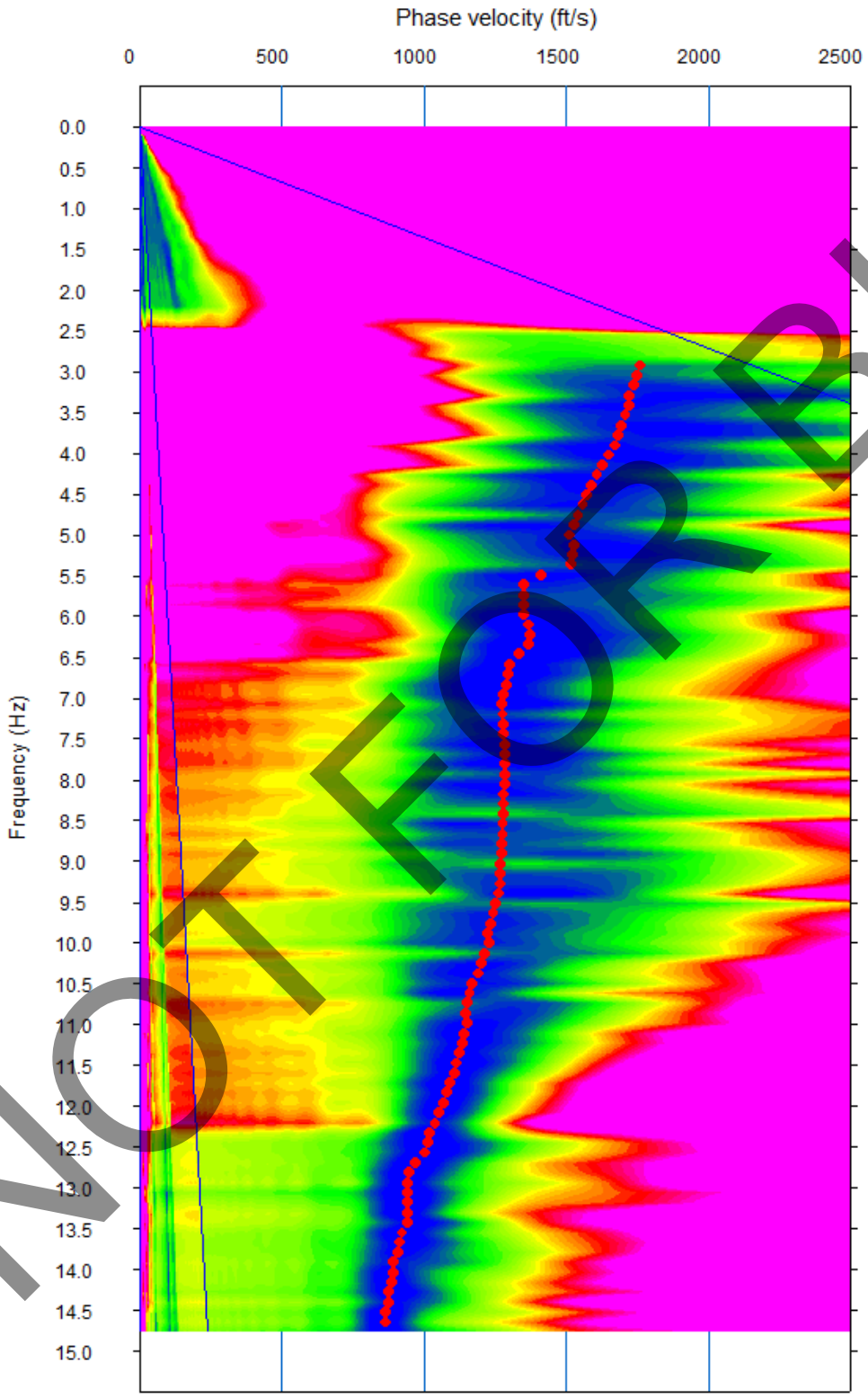
SEISMIC LINE SW-1



Dispersion Curve: Passive.dat

PASSIVE DISPERSION CURVE

APPENDIX B

SITE-SPECIFIC GROUND MOTION ANALYSIS

SITE-SPECIFIC GROUND MOTION ANALYSIS

A detailed summary of the site-specific ground motion analysis, which follows Section 21 of the ASCE Standard 7-16 (2017) and the 2022 California Building Code is presented below, with the Seismic Design Parameters Summary included within this appendix following the summary text.

- ***Mapped Spectral Acceleration Parameters (CBC 1613A.2.1)***-

  Based on maps prepared by the U.S.G.S (Risk-Adjusted Maximum Considered Earthquake (MCE_R) Ground Motion Parameter for the Conterminous United States for the 0.2 and 1-second Spectral Response Acceleration (5% of Critical Damping; Site Class B/C), a value of **2.506g** for the 0.2 second period (S_s) and **1.002g** for the 1.0 second period (S_1) was calculated (ASCE 7-16 Figures 22-1, 22-2 and CBC 1613A.2.1).

- ***Site Classification (CBC 1613A.2.2 & ASCE 7-16 Chapter 20)***-

  Based on the site-specific measured shear-wave value of 1,075.1 feet/second (327.7 meters/second), the soil profile type used should be Site Class **"D."** This Class is defined as having the upper 100 feet (30 meters) of the subsurface being underlain by "stiff soil" with average shear-wave velocities of 600 to 1,200 feet/second (180 to 360 meters/second), as detailed within Appendix A.

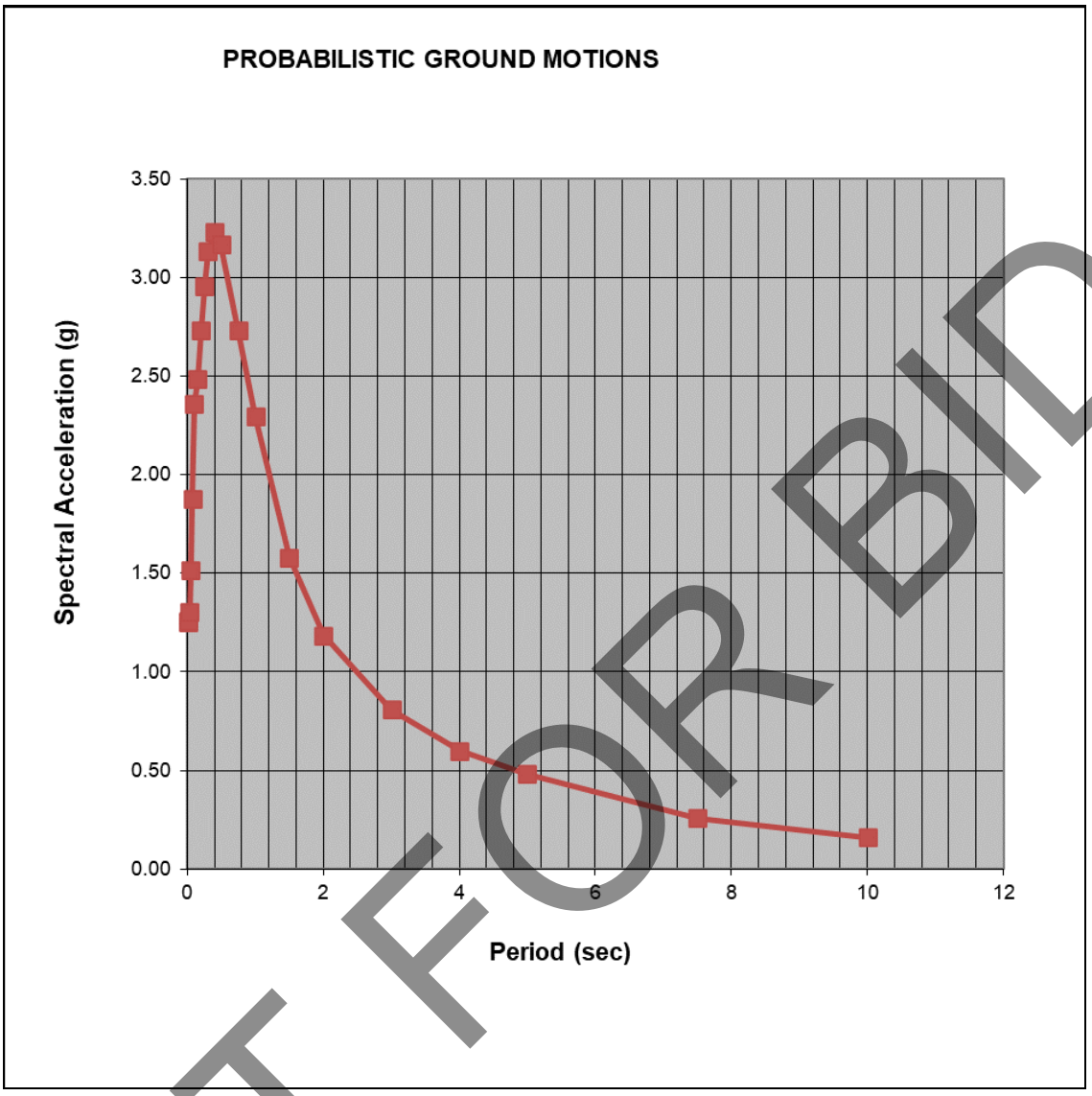
- ***Site Coefficients (CBC 1613A.2.3)***-

  Based on CBC Tables 1613A.2.3(1) and 1613A.2.3(2), the site coefficient **F_a = 1.2** and **F_v = 1.7**, respectively.

- ***Probabilistic (MCE_R) Ground Motions (ASCE 7 Section 21.2.1)***-

  Per Section 21.2.1, the probabilistic MCE spectral accelerations shall be taken as the spectral response accelerations in the direction of maximum response represented by a five percent damped acceleration response spectrum that is expected to achieve a one percent probability of collapse within a 50-year period.

  The probabilistic analysis included the use of the Open Seismic Hazard Analysis (OpenSHA). The selected Earthquake Rupture Forecast (ERF) was UCERF3 along with a Probability of Exceedance of 2% in 50 Years. The average of four Next Generation Attenuation West-2 Relations (2014 NGA) were utilized to produce a response spectrum. These included Chiou & Youngs (2014), Abrahamsom et al. (2014), Campbell & Bozorgnia (2014), Boore et al. (2014), and Campbell & Bozorgnia (2014). The Probabilistic Risk Targeted Response Spectrum was determined as the product of the ordinates of the probabilistic response spectrum and the applicable risk coefficient (C_R). These values were then modified to produce a spectrum based upon the maximum rotated components of ground motion. The resulting MCE_R Response Spectrum is indicated below:



- **<u>*Deterministic Spectral Response Analyses (ASCE 7 Section 21.2.2)*</u>-**

  The deterministic MCE_R response acceleration at each period shall be calculated as an 84th-percentile 5 percent damped spectral response acceleration in the direction of maximum horizontal response computed at that period. The largest such acceleration calculated for the characteristic earthquakes on all known active faults within the region shall be used. Analyses were conducted using the average of four Next Generation Attenuation West-2 Relations (2014 NGA), including Chiou & Youngs (2014), Abrahamsom et al. (2014), Boore et al. (2014) and Campbell & Bozorgnia (2014).

  Based on our review of the Fault Section Database within the Uniform California Earthquake Rupture Forecast (UCERF 3; Field et al., 2013), published geologic data, and based on the length (combined segments) and maximum magnitude of the San Andreas Fault Zone (southern section) located 1.8 kilometers to the northeast, a moment magnitude (M_W) used for this fault was 8.1.

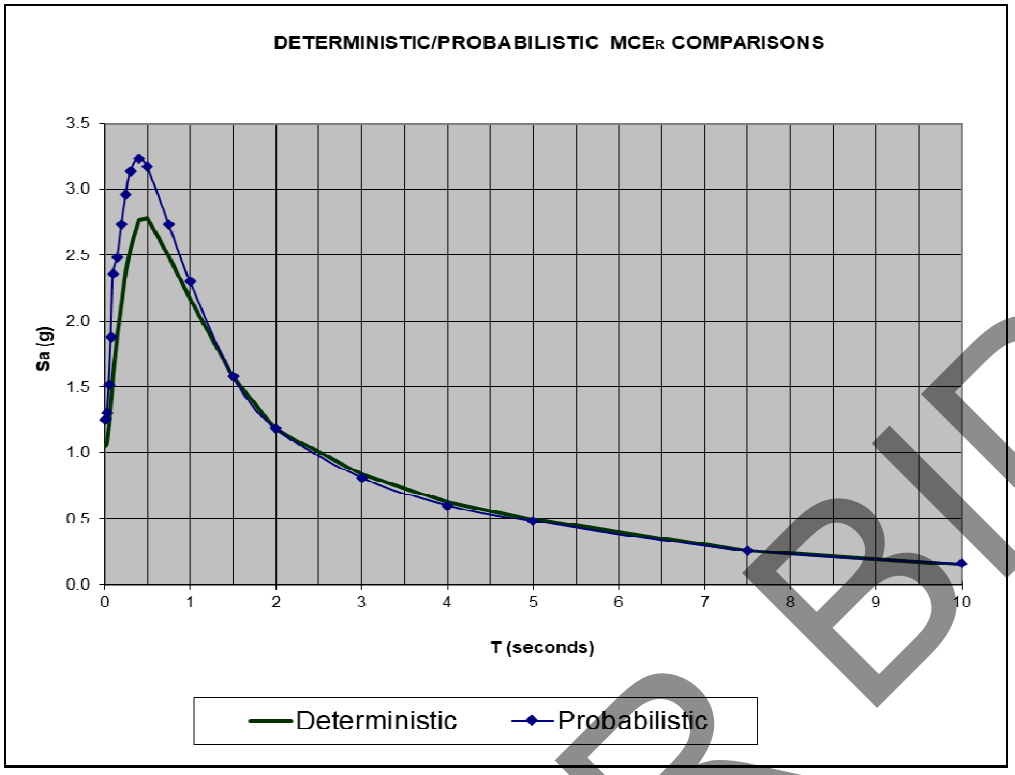
- **Site Specific MCE_R (ASCE 7 Section 21.2.3)-**

  The site-specific MCE_R spectral response acceleration at any period, S_{aM}, shall be taken as the lesser of the spectral response accelerations from the probabilistic ground motions of Section 21.2.1 and the deterministic ground motions of Section 21.2.2. The deterministic ground motions were compared with the probabilistic ground motions that were determined in accordance with Section 21.2.1.

Comparison of Deterministic MCE_R Values with Probabilistic MCE_R Values - Section 21.2.3

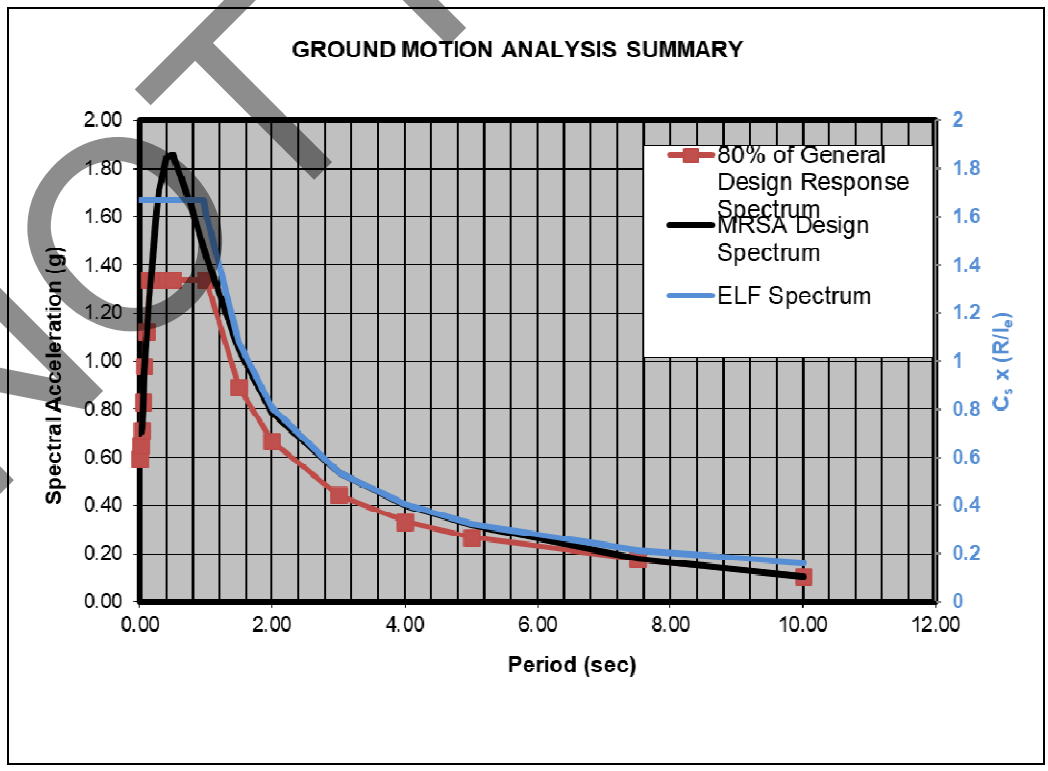
Period	Deterministic	Probabilistic	Lower Value (Site Specific MCE_R)	Governing Method	
T	MCE_R	MCE_R			
0.010	1.05	1.25	1.05	Deterministic Governs	
0.020	1.06	1.26	1.06	Deterministic Governs	
0.030	1.09	1.31	1.09	Deterministic Governs	
0.050	1.21	1.52	1.21	Deterministic Governs	
0.075	1.42	1.88	1.42	Deterministic Governs	
0.100	1.61	2.36	1.61	Deterministic Governs	
0.150	1.90	2.49	1.90	Deterministic Governs	
0.200	2.13	2.73	2.13	Deterministic Governs	
0.250	2.37	2.96	2.37	Deterministic Governs	
0.300	2.56	3.13	2.56	Deterministic Governs	
0.400	2.77	3.23	2.77	Deterministic Governs	
0.500	2.78	3.17	2.78	Deterministic Governs	
0.750	2.49	2.73	2.49	Deterministic Governs	
1.000	2.16	2.30	2.16	Deterministic Governs	
1.500	1.57	1.58	1.57	Deterministic Governs	
2.000	1.18	1.18	1.18	Deterministic Governs	
3.000	0.84	0.81	0.81	Probabilistic Governs	
4.000	0.63	0.60	0.60	Probabilistic Governs	
5.000	0.49	0.48	0.48	Probabilistic Governs	
7.500	0.26	0.26	0.26	Deterministic Governs	
10.000	0.15	0.16	0.15	Deterministic Governs	

These are plotted in the following diagram:



- **Design Response Spectrum (ASCE 7 Section 21.3)-**

  In accordance with Section 21.3, the Design Response Spectrum was developed by the following equation: $S_a = 2/3S_{aM}$, where S_{aM} is the MCE_R spectral response acceleration obtained from Section 21.1 or 21.2. The design spectral response acceleration shall not be taken less than 80 percent of S_a. These are plotted and compared with 80% of the CBC Spectrum values in the following diagram:



- **Design Acceleration Parameters (ASCE 7 Section 21.4)**-

  Where the site-specific procedure is used to determine the design ground motion in accordance with Section 21.3, the parameter S_{DS} shall obtained from the site-specific spectra at a period of 0.2 s, except that it shall not be taken less than 90 percent of the peak spectral acceleration, S_a, at any period larger than 0.2 s. The parameter S_{D1} shall be taken as the greater of the products of Sa * T for periods between 1 and 5 seconds. The parameters S_{MS}, and S_{M1} shall be taken as 1.5 times S_{DS} and S_{D1}, respectively. The values so obtained shall not be less than 80 percent of the values determined in accordance with Section 11.4.4 for S_{MS}, and S_{M1} and Section 11.4.5 for S_{DS} and S_{D1}.

- **Site Specific Design Parameters** -

  For the 0.2 second period (S_{DS}), the maximum average acceleration for any period exceeding 0.2 seconds was 1.86g occurring at T=0.50 seconds. This was multiplied by 0.9 to produce a value of 1.67g making this the applicable value. A value of 1.62g was calculated for S_{D1} at a period of 1 second (ASCE 7-16, 21.4). For the MCE_R 0.2 second period, a value of 2.506g (S_{MS}) was computed, along with a value of 2.429g (S_{M1}) for the MCE_R 1.0 second period was also calculated (ASCE 7-16, 21.2.3).

- **Site-Specific MCE_G Peak Ground Accelerations (ASCE 7 Section 21.5)**-

  The probabilistic geometric mean peak ground acceleration (2 percent probability of exceedance within a 50-year period) was calculated as 1.24g. The deterministic geometric mean peak ground acceleration (largest 84th percentile geometric mean peak ground acceleration for characteristic earthquakes on all known active faults within the site region) was calculated as 0.95g. The site-specific MCE_G peak ground acceleration was calculated to be **0.95g**, which was determined by using the lesser of the probabilistic (1.24g) or the deterministic (0.95g) geometric mean peak ground accelerations, but not taken as less than 80 percent of PGA_M (i.e., 1.14g x 0.80 = 0.92g).

SEISMIC DESIGN PARAMETERS SUMMARY

Project: San Bernardino County Fire Station #227 Lattitude: 34.1601
Project #: 244073-1 Longitude: -117.2866
Date: 7/14/2024

CALIFORNIA BUILDING CODE CHAPTER 16/ASCE7-16

Mapped Acceleration Parameters per ASCE 7-16, Chapter 22

S_s=	2.506	Figure 22-1
S_1=	1.002	Figure 22-2

Site Class per Table 20.3-1

Site Class=	D - Stiff Soil

Site Coefficients per ASCE 7-16 CHAPTER 11

F_a=	1	Table 11.4-1	=	1	For Site Specific Analysis per ASCE7-16 21.3
F_v=	1.7	Table 11.4-2	=	2.50	For Site Specific Analysis per ASCE7-16 21.3

Mapped Design Spectral Response Acceleration Parameters

S_{Ms}=	2.506	Equation 11.4-1	2.506	For Site Specific Analysis per ASCE7-16 21.3
S_{M1}=	1.703	Equation 11.4-2	2.505	For Site Specific Analysis per ASCE7-16 21.3

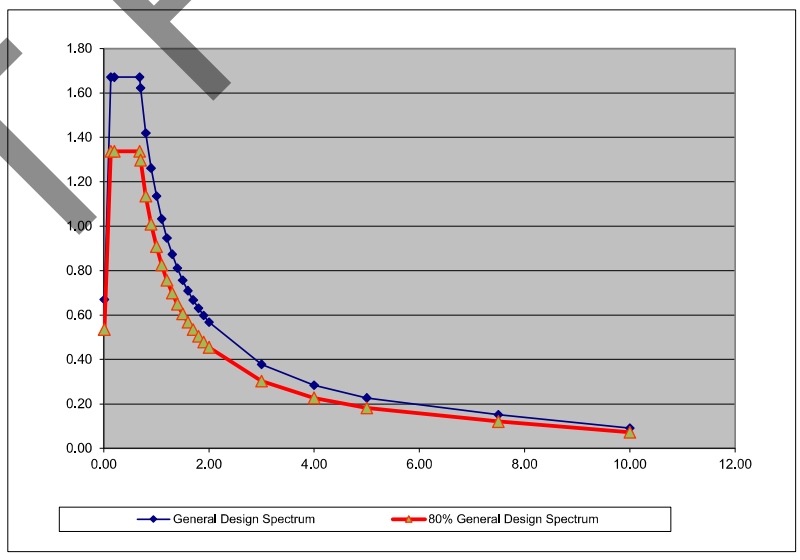
S_{DS}=	1.671	Equation 11.4-3
S_{D1}=	1.136	Equation 11.4-4

Period (T)	Sa (ASCE7-16 - 11.4.6)	80% General Design Spectrum
0.01	0.67	0.54
0.14	1.67	1.34
0.20	1.67	1.34
0.68	1.67	1.34
0.70	1.62	1.30
0.80	1.42	1.14
0.90	1.26	1.01
1.00	1.14	0.91
1.10	1.03	0.83
1.20	0.95	0.76
1.30	0.87	0.70
1.40	0.81	0.65
1.50	0.76	0.61
1.60	0.71	0.57
1.70	0.67	0.53
1.80	0.63	0.50
1.90	0.60	0.48
2.00	0.57	0.45
3.00	0.38	0.30
4.00	0.28	0.23
5.00	0.23	0.18
7.50	0.15	0.12
10.00	0.09	0.07

T_0=	0.136	sec
T_S=	0.680	sec
T_L=	8	sec
PGA	1.04	g
F_{PGA}=	1.1	
C_{RS}=	0.905	
C_{R1}=	0.884	

From Fig 22-12

From Table 11.8-1
Figure 22-17
Figure 22-18



ASCE 7-16 - RISK-TARGETED MAXIMUM CONSIDERED EARTHQUAKE GROUND MOTION ANALYSIS

Use Maximum Rotated Horizontal Component?* (Y/N) **Y**

Presented data are the average of Chiou & Youngs (2014), Abrahamson et. al. (2014) , Boore et. al (2014) and Campbell & Bozorgnia (2014) NGA West-2 Relat
Earthquake Rupture Forecast - UCERF3 Mean, FM 3.1 & 3.2

PROBABILISTIC MCER per 21.2.1.1 **Method 1**

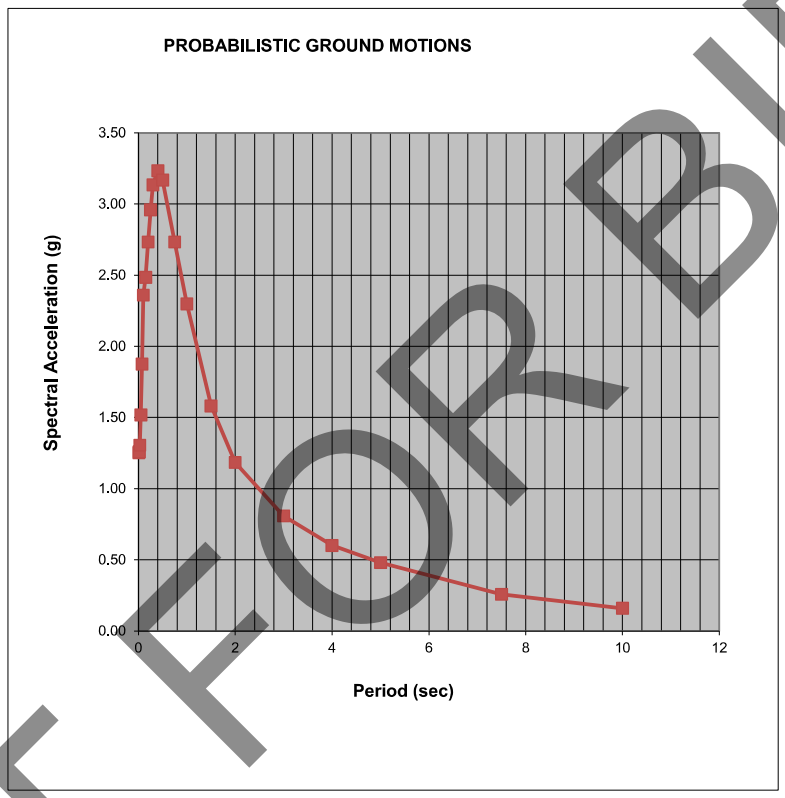
Risk Coefficients taken from Figures 22-18 and 22-19 of ASCE 7-16

OpenSHA data

2% Probability Of Exceedance in 50 years

Maximum Rotated Horizontal Component determined per ASCE7-16

T	Sa 2% in 50	MCER
0.01	1.39	1.25
0.02	1.39	1.26
0.03	1.44	1.31
0.05	1.68	1.52
0.08	2.07	1.88
0.10	2.37	2.36
0.15	2.75	2.49
0.20	3.02	2.73
0.25	3.27	2.96
0.30	3.47	3.13
0.40	3.59	3.23
0.50	3.53	3.17
0.75	3.07	2.73
1.00	2.60	2.30
1.50	1.79	1.58
2.00	1.34	1.18
3.00	0.92	0.81
4.00	0.68	0.60
5.00	0.54	0.48
7.50	0.29	0.26
10.00	0.18	0.16



S_s=	3.02	2.73
S_1=	2.60	2.30
PGA	1.24 g	

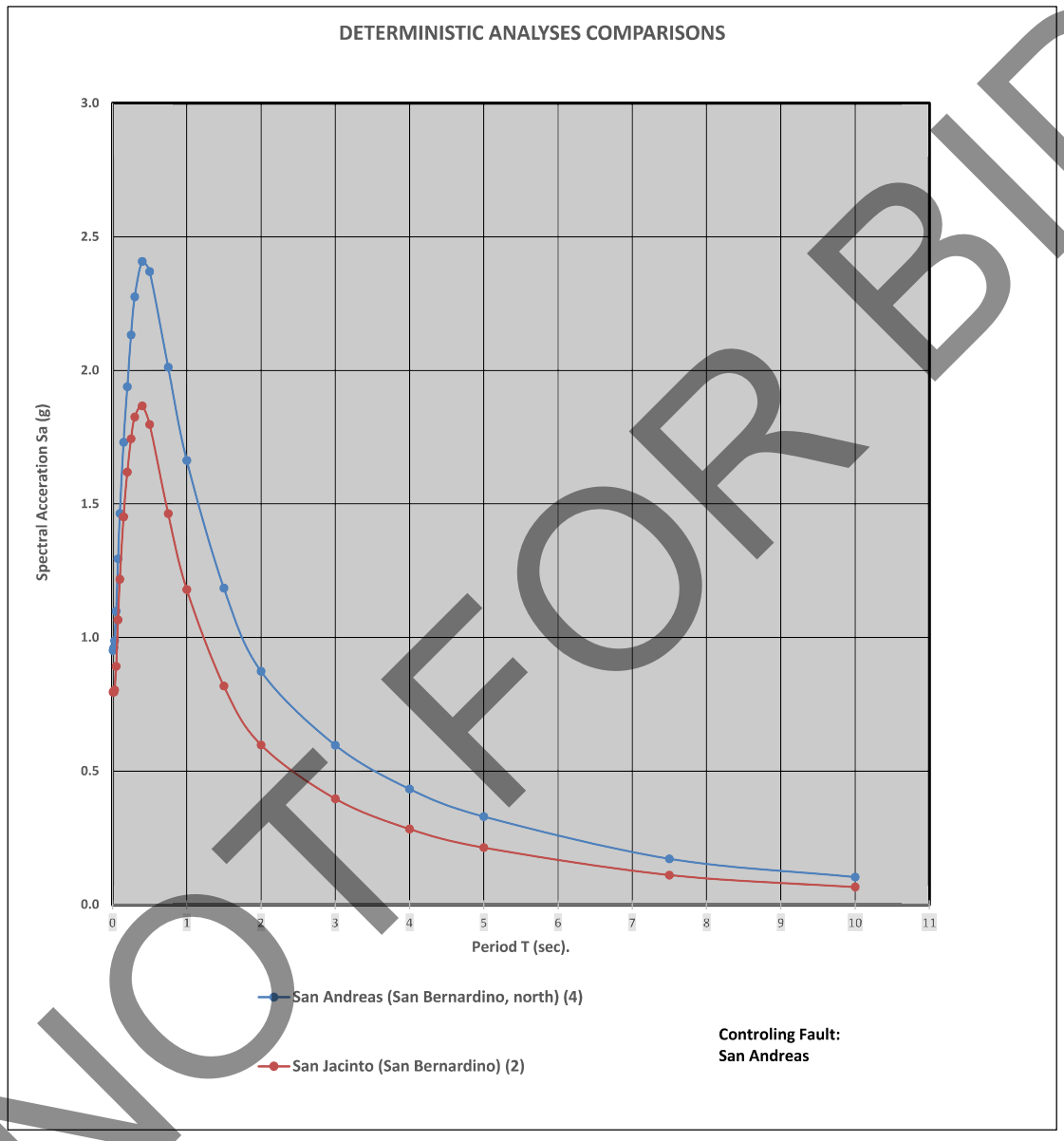
Risk Coefficients:			
C_{RS}	0.905	Figure 22-18	Get from Mapped Values
C_{R1}	0.884	Figure 22-19	
Fa=	1	Table 11.4-1	Per ASCE7-16 - 21.2.3
Is $Sa_{(max)}$<1.2XFa?		NO	If "YES", Probabilistic Spectrum prevails

DETERMINISTIC MCE per 21.2.2

Preliminary Assessment:

Fault	Distance (km)
San Andreas (San Bernardino, north) (4)	1.80
San Jacinto (San Bernardino) (2)	6.30

The Probalistic Analyses revealed 5 faults contributing more than 10% to the seismic hazard. These were considered in the Deterministic Analyses along with the Newport-Inglewood Fault.



Input Parameters		San Andreas (San Bernardino, north) (4)	San Jacinto (San Bernardino) (2)
Fault			
M	= Moment magnitude	8.1	7.8
R_{RUP}	= Closest distance to coseismic rupture (km)	1.8	6.3
R_{JB}	= Closest distance to surface projection of coseismic rupture (km)	1.8	6.3
Rx	= Horizontal distance to top edge of rupture measured perpendicular to strike (km)	1.8	6.3
U	= Unspecified Faulting Flag (Boore et.al.)	0	0
F_{RV}	= Reverse-faulting factor: 0 for strike slip, normal, normal-oblique; 1 for reverse, reverse-oblique and thrust	0	0
F_{NM}	= Normal-faulting factor: 0 for strike slip, reverse, reverse-oblique and thrust; 1 for normal and normal-oblique	0	0
F_{HW}	= Hanging-wall factor: 1 for site on down-dip side of top of rupture; 0 otherwise, used in AS08 and CY08	0	0
Z_{TOR}	= Depth to top of coseismic rupture (km)	0	0
δ	= Average dip of rupture plane (degrees)	90	90
V_{S30}	= Average shear-wave velocity in top 30m of site profile	327.7	327.7
$F_{Measured}$		1	1
$Z_{1.0}$	= Depth to Shear Wave Velocity of 1.0 km/sec (km)	0.25	0.25
$Z_{2.5}$	= Depth to Shear Wave Velocity of 2.5 km/sec (km)	0.35	0.35
Site Class		D	D
W (km)	= Fault rupture width (km)	12.5	16.5
F_{AS}	= 0 for mainshock; 1 for aftershock	0	0
σ	=Standard Deviation	1	1

Deterministic Summary - Section 21.2.2 (Supplement 1)

T	San Andreas (San Bernardino, north) (4)	San Jacinto (San Bernardino) (2)	Maximum S_a (Average)	*Corrected* S_a (per ASCE7-16)*	*Scaled $S_{a(Average)}$*	Controlling Fault
0.010	0.95	0.80	0.95	1.05	1.05	San Andreas (San
0.020	0.96	0.79	0.96	1.06	1.06	San Andreas (San
0.030	0.99	0.80	0.99	1.09	1.09	San Andreas (San
0.050	1.10	0.89	1.10	1.21	1.21	San Andreas (San
0.075	1.29	1.07	1.29	1.42	1.42	San Andreas (San
0.100	1.46	1.22	1.46	1.61	1.61	San Andreas (San
0.150	1.73	1.45	1.73	1.90	1.90	San Andreas (San
0.200	1.94	1.62	1.94	2.13	2.13	San Andreas (San
0.250	2.13	1.74	2.13	2.37	2.37	San Andreas (San
0.300	2.28	1.83	2.28	2.56	2.56	San Andreas (San
0.400	2.41	1.87	2.41	2.77	2.77	San Andreas (San
0.500	2.37	1.80	2.37	2.78	2.78	San Andreas (San
0.750	2.01	1.46	2.01	2.49	2.49	San Andreas (San
1.000	1.66	1.18	1.66	2.16	2.16	San Andreas (San
1.500	1.19	0.82	1.19	1.57	1.57	San Andreas (San
2.000	0.87	0.60	0.87	1.18	1.18	San Andreas (San
3.000	0.60	0.40	0.60	0.84	0.84	San Andreas (San
4.000	0.43	0.28	0.43	0.63	0.63	San Andreas (San
5.000	0.33	0.21	0.33	0.49	0.49	San Andreas (San
7.500	0.17	0.11	0.17	0.26	0.26	San Andreas (San
10.000	0.10	0.07	0.10	0.15	0.15	San Andreas (San
PGA	0.95	0.76	0.95		0.95	g

Max Sa=	2.78
Fa =	1.00
1.5XFa=	1.5
Scaling Factor=	1.00

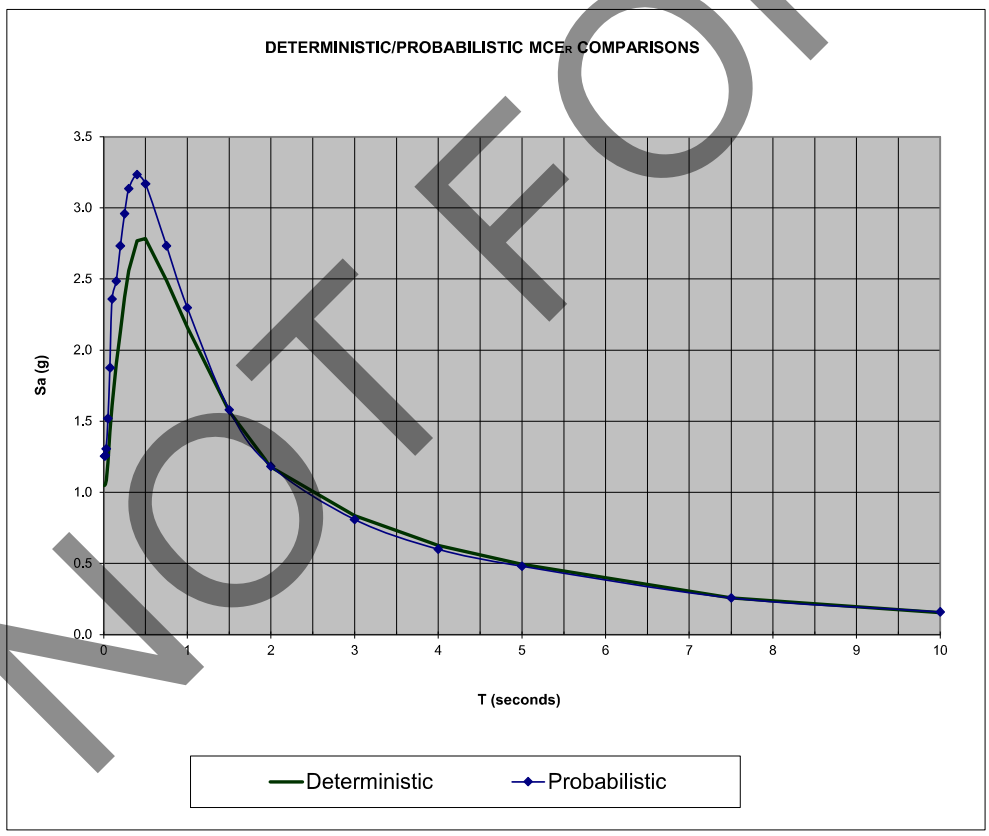
Per ASCE7-16 21.2.2

* Correction is the adjustment for Maximum Rotated Value if Applicable

SITE SPECIFIC MCE_R - Compare Deterministic MCE_R Values (S_a) with Probabilistic MCE_R Values (S_a) per 21.2.3

Presented data are the average of Chiou & Youngs (2014), Abrahamson et. al. (2014) , Boore et. al (2014) and Campbell & Bozorgnia (2014) NGA West-2 Relat

Period	Deterministic	Probabilistic	Lower Value (Site Specific $MCE_{R)}$	Governing Method
T	MCE_R	MCE_R		
0.010	1.05	1.25	1.05	Deterministic Governs
0.020	1.06	1.26	1.06	Deterministic Governs
0.030	1.09	1.31	1.09	Deterministic Governs
0.050	1.21	1.52	1.21	Deterministic Governs
0.075	1.42	1.88	1.42	Deterministic Governs
0.100	1.61	2.36	1.61	Deterministic Governs
0.150	1.90	2.49	1.90	Deterministic Governs
0.200	2.13	2.73	2.13	Deterministic Governs
0.250	2.37	2.96	2.37	Deterministic Governs
0.300	2.56	3.13	2.56	Deterministic Governs
0.400	2.77	3.23	2.77	Deterministic Governs
0.500	2.78	3.17	2.78	Deterministic Governs
0.750	2.49	2.73	2.49	Deterministic Governs
1.000	2.16	2.30	2.16	Deterministic Governs
1.500	1.57	1.58	1.57	Deterministic Governs
2.000	1.18	1.18	1.18	Deterministic Governs
3.000	0.84	0.81	0.81	ProbabilisticGoverns
4.000	0.63	0.60	0.60	ProbabilisticGoverns
5.000	0.49	0.48	0.48	ProbabilisticGoverns
7.500	0.26	0.26	0.26	Deterministic Governs
10.000	0.15	0.16	0.15	Deterministic Governs



DESIGN RESPONSE SPECTRUM per Section 21.3

DESIGN ACCELERATION PARAMETERS per Section 21.4 (MRSA)

Period	2/3*MCE_R	80% General Design Response Spectrum (per ASCE 7-16 23.3-1)	Design Response Spectrum	TXSa
0.01	0.70	0.57	0.70	
0.02	0.71	0.61	0.71	
0.03	0.72	0.65	0.72	
0.05	0.81	0.74	0.81	
0.08	0.95	0.84	0.95	
0.10	1.07	0.94	1.07	
0.15	1.27	1.14	1.27	
0.20	1.42	1.34	1.42	
0.25	1.58	1.34	1.58	
0.30	1.71	1.34	1.71	
0.40	1.85	1.34	1.85	
0.50	1.86	1.34	1.86	
0.75	1.66	1.34	1.66	
1.00	1.44	1.34	1.44	1.44
1.50	1.05	0.89	1.05	1.57
2.00	0.79	0.67	0.79	1.57
3.00	0.54	0.45	0.54	1.62
4.00	0.40	0.33	0.40	1.60
5.00	0.32	0.27	0.32	1.60
7.50	0.17	0.18	0.18	
10.00	0.10	0.11	0.11	

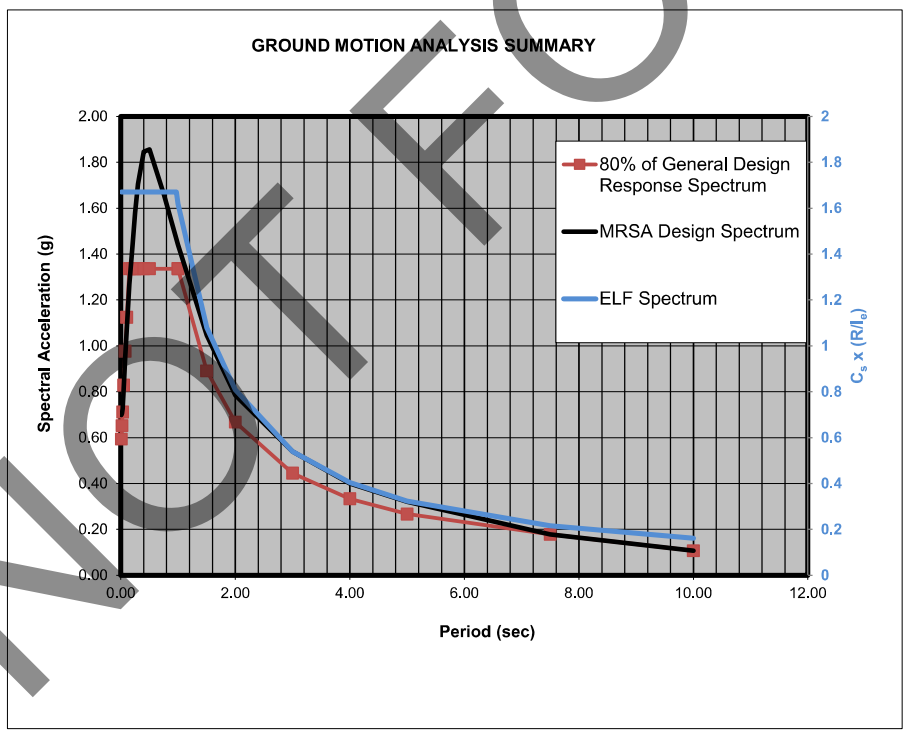
Highest value of S_a for any period exceeding 0.2 sec.=	1.86
90%of Highest Value =	1.67
80% 0f Mapped S_{DS}=	1.34
Maximum TXSa from T=1s-5s =	1.62
80% of Mapped S_{D1}=	0.91

S_{DS}=	1.67
S_{D1}=	1.62
Ts =	0.97

S_{MS}=	2.506
S_{M1}=	2.429

PGA Determination:

Site Coefficient F_{PGA}=	1.1	
Mapped PGA=	1.04	Figure 22-7
PGA_M =	1.14	g
Deterministic PGA =	0.95	g
Probabilistic PGA =	1.24	g
Lesser of Deterministic/Probabilistic =	0.95	g
80% of PGA_M=	0.92	g
MCE_G PGA=	0.95	g



SUMMARY OF SITE SPECIFIC GROUND MOTION HAZARD ANALYSIS DATA

1	2	3		4	5	6	7	8	9	10	11	12
Period (sec)	Mapped MCE_R Spectrum	Mapped Design Spectrum	**Period (sec)**	Risk Coefficient C_R	Scaled MCE_R Deterministic Spectrum	Probabilistic MCE_R Spectrum	Probabilistic w/Risk Coeffcicent C_R	84th Percentile Deterministic Spectrum	2/3 Site Specific MCE_R Spectrum	80% of General Design Spectrum	Site Specific MCE_R Spectrum	Design Response Spectrum
0.01	1.00	0.67	**0.01**	0.905	1.05	1.25	1.25	1.05	0.70	0.57	1.05	0.70
0.14	2.51	1.67	**0.02**	0.905	1.06	1.26	1.26	1.06	0.71	0.61	1.06	0.71
0.20	2.51	1.67	**0.03**	0.905	1.09	1.31	1.31	1.09	0.72	0.65	1.09	0.72
0.68	2.51	1.67	**0.05**	0.905	1.21	1.52	1.52	1.21	0.81	0.74	1.21	0.81
0.70	2.43	1.62	**0.08**	0.905	1.42	1.88	1.88	1.42	0.95	0.84	1.42	0.95
0.80	2.13	1.42	**0.10**	0.905	1.61	2.36	2.36	1.61	1.07	0.94	1.61	1.07
0.90	1.89	1.26	**0.15**	0.905	1.90	2.49	2.49	1.90	1.27	1.14	1.90	1.27
1.00	1.70	1.14	**0.20**	0.905	2.13	2.73	2.73	2.13	1.42	1.34	2.13	1.42
1.10	1.55	1.03	**0.25**	0.904	2.37	2.96	2.96	2.37	1.58	1.34	2.37	1.58
1.20	1.42	0.95	**0.30**	0.902	2.56	3.13	3.13	2.56	1.71	1.34	2.56	1.71
1.30	1.31	0.87	**0.40**	0.900	2.77	3.23	3.23	2.77	1.85	1.34	2.77	1.85
1.40	1.22	0.81	**0.50**	0.897	2.78	3.17	3.17	2.78	1.86	1.34	2.78	1.86
1.50	1.14	0.76	**0.75**	0.891	2.49	2.73	2.73	2.49	1.66	1.34	2.49	1.66
1.60	1.06	0.71	**1.00**	0.884	2.16	2.30	2.30	2.16	1.44	1.34	2.16	1.44
1.70	1.00	0.67	**1.50**	0.884	1.57	1.58	1.58	1.57	1.05	0.89	1.57	1.05
1.80	0.95	0.63	**2.00**	0.884	1.18	1.18	1.18	1.18	0.79	0.67	1.18	0.79
1.90	0.90	0.60	**3.00**	0.884	0.84	0.81	0.81	0.84	0.54	0.45	0.81	0.54
2.00	0.85	0.57	**4.00**	0.884	0.63	0.60	0.60	0.63	0.40	0.33	0.60	0.40
3.00	0.57	0.38	**5.00**	0.884	0.49	0.48	0.48	0.49	0.32	0.27	0.48	0.32
4.00	0.43	0.28	**7.50**	0.884	0.26	0.26	0.26	0.26	0.17	0.18	0.27	0.18
5.00	0.34	0.23	**10.00**	0.884	0.15	0.16	0.16	0.15	0.10	0.11	0.16	0.11
7.50	0.23	0.15										
10.00	0.14	0.09										

APPENDIX C

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Attachment G

NOAA Precipitation Frequency

NOAA Atlas 14, Volume 6, Version 2
Location name: San Bernardino, California, USA*
Latitude: 34.1604°, Longitude: -117.2868°
Elevation: 1288 ft**
* source: ESRI Maps
** source: USGS

POINT PRECIPITATION FREQUENCY ESTIMATES

Sanja Perica, Sarah Dietz, Sarah Heim, Lillian Hiner, Kazungu Maitaria, Deborah Martin, Sandra Pavlovic, Ishani Roy, Carl Trypaluk, Dale Unruh, Fenglin Yan, Michael Yekta, Tan Zhao, Geoffrey Bonnin, Daniel Brewer, Li-Chuan Chen, Tye Parzybok, John Yarchoan

NOAA, National Weather Service, Silver Spring, Maryland

PF_tabular | PF_graphical | Maps_&_aerials

PF tabular

PDS-based point precipitation frequency estimates with 90% confidence intervals (in inches)[1]

Duration	Average recurrence interval (years)									
	1	2	5	10	25	50	100	200	500	1000
5-min	0.124 (0.103-0.151)	0.165 (0.137-0.201)	0.222 (0.184-0.271)	0.273 (0.224-0.336)	0.347 (0.275-0.441)	0.408 (0.317-0.531)	0.475 (0.360-0.633)	0.548 (0.404-0.752)	0.656 (0.463-0.939)	0.747 (0.509-1.11)
10-min	0.178 (0.148-0.217)	0.237 (0.196-0.288)	0.319 (0.264-0.389)	0.391 (0.321-0.481)	0.497 (0.394-0.633)	0.585 (0.454-0.761)	0.681 (0.516-0.908)	0.786 (0.579-1.08)	0.941 (0.664-1.35)	1.07 (0.729-1.59)
15-min	0.216 (0.179-0.262)	0.286 (0.237-0.348)	0.386 (0.319-0.470)	0.473 (0.388-0.582)	0.601 (0.477-0.765)	0.707 (0.549-0.920)	0.823 (0.623-1.10)	0.951 (0.700-1.30)	1.14 (0.803-1.63)	1.30 (0.882-1.92)
30-min	0.328 (0.273-0.398)	0.435 (0.361-0.529)	0.586 (0.485-0.715)	0.718 (0.590-0.884)	0.913 (0.724-1.16)	1.08 (0.835-1.40)	1.25 (0.947-1.67)	1.44 (1.06-1.98)	1.73 (1.22-2.47)	1.97 (1.34-2.92)
60-min	0.498 (0.414-0.605)	0.660 (0.548-0.803)	0.890 (0.737-1.09)	1.09 (0.895-1.34)	1.39 (1.10-1.76)	1.63 (1.27-2.12)	1.90 (1.44-2.53)	2.19 (1.61-3.01)	2.62 (1.85-3.76)	2.99 (2.03-4.43)
2-hr	0.741 (0.616-0.901)	0.946 (0.785-1.15)	1.22 (1.01-1.49)	1.46 (1.20-1.80)	1.80 (1.43-2.29)	2.07 (1.60-2.69)	2.35 (1.78-3.13)	2.65 (1.95-3.64)	3.08 (2.18-4.41)	3.43 (2.34-5.09)
3-hr	0.910 (0.757-1.11)	1.14 (0.951-1.39)	1.46 (1.21-1.78)	1.72 (1.42-2.12)	2.09 (1.66-2.67)	2.39 (1.85-3.10)	2.69 (2.04-3.58)	3.01 (2.21-4.13)	3.45 (2.44-4.94)	3.81 (2.59-5.65)
6-hr	1.31 (1.09-1.59)	1.63 (1.35-1.98)	2.05 (1.70-2.50)	2.39 (1.96-2.94)	2.87 (2.27-3.65)	3.23 (2.51-4.20)	3.60 (2.73-4.81)	3.99 (2.94-5.48)	4.52 (3.19-6.47)	4.93 (3.36-7.31)
12-hr	1.73 (1.43-2.10)	2.16 (1.80-2.64)	2.74 (2.27-3.34)	3.21 (2.63-3.94)	3.84 (3.04-4.88)	4.32 (3.36-5.62)	4.81 (3.64-6.41)	5.31 (3.91-7.29)	5.99 (4.22-8.57)	6.51 (4.44-9.66)
24-hr	2.31 (2.05-2.66)	2.96 (2.62-3.41)	3.81 (3.36-4.40)	4.49 (3.93-5.24)	5.42 (4.59-6.53)	6.13 (5.09-7.54)	6.85 (5.55-8.63)	7.59 (5.98-9.82)	8.58 (6.49-11.6)	9.35 (6.84-13.0)
2-day	2.80 (2.48-3.22)	3.68 (3.26-4.25)	4.84 (4.27-5.60)	5.77 (5.05-6.73)	7.04 (5.96-8.48)	8.00 (6.64-9.84)	8.98 (7.27-11.3)	9.98 (7.86-12.9)	11.3 (8.57-15.3)	12.4 (9.04-17.2)
3-day	3.04 (2.69-3.50)	4.07 (3.60-4.70)	5.42 (4.78-6.27)	6.51 (5.70-7.59)	7.99 (6.77-9.62)	9.12 (7.57-11.2)	10.3 (8.32-12.9)	11.4 (9.02-14.8)	13.0 (9.86-17.6)	14.3 (10.4-19.9)
4-day	3.22 (2.86-3.71)	4.35 (3.85-5.02)	5.83 (5.14-6.74)	7.03 (6.16-8.20)	8.68 (7.35-10.5)	9.94 (8.25-12.2)	11.2 (9.09-14.1)	12.5 (9.89-16.2)	14.3 (10.9-19.3)	15.7 (11.5-22.0)
7-day	3.66 (3.24-4.22)	4.94 (4.37-5.69)	6.64 (5.86-7.68)	8.06 (7.06-9.40)	10.0 (8.50-12.1)	11.6 (9.61-14.2)	13.2 (10.7-16.6)	14.9 (11.7-19.3)	17.2 (13.0-23.2)	19.1 (13.9-26.6)
10-day	4.05 (3.58-4.66)	5.45 (4.82-6.29)	7.36 (6.49-8.51)	8.96 (7.84-10.4)	11.2 (9.50-13.5)	13.0 (10.8-16.0)	14.9 (12.1-18.8)	16.9 (13.3-21.9)	19.7 (14.9-26.6)	22.0 (16.1-30.6)
20-day	5.05 (4.48-5.82)	6.88 (6.09-7.94)	9.39 (8.28-10.9)	11.5 (10.1-13.4)	14.6 (12.3-17.5)	17.0 (14.1-20.9)	19.6 (15.9-24.7)	22.4 (17.6-28.9)	26.3 (19.9-35.4)	29.5 (21.6-41.1)
30-day	5.90 (5.22-6.80)	8.09 (7.16-9.33)	11.1 (9.79-12.8)	13.6 (11.9-15.9)	17.3 (14.6-20.8)	20.2 (16.8-24.9)	23.3 (18.9-29.4)	26.6 (21.0-34.5)	31.3 (23.7-42.2)	35.1 (25.7-49.0)
45-day	7.09 (6.28-8.16)	9.76 (8.63-11.3)	13.4 (11.8-15.5)	16.5 (14.4-19.2)	20.8 (17.7-25.1)	24.3 (20.2-29.9)	28.0 (22.7-35.3)	31.9 (25.1-41.3)	37.4 (28.3-50.5)	41.9 (30.6-58.4)
60-day	8.17 (7.24-9.41)	11.2 (9.95-13.0)	15.4 (13.6-17.8)	18.9 (16.5-22.0)	23.8 (20.2-28.7)	27.7 (23.0-34.1)	31.8 (25.7-40.0)	36.1 (28.4-46.7)	42.1 (31.9-56.8)	47.0 (34.4-65.6)

[1] Precipitation frequency (PF) estimates in this table are based on frequency analysis of partial duration series (PDS).

Numbers in parenthesis are PF estimates at lower and upper bounds of the 90% confidence interval. The probability that precipitation frequency estimates (for a given duration and average recurrence interval) will be greater than the upper bound (or less than the lower bound) is 5%. Estimates at upper bounds are not checked against probable maximum precipitation (PMP) estimates and may be higher than currently valid PMP values.

Please refer to NOAA Atlas 14 document for more information.

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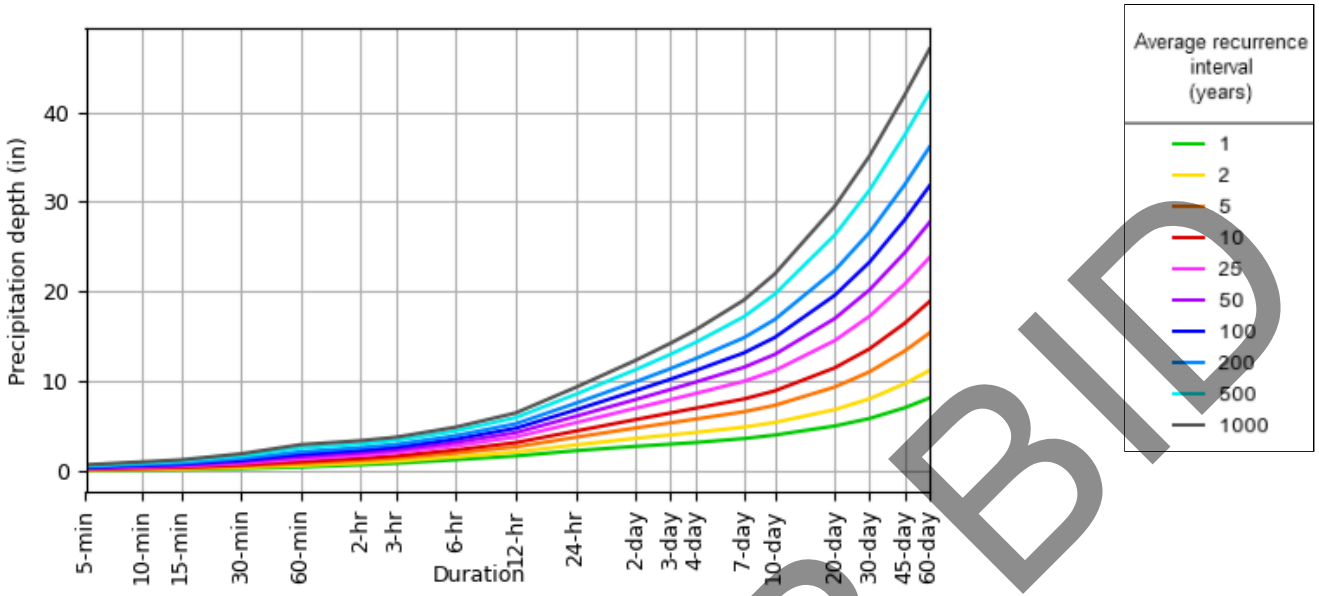
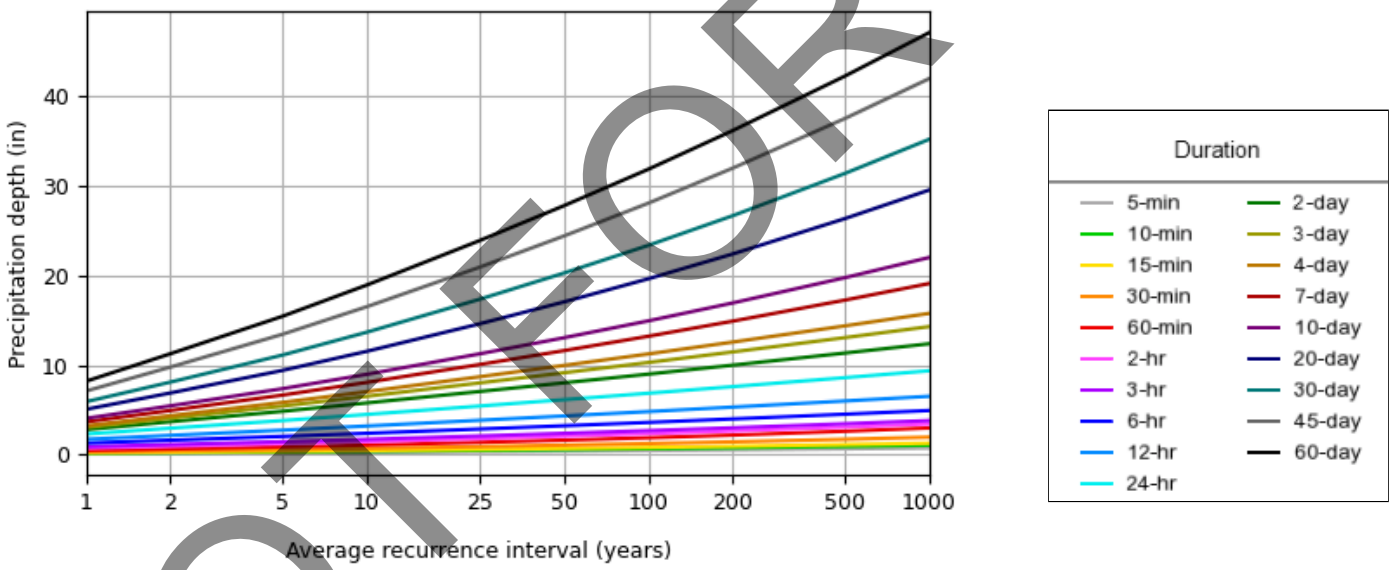
PF graphical

PDS-based depth-duration-frequency (DDF) curves
Latitude: 34.1604°, Longitude: -117.2868°





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Created (GMT): Thu Oct 17 13:56:02 2024

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Maps & aerials

Small scale terrain

Large scale terrain

Large scale map

Large scale aerial

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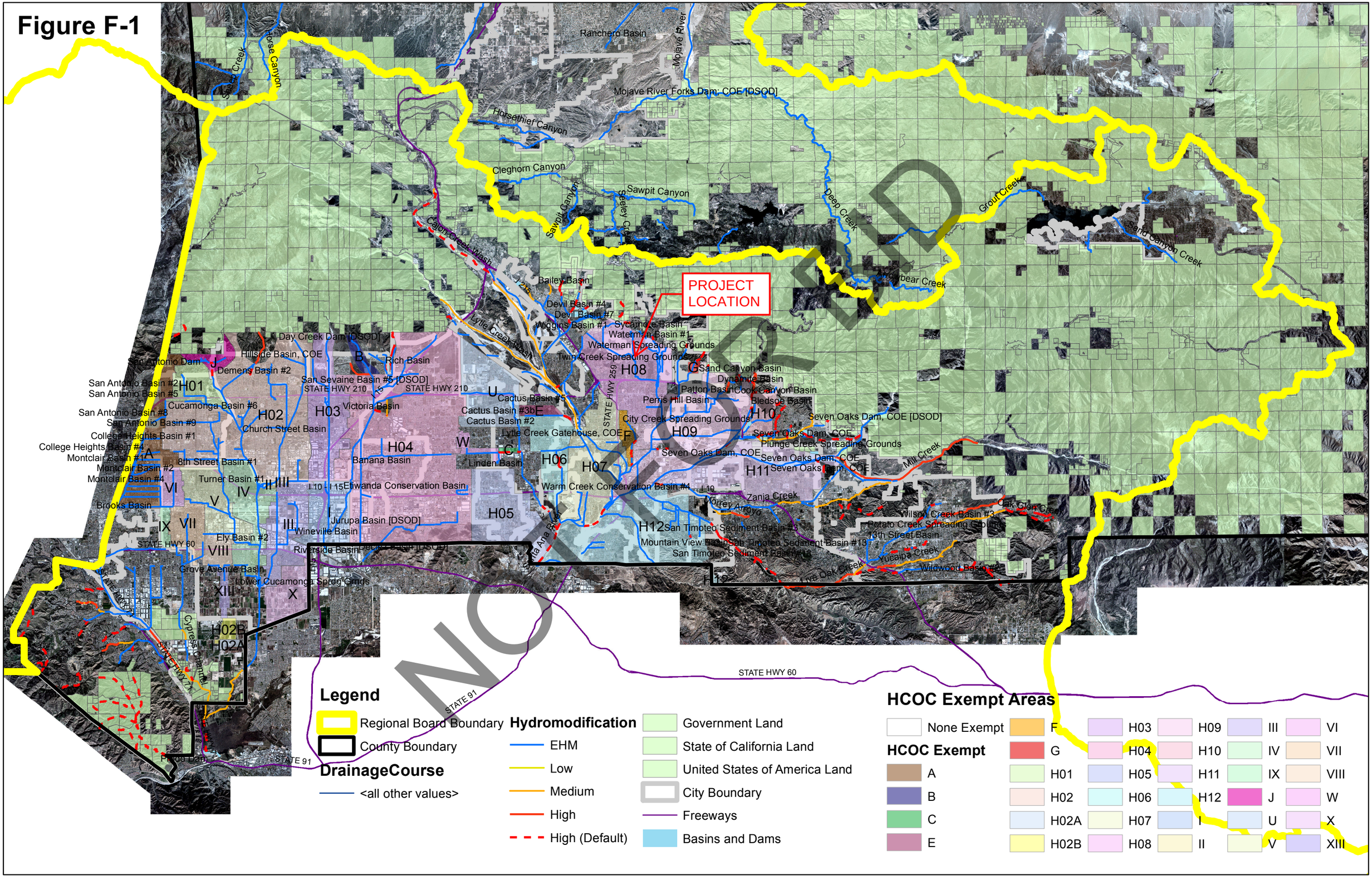
US Department of Commerce
National Oceanic and Atmospheric Administration
National Weather Service
National Water Center
1325 East West Highway
Silver Spring, MD 20910
Questions?: HDSC.Questions@noaa.gov

Disclaimer

Attachment H

HCOC Exemption

Figure F-1


PROJECT LOCATION
Ranchero Basin
Mojave River
Mojave River Forks Dam: COE [DSOD]
Horsethief Canyon
Cleghorn Canyon
Sawpit Canyon
Deep Creek
Grout Creek
Bear Creek
Bailey Basin
Devil Basin #4
Devil Basin #7
Wiggins Basin #1
Sycamore Basin
Waterman Basin #1
Waterman Spreading Grounds
Twin Creek Spreading Grounds
Sand Canyon Basin
Dynamite Basin
Patton Basin
Cook Canyon Basin
Perris Hill Basin
Bledsoe Basin
City Creek Spreading Grounds
Seven Oaks Dam, COE [DSOD]
Seven Oaks Dam, COE
Plunge Creek Spreading Grounds
Mill Creek
Zanja Creek
Wilson Creek Basin #3
Potato Creek Spreading Ground
3th Street Basin
Yucaipa Creek
Wildwood Basin #2
Oak Glen C
San Timoteo Sediment Basin #3
San Timoteo Sediment Basin #13
San Timoteo Sediment Basin #14
Mountain View Basin
Warm Creek Conservation Basin #4
Day Creek Dam [DSOD]
Hillside Basin, COE
Rich Basin
Demens Basin #2
San Sevaine Basin #5 [DSOD]
Cactus Basin #5
Cactus Basin #3b
Cactus Basin #2
Lytle Creek Gatehouse, COE
Linden Basin
Victoria Basin
Banana Basin
Eliwanda Conservation Basin
Jurupa Basin [DSOD]
Wineville Basin
Riverside Basin
Ely Basin #2
Grove Avenue Basin
Lower Cucamonga Spdg Grnds
San Antonio Dam
San Antonio Basin #2
San Antonio Basin #5
Cucamonga Basin #6
San Antonio Basin #8
San Antonio Basin #9
College Heights Basin #1
College Heights Basin #4
Montclair Basin #1
Montclair Basin #2
Montclair Basin #4
Church Street Basin
8th Street Basin #1
Turner Basin #1
Brooks Basin
Prado Dam
Lytle Creek Wash
Cajon Creek Wash
Cypress Channel
Santa Ana River
H01
H02
H03
H04
H05
H06
H07
H08
H09
H10
H11
H12
H02B
H02A
A
B
C
E
F
G
I
J
U
W
X
II
III
IV
V
VI
VII
VIII
IX
XIII
I 215
I 10
I 15
STATE HWY 210
STATE HWY 259
STATE HWY 60
STATE HWY 71
STATE 91
NOT FOR RELEASE
Legend
Regional Board Boundary
County Boundary
DrainageCourse
<all other values>
Hydromodification
EHM
Low
Medium
High
High (Default)
Government Land
State of California Land
United States of America Land
City Boundary
Freeways
Basins and Dams
HCOC Exempt Areas
None Exempt
HCOC Exempt
A
B
C
E
F
G
H01
H02
H02A
H02B
H03
H04
H05
H06
H07
H08
H09
H10
H11
H12
I
II
III
IV
V
VI
VII
VIII
IX
J
U
W
X
XIII

Hydromodification

A.1 Hydrologic Conditions of Concern (HCOC) Analysis

HCOC Exemption:

1. **Sump Condition:** All downstream conveyance channel to an adequate sump (for example, Prado Dam, Santa Ana River, or other Lake, Reservoir or naturally erosion resistant feature) that will receive runoff from the project are engineered and regularly maintained to ensure design flow capacity; no sensitive stream habitat areas will be adversely affected; or are not identified on the Co-Permittees Hydromodification Sensitivity Maps.

2. **Pre = Post**: The runoff flow rate, volume and velocity for the post-development condition of the Priority Development Project do not exceed the pre-development (i.e, naturally occurring condition for the 2-year, 24-hour rainfall event utilizing latest San Bernardino County Hydrology Manual.

    a. Submit a substantiated hydrologic analysis to justify your request.

3. **Diversion to Storage Area**: The drainage areas that divert to water storage areas which are considered as control/release point and utilized for water conservation.

    a. See Appendix F for the HCOC Exemption Map and the on-line Watershed Geodatabase (http://sbcounty.permitrack.com/wap) for reference.

4. **Less than One Acre**: The Priority Development Project disturbs less than one acre. The Co-permittee has the discretion to require a Project Specific WQMP to address HCOCs on projects less than one acre on a case by case basis. The project disturbs less than one acre and is not part of a common plan of development.

5. **Built Out Area**: The contributing watershed area to which the project discharges has a developed area percentage greater than 90 percent.

    a. See Appendix F for the HCOC Exemption Map and the on-line Watershed Geodatabase (http://sbcounty.permitrack.com/wap) for reference.

Summary of HCOC Exempted Area

	HCOC Exemption reasoning				
	1	2	3	4	5
Area					
A			X		X
B			X		
C					X
E			X		
F					X
G			X		X
H01	X		X		
H02	X		X		
H02A	X		X		
H02B			X		
H03			X		
H04	X		X		
H05	X				
H06			X		
H07	X				
H08	X		X		
H09	X				
H10	X		X		
H11	X		X		
H12	X				
J			X		
U			X		
W			X		
I			X		
II			X		
III					X
IV			X		X
V			X*		
VI					X
VII					X
VIII			X		
IX					X
X			X		
XIII			X		

*Detention/Conservation Basin

Attachment I

Maintenance Agreement and Inspection Guidelines

RECORDING REQUESTED BY:
County of San Bernardino
Department of Public Works

AND WHEN RECORDED MAIL TO:
County of San Bernardino
Department of Public Works
825 E. Third Street, Room 117
San Bernardino, CA 92415-0835

SPACE ABOVE THIS LINE FOR RECORDER'S USE

COVENANT AND AGREEMENT REGARDING WATER QUALITY MANAGEMENT PLAN AND STORMWATER BEST MANAGEMENT PRACTICES TRANSFER, ACCESS AND MAINTENANCE

THIS PAGE ADDED TO PROVIDE ADEQUATE SPACE FOR RECORDING INFORMATION

Covenant and Agreement Regarding Water Quality Management Plan and Stormwater Best Management Practices Transfer, Access and Maintenance

OWNER NAME: _____

PROPERTY ADDRESS: _____

_____

APN: _____

THIS AGREEMENT is made and entered into in

_____ ,California, this _____ day of

_____ , by and between

_____ , hereinafter

referred to as Owner, and the COUNTY OF SAN BERNARDINO, a political subdivision of the State of California, hereinafter referred to as "the County";

WHEREAS, the Owner owns real property ("Property") in the County of San Bernardino, State of California, more specifically described in Exhibit "A" and depicted in Exhibit "B", each of which exhibits is attached hereto and incorporated herein by this reference; and

WHEREAS, at the time of initial approval of development project known as

_____ within the Property described herein, the County required the project to employ Best Management Practices, hereinafter referred to as "BMPs," to minimize pollutants in urban runoff; and

WHEREAS, the Owner has chosen to install and/or implement BMPs as described in the Water Quality Management Plan, dated _____, on file with the County and incorporated herein by this reference, hereinafter referred to as "WQMP", to minimize pollutants in urban runoff and to minimize other adverse impacts of urban runoff; and

WHEREAS, said WQMP has been certified by the Owner and reviewed and approved by the County; and

WHEREAS, the Owner is aware that periodic and continuous maintenance, including, but not necessarily limited to, filter material replacement and sediment removal, is required to assure peak performance of all BMPs in the WQMP and that, furthermore, such maintenance activity will require compliance with all Local, State, or Federal laws and regulations, including those pertaining to confined space and waste disposal methods, in effect at the time such maintenance occurs.

NOW THEREFORE, it is mutually stipulated and agreed as follows:

1. Owner shall comply with the WQMP.

2. All maintenance or replacement of BMPs proposed as part of the WQMP are the sole responsibility of the Owner in accordance with the terms of this Agreement.

3. Owner hereby provides the County's designee complete access, of any duration, to the BMPs and their immediate vicinity at any time, upon reasonable notice, or in the event of emergency, as determined by the County Director of Public Works, no advance notice, for the purpose of inspection, sampling, testing of the BMPs, and in case of emergency, to undertake all necessary repairs or other preventative measures at owner's expense as provided in paragraph 5 below. The County shall make every effort at all times to minimize or avoid interference with Owner's use of the Property. Denial of access to any premises or facility that contains WQMP features is a breach of this Agreement and may also be a violation of the County's Pollutant Discharge Elimination System regulations, which on the effective date of this Agreement are found in County Code Sections 35.0101 et seq. If there is reasonable cause to believe that an illicit discharge or breach of this Agreement is occurring on the premises then the authorized enforcement agency may seek issuance of a search warrant from any court of competent jurisdiction in addition to other enforcement actions. Owner recognizes that the County may perform routine and regular inspections, as well as emergency inspections, of the BMPs. Owner or Owner's successors or assigns shall pay County for all costs incurred by County in the inspection, sampling, testing of the BMPs within thirty (30) calendar days of County invoice.

4. Owner shall use its best efforts diligently to maintain all BMPs in a manner assuring peak performance at all times. All reasonable precautions shall be exercised by Owner and Owner's representative or contractor in the removal and extraction of any material(s) from the BMPs and the ultimate disposal of the material(s) in a manner consistent with all relevant laws and regulations in effect at the time. As may be requested from time to time by the County, the Owner shall provide the County with documentation identifying the material(s) removed, the quantity, and disposal destination), testing construction or reconstruction.

5. In the event Owner, or its successors or assigns, fails to accomplish the necessary maintenance contemplated by this Agreement, within five (5) business days of being given written notice by the County , the County is hereby authorized to cause any maintenance necessary to be done and charge the entire cost and expense against the Property and/or to the Owner or Owner's successors or assigns, including administrative costs, attorneys fees and interest thereon at the maximum rate authorized by the County Code from the date of the notice of expense until paid in full. Owner or Owner's successors or assigns shall pay County within thirty (30) calendar days of County invoice.

6. The County may require the owner to post security in form and for a time period satisfactory to the County to guarantee the performance of the obligations stated herein. Should the Owner fail to perform the obligations under the Agreement, the County may, in the case of a cash bond, act for the Owner using the proceeds from it, or in the case of a surety bond, require the surety(ies) to perform the obligations of this Agreement.

7. The County agrees, from time to time, within ten (10) business days after request of Owner, to execute and deliver to Owner, or Owner's designee, an estoppel certificate requested by Owner, stating that this Agreement is in full force and effect, and that Owner is not in default hereunder with regard to any maintenance or payment obligations (or specifying in detail the nature of Owner's default). Owner shall pay all costs and expenses incurred by the County in its investigation of whether to issue an estoppel certificate within thirty (30) calendar days after receipt of a County invoice and prior to the County's issuance of such certificate. Where the County cannot issue an estoppel certificate, Owner shall pay the County within thirty (30) calendar days of receipt of a County invoice.

8. Owner shall not change any BMPs identified in the WQMP without an amendment to this Agreement approved by authorized representatives of both the County and the Owner.

9. County and Owner shall comply with all applicable laws, ordinances, rules, regulations, court orders and government agency orders now or hereinafter in effect in carrying out the terms of this Agreement. If a provision of this Agreement is terminated or held to be invalid, illegal or unenforceable, the validity, legality and enforceability of the remaining provisions shall remain in full effect.

10. In addition to any remedy available to County under this Agreement, if Owner violates any term of this Agreement and does not cure the violation within the time already provided in this Agreement, or, if not provided, within thirty (30) calendar days, or within such time authorized by the County if said cure reasonably requires more than the subject time, the County may bring an action at law or in equity in a court of competent jurisdiction to enforce compliance by the Owner with the terms of this Agreement. In such action, the County may recover any damages to which the County may be entitled for the violation, enjoin the violation by temporary or permanent injunction without the necessity of proving actual damages or the inadequacy of otherwise available legal remedies, or obtain other equitable relief, including, but not limited to, the restoration of the Property and/or the BMPs identified in the WQMP to the condition in which it/they existed prior to any such violation or injury.

11. This Agreement shall be recorded in the Office of the Recorder of San Bernardino County, California, at the expense of the Owner and shall constitute notice to all successors and assigns of the title to said Property of the obligation herein set forth, and also a lien in such amount as will fully reimburse the County, including interest as herein above set forth, subject to foreclosure in event of default in payment.

12. In event of legal action occasioned by any default or action of the Owner, or its successors or assigns, then the Owner and its successors or assigns agree(s) to hold the County harmless and pay all costs incurred by the County in enforcing the terms of this Agreement, including reasonable attorney's fees and costs, and that the same shall become a part of the lien against said Property.

13. It is the intent of the parties hereto that burdens and benefits herein undertaken shall constitute covenants that run with said Property and constitute a lien there against.

14. The obligations herein undertaken shall be binding upon the heirs, successors, executors, administrators and assigns of the parties hereto. The term "Owner" shall include not only the present Owner, but also its heirs, successors, executors, administrators, and assigns. Owner shall notify any successor to title of all or part of the Property about the existence of this Agreement. Owner shall provide such notice prior to such successor obtaining an

interest in all or part of the Property. Owner shall provide a copy of such notice to the County at the same time such notice is provided to the successor.

15. Time is of the essence in the performance of this Agreement.

16. Any notice to a party required or called for in this Agreement shall be served in person, or by deposit in the U.S. Mail, first class postage prepaid, to the address set forth below. Notice(s) shall be deemed effective upon receipt, or seventy-two (72) hours after deposit in the U.S. Mail, whichever is earlier. A party may change a notice address only by providing written notice thereof to the other party.

17. Owner agrees to indemnify, defend (with counsel reasonably approved by the County) and hold harmless the County and its authorized officers, employees, agents and volunteers from any and all claims, actions, losses, damages, and/or liability arising out of this Agreement from any cause whatsoever, including the acts, errors or omissions of any person and for any costs or expenses incurred by the County on account of any claim except where such indemnification is prohibited by law. This indemnification provision shall apply regardless of the existence or degree of fault of indemnitees. The Owner's indemnification obligation applies to the County's "active" as well as "passive" negligence but does not apply to the County's "sole negligence" or "willful misconduct" within the meaning of Civil Code Section 2782, or to any claims, actions, losses, damages, and/or liabilities, to the extent caused by the acts or omissions of any third party contractors undertaking any work (other than field inspections) or other maintenance on the Property on behalf of the County under this Agreement..

[REMAINDER OF THIS PAGE INTENTIONALLY LEFT BLANK]

IF TO COUNTY :

Director of Public Works

825 E. Third Street, Room 117

San Bernardino, CA 92415-0835

IF TO OWNER:

_____

_____

_____

IN WITNESS THEREOF, the parties hereto have affixed their signatures as of the date first written above.

OWNER:

Company/Trust:_____

Signature: _____

Name: _____

Title: _____

Date: _____

OWNER:

Company/Trust:_____

Signature: _____

Name: _____

Title: _____

Date: _____

FOR: Maintenance Agreement, dated _____, for the project known as _____ _____ (APN)_____, As described in the WQMP dated _____.

NOTARIES ON FOLLOWING PAGE

A notary acknowledgement is required for recordation.

ACCEPTED BY:

_____

BRENDON BIGGS, M.S., P.E., Director of Public Works

Date: _____

Attachment: Notary Acknowledgement

ATTACHMENT 1
Notary Acknowledgement)

EXHIBIT A
(Legal Description)

EXHIBIT B
(Map/illustration)