100%	0%	0%	100%	0%
Vol Thru, %	31%	0%	100%	34%	0%	100%	11%	0%	50%
Vol Right, %	55%	0%	0%	66%	0%	0%	89%	0%	50%
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Stop	Stop	Stop
Traffic Vol by Lane	146	39	19	29	54	23	104	118	60
LT Vol	21	39	0	0	54	0	0	118	0
Through Vol	45	0	19	10	0	23	12	0	30
RT Vol	80	0	0	19	0	0	92	0	30
Lane Flow Rate	157	42	21	31	58	25	111	127	65
Geometry Grp	6	6	6	6	6	6	6	6	6
Degree of Util (X)	0.24	0.077	0.035	0.048	0.103	0.041	0.162	0.219	0.096
Departure Headway (Hd)	5.498	6.578	6.071	5.601	6.368	5.862	5.233	6.219	5.368
Convergence, Y/N	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Cap	655	546	590	640	564	612	687	579	668
Service Time	3.222	4.307	3.8	3.329	4.094	3.587	2.958	3.945	3.094
HCM Lane V/C Ratio	0.24	0.077	0.036	0.048	0.103	0.041	0.162	0.219	0.097
HCM Control Delay, s/veh	10	9.9	9	8.6	9.8	8.8	9	10.7	8.7
HCM Lane LOS	A	A	A	A	A	A	A	B	A
HCM 95th-tile Q	0.9	0.2	0.1	0.2	0.3	0.1	0.6	0.8	0.3

HCM 7th TWSC
4: Glen Helen Pkwy & Gate 4

Glen Helen RP Feasibility Analysis
Exist_Weekend_WP_PM

Intersection

Int Delay, s/veh 0

Movement	WBL	WBR	NBT	NBR	SBL	SBT
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Lane Configurations	W		↑↑		W	↑↑
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Traffic Vol, veh/h	0	0	167	0	0	106
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Future Vol, veh/h	0	0	167	0	0	106
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Conflicting Peds, #/hr	0	0	0	0	0	0
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Sign Control	Stop	Stop	Free	Free	Free	Free
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RT Channelized	-	None	-	None	-	None
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Storage Length	0	-	-	-	100	-
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Veh in Median Storage, #	2	-	0	-	-	0
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Grade, %	0	-	0	-	-	0
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Peak Hour Factor	87	87	87	87	87	87
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Heavy Vehicles, %	0	0	0	0	0	0
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Mvmt Flow	0	0	192	0	0	122
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Major/Minor	Minor1	Major1	Major2
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Conflicting Flow All	253	96	0
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Stage 1	192	-	-
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Stage 2	61	-	-
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Critical Hdwy	6.8	6.9	-
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Critical Hdwy Stg 1	5.8	-	-
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Critical Hdwy Stg 2	5.8	-	-
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Follow-up Hdwy	3.5	3.3	-
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Pot Cap-1 Maneuver	720	948	-
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Stage 1	828	-	-
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Stage 2	960	-	-
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Platoon blocked, %		-	-
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Mov Cap-1 Maneuver	720	948	-
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Mov Cap-2 Maneuver	773	-	-
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Stage 1	828	-	-
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Stage 2	960	-	-
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Approach	WB	NB	SB
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HCM Control Delay, s/v	0	0	0
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HCM LOS	A		
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Minor Lane/Major Mvmt	NBT	NBRWBLn1	SBL	SBT
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Capacity (veh/h)	-	-	1394	-
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HCM Lane V/C Ratio	-	-	-	-
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HCM Control Delay (s/veh)	-	-	0	0
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HCM Lane LOS	-	-	A	A
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HCM 95th %tile Q(veh)	-	-	0	0
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HCM 7th TWSC
5: Glen Helen Pkwy & Gate 3

Glen Helen RP Feasibility Analysis
Exist_Weekend_WP_PM

Intersection						
Int Delay, s/veh	0					
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations					 	
Traffic Vol, veh/h	0	0	167	0	0	106
Future Vol, veh/h	0	0	167	0	0	106
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	100	-
Veh in Median Storage, #	2	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	84	84	84	84	84	84
Heavy Vehicles, %	0	0	0	0	0	0
Mvmt Flow	0	0	199	0	0	126
Major/Minor	Minor1	Major1		Major2		
Conflicting Flow All	262	99	0	0	199	0
Stage 1	199	-	-	-	-	-
Stage 2	63	-	-	-	-	-
Critical Hdwy	6.8	6.9	-	-	4.1	-
Critical Hdwy Stg 1	5.8	-	-	-	-	-
Critical Hdwy Stg 2	5.8	-	-	-	-	-
Follow-up Hdwy	3.5	3.3	-	-	2.2	-
Pot Cap-1 Maneuver	710	943	-	-	1386	-
Stage 1	821	-	-	-	-	-
Stage 2	958	-	-	-	-	-
Platoon blocked, %			-	-	-	-
Mov Cap-1 Maneuver	710	943	-	-	1386	-
Mov Cap-2 Maneuver	767	-	-	-	-	-
Stage 1	821	-	-	-	-	-
Stage 2	958	-	-	-	-	-
Approach	WB	NB		SB		
HCM Control Delay, s/v	0	0		0		
HCM LOS	A					
Minor Lane/Major Mvmt	NBT	NBRWBLn1	SBL	SBT		
Capacity (veh/h)	-	-	-	1386	-	
HCM Lane V/C Ratio	-	-	-	-	-	
HCM Control Delay (s/veh)	-	-	0	0	-	
HCM Lane LOS	-	-	A	A	-	
HCM 95th %tile Q(veh)	-	-	-	0	-	

Intersection												
Int Delay, s/veh	0.7											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕		↕	↕	↕	↕	↕	
Traffic Vol, veh/h	12	0	3	0	0	1	5	160	1	0	100	6
Future Vol, veh/h	12	0	3	0	0	1	5	160	1	0	100	6
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	100	-	100	175	-	-
Veh in Median Storage, #	-	2	-	-	2	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	81	81	81	81	81	81	81	81	81	81	81	81
Heavy Vehicles, %	0	0	0	0	0	0	0	0	0	0	0	0
Mvmt Flow	15	0	4	0	0	1	6	198	1	0	123	7

Major/Minor	Minor2		Minor1		Major1		Major2	
Conflicting Flow All	238	338	65	272	341	99	131	0
Stage 1	127	127	-	210	210	-	-	-
Stage 2	111	211	-	62	131	-	-	-
Critical Hdwy	7.5	6.5	6.9	7.5	6.5	6.9	4.1	-
Critical Hdwy Stg 1	6.5	5.5	-	6.5	5.5	-	-	-
Critical Hdwy Stg 2	6.5	5.5	-	6.5	5.5	-	-	-
Follow-up Hdwy	3.5	4	3.3	3.5	4	3.3	2.2	-
Pot Cap-1 Maneuver	701	586	991	665	584	944	1467	-
Stage 1	869	795	-	778	732	-	-	-
Stage 2	888	731	-	948	792	-	-	-
Platoon blocked, %								
Mov Cap-1 Maneuver	698	584	991	659	582	944	1467	-
Mov Cap-2 Maneuver	775	661	-	724	660	-	-	-
Stage 1	869	795	-	775	729	-	-	-
Stage 2	883	728	-	944	792	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s/v	9.55	8.82	0.22	0
HCM LOS	A	A		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1467	-	-	810	944	1386	-	-
HCM Lane V/C Ratio	0.004	-	-	0.023	0.001	-	-	-
HCM Control Delay (s/veh)	7.5	-	-	9.5	8.8	0	-	-
HCM Lane LOS	A	-	-	A	A	A	-	-
HCM 95th %tile Q(veh)	0	-	-	0.1	0	0	-	-

HCM 7th TWSC
7: Glen Helen Pkwy & Sherrif's Rodeo Pk Lot

Glen Helen RP Feasibility Analysis
Exist_Weekend_WP_PM

Intersection						
Int Delay, s/veh	0					
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	0	0	1	200	167	0
Future Vol, veh/h	0	0	1	200	167	0
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	100	-	-	-
Veh in Median Storage, #	2	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	84	84	84	84	84	84
Heavy Vehicles, %	0	0	0	0	0	0
Mvmt Flow	0	0	1	238	199	0
Major/Minor	Minor2	Major1		Major2		
Conflicting Flow All	320	99	199	0	-	0
Stage 1	199	-	-	-	-	-
Stage 2	121	-	-	-	-	-
Critical Hdwy	6.8	6.9	4.1	-	-	-
Critical Hdwy Stg 1	5.8	-	-	-	-	-
Critical Hdwy Stg 2	5.8	-	-	-	-	-
Follow-up Hdwy	3.5	3.3	2.2	-	-	-
Pot Cap-1 Maneuver	654	943	1386	-	-	-
Stage 1	821	-	-	-	-	-
Stage 2	897	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	653	943	1386	-	-	-
Mov Cap-2 Maneuver	744	-	-	-	-	-
Stage 1	820	-	-	-	-	-
Stage 2	897	-	-	-	-	-
Approach	EB	NB		SB		
HCM Control Delay, s/v	0	0.04		0		
HCM LOS	A					
Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR	
Capacity (veh/h)	1386	-	-	-	-	
HCM Lane V/C Ratio	0.001	-	-	-	-	
HCM Control Delay (s/veh)	7.6	-	0	-	-	
HCM Lane LOS	A	-	A	-	-	
HCM 95th %tile Q(veh)	0	-	-	-	-	

HCM 7th TWSC
8: Glen Helen Pkwy & Pvt Dwy/Gate 1

Glen Helen RP Feasibility Analysis
Exist_Weekend_WP_PM

Intersection												
Int Delay, s/veh	3.3											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕		↕	↕			↕	↕	↕	↕	
Traffic Vol, veh/h	1	1	0	45	2	59	1	106	13	8	95	0
Future Vol, veh/h	1	1	0	45	2	59	1	106	13	8	95	0
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	0	-	-	-	-	215	115	-	-
Veh in Median Storage, #	-	2	-	-	2	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	84	84	84	84	84	84	84	84	84	84	84	84
Heavy Vehicles, %	0	0	0	0	0	0	0	0	0	0	0	0
Mvmt Flow	1	1	0	54	2	70	1	126	15	10	113	0

Major/Minor	Minor2		Minor1		Major1		Major2					
Conflicting Flow All	199	276	57	205	261	63	113	0	0	142	0	0
Stage 1	132	132	-	129	129	-	-	-	-	-	-	-
Stage 2	67	144	-	76	132	-	-	-	-	-	-	-
Critical Hdwy	7.5	6.5	6.9	7.5	6.5	6.9	4.1	-	-	4.1	-	-
Critical Hdwy Stg 1	6.5	5.5	-	6.5	5.5	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.5	5.5	-	6.5	5.5	-	-	-	-	-	-	-
Follow-up Hdwy	3.5	4	3.3	3.5	4	3.3	2.2	-	-	2.2	-	-
Pot Cap-1 Maneuver	748	635	1004	740	647	995	1489	-	-	1454	-	-
Stage 1	863	791	-	868	794	-	-	-	-	-	-	-
Stage 2	942	782	-	930	791	-	-	-	-	-	-	-
Platoon blocked, %								-	-	-	-	-
Mov Cap-1 Maneuver	687	630	1004	734	643	995	1489	-	-	1454	-	-
Mov Cap-2 Maneuver	762	692	-	794	702	-	-	-	-	-	-	-
Stage 1	858	786	-	867	793	-	-	-	-	-	-	-
Stage 2	872	781	-	922	786	-	-	-	-	-	-	-

Approach	EB		WB		NB		SB	
HCM Control Delay, s/v	9.98		9.34		0.07		0.58	
HCM LOS	A		A					

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	WBLn2	SBL	SBT	SBR
Capacity (veh/h)	34	-	-	725	794	981	1454	-	-
HCM Lane V/C Ratio	0.001	-	-	0.003	0.067	0.074	0.007	-	-
HCM Control Delay (s/veh)	7.4	0	-	10	9.9	9	7.5	-	-
HCM Lane LOS	A	A	-	A	A	A	A	-	-
HCM 95th %tile Q(veh)	0	-	-	0	0.2	0.2	0	-	-

HCM 7th TWSC
9: Glen Helen Pkwy & Sherrif's Rodeo 2

Glen Helen RP Feasibility Analysis
Exist_Weekend_WP_PM

Intersection						
Int Delay, s/veh	0					
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations	W			↑↑	↑↑	
Traffic Vol, veh/h	0	0	0	115	139	0
Future Vol, veh/h	0	0	0	115	139	0
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	2	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	88	88	88	88	88	88
Heavy Vehicles, %	0	0	0	0	0	0
Mvmt Flow	0	0	0	131	158	0

Major/Minor	Minor2	Major1	Major2			
Conflicting Flow All	223	79	158	0	-	0
Stage 1	158	-	-	-	-	-
Stage 2	65	-	-	-	-	-
Critical Hdwy	6.8	6.9	4.1	-	-	-
Critical Hdwy Stg 1	5.8	-	-	-	-	-
Critical Hdwy Stg 2	5.8	-	-	-	-	-
Follow-up Hdwy	3.5	3.3	2.2	-	-	-
Pot Cap-1 Maneuver	750	972	1434	-	-	-
Stage 1	860	-	-	-	-	-
Stage 2	956	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	750	972	1434	-	-	-
Mov Cap-2 Maneuver	800	-	-	-	-	-
Stage 1	860	-	-	-	-	-
Stage 2	956	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s/v	0	0	0
HCM LOS	A		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	1434	-	-	-	-
HCM Lane V/C Ratio	-	-	-	-	-
HCM Control Delay (s/veh)	0	-	0	-	-
HCM Lane LOS	A	-	A	-	-
HCM 95th %tile Q(veh)	0	-	-	-	-

HCM 7th Signalized Intersection Summary 10: Clearwater Pkwy & Glen Helen Pkwy

Glen Helen RP Feasibility Analysis
Exist_Weekend_WP_PM

	→	↘	↙	←	↖	↗
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑	↑	↘	↑↑	↘	↑
Traffic Volume (veh/h)	95	137	26	118	94	19
Future Volume (veh/h)	95	137	26	118	94	19
Initial Q (Qb), veh	0	0	0	0	0	0
Lane Width Adj.	1.00	1.00	1.00	1.00	1.00	1.00
Ped-Bike Adj(A_pbT)		1.00	1.00		1.00	1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach	No			No	No	
Adj Sat Flow, veh/h/ln	1900	1900	1900	1900	1900	1900
Adj Flow Rate, veh/h	104	151	29	130	103	21
Peak Hour Factor	0.91	0.91	0.91	0.91	0.91	0.91
Percent Heavy Veh, %	0	0	0	0	0	0
Cap, veh/h	1569	700	58	1955	1082	496
Arrive On Green	0.43	0.43	0.03	0.54	0.31	0.31
Sat Flow, veh/h	3705	1610	1810	3705	3510	1610
Grp Volume(v), veh/h	104	151	29	130	103	21
Grp Sat Flow(s),veh/h/ln	1805	1610	1810	1805	1755	1610
Q Serve(g_s), s	1.0	3.5	0.9	1.0	1.3	0.5
Cycle Q Clear(g_c), s	1.0	3.5	0.9	1.0	1.3	0.5
Prop In Lane		1.00	1.00		1.00	1.00
Lane Grp Cap(c), veh/h	1569	700	58	1955	1082	496
V/C Ratio(X)	0.07	0.22	0.50	0.07	0.10	0.04
Avail Cap(c_a), veh/h	1569	700	196	1955	1082	496
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	9.9	10.6	28.6	6.5	14.8	14.5
Incr Delay (d2), s/veh	0.1	0.7	6.6	0.1	0.2	0.2
Initial Q Delay(d3), s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.4	1.2	0.5	0.3	0.5	0.2
Unsig. Movement Delay, s/veh						
LnGrp Delay(d), s/veh	10.0	11.3	35.2	6.6	15.0	14.7
LnGrp LOS	A	B	D	A	B	B
Approach Vol, veh/h	255			159	124	
Approach Delay, s/veh	10.7			11.8	14.9	
Approach LOS	B			B	B	
Timer - Assigned Phs	1	2			6	8
Phs Duration (G+Y+Rc), s	6.4	30.6			37.0	23.0
Change Period (Y+Rc), s	4.5	4.5			4.5	4.5
Max Green Setting (Gmax), s	6.5	21.5			32.5	18.5
Max Q Clear Time (g_c+I1), s	2.9	5.5			3.0	3.3
Green Ext Time (p_c), s	0.0	1.0			0.8	0.3
Intersection Summary						
HCM 7th Control Delay, s/veh			12.0			
HCM 7th LOS			B			

HCM 7th Signalized Intersection Summary 11: I-15 NB Ramps & Glen Helen Pkwy

Glen Helen RP Feasibility Analysis
Exist_Weekend_WP_PM



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↑↑			↑↑		↰	↑	↱			
Traffic Volume (veh/h)	42	85	0	0	151	61	5	1	147	0	0	0
Future Volume (veh/h)	42	85	0	0	151	61	5	1	147	0	0	0
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0			
Lane Width Adj.	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00			
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00			
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00			
Work Zone On Approach	No				No			No				
Adj Sat Flow, veh/h/ln	1900	1900	0	0	1900	1900	1900	1900	1900			
Adj Flow Rate, veh/h	46	92	0	0	164	66	6	0	0			
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92			
Percent Heavy Veh, %	0	0	0	0	0	0	0	0	0			
Cap, veh/h	80	3057	0	0	1857	719	29	0				
Arrive On Green	0.04	0.85	0.00	0.00	0.73	0.73	0.01	0.00	0.00			
Sat Flow, veh/h	1810	3705	0	0	2639	984	3619	0	1610			
Grp Volume(v), veh/h	46	92	0	0	114	116	6	0	0			
Grp Sat Flow(s),veh/h/ln	1810	1805	0	0	1805	1723	1810	0	1610			
Q Serve(g_s), s	1.5	0.2	0.0	0.0	1.1	1.2	0.1	0.0	0.0			
Cycle Q Clear(g_c), s	1.5	0.2	0.0	0.0	1.1	1.2	0.1	0.0	0.0			
Prop In Lane	1.00		0.00	0.00		0.57	1.00		1.00			
Lane Grp Cap(c), veh/h	80	3057	0	0	1318	1258	29	0				
V/C Ratio(X)	0.58	0.03	0.00	0.00	0.09	0.09	0.21	0.00				
Avail Cap(c_a), veh/h	394	3057	0	0	1318	1258	1080	0				
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00			
Upstream Filter(I)	1.00	1.00	0.00	0.00	1.00	1.00	1.00	0.00	0.00			
Uniform Delay (d), s/veh	29.1	0.7	0.0	0.0	2.4	2.4	30.6	0.0	0.0			
Incr Delay (d2), s/veh	6.4	0.0	0.0	0.0	0.1	0.1	3.6	0.0	0.0			
Initial Q Delay(d3), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
%ile BackOfQ(50%),veh/ln	0.8	0.0	0.0	0.0	0.3	0.3	0.1	0.0	0.0			
Unsig. Movement Delay, s/veh												
LnGrp Delay(d), s/veh	35.5	0.8	0.0	0.0	2.5	2.6	34.1	0.0	0.0			
LnGrp LOS	D	A			A	A	C					
Approach Vol, veh/h	138				230			6				
Approach Delay, s/veh	12.3				2.6			34.1				
Approach LOS	B				A			C				
Timer - Assigned Phs	2				5		6	8				
Phs Duration (G+Y+Rc), s	57.0				7.2		49.8	5.0				
Change Period (Y+Rc), s	4.5				4.5		4.5	4.5				
Max Green Setting (Gmax), s	52.5				13.5		34.5	18.5				
Max Q Clear Time (g_c+I1), s	2.2				3.5		3.2	2.1				
Green Ext Time (p_c), s	0.6				0.0		1.4	0.0				

Intersection Summary

HCM 7th Control Delay, s/veh 6.7
HCM 7th LOS A

Notes

User approved volume balancing among the lanes for turning movement.
Unsignalized Delay for [NBR] is excluded from calculations of the approach delay and intersection delay.

HCM 7th TWSC
12: I-15 SB Ramps & Glen Helen Pkwy

Glen Helen RP Feasibility Analysis
Exist_Weekend_WP_PM

Intersection												
Int Delay, s/veh	7.2											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↑↑		↑	↑↑					↑	↑	
Traffic Vol, veh/h	0	41	0	130	26	0	0	0	0	86	5	13
Future Vol, veh/h	0	41	0	130	26	0	0	0	0	86	5	13
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	220	-	-	-	-	-	825	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	97	97	97	97	97	97	97	97	97	97	97	97
Heavy Vehicles, %	0	0	0	0	0	0	0	0	0	0	0	0
Mvmt Flow	0	42	0	134	27	0	0	0	0	89	5	13

Major/Minor	Major1			Major2			Minor2		
Conflicting Flow All	-	0	0	42	0	0	316	337	13
Stage 1	-	-	-	-	-	-	295	295	-
Stage 2	-	-	-	-	-	-	21	42	-
Critical Hdwy	-	-	-	4.1	-	-	6.8	6.5	6.9
Critical Hdwy Stg 1	-	-	-	-	-	-	5.8	5.5	-
Critical Hdwy Stg 2	-	-	-	-	-	-	5.8	5.5	-
Follow-up Hdwy	-	-	-	2.2	-	-	3.5	4	3.3
Pot Cap-1 Maneuver	0	-	-	1580	-	0	658	587	1070
Stage 1	0	-	-	-	-	0	736	673	-
Stage 2	0	-	-	-	-	0	1004	864	-
Platoon blocked, %	-	-	-	-	-	-	-	-	-
Mov Cap-1 Maneuver	-	-	-	1580	-	-	602	0	1070
Mov Cap-2 Maneuver	-	-	-	-	-	-	602	0	-
Stage 1	-	-	-	-	-	-	736	0	-
Stage 2	-	-	-	-	-	-	919	0	-

Approach	EB	WB	SB
HCM Control Delay, s/v	0	6.24	11.39
HCM LOS	B		

Minor Lane/Major Mvmt	EBT	EBR	WBL	WBT	SBLn1	SBLn2
Capacity (veh/h)	-	-	1580	-	602	1070
HCM Lane V/C Ratio	-	-	0.085	-	0.147	0.017
HCM Control Delay (s/veh)	-	-	7.5	-	12	8.4
HCM Lane LOS	-	-	A	-	B	A
HCM 95th %tile Q(veh)	-	-	0.3	-	0.5	0.1

HCM 7th AWSC
1: Glen Helen Pkwy & I-215 NB Ramps

Glen Helen RP Feasibility Analysis
Exist_Event_WP_PM

Intersection	
Intersection Delay, s/veh	13.9
Intersection LOS	B

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations					↕	↕	↕	↕			↕	↕
Traffic Vol, veh/h	0	0	0	286	20	91	189	130	0	0	117	74
Future Vol, veh/h	0	0	0	286	20	91	189	130	0	0	117	74
Peak Hour Factor	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91
Heavy Vehicles, %	0	0	0	0	0	0	0	0	0	0	0	0
Mvmt Flow	0	0	0	314	22	100	208	143	0	0	129	81
Number of Lanes	0	0	0	0	1	1	1	1	0	0	1	1

Approach	WB	NB	SB
Opposing Approach		SB	NB
Opposing Lanes	0	2	2
Conflicting Approach Left	NB		WB
Conflicting Lanes Left	2	0	2
Conflicting Approach Right	SB	WB	
Conflicting Lanes Right	2	2	0
HCM Control Delay, s/veh	16.8	12.5	10.4
HCM LOS	C	B	B

Lane	NBLn1	NBLn2	WBLn1	WBLn2	SBLn1	SBLn2
Vol Left, %	100%	0%	93%	0%	0%	0%
Vol Thru, %	0%	100%	7%	0%	100%	0%
Vol Right, %	0%	0%	0%	100%	0%	100%
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop
Traffic Vol by Lane	189	130	306	91	117	74
LT Vol	189	0	286	0	0	0
Through Vol	0	130	20	0	117	0
RT Vol	0	0	0	91	0	74
Lane Flow Rate	208	143	336	100	129	81
Geometry Grp	5	5	5	5	5	5
Degree of Util (X)	0.387	0.246	0.612	0.149	0.23	0.129
Departure Headway (Hd)	6.701	6.193	6.557	5.379	6.434	5.72
Convergence, Y/N	Yes	Yes	Yes	Yes	Yes	Yes
Cap	538	580	551	666	557	625
Service Time	4.444	3.936	4.296	3.118	4.182	3.468
HCM Lane V/C Ratio	0.387	0.247	0.61	0.15	0.232	0.13
HCM Control Delay, s/veh	13.6	11	19.1	9.1	11.1	9.3
HCM Lane LOS	B	B	C	A	B	A
HCM 95th-tile Q	1.8	1	4.1	0.5	0.9	0.4

HCM 7th AWSC 2: Glen Helen Pkwy & I-215 SB Ramps

Glen Helen RP Feasibility Analysis Exist_Event_WP_PM

Intersection

Intersection Delay, s/veh 31

Intersection LOS D

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↔	↔					↔		↔	↔	
Traffic Vol, veh/h	78	6	249	0	0	0	1	242	271	46	357	0
Future Vol, veh/h	78	6	249	0	0	0	1	242	271	46	357	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
Heavy Vehicles, %	0	0	0	0	0	0	0	0	0	0	0	0
Mvmt Flow	85	7	271	0	0	0	1	263	295	50	388	0
Number of Lanes	0	1	1	0	0	0	0	1	0	1	1	0

Approach	EB	NB	SB
Opposing Approach		SB	NB
Opposing Lanes	0	2	1
Conflicting Approach Left SB		EB	
Conflicting Lanes Left	2	2	0
Conflicting Approach Right NB			EB
Conflicting Lanes Right	1	0	2
HCM Control Delay, s/veh	4.7	48.8	21.9
HCM LOS	B	E	C

Lane	NBLn1	EBLn1	EBLn2	SBLn1	SBLn2
Vol Left, %	0%	93%	0%	100%	0%
Vol Thru, %	47%	7%	0%	0%	100%
Vol Right, %	53%	0%	100%	0%	0%
Sign Control	Stop	Stop	Stop	Stop	Stop
Traffic Vol by Lane	514	84	249	46	357
LT Vol	1	78	0	46	0
Through Vol	242	6	0	0	357
RT Vol	271	0	249	0	0
Lane Flow Rate	559	91	271	50	388
Geometry Grp	4b	5	5	5	5
Degree of Util (X)	0.942	0.195	0.49	0.098	0.702
Departure Headway (Hd)	6.067	7.706	6.513	7.024	6.513
Convergence, Y/N	Yes	Yes	Yes	Yes	Yes
Cap	592	463	549	507	551
Service Time	4.145	5.498	4.305	4.815	4.304
HCM Lane V/C Ratio	0.944	0.197	0.494	0.099	0.704
HCM Control Delay, s/veh	48.8	12.4	15.5	10.6	23.4
HCM Lane LOS	E	B	C	B	C
HCM 95th-tile Q	12.4	0.7	2.7	0.3	5.6

HCM 7th AWSC
3: Glen Helen Pkwy & Cajon Blvd

Glen Helen RP Feasibility Analysis
Exist_Event_WP_PM

Intersection												
Intersection Delay, s/veh50.9												
Intersection LOS F												

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↰↱		↰	↰↱			↰↱		↰	↰	
Traffic Vol, veh/h	168	43	120	131	36	120	26	225	63	145	431	29
Future Vol, veh/h	168	43	120	131	36	120	26	225	63	145	431	29
Peak Hour Factor	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Heavy Vehicles, %	0	0	0	0	0	0	0	0	0	0	0	0
Mvmt Flow	173	44	124	135	37	124	27	232	65	149	444	30
Number of Lanes	1	2	0	1	2	0	0	1	0	1	1	0

Approach	EB	WB	NB	SB
Opposing Approach	WB	EB	SB	NB
Opposing Lanes	3	3	2	1
Conflicting Approach Left	SB	NB	EB	WB
Conflicting Lanes Left	2	1	3	3
Conflicting Approach Right	NB	SB	WB	EB
Conflicting Lanes Right	1	2	3	3
HCM Control Delay, s/veh18.9		17.7	40.8	89.3
HCM LOS	C	C	E	F

Lane	NBLn1	EBLn1	EBLn2	EBLn3	WBLn1	WBLn2	WBLn3	SBLn1	SBLn2
Vol Left, %	8%	100%	0%	0%	100%	0%	0%	100%	0%
Vol Thru, %	72%	0%	100%	11%	0%	100%	9%	0%	94%
Vol Right, %	20%	0%	0%	89%	0%	0%	91%	0%	6%
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Stop	Stop	Stop
Traffic Vol by Lane	314	168	29	134	131	24	132	145	460
LT Vol	26	168	0	0	131	0	0	145	0
Through Vol	225	0	29	14	0	24	12	0	431
RT Vol	63	0	0	120	0	0	120	0	29
Lane Flow Rate	324	173	30	138	135	25	136	149	474
Geometry Grp	6	6	6	6	6	6	6	6	6
Degree of Util (X)	0.806	0.47	0.076	0.335	0.373	0.065	0.335	0.379	1.127
Departure Headway (Hd)	9.249	10.361	9.833	9.172	10.538	10.009	9.335	9.116	8.558
Convergence, Y/N	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Cap	395	350	366	395	343	360	388	395	427
Service Time	6.949	8.061	7.533	6.872	8.238	7.709	7.035	6.868	6.31
HCM Lane V/C Ratio	0.82	0.494	0.082	0.349	0.394	0.069	0.351	0.377	1.11
HCM Control Delay, s/veh	40.8	21.9	13.3	16.4	19.4	13.4	16.7	17.4	111.9
HCM Lane LOS	E	C	B	C	C	B	C	C	F
HCM 95th-tile Q	7.1	2.4	0.2	1.4	1.7	0.2	1.4	1.7	17

HCM 7th TWSC
4: Glen Helen Pkwy & Gate 4

Glen Helen RP Feasibility Analysis
Exist_Event_WP_PM

Intersection						
Int Delay, s/veh	0.6					
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations	W		↑↑		↑	↑↑
Traffic Vol, veh/h	13	45	262	0	1	672
Future Vol, veh/h	13	45	262	0	1	672
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	100	-
Veh in Median Storage, #	2	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	91	91	91	91	91	91
Heavy Vehicles, %	0	0	0	0	0	0
Mvmt Flow	14	49	288	0	1	738
Major/Minor	Minor1	Major1	Major2			
Conflicting Flow All	659	144	0	0	288	0
Stage 1	288	-	-	-	-	-
Stage 2	371	-	-	-	-	-
Critical Hdwy	6.8	6.9	-	-	4.1	-
Critical Hdwy Stg 1	5.8	-	-	-	-	-
Critical Hdwy Stg 2	5.8	-	-	-	-	-
Follow-up Hdwy	3.5	3.3	-	-	2.2	-
Pot Cap-1 Maneuver	401	884	-	-	1286	-
Stage 1	742	-	-	-	-	-
Stage 2	674	-	-	-	-	-
Platoon blocked, %			-	-	-	-
Mov Cap-1 Maneuver	401	884	-	-	1286	-
Mov Cap-2 Maneuver	571	-	-	-	-	-
Stage 1	742	-	-	-	-	-
Stage 2	673	-	-	-	-	-
Approach	WB	NB	SB			
HCM Control Delay, s/v	9.98	0	0.01			
HCM LOS	A					
Minor Lane/Major Mvmt	NBT	NBRWBLn1	SBL	SBT		
Capacity (veh/h)	-	-	787	1286	-	
HCM Lane V/C Ratio	-	-	0.081	0.001	-	
HCM Control Delay (s/veh)	-	-	10	7.8	-	
HCM Lane LOS	-	-	A	A	-	
HCM 95th %tile Q(veh)	-	-	0.3	0	-	

HCM 7th TWSC
5: Glen Helen Pkwy & Gate 3

Glen Helen RP Feasibility Analysis
Exist_Event_WP_PM

Intersection						
Int Delay, s/veh	1.5					
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations	Y		↑↑		Y	↑↑
Traffic Vol, veh/h	0	0	263	291	186	499
Future Vol, veh/h	0	0	263	291	186	499
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	100	-
Veh in Median Storage, #	2	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	90	90	90	90	90	90
Heavy Vehicles, %	0	0	0	0	0	0
Mvmt Flow	0	0	292	323	207	554
Major/Minor	Minor1	Major1	Major2			
Conflicting Flow All	1144	308	0	0	616	0
Stage 1	454	-	-	-	-	-
Stage 2	691	-	-	-	-	-
Critical Hdwy	6.8	6.9	-	-	4.1	-
Critical Hdwy Stg 1	5.8	-	-	-	-	-
Critical Hdwy Stg 2	5.8	-	-	-	-	-
Follow-up Hdwy	3.5	3.3	-	-	2.2	-
Pot Cap-1 Maneuver	196	694	-	-	974	-
Stage 1	612	-	-	-	-	-
Stage 2	464	-	-	-	-	-
Platoon blocked, %			-	-	-	-
Mov Cap-1 Maneuver	155	694	-	-	974	-
Mov Cap-2 Maneuver	322	-	-	-	-	-
Stage 1	612	-	-	-	-	-
Stage 2	366	-	-	-	-	-
Approach	WB	NB	SB			
HCM Control Delay, s/v	0	0	2.63			
HCM LOS	A					
Minor Lane/Major Mvmt	NBT	NBRWBLn1	SBL	SBT		
Capacity (veh/h)	-	-	-	974	-	
HCM Lane V/C Ratio	-	-	-	0.212	-	
HCM Control Delay (s/veh)	-	-	0	9.7	-	
HCM Lane LOS	-	-	A	A	-	
HCM 95th %tile Q(veh)	-	-	-	0.8	-	

Intersection

Int Delay, s/veh 1.6

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕		↕	↕	↕	↕	↕	↕
Traffic Vol, veh/h	39	0	24	0	0	1	98	533	0	14	289	195
Future Vol, veh/h	39	0	24	0	0	1	98	533	0	14	289	195
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	100	-	100	175	-	-
Veh in Median Storage, #	-	2	-	-	2	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	87	87	87	87	87	87	87	87	87	87	87	87
Heavy Vehicles, %	0	0	0	0	0	0	0	0	0	0	0	0
Mvmt Flow	45	0	28	0	0	1	113	613	0	16	332	224

Major/Minor	Minor2		Minor1		Major1		Major2					
Conflicting Flow All	1008	1314	278	1036	1426	306	556	0	0	613	0	0
Stage 1	476	476	-	838	838	-	-	-	-	-	-	-
Stage 2	532	838	-	198	589	-	-	-	-	-	-	-
Critical Hdwy	7.5	6.5	6.9	7.5	6.5	6.9	4.1	-	-	4.1	-	-
Critical Hdwy Stg 1	6.5	5.5	-	6.5	5.5	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.5	5.5	-	6.5	5.5	-	-	-	-	-	-	-
Follow-up Hdwy	3.5	4	3.3	3.5	4	3.3	2.2	-	-	2.2	-	-
Pot Cap-1 Maneuver	198	160	725	188	137	696	1024	-	-	976	-	-
Stage 1	544	560	-	331	384	-	-	-	-	-	-	-
Stage 2	504	384	-	791	499	-	-	-	-	-	-	-
Platoon blocked, %								-	-	-	-	-
Mov Cap-1 Maneuver	173	140	725	159	120	696	1024	-	-	976	-	-
Mov Cap-2 Maneuver	353	288	-	272	265	-	-	-	-	-	-	-
Stage 1	535	551	-	295	342	-	-	-	-	-	-	-
Stage 2	448	342	-	748	491	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s/v	14.81	10.18	1.39	0.25
HCM LOS	B	B		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1024	-	-	439	696	976	-	-
HCM Lane V/C Ratio	0.11	-	-	0.165	0.002	0.016	-	-
HCM Control Delay (s/veh)	8.9	-	-	14.8	10.2	8.7	-	-
HCM Lane LOS	A	-	-	B	B	A	-	-
HCM 95th %tile Q(veh)	0.4	-	-	0.6	0	0.1	-	-

Intersection						
Int Delay, s/veh	0					
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	0	0	4	679	293	0
Future Vol, veh/h	0	0	4	679	293	0
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	100	-	-	-
Veh in Median Storage, #	2	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	84	84	84	84	84	84
Heavy Vehicles, %	0	0	0	0	0	0
Mvmt Flow	0	0	5	808	349	0
Major/Minor	Minor2	Major1		Major2		
Conflicting Flow All	763	174	349	0	-	0
Stage 1	349	-	-	-	-	-
Stage 2	414	-	-	-	-	-
Critical Hdwy	6.8	6.9	4.1	-	-	-
Critical Hdwy Stg 1	5.8	-	-	-	-	-
Critical Hdwy Stg 2	5.8	-	-	-	-	-
Follow-up Hdwy	3.5	3.3	2.2	-	-	-
Pot Cap-1 Maneuver	345	845	1221	-	-	-
Stage 1	691	-	-	-	-	-
Stage 2	641	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	344	845	1221	-	-	-
Mov Cap-2 Maneuver	528	-	-	-	-	-
Stage 1	689	-	-	-	-	-
Stage 2	641	-	-	-	-	-
Approach	EB	NB		SB		
HCM Control Delay, s/v	0	0.05		0		
HCM LOS	A					
Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR	
Capacity (veh/h)	1221	-	-	-	-	
HCM Lane V/C Ratio	0.004	-	-	-	-	
HCM Control Delay (s/veh)	8	-	0	-	-	
HCM Lane LOS	A	-	A	-	-	
HCM 95th %tile Q(veh)	0	-	-	-	-	

HCM 7th TWSC
8: Glen Helen Pkwy & Pvt Dwy/Gate 1

Glen Helen RP Feasibility Analysis
Exist_Event_WP_PM

Intersection												
Int Delay, s/veh	6.2											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕		↕	↕			↕	↕	↕	↕	
Traffic Vol, veh/h	0	1	0	137	2	226	0	466	296	201	99	0
Future Vol, veh/h	0	1	0	137	2	226	0	466	296	201	99	0
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	0	-	-	-	-	215	115	-	-
Veh in Median Storage, #	-	2	-	-	2	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	90	90	90	90	90	90	90	90	90	90	90	90
Heavy Vehicles, %	0	0	0	0	0	0	0	0	0	0	0	0
Mvmt Flow	0	1	0	152	2	251	0	518	329	223	110	0

Major/Minor	Minor2		Minor1		Major1		Major2					
Conflicting Flow All	817	1403	55	1020	1074	259	110	0	0	847	0	0
Stage 1	557	557	-	518	518	-	-	-	-	-	-	-
Stage 2	260	847	-	502	557	-	-	-	-	-	-	-
Critical Hdwy	7.5	6.5	6.9	7.5	6.5	6.9	4.1	-	-	4.1	-	-
Critical Hdwy Stg 1	6.5	5.5	-	6.5	5.5	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.5	5.5	-	6.5	5.5	-	-	-	-	-	-	-
Follow-up Hdwy	3.5	4	3.3	3.5	4	3.3	2.2	-	-	2.2	-	-
Pot Cap-1 Maneuver	272	141	1007	194	222	746	1493	-	-	799	-	-
Stage 1	487	516	-	514	537	-	-	-	-	-	-	-
Stage 2	728	381	-	525	516	-	-	-	-	-	-	-
Platoon blocked, %								-	-	-	-	-
Mov Cap-1 Maneuver	129	102	1007	~ 139	160	746	1493	-	-	799	-	-
Mov Cap-2 Maneuver	223	148	-	313	319	-	-	-	-	-	-	-
Stage 1	351	371	-	514	537	-	-	-	-	-	-	-
Stage 2	481	381	-	377	371	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s/v	29.55	17.85	0	7.53
HCM LOS	D	C		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	WBLn2	SBL	SBT	SBR
Capacity (veh/h)	1493	-	-	148	313	737	799	-	-
HCM Lane V/C Ratio	-	-	-	0.008	0.486	0.344	0.279	-	-
HCM Control Delay (s/veh)	0	-	-	29.5	26.9	12.4	11.2	-	-
HCM Lane LOS	A	-	-	D	D	B	B	-	-
HCM 95th %tile Q(veh)	0	-	-	0	2.5	1.5	1.1	-	-

Notes												
~: Volume exceeds capacity			\$: Delay exceeds 300s			+: Computation Not Defined			*: All major volume in platoon			

Intersection						
Int Delay, s/veh	3					
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations	W			W	W	
Traffic Vol, veh/h	0	3	306	720	217	46
Future Vol, veh/h	0	3	306	720	217	46
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	2	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	91	91	91	91	91	91
Heavy Vehicles, %	0	0	0	0	0	0
Mvmt Flow	0	3	336	791	238	51
Major/Minor	Minor2	Major1		Major2		
Conflicting Flow All	1332	145	289	0	-	0
Stage 1	264	-	-	-	-	-
Stage 2	1068	-	-	-	-	-
Critical Hdwy	6.8	6.9	4.1	-	-	-
Critical Hdwy Stg 1	5.8	-	-	-	-	-
Critical Hdwy Stg 2	5.8	-	-	-	-	-
Follow-up Hdwy	3.5	3.3	2.2	-	-	-
Pot Cap-1 Maneuver	148	883	1284	-	-	-
Stage 1	762	-	-	-	-	-
Stage 2	296	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	98	883	1284	-	-	-
Mov Cap-2 Maneuver	255	-	-	-	-	-
Stage 1	507	-	-	-	-	-
Stage 2	296	-	-	-	-	-
Approach	EB	NB		SB		
HCM Control Delay, s/v	9.09	3.74		0		
HCM LOS	A					
Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR	
Capacity (veh/h)	1002	-	883	-	-	
HCM Lane V/C Ratio	0.262	-	0.004	-	-	
HCM Control Delay (s/veh)	8.8	1.6	9.1	-	-	
HCM Lane LOS	A	A	A	-	-	
HCM 95th %tile Q(veh)	1.1	-	0	-	-	

HCM 7th Signalized Intersection Summary 10: Clearwater Pkwy & Glen Helen Pkwy

Glen Helen RP Feasibility Analysis
Exist_Event_WP_PM

	→	↘	↙	←	↖	↗
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑	↑	↘	↑↑	↘	↑
Traffic Volume (veh/h)	1077	122	36	185	103	41
Future Volume (veh/h)	1077	122	36	185	103	41
Initial Q (Qb), veh	0	0	0	0	0	0
Lane Width Adj.	1.00	1.00	1.00	1.00	1.00	1.00
Ped-Bike Adj(A_pbT)		1.00	1.00		1.00	1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach	No			No	No	
Adj Sat Flow, veh/h/ln	1900	1900	1900	1900	1900	1900
Adj Flow Rate, veh/h	1171	133	39	201	112	45
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	0	0	0	0	0	0
Cap, veh/h	1571	701	72	1986	1053	483
Arrive On Green	0.44	0.44	0.04	0.55	0.30	0.30
Sat Flow, veh/h	3705	1610	1810	3705	3510	1610
Grp Volume(v), veh/h	1171	133	39	201	112	45
Grp Sat Flow(s), veh/h/ln	1805	1610	1810	1805	1755	1610
Q Serve(g_s), s	16.3	3.1	1.3	1.6	1.4	1.2
Cycle Q Clear(g_c), s	16.3	3.1	1.3	1.6	1.4	1.2
Prop In Lane		1.00	1.00		1.00	1.00
Lane Grp Cap(c), veh/h	1571	701	72	1986	1053	483
V/C Ratio(X)	0.75	0.19	0.54	0.10	0.11	0.09
Avail Cap(c_a), veh/h	1571	701	151	1986	1053	483
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	0.91	0.91	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	14.2	10.4	28.3	6.4	15.2	15.1
Incr Delay (d2), s/veh	3.0	0.5	6.2	0.1	0.2	0.4
Initial Q Delay(d3), s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	6.3	1.1	0.6	0.5	0.5	0.5
Unsig. Movement Delay, s/veh						
LnGrp Delay(d), s/veh	17.1	11.0	34.4	6.5	15.4	15.5
LnGrp LOS	B	B	C	A	B	B
Approach Vol, veh/h	1304			240	157	
Approach Delay, s/veh	16.5			11.1	15.4	
Approach LOS	B			B	B	
Timer - Assigned Phs	1	2			6	8
Phs Duration (G+Y+Rc), s	6.9	30.6			37.5	22.5
Change Period (Y+Rc), s	4.5	4.5			4.5	4.5
Max Green Setting (Gmax), s	5.0	23.5			33.0	18.0
Max Q Clear Time (g_c+I1), s	3.3	18.3			3.6	3.4
Green Ext Time (p_c), s	0.0	3.5			1.3	0.4
Intersection Summary						
HCM 7th Control Delay, s/veh			15.6			
HCM 7th LOS			B			

HCM 7th Signalized Intersection Summary 11: I-15 NB Ramps & Glen Helen Pkwy

Glen Helen RP Feasibility Analysis
Exist_Event_WP_PM



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	69	401	0	0	200	88	17	2	798	0	0	0
Future Volume (veh/h)	69	401	0	0	200	88	17	2	798	0	0	0
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0			
Lane Width Adj.	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00			
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00			
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00			
Work Zone On Approach	No				No				No			
Adj Sat Flow, veh/h/ln	1900	1900	0	0	1900	1900	1900	1900	1900			
Adj Flow Rate, veh/h	78	451	0	0	225	99	20	0	0			
Peak Hour Factor	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89			
Percent Heavy Veh, %	0	0	0	0	0	0	0	0	0			
Cap, veh/h	107	3009	0	0	1734	738	85	0				
Arrive On Green	0.06	0.83	0.00	0.00	0.70	0.70	0.02	0.00	0.00			
Sat Flow, veh/h	1810	3705	0	0	2561	1050	3619	0	1610			
Grp Volume(v), veh/h	78	451	0	0	163	161	20	0	0			
Grp Sat Flow(s),veh/h/ln	1810	1805	0	0	1805	1711	1810	0	1610			
Q Serve(g_s), s	2.7	1.5	0.0	0.0	1.9	1.9	0.3	0.0	0.0			
Cycle Q Clear(g_c), s	2.7	1.5	0.0	0.0	1.9	1.9	0.3	0.0	0.0			
Prop In Lane	1.00		0.00	0.00		0.61	1.00		1.00			
Lane Grp Cap(c), veh/h	107	3009	0	0	1269	1203	85	0				
V/C Ratio(X)	0.73	0.15	0.00	0.00	0.13	0.13	0.24	0.00				
Avail Cap(c_a), veh/h	388	3009	0	0	1269	1203	1063	0				
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00			
Upstream Filter(I)	1.00	1.00	0.00	0.00	1.00	1.00	1.00	0.00	0.00			
Uniform Delay (d), s/veh	29.1	1.0	0.0	0.0	3.1	3.1	30.2	0.0	0.0			
Incr Delay (d2), s/veh	9.1	0.1	0.0	0.0	0.2	0.2	1.4	0.0	0.0			
Initial Q Delay(d3), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
%ile BackOfQ(50%),veh/ln	1.4	0.1	0.0	0.0	0.5	0.5	0.2	0.0	0.0			
Unsig. Movement Delay, s/veh												
LnGrp Delay(d), s/veh	38.2	1.1	0.0	0.0	3.3	3.3	31.6	0.0	0.0			
LnGrp LOS	D	A			A	A	C					
Approach Vol, veh/h	529				324				20			
Approach Delay, s/veh	6.6				3.3				31.6			
Approach LOS	A				A				C			
Timer - Assigned Phs	2				5		6		8			
Phs Duration (G+Y+Rc), s	57.0				8.2		48.8		6.0			
Change Period (Y+Rc), s	4.5				4.5		4.5		4.5			
Max Green Setting (Gmax), s	52.5				13.5		34.5		18.5			
Max Q Clear Time (g_c+I1), s	3.5				4.7		3.9		2.3			
Green Ext Time (p_c), s	3.4				0.1		2.0		0.0			
Intersection Summary												
HCM 7th Control Delay, s/veh			5.9									
HCM 7th LOS			A									
Notes												
User approved volume balancing among the lanes for turning movement.												
Unsignalized Delay for [NBR] is excluded from calculations of the approach delay and intersection delay.												

HCM 7th TWSC
12: I-15 SB Ramps & Glen Helen Pkwy

Glen Helen RP Feasibility Analysis

Exist_Event_WP_PM

Intersection												
Int Delay, s/veh	87											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↑↑		↑	↑↑					↑	↑	
Traffic Vol, veh/h	0	90	3	195	22	0	0	0	0	380	11	27
Future Vol, veh/h	0	90	3	195	22	0	0	0	0	380	11	27
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	220	-	-	-	-	-	825	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	80	80	80	80	80	80	80	80	80	80	80	80
Heavy Vehicles, %	0	0	0	0	0	0	0	0	0	0	0	0
Mvmt Flow	0	113	4	244	28	0	0	0	0	475	14	34
Major/Minor	Major1			Major2			Minor2					
Conflicting Flow All	-	0	0	116	0	0				571	631	14
Stage 1	-	-	-	-	-	-				515	515	-
Stage 2	-	-	-	-	-	-				56	116	-
Critical Hdwy	-	-	-	4.1	-	-				6.8	6.5	6.9
Critical Hdwy Stg 1	-	-	-	-	-	-				5.8	5.5	-
Critical Hdwy Stg 2	-	-	-	-	-	-				5.8	5.5	-
Follow-up Hdwy	-	-	-	2.2	-	-				3.5	4	3.3
Pot Cap-1 Maneuver	0	-	-	1485	-	0				~456	401	1069
Stage 1	0	-	-	-	-	0				570	538	-
Stage 2	0	-	-	-	-	0				965	803	-
Platoon blocked, %		-	-		-							
Mov Cap-1 Maneuver	-	-	-	1485	-	-				~381	0	1069
Mov Cap-2 Maneuver	-	-	-	-	-	-				~381	0	-
Stage 1	-	-	-	-	-	-				570	0	-
Stage 2	-	-	-	-	-	-				807	0	-
Approach	EB			WB			SB					
HCM Control Delay, s/v	0			7.1			147.76					
HCM LOS							F					
Minor Lane/Major Mvmt	EBT	EBR	WBL	WBT	SBLn1	SBLn2						
Capacity (veh/h)	-	-	1485	-	381	1069						
HCM Lane V/C Ratio	-	-	0.164	-	1.247	0.044						
HCM Control Delay (s/veh)	-	-	7.9	-	161.7	8.5						
HCM Lane LOS	-	-	A	-	F	A						
HCM 95th %tile Q(veh)	-	-	0.6	-	20.5	0.1						
Notes												
~: Volume exceeds capacity \$: Delay exceeds 300s +: Computation Not Defined *: All major volume in platoon												

HCM 7th AWSC
3: Glen Helen Pkwy & Cajon Blvd

Glen Helen RP Feasibility Analysis
Exist_Weekday_WP_AM_MIT

Intersection	
Intersection Delay, s/veh	13.6
Intersection LOS	B

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↰↱		↰	↰↱		↰	↱	↰↱	↰	↱	
Traffic Vol, veh/h	150	71	24	97	11	193	5	67	111	223	58	18
Future Vol, veh/h	150	71	24	97	11	193	5	67	111	223	58	18
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
Heavy Vehicles, %	0	0	0	0	0	0	0	0	0	0	0	0
Mvmt Flow	163	77	26	105	12	210	5	73	121	242	63	20
Number of Lanes	1	2	0	1	2	0	1	1	1	1	1	0

Approach	EB	WB	NB	SB
Opposing Approach	WB	EB	SB	NB
Opposing Lanes	3	3	2	3
Conflicting Approach Left	SB	NB	EB	WB
Conflicting Lanes Left	2	3	3	3
Conflicting Approach Right	NB	SB	WB	EB
Conflicting Lanes Right	3	2	3	3
HCM Control Delay, s/veh	13.2	13	11.5	15.9
HCM LOS	B	B	B	C

Lane	NBLn1	NBLn2	NBLn3	EBLn1	EBLn2	EBLn3	WBLn1	WBLn2	WBLn3	SBLn1	SBLn2
Vol Left, %	100%	0%	0%	100%	0%	0%	100%	0%	0%	100%	0%
Vol Thru, %	0%	100%	0%	0%	100%	50%	0%	100%	2%	0%	76%
Vol Right, %	0%	0%	100%	0%	0%	50%	0%	0%	98%	0%	24%
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Stop	Stop	Stop	Stop	Stop
Traffic Vol by Lane	5	67	111	150	47	48	97	7	197	223	76
LT Vol	5	0	0	150	0	0	97	0	0	223	0
Through Vol	0	67	0	0	47	24	0	7	4	0	58
RT Vol	0	0	111	0	0	24	0	0	193	0	18
Lane Flow Rate	5	73	121	163	51	52	105	8	214	242	83
Geometry Grp	6	6	6	6	6	6	6	6	6	6	6
Degree of Util (X)	0.012	0.152	0.227	0.353	0.104	0.1	0.226	0.016	0.386	0.505	0.157
Departure Headway (Hd)	7.998	7.494	6.787	7.798	7.291	6.933	7.702	7.195	6.499	7.502	6.836
Convergence, Y/N	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Cap	448	478	528	461	492	517	466	498	554	482	525
Service Time	5.744	5.239	4.532	5.541	5.034	4.676	5.443	4.936	4.239	5.239	4.574
HCM Lane V/C Ratio	0.011	0.153	0.229	0.354	0.104	0.101	0.225	0.016	0.386	0.502	0.158
HCM Control Delay, s/veh	10.8	11.6	11.5	14.8	10.9	10.4	12.7	10.1	13.3	17.7	10.8
HCM Lane LOS	B	B	B	B	B	B	B	B	B	C	B
HCM 95th-ile Q	0	0.5	0.9	1.6	0.3	0.3	0.9	0	1.8	2.8	0.6

HCM 7th AWSC
3: Glen Helen Pkwy & Cajon Blvd

Glen Helen RP Feasibility Analysis
Exist_Weekday_WP_PM_MIT

Intersection	
Intersection Delay, s/veh	28.6
Intersection LOS	D

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	112	54	39	166	247	244	168	123	94	257	80	183
Future Vol, veh/h	112	54	39	166	247	244	168	123	94	257	80	183
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Heavy Vehicles, %	0	0	0	0	0	0	0	0	0	0	0	0
Mvmt Flow	119	57	41	177	263	260	179	131	100	273	85	195
Number of Lanes	1	2	0	1	2	0	1	1	1	1	1	0

Approach	EB	WB	NB	SB
Opposing Approach	WB	EB	SB	NB
Opposing Lanes	3	3	2	3
Conflicting Approach Left	SB	NB	EB	WB
Conflicting Lanes Left	2	3	3	3
Conflicting Approach Right	NB	SB	WB	EB
Conflicting Lanes Right	3	2	3	3
HCM Control Delay, s/veh	18.3	32.9	20.5	33.3
HCM LOS	C	D	C	D

Lane	NBLn1	NBLn2	NBLn3	EBLn1	EBLn2	EBLn3	WBLn1	WBLn2	WBLn3	SBLn1	SBLn2
Vol Left, %	100%	0%	0%	100%	0%	0%	100%	0%	0%	100%	0%
Vol Thru, %	0%	100%	0%	0%	100%	32%	0%	100%	25%	0%	30%
Vol Right, %	0%	0%	100%	0%	0%	68%	0%	0%	75%	0%	70%
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Stop	Stop	Stop	Stop	Stop
Traffic Vol by Lane	168	123	94	112	36	57	166	165	326	257	263
LT Vol	168	0	0	112	0	0	166	0	0	257	0
Through Vol	0	123	0	0	36	18	0	165	82	0	80
RT Vol	0	0	94	0	0	39	0	0	244	0	183
Lane Flow Rate	179	131	100	119	38	61	177	175	347	273	280
Geometry Grp	6	6	6	6	6	6	6	6	6	6	6
Degree of Util (X)	0.529	0.369	0.262	0.378	0.116	0.175	0.484	0.455	0.85	0.75	0.69
Departure Headway (Hd)	10.662	10.151	9.435	11.421	10.902	10.405	9.975	9.46	8.922	9.978	8.99
Convergence, Y/N	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Cap	340	357	383	317	330	346	364	384	410	364	406
Service Time	8.362	7.851	7.135	9.138	8.618	8.121	7.675	7.16	6.622	7.678	6.69
HCM Lane V/C Ratio	0.526	0.367	0.261	0.375	0.115	0.176	0.486	0.456	0.846	0.75	0.69
HCM Control Delay, s/veh	24.7	18.7	15.5	20.9	15	15.3	21.7	19.8	45.3	37.2	29.4
HCM Lane LOS	C	C	C	C	B	C	C	C	E	E	D
HCM 95th-tile Q	2.9	1.7	1	1.7	0.4	0.6	2.5	2.3	8.2	5.9	5

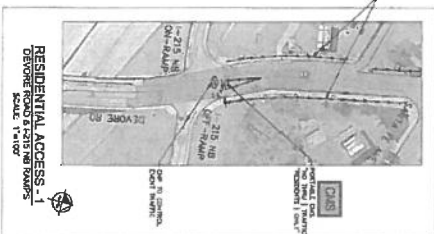
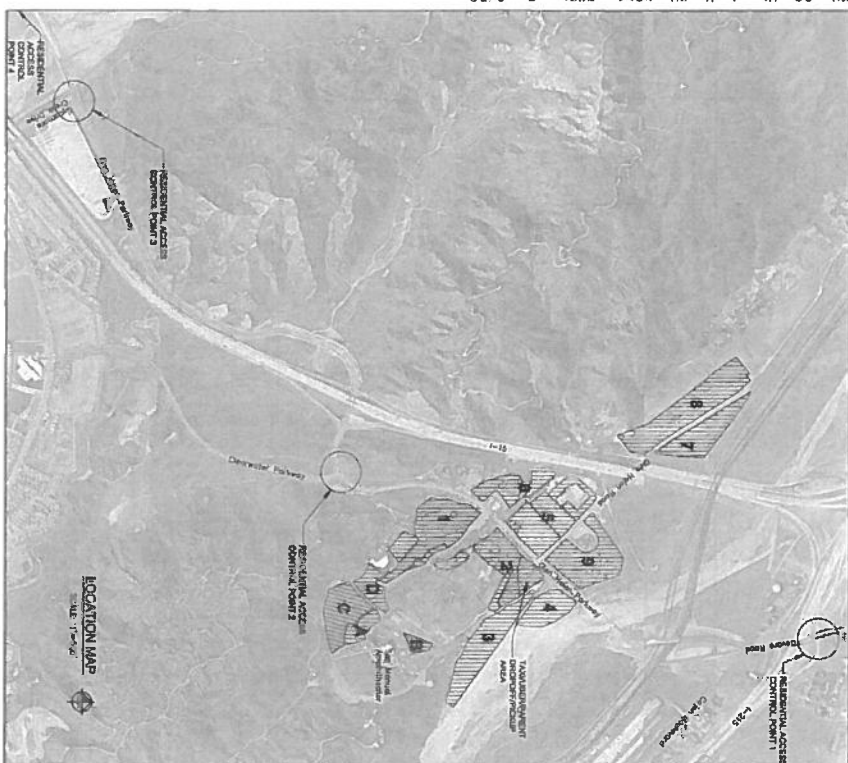
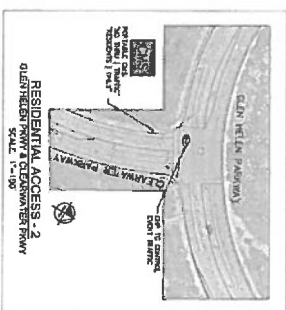
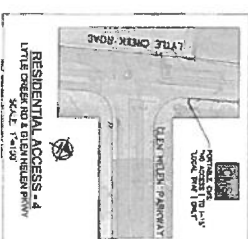
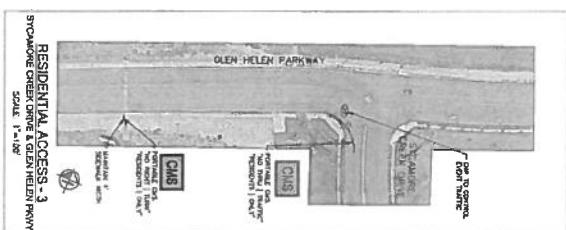
APPENDIX D

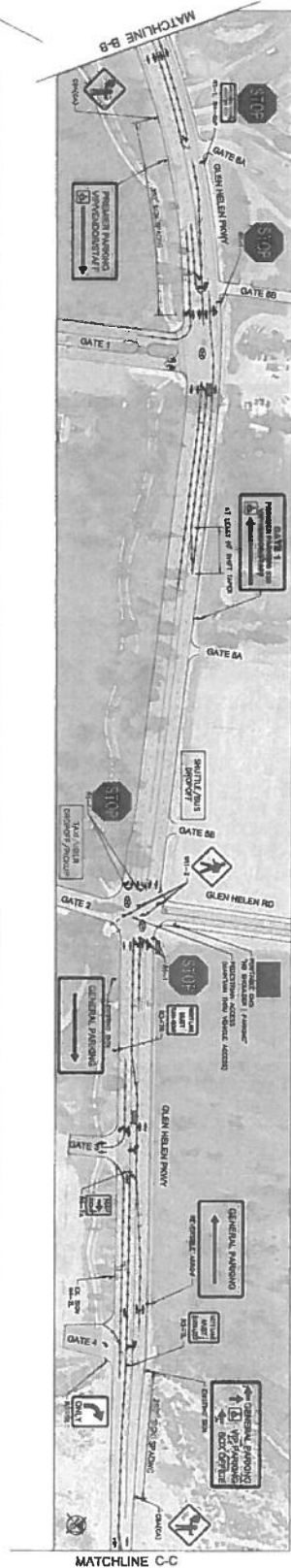
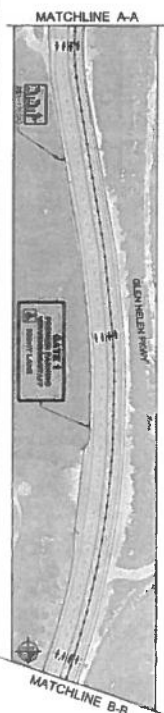
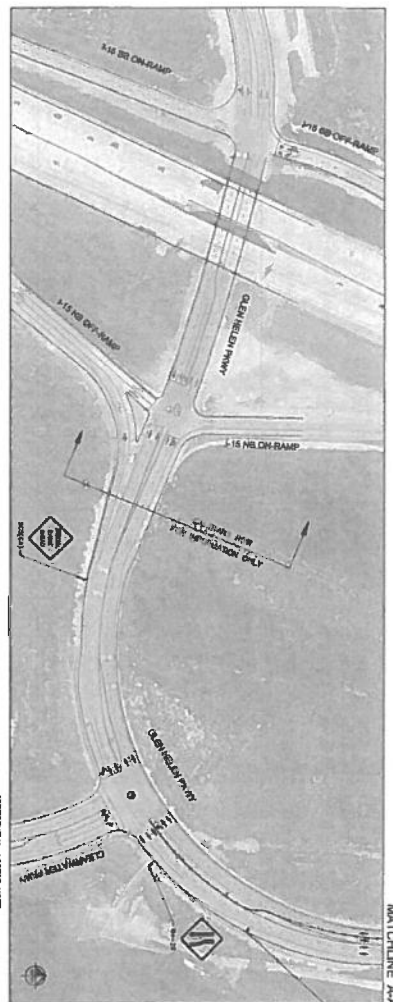
2023 TRAFFIC MANAGEMENT PLAN

**TRAFFIC HANDLING AND ACCESS PLAN
FOR SAN MANUEL AMPHITHEATER
SMALL (12,000) AND LARGE (40,000) ATTENDANCE EVENTS**

SHEET INDEX	
TC-01	COVER SHEET WITH RESIDENTIAL ACCESS CONTROL
AI-01	SMALL ATTENDANCE EVENT - INBOUND
AO-01	SMALL ATTENDANCE EVENT - OUTBOUND
BI-01	LARGE ATTENDANCE EVENT - INBOUND (1 OF 2)
BI-02	LARGE ATTENDANCE EVENT - INBOUND (2 OF 2)
BO-01	LARGE ATTENDANCE EVENT - OUTBOUND (1 OF 2)
BO-02	LARGE ATTENDANCE EVENT - OUTBOUND (2 OF 2)

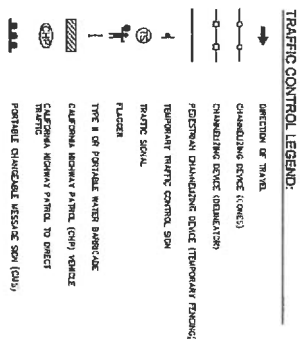
- | SHEET INDEX | |
|-------------|---|
| TC-01 | COVER SHEET WITH RESIDENTIAL ACCESS CONTROL |
| AI-01 | SMALL ATTENDANCE EVENT - INBOUND |
| AO-01 | SMALL ATTENDANCE EVENT - OUTBOUND |
| BI-01 | LARGE ATTENDANCE EVENT - INBOUND (1 OF 2) |
| BI-02 | LARGE ATTENDANCE EVENT - INBOUND (2 OF 2) |
| BO-01 | LARGE ATTENDANCE EVENT - OUTBOUND (1 OF 2) |
| BO-02 | LARGE ATTENDANCE EVENT - OUTBOUND (2 OF 2) |

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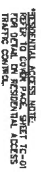
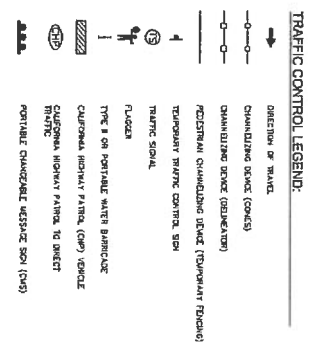


4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50 51 52 53 54 55 56 57 58 59 60 61 62 63 64 65 66 67 68 69 70 71 72 73 74 75 76 77 78 79 80 81 82 83 84 85 86 87 88 89 90 91 92 93 94 95 96 97 98 99 100 101 102 103 104 105 106 107 108 109 110 111 112 113 114 115 116 117 118 119 120 121 122 123 124 125 126 127 128 129 130 131 132 133 134 135 136 137 138 139 140 141 142 143 144 145 146 147 148 149 150 151 152 153 154 155 156 157 158 159 160 161 162 163 164 165 166 167 168 169 170 171 172 173 174 175 176 177 178 179 180 181 182 183 184 185 186 187 188 189 190 191 192 193 194 195 196 197 198 199 200 201 202 203 204 205 206 207 208 209 210 211 212 213 214 215 216 217 218 219 220 221 222 223 224 225 226 227 228 229 230 231 232 233 234 235 236 237 238 239 240 241 242 243 244 245 246 247 248 249 250 251 252 253 254 255 256 257 258 259 260 261 262 263 264 265 266 267 268 269 270 271 272 273 274 275 276 277 278 279 280 281 282 283 284 285 286 287 288 289 290 291 292 293 294 295 296 297 298 299 300 301 302 303 304 305 306 307 308 309 310 311 312 313 314 315 316 317 318 319 320 321 322 323 324 325 326 327 328 329 330 331 332 333 334 335 336 337 338 339 340 341 342 343 344 345 346 347 348 349 350 351 352 353 354 355 356 357 358 359 360 361 362 363 364 365 366 367 368 369 370 371 372 373 374 375 376 377 378 379 380 381 382 383 384 385 386 387 388 389 390 391 392 393 394 395 396 397 398 399 400 401 402 403 404 405 406 407 408 409 410 411 412 413 414 415 416 417 418 419 420 421 422 423 424 425 426 427 428 429 430 431 432 433 434 435 436 437 438 439 440 441 442 443 444 445 446 447 448 449 450 451 452 453 454 455 456 457 458 459 460 461 462 463 464 465 466 467 468 469 470 471 472 473 474 475 476 477 478 479 480 481 482 483 484 485 486 487 488 489 490 491 492 493 494 495 496 497 498 499 500 501 502 503 504 505 506 507 508 509 510 511 512 513 514 515 516 517 518 519 520 521 522 523 524 525 526

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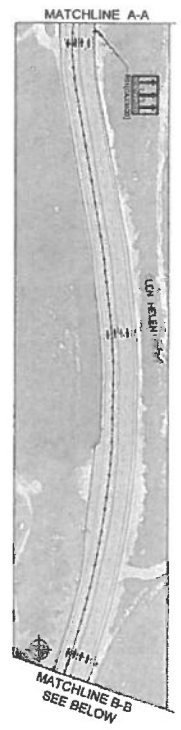
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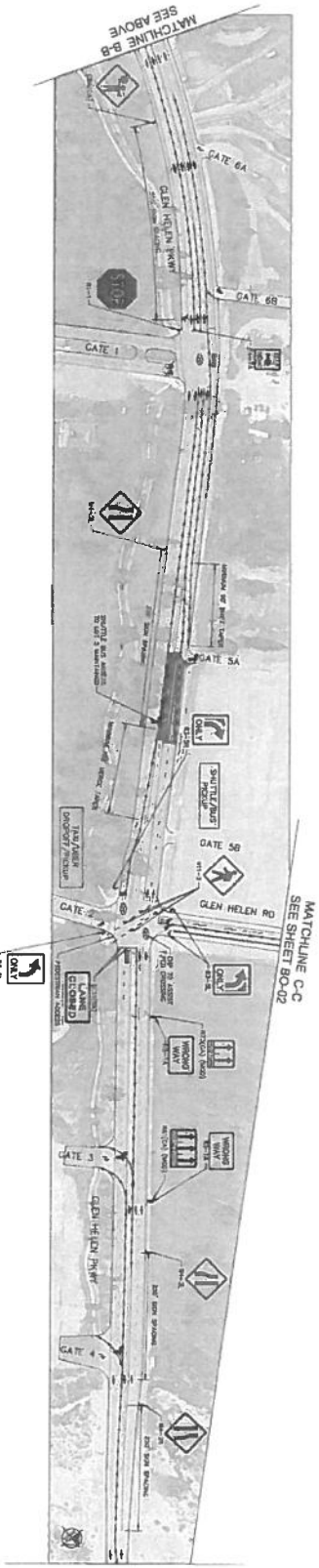
GRAPHIC SCALE IN FEET

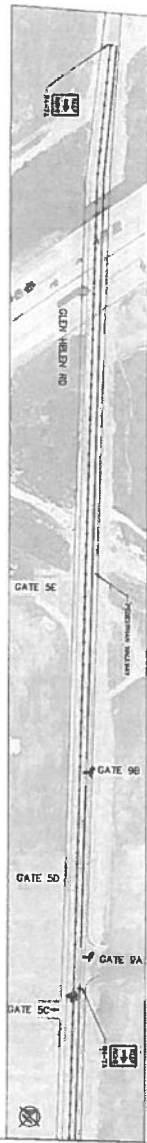
A horizontal graphic scale bar with markings at 0, 50, 100, and 200 feet. The bar is divided into four equal segments, each representing 50 feet.



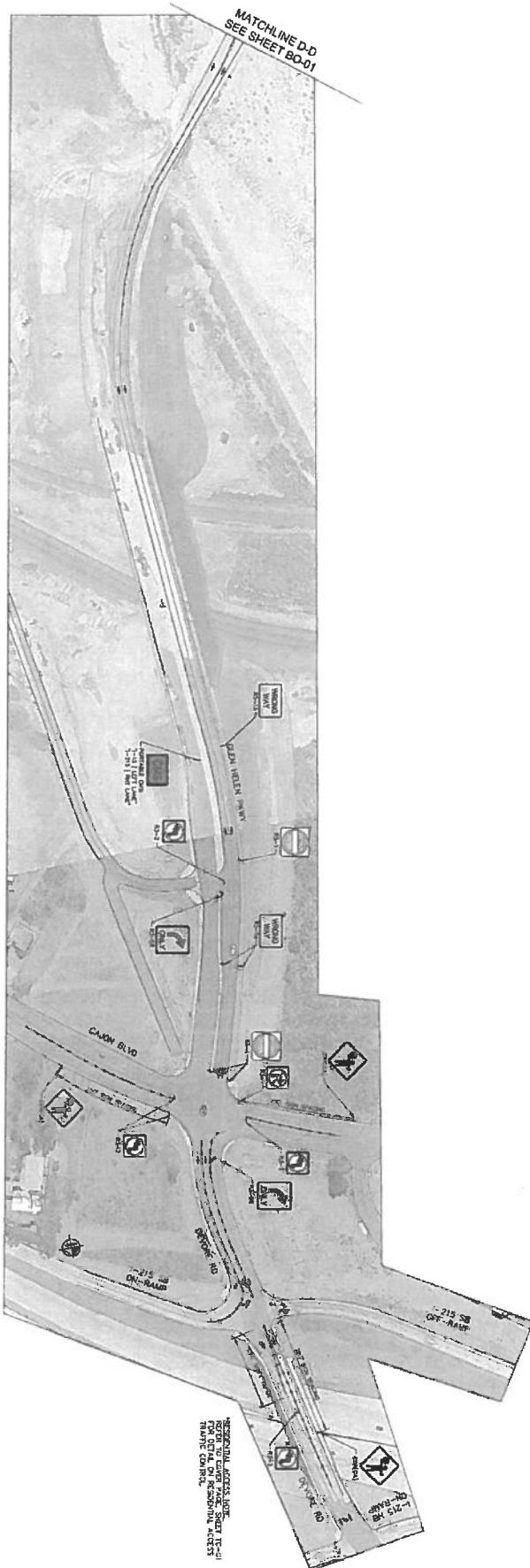
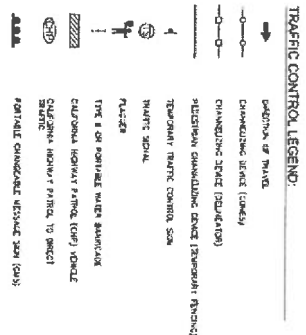
- ## DELOUR NOTES
1. CONTRACTOR TO SET UP SETBACK SPACING TO DIRECT VEHICLES ONTO SIDEWALK FROM FIELD PARK VIA CLINTON DR. (SEE ATTACHED). 300934 AVE. AND I-15 NB.
 2. CONTRACTOR TO SET UP SETBACK SPACING TO DIRECT VEHICLES ONTO EXISTING DRIVE FIELD PARK VIA I-15 SB, SIDEWALK AVE. AND I-15 NB.

TRAFFIC CONTROL LEGEND:	
	DIRECTION OF TRAVEL
	CHANGING BLOCK (ROADS)
	CHANGING POINT (CROSSINGS)
	POSITIVE CHANGING BLOCK (TEMPORARY)
	TEMPORARY TRAFFIC CONTROL SIGN
	TRAFFIC SIGNAL
	FLUOREN
	TYPE B OF PORTABLE WATER BARRIER
	CALIFORNIA HIGHWAY PATROL (CHP) VEHICLE
	CALIFORNIA HIGHWAY PATROL TO DIRECT TRAFFIC
	PORTABLE CHANGING BLOCK SIGN (CHS)

[illegible]



MATCHLINE C-C
SEE SHEET BO-01



*RESIDENTIAL ACCESS NOTE:
REFER TO COVER PAGE, SHEET TC-4
FOR DETAIL ON RESIDENTIAL ACCESS
TRAFFIC CONTROL.

[illegible]

KJ1JLW 770909M48005 + UFG NATION - CALT HELDEN AWP (544 WHEEL AWP)(C400) 48505/-80-02 DMC 2/6/2010 4 56:38 PM

Exhibit C

Consultant: LSA

Biological Resource Assessment

BIOLOGICAL RESOURCES ASSESSMENT

**GLEN HELEN REGIONAL PARK MARKET STUDY AND MASTER PLAN PROJECT
SAN BERNARDINO COUNTY, CALIFORNIA**

LSA

June 2024

BIOLOGICAL RESOURCES ASSESSMENT

GLEN HELEN REGIONAL PARK MARKET STUDY AND MASTER PLAN PROJECT SAN BERNARDINO COUNTY, CALIFORNIA

Submitted to:

Bergman Construction
2850 Saturn Street
Brea, California 92821

Prepared by:

LSA
3210 El Camino Real, Suite 100
Irvine, California 92602
(949) 553-0666

Project No. 20231447



June 2024

EXECUTIVE SUMMARY

LSA was retained by Bergman Construction to conduct a general biological study of the 391.57-acre Glen Helen Regional Park Market Study and Master Plan Project (project) site located within Assessor's Parcel Numbers (APNs) 0239-031-06-0000, 0239-031-42-0000, 0239-031-43-0000, 0262-011-10-0000, 0262-031-15-0000, 0348-161-01-0000, 0349-181-23-0000, 0349-191-09-0000, 0349-191-10-0000, 0349-191-12-0000, 0349-191-14-0000, 0349-191-19-0000, 0349-191-22-0000, 0349-174-09-0000, and 0349-191-18-0000 in San Bernardino County, California.

The project proposes the continued expansion of the existing County Regional Park under the existing Master Plan, which will focus on revenue-generating amenities at Glen Helen Regional Park to include but not be limited to new amusement park-level amenities, sporting venue(s), a concert venue, equestrian and rodeo facilities, and similar entertainment amenities. The study was conducted to address compliance with the California Environmental Quality Act (CEQA), the California Endangered Species Act (CESA), the federal Endangered Species Act (FESA), and for the identification of potential jurisdictional waters. Results of the general biological study are summarized below.

At the time of this report submittal, project plans have not been finalized and, as such, the project may result in direct impacts to special-status species, native habitats, and/or sensitive natural communities. Therefore, the exact impacts and effective mitigation could not be precisely determined.

Suitable habitat for Santa Ana River woollystar (*Eriastrum densifolium* ssp. *sanctorum*), Parry's spineflower (*Chorizanthe parryi* var. *parryi*), and slender-horned spineflower (*Dodecahema leptoceras*) is present in the Scalebroom Alluvial Scrub plant community within the Cajon Wash portion of the project. These three plant species have a moderate probability of occurrence. Therefore, focused rare plant surveys are required within the Cajon Wash portion of the project site to ascertain the presence or absence of special-status plants.

The project site contains suitable habitat for Crotch's bumble bee (*Bombus crotchii*) within the Scalebroom Alluvial Scrub, Scrub Oak Chaparral, and Mixed Scrub habitats. Therefore, focused surveys are required to determine if Crotch's bumble bee is present within the project site.

The project site contains suitable habitat for arroyo toad (*Anaxyrus [Bufo] californicus*) within the area of Cajon Wash. Therefore, focused arroyo toad surveys are required to determine if arroyo toad is present within the project site.

The project site contains suitable habitat for San Bernardino kangaroo rat (*Dipodomys merriami parvus*) and Los Angeles pocket mouse (*Perognathus longimembris brevinasus*) within and immediately adjacent to Cajon Wash. Therefore, focused San Bernardino kangaroo rat and Los Angeles pocket mouse surveys are required to determine if these species are present on the project site. These species have a high probability of occurrence.

The project site contains suitable habitat for burrowing owl (*Athene cunicularia hypugaea*) in the form of open, sparsely vegetated grassland within the northern portions of the project site, namely the existing campground area and the Cajon Creek terraces. Burrowing owl focused surveys will be required to ensure that any direct impacts to this species will be avoided. The species has a moderate probability of occurrence.

The project site contains suitable habitat for least Bell's vireo (*Vireo bellii pusillus*) in the form of Southwest Riparian Woodland. Therefore, focused least Bell's vireo surveys are required to determine if least Bell's vireo is present on the project site. The species has a moderate probability of occurrence.

The project site contains suitable habitat for coastal California gnatcatcher (*Poliophtila californica californica*) in the form of mMixed Scrub. Therefore, focused coastal California gnatcatcher surveys are required to determine if coastal California gnatcatcher is present on the project site. The species has a moderate probability of occurrence.

The project site provides suitable habitat for nesting birds protected under the California Fish and Game Code and the Migratory Bird Treaty Act (MBTA). It is recommended that vegetation removal be conducted between September 1 and January 15 (outside the general bird nesting season) to avoid impacts to nesting birds. If vegetation cannot be removed outside the bird nesting season, a pre-construction nesting bird survey by a qualified biologist is required prior to vegetation removal. Trees suitable for raptor nesting and vegetation suitable for migratory bird nesting are present within and around the project site.

The project site has suitable bat habitat in the form of large trees and Southwestern Riparian Woodland. It is recommended to avoid any tree and bridge work during April–August. If any tree or vegetation removal must be done during that time, a nocturnal emergence survey should be done to verify whether any bats are present by a qualified biologist prior to any work.

A general survey for potential jurisdictional waters/wetlands delineation was conducted as part of the Biological Resources Assessment (BRA) for this project. There are two drainage features (Features A and B) and two ponds (Ponds 1 and 2) identified within the project site that are considered potential jurisdictional waters that may be subject to the regulatory authority of the United States Army Corps of Engineers (USACE), the California Department of Fish and Wildlife (CDFW), and the Regional Water Quality Control Board (RWQCB). Additional jurisdictional areas may exist aside from those identified during the April 10, 2024 field survey. A formal jurisdictional delineation would be required to determine the limits and jurisdictional nature of these potential jurisdictional waters. Once the project plans have been refined, impacts to aquatic resources can be determined based on the aforementioned formal jurisdictional delineation and appropriate permits will need to be acquired from the appropriate agencies prior to impacts. Those regulatory and wildlife agencies may impose permit conditions in addition to any CEQA avoidance, minimization, and mitigation requirements.

The project may also impact the sensitive natural community of Riversidean Alluvial Fan Sage Scrub (RAFSS).

Although much of the project site consists of developed, ruderal, and ornamental land cover, it is located within a natural area that consists of Cajon Wash, the San Gabriel Mountains, and the San Bernardino Mountains. These natural areas all contain habitats that support special-status plant and wildlife species and serve as a wildlife corridor between habitats in the two mountain ranges. The project site functions as a wildlife movement corridor and an important stopover point for migratory species. As noted above, various focused surveys will be required to determine the expected impacts to special-status species and habitats. To reduce impacts to wildlife resources in the project vicinity, standard Best Management Practices (BMPs) shall be implemented.

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LIST OF ABBREVIATIONS AND ACRONYMS

°F	degrees Fahrenheit
amsl	above mean sea level
APN	Assessor's Parcel Number
BMPs	Best Management Practices
BRA	Biological Resources Assessment
BSA	biological study area
BUOW	western burrowing owl
CAGN	coastal California gnatcatcher
CBB	Crotch's bumble bee
CDFW	California Department of Fish and Wildlife
CEQA	California Environmental Quality Act
CESA	California Endangered Species Act
CFR	Code of Federal Regulations
CNDDDB	California Natural Diversity Database
CNPS	California Native Plant Society
Commission	California Fish and Game Commission
CRPR	California Rare Plant Rank
CWA	Clean Water Act
DBH	diameter at breast height
DDT	dichloro-diphenyl-trichloroethane
ESU	evolutionarily significant unit
FESA	Federal Endangered Species Act
I-15	Interstate 15
I-215	Interstate 215
I-5	Interstate 5
I-80	Interstate 80
IPaC	Information for Planning and Conservation
LBVI	least Bell's vireo
MBTA	Migratory Bird Treaty Act



MM	Mitigation Measure
mph	miles per hour
NRCS	Natural Resources Conservation Service
project	Glen Helen Regional Park Market Study and Master Plan Project
RAFSS	Riversidean Alluvial Fan Sage Scrub
RWQCB	Regional Water Quality Control Board
SARW	Santa Ana River woollystar
SBKR	San Bernardino kangaroo rat
SR-58	State Route 58
SSC	Species of Special Concern
SWFL	southwestern willow flycatcher
USACE	United States Army Corps of Engineers
USDA	United States Department of Agriculture
USFWS	United States Fish and Wildlife Service
USGS	United States Geological Survey

INTRODUCTION

Bergman Construction retained LSA to conduct a Biological Resources Assessment (BRA) for the Glen Helen Regional Park Market Study and Master Plan Project (project) on Assessor's Parcel Numbers (APNs) 0239-031-06-0000, 0239-031-42-0000, 0239-031-43-0000, 0262-011-10-0000, 0262-031-15-0000, 0348-161-01-0000, 0349-181-23-0000, 0349-191-09-0000, 0349-191-10-0000, 0349-191-12-0000, 0349-191-14-0000, 0349-191-19-0000, 0349-191-22-0000, 0349-174-09-0000, and 0349-191-18-0000 in San Bernardino County, California (see Figure 1; all figures are provided in Appendix A). The project proposes the continued expansion of the existing County Regional Park under the existing Master Plan, which will focus on revenue-generating amenities at Glen Helen Regional Park to include but not be limited to new amusement park-level amenities, sporting venue(s), a concert venue, equestrian and rodeo facilities, and similar entertainment amenities (Figure 2).

This biological resource assessment addresses the potential effects of the proposed project on designated critical habitats and/or any species currently listed or formally proposed for listing as endangered or threatened under the Federal Endangered Species Act (FESA) and the California Endangered Species Act (CESA) or species designated as sensitive by the California Department of Fish and Wildlife (CDFW) or the California Native Plant Society (CNPS). Information contained in this document is in accordance with accepted scientific and technical standards that are consistent with the requirements of the CDFW and the United States Fish and Wildlife Service (USFWS).

SITE DESCRIPTION

The 391.57-acre project site is a County Regional Park in unincorporated San Bernardino County near the community of Devore, California as depicted on the United States Geological Survey (USGS) *Devore, California* 7.5-minute series topographic quadrangle map occupying Sections 3, 4, 33, and 34 of Township 1 and 2 North, Range 5 West, San Bernardino Baseline and Meridian (USGS 1967).

Historically, the site is mostly developed and various portions have been used for park operations since at least the 1940s, when the site was graded to its current configuration. The current amenities offered by the park include two fishing lakes, a swimming pool with water slides, a splash pad, sheltered picnic areas, the Glen Helen Amphitheater, the Glen Helen Raceway, and associated parking areas and roads. The project vicinity consists of a mixture of residential, commercial, and industrial uses, along with some vacant undeveloped parcels, and is surrounded by the foothills of the Cajon Pass. The project site is on the south side of the San Bernardino Mountains.

The project site is adjacent to: Interstate 15 (I-15) and Glen Helen Parkway on the west; four single-family homes, undeveloped lands to the south; and undeveloped lands, Cajon Wash, commercial uses, and Interstate 215 (I-215) to the north and east.

The Cajon Wash Mitigation Bank, whose conservation area encompasses 1,200 acres preserved in perpetuity, occupies undeveloped lands to the east and south of the project site. The site itself includes the park, which primarily supports ornamental vegetation but also includes native vegetation in the surrounding foothills and Cajon Wash beyond the current limits of development (see Figures 1 and 2).

METHODS

LITERATURE REVIEW

Prior to performing the field survey, a literature review and a record search were conducted to identify the existence and potential for occurrence of sensitive or special-status plant and animal species in the project vicinity. The most recent records were reviewed for the following nine USGS 7.5-minute quadrangles containing and surrounding the project site: *Devore, San Bernardino North, San Bernardino South, Fontana, Guasti, Cucamonga Peak, Telegraph Peak, Cajon, and Silverwood Lake*.

Federal and State lists of sensitive species were also examined. Current electronic database records reviewed include the following:

- **California Natural Diversity Database Information (CNDDDB – RareFind 5)** (CDFW 2024a), which is administered by the CDFW. This database covers sensitive plant and animal species as well as sensitive natural communities that occur in California. Records from the nine USGS quadrangles were obtained from this database to inform the field survey.
- **CNPS Electronic Inventory of Rare and Endangered Vascular Plants** (CNPS 2024b), which uses four specific categories or “lists” of sensitive plant species to assist with the conservation of rare or endangered botanical resources. All the plants constituting California Rare Plant Ranks (CRPRs) 1A, 1B, 2A, and 2B are intended to meet the status definitions of “threatened” or “endangered” in the CESA and the California Fish and Game Code and are considered by CNPS to be eligible for State listing. At the discretion of the California Environmental Quality Act (CEQA) Lead Agency, impacts to these species may be analyzed as such, pursuant to *State CEQA Guidelines* Sections 15125(c) and 15380. Plants in Rank 3 (limited information; review list), Rank 4 (limited distribution; watch list), or that are considered Locally Unusual and Significant may be analyzed under CEQA if there is sufficient information to assess potential significant impacts. Records from the USGS *Devore, California* 7.5-minute quadrangle were obtained from this database to inform the field survey.
- **USFWS Information for Planning and Conservation (IPaC) Online System**, which lists all proposed, candidate, threatened, and endangered species managed by the Endangered Species Program of the USFWS that have the potential to occur on or near a particular site. This database also lists all known critical habitats, national wildlife refuges, and migratory birds that could potentially be impacted by activities from a proposed project. An IPaC Resource Report was generated for the project site.
- **USFWS Designated Critical Habitat Map** (USFWS 2023), which lists species and designated critical habitat information for species managed by the Endangered Species Program of the USFWS. It was used to determine the locations of any listed species sightings and critical habitat boundaries on and in the vicinity of the project.

- **National Wetland Inventory (NWI)** (USFWS n.d.-a) is a database administered by the USFWS. It is publicly available and provides detailed information on the abundance, characteristics, and distribution of America's wetlands. Wetland resources including riparian corridors were determined using this map.
- **United States Department of Agriculture (USDA) Natural Resources Conservation Service (NRCS)** is a database that maps soil data throughout the United States. It is helpful in determining what plant communities could occur. Soil types were determined using the WebSoil Survey (NRCS n.d.).
- **Cornell Lab of Ornithology (eBird)** (2024) is an online database of bird distribution and abundance administered by Cornell Lab of Ornithology and verified by regional experts. It is helpful in supplementing CNDDDB records for recent observations of waitlist or special birds and bird migration patterns.

In addition to the databases listed above, historic and current aerial imagery, existing environmental reports for developments in the project vicinity, and regional habitat conservation plans and local land use policies related to biological resources were reviewed (Google Earth Pro 2024).

A federally listed species is one provided with special legal protection under the FESA. A federally listed endangered species is a species that is in danger of extinction throughout all or a significant portion of its range. A federally threatened species is one likely to become endangered in the absence of special protection or management efforts provided by the listing. A candidate species is one that is proposed by the federal government for listing as endangered or threatened.

A State-listed species is one provided with special legal protection under the CESA. A State-listed endangered species is a species that is in danger of extinction throughout all or a significant portion of its range. A State-listed threatened species is one likely to become endangered in the absence of special protection or management efforts provided by the listing. A candidate species is one that is proposed by the federal or State government for listing as endangered or threatened.

A species of special concern is a species, subspecies, or distinct population of an animal native to California that currently satisfies one or more of the following criteria: (1) is extirpated from the State or, in the case of birds, in its primary seasonal or breeding role; (2) is listed as federally but not State threatened or endangered; (3) meets the State definition of threatened or endangered but has not formally been listed; (4) is experiencing or formerly experienced serious (noncyclical) population declines or range retractions (not reversed) that, if continued or resumed, could qualify it for State threatened or endangered status; (5) has naturally small populations exhibiting high susceptibility to risk from any factor(s) that, if realized, could lead to declines that would qualify it for State threatened or endangered status.

A special-status species is one that has been afforded special recognition by federal, State, and/or local resource agencies or jurisdictions, or recognized resource conservation organizations. Special-status wildlife species include: (1) species listed as a candidate, threatened, or endangered under the FESA or CESA; (2) species considered rare or endangered under the CEQA; (3) plants considered "Rare, Threatened, or Endangered in California" by the CNPS (Lists 1B and 2); (4) animals listed as

“species of special concern” by the State; and (5) animals fully protected in California by the USFWS code.

Critical habitat is a designated area defined by the USFWS as being important for the survival of species listed pursuant to the FESA. The USFWS evaluates the collection of the environmental conditions (i.e., plant communities, range, elevation, food source) essential to the continued conservation and preservation of each species listed as federally threatened or endangered. These areas may require special management or protections.

Before conducting the surveys, soil maps for San Bernardino County were referenced online to determine the types of soil found within the project site. As noted above, soil types were determined using the USDA Natural Resources Conservation Service Websoil Survey (NRCS n.d.).

RECONNAISSANCE FIELD SURVEY

LSA Biologists Leo Simone, Heather Monteleone, Carla Cervantes, and Christina Van Oosten conducted a general reconnaissance-level, pedestrian field survey on April 10, 2024 between 0930 and 1745 hours. All areas within the 391.57-acre project site were surveyed on foot, and binoculars were used to aid in the identification of animal species. Notes were taken on general site conditions, vegetation, and suitability of habitat for various special-status elements. Weather conditions during the survey included temperatures ranging from 63 to 73 degrees Fahrenheit (°F), with sunny skies, no precipitation, and 0- to 3-mile-per-hour (mph) winds. Photographs of the project site were taken to document existing conditions (provided in Appendix D). All habitat types within the project site were evaluated, identified, and mapped in the field.

JURISDICTIONAL FEATURES

An official jurisdictional delineation was not conducted as part of the BRA for this project. Potential jurisdictional features observed were noted and mapped and are discussed below.

VEGETATION

All plant species observed within the project site were recorded. Vegetation communities within the project site were identified and qualitatively described. This project site has areas that are inaccessible due to terrain or dense vegetation, including poison oak (*Toxicodendron diversilobum*), which are mainly the unbroken dense cover of Scrub Oak Chaparral in the southern sections of the project site, as well as the impenetrable Southwest Riparian Woodland area within the central portion of the project site. These areas were surveyed through binoculars.

All coast live oak (*Quercus agrifolia*) trees with a diameter at breast height (DBH) greater than 5 inches were surveyed and mapped.

Plant communities and vegetation mapping was conducted according to *A Manual of California Vegetation*, Second Edition (Sawyer et al. 2009). Plant nomenclature follows that of *The Jepson Manual*, Second Edition (Baldwin et al. 2012). A comprehensive list of the plant species observed during the survey is provided in Appendix B.

WILDLIFE

All wildlife and wildlife signs observed and detected, including tracks, scat, carcasses, burrows, excavations, and vocalizations, were recorded. Additional survey time was spent in those habitats most likely to be utilized by wildlife (native vegetation, wildlife trails, etc.) or in habitats with the potential to support State- and/or federally listed or otherwise special-status species. Notes were made on the general habitat types, species observed, and the conditions of the project site. Suitable habitat for listed and special-status species was determined by the presence of specific habitat elements. A comprehensive list of the wildlife species observed during the survey is provided in Appendix C.

Habitat potential for specific wildlife and plant species was classified as: Not Expected/Absent, Low, Moderate, High, or Present. These classifications were based on the quality of the habitat for each species and the proximity of the habitat to a known occurrence of a species obtained from CNDDDB data. The definition for each classification follows:

- **Not Expected/Absent:** Species not previously reported in the vicinity of the site, and suitable habitat is absent or very marginal due to disturbances, fragmentation, and/or isolation.
- **Low:** Species previously reported from the vicinity of the site, but suitable habitat is absent or marginal due to disturbances, fragmentation, and/or isolation.
- **Moderate:** Species previously reported from the vicinity of the site and large areas of contiguous high-quality habitat present, or species previously reported in the vicinity of the site, but suitable habitat quality is moderate due to disturbances, fragmentation, and/or isolation.
- **High:** Species previously reported from the regional vicinity of the site, and large areas of contiguous high-quality habitat are present.
- **Present:** Species was detected on site or immediately adjacent during surveys.

A list of special-status species and their probability of occurring within the project site is provided in Attachment D.

RESULTS

LITERATURE REVIEW RESULTS

According to the records collected from relevant literature and databases, 58 sensitive species (15 of which are listed as threatened, endangered, candidate for listing or fully protected) and 5 sensitive habitats have been documented in the *Devore, San Bernardino North, San Bernardino South, Fontana, Guasti, Cucamonga Peak, Telegraph Peak, Cajon, and Silverwood Lake* quads. This list of sensitive species and habitats includes any State and/or federally listed threatened or endangered species, CDFW-designated Species of Special Concern (SSC), and otherwise Special Animals. "Special Animals" is a general term that refers to all the taxa the CNDDDB is interested in tracking, regardless of their legal or protection status. This list is also referred to as the list of "species at risk" or "special-status species." The CDFW considers the taxa on this list to be those of greatest conservation need.

An analysis of the likelihood of the occurrence of all CNDDDB-sensitive species documented in the queried quads is provided in Appendix E. This analysis considers a species range as well as documentation within the vicinity of the project area, includes the habitat requirements for each species and the potential for their occurrence on the project site based on required habitat elements and range relative to the current site conditions. According to the databases, five sensitive habitats, including USFWS-designated critical habitat, occur within or adjacent to the project site.

SURVEY RESULTS

Topography and Soils

The topography of the project site is mostly flat within the existing developed park areas and has moderate to steep slopes within undeveloped portions of the site, with elevation ranges from approximately 1,890 to 2,220 feet (576 to 670 meters) above mean sea level (amsl).

A total of nine soil classifications were mapped on the project site (see Table A and Figure 3). These mapped soils are not considered hydric and have drainage class designations of well drained, somewhat excessively drained, and excessively drained as noted below (USDA 2024).

The existing soils are: Cieneba-Rock outcrop complex (30 to 50 percent slopes); Greenfield fine sandy loam (9 to 15 percent slopes); Hanford coarse sandy loam (2 to 9 percent slopes); Psamments, Fluvents and Frequently flooded soils; Fluvents and Frequently flooded soils; Ramona sandy loam (15 to 30 percent slopes) eroded; Soboba gravelly loamy sand (0 to 9 percent slopes); Tujunga loamy sand (0 to 5 percent slopes); Tujunga gravelly loamy sand (0 to 9 percent slopes); and Vista-Rock outcrop complex throughout the project site.